(Accredited with Grade 'A' by NAAC)

Supporting Documents of Metric No. 1.1.3

1.1.3 - Total number of courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year

1.1.3.1 - Number of courses having focus on employability/ entrepreneurship/ skill development during the year

Following are Appended:

1. Mapping of the courses to employability / Entrepreneurship /Skill development.
2. Syllabus copies of the course highlighting the focus on employability/ Entrepreneurship/ Skill development along their course outcomes are provided.
3. List of MOU's focusing on Employability / Entrepreneurship /Skill development.

1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1	Computers in Management	MGT2101	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
2	Financial Accounting	MGT2102	Bachelor of Business Administration	Quiz, Group Discussion	2010
3	E-Commerce	COM2103	Bachelor of Business Administration	Quiz, Presentation, Group Discussion	2010
4	Readings in Management	MGT2130	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
5	Term Paper	MGT2131	Bachelor of Business Administration	Academic writing, Presentation	2010
6	Project (with Presentation & Evaluation)	MGT2132	Bachelor of Business Administration	Project writing, Presentation	2010
7	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2133	Bachelor of Business Administration	Quiz, Written Test	2010
8	Study Abroad	MGT2134	Bachelor of Business Administration	Written test, Country Report	2010
9	Business Statistics	MGT2202	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
10	Corporate Accounting	MGT2203	Bachelor of Business Administration	Quiz, Group Discussion	2010
11	Analysis & Design of Business System	MGT2204	Bachelor of Business Administration	Quiz, Presentation, Group Discussion	2010
12	Innovation & Creativity Management	MGT2205	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
13	Human Values & Professional Ethics	MGT2206	Bachelor of Business Administration	Quiz, Presentation, Group Discussion	2010
14	Readings in Management	MGT2230	Bachelor of Business Administration	Quiz, Group Discussion, Report Writing	2010
15	Term Paper	MGT2231	Bachelor of Business Administration	Academic writing, Presentation	2010
16	Project (with Presentation & Evaluation)	MGT2232	Bachelor of Business Administration	Project writing, Presentation	2010
17	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2233	Bachelor of Business Administration	Quiz, Written Test	2010
18	Study Abroad	MGT2234	Bachelor of Business Administration	Written test, Country Report	2010
19	Cost Accounting	MGT2303	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
20	Analytical Decision Making	MGT2304	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
21	Term Paper	MGT2331	Bachelor of Business Administration	Academic writing, Presentation	2010
22	Project (with Presentation & Evaluation)	MGT2332	Bachelor of Business Administration	Project writing, Presentation	2010
23	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2333	Bachelor of Business Administration	Quiz, Written Test	2010
24	Study Abroad	MGT2334	Bachelor of Business Administration	Written test, Country Report	2010
25	Research Methodology & Report Preparation	MGT2402	Bachelor of Business Administration	Presentation, Quiz, Group Discussion	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
26	Management Accounting	MGT2403	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
27	Business Information & Data Base System	MGT2404	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
28	Term Paper	MGT2431	Bachelor of Business Administration	Academic writing, Presentation	2010
29	Project (with Presentation & Evaluation)	MGT2432	Bachelor of Business Administration	Project writing, Presentation	2010
30	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2433	Bachelor of Business Administration	Quiz, Written Test	2010
31	Study Abroad	MGT2434	Bachelor of Business Administration	Written test, Country Report	2010
32	Operations Research	MGT2551	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
33	Entrepreneurship Development	MGT2502	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
34	Summer Internship Evaluation	MGT2535	Bachelor of Business Administration	Project writing, Presentation	2010
35	Term Paper	MGT2531	Bachelor of Business Administration	Academic writing, Presentation	2010
36	Project (with Presentation & Evaluation)	MGT2532	Bachelor of Business Administration	Project writing, Presentation	2010
37	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2533	Bachelor of Business Administration	Quiz, Written Test	2010
38	Training & Development	MGT2510	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
39	Relational Database Management System	MGT2512	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
40	Programming with Microsoft Visual Basic	MGT2514	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
41	Dissertation	MGT2637	Bachelor of Business Administration	Project writing, Presentation	2010
42	Brand Management	MGT2602	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
43	Advertising & Sales Promotion	MGT2603	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
44	Term Paper	MGT2631	Bachelor of Business Administration	Academic writing, Presentation	2010
45	Project (with Presentation & Evaluation)	MGT2632	Bachelor of Business Administration	Project writing, Presentation	2010
46	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2633	Bachelor of Business Administration	Quiz, Written Test	2010
47	Corporate Tax Planning	MGT2605	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
48	Term Paper	MGT2631	Bachelor of Business Administration	Academic writing, Presentation	2010
49	Project (with Presentation & Evaluation)	MGT2632	Bachelor of Business Administration	Project writing, Presentation	2010
50	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2633	Bachelor of Business Administration	Quiz, Written Test	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
51	Compensation & Reward Management	MGT2610	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
52	Object Oriented Programming with Java	MGT2611	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
53	Web Database Programming with ASP	MGT2613	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
54	Intellectual Property Rights	MGT2614	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
55	Human Rights	MGT2615	Bachelor of Business Administration	Quiz, Presentation, Group Discussion, Viva-Voce	2010
56	Study Abroad	MGT2634	Bachelor of Business Administration	Written test, Country Report	2010
57	Financial Accounting	MBF2103	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
58	Marketing Management	MBF2201	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
59	Business Statistics	MBF2203	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
60	Corporate Accounting	MBF2204	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
61	Financial Management	MBF2302	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
62	Computers and Management Information Systems	MBF2303	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
63	Cost Accounting	MBF2304	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
64	Corporate Tax Planning	MBF2306	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
65	Management Accounting	MBF2401	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
66	Research Methodology & Report Preparation	MBF2403	Bachelor of Business Administration (Banking & Finance)	Presentation, Quiz, Group Discussion	2013
67	Entrepreneurship Development	MBF2503	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013
68	Summer Internship	MBF2535	Bachelor of Business Administration (Banking & Finance)	Report Writing, Presentation	2013
69	Advanced Corporate Finance	MBF2604	Bachelor of Business Administration (Banking & Finance)	Quiz, Presentation, Group Discussion, Viva-Voce	2013

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
70	Project Work/ Dissertation	MBF2637	Bachelor of Business Administration (Banking & Finance)	Project writing, Presentation	2013
71	Accounting Fundamentals	MGG2101	Bachelor of Business Administration (International) (GSP)	Quiz, Group Discussion, Viva-Voce	2021
72	Computers for Managers	MGG2102	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
73	E-Commerce	MGG2108	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
74	Corporate Accounting	MGG2201	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
75	India's Foreign Trade	MGG2203	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
76	Business Statistics	MGG2206	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
77	Human Values & Professional Ethics	MGG2207	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
78	Understanding Organizational Behaviour	MGG2301	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
79	Entrepreneurship Development	MGG2306	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
80	International Trade Institutions	MGG2307	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
81	Business Law	MGG2401	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
82	Export Management	MGG2404	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion, Viva-Voce	2021
83	Research Methodology	MGG2406	Bachelor of Business Administration (International) (GSP)	Quiz, Presentation, Group Discussion	2021
84	Term Paper	MGG2431	Bachelor of Business Administration (International) (GSP)	Academic writing, Presentation	2021
85	Accounting for Management	MGT4102	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
86	Quantitative Techniques in Management	MGT4106	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
87	Information Technology & E-Commerce	MGT4109	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
88	Business Research Methods	MGT4203	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
89	Management Science	MGT4207	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
90	Business Analytics	MGT4210	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
91	Excel for Managers	MGT4211	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
92	Corporate Financial Reporting & Analysis	FIN4201	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
93	Financial Statement Analysis	FIN4203	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
94	International Trade Procedures & Documentation	IBM4201	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
95	Web Design using HTML	ITM4204	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
96	Marketing Research	MKT4201	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
97	Web Design using HTML	ECM4204	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
98	Summer Internship Evaluation	MGT4335	Master of Business Administration	Report Writing, Presentation	2010
99	Business Valuation	FIN4302	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
100	Financial Modeling with MS-Excel	FIN4306	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
101	Training & Development	HRM4305	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
102	Database Management Systems	ITM4302	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
103	Digital Marketing	ITM4303	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
104	Introduction to Cloud Computing	ITM4304	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
105	System Analysis & Design	ITM4305	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
106	Dynamic Web Design & Development	ITM4306	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
107	Advertising & Sales Promotion	MKT4301	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
108	Digital Marketing	MKT4303	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
109	Direct Marketing	MKT4305	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
110	Retail Management	MKT4306	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
111	Sales Management	MKT4307	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
112	Consumer Behaviour	MKT4308	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
113	Digital Marketing	ECM4301	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
114	Database Management Systems	ECM4302	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
115	Dynamic Web Design & Development	ECM4307	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
116	Entrepreneurship Development	MGT4429	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
117	Dissertation	MGT4437	Master of Business Administration	Report Writing, Presentation, Viva-Voce	2010
118	Private Equity and Entrepreneurial Finance	FIN4405	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
119	Compensation & Reward Management	HRM4401	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
120	Psychological Testing	HRM4402	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
121	Managerial Counselling	HRM4406	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
122	Data Warehousing & Data Mining	ITM4401	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
123	Search Engine Optimization	ITM4405	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
124	Tools for Business Intelligence	ITM4406	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
125	Social Media Analytics	ECM4401	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
126	Tools for Business Intelligence	ECM4404	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
127	Search Engine Optimization	ECM4406	Master of Business Administration	Industry Guest Talk, Class Test, Presentation, Report Writing	2010
128	Accounting for Management	MBF4102	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
129	Quantitative Techniques in Management	MBF4106	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
130	Information Technology & E-Commerce	MBF4109	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
131	Business Research Methods	MBF4203	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
132	Business Analytics	MBF4210	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
133	Excel for Managers	MBF4211	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
134	Summer Internship Evaluation	MBF4335	Master of Business Administration (Banking & Finance)	Report Writing, Presentation, Viva-Voce	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
135	Security Analysis & Portfolio Management	MBF4308	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
136	Business Valuation	MBF4311	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
137	Financial Modeling using MS-Excel	MBF4313	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
138	Financial Risk Management	MBF4314	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
139	Fixed Income Securities Analysis	MBF4315	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
140	Entrepreneurship Development	MBF4413	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
141	Dissertation	MBF4437	Master of Business Administration (Banking & Finance)	Report Writing, Presentation, Viva-Voce	2012
142	Corporate Tax Planning	MBF4408	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
143	Private Equity & Entrepreneurial Finance	MBF4412	Master of Business Administration (Banking & Finance)	Industry Guest Talk, Class Test, Presentation, Report Writing	2012
144	Business Statistics	MWP4106	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
145	Information Technology for Managers	MWP4109	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
146	Workshop	MWP4133	Master of Business Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2014
147	Research Methodology & Report Preparation	MWP4204	Master of Business Administration (Executive for Working Professionals)	Class Test, Presentation, Report Writing	2014
148	Fundamentals of Data Analytics	MWP4205	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
149	Term Paper	MWP4231	Master of Business Administration (Executive for Working Professionals)	Academic writing, Presentation	2014
150	Workshop	MWP4233	Master of Business Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2014
151	MOOC Course	MWP4209	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
152	Innovation and Entrepreneurship	MWP4311	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
153	Project-I	MWP4337	Master of Business Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2014
154	Database Management System for Business	MWP4322	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
155	E-Commerce Fundamentals	MWP4323	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
156	Programming for Analytics using R	MWP4326	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
157	Programming for Analytics using Python	MWP4327	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
158	Visual Analytics Tableau/ Power BI	MWP4328	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
159	Environmental Governance and Sustainability	MWP4411	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
160	E-Business Essentials	MWP4412	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
161	Project-II	MWP4437	Master of Business Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2014
162	ERP for Businesses	MWP4425	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
163	Digital Marketing	MWP4426	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
164	Predictive Analytics-I Machine Learning using R	MWP4428	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
165	Predictive Analytics-II Machine Learning using Python	MWP4429	Master of Business Administration (Executive for Working Professionals)	Industry Guest Talk, Class Test, Presentation, Report Writing	2014
166	Accounting in Decision Making	EMF4101	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
167	Information Technology & E-Commerce	EMF4109	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
168	Quantitative Techniques in Management	EMF4111	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
169	Business Research Methods	EMF4203	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
170	Financial Management	EMF4217	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
171	Operations Management	EMF4218	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
172	Product and Brand management	EMF4207	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
173	Advertising & Integrated Marketing Communication	EMF4208	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
174	Cross Cultural Management	EMF4209	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
175	Compensation Management	EMF4210	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
176	Recruitment Selection & Retention	EMF4211	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
177	Organization Structure, Design and HR Planning	EMF4212	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
178	Security Analysis & Portfolio Management	EMF4215	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
179	E-Commerce	EMF4308	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
180	Training & Management Development	EMF4311	Master of Business Administration (Executive Full-Time)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
181	Dissertation / Project Work	EMF4437	Master of Business Administration (Executive Full-Time)	Report Writing, Presentation, Viva-Voce	2011
182	Accounting for Management	HHM4102	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
183	Biostatistics	HHM4104	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
184	Information Technology and E-Commerce	HHM4109	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
185	Research Methodology	HHM4203	Master of Business Administration (Hospital & Healthcare Management)	Class Test, Presentation, Report Writing	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
186	Hospital Planning	HHM4205	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
187	Hospital Materials Management	HHM4206	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
188	Excel for Managers	HHM4209	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
189	Term Paper	HHM4231	Master of Business Administration (Hospital & Healthcare Management)	Academic writing, Presentation	2011
190	Management of Clinical Services	HHM4303	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
191	Operations Research	HHM4305	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
192	Management of Support & Utility Services	HHM4308	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
193	Summer Internship Evaluation	HHM4335	Master of Business Administration (Hospital & Healthcare Management)	Report Writing, Presentation, Viva-Voce	2011
194	Hospital Management Information System	HHM4401	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
195	Entrepreneurship and Consultancy in Healthcare	HHM4406	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
196	Disaster Management	HHM4408	Master of Business Administration (Hospital & Healthcare Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2011
197	Dissertation	HHM4437	Master of Business Administration (Hospital & Healthcare Management)	Report Writing, Presentation, Viva-Voce	2011
198	Accounting for Management	BUA4102	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
199	Statistical Techniques	BUA4104	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
200	Excel for Decision Making	BUA4105	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
201	Optimization Techniques	BUA4106	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
202	Database Management System	BUA4107	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
203	Business Research Methods	BUA4204	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
204	Programming for Analytics using R	BUA4206	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
205	Programming for Analytics using Python	BUA4207	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
206	Datamining	BUA4302	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
207	Predictive Analytics-I Machine Learning using R	BUA4303	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
208	Predictive Analytics-II Machine Learning using Python	BUA4304	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
209	Big Data Analytics- Hadoop	BUA4305	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
210	Financial Decision Analysis	BUA4306	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
211	Visual Analytics- Tablue/ Power BI	BUA4307	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
212	Summer Internship Evaluation	BUA4335	Master of Business Administration (Business Analytics)	Report Writing, Presentation, Viva-Voce	2019
213	Financial Analytics	BUA4402	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
214	Supply Chain Analytics	BUA4403	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
215	HR Analytics	BUA4404	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
216	Marketing Analytics	BUA4405	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
217	Data Privacy and Data Security Laws	BUA4406	Master of Business Administration (Business Analytics)	Industry Guest Talk, Class Test, Presentation, Report Writing	2019
218	Dissertation (Analytics Project)	BUA4437	Master of Business Administration (Business Analytics)	Report Writing, Presentation, Viva-Voce	2019
219	Accounting for Managers	MSM4103	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
220	Business Research Methods	MSM4202	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021
221	Operations Management	MSM4203	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021
222	Excel for Managers	MSM4204	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021
223	Business Analytics	MSM4206	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021
224	Sustainable Development & Sustainability	MSM4207	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021
225	Summer Internship Evaluation	MSM4335	Master of Business Administration (Sustainability Management)	Report Writing, Presentation, Viva-Voce	2021
226	Sustainable Development & Climate Change	MSM4302	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021
227	Sustainability Reporting & CSR	MSM4303	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021
228	Social Entrepreneurship	MSM4402	Master of Business Administration (Sustainability Management)	Industry Guest Talk, Class Test, Presentation, Report Writing	2021
229	Capstone Project	MSM4437	Master of Business Administration (Sustainability Management)	Report Writing, Presentation, Viva-Voce	2021
230	Computers in Management	MGT2101	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
231	E Commerce	COM2103	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
232	Term Paper	ECO2131	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
233	Project (with Presentation &Evaluation)	ECO2132	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010
234	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO2133	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
235	Study Abroad	ECO2134	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
236	Statistical Methods in Economics-I	ECO2202	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
237	Innovation & Creativity Management	MGT2205	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
238	Human Values & Professional Ethics	MGT2206	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
239	Readings in Economics	ECO2230	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
240	Term Paper	ECO2231	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
241	Project (With Presentation & Evaluation)	ECO2232	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010
242	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO2233	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
243	Study Abroad	ECO2234	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
244	Statistical Methods in Economics-II	ECO2302	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
245	Economics of Entrepreneurship	ECO2303	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
246	Agricultural Economics	ECO2305	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
247	Industrial Psychology	MGT2305	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
248	Term paper	ECO2331	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
249	Project (With Presentation & Evaluation)	ECO2332	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010
250	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO2333	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
251	Study Abroad	ECO2334	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
252	Research Methodology	ECO2403	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
253	Business Information & Data Base System	MGT2404	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
254	Term paper	ECO2431	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
255	Project(With Presentation & Evaluation)	ECO2432	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010
256	Workshop / Certification (Discipline Specific) * (1credit per workshop)	ECO2433	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
257	Study Abroad	ECO2434	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
258	Econometrics- Basic Theory & Application	ECO2551	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
259	Summer Internship Evaluation	ECO2535	Bachelor of Arts (Hons.) (Economics)	Report Writing, Presentation, Viva-Voce	2010
260	Relational Database Management System	MGT2512	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
261	Term paper	ECO2531	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
262	Project(With Presentation & Evaluation)	ECO2532	Bachelor of Arts (Hons.) (Economics)	Project writing, Presentation, Viva-Voce	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
263	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO2533	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
264	Study Abroad	ECO2534	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
265	Banking & Financial Institutions	ECO2603	Bachelor of Arts (Hons.) (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2010
266	Dissertation	ECO2637	Bachelor of Arts (Hons.) (Economics)	Report Writing, Presentation, Viva-Voce	2010
267	Term paper	ECO2631	Bachelor of Arts (Hons.) (Economics)	Academic writing, Presentation	2010
268	Workshop / Certification (Discipline Specific) (1credit per workshop)	ECO 2633	Bachelor of Arts (Hons.) (Economics)	Quiz, Written Test	2010
269	Study Abroad	ECO2634	Bachelor of Arts (Hons.) (Economics)	Written test, Country Report	2010
270	Computer Application in Economic Analysis	ECO4103	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
271	Indian Economy-Issues & Policy	ECO4105	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
272	Term Paper/Review of Dissertation-I	ECO4231	Master of Arts (Economics)	Academic writing, Presentation, Viva-Voce	2012
273	Fundamentals of Econometrics	ECO4301	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
274	Research Methods in Economics	ECO4303	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
275	Term Paper/Review of Dissertation-II	ECO4331	Master of Arts (Economics)	Academic writing, Presentation, Viva-Voce	2012
276	Summer Internship Evaluation	ECO4335	Master of Arts (Economics)	Report Writing, Presentation, Viva-Voce	2012
277	Environmental Economics	ECO4309	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
278	Dissertation	ECO4437	Master of Arts (Economics)	Report Writing, Presentation, Viva-Voce	2012
279	Entrepreneurship & Small Scale Business	ECO4404	Master of Arts (Economics)	Quiz, Case Discussion, Report Writing, Class Performance	2012
280	Management Foundations	MGT2151	Management (OE)	Quiz, Presentation, Group Discussion	2013
281	Marketing Management	MGT2251	Management (OE)	Quiz, Presentation, Group Discussion	2013
282	Organizational Behaviour	MGT2351	Management (OE)	Quiz, Presentation, Group Discussion	2013
283	Business Environment	MGT2451	Management (OE)	Quiz, Presentation, Group Discussion	2013
284	Operations Research	MGT2551	Management (OE)	Quiz, Presentation, Group Discussion	2013
285	Business Law	MGT2651	Management (OE)	Quiz, Presentation, Group Discussion	2013
286	Orientation Programme in Entrepreneurship	MGT2152	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
287	Exploring Business Opportunity	MGT2252	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
288	Developing a Business Model	MGT2352	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
289	Translating Business Model into Startup	MGT2452	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
290	Advanced Programme in Entrepreneurship: Growth	MGT2552	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
291	Advanced Programme in Entrepreneurship: Expansion	MGT2652	Entrepreneurship (OE)	Quiz, Presentation, Group Discussion	2018
292	Micro Economics-I	ECO2151	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
293	Indian Economy	ECO2251	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
294	Macro Economics –I	ECO2351	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
295	Public Finance	ECO2451	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
296	Statistical Methods in Economics	ECO2552	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2013
297	Money, Banking & Financial Markets	ECO2651	Economics (OE)	Quiz, Case Discussion, Report Writing, Class Performance	2016
298	Military Training Foundation	GEN2051	Military Training Foundation (OE)	Quiz, Group Discussion, Group Presentation, Viva-Voce	2015
299	Financial Accounting-I	COM2151	Bachelor of Commerce (Hons.)	Quiz, Case Discussion, Report Writing, Class Performance	2010
300	E-commerce	COM2103	Bachelor of Commerce (Hons.)	Quiz, Case Discussion, Report Writing, Class Performance	2010
301	Readings in Management	COM2130	Bachelor of Commerce (Hons.)	Quiz, Case Discussion, Report Writing, Class Performance	2010
302	Term Paper	COM2131	Bachelor of Commerce (Hons.)	Academic writing, Presentation	2010
303	Project (with Presentation & Evaluation)	COM2132	Bachelor of Commerce (Hons.)	Report Writing, Presentation	2010
304	Workshop / Certification (Discipline Specific) (1credit per workshop)	COM2133	Bachelor of Commerce (Hons.)	Quiz, Written Test	2010
305	Study Abroad	COM2134	Bachelor of Commerce (Hons.)	Written test, Country Report	2010
306	Financial Accounting-II	COM2251	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
307	Advertising Management	COM2205	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
308	Computer Applications in Business	COM2204	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
309	Innovation & Creativity Management	COM2207	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
310	Human Values & Professional Ethics	COM2208	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
311	Readings in Management	COM2230	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
312	Term Paper	COM2231	Bachelor of Commerce (Hons.)	Academic Writing, Presentation	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
313	Project(with Presentation &Evaluation)	COM2232	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
314	Workshop/ Certification (Discipline Specific) (1credit per workshop)	COM2233	Bachelor of Commerce (Hons.)	Quiz, Written Test	2010
315	Study Abroad	COM2234	Bachelor of Commerce (Hons.)	Written test, Country Report	2010
316	Corporate Accounting	COM2351	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
317	Statistical Methods in Research – I	COM2301	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
318	Corporate Law	COM2302	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
319	Mergers & Acquisitions	COM2305	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
320	Term Paper(Evaluation)	COM2331	Bachelor of Commerce (Hons.)	Academic Writing, Presentation	2010
321	Project (with Presentation & Evaluation)	COM2332	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
322	Workshop / Certification (Discipline Specific) (1credit per workshop)	COM2333	Bachelor of Commerce (Hons.)	Quiz, Written Test	2010
323	Study Abroad	COM2334	Bachelor of Commerce (Hons.)	Written test, Country Report	2010
324	Financial Management	COM2451	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
325	Auditing	COM2401	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
326	Statistical Methods in Research – II	COM2402	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
327	Income Tax Law & Practice	COM2403	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
328	Business Information & Data Base System	COM2404	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
329	Term Paper	COM2431	Bachelor of Commerce (Hons.)	Academic Writing, Presentation	2010
330	Project (with Presentation & Evaluation)	COM2432	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
331	Workshop / Certification (Discipline Specific) (1credit per workshop)	COM2433	Bachelor of Commerce (Hons.)	Quiz, Written Test	2010
332	Study Abroad	COM2434	Bachelor of Commerce (Hons.)	Written test, Country Report	2010
333	Cost Accounting	COM2551	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
334	Summer Internship Evaluation	COM2535	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
335	Advanced Corporate Accounting	COM2503	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
336	Corporate Tax Law and Practice	COM2504	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
337	Business Taxation	COM2505	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
338	Management Accounting	COM2651	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
339	Dissertation	COM2637	Bachelor of Commerce (Hons.)	Report Writing, Presentation, Viva-Voce	2010
340	Advanced Accounts	COM2602	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
341	Advanced Cost Accounting	COM2603	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
342	Indirect Taxes including GST	COM2604	Bachelor of Commerce (Hons.)	Quiz, Group Discussion, Presentation, Viva Voce	2010
343	Quantitative Techniques for Business Decisions	COM4102	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
344	Auditing	COM4105	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
345	Computer Applications in Business	COM4106	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
346	Managerial Accounting	COM4201	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
347	Corporate Accounting	COM4203	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
348	E-Commerce	COM4205	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
349	Corporate Law	COM4301	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
350	Cost Accounting	COM4302	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
351	Advance Business Statistics & Research Methodology	COM4303	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
352	Income Tax Law & Practice	COM4304	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
353	Summer Internship Evaluation	COM4335	Master of Commerce	Report Writing, Presentation, Viva-Voce	2013
354	Tax Planning & Tax Management	COM4305	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
355	Advertising and Sales Management	COM4310	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
356	Corporate Tax Planning	COM4402	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
357	Industrial Law	COM4404	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
358	Dissertation	COM4437	Master of Commerce	Report Writing, Presentation, Viva-Voce	2013
359	International Accounting	COM4405	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
360	Principles & Practice of Taxation & Indian Tax System	COM4406	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
361	International Financial Management	COM4408	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
362	Marketing Research	COM4409	Master of Commerce	Quiz, Group Discussion, Presentation, Viva Voce	2013
363	Financial Accounting-I	COM2151	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
364	Financial Accounting-II	COM2251	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
365	Corporate Accounting	COM2351	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
366	Financial Management	COM2451	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
367	Cost Accounting	COM2551	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
368	Management Accounting	COM2651	Accounting (OE)	Quiz, Group Discussion, Presentation, Viva Voce	2013
369	Food Production Foundation-I	HMC2101	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
370	Food & Beverage Service Foundation-I	HMC2102	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
371	Front Office Foundation	HMC2103	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
372	Housekeeping Foundation	HMC2104	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
373	Application of Computers	HMC2105	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
374	Food Production Foundation Lab-I	HMC2106	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
375	Food & Beverage Service Foundation Lab-I	HMC2107	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
376	Front Office Foundation Lab	HMC2108	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
377	Housekeeping Foundation Lab	HMC2109	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
378	Application of Computers Lab	HMC2110	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
379	Field Work Project-I	HMC2111	Bachelor of Hotel Management	Field work, Report writing, Presentation	2015
380	Food Production Foundation-II	HMC2201	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
381	Food & Beverage Service Foundation-II	HMC2202	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
382	Front Office Operation-I	HMC2203	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
383	Housekeeping Operation-I	HMC2204	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
384	Food Science & Nutrition	HMC2205	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
385	Fundamentals of Accounting-I	HMC2206	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
386	Food Production Foundation Lab-II	HMC2207	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
387	Food & Beverage Service Foundation Lab-II	HMC2208	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
388	Front Office Operation Lab-I	HMC2209	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
389	Housekeeping Operation Lab-I	HMC2210	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
390	Field Work Project-II	HMC2211	Bachelor of Hotel Management	Field work, Report writing, Presentation	2015
391	Food Production Operations-I	HMC2301	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
392	Food & Beverage Service Operations-I	HMC2302	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
393	Front Office Operation-II	HMC2303	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
394	Housekeeping Operation-II	HMC2304	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
395	Food Production Operations Lab-I	HMC2308	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
396	Food & Beverage Service Operations Lab-I	HMC2309	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
397	Front Office Operation Lab-II	HMC2310	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
398	Housekeeping Operation Lab-II	HMC2311	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
399	Food Production Operations-II	HMC2401	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
400	Food & Beverage Service Operations-II	HMC2402	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
401	Front Office Management-I	HMC2403	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
402	Housekeeping Management-I	HMC2404	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
403	Food Production Operations Lab-II	HMC2408	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
404	Food & Beverage Service Operations Lab-II	HMC2409	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
405	Front Office Management Lab	HMC2410	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
406	Housekeeping Management Lab	HMC2411	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
407	Food Production Training Report	HMC2501	Bachelor of Hotel Management	Field work, Industrial Training, Report Writing, Presentation	2015
408	Food & Beverage Service Training Report	HMC2502	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
409	Front Office Management Training Report	HMC2503	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
410	Housekeeping Management Training Report	HMC2504	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
411	Advanced Food Production Operations-I	HMC2601	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
412	Advanced Food & Beverage Service Operations-I	HMC2602	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
413	Front Office Management-II	HMC2603	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
414	Housekeeping Management-II	HMC2604	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
415	Advanced Food Production Operations Lab-I	HMC2608	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
416	Advanced Food & Beverage Service Operations Lab-I	HMC2609	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
417	Front Office Management Lab-II	HMC2610	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
418	Housekeeping Management Lab-II	HMC2611	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
419	Advanced Food Production-II	HMC2701	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
420	Advanced Food & Beverage Service –II	HMC2702	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
421	Advanced Front Office Management	HMC2703	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
422	Accommodation Management	HMC2704	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
423	Facility Management, Planning & Design	HMC2705	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
424	Entrepreneurship Development	HMC2708	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
425	Event Management	HMC2709	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
426	Advanced Food Production Operations Lab-II	HMC2710	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
427	Advanced Food & Beverage Service Operations Lab-II	HMC2711	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
428	Research Methodology	HMC2803	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
429	Specialization Course Lab	HMC2804	Bachelor of Hotel Management	Practical Classes, Field work, ODC, Industrial Training	2015
430	GDPI Sessions	HMC2805	Bachelor of Hotel Management	Group Discussion, Quiz, Presentation	2015
431	Research Project	HMC2837	Bachelor of Hotel Management	Report Writing, Presentation, Viva-Voce	2015
432	Application of Computers	TRM2106	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
433	Application of Computers Lab	TRM2107	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
434	Field Work Project-I	TRM2108	Bachelor of Tourism & Travel Management	Field work, Industrial Training, Report Writing, Presentation	2015
435	Field Work Project-II	TRM2208	Bachelor of Tourism & Travel Management	Field work, Industrial Training, Report Writing, Presentation	2015
436	Tourism Trends in India	TRM2301	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
437	Transport Management	TRM2302	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
438	Hospitality Management in Tourism	TRM2303	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
439	Travel Documentation	TRM2304	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
440	Tour Packaging Management	TRM2305	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
441	Automation in Travel and Tourism	TRM2306	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
442	Itinerary Designing Management	TRM2403	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
443	Airline Operation Management	TRM2404	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
444	Industrial Training Project & Practicum	TRM2535	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
445	DMC Integrated Project	TRM2632	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
446	Entrepreneurship Development	TRM2707	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
447	Research Methodology	TRM2802	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
448	Ethics in Hospitality & Tourism	TRM2803	Bachelor of Tourism & Travel Management	Practical Classes, Field work, ODC, Industrial Training	2015
449	GDPI Sessions	TRM2804	Bachelor of Tourism & Travel Management	Group Discussion, Quiz, Presentation	2015
450	Research Project	TRM2837	Bachelor of Tourism & Travel Management	Report Writing, Presentation, Viva-Voce	2015
451	Basics of Food Service	VHM2152	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
452	Advanced Food Service	VHM2252	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
453	Beverage Studies- Basic	VHM2352	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
454	Beverage Studies-Advanced	VHM2452	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
455	F&B Service Supervisory Skills	VHM2552	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
456	F&B Management Skills	VHM2652	Food & Beverage Service (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
457	Basics of Food Production	VHM2151	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
458	Food Production Skills	VHM2251	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
459	Food Production Operations	VHM2351	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
460	Advanced Food Production	VHM2451	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
461	Food Production Supervisory Skills	VHM2551	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
462	Food Production Management	VHM2651	Food Production Techniques (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
463	Fundamentals of Front Office Operations	VHM2153	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
464	Handling Reception	VHM2253	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
465	Check-in & Check-out Process	VHM2353	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
466	Front Office Supervisory Skills	VHM2453	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
467	Front Office Yield Management	VHM2553	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
468	Managing Front Office	VHM2653	Front Office Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
469	Basics of Housekeeping	VHM2154	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
470	Rules for Cleaning	VHM2254	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
471	Laundry Operations	VHM2354	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
472	Maintaining Guest Room	VHM2454	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
473	Housekeeping Supervisory Skills	VHM2554	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
474	Housekeeping Management Skills	VHM2654	Housekeeping Functions (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
475	Fundamentals of Tourism	VTM2151	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
476	Tour Operations & Tourist Guidance	VTM2251	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
477	Handling Travel Agency	VTM2351	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
478	Coordinating Tour Transportations	VTM2451	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
479	Tourism Management	VTM2551	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
480	Event Planning	VTM2651	Tourism Operations (OE)	Practical Classes, Field work, ODC, Industrial Training	2016
481	Elementary Statistics	PSY2101	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
482	Psychological Practical-I	PSY2103	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
483	Human Rights, Values and Ethics	PSY2105	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
484	Reading in Psychology	PSY2130	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
485	Project (with Presentation & Evaluation)	PSY2132	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
486	Article/ Feature Writing	PSY2136	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
487	Abnormal Psychology	PSY2251	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
488	Advance Statistics	PSY2201	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
489	Psychological Practical-II	PSY2203	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
490	Readings in Psychology	PSY2230	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
491	Project (with Presentation & Evaluation)	PSY2232	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
492	Article/ Feature Writing	PSY2236	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
493	Psychological Practical-III	PSY2302	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
494	Summer Project Evaluation-I	PSY2335	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
495	Sports Psychology	PSY2304	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
496	Readings in Psychology	PSY2330	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
497	Term paper	PSY2331	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
498	Project (with Presentation & Evaluation)	PSY2332	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
499	Workshop / Certification (Discipline Specific) (1 Credit per workshop)	PSY2333	Bachelor of Science (Clinical Psychology)	Quiz, Written Test	2011
500	Article/ Feature Writing	PSY2336	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
501	Psychological Practical-IV	PSY2402	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
502	Applied Social Psychology	PSY2406	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
503	Readings in Psychology	PSY2430	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
504	Term paper	PSY2431	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011
505	Project (with Presentation & Evaluation)	PSY2432	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
506	Workshop / Certification (Discipline Specific) (1 Credit per workshop)	PSY2433	Bachelor of Science (Clinical Psychology)	Quiz, Written Test	2011
507	Article/ Feature Writing	PSY2436	Bachelor of Science (Clinical Psychology)	Academic Writing, Presentation, Quiz	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
508	Psychometric Testing	PSY2551	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
509	Psychological Practical-V	PSY2501	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
510	Clinical Psychology	PSY2502	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
511	Summer Project Evaluation-II	PSY2535	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
512	Scientific Research Paper-I	PSY2505	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
513	Project (with Presentation & Evaluation)	PSY2532	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
514	Counselling Psychology	PSY2651	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
515	School Counseling	PSY2601	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
516	Psychological Practical-VI	PSY2602	Bachelor of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
517	Dissertation	PSY2637	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
518	Psychology of Children with Special Needs	PSY2603	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
519	Psychology of Exceptional and gifted Children	PSY2604	Bachelor of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
520	Scientific Research Paper-II	PSY2605	Bachelor of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
521	Project (with Presentation & Evaluation)	PSY2632	Bachelor of Science (Clinical Psychology)	Project writing, Presentation, Viva-Voce	2011
522	Elementary Statistics	PSY2101	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
523	Psychological Practical-I	PSY2103	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
524	Human Rights, Values and Ethics	PSY2105	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
525	Readings in Psychology	PSY2130	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
526	Project (with Presentation & Evaluation)	PSY2132	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
527	Article/ Feature Writing	PSY2136	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
528	Abnormal Psychology	PSY2251	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
529	Advance Statistics	PSY2201	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
530	Psychological Practical-II	PSY2203	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
531	Organizational Behaviour	PSY2205	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
532	Readings in Psychology	PSY2230	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
533	Project (with Presentation & Evaluation)	PSY2232	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
534	Article/ Feature Writing	PSY2236	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
535	Psychological Practical-III	PSY2302	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report	2013
536	Summer Project Evaluation-I	PSY2335	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
537	Readings in Psychology	PSY2330	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
538	Term paper	PSY2331	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
539	Project (with Presentation & Evaluation)	PSY2332	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
540	Workshop / Certification (Discipline Specific) 1 Credit per workshop)	PSY2333	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Written Test	2013
541	Article/ Feature Writing	PSY2336	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
542	Psychological Practical-IV	PSY2402	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
543	Applied Social Psychology	PSY2406	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
544	Readings in Psychology	PSY2430	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
545	Term paper	PSY2431	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013
546	Project (with Presentation & Evaluation)	PSY2432	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
547	Workshop / Certification (Discipline Specific) 1 Credit per workshop)	PSY2433	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Written Test	2013
548	Article/ Feature Writing	PSY2436	Bachelor of Arts (Hons.) (Applied Psychology)	Academic Writing, Presentation, Quiz	2013

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
549	Psychometric Testing	PSY2551	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
550	Psychological Practical-V	PSY2501	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
551	Summer Project Evaluation-II	PSY2535	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
552	Clinical Psychology	PSY2502	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
553	Scientific Research Paper-I	PSY2505	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
554	Project (with Presentation & Evaluation)	PSY2532	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
555	Counseling Psychology	PSY2651	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
556	School Counseling	PSY2601	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
557	Psychological Practical-VI	PSY2602	Bachelor of Arts (Hons.) (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2013
558	Dissertation (based on Applied Psychology)	PSY2637	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
559	Scientific Research Paper-II	PSY2605	Bachelor of Arts (Hons.) (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2013
560	Positive Psychology	PSY2606	Bachelor of Arts (Hons.) (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
561	Project (with Presentation & Evaluation)	PSY2632	Bachelor of Arts (Hons.) (Applied Psychology)	Project writing, Presentation, Viva-Voce	2013
562	Cognitive Psychology	PSY4102	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
563	Parametric Statistical Method	PSY4105	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
564	Practicum - I	PSY4106	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
565	Field Practice-I	PSY4107	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
566	Psychopathology	PSY4201	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
567	Psychological Assessment and Diagnosis	PSY4202	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
568	Non-Parametric Statistical Method	PSY4204	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
569	Positive Psychology	PSY4206	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
570	Practicum - II	PSY4207	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
571	Field Practice-II	PSY4208	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
572	Scientific Research Paper	PSY4209	Master of Arts (Counselling Psychology)	Report Writing, Presentation, Viva-Voce	2012
573	Research Methods: Experimental Design	PSY4301	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
574	Psychotherapy	PSY4302	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
575	Counseling Psychology	PSY4304	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
576	Practicum-III	PSY4308	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
577	Field Practice-III	PSY4309	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
578	Summer Internship Evaluation	PSY4335	Master of Arts (Counselling Psychology)	Report Writing, Presentation, Viva-Voce	2012
579	Clinical Psychology	PSY4303	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
580	Developmental Psychology	PSY4305	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
581	Research Methods: Non-Experimental Design	PSY4401	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
582	Advance and Applied Counselling Skills	PSY4403	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
583	Practicum-IV	PSY4412	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
584	Field Practice-IV	PSY4413	Master of Arts (Counselling Psychology)	Practical, Presentation, Class Performance, Lab Report,	2012
585	Dissertation	PSY4437	Master of Arts (Counselling Psychology)	Report Writing, Presentation, Viva-Voce	2012
586	Mental Retardation	PSY4402	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
587	Childhood Pathology and Exceptional Children	PSY4405	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
588	Employee Counselling and Empowerment	PSY4409	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
589	Organizational Behaviour and Industrial Relations	PSY4410	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
590	Psychological Practices in Personnel & Human Resource Management	PSY4411	Master of Arts (Counselling Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2012
591	Parametric Statistical Method	PSY4105	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
592	Practicum-I	PSY4106	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
593	Field Practice-I	PSY4107	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
594	Psychopathology	PSY4201	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
595	Psychological Assessment & Diagnosis	PSY4202	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
596	Non-Parametric Statistical Methods	PSY4204	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
597	Practicum-II	PSY4207	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
598	Field Practice-II	PSY4208	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
599	Scientific Research Paper	PSY4209	Master of Arts (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2016
600	Applied Psychotherapy	PSY4310	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
601	Research Methods in Applied Psychology	PSY4311	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
602	Interviewing & Counselling Skills	PSY4312	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
603	Practicum-III	PSY4308	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
604	Field Practice-III	PSY4309	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
605	Summer Internship Evaluation	PSY4335	Master of Arts (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2016
606	Applied Psychophysiology & Biofeedback	PSY4313	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
607	Human Factors Psychology & Ergonomics	PSY4314	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
608	Forensic & Legal Psychology	PSY4315	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
609	Community Psychology	PSY4316	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
610	Psychological Practices in Personnel & Human Resource Management	PSY4317	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
611	Rehabilitation Psychology	PSY4404	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
612	Psychometrics	PSY4415	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
613	Practicum-IV	PSY4412	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
614	Field Practice-IV	PSY4413	Master of Arts (Applied Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
615	Dissertation	PSY4437	Master of Arts (Applied Psychology)	Report Writing, Presentation, Viva-Voce	2016
616	Employee Counselling & Empowerment	PSY4409	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
617	Psychology of Selling, Marketing & Advertising	PSY4416	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
618	Psychology of Criminal Behaviour & Criminal Profiling	PSY4417	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
619	Guidance & Counselling	PSY4419	Master of Arts (Applied Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
620	Parametric Statistical Method	PSY4105	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
621	Practicum-I	PSY4106	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
622	Field Practice-I	PSY4107	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
623	Psychopathology	PSY4201	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
624	Psychological Assessment and Diagnosis	PSY4202	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
625	Non-Parametric Statistical Method	PSY4204	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
626	Health Psychology	PSY4205	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
627	Practicum-II	PSY4207	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
628	Field Practice-II	PSY4208	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
629	Scientific Research Paper	PSY4209	Master of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
630	Research Methods: Experimental Design	PSY4301	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
631	Psychotherapy	PSY4302	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
632	Clinical Psychology	PSY4303	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
633	Practicum – III	PSY4308	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
634	Field Practice-III	PSY4309	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
635	Summer Internship Evaluation	PSY4335	Master of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
636	Counselling Psychology	PSY4304	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
637	Neuro Psychology	PSY4306	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
638	Research Methods: Non-Experimental Design	PSY4401	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
639	Mental Retardation	PSY4402	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
640	Practicum-IV	PSY4412	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
641	Field Practice-IV	PSY4413	Master of Science (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2011
642	Dissertation	PSY4437	Master of Science (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2011
643	Rehabilitation Psychology	PSY4404	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
644	Childhood Pathology and Exceptional Children	PSY4405	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
645	Psychotherapeutic Intervention in Clinical setting	PSY4406	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
646	Differential Diagnostic Techniques	PSY4407	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
647	Community Psychology and Intervention	PSY4408	Master of Science (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2011
648	Basics of Social Work	SCW4102	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
649	Work with Individuals & Families: Social Case Work	SCW4103	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
650	Working with Groups: Social Group Work	SCW4104	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
651	Research Methods in Social Work: Quantitative Approach	SCW4105	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
652	Field Work Practicum-I	SCW4107	Master of Social Work	Practical, Presentation, Class Performance, Lab Report,	2016
653	Social Policy & Social Welfare Administration	SCW4201	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
654	Social Work with Communities	SCW4202	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
655	Community Organization & Social Action	SCW4204	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
656	Research Methods in Social Work: Qualitative Approach	SCW4205	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
657	Skill Based Project	SCW4206	Master of Social Work	Report Writing, Presentation, Viva-Voce	2016
658	Field Work Practicum-II	SCW4207	Master of Social Work	Practical, Presentation, Class Performance, Lab Report,	2016
659	Social Justice & Empowerment	SCW4302	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
660	Communication & Counselling	SCW4303	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
661	Field Work Practicum-III	SCW4304	Master of Social Work	Practical, Presentation, Class Performance, Lab Report,	2016
662	Summer Internship Evaluation	SCW4335	Master of Social Work	Report Writing, Presentation, Viva-Voce	2016
663	Human Resource Development & Employee Wellness	SCW4305	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
664	Mental Health & Psychiatric Social Work	SCW4306	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
665	Social Work with Families & Children	SCW4307	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
666	Correctional Administration & Services	SCW4308	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
667	Management of Development & Welfare Services	SCW4310	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
668	Human Rights & Social Work Practice	SCW4401	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
669	Social Work with Urban, Rural & Tribal Communities	SCW4403	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
670	Field Work Practicum-IV	SCW4404	Master of Social Work	Practical, Presentation, Class Performance, Lab Report,	2016
671	Dissertation	SCW4437	Master of Social Work	Report Writing, Presentation, Viva-Voce	2016
672	Social Work with PWD	SCW4407	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
673	Social Work with HIV/AIDS	SCW4408	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
674	Disaster Management	SCW4410	Master of Social Work	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
675	Psychosocial Foundation of Behaviour & Psychopathology	PSY5101	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
676	Psychiatry	PSY5103	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
677	Practical: Psychological Assessment including Viva-Voce	PSY5104	M.Phil (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
678	Statistics & Research Methodology	PSY5106	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
679	Submission of Psychodiagnostic Records	PSY5105	M.Phil (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2016
680	Psychotherapy & Counselling	PSY5301	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
681	Behavioural Medicine	PSY5302	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
682	Practical: Psychological Therapies including Viva-Voce	PSY5304	M.Phil (Clinical Psychology)	Practical, Presentation, Class Performance, Lab Report,	2016
683	Biological Foundation of Behaviour	PSY5306	M.Phil (Clinical Psychology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2016
684	Submission of Psychotherapy Records	PSY5305	M.Phil (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2016
685	Dissertation	PSY5337	M.Phil (Clinical Psychology)	Report Writing, Presentation, Viva-Voce	2016
686	Understanding Self for Effectiveness	BEH2151	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
687	Problem Solving and Creative Thinking	BEH2251	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
688	Group Dynamics and Team Building	BEH2351	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
689	Stress and Coping Strategies	BEH2451	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
690	Individual, Society and Nations	BEH2551	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
691	Interpersonal Communication and Relationship Management	BEH2651	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
692	Personality, Nationalism and Human Values	BEH2552	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
693	Interpersonal Communication	BEH2652	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
694	Relationship Management	BEH2751	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
695	Personal & Professional Excellence	BEH2851	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
696	Self-Development and Interpersonal Skills	BEH4151	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
697	Behavioural Communication and Relationship Management	BEH4251	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
698	Leading Through Teams	BEH4351	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010
699	Professional Excellence	BEH4451	Behavioural Science (OE)	Social Awareness Programme (SAP), Journal for Success, Quiz, Presentation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
700	Introductory Psychology	PSY2151	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
701	Abnormal Psychology	PSY2251	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
702	Basic Cognitive Psychology	PSY2351	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
703	Life Span Development	PSY2451	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
704	Psychometric Testing	PSY2551	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
705	Counselling Psychology	PSY2651	Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2013
706	The Science of Happiness	PSY2152	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
707	Optimism and Success	PSY2252	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
708	Resilience and Well Being	PSY2352	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
709	Positive Psychology & Work Life	PSY2452	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
710	Creativity & Problem Solving	PSY2552	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
711	Positive Leadership & Competency Development	PSY2652	Positive Psychology (OE)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2017
712	Introduction to Computers & Programming in C	ASE2105	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
713	Programming in C Lab	ASE2110	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
714	Workshop Technology	ASE2215	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
715	Engineering Graphics Lab	ASE2212	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
716	Engineering Mechanics Lab	ASE2218	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
717	Strength of Materials	ASE2315	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
718	Fluid Mechanics and Dynamics	ASE2322	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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719	Strength of Materials Lab	ASE2317	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
720	Fluid Mechanics and Dynamics Lab	ASE2323	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
721	Aircraft Manufacturing Processes	ASE2324	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
722	Numerical Analysis and Programming	ASE2412	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
723	Aircraft Propulsion	ASE2416	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
724	Aerospace Structures-I	ASE2417	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
725	Low Speed Aerodynamics Lab	ASE2419	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
726	Aircraft Propulsion Lab	ASE2420	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
727	Numerical Analysis and Programming Lab using MATLAB	ASE2421	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
728	Fuels & Combustion	ASE2422	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
729	Control Systems	ASE2423	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
730	Mechatronics	ASE2424	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
731	Turbomachinery	ASE2510	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
732	High Speed Aerodynamics	ASE2511	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
733	Aerospace Structures-II	ASE2512	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
734	Flight Mechanics	ASE2513	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
735	Computer Aided Drafting Lab	ASE2514	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
736	Structural Analysis Lab	ASE2515	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
737	Summer Internship Evaluation-I	ASE2535	Bachelor of Technology (Aerospace Engineering)	Report Writing, Presentation, Viva-Voce	2011
738	Aircraft Systems and Instrumentation	ASE2517	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
739	Aircraft Maintenance & Quality Assurance	ASE2609	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
740	Computational Fluid Dynamics	ASE2613	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
741	Aerospace Materials	ASE2614	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
742	Aircraft Stability & Control	ASE2651	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
743	Computational Fluid Dynamics Lab	ASE2612	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011

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744	Aeromodelling Lab	ASE2615	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
745	Minor Project	ASE2637	Bachelor of Technology (Aerospace Engineering)	Project writing, Presentation, Viva-Voce	2011
746	Finite Element Method	ASE2618	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
747	Flight Dynamics	ASE2702	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
748	Aircraft Design	ASE2709	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
749	Vibration Engineering	ASE2713	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
750	Vibration Engineering Lab	ASE2714	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
751	Summer Internship Evaluation-II	ASE2735	Bachelor of Technology (Aerospace Engineering)	Report Writing, Presentation, Viva-Voce	2011
752	Major Project	ASE2737	Bachelor of Technology (Aerospace Engineering)	Report Writing, Presentation, Viva-Voce	2011
753	Aerospace Navigation, Guidance and Control	ASE2812	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
754	Project-Dissertation	ASE2837	Bachelor of Technology (Aerospace Engineering)	Report Writing, Presentation, Viva-Voce	2011
755	Aeroelasticity	ASE2813	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
756	Aerospace Industrial Management	ASE2814	Bachelor of Technology (Aerospace Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
757	Introduction to Computers & Programming in C	CIV2105	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
758	Programming in C Lab	CIV2110	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
759	Basics of Electrical & Electronics Engineering Lab	CIV2117	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
760	Workshop Technology	CIV2211	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
761	Engineering Mechanics Lab	CIV2207	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
762	Workshop Practice	CIV2212	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
763	Engineering Graphics Lab	CIV2213	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
764	Surveying-I	CIV2305	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
765	Strength of Materials	CIV2312	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
766	Building Construction & Concrete Technology	CIV2318	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
767	Strength of Materials Lab	CIV2314	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
768	Surveying Lab-I	CIV2319	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
769	Materials Testing Lab	CIV2320	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
770	Disaster Management & Mitigation	CIV2316	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
771	Engineering Geology	CIV2321	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
772	Numerical Analysis & Programming	CIV2401	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
773	Surveying-II	CIV2411	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
774	Fluid Mechanics	CIV2412	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
775	Numerical Analysis and Programming Lab	CIV2405	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
776	Surveying Lab-II	CIV2407	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
777	Fluid Mechanics Lab	CIV2413	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
778	Geotechnical Engineering Lab	CIV2418	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
779	Fluid Machinery	CIV2414	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
780	Hydrology & Flood Control	CIV2415	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
781	Remote Sensing & Geographic Information Systems	CIV2416	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
782	Structural Analysis-II	CIV2501	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
783	Concrete Structural Design-I	CIV2513	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
784	Transportation Engineering-I	CIV2514	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
785	Transportation Engineering Lab	CIV2509	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
786	Structural Analysis Lab	CIV2516	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
787	Summer Internship Evaluation-I	CIV2535	Bachelor of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2010
788	Sustainable Development in Civil Engineering	CIV2510	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
789	Air and Water Pollution & Control	CIV2511	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
790	Computer Application in Hydro Engineering	CIV2512	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
791	Environmental Engineering-I	CIV2601	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
792	Water Resource Engineering-I	CIV2610	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
793	Concrete Structural Design-II	CIV2612	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
794	Transportation Engineering-II	CIV2613	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
795	Minor Project Work	CIV2637	Bachelor of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2010
796	Prestressed Concrete	CIV2607	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
797	Traffic Engineering & Management	CIV2608	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
798	Structural Steel Design	CIV2701	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
799	Environmental Engineering-II	CIV2702	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
800	Water Resources Engineering-II	CIV2711	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
801	Environmental Engineering Lab	CIV2704	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
802	Structural Design Lab	CIV2713	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
803	Summer Internship Evaluation-II	CIV2735	Bachelor of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2010
804	Project Work	CIV2737	Bachelor of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2010
805	Estimation and Costing	CIV2810	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
806	Project-Dissertation	CIV2837	Bachelor of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2010
807	Industrial Waste Engineering	CIV2803	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
808	Solid Waste Management & Recycling	CIV2808	Bachelor of Technology (Civil Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
809	Introduction to Computers & Programming in C	CSE2104	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
810	Programming in C Lab	CSE2107	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
811	Object Oriented Programming using C++	CSE2204	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
812	Object Oriented Programming using C++ Lab	CSE2208	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
813	Basics of Electrical & Electronics Engineering Lab	CSE2218	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
814	Engineering Graphics Lab	CSE2219	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
815	Database Management Systems	CSE2302	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
816	Operating Systems	CSE2303	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
817	Data Structures using C	CSE2304	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
818	Digital Electronics	CSE2314	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
819	Data Structures Using C Lab	CSE2305	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
820	Database Management Systems Lab	CSE2307	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
821	UNIX Programming Lab	CSE2308	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
822	Digital Electronics Lab	CSE2315	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
823	Electronic Devices & Circuits	CSE2310	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
824	Electronic Devices & Circuits Lab	CSE2311	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
825	E-Commerce & ERP	CSE2312	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
826	Artificial Intelligence	CSE2412	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
827	Artificial Intelligence Lab	CSE2413	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
828	Data Communication & Computer Networks Lab	CSE2420	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
829	Artificial Neural Network	CSE2410	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
830	Artificial Neural Network Lab	CSE2411	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
831	Communication Systems	CSE2414	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
832	Communication Systems Lab	CSE2415	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
833	Web Designing Technologies	CSE2422	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
834	Web Designing Technologies Lab	CSE2423	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
835	Computer Architecture	CSE2502	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
836	Java Programming	CSE2503	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
837	Microprocessor	CSE2515	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
838	Java Programming Lab	CSE2505	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
839	Microprocessor Lab	CSE2517	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
840	Summer Internship Evaluation-I	CSE2535	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
841	VHDL Programming	CSE2506	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
842	VHDL Programming Lab	CSE2507	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
843	Advanced Web Designing Technologies	CSE2518	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
844	Advanced Web Designing Technologies Lab	CSE2519	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
845	Advanced Java Programming	CSE2604	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
846	Software Engineering	CSE2613	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
847	Internet of Things & Wireless Sensor Networks	CSE2614	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
848	Advanced Java Programming Lab	CSE2608	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
849	Software Engineering Lab	CSE2615	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
850	Minor Project-I	CSE2637	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
851	VLSI Design	CSE2610	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
852	VLSI Design Lab	CSE2611	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
853	Open Source Technologies	CSE2616	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
854	Open Source Technologies Lab	CSE2617	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
855	Data Mining	CSE2618	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
856	Computer Graphics	CSE2710	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
857	Cryptography & Network Security	CSE2713	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
858	System Programming & Compiler Construction	CSE2714	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
859	Computer Graphics Lab	CSE2712	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
860	Network Security Lab	CSE2715	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
861	System Programming & Compiler Lab	CSE2716	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
862	Summer Internship Evaluation-II	CSE2735	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
863	Minor Project-II	CSE2737	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
864	Mobile Computing	CSE2707	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
865	Robotic Process Automation Design & Development	CSE2717	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
866	Responsive Web Design	CSE2718	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
867	Responsive Web Design Lab	CSE2719	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
868	Project-Dissertation	CSE2837	Bachelor of Technology (Computer Science & Engineering)	Report Writing, Presentation, Viva-Voce	2010
869	Digital Image Processing	CSE2803	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
870	Digital Image Processing Lab	CSE2805	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
871	Dot Net Programming	CSE2804	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
872	Dot Net Programming Lab	CSE2806	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
873	Advance Robotic Process Automation Design & Development	CSE2812	Bachelor of Technology (Computer Science & Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
874	Introduction to Programming in C	CSG2103	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
875	Elements of Mechanical Engineering Lab	CSG2104	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Practical, Lab Records	2020
876	Introduction to Environmental Studies	CSG2107	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
877	Engineering Graphics Lab	CSG2205	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Practical, Lab Records	2020
878	Database Management Systems	CSG2302	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
879	Operating Systems	CSG2303	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
880	Data Structures using C	CSG2304	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
881	Java Programming	CSG2305	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
882	Computer Graphics	CSG2402	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
883	Object Oriented Programming using C++	CSG2403	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
884	Basic Simulation Lab	CSG2404	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Practical, Lab Records	2020
885	Material Science	CSG2405	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
886	Term Paper	CSG2431	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Academic Writing, Presentation	2020
887	Artificial Neural Network	CSG2406	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
888	Artificial Neural Network Lab	CSG2407	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Practical, Lab Records	2020
889	Communication Systems	CSG2408	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
890	Communication Systems Lab	CSG2409	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Practical, Lab Records	2020
891	Web Designing Technologies	CSG2410	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
892	Web Designing Technologies Lab	CSG2411	Bachelor of Technology (Computer Science & Engineering) International (Global Study Programme)	Quiz, Viva-Voce, Practical, Lab Records	2020
893	Introduction to Computers & Programming in C	ECE2105	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
894	Elements of Mechanical Engineering Lab	ECE2109	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
895	Programming in C Lab	ECE2110	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
896	Basics of Electrical & Electronics Engineering Lab	ECE2118	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
897	Object Oriented Programming using C++	ECE2203	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
898	Object Oriented Programming using C++ Lab	ECE2206	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
899	Engineering Graphics Lab	ECE2208	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
900	Analog Electronics-I	ECE2302	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
901	Circuits & Systems	ECE2303	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
902	Data Structure using C	ECE2311	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
903	Analog Electronics- I Lab	ECE2305	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
904	Circuits & Systems Lab	ECE2306	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
905	Data Structure using C Lab	ECE2312	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
906	Virtual Instrumentation	ECE2313	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
907	Virtual Instrumentation Lab	ECE2314	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
908	Measurement & Measuring Instruments	ECE2315	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
909	Measurement & Measuring Instruments Lab	ECE2316	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
910	Communication Systems	ECE2402	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
911	Analog Electronics-II	ECE2403	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
912	Electromagnetic Field Theory	ECE2404	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
913	Digital Electronics	ECE2411	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
914	Signals & Systems	ECE2417	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
915	Communication Systems Lab	ECE2406	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
916	Analog Electronics- II Lab	ECE2407	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
917	Digital Electronics Lab	ECE2412	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
918	PCB Fabrications	ECE2414	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
919	Electronic Workshop & PCB Lab	ECE2418	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
920	Database Management Systems	ECE2415	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
921	Database Management Systems Lab	ECE2416	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
922	Java Programming	ECE2419	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
923	Java Programming Lab	ECE2420	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
924	Artificial Neural Network	ECE2421	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
925	Artificial Neural Network Lab	ECE2422	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
926	Digital Circuits & Systems	ECE2501	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
927	Digital Communications	ECE2502	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
928	Control Systems	ECE2503	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
929	Microprocessor Systems	ECE2509	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
930	Digital Circuits & Systems Lab	ECE2504	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
931	Microprocessor Systems Lab	ECE2505	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
932	Control Systems Lab	ECE2506	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
933	Summer Internship Evaluation-I	ECE2535	Bachelor of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010
934	Operating System	ECE2507	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
935	Computer Architecture	ECE2508	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
936	Nano Electronics	ECE2512	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
937	Computer Networks	ECE2513	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
938	VLSI Design	ECE2601	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
939	Digital Signal Processing	ECE2602	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
940	Antenna and Microwave Engineering	ECE2615	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
941	Antenna and Microwave Engineering Lab	ECE2616	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
942	VLSI Design Lab	ECE2605	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
943	Digital Signal Processing Lab	ECE2609	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
944	Minor Project	ECE2637	Bachelor of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
945	Advanced Java Programming	ECE2607	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
946	Advanced Java Programming Lab	ECE2610	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
947	Embedded System	ECE2613	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
948	Embedded System Lab	ECE2614	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
949	IOT and Wireless Sensor Network	ECE2617	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
950	Data Mining	ECE2618	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
951	Radar & Satellite Communication	ECE2719	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
952	Advanced Mobile Communication	ECE2720	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
953	Embedded System with ARM Processors	ECE2721	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
954	Radar & Satellite Communication Lab	ECE2722	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
955	Python Lab	ECE2723	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
956	Summer Internship Evaluation-II	ECE2735	Bachelor of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010
957	Optical Communications	ECE2706	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
958	Optical Communications Lab	ECE2716	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
959	Digital Image Processing	ECE2712	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
960	Digital Image Processing Lab	ECE2713	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
961	Robotic Process Automation Design & Development	ECE2724	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
962	Robotic Process Automation Design & Development Lab	ECE2725	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
963	Independent Study	ECE2718	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Written Test	2010
964	Term Paper	ECE2731	Bachelor of Technology (Electronics & Communication Engineering)	Academic Writing, Presentation	2010
965	Project (With Presentation & Evaluation)	ECE2732	Bachelor of Technology (Electronics & Communication Engineering)	Project writing, Presentation, Viva-Voce	2010
966	Project (Dissertation)	ECE2837	Bachelor of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010
967	RTOS Programming	ECE2805	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
968	Verilog Programming	ECE2806	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
969	Verilog Programming Lab	ECE2813	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
970	Advanced VLSI Design	ECE2812	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
971	Power Electronics	ECE2814	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
972	Information Theory and Coding	ECE2815	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
973	Advanced Robotic Process Automation Design & Development	ECE2816	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
974	Advanced Robotic Process Automation Design & Development Lab	ECE2817	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
975	Wireless Communication	ECE2818	Bachelor of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
976	Introduction to Computers & Programming in C	BME2104	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
977	Programming in C Lab	BME2109	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
978	Elements of Mechanical Engineering Lab	BME2111	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
979	Object Oriented Programming using C++	BME2205	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
980	Engineering Graphics Lab	BME2208	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
981	Object Oriented Programming using C++ Lab	BME2209	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
982	Analog Electronics-I	BME2302	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
983	Circuits & Systems	BME2303	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
984	Medical Imaging Techniques-I	BME2314	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
985	Human Anatomy and Physiology	BME2351	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
986	Analog Electronics Lab-I	BME2306	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
987	Computer Aided Graphic Design Lab	BME2315	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
988	Measurement & Measuring Instruments	BME2316	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
989	Measurement & Measuring Instruments Lab	BME2317	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
990	Virtual Instrumentation	BME2318	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
991	Virtual Instrumentation Lab	BME2319	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
992	Digital Electronics	BME2408	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
993	Biomaterials	BME2412	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
994	Signals and Systems	BME2413	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
995	Bio-Instrumentation	BME2451	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
996	Bio-Instrumentation Lab	BME2403	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
997	Digital Electronics Lab	BME2409	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
998	Signals and Systems Lab	BME2414	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
999	Analog Electronics-II	BME2407	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1000	Analog Electronics Lab-II	BME2417	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1001	Medical Imaging Techniques-II	BME2416	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1002	Artificial Neural Network	BME2418	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1003	Artificial Neural Network Lab	BME2419	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1004	Microprocessor Systems	BME2501	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1005	Medical Image Processing	BME2513	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1006	Machine Learning	BME2514	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1007	Microprocessor Systems Lab	BME2504	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1008	Machine Learning Lab	BME2515	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1009	Medical Image Processing Lab	BME2516	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1010	Summer Internship Evaluation-I	BME2535	Bachelor of Technology (Biomedical Engineering)	Report Writing, Presentation, Viva-Voce	2011
1011	Control Systems	BME2503	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1012	Control Systems Lab	BME2512	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1013	Digital Circuits and Systems	BME2507	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1014	Digital Circuits and Systems Lab	BME2509	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1015	Data Structure with C++	BME2517	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1016	Data Structure with C++ Lab	BME2518	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1017	Fuzzy Logic and Genetic Algorithm	BME2519	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1018	Microcontroller and its Biomedical Applications	BME2601	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1019	Biomechanics	BME2651	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1020	Clinical Need Assessment and Mini Project	BME2609	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Project writing, Lab Records	2011
1021	Medical Imaging and Reconstruction Algorithms Lab	BME2610	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1022	Hospital Management System	BME2607	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1023	Therapeutic and Surgical Equipment	BME2611	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1024	Data Mining	BME2612	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1025	Embedded System with Recent Technology	BME2710	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1026	Artificial Organs and Rehabilitation Engineering	BME2711	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1027	Clinical Electrical Safety Hazards	BME2712	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1028	Biomechanics Simulation Lab	BME2713	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1029	Embedded System with Recent Technology Lab	BME2714	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1030	Summer Internship Evaluation-II	BME2735	Bachelor of Technology (Biomedical Engineering)	Report Writing, Presentation, Viva-Voce	2011
1031	Project Dissertation-I	BME2737	Bachelor of Technology (Biomedical Engineering)	Report Writing, Presentation, Viva-Voce	2011
1032	Clinical Sciences	BME2715	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1033	Neural Network and Fuzzy Logic	BME2716	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1034	Virtual Reality	BME2717	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1035	Robotic Process Automation Design & Development	BME2718	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1036	Project Dissertation-II	BME2837	Bachelor of Technology (Biomedical Engineering)	Report Writing, Presentation, Viva-Voce	2011
1037	Medical Informatics	BME2803	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1038	Recent Advancement in Biomedical Modalities	BME2804	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1039	Advanced Robotic Process Automation Design & Development	BME2805	Bachelor of Technology (Biomedical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1040	Introduction to Computers & Programming in C	MAE2105	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1041	Programming in C Lab	MAE2110	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1042	Basics of Electrical & Electronics Engineering Lab	MAE2117	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1043	Workshop Technology	MAE2212	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1044	Engineering Mechanics Lab	MAE2207	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1045	Engineering Graphics Lab	MAE2208	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1046	Workshop Practice	MAE2213	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1047	Kinematics of Machines	MAE2301	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1048	Material Science & Metallurgy	MAE2303	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1049	Strength of Materials	MAE2318	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1050	Machine Drawing Lab	MAE2306	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1051	Strength of Materials Lab	MAE2319	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1052	Renewable Energy & Energy Management	MAE2314	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1053	Maintenance Engineering	MAE2320	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1054	Welding Technology	MAE2321	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1055	Dynamics of Machines	MAE2401	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1056	Fluid Mechanics	MAE2413	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1057	Machine Tool Technology	MAE2419	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1058	Fluid Mechanics Lab	MAE2415	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1059	Kinematics & Dynamics of Machines Lab	MAE2421	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1060	Machine Tool Technology Lab	MAE2422	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1061	Numerical Analysis & Programming	MAE2408	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1062	Numerical Analysis & Programming Lab	MAE2409	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1063	Gas Turbines	MAE2416	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1064	Tribology	MAE2423	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1065	Artificial Neural Network	MAE2424	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1066	Artificial Neural Network Lab	MAE2425	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1067	Machine Design-I	MAE2501	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1068	Heat Transfer	MAE2502	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1069	Mechanical Measurements	MAE2513	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1070	Heat Transfer Lab	MAE2507	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1071	Mechanical Measurements Lab	MAE2514	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1072	Summer Internship Evaluation-I	MAE2535	Bachelor of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2010
1073	Operations Research	MAE2511	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1074	Solar Energy	MAE2515	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1075	Supply Chain Management	MAE2516	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1076	Machine Design-II	MAE2602	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1077	Fluid Machinery	MAE2611	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1078	Internal Combustion Engines	MAE2612	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1079	Industrial Engineering	MAE2620	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1080	Fluid Machinery Lab	MAE2613	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1081	Internal Combustion Engines Lab	MAE2614	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1082	Minor Project	MAE2637	Bachelor of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2010
1083	Computer Integrated Manufacturing System	MAE2608	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1084	Vibration Engineering	MAE2615	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1085	Vibration Engineering Lab	MAE2616	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1086	Computer Aided Design	MAE2618	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1087	Computer Aided Design Lab	MAE2619	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1088	Data Mining	MAE2621	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1089	Computer Aided Manufacturing	MAE2701	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1090	Automotive Engineering	MAE2707	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1091	Computer Aided Manufacturing Lab	MAE2703	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1092	Automotive Engineering Lab	MAE2708	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1093	Summer Internship Evaluation-II	MAE2735	Bachelor of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2010
1094	Independent Study	MAE2712	Bachelor of Technology (Mechanical Engineering)	Quiz, Written Test	2010
1095	Term Paper	MAE2731	Bachelor of Technology (Mechanical Engineering)	Academic Writing, Presentation	2010
1096	Project	MAE2732	Bachelor of Technology (Mechanical Engineering)	Project Writing, Presentation, Viva-Voce	2010
1097	Robotic Process Automation Design & Development	MAE2714	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1098	Refrigeration & Air-conditioning	MAE2801	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1099	Refrigeration & Air-conditioning Lab	MAE2802	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1100	Major Project	MAE2837	Bachelor of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2010
1101	Artificial Intelligence & Robotics	MAE2805	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1102	Computational Fluid Dynamics	MAE2809	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1103	Computational Fluid Dynamics Lab	MAE2810	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2010
1104	Power Plant Engineering	MAE2811	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1105	Flexible Manufacturing System	MAE2812	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1106	Advanced Robotic Process Automation Design & Development	MAE2813	Bachelor of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2010
1107	Introduction to Computers & Programming in C	EEE2105	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1108	Programming in C Lab	EEE2110	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1109	Object Oriented Programming using C++	EEE2203	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1110	Object Oriented Programming using C++ Lab	EEE2206	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1111	Analog Electronics-I	EEE2302	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1112	Circuits & Systems	EEE2303	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1113	Analog Electronics - I Lab	EEE2305	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1114	Circuits & Systems Lab	EEE2306	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1115	Data Structure using C	EEE2309	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1116	Data Structure using C Lab	EEE2310	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1117	Virtual Instrumentation	EEE2311	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1118	Virtual Instrumentation Lab	EEE2312	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1119	Electric Machine-I	EEE2402	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1120	Electromagnetic Field Theory	EEE2403	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1121	Analog Electronics-II	EEE2408	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1122	Digital Electronics	EEE2412	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1123	Electric Machine Lab-I	EEE2406	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1124	Analog Electronics Lab-II	EEE2409	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1125	Digital Electronics Lab	EEE2413	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1126	Power Plant Practices	EEE2411	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1127	Database Management Systems	EEE2414	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1128	Database Management Systems Lab	EEE2415	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1129	Digital Circuits & Systems	EEE2501	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1130	Microprocessor Systems	EEE2502	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1131	Power System-I	EEE2503	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1132	Control System	EEE2509	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1133	Digital Circuits & Systems Lab	EEE2505	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1134	Microprocessor Systems Lab	EEE2506	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1135	Control System Lab	EEE2510	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1136	Summer Internship Evaluation-I	EEE2535	Bachelor of Technology (Electrical & Electronics Engineering)	Report Writing, Presentation, Viva-Voce	2011
1137	Biomedical Instrumentation	EEE2507	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1138	Power System-II	EEE2601	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1139	Electric Machine-II	EEE2602	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1140	Electric Power Generation, Transmission & Distribution-I	EEE2603	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1141	Modern & Digital Control Engineering	EEE2608	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1142	Power System Lab	EEE2604	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1143	Electric Machine-II Lab	EEE2605	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1144	Minor Project	EEE2637	Bachelor of Technology (Electrical & Electronics Engineering)	Report Writing, Presentation, Viva-Voce	2011
1145	Utilization of Electric Energy	EEE2606	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1146	Substation Engineering	EEE2607	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1147	Digital Signal Processing	EEE2609	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1148	Digital Signal Processing Lab	EEE2610	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1149	Electric Power Transmission & Distribution-II	EEE2701	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1150	Measurement & Measuring Instruments	EEE2702	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1151	Measurement & Measuring Instruments Lab	EEE2703	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1152	Summer Internship Evaluation-II	EEE2735	Bachelor of Technology (Electrical & Electronics Engineering)	Report Writing, Presentation, Viva-Voce	2011
1153	Software Engineering	EEE2704	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1154	Software Engineering Lab	EEE2708	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1155	C based Embedded System Design	EEE2707	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1156	C based Embedded System Design Lab	EEE2711	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1157	Electrical System Design	EEE2713	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1158	Robotic Process Automation Design & Development	EEE2714	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1159	Robotic Process Automation Design & Development Lab	EEE2715	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Practical, Lab Records	2011
1160	Independent Study	EEE2712	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Written Test	2011
1161	Term Paper	EEE2731	Bachelor of Technology (Electrical & Electronics Engineering)	Academic Writing, Presentation	2011
1162	Project (With Presentation & Evaluation)	EEE2732	Bachelor of Technology (Electrical & Electronics Engineering)	Project Writing, Presentation, Viva-Voce	2011
1163	Power Electronics	EEE2801	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1164	Project (Dissertation)	EEE2837	Bachelor of Technology (Electrical & Electronics Engineering)	Report Writing, Presentation, Viva-Voce	2011
1165	High Voltage Engineering	EEE2802	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1166	Nuclear Power Engineering	EEE2803	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1167	Thermal Power Engineering	EEE2804	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1168	Hydro Power Engineering	EEE2805	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1169	Solar Engineering	EEE2806	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1170	Process & Machine Technology	EEE2807	Bachelor of Technology (Electrical & Electronics Engineering)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2011
1171	Introduction to Computers & Programming in C	MLE2103	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1172	Programming in C Lab	MLE2106	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1173	Object Oriented Programming using C++	MLE2205	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1174	Object Oriented Programming using C++ Lab	MLE2206	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1175	Basics of Electrical & Electronics Engineering Lab	MLE2208	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1176	Engineering Graphics Lab	MLE2209	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1177	Database Management Systems	MLE2301	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1178	Operating Systems	MLE2302	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1179	Data Structures using C	MLE2303	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1180	Digital Electronics	MLE2304	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1181	Data Structures using C Lab	MLE2305	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1182	Database Management System Lab	MLE2306	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1183	UNIX Programming Lab	MLE2307	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1184	Digital Electronics Lab	MLE2308	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1185	Electronic Devices and Circuits	MLE2309	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1186	Electronic Devices and Circuits Lab	MLE2310	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1187	E-Commerce & ERP	MLE2311	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1188	Artificial Intelligence	MLE2402	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1189	Data Communication & Computer Networks	MLE2404	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1190	Artificial Intelligence Lab	MLE2405	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1191	Data Communication & Computer Networks Lab	MLE2406	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1192	Artificial Neural Network	MLE2408	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1193	Artificial Neural Network Lab	MLE2409	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1194	Communication Systems	MLE2410	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1195	Communication Systems Lab	MLE2411	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1196	Web Designing Technologies	MLE2412	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1197	Web Designing Technologies Lab	MLE2413	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1198	Computer Architecture	MLE2501	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1199	Java Programming	MLE2502	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1200	Fundaments of Machine Learning	MLE2503	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1201	Fundaments of Machine Learning Lab	MLE2504	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1202	Java Programming Lab	MLE2505	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1203	Python Programming Lab	MLE2506	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1204	Summer Internship Evaluation-I	MLE2535	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Report Writing, Presentation, Viva-Voce	2020
1205	VHDL Programming	MLE2507	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1206	VHDL Programming Lab	MLE2508	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1207	Advanced Web Designing Technologies	MLE2510	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1208	Advanced Web Designing Technologies Lab	MLE2511	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1209	Research Methodology & Technical Report Writing	MLE2601	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Report Writing	2020
1210	Advanced Java Programming	MLE2602	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1211	Deep Learning	MLE2603	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1212	Deep Learning Lab	MLE2604	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1213	Advanced Java Programming Lab	MLE2605	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1214	R-Programming Lab	MLE2606	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1215	Minor Project-I	MLE2637	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Report Writing, Presentation, Viva-Voce	2020
1216	VLSI Design	MLE2607	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1217	VLSI Design Lab	MLE2608	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1218	Open Source Technologies	MLE2609	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1219	Open Source Technologies Lab	MLE2610	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1220	Data Mining	MLE2611	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1221	Reinforcement Learning	MLE2702	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1222	Social Network Data Analytics	MLE2703	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1223	Reinforcement Learning Lab	MLE2704	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1224	MATLAB Programming	MLE2705	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1225	Natural Language Processing Lab	MLE2706	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1226	Summer Internship Evaluation-II	MLE2735	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Report Writing, Presentation, Viva-Voce	2020
1227	Minor Project-II	MLE2737	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Report Writing, Presentation, Viva-Voce	2020
1228	Mobile Computing	MLE2707	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1229	Robotic Process Automation Design & Development	MLE2708	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1230	Responsive Web Design	MLE2709	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1231	Responsive Web Design Lab	MLE2710	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1232	Project-Dissertation	MLE2837	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Report Writing, Presentation, Viva-Voce	2020
1233	Digital Image Processing	MLE2801	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1234	Digital Image Processing Lab	MLE2802	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1235	Dot Net Programming	MLE2803	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1236	Dot Net Programming Lab	MLE2804	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records	2020
1237	Advance Robotic Process Automation Design & Development	MLE2805	Bachelor of Technology (Artificial Intelligence & Machine Learning)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2020
1238	Introduction to Computers & Programming in C	AIE6104	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1239	Programming in C Lab	AIE6106	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1240	Object Oriented Programming using C++	AIE6204	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1241	Object Oriented Programming using C++ Lab	AIE6208	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1242	Engineering Graphics Lab	AIE6211	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1243	Basics of Electrical & Electronics Engineering Lab	AIE6213	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1244	Database Management Systems	AIE6302	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1245	Operating Systems	AIE6303	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1246	Data Structures using C	AIE6304	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1247	Digital Electronics	AIE6313	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1248	Data Structures using C Lab	AIE6305	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1249	Database Management System Lab	AIE6307	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1250	UNIX Programming Lab	AIE6308	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1251	Digital Electronics Lab	AIE6314	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1252	E-Commerce & ERP	AIE6310	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1253	Electronic Devices and Circuits	AIE6311	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1254	Electronic Devices and Circuits Lab	AIE6312	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1255	Artificial Intelligence	AIE6404	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1256	Data Communication & Computer Networks	AIE6414	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1257	Artificial Intelligence Lab	AIE6406	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1258	Data Communication & Computer Networks Lab	AIE6415	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1259	Communication Systems	AIE6407	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1260	Communication Systems Lab	AIE6408	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1261	Artificial Neural Network	AIE6411	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1262	Artificial Neural Network Lab	AIE6412	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1263	Web Designing Technologies	AIE6417	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1264	Web Designing Technologies Lab	AIE6418	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1265	Computer Architecture	AIE6502	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1266	Java Programming	AIE6503	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1267	Microprocessor	AIE6515	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1268	Java Programming Lab	AIE6507	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1269	Python Programming Lab	AIE6508	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1270	Advance Data Structures & Algorithm Lab	AIE6509	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1271	Microprocessor Lab	AIE6517	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1272	Summer Internship Evaluation-I	AIE6535	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1273	VHDL Programming	AIE6512	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1274	VHDL Programming Lab	AIE6513	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1275	Advanced Web Designing Technologies	AIE6518	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1276	Advanced Web Designing Technologies Lab	AIE6519	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1277	Advanced Java Programming	AIE6603	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1278	Advance Database Management System	AIE6604	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1279	Digital Computer Organization	AIE6605	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1280	Software Engineering	AIE6614	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1281	Internet of Things & Wireless Sensor Networks	AIE6615	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1282	Advanced Java Programming Lab	AIE6608	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1283	Advance Database Management System Lab	AIE6609	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1284	Software Engineering Lab	AIE6616	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1285	Minor Project-I	AIE6637	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1286	VLSI Design	AIE6612	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1287	VLSI Design Lab	AIE6613	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1288	Open Source Technologies	AIE6617	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1289	Open Source Technologies Lab	AIE6618	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1290	Data Mining	AIE6619	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1291	Computer Graphics	AIE6702	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1292	Advanced Computer Networks	AIE6704	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1293	Cryptography & Network Security	AIE6713	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1294	System Programming & Compiler Construction	AIE6714	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1295	Computer Graphics Lab	AIE6706	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1296	Advanced Computer Networks Lab	AIE6707	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1297	MATLAB Programming	AIE6708	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1298	Network Security Lab	AIE6715	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1299	System Programming & Compiler Construction Lab	AIE6716	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1300	Summer Internship Evaluation-II	AIE6735	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1301	Minor Project-II	AIE6737	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1302	Mobile Computing	AIE6710	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1303	Robotic Process Automation Design & Development	AIE6717	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1304	Responsive Web Design	AIE6718	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1305	Responsive Web Design Lab	AIE6719	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1306	Research Methodology & Technical Report Writing	AIE6809	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Report Writing	2017
1307	Major Project	AIE6837	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1308	Fundamental of Robotics System & Robot Programming	RBE6801	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1309	Advanced Control Systems & Drives for Robots	RBE6802	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1310	Microprocessor and Interfacing	RBE6803	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1311	Kinematics & Dynamics of Robots	RBE6804	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1312	Fundamental of Robotics System & Robot Programming Lab	RBE6806	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1313	Advanced Control Systems & Drives for Robots Lab	RBE6807	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1314	Microprocessor and Interfacing Lab	RBE6808	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1315	Digital Image Processing	RBE6809	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1316	Digital Image Processing Lab	RBE6810	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1317	Dot Net Programming	RBE6811	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1318	Dot Net Programming Lab	RBE6812	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1319	Advance Robotic Process Automation Design & Development	RBE6813	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1320	Data Mining & Predictive Analysis	MLE6802	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1321	Data Warehousing and Multi-dimensional Modelling	MLE6803	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1322	Big Data Technologies	MLE6804	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1323	Data Mining & Predictive Analysis Lab	MLE6806	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1324	Data Warehousing and Multi-dimensional Modelling Lab	MLE6807	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1325	R-Programming Lab	MLE6808	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1326	Digital Image Processing	MLE6809	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1327	Digital Image Processing Lab	MLE6810	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1328	Dot Net Programming	MLE6811	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1329	Dot Net Programming Lab	MLE6812	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1330	Advance Robotic Process Automation Design & Development	MLE6813	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1331	Summer Internship Evaluation-III	AIE6935	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1332	Project-Dissertation-I	AIE6937	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1333	Automation in Manufacturing Systems	RBE6901	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1334	Robotic Sensors, Vision and Hardware Implementation	RBE6902	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1335	Pattern Recognition & Image Processing	RBE6903	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1336	Robotic Sensors, Vision and Hardware Implementation Lab	RBE6904	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1337	Pattern Recognition & Image Processing Lab	RBE6905	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1338	Optimization Techniques	RBE6906	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1339	CNC Machines & Adaptive Control	RBE6907	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1340	Neural Network and Fuzzy Logic	RBE6908	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1341	Neural Network and Fuzzy Logic Lab	RBE6909	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1342	Decision Making Systems	RBE6910	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1343	Decision Making Systems Lab	RBE6911	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1344	Pattern Recognition and Image Processing	MLE6901	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1345	Neural Network and Fuzzy Logic	MLE6902	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1346	Natural Language Processing	MLE6903	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1347	Pattern Recognition and Image Processing Lab	MLE6904	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1348	Neural Network and Fuzzy Logic Lab	MLE6905	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1349	Hadoop Lab	MLE6906	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Practical, Lab Records	2017
1350	Descriptive Analysis	MLE6907	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1351	Optimization Techniques	MLE6908	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1352	Social Network Data Analytics	MLE6909	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1353	Agent Based Intelligent Systems	MLE6910	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1354	Project-Dissertation-II	AIE6037	B.Tech. + M.Tech. Artificial Intelligence & Machine Learning	Report Writing, Presentation, Viva-Voce	2017
1355	Introduction to Computers & Programming in C	NCE6104	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1356	Programming in C Lab	NCE6106	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1357	Object Oriented Programming using C++	NCE6204	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1358	Object Oriented Programming using C++ Lab	NCE6208	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1359	Engineering Graphics Lab	NCE6211	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1360	Basics of Electrical & Electronics Engineering Lab	NCE6213	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1361	Database Management Systems	NCE6302	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1362	Operating Systems	NCE6303	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1363	Data Structures using C	NCE6304	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1364	Digital Electronics	NCE6313	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1365	Data Structures using C Lab	NCE6305	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1366	Database Management System Lab	NCE6307	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1367	UNIX Programming Lab	NCE6308	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1368	Digital Electronics Lab	NCE6314	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1369	E-Commerce & ERP	NCE6310	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1370	Electronic Devices and Circuits	NCE6311	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1371	Electronic Devices and Circuits Lab	NCE6312	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1372	Artificial Intelligence	NCE6404	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1373	Data Communication & Computer Networks	NCE6414	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1374	Artificial Intelligence Lab	NCE6406	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1375	Data Communication & Computer Networks Lab	NCE6415	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1376	Communication Systems	NCE6407	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1377	Communication Systems Lab	NCE6408	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1378	Artificial Neural Network	NCE6411	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1379	Artificial Neural Network Lab	NCE6412	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1380	Web Designing Technologies	NCE6417	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1381	Web Designing Technologies Lab	NCE6418	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1382	Computer Architecture	NCE6502	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1383	Java Programming	NCE6503	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1384	Microprocessor	NCE6515	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1385	Java Programming Lab	NCE6507	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1386	Python Programming Lab	NCE6508	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017

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1387	Microprocessor Lab	NCE6517	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1388	Summer Internship Evaluation-I	NCE6535	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1389	VHDL Programming	NCE6512	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1390	VHDL Programming Lab	NCE6513	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1391	Advanced Web Designing Technologies	NCE6518	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1392	Advanced Web Designing Technologies Lab	NCE6519	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1393	Advanced Java Programming	NCE6603	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1394	Advance Database Management System	NCE6604	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1395	Digital Computer Organization	NCE6605	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1396	Software Engineering	NCE6614	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1397	Internet of Things & Wireless Sensor Networks	NCE6615	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1398	Advanced Java Programming Lab	NCE6608	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1399	Advance Database Management System Lab	NCE6609	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1400	Software Engineering Lab	NCE6619	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1401	Minor Project-I	NCE6637	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1402	VLSI Design	NCE6612	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1403	VLSI Design Lab	NCE6613	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1404	Open Source Technologies	NCE6616	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1405	Open Source Technologies Lab	NCE6617	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1406	Data Mining	NCE6618	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1407	Computer Graphics	NCE6702	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1408	Advanced Computer Networks	NCE6704	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1409	Cryptography & Network Security	NCE6713	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1410	System Programming & Compiler Construction	NCE6714	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1411	Computer Graphics Lab	NCE6706	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1412	Advanced Computer Networks Lab	NCE6707	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1413	MATLAB Programming	NCE6708	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1414	System Programming & Compiler Construction Lab	NCE6715	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1415	Network Security Lab	NCE6718	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1416	Summer Internship Evaluation-II	NCE6735	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1417	Minor Project-II	NCE6737	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1418	Mobile Computing	NCE6710	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1419	Robotic Process Automation Design & Development	NCE6716	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1420	Responsive Web Design	NCE6717	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1421	Responsive Web Design Lab	NCE6719	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1422	Network and Wireless Security	NCE6802	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1423	Cyber Crime and IT Law	NCE6803	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1424	Cyber Crime Investigation & Forensics	NCE6804	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1425	Intrusion Detection & Prevention System	NCE6805	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1426	Cryptography Foundation Lab	NCE6806	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1427	Web Security Lab	NCE6807	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1428	Network & Wireless Security Lab	NCE6808	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1429	Research Methodology & Technical Report Writing	NCE6809	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Report Writing	2017
1430	Major Project	NCE6837	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1431	Digital Image Processing	NCE6812	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1432	Digital Image Processing Lab	NCE6813	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1433	Dot Net Programming	NCE6814	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1434	Dot Net Programming Lab	NCE6815	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1435	Advance Robotic Process Automation Design & Development	NCE6816	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1436	Biometric Systems & Biometric Image Processing	NCE6901	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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1437	Software Vulnerability Analysis	NCE6902	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1438	Applied Cryptography	NCE6903	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1439	Biometric Image Processing Lab	NCE6904	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1440	Applied Cryptography Lab	NCE6905	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Practical, Lab Records	2017
1441	Summer Internship Evaluation-III	NCE6935	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1442	Project-Dissertation-I	NCE6937	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1443	Web Application & Penetration Testing	NCE6906	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1444	Malware Analysis in Network Security	NCE6907	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1445	Web Security	NCE6908	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1446	Digital Watermarking & Steganography	NCE6909	B.Tech. + M.Tech. Network & Cyber Security	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1447	Project-Dissertation-II	NCE6037	B.Tech. + M.Tech. Network & Cyber Security	Report Writing, Presentation, Viva-Voce	2017
1448	Introduction to Computers & Programming in C	DSE6104	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1449	Programming in C Lab	DSE6106	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1450	Object Oriented Programming using C++	DSE6204	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1451	Object Oriented Programming using C++ Lab	DSE6208	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1452	Engineering Graphics Lab	DSE6211	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1453	Basics of Electrical & Electronics Engineering Lab	DSE6213	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1454	Database Management Systems	DSE6302	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1455	Operating Systems	DSE6303	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1456	Data Structures using C	DSE6304	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1457	Digital Electronics	DSE6313	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1458	Data Structures using C Lab	DSE6305	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1459	Database Management System Lab	DSE6307	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1460	UNIX Programming Lab	DSE6308	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1461	Digital Electronics Lab	DSE6314	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017

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1462	E-Commerce & ERP	DSE6310	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1463	Electronic Devices and Circuits	DSE6311	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1464	Artificial Intelligence	DSE6404	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1465	Data Communication & Computer Networks	DSE6414	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1466	Artificial Intelligence Lab	DSE6406	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1467	Data Communication & Computer Networks Lab	DSE6415	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1468	Communication Systems	DSE6407	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1469	Communication Systems Lab	DSE6408	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1470	Artificial Neural Network	DSE6411	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1471	Artificial Neural Network Lab	DSE6412	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1472	Web Designing Technologies	DSE6417	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1473	Web Designing Technologies Lab	DSE6418	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1474	Computer Architecture	DSE6502	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1475	Java Programming	DSE6503	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1476	Microprocessor	DSE6515	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1477	Java Programming Lab	DSE6507	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1478	Python Programming Lab	DSE6508	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1479	Advance Data Structures & Algorithm Lab	DSE6509	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1480	Microprocessor Lab	DSE6517	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1481	Summer Internship Evaluation-I	DSE6535	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1482	VHDL Programming	DSE6512	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1483	VHDL Programming Lab	DSE6513	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1484	Advanced Web Designing Technologies	DSE6518	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1485	Advanced Web Designing Technologies Lab	DSE6519	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1486	Advanced Java Programming	DSE6603	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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1487	Advance Database Management System	DSE6604	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1488	Digital Computer Organization	DSE6605	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1489	Software Engineering	DSE6614	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1490	Internet of Things & Wireless Sensor Networks	DSE6615	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1491	Advanced Java Programming Lab	DSE6608	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1492	Advance Database Management System Lab	DSE6609	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1493	Software Engineering Lab	DSE6616	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1494	Minor Project-I	DSE6637	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1495	VLSI Design	DSE6612	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1496	VLSI Design Lab	DSE6613	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1497	Open Source Technologies	DSE6617	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1498	Open Source Technologies Lab	DSE6618	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1499	Data Mining	DSE6619	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1500	Computer Graphics	DSE6702	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1501	Advanced Computer Networks	DSE6704	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1502	Cryptography & Network Security	DSE6713	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1503	System Programming & Compiler Construction	DSE6714	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1504	Computer Graphics Lab	DSE6706	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1505	Advanced Computer Networks Lab	DSE6707	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1506	MATLAB Programming	DSE6708	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1507	Network Security Lab	DSE6715	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1508	System Programming & Compiler Construction Lab	DSE6716	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1509	Summer Internship Evaluation-II	DSE6735	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1510	Minor Project-II	DSE6737	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1511	Mobile Computing	DSE6710	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1512	Robotic Process Automation Design & Development	DSE6717	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1513	Responsive Web Design	DSE6718	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1514	Responsive Web Design Lab	DSE6719	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1515	Data Mining & Predictive Analytics	DSE6802	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1516	Data Warehousing & Multi-dimensional Modelling	DSE6803	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1517	Database & Knowledge Base Systems	DSE6804	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1518	Big Data Technologies	DSE6805	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1519	Applied Statically Analysis Lab	DSE6806	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1520	Data Mining & Predictive Analytics Lab	DSE6807	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1521	Data Warehousing & Multi-dimensional Modelling Lab	DSE6808	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1522	Research Methodology & Technical Report Writing	DSE6809	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Report Writing	2017
1523	Major Project	DSE6837	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1524	Digital Image Processing	DSE6812	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1525	Dot Net Programming	DSE6814	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1526	Dot Net Programming Lab	DSE6815	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1527	Advance Robotic Process Automation Design & Development	DSE6816	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1528	Descriptive Analysis	DSE6901	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1529	Learning & Reasoning with Bayesian Networks	DSE6902	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1530	Social Network Data Analytics	DSE6903	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1531	R-Programming Lab	DSE6904	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1532	Hadoop Lab	DSE6905	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Practical, Lab Records	2017
1533	Summer Internship Evaluation-III	DSE6935	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1534	Project-Dissertation-I	DSE6937	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1535	Web Technology	DSE6906	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1536	Service Oriented Architecture	DSE6907	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017

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1537	Natural Language Processing	DSE6908	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1538	Agent Based Intelligent Systems	DSE6909	B.Tech. + M.Tech. Data Science	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2017
1539	Project-Dissertation-II	DSE6037	B.Tech. + M.Tech. Data Science	Report Writing, Presentation, Viva-Voce	2017
1540	Low Power VLSI Design	ECE4101	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1541	Advanced Digital Communication Systems	ECE4102	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1542	Stochastic Methods	ECE4103	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1543	Advanced Control Systems	ECE4104	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1544	Digital Signal Processing	ECE4105	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1545	Low Power VLSI Design Lab	ECE4106	Master of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1546	Advanced Digital Communication Systems Lab	ECE4107	Master of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1547	Digital Signal Processing Lab	ECE4108	Master of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1548	Information Theory & Coding	ECE4201	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1549	Advanced Computer Networks	ECE4202	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1550	Advanced Optical Communication	ECE4204	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1551	Advanced Computer Networks Lab	ECE4205	Master of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1552	Device Modeling & Simulation Lab	ECE4206	Master of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1553	Advanced Optical Communication Lab	ECE4207	Master of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1554	Research Methodology & Technical Report Writing	ECE4214	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010

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1555	Satellite Communication	ECE4208	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1556	Bluetooth Technology	ECE4209	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1557	Cluster & Grid Computing	ECE4210	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1558	Real Time Systems & Software	ECE4211	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1559	MEMS & IC Integration	ECE4212	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1560	Advanced Instrumentation	ECE4301	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1561	Advanced Instrumentation Lab	ECE4305	Master of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1562	Advanced Image Processing Lab	ECE4306	Master of Technology (Electronics & Communication Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1563	Summer Internship Evaluation	ECE4335	Master of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010
1564	Project-Dissertation-I	ECE4337	Master of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010
1565	Nano Science & Technology	ECE4302	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1566	Mobile Computing	ECE4308	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1567	Optimization Techniques	ECE4309	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1568	Advanced Power Electronics	ECE4310	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1569	Radar Systems	ECE4311	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1570	Reliability Engineering	ECE4312	Master of Technology (Electronics & Communication Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2010
1571	Project-Dissertation-II	ECE4437	Master of Technology (Electronics & Communication Engineering)	Report Writing, Presentation, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1572	Applied Numerical Methods	CIV4101	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1573	Sustainable Constructions	CIV4102	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1574	Disaster Mitigation and Management	CIV4103	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1575	Environmental Impact Assessment for Civil Engineers	CIV4104	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1576	Optimization and Quantitative Methods in Civil Engineering	CIV4105	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1577	Advanced Civil Engineering Lab	CIV4106	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1578	Research Methodology and Technical Report Writing	CIV4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1579	Structural Dynamics	STE4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1580	Advanced Steel Design	STE4202	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1581	Design of Industrial Structures	STE4204	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1582	Advanced Structural Analysis	STE4212	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1583	Advanced Bridge Design	STE4208	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1584	Advanced Concrete Design	STE4211	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1585	Finite Element Method	STE4213	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1586	Advances in Construction Practices and Machinery	CME4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1587	Building Services & Maintenance Management	CME4203	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1588	Systems Design and Value Analysis	CME4204	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1589	Reliability Analysis in Construction Management	CME4207	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1590	Pre-Engineered Construction Technology	CME4212	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1591	Construction Planning and Management	CME4213	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1592	Transportation Planning	TRE4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1593	Accidents Analysis & Prevention	TRE4214	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1594	Pavement Materials & Construction	TRE4216	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1595	Pavement Materials & Construction Lab	TRE4217	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1596	Geometric Design of Highways	TRE4218	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1597	Geometric Design of Highways Lab	TRE4219	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1598	Pavement Analysis and Design	TRE4211	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1599	Road Safety Audit	TRE4215	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1600	Environmental Policies and Legislation	EVE4201	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1601	Solid and Hazardous Waste Management	EVE4208	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1602	Water Treatment Plant Design and Operation	EVE4211	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1603	Air Pollution and Control	EVE4212	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1604	Optimization of Water Resources System	EVE4205	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1605	Environmental Chemistry	EVE4213	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1606	Environmental Engineering Lab	EVE4214	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1607	GIS & Remote Sensing for Land and Water Management	EVE4215	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1608	Summer Internship Evaluation	CIV4335	Master of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2013
1609	Project-Dissertation-I	CIV4337	Master of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2013
1610	Design of Tall Buildings	STE4308	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1611	Offshore Structures	STE4312	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1612	Pre-stressed Concrete Design	STE4314	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1613	Advanced Concrete Technology	STE4302	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1614	Soil Structure Interaction	STE4307	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1615	Advanced Construction Materials	STE4304	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1616	Advanced Construction Materials Lab	STE4305	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1617	Advanced Steel and Concrete Composite Structures	STE4309	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1618	Advanced Structural Engineering Lab	STE4310	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1619	GIS in Construction Engineering	CME4307	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1620	Construction Quality & Safety Management	CME4310	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1621	Operations Strategy	CME4308	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1622	Advanced Concrete Technology	CME4315	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1623	Highway Construction and Maintenance	CME4302	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1624	Highway Construction and Maintenance Lab	CME4303	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1625	Geotechnics in Construction	CME4304	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1626	Geotechnical Lab for Construction Engineers	CME4305	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1627	Soft Computing Techniques in Civil Engineering	CME4316	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1628	Soft Computing Techniques in Civil Engineering Lab	CME4317	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1629	Transportation Infrastructure Design	TRE4305	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1630	Airport Infrastructure Planning & Design	TRE4306	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1631	Bridge Engineering for Highways	TRE4309	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1632	Public Transportation System	TRE4303	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1633	Intelligent Transportation System	TRE4307	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1634	Railway Infrastructure Planning & Design	TRE4308	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1635	GIS & Its Application in Transportation Engineering	TRE4301	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1636	GIS & Its Application in Transportation Engineering Lab	TRE4302	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1637	Traffic Engineering & Modeling	TRE4310	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1638	Traffic Engineering & Modeling Lab	TRE4311	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1639	Industrial Wastewater Treatment and Design	EVE4302	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1640	Water Resource Planning and Management	EVE4303	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1641	Biological Process of Waste Water Treatment	EVE4309	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1642	Transport Phenomenon of Waste Water	EVE4310	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1643	Water Reclamation and Reuse	EVE4311	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1644	Air and Water Quality Modelling	EVE4312	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1645	Air and Water Quality Modelling Lab	EVE4313	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1646	Advanced Wastewater Engineering	EVE4314	Master of Technology (Civil Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1647	Advanced Wastewater Engineering Lab	EVE4315	Master of Technology (Civil Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1648	Project-Dissertation-II	CIV4437	Master of Technology (Civil Engineering)	Report Writing, Presentation, Viva-Voce	2013
1649	Advanced Solid Mechanics	MAE4101	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1650	Advanced Machining Processes	MAE4104	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1651	Computer Integrated Manufacturing	MAE4105	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1652	Advanced Machining Processes Lab	MAE4107	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1653	Computer Integrated Manufacturing Lab	MAE4108	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1654	Optimization Techniques	MAE4201	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1655	Design of Experiments	MAE4202	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1656	Research Methodology & Technical Report Writing	MAE4203	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1657	Concept of Combustion	THE4211	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1658	Energy Management & Auditing	THE4212	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1659	Refrigeration & Air Conditioning	THE4213	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1660	Refrigeration & Air Conditioning Lab	THE4214	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1661	Advanced Tribology	MDE4204	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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1662	Industrial Robotics	MDE4205	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1663	Advanced Computer Aided Design	MDE4211	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1664	Advanced Computer Aided Design Lab	MDE4212	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1665	Experimental Stress Analysis	MDE4213	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1666	Mechatronics	IPE4204	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1667	Mechatronics Lab	IPE4213	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1668	Welding and Aided Processes	IPE4205	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1669	Advanced Computer Aided Manufacturing	IPE4211	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1670	Advanced Computer Aided Manufacturing Lab	IPE4212	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1671	Quality and Reliability Management	IPE4214	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1672	Total Quality Management & Quality Assurance	MAE4301	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1673	Summer InternshipEvaluation	MAE4335	Master of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2013
1674	Project-Dissertation-I	MAE4337	Master of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2013
1675	Cryogenics	THE4304	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1676	Advanced Computational Fluid Dynamics	THE4309	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1677	Advanced Computational Fluid Dynamics Lab	THE4310	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1678	Microfluidics &Nanofluidic	THE4311	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1679	Turbo Machines	THE4312	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1680	Advanced Mechanical Vibrations	MDE4302	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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1681	Advanced Mechanical Vibrations Lab	MDE4307	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1682	Finite Elements Method	MDE4303	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1683	Finite Elements Method Lab	MDE4308	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1684	Product Design & Development	MDE4309	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1685	Advanced Mechanical Design	MDE4310	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1686	Computer Aided Metrology & Inspection	IPE4302	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1687	Computer Aided Metrology & Inspection Lab	IPE4307	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1688	Metal Cutting & Tool Design	IPE4303	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1689	Metal Cutting & Tool Design Lab	IPE4308	Master of Technology (Mechanical Engineering)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
1690	Production Planning & Control	IPE4304	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1691	Material Management	IPE4309	Master of Technology (Mechanical Engineering)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
1692	Project-Dissertation-II	MAE4437	Master of Technology (Mechanical Engineering)	Report Writing, Presentation, Viva-Voce	2013
1693	Advanced Database Management Systems	DSE4102	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1694	Digital Computer Organization	DSE4103	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1695	Advanced Computer Networks	DSE4104	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1696	Advanced Database Management Systems Lab	DSE4106	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1697	Advanced Computer Networks Lab	DSE4107	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1698	MATLAB Programming	DSE4108	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1699	Python Programming Lab	DSE4109	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017

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1700	Data Mining & Predictive Analytics	DSE4202	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1701	Data Warehousing & Multi-dimensional Modeling	DSE4203	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1702	Database & Knowledge Base Systems	DSE4204	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1703	Big Data Technologies	DSE4205	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1704	Research Methodology & Technical Report Writing	DSE4206	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1705	Data Mining & Predictive Analytics Lab	DSE4208	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1706	Data Warehousing & Multi-dimensional Modeling Lab	DSE4209	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1707	Information Management System	DSE4210	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1708	Information System Security	DSE4211	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1709	Descriptive Analysis	DSE4301	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1710	Learning and Reasoning with Bayesian Networks	DSE4302	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1711	Social Network Data Analytics	DSE4303	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1712	R-Programming Lab	DSE4304	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1713	Hadoop Lab	DSE4305	Master of Technology (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1714	Summer Internship Evaluation	DSE4335	Master of Technology (Data Science)	Report Writing, Presentation, Viva-Voce	2017
1715	Project Dissertation-I	DSE4337	Master of Technology (Data Science)	Report Writing, Presentation, Viva-Voce	2017
1716	Web Technology	DSE4306	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1717	Service Oriented Architecture	DSE4307	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1718	Natural Language Processing	DSE4308	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1719	Agent Based Intelligent Systems	DSE4309	Master of Technology (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1720	Project Dissertation-II	DSE4437	Master of Technology (Data Science)	Report Writing, Presentation, Viva-Voce	2017
1721	Advanced Database Management Systems	AIE4102	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1722	Digital Computer Organization	AIE4103	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1723	Advanced Computer Networks	AIE4104	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1724	Advanced Database Management Systems Lab	AIE4106	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1725	Advanced Computer Networks Lab	AIE4107	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1726	MATLAB Programming	AIE4108	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1727	Python Programming Lab	AIE4109	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1728	Research Methodology & Technical Report Writing	AIE4206	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1729	Fundamental of Robotics System & Robot Programming	RBE4201	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1730	Advanced Control Systems and Drives for Robots	RBE4202	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1731	Microprocessor and Interfacing	RBE4203	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1732	Kinematics & Dynamics of Robots	RBE4204	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1733	Fundamental of Robotics System & Robot Programming Lab	RBE4206	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1734	Advanced Control Systems & Drives for Robots Lab	RBE4207	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1735	Microprocessor and Interfacing Lab	RBE4208	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1736	Fundamentals of Artificial Intelligence for Robotics	RBE4209	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1737	Robotic Simulation & Simultaneous Localization Mapping	RBE4210	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1738	Data Mining and Predictive Analysis	MLE4202	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1739	Data Warehousing and Multi-dimensional Modeling	MLE4203	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1740	Big Data Technologies	MLE4204	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1741	Data Mining and Predictive Analysis Lab	MLE4206	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1742	Data Warehousing and Multi-dimensional Modeling Lab	MLE4207	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1743	R-Programming Lab	MLE4208	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1744	Database and Knowledge Base Systems	MLE4209	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1745	Information Management System	MLE4210	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1746	Fundamental of Artificial Intelligence	MLE4211	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1747	Summer Internship Evaluation	AIE4335	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Report Writing, Presentation, Viva-Voce	2017
1748	Project Dissertation-I	AIE4337	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Report Writing, Presentation, Viva-Voce	2017
1749	Automation in Manufacturing Systems	RBE4301	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1750	Robotic Sensors, Vision and Hardware Implementation	RBE4302	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1751	Pattern Recognition & Image Processing	RBE4303	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1752	Robotic Sensors, Vision and Hardware Implementation Lab	RBE4304	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1753	Pattern Recognition & Image Processing Lab	RBE4305	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1754	Optimization Techniques	RBE4306	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1755	CNC Machines & Adaptive Control	RBE4307	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1756	Neural Network and Fuzzy Logic	RBE4308	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1757	Neural Network and Fuzzy Logic Lab	RBE4309	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1758	Decision Making Systems	RBE4310	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1759	Decision Making Systems Lab	RBE4311	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1760	Pattern Recognition and Image Processing	MLE4301	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1761	Neural Network and Fuzzy Logic	MLE4302	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1762	Pattern Recognition and Image Processing Lab	MLE4304	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1763	Neural Network and Fuzzy Logic Lab	MLE4305	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1764	Hadoop Lab	MLE4306	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1765	Optimization Techniques	MLE4308	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1766	Social Network Data Analytics	MLE4309	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1767	Agent Based Intelligent Systems	MLE4310	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1768	Project Dissertation-II	AIE4437	Master of Technology (Artificial Intelligence) (Specialisation: Robotics / Machine Learning)	Report Writing, Presentation, Viva-Voce	2017
1769	Advanced Database Management Systems	NCE4102	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1770	Digital Computer Organization	NCE4103	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1771	Advanced Computer Networks	NCE4104	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1772	Advanced Database Management Systems Lab	NCE4106	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1773	Advanced Computer Networks Lab	NCE4107	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1774	MATLAB Programming	NCE4108	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1775	Python Programming Lab	NCE4109	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1776	Network and Wireless Security	NCE4202	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1777	Cyber Crime and IT Law	NCE4203	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1778	Cyber Crime Investigation & Forensics	NCE4204	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1779	Intrusion Detection & Prevention System	NCE4205	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1780	Research Methodology & Technical Report Writing	NCE4206	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1781	Cryptography Foundation Lab	NCE4207	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1782	Web Security Lab	NCE4208	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1783	Network Security Lab	NCE4209	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1784	Big Data Systems	NCE4210	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1785	Distributed System Security	NCE4211	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1786	Block Chain Technology	NCE4212	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1787	Biometric Systems & Biometric Image Processing	NCE4301	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1788	Software Vulnerability Analysis	NCE4302	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1789	Applied Cryptography	NCE4303	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1790	Biometric Image Processing Lab	NCE4304	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1791	Applied Cryptography Lab	NCE4305	Master of Technology (Network & Cyber Security)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2017
1792	Summer Internship Evaluation	NCE4335	Master of Technology (Network & Cyber Security)	Report Writing, Presentation, Viva-Voce	2017
1793	Project Dissertation-I	NCE4337	Master of Technology (Network & Cyber Security)	Report Writing, Presentation, Viva-Voce	2017
1794	Web Application & Penetration Testing	NCE4306	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1795	Malware Analysis in Network Security	NCE4307	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1796	Web Security	NCE4308	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1797	Digital Watermarking & Stagenography	NCE4309	Master of Technology (Network & Cyber Security)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2017
1798	Project Dissertation-II	NCE4437	Master of Technology (Network & Cyber Security)	Report Writing, Presentation, Viva-Voce	2017
1799	Systems and Warfare Platforms Lab	DTE4104	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1800	Warfare Simulations & Strategies Lab	DTE4105	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1801	Seminar	DTE4138	Master of Technology (Defence Technology)	Quiz, Written Test, Report Writing	2021
1802	Numerical Methods for Science & Engineering	DTE4108	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1803	Communication Technology	DTE4109	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1804	Advanced Mechanical Engineering	DTE4110	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021

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1805	Military Electronics System Engineering	DTE4113	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1806	Seminar	DTE4238	Master of Technology (Defence Technology)	Quiz, Written Test, Report Writing	2021
1807	Professional Ethics	DTE4240	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1808	Test & Evaluation of Weapon System	DTE4203	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1809	Combat Vehicle Dynamics Lab	DTE4204	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1810	Combat System Engineering Lab	DTE4205	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1811	Aerospace System Configuration, Design & Simulation	DTE4206	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1812	Aerospace System Configuration, Design & Simulation Lab	DTE4209	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1813	Radar Technologies	DTE4211	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1814	Radar Technologies Lab	DTE4214	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1815	Digital & Satellite Communication and Navigation from Space Lab	DTE4215	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1816	Directed Energy Sources (Lasers, Microwave)	DTE4216	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1817	Directed Energy Sources (Lasers, Microwave) Lab	DTE4219	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1818	Beam Control Technology, Target acquisition, Beam Pointing & Tracking Lab	DTE4220	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1819	High Energy Materials Modeling & Simulation	DTE4221	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1820	Munitions and Target Response Lab	DTE4225	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1821	Robotics (MSS, MCC)	DTE4226	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1822	Software Defined Radios	DTE4244	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1823	Advanced Lightweight and Composite Structures	DTE4245	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1824	Test Methodologies for DEW Systems (Lasers & Microwave)	DTE4246	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1825	Advanced Analytical Techniques/ Lab Testing	DTE4247	Master of Technology (Defence Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2021
1826	Unmanned Aerial Vehicle Design	DTE4249	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1827	Naval Ocean Analysis and Prediction	DTE4250	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1828	Computational Aerodynamics	DTE4262	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1829	Data Acquisition, Tracking & Post Flight Analysis	DTE4265	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1830	Air Independent Propulsion & Batteries	DTE4266	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1831	Advanced Digital Modulation Technologies & Standards	DTE4267	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1832	Trajectories Modelling & Simulation	DTE4268	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1833	Sensor Technology	DTE4269	Master of Technology (Defence Technology)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2021
1834	Seminar / Industrial Training	DTE4335	Master of Technology (Defence Technology)	Quiz, Written Test, Report Writing	2021
1835	Project-Dissertation-I	DTE4337	Master of Technology (Defence Technology)	Report Writing, Presentation, Viva-Voce	2021
1836	Project-Dissertation-II	DTE4437	Master of Technology (Defence Technology)	Report Writing, Presentation, Viva-Voce	2021
1837	Digital Electronics	IFT2112	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1838	Computer Fundamentals & Tools	IFT2114	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1839	Computer Fundamentals & Tools Lab	IFT2115	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1840	Computer Programming with C Language	IFT2116	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1841	Computer Programming with C Language Lab	IFT2118	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1842	Introduction to Database Management System	IFT2202	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1843	Data Structure Through C Language	IFT2211	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1844	Data Structures Using C++ Language Lab	IFT2216	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011

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1845	Web Technologies	IFT2217	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1846	Computer Organization & Architecture	IFT2219	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1847	Web Technologies Lab	IFT2220	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1848	Discrete Mathematics Structures with Application to CS	IFT2222	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1849	Introduction to Database Management System Lab	IFT2223	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1850	Introduction to Object Oriented Programming with C++	IFT2312	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1851	Operating System	IFT2314	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1852	Object Oriented Programming with C++ Lab	IFT2315	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1853	Software Engineering	IFT2319	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1854	Operating System Lab	IFT2320	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1855	Fuzzy Logic	IFT2321	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1856	Accounting & Financial Management	IFT2323	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1857	Summer Internship Evaluation-I	IFT2335	Bachelor of Science (Information Technology)	Report Writing, Presentation, Viva-Voce	2011
1858	Design & Analysis of Algorithm	IFT2413	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1859	Data Communication & Computer Networks	IFT2418	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1860	Data Communication & Computer Networks Lab	IFT2420	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1861	Design & Analysis of Algorithm Lab	IFT2421	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1862	Computer Graphics	IFT2422	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1863	Computer Graphics Lab	IFT2423	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1864	Multimedia & Its Applications	IFT2424	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1865	Java Programming	IFT2510	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1866	Java Programming Lab	IFT2511	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1867	Computer Oriented Numerical Methods	IFT2517	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1868	Linux	IFT2522	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1869	Linux Lab	IFT2523	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1870	Basics of Cloud Computing	IFT2525	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1871	Summer Internship Evaluation-II	IFT2535	Bachelor of Science (Information Technology)	Report Writing, Presentation, Viva-Voce	2011
1872	Computer Oriented Statistical & Optimization Methods	IFT2616	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1873	Introduction to Open Source Technologies (PHP, MySQL)	IFT2618	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1874	Introduction to Open Source Technologies (PHP, MySQL) Lab	IFT2620	Bachelor of Science (Information Technology)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2011
1875	Internet of Things	IFT2622	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1876	Major Project / Dissertation	IFT2637	Bachelor of Science (Information Technology)	Report Writing, Presentation, Viva-Voce	2011
1877	Data Warehousing & Data Mining	IFT2604	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1878	Mobile Computing	IFT2611	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1879	E-Commerce	IFT2619	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1880	Cryptography & Network Security	IFT2621	Bachelor of Science (Information Technology)	Quiz, Class Performance, Group Discussion, Viva-Voce	2011
1881	Computer Fundamentals	IFT2111	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1882	Digital Electronics	IFT2112	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1883	Computer Programming with C Language	IFT2116	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1884	Computer Fundamentals Lab	IFT2117	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1885	Computer Programming with C Language Lab	IFT2118	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1886	Data & File Structure using C	IFT2211	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1887	Data & File Structures using C Lab	IFT2216	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1888	Web Technologies	IFT2217	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1889	Database Management System	IFT2218	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1890	Computer Organization & Architecture	IFT2219	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1891	Web Technologies Lab	IFT2220	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1892	Database Management System Lab	IFT2221	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1893	Object Oriented Programming with C++	IFT2312	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1894	Operating System	IFT2314	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1895	Object Oriented Programming with C++ Lab	IFT2315	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1896	Discrete Mathematical Structure with Applications to CS	IFT2317	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1897	Management Information System	IFT2318	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1898	Fundamentals of Software Engineering	IFT2319	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1899	Operating System Lab	IFT2320	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1900	Summer Internship Evaluation-I	IFT2335	Bachelor of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1901	Computer Networks	IFT2418	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1902	Principles of Management	IFT2419	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1903	Computer Networks Lab	IFT2420	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1904	Multimedia & Its Applications	IFT2424	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1905	Core Java Programming	IFT2510	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1906	Core Java Programming Lab	IFT2511	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1907	Accounting & Financial Management	IFT2518	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1908	Basics of Computer Graphics	IFT2519	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1909	Basics of Computer Graphics Lab	IFT2520	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1910	Summer Internship Evaluation-II	IFT2535	Bachelor of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1911	Computer Oriented Statistical & Optimization Methods	IFT2616	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1912	Introduction to Open Source Technologies (PHP, MySQL)	IFT2618	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1913	Introduction to Open Source Technologies Lab	IFT2620	Bachelor of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1914	Internet of Things	IFT2622	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1915	Major Project / Dissertation	IFT2637	Bachelor of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1916	Data Warehousing & Data Mining	IFT2604	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1917	Mobile Computing	IFT2611	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1918	E-Commerce	IFT2619	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1919	Cryptography & Network Security	IFT2621	Bachelor of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1920	Data Communication and Computer Networks	IFT4101	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1921	Software Engineering	IFT4103	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1922	Computer Graphics and Multimedia Systems	IFT4104	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1923	Data Communication and Computer Networks Lab	IFT4105	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1924	Computer Graphics and Multimedia Systems Lab	IFT4107	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1925	Mobile Computing	IFT4201	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1926	Programming with Java	IFT4202	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1927	Software Project Management	IFT4203	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1928	Artificial Intelligence	IFT4204	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1929	Programming with Java Lab	IFT4205	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1930	Software Project Management Lab	IFT4206	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1931	Artificial Intelligence Lab	IFT4207	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1932	Seminar	IFT4238	Master of Computer Application	Quiz, Written Test	2010
1933	Data Warehousing & Data Mining	IFT4301	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1934	Programming with dot NET Framework	IFT4302	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1935	Network Security & Cryptography	IFT4303	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1936	Soft Computing	IFT4304	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1937	Data Warehousing & Data Mining Lab	IFT4305	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1938	Programming with dot NET Framework Lab	IFT4306	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1939	Soft Computing Lab	IFT4307	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1940	Term Paper	IFT4331	Master of Computer Application	Academic writing, Presentation	2010
1941	Summer Internship Evaluation	IFT4335	Master of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1942	Android Programming	IFT4308	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1943	Android Programming Lab	IFT4309	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1944	Digital Image Processing	IFT4310	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1945	Digital Image Processing Lab	IFT4311	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1946	Big Data	IFT4312	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1947	Big Data Lab	IFT4313	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1948	Machine Learning using Python	IFT4401	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1949	Cloud Computing	IFT4402	Master of Computer Application	Quiz, Class Performance, Group Discussion, Viva-Voce	2010
1950	Machine Learning using Python Lab	IFT4403	Master of Computer Application	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2010
1951	Major Project / Dissertation	IFT4437	Master of Computer Application	Report Writing, Presentation, Viva-Voce	2010
1952	Renewable Energy Conversion Systems	SAE4101	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1953	Solar Thermal Engineering: Conversion and Storage; Flat plate Collectors and Concentrators	SAE4201	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1954	Solar Energy Storage Systems	SAE4203	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1955	Solar PV Lab	SAE4206	Master of Technology (Solar & Alternate Energy)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2012
1956	Lab Project	SAE4210	Master of Technology (Solar & Alternate Energy)	Practical Lab, Report Writing, Presentation, Viva-Voce	2012
1957	Financial Evaluation of Renewable Energy Technologies	SAE4205	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1958	Energy Access and Planning	SAE4211	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1959	Modelling and Simulation of Solar Thermal Systems	SAE4301	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1960	Design & Engineering of Solar PV Cells and Panels	SAE4302	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1961	Large Scale Grid Integration of Renewable Energy Sources	SAE4309	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1962	Solar Thermal Lab	SAE4305	Master of Technology (Solar & Alternate Energy)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2012
1963	Summer Internship Evaluation	SAE4335	Master of Technology (Solar & Alternate Energy)	Report Writing, Presentation, Viva-Voce	2012
1964	Wind Energy: Energy Conversion & Design of Turbines and Small Hydro Systems	SAE4307	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1965	Energy Policy	SAE4401	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1966	Green Buildings	SAE4402	Master of Technology (Solar & Alternate Energy)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
1967	Dissertation /Seminar & Progress Report /Comprehensive Viva	SAE4437	Master of Technology (Solar & Alternate Energy)	Report Writing, Presentation, Viva-Voce	2012
1968	Elements of Aerospace Engineering	ASE2351	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1969	Elements of Space Engineering	ASE2451	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1970	Aircraft System	ASE2551	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1971	Aircraft Stability & Control	ASE2651	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1972	Aircraft Performance	ASE2751	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1973	Introduction to Automatic Flight Control	ASE2851	Aerospace Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1974	Basics of Artificial Intelligence	CSE2351	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1975	Artificial Neural Networks	CSE2451	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1976	Fuzzy Logic	CSE2551	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1977	Introduction to Genetic Algorithm	CSE2651	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1978	Soft Computing	CSE2751	Artificial Intelligence (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1979	Project (Artificial Intelligence)	CSE2851	Artificial Intelligence (OE)	Report Writing, Viva-Voce, Presentation	2013
1980	Human Anatomy and Physiology-I	BME2351	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1981	Bioinstrumentation	BME2451	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1982	Tissue Engineering	BME2551	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1983	Biomechanic	BME2651	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1984	Medical Image Processing	BME2751	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1985	Seminar-Biomedical Engineering	BME2851	Biomedical (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1986	Computer Networks	CSE2353	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1987	Distributed System	CSE2453	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1988	High Performance Computing	CSE2553	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
1989	Information Storage Management	CSE2653	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1990	Interfacing with Virtualization	CSE2753	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1991	Cloud Computing Tools & Techniques	CSE2853	Cloud Computing (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1992	Introduction to Microprocessor System	ECE2352	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1993	Microcontroller	ECE2452	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1994	PCB Fabrication	ECE2552	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1995	Robotics and Automation	ECE2652	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1996	Simulation and Modeling	ECE2752	Embedded System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1997	Project (Embedded System)	ECE2852	Embedded System (OE)	Report Writing, Viva-Voce, Presentation	2013
1998	Engineering Geology	CIV2351	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
1999	Geo informatics	CIV2451	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2000	Geotechnical Engineering-I	CIV2551	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2001	Geotechnical Engineering-II	CIV2651	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2002	Project (Geotechnical Engineering)	CIV2751	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2003	Seminar-Geotechnical Engineering	CIV2851	Geotechnical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2004	Basic Instrumentation	ECE2351	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2005	Virtual Instrumentation	ECE2451	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2006	Biomedical Instrumentation	ECE2551	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2007	Analytical Instrumentation	ECE2651	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2008	Industrial Process Control	ECE2751	Instrumentation Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2009	Project (Instrumentation Engineering)	ECE2851	Instrumentation Engineering (OE)	Report Writing, Viva-Voce, Presentation	2013
2010	Basics of Lasers	LOE2351	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2011	Laser Technology & Applications	LOE2451	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2012	Laser Systems & Devices	LOE2551	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2013	Lasers in Defense Applications	LOE2651	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2014	Lasers in Industrial Applications	LOE2751	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2015	Lasers in Atmospheric Studies	LOE2851	Laser System (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2016	Thermodynamics	MAE2352	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2017	Fluid Power Systems	MAE2452	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2018	KOM	MAE2552	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2019	DOM	MAE2652	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2020	Meteorology	MAE2752	Mechanical Engineering (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2013
2021	Project (Mechanical Engineering)	MAE2852	Mechanical Engineering (OE)	Report Writing, Viva-Voce, Presentation	2013
2022	Basics of Nanoscience	NAT2152	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2023	Properties of Nanomaterials	NAT2251	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2024	Vacuum Science & Clean Room Technology	NAT2352	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2025	Synthesis of Nanomaterials	NAT2452	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2026	Characterization Techniques	NAT2552	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2027	Industrial Applications of Nanomaterials	NAT2652	Nanotechnology (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion	2013
2028	Renewable Energy Conversion Systems	SAE2151	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
2029	Introduction to Solar Thermal Engineering	SAE2251	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
2030	Introduction to Solar Photovoltaic	SAE2351	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
2031	Energy from Wastes	SAE2451	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
2032	Renewable Energy for Heat Applications	SAE2551	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
2033	Energy Audit and Energy Management	SAE2651	Renewable Energy (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2015
2034	Introduction to UAVs and Applications	ASE2352	Unmanned Aerial Vehicles (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2021
2035	Principles of UAV's Flight	ASE2452	Unmanned Aerial Vehicles (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2021

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2036	Aerial Imagery: Hardware & Software	ASE2552	Unmanned Aerial Vehicles (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2021
2037	Embedded Systems for UAVs	ASE2652	Unmanned Aerial Vehicles (OE)	Quiz, Viva-Voce, Presentation, Case-Discussion, Simulation	2021
2038	Research Project-I Drone Development	ASE2752	Unmanned Aerial Vehicles (OE)	Report Writing, Viva-Voce, Presentation	2021
2039	Research Project-II Drone Troubleshooting, Testing & Deployment	ASE2852	Unmanned Aerial Vehicles (OE)	Report Writing, Viva-Voce, Presentation	2021
2040	Inorganic Chemistry Lab-I	CHY2103	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2041	Organic Chemistry Lab-I	CHY2104	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2042	Physics Lab-I	CHY2107	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2043	Physical Chemistry-I	CHY2201	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2044	Physical Chemistry Lab-I	CHY2203	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2045	Analytical Chemistry Lab	CHY2204	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2046	Physics Lab-II	CHY2207	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2047	Inorganic Chemistry Lab-II	CHY2305	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2048	Organic Chemistry Lab-II	CHY2306	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2049	Physical Chemistry Lab-II	CHY2307	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2050	Industrial Chemistry	CHY2308	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2051	Bioinorganic Chemistry	CHY2309	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2052	Polymer Chemistry	CHY2404	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2053	Inorganic Chemistry Lab-III	CHY2405	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2054	Organic Chemistry Lab-III	CHY2406	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2055	Physical Chemistry Lab-III	CHY2407	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2056	Green Chemistry	CHY2408	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2057	Agricultural Chemistry	CHY2409	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2058	Term Paper & Workshop	CHY2431	Bachelor of Science (Hons.) (Chemistry)	Academic Writing, Presentation	2014
2059	Project (with Presentation & Evaluation)	CHY2432	Bachelor of Science (Hons.) (Chemistry)	Project writing, Presentation, Viva-Voce	2014
2060	Inorganic Chemistry Lab-IV	CHY2504	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2061	Organic Chemistry Lab-IV	CHY2505	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2062	Physical Chemistry Lab-IV	CHY2506	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2063	Summer Project Evaluation/ Study Abroad Programme	CHY2535	Bachelor of Science (Hons.) (Chemistry)	Report Writing, Presentation, Viva-Voce	2014
2064	Food & Nutrition Chemistry	CHY2507	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2065	Quantum Chemistry	CHY2508	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2066	Technical Writing in Science-I & Workshop	CHY2509	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2067	Term Paper & Workshop	CHY2531	Bachelor of Science (Hons.) (Chemistry)	Academic Writing, Presentation	2014
2068	Spectroscopy	CHY2604	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2069	Basics of Computer Programming in C and its Application in Chemistry	CHY2605	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2070	Inorganic Chemistry Lab-V	CHY2606	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2071	Organic Chemistry Lab-V	CHY2607	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2072	Physical Chemistry Lab-V	CHY2608	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2073	Programming in C Lab	CHY2609	Bachelor of Science (Hons.) (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2074	Material Chemistry	CHY2610	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2075	Nanochemistry	CHY2611	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2076	Technical Writing in Science-II & Workshop	CHY2612	Bachelor of Science (Hons.) (Chemistry)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2077	Term Paper & Workshop	CHY2631	Bachelor of Science (Hons.) (Chemistry)	Academic Writing, Presentation	2014
2078	Project (with Presentation & Evaluation)	CHY2632	Bachelor of Science (Hons.) (Chemistry)	Project writing, Presentation, Viva-Voce	2014
2079	Computer Fundamentals	MTH2214	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2080	Introduction to C Programming	MTH2318	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2081	C Programming Lab	MTH2319	Bachelor of Science (Hons.) (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2082	Mechanics	MTH2503	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2083	Operations Research	MTH2504	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2084	Scientific Computing	MTH2520	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2085	Summer Workshop/ Study Abroad Programme	MTH2535	Bachelor of Science (Hons.) (Mathematics)	Report Writing, Presentation, Viva-Voce	2014

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2086	Fuzzy Sets and Fuzzy Logic	MTH2518	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2087	R Programming and SAS	MTH2519	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2088	Digital Electronics	MTH2521	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2089	Special Functions & Integral Transforms	MTH2615	Bachelor of Science (Hons.) (Mathematics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2090	Mechanics	PHY2101	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2091	Waves & Oscillations	PHY2102	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2092	Physics Lab-I	PHY2104	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2093	Applied Chemistry Lab-I	PHY2107	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2094	Optics	PHY2202	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2095	Physics Lab-II	PHY2204	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2096	Applied Chemistry Lab-II	PHY2207	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2097	Electricity & Magnetism	PHY2301	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2098	Analog Electronics	PHY2303	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2099	Physics Lab-III	PHY2304	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2100	Classical Mechanics	PHY2309	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2101	Computer programming in C	PHY2306	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2102	Term Paper & Workshop	PHY2331	Bachelor of Science (Hons.) (Physics)	Academic Writing, Presentation, Quiz	2014
2103	Physics Lab-IV	PHY2404	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2104	Quantum Mechanics	PHY2410	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2105	Digital Electronics	PHY2411	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2106	Laser Physics	PHY2406	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2107	Term Paper & Workshop	PHY2431	Bachelor of Science (Hons.) (Physics)	Academic Writing, Presentation, Quiz	2014
2108	Nuclear & Particle Physics	PHY2503	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2109	Physics Lab-V	PHY2504	Bachelor of Science (Hons.) (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2110	Solid State Physics	PHY2506	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014

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2111	Atomic & Molecular Physics	PHY2510	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2112	Summer Project Evaluation/ Study Abroad Programme	PHY2535	Bachelor of Science (Hons.) (Physics)	Report Writing, Presentation, Viva-Voce	2014
2113	Introduction to MATLAB	PHY2512	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2114	Semiconductor Physics	PHY2513	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2115	Term Paper & Workshop	PHY2531	Bachelor of Science (Hons.) (Physics)	Academic Writing, Presentation, Quiz	2014
2116	Introduction to Nanotechnology	PHY2606	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2117	Instrumentation Techniques	PHY2610	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2118	Low Temperature Physics and Superconductivity	PHY2605	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2119	Introduction to Astronomy	PHY2611	Bachelor of Science (Hons.) (Physics)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2120	Term Paper & Workshop	PHY2631	Bachelor of Science (Hons.) (Physics)	Academic Writing, Presentation, Quiz	2014
2121	Study Abroad	PHY2634	Bachelor of Science (Hons.) (Physics)	Written Test, Country Report	2014
2122	Introduction to Forensic Science	FCH2102	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2123	Fundamentals of Crime Scene Investigation	FCH2103	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2124	Human Anatomy and Physiology	FCH2107	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2125	Crime Scene Investigation Lab	FCH2108	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2126	Physical Evidence in Forensic Science	FCH2201	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2127	Fingerprint Science	FCH2202	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2128	Metric System & Physical Properties of Evidences	FCH2203	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2129	Fingerprinting Lab	FCH2207	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2130	Metric System Lab	FCH2208	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2131	Forensic Serology	FCH2302	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2132	Forensic Serology Lab	FCH2311	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2133	Questioned Documents-I	FCH2312	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2134	Research Methodology and Statistics	FCH2313	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2135	Cyber Forensics	FCH2315	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2136	Fundamentals of Forensic Photography	FCH2402	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2137	Forensic Anthropology	FCH2403	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2138	Forensic Anthropology Lab	FCH2410	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2139	Questioned Documents-II	FCH2412	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2140	Questioned Documents Lab	FCH2414	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2141	Wildlife Forensics	FCH2415	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2142	Term Paper	FCH2431	Bachelor of Science (Hons.) (Forensic Science)	Academic Writing, Presentation	2014
2143	Project (with Presentation & Evaluation)	FCH2432	Bachelor of Science (Hons.) (Forensic Science)	Project writing, Presentation, Viva-Voce	2014
2144	Workshop / Certification (Discipline Specific) (1credit per workshop)	FCH2433	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Written Test	2014
2145	DNA Fingerprinting	FCH2502	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2146	Instrumentation- Biological	FCH2505	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2147	DNA Fingerprinting Lab	FCH2511	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2148	Microscopy	FCH2513	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2149	Forensic Toxicology Lab	FCH2515	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2150	Summer Internship Evaluation/ Study Abroad Programme	FCH2535	Bachelor of Science (Hons.) (Forensic Science)	Report Writing, Presentation, Viva-Voce	2014
2151	Technical Writing in Science-I	FCH2509	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2152	Arson and Explosive	FCH2516	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2153	Quality Management and Ethics	FCH2517	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2154	Term Paper	FCH2531	Bachelor of Science (Hons.) (Forensic Science)	Academic Writing, Presentation	2014
2155	Workshop / Certification (Discipline Specific) (1credit per workshop)	FCH2533	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Written Test	2014
2156	Forensic Medicine	FCH2616	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2157	Ballistics	FCH2617	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2158	Ballistics Lab	FCH2619	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2159	Forensic Psychology	FCH2610	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2160	Technical Writing in Science-II & Workshop	FCH2612	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Class Performance, Group Discussion, Viva-Voce	2014
2161	Seminar	FCH2614	Bachelor of Science (Hons.) (Forensic Science)	Quiz, Written Test	2014
2162	Term Paper & Workshop	FCH2631	Bachelor of Science (Hons.) (Forensic Science)	Academic Writing, Presentation, Quiz	2014
2163	Minor Project (with Presentation & Evaluation)	FCH2632	Bachelor of Science (Hons.) (Forensic Science)	Project writing, Presentation, Viva-Voce	2014
2164	Physical Chemistry Lab	CHY4105	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2165	Organic Chemistry Lab	CHY4106	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2166	Cheminformatics & Biochemistry Lab	CHY4112	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2167	Research Seminar	CHY4108	Master of Science (Chemistry)	Quiz, Written Test	2013
2168	Analytical Chemistry	CHY4201	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2169	Industrial Chemistry	CHY4202	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2170	Organometallic Chemistry	CHY4211	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2171	Introduction to Laboratory Safety	CHY4212	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2172	Spectroscopy	CHY4213	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2173	Analytical Chemistry Lab	CHY4206	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2174	Industrial Chemistry Lab	CHY4207	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2175	Term Paper	CHY4231	Master of Science (Chemistry)	Academic Writing, Presentation, Quiz	2013
2176	Inorganic Chemistry Lab	CHY4324	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2177	Natural Products & Heterocyclic Chemistry	CHY4325	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2178	Summer Internship Evaluation/ Study Abroad Programme	CHY4335	Master of Science (Chemistry)	Report Writing, Presentation, Viva-Voce	2013
2179	Instrumentation Workshop	CHY4320	Master of Science (Chemistry)	Academic Writing, Presentation, Quiz	2013
2180	Drugs and Dyes	CHY4304	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013

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2181	Advanced Natural Products Chemistry	CHY4305	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2182	Industrial Management and Safety Processes	CHY4307	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2183	Advanced Nanochemistry	CHY4308	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2184	Chemistry of Cosmetics	CHY4309	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2185	Medicinal Chemistry	CHY4310	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2186	Polymer Technology	CHY4311	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2187	Non-Conventional Energy Sources	CHY4312	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2188	Industrial Waste and Water Treatment	CHY4313	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2189	Nuclear Chemistry	CHY4314	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2190	Food Technology	CHY4315	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2191	Environmental Chemistry	CHY4321	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2192	Renewable Energy Conversion Systems	CHY4322	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2193	Introduction to Polymeric Materials	CHY4405	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2194	Chemistry of Nanomaterials	CHY4407	Master of Science (Chemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2195	Good Laboratory Practices Seminar	CHY4408	Master of Science (Chemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2196	Major Project	CHY4437	Master of Science (Chemistry)	Report Writing, Presentation, Viva-Voce	2013
2197	Computing and C Programming	MTH4105	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2198	C Programming Lab	MTH4106	Master of Science (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013

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2199	Topology	MTH4205	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2200	Statistics Based Lab	MTH4206	Master of Science (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2201	Introduction to MATLAB	MTH4215	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2202	MATLAB Programming Lab	MTH4216	Master of Science (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2203	Operations Research	MTH4217	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2204	Numerical Analysis	MTH4325	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2205	Numerical Analysis Lab	MTH4327	Master of Science (Mathematics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2013
2206	Summer Workshop/ Study Abroad Programme	MTH4335	Master of Science (Mathematics)	Report Writing, Presentation, Viva-Voce	2013
2207	Number Theory & Cryptography	MTH4329	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2208	Statistical Methods	MTH4341	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2209	Fluid Dynamics	MTH4409	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2210	Workshop	MTH4433	Master of Science (Mathematics)	Quiz, Written Test	2013
2211	Project	MTH4437	Master of Science (Mathematics)	Project Writing, Presentation, Viva-Voce	2013
2212	Classical Mechanics	MTH4410	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2213	Biomechanics	MTH4412	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2214	Stochastic Processes	MTH4414	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2215	Statistical Inference	MTH4415	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2216	Numerical Solutions to ODE and PDEs	MTH4416	Master of Science (Mathematics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2013
2217	Classical Mechanics	PHY4102	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012

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2218	Electronics	PHY4103	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2219	Quantum Mechanics-I	PHY4109	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2220	Computational Physics	PHY4110	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2221	Integrated Physics Lab-I	PHY4111	Master of Science (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2012
2222	Statistical Mechanics	PHY4202	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2223	Quantum Mechanics-II	PHY4208	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2224	Electrodynamics	PHY4215	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2225	Atomic and Molecular Physics	PHY4216	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2226	Integrated Physics Lab-II	PHY4212	Master of Science (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2012
2227	Nuclear & Particle Physics	PHY4321	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2228	Laser Physics	PHY4322	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2229	Integrated Physics Lab-III	PHY4316	Master of Science (Physics)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2012
2230	Summer Internship Evaluation/ Study Abroad Programme	PHY4335	Master of Science (Physics)	Report Writing, Presentation, Viva-Voce	2012
2231	Digital Electronics & Microprocessors	PHY4306	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2232	Material Science	PHY4307	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2233	Renewable Energy Resources	PHY4317	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2234	Introduction to Astrophysics	PHY4318	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2235	Experimental Techniques	PHY4410	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2236	Nano-Science & Technology	PHY4404	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2237	Atmospheric Physics	PHY4405	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2238	General Relativity & Cosmology	PHY4406	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2239	Optical Fibers & Communications	PHY4407	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2240	Physics of Solar Photovoltaics	PHY4408	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2241	Biophysics	PHY4409	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2242	Radiation Physics	PHY4411	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2243	High Energy Physics	PHY4413	Master of Science (Physics)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2012
2244	Forensic Physics	FCH4103	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2245	Forensic Ballistics	FCH4106	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2246	Forensic Physics Lab	FCH4107	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2247	Crime Scene Investigation (CSI) Lab	FCH4108	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2248	Forensic and Criminal Investigation	FCH4111	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2249	Instrumentation (Chemical)	FCH4112	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2250	Research Seminar	FCH4110	Master of Science (Forensic Science)	Academic Writing, Presentation, Quiz	2014
2251	Forensic Photography	FCH4201	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2252	Elements of Forensic Medicine and Odontology	FCH4202	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2253	Questioned Documents	FCH4205	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2254	Forensic Medicine & Odontology Lab	FCH4206	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2255	Questioned Documents & Fingerprints Lab	FCH4208	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2256	Instrumentation (Biological)	FCH4209	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2257	Fingerprint Science	FCH4210	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2258	Term Paper	FCH4231	Master of Science (Forensic Science)	Academic Writing, Presentation, Quiz	2014
2259	Forensic Chemistry, Toxicology & Pharmacology	FCH4301	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2260	Forensic Biology & Serology	FCH4302	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2261	Forensic Biology and Serology Lab	FCH4304	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2262	Forensic Chemistry & Toxicology Lab	FCH4305	Master of Science (Forensic Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2263	Statistics & Research Methodology	FCH4315	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2264	Instrumentation (Physical)	FCH4316	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2265	Instrumentation Workshop	FCH4318	Master of Science (Forensic Science)	Academic Writing, Presentation, Quiz	2014
2266	Summer Internship Evaluation/ Study Abroad Programme	FCH4335	Master of Science (Forensic Science)	Report Writing, Presentation, Viva-Voce	2014
2267	Advanced Forensic Biology & Anthropology	FCH4306	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2268	Cyber Forensic & Computer Application	FCH4317	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2269	Forensic Genetics	FCH4319	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2270	Advanced Questioned Documents & Fingerprint Examination	FCH4310	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2271	Advanced Forensic Chemistry and Toxicology	FCH4320	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2272	Forensic Wildlife and Entomology	FCH4321	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2273	Quality Management & Accreditation in Forensic Science Laboratories	FCH4405	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2274	Forensic Psychology	FCH4408	Master of Science (Forensic Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2275	Good Laboratory Practices Seminar	FCH4409	Master of Science (Forensic Science)	Academic Writing, Presentation, Quiz	2014
2276	Major Project	FCH4437	Master of Science (Forensic Science)	Report Writing, Presentation, Viva-Voce	2014
2277	Biostatistics	BCH4102	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2278	Biochemistry Lab	BCH4105	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2279	Instrumentation Techniques	BCH4106	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2280	Biochemical Engineering Lab	BCH4107	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2281	Research Seminar	BCH4108	Master of Science (Biochemistry)	Report Writing, Presentation, Viva-Voce	2014
2282	Biochemistry of Proteins and Enzymes	BCH4109	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2283	Bioinformatics Lab	BCH4111	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2284	Advanced Biochemistry Lab	BCH4206	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2285	Cell Biology and Genetics Lab	BCH4207	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2286	Clinical and Protein Biochemistry Lab	BCH4208	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2287	Immunology	BCH4209	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2288	Term Paper	BCH4231	Master of Science (Biochemistry)	Academic Writing, Presentation, Viva-Voce	2014
2289	Recombinant DNA Technology	BCH4301	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2290	Molecular Biology	BCH4303	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2291	Molecular Biology & Microbiology Lab	BCH4306	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2292	Instrumentation and Genetic Engineering Lab	BCH4307	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2293	Summer Internship Evaluation/ Study Abroad Programme	BCH4335	Master of Science (Biochemistry)	Report Writing, Presentation, Viva-Voce	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2294	Microbiology	BCH4308	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2295	Ecology and Evolution	BCH4310	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2296	Microbiology Lab	BCH4311	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2297	Ecology and Evolution Lab	BCH4313	Master of Science (Biochemistry)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2014
2298	Methodologies of Biochemistry	BCH4409	Master of Science (Biochemistry)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2014
2299	Good Laboratory Practices Seminar	BCH4407	Master of Science (Biochemistry)	Academic Writing, Presentation, Viva-Voce	2014
2300	Major Project	BCH4437	Master of Science (Biochemistry)	Report Writing, Presentation, Viva-Voce	2014
2301	Computer Forensics	FCH2151	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
2302	Ethics, Policies and the IT Act	FCH2251	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
2303	Behavioral Biometrics	FCH2351	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
2304	Implementation Practical on MATLAB	FCH2451	Computer Forensics & Cyber Security (OE)	Lab Record, Quiz, Class Performance, Group Discussion, Viva-Voce	2015
2305	Cyber Security	FCH2551	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
2306	Incident Response Management	FCH2651	Computer Forensics & Cyber Security (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2015
2307	Optimization Techniques	MTH2151	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2308	Statistics	MTH2251	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2309	Data Mining	MTH2351	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2310	Database Management System	MTH2451	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2311	Introduction to Financial Modeling	MTH2551	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2312	Statistical Quality Control	MTH2651	Data Analytics (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2313	Fundamentals of Materials Science	PHY2151	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
2314	Classification & Selection of Materials	PHY2251	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
2315	Properties of Materials	PHY2351	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
2316	Manufacturing Processes for Materials	PHY2451	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019

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2317	Materials Testing & Characterization	PHY2551	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
2318	Materials at Nanoscale	PHY2651	Materials Science & Technology (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2019
2319	Cosmetic Formulation	CHY2351	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2320	Industrial Management and Safety Process	CHY2451	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2321	Drug Design	CHY2551	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2322	Application of Nanotechnology in Medicine	CHY2651	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2323	Intellectual Property Rights and Quality Assurance	CHY2751	Pharmaceuticals (OE)	Quiz, Class Performance, Group Discussion, Viva-Voce	2013
2324	Pharmaceutical and Cosmetics Sciences Lab	CHY2851	Pharmaceuticals (OE)	Lab Record, Quiz, Group Discussion, Viva-Voce	2013
2325	Polymerization	PTE2151	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2326	Waste Plastic Recycling	PTE2251	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2327	Polymer Technology	PTE2351	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2328	Rubber & Tyre Technology	PTE2451	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2329	Polymeric Nano Composites	PTE2551	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2330	Bio-Medical Plastics	PTE2651	Polymer Technology (OE)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2331	Earth Surface Features & Processes	ESC2102	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2332	Chemistry Laboratory	ESC2107	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2333	Field Survey-I	ESC2108	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
2334	Crystallography & Mineralogy	ESC2201	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2335	Structural Geology	ESC2210	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014

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2336	Earth Science Laboratory-I	ESC2208	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2337	Field Survey-II	ESC2209	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
2338	Igneous Petrology	ESC2301	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2339	Sedimentology	ESC2302	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2340	Metamorphic Petrology	ESC2303	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2341	Atmospheric Science	ESC2304	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2342	Marine Science	ESC2309	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2343	Earth Science Laboratory-II	ESC2307	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2344	Field Survey-III	ESC2308	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
2345	Summer Project Evaluation-I	ESC2335	Bachelor of Science (Hons.) (Earth Science)	Report Writing, Presentation, Viva-Voce	2014
2346	Economic Geology	ESC2405	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2347	Remote Sensing & GIS	ESC2410	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2348	Geophysics	ESC2412	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2349	Paleontology	ESC2413	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2350	Earth Science Laboratory-III	ESC2408	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2351	Field Survey-IV	ESC2409	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
2352	Exploration Geology	ESC2503	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014

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2353	Stratigraphy of India	ESC2509	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2354	Engineering Geology	ESC2510	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2355	Hydrogeology	ESC2511	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2356	Earth Science Laboratory-IV	ESC2507	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2357	Field Survey-V	ESC2508	Bachelor of Science (Hons.) (Earth Science)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
2358	Summer Project Evaluation-II	ESC2535	Bachelor of Science (Hons.) (Earth Science)	Report Writing, Presentation, Viva-Voce	2014
2359	Coal and Petroleum Geology	ESC2603	Bachelor of Science (Hons.) (Earth Science)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2360	Workshop / Seminar / Conference/ Symposium	ESC2633	Bachelor of Science (Hons.) (Earth Science)	Academic Writing, Presentation, Quiz	2014
2361	Dissertation	ESC2637	Bachelor of Science (Hons.) (Earth Science)	Report Writing, Presentation, Viva-Voce	2014
2362	Ecology and Ecosystem Dynamics	ENV4101	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2363	Earth System Sciences	ENV4102	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2364	Environmental Biology	ENV4103	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2365	Chemistry of Environment	ENV4109	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2366	Environmental Physics & Energy	ENV4110	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2367	Analytical Laboratory-I	ENV4107	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2368	Term Paper/Seminar	ENV4131	Master of Science (Environmental Science & Management)	Academic Writing, Presentation, Quiz	2014
2369	Pollution Control and Management	ENV4201	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2370	Environmental Analysis: Tools and Techniques	ENV4204	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014

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2371	Atmospheric Science & Climate Change	ENV4209	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2372	Geoinformatics for Environmental Management	ENV4210	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2373	Statistical Tools and Research Methodology	ENV4211	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2374	Analytical Laboratory-II	ENV4212	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2375	Term Paper/Seminar	ENV4231	Master of Science (Environmental Science & Management)	Academic Writing, Presentation, Quiz	2014
2376	Project (Field Survey)	ENV4232	Master of Science (Environmental Science & Management)	On site validation, Hands on Training, Institute & Industry visit, Laboratory Training	2014
2377	Environmental Conservation and Sustainable Development	ENV4301	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2378	Water Resources Management	ENV4313	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2379	Eco-toxicology, Health and Safety	ENV4314	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2380	Waste Management & Valorization	ENV4315	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2381	Analytical Laboratory -III	ENV4316	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2382	Term Paper/Seminar/ Workshop/ Conference/ Training	ENV4331	Master of Science (Environmental Science & Management)	Academic Writing, Presentation, Quiz	2014
2383	Summer Internship Evaluation + Project Formulation	ENV4335	Master of Science (Environmental Science & Management)	Report Writing, Presentation, Viva-Voce	2014
2384	Environmental Biotechnology	ENV4309	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2385	Environmental Geology	ENV4310	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2386	Green Energy	ENV4311	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2387	Waste Water Treatment	ENV4312	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014

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2388	Environmental Law and Environmental Impact Assessment	ENV4401	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2389	Urban Ecosystem and Industrial Ecology	ENV4402	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2390	Natural Hazards and Disaster Management	ENV4403	Master of Science (Environmental Science & Management)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2391	Term Paper/Seminar (Research Article)	ENV4431	Master of Science (Environmental Science & Management)	Academic Writing, Presentation, Quiz	2014
2392	Research based Project work	ENV4437	Master of Science (Environmental Science & Management)	Report Writing, Presentation, Viva-Voce	2014
2393	Environmental Studies-I	ENV2151	Environmental Studies (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2394	Environmental Studies-II	ENV2251	Environmental Studies (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2395	Environmental Studies	ENV2152/ ENV2252	Environmental Studies (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2396	Basics of Climate Science	AST2151	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2397	Introduction to Earth System Science	AST2251	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2398	Cloud Microphysics and Chemistry	AST2351	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2399	Climate Change: Impact, Vulnerability and Adaption	AST2451	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2400	Primer of Oceanography	AST2551	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2401	Fundamentals of Climate Variability and Modeling	AST2651	Climate Science (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2014
2402	Environmental Pollution and Waste Management	ENV2351	Environmental Management (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2403	Environmental Management and Industrial Safety	ENV2451	Environmental Management (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2404	Environmental Economics and Globalization	ENV2551	Environmental Management (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2405	Sustainable Development Practices	ENV2651	Environmental Management (OE)	Quiz, Viva-Voce, Presentation, Project Report	2013
2406	Linkages between Environment and Health	AST2152	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2407	Climate Change and Implications on Public Health	AST2252	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2408	Diseases in Contemporary Society	AST2352	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2409	Air, Water and Soil Pollution, Environmental Health Professions	AST2452	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2410	Ground-based and Satellite Remote Sensing	AST2552	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2411	Instrumentation Lab	AST2652	Environmental Health & Climate (OE)	Hands on Training, Institute & Industry visit, Laboratory Training	2021
2412	Computers Applications	BTH2103	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2413	Plant Sciences-I Lab	BTH2104	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2414	Animal Sciences-I Lab	BTH2105	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2415	Computers Applications Lab	BTH2106	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2416	Microbial Biotechnology	BTH2107	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2417	Food Biotechnology	BTH2108	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2418	Agriculture Biotechnology	BTH2109	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2419	Term Paper	BTH2131	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2420	Project (with Presentation & Evaluation)	BTH2132	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2421	Workshop / Certification (Discipline Specific) (1credit per workshop)	BTH2133	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2422	Study Abroad	BTH2134	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2423	Plant sciences-II Lab	BTH2205	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2424	Animal sciences-II Lab	BTH2206	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2425	Plant Physiology Lab	BTH2207	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2426	Animal Physiology Lab	BTH2208	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2427	Molecular Modeling	BTH2209	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2428	Bio-safety and Bioethics	BTH2210	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2429	Bioinformatics	BTH2211	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2430	Term Paper	BTH2231	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2431	Project(with Presentation &Evaluation)	BTH2232	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2432	Workshop/ Certification (Discipline Specific) (1credit per workshop)	BTH2233	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2433	Study Abroad	BTH2234	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2434	Microbiology	BTH2302	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2435	Enzymology	BTH2303	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2436	Biochemistry Lab	BTH2305	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2437	Microbiology Lab	BTH2306	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2438	Enzymology Lab	BTH2307	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2439	Genetics & Cell Biology Lab	BTH2308	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2440	Intellectual property rights	BTH2309	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2441	Pharmaceutical Biotechnology	BTH2310	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2442	Clinical Biotechnology	BTH2311	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2443	Term Paper	BTH2331	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2444	Project(with Presentation &Evaluation)	BTH2332	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2445	Workshop/ Certification (Discipline Specific) (1credit per workshop)	BTH2333	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2446	Study Abroad	BTH2334	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2447	Introductory Immunology	BTH2402	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2448	Instrumentation & Bioanalytical techniques	BTH2403	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2449	Research Methodology	BTH2404	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2450	In Silico analysis of Biomolecules	BTH2405	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2451	Molecular Biology Lab	BTH2406	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2452	Introductory Immunology Lab	BTH2407	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2453	In Silico analysis of Biomolecules Lab	BTH2408	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2454	Nano Biotechnology	BTH2409	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2455	Forensic Biotechnology	BTH2410	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2456	Genetically Modified Organism (Crops/Animals)	BTH2411	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2457	Term Paper	BTH2431	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2458	Project (with Presentation & Evaluation)	BTH2432	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2459	Workshop / Certification (Discipline Specific) (1credit per workshop)	BTH2433	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2460	Study Abroad	BTH2434	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2461	Marine biotechnology	BTH2504	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2462	Biosensors	BTH2505	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2463	Animal Biotechnology Lab	BTH2509	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2464	Plant Biotechnology Lab	BTH2510	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2465	Modern Killer diseases	BTH2506	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2466	Biofuels and Green Biotechnology	BTH2507	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2467	Artificial Neural Network	BTH2508	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2468	Introductory Nanobiotechnology	BTH2511	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2469	Integrated Biomaterials	BTH2512	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2470	Term Paper	BTH2531	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2471	Project (with Presentation & Evaluation)	BTH2532	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2472	Workshop / Certification (Discipline Specific) (1credit per workshop)	BTH2533	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2473	Study Abroad	BTH2534	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2474	Genomics & Proteomics	BTH2602	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2475	Industrial Biotechnology	BTH2603	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2476	Stress Biology	BTH2604	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2477	Recombinant DNA Technology Lab	BTH2605	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2478	Genomics & Proteomics Lab	BTH2609	Bachelor of Science (Hons.) (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2479	Biosafety Management	BTH2606	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2480	Drug Design and Development	BTH2607	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2481	Bioprocess Technology	BTH2608	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2482	Term Paper	BTH2631	Bachelor of Science (Hons.) (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2483	Project (with Presentation & Evaluation)	BTH2632	Bachelor of Science (Hons.) (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2484	Workshop / Certification (Discipline Specific) (1credit per workshop)	BTH2633	Bachelor of Science (Hons.) (Biotechnology)	Quiz, Written Test	2010
2485	Study Abroad	BTH2634	Bachelor of Science (Hons.) (Biotechnology)	Written Test, Country Report	2010
2486	Plant & Animal Diversity Lab-I	BLS2106	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2487	Chemistry Lab-I	BLS2107	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2488	Physics Lab-I	BLS2108	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2489	Plant & Animal Diversity Lab II	BLS2206	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2490	Chemistry Lab II	BLS2207	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2491	Physics Lab II	BLS2208	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2492	Plant & Animal Anatomy Lab	BLS2305	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2493	Cell biology & Genetics Lab	BLS2306	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2494	Project (with Presentation & Evaluation)	BLS2332	Bachelor of Science (Hons.) (Biological Science)	Project Writing, Presentation, Viva-Voce	2014
2495	Microbiology	BLS2403	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2496	Biostats & Bioinformatics	BLS2404	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2497	Ecology & Evolution	BLS2405	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2498	Plant & Animal Physiology Lab	BLS2406	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2499	Microbiology Lab	BLS2407	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2500	Molecular Biology	BLS2501	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2501	Immunology	BLS2503	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2502	Bio-analytical & Biophysical Techniques	BLS2504	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2503	Biomaterials	BLS2505	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2504	Molecular Biology Lab	BLS2506	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2505	Immunology Lab	BLS2507	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2506	Biochemistry & Bio-analytical Lab	BLS2508	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2507	Summer Internship Project (Evaluation)	BLS2535	Bachelor of Science (Hons.) (Biological Science)	Report Writing, Presentation, Viva-Voce	2014

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2508	Recombinant DNA Technology	BLS2601	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2509	Genomics &proteomics	BLS2602	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2510	IPR, Biosafety & Bioethics	BLS2603	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2511	Applied Biology	BLS2604	Bachelor of Science (Hons.) (Biological Science)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2014
2512	Recombinant DNA Technology Lab	BLS2605	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2513	Applied Biology Lab	BLS2606	Bachelor of Science (Hons.) (Biological Science)	Practical, Lab Visit, Lab Record, Class Performance	2014
2514	Introduction to Computers & Programming in 'C'	BTE2104	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2515	Electrical Science	BTE2106	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2516	Programming in C Lab	BTE2108	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2517	Electrical Science Lab	BTE2110	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2518	Engineering Chemistry Lab	BTE2113	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2519	Object Oriented Programming in C++	BTE2203	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2520	Object Oriented Programming in C++ Lab	BTE2205	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2521	Engineering Graphics Lab	BTE2206	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2522	Life Sciences	BTE2210	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2523	Cell Biology & Genetics	BTE2301	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2524	Biostatistics	BTE2303	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2525	Database Management System	BTE2304	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2526	Cell Biology & Genetics Lab	BTE2307	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2527	Database Management System Lab	BTE2308	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2528	Industrial Biotechnology	BTE2309	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2529	Fermentation technology	BTE2310	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2530	Drug Design and Development	BTE2311	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2531	Recombinant DNA Technology	BTE2312	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2532	Term Paper	BTE2331	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2533	Project (with Presentation & Evaluation)	BTE2332	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2534	Workshop / Certification (Discipline Specific)	BTE2333	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2535	Study Abroad	BTE2334	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2536	Microbiology	BTE2401	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2537	Enzymology & Enzyme Technology	BTE2403	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2538	Chemical Engineering Principles	BTE2404	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2539	Methods and Instrumentation in Biotechnology	BTE2405	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2540	Microbiology Lab	BTE2406	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2541	Enzymology & Enzyme Technology Lab	BTE2408	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2542	Methods and Instrumentation in Biotechnology Lab	BTE2409	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2543	Marine Biotechnology	BTE2410	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2544	Vaccine Development	BTE2411	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2545	Agricultural Biotechnology	BTE2412	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2546	Natural products and medicinal chemistry	BTE2413	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2547	Stem cell Technology	BTE2414	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2548	Term Paper	BTE2431	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2549	Project (with Presentation & Evaluation)	BTE2432	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2550	Workshop / Certification (Discipline Specific)	BTE2433	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2551	Study Abroad	BTE2434	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2552	Molecular Biology	BTE2501	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2553	Bioinformatics	BTE2504	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2554	Molecular Biology Lab	BTE2505	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2555	Animal Biotechnology Lab	BTE2506	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2556	Plant Biotechnology Lab	BTE2507	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2557	Bioinformatics Lab	BTE2508	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2558	Summer Internship Evaluation-I	BTE2535	Bachelor of Technology (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2559	Biofuels & Green Technology	BTE2509	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2560	Stem Cells and Tissue Engineering	BTE2510	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2561	Java-I	BTE2511	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2562	Term Paper	BTE2531	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2563	Project (with Presentation & Evaluation)	BTE2532	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2564	Workshop / Certification (Discipline Specific)	BTE2533	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2565	Study Abroad	BTE2534	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2566	Recombinant DNA Technology	BTE2601	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2567	Bioprocess Technology	BTE2602	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2568	Immunology & Immunotechnology	BTE2603	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2569	Fundamentals of Biochemical Engineering	BTE2604	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2570	Recombinant DNA Technology Lab	BTE2605	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2571	Bioprocess Technology Lab	BTE2606	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2572	Immunology & Immunotechnology Lab	BTE2607	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2573	Pharmaceutical Biotechnology	BTE2608	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2574	Artificial Neural network	BTE2610	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2575	JAVA –II	BTE2611	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2576	RNA Biology	BTE2612	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2577	Term Paper	BTE2631	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2578	Project (with Presentation & Evaluation)	BTE2632	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2579	Workshop / Certification (Discipline Specific)	BTE2633	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2580	Study Abroad	BTE2634	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2581	Genomics & Proteomics	BTE2701	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2582	IPR, Biosafety & Bioethics	BTE2702	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2583	Research Methodology & Report Writing	BTE2703	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2584	Genomics & Proteomics Lab	BTE2704	Bachelor of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2585	Summer Internship Evaluation-II	BTE2735	Bachelor of Technology (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2586	Molecular Medicine & Diagnosis	BTE2706	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2587	Applications of Plant Biotechnology	BTE2707	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2588	Bioenergy Engineering	BTE2708	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2589	Advanced Nanobiotechnology	BTE2709	Bachelor of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2590	Term Paper	BTE2731	Bachelor of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2591	Project (with Presentation & Evaluation)	BTE2732	Bachelor of Technology (Biotechnology)	Project writing, Presentation, Viva-Voce	2010
2592	Workshop/ Certification (Discipline Specific)	BTE2733	Bachelor of Technology (Biotechnology)	Quiz, Written Test	2010
2593	Study Abroad	BTE2734	Bachelor of Technology (Biotechnology)	Written Test, Country Report	2010
2594	Dissertation / Project Report Presentation / Viva Voce	BTE2837	Bachelor of Technology (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2595	Microbiology Lab	BTH4109	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2596	Biochemistry and Analytical Techniques Lab	BTH4115	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2597	Plant & Animal Biotechnology Lab	BTH4116	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2598	Research Methodology & Scientific Communication Skills	BTH4214	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2599	Immunology Lab	BTH4209	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2600	Molecular Biology and Genetic Engineering Lab	BTH4215	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2601	Seminar	BTH4238	Master of Science (Biotechnology)	Quiz, Written Test	2010
2602	Environmental Biotechnology	BTH4204	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2603	RNA Biology	BTH4219	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2604	Bioentrepreneurship, IPR, Biosafety & Bioethics	BTH4306	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2605	Bioprocess Engineering & Technology Lab	BTH4323	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2606	Bioinformatics Lab	BTH4324	Master of Science (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2607	Project Proposal Preparation & Presentation	BTH4332	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2608	Seminar	BTH4338	Master of Science (Biotechnology)	Quiz, Written Test	2010
2609	Summer Internship Evaluation	BTH4335	Master of Science (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2610	Vaccines	BTH4327	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2611	Cancer Biology	BTH4328	Master of Science (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2612	Dissertation	BTH4437	Master of Science (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2613	Instrumentation & Research Methodology	BTE4103	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2614	Microbial Technology	BTE4104	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2615	Biostatistics	BTE4105	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2616	Biochemistry & Metabolic Regulation Lab	BTE4106	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2617	Genetics & Molecular Biology Lab	BTE4107	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2618	Microbial Technology Lab	BTE4108	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2619	Plant Cell, Tissue & Organ Culture	BTE4112	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2620	Animal Biotechnology Lab	BTE4113	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2621	Plant Cell, Tissue & Organ Culture Lab	BTE4114	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2622	Recombinant DNA Technology	BTE4201	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2623	Bioinformatics & Computational Biology	BTE4202	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2624	Biochemical Engineering	BTE4203	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2625	Environmental Biotechnology	BTE4204	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2626	IPR & Bioethics	BTE4205	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2627	Molecular Cell Biology	BTE4206	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2628	Recombinant DNA Technology Lab	BTE4207	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2629	Bioinformatics & Computational Biology Lab	BTE4208	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2630	Environmental Biotechnology Lab	BTE4209	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2631	Molecular Cell Biology Lab	BTE4210	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2632	Immunology	BTE4211	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2633	Immunology Lab	BTE4212	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2634	Term Paper	BTE4231	Master of Technology (Biotechnology)	Academic Writing, Presentation, Quiz	2010
2635	Enzyme technology	BTE4301	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2636	Genomics & Proteomics	BTE4302	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2637	Structural Biology	BTE4303	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2638	Downstream Processing & Fermentation Biotechnology	BTE4304	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2639	Enzyme Technology Lab	BTE4305	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2640	Genomics & Proteomics Lab	BTE4306	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2641	Structural Biology Lab	BTE4307	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2642	Fermentation Biotechnology & Downstream Processing Lab	BTE4308	Master of Technology (Biotechnology)	Practical, Lab Visit, Lab Record, Class Performance	2010
2643	Summer Internship Evaluation	BTE4335	Master of Technology (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2644	Industrial Management	BTE4309	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2645	Immunotechnology	BTE4310	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2646	Agri-Food Biotechnology	BTE4311	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2647	Biofuels & green technology	BTE4312	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2648	Stem Cells and Gene Therapy	BTE4313	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2649	Drug design & Pharmaceutical Biotechnology	BTE4314	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2650	New Generation Sequencing Analysis	BTE4316	Master of Technology (Biotechnology)	Quiz, Group Discussion, Presentation, Class Performance, Report Writing	2010
2651	Dissertation / Project Report Presentation / Viva Voce	BTE4437	Master of Technology (Biotechnology)	Report Writing, Presentation, Viva-Voce	2010
2652	Machine Learning-I	DSC4102	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2653	Statistics & Exploratory Data Analysis	DSC4103	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2654	Database Management System-I	DSC4104	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2655	Programming Toolbox I-R	DSC4105	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2656	Programming ToolBox II- Python	DSC4106	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2657	Big Data Tools & Technologies-I	DSC4107	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2658	Introduction to Linux	DSC4108	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2659	Machine Learning-I Lab	DSC4109	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2660	Statistics & Exploratory Data Analysis Lab	DSC4110	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2661	Machine Learning-II	DSC4201	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2662	Regression Theory & Analysis	DSC4202	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2663	Database Management System-II	DSC4204	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2664	Spark	DSC4205	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2665	Data Visualization	DSC4206	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2666	Big Data Tools & Technologies-II	DSC4207	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2667	Machine Learning-II Lab	DSC4208	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2668	Regression Theory & Analysis Lab	DSC4209	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2669	Data Structure & Algorithm Design Lab	DSC4210	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2670	Pattern Recognition	DSC4211	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2671	Next Generation Sequencing Analysis	DSC4212	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2672	Association Rule Mining	DSC4213	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2673	Generalized & Linear Modeling	DSC4301	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2674	Deep Learning & Neural Networks	DSC4302	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2675	Time Series	DSC4303	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2676	Graph & Social Network Analysis	DSC4304	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2677	Natural Language Processing	DSC4305	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2678	Graph & Social Network Analysis Lab	DSC4306	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2679	Big Data Tools & Technologies-III	DSC4307	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2680	Generalized & Linear Modeling Lab	DSC4308	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2681	Time Series Lab	DSC4309	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2682	Deep Learning & Neural Networks Lab	DSC4310	Master of Science (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2683	Summer Internship Evaluation	DSC4335	Master of Science (Data Science)	Report Writing, Presentation, Viva-Voce	2019
2684	Weather Prediction	DSC4311	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2685	Disease Classification	DSC4312	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2686	Customer Behaviour Analysis	DSC4313	Master of Science (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2687	Dissertation / Project Report Presentation / Viva Voce	DSC4437	Master of Science (Data Science)	Report Writing, Presentation, Viva-Voce	2019
2688	Machine Learning-I	DSC3102	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2689	Statistics & Exploratory Data Analysis	DSC3103	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2690	Database Management System-I	DSC3104	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2691	Programming Toolbox I-R	DSC3105	Post Graduate Diploma (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2692	Programming ToolBox II- Python	DSC3106	Post Graduate Diploma (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2693	Big Data Tools & Technologies-I	DSC3107	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2694	Introduction to Linux	DSC3108	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2695	Machine Learning-I Lab	DSC3109	Post Graduate Diploma (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2696	Statistics & Exploratory Data Analysis Lab	DSC3110	Post Graduate Diploma (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2697	Machine Learning-II	DSC3201	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2698	Database Management System-II	DSC3204	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2699	Spark	DSC3205	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2700	Data Visualization	DSC3206	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2701	Big Data Tools & Technologies-II	DSC3207	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2702	Machine Learning-II Lab	DSC3208	Post Graduate Diploma (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2703	Regression Theory & Analysis Lab	DSC3209	Post Graduate Diploma (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2704	Data Structure & Algorithm Design Lab	DSC3210	Post Graduate Diploma (Data Science)	Quiz, Viva-Voce, Practical, Lab Records, Class Performance	2019
2705	Project	DSC3237	Post Graduate Diploma (Data Science)	Report Writing, Presentation, Viva-Voce	2019
2706	Pattern Recognition	DSC3211	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2707	Next Generation Sequencing Analysis	DSC3212	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2708	Association Rule Mining	DSC3213	Post Graduate Diploma (Data Science)	Quiz, Class Performance, Group Discussion, Report Writing, Viva-Voce	2019
2709	Print Media – Reporting & Editing	JRN2151	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2710	Computer Graphics & Animation	JRN2108	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2711	Basic Photography	JRN2251	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2712	Print Media – Specialized Reporting & Feature Writing	JRN2202	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2713	Electronic Communication: Radio & TV	JRN2207	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2714	Readings in Media	JRN2230	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2715	Project (with Presentation & Evaluation)	JRN2232	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2716	Media Production Portfolio	JRN2236	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2717	TV Journalism	JRN2351	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2718	Digital Photography	JRN2303	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2719	Public Relations	JRN2304	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2720	Mass Communication Research-I	JRN2308	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2721	Readings in Media	JRN2330	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2722	Project (with Presentation & Evaluation)	JRN2332	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2723	Media Production Portfolio	JRN2336	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2724	TV Production and Presentation	JRN2451	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2725	Film Theory & Practice-I	JRN2401	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2726	Project (with presentation & evaluation)	JRN2432	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2727	Web Designing	JRN2404	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2728	Digital Marketing	JRN2409	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2729	New Media	JRN2551	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2730	Film Theory and Practice - II	JRN2501	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2731	Mass Communication Research-II	JRN2507	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2732	Summer Internship Evaluation	JRN2535	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2733	National and International Issues & Affairs	JRN2502	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2734	Event Management	JRN2503	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2735	Multimedia Journalism	JRN2504	Bachelor of Arts (Journalism & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2736	Internship	JRN2635	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2737	Professional Project OR Dissertation	JRN2637	Bachelor of Arts (Journalism & Mass Communication)	Report Writing, Presentation, Viva-Voce	2010
2738	Print Media – Reporting & Editing	JRG2101	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2739	Advertising Principles & Planning	JRG2102	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2740	Computer Graphics & Animation	JRG2103	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2741	Basic Photography	JRG2201	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2742	Print Media – Specialized Reporting & Feature Writing	JRG2202	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2743	Electronic Communication: Radio & TV	JRG2203	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2744	Readings in Media	JRG2230	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2745	Project (with Presentation & Evaluation)	JRG2232	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Project writing, Presentation, Viva-Voce	2021
2746	Media Production Portfolio	JRG2236	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2747	TV Journalism	JRG2301	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2748	Digital Photography	JRG2302	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2749	Mass Communication Research-I	JRG2305	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2750	Readings in Media	JRG2330	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2751	Project (with Presentation & Evaluation)	JRG2332	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Project writing, Presentation, Viva-Voce	2021
2752	Media Production Portfolio	JRG2336	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2753	TV Production and Presentation	JRG2401	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2754	Film Theory & Practice-I	JRG2402	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2755	Project (with presentation & evaluation)	JRG2432	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Project writing, Presentation, Viva-Voce	2021
2756	Web Designing	JRG2405	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2757	Digital Marketing	JRG2408	Bachelor of Arts (Journalism & Mass Communication) International (GSP)	Group Discussion, Presentation, Class Performance, Report Writing	2021
2758	Introduction to Multimedia and its Application	ANI2152	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2759	Design Software	ANI2106	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2760	Basics of Art History and Sketching & Drawing	ANI2108	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2761	Typography	ANI2101	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2762	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2133	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2763	Study Abroad	ANI2134	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2764	Creating 2D Animation	ANI2252	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2765	Web Design & Development	ANI2202	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2766	UI and UX Design	ANI2209	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2767	Production Pipeline	ANI2210	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2768	Digital Photography	ANI2201	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2769	Online Certification (Minimum 30 Hours)	ANI2212	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2770	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2233	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2771	Study Abroad	ANI2234	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2772	Summer Project Evaluation-I	ANI2335	Bachelor of Science (Animation & Visual Graphics)	Report writing, Presentation, Viva-Voce	2012
2773	Design Thinking	ANI2307	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2774	Online Certification (Minimum 30 Hours)	ANI2308	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2775	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2333	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2776	Study Abroad	ANI2334	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2777	Maya Modeling & Texturing	ANI2452	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2778	Digital Composting	ANI2405	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2779	Introduction to Game Development	ANI2406	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2780	Motion Graphics	ANI2407	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2781	Online Certification (Minimum 30 Hours)	ANI2408	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2782	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2433	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2783	Study Abroad	ANI2434	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2784	Maya Rigging & Animation	ANI2505	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2785	Summer Project Evaluation-II	ANI2535	Bachelor of Science (Animation & Visual Graphics)	Report Writing, Presentation, Viva-Voce	2012
2786	Scripting & Storyboarding	ANI2552	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2787	Online Certification (Minimum 30 Hours)	ANI2508	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2788	Workshop / Certification (Discipline Specific) (1 credit per workshop)	ANI2533	Bachelor of Science (Animation & Visual Graphics)	Quiz, Written Test	2012
2789	Study Abroad	ANI2534	Bachelor of Science (Animation & Visual Graphics)	Written Test, Country Report	2012
2790	VFX	ANI2652	Bachelor of Science (Animation & Visual Graphics)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2012
2791	Internship	ANI2635	Bachelor of Science (Animation & Visual Graphics)	Report writing, Presentation, Viva-Voce	2012
2792	Professional Project	ANI2637	Bachelor of Science (Animation & Visual Graphics)	Report writing, Presentation, Viva-Voce	2012
2793	Media Arts - I: Radio & TV	JRN4103	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2794	Advertising : Concepts & Principles	JRN4104	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2795	Design Software	JRN4106	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2796	Print Design & Visualization	JRN4202	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2797	Specialized Reporting & Feature Writing	JRN4203	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2798	Media Arts - II: Radio & TV	JRN4204	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2799	Advanced Photography	JRN4207	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2800	Media Planning & Brand Management	JRN4209	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2801	Media Arts-III: Film	JRN4301	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2802	Media Laws & Ethics	JRN4304	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2803	Digital Media Production	JRN4306	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2804	Mass Media & Industry	JRN4307	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2805	Communication Research	JRN4308	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2806	Summer Internship Evaluation	JRN4335	Master of Arts (Journalilsm & Mass Communication)	Report writing, Presentation, Viva-Voce	2010
2807	Media Arts - IV: Cyber Media	JRN4402	Master of Arts (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2010
2808	Internship	JRN4435	Master of Arts (Journalilsm & Mass Communication)	Report writing, Presentation, Viva-Voce	2010
2809	Dissertation/ Professional Project	JRN4437	Master of Arts (Journalilsm & Mass Communication)	Report writing, Presentation, Viva-Voce	2010
2810	Print Journalism - Reporting & Editing	JRN3102	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2811	Media Arts - I: Radio & TV	JRN3103	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2812	Advertising : Concepts & Principles	JRN3104	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2813	Introduction to Photography	JRN3105	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2814	Design Software	JRN3106	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2815	Advertising Planning & Strategy	JRN3201	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2816	Print Design & Visualization	JRN3202	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2817	Specialized Reporting & Feature Writing	JRN3203	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2818	Media Arts - II: Radio & TV	JRN3204	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2819	Public Relations & Corporate Communication	JRN3206	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2820	Advanced Photography	JRN3207	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2821	Media Planning & Brand Management	JRN3209	Post Graduate Diploma (Journalilsm & Mass Communication)	Group Discussion, Presentation, Class Performance, Report Writing	2011
2822	Project	JRN3232	Post Graduate Diploma (Journalilsm & Mass Communication)	Project writing, Presentation, Viva-Voce	2011
2823	Introduction to Multimedia and its Application	ANI2152	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2824	Creating 2D Animation	ANI2252	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2825	3D Modeling & Texturing	ANI2352	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2826	Maya Modeling & Texturing	ANI2452	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2827	Scripting & Storyboarding	ANI2552	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2013
2828	VFX	ANI2652	Animation (OE)	Practical Sessions in Lab, Class Performance, Presentation, Assignment	2016
2829	Print Media: Reporting & Editing	JRN2151	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2830	Basic Photography	JRN2251	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2831	TV Journalism	JRN2351	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2832	TV Production & Presentation	JRN2451	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2833	New Media	JRN2551	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2013
2834	Media Analysis	JRN2651	Journalism (OE)	Group Discussion, Presentation, Class Performance, Report Writing	2016
2835	Social Formations & Cultural Patterns of the Ancient World	HIS2104	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2836	History of Early India-I	HIS2105	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2837	Social Formations & Cultural Patterns of the Medieval World	HIS2106	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2838	History of Early India-II	HIS2205	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2839	Indo-Islamic Polity and Culture in Medieval India-I	HIS2206	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2840	Term Paper	HIS2231	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2841	Project with Presentation and Evaluation	HIS2232	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2842	Indo-Islamic Polity and Culture in Medieval India-II	HIS2305	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2843	Rise of Modern West-II	HIS2306	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2844	History of British Rule in India-I	HIS2307	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2845	Summer Project Evaluation	HIS2335	Bachelor of Arts (Hons.) (History)	Report Writing, Presentation, Viva-Voce	2013
2846	Term Paper	HIS2331	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2847	Project Studies	HIS2332	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2848	History of British Rule in India-II	HIS2405	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2849	History of USA	HIS2406	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2850	History of China and Japan	HIS2407	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2851	Historical Research Method	HIS2408	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2852	Term Paper	HIS2431	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2853	Project with Presentation & Evaluation	HIS2432	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2854	History of USSR	HIS2504	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2855	History of West Asia	HIS2505	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2856	History of World Wars	HIS2506	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2857	History of Latin America	HIS2507	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2858	Term Paper	HIS2531	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2859	Project Studies	HIS2532	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2860	Gender and History	HIS2604	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2861	History of Contemporary India	HIS2605	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2862	Dissertation/ Project Studies	HIS2637	Bachelor of Arts (Hons.) (History)	Report Writing, Presentation, Viva-Voce	2013
2863	Environmental History- Global Perspectives	HIS2606	Bachelor of Arts (Hons.) (History)	Quiz, Group Discussion, Presentation, Class Performance	2013
2864	Term Paper	HIS2631	Bachelor of Arts (Hons.) (History)	Academic Writing, Presentation, Quiz	2013
2865	Project with Presentation and Evaluation	HIS2632	Bachelor of Arts (Hons.) (History)	Project writing, Presentation, Viva-Voce	2013
2866	Indian Nationalism	POL2101	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2867	British Colonialism in India	POL2102	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2868	Political Philosophy-I	POL2103	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2869	Political Philosophy-II	POL2202	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2870	Current Themes in Indian Politics	POL2204	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2871	Elections and Electoral Politics	POL2206	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2872	Review of Contemporary Literature-I	POL2230	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2873	Term Paper (Political Philosophy/Political Studies)	POL2231	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2874	Project with Presentation and Evaluation	POL2232	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2875	State Politics in India	POL2302	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2876	Politics of Post-Colonial States	POL2303	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2877	Summer Project Evaluation	POL2335	Bachelor of Arts (Hons.) (Political Science)	Report Writing, Presentation, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2878	Politics and media	POL2304	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2879	Review of Contemporary Literature-II	POL2330	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2880	Term Paper (Political Philosophy/Political Studies)	POL2331	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2881	Project with Presentation and Evaluation	POL2332	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2882	Religion and Politics in India	POL2404	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2883	Cinema and Politics in India	POL2405	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2884	Review of Contemporary Literature-III	POL2430	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2885	Term Paper (Political Philosophy/Political Studies)	POL2431	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2886	Project with presentation and evaluation	POL2432	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2887	Workshop on Contemporary Politics	POL2433	Bachelor of Arts (Hons.) (Political Science)	Quiz, Written Test	2013
2888	India's Foreign Policy	POL2503	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2889	Reading Karl Marx	POL2504	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2890	Civil Society in India	POL2505	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2891	Post-Cold War World Politics	POL2506	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2892	Review of Contemporary Literature-IV	POL2530	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2893	Term Paper (Political Philosophy/Political Studies)	POL2531	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013
2894	Project with Presentation and Evaluation	POL2532	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2895	Comparative Government and Politics	POL2601	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2896	Dissertation	POL2637	Bachelor of Arts (Hons.) (Political Science)	Report Writing, Presentation, Viva-Voce	2013
2897	Reading Vivekananda	POL2603	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2898	Reading Ambedkar	POL2604	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2899	Modern Themes in Gender	POL2605	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2900	Political violence: concepts and trends	POL2606	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2901	Review of Contemporary Literature-V	POL2630	Bachelor of Arts (Hons.) (Political Science)	Quiz, Group Discussion, Presentation, Class Performance	2013
2902	Term Paper (Political Philosophy/Political Studies)	POL2631	Bachelor of Arts (Hons.) (Political Science)	Academic Writing, Presentation, Quiz	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2903	Project with Presentation and Evaluation	POL2632	Bachelor of Arts (Hons.) (Political Science)	Project writing, Presentation, Viva-Voce	2013
2904	Research Methodology-I	ENG2205	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2905	Research Methodology-II	ENG2304	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2906	Summer Project Evaluation	ENG2335	Bachelor of Arts (Hons.) (English)	Report Writing, Presentation, Viva-Voce	2012
2907	Research Methodology-III	ENG2410	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2908	Feminist Writings	ENG2408	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2909	Contemporary Literature	ENG2502	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2910	Indian Women Writing	ENG2506	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2911	Dissertation	ENG2637	Bachelor of Arts (Hons.) (English)	Report Writing, Presentation, Viva-Voce	2012
2912	Literature & Gender	ENG2605	Bachelor of Arts (Hons.) (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2913	Research Methodology-I	ENG4206	Master of Arts (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2914	Research Methodology-II	ENG4305	Master of Arts (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2915	Summer Project Evaluation	ENG4335	Master of Arts (English)	Report Writing, Presentation, Viva-Voce	2012
2916	Dissertation	ENG4437	Master of Arts (English)	Report Writing, Presentation, Viva-Voce	2012
2917	Linguistics and English Language Teaching	ENG4406	Master of Arts (English)	Quiz, Group Discussion, Presentation, Class Performance	2012
2918	Written Expression-I	FRE2101	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2919	Oral Expression-I	FRE2102	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2920	Practical Phonetics-I	FRE2104	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2921	Written Expression-II	FRE2201	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2922	Oral Expression-II	FRE2202	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2923	Practical Phonetics-II	FRE2204	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2924	Written Expression-III	FRE2301	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2925	Oral Expression-III	FRE2302	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2926	Understanding French Texts-I	FRE2304	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2927	Written Expression-IV	FRE2401	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
2928	Oral Expression-IV	FRE2402	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2929	Understanding French Texts-II	FRE2406	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2930	French through activities	FRE2405	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2931	FOS: French for hotel and restaurant	FRE2408	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2932	Written Expression-V	FRE2501	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2933	Oral Expression-V	FRE2502	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2934	Introduction to French Literature-I	FRE2506	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2935	Initiation to Translation	FRE2507	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2936	FOS: French for Tourism	FRE2508	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2937	Written Expression-VI	FRE2601	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2938	Oral Expression-VI	FRE2602	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2939	Introduction to French Literature-II	FRE2603	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2940	FOS: Professional & Business French	FRE2606	Bachelor of Arts (Hons.) (French)	Quiz, Class Performance, Report Writing	2014
2941	Project Report	FRE2637	Bachelor of Arts (Hons.) (French)	Report Writing, Presentation, Viva-Voce	2014
2942	Written Expression-I	GER2101	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2943	Oral Expression-I	GER2102	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2944	Written Expression-II	GER2201	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2945	Oral Expression-II	GER2202	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2946	German through Activities	GER2203	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2947	Written Expression-III	GER2301	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2948	Oral Expression-III	GER2302	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2949	Written Expression-IV	GER2401	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2950	Oral Expression-IV	GER2402	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2951	German through Literary Texts	GER2403	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2952	Enhancing language proficiency	GER2404	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017

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2953	German Culture and Civilization (Landeskunde) II	GER2405	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2954	Written Expression-V	GER2501	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2955	Oral Expression-V	GER2502	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2956	Introduction to German Literature	GER2503	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2957	Summer Project Evaluation	GER2535	Bachelor of Arts (Hons.) (German)	Report Writing, Presentation, Viva-Voce	2017
2958	Introduction to Linguistics	GER2504	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2959	Business German-I	GER2505	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2960	Written Expression-VI	GER2601	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2961	Oral Expression-VI	GER2602	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2962	Dissertation	GER2637	Bachelor of Arts (Hons.) (German)	Report Writing, Presentation, Viva-Voce	2017
2963	Business German-II	GER2605	Bachelor of Arts (Hons.) (German)	Quiz, Class Performance, Report Writing	2017
2964	Written Expression-I	SPA2101	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2965	Oral Expression-I	SPA2102	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2966	Grammar and Communicative Spanish-I	SPA2103	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2967	Written Expression-II	SPA2201	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2968	Oral Expression-II	SPA2202	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2969	Grammar and Communicative Spanish-II	SPA2203	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2970	Written Expression-III	SPA2301	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2971	Oral Expression-III	SPA2302	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2972	Written Expression-IV	SPA2401	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2973	Oral Expression-IV	SPA2402	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2974	Business Spanish	SPA2403	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2975	Written Expression-V	SPA2501	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2976	Oral Expression-V	SPA2502	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2977	Introduction to Translation	SPA2503	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018

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2978	Summer Project Evaluation	SPA2535	Bachelor of Arts (Hons.) (Spanish)	Report Writing, Presentation, Viva-Voce	2018
2979	Introduction to Linguistics	SPA2504	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2980	Written Expression-VI	SPA2601	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2981	Oral Expression-VI	SPA2602	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2982	Introduction to Spanish Literature	SPA2603	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2983	Dissertation	SPA2637	Bachelor of Arts (Hons.) (Spanish)	Report Writing, Presentation, Viva-Voce	2018
2984	Applied Spanish Grammar and Introduction to linguistics	SPA2604	Bachelor of Arts (Hons.) (Spanish)	Quiz, Class Performance, Report Writing	2018
2985	Effective Listening	CSS2151	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2986	Presentation Skills	CSS2251	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2987	Reading and Comprehension	CSS2351	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2988	Corporate Communication	CSS2451	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2989	Employability Skills	CSS2551	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2990	Workplace Communication	CSS2651	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2991	English-I	CSS2152	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2992	English-II	CSS2252	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2993	Basics of Communication	CSS4151	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2994	Corporate Communication	CSS4251	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2995	Interpersonal Communication	CSS4351	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2996	Cross Cultural Communication	CSS4451	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2997	Managerial Communication	CSS4152	Communication Skills (OE)	Quiz, Group Discussion, Group Presentation	2010
2998	Shakespearean Comedy	ENG2151	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
2999	Romantic Poetry	ENG2251	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
3000	The Novels of England	ENG2351	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
3001	The English Novels of India	ENG2451	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
3002	Genre Fiction	ENG2551	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013

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3003	Contemporary Literature	ENG2651	English Literature (OE)	Quiz, Group Discussion, Presentation, Class Performance	2013
3004	History of Ancient India	HIS2151	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
3005	History of Medieval India	HIS2251	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
3006	History of Modern India	HIS2351	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
3007	The Ancient World	HIS2451	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
3008	Rise of the Modern West	HIS2551	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
3009	History of the World from Mid 20th Century to the 21st Century	HIS2651	History (OE)	Quiz, Group Discussion, Presentation, Class Performance	2016
3010	Health Education and Sports	PED2151	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
3011	Human Anatomy and Exercise	PED2251	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
3012	Sports Training and Conditioning	PED2351	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
3013	Basics of Sports Management	PED2451	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
3014	Sports Psychology	PED2551	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
3015	Sports Medicine	PED2651	Physical Education and Sports Management (OE)	Quiz, Class Performance, Fitness Assignment, Presentation	2014
3016	Indian National Movement	POL2151	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
3017	Indian State and Politics after Independence	POL2251	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
3018	State Politics in India	POL2351	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
3019	Politics and Media	POL2451	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
3020	South Asia: Political Perspectives	POL2551	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
3021	Post-Cold War World Politics	POL2651	Political Studies (OE)	Quiz, Group Discussion, Presentation, Class Performance	2014
3022	Introduction to Performing Arts	PAR2151	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3023	Dynamics of Dance, Music & Theatre	PAR2251	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3024	Social relevance of Dance, Music & Drama in Contemporary Indian Scene	PAR2351	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3025	Indian Folk Arts	PAR2451	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019

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3026	Modern Indian Performing Arts	PAR2551	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3027	Arts, Aesthetic & Society	PAR2651	Performing Arts (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3028	Introduction to Sanskrit Language	SKT2151	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3029	General Introduction to Vedic Literature & Conversational Sanskrit	SKT2251	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3030	General Introduction to Sanskrit Literature & Sanskrit Conversation	SKT2351	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3031	Sanskrit Language & Indian Culture	SKT2451	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3032	Introduction to Sanskrit Linguistics	SKT2551	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3033	General Introduction to Indian Philosophy & Sanskrit Grammar	SKT2651	Sanskrit (OE)	Quiz, Report Writing, Class Performance, Presentation, Viva-Voce	2019
3034	Rabindranath Tagore in the 21st Century	ENG2152	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
3035	Tagore- Autobiographies & Biographical Sketches	ENG2252	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
3036	Tagore as a Cultural Icon – Tagore as a Painter & Performer	ENG2352	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
3037	Tagore as a Poet	ENG2452	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
3038	Tagore as a Fiction Writer	ENG2552	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
3039	Tagore and Mass Media	ENG2652	Tagore Studies (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2017
3040	French-I	LAN2151	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3041	French-II	LAN2251	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3042	French-III	LAN2351	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3043	French-IV	LAN2451	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3044	French-V	LAN2551	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3045	French-VI	LAN2651	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3046	French-VII	LAN2751	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010

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3047	French-VIII	LAN2851	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3048	French-IX	LAN2951	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3049	French for Technology-I	LAN2170	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2015
3050	French for Technology-II	LAN2270	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2015
3051	French for Technology-III	LAN2370	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2015
3052	French for Technology-IV	LAN2470	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2015
3053	French for Technology-V	LAN2570	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2015
3054	French for Technology-VI	LAN2670	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2015
3055	French for Technology-VII	LAN2770	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2015
3056	French-I	LAN4151	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3057	French-II	LAN4251	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3058	French-III	LAN4351	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3059	French-IV	LAN4451	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3060	French-V	LAN4551	French (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3061	German-I	LAN2152	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3062	German-II	LAN2252	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3063	German-III	LAN2352	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3064	German-IV	LAN2452	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3065	German-V	LAN2552	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3066	German-VI	LAN2652	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3067	German-VII	LAN2752	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3068	German-VIII	LAN2852	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3069	German-IX	LAN2952	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3070	German-I	LAN4152	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3071	German-II	LAN4252	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010

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3072	German-III	LAN4352	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3073	German-IV	LAN4452	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3074	German-V	LAN4552	German (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3075	Spanish-I	LAN2153	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3076	Spanish-II	LAN2253	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3077	Spanish-III	LAN2353	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3078	Spanish-IV	LAN2453	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3079	Spanish-V	LAN2553	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3080	Spanish-VI	LAN2653	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3081	Spanish-VII	LAN2753	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3082	Spanish-VIII	LAN2853	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3083	Spanish-IX	LAN2953	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3084	Spanish-I	LAN4153	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3085	Spanish-II	LAN4253	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3086	Spanish-III	LAN4353	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3087	Spanish-IV	LAN4453	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3088	Spanish-V	LAN4553	Spanish (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3089	Russian-I	LAN2154	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3090	Russian-II	LAN2254	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3091	Russian-III	LAN2354	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3092	Russian-IV	LAN2454	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3093	Russian-V	LAN2554	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3094	Russian-VI	LAN2654	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3095	Russian-VII	LAN2754	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3096	Russian-VIII	LAN2854	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010

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3097	Russian-IX	LAN2954	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3098	Russian-I	LAN4154	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3099	Russian-II	LAN4254	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3100	Russian-III	LAN4354	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3101	Russian-IV	LAN4454	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3102	Russian-V	LAN4554	Russian (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3103	Chinese-I	LAN2155	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3104	Chinese-II	LAN2255	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3105	Chinese-III	LAN2355	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3106	Chinese-IV	LAN2455	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3107	Chinese-V	LAN2555	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3108	Chinese-VI	LAN2655	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3109	Chinese-VII	LAN2755	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3110	Chinese-VIII	LAN2855	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3111	Chinese-IX	LAN2955	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3112	Chinese-I	LAN4155	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3113	Chinese-II	LAN4255	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3114	Chinese-III	LAN4355	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3115	Chinese-IV	LAN4455	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3116	Chinese-V	LAN4555	Chinese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2010
3117	Korean-I	LAN2157	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3118	Korean-II	LAN2257	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3119	Korean-III	LAN2357	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3120	Korean-IV	LAN2457	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3121	Korean-V	LAN2557	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014

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3122	Korean-VI	LAN2657	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3123	Korean-VII	LAN2757	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3124	Korean-VIII	LAN2857	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3125	Korean-IX	LAN2957	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3126	Korean-I	LAN4157	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3127	Korean-II	LAN4257	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3128	Korean-III	LAN4357	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3129	Korean-IV	LAN4457	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3130	Korean-V	LAN4557	Korean (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3131	Japanese-I	LAN2158	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3132	Japanese-II	LAN2258	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3133	Japanese-III	LAN2358	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3134	Japanese-IV	LAN2458	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3135	Japanese-V	LAN2558	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3136	Japanese-VI	LAN2658	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3137	Japanese-VII	LAN2758	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3138	Japanese-VIII	LAN2858	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3139	Japanese-IX	LAN2958	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3140	Japanese-I	LAN4158	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3141	Japanese-II	LAN4258	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3142	Japanese-III	LAN4358	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3143	Japanese-IV	LAN4458	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3144	Japanese-V	LAN4558	Japanese (FL)	Quiz, Project Report, Presentation, Viva-Voce	2014
3145	Hindi-I	LAN2159	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3146	Hindi-II	LAN2259	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3147	Hindi-III	LAN2359	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3148	Hindi-IV	LAN2459	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3149	Hindi-V	LAN2559	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3150	Hindi-VI	LAN2659	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3151	Hindi-VII	LAN2759	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3152	Hindi-VIII	LAN2859	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3153	Hindi-IX	LAN2959	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3154	Hindi-I	LAN4159	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3155	Hindi-II	LAN4259	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3156	Hindi-III	LAN4359	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3157	Hindi-IV	LAN4459	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3158	Hindi-V	LAN4559	Hindi (FL)	Quiz, Project Report, Presentation, Viva-Voce	2017
3159	Professional French for Business-1	LAN2161	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3160	Professional French for Business-2	LAN2261	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3161	Professional French for Business-3	LAN2361	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3162	Professional French for Business-4	LAN2461	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3163	Introduction to French Literature & select socio-cultural aspects of France	LAN2561	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3164	French through activities	LAN2661	French Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3165	Professional German for Business-1	LAN2162	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3166	Professional German for Business-2	LAN2262	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3167	Professional German for Business-3	LAN2362	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3168	Professional German for Business-4	LAN2462	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3169	Introduction to German Literature & select socio-cultural aspects of Germany	LAN2562	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013
3170	German through activities	LAN2662	German Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3171	Introduction to Korean History & Geography	LAN2165	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3172	Korean Cultural Perspectives	LAN2265	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3173	Modern History of Korea & Introduction to Korean Language	LAN2365	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3174	Contemporary Korea	LAN2465	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3175	Polity & Economy of Korea	LAN2565	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3176	Themes in Korean Literature	LAN2665	Korean Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3177	Introduction to the French North America- a short history of Quebec	LAN2164	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3178	Quebec Society Culture & Language	LAN2264	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3179	Quebec in the World Affairs	LAN2364	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3180	Political Economy of Quebec	LAN2464	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3181	Introduction to Major Literary Movements in Quebec-I	LAN2564	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3182	Introduction to Major Literary Movements in Quebec-II	LAN2664	Quebec Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2018
3183	EFE Professional Spanish for Business-I	LAN2163	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
3184	EFE Professional Spanish for Business-II	LAN2263	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
3185	EFE Professional Spanish for Business-III	LAN2363	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
3186	EFE Professional Spanish for Business-IV	LAN2463	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
3187	Introduction to Spanish Literature & select socio-cultural aspects of Spain	LAN2563	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
3188	Spanish through activities	LAN2663	Spanish Studies (OE)	Quiz, Project Report, Presentation, Viva-Voce	2014
3189	Computer Applications	FST2103	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3190	Pattern Making & Drafting-II	FST2202	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3191	Garment Construction-I	FST2203	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3192	Computer Aided Design-I	FST2204	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3193	Fabric Artistry & Embroidery	FST2205	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3194	Fashion-Business Laws, Ethics & Communication	FST2208	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3195	Fashion Art Illustration & Model Drawing-III	FST2301	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3196	Advance Pattern Making-I	FST2302	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3197	Garment Construction-II	FST2303	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3198	Apparel Production	FST2306	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3199	Computer Aided Manufacturing	FST2309	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3200	Project Presentation	FST2332	Bachelor of Design in Fashion Design	Report Writing, Viva-Voce, Presentation	2015
3201	Fashion Art Illustration & Model Drawing-IV	FST2401	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3202	Advance Pattern Making-II	FST2402	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3203	Garment Construction-III	FST2403	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3204	Computer Aided Design-III	FST2404	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3205	Visual Merchandising	FST2408	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3206	Term Paper	FST2431	Bachelor of Design in Fashion Design	Quiz, Written Test	2015
3207	Workshops / Certification (Discipline specific)	FST2433	Bachelor of Design in Fashion Design	Quiz, Written Test	2015
3208	Fashion Art Illustration and Model Drawing-V	FST2501	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3209	Garment Construction-IV	FST2502	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3210	Computer Aided Design-IV	FST2503	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3211	Pattern Draping	FST2504	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3212	Pattern Grading	FST2505	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3213	Fashion Merchandizing-II	FST2506	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3214	Quality Control & Production Management-II	FST2507	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3215	Fashion Forecasting	FST2508	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3216	Craft Documentation (Market Visit, Field Trip, Documentation & Presentation, Scope & Final Presentation)	FST2535	Bachelor of Design in Fashion Design	Report Writing, Viva-Voce, Presentation	2015
3217	Fashion Promotion	FST2512	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3218	The Business of Luxury Fashion	FST2513	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3219	Couture Design	FST2514	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3220	Retail Merchandising and Management	FST2601	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3221	Entrepreneurship	FST2604	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3222	Designing and Development of Fashion Accessories	FST2606	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3223	Sportswear Design & Development	FST2607	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3224	Costume Design Pertaining to Performing Arts	FST2608	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3225	Functions of Indian Buying Houses / Agents - A Study	FST2609	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3226	Field Trip / Visit Documentation Evaluation	FST2702	Bachelor of Design in Fashion Design	Report Writing, Viva-Voce, Presentation	2015
3227	Computer Aided Design-V	FST2703	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3228	Graduate Design Collection	FST2704	Bachelor of Design in Fashion Design	Quiz, Class Performance, Report Writing, Presentation	2015
3229	Graduation Project	FST2837	Bachelor of Design in Fashion Design	Report Writing, Viva-Voce, Presentation	2015
3230	Technical Drawing & Illustrations	IND2202	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3231	Design Studio-II (Photography & Videography)	IND2204	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3232	Typography Exploration	IND2207	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3233	Introduction to Prototyping Techniques	IND2208	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3234	Seminar or Guest Lecture or Workshop for Skill Development	IND2233	Bachelor of Interior Design	Quiz, Written Test	2015
3235	Interior Design Materials & Applications	IND2302	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3236	Elements of Interior Space Planning & Scaling	IND2303	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3237	Lighting & Colour in Interiors	IND2307	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3238	Interior Design Studio-I	IND2309	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3239	Interior Workshop Practice-I	IND2310	Bachelor of Interior Design	Quiz, Written Test	2015
3240	Advanced Interior Design Materials & Applications	IND2402	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3241	Estimation, Costing & Project Management	IND2404	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3242	Interior Design Studio-II	IND2406	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3243	Interior Workshop Practice-II	IND2407	Bachelor of Interior Design	Quiz, Written Test	2015
3244	Seminar or Guest Lecture or Workshop for Skill Development	IND2433	Bachelor of Interior Design	Quiz, Written Test	2015
3245	Design Thinking & Creative Problem Solving #	IND2501	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3246	Revitalization of Arts & Crafts	IND2502	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3247	Interior Safety Systems & Building Management	IND2503	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3248	Textile in Interiors	IND2504	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3249	Interior Design Studio-III	IND2506	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3250	Computer Aided Interior Design & Drafting	IND2507	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3251	Interior Space Modeling Workshop-I	IND2508	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3252	Integrated Project Work	IND2532	Bachelor of Interior Design	Report Writing, Presentation, Viva-Voce	2015
3253	Marketing & Entrepreneurship Development	IND2602	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3254	Professional Practice & Office Management	IND2603	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3255	Interior Design Studio-IV	IND2604	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3256	Computer Aided Interior Design & Visualization	IND2605	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3257	Interior Space Modeling Workshop-II	IND2606	Bachelor of Interior Design	Quiz, Written Test	2015
3258	Seminar or Guest Lecture or Workshop for Skill Development	IND2633	Bachelor of Interior Design	Quiz, Written Test	2015
3259	Furniture Ergonomics & Design	IND2607	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3260	Furniture Construction and Detailing	IND2609	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3261	Sustainable Interior Design& Materials	IND2610	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3262	Design Research Methods & Presentation Techniques	IND2702	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3263	Seminar	IND2733	Bachelor of Interior Design	Quiz, Written Test	2015
3264	Interior Design Portfolio Development	IND2736	Bachelor of Interior Design	Quiz, Class Performance, Report Writing, Presentation	2015
3265	Interior Design Dissertation	IND2737	Bachelor of Interior Design	Report Writing, Presentation, Viva-Voce	2015
3266	Training & Onsite Learning	IND2837	Bachelor of Interior Design	Report Writing, Presentation, Viva-Voce	2015
3267	Fashion Art Illustration and Model Drawing	FDT2151	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013
3268	Fashion Theory	FDT2251	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013
3269	Computer Aided Manufacturing	FDT2351	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013
3270	Fashion Management	FDT2451	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3271	Fashion Forecasting	FDT2551	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2013
3272	Fashion Retailing & Visual Merchandising	FDT2651	Fashion Management (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3273	Introduction to Apparel Merchandising	VFD2151	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3274	Apparel Market Research & Product Analysis	VFD2251	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3275	Vendor Management & Product Evaluation	VFD2351	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3276	Prototype Preparation & Merchandise Plan	VFD2451	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3277	Pre-Production Management	VFD2551	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3278	Shipment & Documentation Management	VFD2651	Apparel Merchandising (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3279	Design Eco-System	VFD2152	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3280	Fashion Design Research	VFD2252	Fashion Design (OE)	Report Writing, Viva-Voce, Presentation	2016
3281	Design Preparatory Process	VFD2352	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3282	Prototype Garment Development	VFD2452	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3283	Design Development	VFD2552	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3284	Health & Safety Equilibrium	VFD2652	Fashion Design (OE)	Quiz, Class Performance, Report Writing, Presentation	2016
3285	Drawing-I	FNA2101	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3286	Geometrical Drawing & Perspective-I	FNA2102	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3287	Design-I	FNA2103	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3288	Painting-I	FNA2104	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3289	Sculpture-I	FNA2105	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3290	Print Making-I	FNA2106	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3291	Visual Graphics-I	FNA2108	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3292	Photography-I	FNA2109	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3293	Drawing-II	FNA2201	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3294	Geometrical Drawing & Perspective-II	FNA2202	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3295	Design-II	FNA2203	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3296	Painting-II	FNA2204	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3297	Sculpture-II	FNA2205	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3298	Print Making-II	FNA2206	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3299	Visual Graphics-II	FNA2208	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3300	Photography-II	FNA2209	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3301	Summer Project Evaluation-I	FNA2335	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
3302	Composition -I	FNA2304	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3303	Carving-I	FNA2305	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3304	Mural-I	FNA2306	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3305	Photography-I	FNA2307	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3306	Ceramics-I	FNA2308	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3307	Assemblage-I	FNA2309	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3308	Sculpture Methods & Materials - I	FNA2310	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3309	Drawing & Illustration-I	FNA2311	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3310	Design-III	FNA2312	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3311	Lettering & Typography-I	FNA2313	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3312	Photography-III	FNA2314	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3313	Printing Techniques-I	FNA2315	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3314	Computer Graphic-I	FNA2316	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3315	Drawing-III	FNA2318	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3316	Painting-III	FNA2319	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3317	Composition-I	FNA2320	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3318	Photography-III	FNA2321	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3319	Print Making-III	FNA2322	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3320	Computer Graphic-I	FNA2323	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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3321	Painting Methods & Materials-I	FNA2324	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3322	Composition- II	FNA2404	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3323	Carving- II	FNA2405	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3324	Mural - II	FNA2406	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3325	Photography - II	FNA2407	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3326	Ceramics - II	FNA2408	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3327	Assemblage - II	FNA2409	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3328	Sculpture Methods & Materials - II	FNA2410	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3329	Drawing & Illustration - II	FNA2411	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3330	Design - IV	FNA2412	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3331	Lettering & Typography - II	FNA2413	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3332	Computer Graphics - II	FNA2414	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3333	Printing Techniques - II	FNA2415	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3334	Drawing - IV	FNA2417	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3335	Painting - IV	FNA2418	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3336	Composition - II	FNA2419	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3337	Mural - I	FNA2420	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3338	Print Making - II	FNA2421	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3339	Painting Methods & Materials - II	FNA2422	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3340	Practical Training - I (Evaluation)	FNA2535	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
3341	Study from Life - III	FNA2503	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3342	Composition - III	FNA2504	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3343	Metal Casting - I	FNA2505	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3344	Mural - III	FNA2506	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3345	Photography - III	FNA2507	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3346	Ceramics - III	FNA2508	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3347	Assemblage - III	FNA2509	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3348	Sculpture Methods & Materials - III	FNA2510	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3349	Drawing & Illustration - III	FNA2511	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3350	Design - V	FNA2512	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3351	Packaging - I	FNA2513	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3352	Computer Graphics - III	FNA2514	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3353	Printing Techniques - III	FNA2515	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3354	Textile Design - I	FNA2516	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3355	Drawing - V	FNA2518	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3356	Painting - V	FNA2519	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3357	Composition - III	FNA2520	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3358	Photography - III	FNA2521	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3359	Print Making - III	FNA2522	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3360	Traditional Painting - I	FNA2523	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3361	Painting Methods & Materials - III	FNA2524	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3362	Study Abroad	FNA2534	Bachelor of Fine Arts	Written Test, Country Report	2011
3363	Project - I	FNA2532	Bachelor of Fine Arts	Project writing, Presentation, Viva-Voce	2011
3364	Dissertation-I	FNA2637	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
3365	Composition - IV	FNA2604	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3366	Metal Casting - II	FNA2605	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3367	Mural - IV	FNA2606	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3368	Photography - IV	FNA2607	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3369	Ceramics - IV	FNA2608	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3370	Assemblage - IV	FNA2609	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3371	Sculpture Methods & Materials - IV	FNA2610	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3372	Drawing & Illustration - IV	FNA2611	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3373	Design-VI	FNA2612	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3374	Packaging-II	FNA2613	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3375	Printing Techniques-IV	FNA2614	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3376	Computer Graphics - IV	FNA2615	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3377	Textile Design - II	FNA2616	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3378	Drawing - VI	FNA2618	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3379	Painting - VI	FNA2619	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3380	Composition - IV	FNA2620	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3381	Mural - II	FNA2621	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3382	Print Making - II	FNA2622	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3383	Painting Methods & Materials - IV	FNA2623	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3384	Study Abroad	FNA2634	Bachelor of Fine Arts	Written Test, Country Report	2011
3385	Traditional Artwork	FNA2630	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3386	Practical Training Evaluation-II	FNA2735	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
3387	Composition - V	FNA2703	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3388	Metal Casting - III	FNA2704	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3389	Mural - V	FNA2705	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3390	Photography -V	FNA2706	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3391	Ceramics - V	FNA2707	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3392	Assemblage - V	FNA2708	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3393	Sculpture Methods & Materials - V	FNA2709	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3394	Design - VII	FNA2710	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3395	Packaging - III	FNA2711	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3396	Drawing & Illustration - V	FNA2712	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3397	Computer Graphics - V	FNA2713	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3398	Photography - V	FNA2714	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3399	Drawing - VII	FNA2716	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3400	Painting & Composition - I	FNA2717	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3401	Mural - III	FNA2718	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3402	Print Making - III	FNA2719	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3403	Painting Methods & Materials - V	FNA2720	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3404	Project- II	FNA2732	Bachelor of Fine Arts	Project writing, Presentation, Viva-Voce	2011
3405	Workshops/Certification/Exhibition (Discipline specific)	FNA2733	Bachelor of Fine Arts	Quiz, Written Test	2011
3406	Portfolio Development & Presentation with exhibitions	FNA2837	Bachelor of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
3407	Composition - VI	FNA2803	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3408	Metal Casting - IV	FNA2804	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3409	Mural - IV	FNA2805	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3410	Photography – IV	FNA2806	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3411	Ceramics - IV	FNA2807	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3412	Assemblage - IV	FNA2808	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3413	Sculpture Methods & Materials - IV	FNA2809	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3414	Design - VIII	FNA2810	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3415	Packaging - IV	FNA2811	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3416	Drawing & Illustration - VI	FNA2812	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3417	Computer Graphics - VI	FNA2813	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3418	Photography - VI	FNA2814	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3419	Drawing - VIII	FNA2816	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3420	Painting & Composition - II	FNA2817	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011

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3421	Mural - IV	FNA2818	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3422	Print Making - IV	FNA2819	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3423	Painting Methods & Materials - VI	FNA2820	Bachelor of Fine Arts	Practical, Report Writing, Class Performance	2011
3424	Visualization - I	FNA4101	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3425	Graphic Designing – I	FNA4102	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3426	TV Graphics – I	FNA4103	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3427	Illustration - I	FNA4104	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3428	Drawing - I	FNA4106	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3429	Creative Painting - I	FNA4107	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3430	Mural (Painting) - I	FNA4108	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3431	Portraiture - I	FNA4109	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3432	Creative Drawing - I	FNA4111	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3433	Portraiture Sculpture- I	FNA4113	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3434	Mural (Sculpture)- I	FNA4114	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3435	Creative Sculpture-I	FNA4115	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3436	Report & Viva (Specialization Specific)	FNA4237	Master of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
3437	Visualization - II	FNA4201	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3438	Graphic Designing - II	FNA4202	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3439	TV Graphics - II	FNA4203	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3440	Illustration - II	FNA4204	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3441	Drawing -II	FNA4206	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3442	Creative Painting - II	FNA4207	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3443	Mural (Painting) - II	FNA4208	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3444	Portraiture - II	FNA4209	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3445	Creative Drawing -II	FNA4211	Master of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3446	Portraiture Sculpture- II	FNA4212	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3447	Mural (Sculpture) - II	FNA4213	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3448	Creative Sculpture- II	FNA4214	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3449	Dissertation & Viva (Specialization Specific)-I	FNA4337	Master of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
3450	Visualization - III	FNA4301	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3451	Graphic Designing-III	FNA4302	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3452	TV Graphics - III	FNA4303	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3453	Illustration - III	FNA4304	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3454	Drawing – III	FNA4306	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3455	Creative Painting - III	FNA4307	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3456	Mural Painting - III	FNA4308	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3457	Portraiture - III	FNA4309	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3458	Art Criticism (Painting) - I	FNA4310	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3459	Creative Sculpture - III	FNA4311	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3460	Portraiture Sculpture - III	FNA4312	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3461	Mural (Sculpture) - III	FNA4313	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3462	Art Criticism (Sculpture) - I	FNA4315	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3463	Dissertation & Viva (Specialization Specific) - II	FNA4437	Master of Fine Arts	Report Writing, Presentation, Viva-Voce	2011
3464	Visualization - IV	FNA4401	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3465	Graphic Designing - IV	FNA4402	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3466	TV Graphics - IV	FNA4403	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3467	Illustration - IV	FNA4404	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3468	Drawing - IV	FNA4406	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3469	Creative Painting - IV	FNA4407	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3470	Mural (Painting) - IV	FNA4408	Master of Fine Arts	Practical, Report Writing, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3471	Portraiture - IV	FNA4409	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3472	Art Criticism (Painting) - II	FNA4410	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3473	Creative Drawing - IV	FNA4411	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3474	Portraiture Sculpture - IV	FNA4412	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3475	Mural (Sculpture) - IV	FNA4413	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3476	Creative Sculpture - II	FNA4414	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3477	Art Criticism (Sculpture) - II	FNA4415	Master of Fine Arts	Practical, Report Writing, Class Performance	2011
3478	Basics of Drawing and Asian Landscape	FNA2151	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3479	Basics of Drawing and Monochrome Folk Composition	FNA2251	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3480	Advanced Drawing and Illustration of Indian Temple Sculpture	FNA2351	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3481	Advanced Drawing with Ink with brush Illustration	FNA2451	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3482	Advanced Drawing and Illustration with Mural Art	FNA2551	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3483	Advanced Drawing and Illustration with Visual Design	FNA2651	Painting Arts (OE)	Practical, Report Writing, Class Performance	2013
3484	Legal Method	LAW2104	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3485	Law of Contract-I	LAW2105	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3486	Micro Economics-I	LAW2106	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3487	Law of Contract-II	LAW2204	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3488	Micro Economics-II	LAW2205	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3489	Macro Economics-I	LAW2302	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3490	Constitutional Law-I	LAW2303	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3491	Law of Crimes-I (Indian Penal Code Section-1 to 120B)	LAW2304	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3492	Family Law-I	LAW2305	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3493	Code of Criminal Procedure	LAW2311	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3494	Summer Internship Evaluation-I	LAW2335	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3495	Macro Economics-II	LAW2402	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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3496	Constitutional Law-II	LAW2403	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3497	Administrative Law	LAW2404	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3498	Family Law-II	LAW2405	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3499	Law of Crimes-II (Indian Penal Code Section 121-511)	LAW2406	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3500	Law of Evidence	LAW2502	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3501	Code of Civil Procedure	LAW2503	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3502	Labour Law-I	LAW2504	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3503	Property Law	LAW2505	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3504	Summer Internship Evaluation-II	LAW2535	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3505	Company Law	LAW2603	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3506	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 1986)	LAW2604	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3507	Labour Law - II	LAW2605	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3508	Cyber Laws	LAW2606	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3509	Environmental Law	LAW2702	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3510	Jurisprudence	LAW2703	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3511	Public International Law	LAW2704	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3512	Arbitration & Alternate Dispute Resolution	LAW2705	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3513	Summer Internship Evaluation-III	LAW2735	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3514	Human Rights Law	LAW2701	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3515	Forensic Science-I	LAW2707	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3516	Offences against Child & Juvenile Offence Human Rights Law	LAW2708	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3517	Law and Medicine-I	LAW2709	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3518	Military Law	LAW2710	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3519	Taxation Law	LAW2802	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3520	Interpretation of Statutes	LAW2803	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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3521	International Trade Law	LAW2804	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3522	Land Laws	LAW2805	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3523	Women & Criminal Law	LAW2806	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3524	Probation & Parole	LAW2807	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3525	Forensic Science-II	LAW2808	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3526	Law and Medicine-II	LAW2809	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3527	Medical Jurisprudence	LAW2810	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3528	Intellectual Property Rights	LAW2902	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3529	Law Poverty & Development	LAW2903	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3530	Professional Ethics	LAW2904	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3531	Summer Internship Evaluation-IV	LAW2935	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3532	Private International Law	LAW2905	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3533	Election Law	LAW2906	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3534	Banking & Insurance Laws	LAW2907	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3535	International Humanitarian & Refugee Law	LAW2908	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3536	Corruption Laws	LAW2911	B.A., LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3537	Moot Court / Internship	LAW2003	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3538	Dissertation	LAW2037	B.A., LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3539	Legal Method	LAW2104	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3540	Law of Contract-I	LAW2105	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3541	Financial Accounting-I	LAW2107	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3542	Readings in Management	MGT2130	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3543	Term Paper	COM2131	B.Com, LLB (Hons.)	Academic Writing, Presentation	2012
3544	Project (with Presentation & Evaluation)	COM2132	B.Com, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3545	Workshop / Certification (Discipline Specific) (1credit per workshop)	COM2133	B.Com, LLB (Hons.)	Quiz, Written Test	2012

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3546	Study Abroad	COM2134	B.Com, LLB (Hons.)	Written Test, Country Report	2012
3547	Law of Contract-II	LAW2204	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3548	Financial Accounting-II	LAW2206	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3549	Computer Applications in Business	COM2204	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3550	Human Values & Professional Ethics	MGT2206	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3551	Readings in Management	MGT2230	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3552	Term Paper	COM2231	B.Com, LLB (Hons.)	Academic Writing, Presentation	2012
3553	Project(with Presentation &Evaluation)	COM2232	B.Com, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3554	Workshop/ Certification (Discipline Specific) *(1credit per workshop)*	COM2233	B.Com, LLB (Hons.)	Quiz, Written Test	2012
3555	Study Abroad	COM2234	B.Com, LLB (Hons.)	Written Test, Country Report	2012
3556	Constitutional Law-I	LAW2303	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3557	Law of Crimes-I (Indian Penal Code Section-1 to 120B)	LAW2304	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3558	Family Law-I	LAW2305	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3559	Corporate Accounting	LAW2307	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3560	Statistical Methods in Research-I	LAW2308	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3561	Code of Criminal Procedure	LAW2311	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3562	Summer Internship Evaluation-I	LAW2335	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3563	Constitutional Law-II	LAW2403	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3564	Administrative Law	LAW2404	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3565	Family Law-II	LAW2405	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3566	Law of Crimes-II (Indian Penal Code Section 121-511)	LAW2406	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3567	Statistical Methods in Research-II	LAW2408	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3568	Law of Evidence	LAW2502	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3569	Code of Civil Procedure	LAW2503	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3570	Labour Law-I	LAW2504	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3571	Property Law	LAW2505	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3572	Cost Accounting	LAW2507	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3573	Macro Economics	LAW2508	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3574	Summer Internship Evaluation-II	LAW2535	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3575	Advanced Corporate Accounting	COM2503	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3576	Corporate Tax Law and Practice	COM2504	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3577	Business Taxation	COM2505	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3578	Company Law	LAW2603	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3579	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 1986)	LAW2604	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3580	Labour Law-II	LAW2605	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3581	Cyber Laws	LAW2606	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3582	Management Accounting	LAW2607	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3583	Advanced Cost Accounting	COM2603	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3584	Indirect Taxes including GST	COM2604	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3585	Public Finance and Tax Practices	COM2605	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3586	Environmental Law	LAW2702	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3587	Jurisprudence	LAW2703	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3588	Public International Law	LAW2704	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3589	Summer Internship Evaluation-III	LAW2735	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3590	Human Rights Law	LAW2701	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3591	Forensic Science-I	LAW2707	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3592	Offences against Child & Juvenile Offence Human Rights Law	LAW2708	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3593	Law and Medicine-I	LAW2709	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3594	Military Law	LAW2710	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3595	Taxation Law	LAW2802	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3596	Land Laws	LAW2805	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3597	Investment & Competition Law	LAW2801	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3598	Women & Criminal Law	LAW2806	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3599	Probation & Parole	LAW2807	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3600	Forensic Science-II	LAW2808	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3601	Law and Medicine-II	LAW2809	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3602	Medical Jurisprudence	LAW2810	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3603	Intellectual Property Rights	LAW2902	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3604	Law Poverty & Development	LAW2903	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3605	Professional Ethics	LAW2904	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3606	Summer Internship Evaluation-IV	LAW2935	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3607	Private International Law	LAW2905	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3608	Election Law	LAW2906	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3609	Banking & Insurance Laws	LAW2907	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3610	International Humanitarian & Refugee Law	LAW2908	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3611	Criminology & Victimology	LAW2909	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3612	Corruption Laws	LAW2911	B.Com, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3613	Moot Court / Internship	LAW2003	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3614	Dissertation	LAW2037	B.Com, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3615	Legal Methods	LAW2104	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3616	Law of Contract-I	LAW2105	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3617	Financial Accounting	LAW2110	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3618	E-Commerce	COM2103	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3619	Economic System and Society	ECO2104	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3620	Readings in Management	MGT2130	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3621	Term Paper	MGT2131	BBA, LLB (Hons.)	Academic Writing, Presentation	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3622	Project (with Presentation & Evaluation)	MGT2132	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3623	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2133	BBA, LLB (Hons.)	Quiz, Written Test	2012
3624	Study Abroad	MGT2134	BBA, LLB (Hons.)	Written Test, Country Report	2012
3625	Law of Contract-II	LAW2204	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3626	Analysis & Design of Business System	MGT2204	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3627	Innovation & Creativity Management	MGT2205	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3628	Human Values & Professional Ethics	MGT2206	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3629	Readings in Management	MGT2230	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3630	Term Paper	MGT2231	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3631	Project (with Presentation & Evaluation)	MGT2232	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3632	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2233	BBA, LLB (Hons.)	Quiz, Written Test	2012
3633	Study Abroad	MGT2234	BBA, LLB (Hons.)	Written Test, Country Report	2012
3634	Constitutional Law-I	LAW2303	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3635	Law of Crimes - I (Indian Penal Code Section-1 to 120B)	LAW2304	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3636	Family Law-I	LAW2305	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3637	Code of Criminal Procedure	LAW2311	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3638	Summer Internship Evaluation-I	LAW2335	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3639	Industrial Psychology	MGT2305	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3640	Term Paper	MGT2331	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3641	Project (with Presentation & Evaluation)	MGT2332	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3642	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2333	BBA, LLB (Hons.)	Quiz, Written Test	2012
3643	Study Abroad	MGT2334	BBA, LLB (Hons.)	Written Test, Country Report	2012
3644	Constitutional Law – II	LAW2403	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3645	Administrative Law	LAW2404	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3646	Family Law - II	LAW2405	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3647	Law of Crimes - II (Indian Penal Code Section 121-511)	LAW2406	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3648	Research Methodology & Report Preparation	LAW2410	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3649	Business Information & Database System	MGT2404	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3650	Personal Financial Planning	MGT2405	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3651	Term Paper	MGT2431	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3652	Project (with Presentation & Evaluation)	MGT2432	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3653	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2433	BBA, LLB (Hons.)	Quiz, Written Test	2012
3654	Study Abroad	MGT2434	BBA, LLB (Hons.)	Written Test, Country Report	2012
3655	Law of Evidence	LAW2502	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3656	Code of Civil Procedure	LAW2503	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3657	Labour Law - I	LAW2504	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3658	Property Law	LAW2505	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3659	Summer Internship Evaluation-II	LAW2535	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3660	Term Paper	MGT2531	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3661	Project (with Presentation & Evaluation)	MGT2532	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3662	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2533	BBA, LLB (Hons.)	Quiz, Written Test	2012
3663	Study Abroad	MGT2534	BBA, LLB (Hons.)	Written Test, Country Report	2012
3664	Term Paper	MGT2531	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3665	Project (with Presentation &Evaluation)	MGT2532	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3666	Workshop / Certification (Discipline Specific) *(1credit per workshop)*	MGT2533	BBA, LLB (Hons.)	Quiz, Written Test	2012
3667	Study Abroad	MGT2534	BBA, LLB (Hons.)	Written Test, Country Report	2012
3668	Training & Development	MGT2510	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3669	Term Paper	MGT2531	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3670	Project (with Presentation & Evaluation)	MGT2532	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3671	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2533	BBA, LLB (Hons.)	Quiz, Written Test	2012
3672	Study Abroad	MGT2534	BBA, LLB (Hons.)	Written Test, Country Report	2012
3673	Company Law	LAW2603	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3674	Law of Torts (Motor Vehicles Act & Consumer Protection Act, 1986)	LAW2604	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3675	Labour Law -II	LAW2605	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3676	Cyber Laws	LAW2606	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3677	Brand Management	MGT2602	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3678	Advertising & Sales Promotion	MGT2603	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3679	Term Paper	MGT2631	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3680	Project (with Presentation & Evaluation)	MGT2632	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3681	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2633	BBA, LLB (Hons.)	Quiz, Written Test	2012
3682	Corporate Tax Planning	MGT2605	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3683	Banking & Financial Institutions	MGT2606	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3684	Advanced Corporate Finance	MGT2607	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3685	Term Paper	MGT2631	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3686	Project (with Presentation & Evaluation)	MGT2632	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3687	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2633	BBA, LLB (Hons.)	Quiz, Written Test	2012
3688	Industrial Relations & Labour Law	MGT2608	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3689	Performance Management System	MGT2609	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3690	Compensation & Reward Management	MGT2610	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3691	Term Paper	MGT2631	BBA, LLB (Hons.)	Academic Writing, Presentation	2012
3692	Project (with Presentation &Evaluation)	MGT2632	BBA, LLB (Hons.)	Project writing, Presentation, Viva-Voce	2012
3693	Workshop / Certification (Discipline Specific) (1credit per workshop)	MGT2633	BBA, LLB (Hons.)	Quiz, Written Test	2012
3694	Environmental Law	LAW2702	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3695	Jurisprudence	LAW2703	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3696	Public International Law	LAW2704	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3697	Summer Internship Evaluation-III	LAW2735	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3698	Human Rights Law	LAW2701	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3699	Forensic Science-I	LAW2707	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3700	Offences against Child & Juvenile Offence Human Rights Law	LAW2708	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3701	Law and Medicine-I	LAW2709	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3702	Military Law	LAW2710	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3703	Taxation Law	LAW2802	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3704	Interpretation of Statutes	LAW2803	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3705	International Trade Law	LAW2804	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3706	Land Laws	LAW2805	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3707	Investment & Competition Law	LAW2801	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3708	Women & Criminal Law	LAW2806	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3709	Probation & Parole	LAW2807	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3710	Forensic Science-II	LAW2808	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3711	Law and Medicine-II	LAW2809	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3712	Medical Jurisprudence	LAW2810	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3713	Intellectual Property Rights	LAW2902	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3714	Law Poverty & Development	LAW2903	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3715	Professional Ethics	LAW2904	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3716	Summer Internship Evaluation-IV	LAW2935	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3717	Private International Law	LAW2905	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3718	Election Law	LAW2906	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3719	Banking & Insurance Law	LAW2907	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3720	International Humanitarian & Refugee Law	LAW2908	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3721	Criminology & Victimology	LAW2909	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3722	Corruption Laws	LAW2911	BBA, LLB (Hons.)	Quiz, Project, Presentation, Viva-Voce	2012
3723	Moot Court / Internship	LAW2003	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3724	Dissertation	LAW2037	BBA, LLB (Hons.)	Report Writing, Presentation, Viva-Voce	2012
3725	Research Method & Legal Writing	LAW4101	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3726	Comparative Public Law/ System of Governance	LAW4102	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3727	Intellectual Property Law	LAW4105	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3728	Fundamental Rights & Directive Principles	LAW4106	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3729	Dissertation	LAW4237	Master of Law (LLM)	Report Writing, Presentation, Viva-Voce	2011
3730	Competition Law	LAW4202	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3731	International Trade Law	LAW4203	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3732	Banking & Insurance Law	LAW4205	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3733	Administrative Law	LAW4206	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3734	Religion Diversity & Law	LAW4207	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3735	Media Law	LAW4208	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3736	International Criminal Law	LAW4209	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3737	Police Law and Administration	LAW4210	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3738	Corporate Crimes/ White Collar Crimes	LAW4211	Master of Law (LLM)	Quiz, Project, Presentation, Viva-Voce	2011
3739	Concept and Theoretical Understanding of Human Rights	LAW2152	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3740	Systems, Organizations and Instruments of Human Rights	LAW2252	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3741	Contemporary Human Rights Situations and Issues	LAW2352	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3742	Specific Themes in Human Rights	LAW2452	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3743	Legislation Themes in Human Rights	LAW2552	Human Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3744	Report Writing and Thesis Preparation (Human Rights)	LAW2652	Human Rights (OE)	Report Writing, Viva-Voce, Presentation	2013
3745	Principles of IPR	LAW2151	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3746	Patent Law and Practices	LAW2251	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3747	Copyright Law and Practices	LAW2351	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3748	Trademark Law and Practices	LAW2451	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3749	Emerging Legal Issues and Challenges	LAW2551	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2013
3750	Future Aspects of Intellectual Property Rights	LAW2651	Intellectual Property Rights (OE)	Quiz, Project, Presentation, Viva-Voce	2016
3751	Food Science- I Lab	DAN2103	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3752	Nutritional Biochemistry Lab	DAN2104	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3753	Food Microbiology	DAN2202	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3754	Food Science II Lab	DAN2203	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3755	Food Microbiology Lab	DAN2204	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3756	Quantity Food Services	DAN2301	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3757	Human Physiology Lab	DAN2303	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3758	Research Paper Writing	DAN2331	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3759	Project (with Presentation &Evaluation	DAN2332	Bachelor of Science (Dietetics & Applied Nutrition)	Project writing, Presentation, Viva-Voce	2011
3760	Workshop (1 credit per workshop)	DAN2333	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Written Test	2011
3761	Food Processing	DAN2304	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3762	Advanced Dietetics	DAN2451	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3763	Food Service Management Lab	DAN2404	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3764	Paper Writing	DAN2431	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3765	Project (with Presentation &Evaluation	DAN2432	Bachelor of Science (Dietetics & Applied Nutrition)	Project writing, Presentation, Viva-Voce	2011
3766	Workshop (1 credit per workshop)	DAN2433	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Written Test	2011
3767	Nutrition for Health & Fitness	DAN2501	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3768	Bakery	DAN2502	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3769	Bakery Lab	DAN2504	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3770	Food Quality Lab	DAN2505	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3771	Summer Internship Evaluation	DAN2535	Bachelor of Science (Dietetics & Applied Nutrition)	Report Writing, Presentation, Viva-Voce	2011
3772	Clinical & Therapeutic Nutrition	DAN2602	Bachelor of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2011
3773	Food Preservation Lab	DAN2603	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3774	Clinical & Therapeutic Nutrition Lab	DAN2604	Bachelor of Science (Dietetics & Applied Nutrition)	Practical, Lab Record, Presentation, Class Performance	2011
3775	Internship	DAN2637	Bachelor of Science (Dietetics & Applied Nutrition)	Report Writing, Presentation, Viva-Voce	2011
3776	Haematology-I	MLT2108	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3777	General Microbiology	MLT2109	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3778	Anatomy and Physiology Lab-I	MLT2110	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3779	Haematology Lab-I	MLT2111	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3780	Clinical Training-I	MLT2112	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3781	Haematology-II	MLT2208	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3782	Clinical Bacteriology	MLT2209	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3783	Haematology Lab-II	MLT2211	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3784	Clinical Training-II	MLT2212	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3785	Nutrition	MLT2205	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3786	Medical Terminology	MLT2206	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3787	Study Abroad	MLT2234	Bachelor of Science (Medical Lab Technology)	Written Test, Country Report	2014
3788	Immunology and Serology	MLT2307	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3789	Haematology-III	MLT2308	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3790	Clinical Parasitology	MLT2309	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3791	Haematology Lab-III	MLT2311	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3792	Clinical Biochemistry Lab	MLT2312	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3793	Clinical Training-III	MLT2313	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3794	Hospital Administration	MLT2305	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3795	Lab Management & Safety Process	MLT2306	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3796	Study Abroad	MLT2334	Bachelor of Science (Medical Lab Technology)	Written Test, Country Report	2014
3797	Clinical Pathology and Cytology	MLT2405	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3798	Clinical Virology and Mycology	MLT2406	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3799	Diagnostic Biochemistry Lab-I	MLT2408	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3800	Clinical Training-IV	MLT2409	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3801	Basics in Computers & PC Package	MLT2410	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3802	Study Abroad	MLT2434	Bachelor of Science (Medical Lab Technology)	Written Test, Country Report	2014
3803	Histopathology	MLT2507	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3804	Immunohematology and Blood Transfusion	MLT2508	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3805	Biostatistics and Quality Assurance	MLT2509	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3806	Diagnostic Biochemistry-II	MLT2510	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3807	Diagnostic Biochemistry Lab-II	MLT2511	Bachelor of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2014
3808	Clinical Training-V	MLT2512	Bachelor of Science (Medical Lab Technology)	Practical, Report Writing, Class Performance	2014
3809	Summer Internship Evaluation	MLT2535	Bachelor of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2014
3810	Preventive & Social Medicine	MLT2505	Bachelor of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2014
3811	Project (with presentation & evaluation)	MLT2532	Bachelor of Science (Medical Lab Technology)	Project writing, Presentation, Viva-Voce	2014
3812	Study Abroad	MLT2534	Bachelor of Science (Medical Lab Technology)	Written Test, Country Report	2014
3813	Internship Evaluation	MLT2637	Bachelor of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2014
3814	Physical Optics	OPT2104	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3815	Geometrical Optics-I	OPT2105	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3816	Optometric Procedures-I	OPT2106	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3817	Basics in Computers and PC package	OPT2107	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3818	Geometrical Optics-II	OPT2204	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3819	Optometric Procedures-II	OPT2205	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3820	Clinics-I	OPT2206	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3821	Nutrition	OPT2207	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3822	Project (with Presentation & Evaluation)	OPT2232	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3823	Ocular Microbiology	OPT2301	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3824	Applied Optics-I (Optometric Optics)	OPT2302	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3825	Visual Optics-I (Visual Perception & Neurophysiology)	OPT2303	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3826	Clinical Optometric Procedures	OPT2306	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3827	Clinics-II	OPT2307	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3828	Term Paper	OPT2331	Bachelor of Optometry	Academic Writing, Presentation	2012
3829	Project (with Presentation & Evaluation)	OPT2332	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3830	Workshop / Certification (1credit per workshop)	OPT2333	Bachelor of Optometry	Quiz, Written Test	2012
3831	Medical Law and Ethics	OPT2310	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3832	Applied Optics-II (Dispensing Optics)	OPT2401	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3833	Visual Optics-II	OPT2402	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3834	Ocular Diseases-II	OPT2403	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3835	Clinics-III	OPT2406	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3836	Ophthalmic Electrodiagnostic Procedures	OPT2408	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3837	Perimetry	OPT2409	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3838	Term Paper	OPT2431	Bachelor of Optometry	Academic Writing, Presentation	2012
3839	Project (with Presentation & Evaluation)	OPT2432	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3840	Workshop / Certification (1credit per workshop)	OPT2433	Bachelor of Optometry	Quiz, Written Test	2012
3841	Contact Lens-I	OPT2501	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3842	Low Vision Care	OPT2502	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3843	Binocular Vision-I	OPT2504	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3844	Diseases of the Eye and Clinical Medicine	OPT2505	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3845	Clinics-IV	OPT2507	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3846	Summer Internship Evaluation-I	OPT2535	Bachelor of Optometry	Report Writing, Presentation, Viva-Voce	2012
3847	Ocular Prosthesis	OPT2508	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3848	Refractive Surgery	OPT2509	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3849	Research Methodology	OPT2510	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3850	Term Paper	OPT2531	Bachelor of Optometry	Academic Writing, Presentation	2012
3851	Project (with Presentation & Evaluation)	OPT2532	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3852	Workshop / Certification (1credit per workshop)	OPT2533	Bachelor of Optometry	Quiz, Written Test	2012
3853	Contact Lens-II	OPT2601	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3854	Binocular Vision-II	OPT2602	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3855	Clinic-V	OPT2605	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3856	Visual Rehabilitation	OPT2606	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3857	Vision Therapy and Learning Disabilities	OPT2607	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3858	Eye Banking	OPT2608	Bachelor of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2012
3859	Project (with Presentation & Evaluation)	OPT2632	Bachelor of Optometry	Project writing, Presentation, Viva-Voce	2012
3860	(Clinics-VI A.) Retina, Glaucoma, Low Vision	OPT2701	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3861	(Clinics-VI B.) Pediatric & Binocular Vision	OPT2702	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3862	(Clinics-VI C.) Cornea and Contact Lenses	OPT2703	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3863	(Clinics-VI D.) Primary Eye Care	OPT2704	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3864	Summer Internship Evaluation-II	OPT2735	Bachelor of Optometry	Report Writing, Presentation, Viva-Voce	2012
3865	Research Project (Mid-Term Evaluation)	OPT2737	Bachelor of Optometry	Report Writing, Presentation, Viva-Voce	2012
3866	Clinics VII (Comprehensive Eye Care and Refraction)	OPT2801	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3867	Clinics VIII (Optometric Procedures and Instruments)	OPT2802	Bachelor of Optometry	Practical, Report Writing, Class Performance	2012
3868	Project - Dissertation	OPT2837	Bachelor of Optometry	Report Writing, Presentation, Viva-Voce	2012
3869	Anatomy and Physiology of Speech & Hearing	ASL2107	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3870	Clinical Psychology	ASL2108	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3871	Linguistics and Phonetics	ASL2109	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3872	Electronics and Acoustics	ASL2110	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3873	Research Methods and Statistics	ASL2111	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3874	Clinical Practicum	ASL2105	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3875	Speech Language Pathology	ASL2208	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3876	Audiology	ASL2209	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3877	Practicals in Speech Language Pathology	ASL2210	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3878	Practicals in Audiology	ASL2211	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3879	Voice and its Disorders	ASL2307	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3880	Speech Sound Disorders	ASL2308	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3881	Diagnostic Audiology Behavioral Test	ASL2309	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3882	Amplification Devices	ASL2310	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3883	Clinicals in Speech Language Pathology-I	ASL2311	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3884	Clinicals in Audiology-I	ASL2312	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3885	Summer Internship Evaluation-I (Community Outreach Programs)	ASL2335	Bachelor of Audiology & Speech Language Pathology	Report Writing, Presentation, Viva-Voce	2014
3886	Motor Speech Disorders in Children	ASL2402	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3887	Diagnostic Audiology – Physiological Tests	ASL2407	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3888	Implantable Hearing Devices	ASL2408	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3889	Clinicals in Speech Language Pathology-II	ASL2409	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3890	Clinicals in Audiology-II	ASL2410	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3891	Fluency and its Disorders	ASL2501	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3892	Structural Anomalies & Speech Disorders	ASL2507	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3893	Pediatric Audiology	ASL2508	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3894	Aural Rehabilitation in Children	ASL2509	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3895	Clinicals in Speech Language Pathology-III	ASL2510	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3896	Clinicals in Audiology-III	ASL2511	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3897	Summer Internship Evaluation-II (Outreach Program)	ASL2535	Bachelor of Audiology & Speech Language Pathology	Report Writing, Presentation, Viva-Voce	2014
3898	Motor Speech Disorders in Adults	ASL2606	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014
3899	Audiology in Practice	ASL2609	Bachelor of Audiology & Speech Language Pathology	Quiz, Presentation, Group Discussion, Class Performance	2014

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3900	Clinicals in Speech Language Pathology-IV	ASL2610	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3901	Clinicals in Audiology-IV	ASL2611	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3902	Clinicals in Speech Language Pathology and Audiology-I	ASL2701	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3903	Clinicals in Speech Language Pathology and Audiology-II	ASL2801	Bachelor of Audiology & Speech Language Pathology	Practical, Report Writing, Class Performance, Presentation	2014
3904	Statistics for Clinical Research	CLR4103	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3905	Basics of Pharmacy, Drug discovery & Development	CLR4104	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3906	Pre Clinical Studies and Safety	CLR4201	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3907	IPR & Data Exclusivity, Bioethics in Clinical Research	CLR4202	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3908	Regulatory Affairs	CLR4204	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3909	Audit & Inspection	CLR4206	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3910	Reporting and Medical Writing	CLR4303	Master of Science (Clinical Research)	Report Writing, Presentation, Viva-Voce	2013
3911	Pharmacogenomics	CLR4304	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3912	Project Management and Pharmacovigilance	CLR4306	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3913	Diagnostics in Clinical Research	CLR4307	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3914	Pathophysiology and Therapeutics	CLR4308	Master of Science (Clinical Research)	Quiz, Presentation, Group Discussion, Class Performance	2013
3915	Summer Internship Evaluation	CLR4335	Master of Science (Clinical Research)	Report Writing, Presentation, Viva-Voce	2013
3916	Dissertation	CLR4437	Master of Science (Clinical Research)	Report Writing, Presentation, Viva-Voce	2013
3917	Nutritional Biochemistry-I	DAN4102	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3918	Food Science-I	DAN4104	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3919	Nutritional Biochemistry Lab-I	DAN4106	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3920	Food Science Lab-I	DAN4107	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3921	Therapeutic Nutrition Lab-I	DAN4108	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3922	Advanced Nutrition-II	DAN4201	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3923	Nutritional Biochemistry-II	DAN4202	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3924	Research Methodology	DAN4203	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3925	Dietetic Technique and Patient Counseling	DAN4205	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3926	Nutritional Biochemistry Lab-II	DAN4206	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3927	Advanced Nutrition Lab-II	DAN4207	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3928	Therapeutic Nutrition Lab-II	DAN4208	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3929	Institutional Food Administration	DAN4302	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3930	Community Nutrition Lab-I	DAN4305	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3931	Food Science Lab-II	DAN4306	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3932	Food Microbiology Lab	DAN4307	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3933	Summer Internship Evaluation	DAN4335	Master of Science (Dietetics & Applied Nutrition)	Report Writing, Presentation, Viva-Voce	2012
3934	Food Processing & Technology	DAN4402	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3935	Nutrition for Health and Fitness	DAN4403	Master of Science (Dietetics & Applied Nutrition)	Quiz, Presentation, Group Discussion, Class Performance	2012
3936	Community Nutrition Lab-II	DAN4404	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3937	Food Processing & Technology Lab	DAN4405	Master of Science (Dietetics & Applied Nutrition)	Practical, Report Writing, Class Performance, Presentation	2012
3938	Dissertation	DAN4437	Master of Science (Dietetics & Applied Nutrition)	Report Writing, Presentation, Viva-Voce	2012
3939	Epidemiology Public Health & Community Optometry	OPT4101	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3940	Clinic-I (General)	OPT4105	Master of Optometry	Practical, Report Writing, Class Performance, Presentation	2011
3941	Research Methodology & Biostatistics-I	OPT4106	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3942	Applied Optics	OPT4110	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3943	Advanced Contact Lens-I	OPT4204	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3944	Clinics-II (Specialty)	OPT4205	Master of Optometry	Practical, Report Writing, Class Performance, Presentation	2011
3945	Research Methodology & Biostatistics-II	OPT4212	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3946	Project (Research)	OPT4232	Master of Optometry	Report Writing, Presentation, Viva-Voce	2011
3947	Advanced Contact Lens-II	OPT4303	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3948	Clinics-III (Specialty)	OPT4305	Master of Optometry	Practical, Report Writing, Class Performance, Presentation	2011
3949	Environmental Optometry	OPT4306	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3950	Teaching Methodology	OPT4307	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3951	Project	OPT4332	Master of Optometry	Report Writing, Presentation, Viva-Voce	2011
3952	Clinical Optometry (General)	OPT4401	Master of Optometry	Practical, Report Writing, Class Performance, Presentation	2011
3953	Clinical Internship-Dissertation	OPT4437	Master of Optometry	Report Writing, Presentation, Viva-Voce	2011
3954	Advance Applied Optics	OPT4409	Master of Optometry	Quiz, Presentation, Group Discussion, Class Performance	2011
3955	Epidemiology Public Health & Community Optometry	OPP4101	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3956	Clinic-I	OPP4105	Master of Optometry (Practitioner)	Practical, Report Writing, Class Performance, Presentation	2012
3957	Research Methodology & Biostatistics	OPP4106	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3958	Low Vision Care and Geriatric Optometry	OPP4109	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3959	Applied Optics (Dispensing)	OPP4110	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3960	Project (with Presentation & Evaluation)	OPP4132	Master of Optometry (Practitioner)	Report Writing, Presentation, Viva-Voce	2012
3961	Advanced Contact Lens-I	OPP4204	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3962	Clinics-II (Specialty)	OPP4205	Master of Optometry (Practitioner)	Practical, Report Writing, Class Performance, Presentation	2012
3963	Low Vision Care and Rehabilitation	OPP4212	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3964	Project	OPP4232	Master of Optometry (Practitioner)	Report Writing, Presentation, Viva-Voce	2012
3965	Advanced Contact Lens-II	OPP4303	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3966	Clinics-III (Specialty)	OPP4305	Master of Optometry (Practitioner)	Practical, Report Writing, Class Performance, Presentation	2012
3967	Environmental Optometry	OPP4306	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3968	Teaching Methodology	OPP4307	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3969	Project	OPP4332	Master of Optometry (Practitioner)	Report Writing, Presentation, Viva-Voce	2012
3970	Clinical Optometry (General)	OPP4401	Master of Optometry (Practitioner)	Practical, Report Writing, Class Performance, Presentation	2012
3971	Clinical Dissertation	OPP4437	Master of Optometry (Practitioner)	Report Writing, Presentation, Viva-Voce	2012
3972	Advance Applied Optics	OPP4410	Master of Optometry (Practitioner)	Quiz, Presentation, Group Discussion, Class Performance	2012
3973	Demography	PUH4101	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3974	Social & Behavioral Aspects of Health	PUH4103	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
3975	Healthcare Delivery System & Policies	PUH4104	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3976	Biostatistics	PUH4106	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3977	Applied Epidemiology	PUH4201	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3978	Environmental Health Sanitation	PUH4204	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3979	Research Methodology	PUH4205	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3980	National Health Programmes	PUH4206	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3981	Health Economics	PUH4208	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3982	Term Paper	PUH4231	Master of Public Health	Academic Writing, Presentation	2012
3983	Operations Research	PUH4301	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3984	Quality in Healthcare	PUH4302	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3985	Nutrition	PUH4303	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3986	Women & Child Health	PUH4304	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3987	Health Programme Management	PUH4305	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3988	Summer Internship Evaluation	PUH4335	Master of Public Health	Report Writing, Presentation, Viva-Voce	2012
3989	Health Information System	PUH4401	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3990	Health Insurance	PUH4402	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3991	Disaster Management	PUH4403	Master of Public Health	Quiz, Presentation, Group Discussion, Class Performance	2012
3992	Dissertation	PUH4437	Master of Public Health	Report Writing, Presentation, Viva-Voce	2012
3993	Demography	MHA4102	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3994	Biostatistics	MHA4105	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3995	Information Technology for Managers	MHA4106	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3996	Essentials of Healthcare System	MHA4107	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3997	Hospital Planning	MHA4203	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3998	Health Economics	MHA4204	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
3999	Research Methodology	MHA4205	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4000	Hospital Materials Management	MHA4206	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
4001	Term Paper	MHA4231	Master of Hospital Administration	Academic Writing, Presentation	2011
4002	Operations Research	MHA4302	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
4003	Quality Management	MHA4303	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
4004	Medical & Health Laws	MHA4304	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
4005	Management of Clinical Services	MHA4305	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
4006	Summer Internship Evaluation	MHA4335	Master of Hospital Administration	Report Writing, Presentation, Viva-Voce	2011
4007	Hospital Management Information System	MHA4401	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
4008	Health Insurance and Medical Tourism	MHA4402	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
4009	Disaster Management	MHA4403	Master of Hospital Administration	Quiz, Presentation, Group Discussion, Class Performance	2011
4010	Dissertation	MHA4437	Master of Hospital Administration	Report Writing, Presentation, Viva-Voce	2011
4011	Laboratory Management & Quality Control	MLT4108	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4012	Clinical Immunology	MLT4113	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4013	Advanced Laboratory Technique	MLT4114	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4014	Lab Course	MLT4105	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4015	Clinical Training	MLT4112	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4016	Molecular Diagnostics	MLT4208	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4017	Research Methodology & Biostatistics	MLT4211	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4018	Clinical Nutrition	MLT4213	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4019	Clinical Biochemistry Lab Course-I	MLT4215	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4020	Clinical Biochemistry Clinical Training-I	MLT4216	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4021	General Microbiology	MLT4217	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4022	Clinical Bacteriology	MLT4219	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4023	Clinical Microbiology Lab Course-I	MLT4220	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4024	Clinical Microbiology Clinical Training-I	MLT4221	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4025	Summer Project Evaluation	MLT4335	Master of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2015
4026	Clinical Endocrinology	MLT4307	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4027	Clinical Enzymology	MLT4308	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4028	Advanced Chemical Pathology	MLT4313	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4029	Clinical Biochemistry Lab Course-II	MLT4314	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4030	Clinical Biochemistry Clinical Training-II	MLT4315	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4031	Clinical Virology	MLT4317	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4032	Clinical Mycology	MLT4318	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4033	Clinical Parasitology	MLT4319	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4034	Pharmaceutical Microbiology	MLT4320	Master of Science (Medical Lab Technology)	Quiz, Presentation, Group Discussion, Class Performance	2015
4035	Clinical Microbiology Lab Course-II	MLT4321	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4036	Clinical Microbiology Clinical Training-II	MLT4322	Master of Science (Medical Lab Technology)	Practical, Lab Record, Presentation, Class Performance	2015
4037	On Job Training	MLT4401	Master of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2015
4038	Dissertation-Clinical Research	MLT4437	Master of Science (Medical Lab Technology)	Report Writing, Presentation, Viva-Voce	2015
4039	Management Process & Organizational Behaviour	HAP4101	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4040	Hospital Planning	HAP4202	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4041	Biostatistics	HAP4204	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4042	Research Methodology	HAP4302	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4043	Medical & Health Laws	HAP4304	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4044	Hospital Materials Management	HAP4305	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4045	Operations Research	HAP4401	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4046	Quality Management	HAP4402	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4047	Management of Clinical Services	HAP4403	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4048	Management of Support & Utility Services	HAP4404	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4049	Disaster Management	HAP4405	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4050	Hospital Management Information System	HAP4502	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4051	Health Insurance & Medical Tourism	HAP4503	Master of Hospital Administration (Executive for Working Professionals)	Quiz, Presentation, Group Discussion, Class Performance	2017
4052	Summer Project Evaluation	HAP4535	Master of Hospital Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2017
4053	Dissertation-Project	HAP4637	Master of Hospital Administration (Executive for Working Professionals)	Report Writing, Presentation, Viva-Voce	2017
4054	Biotechniques & Instrumentation	SCT2105	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4055	Cell & Molecular Biology Lab	SCT2107	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4056	Biochemistry Lab	SCT2108	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4057	Biotechniques & Instrumentation Lab	SCT2109	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4058	Research Presentation	SCT2110	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4059	Term Paper	SCT2131	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
4060	Immunology-I	SCT2202	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4061	Biostatistics	SCT2205	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4062	Molecular Biology Lab	SCT2207	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4063	Microbiology & Virology Lab	SCT2208	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4064	Immunology-I Lab	SCT2209	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4065	Bioinformatics-II Lab	SCT2210	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4066	Scientific Communication Skill Development (Seminar/ Workshop)	SCT2211	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4067	Immunology-II	SCT2303	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4068	Recombinant DNA Technology	SCT2304	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4069	Immunology-II Lab	SCT2307	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4070	Recombinant DNA Technology Lab	SCT2308	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4071	Genomics & Proteomic Algorithms Lab	SCT2309	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4072	Nano-Biotechnology and Nano-Medicine Lab	SCT2310	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4073	Scientific Communication Skill Development (Seminar/ Workshop)	SCT2311	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4074	Term Paper	SCT2331	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
4075	Plant Biotechnology and Its Applications in Molecular Medicine	SCT2405	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4076	Molecular Immunology Lab	SCT2406	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4077	Molecular Modeling & Drug Development Lab	SCT2407	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4078	Scientific Communication Skill Development (Seminar/ Workshop)	SCT2408	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4079	Ethics of Biomedical Research, Intellectual Property (IP), IP rights (IPR)	SCT2503	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019

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4080	Stem Cells and Regenerative Medicine Lab	SCT2505	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4081	Term Paper	SCT2531	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
4082	Scientific Communication Skill Development (Seminar/ Workshop)	SCT2506	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4083	Medical Writing (Online Resources)	SCT2507	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4084	Summer Internship Evaluation	SCT2535	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Report Writing, Presentation, Viva-Voce	2019
4085	Analysis of Business of Science & Alternative Careers in Molecular Medicine and Regenerative Medicine (Online Resources)	SCT2601	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4086	Industry Trends and Campus Recruitment Events and Career Counseling (Online Resources)	SCT2602	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4087	Dissertation/ Project Report Presentation/ Viva-Voce	SCT2637	Bachelor of Science (Molecular Medicine & Stem Cell Technologies)	Report Writing, Presentation, Viva-Voce	2019
4088	Microbiology & Virology	SCT4102	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4089	Molecular Biology & rDNA Technology	SCT4103	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4090	Bioanalytical Technologies & Instrumentation	SCT4105	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4091	Biostatistics	SCT4106	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4092	Biological Programming-I (Bioinformatics)	SCT4107	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4093	Cell & Molecular Biology Lab	SCT4108	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4094	Molecular Biology & rDNA Technology Lab	SCT4109	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4095	Bioanalytical Technologies & Instrumentation Lab	SCT4110	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019

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4096	Research Seminar/ Research Presentation/ Lit. Review & Presentation: Molecular Medicine	SCT4111	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Viva-Voce	2019
4097	Term Paper	SCT4131	Master of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
4098	Stem Cell Technology	SCT4201	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4099	Biological Programming-II (Bioinformatics)	SCT4204	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4100	Molecular Medicine: Principles & Application	SCT4205	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4101	Nano-medicines and Technologies	SCT4206	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4102	Fermentation Technology & Its Applications in Molecular Medicine	SCT4207	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4103	Stem Cell Technology Lab	SCT4208	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4104	Nano-medicines and Technologies Lab	SCT4209	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4105	Fundamental Immunology-I Lab	SCT4210	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4106	Biological Programming (Bioinformatics)-II Lab	SCT4211	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4107	Cancer Biology & Cancer Therapeutics (T cell & Antibody-based Therapeutics)	SCT4301	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4108	Vaccines and Preclinical Animal Models	SCT4303	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4109	Ethics of Biomedical Research Intellectual Property (IP), IP rights (IPR)	SCT4306	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4110	Plant Biotechnology and Its Applications in Molecular Medicine	SCT4307	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4111	Fundamental Immunology-II Lab	SCT4308	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4112	Genomics & Proteomics Lab	SCT4309	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4113	Stem Cell Culture Lab	SCT4310	Master of Science (Molecular Medicine & Stem Cell Technologies)	Practical, Lab Record, Presentation, Class Performance	2019
4114	Scientific Communication Skill Development (Seminar/ Workshop)	SCT4311	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Viva-Voce	2019
4115	Summer Internship Evaluation	SCT4335	Master of Science (Molecular Medicine & Stem Cell Technologies)	Report Writing, Presentation, Viva-Voce	2019
4116	Term Paper	SCT4331	Master of Science (Molecular Medicine & Stem Cell Technologies)	Academic Writing, Presentation, Viva-Voce	2019
4117	Analysis of Business of Science & Alternative Careers in Molecular Medicine & Regenerative Medicine (Online Resources)	SCT4401	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4118	Industry Trends & Campus Recruitment Events & Career Counseling (Online Resources)	SCT4402	Master of Science (Molecular Medicine & Stem Cell Technologies)	Quiz, Presentation, Group Discussion, Class Performance	2019
4119	Dissertation / Project Report Presentation / Viva Voce	SCT4437	Master of Science (Molecular Medicine & Stem Cell Technologies)	Report Writing, Presentation, Viva-Voce	2019
4120	Principles of Nutrition	DAN2151	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
4121	Family Meal Management	DAN2251	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
4122	Basics Dietetics	DAN2351	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
4123	Advanced Dietetics	DAN2451	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
4124	Community Nutrition	DAN2551	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2013
4125	Food Chemistry	DAN2651	Dietetics & Nutrition (OE)	Quiz, Presentation, Group Discussion, Class Performance	2016
4126	Introduction to Stem Cell Technology	SCT2151	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
4127	Fundamental Human Embryology & Developmental Biology	SCT2251	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
4128	Fundamental Cell Biology Human Anatomy & Physiology	SCT2351	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
4129	Human Pluripotent Stem Cell Culture & Differentiation Methods	SCT2451	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
4130	Therapeutic Applications of Human Pluripotent Stem Cells	SCT2551	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
4131	Project & Paper Presentation	SCT2651	Stem Cell Technology (OE)	Quiz, Report Writing, Presentation, Viva-Voce	2018
4132	Communicative English	ENGL101	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4133	Applied Anatomy and Applied Physiology	ANAT105 & PHYS110	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4134	Applied Sociology and Applied Psychology	SOCI115 & PSYC120	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4135	Nursing Foundation-I including First Aid module	N-NF(I) 125	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4136	Self-study/ Co-curricular including First Aid module	SSCC(I) 130	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4137	Applied Biochemistry and Applied Nutrition & Dietetics	BIOC135 & NUTR140	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4138	Nursing Foundation-(I&II) including Health Assessment module	N-NF(II) 125	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4139	Nursing Foundation-(I&II) Practical	N-NF(II)P 125	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4140	Health/ Nursing Informatics & Technology	HNIT145	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4141	Self-study/ Co-curricular	SSCC(II) 130	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4142	Applied Microbiology and Infection Control including Safety	MICR201	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4143	Pharmacology-I and Pathology-I	PHAR(I) 205 & PATH(I) 210	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4144	Adult Health Nursing-I with integrated pathophysiology including BCLS module	N-AHN(I) 215	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4145	Adult Health Nursing-I Practical	N-AHN (I)P 215	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4146	Self-study/ Co-curricular	SSCC(I) 220	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4147	Human Values	ELEC301	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4148	Diabetes Care	ELEC302	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4149	Soft Skills	ELEC303	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4150	Pharmacology-(I&II) including Fundamentals of prescribing Module and Pathology- (I&II) & Genetics	PHAR(II) 205 & PATH(II) 210	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4151	Adult Health Nursing-II with integrated pathophysiology including Geriatric Nursing + Palliative care module	N-AHN (II) 225	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4152	Adult Health Nursing-II Practical	N-AHN (II)P 225	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4153	Professionalism, Professional Values and Ethics including Bioethics	PROF230	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4154	Self-study/ Co-curricular	SSCC(II) 220	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4155	Child Health Nursing-I including Essential Newborn Care (ENBC), FBNC, IMNCI and PLS, modules	N-CHN(I) 301	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4156	Mental Health Nursing-I	N-MHN (I)305	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4157	Community Health Nursing-I including Environmental Science & Epidemiology	N-COMH (I)310	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4158	Community Health Nursing-I Practical	N-COMH (I)P 310	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4159	Educational Technology/ Nursing Education	EDUC315	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4160	Introduction to Forensic Nursing and Indian Laws	N-FORN 320	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4161	Self-study/ Co-curricular	SSCC(I) 325	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4162	CBT	ELEC501	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4163	Personality Development	ELEC502	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4164	Addiction Psychiatry	ELEC503	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4165	Adolescent Health	ELEC504	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4166	Sports Health	ELEC505	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4167	Accreditation & Practice Standards	ELEC506	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4168	Developmental Psychology	ELEC507	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4169	Menopausal Health	ELEC508	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4170	Health Economics	ELEC509	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4171	Child Health Nursing-(I&II)	N-CHN (II)301	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4172	Mental Health Nursing-(I&II)	N-MHN (II)305	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4173	Nursing Management & Leadership	NMLE 330	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4174	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing-I including SBA module	N-MIDW (I)/ OBGN 335	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4175	Child Health Nursing-(I&II) Practical	N-CHN (II)P 301	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4176	Mental Health Nursing-(I&II) Practical	N-MHN (II)P 305	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4177	Community Health Nursing-II	N-COMH (II)401	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4178	Nursing Research & Statistics	NRST405	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4179	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing –II including safe delivery app module	N-MIDW (II)/ OBGN 410	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4180	Community Health Nursing-II Practical	N-COMH (II)P 401	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4181	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing –(I&II) Practical	N-MIDW (II)P / OBGN 410	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4182	Scientific Writing Skills	ELEC701	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4183	Lactation Management	ELEC702	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4184	Sexuality & Health	ELEC703	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4185	Stress Management	ELEC704	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4186	Job Readiness & Employability in Health Care Setting	ELEC705	Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2011
4187	Internship (Intensive Practicum/ Residency Posting)	INTE440	Bachelor of Science (Nursing)	Report Writing, Presentation, Viva-Voce	2011
4188	Nutrition and Dietetics	NUR2106	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4189	Medical Surgical Nursing	NUR2108	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4190	Medical Surgical Nursing (Practical)	NUR2110	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4191	Maternal Nursing	NUR2208	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4192	Pediatric Nursing	NUR2209	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4193	Maternal Nursing (Practical)	NUR2211	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4194	Pediatric Nursing (Practical)	NUR2212	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4195	Community Health Nursing (Practical)	NUR2308	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4196	Introduction to Nursing Research and Statistics	NUR2407	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4197	Psychiatric Nursing (Practical)	NUR2408	Post Basic Bachelor of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2012
4198	Dissertation (Nursing Research)	NUR2437	Post Basic Bachelor of Science (Nursing)	Report Writing, Presentation, Viva-Voce	2012
4199	Nursing Education Practical	NUR4102	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4200	Advance Nursing Practice	NUR4201	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4201	Nursing Research & Statistics	NUR4202	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4202	Medical Surgical Nursing CS-I & II Practical	MSN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4203	Community Health Nursing CS-I & II Practical	CHN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4204	Psychiatric Nursing CS-I & II Practical	PSN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4205	Obstetric & Gynaecological Nursing CS-I & II Practical	OGN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4206	Child Health Nursing CS-I & II Practical	PDN4203	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4207	Nursing Research Project	NUR4337	Master of Science (Nursing)	Report Writing, Presentation, Viva-Voce	2015
4208	Nursing Research Dissertation	NUR4437	Master of Science (Nursing)	Report Writing, Presentation, Viva-Voce	2015
4209	Cardiothoracic & Vascular Nursing CS-III & IV Practical	MSN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4210	Critical Care Nursing CS-III & IV Practical	MSN4403	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4211	Oncology Nursing CS-III & IV Practical	MSN4404	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4212	Neurosciences Nursing CS-III & IV Practical	MSN4405	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4213	Nephro-Urology Nursing CS-III & IV Practical	MSN4406	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4214	Orthopedic Nursing CS-III & IV Practical	MSN4407	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4215	Gastro Enterology Nursing CS-III & IV Practical	MSN4408	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4216	Community Health Nursing CS-III & IV Practical	CHN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4217	Psychiatric Nursing CS-III & IV Practical	PSN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4218	Obstetric & Gynaecological Nursing CS-III & IV Practical	OGN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4219	Child Health Nursing CS-III & IV Practical	PDN4402	Master of Science (Nursing)	Quiz, Presentation, Practical, Nursing Lab, Report writing, Class performance	2015
4220	Pharmaceutical Analysis	BP102T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4221	Communication Skills	BP105T	Bachelor of Pharmacy	Quiz, Viva-Voce, Presentation	2018
4222	Human Anatomy and Physiology Practical-I	BP107P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4223	Pharmaceutical Analysis Practical	BP108P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4224	Pharmaceutics-I Practical	BP109P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4225	Pharmaceutical Inorganic Chemistry Practical	BP110P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4226	Communication Skills Practical	BP111P	Bachelor of Pharmacy	Quiz, Viva-Voce, Presentation	2018
4227	Remedial Biology Practical	BP112RBP	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4228	Computer Applications in Pharmacy	BP205T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4229	Environmental Sciences	BP206T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4230	Human Anatomy and Physiology Practical-II	BP207P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4231	Pharmaceutical Organic Chemistry Practical-I	BP208P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4232	Biochemistry Practical	BP209P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4233	Computer Applications in Pharmacy Practical	BP210P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4234	Pharmaceutical Microbiology	BP303T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4235	Pharmaceutical Engineering	BP304T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4236	Pharmaceutical Organic Chemistry Practical-II	BP305P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4237	Physical Pharmaceutics Practical-I	BP306P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4238	Pharmaceutical Microbiology Practical	BP307P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4239	Pharmaceutical Engineering Practical	BP308P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4240	Medicinal Chemistry Practical-I	BP406P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4241	Physical Pharmaceutics Practical-II	BP407P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4242	Pharmacology Practical-I	BP408P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4243	Pharmacognosy and Phytochemistry Practical-I	BP409P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4244	Industrial Pharmacy-I	BP502T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4245	Pharmaceutical Jurisprudence	BP505T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4246	Industrial Pharmacy Practical-I	BP506P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4247	Pharmacology Practical-II	BP507P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4248	Pharmacognosy and Phytochemistry Practical-II	BP508P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4249	Herbal Drug Technology	BP603T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4250	Quality Assurance	BP606T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4251	Medicinal Chemistry Practical-III	BP607P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4252	Pharmacology Practical-III	BP608P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4253	Herbal Drug Technology Practical	BP609P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4254	Industrial Pharmacy-II	BP702T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4255	Pharmacy Practice	BP703T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4256	Novel Drug Delivery System	BP704T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4257	Instrumental Methods of Analysis Practical	BP705P	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4258	Practice School	BP706PS	Bachelor of Pharmacy	Quiz (Practical based), Viva-Voce, Practical, Lab record	2018
4259	Biostatistics and Research Methodology	BP801T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4260	Social and Preventive Pharmacy	BP802T	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4261	Project Work	BP813PW	Bachelor of Pharmacy	Report Writing, Viva-Voce, Presentation	2018
4262	Quality Control and Standardization of Herbals	BP806ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4263	Computer Aided Drug Design	BP807ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4264	Cosmetic Science	BP809ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4265	Experimental Pharmacology	BP810ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018

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Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4266	Advanced Instrumentation Techniques	BP811ET	Bachelor of Pharmacy	Quiz, Group Discussion, Presentation, Viva-Voce	2018
4267	Architectural Graphics Skills-I	ARC2104	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4268	Visual Arts-I	ARC2105	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4269	Structure-I	ARC2109	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4270	Architectural Graphics Skills-II	ARC2204	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4271	Visual Arts-II	ARC2205	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4272	Structure-II	ARC2209	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4273	Surveying & Leveling	ARC2212	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4274	Architectural Graphics Skills-III	ARC2304	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4275	Visual Arts-III	ARC2305	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4276	Structure-III	ARC2308	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4277	Structure-IV	ARC2409	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4278	Computer Applications-I	ARC2413	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4279	Visual Arts-IV	ARC2414	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4280	Structure-V	ARC2509	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4281	Computer Applications-II	ARC2513	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4282	People Culture & Built Environment-I	ARC2519	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4283	Ecology, Environment & Sustainable Development-I	ARC2520	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4284	Computer Applications & Advance Technologies-I	ARC2521	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4285	Structure-VI	ARC2609	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4286	Site Planning & Landscape	ARC2617	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4287	People Culture & Built Environment-II	ARC2620	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4288	Ecology, Environment & Sustainable Development-II	ARC2621	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4289	Computer Applications & Advance Technologies-II	ARC2622	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4290	Structure-VII	ARC2703	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4291	Research Methodology	ARC2705	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4292	LEED Lab-I	ARC2717	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4293	Interior Design	ARC2718	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4294	Specification, Estimation & Valuation	ARC2720	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4295	People Culture & Built Environment-III	ARC2721	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4296	Ecology, Environment & Sustainable Development-III	ARC2722	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4297	Computer Applications & Advance Technologies-III	ARC2723	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4298	Structure-VIII	ARC2815	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4299	Town Planning	ARC2816	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4300	LEED Lab-II	ARC2817	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4301	Dissertation	ARC2837	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
4302	People Culture & Built Environment-IV	ARC2818	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4303	Ecology, Environment & Sustainable Development-IV	ARC2819	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4304	Computer Applications & Advance Technologies-IV	ARC2820	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4305	Practical Training	ARC2937	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
4306	Architectural Thesis	ARC2037	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
4307	Professional Practice	ARC2001	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
4308	Career Development	ARC2002	Bachelor of Architecture	Portfolio, Report Writing, Viva-Voce, Presentation	2012
4309	Understanding Cultural Landscapes for Urban Renewal & Conservation	ARC2003	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4310	Smart Cities and Smart Technologies	ARC2004	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4311	Transit Oriented Development	ARC2005	Bachelor of Architecture	Portfolio, Project Report, Practical Report Writing, Quiz, Viva-Voce, Presentation, Case-Discussion	2012
4312	Statistical and Quantitative Methods in Planning-I	PLN2104	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4313	Basic Graphical Skills	PLN2108	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4314	Planning and Design Lab-I (Graphics and Presentation Techniques)	PLN2107	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4315	Statistical and Quantitative Methods in Planning-II	PLN2204	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4316	Techniques of Planning-I	PLN2206	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4317	Applied Geology and Hydrology	PLN2207	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4318	Computer Aided Design (CAD) in Planning	PLN2209	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4319	Planning and Design Lab-II (Graphics and Presentation Techniques)	PLN2208	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4320	Techniques of Planning-II	PLN2303	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4321	Traffic and Transportation Planning-I	PLN2306	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4322	Geo-Informatics for Planning-I	PLN2308	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4323	Planning and Design Lab-III (Neighborhoods Site Planning)	PLN2307	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4324	Planning Practice-I	PLN2402	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4325	Traffic and Transportation Planning-II	PLN2403	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4326	Technical Report Writing	PLN2410	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4327	Planning and Design Lab-IV (Transportation Planning)	PLN2407	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4328	Real Estate Planning and Management	PLN2501	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4329	Disaster Risk Management and Climate Change Adaptations	PLN2509	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4330	Ecology, Environment and Resource Development & Management	PLN2511	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4331	Planning and Design Lab-V (Area Planning)	PLN2507	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4332	Training Seminar-I	PLN2508	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4333	Infographic Techniques for representation of Data	PLN2513	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4334	Eco-Tourism	PLN2514	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4335	Planning and Design Lab-VI (Urban Development Plan)	PLN2607	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4336	Landscape Planning and Design	PLN2710	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4337	Project Formulation, Appraisal and Management	PLN2711	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4338	Specification, Estimation and Valuation	PLN2712	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4339	Planning and Design Lab-VII (Regional Planning)	PLN2706	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4340	Training Seminar-II	PLN2707	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation	2011
4341	Dissertation	PLN2737	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation	2011
4342	Smart Cities and Advanced Technologies for Emerging Planning Issues	PLN2714	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4343	Environmental Impact Assessment and TOD	PLN2715	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4344	Planning Practice – II	PLN2802	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4345	Planning Thesis	PLN2837	Bachelor of Planning	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4346	Planning Techniques and Computer Applications	PLN4103	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4347	Infrastructure Planning and Management	PLN4104	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011

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1.1.3 Total number of courses having focus on employability/ entrepreneurship / skill development offered during the year (2021)

Sl. No.	Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
4348	Housing and Environmental Planning	PLN4105	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4349	Planning Studio-I (i) Area Planning (ii) Village Development Plan	PLN4108	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4350	Eco-Tourism	PLN4111	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4351	Demography and Quantitative Analysis	PLN4212	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4352	Planning Studio-II Urban Planning	PLN4206	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4353	Special Area Planning	PLN4213	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4354	Statistical Data Analysis in Planning	PLN4214	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4355	Research Methodology and Thesis Planning	PLN4310	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4356	Planning Studio-III Regional Planning	PLN4307	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4357	Smart Cities and Advanced Technologies for Emerging Planning Issues	PLN4312	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4358	Environmental Impact Assessment	PLN4313	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4359	Planning Legislation and Professional Practice	PLN4403	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4360	Planning Thesis	PLN4437	Master of Planning (Urban & Regional)	Project Report, Quiz, Viva-Voce, Presentation, Case-Discussion	2011
4361	Introduction to Disaster Management	DSM2151	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
4362	Resilience Building for Built Environment	DSM2251	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
4363	Emergency Management	DSM2351	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
4364	Rehabilitation Reconstruction and Recovery	DSM2451	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
4365	Climate Change Adaptations and Sustainable Development	DSM2551	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021
4366	Geoinformatics in Disaster Management	DSM2651	Disaster Management & Sustainable Built Environment (OE)	Quiz, Class Performance, Project, Presentation, Viva-Voce	2021

* OE- Open Electives

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Amity Business School

Bachelor of Arts Economics (Honors)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Arts Economics (Honors)

Syllabus - First Semester

MICRO ECONOMICS-I

Course Code: ECO2151 **CreditUnits: 03**

Course Objective:

This course is designed to expose first –year students, who may be new to economics, the basic principles of microeconomic theory. The emphasis would be on thinking like an economists & the course will illustrate how microeconomic concepts can be applied to analyze real life situations.

Course Contents:

Module I: Exploring the Subject Matter of Economics
Why study economics? The scope and method of economics; scarcity and choice; questions of what, how and for whom to produce and how to distribute output

Module II: Supply and Demand: How Markets Work, Markets and Welfare
Individual demand and supply schedules and the derivation of market demand and supply; shifts in demand and supply curves; the role prices in resource allocation; Elasticity of Demand — price, income and cross; Consumer's surplus

Module III:Consumer's Behavior
Utility-cardinal and ordinal approaches, Indifference curves; budget constraints;. Consumer's equilibrium (Hicks and Slutsky); Giffin goods; Compensated demand; Revealed preference theory; Engel curve.

Module IV: Theory of Production and Costs:
Technology, Isoquants, production with one and more variable inputs, Returns to scale, short run and long run costs, cost curves in the short run and long run, total, average, and marginal product, cost minimization and expansion path, elasticity of substitution.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination)

Text & References:
Text:

- C. Snyder and W. Nicholson, Fundamentals of Microeconomics, Cengage Learning (India), 2010.
- B. Douglas Bernheim and Michael D. Whinston, Microeconomics, Tata McGraw-Hill (India), 2009

- Ahuja H.L. (2010) Principles of Microeconomics, 18th Edition, S. Chand& Co. Ltd.
- Robert S. Pindyk and D.L. Rubinfeld, (2000), Microeconomics, 3rd edition, Prentice Hall India.
- Ferguson &Gould(1989) Micro Economic Theory, 6th edition, all India Traveller Bookseller.
- Koutsoyiannis, A. (1990), Modern Microeconomics, Macmillan

References:

- N. Gregory Mankiw (2007), Economics: Principles and Applications, 4th edition, India edition by South-Western, a part of Cengage Learning, Cengage Learning India Private
- Karl E. Case and Ray C. Fair (2007), Principles of Economics, 8th edition, Pearson Education Inc., ISBN 81-317-1587-6.(hereafter Case & Fair, 2007, 8e).
- Joseph E. Stiglitz and Carl E. Walsh (2006), Economics, International Student Edition, 4th Edition, W.W. Norton & Company, Inc., New York, ISBN 0-393-92622-2. (hereafter Stiglitz& Walsh, 2006, 4e).Limited, ISBN-13:978-81-315-0577-9 (hereafter Mankiw, 2007, 4e).M.L. Trivedi (2002) Managerial Economics- Theory & Applications, Tata McGraw Hill
- W.J. Baumol, Economic Theory & Operations Analysis, Prentice Hall.
- Jhingan M.L.(2008) Microeconomic Theory,4th edition, Konark, Delhi.

MATHEMATICAL METHODS FOR ECONOMICS

Course Code: ECO2101 **CreditUnits: 03**

Course Objective:

The main objective of inclusion of this course in Economics is to familiarize the students with basic quantitative & algebraic tools & techniques which will be needed for the understanding of the core subject and the students can apply the quantitative techniques in the analysis of managerial problems.

Course Contents:

Module I

Matrices and Determinants: Types; Transpose, Trace, Ad Joint and Inverse of Matrices; Solution of a system of two and three equations by Matrix Inverse and Cramer's methods; Linear independence and Linear dependence of vectors; Rank of a matrix; Simple application questions. Application in Input-Output analysis

Module II

Basic Concepts: Functions and their graphs; Limits and Continuity; Equations – simple, quadratic and simultaneous and Identities; Equations of a straight line, concept of slope; Equation and interpretation of Rectangular Hyperbola.

Module III

Partial and Total differentiation; Homogenous function and Euler's Theorem; Maxima and Minima of Functions of one and two variables; Constrained Optimization Problem (with maximum three variables); Integration of a function; Methods of Substitution and Partial fractions

Module IV

The derivative of a function, differentiability and continuity, techniques of differentiation; sums, products and quotients of functions; composite functions and the chain rule, Inverse functions, Implicit differentiation, Second and higher order derivatives, Points of inflexion, Differentials and linear approximation, Exponential and logarithmic functions, Logarithmic differentiation

Module V

Maxima and Minima, saddle point, unconstrained optimization, necessary and sufficient conditions for local optima, constrained optimization (equality constraints), the method of Lagrange multipliers & economic examples

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Knut Sydsaeter and Peter. J. Hammond (2002) Mathematics for Economic Analysis, Pearson Educational Asia: Delhi (reprint of 1st 1995 edition).
- Mabbett. A.J:, Workout Mathematics for Economists, Macmillan, London.
- Mehta &Madnani, Mathematics for Economics, Sultan Chand, New Delhi.

References:

- Alpha C. Chiang (2005) Fundamental Methods of Mathematical Economics. McGraw Hill (4th edition)

ECONOMIC HISTORY OF INDIA (1857-1947)

Course Code: ECO2102 **Credit Units: 03**

Course Objective:
It will throw light on the economic history which will subsequently help the students to understand the trend of economic growth & development.

Course Contents:
Module I: Introduction: Colonial India: Background and Introduction
Overview of colonial economy

Module II: Macro Trends
National Income; Population; Occupational Structure

Module II: Agriculture
Agrarian structure and land relations; agricultural markets and institutions – credit, commerce and technology; trends in performance and productivity; famines

Module II: Railways and Industry
Railways; The de-industrialisation debate; evolution of entrepreneurial and industrial structure; nature of industrialisation in the interwar period; constraints to industrial breakthrough; labour relations

Module II: Economy and State in the Imperial Context
The imperial priorities and the Indian economy; drain of wealth; colonial exploitation-form and consequences; Case for protection of Indian Industries

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; P-Project/Seminar/Quiz/Viva; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text & References:
Text:
- Tirthankar Roy, The Economic History of India, 1857-1974, 3rd edition Oxford University Press
- RajnarayanChandavarkar (1985), "Industrialization in India before 1947: Conventional Approaches and Alternative Perspectives", Modern Asian Studies.
- Irfan Habib, Indian Economy: 1858-1914, 2006. A People's History of India, Volume 28, Tulika, Selected chapters.
- Rajat Ray (1979), Industrialization in India, Oxford University Press, Ch. 4.

References:
- Panday S.N(2008) Economic History of Modern India(1957-1947) Readworthy Publications(p)Ltd.
- A.K. Bagchi (1976), "Deindustrialization in India in the Nineteenth Century: Some theoretical implications", Journal of Developmental Studies.
- J.N. Bhagwati and Padma Desai (1970), India, Planning for Industrialization, Oxford University Press, Chs. 2 & 3.
- Morris D. Morris (1965), The Emergence of an Industrial Labour Force in India: A Study of the Bombay Cotton Mills 1854-1947, Oxford University Press, last chapter.
- Rajat Ray (ed) (1992), Entrepreneurship and Industry in India, 1800-1947, Oxford University Press.

HISTORY OF ECONOMIC THOUGHT

Course Code: ECO2103 **CreditUnits: 03**

Course Objective :
This course is essential for a student who aspires for advanced training in economics. Contemporary economic science has evolved over many centuries. The evolution of economic ideas in each instance was as much a response to immediate economic problems and policy issues as much as it was a self-conscious attempt to refine earlier analysis by correcting mistakes and filling in the gaps in analysis. Economic ideas did not evolve in isolation, but were an integral and important part of the evolution of modern social thought. Prevailing ideas of science, scientific rigour and measurement played a significant role in the shaping of economic science at each stage of its evolution. This course, tracing the history of economic thought, would enable the student to understand how contemporary economics came to be what it is.

Course Contents:

Module 1: Early Period
Nature and importance of Economic Thought. Economic thought of Plato and Aristotle
Mercantilism: main characteristics; Thomas Mun — Physiocracy: natural order, primacy of agriculture, social classes

Module 2: Classical Period
Adam Smith — division of labour, theory of value, capital accumulation, distribution, views on trade, economic progress;
David Ricardo — value, theory of rent, distribution, ideas on economic development and international trade;
Thomas R. Malthus — theory of population, theory of gluts;
Karl Marx — dynamics of social change, theory of value, surplus value, profit, and crisis of capitalism;
Economic ideas of J.B. Say, J.S. Mill

Module 3: Marginalists
The marginalist revolution;
Pigou: Welfare economics; Schumpeter: role of entrepreneur and innovations.

Module 4: Keynesian Ideas
An introduction to the thoughts contributed by Lord Keynes: The aggregate economy, Liquidity Preference Theory, Marginal Efficiency of Capital and Marginal Efficiency of Investment, wage rigidities, multiplier principle, cyclical behaviour of the economy, uncertainty and role of expectations

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Hunt E.K, Lautzenheiser Mark(2011) History of Economic Thought,3rd edition, New Arival ME Sharpe
- Blackhouse, R. (1985), A History of Modern Economic Analysis, Basil Blackwell, Oxford.

- Ganguli, B.N. (1977), Indian Economic Thought: A 19th Century Perspective, Tata McGraw Hill, New Delhi.

References:

- Gide, C. and G. Rist (1956), A History of Economic Doctrines, (2nd Edition), George Harrop& Co., London.
- Grey, A. and A.E. Thomson (1980),The Development of Economic Doctrine, (2nd Edition), Longman Group, London.
- Kautilya (1992), The Arthashastra, Edited, Rearranged, Translated and Introduced by L.N. Rangaranjan, Penguin Books, New Delhi.
- Roll, E. (1973), A History of Economic Thought, Faber, London. Schumpeter, J.A. (1954), History of Economic Analysis, Oxford University Press, New York. Seshadri, G.B. (1997), Economic Doctrines, B.R. Publishing Corporation, Delhi.
- Blaug, M. (1997), Economic Theory in Retrospect : A History of Economic Thought from Adam Smith to J.M. Keynes, (5th Edition), Cambridge University Press, Cambridge.
- Dasgupta, A.K. (1985), Epochs of Economic Theory, Oxford University Press, New Delhi.
- Gandhi, M.K. (1947), India of My Dreams, Navajivan Publishing House, Ahmedabad.
- Koot, G.M. (1988), English Historical Economics : 1850-1926, Cambridge University Press, Cambridge.
- Rao, M.N. (1964), Memoirs, Allied Publishing House, Bombay.
- Schumpeter, J.A. (1951), Ten Great Economists, Oxford University Press, New York. Shionya, Y.
  (1997), Schumpeter and the Idea of Social Science, Cambridge University Press, Cambridge

ECONOMIC SYSTEM AND SOCIETY

Course Code: ECO2104 **CreditUnits: 03**

Course Objective:
This course will reflect the socio-economic change in historical perspective, capitalism as an economic system, structure of capitalism and capitalism in global context.

Course Contents:
Module I
Analyzing Socio-Economic Change in Historical Perspective

Module II
Capitalism as an economic system
Origins, nature and structure of capitalism; Accumulation and crisis; Alternative perspectives on capitalism

Module III
The transition from feudalism to capitalism

Module IV
The evolving structure of capitalism;Monopoly capitalism, the modern corporation: divorce between ownership and control; The institutional diversity of capitalism; Alternative perspectives on the role of state.

Module V
Capitalism in Global Context:Multinational corporations and their impact on the developing economics; imperialism

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination)

Text & References:
Text:
- J. Schumpeter (1942), Capitalism, Socialism and Democracy, George Allen and Unwin (1976 edition).
- T. Bottomore (2000), Theories of Modern Capitalism, Allen & Unwin. Chapters on Weber & Schumpeter, Routledge

References:

- D. Foley (1983), "Commodity", in T. Bottomore et al(ed.), The Dictionary of Marxist Thought., OUP, (Indian edition, Maya Blackwell, 2000)
- R. Blackburn (ed.) (1972), Ideology in Social Science, Chapter 8, Collins
- Rodney Hilton(ed.) (2006) The Transition from Feudalism to Capitalism, Introduction, Aakar Books, Delhi
- P. Hirst and J. Zeitiln (1997), "Flexible Specialization: Theory and Evidence in the Analysis of Industrial Change", in R. Boyer et al (ed.), Contemporary Capitalism, Cambridge University Press.

COMPUTERS IN MANAGEMENT

Course Code: MGT2101 **CreditUnits: 03**

Course Objective:
The objective of this subject is to provide conceptual knowledge of the information technology to the future Managers. This subject highlights the topics like Database Management, Networking, Internet, E-commerce etc., which can help managers to take routine decisions very efficiently.

Course Contents:

Module I: World of Computers
Introduction to world of Computers, Computers in home (Reference, Education & Communications, Entertainment and Digital Media Delivery, Smart Appliances, Home Computers), Computers in education, Computers in workplace (productivity and decision making, customer services, communications), Computers on the move (Portable and Hand held computers, Self-Service kiosks, GPS Applications), Support Systems - Hardware and Software, Computer Peripherals, Memory Management.

Module II: Computer Networks
Introduction to Computer Networks, Networking components, Classification and types of Networks, Network Topologies – Overview with Advantages and Disadvantages, Communication Channels, Client Sever Architecture, LAN concepts.

Module III: Internet Technology & World Wide Web
Introduction to internet intranet and Extranet, Myths about the Internet, Basic concepts of internet, Domain Name Service, Internet Protocols and Addressing, Services of internet, Internet and support Technologies, Censorship and Privacy issues.

Module IV: E-commerce
Introduction, E-Commerce Vs E-Business, Advantages & Disadvantages, E-Commerce Business Models, E-Commerce Technologies, Hosting E-Commerce Site – Planning and constructing web services, E-Commerce Applications, E-Core Values – Ethical, Legal, Taxation and International issues, E-Commerce Security Issues, Internet based Payment System.

Module V: Enterprise Resource Planning
Introduction, Scope and Benefit, ERP and related technologies (BPR, MIS, DSS, EIS, SCM, OLAP, etc), ERP implementation methodology – implementation life cycle, ERP and its success factors, Pitfalls and management concerns, ERP Market – renowned vendors and the packages.

Module VI: Database Management System
Introduction, Need for DBMS, Components of DBMS, Benefits of DBMS over Tradition File System, classification and types of Database Models, Database Approach – Its benefits and Disadvantages.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Deborah Morley - Understanding Computers: Today & Tomorrow, Eleventh Edition, April 11, 2007, Thomson

References:

- Rajaraman, V. 1998, An Introduction to Computers, Prentice Hall of India.
- Nagpal, 1999, Computer Fundamentals, Wheeler Publishing, New Delhi.
- Bhatnagar, S.C. and Ramani, K.V., Computers and Information Management.
- Hunt and Shelly. 1994, Computers and Commonsense, Prentice Hall of India

E-COMMERCE

Course Code: COM2103 **CreditUnits: 03**

Course Objective:
The subject will provide students with the knowledge to cover wide-ranging aspects of conducting business on the Internet.

Course Contents:
Module I:E-Commerce Concept
Meaning, definition, concept, features, function of E-Commerce, E-Commerce practices v/s traditional practices, scope and basic models of E-Commerce, limitations of E-Commerce, precaution for secure E-Commerce, proxy services. Concept of EDI, difference between paper based Business and EDI based business, advantages of EDI, Application areas for EDI, action plan for implementing EDI, factors influencing the choice of EDI, Software concept of Electronic Signature, Access Control.

Module II:Types of E-Commerce
Meaning of B2C, B2B, C2C, P2P, Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts. Application of B2B- E-distributor, B2B service provider, benefits of B2B on Procurement, Just in time delivery. Consumer to consumer and peer to peer business model Introduction and basic concepts

Module III: E-Marketing
Traditional Marketing V/S E-Marketing, impact of Ecommerce on markets, marketing issue in E-Marketing, promoting your E-Business, Direct marketing, one to one marketing

Module IV: E-Finance
Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking; E-Trading-Stock marketing, trading v/s E-Trading, importance of E-Trading, advantages of E-trading, operational aspects of E-Trading.

Module V: E-Payment
Transactions through Internet, requirements of E-Payment system, post paid payment system- credit card solutions, cyber cash Internet cheques. Instant paid payment system- debit card, direct debit. Prepaid payment system- Electronic cash, digicash, netcash, cybercash, smart cards

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:
Text:
- S. Jaiswal,E-Commerce,Galgotia Publications Pvt. Ltd.

Refernces:
- Computer Today, S. Bansundara
- Kamblesh Bajaj and Debjani Nag,(2005) E-Commerce: The Cutting Edge of Business, McGraw Hill

TERM PAPER

Course Code: ECO2131 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inflation
- Unemployment
- Fiscal Deficit
- Poverty
- Education
- Malnutrition
- Rural Development
- Regional Imbalance
- Globalization
- Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2132 **Credit Units: 03**

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

- **a)*Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)*Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
- **c) *Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
- **d)*Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.

- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	**Power Point Presentation & Viva**
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2133 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus - Second Semester

INDIAN ECONOMY

Course Code: ECO2251 **Credit Units: 03**

Course Objective:

This subject covers the major features of Indian Economy at Independence in the field of agriculture industry and other infrastructure of the economy. It also deals with growth of development of different phases on the current issues in Indian economy policy.

Course Contents:

Module I: Economic Development at the time of Independence
Major features of the economy at independence: Colonial economy; Semi-feudal economy; Backward economy; Stagnant economy

Module II:Planning in India
Objectives; Strategy; Broad achievements and failures; Current Five Year Plan — objectives, allocation and targets; New economic reforms — Liberalization, privatization and globalization; Rationale behind economic reforms; Progress of privatization and globalization

Module III: Major Economic Issues
Demographic trends and issues; education; poverty and inequality; unemployment, inflation

Module IV: External Sector
Role of foreign trade; Trends in exports and imports; Composition and direction of India's foreign trade; Balance of payments crisis; Export promotion measures and the new trade policies

Module V: Agriculture
Nature and importance; Trends in agricultural production and productivity; Factors determining productivity; Land Reforms; New agricultural strategy and green revolution

Module VI: Industry
Industrial development during the planning period; Industrial policy of 1991 and the latest Industrial policy; Growth and problems of small scale industries; Role of public sector enterprises in India's industrialization

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- RuddarDutt and K.P.M Sundaram(2012) Indian Economy, S.Chand& Co. Ltd, Delhi
- Mishra &Puri(2005) Indian Economy, Himalayan Publishing House, Bombay
- V.M. Dandekar (1992), Forty Years after Independence in B. Jalan (ed.), The Indian Economy, Problems and Prospects, Viking Press.

References:

- Sebastian Morris (2001), Issues in Infrastructure Development Today: The Interlinkages, in India Infrastructure Report, OUP
- Montek Ahluwalia, (2002), State level Performance under Economic Reforms in India, in A.O. Krueger(ed), Economic Policy Reforms and the Indian Economy**,** Univ. of Chicago Press.
- PranabBardhan(2003), Poverty, Agrarian Structure and Political Economy in India: Selected Essay, OUP, CH.5.
- JagdishBhagwati, (1993), India in Tansition, Freeing the Economy, Clarendon Press, Ch. 2.
- J. Bhagwati and Padma Desai (1970), India: Planning for Industrialization, Ch 2 OUP.
- S. Chakravarty (1987), Development Planning: The Indian Experience, Clarendon Press.
- Jean Dreze and AmartyaSen (2002), India: Development and Participation, OUP, Chs. 2, 3,5,6,9.
- B.S. Minhas (1991), Public vs Private sectors: Neglect of Lessons of Economics in Indian Policy Formulation, R.R. Kale Lecture, Gokhale Institute of Politics & Economics, Pune.
- MihirRakshit (2001), On Correcting Fiscal Imbalances In the Indian Economy: Some Perspectives
- Government of India, Economic Survey(annual) New Delhi
- Reserve Bank of India, Handbook of statistics of Indian Economy(Annual)

MICRO ECONOMICS - II

Course Code: ECO2201 **CreditUnits: 03**

Course Objective:

The main objective of the course is to provide a deeper knowledge on some specific field of Microeconomics such as game theory, factor pricing, oligopoly & welfare Economics.

Course Contents:

Module I: Decision theory under Uncertainty: Utility Functions and Expected Utility
Risk aversion and risk preference, insurance and investor's choice.
Asymmetric information- Adverse selection and moral hazard

Module II: Oligopoly
Analysis of Cournot&Stackelberg, Collusive Oliogopoly and application of Prisoner's Dilemma of Nash equilibrium

Module III: Market Structure
Review of perfect competition and monopoly; Pricing with market power; price discrimination, peak load pricing, two-part tariff; monopolistic competition and oligopoly.

Module IV: Factor Pricing
Derived demand for a single input and multiple inputs in competitive & imperfect competition markets, firm demand and industry demand, collective bargaining and exploitation rent & quasi rent.

Module V: Welfare Economics
Conditions of Pareto optimality in pure exchange and with production, optimality of perfect competition

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

Text:
- W.J. Baumol, 'Economic Theory and Operations Analysis'4th edition, Prentice hall
- Ahuja H.L (2010) Principles of Microeconomics,18thedition,S.Chand& Co. Ltd.
- Ferguson, 'Microeconomic Theory', Cambridge University Press.

References:
- A K Koutsyanni's, 'Modern Microeonomics', Macmillan.
- L.M.B. Cabral, (2000) Introduction to Industrial Organization, MIT Press.
- P.K. Dutta (1999) Strategies and Games: Theory and Practice, MIT Press.
- Formson& Gould – Microeconomic Theory

STATISTICAL METHODS IN ECONOMICS-I

Course Code: ECO2202 **CreditUnits: 04**

Course Objective:
This subject will deal with all fundamental statistical methods of tools which the students have to use in economic analysis and decision making problems.

Course Contents:

Module I: Introduction:
Basic concepts: Population, Sample, Parameter, Statistic, Frequency distribution, Cumulative frequency distribution; Graphic and diagrammatic representation of data; Techniques of data collection. Sampling vs. Population, primary and secondary data.

Module II: Central Tendency and Dispersion:
Measures of Central Tendency: Mean, Median, Mode, Geometric mean, Harmonic mean; Measures of Dispersion; Range, Quartile deviation Mean deviation, Standard deviation; Skewness and Kurtosis, Moments.

Module III: Correlation and Regression:
Correlation: Simple; Coefficient of correlation; Karl Pearson and Rank correlation; Partial and Multiple Correlation analysis; Regression analysis – Estimation of a regression line in a bivariate distribution, Least squares method; Interpretation of correlation and regression coefficients; Coefficient of determination.

Module IV: Time Series:
Time Series Analysis - concept and components, determination of trend (Linear, Quadratic and Exponential) and seasonal indices

Module V: Index Numbers
Concept of an index number; Laspeyer's, Paasche's and Fisher's Index Numbers; Time Reversal, Factor reversal and circular tests; Chain base index; Problems in the Construction of an index number; splicing; base shifting and use of index number for deflating other series.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:
- Allen Webster, Applied Statistics for Business and Economics, (3rd edition), McGraw Hill, International Edition 1998.
- Richard J. Larsen and Morris L. Marx, An Introduction to Mathematical Statistics and its Applications, Prentice Hall, 2011.

References:
- P.H. Karmel and M. Polasek, Applied Statistics for Economists (4th edition), Pitman, Australia.
- M.R. Spiegel (2nd edition), Theory and Problems of Statistics, SchaumSerie

ENVIRONMENTAL ECONOMICS

Course Code: ECO2203 **CreditUnits: 03**

Course Objective:

This course focuses on economic causes of environmental problems. In particular, economic principles are applied to environmental questions and their management through various economic institutions, economic incentives and other instruments and policies. Economic implications of environmental policy are also addressed as well as valuation of environmental quality, quantification of environmental damages, tools for evaluation of environmental projects such as cost-benefit analysis and environmental impact assessments.

Course Content:

Module I:
Economics and environment – Scope and significance of Environmental Economics; Supply & Demand: Market forces and the environment; Market & Market Failure: A cause of Environmental Degradation

Module II:
Consumer Theory and Valuation; Consumer behaviour and the environment; Measuring benefits to consumers; Revealed & State preference methods

Module III: Production Theory: Why firms pollute. Production, pollution, output and prices

Module IV:
Environmental Protection and Welfare-maximising net benefits in the presence of externalities; The Coase Theorem; Government policies for environment protection; . National Committee on Environmental planning and Co-ordination (NCEPC), Tiwari Committee (1980) – Department of Environment (DOE) Pollution Control Board

Module V:
Resource Management-Renewable and Non-Renewable resource management, application-economic growth and the environment; sustainability

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Roger Perman, Yue Ma, Michael Common, David Maddison and James McGilvray, "Natural Resource and Environmental Economics", Pearson Education/Addison Wesley, 4th edition, 2011.
- Charles Kolstad, "Intermediate Environmental Economics", Oxford University Press, 2nd edition, 2010.

- Robert N. Stavins (ed.), “Economics of the Environment: Selected Readings”, W.W. Norton, 6th edition, 2012.

References:

- Robert Solow , “An Almost Practical Step toward Sustainability,” Resources for the Future 40th anniversary lecture,1992.
- Kenneth Arrow et al. , “Are We Consuming Too Much?” Journal of Economic Perspectives, 18(3): 147-172, 2004.
- IPCC (Intergovernmental Panel on Climate Change), Fifth Assessment Report (forthcoming 2014).Breck&Helfand(2011) The Economics of Environmen, Prentice Hall
- Charles Kolstad, Intermediate Environmental Economics, Oxford University Press, 2nd edition, 2010.
- Robert N. Stavins (ed.), Economics of the Environment: Selected Readings, W.W.Norton, 5th edition, 2005.
- Roger Perman, Yue Ma, James McGilvray and Michael Common, Natural Resource and Environmental Economics, Pearson Education/Addison Wesley, 3rd edition, 2003.
- Maureen L. Cropper and Wallace E. Oates, 1992, “Environmental Economics: A Survey”, Journal of Economic Literature, Volume 30, pp. 675-740

INSURANCE AND ECONOMICS

Course Code: ECO2204 **CreditUnits: 03**

Course Objective: To familiarize the students with the concepts of insurance and the application of economics to the fundamentals of insurance.

Course Content:

Module I
The quest for Economic Security - Classification of Risks - Demand for Insurance, Definition and Nature - Evolution and Importance of Insurance, Principles of Insurance

Module II
Life Insurance Contract: Nature and Classification of Policies - Selection of Risk - Calculation of premium - Investment of Funds - Surrender Value.

Module III
Fire Insurance: Nature and uses - Kinds of Policies - Policy Conditions - Rate Fixation - Payment of claim - Motor Insurance - Personal Accident - Health and Medical Insurance

Module IV
Insurance in Economic Development: Insurance and Mobilisation of savings - Insurance Institutions as Investment Institutions and their role in capital market.

Module V
Insurance as social welfare and security: Insurance - An Investment - Tax and Non - Tax Advantages - Retirement Planning - pension plans - Insurance Regulation and Development Authority (IRDA)

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination)

Text & References:
Text:
- Pal Karam,Bodla B.S. (2007), Insurance Management,Principles and Practices, Deep &Deep Publications Pvt. Ltd., Delhi
- Mishra, M.N, Insurance : Principles and Practice S.Chand& Co

References:
- Mishra, M.N, Modern Concepts of Insurance,S. Chand & Co
- Black K, Life and Health Insurance
- Skipper H.D., Prentice Hall, New Jersey
- Dionne &Harrington : Foundations of Insurance Economics - Kluwer Academic Publisher, Bostom.
- Insurance : General Insurance I.C. 340, Mumbai Institute of India.
- IRDA : Insurance Regulations and Development Authority Regualtions New Delhi.
- Govt of India, Old age and Income Security
- Report (Dave Committee Report) Govt of India, New Delhi

ANALYSIS AND DESIGN OF BUSINESS SYSTEMS

Course Code: MGT2204 **CreditUnits: 03**

Course Objective:

The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: The Systems Development Environment. (Information System Development Life Cycle)
System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology Modeling Tool)
Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)
Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System & Database Design
System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Database Design, Database Management System – an introduction, Overview of Data Models, Relational Database Model – Well structured relations, Keys, Schema & Subschema, Structure, Facilities & Users, Constraints, Anomalies, Functional Dependency, Normalization, Roles & Duties of System Administration.

Module V: System Implementation & Operation (System Management)
Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing
System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit

Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Essentials of System Analysis & Design, Second Edition, Valacich George Hoffer, Prentice-Hall India

References:

- Analysis and Design of Information Systems, James A. Senn
- Computer Based Information Systems, Kroeber, Donald W. and Watron, Hugh J.
- Systems Analysis & Design, E. M. Awad.
- Systems Analysis and Design – An Applied Approach, Dennis Wixom, Wiley

INNOVATION & CREATIVITY MANAGEMENT

Course Code: MGT2205 **CreditUnits: 03**

Course Objective:

To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations is demanding such an approach.

Course Contents:

Module I
Innovation Management- Introduction, characteristics, components, types, models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing Innovation, Nurturing Innovation in e-business.

Module II
Organizing for Innovation- Organizational theories and structures, traits of innovative organizations, current trends, factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, creativity crushers, fostering innovation climate and culture, the creativity Hit List.

Module III
Research and Development management- Significance, prerequisites, process, technology development approaches, management of R &D, In source to open source environment, R&D in small industry, Managing creative employees, significance and challenges of managing creative employees, Traits of a creative person, motivation to creativity, strategies for unblocking creativity, factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, creative thinking, Tradition vs creative thinking.

Module IV
Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, writing techniques, techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, new product development, packaging and positioning innovations, beyond product innovation, New product failures.

Module V
Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.

Module VI
Legal aspects of innovation- IPR, Indian Patents Act, trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P-**Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT-**Class Test; **EE-**End Semester Examination)

Text & References:

Text:

- Krishnamarcharyulu and Lalitha, *Innovation Management*, Himalaya Publishing House, New Delhi- 2007

References:

- Plsek**,** *Creativity,Innovation and Quality***,** Prentice Hall of India, New Delhi-2003

HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: MGT2206 **CreditUnits: 03**

Course Objective:

The aim of this course is to facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the human reality and the rest of existence. Such a holistic perspective forms the basis of value based living in a natural way, recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the moral issues involved in management areas and to provide an understanding of the interface between social, technological and natural environments.

Course Contents:

Module I: Human Values
Morals, Values, types of values, evolution of human values, Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character, Challenges at Work place

Module II: Values in Management
Relevance of values in Management, need for values in global change, values for managers, holistic approach for managers in decision making, problems related to stress in corporate management

Module III:Workplace Rights and Responsibilities and Work Environment
Organizational complaint procedures; Government agencies; Resolving employee concerns; Limits on acceptable behavior in large corporation.
Work Environment:Ethical and legal considerations, Organizational responses to offensive behavior and harassment; Ethics in a Global Context.

Module IV: Industrial Integrity
The epitome of industrial success, Integrity and organization, exploring learning process of integrity, Consequences of lack of integrity

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination)

Text &References:

Text:

- R R Gaur, R Sangal, G P Bagaria, 2010, A Foundation Course in Human Values and Professional Ethics, Excel Books

References:

- Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
- E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
- A Nagraj, 1998, JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
- PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
- A.N. Tripathy, 2003, Human Values, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.

READINGS IN ECONOMICS

Course Code: ECO2230 **Credit Units: 02**

Objectives:
The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: ECO2231 **Credit Units: 02**

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inflation
- Unemployment
- Fiscal Deficit
- Poverty
- Education
- Malnutrition
- Rural Development
- Regional Imbalance
- Globalization
- Foreign Direct Investment

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2232 **Credit Units: 03**

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

- **a)*Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)*Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
- **c) *Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
- **d)*Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.

- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
STEP III : Collection of information and data relating to the topic and analysis of the same.
STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	**Power Point Presentation & Viva**
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2233 **Credit Units: 01**

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus – Third Semester

MACRO ECONOMICS - I

Course Code: ECO2351 **CreditUnits: 03**

Course Objective:
This course aims at introducing the fundamentals of Macroeconomic theories, policies and models in a historical perspective. It will enable the students to develop a critical insight on Classical and Keynesian macroeconomic models, to understand the relationship between inflation and employment by providing exposure to the constructions of Friedman, Phelps & Phillips.

Course Contents:
Module I: Introduction to Macroeconomics
The roots of macroeconomics, macroeconomic concerns, the role of government in the macro economy, the components of the macro economy, the methodology of macroeconomics

Module II: Introduction to National Income Accounting
Concepts of GDP and national income, approaches to calculating GDP, GDP and personal income, Nominal and real GDP, Limitations of the GDP concept.

Module III: Schools of Macroeconomic Thoughts
Classical, Neo Classical and Keynesian Models.; Say's Law of Markets and Classical Theory of Employment

Module IV: Keynesian Model
Keynes theory of income and employment; Consumption function; theory of investment-marginal efficiency of capital; saving and investment; The Investment Multiplier and its application to LDC's

Module V: Money in the Modern Economy
Theories of Demand for Money: Quantity Theory and Keynes approach; Characteristics of a monetary economy; the supply of money and overall liquidity position; credit creation

Module VI: Inflation
Inflation: types, causes, consequences and impact on the Indian economy; remedial measures.
Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:
Text:
- Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th edition, 2010Ahuja H.l. (2010) Macroeconomics: Theory and Policy,S. Chand& Co. Ltd.
- Mc Connell. C.R & H.C. Gupta, "Introduction to Macro Economics", Tata McGraw Hill, Delhi
- Gardner Ackeley, "Macro Economics".

References:
- J.E. Stiglitz, and C.E. Walsh (2002), Principles of Economics, 3rd Edition, W.W. Norton & Company, New York.
- R. Stone and G. Stone (1977), National Income and Expenditure,10th edition, Bowes and Bowes London.
- K.K. Dewett: Modern Economic Theory, New Delhi, Shyamlal Charitable Trust.

INDUSTRIAL ECONOMICS

Course Code: ECO2301 **CreditUnits: 03**

Course Objective:

The core idea behind the inclusion of this subject is to introduce the students on the industrial developmental side of India, its different facts, different arena, policies & future prospect.

Course Contents:

Module I
Patterns, processes, speed and implications of industrialization; Factors inhibiting industrialization; measures conducive to industrialization; Size and efficiency of an industrial unit; Factors determining optimum size of industrial units

Module II
Issues relating to the Composition of Indian Industry:Small vs. Large Industry; Public vs. Private Sector, with emphasis on: Performance of the public sector; Privatization; Dynamics of the Industrial Sector: Growth and Sickness

Module III
Theories of industrial location—Weber's deductive theory; Sargent Florence's inductive analysis; Factors affecting industrial location; Industrial productivity

Module IV
Industrial Development in India**:** New Industrial Policy 1991 and recent industrial policies in India, Industrial Growth and pattern in India.

Module VI
Role and functions of IFCI, IDBI, SIDBI, MSFC in Industrial Finance

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance **(A**-Attendance; **P-**Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT-**Class Test; **EE**-End Semester Examination)

Text & References:

Text:
- DilipMookherjee, ed. (1995), Indian Industry, Oxford University Press, New Delhi.

References:
- J. Bhagwati (1993), India in Transition: Freeing the Economy, Clarendon Oxford 1993
- MrinalDattaChaudhri (1990), Market Failure and Government Failure: Journal of Economic Perspectives
- NCAER The India Infrastructure Report (Rakesh Mohan Committee)
- Department of Disinvestment, White Paper, 2000

STATISTICAL METHODS IN ECONOMICS - II

Course Code: ECO2302 **CreditUnits: 04**

Course Objective:

This subject will lead the students into the field of probability and hypothesis testing. Each one of them has a lot of application in the practical problems of economics.

Course Contents:

Module I: Probability Theory
Elements of Probability Theory: Sample space Events, meaning of probability Classical definition of probability, The addition rule, Multiplication Rule, Theorems of total probability, conditional and statistical independence, limitation of classical definition, Bayes formula, random variable, expectation and variance of random variable (for random sampling with or without replacement)

Module II: Random Variables and Probability Distributions
Defining random variables; probability distributions; expected values of random variables and of functions of random variables; properties of commonly used discrete and continuous distributions (uniform, binomial, normal, poisson and exponential random variables).

Module III: Introduction to Estimation
Methods of sampling; sampling distribution of a statistic; distribution of the sample mean; sampling error and standard error of a statistic with special reference to the mean; Point and interval estimation of parameters; properties of an estimator; unbiasedness, relative efficiency and consistency.

Module IV: Hypothesis Testing
Testing of Hypothesis; type I and type II errors, power of a test; large sample tests, "t" test for the mean; one tail and two tail tests for difference of means; z-test, f-test, Chi-square test for (i) goodness of fit and (ii) independence of two attributes.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Allen Webster, Applied Statistics for Business and Economics, (3rd edition), McGraw Hill, International Edition 1998.
- K. Sydsaeter and P. Hammond, Mathematics for Economic Analysis, Pearson Educational Asia, Delhi, 2002

References:

- P.H. Karmel and M. Polasek, Applied Statistics for Economists (4th edition), Pitman, Australia. M.R. Spiegel (2nd edition), Theory and Problems of Statistics, Schaum Series.

ECONOMICS OF ENTREPRENEURSHIP

Course Code: ECO2303 **CreditUnits: 03**

Course Objective:
The twenty first century has dawned with entrepreneurship as a major force shaping the global economy. The future growth of this economy lies in the hands of men and women committed to achieving success through innovative customer focussed new products and services. Therefore it is high time that the students had a glimpse of a few aspects of entrepreneurship.

Course Content:
Module I
Entrepreneurs - Concepts and qualities - Barriers - Structures - Definitions - Entrepreneur - Traits and types - Functions - Motivation - Project identification - Theories of entrepreneurship.

Module II
Steps for starting a small scale industry - selection of types of organisation - Small Scale Industry - Problems and sickness of small scale industry - Government Policy

Module III
Women Entrepreneur - Concept of women entrepreneur - Growth and Development of entrepreneurs - Functions - Rural women entrepreneurs - Problems of Women Entrepreneur - Role of Women's Association

Module IV
Financial Analysis - Social Cost and Benefit Analysis - Sources of Project Finance - Institutions helping entrepreneurs - Role of Commercial Banks - New Entrepreneurial Development Agencies

Module V
Entrepreneurial Development Programme (EDP) - Indian EDP - Risk - Development Strategy - Backward Area Development - International Business - Small Companies "going global"

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text and References:
Text:
- BhalthaCharjee; Entrepreneurial Development, Himalaya Publications
- Gupta &Srinivasan,N.P.; Entrepreneurial Development, S.Chand& Co.
- Nandan; Fundamentals of Entrepreneurship, Prentice Hall

References:
- Coulter; Entrepreneurship in action, Prentice Hall of India
- Edward F Marvicka, Jr; The Rational Investor, S.Chand& Co.
- Jayashree Suresh; Entrepreneurial Development, Margham Publications
- Khanka; Entrepreneurial Development, S.Chand& Co.
- Lankan Pal; Entrepreneurial Development
- Manimala; Entrepreneurship Theory at Cross Roads, S.Chand& Co
- Rastogi; Reengineering and Re-inventing the enterprise, S.Chand& Co.
- Robert D.Hisrich& Michael P.Peters; Entrepreneurship, Tata McGraw Hill
- Saini; Entrepreneurship, Theory and Practice, S.Chand& Co.

MERGERS AND ACQUISITIONS

Course Code: ECO2304 **CreditUnits: 03**

Course Objective:

The main objective of this course is to familiarize the students with the basic aspects of mergers and acquisitions.

Course Contents:

Module I: Mergers and Acquisitions – Overview
Introduction – Forms of Corporate Restructuring – Expansion – Mergers and Acquisitions – Tender Offers – Joint Ventures – Sell Offs – Spin Offs – Split Offs – Split Ups – Divestitures – Equity Carve outs - Corporate Control – Premium Buy Backs – Standstill Agreements – Anti- Takeover Amendments – Proxy Contests - Changes in Ownership Structures - Share Repurchases – Exchange Offers – Leveraged Buy – out – Going Private – Issue Raised by Restructuring – History of Merger Movements.

Module II: Mergers and Acquisitions
Economic Rationale for Major Types of Mergers - Horizontal Mergers – Vertical Mergers – Conglomerate Mergers - Concentric Mergers.

Module III: Theories of Mergers
Efficiency Theories – Differential Efficiency - Inefficient Management – Operating Synergy – Pure Diversification - Financial Synergy – Strategic Realignment to Changing Environments – Undervaluation – Information and Signaling – Agency Problems and Managerialism - Takeovers as a Solution to Agency Problems

Module IV: Divestment of Public Sector Undertakings and Leveraged Buy-outs
General Economic and Financial Factors illustration of an LBO
Takeover Defenses : Anti-Takeover Amendments, Any case study

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:
Text:
- The Complete Guide to Mergers and Acquisitions : Process Tools to Support M & A Integration at Every Level – Timothy J Galpin and Mark Herndon, 2007
- Mergers – What Can Go Wrong and How to Prevent it – Patrick A Gaughan (Wiley Finance)

References:
- Mergers and Acquisitions – Fred Weston
- M & A and Corporate Restructuring - Patrick A Gaughan (Wiley Finance Series)

AGRICULTURAL ECONOMICS

Course Code: ECO2305 **CreditUnits: 03**

Course Objective:
This subject is aimed at providing knowledge on the agricultural economy of India, its development, productivity, rural indebtedness and defects in the agricultural market and to develop a critical study on recent agricultural crises in India To familiarize the agricultural situation in India To provide sound knowledge base on India's Agricultural economy before green revolution and after it. To develop a critical study on recent Agricultural crises in India

Course Contents:

Module I
Features of Agriculture - Importance of Agriculture in the Indian Economy – Relationship between Agriculture and Non-Agriculture sectors

Module II
Agriculture Development in India - Subdivision and Fragmentation of holdings in India and causes - Land Tenure and Land Reforms
Productivity in Agriculture - New Agriculture Strategy - Green Revolution - Nature of Food Economy - Agriculture price policy in India - Public Distribution system

Module III
Rural Indebtedness - Causes of Rural Indebtedness - Sources of Agricultural Finance.
Market and Marketed Surplus - Defects in marketing Agricultural produce – Regulated markets - Co-operative marketing - Farmers Market.

Module IV
Current Issues in Indian Agriculture
Sustainable Agricultural growth- Concepts & Constraints

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:
- RuddarDutt and K P M Sundaram(2012), Indian Economy, S. Chand & Co. Ltd, New Delhi.
- Bansil.B.C. Agricultural Problems of India, Vikas Publishing House. Pvt. Ltd., New Delhi.

References:
- Misra and Puri, Indian Economy, Himalaya Publishing House, Bombay.
- Sankaran.A. Agricultural Economy of India, Progressive Corporation. Pvt. Ltd., Bombay.
- Srivastava.O.S. Agricultural Economics, Rawat Publications, Jaipur, 1996.
- Ashok Gulati (2000), Indian Agriculture in an Open Economy: Will it Prosper? In Ahluwalia & Little (eds) India's Economic reforms &developmet: Essay for Manmohan Singh, Oxford University Press.

INDUSTRIAL PSYCHOLOGY

Course Code: MGT2305 **CreditUnits: 03**

Course Objective:
This course is designed to provide an overview of Industrial Psychology including individual, group, and organizational issues resulting in enhanced understanding of the world of business and related career concerns. The main aim is to create awareness about the role and importance of psychological factors and processes in the world of work

Course Contents:

Module I: Introduction
Nature and scope of organizational Psychology – History and development of field; major problems of industrial psychology, current trends in organizational psychology

Module II: Types of Psychology
Mental psychology, Male & Female psychology; Impact on behavior and efficiency

Module III: Test of Psychology
Types of tests, Effectiveness of these tests; Measures to control the tests, steps to improve the psychology

Module IV: Individual and Group Behavior
Interaction and psychology involved in individuals; Improving psychology; Group Dynamics – Characteristics of group behavior; attitude measurement; methods of measuring attitudes; leadership and supervision; theories of leadership

Module IV: Performance Management
Performance appraisal- Introduction, types, importance; Training and development- Introduction, significance and categories/types of training

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text &References:

Text:
- Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
- Blum & Naylor (2004) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.

References:

- Aamodt, M.G. (2012) Industrial/Organizational Psychology : An Applied Approach (7th edition) Wadsworth/Thompson : Belmont, C.A.
- Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill.

TERM PAPER

Course Code: ECO2331 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inflation
- Unemployment
- Fiscal Deficit
- Poverty
- Education
- Malnutrition
- Rural Development
- Regional Imbalance
- Globalization
- Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2332 **Credit Units: 03**

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

- **a)*Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)*Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
- **c) *Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
- **d)*Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.

- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	**Power Point Presentation & Viva**
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2333 **Credit Units: 01**

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1) Relevant study material and references will be provided by the trainer in advance.
2) The participants are expected to explore the topic in advance and take active part in the discussions held
3) Attending and Participating in all activities of the workshop
4) Group Activities have to be undertaken by students as guided by the trainer.
5) Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6) Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus - Fourth Semester

MACRO ECONOMICS - II

Course Code: ECO2401 **Credit Units: 03**

Course Objective:
The course mainly aims to lead the students to a higher level of macro economics. It will deal with, New Keynesian models: - Keynesian & classical theories of macroeconomics.

Course Contents:

Module I: Fiscal Policy:
Fiscalpolicy: objectives, targets, instruments and implications on an economy

Module II: Monetary Policy
Monetary policy :objectives, targets, instruments and implications on an economy

Module III:Business Cycles
Business Cycle Theories of Schumpeter, Kaldor, Samuelson and Hicks; Control of business cycles – relative efficacy of monetary and fiscal policies.

Module IV:Equilibrium of Product Market and Money Market
Theory of Interest; IS and LM curves: Derivation, their shifts and rotations. Simultaneous equilibrium of product market and money market

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination)

Text & References:

Text:
- Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th edition, 2010Ahuja H.(2010) Macroeconomics: Theory and Policy, S.Chand
- Olivier Blanchard, Macroeconomics, Pearson Education Inc., 5th edition, 2009
- A.C. Chiang (1992), Elements of Dynamic Optimization, McGraw Hill.
- C. Jones (2002), Introduction to Economic Growth, 2nd revises edition, Norton.

References:
- O. Blanchard and S. Fischer (1989), Lectures on Macroeconomics, MIT.
- W. Scarth (1996), Macroeconomics, Dryden.
- S. Sheffrin (1996), Rational Expectations, Cambridge University Press.
- R. Dornbusch (1980), Open Economy Macroeconomics, Basic Books.
- N. Mankiw and D. Romer (1991), ed., New Keynesian Economics, MIT, 2 volumes. Selected Readings.

COMPARATIVE ECONOMIC DEVELOPMENT

Course Code: ECO2402 **CreditUnits: 03**

Course Objective:

The objective of this course is to make a comparative study of the economic development among the developed countries- Britain, German, USA, Japan & USSR. The student will also get to know about the role of the state in economic development.

Course Contents:
Module I: Perspectives on Comparative Economic Development:
(a)Features of and trends in Modern Economic Growth -- a brief discussion of Kuznets' findings
(b) Gerschenkron's hypothesis of Economic Development in Historical Perspective.

Module II
An overview of economic development of the countries selected for case studies -- Britain, U.S.A., Japan and USSR. Major features of structural changes and their interrelations- labour, productivity, capital formation, output, consumption, income and distribution of income.

Module III
Changes in the structure of agriculture and economic development -- Britain, Japan and U.S.S.R.
Role and pattern of industrialisation in Britain, Japan and U.S.S.R.

Module IV
Labour markets and processes - Britain and Japan
Financial institutions and economic development in U.S.A and Japan

Module V
Foreign trade and economic development -- Britain, Japan and USA.
Role of the State in economic development (regulatory and developmental role) -- Japan, USA and USSR

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:
Text:

- Richard A. Easterlin, Davis and Parker (1972) American Economic Growth: An economist's History of the United States. Harper & Row Chs. 1, 9, 14 and 17.
- Maurice Dobb (1977), Soviet Economic Development since 1917 ed.6, Routledge& Kegan Paul, Chs. 9, 10
- Paul R Gregory and Robert C. Stuart (1986), Soviet Economic Structure and Performance, Harper & Row (3rd ed) Chs. 1, 4, 5 & 7.
- E.J. Hobsbawm (1968), Industry and Empire: An Economic History of Britain since 1750. Weidenfeld& Nicholson, Chs.1, 2, 3, 5, 6.
- Richard Tilly, "German Banking" in Journal of European Economic History, 1986, Vol. 15. No.1.
- S. Kuznets(1966) Modern Economic Growth: Rate Structure and Spread

- D.M. Mithani, International Economics, Himalay Publishing House, New Delhi.

***References*:**

- W.W. Lockwood (1966), Economic Development of Japan, Expanded edition, Princeton University Press, Chs.6,7 & 10
- Peter Mathias (1983), The First Industrial Nation, An Economic History of Britain, 1700- 1914. 2nd edn, Methuen Chs.1, 3, 8 and 15.
- Roderick Floud and D. McCloskey (ed) (1981), Economic History of Britain Since 1700, Cambridge University Press, (2nd ed) Ch. 12.
- T. Nakamura (1983) Economic Growth in Pre-War Japan, Tr. by Robert A Feldman, Yale University Press, Chs. 1, 2, 3, 5 and 6.
- Alec Nove (1969) An Economic History of USSR, Penguin, 1969, Chs.5,6,7,8

PUBLIC FINANCE

Course Code: ECO2451 **Credit Units: 03**

Course Objective:

This subject is primarily aimed at introducing principles of public finance, role of different governments, public expenditure, taxation, budget and fiscal policy in India. The government plays different roles and performs varied functions which are different from earlier societies. In this context the public financial functions of the government need to be understood by a student, by studying the relevant theory and empirical analysis.

Course Contents:

Module I Introduction
Nature, Scope and Importance, Theory of Maximum Social Advantage, Private goods, Public goods and Merit goods; Role of government in managing the economy under different economic systems – Social Welfare Function; Theory of Public goods - Market failure - Externalities - problems in allocation of resources - theoretical developments in Demand revelation for social goods -Public choice.

Module II: Public Expenditure
Theories of Public Expenditure -Structure and growth of public expenditure - Criteria for public investment - Income Redistribution – Expenditure Programmes for the poor - Social Insurance: Unemployment Insurance, Health Care, and Education - Social cost-benefit analysis - benefit estimation and evaluation.

Module III: Taxation
Theory of Taxation - Benefit and ability-to-pay approaches - Indian Direct and Indirect Taxes - Effects of taxation - Requirements of a sound tax system - Canons of taxation - Tax reforms since 1975 - Chelliah Committee Report - Evaluation of Tax Reforms -Taxation Incidence and alternative concepts of Incidence.

Module IV Budgeting and Debt
Budget - Concept of PPB - Zero-based Budgeting - Cash budgeting : Cash management and Treasury functions in Government - Deficit Budgeting - Types of Deficits - Public Debt: Trends and composition of Indian Public Debt: Instruments - Treasury bills, bonds and other securities, Role of RBI - Debt management - Methods of debt redemption.

Module V: Fiscal Policy
Role of Fiscal Policy in India - Principles of Fiscal federalism in India; Finance Commissions and Planning Commission

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Musgrave, R.A. and P.B. Musgrave (1976), Public Finance in Theory and Practice, 3rd edition, McGraw-Hill Kogakusha, Tokyo.
- RaghbendraJha : (1998), Modern Public Economics
- Rosen, Harway, S. - Public Finance, IVthEdn. Irwin.

References:

- Mueller, D.C. (1979), Public Choice, Cambridge University Press, Cambridge.
- Brown, C.V. and Jackson - Public Sector Economics
- Raja J. Chellia et al. - Trends in Federal Finance.
- D.N. Dwivedi, Readings in India Public finance
- Government of India, Report of the 13th Finance Commission.
- Economic Survey, Government of India (latest).
- State Finances: A Study of Budgets, Reserve Bank of India (latest).

ECONOMICS OF INFRASTRUCTURE

Course Code: ECO2404 **Credit Units: 03**

Course Objective:

To enable the student to understand the importance of infrastructure in an economy and the provision and management of it

Course Content:

Module I: Importance of Infrastructure
Infrastructure – meaning, importance and role in economic development - Infrastructure as a public good- Social and physical infrastructure- Special characteristics of infrastructure- Pricing of infrastructure.

Module II Transport and Communication
Demand for transport- cost functions in the transport sector – Principle of pricing- Special problems of individual modes of transport- Telephone utilities- cost in telephone industry- Characteristics of postal services- Criteria for fixation of postal rates- measurement of standards of service in telephone and postal utilities.

ModuleIII: Energy, Electricity and Water Supply
Primacy of energy in the process of economic development- factors determining demand for energy- Effects of energy shortages- Energy conservation- Renewable and non-conventional sources of energy- Relative economics of thermal, hydel and nuclear power plants.

Module IV: Education and Economic Growth
Education and economic growth- the case for universal, free, primary education- structure of higher education- Financing of Higher Education in India- Health dimensions - Determinants of health – Poverty, Malnutrition,Illiteracy and lack of health information.

Module V Organisation and Financing of Infrasturcture
Organization and financing of infrastructure - Private Vs Public sector financing - PPP in infrastructure.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Dash. L. N, Economics of Infrastructure: Growth and Development,Regal, New Delhi, 2007.

Reference:

- Ashok V.Desai, Energy Demand, Analysis, Management and Conservation, Wiley Eastern, 1990.
- Choudhuri. R.K. Economics of Public Utility, Himalaya Mumbai, 1986.
- Raghuram .G, &Rekha Jain, Infrastructure Development and Financing, Macmillan New Delhi
- Reddy. K.C, Economics and Public Policy, Himalaya Mumbai, 2000.
- Roma Mukherjee, Environmental Economics in the Third Millennium, Sterling Publishers, 2001.

BUSINESS INFORMATION & DATABASE SYSTEM

Course Code: MGT2404 **Credit Units: 03**

Course Objective:

The aim of this course is to introduce the students to the managerial issues relating to information systems, its role in organization and how information technology can be leveraged to provide business value.

Course Contents:

Module I
MIS need and concepts, characteristics, Typology of MIS, Structure of MIS. Planning for MIS, System Development Methodologies, Conceptual and detailed designs of MIS, System Implementation strategies and process, System Evaluation and Maintenance.

Module II
Introduction to data base management system- Data versus information, record, file; data dictionary, database administrator, functions and responsibilities, file-oriented system versus databases system.

Module III
Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Data, Warehousing and Data Mining.

Module IV
Database system architecture- Introduction, schemas, sub schemas and instances; data base architecture, data independence, mapping, data models, types of database systems.

Module V
Data base security- Threats and security issues, firewalls and database recovery; techniques of data base security; distributed data base.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text

- James, A. O'Brien, Introduction to Information Systems, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2005.
- Kenneth C. Laudon and Jane P. Laudon, Management Information Systems, Prentice-Hall of India, New Delhi, 9th Edition, 2006.

References:

- Navathe, Data Base System Concepts 3rd, McGraw Hill.
- Date, C.J., An Introduction to Data Base System 7ed, Addision Wesley.
- Singh, C.S., Data Base System, New Age Publications, New Delhi.

PERSONAL FINANCIAL PLANNING

Course Code: MGT2405 **CreditUnits: 03**

Course Objective:

Post Liberalization, India has witnessed a phenomenal growth in her GDP. With the advent of MNC's, and growth in private business, individuals income and saving pattern has changed. Therefore the need arises to manage these funds in a manner that it is no more called as savings but addressed as a need for Personal financial planning. This course is essential for every student irrespective of the specialization as every individual needs to plan his finances.

Course Contents:

Module I: Introduction to Personal Financial Planning and Personal Accounting
Concept of Personal Financial Planning: Need, Significance, Scope; Ethical issues in Personal Financial Planning; Changing per capita investors. Need to maintain Accounts, Methods: Traditional & Using Electronic Media. Applying for PAN & filing of Income Tax returns.

Module II: Investment Avenues
Real Assets: Investment in Real Assets: Real Estate, Precious Metals, Other Fixed assets. Their relative merits & demerits. Change in their returns over the past few years.
Financial Assets: Investments in securities: Through IPO, Secondary Market. Investment in G-sec; Debt instruments, Post Office instruments, Insurance Policies, Mutual Funds, Certificate of Deposits, Foreign Market.

Module III: Introduction to Income tax and Income from Salary
Introduction to Income tax act 1961 and Finance Act. Previous year, Assessment year, Income, Total Income, Gross Total Income, Capital and Revenue Receipts / Expenditures, Exempted Incomes, Residential Status and incidence of Tax.
Salary, Exemption:- Leave encashment, Gratuity, Pension, Annuity, Pension fund, Allowance (HRA, Entertainment, Special allowance – dependent of expense ad not dependent on expenae, perquisites – rent free accommodation, Leave travel concession, medical facility), Deductions 80c to 80u.). Sections (2(9), 2(31), 2(7), 2(24), 3, 6, 14, 288A, 288B, 2(17), 4, 9, 45, 9(1)(ii), 9(1)(iv), 9(1)(v), 10, 11, 12, 17(1), 22,

Module IV: Income from House Property, Capital Gains and Other Sources
Income from House Property(Types of house property, Exempted house property income, Computation of GAV and NAV, Treatment of unrealized, recovered and arrears of rent), Capital Gains and other Sources (Short term & Long term capital gain, Cost of acquisition, Cost of improvement, Index cost, Income that are taxed under other sources, Deduction under other sources, Tax treatment of lotteries, puzzles. Sections 23, 24, 2528, 30, 31, 32

Module V: Tax Planning
Concept, significance and problems of tax planning, Tax evasion and tax avoidance, Individual Taxation Slabs, Wealth Tax, Gift Tax, Capital Gains Tax, Service tax, Recent Tax saving schemes

Module VI: Retirement & Goal Planning
Concept of risk assessment of individual, Introduction to portfolio management, Retirement planning & investment: Income generation after retirement, liability management, anticipation of expenses. Investment for major goals: House, Family, Education, Medical, Wealth Management/ Financial Advisory companies. Their role, significance & growth.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination)

Text & References:

Text:

- Chandra P,(2010) Investment analysis and Portfolio Management, 3rd edition, Tata McGraw Hill
- Lal&Vashisht, Direct Taxes, Tata McGraw Hill.
- Singhania, Vinod& Monika, Students Guide to Income Tax, Taxman

References:

- V.K.Bhalla, Security analysis and Portfolio Management,6th edition, S.Chand

SALES AND DISTRIBUTION MANAGEMENT

Course Code: MGT2406 **Credit Units: 03**

Course Objective:

The major objective of this course is to acquaint the students with the theory and practice of Management of Sales Operations.

Course Contents:

Module I: Introduction
Sales management- Concept, Objectives and functions; Evolution of sales management; Nature and role of Sales Manager's job; Sales management as a career, emerging trends in sales management

Module II: Sales Organization
Purpose of sales organization; Setting sales organization; Types of sales organization; Coordination of selling functions with other marketing activities; Sales forecasting

Module III: Controlling Sales Effort
Sales Budget: Purpose and budgetary procedure. Quotas: Concept, Objectives and Types. Sales Territory: Concept and procedure of devising sales territories, Routing and Scheduling of Sales force. Sales Audit.

Module IV: Managing Sales Force
Concept of sales force management. Recruitment and Selection of sales personnel (domestic and international perspective). Cross Cultural challenges. Sales training. Compensating and motivating sales personnel. Controlling and evaluating sales personnel.

Module V: Distribution Management and Channel Control
Distribution channels: Concept and need. Distribution Channel Strategy. Managing distribution channel. Features of effective channel design. Channel Conflict: Concept and stages. Conflict management.

Module VI: Logistics Management
Objectives of logistics. Concept of logistics planning: inventory management decisions, transportation decisions, Location decisions.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:
- Still Cundiff, Sales Management Decision Strategies, Fifth Edition, Printice Hall.
- Panda Tapan K., Sahadev Sunil, Sales and Distribution Management, 2005, Oxford University Press.

References:
- Kapoor Ramneek, Fundamentals of Sales Management, 2005, McMillan.
- Sudha GS, Sales & Advertising Management, 2005, Indus Valley Publications.
- Walker, Churchill Ford, Management of Sales Force

TERM PAPER

Course Code: ECO2431 **Credit Units: 02**

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inflation
- Unemployment
- Fiscal Deficit
- Poverty
- Education
- Malnutrition
- Rural Development
- Regional Imbalance
- Globalization
- Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2432 **Credit Units: 03**

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

- **a)*Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)*Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
- **c) *Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
- **d)*Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
STEP III : Collection of information and data relating to the topic and analysis of the same.
STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2433 **Credit Units: 01**

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

ECONOMETRICS - BASIC THEORY AND APPLICATION

Course Code: ECO2551 **Credit Units: 03**

Course Objective:

This course presents the basic econometrics techniques emphasizing numerical estimation of economic relationships as applied to practical economic and managerial problems. It enables the students to learn the basic econometric techniques relating to the estimation of parameters. On successful completion of the course the students should have understood the estimation techniques, learned the difficulties involved in the estimation process, evaluation of parameters and enable understanding of scientific decision making process.

Course Contents:

Module I: Nature and Scope of Econometrics, The methodology of econometric research; Specification and estimation of an econometric model; Basic concepts of estimation

Module II: Simple Linear Regression Model: Two Variable Case
Estimation of model by method of ordinary least squares, properties of estimators, goodness of fit; tests of hypotheses, scaling and units of measurement, confidence intervals, GaussMarkov theorem, forecasting.

Module III: Multiple Linear Regression Model.
Estimation of parameters; properties of OLS estimators, goodness of fit, partial regression coefficients, testing hypotheses,functional forms of regression models, qualitative (dummy variables) independent variables

Module IV: Violations of Classical Assumptions and Remedies
Multicollinearity, Heteroscedasticity and Auto-correlation

Module V: Specification Analysis
Omission of a relevant variable; Inclusion of irrelevant variable; Tests of Specification Errors

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- A Koutsoyiannis, “Theory of Econometrics: An Introduction Exposition of Econometric Methods”, Educational Low-Priced Books Scheme, McMillan Education Ltd. (1992).
- DamodarGujarathi "Basic Econometrics", Tata McGraw Hill Ltd, 2010

References:

- Christopher Dougherty, Introduction to Econometrics, Oxford University Press, 3rd Edition, Indian Edition, 2007.
- Jan Kmenta, Elements of Econometrics, Indian Reprint, Khosla Publishing House, 2nd edition, 2008.A.S. Goldberger (1998), Introductory Econometrics, Harvard University Press, Cambridge.
- Suresh K.Ghose “Econometrics”, Prentice Hall of India private limited, New Delhi

INTERNATIONAL ECONOMICS

Course Code: ECO2501 **CreditUnits: 03**

Course Objective:

This course focuses on the basic issues, concepts and theories related to the international economics. It includes different trade policy & welfare, international trading system, WTO, Balance of Payments Fixed and Flexible exchange rate systems, IMF & others.

Course Contents:

Module I
The subject matter of international economics; Comparative advantage theory: Ricardian, specific-factors, and Heckscher-Ohlin models; Terms of trade, Immiserising growth, and the transfer problem.

Module II
New trade theories: economies of scale and imperfect competition; International factor movements: labour migration and foreign investment; Trade policy and welfare, with special reference to developing countries. The international trading system: WTO and preferential trading agreements.

Module III
Review of national income and balance of payments accounting; The foreign exchange market and exchange rate determination; fixed and flexible exchange rates.

Module IV
International monetary institutions and issues: IMF, World Bank, WTO, currency crises, stabilization and other contemporary issues.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:
- Paul Krugman, Maurice Obstfeld, and Marc Melitz, International Economics: Theory and Policy, Addison-Wesley (Pearson Education Indian Edition), 9th edition, 2012.
- Dominick Salvatore, International Economics: Trade and Finance, John Wiley International Student Edition, 10th edition, 2011.

References:
- W.M. Corden (1997) *Trade Policy and Welfare*, Clarendon Oxford, 2nd edition, Chapters 1, 2 and 9.
- T.N. Srinivasan (1998), *Developing Countries and the Multilateral Trading System*, OUP, Delhi, Chapters 5-8.

MONEY AND FINANCIAL MARKETS

Course Code: ECO2502 **CreditUnits: 03**

Course Objective:

The main objective of the course is to impart knowledge about money & financial markets, financial instruments & money; Demand for & Supply of money, financial deepening etc.

Course Contents:

Module I:Money in the Financial System
Money and its functions; financial markets, financial instruments and money; Money and Capital market, Financial deepening

Module II: Risk and Return
Sources and types of risk; management of risk and return, efficient portfolio, minimum Variance Portfolio, Optimal Portfolio, Capital Asset Pricing Model, Efficient Market Hypothesis.

Module III:Analysis of Interest Rates
Interest rates in closed and open economies; Theories of term structure

Module IV:Financial Markets and Services
Banking system, bond market, foreign exchange market, equity market, debt market, Introduction to the concept of Derivatives: Futures, Options, Call/Put; Primary Market: Initial public offer (IPO), Book Building, Fixed vs booking building issues, Private placement.
Secondary Market: Roles and functions of SEBI,Intermediaries in Indian stock exchange.

Module V:Financial Services
Meaning, Nature and Types - Leasing, Factoring, Hire Purchase Finance, Housing, Finance, Credit Rating

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:
Text:
- L. M. Bhole and J. Mahukud, Financial Institutions and Markets, Tata McGraw Hill, 5th edition, 2011.
- M. Y. Khan, Indian Financial System, Tata McGraw Hill, 7th edition, 2011.

References:
- F. J. Fabozzi, F. Modigliani, F. J. Jones, M. G. Ferri, Foundations of Financial Markets and Institutions, Pearson Education, 3rd edition, 2009
- Various latest issues of R.B.I. Bulletins, Annual Reports, Reports on Currency and Finance and Reports of the Working Group, IMF Staff Papers.M.R. Baye, D.W. Jansen (1996), Money Banking and Financial Markets, AITBS, (Indian Edition)
- F. S. Mishkin and S. G. Eakins, Financial Markets and Institutions, Pearson Education, 6th edition, 2009.

URBAN ECONOMICS

Course Code: ECO2503 **Credit Units: 03**

Course Objective: To understand the causes and consequences of urban growth and economic issues in the provision of urban amenities.

Course Contents:

Module I: Urban Systems
Structure of Human settlement - Spatial economic organization - Urban system - Functional dependencies between human settlements of different sizes

Module II: Economics of Location
Economics of city size - Agglomeration economics - Economics of location - City size distribution – Satellite Town

Module III: Urban Infrastructure
Urban infrastructure - Land use pattern – Land Market – Urban housing - Slum renewal and up-gradation - Urban crimes

Module IV: Urban Planning
Urban environmental planning – Transport - MRTS - Metro Industrial Complex - Energy use – Urban water supply

Module V: Urban Finance
Financing Urban Infrastructure - Different Methods - Federal Finance -Local Public Finance - Municipal Administration - Urban Planning and Policy - Private Sector Participation

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text and References:

Text:

- Arthur.O'Sullivan, Urban Economics, McGrawHill Education group, UK, 7th edition, 2008.

References:

- Diamon, Tolley, The Economics of Urban Amenities, Academic Press, New York, 1982.
- Richardson, Urban Economics, Penguin, Harmondsworth, 1971.
  Sivarmakrishnan, The Economic Development & Green Metropolitan Management, Institute of the World Bank, OUP, 1986

SUMMER INTERNSHIP EVALUATION

Course code: ECO2535 **Credit Units:06**

Objective:

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:

Every student of B.A (Honors) shall be required to undergo a practical training in a corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.
The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the fifth semester.

Chapter Scheme
Chapter I: Introduction: 20 marks
Chapter II: Conceptual Framework/National/International Scenario: 5 marks
Chapter III: Presentation, Analysis and Findings: 35 marks
Chapter IV: Conclusion and Recommendations: 15 marks

The report has to be type written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 80 to 100 pages and has to be submitted in two copies.

Components of the Report

The outcome of Summer Internship is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

a)*Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b)*Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).

c) *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).

d)*Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

EvaluationScheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks

DEMOGRAPHY

Course Code: ECO2504 **Credit Units: 03**

Course Objective:

The modules incorporated in this paper educate the students about the inter-relationship between economic development and population, along with an exposition of the established theories of population. Issues relating to demographic techniques and basic sources of demographic data in the Indian economy have also been included. Aspects of population policy and study of its social characteristics are other important components of the modules of this paper.

Course Contents:

Module 1: Introduction
Population study and demography: its relation with other disciplines; Theories of Population: Malthus, Optimum theory of population, and theory of demographic transition; Historical evidence of population growth in developed and developing countries.

Module 2:Sources of Demographic Data in India
Sources of Demographic data in India: Census — civil registration system and demographic surveys; National Family Health Survey: their relative merits and demerits.

Module 3:Techniques of Analysis
Crude birth and death rates, age specific birth and death rates; Study of Fertility: Total fertility rate, gross reproduction rate, and net reproduction rate— Life table: meaning of its columns and its uses — Reproductive and child health in India — Temporal and spatial variation in sex ratios.

Module 4:Population Projection
Techniques of population projection — Concept of stationary, stable and quasi-stationary population; Changes in family structure and old age security

Module 5: Population Policy
Evolution of population policy in India, Shift in policy focus from fertility population control to family welfare and to women empowerment; Education, Women's autonomy; The New Population Policy

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text and References:
Text:

- Bogue, D.J. (1971), Principles of Demography, John Wiley, New York.

References:

- Agarwala S.N. (1985), India's Population Problem, Tata McGraw-Hill, Bombay.
- Agarwal U.D. (1999), Population Projections and Their Accuracy, B.R. Publishing Corporation,New Delhi.
- Bhende, A.A. and T.R. Kanitkar (1982), Principles of Population Studies, Himalaya Publishing House, Bombay.
- Bose A. (1996), India's Basic Demographic Statistics, B.R. Publishing Corporation, New Delhi.
- Census of India, Government of India, Various Reports, New Delhi.
- Choubey, P.K. (2000), Population Policy in India, Kanishka Publications, New Delhi.
- Misra, B.D. (1980), An Introduction to the Study of Population, South Asian Publishers, New Delhi.
- Srinivasan, K. (Ed.) (1999), Population Policy and Reproductive Health, Hindustan Publishing Corporation, New Delhi.!Buvinic M. and M.A. Lycette, (1989), 'Women, Poverty and Development in the Third World,'in Lewis, J.P. (Ed.) Strengthening the Poor: What Have We Learnt, OECD, Paris.
- Government of India (1974), 'Towards Equality — Report of the Committee on the Status of Women in India, Government of India, Department of Social Welfare, Ministry of Education and Social Welfare, New Delhi.
- Gulati, S.C. (1988), Fertility in India : An Econometric Analysis of a Metropolis, Sage Publications, New Delhi
- Gupta, J.A. (2000), New Reproductive Technologies : Women's Health and Autonomy, Indo-Dutch Studies on Development Alternatives, Sage Publications, New Delhi.
- Krishnaji M., R.M. Sudrashan and A. Shariff (1999), Gender Population and Development,Oxford University Press, New Delhi.
- Srinivasan, K. (1998), Basic Demographic Techniques and Applications, Sage Publications,New Delhi.

PRINCIPLES OF INVESTMENT MANAGEMENT

Course Code: MGT2507 **Credit Units: 03**

Course Objective:

The course aims at equipping the undergraduate students with financial tools, which help in making decisions for investment in financial securities. It is also aimed at imparting a basic understanding of the influence of changing economic scenario on the decisions and important theories and models, techniques and regulations underlying these decisions.

Course Contents:

Module I: Introduction to Investments
Investments: Introduction, Avenues for Investment including introduction to derivatives, Investments and Speculation, Features of a good investment programme, Process of Investment Decision Making, Risks involved in Investments including the concept of beta, Principle of Dominance.

Module II: The Stock Markets in India
Nature and Functions of the Stock Market, OTCEI & BSE, NSE & Role of Depositories, Market Indices, The Brokerage Business

Module III: Valuation of Securities
Bond Valuation and Analysis, Preference share Valuation and Analysis, Equity Share Valuation

Module IV:Security Analysis
Fundamental Security Analysis, Technical Security Analysis

Module V: Portfolio Analysis and Management
Portfolio Analysis: Risk and Return, Portfolio Choice: Utility Theory and Indifference Curves, Markowitz: Portfolio Selection Model, Capital Asset Pricing Model, Sharpe's Single Index Model and Portfolio Evaluation Treynor, Sharpe and Jensen.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:
- Sharpe, William F. Alexander and Bailey, Investments, Sixth Edition Prentice - Hall, India

References:
- Fisher, Donald E & Jordan, Ronald., Securities Analysis & Portfolio Management:, Sixth Edition, Prentice Hall
- Haugen, Robert. Modern Investment Theory, Fifth Edition, Prentice Hall
- Bhalla, V. K. Investment Management, S. Chand & Co.

RELATIONAL DATABASE MANAGEMENT SYSTEM

Course Code: MGT2512 **CreditUnits: 03**

Course Objective:

The objective of the course is to give knowledge of the Relational Database Management Software, in particular ORACLE. It is expected that a student at the end of the course would attain a good conceptual and practical understanding of databases.

Course Contents:

Module I: Introduction to RDBMS
RDBMS: Introduction, Relational Model concept and Relational data structure, Relational Model constrains as domain constraints, Key constraints, Entity integrity constraints, Referential Integrity constraints.

Module II: Introduction to oracle
Tools of Oracle, Features of oracle

Module III: SQL
Overview of SQL, Component of SQL (DDL, DML, DCL), Advantage of SQL, Basics of syntax writing, Data Definition Language, Create command, Data type, Constraints, ALTER & DROP, UPDATE & DELETE Commands, Substitutions variables, Run time Environments variables, SELECT Commands Basic Constructs, Functions, Nested Queries, Correlated queries, Views, Sequence, User Management Commands.

Module IV: PL/SQL
Basic features, Block Structure of a PL/SQL Programs, Control Structures, Exception Handling, Cursor, Procedure, Functions and Triggers, Internet features of Oracle.

Module V: Database Technologies
Client/Server Databases, Distributed Databases, Web Databases

Module VI: Administration of Oracle databases

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- S.Sumathi, S. Esakkirajan (2010), Fundamentals of Relational Database Management Systems,Springer

References:

- Oracle8i: The Complete Reference, McGraw Hill
- Narang Rajesh, Database Management systems

TERM PAPER

Course Code: ECO2531 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inflation
- Unemployment
- Fiscal Deficit
- Poverty
- Education
- Malnutrition
- Rural Development
- Regional Imbalance
- Globalization
- Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: ECO2532 **Credit Units: 03**

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

- **a)*Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)*Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
- **c) *Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
- **d)*Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
STEP III : Collection of information and data relating to the topic and analysis of the same.
STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Chapter 5: Bibliography

STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	**Power Point Presentation & Viva**
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:

Date:

WORKSHOP

Course Code: ECO2533 **Credit Units: 01**

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

ECONOMIC GROWTH AND DEVELOPMENT

Course Code: ECO2601 **Credit Units: 03**

Course Objective:

This course will enable the students to acquire advanced knowledge as to how policies facilitate the economic growth and development in advanced countries. It also enables the students to understand important growth models and help them to familiarize with factors that contribute to economic growth. It will provide a strong knowledge base on India's economy both during pre and post reform periods and help in developing a critical study on recent development in the Indian Economy in the context of the world economic scenario.

Course Contents:

Module I
Economic growth, Economic Development and Sustainable Development – Measurement of Development: Conventional, HDI and Physical Quality of life Indies (PQLI) – Factors determining economic development – Obstacles of economic development: vicious circle of poverty.

Module II
Growth Theories-Adam Smith-Ricardo-Malthus- Karl Marx-Schumpeter's theory of Development-Keynes-Rostow's stages of Economic Growth-Big Bush theory.

Module III
Doctrine of balanced growth-Concept of unbalanced growth-Dualistic theories-Myrdal theory- Growth Models-Harrod-Domar – Joan Robinson's model of capital accumulation-Meade's neoclassical model-Solow Model of Long Run Growth-Kaldor's model of growth-Models of Technical Change – Mahalanobis Model.

Module IV
Economic planning-Planning process in a mixed economy-Growth Models in Indian Planning- Need for Foreign Capital-Forms of Foreign Capital-Multinational Corporations and foreign collaborations – India's Balance of Payments.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- R.C. Agarwal and M.L. Seth: Economic of Development and Planning, Lakshmi Narain Agarwal, Agra.
- A.N. Agarwal and Kundanlal: Economics of Development and Planning, Vikas Publishing House P. Ltd
- Debraj Ray, Development Economics, Oxford University Press, 2009

References:

- The Economics of Development and Planning (with special reference to India) Vani education books.

LABOUR ECONOMICS

Course Code: ECO2602 **Credit Units: 03**

Course Objective:
This paper exposes the students to theoretical as well as empirical issues concerning labour.

Course Contents:

Module I: Labour and Labour Economics
Meaning and concept of labour - Definition, nature, scope and importance of Labour Economics – Labour Market Segmentation – Labour Market Policies

Module – II: Wage Determination
Wage concepts - Minimum wage, fair wage and living wage - Classical, Neo classical and Bargaining theories; Types of wages in India -Need for State Regulation of wages - National Wage Policy and Wage Boards in India.

Module -III: Trade Unionism, Industrial Dispute and Labour Legislation
Meaning and objectives of Trade Union - Trade Union Movement in India- Problems and draw backs - Measures to strengthen the Trade Union Movement -Industrial disputes: meaning - causes and effects of industrial disputes - Prevention of industrial disputes - Machinery of settling the industrial disputes in India – Collective Bargaining - Labour Legislation in India.

Module IV: Social Security Measures of Labour
Meaning and need for Social Security Measures - Social Assistance and Social Insurance - Social Security Legislations in India: Workmen's Compensation Act, 1923, Employees' State Insurance Scheme Act, 1948, Maternity Benefits Act, 1961 and the Provident Fund Act, 1952 – Labour Welfare Funds

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:
- Tyagi B.P, Labour Economics and Social Welfare, Jai Prakash Nath& Co., Meerut, 2004
- Sharma A.K. - Labour Economics, Anmol Publications, New Delhi, 2007

Reference:
- Hajela, P.D., Labour Restructuring in India: A Critique of the New Economic Policies Common wealth Publishers, New Delhi, 2011
- VenkataRatnam, C.S., Globalization and Labour Management Relations Dynamics of change, Sage, New Delhi, 2001.
- Memoria, C.B., Labour Problems and Social Welfare in India, Allahabad, KitabMahae
- Misra, L., Child Labour in India, OUP, New Delhi, 2000

BANKING & FINANCIAL INSTITUTIONS

Course Code: ECO2603 **Credit Units: 03**

Course Objective:

The objective of this course is to make the candidates aware about the banking system prevalent in India and the role of financial Institution in the Indian financial system.

Course Contents:

Module I: Introduction
Bank - Concept, classification, objectives & functions. Bank Management - Concept, Functions, Importance. Legal framework of regulation of banks: Banking Regulation Act 1949 and main amendments. Reserve requirements: CRR, SLR, Forex Reserves, bank fee based services; innovative products in banking.

Module II:RBI and Banking Reforms:
The RBI Act, 1934 and main amendments; Reforms in banking after 1991. Micro Financing in India.

Module III: Financial Institutions:
Commercial banks: Meaning, functions, management and investment policies, E-banking and E-trading; Present structure and recent developments in commercial banking.
Development banks: Concept, objectives and functions of development banks; Operational and promotional activities of development Banks; IFCI, ICICI, IDBI, IRBI, SIDBI, state development banks and state financial corporations.

Module IV: Other Financial Institutions:
Introduction; Life Insurance Corporation of India, General Insurance Corporation of India, Unit Trust of India.

Module V: Mutual Funds:
Concept, performance appraisal and regulation of mutual funds (with special reference of SEBI guidelines); Designing and marketing of mutual funds schemes; Latest mutual fund schemes in India – an overview.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:
- Viganim, BML, 'Banking, law and practice', Konak Publication 2005.

References:
- Justin Paul and Padmalatha Suresh, 'Management of Banking and financial services', TMH 2009.
- M. RavathySriram and P.K. Bamanan, 'Core banking solution', PHI 2008.
- JyotsnaSethi and Nishevan Bhatia, 'Elements of Banking and Insurance', PHI 2008.
- VijayaragavanIyengar, 'Introduction to Banking', Excel Books Pvt. ltd. 2007.
- K.C. Shekhar, LakshmyShekhar, 'Banking, theory and practice', Pearson publications, 2009

DISSERTATION

Course Code: ECO2637

CreditUnits:09

Objectives:

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion &Recommendations -- 10 marks
Chapter 5: Bibliography-- 5marks

The Components of a Dissertation
A Dissertation should have the following components:
1) Cover Page: This should contain the title of the, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

a)*Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b)*Conceptual Framework / National and International Scenario*: (relating to the topic of the Dissertation).

c) *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).

d)*Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the work, and in writing the report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.
Annexures,
References / Bibliography

Guidelines for evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Dissertation	**Power Point Presentation & Viva**
75 marks	25 marks

Cover Page / Title page

Project Report on

Title of the Project

XXXXXXXXXXXXXXXXX

(Submitted for the partial fulfilment for the awardof Degree of B.A. Honours in Economics

To

Amity College of Economics

Submitted by

Name of the Candidate :.....

Registration No. .....

Name of the College .....

College Roll No. .....

Supervised by

Name of the Supervisor:

Designation

Month & Year of Submission

University Logo and Name

(Annexure-IB)

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... submitted by me for the partial fulfilment of the degree of B.A. Honours in Economics is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:

Date:

HEALTH ECONOMICS

Course Code: ECO2604 **Credit Units: 03**

Course Objective:

The importance of education and health in improving well being is reflected in their inclusion among the Millennium Development Goals adopted by the United Nations member states, which include among other goals, achieving universal primary education, reducing child mortality, improving maternal health and combating diseases. This course provides a microeconomic framework to analyse, among other things, individual choice in the demand for health and education, government intervention and aspects of inequity and discrimination in both sectors. It also gives an overview of health and education in India.

Course Contents:

Module I

Definition and scope; Health, good health and quality of life; Determinants of good health;Measurement of health status; Mortality, morbidity and "HALY family" of summary measures QUALY

Module II

Demand for health and demand for medical care. Supplier induced demand; Production of health care, providers- physicians, hospitals and pharmaceuticals; Role of technological change in health care; Sustainability, equity-efficiency trade off

Module III

Health Cost concepts – opportunity cost, fixed and variable costs, incremental and marginal cost, direct and indirect medical costs time costs and travel cost.

Module IV

Economics of health insurance; Information asymmetry – adverse selection; Risk aversion; Moral hazard; Health insurance- challenges; Insurance concepts; Co-payments; Co-insurance rates, deductibles, group insurance

Module V

Health and Education Sector in India: Overview: Health outcomes; health systems; health financing Literacy rates, school participation, school quality measures.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text and References:

Text:

- William, Jack, Principles of Health Economics for Developing Countries, World Bank Institute Development Studies, 1999.

Refernces:

- World Development Report, Investing in Health, The World Bank, 1993.
- Charles Phelps - Health economics
- Clewer, Ann and David Perkins 1998 – Economics for health care management

TERM PAPER

Course Code: ECO2631 **Credit Units: 02**

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inflation
- Unemployment
- Fiscal Deficit
- Poverty
- Education
- Malnutrition
- Rural Development
- Regional Imbalance
- Globalization
- Foreign Direct Investment

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

WORKSHOP

Course Code: ECO2633 **Credit Units: 01**

Objectives:

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Bachelor of Business Administration
(Banking & Finance)

FLEXILEARN
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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Business Administration (Banking & Finance)

Syllabus - First Semester

MANAGEMENT FOUNDATIONS

Course Code: MBF2101 **Credit Units: 03**

Course Objective:
The aim of the course is to orient the students in theories and practices of Management so as to apply the acquired knowledge in actual business practices. This is a gateway to the real world of management and decision-making.

Course Contents:

Module I: Introduction
Concept, Nature, Scope and Functions of Management, Levels of Management, Evolution and Foundations of Management Theories - Classical and Neo - Classical Theories, Systems Approach to organization, Modern Organization Theory.

Module II: Management Planning Process
Planning objectives and characteristics, Hierarchies of planning, the concept and techniques of forecasting, Decision making – concepts & process, MBO, concept and relevance.

Module III: Organization
Meaning, Importance and Principles, Departmentalization, Span of Control, Types of Organization, Authority, Delegation of Authority.

Module IV: Staffing
Meaning, Job analysis, Manpower planning, Recruitment, Transfers and Promotions, Appraisals, Management Development, Job Rotation, Training, Rewards and Recognition.

Module V: Directing
Motivation, Co-ordination, Communication, Directing and Management Control, Decision Making, Management by objectives (MBO) the concept and relevance.

Module VI: Management Control
Coordination, Meaning, Nature, Features, Objectives and Process of Management Control, Techniques and Behavioural Aspects of Management control.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(**C** - Case Discussion/ Presentation; **HA** - Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Text & References:

Text:

- Stoner, Freeman and Gilbert Jr. (2010), Management, 8th Edition, Pearson Education
- Robbins, (2009), Fundamentals of Management: Essential concepts and Applications, 6th edition, Pearson Education

References:

- Prasad, L.M. Principles & Practice of Management, 1st Edition, Tata McGrew Hills.
- Gupta, C.B., Management Concepts and Practices, Sultan Chand & Sons, New Delhi

FINANCIAL ENVIRONMENT

Course Code: MBF2102 **CreditUnits: 03**

Course Objective:
The course aims to acquaint the student with a basic and elementary knowledge of the financial environment of Indian Economy.

Course Contents:

Module I: Introduction
An Introduction to business environment, Nature, Scope and role of business environment, Financial environment, Indian financial system. Financial services and economic development, Financial Institutions and types - IDBI, NABARD, SIDBI, IFCI

Module II: Central Bank
Role of Central Bank, Policy Framework for RBI, RBI and Monetary Policy, Regulation and Supervision of Banking system, Review of the Banking system, Review of RBI balance sheet, Current Developments and Reports of RBI, Maintenance of CRR, SLR, Interest Rate Policy.

Module III: Commercial Banking
Commercial Banking: Banker Customer Relationship, Management of Deposit Business & Credit Business, Fee Based services, Liquidity Vs. Profitability, Credit Assessment, Principles of Bank Lending: Types & Methods of Charging, Secured & Unsecured Advances.

Module IV: Co-Operative Banking
Overview and regulation of Co-Operative banking, Regional Banks, Rural Banks and Co-Operative banking societies

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(**C -** Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V -** Viva; **CT -** Class Test; A-Attendance; **EE -** End Semester Examination)

Text & References:
Text:
Sundaram&Varshney; (2004) "Banking, Theory Law and Practice"; Sultan chand& sons.
Vasant Desai; (2001) "Development Banking & Financial Intermediaries"; Himalaya Publishing House.

Reference:
Mithani, D.M., Gordon, E.; (2003) "Banking & Financial Systems"; Himalaya Publishing House;.
Reddy, P.N., Appannaiah, H.R.; (2003) "Theory & Practice of Banking"; Himalaya Publishing House;.

FINANCIAL ACCOUNTING

Course Code: MBF2103 **Credit Units: 03**

Course Objective:
To understand the basics of accounting and concepts of double entry system. The students will be given a detailed grounding on recording of transactions and preparation of final accounting statements for business organizations.

Course Contents:

Module I: Introduction to Accounting
Understanding the meaning, nature, functions and usefulness of accounting, branches of Accounting, Accounting Equation, Accounting Concepts and Generally Accepted Accounting Principles. Difference between Indian GAAP and US GAAP

Module II: Recording of Transactions and Subsidiary Books
Concept of Double Entry System. Understanding the Accounting cycle, Preparation of Voucher, Journal, Ledger and Trial Balance and Numerical on the Same. Preparation of subsidiary Books including Purchase Book, Sales Book, Purchase Returns Book and Sales Return Books (and numerical on the same), Cash book, types of cash book and balancing of cashbook. Numerical on single column cashbook, Double column cashbook, triple column cashbook and petty cash book.

Module III: Reconciliation of Bank Accounts
Causes for difference in the Balance as per Pass book and balance as per cashbook, Procedure for preparation of bank reconciliation statement when there is favorable balance and in case of overdraft (and numerical on the same).

Module IV: Financial Statements
Preparation of Trading Account, Manufacturing Account, Profit And Loss Account and balance sheet along with adjustments (and numerical on the same) and non-profit making organizations an overview.AS-1,AS-21**(no numerical)**

Module V: Accounting For Partnership
Introduction to Partnership Accounts, Partnership Deed.**Admission of a new partner**- Revaluation account, Computation of New Profit Sharing Ratio and Sacrificing Ratio, Proportionate Capital, Treatment of goodwill in partnership accounts and its valuation.**Retirement and Deathof a partner:** Determining the gaining ratio, Revaluation of assets and liabilities, Reserve, Final payment to retiring partner, Treatment and adjustment of goodwill. Numericals on preparation of various accounts in case of retirement and death of a partner. **Dissolution of the firm:** Circumstances leading to dissolution of partnership, Settlement of the accounts, Capital ratio on insolvency, Insolvency of all partners and Garner Vs Murray decision.

Examination Scheme:

Components	**CT**	**HA**	**C**	**P**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V** - Viva; **CT** - Class Test; **P** - Project **A** - Attendance; **EE** - End Semester Examination)

Text & References:

Text:

- Maheshwari, S.N., Advanced Accountancy Volume-I, Ninth Edition, Vikas Publishing House Pvt. Ltd.

References:

- Grewal, T. S., Shukla, M .C, Advanced Accountancy, Sixteenth Edition, Sultan Chand and Sons.
- Tulsian, P.C (2009), Financial Accounting 2nd Edition, Pearson Education.
- Narayanaswamy, R. Financial Accounting- A Managerial Perspective, Second Edition, Prentice Hall India.
- Ramachandran, N., Kakani, R.K., Financial Accounting for Management, Tata McGraw Hill Publishing Company Limited.

MANAGERIAL ECONOMICS

Course Code: MBF2104 **CreditUnits: 03**

Course Objective:
The purpose of this course is to apply managerial economics concepts and techniques in evaluating business decision taken by firms. The emphasis is on explaining how the tools of standard price theory can be employed to formulate a decision problem, evaluate alternative courses of action and finally choose among alternatives.

Course Contents:
Module I: Introduction to Managerial Economics
Nature, Scope, Definitions of Managerial Economics, Application of Managerial Economics to Business, Micro Vs. Macro Economics, Opportunity Costs, Time Value of Money, Marginalism, Incrementalism, Market Forces and Equilibrium.

Module II: Consumer Behaviour and Demand Analysis
Cardinal Utility Approach: Diminishing Marginal Utility, Law of Equi-Marginal Utility, Ordinal Utility Approach: Indifference Curves, Marginal Rate of Substitution, Budget Line and Consumer Equilibrium, Theory of Demand, Law of Demand, Movement along vs. Shift in Demand Curve, Concept of Measurement of Elasticity of Demand, Factors Affecting Elasticity of Demand, Income Elasticity of Demand, Cross Elasticity of Demand. Production with one variable input, Production and optimal input proportions, two variable inputs, Law of variable proportions and law of return to scale, Cost Concepts, Theory of costs in short run and long run.

Module III: Theory of Production, Cost and Firm's Behaviour
Meaning and concept of Production, Factors of Production and Production Function, Fixed and Variable Factors, Law of Variable Proportion (Short Run Production Analysis), Law of Returns to a Scale (Long Analysis), Concept of Cost, Cost Function, Short Run Cost, Long Run Cost, Economics and Diseconomies of Scale, Explicit cost and Implicit Cost, Private and Social Cost

Module IV: Macro Economics and Business Decisions
Phases of Business cycle - Evil effects of cyclical fluctuations on business firms - Minimizing effects of Business cycles, Economic and Business forecasting - uses of economic forecasts - Methods of economic forecasting - selecting a forecast - evaluating forecasts.

Module V: Price and Output Decisions under Different Market Structures
Price and Output Decisions under Perfect Competition, Monopoly and Monopolistic Competition - Pricing under Oligopoly - Kinked Demand Curve - Price Leadership - Pricing under Collusion.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(**C** - Case Discussion/ Presentation; **HA** - Home Assignment; **Q** – Quiz; **V** - Viva; **CT** - Class Test; A-Attendance; **EE** - End Semester Examination)

Text & References:
Text:
- Dwivedi, D. N., Managerial Economics, 7th Edition, Vikas Publishing House.
- Ahuja, H.L. Advanced Economic Theory (Micro Economics), S. Chand & Co, New Delhi

References:
- Browning Edgar K. &Jacquel Line M. Browning, Micro Economics and Application, Kalyani Publishers, New Delhi.
- Gould John P. and Edward P. Lazear Micro Economic Theory, All India Traveller Book-seller, New Delhi.
- Koutsoviannis Modern Micro Economics, Macmillan Press Limited, New Delhi.
- Dewett. K.K. Micro Economics, S. Chand &Co, New Delhi

PRINCIPLES OF BANKING

Course Code: MBF2105 **CreditUnits: 03**

Course Objective:

The course aims to acquaint the student with a basic and elementary knowledge of the banking services and practices. It provides institutional features of banking system in India.

Course Contents:

Module I: Introduction
Banking – An overview, Bank structure and types, Establishment of Banks, Principles of Banking, Functions of Banking

Module II: Evolution of Banking
Systems of Banking- Mixed, Branch, Unit, Group, Chain; Brief Structure of banks; RBI-Organisation, Functions, Methods of credit control; Commercial banking; Balance sheet of a Bank; Credit creation.

Module III:Banking system in India
Structure and Charateristics of Financial & Banking system in India; Indian Money Market; Indian Capital Market; Indian Monetary Policy & System.

Module IV: Emerging trends in Banking
Sources and Uses of Funds in Banks; Value Chain Analysis in Banking Industry, Emerging trends in Banking: Universal Banking, Venture Capital, Project Financing, Merchant, Banking, E-Banking, Credit Cards, Banking Ombudsman Scheme, Corporate governance.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V** - Viva; **CT** - Class Test; A-Attendance; **EE** - End Semester Examination)

Text & References:
Text:
Sundaram&Varshney, " Banking, Theory Law and Practice" Sultan chand& sons;2004

References:
Chaturvedi D.D., Anand Mittal, " Business Economics-II", Brijwasi Book Distributors;2005
Varshney& Malhotra, "Principles of Banking",Sultan Chand & Sons, 2005.

MARKETING MANAGEMENT

Course Code: MBF2201 **Credit Units: 03**

Course Objective:
The main objective of this course is to give students an elementary knowledge of the fundamentals in the field of marketing. The focus will be both on developing and helping them imbibe basic marketing principles and establishing an appreciation of contemporary realities.

Course Contents:

Module I: Introduction to Marketing
Meaning of marketing, Core concepts of marketing, Evolution and its role in the changing business environment, various marketing management philosophies, viz., the production concept, the product concept, selling concept and the marketing concept, Newer definitions of marketing- societal marketing and relationship marketing, Strategies planning in marketing, Formulation of marketing plan.

Module II: Analyzing Marketing Opportunities
Internal and External Marketing Environment Analysis, Introduction to Marketing Information System and Marketing Research, BCG matrix, GE 9 cell model.

Module III: Studying Consumer Behaviour and Selecting Markets
Buying Behaviour for Consumer Markets and Industrial Markets, Types of Buying Situations, Buying Decision Process and Factors Affecting Buyer Behaviour, Consumer Adoption Process, Concept of Market Segmentation, Bases for segmenting Consumer and Business markets, Approaches for Targeting, Differentiation and Positioning.

Module IV: Product Mix Strategy
Product: concept & levels, Classification of consumer and industrial products, Product Differentiation, Product Mix, Product Life Cycle and various strategies, Branding: concept and challenges, Brand decisions, Packaging and Labeling.

Module V: Product Development Decision and Pricing
Product Line Decisions, New Product Development: Challenges & Process; Consumer Adoption Process, Diffusion of Innovation, Pricing Strategies; Setting the price, Understanding various pricing strategies and their application.

Module VI: Distribution and Logistics Decision and Integrated Communication Mix
Nature of Marketing Channels, Channel Functions and Flows, Channel Design and Management Decisions, Channel Dynamics, Introduction to Wholesaling, Retailing and Logistics, Marketing communication mix and Introduction to various elements of integrated marketing communications briefly

Module VII: Emerging Marketing Paradigms
E-marketing, Global marketing, Mobile marketing, Kiosk marketing, Green marketing, Tele marketing, Multi level marketing, Rural marketing.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Kotler, Philip & Armstrong, Gray, Principles of Marketing, 10th Edition, Pearson Education.
- Saxena, Rajan (2008), Marketing Management, 3rd Edition, McGrew Hills Education.

References:

- Ramaswamy and Namkumar, S (2009), Marketing Management Global Perspective: Indian Context, McMillion, New Delhi.
- Kumar, Arun and Meenakashi, N (2009), Marketing Management, Vikas Publishing House.
- Russel, Wines, Marketing Management, 3rd Edition, Pearson Education.
- Kotler, KoshiJha (2009), Marketing Management, 13th Edition, Pearson Education.

HUMAN RESOURCE MANAGEMENT

Course Code: MBF2202 **CreditUnits: 03**

Course Objective:
The objective of this course is to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India.

Course Contents:
Module I: Fundamentals of HRM
Introduction, Concept and Functions, Scope and Significance of Human Resource Management, Personnel Management and HRM, Overview of basic HRM Model, Role and responsibilities of the Human Resource Manager and Essentials of Sound HR Policies.

Module II: Acquisition of Human Resources
Objectives, Policies and Process of Human Resource Planning, Job Analysis, Recruitment (process, methods: internal, external), Selection (process, tests, interviews), Placement, Induction.

Module III: Development of Human Resources
Training and Development(process, methods: On-the job, Off-the job), Evaluation of training (Kirkpatrick model) and Performance Appraisal (concept, significance, process, methods-Graphic rating scales, Essays, Confidential report, BARS, 360 Degree, etc, errors during appraisal, reducing errors).

Module IV: Maintenance of Human Resources
Job Evaluation: concept, process, compensation: concept, components, Designing and Administering the Wage and Salary Structure, Grievance Procedure and Handling.

Module V: Retention and Separation Processes
Procedure of separation: Discharge, Retirement, Layoff, Retrenchment, VRS, Promotion and Transfer, Exit interview, Attrition and Retention (concept, significance, determinants and strategies).

Module VI: Current Issues in HRM
Increased concern for HRM (Sound IR, dual career couples, flexi-working hours, work-from home facility), International Human Resource Management-Managing inter country differences, SHRM, Talent management, Employee engagement, Competency mapping, HR accounting-cases of Indian organizations, HRIS, HR audit.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Garry Dessler, Human Resource Management, Pearson Publications

References:

- Edward, B Flippo, Personnel Management, McGraw hill International Ed.
- Dale Yoder, Personnel Management and Industrial Relation,
- Monappa&Sayiaddin, Personnel Management, Vikas Publishing Company
- VSP Rao, Human Resource Management, Excel Publications
- K Aswathappa, (2010), Human Resource Management; McGraw- Hill Education.
- Gupta, C B; Human Resource Management; Sultan Chand & Sons, New Delhi.

BUSINESS STATISTICS

Course Code: MBF2203 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize the students with various statistical tools which can help them in analysis and interpretation of business data. This course will provide students with hands-on experience to promote the use of statistical thinking and techniques to apply them to make educated decisions whenever there is variation in business data. Therefore, it is a course in statistical thinking via a data-oriented approach.

Course Contents:

Module I: Introduction to Statistics
Definitions, Functions of Statistics, Statistics and Computers, Limitation of Statistics, Application of Statistics.

Module II: Data Collection and Analysis
Methods of Data Collection, Primary and Secondary Data, Graphic Representation of Data, Measures of Dispersion-Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation.(Absolute & Relative Measure of Dispersion), Skewness-Karl-Pearson's Coefficient of Skewness, Bowley's Coefficient of Skewness, Kurtosis.

Module III: Correlation Analysis and Regression Analysis
Introduction-Importance of Correlation, Types of Correlation, Scatter Diagram Method, Karl Pearson's coefficient of Correlation (Grouped and Ungrouped). Spearman's Coefficient of Rank Correlation, Rank Correlation for Tied Ranks, Regression Analysis- Concepts of Regression, Difference b/w Correlation and Regression, Regression Lines.

Module IV: Time Series Analysis
Meaning and Significance, Components of Time Series, Trend Measurement, Moving Average Method, Least Square Method (Fitting of Straight Line Only).

Module V: Probability
Introduction, Terminology used in Probability, Definitions of Probability, Mathematical, Statistical and Axiomatic Approach to Probability, Probability Rules-Addition Rule, Multiplication Rule of Probability, Conditional Probability- Bayes Theorem, Problems on Bayes Theorem.

Module VI: Probability Distribution
Discrete Probability Distributions-Binomial Probability Distribution, Poisson Probability Distribution, Properties, Applications, Continuous Probability Distributions-Normal Probability distribution, Properties of the Normal Curve, Applications, Relation b/w distributions.

Examination Scheme:

Components	**CT**	**HA**	**Q**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Aditham B Rao, Quantitative Techniques in Business, Second Edition, Jaico Publications

References:

- Gupta S P, Statistical Methods, S. Chand & Co. New Delhi.
- Kapoor &Sancheti, Business Statistics, Sultan Chand & Sons, New Delhi.
- Khanna K K, Prof. Jagjit Singh & Dr. Chandan J S, Business Statistics, Second edition, Vikas Publishing House
- Anderson Sweeney Williams, Statistics for Business and Economics, Eighth edition, Thomson
- Kothari C R, Quantitative Techniques, Third edition, Vikas Publishing House
- Aggarwal B M, Business Statistics, S. Chand & Co.
- Hooda R P, (2002), Introduction to Statistics, Macmillan
- Rubin & Levin, Statistics for Management, Seventh edition, Pearson, Prentice Hall of India.

CORPORATE ACCOUNTING

Course Code: MBF2204 **Credit Units: 03**

Course Objective:
This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module I
Statutory records to be maintained by a company, Accounting standards - relevance and significance; National and international accounting standards.

Module II
Accounting for share capital transactions - issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of shares; redemption of preference shares - Statutory requirements, Disclosure in balance sheet; Rights issue, Underwriting.

Module III
Issue of debentures - accounting treatment and procedures; Redemption of debentures; Conversion of debentures into shares.

Module IV
Preparation and presentation of final accounts of joint stock companies as per company law requirements; Provisions and reserves; Determination of managerial remuneration; Appropriation out of profits; Transfer of profits to reserves; Payment of dividend, Transfer of unpaid dividend to Investor Education and Protection Fund; Bonus shares and payment of interest out of capital.

Module V
Holding and subsidiary companies - Accounting treatment and disclosures; Consolidation of accounts.

Module VI
Valuation of goodwill and shares
Good will – Meaning, Definition, Elements, Types and Methods of Valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module VII
Accounting treatment for amalgamation, Absorption and reconstruction of companies; Internal and external reconstruction, Liquidation- Preparation of liquidators statement & affairs, Deficiency/ surplus statement, Calculation of pro rata treatment of uncalled capital.

Examination Scheme:

Components	**HA**	**CT**	**C**	**A**	**EE**
Weightage (%)	5	10	10	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Maheswari, S.N. (2009), Principles of Management Accounting, Sultan Chand & Sons, N Delhi.

References:

- Tulsian, P C, (2009), Financial Accounting, 2nd Edition, Pearson Education.
- Rajasekran, (2010), Financial Accounting, 1st Edition, Pearson Education.
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting

FINANCIAL SERVICES

Course Code: MBF2205 **CreditUnits: 03**

Course Objective:
The aim of the course is to orient the student to the recent changes in the financial institutions and financial services industry and their link to economic development. The financial institutions and services are changing rapidly. A course that merely describes the existing institutions and services will not prepare you for the change. Thus you must familiarize yourself with the services available in the industry today and understand why they are the way they are and why they are changing. An Indian perspective will be given.

Course Contents:
Module I: Financial Services
Role of Financial Services in economic development, Evolution of Financial Services Sector in India, Marketing of Financial Services (Introduction)

Module II: Venture Capital
Venture Capital Financing, International Experiences in Venture Capital Financing, Venture Capital Financing in India, Pitfalls to be avoided, Preparation & evaluation of Business Plan

Module III: Factoring & Forfaiting
Factoring Services - Features Merits and Demerits, Cost Benefit Analysis, Forfaiting: Features, merits & Limitations

Module IV: Leasing and Hire Purchase
Development of Leasing and Hire Purchase, Types of Leasing, Pricing Methodology and Financial analysis, Taxation, Legal Framework for Leasing and Hire Purchase Companies

Module V:Mutual Funds
The concept & Role of M/Fs, History of M/Fs in India, Types of M/Fs, Fund Structure & constituent, Selecting the right Investment Products for Investors, Comparison of Investment products, Measuring of Risk In M/Fs, Recommending model Portfolios & selecting the right funds.

Module VI: Credit Rating & other Financial Services
Credit rating concept of Credit rating, Types of credit rating, Advantages and Disadvantages of credit rating, Credit rating agencies and their methodology and process, Individual Credit rating, Sovereign Credit Rating Practices. Custodial Services, Credit Cards

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:
Text:

- Khan, M. Y. Indian Financial System, Tata McGraw Hill
- Khan, M.Y. Financial Services, Tata McGraw Hill

References:

- Bhole L.M, Financial Institutions and Markets: Structure, Growth & Innovations, Tata McGraw Hill
- Pnadey,I.M., Financial Management, Ninth Edition, Vikas Publishing House Pvt. Ltd.

ORGANISATIONAL BEHAVIOUR

Course Code: MBF2301 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize the students with the behavioural patterns of Human beings at individual and group levels.

Course Contents:

Module I: Understanding Human Behaviour
Concept, Nature and Significance of Human Behaviour, Factors Affecting Human Behaviour, Levels of Human Behaviour; Disciplines contributing to OB.

Module II: Individual Behaviour
Individual Differences; Personality and Theories of Personality; Perception; Learning and Behaviour reinforcement, Values.

Module III: Motivation & Attitude
Concept, Significance and Theories of Motivation, Motivation and Behaviour, Motivation at Work, Attitudes, Meaning and nature, Formation and change in attitudes, Job related attitudes.

Module IV: Interpersonal Behaviour, Power & Politics
Interpersonal Dimensions of Behaviour; Transactional Analysis Implications of TA, Organizational communication, making communication effective, Power: Concept, determinants, types; Organizational Politics: Tactics, Impression Management.

Module V: Group Behaviour and Leadership
Group Behaviour; Types, Functions, Determinants of Group Behaviour, Inter Group Problems, Leadership: Nature and Significance of Leadership, Leadership Styles, Theories of Leadership; Trait Theory, Behavioural Theory, Managerial Grid.

Module VI: Change and Conflicts
Organizational conflict, Nature and types of conflict, Management of organizational conflict, Approaches to conflict management, Organizational culture, Learning and maintaining organizational culture, Organizational change, Planned change, Resistance to change, Organization development, Definition, Need for organization development, Organization development process.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Stephen Robbins, OrganisationalBehaviour, 15th Edition PHI.

References:

- K. Ashwathappa, (2005) OrganisationalBehaviour, Tata McGrae Hill
- Keith Davis, OrganisationalBehaviour, Tata McGraw-Hill
- Keith Davis, Human Behaviour at Work, Tata McGraw-Hill

FINANCIAL MANAGEMENT

Course Code: MBF2302 **CreditUnits: 03**

Course Objective:
To take decisions which are effective, a manager in any of the functional areas be it Marketing, HR or IT requires a thorough cost and benefit analysis and a feel for Finance so as to look at the long term implications of his/her decision. This course is a "nut and bolts" course on Finance where the basic Financial decisions will be explained through problems and exercises, thus giving the student an understanding and a feel for Financial decision making.

Course Contents:

Module I: Introduction to Financial Management
Evolution of Financial Management, Key activities of Finance Manager Changing Role of Finance Managers, Key Decision Areas in Financial Management, Objectives of the firm.

Module II: Financial Statement Analysis
Introduction, objectives of financial statement analysis, Techniques-Ratio analysis, Comparative analysis and limitations of financial statement analysis, AS-20 (**no numerical**)

Module III: Valuation Concepts
Concept of Time value of Money, Process of Compounding and Discounting, Future Value of a Single amount, Future Value of an Annuity, Present Value of a Single Amount, Present Value of an Annuity, Cost of capital, Weighted average cost of capital, Leverage Analysis

Module IV: Financing Decision
Capital structure, Factors affecting Capital Structure decisions, Theory of Capital Structure Decisions, MM Theory, NI, NOI and Traditional theory, Pecking order theory.

Module V: Investment Decision
Basics of Capital Budgeting, Types of capital budgeting decisions, Estimating cash flows for project appraisal, Green capital budgeting, Non-discounted Cash Flow Techniques: Payback Period, ARR, Discounted Cash Flow Techniques: NPV, IRR, PI. Risk Analysis of Capital Budgeting: Risk adjusted discount rate, Certainty Equivalent Approach.

Module VI: Working Capital Management
Meaning and importance of adequate working capital, Excess or Inadequate working capital, Determinants of working capital requirement, Cash management, Receivable management and Inventory management – Sources of working capital.

Module VII:Dividend Decisions
Importance of dividend decisions, Theories of Dividend decisions: Irrelevance theory, Optimal dividend decision, Relevance theory, Determinants of dividend policy: Bonus Shares, Stock Splits & Buyback of shares. Tax considerations.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Pandey, I. M, (2010), Financial Management. 10th Edition, Vikas Publishing House Pvt. Ltd.

References:

- Van Horne, J.C (2008), Financial Management & Policy, 13th Edition, Prentice Hall
- Chandra, P., Fundamentals of Financial Management, Sixth Edition, Tata McGraw Hill.
- Brearly R.A. and Myers, S.C. Principles of Corporate Finance, 8th Edition, Tata Mc-Graw Hill.

COMPUTERS & MANAGEMENT INFORMATION SYSTEMS

Course Code: MBF2303 **CreditUnits: 03**

Course Objective:
This course focuses on the relationships among management, information, and systems as well as the relationship between a manager's need for information and his/her position in the organization, how hardware, software, data, people, and procedures are combined to form an information system, how information technology can be used by a business organization to gain a competitive advantage why a knowledge of information systems is crucial to anyone who plans a career in business Organization.

Course Contents:
Module I: Organizations, Management and Information
Meaning of MIS, Components of MIS, IS in Business, Data Information and knowledge, Characteristics of Information in context, Issues with Information, System and Subsystems, Organization as a System, Different Organizational Structures: Hierarchical Structure – (Different Levels of Management, Information disposition at different levels), Matrix Structure, Business Process (Management, Operational and Support).

Module II: Information Technology Architecture
Managing Hardware Assets – Considerations in Procurement and installation, Managing Software Assets – Consideration in procurement and configuration, Data Resource Management (Database Management System – Types and Structure of Database, Data Warehousing – Phases in building Data Warehouses in an organization, Data Mining – Data Mining Applications, Data Banking)

Module III: Management and Organizational Support Systems for the Firm
Information, Decision and Management, Decision Support System (Phases in Decision Making, Problems and Decision Types, DSS components, and Analytical Models in Decision Making), Executive Information System – Characteristics and benefits, Managing Knowledge (Knowledge Engineering, Knowledge Management Activities and Knowledge Representation Methodologies), Artificial Intelligence (Domains of AI, AI in Business), Expert System (Components, Benefits and Limitations, Suitability Criteria for ES)

Module IV: Building Information Systems in the Digital Firm
Organizational Planning – Planning at distinct Managerial Levels, Approaches in Planning (Top Down, Bottom Up, Planning through CSF), IT and IS Planning – Prerequisites and factors, IT and IS Architecture (Centralized, Decentralized and Distributed), Implementing IT and IS (Factors and Resistance in implementation), Change Management with BPR, System Development (System Development Life Cycle-Overview, Prototyping), Evaluating Factors for IT and IS services.

Module V: Managing Information Systems in the Digital Firm
Managing Security (Security Challenges of IT, Business and Technological Ethics), Computer Crime (Tools for Computer Crime, Tools for Security Management), IS Security Management Control (Information System Control, Auditing the Security), Managing World Wide Information System (Managing Multi Site IT and IS – Cultural and Technical Differences), World Wide IT and IS Strategies (Multinational, International and Global Strategies)

Module VI: Key System Applications for the Digital Age
Enterprise Systems – Supply Chain Management & Customer Relationship Management Systems, Using Enterprise Applications and Achieving Operational Excellence & Customer Intimacy, E-Commerce: Digital Market & Digital Goods, M-Commerce: Services & Applications, Enterprise Applications: New Opportunities and Challenges.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Housley, Trevor, Data Communication and Teleprocessing System, (Digitalised in 2010) Prentice Hall.

References:

- Uyless D. Black, Data Communication and Distributed Networks.

COST ACCOUNTING

Course Code: MBF2304 **CreditUnits: 03**

Course Objective:
To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:
Module I: Cost Accounting
Introduction – Meaning of Cost, costing and Cost Accounting, Comparison between Financial Accounts and Cost Accounts, Application of Cost Accounting, Designing and installing a Cost Accounting system, Cost concepts and Classification of Costs, Cost Module, Cost Center, Elements of Cost, Preparation of cost sheet, Tenders and Quotations, Problems.

Module II: Material Costing
Classification of materials, Material Control, Purchasing procedure, store keeping, techniques of Inventory control, Setting of stock levels, EOQ, Methods of pricing materials issues, LIFO, FIFO, Weighted Average Method, Simple Average Method, Problems.

Module III: Labour Costing
Control of labour cost, Labour Turn Turnover, Causes and effects of labour turnover, Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking, Idle time, causes and treatment, Overtime, Methods of Wage Payment, Time rate and Piece Rate, Incentive Schemes.

Module IV: Overhead Costing
Definition, Classification of overheads, Procedure for accounting and control of overheads, Allocation of overheads, Appointment of overheads, Apportionment of Service department costs to production departments, Repeated Distribution method, Simultaneous equation method, absorption of OH's, Methods of Absorption, Percentage of direct material cost, Direct Labour Cost, Prime Cost, Direct Labour hour rate and Machine Hour Rate, Problems.

Module V
Costing Methods Introduction, Job Costing, Batch Costing, Contract Costing, Process Costing, principles, distinction between Process and Job, Preparation of process accounts, treatment of normal loss, abnormal loss, abnormal gain, Joint and By-products, Service costing.

Module VI
Reconciliation of Cost and Financial Accounts, Need for reconciliation, Reasons for difference in profits, Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.

Examination Scheme:

Components	**A**	**CT**	**C**	**H**	**EE**
Weightage (%)	5	15	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:
Text:
- N.K. Prasad, Cost Accounting
- Nigam & Sharma, Advanced Cost Accounting, 5th edition, Himalaya Publishing House

References:
- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal, (2010), Cost Accounting, SahityaBhawan.
- Jain &Narang, Cost Accounting, Kalyani Publishers.
- S.N. Maheshwari: Cost Accounting
- M. N. Arora: Cost Accounting

MONEY AND BANKING

Course Code: MBF2305 **CreditUnits: 02**

Course Objective:
The course aims to provide the student with an introduction to the role of money, banking and money market in the economy, thus providing a solid foundation for further study or employment in the banking and financial services industry. This course addresses classical and contemporary issues in the theory of money and banking.

Course Contents:

Module I: Money
Evolution and functions of money – Significance of money, Quantity theory of money (Fishers and Cambridge), Demand for and supply of money.

Module II: Commercial Banking
Commercial Banking- Functions and kinds, Balance sheet of a commercial bank, Investment policy, commercial bank in economic development, Branch Banking and Unit Banking, Deposit Banking Vs Mixed Banking, credit creation of Commercial Banks.

Module III: Central Banking
Functions of a central bank, credit control, quantitative controls, selective controls, RBI and economic development.

Module IV: Money Market
Structure, organized and unorganized money market, Development of money market, Indian Money Market, London and New York Money Markets, Capital Market in India

Module V: Inflation and Deflation
Inflation: Meaning and definition, Kinds of inflation, causes and consequences of inflation, Deflation, Inflation in a developing economy.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V -** Viva; **CT -** Class Test; A- Attendance; **EE -** End Semester Examination)

Text & References:
Text:
K P M, Sundaram, "Money and Banking and International Trade", Sultan Chand & Sons.

References:
K P M, Sundram, "Money Banking", Sultan Chand & Sons.
M L, Jhingan, "Money Banking and International Trade", S. Chand
S. Sankaran, "Money Banking and International Trade", Margham Publications.
Ashok Desai, "Indian Banking", HPH
Gordan& Natarajan, "Banking", HPH
Nirmala Prasad and Chandradoss, "Banking and Financial System", HPH

CORPORATE TAX PLANNING

Course Code: MBF2306 **CreditUnits: 03**

Course Objective:
To provide understanding of Direct Tax including Rules pertaining there to and application to different business situations. To understand principles underlying the Service Tax and concepts of VAT.

Course Contents:
Module I: Introduction to Tax Management
Concept of tax planning, Tax avoidance and tax evasions, Corporate taxation.

Module II Income from Business
Residential Status of companies, Taxable income under Business and Profession, Computation of Profit and Gains from business profession, Deemed business profits, Assessment of Retail Business, Deemed incomes (cash credit, unexplained investments, un explained money and other assets, unexplained expenditures, investments and valuable articles not fully disclosed in books of accounts).

Module III: Deductions Allowed Under Business and Profession
Deduction Expressly allowed section 30-35, Depreciation deduction calculation, Setoff and carry forward of unabsorbed depreciation section 32(2). Determining Actual Cost43(1), Set-off and Carry Forward Losses, Bonus or commission to employees section, Interest on borrowed capital, Insurance premium 36(1(i)), Employees contribution to provident fund, Bad debts 36, Revenue expenditure incurred by statutory corporation, Banking transaction tax, Security transaction tax, Commodity transaction tax, provision for adminisibility of general deduction 37(1),

Module IV: International Accounting and Taxation
Analysis of foreign financial statement, Accounting standard: US GAAP, Indian GAAP, IAS, IFRS. Transfer Pricing – Meaning, measurement, strategic considerations Norms & Practices, tax havens, Double taxation agreement among countries, Tax implication of activities of foreign enterprise in India: Mode of entry and taxation respectively.

Module V: Indirect Tax - Concepts and General Principles
Service tax - Charge of service tax and taxable services, Valuation of taxable services, Payment of service tax and filing of returns.
VAT – Introduction, Calculation of VAT Liability including input Tax Credits, Small Dealers and Composition Scheme, VAT Procedures, Central Sales Tax.

Module VI: Tax Planning and Financial Management Decisions
Tax planning relating to capital structure decision, Dividend policy, Inter – corporate, dividends and bonus shares, Tax provisions relating to free trade zones, Infrastructure sector and backward areas, Tax incentives for exports. Tax deductions and collection at source, Advance payment of tax.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & Reference:
Text:
- Lal&Vashisht, Direct Taxes, 29th Edition, Pearson

References:
Singhania&Singhania, Income Tax, 39th Edition, Taxmann

MANAGEMENT ACCOUNTING

Course Code: MBF2401 **Credit Units: 03**

Course Objective:
To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:

Module I:Management Accounting
Meaning and Definition, Nature & Scope: Objectives of Management Accounting, Management Accounting and Financial Accounting, Management Accounting and Cost Accounting, Utility of Management Accounting, Limitations of Management Accounting, Position of Management Accountant in the Organization.

Module II:Cash Flow Analysis
Distinction of Cash from Funds, Utility of Cash Flow Statement, Construction of Cash FlowStatement

Module III:Budgets and Budgetary Control
Concept of Budgets and Budgetary Control, Nature and Objectives of Budgetary Control, Advantages and Limitations of Budgetary Control, Establishing a system of Budgetary Control, Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget, Flexible Budgets and Master Budgets.

Module IV:Responsibility Accounting
Concept of Responsibility Accounting, Cost Centers and Profit Centers, Contribution by Segments

Module V: Marginal Costing
Meaning, assumptions, cost- volume profit analysis, Break- Even analysis, Decision making areas- product mix, make/ buy, pricing decision.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	10	10	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Maheswari, S.N., (2009) Principles of Management Accounting, Sultan Chand & Sons
- Sexana, Management Accounting

References:
- Made Gowda, Management Accounting
- S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting, 1st Edition, Kalyani Publisher
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy &Appanaiah, Essentials of Management Accounting
- Saxena, V.K. and Vashist, Cost Accounting, Sultan Chand & Sons, new Dwlhi

PRODUCTION AND OPERATIONS MANAGEMENT

Course Code: MBF2402 **CreditUnits: 03**

Course Objective:
The course is oriented to familiarize the students with fundamentals of Production and Operations Management, and tools and techniques used in taking decisions in operating and controlling the Production and Service Industries. Further this course will familiarize the students with Quality Management and Current Quality Tools used in Production and Service Industries.

Course Contents:

Module I: Overview of Production and Operation Management
Brief history of Production and Operation Management, Service Revolution, Definition, Factors Affecting Operations Management, Role- Scope and Function of Production and Operation Management, Criteria of Performance for the Production and Operation Management, Operation Strategies, Effect of Growth of Service Sector on Operations Management

Module II: Demand Forecasting & Capacity Planning
Qualitative Forecasting Methods (Educated Guess, Consensus, Delphi Method, Historical Analogy, Market Research), Quantitative Forecasting (Linear Regression, Moving Average, Weighted Moving Average, Exponential Smoothing with Numerical), Definition of Production Capacity

Module III: Facility Location and Facility Layout
Factors Affecting Location Decisions, Quantitative Techniques in Facility Location (Factor Rating Method, Centre of Gravity Method, Load Distance Method, Break Even Analysis Method – Numerical for each method), Utilization of GIS in Plant Location.
Principles of Facility Layout, Types of Layout (Process Layout, Product or Line Layout, Fixed Position Layout), Basics of Line Balancing –(No Numerical), Merits and Demerits of Product and Process Layout

Module IV: Production Planning and Control
Capacity Planning, Aggregate Planning, Master Production Scheduling.
Production Planning and Control Systems (Push System, Pull System)
Job Shop Scheduling and its Criteria (Mean Flow Time, Mean Tardiness, Number of Tardy Jobs - Numerical), Single Processor Job Shop Scheduling (Due Date Method, Shortest Processing Time Method - Numerical).
Two Machines Scheduling – Johnson's Rule – (Numerical).
General Job Shop Scheduling – Earliest Due Date Method – (Numerical)

Module V: Inventory Management, Supply Chain Management & Logistics Management
Basic Concepts of Inventory Management, Lead time, Safety Stock, Elements of Inventory Costs,
Inventory Models – EOQ –(Derivation and Numerical), EOQ with Quantity Discount – (Numerical), Fixed Order Quantity Model - No Numerical, Fixed Order Period Model - (No Numerical).
Basic Concepts, Objectives of Supply Chain Management, Decision Phases in Supply Chain Management. Basic Concepts of Logistics Management, Warehousing, Material Handling Equipments

Module VI: Foundations of Quality, Quality Control, TQM
Concept of Quality - Gurus of quality a Comparative Discussion on Edward Deeming, David Juran and Philip Crosby - their Philosophy contribution and limitations.
Statistical Quality Control (Mean and Range Charts, c Chart, p Chart – (Numerical), Basic Concepts of Acceptance Sampling, OC Curves – (No Numerical).
Basic Concepts of TQM, 5 –S and Kaizen, 6-Sigma.
ISO Standards, and ISO Certification.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

Buffa, E.S, Sarin RK, (2008), Modern Production/ Operations Management, John Wiley & Sons

References:

Chary SN, (2009), Production and Operations Management, McGraw Hill Education.
Gaither N, Greg F, (2002), Operations Management, Thompson South Western.
Everett E., Adam Jr. & Ronald J Ebert, Production and Operation Management, Fifth edition, Prentice Hall of India.
Monden Y, (1993), Toyota Production System, Industrial Engineering and Management Press – Institute of Industrial Engineering, Norcross, Georgia.

RESEARCH METHODOLOGY AND REPORT PREPARATION

Course Code: MBF2403 **Credit Units: 03**

Course Objective:
To provide an exposure to the students pertaining to the nature and extent of research orientation, which they are expected to possess when they enter the industry as practitioners. To give them an understanding of the basic techniques and tools of marketing research. To train the students in evaluating and developing the marketing information system.

Course Contents:

Module I: Introduction
Nature and scope of marketing research, Marketing research as input in decision making process, Marketing research and marketing information system. Applications of marketing research, Planning a research project, Problem identification and formulation of Research Design, introduction to Research Design, Market research on the Internet.

Module II: Data collection methods
Attitudes measurement and scaling techniques, Ratio, Interval, Ordinal and Nominal scales, Likert's scale, Thurstone scale, Semantic differentiation method, Observation methods and questionnaire method, Questionnaire design, Steps in constructing a questionnaire, Types of questions, introduction to Projective techniques and perceptual mapping.

Module III: Sampling
Sampling decisions, Sampling frame, Sample selection methods - Probability and non probability, Sample size, sampling error, Application of sampling methods to marketing problems.

Module IV: Data Collection Field Force
Data collection field force, Fieldwork procedure, common sources of error in the fieldwork, minimizing fieldwork errors, Tabulation of collected data.

Module V: Data Analysis
Data analysis-1, Test of significance Z, t, F and chi-square, Data analysis-II, Correlation and Regression techniques, Data analysis – III – Cluster Analysis, Introduction to Statistical Package

Module VI: Report Writing
Research presentation and research process examination; Report writing - Types of research report. Examination of the research procedure, Selected applications of marketing research, identifying market segments, Product research, Advertising research**.**

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Malhotra, Naresh, (2008), Marketing Research, 5th Edition, Pearson Eucation.
- Luck, David J and Rubin, Ronald S., Marketing Research, Seventh edition, Prentice Hall of India

References:

- Aaker, David A; Kumar V and George S., Marketing Research, Sixth edition, John Wiley & Sons
- Boyd, Harper W, Westphall, Ralph &Stasch, Stanely F, Market Research – Text & Cases,
- Sekaran, Uma (2003), Research Methods for Business 4th Edition, Willey.

BANKING LAW AND PRACTICES

Course Code: MBF2404 **CreditUnits: 03**

Course Objective:
The course aims to acquaint the student with a basic and elementary knowledge of the banking laws and practices.

Course Contents:

Module I
Overview, Legal Framework of Regulation of Banks, Reserve Bank of India Act1930

Module II
Banking Regulation Act, 1949, Negotiable Instruments Act 1860.

Module III
Cyber Laws relating to Banking, Banking Companies Act, 1970/ 1980.

Module IV
Securitization Act, 2002., Recent trends in Banking Industry (Legal).

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V -** Viva; **CT -** Class Test; A-Attendance; **EE -** End Semester Examination)

Text & References:
Text:
Varshney P.N; (2005), “Banking Law and Practice”; Sultan Chand and Sons.
Saxena G.S.; (2005), “Legal Aspects of Banking Operations”; Sultan Chand and Sons.

Reference:
Suneja H.R; (2000), “Practical and Law of Banking”; Himalya Publishing House.
Chabra T.N; (2000), “Elements of Banking Law”; DhanpatRai and Sons.

INTERNATIONAL FINANCIAL MANAGEMENT

Course Code: MBF2405 **CreditUnits: 03**

Course Objective:
The possibility for companies to look beyond domestic markets while making the financial decisions has given new dimensions to the way these decisions are taken. This has essentially led to changes in financial environment by linking domestic markets to global markets causing unprecedented increase in opportunities as well as risks. Management in such environment requires understanding of innovative conceptual and physical tools for better financial decision-making. The course on International Financial Management aims at equipping the financial manager with concepts, tools that enable financial decisions making in a global market and help better achieve the objectives of the firm. International boundaries are blurring therefore MNCs can raise funds from international financial management. The purpose of this paper is to equip the students with financial and investment decisions of MNCs.

Course Contents:

Module I: International Financial Environment
An overview of multinational financial management, Finance functions in multinational firms. International Monetary System, International Financial Markets and Instruments, Balance of Payments, Recent Developments.

Module II: International Working Capital Management
International working capital management; international cash management; international receivable management; managing short term assets and liabilities; international capital money markets; euro dollar and currency market; financial market instruments – GDRs, ADRs, Euro issues, CP and ECB

Module III: International Capital Budgeting
Multinational capital budgeting, cost of capital and capital structure decisions; dividend policy of multinational firm; Management of funds of MNC's operating in different countries; Political Risk Analysis

Module IV: Foreign Exchange Markets
Spot and Forward Foreign Exchange Markets, Speculation and Arbitrage in Foreign Exchange Markets and Implications of Market Efficiency, Currency Swaps, Currency Futures and Options

Module V: Foreign Exchange Rate Exposure and Risk Management
Transaction, Translation and Operating Exposure, Exposure from Equity and Borrowing in International Financial Markets, Hedging tools for Management of Transaction Exposure and Interest Rate Exposure, Degree of Hedge

Module VI: Finance of Foreign Trade
Income terms, foreign letters of credit, export & import finance, rules governing letters of credit

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Levi, M. D. (1996), International Finance, McGraw Hill International.
- Apte, P. G. (1995), International Financial Management, Tata McGraw Hill

References:

- Errunza, V.R., Singh, D. and Srinivasan, T.S. (1994), International Business Finance,Global Business Press.
- Seth, A.K.(2000), International Financial Management, Galgotia Publishing Company.
- Hull, J. C. (1999), Introduction to Futures and Options Markets, Prentice Hall of India.
- Edwards, F. R. and Ma, C. W. (1992), Futures and Options, McGraw-Hill International.
- Kolb, R. W. (1997), Understanding Futures Markets, Prentice Hall of India.
- Rebonato, R. (1996), Interest Rate Option Models: Understanding, Analysing and Using Models for Exotic
- Interest Rate Options, John Wiley and Sons.
- Kohn, M.(1998), Financial Institutions and Markets, Tata McGraw Hill Publishing

OPERATIONS RESEARCH

Course Code: MBF2501 **Credit Units: 03**

Course Objective:
The objective of this paper is to make students familiar with basic concepts and tools in Operations Research. These techniques assist in solving complex problems and help in decision making.

Course Contents:

Module I: Introduction
Introduction to Operations Research, Definition, scope and limitations of Operations Research

Module II: Linear Programming
Linear Programming – Basic Concepts, Model formulation; Solution methods – Graphical Solution method, Simplex method (problems involving only upto 3 constraints and of inequality <), Application of LPP in business decision making.

Module III: Transportation Problem
Transportation problem- Initial Basic feasible solution (North - West corner rule, Vogels approximation method), Test for optimality (Modified Distribution (MODI) method)

Module IV: Assignment Problem
Assignment Problem – Introduction, Approach of the Assignment model, Solution Methods (Hungarian method)

Module V: Game Theory
Game Theory - Concept and definition; Solution methods of Pure Strategy games (with saddle point), Significance of Game Theory.

Module VI: Queuing & Simulation
Introduction, Elementary queuing system, Introduction to Single – channel queuing model (with Poisson arrivals and Exponential service times), (no numerical); Introduction to Simulation, applications, advantages and drawbacks of simulation, Introduction to Monte – Carlo Simulation, Role of computers in Simulation.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Kapoor V K, Operations Research (Techniques for Management), Seventh edition, Sultan Chand & Sons.

References:
- Sharma J K, Operations Research (Theory & Practices), Second edition, Macmillan India Ltd.
- Hamdy A Taha, Operations Research, Seventh edition, Prentice Hall India
- Kothari C R, An introduction to Operations Research, Third edition, Vikas Publishing House

INTERNATIONAL BUSINESS MANAGEMENT

Course Code: MBF2502 **CreditUnits: 03**

Course Objective:
To introduce students to the contemporary issues in International Business that illustrate the unique challenges faced by manages in the international business environment.

Course Contents:

Module I: Introduction to International Business
Nature and scope of international business. International business environment,
Classical theory of international trade: Absolute cost advantage theory, comparative cost theory, and Modern theory of international trade. Michael Porter model of competitive advantage of nations,
Globalization – forces, Meaning, dimensions and stages in Globalization.

Module II: International Business Environment
Tariff and non-tariff barriers, General Agreement on Trade and Tariffs (GATT), World Trade Organization, Important Ministerial Conferences & their outcomes, Dispute settlement mechanism under WTO, Regional Integrations, Trade Blocks – nature and levels of integration, arguments for and against regional integration.

Module III: Modes of International Entry
International Business – Entry modes, Franchising, Exporting, Licensing, International Agents, International Distributors, Cross Border Mergers & Acquisitions, Strategic Alliances, Joint Ventures, Overseas Manufacture and International Sales Subsidiaries, Outsourcing, FDI, FII, PN

Module IV: International Financial Management
Introduction to International Financial Management –International Monetary System, exchange rate system (floating and fixed) Financial Markets and Instruments- Introduction to Export and Import Finance – ECGC & EXIM Bank, Methods of payment in International Trade: Letter of Credit, Banker's Acceptance, Draft.

Module V: Forex Exposure
Country Risk Analysis, Political, Social and Economic, Types of Forex Exposure: Accounting, Operating & Transaction – their management, An introduction to interest rate exposure.

Module VI: Foreign Trade Procedure
An Introduction to Foreign trade Policy and its impact on different sectors of the Economy. Documentation Framework: Types, Characteristics of Document, Export Contract - INCO Terms - Processing of an Export Order.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Charles W L Hill. andArun Kumar Jain (2007), International Business: competing in the global market place, McGraw-Hill.

References:

- John D. Daniels Lee H Radebaugh, (2007), International Business: Environments and Operations. Addison Wesley.
- Cherulinam, Francis, International Business, 3rd edition, Prentice Hall India

ENTREPRENEURSHIP DEVELOPMENT

Course Code: MBF2503 **Credit Units: 03**

Course Objective:
The objective of the course is to provide students an understanding of entrepreneurship & the process of creating and grooving a new venture. The course also focuses on giving the students the concept of an entrepreneur who is willing to accept all the risks & put forth the effort necessary to create a new venture.

Course Contents:

Module I: Basic Concepts
Qualities, Characteristics of an entrepreneur, Venture idea generation, Ideas and the entrepreneurship, Women entrepreneurs, Preliminary Screening, Drawbacks or Problems of entrepreneurship, Reasons of failure, Overview of setting up an enterprise with organizational forms – MSMED Act and SMERA Overview.

Module II: Project Appraisal
Pre-feasibility Report, Project Report, Comparative Rating of Product ideas, Cash Flow, Financial Analysis and Planning, Sources of Finance, Stages of Project Feasibility Analysis-Market, Technical, Financial, Social Analysis, Project Implementation Stages

Module III: Financial Analysis
Financing the project, Sources of finance, Venture Capital Sources, What Investor looks in the Investment Proposal, Outline for a Venture Capital Proposal, Sources of finance from different banks, Proposal with IDBI etc.

Module IV: Market and Materials Management Analysis
Vendor development, vendor selection decision factors, methods of price determination, direct and hidden cost in material management, market development, market feasibility, activities and decisions in materials management – International Markets.

Module V: Project Management
Steps and procedure for setting up small scale, Role of Banks and Financial Institutions in Development, E-Commerce, E-Business, E-Auction, Project management problems. SEZ, Cluster Development.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Developing Entrepreneurship, UdaiPareekSanjeev& Rao T.V, Printers, Ahmedabad
- Issues and Problems: Small: 1, Sharma, S.V.S., Industry Extension Training Institute, Hyderabad

References:
- A Practical Guide to Industrial Entrepreneurs; Srivastave, S.B., Sultan Chand & Sons
- Entrepreneurship Development; Bhanussali, Himalaya Publishing, Bombay

RETAIL BANKING

Course Code: MBF2504 **CreditUnits: 03**

Course Objective:
The basic objectives of the course are to acquaint the students about the concept of Retail Management and Retail Banking and the various types of Retail Banking Products. It will also develop our understanding about Bancassurance among the students.

Course Contents:

Module I: Retail Management
Retail Management – An Introduction, Functions of Retailing, Types of Retailers, Retailing Strategies for emerging markets, Organized Retail formats in India, Challenges ahead for Retailing

Module II: Changing Retail Environment
Environmental Analysis, Retail Branding, Retail Selling, Relationship Marketing for Retailers, Type of Merchandise.

Module III: Retail Banking
Retail Banking – An Introduction, Open market conditions and role of Banks and Financial Institutions, Retail Banking – Concept and Importance.
Retail Banking Products- Housing Loan, Conveyance Loan, Personal Loan, Educational Loan, Loan for Retail Traders, Plastic Money.

Module IV: e-Banking
e-Banking – An Overview, Concept of ATMs and 24 hours Banking, Online Banking, Online banking and e-Banking, Bancassurance, SSI financing.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V** - Viva; **CT** - Class Test; A- Attendance; **EE** - End Semester Examination)

Text & References:
Text:
Suri,R. K., (2005), "Retail Management", Excel Books,.
Jha, S.M., (2000), "Bank Marketing", Himalaya Publishing House,.

Reference:
Singh &Chabra, (2001), "Commercial Banking",DhanpatRai& Sons,.
Mithani&Gorden, (2003), "Banking Theory &Practice",Himalaya Publications,.

PRINCIPLES OF INVESTMENT MANAGEMENT

Course Code: MBF2505 **Credit Units: 03**

Course Objective:
The course aims at equipping the undergraduate students with financial tools, which help in making decisions for investment in financial securities. It is also aimed at imparting a basic understanding of the influence of changing economic scenario on the decisions and important theories and models, techniques and regulations underlying these decisions.

Course Contents:

Module I: Introduction to Investments
Investments: Introduction, Avenues for Investment including introduction to derivatives, Investments and Speculation, Features of a Good Investment programme, Process of Investment Decision Making, Risks involved in Investments including the concept of beta, Principle of Dominance.

Module II: The Stock Markets in India
Nature and Functions of the Stock Market, OTCEI & BSE, NSE & Role of Depositories, Market Indices, Brokerage Business

Module III: Valuation of Securities
Bond Valuation and Analysis, Preference share Valuation and Analysis, Equity Share Valuation

Module IV:Security Analysis
Fundamental Security Analysis, Technical Security Analysis

Module V: Portfolio Analysis and Management
Portfolio Analysis: Risk and Return, Portfolio Choice: Utility Theory and Indifference Curves, Markowitz: Portfolio Selection Model, Capital Asset Pricing Model, Sharpe's Single Index Model and Portfolio Evaluation Treynor, Sharpe and Jensen.

Examination Scheme:

Components	**CT**	**HA**	**C**	**S**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Sharpe, William F. Alexander and Bailey, Investments, Sixth Edition, Prentice - Hall, India

References:

- Fisher, Donald E & Jordan, Ronald., Securities Analysis & Portfolio Management:, Sixth Edition, Prentice Hall
- Haugen, Robert. Modern Investment Theory, Fifth Edition, Prentice Hall
- Bhalla, V. K. Investment Management, S. Chand & Co. New Delhi.

SUMMER INTERNSHIP EVALUATION

Course Code: MBF2535 **CreditUnits: 06**

Objective:
The basic objective of a summer internship is to provide first hand practical exposure of the corporate functioning and to acquaint students with the culture of corporate. The summer training will also provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus, this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:
Every student of under graduate courses will be required to undergo a practical training in a corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in the form of a report as per the guidelines provided by the Department.

Chapter Scheme for the SIP Report:

Chapter I: Introduction	- 20 marks
Chapter II: Conceptual Framework/National/International Scenario	- 5 marks
Chapter III: Presentation, Analysis and Findings	- 35 marks
Chapter IV: Conclusion and Recommendations	- 15 marks

The report has to be written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

THE COMPONENTS OF A SIP REPORT
The outcome of Summer Internship is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) **Body of the Report:** The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexure: Questionnaires (if any), relevant reports, etc.

Evaluation Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks

BUSINESS LAW

Course Code: MBF2601 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint the students with the fundamentals of business related laws, which have an important role over smooth conduct of business.

Course Contents:

Module I: Legal Environment of Business
Importance of Law, Legal environment of business, Sources of law, Function of law.

Module II: Indian Contract Act, 1872
Nature and kinds of Contracts, Concepts related to offer, Acceptance and Consideration, Principles Governing Capacity of Parties and Free Consent, Legality of Objects, Performance and Discharge of Contract, Breach of Contract and its Remedies, Basic Elements of Law Relating to Agency, Guarantee and Pledge.

Module III: Indian Sale of Goods Act, 1930
Sale and Agreement to Sell, Hire Purchase, Pledge, Mortgage, Hypothecation Lease, Goods, Different types of Goods, Passing of Property in Goods, Conditions and Warranties, Doctrine of Caveat emptor, Rights of an unpaid Seller.

Module IV: Negotiable Instruments Act, 1881
Meaning of Negotiability and Definition of Negotiable Instruments, Features, Cheques, Bill of Exchange and Promissory Note, Holder in Due Course, Crossing of Cheques, Endorsement and Dishonour of Cheques.

Module V: Elements of Company Law
Meaning and types of companies, Formation of a company, Memorandum and Articles of Association, Prospectus and Issue of Shares, Share Capital and Shareholders, Company Meetings and Proceedings, Powers and Liabilities of Directors, meeting, Managerial Remuneration and Winding up of Company.

Module VI: Consumer Protection Act 1986 and Torts
Need for Consumer Protection, Meaning of Consumer, DifferentRedressal Forums for Consumers, Rights of Consumers, Unfair Trade Practices, and Procedure for Filing Complaints, Meaning of tort, Application of Tortuous Liability in Business Situations.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- N.D. Kapoor, Mercantile Law
- P.K Goel, Business Law for managers Biztantra.

References:

- Shukla, S.M. and Gupta, O P, Mercantile Law.
- S. S. Gulshan Mercantile Law, Excel Book.
- Maheshwari&Maheshwari Business Law.

BUSINESS POLICY AND STRATEGIC MANAGEMENT

Course Code: MBF2602 **CreditUnits: 03**

Course Objective:
The aim of the course is to orient the students in theories and practices of Strategic Management so as to apply the acquired knowledge in formulation and implementation of strategies for better decision-making. This is a gateway to the real world of management and decision-making.

Course Contents:
Module I: Introduction
Planning, Evolution of strategic management, Concept of Corporate Strategy: Intended & Emergent, Patterns of Strategy Development, Levels of strategy.

Module II: Mission & Vision
Concept of Strategic Intent, Vision and Mission, Formulation of Vision and Mission Statements, Different Perspectives on Vision and Mission, Business Definition and concept of a Business Model.

Module III: Strategic Analysis
Industry Analysis, Competitor Analysis using Porter's 5-Forces model, Market Analysis, Environmental Threat and Opportunity Profile (ETOP), Internal Analysis: Building Organization Capability Profile and Strategic Advantage Profile (SAP), Building competencies using Value chain Analysis, Environmental Analysis and dealing with uncertainty, Scenario Analysis, SWOT Analysis.

Module IV: Strategic Choice
Strategic alternatives at corporate level: Expansion, Stability, Retrenchment and Combination, Strategic choice models for dominant single- Business companies- Strickland's Grand Strategy Selection Matrix, Model of Grand Strategy Clusters, Strategic choice models for multi-business companies- BCG, GE Nine Cell Matrix, Hofer's Model, Coevolving, Patching, Strategy as simple rules, Strategic alternatives at business level: Michael Porter's Generic competitive strategies, Building Sustainable Competitive Advantage.

Module V: Strategic Implementation
Operationalizing strategy and Institutionalizing strategy- Developing short-term objectives and policies, Functional tactics, and Rewards, Structural Implementation, Strategic Control, Mc Kinsey 7-S Framework.

Module VI: Recent Developments
Recent Developments in the Field of Strategy: Use of Balanced Scorecard approach, Corporate Governance and Corporate Social Responsibility, Corporate sustainability.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Jauch&Glueck, Business Policy and Strategic Management,
- Pearce & Robinson, Strategic Management Formulation Implementation & Control, McGraw Hill.

References:

- Lynch, Corporate Strategy, 4th Edition, Pearson.
- Ramaswamy&Namakumari, Strategic Planning,
- Michael E. Porter, Competitive Advantage, Crafting & Executing Strategy, The Quest for Competitive Advantage, Thomson, Strickland, Gamble & Jain, 12th Edition, McGraw Hill.

E-BANKING

Course Code: MBF2603 **CreditUnits: 03**

Course Objective:
To enable the students to understand the role of information and technology in banking. To impart them with skill related to IT implementation in banking industry. To make them aware about the various security measures and laws related.

Course Contents:

Module I: Introduction
Concept, Definition & Origin of E-Banking, Scope and Type of E-Banking – Internet Banking, Mobile Banking etc., Issues and Challenges in E-Banking, Advantages and Limitations of E-Banking, Future of E-Banking in India.

Module II: Electronic Payment System
Concept of Electronic Payment, Basic elements of electronic payment system, Types of Electronic Payment Systems – Electronic Cash, Electronic Cheque, EFT, RTGS, Credit Card, Smart Card, Concept of Payment Gateway and Paypal, Concept & Working of ATM.

Module III: Cyber Security and Legal Issues
Cyber Crimes & Security, Cyber Attacks – Trojan, Virus, Worm, Spam, Hacking – Phishing, IP Spoofing, Safety Measures – Firewalls, Intrusion Detection, Systems, Secure Sockets Layer, Authentication & Assurance of Data Integrity, Cryptography, Digital Signatures, Overview of Information Technology Act – 2000

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V -** Viva; **CT -** Class Test; A- Attendance; **EE -** End Semester Examination)

Text & References:
Text:
Bajaj, K. K. & Nag, D. "E-Commerce". New Delhi: Tata McGrawHill.

References:
Diwan, P. & Sharma, S. "E-commerce-A Manager's Guide to e- Business". New Delhi: Excel Books.
Kalakota, R. &Whinston A. B. "Frontiers of Electronic Commerce". New Delhi: Pearson Education.
Kaptan S. S. &Choubey, N. S. "Indian Banking in Electronic Era". New Delhi: Sarup& Sons.
Sharma, K. C. "Modern Banking in India." New Delhi: Deep & Deep Publications.

ADVANCED CORPORATE FINANCE

Course Code: MBF2604 **Credit Units: 03**

Course Objective:
The basic objective of this course is to acquaint the students with the latest developments in the field of corporate finance. This course will be a step above Financial Management II where they will learn advanced topics related to behavioural finance, corporate restructuring & corporate governance

Course Contents:

Module I: Introduction
Objectives of Corporate finance, Shareholder wealth maximization, Agency Problems, Management Compensation & measurement of Performance

Module II: Valuation Concepts
Valuation Models, Application of Valuation Model, EVA/MVA, Balanced scorecard and other methods/measures of financial performance.

Module III: Corporate restructuring
Differential Efficiency & Financial Synergy: Theory of Mergers**,** Operating Synergy & Pure Diversification: Theory of mergers**,** Costs and Benefits of Merger**,** Evaluation of Merger as a Capital Budgeting Decision**,** Poison Pills,Turnaround Strategies, Tax Planning relating to mergers and Amalgamation

Module IV: Corporate Governance& Business Ethics
Implementation of Corporate Governance**,** Ethics and finance, Ethical practices in market place, Corporate Responsibility, Social Audit and Ethical Investing.

Module V: Behavioural Finance
Introduction and Expected Utility, Non-Expected Utility Preferences, A review of classical probability theory, Beliefs, Biases and Heuristics, Preferences and Anomalies in the Financial markets

Module VI: Strategic Cost management
Financial aspects of Supply Chain Management, Operations management perspective on Costs, Strategic cost analysis (using activity based costing, target costing and life cycle costing) and Product pricing at Different stages of product's life cycle.

Examination Scheme:

Components	**CT**	**HA**	**Q**	**C**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Brealey and Myers, Priciples of Corporate Finance, Eighth Edition, Tata McGraw Hill Publishing Company Limited.

References:

- Ross, Westerfield and Jaffe, Seventeenth Edition, Tata McGraw Hill.
- Quiry, P., Dallocohio, M., YannLEFur,.AntonioSalvi, Seventh Edition, John Wiley and Sons

PROJECT WORK/ DISSERTATION

Course Code: MBF2637 **CreditUnits: 09**

Objectives:
The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	- 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	- 5 marks
Chapter 3: Presentation, Analysis & Findings	- 25 marks
Chapter 4: Conclusion & Recommendations	- 10 marks

THE COMPONENTS OF A PROJECT REPORT
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

THE STEPS OF PROJECT WORK
STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III: Collection of information and data relating to the topic and analysis of the same.

STEP IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

STEP V : The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Annexures, References / Bibliography

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she have to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Project Work separately, obtaining minimum marks of 40 (Project Report and Viva-Voce taken together).

Evaluation Scheme:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

Bachelor of Business Administration

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Business Administration

Syllabus - First Semester

MANAGEMENT FOUNDATIONS

Course Code: MGT2151 **Credit Units: 03**

Course Objective:
The aim of the course is to orient the students in theories and practices of Management so as to apply the acquired knowledge in actual business practices. This is a gateway to the real world of management and decision-making.

Course Contents:

Module I: Introduction
Concept, Nature, Scope and Functions of Management, Levels of Management, Evolution and Foundations of Management Theories - Classical and Neo - Classical Theories, Systems Approach to organization, Modern Organization Theory.

Module II: Management Planning Process
Planning objectives and characteristics, Hierarchies of planning, the concept and techniques of forecasting, Decision making – concepts & process, MBO, concept and relevance.

Module III: Organization
Meaning, Importance and Principles, Departmentalization, Span of Control, Types of Organization, Authority, Delegation of Authority.

Module IV: Staffing
Meaning, Job analysis, Manpower planning, Recruitment, Transfers and Promotions, Appraisals, Management Development, Job Rotation, Training, Rewards and Recognition.

Module V: Directing
Motivation, Co-ordination, Communication, Directing and Management Control, Decision Making, Management by objectives (MBO) the concept and relevance.

Module VI: Management Control
Coordination, Meaning, Nature, Features, Objectives and Process of Management Control, Techniques and Behavioural Aspects of Management control.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA** - Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Text & References:

Text:

- Stoner, Freeman and Gilbert Jr. (2010), Management, 8th Edition, Pearson Education
- Robbins, (2009), Fundamentals of Management: Essential concepts and Applications, 6th edition, Pearson Education

References:

- Prasad, L.M. Principles & Practice of Management, 1st Edition, Tata McGrew Hills.
- Gupta, C.B., Management Concepts and Practices, Sultan Chand & Sons, New Delhi

COMPUTERS IN MANAGEMENT

Course Code: MGT2101 **CreditUnits: 03**

Course Objective:
The objective of this subject is to provide conceptual knowledge of the information technology to the future Managers. This subject highlights the topics like Database Management, Networking, Internet, E-commerce etc., which can help managers to take routine decisions very efficiently.

Course Contents:
Module I: World of Computers
Introduction to world of Computers, Computers in Home (Reference, Education & Communications, Entertainment and Digital Media Delivery, Smart Appliances, Home Computers), Computers in Education, Computers in workplace (productivity and decision making, customer services, communications), Computers on the move (Portable and Hand held computers, Self-Service kiosks, GPS Applications), Computer Peripherals, Memory Management.

Module II: Computer Networks
Introduction to Computer Networks, Networking Components, Classification and Types of Networks, Network Topologies – Overview with Advantages and Disadvantages, Communication Channels, Client Server Architecture, LAN concepts.

Module III: Internet Technology & World Wide Web
Introduction to Internet Intranet and Extranet, Myths about the Internet, Basic Concepts of Internet, Domain Name Service, Internet Protocols and Addressing, Services of internet, Internet and support Technologies, Censorship and Privacy issues.

Module IV: E-commerce
Introduction, E-Commerce Vs E-Business, Advantages & Disadvantages, E-Commerce Business Models, E-Commerce Technologies, Hosting E-Commerce Site – Planning and constructing web services, E-Commerce Applications, E-Core Values – Ethical, Legal, Taxation and International issues, E-Commerce Security Issues, Internet based Payment System.

Module V: Enterprise Resource Planning
Introduction, Scope and Benefit, ERP and related technologies (BPR, MIS, DSS, EIS, SCM, OLAP, etc), ERP implementation methodology – implementation life cycle, ERP and its success factors, Pitfalls and management concerns, ERP Market – renowned vendors and the packages.

Module VI: Database Management System
Introduction, Need for DBMS, Components of DBMS, Benefits of DBMS over Tradition File System, classification and types of Database Models, Database Approach – Its benefits and Disadvantages.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(**C** - Case Discussion/ Presentation; **HA** - Home Assignment; **V** - Viva; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination)

Text & References:

Text:

- Deborah Morley (2007), Understanding Computers: Today & Tomorrow, Eleventh Edition, Thomson

References:

- Rajaraman, V. (1998), An Introduction to Computers, Prentice Hall of India.
- Nagpal, (1999), Computer Fundamentals, Wheeler Publishing, New Delhi.
- Bhatnagar, S.C. and Ramani, K.V., Computers and Information Management.
- Hunt and Shelly. (1994), Computers and Commonsense, Prentice Hall of India.

FINANCIAL ACCOUNTING

Course Code: MGT2102 **Credit Units: 03**

Course Objective:
To understand the basics of accounting and concepts of double entry system. The students will be given a detailed grounding on recording of transactions and preparation of final accounting statements for business organizations.

Course Contents:

Module I: Introduction to Accounting
Understanding the meaning, nature, functions and usefulness of accounting, branches of Accounting, Accounting Equation, Accounting Concepts and Generally Accepted Accounting Principles. Difference between Indian GAAP and US GAAP

Module II: Recording of Transactions and Subsidiary Books
Concept of Double Entry System. Understanding the Accounting cycle, Preparation of Voucher, Journal, Ledger and Trial Balance and Numerical on the Same. Preparation of subsidiary Books including Purchase Book, Sales Book, Purchase Returns Book and Sales Return Books (and numerical on the same), Cash book, types of cash book and balancing of cashbook. Numerical on single column cashbook, Double column cashbook, triple column cashbook and petty cash book.

Module III: Reconciliation of Bank Accounts
Causes for difference in the Balance as per Pass book and balance as per cashbook, Procedure for preparation of bank reconciliation statement when there is favorable balance and in case of overdraft (and numerical on the same).

Module IV: Financial Statements
Preparation of Trading Account, Manufacturing Account, Profit And Loss Account and balance sheet along with adjustments (and numerical on the same) and non-profit making organizations an overview.AS-1,AS-21**(no numerical)**

Module V: Accounting For Partnership
Introduction to Partnership Accounts, Partnership Deed.**Admission of a new partner**- Revaluation account, Computation of New Profit Sharing Ratio and Sacrificing Ratio, Proportionate Capital, Treatment of goodwill in partnership accounts and its valuation.**Retirement and Deathof a partner:** Determining the gaining ratio, Revaluation of assets and liabilities, Reserve, Final payment to retiring partner, Treatment and adjustment of goodwill. Numericals on preparation of various accounts in case of retirement and death of a partner. **Dissolution of the firm:** Circumstances leading to dissolution of partnership, Settlement of the accounts, Capital ratio on insolvency, Insolvency of all partners and Garner Vs Murray decision.

Examination Scheme:

Components	**CT**	**HA**	**C**	**P**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V -** Viva; **CT -** Class Test; **P -** Project **A -** Attendance; **EE -** End Semester Examination)

Text & References:

Text:

- Maheshwari, S.N., Advanced Accountancy Volume-I, Ninth Edition, Vikas Publishing House Pvt. Ltd.

References:

- Grewal, T. S., Shukla, M .C, Advanced Accountancy, Sixteenth Edition, Sultan Chand and Sons.
- Tulsian, P.C (2009), Financial Accounting 2nd Edition, Pearson Education.
- Narayanaswamy, R. Financial Accounting- A Managerial Perspective, Second Edition, Prentice Hall India.
- Ramachandran, N., Kakani, R.K., Financial Accounting for Management, Tata McGraw Hill Publishing Company Limited.

MANAGERIAL ECONOMICS

Course Code: MGT2103 **CreditUnits: 03**

Course Objective:
The purpose of this course is to apply managerial economics concepts and techniques in evaluating business decision taken by firms. The emphasis is on explaining how the tools of standard price theory can be employed to formulate a decision problem, evaluate alternative courses of action and finally choose among alternatives.

Course Contents:

Module I: Introduction to Managerial Economics
Nature, Scope, Definitions of Managerial Economics, Application of Managerial Economics to Business, Micro Vs. Macro Economics, Opportunity Costs, Time Value of Money, Marginalism, Incrementalism, Market Forces and Equilibrium.

Module II: Consumer Behaviour and Demand Analysis
Cardinal Utility Approach: Diminishing Marginal Utility, Law of Equi-Marginal Utility, Ordinal Utility Approach: Indifference Curves, Marginal Rate of Substitution, Budget Line and Consumer Equilibrium, Theory of Demand, Law of Demand, Movement along vs. Shift in Demand Curve, Concept of Measurement of Elasticity of Demand, Factors Affecting Elasticity of Demand, Income Elasticity of Demand, Cross Elasticity of Demand. Production with one variable input, Production and optimal input proportions, two variable inputs, Law of variable proportions and law of return to scale, Cost Concepts, Theory of costs in short run and long run.

Module III: Theory of Production, Cost and Firm's Behaviour
Meaning and concept of Production, Factors of Production and Production Function, Fixed and Variable Factors, Law of Variable Proportion (Short Run Production Analysis), Law of Returns to a Scale (Long Analysis), Concept of Cost, Cost Function, Short Run Cost, Long Run Cost, Economics and Diseconomies of Scale, Explicit cost and Implicit Cost, Private and Social Cost

Module IV: Macro Economics and Business Decisions
Phases of Business cycle - Evil effects of cyclical fluctuations on business firms - Minimizing effects of Business cycles, Economic and Business forecasting - uses of economic forecasts - Methods of economic forecasting - selecting a forecast - evaluating forecasts.

Module V: Price and Output Decisions under Different Market Structures
Price and Output Decisions under Perfect Competition, Monopoly and Monopolistic Competition - Pricing under Oligopoly - Kinked Demand Curve - Price Leadership - Pricing under Collusion.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(**C** - Case Discussion/ Presentation; **HA** - Home Assignment; **Q** – Quiz; **V** - Viva; **CT** - Class Test; A-Attendance; **EE** - End Semester Examination)

Text & References:
Text:
- Dwivedi, D. N., Managerial Economics, 7th Edition, Vikas Publishing House.
- Ahuja, H.L. Advanced Economic Theory (Micro Economics), S. Chand & Co, New Delhi

References:
- Browning Edgar K. &Jacquel Line M. Browning, Micro Economics and Application, Kalyani Publishers, New Delhi.
- Gould John P. and Edward P. Lazear Micro Economic Theory, All India Traveller Book-seller, New Delhi.
- Koutsoviannis Modern Micro Economics, Macmillan Press Limited, New Delhi.
- Dewett. K.K. Micro Economics, S. Chand &Co, New Delhi

E-COMMERCE

Course Code: COM2103 **CreditUnits: 03**

Course Objective:
In the changed business environment of today, it has become imperative for businesses to understand, appreciate and learn to create their presence in cyber space. This course focuses on exposing the students to the world of e-commerce, the opportunities, and the threats and teaches them the strategies of making businesses viable and successful.

Course Contents:

Module I: E-Commerce Concept
Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services. Concept of EDI, Difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI, Software Concept of Electronic Signature, Access Control.

Module II: Types of E-Commerce
Meaning of B2C, B2B, C2C, P2P, Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts, Application of B2B- E-distributor, B2B service provider, benefits of B2B on Procurement, Just in time delivery, Consumer to consumer and peer to peer business model introduction and basic concepts.

Module III: E-Marketing
Traditional Marketing V/S E-Marketing, Impact of Ecommerce on markets, Marketing issue in E-Marketing, Promoting your E-Business, Direct marketing, one to one marketing.

Module IV: E-Finance
Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking, E-Trading-Stock marketing, Trading v/s E-Trading, Importance of E-Trading, Advantages of E-trading, operational aspects of E-Trading.

Module V: E-Payment
Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA** - Home Assignment; **V** - Viva; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination)
Text & References:

Text:
- Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education

References:
- Ravi Kalakota& Andrew B. Shinston, Electronic Commerce – A manager's Guide, PearsonEducation.
- Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
- J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.

BUSINESS MATHEMATICS

Course Code: MGT2104 **Credit Units: 03**

Course Objective:
The course is designed to orient the students towards the basic concepts of mathematics and its applications in the business world.
Course Contents:

Module I: Set Theory & Mathematical Induction
Theory of Sets; Meaning; Elements; Types; Presentation and Equality of sets; Subsets; Super sets & Power sets; Finite, Countable or Infinite sets; Union; Intersection; Compliment & Difference of sets; Venn diagrams; Cartesian product of sets; Cardinality; Inclusion – Exclusion principle; Applications of set theory; Mathematical induction

Module II: Techniques of counting
Basic counting principle; Factorial notation; Binomial coefficient; Pascal's triangle; Permutations and Combination; Permutation with restriction; Circular permutation and Combination with restriction; Concept of tree diagram

Module III: Logrithms& Sequence – A.P.; G.P.
Indices & Logarithms; Definition and properties, Common logarithms; Arithmetic and Geometric Progression- General term, Summation, Business Application.

Module IV: Matrices & Determinants
Matrices; concepts and types; properties; Addition; Multiplication; Transpose and inverse of matrix; Algebra of matrices; Adjoint of a matrix; Determinants; Properties of determinants; Solution of simultaneous Linear Equations; Business applications of matrices; Homogeneous System of Linear equations; Condition for Uniqueness for the homogeneous system; Solution using inverse of the coefficient matrix; Problems

Module V: Differentiation & Differential Calculus
Differentiation - definition, Derivatives of Algebraic, Logarithmic and exponential function, Business application of differentiation; Optimization using calculus; Point of inflexion absolute and local optima

Examination Scheme:

Components	**CT**	**HA**	**C**	**P**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V -** Viva; **CT -** Class Test; **P** – Project; **A**- Attendance; **EE -** End Semester Examination)
Text & References:
Text:
- Singh J K & Singh Y P (2010), Business Mathematics, Second Edition, Brijwasi Book Distributors and Publishers

References:
- Gupta S P, Statistical Methods, S. Chand & Co.
- Raghavachari, M, Mathematics for Management, Tata Mc. GrawHill
- Piskunov N, Differential & Integral Calculus, Moscow MIR Publishers
- Sancheti& Kapoor, Business Mathematics, Sultan Chand & Sons

ECONOMIC SYSTEM AND SOCIETY

Course Code: ECO2104 **CreditUnits: 03**

Course Objective:

This course will reflect the socio-economic change in historical perspective, capitalism as an economic system, structure of capitalism and capitalism in global context.

Course Contents:

Module I
Analyzing Socio-Economic Change in Historical Perspective

Module II
Capitalism as an economic system
Origins, nature and structure of capitalism; Accumulation and crisis; Alternative perspectives on capitalism

Module III
The transition from feudalism to capitalism

Module IV: The evolving structure of capitalism
Monopoly capitalism, The modern corporation: Divorce between ownership and control; The institutional diversity of capitalism; Alternative perspectives on the role of state.

Module V: Capitalism in Global Context
Multinational corporations and their impact on the developing economics; Imperialism

Examination Scheme:

Components	CT	P	HA	A	EE
Weightage (%)	10	10	5	5	70

HA - Home Assignment; **P** - Project; **CT** - Class Test; **A**- Attendance; **EE** - End Semester Examination

Text & References:

Text:

- J. Schumpeter, Capitalism, Socialism and Democracy, George Allen and Unwin (1976 edition).
- T. Bottomore, Theories of Modern Capitalism, Allen & Unwin. Chapters on Weber & Schumpeter.

References:

- D. Foley, "Commodity", in T. Bottomore et al(ed.), The Dictionary of Marxist Thought., OUP, (Indian edition, Maya Blackwell, 2000)
- R. Blackburn (ed.), Ideology in Social Science, Chapter 8, Fontana
- Rodney Hilton(ed.) The Transition from Feudalism to Capitalism, Introduction
- P. Hirst and J. Zeitiln, "Flexible Specialization: Theory and Evidence in the Analysis of Industrial Change", in R. Boyer et al (ed.), Contemporary Capitalism, Cambridge University Press.

READINGS IN MANAGEMENT

Course Code: MGT2130 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. The selection of the book will be department specific so that it can be discipline specific.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters (if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Evaluation Scheme:

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: MGT2131 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Management practices
   - Talent management
   - HR cases from any Indian industry
   - Employee motivation
   - Managerial competencies
   - Employability skills
   - Industrial relations
   - Knowledge management
   - Social media
   - Green marketing
   - Six Sigma
   - Sustainable branding practices
   - Training and development
   - Relationship management
   - CSR
   - Performance management system
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100

PROJECT

Course code: MGT2132 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	– 25 marks
Chapter 4: Conclusion & Recommendations	– 10 marks
Chapter 5: Bibliography	– 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:**The body of the report should have these four logical divisions

a) *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).

c) *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).

d) *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

(Annexure I B)

Declaration

I .....hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor: Signature of the student

Name:

Registration No

Place:
Date:

WORKSHOP

Course Code: MGT2133 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held.
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

MARKETING MANAGEMENT

Course Code: MGT2251 **Credit Units: 03**

Course Objective:
The main objective of this course is to give students an elementary knowledge of the fundamentals in the field of marketing. The focus will be both on developing and helping them imbibe basic marketing principles and establishing an appreciation of contemporary realities.

Course Contents:

Module I: Introduction to Marketing
Meaning of marketing, Core concepts of marketing, Evolution and its role in the changing business environment, various marketing management philosophies, viz., the production concept, the product concept, selling concept and the marketing concept, Newer definitions of marketing- societal marketing and relationship marketing, Strategies planning in marketing, Formulation of marketing plan.

Module II: Analyzing Marketing Opportunities
Internal and External Marketing Environment Analysis, Introduction to Marketing Information System and Marketing Research, BCG matrix, GE 9 cell model.

Module III: Studying Consumer Behaviour and Selecting Markets
Buying Behaviour for Consumer Markets and Industrial Markets, Types of Buying Situations, Buying Decision Process and Factors Affecting Buyer Behaviour, Consumer Adoption Process, Concept of Market Segmentation, Bases for segmenting Consumer and Business markets, Approaches for Targeting, Differentiation and Positioning.

Module IV: Product Mix Strategy
Product: concept & levels, Classification of consumer and industrial products, Product Differentiation, Product Mix, Product Life Cycle and various strategies, Branding: concept and challenges, Brand decisions, Packaging and Labeling.

Module V: Product Development Decision and Pricing
Product Line Decisions, New Product Development: Challenges & Process; Consumer Adoption Process, Diffusion of Innovation, Pricing Strategies; Setting the price, Understanding various pricing strategies and their application.

Module VI: Distribution and Logistics Decision and Integrated Communication Mix
Nature of Marketing Channels, Channel Functions and Flows, Channel Design and Management Decisions, Channel Dynamics, Introduction to Wholesaling, Retailing and Logistics, Marketing communication mix and Introduction to various elements of integrated marketing communications briefly

Module VII: Emerging Marketing Paradigms
E-marketing, Global marketing, Mobile marketing, Kiosk marketing, Green marketing, Tele marketing, Multi level marketing, Rural marketing.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Kotler, Philip & Armstrong, Gray, Principles of Marketing, 10th Edition, Pearson Education.
- Saxena, Rajan (2008), Marketing Management, 3rd Edition, McGrew Hills Education.

References:

- Ramaswamy and Namkumar, S (2009), Marketing Management Global Perspective: Indian Context, McMillion, New Delhi.
- Kumar, Arun and Meenakashi, N (2009), Marketing Management, Vikas Publishing House.
- Russel, Wines, Marketing Management, 3rd Edition, Pearson Education.
- Kotler, KoshiJha (2009), Marketing Management, 13th Edition, Pearson Education.

HUMAN RESOURCE MANAGEMENT

Course Code: MGT2201 **CreditUnits: 03**

Course Objective:
The objective of this course is to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India.

Course Contents:

Module I: Fundamentals of HRM
Introduction, Concept and Functions, Scope and Significance of Human Resource Management, Personnel Management and HRM, Overview of basic HRM Model, Role and responsibilities of the Human Resource Manager and Essentials of Sound HR Policies.

Module II: Acquisition of Human Resources
Objectives, Policies and Process of Human Resource Planning, Job Analysis, Recruitment (process, methods: internal, external), Selection (process, tests, interviews), Placement, Induction.

Module III: Development of Human Resources
Training and Development(process, methods: On-the job, Off-the job), Evaluation of training (Kirkpatrick model) and Performance Appraisal (concept, significance, process, methods-Graphic rating scales, Essays, Confidential report, BARS, 360 Degree, etc, errors during appraisal, reducing errors).

Module IV: Maintenance of Human Resources
Job Evaluation: concept, process, compensation: concept, components, Designing and Administering the Wage and Salary Structure, Grievance Procedure and Handling.

Module V: Retention and Separation Processes
Procedure of separation: Discharge, Retirement, Layoff, Retrenchment, VRS, Promotion and Transfer, Exit interview, Attrition and Retention (concept, significance, determinants and strategies).

Module VI: Current Issues in HRM
Increased concern for HRM (Sound IR, dual career couples, flexi-working hours, work-from home facility), International Human Resource Management-Managing inter country differences, SHRM, Talent management, Employee engagement, Competency mapping, HR accounting-cases of Indian organizations, HRIS, HR audit.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Garry Dessler, Human Resource Management, Pearson Publications

References:

- Edward, B Flippo, Personnel Management, McGraw hill International Ed.
- Dale Yoder, Personnel Management and Industrial Relation,
- Monappa&Sayiaddin, Personnel Management, Vikas Publishing Company
- Desimone; Human Resource Development, Thomson Learning
- VSP Rao, Human Resource Management, Excel Publications
- K Aswathappa, (2010), Human Resource Management; McGraw- Hill Education.
- Bohlander; Managing Human Resources; Thomson Learning. Ed. 13 2004

BUSINESS STATISTICS

Course Code: MGT2202 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize the students with various statistical tools which can help them in analysis and interpretation of business data. This course will provide students with hands-on experience to promote the use of statistical thinking and techniques to apply them to make educated decisions whenever there is variation in business data. Therefore, it is a course in statistical thinking via a data-oriented approach.

Course Contents:

Module I: Introduction to Statistics
Definitions, Functions of Statistics, Statistics and Computers, Limitation of Statistics, Application of Statistics.

Module II: Data Collection and Analysis
Methods of Data Collection, Primary and Secondary Data, Graphic Representation of Data, Measures of Dispersion-Range, Quartile Deviation, Mean Deviation, Standard Deviation, Coefficient of Variation.(Absolute & Relative Measure of Dispersion), Skewness-Karl-Pearson's Coefficient of Skewness, Bowley's Coefficient of Skewness, Kurtosis.

Module III: Correlation Analysis and Regression Analysis
Introduction-Importance of Correlation, Types of Correlation, Scatter Diagram Method, Karl Pearson's coefficient of Correlation (Grouped and Ungrouped). Spearman's Coefficient of Rank Correlation, Rank Correlation for Tied Ranks, Regression Analysis- Concepts of Regression, Difference b/w Correlation and Regression, Regression Lines.

Module IV: Time Series Analysis
Meaning and Significance, Components of Time Series, Trend Measurement, Moving Average Method, Least Square Method (Fitting of Straight Line Only).

Module V: Probability
Introduction, Terminology used in Probability, Definitions of Probability, Mathematical, Statistical and Axiomatic Approach to Probability, Probability Rules-Addition Rule, Multiplication Rule of Probability, Conditional Probability- Bayes Theorem, Problems on Bayes Theorem.

Module VI: Probability Distribution
Discrete Probability Distributions-Binomial Probability Distribution, Poisson Probability Distribution, Properties, Applications, Continuous Probability Distributions-Normal Probability distribution, Properties of the Normal Curve, Applications, Relation b/w distributions.

Examination Scheme:

Components	**CT**	**HA**	**Q**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Aditham B Rao, Quantitative Techniques in Business, Second Edition, Jaico Publications

References:

- Gupta S P, Statistical Methods, S. Chand & Co. New Delhi.
- Kapoor &Sancheti, Business Statistics, Sultan Chand & Sons, New Delhi.
- Khanna K K, Prof. Jagjit Singh & Dr. Chandan J S, Business Statistics, Second edition, Vikas Publishing House
- Anderson Sweeney Williams, Statistics for Business and Economics, Eighth edition, Thomson
- Kothari C R, Quantitative Techniques, Third edition, Vikas Publishing House
- Aggarwal B M, Business Statistics, S. Chand & Co.
- Hooda R P, (2002), Introduction to Statistics, Macmillan
- Rubin & Levin, Statistics for Management, Seventh edition, Pearson, Prentice Hall of India.

CORPORATE ACCOUNTING

Course Code: MGT2203 **Credit Units: 03**

Course Objective:
This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module I
Statutory records to be maintained by a company, Accounting standards - relevance and significance; National and international accounting standards.

Module II
Accounting for share capital transactions - issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of shares; redemption of preference shares - Statutory requirements, Disclosure in balance sheet; Rights issue, Underwriting.

Module III
Issue of debentures - accounting treatment and procedures; Redemption of debentures; Conversion of debentures into shares.

Module IV
Preparation and presentation of final accounts of joint stock companies as per company law requirements; Provisions and reserves; Determination of managerial remuneration; Appropriation out of profits; Transfer of profits to reserves; Payment of dividend, Transfer of unpaid dividend to Investor Education and Protection Fund; Bonus shares and payment of interest out of capital.

Module V
Holding and subsidiary companies - Accounting treatment and disclosures; Consolidation of accounts.

Module VI
Valuation of goodwill and shares
Good will – Meaning, Definition, Elements, Types and Methods of Valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module VII
Accounting treatment for amalgamation, Absorption and reconstruction of companies; Internal and external reconstruction, Liquidation- Preparation of liquidators statement & affairs, Deficiency/ surplus statement, Calculation of pro rata treatment of uncalled capital.

Examination Scheme:

Components	**HA**	**CT**	**C**	**A**	**EE**
Weightage (%)	5	10	10	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

- Maheswari, S.N. (2009), Principles of Management Accounting, Sultan Chand & Sons, N Delhi.
- Tulsian, P C, (2009), Financial Accounting, 2nd Edition, Pearson Education.
- Rajasekran, (2010), Financial Accounting, 1st Edition, Pearson Education.
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting

ANALYSIS AND DESIGN OF BUSINESS SYSTEM

Course Code: MGT2204 **CreditUnits: 03**

Course Objective:
The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: Systems Development Environment. (Information system development life cycle)
System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology modeling tool)
Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)
Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System & Database Design
System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Database Design, Database Management System – an introduction, Overview of Data Models, Relational Database Model – Well structured relations, Keys, Schema & Subschema, Structure, Facilities & Users, Constraints, Anomalies, Functional Dependency, Normalization, Roles & Duties of System Administration.

Module V: System Implementation & Operation (System Management)
Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing
System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Valacich George Hoffer, Essentials of System Analysis & Design, Second Edition, Prentice-Hall India.

References:

- James A. Senn, Analysis and Design of information systems.
- Kroeber, Donald W. and Watron, Hugh J., Computer Based Information Systems.
- E. M. Awad, Systems Analysis & Design.
- Dennis Wixom and Wiley, Systems Analysis and Design – An Applied Approach.

INNOVATION & CREATIVITY MANAGEMENT

Course Code: MGT2205 **CreditUnits: 03**

Course Objective:
To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations.

Course Contents:
Module I
Innovation Management- Introduction, Characteristics, Components, Types, Models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing innovation, Nurturing innovation in e-business.

Module II
Organizing for Innovation- Organizational theories and structures, Traits of innovative organizations, Current trends, Factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, Creativity crushers, Fostering innovation climate and culture, The creativity Hit List.

Module III
Research and Development management- Significance, Prerequisites, Process, Technology development approaches, Management of R &D, In source to open source environment, R&D in small industry, Managing Creative employees, Significance and challenges of managing creative employees, Traits of a creative person, Motivation to creativity, Strategies for unblocking creativity, Factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, Creative thinking, Traditional vs Creative thinking.

Module IV
Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, Writing techniques, Techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, New product development, Packaging and Positioning innovations, Beyond product innovation, New product failures.

Module V
Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.

Module VI
Legal aspects of innovation- IPR, Indian Patents Act, Trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	**CT**	**HA**	**V**	**A**	**EE**
Weightage (%)	10	10	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Krishnamarcharyulu and Lalitha, (2007), Innovation Management, Himalaya Publishing House, New Delhi- 2007

References:

- Plsek**,** (2003)Creativity,Innovation and Quality**,** Prentice Hall of India, New Delhi.

Salient Pedagogical Features-

1. Classroom teaching to focus on enhancing out of the box thinking.
2. Assignments: Practical tasks emphasising on honing up creative thinking.
3. Case study analysis: To enable students to appreciate the application of concepts in real life environment.
4. Active student participation in class discussions.
5. Role plays to boost spontaneity.

HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: MGT2206 **CreditUnits: 03**

Course Objective:
The aim of this course is to facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way. Recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the Moral issues involved in Management areas and to provide an understanding of the interface between Social, Technological and Natural environments.

Course Contents:

Module I: Human Values
Morals, Values, Types of values, Evolution of human values, Ethics, Integrity, Work Ethic, Honesty, Courage, Empathy, Self-Confidence, Character, Challenges at Work place

Module II: Values in Management
Relevance of values in Management, Need for values in global change, Values for managers, Holistic approach for managers in decision making, Problems related to stress in corporate management.

Module III
Workplace Rights and Responsibilities: Organizational complaint procedures. Government agencies, Resolving Employee concerns, Limits on acceptable behavior in large corporation.
Work environment: Ethical and legal considerations, Organizational responses to offensive behavior and harassment, Ethics in a Global Context.

Module IV: Industrial Integrity
The epitome of industrial success, Integrity and organization, Exploring learning process of integrity, Consequences of lack of integrity.

Examination Scheme:

Components	C	V	HA	A	ME	EE
Weightage (%)	5	5	5	5	10	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text &References:

- R R Gaur, R Sangal, G P Bagaria, (2010), A Foundation Course in Human Values and Professional Ethics, Excel Books

References:

- Ivan Illich, (2000), Energy & Equity, Marion Boyers Publishing Ltd.
- E.F. Schumacher, (1973), Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
- A Nagraj, (1998), JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
- Sussan George, (1976), How the Other Half Dies, Penguin Press.
- PL Dhar, RR Gaur, (1990), Science and Humanism, Commonwealth Purblishers.
- A.N. Tripathy, (2003), Human Values, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.

READINGS IN MANAGEMENT

Course Code: MGT2230 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. The selection of the book will be department specific so that it can be discipline specific.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size 16

Evaluation:

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: MGT2231 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Management practices
   - Talent management
   - HR cases from any Indian industry
   - Employee motivation
   - Managerial competencies
   - Employability skills
   - Industrial relations
   - Knowledge management
   - Social media
   - Green marketing
   - Six Sigma
   - Sustainable branding practices
   - Training and development
   - Relationship management
   - CSR
   - Performance management system
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100

PROJECT

Course code: MGT2232 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	– 25 marks
Chapter 4: Conclusion & Recommendations	– 10 marks
Chapter 5: Bibliography	– 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:**The body of the report should have these four logical divisions
a) ***Introduction:***This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c*) Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:***In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

(Annexure I B)

Declaration

I .....hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor: Signature of the student

Name:

Registration No

Place:
Date:

WORKSHOP

Course Code: MGT2233 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

ORGANISATIONAL BEHAVIOUR

Course Code: MGT2351 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize the students with the behavioural patterns of Human beings at individual and group levels.

Course Contents:

Module I: Understanding Human Behaviour
Concept, Nature and Significance of Human Behaviour, Factors Affecting Human Behaviour, Levels of Human Behaviour; Disciplines contributing to OB.

Module II: Individual Behaviour
Individual Differences; Personality and Theories of Personality; Perception; Learning and Behaviour reinforcement, Values.

Module III: Motivation & Attitude
Concept, Significance and Theories of Motivation, Motivation and Behaviour, Motivation at Work, Attitudes, Meaning and nature, Formation and change in attitudes, Job related attitudes.

Module IV: Interpersonal Behaviour, Power & Politics
Interpersonal Dimensions of Behaviour; Transactional Analysis Implications of TA, Organizational communication, making communication effective, Power: Concept, determinants, types; Organizational Politics: Tactics, Impression Management.

Module V: Group Behaviour and Leadership
Group Behaviour; Types, Functions, Determinants of Group Behaviour, Inter Group Problems, Leadership: Nature and Significance of Leadership, Leadership Styles, Theories of Leadership; Trait Theory, Behavioural Theory, Managerial Grid.

Module VI: Change and Conflicts
Organizational conflict, Nature and types of conflict, Management of organizational conflict, Approaches to conflict management, Organizational culture, Learning and maintaining organizational culture, Organizational change, Planned change, Resistance to change, Organization development, Definition, Need for organization development, Organization development process.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Stephen Robbins, OrganisationalBehaviour, 15th Edition PHI.

References:

- K. Ashwathappa, (2005) OrganisationalBehaviour, Tata McGrae Hill
- Keith Davis, OrganisationalBehaviour, Tata McGraw-Hill
- Keith Davis, Human Behaviour at Work, Tata McGraw-Hill

FINANCIAL MANAGEMENT

Course Code: MGT2301 **CreditUnits: 03**

Course Objective:
To take decisions which are effective, a manager in any of the functional areas be it Marketing, HR or IT requires a thorough cost and benefit analysis and a feel for Finance so as to look at the long term implications of his/her decision. This course is a "nut and bolts" course on Finance where the basic Financial decisions will be explained through problems and exercises, thus giving the student an understanding and a feel for Financial decision making.

Course Contents:
Module I: Introduction to Financial Management
Evolution of Financial Management, Key activities of Finance Manager Changing Role of Finance Managers, Key Decision Areas in Financial Management, Objectives of the firm.

Module II: Financial Statement Analysis
Introduction, objectives of financial statement analysis, Techniques-Ratio analysis, Comparative analysis and limitations of financial statement analysis, AS-20 (**no numerical**)

Module III: Valuation Concepts
Concept of Time value of Money, Process of Compounding and Discounting, Future Value of a Single amount, Future Value of an Annuity, Present Value of a Single Amount, Present Value of an Annuity, Cost of capital, Weighted average cost of capital, Leverage Analysis

Module IV: Financing Decision
Capital structure, Factors affecting Capital Structure decisions, Theory of Capital Structure Decisions, MM Theory, NI, NOI and Traditional theory, Pecking order theory.

Module V: Investment Decision
Basics of Capital Budgeting, Types of capital budgeting decisions, Estimating cash flows for project appraisal, Green capital budgeting, Non-discounted Cash Flow Techniques: Payback Period, ARR, Discounted Cash Flow Techniques: NPV, IRR, PI. Risk Analysis of Capital Budgeting: Risk adjusted discount rate, Certainty Equivalent Approach.

Module VI: Working Capital Management
Meaning and importance of adequate working capital, Excess or Inadequate working capital, Determinants of working capital requirement, Cash management, Receivable management and Inventory management – Sources of working capital.

Module VII:Dividend Decisions
Importance of dividend decisions, Theories of Dividend decisions: Irrelevance theory, Optimal dividend decision, Relevance theory, Determinants of dividend policy: Bonus Shares, Stock Splits & Buyback of shares. Tax considerations.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:
Text:

- Pandey, I. M, (2010), Financial Management. 10th Edition, Vikas Publishing House Pvt. Ltd.

References:

- Van Horne, J.C (2008), Financial Management & Policy, 13th Edition, Prentice Hall
- Chandra, P., Fundamentals of Financial Management, Sixth Edition, Tata McGraw Hill.
- Brearly R.A. and Myers, S.C. Principles of Corporate Finance, 8th Edition, Tata Mc-Graw Hill.

MANAGEMENT INFORMATION SYSTEMS

Course Code: MGT2302 **CreditUnits: 03**

Course Objective:

This course focuses on the relationships among management, information, and systems as well as the relationship between a manager's need for information and his/her position in the organization, how hardware, software, data, people, and procedures are combined to form an information system, how information technology can be used by a business organization to gain a competitive advantage why a knowledge of information systems is crucial to anyone who plans a career in business Organization.

Course Contents:

Module I: Organizations, Management and Information
Meaning of MIS, Components of MIS, IS in Business, Data Information and knowledge, Characteristics of Information in context, Issues with Information, System and Subsystems, Organization as a System, Different Organizational Structures: Hierarchical Structure – (Different Levels of Management, Information disposition at different levels), Matrix Structure, Business Process (Management, Operational and Support).

Module II: Information Technology Architecture
Managing Hardware Assets – Considerations in Procurement and installation, Managing Software Assets – Consideration in procurement and configuration, Data Resource Management (Database Management System – Types and Structure of Database, Data Warehousing – Phases in building Data Warehouses in an organization, Data Mining – Data Mining Applications, Data Banking)

Module III: Management and Organizational Support Systems for the Firm
Information, Decision and Management, Decision Support System (Phases in Decision Making, Problems and Decision Types, DSS components, and Analytical Models in Decision Making), Executive Information System – Characteristics and benefits, Managing Knowledge (Knowledge Engineering, Knowledge Management Activities and Knowledge Representation Methodologies), Artificial Intelligence (Domains of AI, AI in Business), Expert System (Components, Benefits and Limitations, Suitability Criteria for ES)

Module IV: Building Information Systems in the Digital Firm
Organizational Planning – Planning at distinct Managerial Levels, Approaches in Planning (Top Down, Bottom Up, Planning through CSF), IT and IS Planning – Prerequisites and factors, IT and IS Architecture (Centralized, Decentralized and Distributed), Implementing IT and IS (Factors and Resistance in implementation), Change Management with BPR, System Development (System Development Life Cycle-Overview, Prototyping), Evaluating Factors for IT and IS services.

Module V: Managing Information Systems in the Digital Firm
Managing Security (Security Challenges of IT, Business and Technological Ethics), Computer Crime (Tools for Computer Crime, Tools for Security Management), IS Security Management Control (Information System Control, Auditing the Security), Managing World Wide Information System (Managing Multi Site IT and IS – Cultural and Technical Differences), World Wide IT and IS Strategies (Multinational, International and Global Strategies)

Module VI: Key System Applications for the Digital Age
Enterprise Systems – Supply Chain Management & Customer Relationship Management Systems, Using Enterprise Applications and Achieving Operational Excellence & Customer Intimacy, E-Commerce: Digital Market & Digital Goods, M-Commerce: Services & Applications, Enterprise Applications: New Opportunities and Challenges.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Housley, Trevor, Data Communication and Teleprocessing System, (Digitalised in 2010) Prentice Hall.

References:

- Uyless D. Black, Data Communication and Distributed Networks.

COST ACCOUNTING

Course Code: MGT2303 **CreditUnits: 03**

Course Objective:
To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:
Module I: Cost Accounting
Introduction – Meaning of Cost, costing and Cost Accounting, Comparison between Financial Accounts and Cost Accounts, Application of Cost Accounting, Designing and installing a Cost Accounting system, Cost concepts and Classification of Costs, Cost Module, Cost Center, Elements of Cost, Preparation of cost sheet, Tenders and Quotations, Problems.

Module II: Material Costing
Classification of materials, Material Control, Purchasing procedure, store keeping, techniques of Inventory control, Setting of stock levels, EOQ, Methods of pricing materials issues, LIFO, FIFO, Weighted Average Method, Simple Average Method, Problems.

Module III: Labour Costing
Control of labour cost, Labour Turn Turnover, Causes and effects of labour turnover, Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking, Idle time, causes and treatment, Overtime, Methods of Wage Payment, Time rate and Piece Rate, Incentive Schemes.
Module IV: Overhead Costing
Definition, Classification of overheads, Procedure for accounting and control of overheads, Allocation of overheads, Appointment of overheads, Apportionment of Service department costs to production departments, Repeated Distribution method, Simultaneous equation method, absorption of OH's, Methods of Absorption, Percentage of direct material cost, Direct Labour Cost, Prime Cost, Direct Labour hour rate and Machine Hour Rate, Problems.

Module V
Costing Methods Introduction, Job Costing, Batch Costing, Contract Costing, Process Costing, principles, distinction between Process and Job, Preparation of process accounts, treatment of normal loss, abnormal loss, abnormal gain, Joint and By-products, Service costing.

Module VI
Reconciliation of Cost and Financial Accounts, Need for reconciliation, Reasons for difference in profits, Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.
Examination Scheme:

Components	**A**	**CT**	**C**	**H**	**EE**
Weightage (%)	5	15	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination
Text & References:
Text:
- N.K. Prasad, Cost Accounting
- Nigam & Sharma, Advanced Cost Accounting, 5th edition, Himalaya Publishing House

References:
- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal, (2010), Cost Accounting, SahityaBhawan.
- Jain &Narang, Cost Accounting, Kalyani Publishers.
- S.P. Iyengar: Cost Accounting
- S.N. Maheshwari: Cost Accounting
- M. N. Arora: Cost Accounting

ANALYTICAL DECISION MAKING

Course Code: MGT2304 **Credit Units: 02**

Course Objective:
To develop in students skills of analytical and logical reasoning this will be a great asset for them in their future careers.

Course Contents:

Module I: Quantitative Reasoning
Number System & Number Theory, Percentage method, Profit & Loss, Speed, Time & Distance

Module II: Quantitative Reasoning
Ratio, Proportion, Mixtures &Alligations, Set Theory, Co-ordinate Geometry (2-D only), Mensuration

Module III: Data Interpretation
Bar Graph, Line Graph, Pie Chart, Table, Table Three Dimensional or Triangular Bar Diagram, Misc. (Radar, Area, Network), Caselets.

Module IV: Data Sufficiency & Logical reasoning
Mathematical, reasoning based, Data Decoding: Analytical: Assumption, Courses of Action, Argument, Weak/ Strong, Pictorial Analysis

Module V: Verbal Ability, Reasoning & Reading Comprehension
Vocabulary based questions, English Usage, Grammar Types of statements and their relationship / Reversibility of idea, Re-arranging sentences of a paragraph, Paraphrasing, Fact, Inference, Judgment & deductions. Four types of Passages: The social science passage, The Science passage, the business passage & the entertainment passage.

Module VI: General Awareness and Current Affairs
Economic, Political, Financial & Social Affairs based on International & Indian Issues.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

- This course is aimed at enhancing students' skills in the area of English, General knowledge and Quantitative aptitude. No textbooks or reference books are required as the course is carried out in the form of classroom exercises, which are circulated by the faculty himself.

MERGERS AND ACQUISITIONS

Course Code: ECO2304 **CreditUnits: 03**

Course Objective:

The main objective of this course is to familiarize the students with the basic aspects of mergers and acquisitions.

Course Contents:

Module I: Mergers and Acquisitions – Overview
Introduction – Forms of Corporate Restructuring, Expansion, Mergers and Acquisitions, Tender Offers, Joint Ventures, Sell Offs, Spin Offs, Split Offs, Split Ups, Divestitures, Equity Carve outs, Corporate Control, Premium Buy Backs, Standstill Agreements, Anti Takeover Amendments, Proxy Contests, Changes in Ownership Structures, Share Repurchases, Exchange Offers, Leveraged Buy, out, Going Private, Issue Raised by Restructuring, History of Merger Movements.

Module II: Mergers and Acquisitions
Economic Rationale for Major Types of Mergers, Horizontal Mergers, Vertical Mergers, Conglomerate Mergers, Concentric Mergers.

Module III: Theories of Mergers
Efficiency Theories, Differential Efficiency, Inefficient Management, Operating Synergy, Pure Diversification, Financial Synergy, Strategic Realignment to Changing Environments, Undervaluation, Information and Signaling, Agency Problems and Managerialism , Takeovers as a Solution to Agency Problems

Module IV: Divestment of Public Sector Undertakings and Leveraged Buy-outs
General Economic and Financial Factors illustration of an LBO
Takeover Defenses
Anti-Takeover Amendments, Any case study

Examination Scheme:

Components	**CT**	**C**	**HA**	**A**	**EE**
Weightage (%)	10	10	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination
Text & References:

Text:
- Timothy J Galpin and Mark Herndon, (2007), The Complete Guide to Mergers and Acquisitions: Process Tools to Support M &A Integration at Every Level.
- Patrick A Gaughan (Wiley Finance), Mergers – What Can Go Wrong and How to Prevent it.

References:
- Mergers and Acquisitions – Fred Weston
- M & A and Corporate Restructuring - Patrick A Gaughan (Wiley Finance Series)

INDUSTRIAL PSYCHOLOGY

Course Code: MGT2305 **CreditUnits: 03**

Course Objective:
This course is designed to provide an overview of I/O Psychology including individual, group, and organizational issues resulting in enhanced understanding of the world of business and related career concerns. The main aim is to create awareness about the role and importance of Psychological factors and processes in the world of work

Course Contents:

Module I: Introduction
Nature and scope of organizational Psychology, History and development of field, Major problems of Industrial Psychology, Current trends in organizational Psychology

Module II: Types of Psychology
Mental psychology, Male & Female psychology, Impact on behavior and efficiency

Module III: Test of Psychology
Types of Tests, Effectiveness of these tests, Measures to control the tests steps to improve the psychology

Module IV: Individual and group behavior
Interaction and psychology involved in individuals, Improving psychology, Group Dynamics, Characteristics of group behavior, Attitude measurement, Methods of measuring attitudes,
Leadership and supervision, Theories of Leadership.

Module IV: Performance Management
Performance appraisal- Introduction, types, importance, Training and development- Introduction, significance and categories/types.

Examination Scheme:

Components	**C**	**HA/P**	**CT**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text &References:

- Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
- Blum & Naylor (2004) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.

References:

- Aamodt, M.G. (2012) Industrial/Organizational Psychology : An Applied Approach (7th edition) Wadsworth/Thompson : Belmont, C.A.
- Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill.

TERM PAPER

Course Code: MGT2331 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Management practices
   - Talent management
   - HR cases from Indian any industry
   - Employee motivation
   - Managerial competencies
   - Employability skills
   - Industrial relations
   - Knowledge management
   - Social media
   - Green marketing
   - Six Sigma
   - Sustainable branding practices
   - Training and development
   - Relationship management
   - CSR
   - Performance management system
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100

PROJECT

Course code: MGT2332 **Credit Units:03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:**The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

(Annexure I B)

Declaration

I .....hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor: Signature of the student

Name:

Registration No

Place:
Date:

WORKSHOP

Course Code: MGT2333 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

BUSINESS ENVIRONMENT

Course Code: MGT2451 **CreditUnits: 03**

Course Objective:
The aim of the course is to orient the students towards the basic concepts of Indian and global business environment.

Course Contents:
Module I: Overview of Business Environment
Meaning and types of business environment, Internal and external environment, Micro and macro environment, Factors (Cultural, social, Political economic legal, demographic and technological) effecting business environment.

Module II: Indian Industrial environment
Industrial policy up to 1991, New industrial policy, Liberalization, Privatization and Globalization process in India, Disinvestment, Industrial sickness, MRTP act 1969, Competition law2002, Foreign Exchange Regulation Act and Foreign Exchange Management Act (FERA and FEMA).

Module III: Financial Environment
Indian money and capital markets: meaning, functions and constituents, Stock exchange- importance and functions, SEBI, Capital market reforms and development, Industrial financial institutions (IDBI, SIDBI, ICICI, IFCI etc.).

Module IV: Labour Environment
Labour legislation in India, Social security benefits, Industrial disputes- causes and preventive measures, Settlement of disputes, International LabourOrganisation (ILO), Trade union- meaning and functions, Trade Union Act.

Module V: Economic Planning and Development
Planning in India- needs and objectives, five year plans, planning commission, 11th five year plan, Green and white revolution- achievements and failures, Second green revolution, foreign trade policy 2009, Export processing zones, Export oriented units, Special economic zones (EPZ's, EOU's, SEZ's) and trading houses in India.

Module VI: Global Environment
Bretton woods system, features of Uruguay round of negotiations, GATT/ WTO- role, functions and ministerial conferences, IMF, World Bank (International Bank for Reconstruction and Development), Regional economic cooperation institutions, SAARC, EU, NAFTA and ASEAN.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:
Text:
- Francis Cherunillum, (2007), Business EnvironmentText and Cases, Himalaya Publications.

References:
- Bedi Suresh, (2004), Business Environment, Excel Books, N. Delhi.
- Shaikh Saleem, (2010), Business Environment, 2nd Edition, Pearson Education.
- Bhatia H.L, International Economics, Vikas Publications.
- Mishra S.K, and Puri V.K, Indian Economy, Himalaya Publishing House.
- Gupta, C B, (2008), Business Environment, 4th Edition, S. Chand & Co. New Delhi
- Rudra Dutta and Sundharam, Indian Economy, S. Chand & Co. New Delhi

PRODUCTION AND OPERATIONS MANAGEMENT

Course Code: MGT2401 **CreditUnits: 03**

Course Objective:
The course is oriented to familiarize the students with fundamentals of Production and Operations Management, and tools and techniques used in taking decisions in operating and controlling the Production and Service Industries. Further this course will familiarize the students with Quality Management and Current Quality Tools used in Production and Service Industries.

Course Contents:

Module I: Overview of Production and Operation Management
Brief history of Production and Operation Management, Service Revolution, Definition, Factors Affecting Operations Management, Role- Scope and Function of Production and Operation Management, Criteria of Performance for the Production and Operation Management, Operation Strategies, Effect of Growth of Service Sector on Operations Management

Module II: Demand Forecasting & Capacity Planning
Qualitative Forecasting Methods (Educated Guess, Consensus, Delphi Method, Historical Analogy, Market Research), Quantitative Forecasting (Linear Regression, Moving Average, Weighted Moving Average, Exponential Smoothing with Numerical), Definition of Production Capacity

Module III: Facility Location and Facility Layout
Factors Affecting Location Decisions, Quantitative Techniques in Facility Location (Factor Rating Method, Centre of Gravity Method, Load Distance Method, Break Even Analysis Method – Numerical for each method), Utilization of GIS in Plant Location.
Principles of Facility Layout, Types of Layout (Process Layout, Product or Line Layout, Fixed Position Layout), Basics of Line Balancing –(No Numerical), Merits and Demerits of Product and Process Layout

Module IV: Production Planning and Control
Capacity Planning, Aggregate Planning, Master Production Scheduling.
Production Planning and Control Systems (Push System, Pull System)
Job Shop Scheduling and its Criteria (Mean Flow Time, Mean Tardiness, Number of Tardy Jobs - Numerical), Single Processor Job Shop Scheduling (Due Date Method, Shortest Processing Time Method - Numerical).
Two Machines Scheduling – Johnson's Rule – (Numerical).
General Job Shop Scheduling – Earliest Due Date Method – (Numerical)

Module V: Inventory Management, Supply Chain Management & Logistics Management
Basic Concepts of Inventory Management, Lead time, Safety Stock, Elements of Inventory Costs, Inventory Models – EOQ –(Derivation and Numerical), EOQ with Quantity Discount – (Numerical), Fixed Order Quantity Model - No Numerical, Fixed Order Period Model - (No Numerical).
Basic Concepts, Objectives of Supply Chain Management, Decision Phases in Supply Chain Management.
Basic Concepts of Logistics Management, Warehousing, Material Handling Equipments

Module VI: Foundations of Quality, Quality Control, TQM
Concept of Quality - Gurus of quality a Comparative Discussion on Edward Deeming, David Juran and Philip Crosby - their Philosophy contribution and limitations.
Statistical Quality Control (Mean and Range Charts, c Chart, p Chart – (Numerical), Basic Concepts of Acceptance Sampling, OC Curves – (No Numerical).
Basic Concepts of TQM, 5 –S and Kaizen, 6-Sigma.
ISO Standards, and ISO Certification.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Buffa, E.S, Sarin RK, (2008), Modern Production/ Operations Management, John Wiley & Sons

References:

- Chary SN, (2009), Production and Operations Management, McGraw Hill Education.
- Gaither N, Greg F, (2002), Operations Management, Thompson South Western.
- Everett E., Adam Jr. & Ronald J Ebert, Production and Operation Management, Fifth edition, Prentice Hall of India.
- Monden Y, (1993), Toyota Production System, Industrial Engineering and Management Press – Institute of Industrial Engineering, Norcross, Georgia.

RESEARCH METHODOLOGY AND REPORT PREPARATION

Course Code: MGT2402 **Credit Units: 03**

Course Objective:
To provide an exposure to the students pertaining to the nature and extent of research orientation, which they are expected to possess when they enter the industry as practitioners. To give them an understanding of the basic techniques and tools of marketing research. To train the students in evaluating and developing the marketing information system.

Course Contents:

Module I: Introduction
Nature and scope of marketing research, Marketing research as input in decision making process, Marketing research and marketing information system. Applications of marketing research, Planning a research project, Problem identification and formulation of Research Design, introduction to Research Design, Market research on the Internet.

Module II: Data collection methods
Attitudes measurement and scaling techniques, Ratio, Interval, Ordinal and Nominal scales, Likert's scale, Thurstone scale, Semantic differentiation method, Observation methods and questionnaire method, Questionnaire design, Steps in constructing a questionnaire, Types of questions, introduction to Projective techniques and perceptual mapping.

Module III: Sampling
Sampling decisions, Sampling frame, Sample selection methods - Probability and non probability, Sample size, sampling error, Application of sampling methods to marketing problems.

Module IV: Data Collection Field Force
Data collection field force, Fieldwork procedure, common sources of error in the fieldwork, minimizing fieldwork errors, Tabulation of collected data.

Module V: Data Analysis
Data analysis-1, Test of significance Z, t, F and chi-square, Data analysis-II, Correlation and Regression techniques, Data analysis – III – Cluster Analysis, Introduction to Statistical Package

Module VI: Report Writing
Research presentation and research process examination; Report writing - Types of research report. Examination of the research procedure, Selected applications of marketing research, identifying market segments, Product research, Advertising research**.**

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Malhotra, Naresh, (2008), Marketing Research, 5th Edition, Pearson Eucation.
- Luck, David J and Rubin, Ronald S., Marketing Research, Seventh edition, Prentice Hall of India

References:

- Aaker, David A; Kumar V and George S., Marketing Research, Sixth edition, John Wiley & Sons
- Boyd, Harper W, Westphall, Ralph &Stasch, Stanely F, Market Research – Text & Cases, Richard D. Irwin Inc. Homewood, Illinois.
- Sekaran, Uma (2003), Research Methods for Business 4th Edition, Willey.

MANAGEMENT ACCOUNTING

Course Code: MGT2403 **Credit Units: 03**

Course Objective:
To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:

Module I:Management Accounting
Meaning and Definition, Nature & Scope: Objectives of Management Accounting, Management Accounting and Financial Accounting, Management Accounting and Cost Accounting, Utility of Management Accounting, Limitations of Management Accounting, Position of Management Accountant in the Organization.

Module II:Cash Flow Analysis
Distinction of Cash from Funds, Utility of Cash Flow Statement, Construction of Cash FlowStatement

Module III:Budgets and Budgetary Control
Concept of Budgets and Budgetary Control, Nature and Objectives of Budgetary Control, Advantages and Limitations of Budgetary Control, Establishing a system of Budgetary Control, Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget, Flexible Budgets and Master Budgets.

Module IV:Responsibility Accounting
Concept of Responsibility Accounting, Cost Centers and Profit Centers, Contribution by Segments

Module V: Marginal Costing
Meaning, assumptions, cost- volume profit analysis, Break- Even analysis, Decision making areas- product mix, make/ buy, pricing decision.

Examination Scheme:

Components	**A**	**CT**	**C**	**H**	**EE**
Weightage (%)	5	10	10	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Maheswari, S.N., (2009) Principles of Management Accounting, Sultan Chand & Sons
- Sexana, Management Accounting

References:
- Made Gowda, Management Accounting
- S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting, 1st Edition, Kalyani Publisher
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy &Appanaiah, Essentials of Management Accounting
- Saxena, V.K. and Vashist, Cost Accounting, Sultan Chand & Sons, new Dwlhi

BUSINESS INFORMATION AND DATABASE SYSTEM

Course Code: MGT2404 **CreditUnits: 03**

Course Objective:
The aim of this course is to introduce the students to the managerial issues relating to information systems, its role in organization and how information technology can be leveraged to provide business value.

Course Contents:

Module I:
MIS need and concepts, characteristics, Typology of MIS, Structure of MIS. Planning for MIS, System Development Methodologies, Conceptual and detailed designs of MIS, System Implementation strategies and process, System Evaluation and Maintenance.

Module II:
Introduction to data base management system- Data versus information, record, file; data dictionary, database administrator, functions and responsibilities, file-oriented system versus databases system.

Module III:
Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Data, Warehousing and Data Mining.

Module IV:
Database system architecture- Introduction, schemas, sub schemas and instances; data base architecture, data independence, mapping, data models, types of database systems.

Module V:
Data base security- Threats and security issues, firewalls and database recovery; techniques of data base security; distributed data base.

Examination Scheme:

Components	**C**	**H**	**CT**	**V**	**A**	**EE**
Weightage (%)	5	5	10	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- James, A. O'Brien, Introduction to Information Systems, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2005.
- Kenneth C. Laudon and Jane P. Laudon, Management Information Systems, Prentice-Hall of India, New Delhi, 9th Edition, (2006).

References:

- Navathe, Data Base System Concepts 3rd, McGraw Hill.
- Date, C.J., An Introduction to Data Base System 7ed, Addision Wesley.
- Singh, C.S., Data Base System, New Age Publications, New Delhi.

PERSONAL FINANCIAL PLANNING

Course Code: MGT2405 **CreditUnits: 03**

Course Objective:
Post Liberalization, India has witnessed a phenomenal growth in her GDP. With the advent of MNC's, and growth in private business, individual's income and saving pattern has changed. Therefore the need arises to manage these funds in a manner that it is no more called as savings but addressed as a need for Personal financial planning. This course is essential for every student irrespective of the specialization as every individual needs to plan his finances.

Course Contents:

Module I: Introduction to personal financial planning and personal accounting
Concept of Personal Financial Planning: Need, Significance, Scope; Ethical issues in Personal Financial Planning; Changing per capita investors. Need to maintain Accounts, Methods: Traditional & Using Electronic Media. Applying for PAN & filing of Income Tax returns.

Module II: Investment Avenues
Real Assets: Investment in Real Assets: Real Estate, Precious Metals, Other Fixed assets. Their relative merits & demerits. Change in their returns over the past few years.
Financial Assets: Investments in securities: Through IPO, Secondary Market. Investment in G-sec; Debt instruments, Post Office instruments, Insurance Policies, Mutual Funds, Certificate of Deposits, Foreign Market.

Module III: Introduction to Income tax and Income from salary
Introduction to Income tax act 1961 and Finance Act. Previous year, Assessment year, Income, Total Income, Gross Total Income, Capital and Revenue Receipts / Expenditures, Exempted Incomes, Residential Status and incidence of Tax.
Salary, Exemption:- Leave encashment, Gratuity, Pension, Annuity, Pension fund, Allowance (HRA, Entertainment, Special allowance – dependent of expense ad not dependent on expense, perquisites – rent free accommodation, Leave travel concession, medical facility), Deductions 80c to 80u.). Sections (2(9), 2(31), 2(7), 2(24), 3, 6, 14, 288A, 288B, 2(17), 4, 9, 45, 9(1)(ii), 9(1)(iv), 9(1)(v), 10, 11, 12, 17(1), 22,

Module IV: Income from house property, capital gains and other sources
Income from House Property(Types of house property, Exempted house property income, Computation of GAV and NAV, Treatment of unrealized, recovered and arrears of rent), Capital Gains and other Sources (Short term & Long term capital gain, Cost of acquisition, Cost of improvement, Index cost, Income that are taxed under other sources, Deduction under other sources, Tax treatment of lotteries, puzzles. Sections 23, 24, 25, 28, 30, 31, 32.

Module V: Tax planning
Concept, significance and problems of tax planning, Tax evasion and tax avoidance, Individual Taxation Slabs, Wealth Tax, Gift Tax, Capital Gains Tax, Service tax, Recent Tax saving schemes

Module VI: Retirement & Goal Planning
Concept of risk assessment of individual, Introduction to portfolio management, Retirement planning & investment: Income generation after retirement, liability management, anticipation of expenses. Investment for major goals: House, Family, Education, Medical, Wealth Management/ Financial Advisory companies. Their role, significance & growth.

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	10	5	10	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Chandra P, Investment analysis and Portfolio Management, 3rd edition, Tata McGraw Hill
- Lal&Vashisht, Direct Taxes, 29th Edition, Tata McGraw Hill.

References:

- V.K.Bhalla, Security analysis and Portfolio Management, 16th edition, S.Chand

SALES AND DISTRIBUTION MANAGEMENT

Course Code: MGT2406 **Credit Units: 03**

Course Objective:
The major objective of this course is to acquaint the students with the theory and practice of Management of Sales Operations.

Course Contents:

Module I: Introduction
Sales management- Concept, Objectives and functions. Evolution of sales management. Nature and role of Sales Manager's job. Sales management as a career. Emerging trends in sales management.

Module II: Sales Organization
Purpose of sales organization. Setting sales organization. Types of sales organization. Coordination of selling functions with other marketing activities. Sales forecasting.

Module III: Controlling sales effort
Sales Budget: Purpose and budgetary procedure. Quotas: Concept, Objectives and Types. Sales Territory: Concept and procedure of devising sales territories, Routing and Scheduling of Sales force. Sales Audit.

Module IV: Managing Sales Force
Concept of sales force management. Recruitment and Selection of sales personnel (domestic and international perspective). Cross Cultural challenges. Sales training. Compensating and motivating sales personnel. Controlling and evaluating sales personnel.

Module V: Distribution Management and channel control
Distribution channels: Concept and need. Distribution Channel Strategy. Managing distribution channel. Features of effective channel design. Channel Conflict: Concept and stages. Conflict management.

Module VI: Logistics Management
Objectives of logistics. Concept of logistics planning: inventory management decisions, transportation decisions, Location decisions.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:
- Still Cundiff, Sales Management Decision Strategies, Fifth Edition, Printice Hall.
- Panda Tapan K., Sahadev Sunil, Sales and Distribution Management, 2005, Oxford University Press.

References:
- Kapoor Ramneek, Fundamentals of Sales Management, (2005), McMillan.
- Sudha GS, Sales & Advertising Management, (2005), Indus Valley Publications.
- Walker, Churchill Ford, Management of Sales Force

TERM PAPER

Course Code: MGT2431 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Management practices
   - Talent management
   - HR cases from any Indian industry
   - Employee motivation
   - Managerial competencies
   - Employability skills
   - Industrial relations
   - Knowledge management
   - Social media
   - Green marketing
   - Six Sigma
   - Sustainable branding practices
   - Training and development
   - Relationship management
   - CSR
   - Performance management system
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Evaluation Scheme:

Organization and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100

PROJECT

Course code: MGT2432 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

***4)* Body of the Report:**The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

(Annexure I B)

Declaration

I .....hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor: Signature of the student

Name:

Registration No

Place:
Date:

WORKSHOP

Course Code: MGT2433 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

OPERATIONS RESEARCH

Course Code: MGT2551 **Credit Units: 03**

Course Objective:
The objective of this paper is to make students familiar with basic concepts and tools in Operations Research. These techniques assist in solving complex problems and help in decision making.

Course Contents:

Module I: Introduction
Introduction to Operations Research, Definition, scope and limitations of Operations Research

Module II: Linear Programming
Linear Programming – Basic Concepts, Model formulation; Solution methods – Graphical Solution method, Simplex method (problems involving only upto 3 constraints and of inequality <), Application of LPP in business decision making.

Module III: Transportation Problem
Transportation problem- Initial Basic feasible solution (North - West corner rule, Vogels approximation method), Test for optimality (Modified Distribution (MODI) method)

Module IV: Assignment Problem
Assignment Problem – Introduction, Approach of the Assignment model, Solution Methods (Hungarian method)

Module V: Game Theory
Game Theory - Concept and definition; Solution methods of Pure Strategy games (with saddle point), Significance of Game Theory.

Module VI: Queuing & Simulation
Introduction, Elementary queuing system, Introduction to Single – channel queuing model (with Poisson arrivals and Exponential service times), (no numerical); Introduction to Simulation, applications, advantages and drawbacks of simulation, Introduction to Monte – Carlo Simulation, Role of computers in Simulation.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Kapoor V K, Operations Research (Techniques for Management), Seventh edition, Sultan Chand & Sons.

References:
- Sharma J K, Operations Research (Theory & Practices), Second edition, Macmillan India Ltd.
- Hamdy A Taha, Operations Research, Seventh edition, Prentice Hall India
- Kothari C R, An introduction to Operations Research, Third edition, Vikas Publishing House

INTERNATIONAL BUSINESS MANAGEMENT

Course Code: MGT2501 **CreditUnits: 03**

Course Objective:
To introduce students to the contemporary issues in International Business that illustrate the unique challenges faced by manages in the international business environment.

Course Contents:

Module I: Introduction to International Business
Nature and scope of international business. International business environment,
Classical theory of international trade: Absolute cost advantage theory, comparative cost theory, and Modern theory of international trade. Michael Porter model of competitive advantage of nations,
Globalization – forces, Meaning, dimensions and stages in Globalization.

Module II: International Business Environment
Tariff and non-tariff barriers, General Agreement on Trade and Tariffs (GATT), World Trade Organization, Important Ministerial Conferences & their outcomes, Dispute settlement mechanism under WTO, Regional Integrations, Trade Blocks – nature and levels of integration, arguments for and against regional integration.

Module III: Modes of International Entry
International Business – Entry modes, Franchising, Exporting, Licensing, International Agents, International Distributors, Cross Border Mergers & Acquisitions, Strategic Alliances, Joint Ventures, Overseas Manufacture and International Sales Subsidiaries, Outsourcing, FDI, FII, PN

Module IV: International Financial Management
Introduction to International Financial Management –International Monetary System, exchange rate system (floating and fixed) Financial Markets and Instruments- Introduction to Export and Import Finance – ECGC & EXIM Bank, Methods of payment in International Trade: Letter of Credit, Banker's Acceptance, Draft.

Module V: Forex Exposure
Country Risk Analysis, Political, Social and Economic, Types of Forex Exposure: Accounting, Operating & Transaction – their management, An introduction to interest rate exposure.

Module VI: Foreign Trade Procedure
An Introduction to Foreign trade Policy and its impact on different sectors of the Economy. Documentation Framework: Types, Characteristics of Document, Export Contract - INCO Terms - Processing of an Export Order.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Charles W L Hill. andArun Kumar Jain (2007), International Business: competing in the global market place, McGraw-Hill.

References:

- John D. Daniels Lee H Radebaugh, (2007), International Business: Environments and Operations. Addison Wesley.
- Cherulinam, Francis, International Business, 3rd edition, Prentice Hall India

ENTREPRENEURSHIP DEVELOPMENT

Course Code: MGT2502 **Credit Units: 03**

Course Objective:
The objective of the course is to provide students an understanding of entrepreneurship & the process of creating and grooving a new venture. The course also focuses on giving the students the concept of an entrepreneur who is willing to accept all the risks & put forth the effort necessary to create a new venture.

Course Contents:

Module I: Basic Concepts
Qualities, Characteristics of an entrepreneur, Venture idea generation, Ideas and the entrepreneurship, Women entrepreneurs, Preliminary Screening, Drawbacks or Problems of entrepreneurship, Reasons of failure, Overview of setting up an enterprise with organizational forms – MSMED Act and SMERA Overview.

Module II: Project Appraisal
Pre-feasibility Report, Project Report, Comparative Rating of Product ideas, Cash Flow, Financial Analysis and Planning, Sources of Finance, Stages of Project Feasibility Analysis-Market, Technical, Financial, Social Analysis, Project Implementation Stages

Module III: Financial Analysis
Financing the project, Sources of finance, Venture Capital Sources, What Investor looks in the Investment Proposal, Outline for a Venture Capital Proposal, Sources of finance from different banks, Proposal with IDBI etc.

Module IV: Market and Materials Management Analysis
Vendor development, vendor selection decision factors, methods of price determination, direct and hidden cost in material management, market development, market feasibility, activities and decisions in materials management – International Markets.

Module V: Project Management
Steps and procedure for setting up small scale, Role of Banks and Financial Institutions in Development, E-Commerce, E-Business, E-Auction, Project management problems. SEZ, Cluster Development.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:
- Developing Entrepreneurship, UdaiPareekSanjeev& Rao T.V, Printers, Ahmedabad
- Issues and Problems: Small: 1, Sharma, S.V.S., Industry Extension Training Institute, Hyderabad

References:
- A Practical Guide to Industrial Entrepreneurs; Srivastave, S.B., Sultan Chand & Sons
- Entrepreneurship Development; Bhanussali, Himalaya Publishing, Bombay

SUMMER INTERNSHIP EVALUATION

Course Code: MGT2535 **CreditUnits: 06**

Objectives:
The basic objective of a summer internship is to provide first hand practical exposure of the corporate functioning and to acquaint students with the culture of corporate. The summer training will also provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus, this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:
Every student of under graduate courses will be required to undergo a practical training in a corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in the form of a report as per the guidelines provided by the Department.

Chapter Scheme for the SIP Report:

Chapter I: Introduction	- 20 marks
Chapter II: Conceptual Framework/National/International Scenario	- 5 marks
Chapter III: Presentation, Analysis and Findings	- 35 marks
Chapter IV: Conclusion and Recommendations	- 15 marks

The report has to be written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

THE COMPONENTS OF A SIP REPORT
The outcome of Summer Internship is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

***4)* Body of the Report:** The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexure: Questionnaires (if any), relevant reports, etc.

Evaluation Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks

CONSUMER BEHAVIOUR

Course Code: MGT2503 **Credit Units: 03**

Course Objective:
To develop an understanding of how consumers behave and use the knowledge to adopt appropriate marketing strategies.

Course Contents:

Module I: Introduction
Consumer Behaviour: Definition and significance, Understanding consumer and market, Difference in individual buyer behaviour and organizational buyer behaviour, Market segmentation: lifestyle and demographic segmentation, usage segmentation, benefit segmentation, Product positioning.

Module II: Environmental influences
Culture: Meaning and Characteristics, Cross Cultural understanding of Consumer Behaviour, Subculture, Social Groups: Meaning and formation of a group, Reference groups, Influence of reference groups on consumer behaviour, Family: Lifecycle and it's significance on consumer behaviour, Family purchase decision process.

Module III: Personal influence and Diffusion of Innovation
Concept, nature and significance of personal influence, Opinion leadership and its role in consumer behaviour, Concept of product adoption and adoption process, Diffusion of innovation and process of diffusion.

Module IV: Individual determinants of Consumer Behaviour
Personality and self concept and it's relevance in consumer behaviour, Motivation: Nature and role of motives and their significance in marketing, Information processing: Concept and Process, Attitudes: Characteristics, functions and it's importance in buyer behaviour.

Module V: Consumer Decision process
Consumer decision process model, Problem Recognition, Search and Evaluation, Purchasing Process, Post-purchase Behaviour: Post Purchase evaluation and Product disposition.

Module VI: Organizational Buyer Behaviour
Nature of Organizational Buying Behaviour, Factors influencing organizational buyer behaviour, Types of decision situations, Organizational buyers decision process.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Loudon David L. & Della Bitta Albert J. Consumer Behaviour, Fourth Edition, Tata McGraw Hill.

References:
- Schiffman and Kanuk, Consumer Behaviour, Eighth Edition, Printice Hall.
- Hawkins, Best, Coney, Consumer Behaviour, Building Marketing Strategy, Ninth Edition, Tata McGraw Hill.

SERVICE MARKETING

Course Code: MGT2504 **Credit Units: 03**

Course Objective:
The course has been designed to familiarize students with characteristics of services, their design and delivery and the complexities of handling intangibles.

Course Contents:

Module I: Services an Overview
Services: concept, characteristics, Marketing of goods v/s marketing of services, Significance of services marketing, Role of services sector in economy, Growth of service sector, Services- Global and Indian Scenario, Introduction to service marketing mix; classification of services.

Module II: Consumer Behaviour in Services
Consumer decision-making process, Consumer Expectations: Concept, Factors influencing customer expectation of services, Service encounter and moments of truths, Managing Customer Satisfaction, Service failure and recovery.

Module III: Service Quality & Productivity
Managing service operations. Concept of productivity in service context. Approaches to improve productivity, Managing service demand and capacity: Understanding capacity constraints, understanding demand patterns, Strategies for matching demand and supply; service blueprinting, physical evidence &Servicescape.

Module IV: Service Quality
Concept of service quality, Gap model of service quality, Measuring & improving service quality, Concept of SERVQUAL system, Concept of CRM & enhancing quality through it, Introduction to Six Sigma.

Module V: Managing service personnel
Role of service personnel and developing customer-focused personnel, Job characteristics, Internal marketing, strategies for delivering quality through people.

Module VI: Pricing and Distribution for services
Price determinants, pricing modifications, Approaches to pricing services, Pricing strategies linking to value definitions, Customer-focused pricing, Channel structures, distribution-growth options.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Clow Kenneth E. and Kurtz David L., Services Marketing Operations: Management and Strategy, Biztantra Innovations in Management, John Willey & Sons

References:

- Valarie A Zeithaml and Mary J Bitner, Services Marketing, Third Edition, Tata McGraw Hill Companies
- Christopher lovelock, Service Marketing (people, technology and strategy), Fifth Edition, Pearson Education.
- Rampal M.K., Gupta S.L., Service Marketing, Galgotia Publishing Company.

INTERNATIONAL MARKETING

Course Code: MGT2505 **Credit Units: 03**

Course Objective:
After giving students an introduction of marketing management, it is necessary to give them an overview about the international scenario keeping in view the ever growing importance of international market.

Course Contents:

Module I: Introduction
Meaning, scope and challenges of international marketing, International dimensions of marketing, international marketing v/s domestic marketing, Benefits of International Marketing.

Module II: Global Business Environment
WTO and its impact on international business operations, Tariff and non-tariff barriers, Regional economic groupings and their significance.

Module III: International Marketing Environment
International marketing environment- Geographical, demographic, economic, political, legal, socio cultural environment- Elements of culture, Cultural challenges, Business customs and practices, Emerging markets and marketing challenges.

Module IV: Planning for International Marketing
International Marketing Research and Information System, Modes of entering into foreign markets, International Product Life Cycle, International market segmentation, targeting and positioning.

Module V: International Marketing Decisions
International pricing strategy- Factors influencing price, pricing methods, Global Branding Decisions, International distribution – Types and functions of foreign distribution channels; distribution logistics, Promotion Decisions- International advertising, Selection of media, Challenges of international advertising, Personal selling publicity and sales promotion.

Module VI: The Indian Scenario
The Export Import Scene in India, EXIM Policy, Export Documentation, Export Procedure

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:

- OnkvistSakOnkvist, Shaw John J. International Marketing Analysis & Strategy, Third Edition, Prentice Hall.

References:

- Graham Cateora, International Marketing, Twelfth Edition, Tata McGraw Hill.
- Keegan Warren J. Global Marketing Management, Seventh Edition, Prentice Hall.

TERM PAPER

Course Code: MGT2531 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Management practices
   - Talent management
   - HR cases from any Indian industry
   - Employee motivation
   - Managerial competencies
   - Employability skills
   - Industrial relations
   - Knowledge management
   - Social media
   - Green marketing
   - Six Sigma
   - Sustainable branding practices
   - Training and development
   - Relationship management
   - CSR
   - Performance management system
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100

PROJECT

Course code: MGT2532 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

***4)* Body of the Report:**The body of the report should have these four logical divisions

e. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
f. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
g. *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
h. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	**Power Point Presentation & Viva**	**Total**
75 marks	25 marks	100

(Annexure I B)

Declaration

I .....hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor: Signature of the student

Name:

Registration No

Place:
Date:

WORKSHOP

Course Code: MGT2533 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

FINANCIAL SERVICES

Course Code: MGT2506 **CreditUnits: 03**

Course Objective:
The aim of the course is to orient the student to the recent changes in the financial institutions and financial services industry and their link to economic development. The financial institutions and services are changing rapidly. A course that merely describes the existing institutions and services will not prepare you for the change. Thus you must familiarize yourself with the services available in the industry today and understand why they are the way they are and why they are changing. An Indian perspective will be given.

Course Contents:

Module I: Financial Services
Role of Financial Services in economic development, Evolution of Financial Services Sector in India, Marketing of Financial Services (Introduction)

Module II: Venture Capital
Venture Capital Financing, International Experiences in Venture Capital Financing, Venture Capital Financing in India, Pitfalls to be avoided, Preparation & evaluation of Business Plan

Module III: Factoring & Forfaiting
Factoring Services - Features Merits and Demerits, Cost Benefit Analysis, Forfaiting: Features, merits & Limitations

Module IV: Leasing and Hire Purchase
Development of Leasing and Hire Purchase, Types of Leasing, Pricing Methodology and Financial analysis, Taxation, Legal Framework for Leasing and Hire Purchase Companies

Module V:Mutual Funds
The concept & Role of M/Fs, History of M/Fs in India, Types of M/Fs, Fund Structure & constituent, Selecting the right Investment Products for Investors, Comparison of Investment products, Measuring of Risk In M/Fs, Recommending model Portfolios & selecting the right funds.

Module VI: Credit Rating & other Financial Services
Credit rating concept of Credit rating, Types of credit rating, Advantages and Disadvantages of credit rating, Credit rating agencies and their methodology and process, Individual Credit rating, Sovereign Credit Rating Practices. Custodial Services, Credit Cards

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Khan, M. Y. Indian Financial System, Tata McGraw Hill
- Khan, M.Y. Financial Services, Tata McGraw Hill

References:

- Bhole L.M, Financial Institutions and Markets: Structure, Growth & Innovations, Tata McGraw Hill
- Pnadey,I.M., Financial Management, Ninth Edition, Vikas Publishing House Pvt. Ltd.

PRINCIPLES OF INVESTMENT MANAGEMENT

Course Code: MGT2507 **Credit Units: 03**

Course Objective:
The course aims at equipping the undergraduate students with financial tools, which help in making decisions for investment in financial securities. It is also aimed at imparting a basic understanding of the influence of changing economic scenario on the decisions and important theories and models, techniques and regulations underlying these decisions.

Course Contents:

Module I: Introduction to Investments
Investments: Introduction, Avenues for Investment including introduction to derivatives, Investments and Speculation, Features of a Good Investment programme, Process of Investment Decision Making, Risks involved in Investments including the concept of beta, Principle of Dominance.

Module II: The Stock Markets in India
Nature and Functions of the Stock Market, OTCEI & BSE, NSE & Role of Depositories, Market Indices, Brokerage Business

Module III: Valuation of Securities
Bond Valuation and Analysis, Preference share Valuation and Analysis, Equity Share Valuation

Module IV:Security Analysis
Fundamental Security Analysis, Technical Security Analysis

Module V: Portfolio Analysis and Management
Portfolio Analysis: Risk and Return, Portfolio Choice: Utility Theory and Indifference Curves, Markowitz: Portfolio Selection Model, Capital Asset Pricing Model, Sharpe's Single Index Model and Portfolio Evaluation Treynor, Sharpe and Jensen.

Examination Scheme:

Components	**CT**	**HA**	**C**	**S**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Sharpe, William F. Alexander and Bailey, Investments, Sixth Edition, Prentice - Hall, India

References:
- Fisher, Donald E & Jordan, Ronald., Securities Analysis & Portfolio Management:, Sixth Edition, Prentice Hall
- Haugen, Robert. Modern Investment Theory, Fifth Edition, Prentice Hall
- Bhalla, V. K. Investment Management, S. Chand & Co. New Delhi.

FINANCIAL DERIVATIVES

Course Code: MGT2508 **CreditUnits: 03**

Course Objective:
This course attempts to give an overview of the derivatives market with special reference to India. A financial manager must understand how derivatives can be used to the advantage of the firm. An introduction to Derivatives will equip the students to understand the mechanics of this highly intriguing & innovative field of study

Course Contents:

Module I: Introduction to financial derivatives
Introduction to derivative trading, Characteristics of derivatives, Underlying assets (Equity Bonds/loans, Foreign Currency, and Commodity), Importance of derivatives as an investment option, introduction to types of derivatives, Participants in derivatives market (Hedgers, Speculators, Arbitrageurs), Evolution of Derivative markets in India

Module II: Forwards & Futures
Forward contracts: Limitations of forward markets, Differences between forwards and futures, Futures terminology, Pricing of futures contract, Introduction to currency futures, Interest rate futures, Treasury bond futures, Eurodollar futures, Commodity futures, Index futures & Stock Futures (Hedging, speculation and arbitrage).

Module III: Options: Fundamentals
Terminology - call, put, writer, buyer, premium, intrinsic value, time value, expiry date, settlement date, strike price, ATM, OTM & ITM, Options positions(payoff graphs), Types of Stock options, Futures options vs Spot options, Options on stock Indices, Currencies & futures, Warrants & Executive stock options, Exotic options

Module IV: Principles of trading & Hedging with Options
Option Valuation: The BS-Merton Model (Solving for BS model, assumption application and criticism), Trading strategies - Option trading using bull and bear spreads (payoff graphs)

Module V: Swaps
Terminology: LIBOR, MIBOR, Swap basis, Interest rate swaps, Determining LIBOR/MIBOR swap zero rates, Currency swaps: Various types of swaps & features, Introduction to Swaptions.

Module VI: Recent Developments
New Derivative contracts including Credit Derivatives, Weather Derivatives, Energy Derivatives etc, Role of derivatives in the economic meltdown of 2007 - 2008, Major Derivative mishaps in the world including The Barrings Bank disaster, The Sumitomo Corporation Scandal, the Swiss Bank Scam

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	10	5	10	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Hull, John C, An introduction to futures and options markets, Second Edition Prentice Hall of India

References:

- Gupta, S .L., Financial Derivatives Theory, Concepts and Problem, Prentice - Hall, India

ORGANISATIONAL DEVELOMENT AND CHANGE

Course Code: MGT2509 **Credit Units: 03**

Course Objective:
It aims to provide a conceptual input of meaning, characteristics, process and influences of organizational development and change management. It gives comprehensive overview of human capital from the prospective of organizational excellence in the light of transitional phase of Indian Industries. It gives the imperatives, assumptions, role and skills of O.D. specialists through experiential learning methods. It facilitates teamwork, team building and the concepts of transformational Leadership.

Course Contents:

Module I: Organizational Development
Nature, Assumptions, Characteristics & Importance, Values and assumption.

Module II: Organizational Development Process
Steps involved in OD, Role of Managers, Factors affecting OD.

Module III: Implementation of Change Models
Lewin's force field analysis, Kotler's eight step model, action research model.

Module IV: Structural and Comprehensive OD Interventions
Classification of OD interventions: Human Process, Techno structural, HRM, Strategic interventions, Evaluation and institutionalization of interventions.

Module V: Change Management
Need for the change, Factors causing change, environmental, Technological, Legal, Political, Social and cultural factors of change, Models and Techniques involved in change management, Total Quality Management, Business Process Reengineering, Learning Organization.

Module VI: OD Process
OD process, Role & styles of OD practitioners, contemporary OD issues for today's managers.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Harv and Brown, Organizational Change and Development.
- Thomas G. Cummings and Christopher G. Worley (2008), Organization Development and Change, 9th Edition, Cengage Learning.

References:
- French W L & Bell, Organizational Development, Prentice Hall of India
- Ravishankar S & Mishra R.K., Organizational Development, Visison Books Pvt. Ltd.
- Pereek U &Rao T V, Designing &Managing HR System, Oxford &IBH Publishing company
- Pereek U & Rao T V, Making Organization Roles Effective, TATA McGraw Hill

TRAINING AND DEVELOPMENT

Course Code: MGT2510 **Credit Units: 03**

Course Objective:
The objective of the course is to help students acquire and enhance their knowledge of how to plan, develop, carry out, and evaluate training and executive development programmes in Business Organizations.

Course Contents:

Module I: Introduction
Meaning and definition of training, Training vs Education, Culture and Context, Introduction to training Strategy.

Module II: Process of Training
Establishing objectives, Training need assessment, Designing the programs, Training methods, Trainers and training styles, Introduction to Management Development program.

Module III: Evaluation of Training & Development
Training Evaluation – Need for evaluation, Measuring Training Effectiveness, Concept of Return on Investment, Cost – Benefit Analysis, Models of Training Evaluation.

Module IV: Training Systems
Action Research for better training, Knowledge management, Career development, Succession planning, Diversity training, Orientation training.

Module V: Changes in Training Needs for Modern Organizations
Concept and Need for Learning Organizations, Training for Trainers, Leadership, Team Playing and Group Dynamics, Basics of Sensitivity Training, Computer Based Training.

Module VI: Development
Executive Development – significance & nature, Identifying development needs and setting objectives. Techniques of development and advantages, Role of HRD in 21st Century.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:
- Lynton R.P and Pareek U, Training for Development, Vistaar Publications, New Delhi

References:
- Goldstein, Training in Organizations, Thomson Learning
- PareekUdai, Training and Development, Tata McGraw Hill.
- Srivastava, S., Recruitment, Selection & Retention, ABS Course pack.
- Wexley, K & Lathan Gary, Developing & Training HR in Organization. P. Hall.

INTERNATIONAL HUMAN RESOURCE MANAGEMENT

Course Code: MGT2511 **CreditUnits: 03**

Course Objective:
The main objective of this course is to explore the dynamics of global business development and to prepare the students about examining significant business investment opportunities and maximization of returns in context with human resources.

Course Contents:

Module I: Internationalization
Broad overview of International Human Resource Management features, Elements, Benefits and Limitations, Domestic and International HRM, Factors influencing the global work environment.

Module II: Strategic Human Resource Management
Strategic HRM, Aims of SHRM, Integrating the business and HR strategies, Formulating HR strategy, Content of HR strategies, Relationship between International Strategy and SIHRM

Module III: Cross-Cultural Management
Cultural diversity in consortia formation, Developing cognitive framework to appreciate the impact of culture on managerial behaviour, Introduction, Understanding Culture, Key Concepts, Determinants of Cultural Identity, Frameworks for Mapping the Culture, Concept of Geert Hofstede

Module IV: International Recruitment, Training and Rewards
Recruiting from Host country, Reward strategies for international execution, The expatriate approach, International values and reward policy, Designing rewards for the international business unit, Training Global executives.

Module V: Performance Management and Compensation in International Business
Context for international performance management, framework for performance management, Compensation, Issue of double taxation.

Module VI: Best HR Practices
Emerging Trends, North America, South America, Some key pointers, Northern Europe, Value based management in Nordic countries, China emerging economy, Japan – a culture of enfolding relationship, Trends and Future of HR in high performing Co., Essay on Dream Organisational.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Dowling, Peter, International Human Resource Management - Managing People in a Multinational Context, Thompson.

References:

- Monir H. Tayeb International Human Resource Management: A Multinational Company Perspective, Oxford University Press.
- Paul Sparrow, Chris Brewster, Hilary Harris, Taylor and Francis, Globalizing Human Resource Management; Oxford University Press.

RELATIONAL DATABASE MANAGEMENT SYSTEM

Course Code: MGT2512 **CreditUnits: 03**

Course Objective:
The objective of the course is to give knowledge of the Relational Database Management Software, in particular ORACLE. It is expected that a student at the end of the course would attain a good conceptual and practical understanding of databases.

Course Contents:

Module I: Introduction to RDBMS
RDBMS: Introduction, Relational Model concept and Relational data structure, Relational Model constrains as domain constraints, Key constraints, Entity integrity constraints, Referential Integrity constraints.

Module II: Introduction to Oracle
Tools of Oracle, Features of oracle.

Module III: SQL
Overview of SQL, Component of SQL (DDL, DML, DCL), Advantage of SQL, Basics of syntax writing, Data Definition Language, Create command, Data type, Constraints, ALTER & DROP, UPDATE & DELETE Commands, Substitutions variables, Run time Environments variables, SELECT Commands Basic Constructs, Functions, Nested Queries, Correlated queries, Views, Sequence, User Management Commands.

Module IV: PL/SQL
Basic features, Block Structure of a PL/SQL Programs, Control Structures, Exception Handling, Cursor, Procedure, Functions and Triggers, Internet features of Oracle.

Module V: Database Technologies
Client/Server Databases, Distributed Databases, Web Databases

Module VI: Administration of Oracle databases

Examination Scheme:

Components	CT	HA	Q	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

- Oracle8i: The Complete Reference, McGraw Hill

SOFTWARE PROJECT DESIGN AND ANALYSIS

Course Code: MGT2513 **Credit Units: 03**

Course Objective:
This module will introduce and develop concepts that are seen as central to the effective management of software projects. You will be expected to develop an appreciation of key, generic project management concepts and techniques as well as those techniques and approaches that are specific to the management of software projects. As well as knowing the core techniques, you will be expected to apply them across a limited range of software project management scenarios.

Course Contents:

Module I: An Introduction to Software Project Management
Management Spectrum, People, Product, Process, Project the W5HH Principle, The Profile of a Project, Project start-up, Development, Completion Operation, Role of SDLC models (such as the waterfall model, incremental model, spiral model) and Structured methods (such as SSADM)

Module II: Project Metrics
Measures, Metrics & Indicators, Metrices in the process & Project domain, Metrics for software quality.

Module III: Software Project Planning
Discussion of network diagrams and critical path analysis (CPA), Planning aids, Simple manual techniques such as Gantt Charts through to more complex and sophisticated planning tools, Estimation tools (Delphi technique, CoCoMo)

Module IV: Risk Analysis & Management
Risks Risk Identification, Risk Projection, Risk Refinement, Mitigation, Monitoring & Management.

Session V: Scheduling and Resourcing
Concepts of lateness, Defining task set for software project, Defining a Task Network, Scheduling, Earned value analysis, Error tracking, Project plan

Module VI: Software Configuration Management
Baselines, SCM Process, Identification of objects in s/w configuration, Version control, Change control, Configuration audit, Status reporting, Hands on MS-Project.

Examination Scheme:

Components	**CT**	**HA**	**Q**	**C**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

- Software Engineering by Pressmann.
- Structured System Analysis & Design by Whitten

PROGRAMMING WITH MICROSOFT VISUAL BASIC

Course Code: MGT2514 **Credit Units: 03**

Course Objective:
The objective of the course is to offer the students all key concepts and capabilities to be bound in Microsoft Visual Basic. This course seeks to provide very clear and straightforward implementation of key features of Visual Basic with explanations of each work. The student should walk away with an in-depth understanding of how to utilize all of Visual Basic's capabilities for building industrial strength enterprise application and understand the process of software development. The course will make the students learn real world context.

Course Contents:

Module I: Visual Basic Overview
Opening, writing and running Visual Basic Program, Working with controls and defining their properties, Working with menus and dialog boxes.

Module II: Programming Fundamentals
Visual Basic Variables and Operators, Using Decision Structure, Using Iterations and Timers.

Module III: Creating the Perfect User Interface
Working with Forms, Printers and Error Handling, Adding Artwork and Special Effects

Module IV: Managing Corporate Data
Using Modules and Procedures, Working with Arrays, Exploring text files and string processing, Managing access databases.

Module V: Professional Edition Tools and Techniques
Word Processing with the Rich Text box control, Displaying progress and status information, Integrating music and video with the multimedia MCI control, Using the windows API.

Module VI: Advanced Database Programming
Managing data with the Flex Grid Control, Exploring database handling using DAO, RDO and ADO, Handling the Recordset.

Examination Scheme:

Components	**CT**	**HA**	**Q**	**C**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:
- Michael Halvorson: Microsoft Visual Basic 6.0 – Prentice Hall of India P Ltd.

References:
- Noel Jerke: The Complete Reference Visual Basic 6.0 – Tata Mc-Graw Hill
- Smith & Amundsen: Database Programming with Visual Basic 6 – Techmedia
- Rob Thayer: Visual Basic 6 Unleashed – Techmedia

LAW OF CRIMES

Course Code: MGT2515 **Credit Units: 03**

Course Objective:
The basic objective of this course is to give an insight of the basic principles of crime and the law determining criminal liability and punishment.

Course Contents:

Module I: Introduction to Law of Crimes
Extent and operation of the Indian Penal Code, Definition of Crime, Fundamental elements of crime, Stages in commission of a crime, Intention, Preparation, Attempt: Essentials of the attempt, Impossible attempt, Attempt and preparation distinguished

Module II: General Explanations and Exceptions
Definitions, Constructive joint liability, Mistake, Judicial and Executive acts, Accident, Necessity, Infancy, Insanity, Intoxication, Consent,. Good faith Private Defense

Module III: Abetment and Criminal Conspiracy
Law relating to Abetment, Accomplice vs. Co-accused.

Module IV: Punishment
Theories: Deterrent, Retributive, Preventive, Expiatory and Reformative Theory Punishment under the IPC: Fine, Life Imprisonment, And Death Sentence/Capital Punishment

Module V: Offences affecting Body
Offences affecting the Human body, Offences against Women and Offences against Property.

Module VI: Offences: Defamation and related to property
Defamation and offences relating to documents and property marks.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:
- Ratanlal&Dhirajlal – The Indian Penal Code
- H.S. Gaur – Penal Law of India

References:
- Glanville Williams – Textbook of Criminal Law
- Russel on Crime

INVESTMENT AND COMPETITION LAW

Course Code: MGT2516 **CreditUnits: 03**

Course Objective:
Understanding the basics of investment and competition laws of India in the contest of new economic order.

Course Contents:

Module I: Competition Law
Background, Prohibitions and Competition Commission of India

Module II: Corporate Finance and Regulatory Framework
Security Contract (Regulation) Act 1956, Depositories Act 1996, The Securitization and Reconstruction of Financial Assets and enforcement of security Interest Act, 2002

Module III: Regulatory Framework for Foreign Trade, Multinational Companies
Foreign Trade (Development & Regulation) Act 1992, UNCTAD Draft Model on Trans – national Corporations, Control and regulation of foreign companies in India, Foreign collaborations and joint ventures

Module IV: Foreign Exchange Management
Background, Policies and Authorities and FERA Vs FEMA

Module V: Investor's Protection Law
Provisions under SEBI Act, Important provisions of Consumer Protection Act, IRDA

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

(Compulsory Readings (Latest editions only): Competition Act 2002)

- Security Contract (Regulation), Act 1956
- SEBI, Act 1992
- Depositories, Act 1996
- Foreign Trade (Development & Regulation), Act 1992
- Foreign Exchange Management, Act 1999
- Taxman's Student's Guide to Economic Laws

LAW AND TECHNOLOGY

Course Code: MGT2517 **Credit Units: 03**

Course Objective:
Understanding the legal measures for handling issues related Technological development in various fields. To develop a better understanding of Techno- legal aspects for the development of society and business.

Course Contents:

Module I: E-Commerce
Online contracting, Online securities offering and E-Banking

Module II: Cyber Crimes
Obscenity, Defamation, Hacking and Cracking Crime through Mobile Phones

Module III: Genetic and Medical Technologies
Regulation of Genetic Technology and Laws for Medical Technology

Module IV: Broadcasting
Regulation and Control of Broadcasting and Law relating to Cable Television Network

Module V: Jurisdiction
Concept of Territorial Jurisdiction for Handling Technological issues, and Protection against the anticipated threats (outcome of technological advancement)

Module VI: Information Technology Act, 2000
Introduction to Information Technology Act: Meaning and Definition, Digital Signature, Electronic governance, Offences Cyber regulation Appellate Tribunal

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Compulsory Readings (Latest editions only)

Text:
- Relevant Legislations and Conventions
- Bhansali S. R., Information Technology Act
- Gerald R. Ferrera, Cyber Law (Text and Cases), WEST THOMSON

References:
- Cyber Crime - Vakul Sharma

BUSINESS LAWS

Course Code: MGT2651 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint the students with the fundamentals of business related laws, which have an important role over smooth conduct of business.

Course Contents:

Module I: Legal Environment of Business
Importance of Law, Legal environment of business, Sources of law, Function of law.

Module II: Indian Contract Act, 1872
Nature and kinds of Contracts, Concepts related to offer, Acceptance and Consideration, Principles Governing Capacity of Parties and Free Consent, Legality of Objects, Performance and Discharge of Contract, Breach of Contract and its Remedies, Basic Elements of Law Relating to Agency, Guarantee and Pledge.

Module III: Indian Sale of Goods Act, 1930
Sale and Agreement to Sell, Hire Purchase, Pledge, Mortgage, Hypothecation Lease, Goods, Different types of Goods, Passing of Property in Goods, Conditions and Warranties, Doctrine of Caveat emptor, Rights of an unpaid Seller.

Module IV: Negotiable Instruments Act, 1881
Meaning of Negotiability and Definition of Negotiable Instruments, Features, Cheques, Bill of Exchange and Promissory Note, Holder in Due Course, Crossing of Cheques, Endorsement and Dishonour of Cheques.

Module V: Elements of Company Law
Meaning and types of companies, Formation of a company, Memorandum and Articles of Association, Prospectus and Issue of Shares, Share Capital and Shareholders, Company Meetings and Proceedings, Powers and Liabilities of Directors, meeting, Managerial Remuneration and Winding up of Company.

Module VI: Consumer Protection Act 1986 and Torts
Need for Consumer Protection, Meaning of Consumer, DifferentRedressal Forums for Consumers, Rights of Consumers, Unfair Trade Practices, and Procedure for Filing Complaints, Meaning of tort, Application of Tortuous Liability in Business Situations.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- N.D. Kapoor, Mercantile Law
- P.K Goel, Business Law for managers Biztantra.

References:

- Shukla, S.M. and Gupta, O P, Mercantile Law.
- S. S. Gulshan Mercantile Law, Excel Book.
- Maheshwari&Maheshwari Business Law.

BUSINESS POLICY AND STRATEGIC MANAGEMENT

Course Code: MGT2601 **CreditUnits: 03**

Course Objective:
The aim of the course is to orient the students in theories and practices of Strategic Management so as to apply the acquired knowledge in formulation and implementation of strategies for better decision-making. This is a gateway to the real world of management and decision-making.

Course Contents:

Module I: Introduction
Planning, Evolution of strategic management, Concept of Corporate Strategy: Intended & Emergent, Patterns of Strategy Development, Levels of strategy.

Module II: Mission & Vision
Concept of Strategic Intent, Vision and Mission, Formulation of Vision and Mission Statements, Different Perspectives on Vision and Mission, Business Definition and concept of a Business Model.

Module III: Strategic Analysis
Industry Analysis, Competitor Analysis using Porter's 5-Forces model, Market Analysis, Environmental Threat and Opportunity Profile (ETOP), Internal Analysis: Building Organization Capability Profile and Strategic Advantage Profile (SAP), Building competencies using Value chain Analysis, Environmental Analysis and dealing with uncertainty, Scenario Analysis, SWOT Analysis.

Module IV: Strategic Choice
Strategic alternatives at corporate level: Expansion, Stability, Retrenchment and Combination, Strategic choice models for dominant single- Business companies- Strickland's Grand Strategy Selection Matrix, Model of Grand Strategy Clusters, Strategic choice models for multi-business companies- BCG, GE Nine Cell Matrix, Hofer's Model, Coevolving, Patching, Strategy as simple rules, Strategic alternatives at business level: Michael Porter's Generic competitive strategies, Building Sustainable Competitive Advantage.

Module V: Strategic Implementation
Operationalizing strategy and Institutionalizing strategy- Developing short-term objectives and policies, Functional tactics, and Rewards, Structural Implementation, Strategic Control, Mc Kinsey 7-S Framework.

Module VI: Recent Developments
Recent Developments in the Field of Strategy: Use of Balanced Scorecard approach, Corporate Governance and Corporate Social Responsibility, Corporate sustainability.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Jauch&Glueck, Business Policy and Strategic Management,
- Pearce & Robinson, Strategic Management Formulation Implementation & Control, 9th Edition, McGraw Hill.

References:

- Lynch, Corporate Strategy, 4th Edition, Pearson.
- Ramaswamy&Namakumari, Strategic Planning,
- Michael E. Porter, Competitive Advantage, Crafting & Executing Strategy, The Quest for Competitive Advantage, Thomson, Strickland, Gamble & Jain, 12th Edition, McGraw Hill.

DISSERTATION

Course Code: MGT2637 **CreditUnits: 09**

Objectives:
The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	- 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	- 5 marks
Chapter 3: Presentation, Analysis & Findings	- 25 marks
Chapter 4: Conclusion & Recommendations	- 10 marks

THE COMPONENTS OF A PROJECT REPORT
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

THE STEPS OF PROJECT WORK
STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.

STEP IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

STEP V : The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.
Annexures,
References / Bibliography

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Project Work separately, obtaining minimum marks of 40 (Project Report and Viva-Voce taken together).

Evaluation Scheme:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

BRAND MANAGEMENT

Course Code: MGT2602 **Credit Units: 03**

Course Objective:
The objective of the course is to help the students understand and appreciate the theoretical concepts of brands. To generate the ability to apply the concepts in real life.

Course Contents:

Module I: Introduction
Meaning and importance of brands, Brands v/s products, Challenges and opportunities of branding, Concept of Brand Equity, Brand management process, Role of CRM in building brands.

Module II: Brand Positioning and value
Sources of brand equity, Brand Building, Implications of brand building, Brand positioning: Brand value, Internal branding.

Module III: Brand Marketing
Criteria for choosing Brand elements, Building brand equity: Product strategy, pricing strategy, Integrated marketing communication, Celebrity endorsements, Concept of co-branding

Module IV: Brand Performance and Branding strategies
Brand value chain, Brand equity management system, Brand hierarchy, Designing branding strategy, Brand extension: Concept, Advantages and disadvantages, Evaluating opportunities of brand extension, Branding strategy over PLC.

Module V: Managing Brands
Reinforcing Brands, Brands revitalization Managing brands internationally, Advantages and disadvantages of global marketing, Standardization v/s customization, Global Brand strategy.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Keller Kevin Lane, Strategic Brand Management: Building, Measuring and Managing Brand Equity, Second Edititon, Printice Hall.

References:

- Jean Noel Kampferer, Kogan Page, Strategic Brand Management, Second Edition
- Cowley D., Understanding Brands.

ADVERTISING AND SALES PROMOTION

Course Code: MGT2603 **Credit Units: 03**

Course Objective:
The objective of the course is to familiarize students with advertising concepts and strategies, the methods and tools used. Enabling them to develop advertising strategies and plans and to develop the judgment parameters required in product management, to evaluate advertising.

Course Contents:

Module I: Introduction
Role of Promotion in Marketing Mix, Components of promotion mix viz Advertising Publicity, Personal selling, Public relations and Sales promotion, Concept of integrated marketing communication.

Module II: Advertising
Need, scope objectives and importance of advertising, Strengths and Weaknesses of Advertising as a Promotion Tool, role of advertising in current market, advertising and society- latest trends in advertisements different types of advertisements.

Module III: Advertising Campaign Planning
Setting advertising goals and objectives- The DAGMAR Approach, Message strategies and tactics-Creative approaches, Copywriting and testing, Advertising copy design, Copy layout, Advertising appeals and themes, Classification of advertisement copies-Essentials of a good copy Ethics in advertising.

Module IV: Advertising Media and Agencies
Types of media, media planning and scheduling, Advertising budgets, Approaches to advertising budgeting, Measuring advertising effectiveness, Advertising business in India, Rural advertising, Legal and ethical aspects of advertising, Advertising in international perspective.

Module V: Sales Promotion
Need, Scope, Objectives and Importance of sales promotion, Management of sales Promotion at the consumer, Trade and sales force levels, Strengths and weaknesses of Sales Promotion.

Module VI: Sales Promotion Strategy
Planning and designing sales promotion programme with specific reference to sales contest, Trade in discount coupons etc. Sales display and merchandising, Latest trends in sales promotion.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:
Text:
- Belch and Belch, Advertising and Promotion, Sixth Edition, Tata McGraw Hill

References:
- Batra Rajeev, Aaker, David A and Myere John G. Advertising Management, Fifth Edition, Pearson Education
- Advertising Management – Chunawalla

RETAIL MANAGEMENT

Course Code: MGT2604 **CreditUnits: 03**

Course Objective:
Keeping in view the growth of retail industry, the course has been designed to familiarize students with the basics of retail industry and give them an overview about rural marketing practices.

Course Contents:

Module I: Introduction
Nature, Scope and Importance of retailing, Retail competition theories, Retail management process, Influence of changing environment on retailing viz demographic changes, lifestyle changes, technology changes (e-business), Retail Environment.

Module II: Consumer Behavior in Retailing
Consumer Behavior in retailing, Buying decision process in retailing, Types of buying decision, Market segmentation for retailing, Generational cohorts.

Module III: Retail Marketing Strategy& Customer Service
Types of retailers, Multichannel retailing, Retail strategy concept & its elements, Strategic retail planning process, Retail Pricing, Retail Promotion tool, Customer Loyalty Programme, Global retailing growth strategies & international market entry strategies, Advantages through customer service, Customer evaluation of service quality, GAP model for improving service.

Module IV: Merchandise Management
Retail Information system & supply chain management, Concept of merchandise management. Planning Merchandise – organizing buying process, Developing an assortment plan, Allocating merchandise to stores meeting vendors and establishing strategic relations with them, Branding strategies for retail (e.g., private labels).

Module V: Store Management & Visual Merchandising
Store layout & space planning, Atmospherics, Choosing store location, Visual merchandising, Recruitment, Selection, Training, Motivation, Compensation and Control of store employees.

Module VI: Rural Retailing
Introduction to rural retailing, Relevance, Importance and the Emerging Scenario of Rural markets, Major problem areas in rural retailing, Strategies for Rural Retailing, Social and sustainability aspects of rural retailing.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Levy &Weitz, Retailing Management, Fifth edition, Tata McGraw Hill,
- Kashyap Pradeep, Raut Siddhartha, The Rural Marketing Book, 2006, Biztantra.

References:
- Retailing management, Swapna Pradhan, 3rd edition Tata McGrawhill.
- Retail Marketing Management, David Gilbert.
- Barry Berman & Joel R. Evans, Retail Management, A Strategic Approach, Ninth Edition, Pearson Education.

TERM PAPER

Course Code: MGT2631 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Management practices
   - Talent management
   - HR cases from Indian any industry
   - Employee motivation
   - Managerial competencies
   - Employability skills
   - Industrial relations
   - Knowledge management
   - Social media
   - Green marketing
   - Six Sigma
   - Sustainable branding practices
   - Training and development
   - Relationship management
   - CSR
   - Performance management system
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100

PROJECT

Course code: MGT2632 **Credit Units:03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

***4)* Body of the Report:**The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

(Annexure I B)

Declaration

I .....hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor: Signature of the student

Name:

Registration No

Place:
Date:

WORKSHOP

Course Code: MGT2633 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

CORPORATE TAX PLANNING

Course Code: MGT2605 **CreditUnits: 03**

Course Objective:
To provide understanding of Direct Tax including Rules pertaining there to and application to different business situations. To understand principles underlying the Service Tax and concepts of VAT

Course Contents:

Module I: Introduction to Tax Management
Concept of tax planning, Tax avoidance and tax evasions, Corporate taxation.

Module II Income from Business
Residential Status of companies, Taxable income under Business and Profession, Computation of Profit and Gains from business profession, Deemed business profits, Assessment of Retail Business, Deemed incomes (cash credit, unexplained investments, un explained money and other assets, unexplained expenditures, investments and valuable articles not fully disclosed in books of accounts).

Module III: Deductions Allowed Under Business and Profession
Deduction Expressly allowed section 30-35, Depreciation deduction calculation, Setoff and carry forward of unabsorbed depreciation section 32(2). Determining Actual Cost43(1), Set-off and Carry Forward Losses, Bonus or commission to employees section, Interest on borrowed capital, Insurance premium 36(1(i)), Employees contribution to provident fund, Bad debts 36, Revenue expenditure incurred by statutory corporation, Banking transaction tax, Security transaction tax, Commodity transaction tax, provision for adminisibility of general deduction 37(1),

Module IV: International Accounting and Taxation
Analysis of foreign financial statement, Accounting standard: US GAAP, Indian GAAP, IAS, IFRS. Transfer Pricing – Meaning, measurement, strategic considerations Norms & Practices, tax havens, Double taxation agreement among countries, Tax implication of activities of foreign enterprise in India: Mode of entry and taxation respectively.

Module V: Indirect Tax - Concepts and General Principles
Service tax - Charge of service tax and taxable services, Valuation of taxable services, Payment of service tax and filing of returns.
VAT – Introduction, Calculation of VAT Liability including input Tax Credits, Small Dealers and Composition Scheme, VAT Procedures, Central Sales Tax.

Module VI: Tax Planning and Financial Management Decisions
Tax planning relating to capital structure decision, Dividend policy, Inter – corporate, dividends and bonus shares, Tax provisions relating to free trade zones, Infrastructure sector and backward areas, Tax incentives for exports. Tax deductions and collection at source, Advance payment of tax.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & Reference:

Text:
- Lal&Vashisht, Direct Taxes, 29th Edition, Pearson

References:
- Singhania&Singhania, Income Tax, 39th Edition, Taxmann

BANKING AND FINANCIAL INSTITUTIONS

Course Code: MGT2606 **CreditUnits: 03**

Course Objective:
The aim of the course is to orient the finance students to the change in the banking industry. The financial industry much like the computer industry is changing rapidly. The students will be familiarized with institutions of today and developing an understanding why they are the way they are, and why they are changing is the core aim of the course.

Course Contents:

Module I: Introduction
Money, Process of Capital Formation., Banking and Financial Institutions and economic development, Role of Development Banks in Industrial Financing.

Module II: Banking System & Operations.
Banking system and structure in India- Types of banks in operation and their functions, Retail and Wholesale Banking, Near Banks, Rural Banking. Cooperative Banking. Universal Banking, NBFCs- International Banking- Financing exporters and importers – Important ECGC Policies and guarantees governing export financing) Banking Operation: An overview Principles of Lending, Study of Borrowers & Project Evaluation Criteria

Module III: Banking Sector Reforms
Provisions of Banking Regulation Act, Prudential Norms - Narsimhan Committee Recommendations, Regulatory Institutions RBI & SEBI, Basle Committee Recommendations, Asset Liability Management in Commercial Banks.

Module IV: Insurance Institutions
Introduction to Insurance – Elements of Insurance Risk, Principles of Insurance, Types of Insurance – Life Insurance and General Insurance Products including unit linked plans, Re-insurance, Bancassurance- concepts, critical issues & functional aspects. Role of Insurance companies in Industrial Financing.

Module V: Financial Inclusion
Concept, Financial Inclusion in India: Challenges, Scope of Financial Inclusion in banking activities & financial services.
Micro Finance as a tool of Financial inclusion: Evolution: Grameen Model, Self Help groups.
Progress in India, Principles of microfinance- institutional structures and delivery mechanisms. Enforcement and savings

Module VI: Trends in Banking
Banking Innovations, Marketing of banking services, Banking Technology - Internet banking, ATMs, mobile banking; Banking Technology - ECS, debit, credit and smart cards Securitization (SARFAECI Act, SPV, ARC)

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Khan,M. 3rd Reprint, Financial Institutions and Markets, Tata McGraw Hill Publishing Company Limited.

References:

- Cornett and Sauunders, Fundamentals of Financial Institutions Management, McGraw Hill Publishing Company Limited.
- Bhole L.M., Third Edition, Financial Institutions and Markets; Structure, Growth and Innovations, Tata McGraw Hill Publishing Company Limited.
- Patahak.VBharati, The Indian Financial System Pearson Education, Second Edition

ADVANCED CORPORATE FINANCE

Course Code: MGT2607 **Credit Units: 03**

Course Objective:
The basic objective of this course is to acquaint the students with the latest developments in the field of corporate finance. This course will be a step above Financial Management II where they will learn advanced topics related to behavioural finance, corporate restructuring & corporate governance

Course Contents:

Module I: Introduction
Objectives of Corporate finance, Shareholder wealth maximization, Agency Problems, Management Compensation & measurement of Performance

Module II: Valuation Concepts
Valuation Models, Application of Valuation Model, EVA/MVA, Balanced scorecard and other methods/measures of financial performance.

Module III: Corporate restructuring
Differential Efficiency & Financial Synergy: Theory of Mergers**,** Operating Synergy & Pure Diversification: Theory of mergers**,** Costs and Benefits of Merger**,** Evaluation of Merger as a Capital Budgeting Decision**,** Poison Pills,Turnaround Strategies, Tax Planning relating to mergers and Amalgamation

Module IV: Corporate Governance& Business Ethics
Implementation of Corporate Governance**,** Ethics and finance, Ethical practices in market place, Corporate Responsibility, Social Audit and Ethical Investing.

Module V: Behavioural Finance
Introduction and Expected Utility, Non-Expected Utility Preferences, A review of classical probability theory, Beliefs, Biases and Heuristics, Preferences and Anomalies in the Financial markets

Module VI: Strategic Cost management
Financial aspects of Supply Chain Management, Operations management perspective on Costs, Strategic cost analysis (using activity based costing, target costing and life cycle costing) and Product pricing at Different stages of product's life cycle.

Examination Scheme:

Components	**CT**	**HA**	**Q**	**C**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Text:
- Brealey and Myers, Priciples of Corporate Finance, Eighth Edition, Tata McGraw Hill Publishing Company Limited.

References:
- Ross, Westerfield and Jaffe, Seventeenth Edition, Tata McGraw Hill.
- Quiry, P., Dallocohio, M., YannLEFur,.AntonioSalvi, Seventh Edition, John Wiley and Sons

INDUSTRIAL RELATIONS AND LABOUR LAW

Course Code: MGT2608 **CreditUnits: 03**

Course Objective:
The objective of the course is to acquaint students with the origin and importance of Labour laws governing general functioning of employees in an organisation and also to educate student with the important provisions under these laws .This will enable them to develop the right perspective of this delicate responsibility to deal with union constructively and to maintain industrial democracy.
Course Contents:

Module I: Basic Concepts
Industrial Relations, Industrial Peace, Industrial unrest and Industrial Discipline

Module II: Laws Relating to Industry
The Factories Act, 1948, Definition, Approval licencing and registration of factories, Notice by occupier, Health, and welfare measures, weekly holidays, Leave with wages, Employment of women and young person, Penalties and returns, The Industrial Disputes Act, 1947 – Definition, Conciliation, Court of enquiry and Voluntary process for the settlement of industrial disputes, Power of the Govt. under ID Act, Instrument of economic coercion, Strike & lock out, Lay off Retrenchment, Transfer and closures, Discharge and Dismissal, Managements prerogative during pendency of proceeding, Work Committee, arbitration and adjudication.

Module III: Laws Relating to Remuneration
The Payment of Wages Act, 1936 - Definition - Rules for payment of wages and deductions from wage, The Minimum Wages Act 1948 - Fixing of minimum wages, Procedure for raising minimum wage, Concept of living wages, Fair wage and minimum wage, The Employees State Insurance Act 1948 – Definition, Applicability of the Act, Insurable workmen, Contribution Benefit, Penalties, The Employees Provident Fund and Miscellaneous Provisions Act, 1952 and Employees family pension scheme – definition, Coverage of the organization and employees under the Act, Employees Provident Fund and pension fund scheme, Calculation of contribution withdrawal of Provident Fund amount, Penalties for offence, The Payment of Gratuity Act, 1972 – Definition, Scope and Coverage of the Act - Eligibility criteria - Calculation of Gratuity Nomination, The Payment of Bonus Act 1965 - Applicability of Act, Coverage of employee, Calculation of bonus Rate of Payable bonus, Available surplus, Allocable surplus.

Module IV: Laws Relating to Trade Union
The Trade Union Act 1926, Statutory Definition - Registration of TU, Immoduley granted to Registered Trade Union, Recognition of TU.

Module V: Compensation and Insurance
The workmen's compensation Act 1923 – Definition, Rules regarding workmen's compensation, Defense available to employer and employees, The Maternity Benefit Act 1961.

Module VI: Miscellaneous Acts
The Industrial Employment (standing order) Act 1946 - Scope and coverage of the Act - Concept of standing order, its Certification process - Modification - Interpretation and Enforcement of standing orders.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- P L Malik, Handbook of Labour and Industrial Law, 9th Edition, Eastern Book Publication

References:

- R. C. Chawla and K.C. Garg, "Industrial Law", Ludhiana, Kalyani Publishers.
- P.L. Malik, "Industrial Law", Lucknow, 19th edition reprinted, Eastern Book Co.
- J.K. Bareja, "Industrial Law", New Delhi, Galgotia Publishing Co.
- M.Y. Pylee and George Simon, "Industrial Relations and Personnel Management", New Delhi, Vikas Publishing House.
- P. Subba Rao, (2013), "Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games", Mumbai, Himalaya Publishing House.
- S.C. Shrivastava, (2012), "Industrial Relations and Labour Laws", New Delhi, Fourth revised Edition, Vikas Publishing House.

PERFORMANCE MANAGEMENT SYSTEM

Course Code: MGT2609 **Credit Units: 03**

Course Objective:
This course will help students understand the significance of appraisal for an organization and individuals. It will develop an understanding of various Performance Appraisal tools and their applications and potential appraisal. Further it will develop a right perspective in them towards managing and improving performance.

Course Contents:

Module I: Overview of Performance Management
Employee Motivation & Needs (Vroom's & Adam's Theory of Motivation), Performance Appraisal: The past & the future, Human Resource Development & Performance Appraisal, Planning Performance & Role Clarity, Accountability and Effectiveness.

Module II: Process of Performance Appraisal
Measuring Performance Appraisal – Objectives & Indicators, Methods of Appraisal – Contemporary & Modern methods, Performance feedback & counseling, PMS.

Module III: 360 Degree Feedback
Definition, methodology, advantages/disadvantages of Feedback, RSDQ Model, and Criteria for success, Experiences in 360 appraisals.

Module IV: Potential Appraisal
Concept, Difference between performance appraisal and potential appraisal, Competency mapping & Potential appraisal –case studies

Module V: Performance Management in Application
Performance Management and development, Performance Management and Pay, Creating High Performance organization.

Module VI: Emerging Concerns & Performance Management
Appraisal for future – Going beyond tangible performance, HR Scorecard.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- T.V. Rao; Performance Management and Appraisal; Jaico Publication
- Dinesh K. Srivastava, "Strategies for Performance Management", New Delhi, Excel Books,

References:
- K Aswathappa; (2012), Human Resource and Personnel Management; McGraw- Hill Companies
- Desimone; Human Resource Development, Thomson Learning

COMPENSATION AND REWARD MANAGEMENT

Course Code: MGT2610 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize students with the dynamics of wage and salary administration and current trends in India.

Course Contents:
Module I: Introduction
Overview of Compensation Management, Wage and Salary Administration – Nature, Importance, Philosophy, Objectives, Definition, Goals Role of various parties – Employees, Employers, Unions & Government and Legislations for compensation.

Module II: Developing Compensation Programs
Job Evaluation, Basic systems Time wage, Piece wage, Incentives, Wage payments and Total Salary Structure, Compensation Surveys, Hay Plan, Developing Competitive Compensation Programs, Developing Salary Structures

Module III: Derivatives of Compensation
Pay for Performance, Merit pay and Performance Appraisal, Performance based rewards, Performance Criteria Choices, and Competency Mapping & Developing Performance Matrix, Performance based Compensation Schemes.

Module IV: Incentive Plans
Incentive Plans: individual and group incentive plans, Productivity Gain sharing plans, Profit Sharing Plans, Non - Financial and Financial incentives, Measuring Cost- to – Company (CTC).

Module V: Employee Benefits
Employee Benefits: Supplemented Pay benefits (pay for time not worked) insurance benefits, Retirement benefits, Employees' service benefits, Introduction to ESOPs, Flexible benefits and Benefit Surveys.

Module VI: Current Trends
Current Trends in Compensation and Reward Management

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:
Text:
- Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall.
- William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill.
- Milkovich& Newman, Compensation, Irwin/McGraw-Hill 8th Ed.

References:
- Frans Poets, The Art of HRD – Job Evaluation & Remuneration, Crest Publishing, Volume7 1st Edition
- Michael Armstrong, Helen Murlis, The Art of HRD – Reward Management, Crest Publishing
- Michael Armstrong, Employee Reward, (University Press)
- P. Zingheim, The New Pay, Linking Employee & Organization Performance, Schuster, (Jossey-Bass)
- Sara Rynes, Compensation in Organization, Gerhart (Jossey BASS)
- Wendell L French, "Human Resource Management", USA, Houghton Mifflin Company.
- David D. Decenzo and Stephen P. Robbins, "Human Resource Management", New Delhi, Prentice Hall.

OBJECT ORIENTED PROGRAMMING WITH JAVA

Course Code: MGT2611 **Credit Units: 03**

Course Objective:
The objective of the course is to give knowledge of 5the Object Oriented approach to development of software using Java Language, It is expected that a student at the end of the course would attain a good conceptual understanding and logical approach of software development

Course Contents:
Module I: Basics of OOPS
Object, Class, Abstraction & Encapsulation, Inheritance, Polymorphism Genesis and overview of Java The creation of Java, Java's importance to the Internet, Lexical issues (White space, Identifiers, Literals, Comments, Separators, Keywords), The Java Class Libraries.

Module II: Data types, Variables and Arrays
Integer Data Type, Floating Data Type, Characters, Booleans, Literals, Variables, Type Conversion & Casting, Arrays & Strings Operators Arithmetic Operators, Bitwise Operators, Relational Operators, Boolean Logical Operators, the Assignment Operator, Operator.

Module III: The Control Statements
Selection Statements, Iteration Statements, Jump Statements Classes, Class Fundamentals, Declaration of Object, Methods, Constructors, A Stack Class, Overloading Methods and Constructors, Argument Passing, Objects as Parameters, Returning Objects, Introducing Final & Understanding Static

Module IV: Inheritance
Inheritance Basics, Using Super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, using Abstract Classes, Exception handling Fundamentals of Exception Handling, Exception Types, using Try and Catch, Throw and Throws, nested Try statements.

Module V: I/O Applets
I/O basics, Reading console inputs and outputs, The Print Writer Class, Applet fundamentals, the Transient and Volatile modifiers, native methods and their problems, The Java Libraries String Handling, Exploring Java.lang, the collections framework with java.util, managing Input/ Output by exploring java.io.

Module VI: **The Applet Class**
Applet architecture, an applet skeleton, Applet display methods, passing parameters to Applets, Applet context and show Document, Networking, Java and the net, InetAddress, TCP/IP Client and Server Socket, URL Connections.

Examination Scheme:

Components	CT	HA	Q	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:
Text:
- Herbert Schildt: The Complete Reference – Java 2, Fourth Edition. Tata McGraw-Hill.

References:
- C. Thomas Wu - An introduction to Object Oriented Programming with Java 2nd Edition. Tata Mc-Graw Hill
- Cay S. Horstmann, Gary Cornell – Core Java. Pearson Education Asia
- Deitel&Deitel – Java, How to Program, 3rd Edition. Pearson Education Asia

DATA COMMUNICATION AND NETWORK

Course Code: MGT2612 **CreditUnits: 03**

Course Objective:
The objective of the course is to give knowledge of the Object Oriented approach to development of software using C++ Language. It is expected that a student at the end of the course would attain a good conceptual understanding and logical approach of software development.

Course Contents:

Module I: Introduction
Introduction to Computer Networking, Computing Models and Network development, Required Network Elements, Networking Services, Common Networking Services File Service, Print Services, Message services, Application Services, Database services Centralized versus Distributed Network Services.

Module II: Transmission Media
Transmission Media, Introduction to Transmission Media, Common Computer Network Transmission Media, Public and Private Network, Transmission Media Connections Introducing Transmission Media Connections, Networking Connectivity Hardware.

Module III: Networking Protocol and Models
Networking Protocol and Models, Need of Rules, Moving from Rules to Models, OSI Model, Leading Protocol Stack for Computer Networking, Internet protocol, Transmission Control Protocol.

Module IV: LAN Terminology & Components
LAN terminology & Components, LAN architecture, Protocols and Addressing, Ethernet LANs, Token Ring & FDDI, LAN Networking Devices, Common approaches to LAN Management, Concept of N/w Design, Introduction to WAN: Private& Public, VPN: How it works, VPN security, Technologies.

Module V: Overview of ATM Technology
Overview of ATM Technology, VoIP, Frame Relay, Gigabit Ehernet, Wireless Communications Convergence of Telecom, IT & Management, Telecommunication as a strategic weapon-some, Satellite communication, V-SAT.

Examination Scheme:

Components	**CT**	**HA**	**Q**	**C**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:
- Computer Networks & Internets, D.E. Comer
- Data & Computer Communications, William Stallings

References:
- Introduction to Networking, Barry Nance
- Computer Communication Networks, A. Shanmugam and S. Rajeev
- Computer Networks, Tanenbaum

WEB DATABASE PROGRAMMING WITH ASP

Course Code: MGT2613 **CreditUnits: 03**

Course Objective:
The objective of the course is to capacitate students to build and deploy dynamic web applications that interact with a powerful database. The modules provide background on subjects such as HTML, client side scripting and relational databases. At the end of the course, the students will be able to set up their own personal dynamic web site using a Microsoft web server to illustrate web site creation and administration principles. The curriculum will make the students learn real world context.

Course Contents:

Module I: **ASP Fundamentals**
Software requirements, Installing personal web server, Installing IIS, IIS service features, Hardware requirement, ASP connection with IIS, Built in objects. Understanding request and response objects, The ASP request object, Requesting information from forms, QueryString collection & Server variables, cookies, ASP response object, response object methods and properties.

Module II: Understanding VB Script Language
Scripting, VB Scripting, Understanding variables, Integerating Script with HTML, Client side and server side scripting, Converting variable types, Operators, Message Box, Accessing objects, Using built in functions and statements, Program control statements.
Error Handling: Error Handling, ASP.

Module III:
Understanding Procedures and Classes
Understanding procedures, Sub-procedures, Functions, Classes, Methods, Events.
Session and Application Objects
The Session Object and collection of Session Object, Methods, properties and events, The Application object collections and methods, Using session and application objects.

Module IV: The ADO connect Object
Data Access components, Universal data access architecture, ADO, DAO, RDO architectures, OLE DB and ODBC, The ADO connection object, Creating and opening connection object, Creating DSN, connection with ODBC, connecting with OLE DB, using ADO connection and SQL statements.

Module V: ADO Record set Object
Creating and opening a record set object, Moving through a record set, The fields collection, using ADO record set, Bookmarks, Filtering Record sets, Searching for records, Modifying Records, The Get String method.
The ADO command object: Creating a command object, using a stored procedure, using stored procedure with parameters, return values, Output parameters and the command object.

Examination Scheme:

Components	CT	HA	Q	C	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:
Text:
- Joline Morrison, Mike Morrison: Database Driven Web Sites, Second Edition - Thomson.

References:
- BhanuPratap: Understanding Active Server Pages – Cyber Tech Publication
- Patrick Carey: New Perspective on HTML, XHTML, and Dynamic HTML, Comprehensive, Third Edition - Thomson
- Keith Morneau, Jill Batistick: Active Server Pages – Thomson

INTELLECTUAL PROPERTY RIGHTS

Course Code: MGT2614 **Credit Units: 03**

Course Objective:
The objective of this course is to acquaint the students with basics of intellectual property rights with special reference to Indian law and practice.

Course Contents:

Module I: Introduction
Types of Intellectual Property Rights, Inventions vs. Discoveries, Conventions .

Module II: Copyright
Nature and Meaning, Scope of protection, Procedure for protection, Enforcement and Remedies.

Module III: Patents
Nature and Meaning, Scope of protection, Procedure for protection, Enforcement and Remedies .

Module IV: Trademarks
Nature and Meaning, Scope of protection, Procedure for protection, Enforcement and Remedies .

Module V: Designs
Nature and Meaning, Scope of protection, Procedure for protection, Enforcement and Remedies.

Module VI: Current Scenario:
Role of WTO and essential elements under TRIPS.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

Compulsory Readings (Latest editions only)

Text:
- Paris Convention for the Protection of Industrial Property, 1883
- Berne Convention for the Protection of Literary and Artistic Works, 1886
- Indian Copyright Act, 1957
- Indian Patents Act, 1970
- Agreement on Trade-Related Aspects of Intellectual Property Rights, 1994 (the TRIPS Agreement)
- Indian Trademarks Act, 1999
- Indian Designs Act, 2000
- Patents Amendment Ordinance, 2004.

References:

- Nair and Kumar, eds., Intellectual Property Rights (N. Delhi: Allied, 1994)
- Narayanan, P., Patent Law, Kolkata: Eastern Law House, 1998)

HUMAN RIGHTS

Course Code: MGT2615 **Credit Units: 03**

Course objective:
The objective of this course is to lay the foundation of the Human Rights Law and acquaint the students with basic human rights institutions.

Course Contents:

Module I: Introduction
Concept & Development of Human Rights.

Module II: UN Charter and Human Rights
Contribution of United Nations in the Development & Implementation of Human Rights, Universal Declaration of Human Rights, International Covenants

Module III: Human Rights and the Indian Constitution
Fundamental Rights & Directive principles of State Policy.

Module IV: Protection of Human Rights Act 1993
Meaning & scope, Nature of Human Rights violations Role of National Human Rights Commission.

Module V: Group Rights
Rights of Marginalised Groups
Women
Children
Refugees
Refugees
Prisoners
Disabled

Module VI: Protection of Human Rights
Role of National Human Rights Commission, role of NGO's, the role of Judiciary, Recent developments in Human Rights.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text: **(Compulsory Readings)**

- UN Charter
- Constitution of India
- Human Rights Act 1993
- Sinha, M.K. – Implementation of Non-Derogation Human Rights (Delhi 1999)

References:

- D.D. Basu – Human Rights
- UpenderBaxi – Human Rights
- Thomas Buergenthal – Human Rights
- Henry Steiner & Philip Alston – International Human Rights Law
- B.G. Ramcharan – International Human Rights (Oxford, 1998)
- Y.K. Tyagi – British Yearbook (2001).

INDUSTRIAL RELATIONS AND LABOUR LAW

Course Code: MGT2616 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint student's with the origin and importance of Labour laws governing general functioning of employees in an organisation. And also to educate student with the important provisions under these laws .This will enable them to develop the right perspective of this delicate responsibility to deal with union constructively and to maintain industrial democracy.
Course Contents:

Module I: Basic Concepts
Industrial Relations, Industrial Peace, Industrial Unrest and Industrial Discipline

Module II: Laws Relating to Industry
The Factories Act, 1948 – Definition, Approval licensing and registration of factories, Notice by occupier, Health, and welfare measures, weekly holidays, Leave with wages, Employment of women and young person, Penalties and returns, The Industrial Disputes Act, 1947 – Definition, Persuasive, conciliation and voluntary process for the settlement of industrial disputes, power of the Govt. under ID Act, Instrument of economic coercion, Strike & lock out, Lay off Retrenchment, Transfer and closures, Discharge and Dismissal, Managements prerogative during pendency of proceeding.

Module III: Laws Relating to Remuneration
The Payment of Wages Act, 1936 – Definition, Rules for payment of wages and deductions from wage, The Minimum Wages Act 1948 - Fixing of minimum wages, Procedure for raising minimum wage, Concept of living wages, Fair wage and minimum wage, The Employees State Insurance Act 1948 – Definition, Applicability of the Act - Insurable workmen, Contribution Benefit, Penalties, The Employees Provident Fund and Miscellaneous Provisions Act, 1952 and Employees family pension scheme – definition, Coverage of the organization and employees under the Act - Employees Provident Fund and pension fund scheme, Calculation of contribution withdrawal of Provident Fund amount, Penalties for offence, The Payment of Gratuity Act, 1972 – Definition, Scope and Coverage of the Act - Eligibility criteria, Calculation of Gratuity Nomination, The Payment of Bonus Act 1965 - Applicability of Act, Coverage of employee, Calculation of bonus Rate of Payable bonus, available surplus, allocable surplus.

Module IV: Laws Relating to Trade Union
The Trade Union Act 1926, Statutory Definition - Registration of TU Immoduley granted to Registered Trade Union - Recognition of TU.

Module V: Compensation and Insurance
The workmen's compensation act 1923 – Definition, Rules regarding workmen's compensation, Defense available to employer and employees, E.S.I.C. Act, 1948, The Maternity Benefit Act 1961

Module VI: Miscellaneous Acts
The Industrial Employment (standing order) Act 1946 - Scope and coverage of the Act, Concept of standing order, its certification process, Modification, interpretation and enforcement of standing orders.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- P L Malik, Handbook of Labour and Industrial Law, 9th Edition, Eastern Book Publication

References:

- R. C. Chawla and K.C. Garg, "Industrial Law", Ludhiana, Kalyani Publishers.
- P.L. Malik, "Industrial Law", Lucknow, 19th edition reprinted, Eastern Book Co.
- J.K. Bareja, "Industrial Law", New Delhi, Galgotia Publishing Co.
- M.Y. Pylee and George Simon, "Industrial Relations and Personnel Management", New Delhi, Vikas Publishing House.
- P. Subba Rao, (2013), "Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games", Mumbai, Himalaya Publishing House.
- S.C. Shrivastava, (2012), "Industrial Relations and Labour Laws", New Delhi, Fourth revised Edition, Vikas Publishing House.

ECONOMICS

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
ECO2151	Micro Economics-I	3	-	-	3
ECO2251	Indian Economy	3	-	-	3
ECO2351	Macro Economics-I	3	-	-	3
ECO2451	Public Finance	3	-	-	3
ECO2552	Statistical Methods in Economics	3	-	-	3
ECO2651	Money, Banking & Financial Markets	3	-	-	3
	TOTAL				**18**

ECONOMICS

Syllabus - Semester First

MICRO ECONOMICS-I

Course Code: ECO2151 **Credit Units: 03**

Course Objective:
This course is designed to expose first –year students, who may be new to economics, the basic principles of microeconomic theory. The emphasis would be on thinking like an economists & the course will illustrate how microeconomic concepts can be applied to analyze real life situations.

Course Contents:
Module I: Exploring the Subject Matter of Economics
Why study economics? The scope and method of economics; scarcity and choice; questions of what, how and for whom to produce and how to distribute output

Module II: Supply and Demand: How Markets Work, Markets and Welfare
Individual demand and supply schedules and the derivation of market demand and supply; shifts in demand and supply curves; the role prices in resource allocation; Elasticity of Demand — price, income and cross; Consumer's surplus

Module III: Consumer's Behavior
Utility-cardinal and ordinal approaches, Indifference curves; budget constraints;. Consumer's equilibrium (Hicks and Slutsky); Giffin goods; Compensated demand; Revealed preference theory; Engel curve.

Module IV: Theory of Production and Costs:
Technology, Isoquants, production with one and more variable inputs, Returns to scale, short run and long run costs, cost curves in the short run and long run, total, average, and marginal product, cost minimization and expansion path, elasticity of substitution.

Examination Scheme:

Components	A	P	HA	CT	EE
Weight age (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:
Text:

- C. Snyder and W. Nicholson, Fundamentals of Microeconomics, Cengage Learning (India), 2010.
- B. Douglas Bernheim and Michael D. Whinston, Microeconomics, Tata McGraw-Hill (India), 2009
- Ahuja H.L. (2010) Principles of Microeconomics, 18th Edition, S. Chand& Co. Ltd.
- Robert S. Pindyk and D.L. Rubinfeld, (2000), Microeconomics, 3rd edition, Prentice Hall India.

- Ferguson &Gould(1989) Micro Economic Theory, 6th edition, all India Traveller Bookseller.
- Koutsoyiannis, A. (1990), Modern Microeconomics, Macmillan

References:

- N. Gregory Mankiw (2007), Economics: Principles and Applications, 4th edition, India edition by South-Western, a part of Cengage Learning, Cengage Learning India Private

Syllabus - Semester Second

INDIAN ECONOMY

Course Code: ECO2251 **Credit Units: 03**

Course Objective:
This subject covers the major features of Indian Economy at Independence in the field of agriculture industry and other infrastructure of the economy. It also deals with growth of development of different phases on the current issues in Indian economy policy.

Course Contents:

Module I: Economic Development at the time of Independence
Major features of the economy at independence: Colonial economy; Semi-feudal economy; Backward economy; Stagnant economy

Module II: Planning in India
Objectives; Strategy; Broad achievements and failures; Current Five Year Plan — objectives, allocation and targets; New economic reforms — Liberalization, privatization and globalization; Rationale behind economic reforms; Progress of privatization and globalization

Module III: Major Economic Issues
Demographic trends and issues; education; poverty and inequality; unemployment, inflation

Module IV: External Sector
Role of foreign trade; Trends in exports and imports; Composition and direction of India's foreign trade; Balance of payments crisis; Export promotion measures and the new trade policies

Module V: Agriculture
Nature and importance; Trends in agricultural production and productivity; Factors determining productivity; Land Reforms; New agricultural strategy and green revolution

Module VI: Industry
Industrial development during the planning period; Industrial policy of 1991 and the latest Industrial policy; Growth and problems of small scale industries; Role of public sector enterprises in India's industrialization

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- RuddarDutt and K.P.M Sundaram(2012) Indian Economy, S.Chand& Co. Ltd, Delhi
- Mishra &Puri(2005) Indian Economy, Himalayan Publishing House, Bombay
- V.M. Dandekar (1992), Forty Years after Independence in B. Jalan (ed.), The Indian Economy, Problems and Prospects, Viking Press.

References:

- Sebastian Morris (2001), Issues in Infrastructure Development Today: The Interlinkages, in India Infrastructure Report, OUP
- MontekAhluwalia, (2002), State level Performance under Economic Reforms in India, in A.O. Krueger(ed), Economic Policy Reforms and the Indian Economy**,** Univ. of Chicago Press.
- PranabBardhan(2003), Poverty, Agrarian Structure and Political Economy in India: Selected Essay, OUP, CH.5.
- JagdishBhagwati, (1993), India in Tansition, Freeing the Economy, Clarendon Press, Ch. 2.
- J. Bhagwati and Padma Desai (1970), India: Planning for Industrialization, Ch 2 OUP.
- S. Chakravarty (1987), Development Planning: The Indian Experience, Clarendon Press.
- Jean Dreze and AmartyaSen (2002), India: Development and Participation, OUP, Chs. 2, 3,5,6,9.
- B.S. Minhas (1991), Public vs Private sectors: Neglect of Lessons of Economics in Indian Policy Formulation, R.R. Kale Lecture, Gokhale Institute of Politics & Economics, Pune.
- MihirRakshit (2001), On Correcting Fiscal Imbalances In the Indian Economy: Some Perspectives
- Government of India, Economic Survey(annual) New Delhi
- Reserve Bank of India, Handbook of statistics of Indian Economy(Annual)

Syllabus - Semester Third

MACRO ECONOMICS-I

Course Code: ECO2351 **Credit Units: 03**

Course Objective:
This course aims at introducing the fundamentals of Macroeconomic theories, policies and models in a historical perspective. It will enable the students to develop a critical insight on Classical and Keynesian macroeconomic models, to understand the relationship between inflation and employment by providing exposure to the constructions of Friedman, Phelps & Phillips.

Course Contents:

Module I: Introduction to Macroeconomics
The roots of macroeconomics, macroeconomic concerns, the role of government in the macro economy, the components of the macro economy, the methodology of macroeconomics

Module II: Introduction to National Income Accounting
Concepts of GDP and national income, approaches to calculating GDP, GDP and personal income, Nominal and real GDP, Limitations of the GDP concept.

Module III: Schools of Macroeconomic Thoughts
Classical, Neo Classical and Keynesian Models.; Say's Law of Markets and Classical Theory of Employment

Module IV: Keynesian Model
Keynes theory of income and employment; Consumption function; theory of investment-marginal efficiency of capital; saving and investment; The Investment Multiplier and its application to LDC's

Module V: Money in the Modern Economy
Theories of Demand for Money: Quantity Theory and Keynes approach; Characteristics of a monetary economy; the supply of money and overall liquidity position; credit creation

Module VI: Inflation
Inflation: types, causes, consequences and impact on the Indian economy; remedial measures.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th edition, 2010Ahuja H.l. (2010) Macroeconomics: Theory and Policy,S. Chand& Co. Ltd.
- Mc Connell. C.R & H.C. Gupta, "Introduction to Macro Economics", Tata McGraw Hill, Delhi
- Gardner Ackeley, "Macro Economics".

References:

- J.E. Stiglitz, and C.E. Walsh (2002), Principles of Economics, 3rd Edition, W.W. Norton & Company, New York.
- R. Stone and G. Stone (1977), National Income and Expenditure,10th edition, Bowes and Bowes London.
- K.K. Dewett: Modern Economic Theory, New Delhi, Shyamlal Charitable Trust.

Syllabus - Semester Fourth

PUBLIC FINANCE

Course Code: ECO2451 **Credit Units: 03**

Course Objective:
This subject is primarily aimed at introducing principles of public finance, role of different governments, public expenditure, taxation, budget and fiscal policy in India. The government plays different roles and performs varied functions which are different from earlier societies. In this context the public financial functions of the government need to be understood by a student, by studying the relevant theory and empirical analysis.

Course Contents:

Module I: Introduction
Nature, Scope and Importance, Theory of Maximum Social Advantage, Private goods, Public goods and Merit goods; Role of government in managing the economy under different economic systems – Social Welfare Function; Theory of Public goods - Market failure - Externalities - problems in allocation of resources - theoretical developments in Demand revelation for social goods -Public choice.

Module II: Public Expenditure
Theories of Public Expenditure -Structure and growth of public expenditure - Criteria for public investment - Income Redistribution – Expenditure Programmes for the poor - Social Insurance: Unemployment Insurance, Health Care, and Education - Social cost-benefit analysis - benefit estimation and evaluation.

Module III: Taxation
Theory of Taxation - Benefit and ability-to-pay approaches - Indian Direct and Indirect Taxes - Effects of taxation - Requirements of a sound tax system - Canons of taxation - Tax reforms since 1975 - Chelliah Committee Report - Evaluation of Tax Reforms -Taxation Incidence and alternative concepts of Incidence.

Module IV Budgeting and Debt
Budget - Concept of PPB - Zero-based Budgeting - Cash budgeting : Cash management and Treasury functions in Government - Deficit Budgeting - Types of Deficits - Public Debt: Trends and composition of Indian Public Debt: Instruments - Treasury bills, bonds and other securities, Role of RBI - Debt management - Methods of debt redemption.

Module V: Fiscal Policy
Role of Fiscal Policy in India - Principles of Fiscal federalism in India; Finance Commissions and Planning Commission

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P-**Project/Seminar/Quiz/Viva; **HA-**Home Assignment; **CT-**Class Test; **EE-**End Semester Examination)

Text & References:

Text:

- Musgrave, R.A. and P.B. Musgrave (1976), Public Finance in Theory and Practice, 3rd edition, McGraw- Hill Kogakusha, Tokyo.
- RaghbendraJha : (1998), Modern Public Economics.
- Rosen, Harway, S. - Public Finance, IVthEdn. Irwin.

References:

- Mueller, D.C. (1979), Public Choice, Cambridge University Press, Cambridge.
- Brown, C.V. and Jackson - Public Sector Economics
- Raja J. Chellia et al. - Trends in Federal Finance.
- D.N. Dwivedi, Readings in India Public finance
- Government of India, Report of the 13th Finance Commission.
- Economic Survey, Government of India (latest).
- State Finances: A Study of Budgets, Reserve Bank of India (latest).

Syllabus - Semester Fifth

STATISTICAL METHODS IN ECONOMICS

Course Code: ECO2552 **Credit Units: 03**

Course Objective:
This subject will deal with all fundamental statistical methods of tools which the students have to use in economic analysis and decision making problems.

Course Contents:

Module I: Introduction:
Basic concepts: Population, Sample, Parameter, Statistic, Frequency distribution, Cumulative frequency distribution; Graphic and diagrammatic representation of data; Techniques of data collection. Sampling vs. Population, primary and secondary data.

Module II: Central Tendency and Dispersion:
Measures of Central Tendency: Mean, Median, Mode, Geometric mean, Harmonic mean; Measures of Dispersion; Range, Quartile deviation Mean deviation, Standard deviation; Skewness and Kurtosis, Moments.

Module III: Correlation and Regression:
Correlation: Simple; Coefficient of correlation; Karl Pearson and Rank correlation; Partial and Multiple Correlation analysis; Regression analysis – Estimation of a regression line in a bivariate distribution, Least squares method; Interpretation of correlation and regression coefficients; Coefficient of determination.

Module IV: Time Series:
Time Series Analysis - concept and components, determination of trend (Linear, Quadratic and Exponential) and seasonal indices

Module V: Index Numbers
Concept of an index number; Laspeyer's, Paasche's and Fisher's Index Numbers; Time Reversal, Factor reversal and circular tests; Chain base index; Problems in the Construction of an index number; splicing; base shifting and use of index number for deflating other series.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:

Text:

- Allen Webster, Applied Statistics for Business and Economics, (3rd edition), McGraw Hill, International Edition 1998.
- Richard J. Larsen and Morris L. Marx, An Introduction to Mathematical Statistics and its Applications, Prentice Hall, 2011.

References:

- P.H. Karmel and M. Polasek, Applied Statistics for Economists (4th edition), Pitman, Australia.
- M.R. Spiegel (2nd edition), Theory and Problems of Statistics, Schaum Series.

Syllabus - Semester Sixth

MONEY, BANKING AND FINANCIAL MARKETS

Course Code: ECO2651 **Credit Units: 03**

Course Objective:

The main objective of the course is to impart knowledge about the concept of money, financial markets, financial instruments &banking industry; The concepts like estimation of demand for & Supply of money, financial deepening etc. will also be introduced.

Course Contents:

Module I: Money in the Financial System
Role of money in the economy - various schools of economic thought. Functions of money, financial markets, financial instruments and financial deepening;

Module II :Financial Markets
Structure of Money and Capital market in India. Monetary and Financial sector reforms in India. Concept of risk and return ; management of risk and return, Optimal Portfolio, Financial Innovations.

Module III: Interest Rates
Theories of Interest, Determination and Interstates differentials, Structure of interest rates in India. Theories of term structure of interest rates.

Module IV: Banking System
Introduction to the Banking system, Role and functions of commercial banks, Balance sheet and Portfolio Management, Indian Banking system –Changing role and structure, Banking Regulations, Banking sector reforms in India.

Module V: Central Banking and Monetary Policy
Functions of Central Banking, Various measures of money supply, Reserve Money .Goals, Targets, Instruments of Monetary Control, Monetary Policy Transmission mechanism, Monetary- management in an open economy, current monetary policy of India.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage(%)	5	10	5	10	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva;**HA**-Home Assignment;**CT**-Class Test;**EE**-End Semester Examination)

Text & References:

Text:

- L. M. Bhole andJ.Mahukud, FinancialInstitutions and Markets,TataMcGraw Hill, 5th edition, 2011.
- M. Y. Khan, Indian FinancialSystem, TataMcGraw Hill, 7th edition, 2011.
- NarendraJhadav, Monetary Economics for India, Macmillan India Publishers,1994.
- D.N Diwedi, Macroeconomics – Theory and Policy, Tata McGraw Hill Publishers, 3rd edition 2010

References:

- F.J. Fabozzi, F. Modigliani, F.J.Jones,M. G. Ferri, Foundations ofFinancialMarkets and Institutions, Pearson Education,3rdedition, 2009
- Various latestissuesofR.B.I. Bulletins, AnnualReports, Reportson CurrencyandFinance and Reports of the WorkingGroup, IMF StaffPapers.M.R. Baye,D.W.Jansen(1996),MoneyBankingand
- FinancialMarkets, AITBS, (Indian Edition)
- F. S. MishkinandS.G. Eakins, FinancialMarkets andInstitutions, PearsonEducation, 6th edition,2009.
- Annual Report of RBI 2014 -15 Chapter 3
- How does the Reserve Bank of India conduct its Monetary Policy? Aug 12,2011 (available on www.rbi.org.in)

ENTREPRENEURSHIP

Programme Structure-2018

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
MGT2152	Orientation Programme in Entrepreneurship	2	-	2	3
MGT2252	Exploring Business Opportunity	2	-	2	3
MGT2352	Developing a Business Model	2	-	2	3
MGT2452	Translating Business Model into Startup	2	-	2	3
MGT2552	Advanced Programme in Entrepreneurship: Growth	2	-	2	3
MGT2652	Advanced Programme in Entrepreneurship: Expansion	2	-	2	3
	TOTAL				**18**

ENTREPRENEURSHIP

Syllabus - Semester First

ORIENTATION PROGRAMME IN ENTREPRENEURSHIP

Course Code: MGT2152 **Credit Units: 03**

Course Overview
The goals of this programme are to inspire students and help them imbibe an entrepreneurial mind-set. The students will learn what entrepreneurship is and how it has impacted the world and their country. They will be introduced to key traits and the DNA of an entrepreneur, and be given an opportunity to assess their own strengths and identify gaps that need to be addressed to become a successful entrepreneur.

The programme comprises several short courses, each focusing on a specific entrepreneurial knowledge or skill requirement such as creative thinking, communication, risk taking, and resilience and helping them become career ready, whether it is entrepreneurship or any other career.

Course Contents:

Module-I: Introduction to Entrepreneurship
Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, Myths about entrepreneurs, agencies in entrepreneurship management and future of entrepreneurship types of entrepreneurs.

Module-II: The Entrepreneur
Why to become entrepreneur, the skills/ traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis, and role models, mentors and support system, entrepreneurial success stories.

Module-III: E-Cell
Meaning and concept of E-cells, advantages to join E-cell, significance of E-cell, various activities conducted by E-cell

Module-IV: Communication
Importance of communication, barriers and gateways to communication, listening to people, the power of talk, personal selling, risk taking & resilience, negotiation.

Module-V: Introduction to various form of business organization (sole proprietorship, partnership, corporations, Limited Liability company), mission, vision and strategy formulation.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(**C** - Case Discussion/ Presentation; **HA** - Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Learning Outcomes

At the end of the course, the students will:

- Develop awareness about entrepreneurship and successful entrepreneurs.
- Develop an entrepreneurial mind-set by learning key skills such as design, personal selling, and communication.
- Understand the DNA of an entrepreneur and assess their strengths and weaknesses from an entrepreneurial perspective.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.

Syllabus - Semester Second

EXPLORING BUSINESS OPPORTUNITY

Course Code: MGT2252 **Credit Units: 03**

Course Overview
The goal of this programme is to provide a space and platform for discovery, both self discovery and opportunity discovery. Students will discover their strengths in terms of an entrepreneurial founding team and learn basics such as opportunity discovery, prototyping, competition analysis, and early customer insights and participate in on-line and campus activities and events such as idea competitions, business plan challenges, etc.

Course Contents:

Module-I: Self-Discovery
Natural born entrepreneur, the reluctant entrepreneur, the hidden traits, discovers your own strength.

Module-II: Idea Generation
Sources of business ideas, how to find & assess ideas? Where to find data for ideation? What is a good problem? Opportunity recognition.

Module-III: Idea Evaluation
Design thinking for finding solutions, prototyping, idea evaluation, entrepreneurial Outlook, value proposition design, customer insight, ideas development , capstone project presentation.

Module-IV: Feasibility Analysis
Product/Service Feasibility Analysis, Industry & competition analysis, environment analysis, financial feasibility analysis.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Further discover their strengths and weaknesses in terms of qualities and traits required to be a successful entrepreneur in the context of a founding team.
- Identify gaps in terms of qualities and traits required to be an entrepreneur, if any, and make a personal action plan to close those gaps.
- Develop the entrepreneurial mind-set further in terms of acquiring a business focus, creative thinking, risk-taking ability, and more.
- Learn about opportunity discovery and evaluation of viable business ideas for new venture creation.

- Practice critical talents and traits required for entrepreneurs such as problem solving, creativity, communication, business math, sales, and negotiation.
- Start customer development, validate their ideas, and learn what prototyping is.
- Understand the value of mentorship in the success of an entrepreneur and their ventures.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.

Syllabus - Semester Third

DEVELOPING A BUSINESS MODEL

Course Code: MGT2352 **Credit Units: 03**

Course Overview
The goal of this program is to take the students from the MVP (Minimum Viable Product) stage to the Business Model stage, i.e. the students will acquire the skills required to transform their MVP into a business model. In this course, they will start building their teams by finding co-founders and perhaps even hiring. They will transform their business idea into the Business Model Canvas and will use it to further refine their MVP. They will also set up a digital presence and learn to use promotional channels and distribution channels to engage and serve their customers. Additionally, they will get started with various legal and operational aspects as well as initial funding concepts such as bootstrapping.

Course Contents:

Module-I: Team
Finding your team, art of team formation, teamwork planning, chief mentor/ founder & Co founders, team formation, and delegation of work.

Module-II: Preparation of Business model/Plan
Meaning and significance of a business plan, components of a business plan, and feasibility study, Iterating the MVP, Digital Presence for Ventures, Clarifying the value proposition, Guidelines for writing BP, pre- requisites from the perspective of investor.

Module-III: Business Model
The importance and diversity of business model, how business model emerge, potential fatal flaws of business models, components of an effective business model, core strategy, strategic resources, partnership network, customer interface.

Module-IV: Product/ Market Fit
Understanding basics of unit economics, cost and profitability, Refining the product/service, Establish the success and operational matrix, Starting Operations.

Customer Validation: Evaluate the efficiency with which customers can be captured and kept, Early insights on cost of customer acquisition, Other Stakeholder Validation, Customer Development and Experience.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(**C** - Case Discussion/ Presentation; **HA** - Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Learning Outcomes

At the end of this course, the students will be able to:

- Acquire the skills and knowledge related to the various phases in venture creation process such as creating a business model and building a prototype.
- Practice entrepreneurship by forming and running a Campus Venture as part of a team.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.

Syllabus - Semester Fourth

TRANSLATING BUSINESS MODEL INTO STARTUP

Course Code: MGT2452 **Credit Units: 03**

Course Overview
The students who are keen to launch their own venture will take this course. Students will select a vertical and launch their own venture. They will learn about market size, costs, channels and customer acquisition, business model and plan finalization, efficiency and growth processes.

Course Contents:

Module-I: Gaining marketing Intelligence
Identify the vertical you will operate in and the business opportunity, understand your customers and accurately assess market opportunity, minimum viable product and the lean method.

Module-II: Develop and validate business model for your venture
Value Proposition, Customer Segments, Channels and Partners, Revenue Model and Streams, Key Resources, Activities, and Costs Customer Relationships and Customer.

Module-III: Development Processes
Translate Business Model into a Business Plan, Visioning for venture, Take product or service to market, Deliver an investor pitch to a panel of investors, Identify possible sources of funding for your venture – customers, friends and family, Angels, VCs, Bank Loans and key elements of raising money for a new venture.

Module-IV: Business Plan & Startup-I
Get to market Plan, Effective ways of marketing for start-ups – Digital and Viral Marketing; Hire and Manage a Team, Managing start-up finance: The Concept of Costs, Profits, and Losses, Manage your Cash Flow, analyse your Financial Performance, budgeting.

Module-V: Business Plan & Startup-II
Establishing a ethical culture for a firm, Legal and regulatory aspects for starting up specific to your venture, Enhancing the growth process and creating scalability (customers, market share, and/or sales), Thorough understanding of market size, costs, margins, delivery channels, customer acquisition costs, Identify areas to build efficiency (product making, service delivery, and channels - key areas of the BM Canvas are identified by now), Finalize business model and plan, Have a 1-2 year roadmap and trajectory.

Module-VI: Obtaining Business Licenses and permits
Business Licenses, business permits, choosing a form of business organization, sole proprietorship, partnership, corporations, Limited Liability company.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA** - Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Launch a sustainable venture with a valid business model, with co-founder(s) on or off campus, and real paying customers.
- Create and validate a business model and business plan for their idea.
- Develop the Minimum Viable Product (MVP).
- Implement an inexpensive and optimum Go-to-Market plan for their business.
- Craft and present an effective business pitch for investors, partners and other stakeholders.
- Gain in-depth knowledge and relevant skills about a specific vertical.
- Students build a prototype or service, generate jobs and revenue.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects including Student Venture; and Practical Experiences including challenges, internships and apprenticeships.

Syllabus - Semester Fifth

ADVANCED PROGRAMME IN ENTREPRENEURSHIP: GROWTH

Course Code: MGT2552 **Credit Units: 03**

Course Overview
The students who already have their own venture will take this course to focus on a growth agenda. They will learn advanced concepts and build sustainability in their venture in various ways such as Growth Financing, process refinement, and scalability.

Course Contents:

Module-I: Growth Opportunities
Characteristics of high growth new ventures, strategies for growth, and building the new venture capital, discovering and assessing opportunities for growth, developing a growth mind-set and visioning for growth, review the robustness and relevance of business model vis-à-vis current market situation, map financing decisions to business models and reiterating business models

Module-II: Retention & Expansion Strategies
Dealing with stagnation of customer base and developing customer base: expansion to new markets – options and strategies, product Life Cycle – Product Road Map; Getting to Plan B, p*roject to Process:* Build, adapt, test, and establish key processes and systems that enable efficiency, continuous and sustained innovation

Module-III: Developing the organizational capabilities for growth
Develop strong leadership capabilities, ability to delegate and manage key leadership tasks. o Streamline operations and organizational design to accommodate growth, Implement new and effective approaches to marketing and communication for customers, suppliers, and employees, Acquire new resources for strategic growth: executive hires.

Module-IV: Planning and streamlining financial/ Legal processes:
Managing cash for growth, Balance between profitability and growth costs, Role of business services – accountant, lawyer, Understanding legal requirements, and compliance issues, Exit options :Evaluating opportunities for acquisition; Growth financing, Scalability & efficiency improvements, IPR.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V -** Viva; **CT-** Class Test; **A -** Attendance; **EE -** End Semester Examination)

Learning Outcomes
At the end of the course, the students will be able to:

- Manage and grow their business in terms of jobs and revenue.
- Make a Growth Plan and pitch it to all stakeholders (investors, partners, key employees etc.).
- Sign up for advanced support for entrepreneurs – Mentor Platform.
- Identify key drivers of growth in a venture.

- Develop a growth mind-set.
- Understand the basics of organization and team building; and establishing policies to hire and retain staff.
- Understanding legal and compliance issues related to their business.
- Present a pitch for funding their growth plan.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.

Syllabus - Semester Sixth

ADVANCED PROGRAMME IN ENTREPRENEURSHIP: EXPANSION

Course Code: MGT2652 **Credit Units: 03**

Course Overview
The students who have a sustainable venture will get ready for the expansion phase. They will focus on expansion and go on the path of creating a high-performance company. They will learn advanced concepts such as franchising, renewal, and profit maximization.

Audience
This course will be offered to all the students who have gone through Advanced Programme in Entrepreneurship. It is suitable for students, keen to continue to grow their ventures. deally, they will have a reasonable understanding of growth challenges and how to tackle them and would seek to expand further through inputs from this course.

Course Contents:

Module-I: Expansion model – Geographical/Franchising/Licensing routes to new market expansion

Module-II: Maximizing Profits- Testing price elasticity, Cost reduction through scaling up, Expanding offerings, other revenue streams (partnerships)

Module-III: Renewal - Similar to Take-off and Resource Maturity of SMEs

Module-IV: Harvesting Rewards- Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Learning Outcomes
At the end of the course, the students will be able to:

- Effectively tackle growth challenges of their venture.
- Nurture and apply a growth mind-set.
- Continue refining their business model.
- Draw an expansion plan for their venture.
- Scale up their business.
- HR policies, How to attract and retain key management team.
- Focus on revenue maximization.
- Build key aspects of adaptation and sustainability.
- Manage and grow their business in terms of expansion and look for partnerships.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Projects; and Practical Experiences including challenges, internships and apprenticeships.

PRACTICUM PROGRAMMES

- Practicum programmes enable real-world experiences that empower students to explore and strengthen their entrepreneurial abilities. Students join E-cells in the first year, build their skills through a series of activities, and practice by starting campus companies as they move forward.
- The Practicum Approach motivates and nurtures entrepreneurial development through hands-on work at the E-Cells. By managing operations of E-cells, interacting with entrepreneurs, organizing workshops, enabling start-up internships, and running campus companies, students apply learnings to real world situations and challenges. Additionally, all E-Cells participate in entrepreneurship events through the year.
- The Practicum Programme is designed to cater the learning needs of new (basic) students and advanced students in the entrepreneurship learning curve.
- A bouquet of 16 activities, 8 per category will be offered both for the Basic and Advanced students. In addition to two hands-on Programs.
- Additionally, a select number of students from each institute will be trained as leaders. These E-leaders manage the E-cells and run the Practicum activities along with the designated faculty.
- The structure of the Programme is provided in the below table.

Text & References:

- Ramachandran , Entrepreneurship Development, Mc Graw Hill
- Katz , Entrepreneurship Small Business, Mc Graw Hill
- Byrd Megginson,,Small Business Management An Entrepreneur's Guidebook 7th ed, McGraw-Hill
- Fayolle A (2007) Entrepreneurship and new value creation. Cambridge, Cambridge University Press
- Hougaard S. (2005) The business idea. Berlin, Springer
- Lowe R & S Mariott (2006) Enterprise: Entrepreneurship & Innovation. Burlington, ButterworthHeinemann
- Léo-Paul Dana ,World Encyclopedia of Entrepreneurship, , Edward Elgar

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2021

AMITY UNIVERSITYHARYANA

GURUGRAM

Master of Arts Economics

Syllabus - First Semester

MICRO ECONOMIC THEORY & APPLICATION

Course Code: ECO4101 **Credit Unit: 03**

Course Objective:
This paper analyses the economic behaviour of individuals, firms and markets. It is mainly concerned with the objective of equipping the students in a rigorous and comprehensive manner with the various aspects of consumer behaviour and demand analysis, production theory and behaviour of costs, the theory of traditional markets and equilibrium of firm in modern non-profit maximizing framework.

Course Contents:

Module I: Demand Analysis
Introduction to Economics, Definitions, Economic Problems. Demand and its determinates. Elasticities (price, cross, income) of demand — theoretical aspects and empirical estimation; elasticity of supply; Theories of demand — utility; indifference curve (income and substitution effects, Slutsky theorem, compensated demand curve) and their applications; Revealed preference theory; Revision of demand theory by Hicks; Characteristics of goods approach; consumer's choice involving risk; Indirect utility functions (duality theory); Recent developments in demand analysis (pragmatic approach and linear expenditure systems); Consumer's surplus; Inter-temporal consumption; Recent developments in demand; Elementary theory of price formation — demand and supply equilibrium; Cobweb theorem; lagged adjustment in interrelated markets.

Module II: Production and Costs
Technology, isoquants, production with one and more variable inputs, returns to scale, short run and long run costs, cost curves in the short run and long run. Total, average and marginal product, cost minimization and expansion path, elasticity of substitution, Cobb – Douglas Linear and CES production function.

Module III: Market Structure
Marginal analysis as an approach to price and output determination: perfect competition — short run and long run equilibrium of the firm and industry, price and output determination, supply curve; Perfect competition: short run and long run equilibrium of a firm and industry. Monopoly: short run and long run equilibrium of a monopolist, price discrimination under monopoly: first degree, second degree and third degree discrimination; welfare aspects, monopoly control and regulation. Monopolistic Competition.

Module IV: Oligopoly
Theory of games, zero-sum and non-zero sum games; Nash equilibrium; Mixed strategies; Oligopoly-Cournot, Bertrand and Stacklberg models; Cartels - Joint profit maximization and market sharing cartels; Price leadership - low cost price and dominant price leadership;

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- W.S. Baumol, 'Economic Theory And Operational Analysis', Prentice hall
- Kreps, David M. (1990), A Course in Microeconomic Theory, Princeton University Press, Princeton.
- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London

References:

- Ferguson, 'Microeconomic Theory', Cambridge University Press
- L.M.B.Cabral, (2000) Introduction to Industrial Organization, MIT Press
- P.K.Dutta (1999) Strategies and Games: Theories and Practices, MIT Press
- Formsom and Gould – Microeconomic Theory

MACRO ECONOMIC THEORY & APPLICATION

Course Code: ECO4102 **Credit Unit: 03**

Course Objective:
This course aims to lead students to arena of macro- economic theories, policies and models in a historical perspective. It will enable the students to develop a critical insight on classical – Keynesian macroeconomic models**.**

Course Contents:

Module I: National Income and Social Accounting
MacroEconomics nature and scope- Circular flow of National Income - National Product—Productive and non- productive activities, The components of final product, Equality and distribution of national income, GNP, Social accounting— concept and importance, The System of Accounts and economic theory, matrix presentation of social accounting.

Module II: Basic Classical Model and Keynes Model
Classical theory of Output and Employment; Say's law of market and Quantitative theory of Money, Classical model without saving and Investment - effects of a change in money supply, labour demand and labour supply, effects of rigid money wage, classical theory with saving and Investment; National Income Determination: The Keynesian Model - The Aggregate Demand and Supply Approach. Saving and Investment Approach.

Module III: Theory of Multiplier
Static and Dynamic Multipliers, Super Multiplier, Paradox of Thrift, Government Purchases, Transfer Payments and Tax Multipliers, Balance Budget Multiplier; Theories of Consumption – Absolute income, Relative Income, Permanent Income and Life cycle Hypotheses.

Module IV: Inflation
Demand Pull and Cost – Push Approaches. Philips Curve: tradeoff between Inflation and unemployment, Keynesian Explanation of Philips curve. Natural Unemployment Hypothesis and Adaptive Expectation (Friedman's view) Long – run Phillip's curve – Rational Expectation. Relationship between Short run and Long run Phillip's curve.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:
Text:
- Gardner Ackeley, "Macro Economics".
- McConnell, C.R & H.C. Gupta, "Introduction to Macroeconomics", Tata McGraw Hill, Delhi

References:
- Liesey& Chrystal – Principles of Economics
- Edgmand, M.R., Macro Economics : theory and Policy, Prentice – Hall of India, Delhi
- J.E. Stiglitz, and C.E. Walsh (2002), Principles of Economics. 3rd Edition. W.W. Norton & company, New York
- K.K. Dewett: Modern Economic Theory, New Delhi, New Delhi, Shyamlal Charitable Trust.

COMPUTER APPLICATION IN ECONOMIC ANALYSIS

Course Code: ECO4103 **Credit Unit: 03**

Course Objective:

The objective of the course is to demonstrate knowledge of the computer applications in economic analysis and be able to choose the appropriate application for a given task.

Course Content:

Module 1: Computers and Peripherals
Basic components of computer – CPU, input-output devices, keyboard, mouse and scanner, Video display, printers and plotters, data storage and retrieval, hard disk, floppy disk and CD ROM; Types of computers and their applications; Computer networking and resource sharing, Hardware and software - Operating system.

Module 2: Data Processing, Techniques and Algorithms
Concept of data, record and file; Types of data and data structures, data analysis; File handling and, appending and cascading, closing and attribute control; Data storage and retrieval; Data operations; Algorithms like sorting, merging, joining and bifurcation; Database concepts and operation on database; DBMS and RDBMS. Introduction to MS Excel and MS Access

Module 3: Software-based Analysis
SPSS/STATISTICA: A package for Statistical Analysis in Social Sciences. Basic Operations; File, Edit, View, Data, Transformation, Graph and Utilities. Statistical Analysis using SPSS/STATISTICA: Summary, Tabulation and Comparison of Summary Statistics; Correlation and Regression (Linear and Non-linear) using SPSS/STATISTICA; Discriminant analysis, Principal Components, Factor Analysis and Cluster analysis by SPSS/STATISTICA; Use of MATLAB.

Module 4: IT Application to Economics
On line banking; ATM‘s Electronic stock exchange; Electronic trading; Data sharing and dissemination; Electronic transaction; Document delivery; Authentication and validation transaction processing – Electronic trading and marketing; On line shopping and malls, B2B, B2C, models, Document and transaction security and digital signature; Integrated transaction on mobile platforms. E-Commerce applications in India

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Krishnamurthy and Sen :Computer-Based Numerical Algorithms, Affiliated East-West Press, ND
- Lipschultz, M.M. and S. Lipschultz (1982): Theory and Problems of Data Processing, Schaum’s Outline Series, McGraw Hill, NY.
- Mishra, S.K. and J.C. Binwal (1991): Computer Applications in Social Science Research, Vikas, Delhi.
- Rajaraman, V. (1996): Fundamental of Computers, Prentice Hall, ND.
- Sanders, D.H. (1988): Computer Today, McGraw Hill (3e), NY.
- Sinha, P.K. (1992): Computer Fundamentals, BPB Publications, ND

References:

- Kim, J. and C.W. Muller (1989): Factor Analysis: Statistical Methods and Practical Issues, Sage, ND.
- Kuester, J.L. and J.H. Mize (1973): Optimization Techniques with FORTRAN IV, McGraw Hill, NY.
- Nie, N.H. (1970): SPSS – Statistical Package for Social Sciences, McGraw Hill, NY
- Rushton, G., M.F. Goodchild and L.M. Ostresh (1973): Computer Programs for Location-Allocation
  Problems. Monograph 6, Dept. of Geography, Univ. of Iowa, Iowa
- Sharma, J.K. (1997): Operations Research, Macmillan, Delhi.

MATHEMATICS FOR ECONOMICS

Course Code: ECO4104 **Credit Unit: 04**

Course Objective: The main objective of inclusion of this course in Economics is to familiarize the students with basic quantitative & algebraic tools & techniques which will be needed for the understanding of the core subject and the students can apply the quantitative techniques in the analysis of managerial problems

Course Content:

Module 1

Basics: real number system, sets and set operations, relations and functions, inverse functions; solution of linear equations in two variables, solution of quadratic equations, logarithms and exponents; exogenous and endogenous variables; Fundamentals of Matrices; Determinants; Solution of a system of upto 3 equations by matrix inversion and Cramer's rule.

Module 2

Differential equation - basic concepts, solution of first order linear differential equation; Non-linear differential equation - exact and variable separable type only; Linear differential equation of second order with constant coefficient and term

Module 3

Differentiation-idea of limit (but not its evaluation), meaning and economic interpretations of derivative; Rules of differentiation including logarithms and exponential functions; Unconstrained optimization - single choice variable; global and local

Module 4

Integration - meaning and economic interpretation; Indefinite and definite integration; Simple techniques including integration by substitution and integration by parts

Module 5

Linear Programming - Relevance and basic concepts, graphic, simplex and dual solution. Economic interpretation

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text

- Knut Sydsaeter and Peter. J. Hammond (2002) Mathematics for Economic Analysis, Pearson Educational Asia: Delh
- Chiang, Alpha C. "Fundamental Methods of Mathematical Economics" (Mcgraw Hill).
- Dowling, Edward T. "Mathematics for Economists"(Schaum's Outline Series, Tata Mcgraw Hill).

References

- R.G.D. Allen. Mathematical Analysis for Economists, MacMillan, India Limited, Delhi.
- Alpha C. Chiang. Fundamental Methods of Mathematical Economic Analysis, McGraw-Hill Bank Company London.
- BadalMukherji and V. Pandit. Mathematical Methods for Economic Analysis, Allied Publishers Pvt. Ltd. , New Delhi.
- Chris Berchenhal and Paul Grount, Mathematics for Modern Economics, Heritage Publishers, New Delhi.
- D. Bose, An Introduction to Mathematical Economics, Himlya Publishing House, Bombay.

INDIAN ECONOMY-ISSUES & POLICY

Course Code: ECO4105 **Credit Unit: 04**

Course Objective:
The objective of this course is to provide to students the basic knowledge of the structure of Indian Economy and its current developments.

Course Contents

Module I: Growth and Structure of Indian Economy Since 1950
Growth of Indianeconomy since 1950; Measures for raising economic growth; Trends in the nature andmmagnitude of poverty, inequality and unemployment; Changes in occupational Pattern, Demographic trends and economic development; Rate and trend in saving, Investment and growth rate

Module II: Growth of Agricultural and Industrial Sectors
Trends in agricultural production and productivity; Food policy and Public Distribution System (PDS); Impact of liberalization in agricultural sector; Industrial Growth performance and problems; Industrial concentration; its nature and extent; Cottage and small scale industries; Impact of liberalization and privatization on the
Industrial sector

Module III: Money Supply, Inflation and Public Policies
Factors determining interest rates; Money supply and inflation in India; financial sector reforms during 1990's Recent tax reforms; Growth and structure of Subsidies in India; Macro-economic policies – fiscal policy, income policy and Stabilization policy; Parallel economy and its implications

Module IV: International Trade Policies
Composition and directions of India's foreign trade; Factors determining the Balance of payment. Is equilibrium in the balance of payment? Causes, consequences; and policy measure; India's policies towards foreign capital; collaboration, export; Promotion and import substitution. Exchange rate policy and the convertibility of Rupee

Module V: Development Policies
India's planned development; Successes and failures. Policies for social justice (With special reference to the alleviation of poverty, inequality and unemployment) Sectoral policies: Industrial and agrarian. Policies for liberalization and privatization

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weight age (%)	5	5	5	15	70

Text & References:

Text:

- Bagchi, A. (1982). The Political Economy of Underdevelopment in India,
- Cabridge University Press, Cambridge.
- Bardhan, P. (1984). The political Economy of Development in India, Oxford
- University Press, New Delhi.
- Brahmandnda, P. R. and V. R. Panchumkhi, (Eds) (1987). The Development

- Process of the Indian Economy, Himalaya Publishing House, Bombay.
- Dandekar, V. M. & N. Rath. Poverty in India; Indian School of Political
- Economy, Bombay.
- Datta, Bhabatosh (1977). The Contents of Economic Growth, and other
- Eassay, Research India Publication, Calcutta.
- Rao, V. K. R. V. (1983). India's National Income : 1950-1980, Sage Publications, New Delhi.

References:

- Kapila, U., (Ed.) (1988). Indian Economy Since Independence, Vol. – I, Academic foundation, New Delhi.
- N. Aggarwal (1995). Indian Economy Problems of Development and
- Planning, WishwaParkashan, New Delhi.
- Misra S. K. and Puri V. K. (1993). Indian Economy-its Development Experience, Hinday Publishing House.

Syllabus - Second Semester

STATISTICS FOR ECONOMICS

Course Code: ECO4201 **CreditUnits: 04**

Course Objective:

This subject will deal with all fundamental statistical methods or tools which the students have to use in economic analysis and decision making problems.

Course Contents:

Module I: Elementary Distribution Theory
Nature and scope of statistics; Frequency and Cumulative frequency distributions, Measures of Central Tendency, Dispersion, Skewness and Kurtosis

Module II: Bivariate Distribution and Simple Linear Regression
Covariance and Correlation: rank correlation etc Simple Linear Regression; method of least squares; derivation of normal equations; standard error of regression (SER), properties of least square estimator

Module III: Time Series Analysis & Forecasting
Time Series Analysis, Time Series Decomposition Models – Multiplicative and Additive model, Linear and Exponential trend, Forecasting: Different methods of forecasting: Quantitative methods – freehand method, smoothing method, exponential smoothing method, trend projection methods; Qualitative methods. Steps of Forecasting

Module IV: Index Numbers
Concept of an Index Number. Laspeyer's, Paasche's and Fisher's Index Numbers; Time Reversal, Factor Reversal and Circular tests; Chain base index; Problems in the construction of index numbers;; Base shifting and use of index number for deflating other series.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:
- Allen Webster, Applied Statistics for Business and Economics, (3rd edition), McGraw Hill, International Edition 1998
- J.K. Sharma, Business Statistics, (2nd edition), Pearson Education
- Andreson. Sweeny. Williams, Statistics for Business and Economics, Cengage Learning

***References*:**
- P.H. Karmel and M. Polasek, Applied Statistics for Economics (4th edition), Pitman, Australia
- M.R. Spiegel (2nd edition), Theory and Problems of Statistics, Schaum Series

MATHEMATICAL ECONOMICS

Course Code: ECO4202 **CreditUnits: 03**

Course Objective:

A thorough knowledge of mathematics is essential for understanding almost all fields of economics. Mathematics is essential in the expression and communication of ideas in economics. The goal of this course is to help students understand and use the mathematics required for studying economics at the master's level. As a way of demonstrating the importance of mathematics in economics, the mathematical concepts studied will be illustrated with applications in economics.

Course Content:

Module I

Types of utility functions; Ordinal utility maximization; Demand functions- ordinary and compensated; Slutsky equation- income, substitution, and price effects; Consumer surplus; Elasticity of demand; Linear expenditure systems; Indirect utility function.

Module II

Production function; Properties of Cobb-Douglas, CES and Translog production functions; Producers equilibrium; Behaviour of cost curves; Derivation of Cost functions from production function (using CD function).

Module III

Price and output determination with marginalist rule; Equilibrium of a price discriminating monopolist; Cournot model; Multi-plant model; Baumol's sales maximization model; Williamsons model.

Module IV

Pricing of factors under different types of competitions; product exhaustion theorems – Euler, Clark-Wicksteed; Derivation of Pareto-optimal conditions

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Henderson, J. M. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
- Koutsoyiannis, A. (1979), Modern Microeconomics, (2nd Edition), Macmillan Press, London.
- Allen, R.G.D. (1976), Mathematical Economics, Macmillan, London.
- Arrow, K. J. and M. Intrilligator (Eds.)(1982), Handbook of Mathematical Economics, Volumes I, II and III, North Holland, Amsterdam.

References:

- Chung, J.W. (1993), Utility and Production: Theory and Applications, Basil Blackwell, London.
- Ferguson, C.E. (1976), New-classical Theory of Production and Distribution.
- Allen R.G.D. (1974), Mathematical Analysis for Economists, Macmillan Press and ELBS, London.
- Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics, McGraw Hill, New York.
- Jha, R. (1991), Contemporary Macroeconomic Theory and Policy, Wiley Eastern Ltd., New Delhi.
- Jones, H.G. (1976), An Introduction to the Modern Theory of Economic Growth, McGraw Hill-Kogakusha, Tokyo.
- Handley, G. (1962), Linear Programming, Addison Wesley Publishing Co., Massachusetts.
- Hiller, F.S. and G.J. Lieberman (1985), Operations Research, C.B.S., New Delhi.
- Kothari, C.R. (1992), An Introduction to Operations Research, Vikas Publishing House, New Delhi.
- Mustafi, C. K. (1992), Operations Research: Methods and Practice, Wiley Eastern, New Delhi.

PUBLIC FINANCE IN INDIA

Course Code: ECO4203 **CreditUnits: 03**

Course Objective:

This subject deals with the broad understanding of the current theories and practices in Public Finance. It will help students to understand taxation policy, management of public expenditure and public debt. The coverage of the subject will be with special emphasis on Indian experience.

Course Contents:

Module I: Introduction to Public Finance
Economic systems–concepts–Capitalism, Socialism and Mixed Economy– Characteristics; Public and Private Finances: meaning, difference and similarities. Indian Federal Finance: concepts of three layers of government; Market failure and role of government; Characteristics of public and private goods, merits goods; Government budget, its importance. Various concepts of deficit: revenue deficit, budgetary deficit, fiscal deficit, primary deficit, their uses and effects.

Module II: Taxation
Direct and indirect taxes: meaning and its characteristics–concepts of progressive, Proportional and regressive taxes. Present Indian tax structure: its characteristics and defects; Role of taxation in economic development. Meaning of tax avoidance and tax evasion

Module III: Income and Public Expenditure
Sources of income of local government, state government and central government; Public expenditure: purpose, importance and causes of increase in public expenditure. Meaning of Fiscal Responsibility and Budget Management Act (FRBM Act).Privatization and disinvestment: concept and importance.

Module IV: Public Debt
Public debt-meaning and types of public debt; Economic effects of public debt; Difference between taxation and debt; Burden of public debt-Learner's and Buchanan'view point

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Texts & References:
Texts:
- Public finance in Theory & Practice: R.A. Musgrave & P.G. Musgrave
- Introduction to Public Finance: Carl C. Plehn

References
- The Theory & Working of Union Finance in India: Bhargava R. N.
- D.M.Mithani: Money, Banking, International trade and Public finance
- Public Finance: H.L. Bhatia
- Public Finance: B.P.Tyagi
- Public Finance: R.C. Agrawal
- Modern Public Finance: Jha R.
- Intermediate Public Economics: Jean Hindriks& Gareth D. Myles

ADVANCED MICRO ECONOMIC THEORY & APPLICATION

Course Code: ECO4204 **CreditUnits: 03**

Course Objective:
The main objective of the course is to provide deeper knowledge on some specific field of microeconomics so that they can apply economic theory and models in the execution of managerial problems and functions.

Course Contents:
Module I: Uncertainty and Information
Contingent consumption; catastrophe bonds; utility functions and probabilities; Expected utility; Why expected utility is reasonable; Risk aversion; Risk spreading; Asymmetric information-Market for lemons; Market signalling. Principle- agent problems Moral Hazard;

Module II: Managerial theories of firm
Marginalism - attacks and defence; Average cost pricing- the mark up rule; Limit pricing-Bain's concept of entry and barriers to entry; Model of Sylos-Labini and Franco Modigliani; Baumol's static and dynamic models of sales revenue maximization; Marris's model of managerial enterprise; Williamson's simplified model of managerial discretion;

Module III: Theory of Distribution
Marginal productivity theory, the general theory of factor price discrimination under competition, monopoly and monopsony; Determination of rent wages and interest; Concept of exploitation of labour and role of labour unions in wage determination; The nature of profit; Euler's Product – Exhaustion theorem

Module IV: General Equilibrium
Meaning, partial v/s general equilibrium approach, Walrasian General Equilibrium model, Tatonnement, Existence, Uniqueness and stability of equilibrium; A graphical treatment of the 2 – factor, 2 – commodity, 2 – consumer general equilibrium system (2x2x2 model)

Module V: Welfare Economics
Criteria of social welfare – value judgments in welfare economics, basic theorems of new welfare economics – Pareto Optimality and necessary conditions to achieve it; Market forms and welfare. Compensation principle: Kaldor – Hicks criterion, Little's criterion, the Bergson criterion: social welfare function.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:
Text:

- W.S. Baumol, 'Economic Theory And Operational Analysis', Prentice hall
- Ferguson, 'Microeconomic Theory', Cambridge University Press
- Sen A, Microeconomics: Theory and Application, Oxford University Press, New Delhi
- Quirk, J.R. Saposnik, Introduction to General Equilibrium Theory and Welfare Economics, McGraw Hill, New York

***References*:**

- A.K. Koutsoyiannis, 'Modern Microeconomics', Macmillan
- L.M.B.Cabral, (2000) Introduction to Industrial Organization, MIT Press
- P.K.Dutta (1999) Strategies and Games: Theories and Practices, MIT Press
- Formsom and Gould – Microeconomic Theory

ADVANCED MACRO ECONOMIC THEORY & APPLICATION

Course Code: ECO4205 **Credit Units: 03**

Course Objective:
This course aims to lead students to arena of macro- economic theories, policies and models such as investment demand, New classical model, New Keynesian model and macro economics of an open economy.

Course Contents:

Module I: The Economy in the Long Run
The classical analysis of the real sector, determination of employment, income and interest rate; Golden rule of accumulation, impact of change in saving propensity, population growth and technological progress

Module II: Investment Demand
Theories of investment – Accelerator and Profit Theories; Theories of Business Cycle: Samuelson, Hicks and Kaldor

Module III
The New classical Model (Lucas View); The New Keynesian Model

Module IV: Equilibrium in Money Market
The Keynesian Model, Liquidity Trap. Simultaneous equilibrium in money and product market – IS-LM Model; Relative Effectiveness of monetary and Fiscal policies; Fiscal Policy and Crowding out

Module V: Exploring the Macroeconomics of an Open Economy
Balance of Payment - the current and capital account: Determining equilibrium output in an open economy; open economy with flexible exchange rates - markets for foreign exchange, factors affecting exchange rates, effects of exchange rates on the economy.

Examination Scheme:

Components	**P0(Att.)**	**P1**	**C1**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:
Text:
- Gardner Ackeley, "Macro Economics".
- McConnell, C.R & H.C. Gupta, "Introduction to Macroeconomics", Tata McGraw Hill, Delhi

***References*:**
- Edgmand, M.R., Macro Economics : theory and Policy, Prentice – Hall of India, Delhi
- Dornbusch, R. and S. Fisher, Macro Economics, McGraw Hill, Koga Kush, Tokyo.
- J.E. Stiglitz, and C.E. Walsh (2002), Principles of Economics. 3rd Edition. W.W. Norton & company, New York
- K.K. Dewett: Modern Economic Theory, New Delhi, New Delhi, Shyamlal Charitable Trust.

ECONOMICS OF GROWTH AND DEVELOPMENT

Course Code: ECO4206 **Credit Units: 03**

Course Objective:

This course will enable the students to acquire knowledge as to how policies facilitate growth and development in advanced countries. It also enables the students to understand important growth models and help them to familiarize with factors that contribute to economic growth.

Course Contents:

Module-I: Introduction to Development
Economic Growth, Economic Development and Sustainable Development – measurement of development: convectional HDI and Physical Quality of Life Indices (PQLI) – Factors determining economic development – obstacles of economic development: vicious circle of poverty

Module-II: Growth Theories
Adam Smith – Ricardo – Malthus – Karl Marx – Schumpeter's theory of development – Keyens – Rostow's stages of economic growth – Big Push theory

Module-III
Doctrine of balanced growth – Concept of unbalanced growth – Dualistic theories – Myrdal theory – Growth models – Harrod – Domar – Joan Robinson's model of capital accumulation – Meade's neo classical model – Solow model long run growth – Kaldor's model of growth.

Module-IV: Special Topics in Economic Development
Poverty and inequality, Education and Economic Development, Health and Economic Development.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:
- Todaro M.P.: Economic Development in the Third World, Longman, New York
- Thirlwal A.P.: Growth and Development, Macmillan, London

***References*:**
- R.C. Agarwal and M.L. Seth: Economic of Development and Planning, Lakshmi Naraian Agarwal, Agra
- A.N. Agarwal and Kundanlal: Economics of Development and Planning, Vikas Publishing House Pvt Ltd.

TERM PAPER/ REVIEW OF DISSERTATION-I

Course Code: ECO4231 **Credit Units: 02**

GUIDELINES FOR TERM PAPER

A term (or research) paper is primarily a record of intelligent articulation through several sources on a particular topic of a given subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned/chosen. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned/chosen. The evaluation will be done by Board of examiners comprising of the faculties.

The procedure for writing a term paper may consists of the following steps:

Choosing a topic

1. Finding sources of material
2. Collecting the notes
3. Outlining the paper
4. Writing the first draft
5. Editing & preparing the final paper

1. Choosing a Topic

The topic chosen should not be too general. Student will normally consult the faculty guide while finalizing the topic.

***2.* Finding Sources of material**

- The material sources should be not more than 5 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the topics to be listed.
- The sources could be books and magazines articles, news stories, periodicals, journals, internet etc.

3. Collecting the notes

Skim through sources, locate the useful material, make notes of it, including quotes and information for footnotes.

- ***Get facts, not just opinions***. Compare the facts with author's conclusion(s)/recommendations.
- In research studies, notice the methods and procedures, results & conclusions.
- Check cross references.

4. Outlining the paper

- Review notes to find main sub-divisions of the topic.
- Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- statement of purpose/objectives
- main body of the paper
- statement of summary and possible conclusion(s)/recommendations

Avoid short, bumpy telegraphic sentences and long straggling sentences with more than one main ideas.

6. Editing & preparing the final paper

a) Before writing a term paper, you should ensure you have an issue(s) which you attempt to address in your paper and this should be kept in mind throughout the paper. Include only information/ details/ analyses that are relevant to the issue(s) at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure that you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" smoothly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1. Title page
2. Abstract
3. Introduction
4. Review of the Literature
5. Discussion&Conclusion
6. References
7. Appendix

Generally, the introduction, discussion, conclusion and references should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a. summary of objectives and issues raised.
b. summary of findings
c. summary of limitations of the study at hand
d. details of possibilities for related future research

References

From the very beginning of the research work, one should be careful to note all details of articles or any other material gathered. The Reference part should list ALL references included in the paper. References not included in the text in any form should NOT be listed here. The key issue here is consistency. Choose a particular convention and stick to this.

The Conventions

Monographs

Crystal, D. (2001), *Language and the internet.* Cambridge: Cambridge University Press.

Edited volumes
Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language.* Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language.* Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. *Journal of consumer research* 19, 180-197.

Electronic book
Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. *German as a Foreign Language Journal [online] 1.* Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts etc.) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

The Layout Guidelines for the Term Paper
- A4 size Paper
  - Font: Arial (10 points) or Times New Roman (12 points)
  - Line spacing: 1.5
  - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation: 60%
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/presented, outcomes vs. objectives, presentation/ viva etc.)

Syllabus - Third Semester

FUNDAMENTALS OF ECONOMETRICS

Course Code: ECO4301 **CreditUnits: 04**

Course Objective:

This course presents the basic econometrics techniques emphasizing numerical estimation of economic relationships as applied to practical economic and managerial problems

Course Contents:

Module I: Basic Econometrics

Nature, meaning and scope of econometrics; Simple and general linear regression model — Assumptions, Estimation (through OLS approach) and properties of estimators; Gauss-Markov theorem; Concepts and derivation of R2 and adjusted R2; Concept and analysis of variance approach and its application in regression analysis;

Module II: Problems in Regression Analysis

Nature, test, consequences and remedial steps of problems of heteroscedasticity; Multicollinearity and auto-correlation; Problems of specification error; Errors of measurement

Module III:Regressions with Qualitative Independent Variables

Dummy variable technique — Testing structural stability of regression models comparing to regressions, interaction effects, seasonal analysis, piecewise linear regression, use of dummy variables, regression with dummy dependent variables; The LPM, Logit, Probit and Tobit models — Applications.

Module IV: Dynamic Econometric Model

Autoregressive and distributed lag models — Koyak model, Partial adjustment model, adaptive expectations; Instrumental variables; Problem of auto-correlation — Application; Almon approach to distributed-lag models; Error correlation mechanism, Causality test, Granger test and Sim's test

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Gujarati, D.N. (1995), Basic Econometrics (2nd Edition), McGraw Hill, New Delhi.
- Theil, H. (1981), Introduction to Econometrics, Prentice Hall of India, New Delhi.

***References*:**

- A.S. Goldberger (1998), Introductory Econometrics, Harvard University Press, Cambridge
- Suresh K. Ghoshe, "Econometrics", Prentice Hall of India Private Limited, New Delhi
- A. Koutsoyiannis, "The theory of Econometrics: An introduction exposition of econometric methods", Educational low-priced books scheme, McMillan Education (1992)
- Damodar N. Gujarathi," Basic Econometrics", Tata McGraw Hill Ltd., 1999 (4th ed.)
- J. Johnson," Econometric Methods"
- Christopher Dougherty," Introduction to Econometrics", Oxford University Press (3rd edition)

- Amemiya, T. (1985), Advanced Econometrics, Harvard University Press, Cambridge, Mass.
- Baltagi, B.H. (1998), Econometrics, Springer, New York.
- Dongherty, C. (1992), Introduction to Econometrics, Oxford University Press, New York.
- Goldberger, A.S. (1998), Introductory Econometrics, Harvard University Press, Cambridge,Mass.

MONEY AND FINANCIAL MARKETS

Course Code: ECO4302 **Credit Units: 03**

Course Objective:
The main objective of the course is to impart knowledge about money and financial markets, financial instruments and money, financial deepening etc**.**

Course Contents:
Module I: Money in the financial system
Role of Money in the economy, Financial Markets - Need, scope and types. Financial instruments- Futures, Forwards, Option and Swaps, financial deepening.

Module II: Financial markets
Role and structure of money market – call money market, Treasury bill market and commercial bill market. An introduction to new instruments in money market
Capital markets: Role, Structure, Primary and Secondary market for securities. An Introduction to reforms in capital market (with special reference to India)

Module III: Monetary Management in an Open Economy
International Financial Institutions: International Monetary fund; Objectives, Functions and an assessment of the working of IMF, IMF and India.
World Bank: Functions, Role of bank in developing countries, World Bank and India.
Emergence of a new world economic order; Setting up of World Trade Organization. WTO and India, Euro- Dollar Market.

Module IV: International Financial Market
The structure & role of Global financial environment, Global effects of monetary policy on financial market, Foreign Exchange market, International Money, Credit & bond market.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:
- M.R. Baye, D.W. Jansen (1996), Money Banking and Financial Markets, AITBS (Indian edition),
- W.S. Baumol, Economic Theory and Operational Analysis, Prentice Hall
- L.M. Bhole (1999), Financial Institutions and Markets, Tata McGraw Hill

***References*:**
- M.K. Lewis (2000), Monetary Economics, OUP
- Morris Levi (1999), International Finance, Tata McGraw Hill
- RBI Bulletin. Annual Report; Report on currency and Finance
- Salvatore, Dominick, International Economics, McMillan Publishing Company, New York

RESEARCH METHODS IN ECONOMICS

Course Code: ECO4303 **Credit Units: 03**

Course Objective:

The need of this subject is for those concerned with research to pay due attention to the designing and adhering to the appropriate methodology for improving the quality of research and specifically for introducing the different techniques of doing marketing research.

Course Contents:

Module I -Preliminaries
Meaning and definition of research- classification of research(pure, applied, exploratory, descriptive, historical, diagnostic, experimental, qualitative, quantitative) - importance, applications and limitations of social science research- interdisciplinary and trans-disciplinary approaches Statistics and information -communication technology in research- Basic elements of the scientific method-theory and research- the meaning of methodology

Module II- Research problem and design
An overview of the different steps in research process-selection of the topic and formulation of the research problem in Economics with illustrations- review of literature- Research design, features of a good design-different research designs for exploratory, descriptive, diagnostic and experimental research

Module III -Collection and analysis of data
Sample design- probability and non probability sampling- complex random sampling designs-Methods of collecting primary data- questionnaire and schedules- sources of secondary data on Indian economy- case study method -processing of data- sources of hypothesis-Testing of hypothesis – procedure for testing hypothesis-one tailed and two tailed tests – basics of the important parametric and non-parametric tests- basic awareness of SPSS

Module IV- Interpretation and preparation of the report
Interpretation, drawing conclusions and reporting it-Structure of the research report- Types of reports-Methods of footnotes and referencing

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:
Text:
- William J Goode and Paul K Hatt,1981 Methods in social Research, McGraw- Hill
- Wilkinson and Bhandarkar,2002 Methodology and Techniques of Social Research, Himalaya
- Kothari, C.R., Research Methodology, Wiley Eastern Ltd, New Delhi

***References*:**
- William J Goode and Paul K Hatt,1981 Methods in social Research, McGraw- Hill
- Wilkinson and Bhandarkar,2002 Methodology and Techniques of Social Research, Himalaya
- Marc Blaug The Methodology of Economics, or How Economics Explain, Cambridge University
- P.S Mohanakumar(Edited),1998 : A Handbook on Research Methodology. Right Publishers, Kudavechoor

GROUP A: INDUSTRIAL AND AGRICULTURE ECONOMICS
INDUSTRIAL ECONOMICS

Course Code: ECO4304 **Credit Units: 03**

Course Objective: The objective of Industrial Economics is to understand about the Organization of industry, changing forms of industrial organization, Process of industrialization, Rationale, objectives, strategies and polices. Employment implications of industrialization; Appropriate industrial technology for LDSLs. Industrialization and economic development. Patterns and phases of industrial growth and changes in industrial structure

Course Contents:

Module I: Theory of firm and pricing

Objectives of the firm profit and non-profit, Maximizing models of the firm. Bains theory of limit pricing; Marginal cost versus full cost pricing; Allocation of costs in case of joint products; Welfare implications of monopoly pricing; Investment decision; conventional and modern approaches; risk, uncertainty and investment decision.

Module II: Market structure, conduct and performance

Industrial concentration: concepts and measurement; Extent, causes and likely effects of concentration. Analysis of diversification, Vertical integration and mergers in Industry; Extent of monopoly and concentration in India; Public policy towards Industrial concentration and monopoly power in India

Module III: Industrial location

Theories and factors affecting location; infrastructure for industrialization; Regional growth of industry in India; Tools of public policy; Indian policy for backward areas. Industrial finance in India; Role of term-leading institutions in industrial development of India; Indian capital market

Module IV: Issues in Indian industry

Phases of industrial growth and changes in industrial structure India. Public sector rationale and organization; Public sector pricing policies; The question of efficiency in the context of special constraints; Overall performance of public sector in India; The concept of joint-sector in India; The problems of industrial sickness; Capacity utilization. Foreign collaborations; Multinationals in Indian joint ventures aboard; The recent liberalization trends; Large versus small scale industry debate in India.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Barthwal, R. (1984). Industrial Economics, 2e, Wiley Eastern Lted., New Delhi.
- Sbain, Joe (1967). Industrial Organization, 2e, John Wiley, New York.
- Hay, D. H. and D. J. Morris, (1979). Industrial Economics' : Theory and Evidence, Oxford University Pres, Oxford.

References:

- Byrce D. Marray (1960). Industrial development. A Guide for Accelerating Economic Growth, McGraw Hill Book Company, New York.
- Thakur, Srinivas V. (1985). Industrialization and Economic Development, Popular Parkashan, Bombay.

AGRICULTURAL ECONOMICS OF INDIA: INCENTIVES & DECISION MAKING

Course Code: ECO4305 **Credit Units: 03**

Course Objective:

The Objective of Agricultural Economics is to make students aware about the Agricultural setup of India and the various decision making processes of India at different levels.

Course Contents:

Module I

Nature and scope of agricultural economics; Role of agriculture in economic development; Interdependence between agriculture and industrial development; Systems of farming Farm size and productivity debate; Land reforms in India

Module II

Agricultural production functions. Input output relationships; factor-factor relationships and product-product relationships; Measures of farm efficiency; Risk and uncertainty in agriculture

Module III

Models of agricultural development (Lewis, Fei-Ranis, Jorgenson, Mellor, Schultz, and Boserup. Modals); Technological change and new agricultural strategy (green revolution) in India, Agro-climatic zonal planning in India

Module IV

Agricultural price policy in India; Criteria to fix agricultural prices; Intersectoral terms of trade; Measures to increase marketable surplus; Functions of agricultural marketing; Efficiency criteria for agricultural marketing. Problems of Indian agricultural marketing; Measures to improve the efficiency of agricultural marketing in India

Module V

Importance of agricultural finance; Source of agricultural finance, Defects of rural money lending system; problems of agricultural cooperative societies; Government policy for agricultural credit; Problems and suggestions to improve agricultural finance; Causes of rural indebtedness; Measures to reduce rural indebtedness; Objective and impact of integrated rural development programme; Resource mobilisation from agricultural sector

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- JhinganM.L , Agricultural Economics of India.
- Schultz, T. W. (1984), Transforming Traditional Agriculture ,Yele University Press, New Haven. Southworth H. and B. F. Johanson (1957).
- Agricultural Development and Economic Growth. Cornell, niversity Press, Ithaca, New York.

References:

- Mellor, J. W. (1969) .The Economics of Agrikcultural Development Vora& Co., Bombay.hingan
- Eicher, C.K. & L.W. Witt. Agriculture in Economic Development

GROUP B: DEVELOPMENT ECONOMICS

ECONOMIC DEVELOPMENT & POLICY IN INDIA

Course Code: ECO4306 **Credit Units: 03**

Course Objective:
The main focus of this subject is on different concepts of Growth and Development, to understand different models of Development and Development Process of India as far as its various Plans are concerned.

Course Contents:
Module I
Economic growth, development and sustainable economy; Various traditional and modern criteria and measure of development, Major features of structural change and economic development; Measurement of absolute poverty and income inequality; Growth and equality trade –off

Module II
Classical, Marxian and Schumpeterian theories of economic development; Stages of economic growth (Rostow and Marx); approaches to the theory of underdevelopment and development underdevelopment; The big-push theory; Critical minimum effort thesis, Low level equilibrium trap. Lewis and Ranis- Fei models of economic development

Module III
Planning and the market mechanism State intervention vs. liberalization, and privatization debate; The core areas of State intervention under liberalization; Process of plan formulation; Investment criteria for plan projects, cost-benefit analysis; Determination of size, growth rate and priorities in planning; Use of input-output and linear programming techniques in planning.

Module IV
Models in economic planning: policy models, projection models and development planning models. Models underlying various Indian Plans: Harrod-Domar model; Mahalanobis model, and the model underlying current Five Years Plan. Resource mobilization for planning: Domestic resources; mobilization of resources through fiscal measures and monetary regulation; Savings and inflationary finance; External resources-Dual gap analysis and foreign borrowings. Foreign borrowings vs. foreign direct investment

Module V
India's Five Year Plans: Objectives, strategies, achievements and constraints. Decentralized planning and people's participation; Saving-investment rates-trends and Problems; The policy debate in the post liberalization period and disinvestments in public sector undertaking MNCs Vs.Swadeshi movement benefits and pitfalls of globalization and international finance

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:
Text:
- K.P.M.Sundraram and Ruddardutt, Indian Economy
- S.K.Mishra and V.K.Puri , Indian Economy.
- ·Thakur Dalip S. (1996). Economic Development Growth. And distributive

- Justice in Developing Countries: With Special Reference to India, Reliance.

References:

- Ghatak, S. (1986). An exeintroduction to Development Economic, Allen Unwin, London.
- Ahluwalia M. S. et.al. (1979). Growth and Poverty in Development Countries, Journal of Development Economics, Vol. G, No.3.
- Thakur Dalip S. (1996). Economic Development Growth. And distributive Justice in Develping Countries: With Special Reference to India, Reliance

LABOUR ECONOMICS

Course Code: ECO4307 **Credit Units: 03**

Course Objective:
The course deals with issues pertaining to the labour market, wage theories, employment policies trade unions and collective bargaining in the globalized economy which have become vitally important for developing countries. In a country like India where the bulk of the labour force is in the unorganized sector and the organized sector is witnessing "jobless" growth, the importance of issues such as employment and unemployment as well as livelihood and social security for the growing millions continues to assume significance. This paper exposes students to theoretical as well as empirical issues relating to the labour market with special reference to India

Course Content:
Module I: Introduction
Meaning, Concept, Significance & Peculiarities of Labour; Nature, Scope & Importance of Labour Economics; Characteristics of the Indian Labour Market

Module II: Wage Determination -
Marginal Productivity Theory, Theory of Collective Bargaining, Modern Theory of Wages; Concept of Minimum Wage and Fair Wage; Wage Determination in Various Sectors- Rural, Urban, Organized, Unorganized and Informal Sector; Wages in Relation to Cost and Productivity; Wage Policy in India

Module III: Migration & Absenteeism
Approaches to Labour Migration , Effects of Migration; Absenteeism of Industrial Labour in India , Causes , Effects and Remedies of Absenteeism; Labour Turnover – Causes of Low Labour Turnover in India, Remedies to Improve the Labour Turnover

Module IV: Industrial Relations:-
Growth, Pattern, Structure & Achievements of Labour Unions in India; Causes of Industrial Disputes, their Settlement & Prevention Mechanism; Role of Tripartism; Current Trends in Collective Bargaining

Module V: Labour Market Reforms:-
Measures, Imparting and Flexibility in Labour Markets; Exit Policy; Need of Safety Nets
Second National Commission on Labour, Globalization and Labour Market

Examination Scheme:

Components	**P0(Att.)**	**P1**	**C1**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Datt, G. (1966), Bargaining Power , Wages and Employment : An Analysis of Agricultural , Labour : Marketsin India ; Sage Publishers , New Delhi .
- Hajela, P.D. (1998) , Labour Restrucing in India : A Critique of the New Economic Policies , Commonwealth Publishers, New Delhi.

References:

- Jhabvala, R.and R.K. Subrahmanya (Eds.) (2000), The Unorganised Sector : Work Security and Social Protection ; Sage Publications, New Delhi
- Lester, R.A. (1964) , Economics of Labour (2nd Edition), Miacmillan, New Work.
- McConnell, C.R. And S.L. Brue (1986) , Contemporary Labour Economics , McGraw –Hill , New York.
- Papola ,T.S.P.P. Ghosh and A.N. Sharma (Eds.) (1993), Labour , Employment and Industrial Relations in India , B.R. Publishing Corporation , New Delhi.
- Rosenberg M.R. (1988) , Labour Markets in Low Income Countries in Chenery , H.B. and
- T.N. Srinivasan (Eds.) The Handbook of Development Economics North- Holland, New York.

GROUP C: PUBLIC ECONOMICS
PUBLIC FINANCIAL ADMINISTRATION

Course Code: ECO4308 **Credit Units: 03**

Course Objective: the course objective shall be to provide the students a broad understanding of the current theories and practices in Public Financial Administration, helping them to identify contemporary issues in Public Financial Administration in India and to formulate solutions in the light of theories and practices; Helping the participants to understand taxation policy, management of public expenditure, public debt and budgetary techniques and practices. The coverage of the subject will be with special emphasis on Indian experience.

Course Contents:

Module I: Public Financial Administration

Public Finance - Theory & Principles, Fiscal functions, Public choice - provision for social goods, Principles of federal finance Public financial administration in federal set up, Budgeting: Objectives & types of budget, Constitutional provisions for preparation and presentation of Budget, Finance Act & Appropriation Act.

Linkage with Accounting and Economic Classification

Module II: Modern Techniques in Budgeting

Zero Base Budgeting, Performance Budgeting, Cash budgeting: Cash management and Treasury functions in Government, Other budgeting techniques, Budgetary reforms and New Public Management

Module III: Central Government Budgeting Process

Plan & Non-Plan expenditure, Capital and revenue expenditure, Preparation of budget, Implementation and monitoring of budget, Public Investment – Programming and Management Concept and purpose: Role of Planning Commission, its Fiscal Responsibility.

Module IV: Finance Commission's Recommendations

Principles of Federal Finance**,** 13th Finance Commission**,** Centre-State relations**,** Grants-in-Aid; Parliamentary Financial Committees: Estimates Committee**,** Public Accounts Committee**,** Committee on Public Undertakings**,** Standing Committee for scrutiny of demands for grants .

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Richard Musgrave & Peggy Musgrave; Public Finance : Theory and Practice -Mcgraw Hill
- H.L. Bhatia. Public Finance
- B.P. Tyagi, Public Finance, Jaiprakash, Meerut.

References

- S.P. Ganguly : Fundamentals of Government Budgeting : Control over Public Finance and India
- K.P.M. Sundharam, Public Finance - Theory and Practice (16th Edition), S. Chand & Co., New Delhi.

ENVIRONMENTAL ECONOMICS

Course Code: ECO4309 **Credit Units: 03**

Course Objective:

The course will provide an insight into basics of environmental problems environmental management and interrelationshipbetweenenvironment and economic development.

Course Contents:

Module I: Introduction
Environmental Economics - Meaning, nature and Historical development of environmental economics. Structure of environment, Characteristics of Environment, Sustainable development: concept, indicator and measurement.

Module II: Waste management
Pollution prevention, physical operations of waste treatment, Water pollution, Air pollution and control, Global Environmental Issues

Module III: Environmental Management
Environmental Legislations in India, Environment Quality Objectives and standards, Institutional Environmental agreements; Tools for environmental management; Environmental economics

Module IV:Environment and Economic Development
Interrelationship between environment and economic development; Environnemental pollution in global perspective; Case studies on environmental management – Textile Industries and Tanneries

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:
- Joseph, K. and R. Nagendran; Essentials of Environmental Studies, Pearson Education.
- DeshBandhu, H Singh and A.K. Mitra (1990). Environmental Education and Sustainable Development. New Delhi, Indian Environmental Society

***References*:**

- Dhaliwal, G.S., G.S Sangha and P.K. Ralhan (1998); Fundamentals of Environmental Science; New Delhi; Kalyani Publishers.
- Dixon, John A., Louise F. Scura, Richard A. Carpenter and Paul B. Sherman (1994); Economic Analysis of Environmental Impacts. London: Earthscan Publications.
- Elkins, Paul (2001); Economic Growth, Human welfare and Environmental Sustainability; New York; Routledge.

TERM PAPER/ REVIEW OF DISSERTATION-II

Course Code: ECO4331 **Credit Units: 02**

GUIDELINES FOR TERM PAPER

A term (or research) paper is primarily a record of intelligent articulation through several sources on a particular topic of a given subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned/chosen. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned/chosen. The evaluation will be done by Board of examiners comprising of the faculties.

The procedure for writing a term paper may consists of the following steps:

Choosing a topic

1. Finding sources of material
2. Collecting the notes
3. Outlining the paper
4. Writing the first draft
5. Editing & preparing the final paper

1. Choosing a Topic

The topic chosen should not be too general. Student will normally consult the faculty guide while finalizing the topic.

***2.* Finding Sources of material**

- The material sources should be not more than 5 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the topics to be listed.
- The sources could be books and magazines articles, news stories, periodicals, journals, internet etc.

3. Collecting the notes

Skim through sources, locate the useful material, make notes of it, including quotes and information for footnotes.

- ***Get facts, not just opinions***. Compare the facts with author's conclusion(s)/recommendations.
- In research studies, notice the methods and procedures, results & conclusions.
- Check cross references.

4. Outlining the paper

- Review notes to find main sub-divisions of the topic.
- Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

- statement of purpose/objectives
- main body of the paper
- statement of summary and possible conclusion(s)/recommendations

Avoid short, bumpy telegraphic sentences and long straggling sentences with more than one main ideas.

6. Editing & preparing the final paper

a. Before writing a term paper, you should ensure you have an issue(s) which you attempt to address in your paper and this should be kept in mind throughout the paper. Include only information/ details/ analyses that are relevant to the issue(s) at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure that you briefly explain the relevance of every section.
b. Read the paper to ensure that the language is not awkward, and that it "flows" smoothly.
c. Check for proper spelling, phrasing and sentence construction.
d. Check for proper form on footnotes, quotes, and punctuation.
e. Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f. Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1. Title page
2. Abstract
3. Introduction
4. Review of the Literature
5. Discussion&Conclusion
6. References
7. Appendix

Generally, the introduction, discussion, conclusion and references should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of objectives and issues raised.
b) summary of findings
c) summary of limitations of the study at hand
d) details of possibilities for related future research

References

From the very beginning of the research work, one should be careful to note all details of articles or any other material gathered. The Reference part should list ALL references included in the paper. References not included in the text in any form should NOT be listed here. The key issue here is consistency. Choose a particular convention and stick to this.

The Conventions

Monographs

Crystal, D. (2001), *Language and the internet.* Cambridge: Cambridge University Press.

Edited volumes
Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language.* Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), *Speech acts across cultures. Challenges to communication in a second language.* Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. *Journal of consumer research* 19, 180-197.

Electronic book
Chandler, D. (1994), *Semiotics for beginners* [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. *German as a Foreign Language Journal [online] 1.* Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts etc.) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

The Layout Guidelines for the Term Paper
- A4 size Paper
  - Font: Arial (10 points) or Times New Roman (12 points)
  - Line spacing: 1.5
  - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation: 60%
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/presented, outcomes vs. objectives, presentation/ viva etc.)

SUMMER INTERNSHIP EVALUATION

Course Code: ECO4335 **Credit Units: 06**

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organisation)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. ***Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.***

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include ***five sections*** in the order described below.

1. **The Title Page –** An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content –** An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates

and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

- **Title or Cover Page**.
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgements**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**
  A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate

titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 30%
(based on Internship File and the observations of the faculty guide/ supervisor)

Feedback from Company/ Organization: 10%

Final Evaluation:
(Based on Internship Report, Viva/ Presentation) 60%

Syllabus - Fourth Semester

ADVANCED ECONOMETRICS

Course Code: ECO4401 **Credit Units: 04**

Course Objective:

This course will enable the students to learn techniques relating to the estimation of parameters. On successful completion of the course the students will understand the estimation techniques, difficulties involved in estimation process, evaluation of parameters. All this will enhance the understanding of scientific decision making process.

Course Contents:

Module I: Simultaneous Equation Models
Introduction and examples; The simultaneous equation bias and inconsistency of OLS estimators;The identification problem; Rules of identification — order and rank conditions

Module II: Methods of Estimating Simultaneous Equation
System Recursive Methods and OLS; Indirect Least Squares (ILS), Instrumental Variables (IV) 2SLS and 3SLS Methods

Module III: Time Series Analysis
Stationarity, unit roots, co-integration-spurious regression, Dickey-Fuller test, Engle-Granger test, Random walk model

Module IV: Forecasting Techniques
Forecasting with ARIMA modelling; Box-Jenkins methodology; Vector autoregression; Problems with VAR modelling — Applications; Time varying parameters and Kalman filter

Module V: Panel Data Techniques
Panel data techniques — Random coefficients model; Fix effects model; Random effect model

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Amemiya, T. (1985), Advanced Econometrics, Harvard University Press, Cambridge, Mass.
- Gujarati, D.N. (1995), Basic Econometrics (2nd Edition), McGraw Hill, New Delhi.
- Theil, H. (1981), Introduction to Econometrics, Prentice Hall of India, New Delhi.

References:

- Maddala, G.S. (1997), Econometrics, McGraw Hill, New York.
- Intrilligator, M.D. (1978), Econometric Methods, Techniques and Applications, Prentice Hall,Englewood Cliffs, New Jersey.
- Chow, G.C. (1983), Econometrics, McGraw Hill, NewYork.
- Draper, N.R. and H. Smith (1966), Applied Regression Analysis, John Wiley, New York
- Educational low-priced books scheme, McMillan Education (1992)
- A. Koutsoyiannis, "The theory of Econometrics: An introduction exposition of econometric methods",
- Damodar N. Gujarathi," Basic Econometrics", Tata McGraw Hill Ltd., 1999 (4thed.)
- J. Johnson," Econometric Methods"
- Christopher Dougherty," Introduction to Econometrics", Oxford University Press (3rd edition)
- A.S. Goldberger (1998), Introductory Econometrics, Harvard University Press, Cambridge
- Suresh K. Ghoshe, "Econometrics", Prentice Hall of India Private Limited, New Delhi

MONETARY ECONOMICS

Course Code: ECO4402 **Credit Units: 03**

Course Objective:
The main objective of the course is to impart knowledge about the monetary theories and policy, demand and supply of money, functions of a central bank, neutrality of money etc.

Course Contents:

Module I: Money
Meaning, functions and significance; Theories of Money and Prices: Traditional quantity theory of money (Fisher's and Cambridge Versions), Keynesian theory, Modern theory (Friedman's approach)

Module II: Demand for Money
Classical approach, Keynesian approach and Post Keynesian: Tobin's approach.

Module III: Supply of Money
Components and measures of money supply; The 'H' theory of money supply, money multiplier - process and determinants. Factors affecting 'H'; RBI's analysis of money supply

Module IV: Monetary Policy
Functions of central bank; Definition, Goals, targets and indicators of monetary policy; Measures of credit control; Transmission mechanism of monetary policy - Keynesian and portfolio mechanisms; Lags in monetary policy. The neutrality of money, Discriminatory effects of monetary policy.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Gupta, S.B.; Monetary Economics; S. Chand and Company; New Delhi
- Harris, L., Monetary Theory ; McGraw Hill, New York

References:

- Friedman, ed Studies in Quantity Theory of Money; University of Chicago Press, Chicago
- Reserve Bank of India (1977); Money Supply: Concepts, Comilation and Analysis, RBI Bulletin, January.
- Mitra, S., ed, Money and Banking, Random House; New York

INTERNATIONAL ECONOMICS

Course Code: ECO4403 **Credit Units: 03**

Course Objective:
The course focuses on the basic issues, concepts and theories related to the international economics; it includes concepts like gains from trade, terms of trade and exchange rate.

Course Contents:

Module I
Nature of International Economics; Theories of International Trade – Absolute and Comparative Cost Advantage Theory. Haberler's Opportunity Cost Theory. Mill's Reciprocal Demand Theory. Hecksher Ohlin Theorem – Factor Abundance in terms of price and physical. Factor Intensity, Factor Price Equalisation theorem; Leontief paradox

Module II
New Theories of International Trade: KRAVIS theory of Avalilability, Linders theory of the volume of trade and Demand Pattern. Posner's Technological gap theory; Gains from Trade: Measurement - Ricardian, Mill's and Modern Approach. Factors affecting Gains from Trade

Module III: Terms of Trade
Types, determination of Terms of Trade; Factors affecting terms of trade; Economic Growth and International Trade: Effects of Growth on Trade – Production and Consumption effects. Effects of growth on terms of trade, immeserising growth; Increase in factor endowments and International Trade: Rybezynski theorem

Module IV: Exchange Rate
Types, Pegged, Spot, Forward. Determination of exchange rate – Mint Power Parity, theory of Purchasing Power Parity; Fixed v/s Flexible Exchange Rate

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:
- Kindleberger, C.P.: International Economics, R.D. Irwin, Homewood.
- Salvatore, D.: International Economics, John Willey and Sons.

***References*:**
- Meade, J.F.: Theory of International Policy, Volume II Oxford University Press, London
- Mannur: International Economics, Vikas Publishing House

GROUP A: INDUSTRIAL AND AGRICULTURE ECONOMICS

ENTREPRENEURSHIP & SMALL SCALE BUSINESS

Course Code: ECO4404 **Credit Units: 03**

Course Objective: The purpose of this paper is to prepare a ground where the students view Entrepreneurship as a desirable and feasible career option. In particular the paper seeks to build the necessary competencies and motivation for a career in Entrepreneurship.

Course Content:

Module I: Er.-Entrepreneurship-Enterprise: Conceptual issues. Entrepreneurship vs. Management. Roles and functions of er in relation to the enterprise and in relation to the economy. Entrepreneurship is an interactive process between the individual and the environment. Small business as seedbed of Entrepreneurship; Entrepreneur competencies, Entrepreneur motivation, performance and rewards

Module II: Opportunity scouting and idea generation: role of creativity and innovation and business research. Sources of business ideas; Entrepreneur opportunities in contemporary business environment, for example opportunities in net-work marketing, franchising, business process outsourcing in the early 21 century. The process of setting up a small business: Preliminary screening and aspects of the detailed study of the feasibility of the business idea and financing/non-financing support agencies to familiarize themselves with the policies/programs and procedures and the available schemes.

Module III: Management roles and functions in a small business. Designing and re-designing business process, location, layout, operations planning and control. Basic awareness on the issues impinging on quality, productivity and environment; Managing business growth; The pros and cons of alternative growth options: internal expansion, acquisitions and mergers, integration and diversification; Crisis in business growth

Module IV: Sources of risk/venture capital, fixed capital, working capital and a basic awareness of financial services such as leasing and factoring.

Module V: Issues in small business marketing. The concept and application of product life cycle [plc], advertising and publicity, sales and distribution management; The idea of consortium marketing, competitive bidding/tender marketing, negotiating with principal customers. The contemporary perspectives on Infrastructure Development, Product and Procurement Reservation, Marketing Assistance, Subsidies and other Fiscal and Monetary Incentives. National state level and grass-root level financial and non-financial institutions in support of small business development.

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- Bhide, Amar V., The Origin and Evolution of New Business, Oxford University Press, New York, 2000.
- Desai, Vasant Dr. (2004) Management of small scale enterprises New Delhi: Himalaya Publishing House

References

- Taneja, Gupta, Entrepreneur Development New Venture Creation,: 2nd ed. Galgotia Publishing Company
- Dollinger M.J., 'Entrepreneurship strategies and Resources', 3rd edition, Pearson Education, New Delhi 2006.
- Brandt, Steven C., The 10 Commandments for Building a Growth Company, Third Edition, Macmillan Business Books, Delhi, 1977
- Holt, David H., Entrepreneurship: Strtegies and Resources, Illinois, Irwin, 1955.
- Panda, ShibaCharan, Entrepreneurship Development, New Delhi, Anmol Publications.
- Patel, V.G., The Seven Business Crises and How to Beat Them, Tata-Mcgraw, New Delhi, 1995.
- SIDBI Report n Small Scale Industries Sector[latest edition]
- Verma, J.C.., and Gurpal Singh, Small Business and Industry-A Handbook for Entrepreneurs, Sage, New Delhi, 2002 11. Vesper, Karl H., New Venture Strategies, [Revised Edition], New Jersy, Prentice Hall, 1990

INDIAN AGRICULTURE-MARKETS, INSTITUTIONS & TECHNOLOGY

Course Code: ECO4405 **Credit Units: 03**

Course Objective:

The Objective of Agricultural Economics is to make students aware about the Agricultural setup of India and the various decision making processes of India at different levels with regard to its commodity Markets, Reorganization of Rural Credit, Agricultural Productivity, Demand& Supply of Farm Products.

Course Content:

Module I: Introduction
Nature and Problems of Agricultural Commodity Markets –Types; Group, Global, Corporate & Forward - agricultural marketing and price system in India - Marketing Margins and Marketing Margin Determinants; and Evaluation of Marketing Efficiency .

Module II: Rural Money Markets
Reorganization of rural credit – co-operatives, commercial banks,regional rural banks, micro finance, Role of NABARD and Vaidynathan committee - Credit fragmentation - Organized and unorganized sectors -Report of Radhakrishna Committee - Credit rationing _ Moral hazards, Evolution of credit systems in India - Imperfections in rural credit markets

Module III: Agricultural Production and Productivity
Agricultural production – Resource and efficiency in traditional agriculture,Production function analysis in agriculture, factor combination and resource substitution, cost and supply curves - Size of farm and laws of returns –Theoretical and empirical findings - Farm budgeting and cost concepts, supply response of individual crops and aggregate supply - Technical change and agricultural productivity

Module IV: Demand for Farm Products
Characteristics of demand for farm products - Concept and measurement of own pricecross _ Price and income elasticities of demand and their interrelationship _Quantity and quality components of demand for food - Growth in demand for food in developing and developed countries - Forecasting of demand for food products -
Rationale for and types of government intervention for food and nutrition security in developing countries

Module V: Supply of Farm Products
Characteristics of supply of farm products - Issues relating to specification of supply response function (Distributed lags, acreage vs. production response etc.) -Rigidities in farm supply response - Supply response of individual crops and aggregate production Market supply of a subsistence crop - Supply responin Indian agriculture - Price vs. non-price factors in inducing aggregate supply growth - Characteristics of farm product markets in India Role of farmers' marketing co-operatives - Futures trading - Towards free trade in agricultural
commodities

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- RuddarDutt and K P M Sundaram Indian Economy, S. Chand & Co. Ltd, New Delhi.
- Bansil.B.C. Agricultural Problems of India, Vikas Publishing House. Pvt. Ltd., New Delhi.

References:

- Misra and Puri, Indian Economy, Himalaya Publishing House, Bombay**.**
- Sankaran.A. Agricultural Economy of India, Progressive Corporation. Pvt. Ltd., Bombay.
- Srivastava.O.S. Agricultural Economics, Rawat Publications, Jaipur, 1996.

GROUP B: DEVELOPMENT ECONOMICS
COMPARATIVE ECONOMIC DEVELOPMENT

Course Code: ECO4406 **Credit Units: 03**

Course Objective:

This course investigates selected issues in comparative historical perspective over the 19th century and the first few decades of the 20th century. The course focuses on a set of countries, which followed clearly diverse trajectories and patterns of growth to achieve their industrial transition and compares the outcomes of these diverse trajectories on sectoral change, intersectoral relations, labour processes and industrial relations and also compares the role of the state in facilitating the respective trajectories.

Course Content:

Module I
An overview of economic development of the countries selected for case studies -- Britain, U.S.A., Japan and USSR. Major features of structural changes and their interrelations- labour, productivity, capital formation, output, consumption, income and distribution of income.

Module II
Changes in the structure of agriculture and economic development -- Britain, Japan and U.S.S.R
Role and pattern of industrialisation in Britain, Japan and U.S.S.R

Module III
Labour markets and processes - Britain and Japan
Financial institutions and economic development in U.S.A and Japan

Module IV
Foreign trade and economic development -- Britain, Japan and USA; Role of the State in economic development (regulatory and developmental role) -- Japan, USA and USSR

Module V: Emergence of regional groupings with special reference to SARC, SAPTA, SAFTA, ASEAN in changing economic scenario

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- G.C. Allen, "Industrialisation of the Far East" in Cambridge Economic History of Europe(CEHE), Vol.VI, Part II
- W.A. Cole, "The Growth of National Incomes", CEHE, Volume VI, Part I.
- Richard A. Easterlin, Davis and Parker (1972) American Economic Growth: An economist'sHistory of the United States. Harper & Row Chs. 1, 9,14 and 17.
- Phyllis Deane (1966), The First Industrial Revolution, Cambridge University Press, Ch.3
- Phyllis Deane, "Great Britain" Ch.3 in the Fontana Economic History of Europe (FEHE),The Emergence of Industrial Societies, Part one.

- Maurice Dobb (1977), Soviet Economic Development since 1917 ed.6, Routledge&KeganPaul, Chs. 9, 10
- A. Gerschenkron (1969), Economic Backwardness in Historical Perspective, HarvardUniversity Press, Ch.1
- Bertrand Gille, "Banking and Industrialization in Europe 1730-1914", in FEHE, TheIndustrial Revolution. Vol. 3, Ch. 4.
- Paul R Gregory and Robert C. Stuart (1986), Soviet Economic Structure and Performance,Harper& Row (3rd ed) Chs. 1,4,5 & 7.
- Gregory Grossman, "Russia and the Soviet Union" in FEHE, Vol IV, Part II, Ch. 8.11. Y Hayami (1975), A Century of Agricultural Growth in Pre-War Japan: Its Relevance toAsian Development. University of Minnesota Press, Chs. 1, 3, and 8.
- E.J. Hobsbawm (1968), Industry and Empire: An Economic History of Britain since 1750.Weidenfeld & Nicholson, Chs.1,2,3,5,6.
- E.J. Hobsbawm (1984), World of Labour: Further studies in the history of labour. LondonWeidenfeld& Nicholson, Ch. 11
- Chalmers Johnson (1982), MITI and the Japanese Miracle: The Growth of Industrial Policy1925-1975, Stanford University Press, Chs.1,9.
- Okochi, Karsh and Levine (1965), Workers and Employees in Japan, The Japanes
- Employment relations system, University of Tokyo, Ch.13
- Simon Kuznets, Economic Growth and Structure, Oxford & IBH, Ch.1.
- Simon Kuznets (1966), Modern Economic Growth: Rate, Structure & Spread, YaleUniversity Press, Ch 10.
- W.W. Lockwood (ed) (1965), State and Economic Enterprise in Japan, Princeton UniversityPress, Ch.2, 195-215.
- W.W. Lockwood (1966), Economic Development of Japan, Expanded edition, PrincetonUniversity Press, Chs.6,7 & 10
- Peter Mathias (1983), The First Industrial Nation, An Economic History of Britain, 1700-1914. 2ndedn, Methuen Chs.1,3,8 and 15.
- Roderick Floud and D. McCloskey (ed) (1981), Economic History of Britain Since 1700,Cambridge University Press, (2nd ed) Ch. 12.
- T. Nakamura (1983) Economic Growth in Pre-War Japan, Tr. by Robert A Feldman, YaleUniversity Press, Chs. 1, 2, 3, 5 and 6.
- Alec Nove (1969) An Economic History of USSR, Penguin, 1969, Chs.5,6,7,8,9.
- Sidney Pollard, "Labour in Great Britain" in CEHE, ch3, Vol. VII, Part I.
- Michael Piore and Charles SabelThe Second Industrial Divide: Possibilities for Prosperity.Basic Books.
- Richard Tilly, "German Banking" in Journal of European Economic History, 1986, Vol. 15.No.1.
- William Woodruff, “Emergence of International Economy 1700-1914” in FEHE

URBAN ECONOMICS

Course Code: ECO4407 **Credit Units: 03**

Course Objective:

This objective behind introducing this course is to acquaint the underlying theories, propositions and issues that usually arise in studying an urban situation. The course will equip the student with the basic theoretical premises and analytical tools (borrowed from the standard micro and macro economics) that are used by an urban economist. The course therefore is not necessarily grounded in any particular reality (except where explicitly mentioned), however for pedagogical purposes, explanation and illustrations will naturally come from the Indian situation.

Course Content:

Module I: Historical emergence of urban economics and regional development as academic disciplines – Spatial structure and growth – Comparison between developed and developing countries

Module II: Decentralisation of economic decisions (arguments for and against) –Regional inequality – Rural/urban inter linkages – Indian situation.

Module III: Analytical techniques in urban economics and difficulties in measurement of Urban growth – Regional I/O tables – difficulties and uses – Multi-regional models – Statistical/econometric/qualitative models in regional and urban studies – Data sources and techniques – Geographical Information System (GIS).

Module IV: City functions and structure – Size/distribution/growth – Concept of Urbanisation – Urban morphology (sub/ de/ re/ over/ urbanisation) – Classical models – Location of residential and industrial activities – Industrial productivity and agglomeration –Tertiary sector – Metropolitan/mega cities – Trends world wide – Indian situation –The case of Mumbai.

Module V: Urban labour markets – Developed and developing economies – Informal sector – Segmentation and hierarchy – Dualism – Impact of globalisation – Todaro model –Migration theory and empirical trends in India

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text:

- O'Sullivan, A. (2002) *Urban Economics*, McGraw-Hill Irwin.
- Shukla, V. (1996) *Urbanization and Economic Growth*, Himalaya Publishers Pvt.Ltd.

References

- Ramachandran, R. (1989) *Urban Economics and Urban Systems in India***,** OUP
- http://www.mu.ac.in/arts/social_science/eco/vibhuti_html
- Harvey Armstrong and Jim Taylor(2000) *Regional Economics and Policy*, 3rd edition, Blackwell Publishing

GROUP C: PUBLIC ECONOMICS

APPLIED WELFARE ECONOMICS

Course Code: ECO4408 **Credit Units: 03**

Course Objective:

The learning outcome of this course is to use economic theory (Welfare Economics, Public Choice and Social Choice) to explain the foundation of economic policy, the design and the efficiency of different policy instruments, welfare consequences of economic policy, and the process of policy-making.

Course Content:

Module I: Introduction: welfare economics and welfare, concepts of utility; Competitive equilibrium and Pareto optimality: the fundamental theorems of wel-fare economics, alternatives to efficiency, efficient allocations with public goods

Module II: Externalities and market failures: The Coase theorem, markets for externalities, theory of second best

Module III: Introduction to social choice: the Arrow theorem - why it is impossible to make everyone happy, social welfare functions

Module IV: State intervention: reasons for state intervention, types of intervention, reasons for redistribution: redistribution as insurance, redistribution as a public good, redistribution as a fairness concept

Module V: Social decision- making: voting, voting systems, welfare implications of voting, fair social contracts; Implications of voting: theory vs. practice: interest groups, rent-seeking and bureaucracy

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text

- Mueller, D. (2003) Public Choice III, Cambridge University Press, New York
- Atkinson A.B. and J.E. Stiglitz (1980) Lectures on Public Economics, Mcgraw-HillCollege

References:

- Jones, C. (2005) Applied Welfare Economics, Oxford University Press, Oxford

RESOURCE ECONOMICS

Course Code: ECO4409 **Credit Units: 03**

Course Outline:

The course begins by exposing students to basic concepts in optimization and relevant introductory topics in microeconomics. Different categories of natural resources are covered separately with focus on forestry, fishery and exhaustible energy resources. This is followed by discussions on stock pollutants, issues of risk and uncertainty and biodiversity conservation and valuation. The course includes additional modules relating to: (a) the sustainable development concepts, relevant indicators (such as genuine savings) and natural resource accounting and (b) to the economics of property rights regimes (with focus on common property rights). It is expected that the course will help bridge the gap between theoretical models and empirical study of resource allocation and management issues in a real-world context.

Course Content:

Module I: Basics concepts in static & dynamic optimization; Introduction: Asset markets, issues of discounting, the resource allocation problem; Malthus and the commons problem; Economic Surpluses and Market distortions;

Module II: Renewable resources: basic optimal harvest problem; economics of fishery; economics of forestry

Module III: Non-renewable resources: basic optimal depletion problem; Hotelling's rule; exhaustible energy resources

Module IV: Stock pollutants, risk and uncertainty

Module V: Efficiency and Sustainability; OPEC and the political economy of oil; Energy markets and policies; Resource exploitation in LDC's; war and famine

Examination Scheme:

Components	P0(Att.)	P1	C1	CT	EE
Weightage (%)	5	5	5	15	70

Text & References:

Text

- Conrad J.M. (1999) Resource Economics, Cambridge University Press.
- Hanley N., Shogren J.F. and White B. (1997) Environmental Economics in Theory and Practice, Oxford and London, Oxford University Press and Macmillan.
- Sydsaeter and Hammond, Mathematics for Economics. LPE.

References:

- Bromley D.W. (ed). (1995) The Handbook of Environmental Economics, Blackwell, Cambridge, Massachusetts.
- Dasgutpta P. (2001) Human Well-being and the Environment, New York, Oxford Universiy Press.

- Dasgupta P.S. and Heal G.M. (1979) Economic Theory and Exhaustible Resources, Cambridge University Press
- Fisher A.C. (1981) Resource and Environmental Economics, Cambridge, Cambridge University Press.
- Kadekodi C., Singh H.C. and Kadekodi G.K. (Ed) (2004) Environmental Economics in Practice, Oxford University Press.
- Kerr J.M., Marothia D.K., Singh K., Ramasamy C., Bentley W.M. (1997) Natural Resource Economics: Theory and Applications in India, Oxford and IBH Company Private Limited.
- Kneese A.V. and Sweeney J.L. (Eds.) (1985) Handbook of Natural Resource and Energy Economics, Amsterdam, Elsevier.
- Ostrom E. Chap in Sankar U (ed) (2001) Environmental Economics, Oxford University Press
- Sydsaeter K. and Hammond P.J. (1995), Mathematics for Economics, LPE.
- Varian H.L. (2003) Intermediate Microeconomics: A Modern Approach, East West Press, Sixth Edition.

DISSERTATION

Course Code: ECO4437 **Credit Units: 06**

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.

- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:
- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:	40%
(Based on Abstract, Regularity,	
Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	25
Conceptual Framework,	10
Objectives & Methodology and	10
Implications & Conclusions	15

MANAGEMENT

Programme Structure

Course code	Course title	Lectures(L) Hour per week	Tutorial (T) Hour per week	Practical (P) Hours per week	Total Credits
MGT2151	Management Foundations	2	1	-	3
MGT2251	Marketing Management	2	1	-	3
MGT2351	Organisational Behaviour	2	1	-	3
MGT2451	Business Environment	2	1	-	3
MGT2551	Operations Research	2	1	-	3
MGT2651	Business Law	-	-	6	3
	TOTAL				**18**

MANAGEMENT

Syllabus - Semester First

MANAGEMENT FOUNDATIONS

Course Code: MGT2151 **Credit Units: 03**

Course Objective:
The aim of the course is to orient the students in theories and practices of Management so as to apply the acquired knowledge in actual business practices. This is a gateway to the real world of management and decision-making.

Course Contents:

Module I: Introduction
Concept, Nature, Scope and Functions of Management, Levels of Management, Evolution and Foundations of Management Theories - Classical and Neo - Classical Theories, Systems Approach to organization, Modern Organization Theory.

Module II: Management Planning Process
Planning objectives and characteristics, Hierarchies of planning, the concept and techniques of forecasting, Decision making – concepts & process, MBO, concept and relevance.

Module III: Organization
Meaning, Importance and Principles, Departmentalization, Span of Control, Types of Organization, Authority, Delegation of Authority.

Module IV: Staffing
Meaning, Job analysis, Manpower planning, Recruitment, Transfers and Promotions, Appraisals, Management Development, Job Rotation, Training, Rewards and Recognition.

Module V: Directing
Motivation, Co-ordination, Communication, Directing and Management Control, Decision Making, Management by objectives (MBO) the concept and relevance.

Module VI: Management Control
Coordination, Meaning, Nature, Features, Objectives and Process of Management Control, Techniques and Behavioural Aspects of Management control.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Text & References:

Text:

- Stoner, Freeman and Gilbert Jr. (2010), Management, 8th Edition, Pearson Education
- Robbins, (2009), Fundamentals of Management: Essential concepts and Applications, 6th edition, Pearson Education

References:

- Prasad, L.M. Principles & Practice of Management, 1st Edition, Tata McGrew Hills.
- Gupta, C.B., Management Concepts and Practices, Sultan Chand & Sons, New Delhi

Syllabus - Semester Second

MARKETING MANAGEMENT

Course Code: MGT2251 **Credit Units: 03**

Course Objective:
The main objective of this course is to give students an elementary knowledge of the fundamentals in the field of marketing. The focus will be both on developing and helping them imbibe basic marketing principles and establishing an appreciation of contemporary realities.

Course Contents:

Module I: Introduction to Marketing
Meaning of marketing, Core concepts of marketing, Evolution and its role in the changing business environment, various marketing management philosophies, viz., the production concept, the product concept, selling concept and the marketing concept, Newer definitions of marketing- societal marketing and relationship marketing, Strategies planning in marketing, Formulation of marketing plan.

Module II: Analyzing Marketing Opportunities
Internal and External Marketing Environment Analysis, Introduction to Marketing Information System and Marketing Research, BCG matrix, GE 9 cell model.

Module III: Studying Consumer Behaviour and Selecting Markets
Buying Behaviour for Consumer Markets and Industrial Markets, Types of Buying Situations, Buying Decision Process and Factors Affecting Buyer Behaviour, Consumer Adoption Process, Concept of Market Segmentation, Bases for segmenting Consumer and Business markets, Approaches for Targeting, Differentiation and Positioning.

Module IV: Product Mix Strategy
Product: concept & levels, Classification of consumer and industrial products, Product Differentiation, Product Mix, Product Life Cycle and various strategies, Branding: concept and challenges, Brand decisions, Packaging and Labeling.

Module V: Product Development Decision and Pricing
Product Line Decisions, New Product Development: Challenges & Process; Consumer Adoption Process, Diffusion of Innovation, Pricing Strategies; Setting the price, Understanding various pricing strategies and their application.

Module VI: Distribution and Logistics Decision and Integrated Communication Mix
Nature of Marketing Channels, Channel Functions and Flows, Channel Design and Management Decisions, Channel Dynamics, Introduction to Wholesaling, Retailing and Logistics, Marketing communication mix and Introduction to various elements of integrated marketing communications briefly

Module VII: Emerging Marketing Paradigms
E-marketing, Global marketing, Mobile marketing, Kiosk marketing, Green marketing, Tele marketing, Multi level marketing, Rural marketing.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Kotler, Philip & Armstrong, Gray, Principles of Marketing, 10th Edition, Pearson Education.
- Saxena, Rajan (2008), Marketing Management, 3rd Edition, McGrew Hills Education.

References:

- Ramaswamy and Namkumar, S (2009), Marketing Management Global Perspective: Indian Context, McMillion, New Delhi.
- Kumar, Arun and Meenakashi, N (2009), Marketing Management, Vikas Publishing House.
- Russel, Wines, Marketing Management, 3rd Edition, Pearson Education.
- Kotler, Koshi Jha (2009), Marketing Management, 13th Edition, Pearson Education.

Syllabus - Semester Third

ORGANISATIONAL BEHAVIOUR

Course Code: MGT2351 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize the students with the behavioural patterns of Human beings at individual and group levels.

Course Contents:

Module I: Understanding Human Behaviour
Concept, Nature and Significance of Human Behaviour, Factors Affecting Human Behaviour, Levels of Human Behaviour; Disciplines contributing to OB.

Module II: Individual Behaviour
Individual Differences; Personality and Theories of Personality; Perception; Learning and Behaviour reinforcement, Values.

Module III: Motivation & Attitude
Concept, Significance and Theories of Motivation, Motivation and Behaviour, Motivation at Work, Attitudes, Meaning and nature, Formation and change in attitudes, Job related attitudes.

Module IV: Interpersonal Behaviour, Power & Politics
Interpersonal Dimensions of Behaviour; Transactional Analysis Implications of TA, Organizational communication, making communication effective, Power: Concept, determinants, types; Organizational Politics: Tactics, Impression Management.

Module V: Group Behaviour and Leadership
Group Behaviour; Types, Functions, Determinants of Group Behaviour, Inter Group Problems, Leadership: Nature and Significance of Leadership, Leadership Styles, Theories of Leadership; Trait Theory, Behavioural Theory, Managerial Grid.

Module VI: Change and Conflicts
Organizational conflict, Nature and types of conflict, Management of organizational conflict, Approaches to conflict management, Organizational culture, Learning and maintaining organizational culture, Organizational change, Planned change, Resistance to change, Organization development, Definition, Need for organization development, Organization development process.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Stephen Robbins, Organisational Behaviour, 15th Edition PHI.

References:

- K. Ashwathappa, (2005) Organisational Behaviour, Tata McGrae Hill
- Keith Davis, Organisational Behaviour, Tata Mc Graw-Hill
- Keith Davis, Human Behaviour at Work, Tata McGraw-Hill

Syllabus - Semester Fourth

BUSINESS ENVIRONMENT

Course Code: MGT2451 **Credit Units: 03**

Course Objective:
The aim of the course is to orient the students towards the basic concepts of Indian and global business environment.

Course Contents:
Module I: Overview of Business Environment
Meaning and types of business environment, Internal and external environment, Micro and macro environment, Factors (Cultural, social, Political economic legal, demographic and technological) effecting business environment.

Module II: Indian Industrial environment
Industrial policy up to 1991, New industrial policy, Liberalization, Privatization and Globalization process in India, Disinvestment, Industrial sickness, MRTP act 1969, Competition law2002, Foreign Exchange Regulation Act and Foreign Exchange Management Act (FERA and FEMA).

Module III: Financial Environment
Indian money and capital markets: meaning, functions and constituents, Stock exchange- importance and functions, SEBI, Capital market reforms and development, Industrial financial institutions (IDBI, SIDBI, ICICI, IFCI etc.).

Module IV: Labour Environment
Labour legislation in India, Social security benefits, Industrial disputes- causes and preventive measures, Settlement of disputes, International Labour Organisation (ILO), Trade union- meaning and functions, Trade Union Act.

Module V: Economic Planning and Development
Planning in India- needs and objectives, five year plans, planning commission, 11th five year plan, Green and white revolution- achievements and failures, Second green revolution, foreign trade policy 2009, Export processing zones, Export oriented units, Special economic zones (EPZ's, EOU's, SEZ's) and trading houses in India.

Module VI: Global Environment
Bretton woods system, features of Uruguay round of negotiations, GATT/ WTO- role, functions and ministerial conferences, IMF, World Bank (International Bank for Reconstruction and Development), Regional economic cooperation institutions, SAARC, EU, NAFTA and ASEAN.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Francis Cherunillum, (2007), Business Environment Text and Cases, Himalaya Publications.

References:

- Bedi Suresh, (2004), Business Environment, Excel Books, N. Delhi.
- Shaikh Saleem, (2010), Business Environment, 2nd Edition, Pearson Education.
- Bhatia H.L, International Economics, Vikas Publications.
- Mishra S.K, and Puri V.K, Indian Economy, Himalaya Publishing House.
- Gupta, C B, (2008), Business Environment, 4th Edition, S. Chand & Co. New Delhi
- Rudra Dutta and Sundharam, Indian Economy, S. Chand & Co. New Delhi

Syllabus - Semester Fifth

OPERATIONS RESEARCH

Course Code: MGT2551 **Credit Units: 03**

Course Objective:
The objective of this paper is to make students familiar with basic concepts and tools in Operations Research. These techniques assist in solving complex problems and help in decision making.

Course Contents:

Module I: Introduction
Introduction to Operations Research, Definition, scope and limitations of Operations Research

Module II: Linear Programming
Linear Programming – Basic Concepts, Model formulation; Solution methods – Graphical Solution method, Simplex method (problems involving only upto 3 constraints and of inequality <), Application of LPP in business decision making.

Module III: Transportation Problem
Transportation problem- Initial Basic feasible solution (North - West corner rule, Vogels approximation method), Test for optimality (Modified Distribution (MODI) method)

Module IV: Assignment Problem
Assignment Problem – Introduction, Approach of the Assignment model, Solution Methods (Hungarian method)

Module V: Game Theory
Game Theory - Concept and definition; Solution methods of Pure Strategy games (with saddle point), Significance of Game Theory.

Module VI: Queuing & Simulation
Introduction, Elementary queuing system, Introduction to Single – channel queuing model (with Poisson arrivals and Exponential service times), (no numerical); Introduction to Simulation, applications, advantages and drawbacks of simulation, Introduction to Monte – Carlo Simulation, Role of computers in Simulation.

Examination Scheme:

Components	**CT**	**HA**	**Q**	**C**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Kapoor V K, Operations Research (Techniques for Management), Seventh edition, Sultan Chand & Sons.

References:

- Sharma J K, Operations Research (Theory & Practices), Second edition, Macmillan India Ltd.
- Hamdy A Taha, Operations Research, Seventh edition, Prentice Hall India
- Kothari C R, An introduction to Operations Research, Third edition, Vikas Publishing House

Syllabus - Semester Sixth

BUSINESS LAW

Course Code: MGT2651 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint the students with the fundamentals of business related laws, which have an important role over smooth conduct of business.

Course Contents:

Module I: Legal Environment of Business
Importance of Law, Legal environment of business, Sources of law, Function of law.

Module II: Indian Contract Act, 1872
Nature and kinds of Contracts, Concepts related to offer, Acceptance and Consideration, Principles Governing Capacity of Parties and Free Consent, Legality of Objects, Performance and Discharge of Contract, Breach of Contract and its Remedies, Basic Elements of Law Relating to Agency, Guarantee and Pledge.

Module III: Indian Sale of Goods Act, 1930
Sale and Agreement to Sell, Hire Purchase, Pledge, Mortgage, Hypothecation Lease, Goods, Different types of Goods, Passing of Property in Goods, Conditions and Warranties, Doctrine of Caveat emptor, Rights of an unpaid Seller.

Module IV: Negotiable Instruments Act, 1881
Meaning of Negotiability and Definition of Negotiable Instruments, Features, Cheques, Bill of Exchange and Promissory Note, Holder in Due Course, Crossing of Cheques, Endorsement and Dishonour of Cheques.

Module V: Elements of Company Law
Meaning and types of companies, Formation of a company, Memorandum and Articles of Association, Prospectus and Issue of Shares, Share Capital and Shareholders, Company Meetings and Proceedings, Powers and Liabilities of Directors, meeting, Managerial Remuneration and Winding up of Company.

Module VI: Consumer Protection Act 1986 and Torts
Need for Consumer Protection, Meaning of Consumer, Different Redressal Forums for Consumers, Rights of Consumers, Unfair Trade Practices, and Procedure for Filing Complaints, Meaning of tort, Application of Tortuous Liability in Business Situations.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA** - Home Assignment; **P** - Project; **S** - Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- N.D. Kapoor, Mercantile Law
- P.K Goel, Business Law for managers Biztantra.

References:

- Shukla, S.M. and Gupta, O P, Mercantile Law.
- S. S. Gulshan Mercantile Law, Excel Book.
- Maheshwari & Maheshwari Business Law.

Amity Business School

Master of Business Administration
(Business Analytics)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Business Administration (Business Analytics)

Programme Mission:
The mission of the MBA programme is to foster an environment of academic excellence in Business Management through research and innovation, industry integration, internationalization and extension activities and develop highly trained and employable professionals with specialization in the area of Marketing & Sales, Finance, Banking & Finance, Human Resource Management, International Business, Information Technology, E-Commerce and Hospital & Healthcare, who are socially responsible and globally minded professional to meet the current and emerging needs of business and society.

Programme Description:
The two year full time Masters in Business Administration programme is to educate and prepare students with the knowledge, analytical ability, and management perspectives and skills needed to lead, to motivate and to manage diversified workforce, rapid technological change and competitive marketplace while considering the principles of ethical, legal and corporate governance fundamentals.

Programme Outcome (PO):

PO1	Apply the knowledge of marketing, human resource management, finance and other functional areas of management to solve complex management issues in volatile business environment
PO2	Student shall have ability to acquire & evaluate new knowledge through Business Research Methods, have the ability to identify, define, investigate, and solve critical business issues using management principles, analyse data/information and interpret results for reaching optimum solutions.
PO3	Student shall be able to understand global issues from different perspectives, recognize the opportunities to improve the business value chain as an entrepreneur and shall develop and display basic business acumen & business skills and be able to apply different forms of communication in diversified cultural settings.
PO4	Student shall able to critically thinkto assess societal, health, safety, legal, and cultural issues and apply range of strategies for solving a problem and decision making
PO5	Student shall be able to practice ethical principles and commit to professional ethics and responsibilities and norms of the management practice.
PO6	Student shall develop range of Leadership skills and shall demonstrate excellent interpersonal skills, understanding of group dynamics and effective teamwork, including awareness about personal strengths and limitations.
PO7	Student shall be able to communicate effectively on complex management activities with various stakeholders being able to comprehend and write effective reports, design documentation, make effective presentations, and give & receive clear instructions.
PO8	Student shall recognize the need for, and have the ability to engage in independent and life-long learning in the broadest context of technological change.
PO9	Student shall be able to create, select, and apply appropriate techniques, resources, and modern management and IT tools including prediction and modeling to make decisions.

Supporting document for PSOs (Programme Specific Outcomes) of MBA BA

PSO 1			PSO 2	PSO 3		PSO4	
Student shall be able to describe fundamental knowledge of general and functional management courses & relevant technological tools to identify opportunities and apply appropriate business strategies & solutions.			Student shall be able to apply knowledge of business analytics to solve business problems using appropriate technology such as machine learning/artificial intelligence and software solutions such as R, Python, SPSS, SAS to make holistic judgment. Student shall also apply technical skills to design effective advanced analytics models and simulations for effective decision making.	Student shall be able to apply specific and cross functional knowledge to solve critical business and management issues, write effective reports, demonstrate leadership and interpersonal skills, understanding of group dynamics and effective teamwork, including awareness about personal strengths and limitations.		Student shall be able to communicate effectively on complex management issues, make effective presentation with various stakeholders being able to comprehend and shall be able to practice ethical principles, professional values and fulfil social responsibilities and engage in life-long learning	
Fundamental Business Management	**Functional Management domain**	**Research, Analysis and Technical Management Domain**	**Business Analytics**	**NTCC**		**Communication**	**Value Added**
Management Process and Organizational Behaviour	Accounting for Management	Operations and Supply Chain Management	Datamining	Financial Analytics	Summer Internship Evaluation	Basics of Communication	Self Development & Interpersonal Skills
Economics for Management	Marketing Management	Business Research Methods	Predictive Analytics-I Machine Learning using R	Supply Chain Analytics	Dissertation (Analytics Project)	Corporate Communication	Behavioural Communication & Relationship Management
Strategic Management	Human Resource Management		Predictive Analytics-II Machine Learning using Python	HR Analytics		Interpersonal Communication	Leading Through Teams
Total Quality Management	Financial Management		Big Data Analytics-Hadoop	Marketing Analytics		Cross Cultural Communication	Professional Excellence
	Consumer Behaviour		Financial Decision Analysis	Data Privacy and Data Security Laws		**Foreign Business Language**	
			Visual Analytics- Tablue/ Power BI	Statistical Techniques		Chinese	French
			Econometrics	Excel for Decision Making		Portuguese	German

			Programming for Analytics using R	Optimization Techniques		Korean	Spanish
			Programming for Analytics using Python	Database Management System		Japanese	Russian

Syllabus – First Semester

BUA4101	**MANAGEMENT PROCESS & ORGANIZATIONAL BEHAVIOR**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of general Management				
Co-requisites	Student must have basic understanding of General Management.				

Catalog Description
To help the students to develop cognizance of the importance of human behaviour.

Course Objective:
The objective of this course is to:
1. Help the students in gaining understanding of the functions and responsibilities of the manager.
2. Provide the student understanding of Human Behaviour in organizations so as to improve his/her managerial effectiveness.

Course Outcome:
Upon successful completion of the course a student will be able to:
CO1: Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization and diversified cultural settings.
CO2: Enable students to describe how people behave under different conditions.
CO3: Analyze the complexities associated, critically evaluate and apply decisions appropriately.
CO4: Enable students to synthesize related information and evaluate options for the most logical and optimal solution so that they would be able to predict and control human behaviour and improve results.

Modules	Blooms level*	Number of hours
Module I: Management vs. Manager Evolution of management thought, Functions of management, Roles and Skills of a manager, Emerging challenges of management.	L1, L2	6
Module II: Organization Nature and structure of organization, Types of organizations, Line and staff relationships, Formal and informal organizations.	L1, L2,	6
Module III: Introduction to Organization Behaviour Overview of organization behaviour and its importance, Organization models.	L1, L2,	6
Module IV: Individual Behaviour Individual behaviour, Perception and learning, Personality, Values & attitudes, Motivation: Concept theory and application	L1, L2, L3, L4, L5, L6	6

Module V: Group Behaviour Group dynamics, Communication, Leadership, Power and politics, Conflicts and negotiation.	L1, L2, L3, L4, L5, L6	6
Module VI: Organizational Culture and Change Management Organisational culture, Organisational change and development, Work stress and its management**.**	L1, L2, L3, L4, L5, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

1. Luthans, F. (2010), Organizational Behaviour, Mcgraw-Hill Education India Pvt.Ltd - New Delhi.
2. Robbins, S.P. (2016), Organizational Behaviour, Sixteenth Edition, Pearson Education.

Reference Books

1. Greenberg, J. & Baron, R.A. (2005), Behaviour in Organizations, Pearson Education.
2. Newstrom John W. and Davis Keith, (1993), Organizational Behaviour: Human Behaviour at Work, Tata McGraw Hill, New Delhi
3. P. Subba Rao (2010), Management and Organisation and Behaviour, Himalaya Publishing House, New Delhi
4. Pierce Gardner with Dunham (2011) Managing Organizational Behaviour. Cengage Learning India.

Modes of Evaluation: Class Test /Home Assignment/ Power Point Presentation/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**PPT**	**A**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, PPT: Power Point Presentation, A: Attendance EE: End Semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

BUA4102	**ACCOUNTING FOR MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of general Management				
Co-requisites	Student must have basic understanding of General Management.				

Catalog Description

The intent of this course is to acquaint the students with fundamental concepts and processes of accounting so that they are able to appreciate the nature of item presented in the annual accounts of an organization. The student will be able to familiarize with the significant tools and techniques of financial analysis further useful in the interpretation of the financial statements. The aim of this course does not focus on to make the student's expert accountant but to have a good comprehension on the management planning and control systems. However, the principal focus will be related to the interpretation and use of the financial data by non-accounting students to gain the ability of using accounting information as a tool in applying solutions for managerial problems, evaluating the financial performance, and interpreting the financial structure.

Course Objectives

The objective of this course is to:

1. Equip the students to develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, students will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts.
2. Develop skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Outcome:

On completion of this course, the students will be able to:

CO1: Enable the students to combine practice and theoretical knowledge of financial accounting.

CO2: Demonstrate the decision-making skills to the students in the financial analysis context,

CO3: Develop an ability to identify and analyze complex financial accounting problems and opportunities in real life situations.

CO4: Develop skills in applying management accounting techniques to assist in decision making.

Modules	Blooms Level	Number of Hours
Module 1: Introduction The Financial Accounting Framework, Accounting Policies, Need of Accounting. Users of Accounting Information,	L1, L2, L3	8

Accounting Cycle, Accounting and Management Control. Balance sheet- Classification Items of Balance Sheet, Formats of Balance Sheet. Preparation of Balance Sheet. Income Statement- Realization vs. Accrual Principle, Format of Income Statement), Preparation of Income Statement (IAS,GAAP&IFRS), Depreciation Accounting.		
Module 2: Measuring and Reporting Measuring and Reporting Assets, Liabilities &Equity:Cost of sales and Inventories, Debentures, Investments, Shareholder Equity; Human Resource Accounting: Valuation of Human Resources, Recording and Disclosure in Financial Statements.	L1, L2, L5	8
Module 3: Analyzing and Interpreting Financial Statements Financial Statement Analysis – Basic Relationship, Overall Measures, Profitability Ratios, Investment Utilization Ratios, Financial Condition Ratios, Making Comparisons. The Statement of Cash Flows-Profit versus Cash, Purpose and Use of Cash Flow Statement, Format of Cash Flow Statement (AS-3), Preparation of Cash Flow Statement (IAS,GAAP&IFRS).	L4, L5, L6	9
Module 4: Management Accounting Emergence of Management Account, Managerial costing and Cost-Volume- Profit Analysis, Budgeting and Budgetary control, Variance Analysis .	L1, L2, L5	5
Module 5: Cost Accounting: Elements of Cost, Cost Classification and Allocation, Cost sheet, Process Costing, Job Costing.	L1, L2, L5	5

*Bloom's Level: L1 – Knowledge; L2-Comprehension, L3 – Application, L4 – Analysis, L5 – Synthesis, L6 - Evaluation

Text Books

1. Anthony, N.R; Hawkings, F. D; Merchant, A.K (2014), Accounting Text and Cases, 13th Edition, McGraw Hill.
2. Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, McGraw Hill.

Reference Books

1. Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing House
2. Narayanaswamy R (2014), Finanacial Accounting – A Managerial Perspective, Prentice Hall of India.
3. Maheshwari S N; Maheshwari SK and Maheshwari SK, 3rd Edition, A Text Book for Accounting for Management, Vikas Publishing House.
4. Tulsian, P.C (2006), Financial Accounting, Tata McGraw Hill.
5. Banerjee, A (2005), Financial Accounting, Excel Books.
6. Ghosh,T.P (2005), Fundamentals of Management Accounting, Excel Books
7. M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.

Modes of Evaluation: Quiz/Assignment/Presentation/Written Examination

Examination Scheme:

Components	Group Presentation	In Class Quiz	Class Test/Mid Term Exam	Attendance	External Exam
Weightage (%)	10	5	10	5	70

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	-	1	1	--	--	--	--	--	--	1	--	--	--
CO2	1	1	1	--	--	--	1	--	--	1	--	--	--
CO3	1	1	--	1	--	--	--	--	--	1	--	--	--
CO4	1	1	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4103	**MARKETING MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Marketing management emphasizes upon the practical aspects of marketing concepts and management functions performed by professionals. This is a beginner's course in Marketing and shall cover the basics. The course helps in developing an understanding of the challenges of marketing management in manufacturing and service industries: analyzing marketing environments; evaluating strategic alternatives and designing and implementing marketing programmes involving decisions about products/services, pricing, distribution and promotion. The course serves to familiarize participants with basic marketing concepts, environment, strategies and methodology.

Course Objectives

The objectives of this course are to:

1. Provide the students exposure to modern marketing concepts, tools and techniques.
2. Enhance student's knowledge to prepare for general management responsibilities by focusing on the input of the marketing perspective across all functions.
3. Explain different consumer-specific characteristics as well as certain psychological processes influencing buying behavior.
4. Provide different dimensions of marketing such as STP, business environment, distribution channels, marketing communication, and social media marketing to enable the students to design and analyze the functional aspects in emerging market.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Define the holistic marketing efforts to develop, design and implement marketing programs. They will also be able to examine challenges, responsibilities, and risks managers face in today's workplace.

CO2: Illustrate a comprehensive knowledge about how values are created, communicated and delivered to the target audiences.

CO3: Explain how to control the elements of the marketing mix—product policy, channels of distribution, communication, and pricing—to satisfy customer needs profitably

CO4: Design strategic approaches to manage different marketing dimensions in uplifting the consumer as well as business market.

CO5: Describe the marketing communication and its applicability along with understanding new-age media, advertising, sales promotion, personal selling etc.

Modules	Blooms Level*	Number of hours
Module I: Understanding Marketing in New Perspective Fundamentals of Marketing, Customer Value and Satisfaction, Customer Delight, Conceptualizing Tasks and Philosophies of Marketing Management, Value Chain, Scanning the Marketing Environment, Marketing Mix Elements, Difference between marketing and Selling, Relationship marketing, Social marketing, Strategic Planning in marketing, formulating the marketing plan.	L1, L2	8
Module II: Analyzing Consumers & Selecting Markets The factors influencing consumer behavior. The stages in the buying process, the buying decision making process, factors effecting the buying decision., Market Segmentations, Levels of Market Segmentations, Patterns, Procedures, Requirement for Effective Segmentation, Evaluating the Market Segments, Selecting the Market Segments, Tool for Competitive Differentiation, Developing a Positioning Strategy.	L1, L2, L4	7
Module III: Managing Product & Pricing Strategies Classification of products, New Product development, stages of product development, Adoption process, Product mix decisions and line management, Length, width and depth of a line, line analysis, and brand management, product life cycle, stages in lifecycle and factors affecting each stage, Managing product life cycles. Setting the price, adapting the price, initiating and responding the price changes.	L1, L2, L3	7
Module IV: Designing: Managing the Integrated Communication Channel functions and flows. Channel design decisions. Channel management decisions. Channel dynamics; vertical horizontal and multi channel marketing systems. Market Logistics decisions. Effective Communication, Integrated Marketing Communication, Marketing Communication Process, Promotion mix, Advertising, Personal Selling, Sales Promotion and Publicity and Public Relations, Direct Marketing.	L1, L2, L3	7
Module VI: Emerging Trends in Marketing An Introduction to Internet Marketing, Multi Level Marketing, E-Marketing, Green Marketing, Event Marketing, Types of Events, Sponsorship, Cause Related Marketing, Marketing for Non Profit Organizations Marketing Strategies for Leaders, Challengers, Followers and Nichers.	L1, L2, L5	7

*Bloom's Level: *L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation*

Text Book

Kotler, Keller, Koshi& Jha, (2015), Marketing Management (14th ed.)- A South Asian Perspective, Pearson Education.

Reference Books

1. V S Ramaswamy & S Namakumari, (2009), Marketing Management; Planning, Implementation & Control (5th ed.)McMillan.

2. S.Neelamegham, (2009) Marketing in India, Vikas publishing house.
3. Saxena, Ranjan (2016), Marketing Management, 5th edition, Tata McGraw Hill, New Delhi.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	1	1	--	1	1	1	--	1
CO2	1	1	1	1	--	1	1	--	1	1	1	--	1
CO3	1	2	1	1	--	1	1	--	1	1	1	--	2
CO4	1	1	1	1	--	1	2	--	1	1	1	--	1
CO5	1	1	1	2	--	1	2	--	1	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

BUA4104	**STATISTICAL TECHNIQUES**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the understanding on identification of data, analysis and interpretation of data using basic quantitative tools & techniques. In this course, students can apply the quantitative techniques in the analysis of statistical and economic problems. Probability and hypothesis testing are major topics to be covered. Basic understanding of statistical concepts helps in deciding on the suitable technique for data analysis and also to interpret results.

Course Objectives

The objectives of this course are to

1. Familiarize the students with basic quantitative tools & techniques for data analysis.
2. Equip the students with the concept of probability, hypothesis testing, data identification, and data analysis and interpretation using statistical tools.
3. Facilitate hands on experience to various statistical problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts of probability and Bayes Theorem and manipulate the probability models that are most widely used in economics, and apply them correctly and carry out the appropriate statistical analysis.

CO2: Apply the appropriate statistical tools and techniques for data analysis of economic models.

CO3: Apply graphical, numerical methods and Excel to make calculate and illustrate descriptive statistics and critically evaluate the basis for these calculations.

CO4: Identify the appropriate regression model to apply to an economics dataset and also the problems associated with these models such as autocorrelation. Multicollinearity, heteroscedasticity, non Stationarity data series that may affect regression analyses.

Modules	Blooms level*	Number of hours
MODULE 1: Probability Theory Elements of Probability Theory: Sample space Events, meaning of probability Classical definition of probability, The addition rule, Multiplication Rule, Theorems of total probability, conditional and statistical independence, limitation of classical definition, Bayes formula, random variable, expectation and variance of random variable (for random sampling with or without replacement)	L1, L2,L3	9
MODULE 2: Random Variables and Probability Distributions Defining random variables; probability distributions; expected	L1, L2,L3	9

values of random variables and of functions of random variables; properties of commonly used discrete and continuous distributions (uniform, binomial, normal, poisson and exponential random variables).		
MODULE 3:Introduction to Estimation Methods of sampling; sampling distribution of a statistic; distribution of the sample mean; sampling error and standard error of a statistic with special reference to the mean; Point and interval estimation of parameters; properties of an estimator; unbiasedness, relative efficiency and consistency.	L1, L2,L3	9
MODULE 4: Hypothesis Testing Testing of Hypothesis; type I and type II errors, power of a test; large sample tests, "t" test for the mean; one tail and two tail tests for difference of means; z-test, f-test, Chi-square test for (i) goodness of fit and (ii) independence of two attributes.	L1, L2,L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Gupta S.C, *Fundamentals of Statistical Methods*, Sultanchand& Sons.
2. Allen Webster, Applied Statistics for Business and Economics, (3rd edition), McGraw Hill, International Edition 1998.
3. Pitman, Australia. M.R. Spiegel (2nd edition), *Theory and Problems of Statistics*, Schaum Series.

Reference Books

1. P.H. Karmel and M. Polasek, *Applied Statistics for Economists* (4th edition)
2. N.G.Das, *Statistical Methods* (Edition 1&2), Tata McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	1	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	1	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4105	**EXCEL FOR DECISION MAKING**	L	T	P	C
Version 1.1	Latest Approved	1	0	2	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers. This course will provide all the tools necessary to create and use basic and advanced spreadsheets.

Course Objectives
The course enables students to:
1. Explore the Microsoft Excel as a tool for facilitating solutions for business problems/decision making
2. Have an understanding on the advanced functions of excel through guided demonstration.
3. Enhance excel skills of students and develops a set of fundamental skills that are essential for survival in business amid global uncertainty.

Course Outcomes
On completion of this course, the students will be able to
CO1: Manage data in excel.
CO2: Explore the functions of basic and advanced excel.
CO3: Analyze the real time series dataset.
CO4: Explain insights about decision making in business.

Modules	Blooms level*	Number of hours
Module 1: Overview of Excel **Contents:** Introduction to Spreadsheets: data entry using autofill, sort & filter feature, widening rows and columns, inserting & deleting rows and columns, creating lists, wrapping & merging text and cells. Introduction to basic data formatting, saving work in excel. Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel, page orientation and print area in Excel. How to adding hyperlinks to cells, inserting images, objects, equations and symbols. Introduction toFigures and Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart.	L1, L3, L4	4
Module 2: Data Cleansing and Lookups **Contents:** Textual functions- TRIM, SUBSTITUTE, CLEAN, STORED AS TEXT, DE-DUPLICATING, LEN & FIND,	L1, L3, L4	4

CONCATENATE, UPPER, LOWER, REPLACE functions and Data validation; Look up functions- VLookup, multiple VLook up together and HLookup with index and match; Basics of Macros.		
Module 3: Logical Functions and Pivot Tables **Contents:** Basic functions- ROUNDING, SUM, PRODUCT, MIN, MAX, AVERAGE, CONDITIONAL COUNTS, LARGE, RANK, VAR, Std Dev, CONDITIONAL SUMS. Date functions and Time functions. Logical functions- IF, THEN, AND, OR, NOT, COUNTIFS, SUMIFS, TRUE, FALSE Functions. Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager. Pivot table, pivot charts and conditional formatting.	L1, L3, L4	4
Module 4: Simulation and Decision Making **Contents:** Basics of simulation, Monte Carlo Exoperiment, Decision Analysis (DA): Terminology, DA without probabilities (Maximax, Maximin, Minimax Regret), DA with probabilities: (Decision point / branch, chance event / branch, Decision tree with examples.	L1, L3, L4	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Written Test**	**Practical**	**Viva**	**File/Assignment**	**Attendance**
Weightage (%)	20	30	30	15	5

Text Books

1. Carlberg CG, "*Business Analysis with Microsoft Excel* (2nd Edition)", Que Publishing, ISBN 0974415626.
2. Harvey G (2012), "*Excel 2013 for Dummies*" John Wiley & Sons, ISBN 9781118559703

Reference Book

Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons, 2012, ISBN 9781118559703

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	-	-	-	-	-	1	-	1	-	-
CO2	-	-	-	-	-	-	-	-	1	-	1	-	-
CO3	-	-	-	-	-	-	-	-	1	-	1	-	-
CO4	-	-	-	-	-	-	-	-	1	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

BUA4106	**OPTIMIZATION TECHNIQUES**	L	T	P	C
Version 1	Latest approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The main objective of the course is to provide the students the insight into structures and processes that management science can offer and the enormous practical utility of its various utility. The course is designed to introduce the fundamental tools of MS and their application to real life business problems. It will help students to take well informed decisions in their corporate life.

Course Objective:

The main objectives of this course are to:

1. Take decision under certain, uncertain and risky environment
2. Understand various business problems and applying a suitable MS model
3. Formulate Linear Programming Problem and solving using graphical and Simplex methods
4. Design the transportation and assignment problem, solve them and interpret the result
5. Design and solving the problems of game theory for the optimal solution
6. Describe the application of simulations.

Course Outcomes

On completion of this course**, s**tudents shell be able to:

CO1. To recall the evolution of OR and specify currently used OR models for different business situations

CO2. To describe a business problem and analyzing it for the optimum solution

CO3. To illustrate different prevailing constraints while finding out optimum solution

CO4. To evaluate various models to take better and improved decisions

Modules	Blooms level*	Number of hours
Module I: Introduction Optimization Techniques: uses, scope, applications in managerial decision making; assumptions of management science models, decision making environments: decisions under certainty, uncertainty and risk situation; decision tree approach and its applications.	L1, L2, L3	6
Module II: Linear Programming Problems Linear Programming Problems: Modeling and Solution Methods-graphical method, simplex methods, problems with maximization and minimization objects, duality and its managerial interpretation; Sensitivity analysis: meaning, Change in Objective Function Coefficients, Change in Right Hand Side Values, Change in Availability of resources and Addition of a new variable.	L1, L2, L3, L4, L6	8

Module III: Transportation and Assignment Model Transportation model: various methods of finding initial basic feasible solution and optimal solution, MODI method, degeneracy, unbalanced problems, prohibited route problems, maximization transportation problems Assignment Model: Hungarian method for solution, unbalanced assignment problems, restrictions on assignments, travelling salesman problem.	L1, L2, L3, L4, L6	8
Module IV: Game Theory Two-Person Zero Sum Games, Pure Strategies: Games with Saddle Point, Mixed Strategies: Games without Saddle Point, Principle of Dominance, and Solution Methods for Games without saddle point – Algebraic Method, Arithmetic Method, Graphical Method.	L1, L2, L3, L4, L6	8
Module VI: Simulation Simulation: meaning, types of simulation, steps of simulation process, Monte Carlo simulation, applications of simulation	L1, L2, L3, L4, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Vohra, N.D. (2007). *Quantitative Techniques in Management (3rd ed.*). New Delhi, India: Tata McGraw-Hill Publishing Company Limited
2. Sharma, J.K. (2013). *Operation Research: Theory and Applications (5th ed.).* New Delhi, India: Macmillan Publishers India limited
3. Jaishankar, S. (2010). *Operation Research.* New Delhi, India: Excel Books
4. Kalavathy, S. (2002). *Operation Research (2nd ed.).* New Delhi, India: Vikas Publishing House
5. Kapoor, V.K. (2008). *Operation Research: Techniques for Management (7th ed.).* New Delhi, India: Sultan Chand and Sons

Reference Books

1. Frederick Shiller & Gerald J Liberman. *Introduction to Operation Research*. New Delhi, India: Tata McGraw- Hill Education (India) Private Limited
2. Taha, H.A. *Operation Ressearch.* New Delhi, India: Prentice Hall India
3. Gillet, B.E. *Introduction to Business Research*. Tata McGraw Hill

Modes of Evaluation: Class Test/Assignment /Written Examination

Examination Scheme:

Components	**ME**	**A**	**Q/S**	**Asn**	**CT**	**EE**
Weightage (%)	10	5	5	5	5	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination, CT- Class test

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	-	1	2	--	--	--	--	--	--	1	1	--	
CO2	-	1	2	--	--	--	--	--	--	1	2	2	
CO3	-	1	--	--	--	--	--	--	--	1	2	2	
CO4	-	1	1	1	--	--	--	--	--	1	3	3	

1: strongly related, 2: moderately related and 3: weakly related

BUA4107	**DATABASE MANAGEMENT SYSTEMS**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn about the importance and usage of database management systems in the modern day organizations. The students shall grasp sound knowledge of various types of databases that exist, creation of data warehouse and application areas of data mining. Also, the students will be learning SQL, the language of databases.

Course Objectives

The course aims to make the students

1. Understand the basic and advanced concepts in databases and database management systems
2. Analyze the importance of databases in day to day life.
3. Get a hands-on experience on the SQL-the language of databases.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the basic terminology used in databases.

CO2: Describe the concepts related to databases architecture.

CO3: Apply the knowledge of SQL in creating databases using DBMS software for a business organization.

CO4: Compare and contrast various types of keys used in database creation.

CO5: Review and assess the organization's data and network security aspects.

Modules	Blooms level*	Number of hours
Module I: Introduction to DBMS Definition of DBMS, Concept and Goals of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Database Languages, Database Users, Database Abstraction.	L1, L2	6
Module II: Relational Database & ER Model **Relational Database**: Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views **ER Model:** Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER diagrams.	L2, L3	7

Module III: Relational Model Objects Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules, Relational operators, Relational Algebra	L1, L2	7
Module 4: SQL SQL Language, DDL, DML and DCL commands. Data definition, Data retrieval and update operations on MS ACCESS and SQL Server DBMS.	L1, L2	8
Module 5: Database Applications and Types Distributed Database, Object Oriented Database, Multimedia Database, Data Mining, Digital Libraries. Data Warehouse.	L1, L2	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmasari, Navathe, "Fundamentals of Database Systems", Addision Wesley.
2. Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.

Reference Books

1. Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
2. Date C J." An Introduction to Database Systems", Addision Wesley.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1			-				-	-		1		
CO2	1			-				-	-		1		
CO3	2			-				-	1		1		
CO4	-			-				1	2		1		
CO5	-			1				2	-		1		

1: strongly related, 2: moderately related and 3: weakly related

BUA4108	**HUMAN RESOURCE MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description: The course provides insight into managing Human Resources, Recruitment, Selection, Performance Appraisal, Training & Development and Compensation.

Course Objective:
The objective of this course is to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India.

Course Outcomes:
On completion of the course the students will be able to:
CO1: Explain and apply the concepts of human resources management in the financial sector.
CO2: Demonstrate a basic understanding of different tools and techniques used in forecasting and planning human resource requirements especially in context to the banking industry.
CO3: Interpret the industry regulations of the banking sector that will effect employees and employers and apply them effectively.
CO4: Analyze and solve key issues related to the human elements, both nationally and internationally such as employee acquisition, retention compensation, appraisal, training, career planning and diversity.

Modules	Blooms level*	Number of hours
Module I: Human Resource Management in Perspective Nature and scope of HRM, HRM functions, HRM models, understanding concepts of Personnel Management, Human Resource Development and Strategic Human Resource Management, HR Environment, Changing Role of HR.	L1, L2	7
Module II: Meeting Human Resource Requirements Job Analysis, Job Description, Strategic Human Resource Planning, Recruitment, Selection Process, Methods – Interview, Tests, Placement and Induction	L1, L2	6
Module III: Training & Developing of Employees Training and Development, Understanding of Performance Management Systems, Potential Appraisal, Career Development	L1, L2	8
Module IV: Managing Compensation Job evaluation, Methods of Job Evaluation, Strategic Compensation, Equity Theory, Components of Pay Structure, Designing and	L1,L2	4

Administration of Wage and Salary Structure, Wage Regulations in India		
Module V: Employee Relations Overview of Industrial Relations, Industrial disputes, Collective Bargaining, Workers Participation and Management, Grievance handling	L1, L2	5
Module VI: Emerging Trends in HRM Overview of Human Resource Information System (HRIS), Introduction to HR Audit, IHRM Practices, Cross- Cultural and Diversity Management, Work-life integration, Human Resource Outsourcing	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & References:

1. David A. Decenzo ,Stephen P. Robbins , Susan L. Verhulst,(2015), Human Resource Management ,eleventh edition , Wiley;
2. Prasad. L.M, (2014) Human Resource Management, Third Edition, Sultan Chand & Sons; New Delhi.
3. Chhabra T.N,(2014) Human Resource Management: Concepts and Issues, Edition 2014,Dhanpat Rai & Co
4. Dessler G (2014) A Framework for Human Resource Management, 7 edition (2014), Pearson Education India;
5. Michael Armstrong , Stephen Taylor,(2017), Armstrong's Handbook of Human Resource Management Practice, 14 edition (3 February 2017), Kogan Page;

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	**5**	**5**	**5**	**5**	**10**	**70**

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	-	-	-	-	-	-	1	-	-	-
CO2	2	1	-	-	-	-	-	-	-	1	-	-	-
CO3	2	3	-	-	-	-	-	-	-	2	-	-	-
CO4	1	2	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

Syllabus – Second Semester

BUA4201	**FINANCIAL MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course introduces an investigation of the firm's acquisition and financial activities, to include working capital management, capital budgeting, capital structure strategies, and valuation theory. The practical application of financial policy is stressed for decision-making purposes.

Course Objectives
The objective of this course is to
1. Provide the students relevant, systematic, efficient and actual knowledge of financial management that can be applied in practice with making financial decisions and resolving financial problems.
2. Help the students to acquire the basic knowledge by means of combining theoretical cognitions and practical attitudes to enable them to understand the financial problems in business practice.

Course Outcomes
On completion of this course, the students will be able to
CO1: Describe the financial environment within which organisations must operate.
CO2: Critically evaluate the financial objectives of various types of organisations and the respective requirements of stakeholders
CO3: Explain alternative sources of finance and investment opportunities and their suitability in particular circumstances
CO4: Assess the factors affecting investment decisions and opportunities presented to an organisation.
CO5: Select and apply techniques in managing working capital
CO6: Analyse a company's performance and make appropriate recommendations.

Modules	Blooms level*	Number of hours
Module I: Introduction A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm.	L1,L2	4
Module II: Valuation Concepts Time Value of Money, Risk and Return, Financial and Operating	L1, L2 ,L3	4

Leverage.		
Module III: Financing Decisions Capital Structure and Cost of Capital**,** Marginal Cost of Capital.	L1, L2,L3	7
Module IV: Capital Budgeting Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction.	L1,L2,L3	10
Module V: Working Capital Management Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of Working Capital.	L1,L2,L3	5
Module VI: Dividend Policy Decisions An introduction**:** Different Schools of Thought on Dividend Policy.	L1,L2,L3	6

**Bloom's Level: L1-Knowledge;L2-Comprehension;L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Pandey, I.M. (2016), Financial Management, 11th Edition,Vikas Publishing House**.**
2. Chandra, P. (2017), Financial Management: Theory and Practice, 9th Edition,Tata McGraw Hill
3. Rustagi, R.P,Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.

Reference Books

1. Damodaran, A.(2007), Corporate Finance: Theory and Practice, Wiley & Sons.
2. Van Horne, J.C. (2011), Financial Management and Policy, Prentice Hall of India.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	1	2	--	--
CO2	1	1	--	--	--	2	2	--	--	1	--	--	--
CO3	1	1	--	--	--	--	1	--	--	1	2	--	--
CO4	1	1	--	--	--	--	2	--	--	1	2	--	--
CO5	1	1	--	--	--	--	--	--	2	1	2	--	--
CO6	1	1	--	--	--	--	--	2	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4202	**OPERATIONS AND SUPPLY CHAIN MANAGEMENT**	L	T	P	C
Version 1	Latest approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Operations and supply chain management deals with the design and operation of the systems for production of goods and services. It will explore the approaches and analyze strategic decisions in operations management with a focus on designing products and processes, allocating scarce resources to strategic alternatives, and do long-range capacity and facility planning. These operations functions help in achieving the organization's long-range objectives. Subsequent focus will be on medium and short term planning and controlling. Care will be taken to strike a balance between theoretical and practical perspectives in manufacturing and serviceorganizations.

Course Objectives

The main objectives of this course are to:

1. Develop an understanding of how the operations, have strategic importance and can provide a competitive advantage in theworkplace.
2. Understand the relationship between operations and other businessfunctions.
3. Understand techniques of location and facility planning, line balancing, job designing, and capacity-planning in operationsmanagement.
4. Understand the supply chain function starting from Demand Management through InventoryManagement.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define the elements of operations management and various transformation processes to enhance productivity andcompetitiveness

CO2. Classify and apply various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments

CO3. Illustrate aggregate capacity plans and MPS in operationenvironments

CO4. Analyze suitable supply chain principles and practices in the operations.

CO5. Compare and apply variousinventory control methods

Modules	Blooms level*	Number of hours
Module I: Introduction Operations in manufacturing and services, responsibility of Operations Manager, Operations strategy and competitiveness, process analysis, manufacturing process and service process selection and design, job design and work measurement	L1, L2, L3	6
Module II: Strategic Decisions Facility location decisions, factors affecting location, location techniques: factor rating method, centroid method, facility layout, process layout, systematic layout planning, product layout, line balancing, fixed position layout, service operations layout, types of capacity, capacity planning: long term and short term, economies of scale	L1, L2, L3	8
Module III: Operating Decisions Aggregate Planning, production planning and control (PPC), benefits of PPC, Master Production Scheduling, Operations scheduling: loading, sequencing, priority rules and techniques, Materials Requirement Planning (MRP), concerns in MRP	L1, L2, L3	8
Module IV: Supply Chain Management Recent issues in SCM: Role of IT in SCM, CRM Vs SCM, structure of supply chain, benchmarking concept, features and implementation, outsourcing decisions, value addition in SCM	L1, L2, L4, L5	8
Module V: Inventory Management Inventory management: Objectives, factors, process, inventory costs, inventory models, inventory control techniques: ABC, VED, EOQ, SED analysis, Just-in-Time (JIT), JIT vs traditional systems of operations, JIT in services	L1, L3, L4, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Production and Operations Management, S.N. Cherry, McGraw Hill Publications, 3/e, 4th reprint 2007
2. Production and Operations Management , Sunil Chopra, Peter Meindle, Prentice Hall of India
3. Supply Chain Management, R.B. Handfield, Prentice Hall of India
4. Supply Chain Management, Ajay Garg, McGraw Hill Publications
5. Introduction to Supply Chain Management, Frederick Shiller& Gerald J Liberman , Tata McGraw Hill edition
6. Operation Research, H..A.Taha, Prentice Hall India
7. Introduction to Operation Research, B.E .Gillet ,Tata McGraw Hill:

Reference Books

1. RichardB.Chase,RaviShankarandF.RobertJacobs(2014);Operations&Supply Chain Management; McGraw-Hill - 2014 (14thEdition).
2. CharyS.N.TheoryandProblemsinProduction&OperationsMgt.;TataMcGraw Hill(14th Edition).
3. Krajewski Lee; Operations Mgt. Process for ValueChains; Prentice Hall (8th Edition)
4. Russell S. Roberta & Taylor, Operations Mgt., Prentice Hall (4thEdition).

Modes of Evaluation: Class Test/Assignment /Written Examination

Examination Scheme:

Components	**ME**	**A**	**Q/S**	**Asn**	**CT**	**EE**
Weightage (%)	10	5	5	5	5	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2	1	2	--	--	--	--	--	--	1	1	3	
CO2	2	1	2	--	--	2	--	2	--	1	--	3	
CO3	--	1	--	1	--	1	--	2	--	1	--	--	
CO4	--	1	1	1	--	--	--	3	--	1	2	--	
CO5	--	1	1	1	--	--	--	--	--	1	2	--	

1: strongly related, 2: moderately related and 3: weakly related

BUA4203	**ECONOMETRICS**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the both fundamental and strategic understanding on identification of business problem and how to approach that problem using econometric techniques. This course facilitates a good learning on the estimation of parameters and forecasting of any indicator/variable related to business/ economy at both micro and macro level. Also, this course covers the quantitative analysis, model building and policy making for any economic/business problem. The course starts with simple and multiple linear regressions, followed by topics of special interest to deal with model specification, endogenous variables, binary choice data, and time series data. The aim of the course is to make the students familiar with statistical techniques and quantitative analysis.

Course Objectives

The objective of this course is to

1. Provide a good understanding on identification of problem, estimation of parameters and interpretation of results.
2. Equip the students with major statistical tools and techniques using various statistical software such as STATA, R, SPSS, Eview, SAS.
3. Explore the mathematical background of these concepts and techniques, and demonstrate their use through practical examples and interactive experiments.
4. Facilitate hands on experience to various real world business problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Translate data into models to make forecasts and to support decision making in a wide variety of fields, ranging from macroeconomics to finance and marketing.

CO2: Use statistical software or programming languages to combine data sets and estimate econometric models.

CO3: Analyse binary response data, panel and time series data using appropriate statistical models.

CO4: Explain problems imposed by endogeneity and simultaneity bias and how to resolve these problems using appropriate statistical models.

Modules	Blooms level*	Number of hours
MODULE 1: Parametric Tests Nature, meaning and scope of econometrics; Simple and general linear regression model —Assumptions, Estimation (through OLS approach) and properties of estimators; Gauss-Markov theorem; Concepts and derivation of R2 and adjusted R2; Concept and	L1, L2,L3	8

analysis of variance approach and its application in regression analysis.		
MODULE 2: Autocorrelation Nature, test, consequences and remedial steps of problems of auto-correlation	L1, L2,L3,L4	7
MODULE 3: Heteroscedasticity Nature, test, consequences and remedial steps of problems of heteroscedasticity.	L1, L2,L3,L4	7
MODULE 4: Multicollinearity Nature, test, consequences and remedial steps of problems of Multicollinearity.	L1, L2,L3,L4	7
MODULE 5: Non-Parametric Tests Dummy variable technique, Testing structural stability of regression models, Stationarity Tests, Logit, Probit and Tobit models — Applications.	L1, L2, L3,L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text Books

1. Gujarati, D.N. (1995), *Basic Econometrics* (2nd Edition), McGraw Hill, New Delhi.
2. Theil, H. (1981), *Introduction to Econometrics*, Prentice Hall of India, New Delhi.

Reference Books

1. Suresh K. Ghoshe, *Econometrics*, Prentice Hall of India Private Limited, New Delhi (2003)
2. A. Koutsoyiannis, *The theory of Econometrics: An introduction exposition of econometric methods*, Educational low-priced books scheme, McMillan Education (1992)
3. Christopher Dougherty, *Introduction to Econometrics*, Oxford University Press (3rd edition)
4. Amemiya, T. (1985), *Advanced Econometrics*, Harvard University Press, Cambridge, Mass.
5. Baltagi, B.H. (1998), *Econometrics*, Springer, New York.
6. Dongherty, C. (1992), *Introduction to Econometrics*, Oxford University Press, New York.
7. Goldberger, A.S. (1998), *Introductory Econometrics*, Harvard University Press, Cambridge

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	1	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	1	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4204	**BUSINESS RESEARCH METHODS**	L	T	P	C
Version 1.1	Latest Approved	1	0	2	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:
The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Objectives:
The objectives of this course are to ensure that students are able to:

1. Understand the basic framework of research process.
2. Comprehend of various research designs and techniques.
3. Identify various sources of information for literature review and data collection.
4. Understand some basic concepts of research and its methodologies
5. Understand as how to organize and conduct research in a more appropriate manner and write a research report, thesis and a research proposal

Course Outcomes (CO):
On completion of this course, the students will be able to:
CO1: Apply a range of quantitative and / or qualitative research techniques to business and management problems / issues
CO2: Determine and apply research approaches, techniques and strategies in the appropriate manner for managerial decision making
CO3: Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process
CO4: Develop necessary critical thinking skills in order to evaluate different research approaches utilised in the different industries and be able to critically assess the overall process of designing a research study from its inception to its final report preparation.

Modules	**Blooms level***	**Number of hours**
Module I: Introduction Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation of hypothesis, research designs, drafting a research proposal	L1, L2	2
Module II: Measurement and Data Collection Primary data, secondary data, design of questionnaire, sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques,	L1, L2,L3,L4, L5	8

measures of central tendency mean, median, mode; measures of dispersion, data processing		
Module III: Data Analysis I Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test, Chi- square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test	L1, L2,L3,L4,L5	6
Module IV: Data Analysis-II Simple linear regression: coefficient of determination, significance tests, residual analysis, Multivariate techniques: multiple linear regression: Multiple coefficient of determination, interpretation of regression coefficients, heteroscedasticity, multicollinearity, outliers, auto regression, factor analysis, cluster analysis (concept)	L1,L2,L3,L4, L5	4
Module V: Report Writing Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report	L1,L2,L3,L4, L5	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Book:

Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited

Reference Books:

1. Zikmund, William C (1997). Business Research Methods (5th Ed.). The Dryden Press, Harcourt Brace College Publishers
2. Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Term Exam EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	-	--	--	--	-	--	1	3	-	-
CO2	1	1	-	--	--	-	--	-	-	1	2	-	-
CO3	1	2	--	-	--	--	-	--	--	1	3	-	-
CO4	1	1	--	--	3	-	2	--	--	1	3	2	2

1: strongly related, 2: moderately related and 3: weakly related

BUA4205	**ECONOMICS FOR MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	2	0	0	2
Pre-requisites/Exposure	Basic knowledge of economic science preferred but not compulsory				
Co-requisites					

Catalog Description

In this course the students are introduced with various concepts of economic science that relates to decision making process in management of business organization. To begin with, introductory concepts of economic theory and their implications on managerial decision process are analyzed. Thereafter concepts related to demand analysis, demand forecasting supply analysis, and equilibrium market conditions are discussed in detail. The next phase deals extensively concepts related to production theory, cost theory and revenue aspects. Third, various concepts related to market structure are discussed in detail. Finally, various macroeconomic concepts, policy perspectives of government and other institutions are explored in detail. The overall aim of this course is to make the students familiar with working knowledge of economic decision process based on rational choice approach in workplace.

Course Objectives:

The objective of this course is to:

1. Equip the students with theoretical concepts of economic science so that they can analyze situations and improve upon their managerial decision making process in workplace.
2. Provide students with extensive exposure about the micro and macro level variables and government policies that influence business operations and strategies of the firm under dynamic business environment in an increasingly globalized and integrated business architecture.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain basic concepts of economic analysis, demand and supply dynamics, demand forecasting techniques and their application, and analyze the working of free market mechanism and appreciate how forces of demand and supply reinforce each other for attaining market equilibrium.

CO2: Analyze rationally the dynamics of production and cost aspects in order to make a holistic assessment of the complexities inherent in production system.

CO3: Describe the various forms of market structure and their implications in managerial decision process.

CO4: Discuss holistically the various macroeconomic aspects of business, economic variables affecting business operations, and implications of government policies in shaping the dynamics of business environment.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Managerial Economics, Demand Analysis and Demand Forecasting: *Introduction to Managerial Economics:* Meaning and Nature of Managerial Economics, Significance of Managerial Economics, Scope of Managerial Economics. *Demand Analysis:* Meaning of Demand, Determinants of Demand, Individual and Market Demand Functions, Individual and Market Demand Curves, Law of Demand, Exception of Law of Demand. *Elasticity of Demand:*Types of Elasticity of Demand, Significance of Elasticity of Demand. *Demand Forecasting*: Purpose of Demand Forecasting , Steps Involved in Forecasting, Determinants of Demand Forecasting, Methods of Demand Forecasting.	L1, L2	7
MODULE 2: Theory of Supply, Production, Cost and Revenue Analysis: *Supply:* Law of Supply, Determinants of Supply, Shift of Supply and Change in Supply, Elasticity of Supply, Kinds of Elasticity of Supply, Determinants Elasticity of Supply. *Theory of Production:* Meaning of Production, Short –run Analysis of Production, Law of Variable Proportion, the Three Stages of Production, Returns to Scale. *Analysis of Cost*: Cost and Managerial Decision-making, Types of Cost, Cost Function, Relationship between Production and Cost, Short Run Cost Function, Long Run Cost Function, Relation between Short-run and Long-run Cost Curves,.*Economies of Scale.* Break-Even Analysis. Concept of Revenue.	L1, L2	11
MODULE 3:Market Structure and Price Determination *Perfect Competition:* Introduction of Perfect Competition, Characteristics of Perfect Competition, Demand Curve of Firm and Industry, Equilibrium of the Firm in the Short Run and Long Run. Effects of Tax Imposition under Perfect Competition. *Monopoly:* Assumptions, Causes of Monopoly, Demand, Average Revenue and Marginal Revenue of a Monopolistic, Profit Maximization Price Determinants of the Monopolist in Short-run and Long-run. Measures of Monopoly Power. *Monopolistic Competition:* Assumptions, Product Differentiation, Demand Curve, Equilibrium of the Firm in Short-run and Long-run, Selling cost and Monopolistic Competition. *Oligopoly:* Assumptions, Non-collusive Oligopoly and Collusive Oligopoly, Kinked Demand Curve Analysis.	L1, L2, L3	8
MODULE 4: Macroeconomics Analysis *National Income:* An Indicator of Economic Activity, The Parameters that Influence Level of Economic Activity. *Business Cycles:* Characteristics of Business Cycle, Phases of Business Cycle, Ill Effects of Business Cycles, General Measure to Control Business Cycles. *The Role of Government in Market Economy and Strategic Business Implications:* Rationale of Government Intervention, Government Macroeconomic Policy Measures – GST, Demonetization – and their impact on Business; Macro Economic variables and their	L1, L2, L3, L4	10

functional relationship; Economic Functions of Government in a Market Economy, Legal and Social Framework, Restraining Unfair Competition and Increasing Market Power, Reallocation of Resources in the Presence of Externalities, Redistribution of Income, Regulation of Natural Monopoly, Stabilization of Economy; *Macroeconomic Variables affecting Business:*Consumption Function, Saving Function, Investment Multiplier; Transaction, Precautionary, Speculative Demand for Money; Liquidity Preference; Components of Money Supply; Fiscal Policy & Monetary Policy and their implications on business and management; Inflation and Deflation - Demand pull and Cost push inflation; Government policies to control inflation. *International Trade Regime and its implications on Business:* GATT, World Trade Organization, Regional Trade Agreements – EU, NAFTA, ASEAN, SAFTA, MERCUSOR		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Thomas, Christopher R., S. Charles Maurice, Sumit Sarkar, Managerial Economics, 9th Edition, Tata McGraw Hills.
2. Samuelson, Paul A., and William Nordhaus, Economics, 19th Edition, McGraw Hills India Pvt. Ltd.
3. Krugman, Paul and Maurice Obstfeld (2008), International Trade Policy, Pearsons.
4. Salvatore, D (2010), Managerial Economics, Oxford University Press

Reference Books

1. Peterson, H.C and Lewis, W.C. (2005), Managerial Economics, Prentice Hall of India
2. Bhattacharya, Govind and Debasis Bhattacharya. (2018), GST and Its Aftermath: Is Consumer Really the King, SAGE Publications.
3. Gupta, G.S. (2006), Managerial Economics, Tata McGraw Hill
4. Mishra, S.K., and V.K. Puri. (2009), Indian Economy, Himalaya Publishing House.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	--	2	1	1	--	--
CO2	1	1	2	--	--	--	--	2	--	1	1	--	--
CO3	1	1	2	--	--	--	--	--	--	1	1	2	--
CO4	1	1	1	--	--	--	2	2	2	1	1	2	2

1: strongly related, 2: moderately related and 3: weakly related

BUA4206	**PROGRAMMING FOR ANALYTICS USING R**	L	T	P	C
Version 1.1	Date of Approval: Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course offers the specialization on R (powerful language used widely for data analysis and statistical computing). This course facilitates a good understanding on the process of data manipulation and visualization. The course provides ample working examples on statistical data analysis using R.

Course Objectives
The objective of this course is to:
1. Provide learning on how to program in R, how to use R for effective data analysis, how to install and configure software necessary for a statistical programming environment.
2. Provide applications on statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code.
3. Facilitate hands on experience to various real world business problems using R.

Course Outcomes
On completion of this course, the students will be able to:
CO1: Analyze different datasets using R
CO2: Explore real time data at various levels using appropriate visualizations
CO3: Apply critical programming language concepts such as data types, iteration, control structures, functions, and boolean operators by writing R programs and through examples

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Introducing to R , R Data Structures , Help functions in R , Vectors , Scalars , Declarations , recycling , Common Vector operations , Using all and any, Vectorized operations , NA and NULL values , Filtering , Vectorized if-then else , Vector Equality , Vector Element names	L1, L2,L3	8
MODULE 2: Matrices, Arrays And Lists: Creating matrices , Matrix operations , Applying Functions to Matrix Rows and Columns , Adding and deleting rows and columns , Vector/Matrix Distinction , Avoiding Dimension Reduction , Higher Dimensional arrays , lists , Creating lists , General list operations , Accessing list components and values , applying functions to lists , recursive lists	L1, L2,L3	7
MODULE 3: Data Frames: Creating Data Frames , Matrix-like operations in frames , Merging Data Frames , Applying functions to	L1, L2,L3	7

Data frames , Factors and Tables , factors and levels , Common functions used with factors , Working with tables - Other factors and table related functions - Control statements , Arithmetic and Boolean operators and values , Default values for arguments - Returning Boolean values , functions are objects , Environment and Scope issues , Writing Upstairs - Recursion , Replacement functions , Tools for composing function code , Math and Simulations in R		
MODULE 4: OOP: S3 Classes , S4 Classes , Managing your objects , Input/ Output , accessing keyboard and monitor , reading and writing files , accessing the internet , String Manipulation , Graphics , Creating Graphs , Customizing Graphs , Saving graphs to files , Creating three-dimensional plots	L1, L2,L3	7
MODULE 5: Interfacing: Interfacing R to other languages , Parallel R , Basic Statistics , Linear Model , Generalized Linear models , Non-linear models , Time Series and Auto-correlation , Clustering	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Beginning R – The Statistical Programming Language by Mark Gardener, Wiley, 2013
2. Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R
3. ByRobert Knell, Amazon Digital South Asia Services Inc, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	1	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4207	**PROGRAMMING FOR ANALYTICS USING PYTHON**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course is designed in such a way that leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, regular expressions, working with binary data, and using the extensive functionality of Python modules.

Course Objectives
The objective of this course is to:
1. Equip students with the concepts of thefundamental programming concepts including data structures, networked application program interfaces, and databases, using the Python programming language.
2. Provide applications on statistical, machine learning, information visualization, text analysis, and social network analysis techniques through popular python toolkits such as pandas, matplotlib, scikit-learn, nltk, and networkx to gain insights into data analysis process.

Course Outcomes
On completion of this course, the students will be able to
CO1: Create applications for data retrieval and processing
CO2: Conduct an inferential statistical analysis of various business problems
CO3: Explain fundamental Python functionality and features used for data science
CO4: Apply techniques such as lambdas and manipulate csv files

Modules	Blooms level*	Number of hours
MODULE 1: Installing Python; basic syntax, interactive shell, editing, saving, and running a script, Concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation	L1, L2,L3	8
MODULE 2: Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers	L1, L2,L3	7
MODULE 3: Lists, tuples, and dictionaries; basic list operators,	L1,	7

replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments, Program structure and design, Recursive functions	L2,L3	
MODULE 4: Simple Graphics and Image Processing: "turtle" module; simple 2d drawing - colors, shapes; digital images, image file formats, image processing Simple image manipulations with 'image' module (convert to bw, greyscale, blur, etc).Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects OOP, continued: inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes; exception handling, try block	L1, L2,L3	7
MODULE 5: Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames Multithreading, Networks, and Client/Server Programming; introduction to HTML, interacting with remote HTML server, running html-based queries, downloading pages; CGI programming, programming a simple CGI form. Searching, Sorting, and Complexity Analysis	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Core Python Programming by Wesley Chun,Prentice Hall
2. Fundamentals of Python: First Programs By Kenneth Lambert,Course Technology, Cengage Learning
3. Learning Python by David Ascher and Mark Lutz,Oreilly

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4208	**CONSUMER BEHAVIOR**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic Marketing concepts				
Co-requisites	NA				

Catalog Description:
The increasing trend of customer centric organizations makes it imperative to understand the psyche of consumer to the fullest. Virtually all companies are striving to gain maximum knowledge about the way consumer thinks and behave so that proper direction can be given to the marketing strategy. This paper on consumer behaviour aims to familiarize students about the importance of understanding consumers for the success of an organization. It makes a connection between customer behaviour principles and the elements of marketing strategy.

Course Objectives:
The objectives of this course are to:
1: Make the student understand the concepts/theories pertaining to consumer behaviour and reveal its importance in the context of marketing.
2: Make the student well versed with the various factors that influence consumer behaviour.
3: Enable the student to examine the consumer decision-making process.
4: Provide with knowledge to the student so that he may describe the target market and determine the positioning strategy according to consumer characteristics and behaviour.

Course Outcomes (CO):
On completion of this course, the students will be able to:
CO1: Memorize the various concepts and discuss the rationale for studying consumer behaviour.
CO2: Identify and explain factors which influence consumer behaviour inclusive of society and culture.
CO3: Demonstrate how knowledge of consumer behaviour can be applied to marketing.
CO4: Employ communication skills both orally and in writing within marketing contexts.

Modules	Blooms level*	Number of hours
Module I Consumer Behavior: Understandings and Applications, Consumer Research	L1, L2	5
Module II Consumer as an Individual: Consumer Motivation, Consumer Personality, Consumer Perception, Consumer Learning, Consumer Attitude formation and change.	L1, L2,L3,L4	13

Module III Consumers in their Social Setting: Reference Groups and Family Influences, Social Class and Consumer Behavior, Influence of Culture and Sub Cultures on Consumer Behavior.	L1, L2,L3,L4	13
Module IV Consumer Decision Making Process	L1,L2,L3,L4,L5	3
Module V Opinion Leadership, Diffusions of Innovations and Adoption	L1,L2	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Schiffman, L.G., Wisenblit,J, J.& Kumar, S.R.(2016). *Consumer Behavior* (11th ed.*)*. Noida, India: Pearson
2. Loudon, D. L. &Bitta, A. J.(2002). *Consumer Behavior*. N. Delhi, India: Tata-McGraw-Hill
3. Gupta, S.L. & Pal, S (2006).*ConsumerBehavior*. N. Delhi, India: Sultan Chand &Sons.

Reference Book:

Blackwell, R.D., Miniard, P.W. &.Engel, J.F.(2007). *Consumer Behavior*.Kundli, India: Thomsons South-Western.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Examination, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	--	2	--	--	--	--	--	2	1	--	--
CO2	1	-	-	--	--	2	--	--	--	2	1	--	--
CO3	1	-	--	2	--	--	--	--	--	-	1	3	-
CO4	1	-	--	--	--	--	2	--	--	-	1	3	1

1: strongly related, 2: moderately related and 3: weakly related

Syllabus – Third Semester

BUA4301	**STRATEGIC MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces the key concepts, tools, and principles of strategy formulation and competitive analysis. It is concerned with managerial decisions and actions that affect the performance and survival of business enterprises. The course is focused on the information, analyses, organizational processes, and skills and business judgment managers must use to devise strategies, position their businesses, define firm boundaries and maximize long-term profits in the face of uncertainty and competition.

Course Objectives

The objective of this course is to

1. Introduce students to the key concepts, tools and principles of business policy and strategic management.
2. Expand the student's capacity to integrate and appreciate the changes in the environment that shape the strategy of a business and lead to developing a competitive edge.
3. Develop the perspective of students towards understanding the culmination of different functional areas into building up of a corporate strategy.
4. Expose the students to the various approaches in crafting business strategy, tools that aid in reasoning carefully about strategic options, and learning how companies use what-if analysis to evaluate action alternatives and make sound strategic decisions.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify and recognise the various levels at which strategic decision making happens in an organization.

CO2: Analyse the internal and external environment of businessthat will lead to formulation of strategic plans.

CO3: Analyze the suitability of strategies that firms have developed in the real world scenario to achieve valueable outcomes.

CO4: Prepare strategic analysis and choice in order to determine alternative courses of action that could best enable the firm to achieve its mission and objectives.

CO5: Analysis of strategy implementation and evaluation to gain competitive advantage.

Modules	Blooms level*	Number of hours
Module I: Introduction and Purpose of Strategy Formulation Evolution and Introduction of strategic management, Concept of Strategy, corporate, Business and Functional Levels of Strategy,	L1,L2	7

Mission, Vision, Objectives, Approaches to four Phases in Strategic Management Process, Stakeholders in business and their roles in strategic management, Strategic decision making.		
Module II: Environmental Analysis Analysing company's External Environment: PESTLE Analysis; Preparing an Environmental Threat and Opportunity Profile (ETOP), Analysing Industry Environment: Industry Analysis – Porter's Five Forces Model of competition, Strategic Group analysis.	L1, L2 ,L3	7
Module III: Analysis of Organizational Competencies Analysing Company's Internal Environment Resource based view of a firm, meaning, types & sources of competitive advantage, analysing company's Resources and Competitive Position, VRIO Framework; Benchmarking as a method of comparative analysis, Competitive advantage; Concept of a Core competence and Distinctive competitiveness, Characteristics of Core Competencies; Value Chain Analysis Using Porter's Model; Organizational Capability Profile: Strategic Advantage Profile.s	L1, L2,L3	7
Module IV: Strategic Analysis and Choice Generic Competitive Strategies: Meaning of Generic competitive strategies, Low cost, Differentiation, Focus – when to use which strategy; Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic alliances & Collaborative Partnerships), Retrenchment – Turnaround, Divestment, Liquidation, Outsourcing Strategies; Offensive and Defensive Strategies, Blue Ocean Strategy, Strategy in the age of Internet and E-commerce; Portfolio Analysis Business Portfolio Analysis – BCG Matrix – GE 9 Cell Model; Evaluation of Strategic Alternatives: SWOT Analysis, Grand Strategy Selection Matrix.	L1,L2,L3	8
Module V: Strategy Implementation and Evaluation Strategy Implementation, Barriers to implementation of strategy, Mc Kinsey's 7s Framework; Organization Structures for Strategy Implementation, Leadership Implementation, Functional Implementation, Strategic evaluation review and control.	L1, L2	7

**Bloom's Level: L1-Knowledge;L2-Comprehension;L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Kazmi, A. (2015), Business Policy and Strategic Management 4th edition), Tata Mc Graw Hill.
2. Wheelen and Hunger, (2018), Strategic Management and Business Policy: Globalisation, Innovation and Sustainability, Pearson Education.

Reference Books

1. Pearce and Robinson (2017),Strategic Management :Formulation, Implementation and Control, Tata McGraw Hill.
2. David Fred R.(2018)Strategic Management Concepts: A Competitive Advantage Approach, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Examination, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	2	--	--	--	--	--	1	--	--	--
CO2	1	1	--	--	--	2	2	--	--	1	2	--	--
CO3	1	1	--	2	--	--	1	--	--	1	--	--	--
CO4	1	1	--	--	--	--	2	--	--	1	--	--	--
CO5	1	1	--	--	--	--	2	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4302	**DATA MINING**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Every business organization is realizing the importance of data. They are harnessing the benefits offered by Data Mining as it allows them to see hidden patterns from the data and helps in framing business policies. This course emphasizes on utilizing the techniques offered by Data Mining.

Course Objectives

This course enable students to:

1. Understand the basic concepts, principles, methods, implementation techniques, and applications of data mining, with a focus on major data mining functions such as cluster analysis.
2. Develops skills to use data mining software and other data mining techniques to solve business problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Evaluate and implement a wide range of emerging and new technologies to facilitate the knowledge discovery.

CO2: Assess raw input data, and process it to provide suitable input for a range of data mining algorithms.

CO3: Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining

CO4: Discover and measure interesting patterns from different kind of databases.

CO5: Determine data mining functionalities.

CO6: Identify appropriate data mining algorithms, and apply and interpret and report the output appropriately.

CO7: Describe complex data types with respect to spatial and web mining

CO8: Analyze data using the powerful data mining tool Weka.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data Mining What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Data Mining Goals, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications, Example: weather data, Data Warehouse and DBMS, Multidimensional data model, OLAP operations, Example: loan data set. Data cleaning, Data transformation, Data reduction, Discretization and generating	L1, L2	6

concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization		
Module II: Data mining knowledge representation and Attribute oriented Analysis **Data mining knowledge representation** Task relevant data, Background knowledge, Interestingness measures, Representing input data and output knowledge, Visualization techniques, Experiments with Weka – visualization. **Attribute oriented Analysis:** Attribute generalization, Attribute relevance, Class comparison, Statistical measures, Experiments with Weka - using filters and statistics.	L2, L3	7
Module III: Data mining algorithms **Association rules:** Motivation and terminology, Example: mining weather data , Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis, Experiments with Weka - mining association rules **Classification:** Basic learning/mining tasks, Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules, Experiments with Weka - decision trees, rules **Prediction:** The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), Linear models, Experiments with Weka - Prediction	L1, L2, L3	7
Module IV: Cluster Analysis: Concepts and Methods Basic issues in clustering, First conceptual clustering system: Cluster/2, Partitioning methods: k-means, expectation maximization (EM), Hierarchical methods: distance-based agglomerative and divisible clustering, Density Based, Grid based Methods, Conceptual clustering: Cobweb, Experiments with Weka - k-means, EM, Cobweb	L1, L2, L3	8
Module V: Advanced techniques- Data Mining software and applications Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing), Bayesian approach to classifying text, Web mining: classifying web pages, extracting knowledge from the web, Data Mining software and applications	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & References:

1. Han, J., Kamber, M., & Pei, J. (2011). Data mining: Concepts and techniques (3rd ed.). Waltham: Morgan Kaufmann.
2. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.
4. (Berry, Michael)Data Mining Techniques.
5. (Sharma, Gajendra)Data Mining, Data Warehousing and OLAP.
6. (Gupta, GK) Data Mining with Case Studies.
7. (Han &Kamber)Data Mining: Concepts and Techniques.
8. (PaulrajPonniah) Datawarehousing Fundamentals

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1							1			1		
CO2	1							1			1		
CO3	2							1	1		1		
CO4	1							1	2		1		
CO5	1			1				2			1		
CO6	1										1		
CO7	1										1		
CO8	1										1		

1: strongly related, 2: moderately related and 3: weakly related

BUA4303	**PREDICTIVE ANALYTICS-I MACHINE LEARNING USING R**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers fundamental and applied evidence based knowledge to improve professional practice of students. It provides a detailed understanding of both supervised and unsupervised learning as it is vital for a data scientist. This course offer insight on text mining using "tidytext."

Course Objectives

The objective of this course is to:

1. Facilitate an introduction to machine learning techniques using several popular algorithms.
2. Internalize a core set of practical and effective machine learning methods and concepts, and apply them to solve some real world problems.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain and apply a set of unsupervised learning concepts and methods, classification methods of increasing complexity (rules, trees, random forests), and associated optimization methods (gradient descent and variants)

CO2: Explain the common idioms of large-scale graph analytics, including structural query, traversals and recursive queries, PageRank, and community detection

CO3: Apply the popular algorithms of machine learning using R

CO4: Analyze and interpret the results using specific statistical tools and techniques in R.

Modules	Blooms level*	Number of hours
MODULE 1: Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection, Ridge regression, Lasso regression , Linear Discriminant Analysis , Logistic regression, Perception learning algorithm	L1, L2,L3,L4	8
MODULE 2: Model Assessment and Selection: Bias, Variance, and model complexity, Bias-variance trade off, Optimism of the training error rate, Estimate of In-sample prediction error, Effective number of parameters, Bayesian approach and BIC, Cross- validation, Boot strap methods, conditional or expected test error	L1, L2,L3,L4	7
MODULE 3: Additive Models, Trees and Boosting: Generalized additive models, Regression and classification trees, Boosting methods-exponential loss and AdaBoost, Numerical Optimization via gradient boosting	L1, L2,L3,L4	7

MODULE 4: Neural Networks (NN), Support Vector Machines (SVM), and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, Reproducing Kernels, SVM for regression, K-nearest –Neighbour classifiers (Image Scene Classification)	L1, L2,L3,L4	7
MODULE 5: Implementation of following methods using R Simple and multiple linear regression, Logistic regression, Linear discriminant analysis, Ridge regression, Cross-validation and boot strap, Fitting classification and regression trees, K-nearest neighbours, Principal component analysis, K-means clustering	L1, L2, L3,L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman , *The Elements of Statistical Learning-Data Mining, Inference, and Prediction* ,Second Edition , Springer Verlag, 2009.
2. G.James, D.Witten,T.Hastie,R.Tibshirani-*An introduction to statistical learning with applications in R*,Springer,2013.
3. E.Alpaydin, *Introduction to Machine Learning*, Prentice Hall Of India, 2010

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	--	3	--	--	--	--	2	1	3	1	--	--
CO2	3	2	1	2	--	2	1	--	1	2	1	3	--
CO3	2	1	1	2	--	--	1	3	1	2	1	3	--
CO4	3	1	2	1	--	--	1	--	1	2	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4304	**PREDICTIVE ANALYTICS-II MACHINE LEARNING USING PYTHON**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the specialization of Python staring with data strategy. This course covers the two core paradigms that account for most business applications of predictive modeling: classification and prediction. It also covers the use of partitioning to divide the data into training data (data used to build a model), validation data (data used to assess the performance of different models, or, in some cases, to fine tune the model) and test data (data used to predict the performance of the final model).

Course Objectives

The objective of this course is to:

1. Facilitates a good learning to students on how to make meaningful predictions for a wide range of business purposes.
2. Provide provides a sufficient understanding on development of statistical models and how to devise data-driven workflows.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Apply data science techniques to extract insights from a wide range of data sources and to provide an assessment basis for predictive models. Also, students shall be able to explain how ensemble models improve predictions

CO2: Visualize and explore data to better understand relationships among variables

CO3: Identify and implement appropriate performance measures for predictive models with popular algorithms

Modules	Blooms level*	Number of hours
MODULE 1: Data Cleaning: Reading the data – variations and examples, Data frames, Delimiters, Various methods of importing data in Python: csv method, open method in Pyton, reading data form a URL, reading .xlsor .xlsx files, Reading from an .xls or .xlsx file, Writing to a CSV or Excel file. Handling missing values, Creating dummy variables, Visualizing a dataset by basic plotting, Scatter plots, Histograms, Boxplots	L1, L2,L3,L4	8
MODULE 2: Data Wrangling: Subsetting a dataset, Selecting columns, Selecting rows, Selecting a combination of rows and columns, Creating new columns, Generating random numbers and their usage, Seeding a random number, Generating random numbers following probability distributions, Probability density	L1, L2,L3	7

function, Cumulative density function, Uniform distribution, Normal distribution, Using the Monte-Carlo simulation to find the value of pi, Geometry and mathematics behind the calculation of pi, Generating a dummy data frame, Grouping the data: aggregation, filtering, and transformation		
MODULE 3: Statistical Concepts for Predictive Modelling, Random sampling and the central limit theorem, Hypothesis testing, Null versus alternate hypothesis, Linear Regression with Python: Understanding the math behind linear regression, Linear regression using simulated data, Fitting a linear regression model and checking its efficacy, Finding the optimum value of variable coefficients ,Making sense of result parameters, p-values, F-statistics, Residual Standard Error, Implementing linear regression with Python, Linear regression using the stats model library, Multiple linear regression, Multi-collinearity, Variance Inflation Factor, Model validation, Training and testing data split , Handling categorical variables, Transforming a variable to fit non-linear relations	L1, L2,L3,L4	7
MODULE 4: Logistic Regression with Python, Linear regression versus logistic regression, Understanding the math behind logistic regression, Contingency tables, Conditional probability, Odds ratio, Moving on to logistic regression from linear regression, Estimation using the Maximum Likelihood Method, Likelihood function: Log likelihood function, Building the logistic regression model from scratch, Making sense of logistic regression parameters, Wald test, Likelihood Ratio Test statistic, Chi-square test, Implementing logistic regression with Python, Processing the data, Data exploration, Data visualization, Creating dummy variables for categorical variables, Feature selection, Implementing the model, Model validation and evaluation, Cross validation, Model validation, The ROC curve, Confusion matrix.	L1, L2,L3,L4	7
MODULE 5: Trees and Random Forests with Python: Introducing decision trees, A decision tree Understanding the mathematics behind decision trees, Homogeneity, Entropy, Information gain, ID3 algorithm to create a decision tree, Gini index, Reduction in Variance, Pruning a tree, Handling a continuous numerical variable, Handling a missing value of an attribute, Implementing a decision tree with scikit-learn, Visualizing the tree, Cross-validating and pruning the decision tree, Understanding and implementing regression trees, Regression tree algorithm, Implementing a regression tree using Python, Understanding and implementing random forests, The random forest algorithm, Implementing a random forest using Python, Why do random forests work?, Important parameters for random forests	L1, L2, L3,L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. A. I. Khuri. Introduction to linear regression analysis, by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining. International Statistical Review, 81(2):318–319, 2013.
2. A. Toescher, M. Jahrer, and R. M. Bell. The bigchaos solution to the netflix grand prize. Netflix prize documentation, 2009.
3. C. J. Burges. A tutorial on support vector machines for pattern recognition. Data mining and knowledge discovery, 2(2):121–167, 1998.
4. D. H. Wolpert and W. G. Macready. No free lunch theorems for optimization. Evolutionary Computation, IEEE Transactions on, 1(1):67–82, 1997.
5. D. H. Wolpert. Stacked generalization. Neural networks, 5(2):241–259, 1992.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	--	2	--	2	1	--	1	2	1	--	--
CO2	2	1	--	2	--	2	1	--	1	--	1	--	--
CO3	2	1	--	2	--	2	1	--	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4305	**BIG DATA ANALYTICS- HADOOP**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course familiarizes the students on how to perform analytical operations on structured and unstructured data to gain insights from data processed through Hadoop. This offers a specialization on Big Data Platform and its use cases providing an overview of Apache Hadoop.

Course Objectives

The objective of this course is to:

1. Equip students with the concepts of how to use Pig, Hive, and Impala to practice and examine tremendous datasets stored in the HDFS, and use Sqoop and Flume for data ingestion.
2. Provide applications on components of Hadoop and Hadoop Eco-System such as Hadoop Cluster Architecture, Important Configuration files in a Hadoop Cluster, Data Loading Techniques, how to setup single node Hadoop clusterl installation of VM player and Hadoop, Important Configuration files in a Hadoop Cluster, Linux commands, Importing Hadoop Jars, Data Loading Techniques

Course Outcomes

On completion of this course, the students will be able to:

CO1: Identify Big Data and its Business Implications

CO2: Access and Process Data on Distributed File System

CO3: Manage Job Execution in Hadoop Environment

CO4: Develop Big Data Solutions using Hadoop Eco System

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Big Data Definition of Big Data, The 5 V's of Big Data(Volume, Variety, Velocity, Veracity, Value), Comparison of Traditional Data with Big Data, Management of Big Data, Analyzing Big Data, and Technology Challenges for Big Data. Big Data Sources, Big Data Applications, Big Data Architecture	L1, L2,L3	8
MODULE 2: Technologies for Handling Big Data Introduction to Traditional RDBMS, OLTP, OLAP, Data Mining, Data Warehouse, Basic SQL Commands and queries: CREATE, INSERT, DELETE, UPDATE, SELECT Cloud Computing : Definition, Characteristics, Applications, Deployment Model, Service Models	L1, L2,L3	7
MODULE 3:Distributed Computing Using Hadoop	L1,	7

Introduction, Hadoop Framework, Hadoop Distributed File System, Map Reduce, Hive, Pig Sample Map Reduce Application, HIVE language capabilities, Pig Language capabilities, HIVE query examples, Pig Scripts examples	L2,L3	
MODULE 4: Big Data in Business Case Studies: Big Data in Marketing, Retail Hospitality, Customer Services, Decision Support using Big Data. Developing a Big Data Strategy/ Defining a Big Data strategy for your organization, Big Data Platform for Internet of Things	L1, L2,L3	7
MODULE 5:Visualization and Analytics Visualizations - Visual Data Analysis Techniques - Interaction Techniques; Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association-Intelligence from unstructured information	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011
6. Jiawei Han, MichelineKamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4306	**FINANCIAL DECISION ANALYSIS**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Financial decision making involves analyzing the financial problems that the company faces and deciding which course of action should be taken. In order to make financial decisions, you must be able to identify potential financial problems and analyze the effects of alternative courses of action.

Course Objectives

This course provides a specialization on financial tools to apply to decision-making within organizations. The course helps the student to

1. Develop a range of financial analysis skills through a combination of class discussions and analyses of case studies of specific organizations.
2. Demonstrates the complex relationships between finance, impact, strategy, and governance in business organizations.

Course Outcomes

By the end of the course the participants should be better able to:

CO1: Explain how organisations make value optimising financial decisions, and reflectively and critically assess the ethical issues arising from these decisions.

CO2: Critically analyse and evaluate various financial models and decision making techniques and their impact on different constituencies of stakeholder. Apply financial analysis skills in the facilitation of strategic decision making.

CO3: Review Assess the features of alternative and diverse sources of finance and critically evaluate their appropriateness under different circumstances and evaluate elements of risk, return and value in a range of strategic operational financial decisions and understand the implications in regulatory and governance terms of the consequences of doing so.

Modules	Blooms level*	Number of hours
Module I : Financial governance: objectives and environment The role of shareholder wealth maximisation in modern financial management, Shareholder v stakeholder perspectives, Role of the finance , function Balancing risk and return, Shareholder wealth maximisation and ethical behaviour Ethics and the finance function, Corporate Governance *:* Corporate Governance and the agency problem, Financial aspects of the Indian Corporate Governance Code New public management, Listing requirements in the Stock Exchanges.	L1,L2, L3	5

Module II: Management performance measurement Financial ratio analysis – Profitability – Efficiency – Liquidity - Investment performance. Operating, Financial and Combined Leverage. Financial distress and insolvency, including the use of financial ratios based on univariate and multivariate analysis to predict financial failure. Analysis of Risk and Uncertainty in Capital Budgeting, Description and Measurement of Risk; and Risk Evaluation Approaches. Risk and Return - Conceptual Framework of Risk and Return: Type of Risks; Risk and Return of a Single Asset; Risk and Return of Portfolio (only two asset portfolio); Portfolio Selection; and Capital Asset Pricing Model (CAPM)	L1, L2, L3	6
Module III:-Making distributions to shareholders Dividend policy and shareholder wealth – Traditional v Modigliani and Miller arguments Reasons for the importance of dividends, Factors determining the level of dividends Scrip dividends, Special dividends and share buybacks, Tax Aspects associated with Dividend Decision	L1, L3	6
Module IV: - Long term investment decisions The nature of investment decisions - Investment appraisal methods - Payback period (including discounted payback period) - Accounting rate of return - Net present value - Internal rate of return – MIRR – XIRR- CAGR, Investment opportunities and risk - Risk and Return preferences of investors. Risk appraisal methods – Sensitivity analysis – Scenario analysis –Simulations - Expected net present value - Risk-adjusted discount rate. **Shareholder value analysis:** Shareholder value and the need for new forms of measurement-Shareholder value analysis and net present value -Comparison of shareholder value analysis and Economic value added -Total shareholder return (TSR) and market value added (MVA) , Cash Value added, Market to Book Value , Evaluation of the shareholder value approach. **Analysis of securities**: Cost method and market method. Equity method of accounting and analysis of minority interest.	L1, L3,L4	7
Module V: Business combinations and share valuation **Business Valuation**: Conceptual Framework of Valuation; Approaches/Methods of Valuation; and other Approaches to Value Measurement, **Corporate Restructuring**: Conceptual Framework; Financial Framework; Tax Aspect of Amalgamation; Merger and Demergers; Legal and Procedural Aspects of Mergers/Amalgamations and Acquisition/Takeovers; and other forms of Corporate Restructuring. Economic rationale for mergers and acquisitions, forms of purchase consideration with DCF model. **Option Valuation**: Concept and Types of Options; Option Payoffs; Call Option Boundaries; Factors Influencing Option Valuation; and The Black-Scholes Option Pricing Model. **Valuation and forecasting -** Valuation models: Asset based models, DCF models and abnormal earnings or Edwards-Bells-Ohlson model. Forecasting models: Extrapolative models and index models, Forecasting with disintegrated data,	L1, L3,L4	5

Comparison with financial analysts' forecast.		
Module VI: Capital markets and long-term financing decisions Financial markets and institutions-The role of the Stock Exchange Advantages and disadvantages of a Stock Exchange listing Stock market efficiency – Long term sources of financing – Shares– Debts - Debentures – Personal financing -		7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text and Reference Books:

1. Khan, M.Y & Jain, P.K.: Financial Management; Tata McGraw Hill, New Delhi, 2015.
2. Pandey, I. M.: Financial Management; Vikas Publishing House, New Delhi, 2015.
3. Chandra, Prasana: Financial Management; Tata McGraw Hill, New Delhi, 2008.
4. Brealey and Meyers: Principles of Corporate Finance: Tata McGraw Hill, New Delhi, 2008.
5. Keown, Martin, Petty and Scott (Jr): Financial Management: Principles and Applications; Prentice Hall of India, New Delhi, 2002.
6. Gitman, L.J: Principles of Managerial Finance; Addison Wasley, 2009.
7. Vanhorne, James C: Financial Management and Policy; Prentice Hall of India, New Delhi, 2015.
8. Kishore Ravi, M: Financial Management; Taxman, 2018.
9. Gerald I. White, Ashinpaul C. Sondhi and Dov Fired , "The Analysis and use of Financial Statements", (3rd Ed.), , Wiley-India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	P	A	EE
Weightage (%)	**10**	**5**	**10**	**5**	**70**

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	1	1	1	--	--
CO2	1	1	--	--	--	--	--	--	1	1	1	--	--
CO3	1	1	--	--	--	--	--	--	1	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4307	**VISUAL ANALYTICS- TABLUE /POWER BI**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/ Exposure					
Co-requisites					

Catalog Description
This course familiarizes the students on data visualization tools. This course is designed to provide a fundamental and strategic understanding on the concepts of Business Intelligence using Tablue.

Course Objectives
The objective of this course is to:
1. Equip students with the concepts of BIs and its types and how to connect to and import data, author reports using Power BI Desktop, and publish those reports to the Power BI service
2. Emphasize on how to create dashboards and share with business users—on the web and on mobile devices

Course Outcomes
On completion of this course, the students will be able to:
CO1: Connect, import, shape, and transform data for business intelligence (BI)
CO2: Visualize data, author reports, and schedule automated refresh of your reports
CO3: Create and share dashboards based on reports in Power BI desktop and Excel
CO4: Use natural language queries and create real-time dashboards

Modules	Blooms level*	Number of hours
MODULE 1: Tableau: Introduction, Getting Started with Tableau, Connecting to Data, Data Prep with Excel, Overview of the Tableau User Interface, Working with Discrete vs. Continuous Data, Calculated fields **Power BI**: Understanding key concepts in business intelligence, data analysis, and data visualization, Importing data and automatically creating dashboards from services such as Marketo, Salesforce, and Google Analytics, Connecting to and importing your data, then shaping and transforming that data, Enriching your data with business calculations.	L1, L2,L3	8
MODULE 2: Tableau: Introduction to data visualization, the evolution of the BI industry, Understanding the business value of visual analytics, Data visualization best practices (overview), Power BI: Visualizing your data and authoring reports, Scheduling automated refresh of your reports, Creating dashboards based on reports and natural language queries, Sharing dashboards across	L1, L2,L3	7

your organization, Consuming dashboards in mobile apps		
MODULE 3:Tableau: Basic charts, Design considerations for effective data visualization, Human cognition and visual perception, Using Maps to Visualize Spatial Data, **Power BI:** Leveraging your Excel reports within Power BI, Creating custom visualizations that you can use in dashboards and reports, Collaborating within groups to author reports and dashboards, Sharing dashboards effectively based on your organization's needs.	L1, L2,L3	7
MODULE 4: Tableau: The visual storytelling framework, the business value of visual stories, Creating dashboards and story points, Formatting worksheets and dashboards. **Power BI:** Exploring live connections to data with Power BI, Connecting directly to SQL Azure, HD Spark, and SQL Server Analysis Services, Introduction to Power BI Development API, Leveraging custom visuals in Power BI	L1, L2,L3	7
MODULE 5: Common pitfalls of data visualization, Common pitfalls of data narratives, Share and critique an example of a data visualization, Provide your Tableau Public URL, Share data visualization on Tableau Public, Building a Dashboard in Tableau and Power BI, Develop a data story pitch	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Microsoft Business Intelligence Tools for Excel Analysts: Michael Alexander, Jared Decker, Bernard Wehbe, John Wiley & Sons, 2014
2. Introducing Microsoft Power BI: Alberto Ferrari and Marco Russo, Microsoft Press 2016
3. Getting started with Watson Analytics: IBM Corporation 2015
4. Tableau Your Data! Fast and Easy Visual Analysis with Tableau Software: Daniel G. Murray and the InterWorks BI Team, John Wiley & Sons 2013
5. Beginning Big Data with Power BI and Excel 2013: Neil Dunlop, Apress 2015
6. IBM Watson Content Analytics Discovering Actionable Insight from Your Content: Wei-Dong (Jackie)
7. Zhu Bob Foyle, Daniel Gagné, Vijay Gupta, Josemina Magdalen, Amarjeet S Mundi, Tetsuya Nasukawa Mark Paulis, Jane Singer, Martin Triska, ibm.com/redbooks, IBM Corporation July 2014

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4335	**SUMMER INTERNSHIP EVALUATION**	**L**	**T**	**P**	**C**
Version 1.1	Latest Approved	0	0	0	6
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

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Course Objectives

The objective of this course is to:

1. Offer students the opportunity to apply their knowledge in real-life environments through an industry placement for eight-weeks.
2. Providedesired skills to students that will help them perform better on their jobs after graduation.

Course Outcomes

On completion of Summer Internship,the students will be able to:

CO1: Get hands-on experience about real world problems in a field relevant to their major of studies.

CO2: Acquire confidence for employment after graduation.

CO3: Acquire skills important for time management, discipline, self-learning, effective communication and so on.

CO4: Learn practically about team-work, collaboration, and leadership.

Credit Hours: 6 hours

Course Duration: Six-Eight weeks

Semester Offered: Summer

Format for Report Writing	**Blooms level***	**Number of hours**
1. Title of the project 2. About the organization 3. Introduction and objectives of the project/ programme / organization	L1, L2 ,L3,L4,L5,L6	6hours (Duration-6-8 weeks during

4. Funding agency—about the agency, how to get funding, Nature of funding agency 5. Staffing pattern of the project with their functions 6. Major activities going under project 7. Results achieved so far (target Vs achievement) 8. Role of the candidate in the project/programme / organization 9. Evaluation by the candidate		summer)

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

SIP Guidelines

1.Every student is required to write an Internship report upon completion of their internship and required to submit two copies (student copy + department copy) of the report to concerned department HOD (along with internal marks certificate given by the company) for final evaluation and awarding of end examination marks.

2.Before submitting the report to the HOD, the student required to go through multiple rounds of revision in collaboration with the industry guide and department internship mentor/coordinator/supervisor.

The Internship Report serves multiple purposes:

• Help the student develop written communication skills. • Serve as an archival record of the internship experience. • Give the student an opportunity to reflect on the professional aspects of the internship experience and the skills that were learned. • Allow the student to describe the science content of the internship. • Have the student to reflect on the initial goals of the internship and how they were (or were not) achieved during the internship.

Modes of Evaluation: Presentation/Viva/ Report /Assignment Examination

Examination Scheme:

Components	Content & Layout of Report	Conceptual Framework	Objectives & Methodology	Implications & Conclusions	Presentation
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	1	--	--	--	1	--
CO2		1	--	--	--	--	--	--	--	--	--	1	--
CO3	--	--	1	--	--	1	1	--	--	--	--	1	2
CO4	--	--	--	--	--	--	1	--	--	--	--	1	2

1: strongly related, 2: moderately related and 3: weakly related

Syllabus – Fourth Semester

BUA4401	**TOTAL QUALITY MANAGEMENT**	L	T	P	C
Version 1.1		2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description: This course teaches the students the methodology and system of tools aimed to create and maintain mechanism of organization's continuous improvement.

Course Objective:
The aim of this course is to:
1. Provide a structured learning framework to students in order that they can understand that total quality management is a philosophy, methodology and system of tools aimed to create and maintain mechanism of organization's continuous improvement.
2. Help the students to understand the main principles of business and social excellence; generate knowledge and skills to use models and quality management methodology for the implementation of total quality management in any sphere of business and public sector.

Course Outcomes:
On completion of the course the students will be able to:
CO1: Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.
CO2: Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.
CO3: Critically appraise the organizational, communication and teamwork requirements for effective quality management.
CO4: Critically analyze the strategic issues in quality management nationally and internationally, including current issues and developments, and use the appropriate statistical techniques to evaluate quality implementation plans.

Modules	Blooms level*	Number of hours
Module I: Introduction Definition of quality, brief history, quality in manufacturing and service industries, quality and price, quality and market share, quality and cost, quality and competitive advantage Evolution of the concept of total quality management, elements of total quality management, benefits of total quality management, the Deming management philosophy, the Juran philosophy, the Crosby philosophy	L1, L2	7
Module II: Organization for Quality Quality objectives, quality policy, leadership for quality, quality and organization culture, cross functional teams, quality circles, suppliers/customers partnership	L1, L2	5

Module III: Quality Control Concept of quality control, quality assurance, concept of process variation, sampling inspection vs. 100% inspection, acceptance sampling by attributes: Operating Characteristics (OC) curves; producer risk: AQL, RQL, TQL, AOQL Statistical Process Control: advantages of SQC, construction of control charts: X-R chart, np chart, C- chart, U chart, Pareto analysis (20/80 rule)	L1, L2	6
Module IV: Benchmarking and Kaizen Benchmarking, rationale of benchmarking, approach and process, prerequisite of benchmarking, obstacles of successful benchmarking, perceptual benchmarking, concept of Kaizen, kaizen vs innovation, Kaizen practice	L1,L2	3
Module V: Quality Management Systems Quality certification, quality management principles, ISO 9001:2000, ISO 14000, Capability Model Maturity Integration (CMMI): Fundamentals and Concepts, quality system audit, types of quality audit	L1, L2	3

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text and Reference Books:

1. Garg, Ajay K. (2012). *Production and Operations Management.* McGraw-Hill, New Delhi
2. Cherry, S.N. (2012). *Production and Operations Management (5th ed.).* McGraw-Hill, New Delhi
3. Crosby, Philip B., Completeness: Quality for 21stCentuary, Dutton, New York, 1992
4. Drummond, Helga, The TQM Movement: What Total Quality Management is All Movement, UBS Publication, New Delhi, 1992
5. Juran, J.M. &Gryna, F.M., Quality Planning and Analysis
6. Lock, Dennis, Handbook of Quality, Jaico Publishing House, Mumbai, 1996
7. Ross, Joel E., TQM: Text, Cases and Readings, St. Lucie Press, New York, 1993

Modes of Evaluation: Presentation/Viva/ Report /Assignment Examination

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	-	2	-	-	1	2	1	-	-	2
CO2	2	1	-	-	3	-	-	1	1	1	-	-	3
CO3	2	2	-	-	3	-	-	1	2	2	-	-	1
CO4	1	2	-	-	1	-	-	1	1	1	-	-	2

1: strongly related, 2: moderately related and 3: weakly related

BUA4402	**FINANCIAL ANALYTICS**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Every business in the industry is generating loads of financial data and they understand the significance of deriving logical inferences out of it to streamline their decision making process. Lately, accurate financial data analysis is not enough for a business to sail through. They need predictive insights which can improve their real time day to day decision making. Financial analytics helps in combining internal and external financial information by using social media and big data to provide predictive insights. Whether it is with respect to stock market prediction or customer profitability, finance analytics enables to provide a direction in predicting all.This course blends easy-to-use statistical tools with complex machine learning tools and algorithms to equip the participants with the requisite skill set in analysing data. By the end of this course, the participants should be able to perform financial analysis using powerful tools like R and Python.

Course Objectives

The objective of this course is to:

1. Make students understand and diagnose the information contained in financial statement with a view to judge the profitability and financial soundness of the firm, and to make forecast about future prospects of the firm.
2. Provide understanding on diverse needs of the traditional financial department, and advancements in technology, all point to the need for financial analytics.
3. Help students to shape up the business' future goals and to improve the decision-making strategies for various business situations.
4. Emphasize on measuring and managing business' tangible assets such as cash and equipment.
5. Provides an in-depth insight into the organization's financial status and improves the cash flow, profitability, and business value.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Understand and interpret the financial data about the company

CO2: Forecast the firm financial position and interpret accordingly

CO3: Evaluate the financial position with the support of various financial tools like financial statement analysis, time value of money, bond valuation and valuation of the firm

CO4: Equip the requisite skill set in analyzing data in terms of finance

Modules	Blooms level*	Number of hours
Module I: Introduction to Financial Analytics and Time Series Data Subjective Forecasting, Business Forecasting and Time Series Data, Introduction to Financial Analytics, Forecasting Performance Measurements: Distance, Forecasting Performance Measurements: Metrics.	L1,L2,L3	7
Module II: Performance Measures and Holt-Winters Model Introduction to Forecasting: Average Method, Naive Method, Linear regression, R example, Moving Averages, Introduction to Exponential Smoothing, Simple Exponential Smoothing, R example on Simple exponential smoothing, Holt's Exponential Smoothing, Holt-Winter's Forecasting Model, Holt-Winter's Model: R Example, Autoregression: Introduction, Autoregression: R Example	L1, L2, L3,L4, L6	8
Module III : Financial Statement Analysis Balance Sheet, Income Statement, Cash Flow Statement, Understanding the Financial Statements and their interlinking, Financial Ratios, Ratio Analysis Present Value (single and multiple cash flows), Future Value (single and multiple cash flows), Annuity, Perpetuity, Growing Annuity. Application: Loan Amortization, Compounding the interest rate	L1, L2, L4, L6	7
Module IV: Modern Portfolio Theory and Introduction to Algorithmic Trading Portfolio Theory: Introduction, Expected Returns, Risk of a Security, Efficient Frontier, Portfolio Weights, Capital Allocation Line, Diversification, Introduction to Algorithmic Trading, Trend Following Strategy, Backtesting, R Example	L1, L2, L3,L4	7
Module V:Linear Regression, Predicting Binary Outcomes (Credit Prediction) Single and Multiple Linear Regression, Modelling and Prediction (Examples using financial data), Logistic Regression, Multiple Logistic Model, Historical Simulation, Simple Variance based approach, Risk Metrics, Monte Carlo Simulation, Value-at-Risk Estimation and Backtesting	L1, L2, L3,L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

Edward E Williams (Author), John A Dobelman , Quantitative Financial Analytics: The Path To Investment Profits, 2017, Publisher: WSPC, ISBN-10: 9813224258I

Reference Books:

1. Thomas Mazzoni , A First Course in Quantitative Finance, 2018, Cambridge University Press (March 22, 2018)ISBN-10: 9781108411431
2. Mark J. Bennett and Dirk L. Hugen, Financial Analytics with R: Building a Laptop Laboratory for Data Science, 2016 by Cambridge University Press

Modes of Evaluation: Presentation/Viva/ Report /Assignment Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	2	--	2	1	2	1	--	--
CO2	1	1	--	--	--	2	--	2	1	2	1	--	--
CO3	1	1	--	--	--	2	--	2	1	2	1	--	--
CO4	1	1	--	--	--	2	--	2	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4403	**SUPPLY CHAIN ANALYTICS**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course provides foundational knowledge associated with the operations analytics. The course offers insights on the various tools and techniques for implementation of analytics based on the supply chain drivers such as location, logistics and inventory.

Course Objectives
The objective of this course is to:
1. Manage uncertainty and risk within supply chain management
2. Segment different customers, products, and channels and design an optimal portfolio of logistics approaches and strategies for these various segments
3. Understand the appropriate forecasting methodology for each segment

Course Outcomes
On completion of this course, the students will be able to:
CO1: Describe the various techniques for analytics based on the Multi Attribute Decision Making (MADM) and risk.
CO2: Identify the inventory techniques for analytics and the different network models.
CO3: Analyze the inventory using aggregate production model.
CO4: Illustrate the transportation problems for analytics in network design.
CO5: Analyze the different dimensions using Analytic Hierarchy Process.

Modules	**Blooms level***	**Number of hours**
Module I: Warehousing Decisions, Mathematical Programming Models, P-Median Methods, Guided LP Approach, Balmer – Wolfe Method, Greedy Drop Heuristics, Dynamic Location Models, Space Determination and Layout Methods.	L1, L2	7
Module II:Inventory Management, Inventory aggregation Models, Dynamic Lot sizing Methods, MultiEchelon Inventory models, Aggregate Inventory system and LIMIT, Transportation Network Models, Notion of Graphs, Minimal Spanning Tree.	L1, L2	8
Module III: Shortest Path Algorithms, Maximal Flow Problems, Multistage Transshipment and Transportation Problems, Set covering and Set Partitioning Problems, Traveling Salesman Algorithms, Advanced Vehicle Routing Problem Heuristics, Scheduling Algorithms-Deficit function Approach and Linking Algorithms.	L1, L2	6

Module IV: Analytic Hierarchy Process, Data Envelopment Analysis, Risk Analysis in Supply Chain, Measuring transit risks, supply risks, delivering risks	L1,L2	5
Module V: Risk pooling strategies, Fuzzy Logic and Techniques-Application in SCM	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Gerad Feigin, Supply Chain planning and analytics – The right product in the right place at the right time, Business Expert Press, 2011
2. Peter Bolstorff, Robert G. Rosenbaum, Supply Chain Excellence: A Handbook for Dramatic Improvement Using the SCOR Model, AMACOM Div American MgmtAssn, 2007
3. Robert Penn Burrows, Lora Cecere, Gregory P. Hackett, The Market-Driven Supply Chain: A Revolutionary Model for Sales and Operations Planning in the New On Demand Economy, AMACOM Div American Mgmt Assn, 2013.

Reference Books:

1. Hamdy A. Taha, "Operations Research An Introduction", Prentice Hall India. Sixth, Edition
2. Anderson, Sweeney and Williams, "An Introduction to Management Science: Quantitative Approaches to Decision Making", Cengage Learning, Fifth India Edition
3. Barry Render, Ralph M. Stair Jr. "Quantitative Analysis for Management, Rearson Education, Eighth Edition
4. Frederick S. Hillier and Mark S. Hillier, Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets, Tata McGrow-Hill Edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	-	-	-	-	-	3	-	1	--	3
CO2	1	1	-	-	-	-	-	-	3	-	1	--	3
CO3	1	1	-	-	-	-	-	-	3	-	1	--	3
CO4	1	1	-	-	-	-	-	-	3	-	1	--	3
CO5	1	2	-	-	-	-	-	-	3	-	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

BUA4404	HR ANALYTICS	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description:
Developing the right HR metrics and analytics for your specific context which support long-term performance and improving the decision making is a key competitive edge in the modern economy. HR is increasingly difficult in an era of talent wars, complex environments and a deluge of information.

Course Objective:
The course aims to:
1. Give students a good understanding on the concepts and techniques of human resource analytics.
2. Familiarize the students on how to prepare HR reports and identify decision technologies.
3. Develop a structured approach among students to apply judgment, and generate insight from data for enhanced decision making.

Course Outcomes:
On successful completion of the course a student will be able to:
CO1. Explain internal and external human resource metrics benchmarks and indicators.
CO2. Reproduce knowledge on relational databases and make recommendations regarding the appropriate HRIS to meet organization's human resource needs.
CO3. To identify appropriate software to record, maintain, retrieve and analyze human resources information (e.g., staffing, skills, performance ratings and compensation information).
CO4. To describe both the quantitative and qualitative analysis to understand trends and indicators in human resource data.

Modules	Blooms level*	Number of hours
Module I:Introduction to HR Analytics Basics of HR Analytics: Concept and Evolution of HR Analytics & data sources - HCM: 21Model, Use of workforce analytics to improve decision making, Analytics and Prediction, Introduction to HR Metrics and predictive analytics, Importance of HR Analytics, Data Analytic techniques using software packages, Future of Human Resource Analytics.HR Metrics and HR Analytics; Intuition versus analytical thinking.	L1, L2	7
Module II: Creating business understanding for HR initiatives	L1, L2	6

Workforce segmentation and search for critical job roles; Statistical driver analysis – association and causation; Linking HR measures to business results; choosing the right measures for scorecards; Identifying and using key HR Metrics.		
Module III:Forecasting budget numbers for HR costs Workforce planning including internal mobility and career pathing; training and development requirement forecasting and measuring the value and results of improvement initiatives; optimizing selection and promotion decisions	L1, L2	8
Module IV:Predictive modelling in HR Employee retention and turnover; workforce productivity and performance; scenario planning.	L1,L2	6
Module V:Communicating with data and visuals Data requirements; identifying data needs and gathering data; HR data quality, validity and consistency; Using historical data; Data exploration; Data visualization; Association between variables; Insights from reports; Root cause analysis of HR issues	L1, L2	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text and Reference Books:

1. Fitz-Enz, J (2010)*The New HR Analytics: Predicting the Economic Value of Your Company's Human Capital Investments*, Amacom.
2. Pease,G Byerly, B& Fitz-enz, J(2012).*Human Capital Analytics: How to Harness the Potential of Your Organization's Greatest Asset*, John Wiley & Sons

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2									1	1		
CO2	1						1			2	1		
CO3								2	1		1		
CO4	2	1									1		

1: strongly related, 2: moderately related and 3: weakly related

BUA4405	MARKETING ANALYTICS	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course provides an understanding on the use of analytics in Marketing Management. The course offers insights to the students on the use of predictive analysis in decision making. The course familiarizes the students on the concept of the market place, various segments of products and services in the markets, and changing consumer needs in the markets.

Course Objectives

The objective of this course is to

1. Develop the ability to critically evaluate business problems and to determine the most appropriate analytical technique address marketing problems.
2. Acquaint the students to develop and implement the marketing strategy by providing a framework from which to identify and evaluate strategic options and programs.
3. Enable students to solve real-world marketing problems across a wide range of industries, giving them a competitive edge.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Identify various methods followed build CRM practices and various positioning strategies followed by the companies.

CO2: Contrast the characteristics of industrial and consumer goods.

CO3: Identify and apply the various techniques of predictive analysis in the different market situations.

CO4: Explain the need for digital evolution in marketing.

Modules	Blooms level*	Number of hours
Module 1: Introduction to Marketing Understanding the marketplace and consumer needs, Designing a Customer Driven Marketing Strategy, Building Customer Relationships, Consumer Behaviour and Business Buyer Behaviour	L2,L5	7
Module 2: Marketing Strategy Market Segmentation and Product Positioning, Market Segmentation, Market Targeting, Target Market Strategies, Product Positioning and Differentiation, Choosing a Differentiation and Positioning Strategy.	L1, L4	8
Module 3: Product and Service Products and services, product and service classifications, consumer products, industrial products, product and service decisions, product	L2,L4	7

and service attributes, product support services, services marketing – the nature and characteristics of a service.		
Module 4: Retail Analytics – I Customer Analytics Overview; Quantifying Customer Value, Using Stata for Basic Customer Analysis, Predicting Response with RFM Analysis, Statistics Review, Predicting Response with Logistic Regression, Predicting Response with Neural Networks, Predicting Response with Decision Trees.	L2,L3, L5	6
Module 5: Retail Analytics – II The digital evolution of retail marketing, Digital natives, Constant connectivity Social interaction, Predictive modelling, Keeping track, Data availability, Efficiency optimization.	L2,L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Kotler, P., Keller, K. L. ,Koshy, A., Jha, M. Marketing Management: A South Asian Perspective. New Delhi: Pearson Education , 14th edn,.2013
2. Rajan, S. Marketing Management. India: New Delhi: Tata McGraw-Hill Education. 4th edn,2005

Reference Books:

1. Karunakaran, K..Marketing Management. New Delhi: Himalaya Publishing House. 3rd edition, 2013.
2. Kumar, A., Meenakshi. Marketing Management. New Delhi: Vikas Publishing House Pvt Ltd. , 2nd edition,2013
3. Ramaswamy, V. S., Namakumari, S. Marketing Management Global Perspective, Indian Context. New Delhi: Macmillan India Limited. 3rd edition, 2009

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	-	-	1	1	-	-	1	1	1	1	1	-	-
CO2	-	-	1	1	-	-	1	1	1	1	1	-	-
CO3	-	-	1	1	-	-	1	1	1	1	1	-	-
CO4	-	-	1	1	-	-	1	1	1	1	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

BUA4406	**DATA PRIVACY AND DATA SECURITY LAWS**	L	T	P	C
Version 1.1	Latest Approved	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course is designed to familiarize the students with the basic concepts of data privacy issues and security laws including current and proposed laws and regulations that govern data security and privacy.

Course Objectives
The objective of this course is to:
1. Provide the foundational knowledge based on data security investigation and data policy questions concerning the value of data security and data privacy regulations.
2. Emphasize on the real world effects of data breaches on individuals and businesses.
3. Provide an understanding on how to secure data and balancing of interests among individuals, government, and enterprises from the technical and legal perspective.

Course Outcomes
On completion of this course, the students will be able to:
CO1: Explain the fundamental concepts of data security and security laws.
CO2: Explain the business needs for data privacy and security investigation.
CO3: Assess the risk for data security.
CO4: Identify the legal, professional and ethical issues related to data.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Data Security History of data security, Meaning of data Security and data privacy, Critical Characteristics and components of Data security, Need for Security, Business Needs, Threats, Attacks, Meaning of term personal data, data processing, data protection, NSTISSC Data Security Model, Balancing Security and Access to data, The SDLC model, The Security SDLC	L1, L2	6
MODULE 2: Introduction to Data Security Laws Introduction of the General Data Protection Regulation (GDPR), rationale for the introduction of the GDPR , primary objectives of the General Data Protection Regulation, scope of data processing activities covered by the GDPR, territorial scope of the GDPR regarding the location of personal data processing and data subjects, GDPR impact on Indian Companies, Data protection Laws in India	L1, L2	6

MODULE 3: Data Privacy: Legal Issues and Landscape Development of Privacy Laws (historical and legal context), Fair Information Principles, The Statutory Landscape in the US, Indian IT Act, Adjudication under Indian IT ACT, IT Service Management Concept, IT Audit standards, ISO/IEC 27000 Series, COBIT, HIPPA, SOX, System audit, Information security audit, ISMS, SoA (Statement of Applicability), BCP (Business Continuity Plan), DR (Disaster Recovery), RA (Risk Analysis/Assessment)	L1, L2	6
MODULE 4: Data Security Analysis and Risk Management **Risk Management:** Identification, Assessment and controlling of Risk **Logical Design:** Blueprint for Security, Information Security Policy, Standards and Practices, ISO17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity **Physical Design:** Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart McClure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
3. Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.
4. International Guide to Privacy – American Bar Association (Privacy)
5. International Guide to Cyber Security – American Bar Association (Cyber Security)
6. Roadmap to an Enterprise Security Program - American Bar Association (Roadmap)
7. The Executive Guide to Information Security – Egan and Mather (Guide)
8. Case studies from the Harvard Business School; http://cb.hbsp.harvard.edu/cb/access/5263390

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	3	2	1	3	--	2	2	2	--	1	--	3
CO2	2	2	--	1	3	--	2	2	--	--	1	--	2
CO3	2	3	1	1	2	--	2	--	2	--	1	--	3
CO4	2	2	2	1	1	--	2	2	2	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BUA4437	**DISSERTATION (ANALYTICS PROJECT)**	L	T	P	C
Version 1.1		0	0	0	6
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Under this, it is usual to give the student some discretion in the choice of topic for the dissertation and the approach to be adopted. The dissertation topic is related to the field of specialization. Deciding this is often the most difficult part of the dissertation process, and requires thorough preparation and background research.

The aim of the dissertation is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.

Course Objectives

The objective of this course is to:

1. Understand and apply theoretical frameworks to the chosen area of study.
2. Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently.

Course Outcomes

On completion of Dissertation, the students will be able to

CO1: Describe a relevant area of career development, career coaching, coaching or work-related learning studies.

CO2: Identify research methods and state research questions.

CO3: Critically analyze and evaluate the knowledge and understanding in relation to the agreed area of study.

CO4: Integrate theory and practice for the development of responses on the basis of the evaluation and analysis undertaken.

CO5: Communicate in written form by integrating, analyzing and applying key texts and practices.

CO6: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

Planning the dissertation	**Blooms level***	**Number of hours**
• Selecting a topic for investigation. • Establishing the precise focus of the study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility. • Drawing up initial dissertation outlines considering the aims	L1, L2 ,L3,L4,L5,L6	6hours a Week

and objectives of the dissertation. Workout various stages of dissertation • Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Modes of Evaluation: Viva/ Report Examination

Examination Scheme:

Components	**Content & Layout of Report**	**Conceptual Framework**	**Objectives & Methodology**	**Implications & Conclusions**	**Viva-Voce**
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	--	--	--	1	--	--	--	1	--
CO2	--	1	--	--	--	--	--	--	--	--	--	1	--
CO3	--	1	2	--	--	--	--	--	--	--	--	1	--
CO4	1	--	--	--	--	--	--	--	--	--	--	1	--
CO5	--	--	--	--	--	--	1	--	--	--	--	1	2
CO6	--	--	--	--	--	--	--	--	1	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

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Programme Mission:

The mission of the MBA programme is to foster an environment of academic excellence in Business Management through research and innovation, industry integration, internationalization and extension activities and develop highly trained and employable professionals with specialization in the area of Marketing & Sales, Finance, Banking & Finance, Human Resource Management, International Business, Information Technology, E-Commerce and Hospital & Healthcare, who are socially responsible and globally minded professional to meet the current and emerging needs of business and society.

Programme Description:

The two year full time Masters in Business Administration programme is to educate and prepare students with the knowledge, analytical ability, and management perspectives and skills needed to lead, to motivate and to manage diversified workforce, rapid technological change and competitive marketplace while considering the principles of ethical, legal and corporate governance fundamentals.

Programme Outcome (PO):

PO1	Apply the knowledge of marketing, human resource management, finance and other functional areas of management to solve complex management issues in volatile business environment
PO2	Student shall have ability to acquire & evaluate new knowledge through Business Research Methods, have the ability to identify, define, investigate, and solve critical business issues using management principles, analyse data/information and interpret results for reaching optimum solutions.
PO3	Student shall be able to understand global issues from different perspectives, recognize the opportunities to improve the business value chain as an entrepreneur and shall develop and display basic business acumen & business skills and be able to apply different forms of communication in diversified cultural settings.
PO4	Student shall able to critically think to assess societal, health, safety, legal, and cultural issues and apply range of strategies for solving a problem and decision making
PO5	Student shall be able to practice ethical principles and commit to professional ethics and responsibilities and norms of the management practice.
PO6	Student shall develop range of Leadership skills and shall demonstrate excellent interpersonal skills, understanding of group dynamics and effective teamwork, including awareness about personal strengths and limitations.
PO7	Student shall be able to communicate effectively on complex management activities with various stakeholders being able to comprehend and write effective reports, design documentation, make effective presentations, and give & receive clear instructions.
PO8	Student shall recognize the need for, and have the ability to engage in independent and life-long learning in the broadest context of technological change.
PO9	Student shall be able to create, select, and apply appropriate techniques, resources, and modern management and IT tools including prediction and modeling to make decisions.

Supporting document for PSOs (Programme Specific Outcome) of MBA EFT

PSO 1			**PSO 2**		**PSO 3**	**PSO4**	
Student shall be able to describe fundamental knowledge of general and functional management courses & relevant technological tools to identify opportunities, relating their existing industry knowledge base and apply appropriate business strategies and ultimately transforming into industry ready professionals and executives.			Student shall able to apply technical and management knowledge in the domain of finance, marketing, human resources and information technologies to solve complex business and management problems in global business environment		Student shall be able to apply specific and cross functional knowledge to solve critical business and management issues, write effective reports, demonstrate leadership and	Student shall be able to communicate effectively on complex management issues, make effective presentation with various stakeholders being able to comprehend and shall be able to practice ethical principles, professional values and fulfil social	
Fundamental Business Management	**Functional Management domain**	**Research, Analysis and Technical**	**Finance/Marketing/HR**		**NTCC**	**Communication**	**Value Added**
Business Environment	Accounting in Decision Making	Information Technology & E-Commerce	Management of Financial Institutions	Cross Cultural Management	Dissertation / Project Work	Managerial Communication	
Organization Behavior	Human Resource Management	Quantitative Techniques in Management	International Financial Management	Compensation Management		**Foreign Business Language**	
Competitive Strategy	Marketing Management	Business Research Methods	Security Analysis & Portfolio Management	Recruitment Selection & Retention		Chinese	French
Managerial Economics	Financial Management	Operations Management	Management of Financial Services	Organization Structure, Design and HR Planning		Portuguese	German

Corporate Governance and Legal Aspects of Business	Consumer Behaviour		Strategic Financial Management	Performance Management		Korean	Spanish
Management Control System	Global Business Environment		Project Management & Control	Industrial Relations & Labor Laws		Japanese	Russian
			Sales and Distribution Management	Training & Management Development			
			Product and Brand management	Marketing of Services			
			Advertising & Integrated Marketing Communication	Retail Management			
			Customer Relationship Management	E-Commerce			

MASTER OF BUSINESS ADMINISTRATION
(EXECUTIVE FULL TIME)

FIRST SEMESTER

EMF4101	ACCOUNTING IN DECISION MAKING	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

Participants in this course will develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, participants will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts. In addition the course develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Objectives

The objectives of this course is to:

1. Equip the students to develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, students will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts.
2. Develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Outcome:

On completion of this course, the students will be able to:

CO1: To enable the students to combine practice and theoretical knowledge of financial accounting.

CO2: To demonstrate the decision making skills to the students in the financial analysis context,

CO3: To develop an ability to identify and analyze complex financial accounting problems and opportunities in real life situations.

CO4: To develop skills in applying management accounting techniques to assist in decision making*Bloom's

Modules	Blooms Level	Number of Hours
Module 1: Financial Accounting Introduction, Foundations, Accounting policies, Accounting and management control, Branches of accounting, Recording of transactions and classification, Trial Balance & Errors, Cash, Preparation of Income Statement and Balance Sheet, Adjustments, Depreciation Accounting, Form and contents of financial statements with reference to Indian Companies Act. Accounting	L1, L2, L3	8

Standards		
Module 2: Financial Statement Analysis Relation and Comparison of Accounting data and using financial statement information, Ratio Analysis, and Cash flow analysis.	L1, L2, L4,L5	8
Module 3: Costing Accounting Elements of cost, Cost Classification and Allocation, Cost Sheet, Costing Techniques & Methods	L1,L2, L5, L6	6
Module 4: Management Accounting Marginal Costing and Cost Volume Profit Analysis, Budgeting & Variance Analysis..	L1, L2, L4,L5	8

Level:L1 – Knowledge; L2-Comprehension, L3 – Application, L4 – Analysis, L5 – Synthesis, L6 - Evaluation

Text Books

1. Anthony, N.R; Hawkings, F. D; Merchant, A.K (2014), Accounting Text and Cases, 13th Edition, McGraw Hill.
2. Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, McGraw Hill.

Reference Books

1. Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing House
2. Narayanaswamy R (2014), Finanacial Accounting – A Managerial Perspective, Prentice Hall of Indi.
3. Maheshwari S N; Maheshwari SK and Maheshwari SK, 3rd Edition, A Text Book for Accounting for Management, Vikas Publishing House.
4. Tulsian, P.C (2006), Financial Accounting, Tata McGraw Hill.
5. Banerjee, A (2005), Financial Accounting, Excel Books.
6. Ghosh,T.P (2005), Fundamentals of Management Accounting, Excel Books
7. M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.

Modes of Evaluation: Quiz/Assignment/Presentation/Written Examination

Examination Scheme:

Components	Assessment 1 Group Presentation	Assessment 2 In Class Quiz	Class Test/Mid Term Exam	Attendance	External
Weightage (%)	10	5	10	5	70

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	-	1	1	--	--	--	--	--	--	1	--	--	--
CO2	1	1	1	--	--	--	1	--	--	1	--	--	--
CO3	1	1	--	1	--	--	--	--	--	1	--	--	--
CO4	1	1	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4105	BUSINESS ENVIRONMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of business practices preferred but not compulsory				
Co-requisites					

Catalog Description

In this course the students are introduced with various rapidly changing developments and momentum of domestic and global business. The students are familiarized with aspects related to international and external business environment. Thereafter, changing developments in Indian economic reforms, industrial and financial environment in the country are discussed in detail. This is followed by discussion about labor environment in business. Fourth, there is a detailed analysis regarding planning and economic development in India. Finally, details of international regime, institutions, and trade blocs are discussed. The overall aim of this course is to make the students aware of various changes taking place in the business paradigm.

Course Objectives:

The objective of this course is to:

1. Make students acquainted with meaningful knowledge about the various dimensions of domestic and international business environment and also international trade regime.
2. Enable students to apply the theoretical concepts in work place related to financial and economic policies influencing business environment.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Explain the various changes taking place in international business environment along with fundamental knowledge on domestic business.

CO2: Discuss the sequence of developments in Indian economic reforms, industrial and financial environment.

CO3: Describe the changing paradigms in labour environment and Indian economic planning and development.

CO4: Discuss holistically the growth, development and significance of international trade regime, financial institutions, trade blocs and trade dispute settlements.

Modules	Blooms level*	Number of hours
MODULE 1: Overview of Business Environment Meaning and types of business environment, Internal and external environment, Micro and macro environment, Factors (Cultural, social, Political economic legal, demographic and technological) effecting business environment.	L1, L2	9
Module II: Indian Industrial environment Industrial policy up to 1991, New industrial policy, Disinvestment,	L1, L2, L4	9

Industrial sickness, legislation for anti-competitive and unfair trade practices, Industrial financial institutions (IDBI, SIDBI, ICICI, IFCI etc.), Industrial disputes- causes and preventive measures, Settlement of disputes, Intellectual Property Rights		
Module III: Economic Planning and Development Planning in India- needs and objectives, planning commission, 11th five year plan, Foreign trade policy 2009, Export processing zones, Export oriented units, Special economic zones (EPZ's, EOU's, SEZ's) and trading houses in India, business opportunities in rural sector.	L1, L2, L4	9
Module IV: Global Environment GATT/ WTO- role, functions and ministerial conferences, IMF, World Bank (International Bank for Reconstruction and Development), Regional economic cooperation institutions, SAARC, EU, NAFTA and ASEAN. Examination Scheme:	L1, L2, L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Charles W L Hill. and Arun Kumar Jain (2007), International Business: competing in the global market place, Mc Graw-Hill.
2. Mishra, S.K., and V.K. Puri. (2009), Indian Economy, Himalaya Publishing House.
3. Cherulinam, Francis, International Business, 3rd edition, Prentice Hall India

Reference Books

1. John D. Daniels Lee H Radebaugh, (2007), International Business: Environments and Operations. Addison Wesley.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	2	--	--	1	--
CO2	1	1	2	--	--	--	--	2	--	--	--	1	--
CO3	1	1	2	--	--	--	--	2	--	1	1	1	--
CO4	1	1	1	--	--	--	2	2	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

EMF 4106	ORGANIZATIONAL BEHAVIOR	L	T	P	C
Version 1.1	Latest Version	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
To help the students to develop cognizance of the importance of human behaviour.

Course Objective:
1. To help the students gain understanding of the functions and responsibilities of the manager.
2. To provide the student understand Human Behaviour in organizations so as to improve his managerial effectiveness.

Course Outcome:
Upon successful completion of the course a student will be able to:
CO1: The students will be able to demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization and diversified cultural settings.
CO2: To enable students to describe how people behave under different conditions.
CO3: Students will analyze the complexities associated, critically evaluate and apply decisions appropriately.
CO4: To enable students to synthesize related information and evaluate options for the most logical and optimal solution so that they would be able to predict and control human behaviour and improve results.

Modules	Blooms level*	Number of hours
Module I: Management vs. Manager Evolution of management thought, Functions of management, Roles and Skills of a manager, Emerging challenges of management.	L1, L2	6
Module II: Organization Nature and structure of organization, Types of organizations, Line and staff relationships, Formal and informal organizations.	L1, L2	6
Module III: Introduction to Organization Behaviour Overview of organization behaviour and its importance, Organization models.	L1, L2	6
Module IV: Individual Behaviour Individual behaviour, Perception and learning, Personality, Values & attitudes, Motivation: Concept theory and application	L1, L2, L3, L4, L5, L6	6
Module V: Group Behaviour Group dynamics, Communication, Leadership, Power and politics, Conflicts and negotiation.	L1, L2, L3, L4, L5, L6	6
Module VI: Organizational Culture and Change Management Organisational culture, Organisational change and development, Work stress and its management**.**	L1, L2, L3, L4, L5, L6	6

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text and Reference Books

1. Luthans, F. (2010), Organizational Behaviour, Mcgraw-Hill Education India Pvt.Ltd - New Delhi.
2. Robbins, S.P. (2016), Organizational Behaviour, Sixteenth Edition, Pearson Education.
3. Greenberg, J. & Baron, R.A. (2005), Behaviour in Organizations, Pearson Education.
4. Newstrom John W. and Davis Keith, (1993), Organizational Behaviour: Human Behaviour at Work, Tata McGraw Hill, New Delhi
5. P. Subba Rao (2010), Management and Organisation and Behaviour, Himalaya Publishing House, New Delhi
6. Pierce Gardner with Dunham (2011)Managing Organizational Behaviour. Cengage Learning India.

Modes of Evaluation: Class Test /Home Assignment/ Power Point Presentation/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**PPT**	**A**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1				1	1			1			
CO2	1	1				1	1			1			
CO3	1	1				1	1			1			
CO4	1	1				1	1			1			

1: strongly related, 2: moderately related and 3: weakly related

EMF4108	HUMAN RESOURCE MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Students should be aware of the HR practices in the industry and current trends				
Co-requisites	NA				

Course Catalogue:
Human Resource Management links people-related activities to business strategy. The course develops a critical understanding of the role and functions of the various human resource activities in an organisation, providing students with a comprehensive review of key HRM concepts, techniques and issues.

Course Objective:
The course aims to:

1. The objective of this course is to help the students develop an understanding of the management of human resources, with particular reference to HR functions like recruitment, selection, training, development and appraisal.
2. To help the students focus on and analyze the issues and strategies required to develop effective compensation structures.
3. To give students an overview of human resource information system (HRIS), HR Audit, cross- cultural practices in HR and managing diversity.

Course Outcomes:
On completion of the course the students will be able to:
CO1: Understand the processes of acquisition, performance management, retention, reward strategy and training and development.
CO2: Reproduce the contemporary knowledge in basic and strategic HR issues, nationally & internationally that are suggested through the latest research findings.
CO3: Explain HR strategies that will be aligned with the overall organizational strategies and serve the long-term interests of the firm.
CO4: Define a strategic direction, particularly in relation to people and to embed operational plans.

Modules	Blooms level*	Number of hours
Module I: Human Resource Management in Perspective Nature and scope of HRM, HRM functions, HRM models, understanding concepts of Personnel Management, Human Resource Development and Strategic Human Resource Management, HR Environment, Changing Role of HR.	L1,L2	7
Module II: Meeting Human Resource Requirements Job Analysis, Job Description, Strategic Human Resource Planning, Recruitment, Selection Process, Methods – Interview, Tests, Placement and Induction	L1, L2	6
Module III: Training & Developing of Employees Training and Development, Understanding of Performance	L1, L2	8

Management Systems, Potential Appraisal, Career Development		
Module IV: Managing Compensation Job evaluation, Methods of Job Evaluation, Strategic Compensation, Equity Theory, Components of Pay Structure, Designing and Administration of Wage and Salary Structure, Wage Regulations in India	L1,L2	6
Module V: Employee Relations Overview of Industrial Relations, Industrial disputes, Collective Bargaining, Workers Participation and Management, Grievance handling	L1, L2	4
Module VI: Emerging Trends in HRM Overview of Human Resource Information System (HRIS), Introduction to HR Audit, IHRM Practices, Cross- Cultural and Diversity Management, Work-life integration, Human Resource Outsourcing	L1, L2	5

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & Reference Books:

1. David A. Decenzo ,Stephen P. Robbins , Susan L. Verhulst,(2015), Human Resource Management ,eleventh edition , Wiley;
2. Prasad. L.M, (2014) Human Resource Management, Third Edition, Sultan Chand & Sons; New Delhi.
3. Chhabra T.N,(2014) Human Resource Management: Concepts and Issues, Edition 2014,Dhanpat Rai & Co
4. Dessler G (2014) A Framework for Human Resource Management, 7 edition (2014), Pearson Education India;
5. Michael Armstrong , Stephen Taylor,(2017), Armstrong's Handbook of Human Resource Management Practice, 14th edition, Kogan Page

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2								1	3	-	
CO2			2							1	3	-	
CO3	2			2						1	3	-	
CO4	2		2	2						1	3	-	

1: strongly related, 2: moderately related and 3: weakly related

EMF4109	INFORMATION TECHNOLOGY AND E-COMMERCE	L	T	P	C
Version	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn the concepts of computer evolution, database management systems, networking fundamentals, e-commerce, electronic data interchange, electronic payment systems and security issues related to computer systems. The aim of this course is to make the students familiar with the basic concepts of Information Technology and E-commerce.

Course Objectives

This course will enable students to:

1. Grasp the latest developments in computer technology and understand the working of a computer system.
2. Understand various technologies like internet, telecom & networking, DBMS concepts, e-commerce etc.
3. Grasp the latest trends in e-business models, electronic payment systems and data & information security.

Course Outcomes

On completion of this course, the students will be able to

CO1: State the strategic use of Information Technology in Business and differentiate between functional and cross functional information systems.

CO2: Describe the concepts related to databases and networking.

CO3: Apply the knowledge of Information Technology in managing the broad array of responsibilities in the business organization.

CO4: Design the e-commerce website for various e-business organization using e-commerce models.

CO5: Review and assess the organization's data and network security aspects.

Modules	Blooms level*	Number of hours
Module I: Modern Computer Systems Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation, (e.g. Delhi Metro , Digitally Controlled Car engines etc.), Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources	L1, L2	6

Module II: Data Resource Management Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts.SQL Query handling, Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers. Storage Technologies and Architecture (DAT, NAS, SAN etc.). Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis	L2, L3	6
Module III: Telecommunications and Computer Networks Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Network Topologies, Web 2.0/3.0, Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,Features of 3G & 4G technologies, VOIP and IPTV.	L1, L2	6
Module IV: Electronic Commerce Systems Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services.	L1, L2	6
Module V: E-Commerce Business Models & EDI Concept of EDI, Difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI.Various business models in Ecommerce likeB2C, B2B, C2C.	L1, L2, L5	6
Module VI: E-Payment Systems and Security Management Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards. The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types.Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.	L1, L2, L6	6

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1.Norton P (2010), Introduction to Computers, Tata McGraw-Hill
2.Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd

Reference Books

1. Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
2. Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education
3. Ravi Kalakota& Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.
4. Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.

5. J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1									1			
CO2	1	2								2			
CO3	2	1	1							2			
CO4									2	1			
CO5		1							2	1			

1: strongly related, 2: moderately related and 3: weakly related

EMF4110	MARKETING MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Marketing management emphasizes upon the practical aspects of marketing concepts and management functions performed by professionals. This is a beginner's course in Marketing and shall cover the basics. The course helps in developing an understanding of the challenges of marketing management in manufacturing and service industries: analyzing marketing environments; evaluating strategic alternatives and designing and implementing marketing programmes involving decisions about products/services, pricing, distribution and promotion. The course serves to familiarize participants with basic marketing concepts, environment, strategies and methodology.

Course Objectives

The objectives of this course are to:

1. Provide the students exposure to modern marketing concepts, tools and techniques.
2. Enhance student's knowledge to prepare for general management responsibilities by focusing on the input of the marketing perspective across all functions.
3. Explain different consumer-specific characteristics as well as certain psychological processes influencing buying behavior.
4. Provide different dimensions of marketing such as STP, business environment, distribution channels, marketing communication, and social media marketing to enable the students to design and analyze the functional aspects in emerging market.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Define the holistic marketing efforts to develop, design and implement marketing programs. They will also be able to examine challenges, responsibilities, and risks managers face in today's workplace.

CO2: Illustrate a comprehensive knowledge about how values are created, communicated and delivered to the target audiences.

CO3: Explain how to control the elements of the marketing mix—product policy, channels of distribution, communication, and pricing—to satisfy customer needs profitably

CO4: Design strategic approaches to manage different marketing dimensions in uplifting the consumer as well as business market.

CO5: Describe the marketing communication and its applicability along with understanding new-age media, advertising, sales promotion, personal selling etc.

Modules	Blooms Level*	Number of hours

Module I: Understanding Marketing in New Perspective Fundamentals of Marketing, Customer Value and Satisfaction, Customer Delight, Conceptualizing Tasks and Philosophies of Marketing Management, Value Chain, Scanning the Marketing Environment, Marketing Mix Elements, Difference between marketing and Selling, Relationship marketing, Social marketing, Strategic Planning in marketing, formulating the marketing plan.	L1, L2	8
Module II: Analyzing Consumers & Selecting Markets The factors influencing consumer behavior. The stages in the buying process, the buying decision making process, factors effecting the buying decision., Market Segmentations, Levels of Market Segmentations, Patterns, Procedures, Requirement for Effective Segmentation, Evaluating the Market Segments, Selecting the Market Segments, Tool for Competitive Differentiation, Developing a Positioning Strategy.	L1, L2, L4	7
Module III: Managing Product & Pricing Strategies Classification of products, New Product development, stages of product development, Adoption process, Product mix decisions and line management, Length, width and depth of a line, line analysis, and brand management, product life cycle, stages in lifecycle and factors affecting each stage, Managing product life cycles. Setting the price, adapting the price, initiating and responding the price changes.	L1, L2, L3	7
Module IV: Designing: Managing the Integrated Communication Channel functions and flows. Channel design decisions. Channel management decisions. Channel dynamics; vertical horizontal and multi channel marketing systems. Market Logistics decisions. Effective Communication, Integrated Marketing Communication, Marketing Communication Process, Promotion mix, Advertising, Personal Selling, Sales Promotion and Publicity and Public Relations, Direct Marketing.	L1, L2, L3	7
Module VI: Emerging Trends in Marketing An Introduction to Internet Marketing, Multi Level Marketing, E-Marketing, Green Marketing, Event Marketing, Types of Events, Sponsorship, Cause Related Marketing, Marketing for Non Profit Organizations Marketing Strategies for Leaders, Challengers, Followers and Nichers.	L1, L2, L5	7

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation*

Text Book

1. Kotler, Keller, Koshi & Jha, (2015), Marketing Management (14th ed.)- A South Asian Perspective, Pearson Education.

Reference Books

1. V S Ramaswamy & S Namakumari (2009), Marketing Management; Planning, Implementation & Control (5th ed.)McMillan.
2. S. Neelamegham, (2009) Marketing in India, Vikas publishing house.

3. Saxena, Ranjan (2016), Marketing Management, 5th edition, Tata McGraw Hill, New Delhi.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	1	1	--	1	1	1	--	1
CO2	1	1	1	1	--	1	1	--	1	1	1	--	1
CO3	1	2	1	1	--	1	1	--	1	1	1	--	1
CO4	1	1	1	1	--	1	2	--	1	1	1	--	1
C05	1	1	1	2	--	1	2	--	1	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

EWF4111	QUANTITATIVE TECHNIQUES IN MANAGEMENT	L	T	P	C
Version 1		3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course not only exposes the students to the theory of probability and sampling distribution but also includes the various types of statistical tools which are to be used in the present rapidly changing business environment. Its main focus is on the application of data analytic tools to enable the students to make correct decision making under the complex and dynamic business scenario. The content of the course will also include the different forecasting techniques with main focus on the quantitative technique that would be immensely beneficial for the students to make the predictions correctly. Numerous empirical examples and real business cases are used to illustrate applications of the material covered.

Course Objectives

The objective of this course is to

1. Appreciate the problems of obtaining or gathering the desired information or data.
2. Learn the theoretical basis of sampling, various sampling techniques, their merits and demerits.
3. Understand the types of classification of data, representation of data in the form of diagrams, graphs or tables.
4. Appreciate the basics of central value, dispersion, skewness etc and their applications in real business problems.
5. To examine the problems related to theory of probability, various types of probability distribution and particularly Baye's theorem and their application in real-life problems.
6. Know the process of hypothesis testing for large and small samples and its uses in business problems
7. Equip with the knowledge of correlation, regression and time series; enabling them to make the correct future predictions

Course Outcomes

The students will be able to:

CO1. Define types of data, representation of data, treatment of data

CO2. Classify sampling process and methods

CO3. Identify different types of probability distributions

CO4. Analyze a given business problem and applying required statistical tool accordingly

CO5. Make prediction using various forecasting techniques

Modules	Blooms	Number

	level*	of hours
MODULE 1: Introduction Application of Statistics in Business; Classification of Data; Interpretation of computer output of diagrammatic and graphical presentation of data, measures of central tendency, measures of dispersion and skewness.	L1, L2	8
MODULE 2: Probability and Probability Distributions Concepts of Probability, addition theorem, multiplication theorem, Baye's Theorem; continuous and discrete probability distribution:Binomial Probability Distribution, Poisson Probability Distribution and Normal Probability Distribution.	L1, L2, L3	6
MODULE 3: Sampling and Sampling Distribution Sampling: Basic Concept, Types of Sampling, Errors and Precautions in sampling, size of sample, Parameter and Statistic, Sampling Distribution of the mean, Sampling distribution of proportion, Estimation – point estimation, Interval Estimation,	L1, L2, L3, L4	6
MODULE 4: Tests of Hypothesis Null and Alternative hypothesis, One-Tailed and Two-Tailed tests of hypothesis, Type I and Type II error, rejection rule using p – Value and critical value approach. Hypothesis Testing to compare two populations: Test for one sample mean, Test for two population means (Independent Samples), Tests for two population means (Dependent Samples), Tests for two population proportions (Independent Samples), Tests for two population variances (Dependent Samples), F-test, Chi – Square Test	L1, L2, L3, L4, L5, L6	6
MODULE 5: Forecasting Techniques Correlation - Karl Person, Spearman's Rank methods, simple linear regression analysis – Estimated regression equation, least squares method, coefficient of determination, interpretation of computer output for Regression, Introduction to time series, trend analysis	L1, L2, L3, L4, L5, L6	6
MODULE 6: Lab Work Introduction to SPSS, performing univariate and bivariate analysis on SPSS	L5, L6	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Beri, C. (2016). *Business Statistics*. New Delhi, India: McGraw Hill Education (India) Private Limited
2. Gupta, S.P. (2007). *Statistical Methods (35th ed.)*. New Delhi, India: Sultan Chand and Sons
3. Kothari, C.R. (2009). *Research Methodology: Methods and Techniques (2nd revised ed.)*. New Delhi, India: New Age International Publisher
4. Zikmund, William C (1997). *Business Research Methods (5th Ed.)*. The Dryden Press, Harcourt Brace College Publishers
5. Gujrati, Damodar N and Sangeetha (2011). *Basic Econometrics (4th Ed.)*. New Delhi, India: McGraw Hill Education (India) Private Limited

Reference Books

1. Aczel, D.A., Sounderpandian, J., Saravanan, P. and Joshi, R. (2012). *Complete Business Statistics (7th ed.*). New Delhi, India: McGraw Hill Education (India) Private Limited
2. Levin, Richard I. & Rubin, David S. (1998). *Statistics for Management.* New Delhi, India: Pearson Education
3. Srivatsava, T.N., Shailaja, Rego (2008). *Statistics for Management.* Tata McGraw Hill
4. Stephen .K.C. (2002). *Applied Business Statistics: Text, Problems and Cases.* New York: Harper and Row
5. Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited

Modes of Evaluation: Class Test/Assignment /Written Examination

Examination Scheme:

Components	**H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

CT: Class Test; H/P/V/Q: Home Assighnment, Presentation, Viva, Quiz; A- Attendance; EE- External Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	--	1	2	2	--	--	--	--	1	1	--	3	--
CO2	--	1	2	2	--	--	--	--	1	1	--	3	--
CO3	--	1	--	--	--	--	--	--	1	1	2	3	--
CO4	--	1	1	1	--	--	--	--	1	1	1	--	--
CO5	--	--	--	1	--	--	--	--	1	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

CSS4152	Managerial Communication	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course of Communication Skills, we would like students to understand the basic concepts of Communication skills and to use different tools to enhance their vocabulary and strengthen their spoken and written communication

Course Objectives

The objective of this course is to

1. Explain students to communicate effectively by emphasizing on practical communication through refurbishing their existing language skills and also to bring one and all to a common take-off level.
2. Develop skills for effective word choice and sentence and avoid common errors in written communication.

Course Outcomes

On completion of this course the students will be able to:

CO1: Develop competency to write and speak grammatically correct English that will enable them to communicate effectively and solve issues that arise due to miscommunication.

CO2: Apply the different models of communication to facilitate effective communication throughout the organization.

CO3: Develop the capability of customizing communication in different situations like social, legal, cultural.

CO4: Demonstrate the capability of using different tools of communication, particularly related to technology

CO5: Demonstrate the ability to effectively communicate in complex situations.

Modules		Blooms' Level*	Credit Hours
Module 01	MODULE I: INTRODUCTION Communication, Importance Principles of effective communication, Effective use of language, Language of Business, Contemporary dynamics affecting communication contingencies	L1, L3	4
Module 02	The managerial communication process Levels of managerial communication, Critical errors in communication, Channels of Communication, Matching technology and the message:	L1, L3	12

	1. Message sensitivity 2. Message negativity 3. Message complexity 4. Message persuasiveness Contemporary managerial writing Guidelines for making a call, Answering a call, Telephone word groups **Inter Office communication** (2 HR) Business Letters, Emails, Netiquette **Intra Office Communication** (3 HR) Memos, Notices, Circulars, Minutes Report Writing **Information Packaging** (2 HR) Audience Analysis, Case Studies, Business Conversation, Art of Persuasion		
Module 03	MODULE III: INTERPERSONAL COMMUNICATION STRATEGIES Types of Interviews, Styles of Interview Conducting Interviews • Fundamental and Practice session • Question Answer on various dimensions • Barriers to effective interviews Participation in Meetings, Keynote speeches, Announcements, Movie Magic, Picture reading presentation Making formal presentations, General & Contextual	L1,L3	7
Module 04	MODULE IV: STRATEGIES FOR UNDERSTANDING MESSAGES Listening (2 HR) • Benefits of listening • Barriers to listening • General techniques for listening Non Verbal Communication (3 HR) Intercultural Managerial Communication (2 HR) • Ethnocentrism • Ethno relativism		7

Bloom's Level*L1: Knowledge; L2: Comprehension; L3: Application L4: Analysis;L5: Synthesis, L6: Evaluation*

Text Books

1. Meenakshi Raman, *Business Communication*. New Delhi : OXFORD University Press, 2012.

References Books

1. Patricia Merrier, A. C. "Buddy" Krizan, Joyce P. Logan, *Business Communication*, Boston: Cengage Learning, 2008
2. Sethi, Adhikari ,*Business Communication*, Tata McGraw Hill, 2010.

3. Jones, *Working in English.* Cambridge University Press; Student edition, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Viva**	**Presentation**	**Assignment**	**MCAF**	**A**
Weightage (%)	20	20	20	35	5

MCAF- Management Communication Assessment File, **A**- Attendanc

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	1	-	-	1	-	-	2	-	-	1
CO2	1	-	1	2	-	-	1	-	-	2	-	-	1
CO3	1	-	1	1	-	-	1	-	-	2	-	-	1
CO4	2	-	1	3	-	-	1	-	-	2	-	-	1
CO5	1	-	1	3	-	-	1	-	-	2	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

MASTER OF BUSINESS ADMINISTRATION
(EXECUTIVE FULL TIME)

SECOND SEMESTER

EMF 4202	COMPETITIVE STRATEGY	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces the key concepts, tools, and principles of strategy formulation and competitive analysis. It is concerned with managerial decisions and actions that affect the performance and survival of business enterprises. The course is focused on the information, analyses, organizational processes, and skills and business judgment managers must use to devise strategies, position their businesses, define firm boundaries and maximize long-term profits in the face of uncertainty and competition.

Course Objectives

The objective of this course is to

1. Introduce students to the key concepts, tools and principles of business policy and strategic management.
2. Expand the student's capacity to integrate and appreciate the changes in the environment that shape the strategy of a business and lead to developing a competitive edge.
3. Develop the perspective of students towards understanding the culmination of different functional areas into building up of a corporate strategy.
4. Expose the students to the various approaches in crafting business strategy, tools that aid in reasoning carefully about strategic options, and learning how companies use what-if analysis to evaluate action alternatives and make sound strategic decisions.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify and determine the various levels at which strategic decision making happens in an organization.

CO2: Analyze the internal and external environment of business that will lead to formulation of strategic plans.

CO3: Analyze the suitability of strategies that firms have developed in the real world scenario to achieve valuable outcomes.

CO4: Design strategic analysis and choice in order to determine alternative courses of action that could best enable the firm to achieve its mission and objectives.

CO5: Review of strategy implementation to gain competitive advantage.

Modules	Blooms level*	Number of hours
Module-I Strategic Management Process: defining strategy, levels of approaches to strategic decision making, process of strategic management, roles of strategies, mission and objectives, strategic	L1,L3	7

business unit, environment – concept, components and appraisal.		
Module -II Organization appraisal and strategy formulation: SWOT analysis formulation – corporate level strategies and business strategies.	L1, L2 ,L4	7
Module-III Strategy analysis and choice – the process, BCG matrix, GE matrix, SPACE approach, QSP matrix and strategic plan	L1, L2,L4	7
Module -IV Overview of strategy implementation: aspects, structures, design and change; behavioural implementation – leadership, culture, value and ethics, functional implementation	L1,L2,L5	8
Module -V An overview of strategic evaluation and control, techniques of strategic evaluation and control, Application of information technology in Strategic Management	L1, L2,L6	7

*Bloom's Level: L1-Knowledge;L2-Comprehension;L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Kazmi, A.(2015), Business Policy and Strategic Management 4th edition), Tata Mc Graw Hill.
2. Wheelen and Hunger,(2018),Strategic Management and Business Policy :Globalisation, Innovation and Sustainability, Pearson Education.

Reference Books

1. Pearce and Robinson(2017),Strategic Management :Formulation, Implementation and Control, Tata McGraw Hill.
2. David Fred R.(2018)Strategic Management Concepts: A Competitive Advantage Approach, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	1	2	--	--
CO2	1	1	--	--	--	2	2	--	--	1	2	--	--
CO3	1	1	--	--	--	--	1	--	--	1	2	--	--
CO4	1	1	--	--	--	--	2	--	--	1	2	--	--
CO5	1	1	--	--	--	--	2	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4203	**BUSINESS RESEARCH METHODS**	L	T	P	C
Version	Latest Version	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course will provide an opportunity for participants to establish or advance their understanding of research through critical exploration of research language, ethics, and approaches. The course introduces the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Participants will use these theoretical underpinnings to begin to critically review literature relevant to their field or interests and determine how research findings are useful in informing their understanding of their environment (work, social, local, global).

Course Objectives

The course aims to

1. Provide a thorough understanding of the essential characteristics and the basic tenets of research methodology and report preparation.
2. Focus on quantitative and descriptive research methods and techniques that are essential for the validity and reliability of the research process.
3. Understand the components essential for preparation of research proposals, research reports, business proposals and feasibility studies in order to develop report writing and formal presentation skills of the research projects undertaken.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the nature of research methods and research methodologies

CO2: State the components and problems/constraints underlying a research project and report proposal.

CO3: Identify the suitable sampling method to market problems/constraints underlying a research project and report proposal.

CO4: Explain and apply hypothesis technique to analyze the data.

CO5: Define and analyse data to interpret and conclude research findings and provide relevant recommendations.

Modules	Blooms level*	Number of hours
Module I: Research Methodology and Research Methods Objective, significance and types of research Research Methods vis-à-vis Methodology Research Process and criterion for good research Ethics in Business Research	L1, L2	5
Module II: Research Problem and Research Design Identifying and Defining the Research Problem	L1, L2	5

Developing the Hypotheses Meaning of Research Design Steps to Design the Research		
Module III: Sampling Design and Scaling Techniques Census and sample survey Criteria for selecting a sampling procedure Measurement and Scaling techniques Classification and importance of scaling techniques	L1,L2	5
Module IV: Statistical Inference- Test of Significance Procedure for Testing a Hypothesis Parametric Test: Z-test, F-test, T-test Non-Parametric: Chi-Square Test	L1,L4	4
Module V: Design and Analysis of Experiments Basic Principles of ANOVA ANOVA Technique Interpreting ANOVA (One Way and Two Way ANOVA) and its application in various fields of management Completely Randomized Design Randomised Block Design	L1,L4	4

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Malhotra, Naresh, Marketing Research, 7th Edition, Pearson Education, 2019
2. Cooper, Donald R and Schindler, Ramela (2006) Business Research Methods, Tata Mc Graw Hill, 9th edition,
3. Kothari C R., Research Methodology, Wiley Eastern Ltd, New Delhi, 2019

Reference Books

1. Amarchand, D. Research methods in Commerce, Emerald Publishers, Chennai, 2009
2. Ganesan, Sarangi Prashant, Research Methodology, Taxmann Publication, 2010

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**Att**	**EE**
Weightage (%)	10	5	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	1	--	--	--
CO2	1	1	--	--	--	--	--	--	--	1	--	--	--
CO3	1	1	--	--	--	--	--	--	--	1	--	--	--
CO4	1	1	--	--	--	--	--	--	1	1	--	--	--
CO5	1	1	--	--	--	--	--	--	1	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4216	MANAGERIAL ECONOMICS	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of economic science preferred but not compulsory				
Co-requisites					

Catalog Description

In this course the students are introduced with various concepts of economic science that relates to managerial decision process based on rational choice approach. To begin with, introductory concepts of economic theory and their implications on managerial decision process are analyzed. Thereafter concepts related to demand analysis, demand forecasting supply analysis, and equilibrium market conditions are discussed in detail. The next phase deals extensively concepts related to production theory, cost theory and revenue aspects. Third, various concepts related to market structure are discussed in detail. Finally, various macroeconomic concepts, policy perspectives of government and other institutions are explored in detail. The overall aim of this course is to make the students familiar with working knowledge of the fundamentals of managerial economics.

Course Objectives:

The objective of this course is to:

1. Equip the students with theoretical concepts of economic science so that they can analyze situations and improve upon their managerial decision process in workplace.
2. Provide students with extensive exposure about the micro and macro level variables that influence business operations and strategies of the firm and business environment under which they operate.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain basic concepts of economic analysis, demand and supply dynamics, demand forecasting techniques and their application, and analyze the working of free market mechanism and appreciate how forces of demand and supply reinforce each other for attaining market equilibrium.

CO2: Analyze rationally the dynamics of production and cost aspects in order to make a holistic assessment of the complexities inherent in production system.

CO3: Describe the various forms of market structure and their implications in managerial decision process.

CO4: Discuss holistically the various macroeconomic aspects of business and implications of government policies in shaping the dynamics of business environment.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Managerial Economics, Demand Analysis and Demand Forecasting: Introduction to Managerial Economics: Meaning and Nature of Managerial Economics, Significance of Managerial Economics, Scope of Managerial Economics. Demand	L1, L2, L4	7

Analysis: Meaning of Demand, Determinants of Demand, Individual and Market Demand Functions, Individual and Market Demand Curves, Law of Demand, Exception of Law of Demand. Elasticity of Demand: Types of Elasticity of Demand, Significance of Elasticity of Demand. Demand Forecasting: Purpose of Demand Forecasting , Steps Involved in Forecasting, Determinants of Demand Forecasting, Methods of Demand Forecasting.		
MODULE 2: Theory of Supply, Production, Cost and Revenue Analysis: Supply: Law of Supply, Determinants of Supply, Shift of Supply and Change in Supply, Elasticity of Supply, Kinds of Elasticity of Supply, Determinants Elasticity of Supply. Theory of Production: Meaning of Production, Short –run Analysis of Production, Law of Variable Proportion, the Three Stages of Production, Returns to Scale. Analysis of Cost: Cost and Managerial Decision-making, Types of Cost, Cost Function, Relationship between Production and Cost, Short Run Cost Function, Long Run Cost Function, Relation between Short-run and Long-run Cost Curves,. Economies of Scale. Break-Even Analysis. Concept of Revenue.	L1, L2,L4,L6	12
MODULE 3: Market Structure and Price Determination Perfect Competition: Introduction of Perfect Competition, Characteristics of Perfect Competition, Demand Curve of Firm and Industry, Equilibrium of the Firm in the Short Run and Long Run. Effects of Tax Imposition under Perfect Competition. Monopoly: Assumptions, Causes of Monopoly, Demand, Average Revenue and Marginal Revenue of a Monopolistic, Profit Maximization Price Determinants of the Monopolist in Short-run and Long-run. Measures of Monopoly Power. Monopolistic Competition: Assumptions, Product Differentiation, Demand Curve, Equilibrium of the Firm in Short-run and Long-run, Selling cost and Monopolistic Competition. Oligopoly: Assumptions, Non-collusive Oligopoly and Collusive Oligopoly, Kinked Demand Curve Analysis.	L1, L2, L3,L4	8
MODULE 4: Macroeconomics Analysis National Income: An Indicator of Economic Activity, The Parameters that Influence Level of Economic Activity. Business Cycles: Characteristics of Business Cycle, Phases of Business Cycle, Ill Effects of Business Cycles, General Measure to Control Business Cycles. The Role of Government in Market Economy: Rationale of Government Intervention, Economic Functions of Government in a Market Economy, Legal and Social Framework, Restraining Unfair Competition and Increasing Market Power, Reallocation of Resources in the Presence of Externalities, Redistribution of Income, Regulation of Natural Monopoly, Stabilization of Economy.	L1, L2, L3,L4,L5,L6	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Gupta, G.S. (2006), Managerial Economics, Tata McGraw Hill
2. Salvatore, D (2010), Managerial Economics, Oxford University Press
3. Peterson, H.C and Lewis, W.C. (2005), Managerial Economics, Prentice Hall of India

Reference Books

1. Dwivedi, D.N. (2010), Essentials of Business Economics, Vikas Publishing House Pvt. Ltd.
2. Mishra, S.K., and V.K. Puri. (2009), Indian Economy, Himalaya Publishing House.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	--	--	1	1	--	--
CO2	1	1	2	--	--	--	--	--	--	1	1	--	--
CO3	1	1	2	--	--	--	--	--	--	1	1	2	2
CO4	1	1	2	--	--	--	2	2	--	1	1	2	2

1: strongly related, 2: moderately related and 3: weakly related

EMF4217	FINANCIAL MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces an investigation of the firm's acquisition and financial activities, to include working capital management, capital budgeting, capital structure strategies, and valuation theory. The practical application of financial policy is stressed for decision-making purposes.

Course Objectives

The objective of this course is to

1. Provide the students relevant, systematic, efficient and actual knowledge of financial management that can be applied in practice with making financial decisions and resolving financial problems.
2. Help the students to acquire the basic knowledge by means of combining theoretical cognitions and practical attitudes to enable them to understand the financial problems in business practice.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the financial environment within which organizations must operate.

CO2: Analyse the financial objectives of various types of organizations and the respective requirements of stakeholders

CO3 :Explain and analyse the alternative sources of finance and investment opportunities and their suitability in particular circumstances

CO4: Assess the factors affecting investment decisions and opportunities presented to an organization.

CO5: Apply techniques in managing working capital

CO6: Analyse a company's performance and make appropriate recommendations.

Modules	Blooms level*	Number of hours
Module I: Introduction A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm.	L1,L2	4
Module II: Valuation Concepts Time Value of Money, Risk and Return, Financial and Operating Leverage.	L1, L2 ,L4	4
Module III: Financing Decisions Capital Structure and Cost of Capital**,** Marginal Cost of Capital.	L1, L2,L4	7

Module IV: Capital Budgeting Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction.	L1,L2,L3,L4,L6	10
Module V: Working Capital Management Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of Working Capital.	L1,L2,L3	5
Module VI: Dividend Policy Decisions An introduction**:** Different Schools of Thought on Dividend Policy.	L1,L2,L4	6

*Bloom's Level: L1-Knowledge;L2-Comprehension;L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1.Pandey, I.M. (2016), Financial Management, 11th Edition, Vikas Publishing House**.**

2.Chandra, P. (2017), Financial Management: Theory and Practice, 9th Edition, Tata McGraw Hill

3.Rustagi, R.P,Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.

Reference Books

1.Damodaran, A.(2007), Corporate Finance: Theory and Practice, Wiley & Sons.

2.Van Horne, J.C. (2011), Financial Management and Policy, Prentice Hall of India.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	2	--	--	--	--	1	2	--	--
CO2	1	1	--	--	2	2	2	--	--	1	--	--	--
CO3	1	1	--	--	--	--	1	--	--	1	2	--	2
CO4	1	1	--	1	--	--	2	--	--	1	2	--	--
CO5	1	1	--	--	--	--	--	--	2	1	2	--	--
CO6	1	1	--	--	--	--	--	2	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF 4218	OPERATIONS MANAGEMENT	L	T	P	C
Version 1	Latest approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Operations Management deals with the design and operation of the systems for production of goods and services. It will explore the approaches and analyze strategic decisions in operations management with a focus on designing products and processes, allocating scarce resources to strategic alternatives, and do long-range capacity and facility planning. These operations functions help in achieving the organization's long-range objectives. Subsequent focus will be on medium and short term planning and controlling. Care will be taken to strike a balance between theoretical and practical perspectives in manufacturing and service organizations.

Course Objectives

The main objectives are:

1. To develop an understanding of how the operations, have strategic importance and can provide a competitive advantage in the workplace.
2 .To understand the relationship between operations and other business functions.
3. To understand techniques of location and facility planning, line balancing, job designing and capacity planning in operations management.
4. To understand the supply chain function starting from Demand Management through Inventory Management.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define the elements of operations management and various transformation processes

CO2. Classify various facility layout alternatives and their capacity decisions,

CO3. Illustrate aggregate capacity plans and MPS in operation environments

CO4. Appraise suitable supply chain principles and practices in the operations.

CO5. Compare various inventory control methods

Modules	Blooms level*	Number of hours

Module I: Introduction Operations in manufacturing and services, responsibility of Operations Manager, Operations strategy and competitiveness, process analysis, manufacturing process and service process selection and design, job design and work measurement	L1, L2, L3	6
Module II: Strategic Decisions Facility location decisions, factors affecting location, location techniques: factor rating method, centroid method, facility layout, process layout, systematic layout planning, product layout, line balancing, fixed position layout, service operations layout, types of capacity, capacity planning: long term and short term, economies of scale	L1, L2, L3	8
Module III: Operating Decisions Aggregate Planning, production planning and control (PPC), benefits of PPC, Master Production Scheduling, Operations scheduling: loading, sequencing, priority rules and techniques, Materials Requirement Planning (MRP), concerns in MRP	L1, L2, L3	8
Module IV: Supply Chain Management Recent issues in SCM: Role of IT in SCM, CRM Vs SCM, structure of supply chain, benchmarking concept, features and implementation, outsourcing decisions, value addition in SCM	L1, L2, L4, L5	6
Module V: Inventory Management Inventory management: Objectives, factors, process, inventory costs, inventory models, inventory control techniques: ABC, VED, EOQ, SED analysis, Just-in-Time (JIT), JIT vs traditional systems of operations, JIT in services	L1, L3, L4, L6	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Production and Operations Management, S.N. Cherry, McGraw Hill Publications, 3/e, 4th reprint 2007
2. Production and Operations Management , Sunil Chopra, Peter Meindle, Prentice Hall of India
3. Supply Chain Management, R.B. Handfield, Prentice Hall of India
4. Supply Chain Management, Ajay Garg, McGraw Hill Publications
5. Introduction to Supply Chain Management, Frederick Shiller& Gerald J Liberman , Tata McGraw Hill edition
6. Operation Research, H..A.Taha, Prentice Hall India
7. Introduction to Operation Research, B.E .Gillet ,Tata McGraw Hill:

Reference Books

1. Richard B. Chase, Ravi Shankar and F. Robert Jacobs (2014); Operations &Supply Chain Management; McGraw-Hill - 2014 (14th Edition).
2. Chary S. N. Theory and Problems in Production & Operations Mgt.; Tata McGraw Hill (14th Edition).
3. Krajewski Lee; Operations Mgt. Process for Value Chains; Prentice Hall (8th Edition)
4. Russell S. Roberta & Taylor, Operations Mgt., Prentice Hall (4th Edition).

Modes of Evaluation: Class Test/Assignment /Written Examination

Examination Scheme:

Components	**ME**	**A**	**Q/S**	**Asn**	**CT**	**EE**
Weightage (%)	10	5	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2	1	2	--	--	--	--	--	--	1	1	3	1
CO2	2	1	2	--	--	2	--	2	--	1	--	3	1
CO3	--	1	--	1	--	1	--	2	--	1	--	--	2
CO4	--	1	1	1	--	--	--	3	--	1	2	--	2
CO5	--	1	1	1	--	--	--	--	--	1	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

EMF4206	SALES AND DISTRIBUTION MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Sales and distribution management is a practical course to learn. This course intends to expose students to various theories and practices of sales and distribution management prevalent in current economic and business scenario. The course is designed especially for exceptionally talented professionals who have earned reputation for their special analytical intellect, brilliant communication skill and excellent managerial capacity. The course is devised to provide different concept of improving interface between sales and marketing, use of sales technologies; sales force training, their motivation & compensation and marketing channels. It aims to offer practical approaches and tools to develop sales and channel strategies.

Course Objectives

The objectives of this course are to:

1. Provide students with a firm foundation for understanding all main components of sales
   and distribution management.
2. Offer practical approaches and tools to develop sales strategies and key customer relationships.
3. Help students to deal with solving business problems and to function as effective managers.

Course Outcomes

On completion of this course, the students will be able to:

CO1: State the sales management objectives, strategies & tactics, effective communication skills, and sales related marketing policies.

CO2: Explain different practices to lead a sales force enhancing its performance.

CO3: Describe how sales managers and the distribution channels work together to manage the demand and supply sides of operations.

CO4: Explain the concept of and reasons for establishing sales territories.

CO5: Identify the objectives of compensation plan and how to design an effective compensation plan.

CO6: Identify and interpret channel systems.

Modules	Blooms Level*	Number of hours
Module 1 Transactional and Relationship Selling Models, Sales Professionalism, HR aspects in Sales, buying processes,	L1, L2	8

personal selling skills.		
Module 2 Adaptive Selling, Sales Motivation, Presentation, Quotas, Territory Optimization, Sales Forecasting, Complaint Management, Retention Marketing.	L1, L2	9
Module 3 Channel design (Customer oriented), Channel Implementation, Channel Strategy, Structure and Functions, Linking the service output objectives to the flows, Designing the ideal channel, Vertical Marketing Systems.	L1, L2	9
Module 4 Logistics and Supply Chain Management, Non-store-Retailing, Conflict and Control in Channels, Evaluating channel member performance, Retailing and Wholesaling- Overview of Retail management with examples, Managing international distribution channels.	L1, L2	10

*Bloom's Level****L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation***

Text Book

1. Krishna K Havalar and Vasant M Cavale. (2016), Sales and Distribution Management: Text and Cases, Mc Graw Hill.

Reference Books

1. Ramendra Singh. (2018), Sales and Distribution Management: A Practice-Based Approach, Vikas Publication.
2. Still, Cundiff and Govoni. (2009), Sales Management, Decisions, Strategies and Cases. Prentice Hall of India.
3. Tapan K. Panda and Sunil Sahadev. (2012), Sales and Distribution Management, Oxford Publication.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Examination Scheme:Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	1	1	--	1	1	--	1	1	--	--
CO2	1	--	--	1	1	--	1	1	--	1	1	--	--
CO3	1	--	--	3	1	--	1	2	--	1	1	--	--
CO4	1	--	--	3	2	--	1	3	--	1	1	--	--
C05	1	--	--	2	2	--	1	3	--	1	1	--	--
CO6	1	--	--	2	2	--	1	3	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF 4207	Product & Brand Management	L	T	P	C
Course Version	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic Marketing concepts				
Co-requisites	NA				

Catalogue Description:
In congruence with the aim of marketing to convert a commodity into an identifiable product and to a subsequent brand, the course involves the objective of imparting comprehensive understanding of the process of product strategy and the fundamentals of building, measuring, and managing a brand.

As products, pricing and distribution increasingly become commodities, the new competitive arena is brand value, which creates long-term profitable brand relationships. Building brand equity involves managing brands within the context of other brands, as well as managing brands over multiple categories, over time, and across multiple market segments

Course Objectives :
The objectives of this course are to-
1: Make the student understand the concepts/theories pertaining to product management as well of managing a brand and reveal their significance in the context of marketing.
2: Make the student well versed with the various factors that influence product development.
3: Enable the student to comprehend the process of branding..
4: Provide with knowledge to the student so that he may describe the target market and determine the product development strategy according to consumer characteristics and behaviour.

Course Outcomes (CO):
On completion of this course, the students will be able to-
CO1: Memorize the various concepts and discuss the rationale for product and brand management.
CO2: Identify and explain factors which influence brand image.
CO3: Demonstrate how to make a product and create a brand out of it.
CO4: Interpret, relate and evaluate product and brand strategies in an array of customer contexts and competitive contexts.

Modules	Blooms level*	Number of hours
Module I: Product Strategy Development Elements of Product Strategy, Product Mix and Line decisions. Positioning Strategy, Product Strategy over Life Cycle, New Product Development Process	L1, L2	5
Module II: Introduction to Brand Management Concept of branding, the challenges faced by brand managers, the value of a brand to customers and the organization, Branding Challenges & Opportunities,	L1, L2,L3	11

Strategic Brand Management Process		
Module III: Elements to build Effective Brands Criteria to choose brand elements, Creation of brand personality, brand personality scale, brand image sources, Brand identity dimensions	L1, L2,L3	11
Module IV: Brand Re-vitalization Brand & Line Extensions, Marketing Mix for Brand Extensions, Co – Branding. Upward and Downward stretching of brands.	L1,L2,L3	4
Module V: Managing the Brand Systems The brand equity concept, Brand Equity Models – Customer Based Brand Equity, Aaker Model, Brand hierarchy Brand Awareness, Brand Loyalty, Brand Associations, Brand Recognition, Recall	L1,L2,L3,L4,L5	5

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1.Keller K.L. (2008), Strategic Brand Management: Building, Measuring, and Managing Brand

2.Equity, Prentice Hall

Reference Book/s:

1.Sengupta S. (2010), Brand Positioning, Tata McGraw-Hill

2.Kapferer J. L. (1994), Strategic Brand Management, Free Press

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	--	2	--	--	--	--	--	3	1	--	--
CO2	3	-	-	--	--	--	--	--	--	-	1	--	--
CO3	-	-	--	2	--	--	2	--	--	3	1	2	-
CO4	-	2	--	--	--	--	--	--	--	-	1	-	3

1: strongly related, 2: moderately related and 3: weakly related

EMF4208	ADVERTISING & INTEGRATED MARKETING COMMUNICATION	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course gives a better understanding of contemporary communications thinking and integrated marketing communications (IMC), as practiced by marketing managers. IMC is a methodology and a way of thinking about communication which was created to manage brands in the new brand communication landscape. IMC looks at the different ways for companies to communicate about their product, in an integrated fashion, which takes advantage of the differences between media and leverages their strengths. This course will profile a number of frameworks and theories to elaborate and evaluate communication initiatives. The main aim of this course is to familiarize the students with the role of advertising in the context of promoting products and services. This course will also provide students with a comprehensive understanding of the fundamentals needed to build an integrated marketing communications plan.

Course Objectives

The objectives of this course are to:

1. Help students understand the principles and practices of marketing communications, involving tools used by marketers to inform consumers and to provide a managerial framework for integrated marketing communications planning.
2. Understand the importance of integrating the various marketing disciplines within a marketing campaign
3. Have an understanding of the role of paid, earned and owned media channels.
4. Build an integrated marketing campaign taking into account the role of each marketing discipline.
5. Know how to evaluate the effectiveness of an integrated marketing communications campaign.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Demonstrate their understanding of how the communication component plays a vital role in the conceptualization, development and ultimate success of a marketing campaign by describing and critically evaluating previous campaigns and applying theories to concrete cases.

CO2: Gain an appreciation of how different media and platforms orient and impact the communication process.

CO3: Apply marketing communication theories and concepts to understand the business environment for a company and understand marketing communication objectives.

CO4: Identify, analyse and evaluate data, information based on evidence to develop relevant marketing communications.

Modules	Blooms level*	Number of hours
Module I: Introduction to Integrated Marketing Communication Integrated Marketing Communications (IMC): Understanding marketing, understanding marketing communication and integrated marketing communication. The Role of IMC in Marketing Process: Marketing strategy, Marketing mix strategies, integrating IMC in marketing mix.	L1, L2 ,L3	7
Module: II Integrated Marketing Program Situation Analysis Understanding Consumer Behavior: Factors influencing buyer behavior, buying decision process, Structure of the Advertising and Promotions World: Players in the Advertising world, Advertising Agency, Specialized services.	L1, L2	5
Module: III: Analyzing the communication process The Communication Process. Communication response hierarchy, consumer involvement, processing communication. Understanding relevance of Source, Message, and Channel Factors.	L1, L2	5
Module: IV: Developing the Integrated Marketing Program Establishing Objectives and Budgeting for promotional programs. Creative Strategy: Planning, Development, Implementation, Evaluation. Media Planning and Strategy. Evaluation of Broadcast and Print Media. Support Media. Direct Marketing, Internet and Interactive Media, Sales Promotion, Public Relations, Publicity and Corporate Advertising, Personal Selling.	L1, L2, L3	7
Module: V: Monitoring, Evaluation and Control Measuring the effectiveness of a promotional program: Measuring communication effectiveness, advertising testing process, post testing tools, evaluating other promotional tools	L1, L2, L3	6
Module: VI: Special issues and perspectives Social, Ethical and Legal Aspects of Advertising and Promotion: Legislation affecting advertising, self regulatory code of conduct, ethical issues in advertising. Regulation of Advertising and Promotion: Regulations governing sales promotion, packaging and labeling, direct marketing, internet marketing.	L1, L2, L3	6

***Bloom's Level:** *L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text Books

1. G E Belch and M A Belch, 2008, " Advertising and Promotion: An IMC Perspective", 6th Edition, Tata McGraw Hill, New Delhi.

2. T Duncan, 2007 “Principles of Advertising & IMC”,2nd Edition, Tata McGraw Hill, New Delhi.

Reference Books

1. Guinn O’, T. C., Allen, C. T., & Semenik, R. J. (2009). Advertising management with integrated brand promotion. New Delhi: Cengage Learning.
2. Moriarty, S., Mitchell, N., & Wells, W. (2008). Advertising principles and practice (8th ed.). New Delhi: Pearson Education.
3. Sandage, C. H., Fryburger, V., & Rotzoll, K. B. (1983). Advertising theory and practice. Homewood: Richard D Irvin.
4. K E Clow and D Baack, 2003, “Integrated Advertising, Promotion, & Marketing Communications, Pearson Education.
5. R Batra, J G Myers, and D A Aaker, “Advertising Management”, 5th Edition, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	--	--	1	1	1	1	1	--	--
CO2	1	--	--	--	--	--	1	1	1	--	1	--	--
CO3	1	--	--	--	--	--	1	1	1	--	1	--	--
CO4	1	--	--	--	--	--	1	1	1	--	1	--	

1: strongly related, 2: moderately related and 3: weakly related

HUMAN RESOURCE MANAGEMENT:

EMF4209	**CROSS CULTURAL MANAGEMENT**	**L**	**T**	**P**	**C**
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	An understanding of cross cultural functions is deemed to be there in the students.				
Co-requisites					

Catalog Description

This course examines the ways in which cultural differences impact on the process of doing business and managing internationally. A range of conceptual frameworks are developed, including mental models and schemata as the source of cultural differences and difficulties in managing intercultural interactions. Using evidence and business practice, the course explores the nature of culture and how cultural differences impact on interpersonal interactions, intergroup interactions and the management of multi-cultural workforces (including expatriates). This course analyses the practice of management and negotiation in an international cross-cultural context, and the challenges of managing international business relationships are critically analyzed.

Course Objectives

The objectives of this course are:

1. The functions, systems, policies and applications of Human Resource Management in cross cultural organizations.
2. An overview of theoretical foundations of key areas associated with HR development in the organizations,
3. Develop cross-cultural intelligence, which is an essential quality of any global leader.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Outline an integrative understanding of the ethical and social issues in cross-cultural management and negotiation.

CO2: Explain the key issues raised by international business cases in cross-cultural management.

CO3: Apply analytical and theoretical frameworks to cross-cultural management.

CO4: Interact with team members within a problem-based learning structure to effectively coordinate and communicate project and case study outcomes.

CO5: Identify, analyse, evaluate and communicate information reflective of negotiation and management formats and in cross cultural contexts.

Modules	**Blooms level***	**Number of hours**
Module I: Introduction The Concept of International Comparative Management Definition of Culture and impact of the culture on International Business	L1, L2	4

Module II: Modalities of Cross-Cultural Dimensions Kluckhohn and Strodtbeck`s Cultural Dimension Hofstede's Cultural Dimensions Trompenaars Cultural Dimensions Hall and Hall's Cultural Dimension	L1, L2	4
Module III: Styles of Management and its impact on the International Business Japanese Style of Management, German style of Management, UK style of Management French style of Management, Spanish style of Management, Style of Management of United States companies,Management Characteristics of West European Companies Styles of Management in African Countries, Style of Management of Latin American Countries, Indian style of Management	L1, L2	5
Module IV: Cross Cultural Leadership Differences in managerial behaviour Cultural influences on leaders and their behavioural patterns	L1,L2	4
Module V: **Business Ethics with focus on Corporate Governance** Business Ethics and Corporate Governance Business Ethics and Management of Change in the International Organisation Comparative Analysis of Cultural Patterns in Different Economics and the issues, which affect the good governance. **Module VI: Management of Multinational companies** Management of Multinational Companies - Problems & Prospects of MNCs in an International environment **Module VII: Communication and International Negotiation** Culture and Communication Major Obstacles to Intercultural Communication Nonverbal Communication Subtle art of negotiation Managing Negotiation with Multinational Companies **Module VIII: Managing intercultural teams/ Conflict resolution** Negotiating across cultures Thomas- Kilmann Conflict model Managing intercultural teams Cultural synergy model of conflict **Module IX: Transformation in cultures/ Work practices as a result of new ideologies** Marxist philosophy and the rise in communism Industrial revolution and its impact across the globe Globalization and increased importance of culture The advent of MNC's.	L1, L2	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Daniels, J. D. and Radebaugh, L. H.2017, International Business: Environments and Operations, 16th Edition. Prentice-Hall, Inc., New Jersey. ISBN: 0-13-121726-7. (referred to as D&R).

Reference Books:

1. Hill, C. W. (2005) 12th Edition, International Business: Competing in the Global Marketplace. Tata McGraw-Hill.
2. Griffin, R. W. and Pustay, M. W. (2014) International Business: A Managerial Perspective. FT/Prentice Hall. 8th edition.
3. Griffin, R. W. and Pustay, M. W. (2014). International Business. FT/Prentice Hall. 6th edition.
4. Hibbert, E. (2001). International Business Strategy and Operations. MacMillan Press Ltd.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	-	-	1	1	-	-	-	-	-	1	--	1
CO2	2	-	1	1	-	-	-	-	-	-	1	--	2
CO3	1	-	-	3	-	-	-	-	-	-	1	--	1
CO4	2	-	-	-	-	1	1	1	-	-	1	--	1
CO5	2	-	1	-	-	-	-	-	-	-	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

EMF4210	COMPENSATION MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Students should have some knowledge of the compensation strategies being followed in the industry				
Co-requisites	NA				

Course catalogue:
The coursed deals with the principles and the concepts of compensation management in organizations, highlighting the role of pay-for-performance link, variable compensations, bonuses and incentives and employee gain sharing.

Course Objective:
The course aims to:
1. The course deals with the principles and concepts of compensation and benefits in organizations.
2. The course highlights the importance of pay-for-performance link and how to strengthen the link.
3. The course will introduce topics like Variable Compensation, Principles of Reward Strategy, Perquisites, Bonuses & Incentives Scope and Process, Ethical Considerations, Social Security, Sharing Productivity Gains with Employees, Gain Sharing,

Course Outcomes:
On completion of the course the students will be able to:
CO1: Explain and apply the basic compensation concepts and the various compensation practices followed in organizations.
CO2: Discuss different ways to strengthen the pay-for-performance link, in context to Indian organizations and globally.
CO3: Identify issues related to employment benefits of contingent workers, perquisites, bonus and incentives, employee gain sharing and social security.
CO4: To outline the salient features of a compensation structure that will ensure that the firm is competitive and will also comply with the legal policies of the organization and the industry as a whole.

Modules	Blooms level*	Number of hours
Module I: Introduction Concept of Compensation, System of Compensating, Concept of Reward and Reward System, Economic Theory of Wages, Limitations of Economic Theories. Wage and Salary Administration at micro level, Wage concepts, Methods of Job Evaluation, Role of various parties – Employees, Employers, Unions & Government, Overview of Legislations affecting Compensation	L1, L2	7
Module II: Compensation Structure- Indian Practices	L1, L2	6

Salary Progression, Methods of Payment, Limitations of the Job Related Compensation, Competency based Compensations, Performance linked Compensations- Performance Appraisal		
Module III: Elements of Compensation Variable Compensation, Principles of Reward Strategy, Perquisites, Bonuses & Incentives Scope and Process, Ethical Considerations, Social Security, Sharing Productivity Gains with Employees, Gain Sharing, Team Based Pay, The Role of Compensation in Sales Force Success, Constructing pay structure	L1, L2	8
Module IV: Incentive Schemes / Payment by Results Types of Incentive Schemes/ Systems and Plans, Merits and Demerits of Incentives	L1,L2	4
Module V: Benefits and Services Concept of Benefit- Strategic Perspectives on Benefits, Type of Benefits, Factor Influencing Choice of Benefit Package, Administration of Benefits and Services	L1, L2	5
Module VI: Current Trends in Compensation and Reward Management Elements of Managerial Compensation- A New Approach, VRS, Pay the Person, Rewarding Excellence, Individualizing the Pay System, Executive compensation, International Compensation	L1,L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & Reference Books:

1. Singh B.D. (2007). Compensation and Reward Management, Excel Books, New Delhi.
2. Milkovich& Newman (2020), Compensation , McGraw-Hill, 13th edition.
3. Henderson Richard (2006), Compensation Management in a Knowledge - Based World, Prentice Hall India, 11th edition.
4. Armstrong Michael &Murlis Helen (2005), Reward Management A Handbook of Remuneration, Strategy and Practice, Kogan Page, 5th edition.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2									1	2		
CO2	2		2							1	2		
CO3	2			2						1	2		
CO4	2		2							1	2		

1: strongly related, 2: moderately related and 3: weakly related

EMF4211	RECRUITMENT SELECTION & RETENTION	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Students should have some prior knowledge of the recruitment and retention strategies being followed in the industry				
Co-requisites	NA				

Catalogue Description:
This course presents recruitment and selection as an essential component in recruitment planning and the course introduces students to a wide range of issues, principles, practices and trends in recruitment and selection& retention

Course Objectives:
The course aims to:
1. To understand the basic concepts of recruitment, selection & retention in organizations
2. Introduce the selection, recruitment and retention strategies theoretically and explain their applications

Course Outcomes:
On completion of the course the students will be able to:
CO1: Explain the concepts practically to put in place an effective recruitment strategy
CO2: Identify effective job descriptions and job specifications and identify specific job skills.
CO3: Discuss the selection process and identify different types of selection tests and interviews.
CO4: Understand the various tools, techniques and enterprise resources available so as to give a meaningful experience to the prospective employees.

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2									1	2	-	
CO2	2									1	2	-	
CO3	2									1	2	-	
CO4	2									1	2	-	

1: strongly related, 2: moderately related and 3: weakly related

EMF4212	Organization Structure, Design and Planning	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Student should have basic knowledge of organization structures and Human resource planning				
Co-requisites					

Catalog Description
This course introduces the macro- theories of organization. It focuses on the organization as a whole and its relationship with the environment. Special topics include organizational effectiveness, technology, structure, processes, management, power, politics, and culture. Both theoretical underpinnings and practical applications are equally emphasized in this course.

Course Objectives
1. To develop an understanding of the nature, functioning and design of organization as social collectives.
2. To develop theoretical & practical insights & problem solving capabilities for effectively managing the organizational processes.
3. To provide a comprehensive perspective on new emergent organizational forms by discussing them in the context of environment, systems & processes.

Pre-Requisites: An understanding of organization structure, Organization design and planning process is deemed to be there in the students.

Course Outcomes
On completion of this course, the students will be able to:
CO1: Define and Apply knowledge of different organizational structures
CO2: Explain the challenges of organizational design
CO3: Apply critical thinking skills to develop structural recommendations
CO4: Outline the interaction of organizational designs and competitive strategies
CO5: Illustrate how organizations both affect and are affected by their environments

Modules	Blooms level*	Number of hours
Module I: Overview of Organizations Defining Organizations, Types of Organizations, Determinants of Organization Design, Parameters of Organization Design, Definition of Organizational Structure, Complexity, Formalization and Centralization	L1, L2	7
Module II: Organization & Environment Organizational Environment, Specific and General Environment, Sources of Uncertainty in Organizational Environment, Hyper-Turbulence; Networks and Business Eco-Systems; Technological Discontinuities; Paradigm Shift	L1, L2	8
Module III: Types of Organization Organization Design, Approaches to Organizational Design, Basic	L1, L2	7

Challenges of Organizational Design, Organizational Design for Different Excellences, New Design Option		
Module IV: Organizational Effectiveness Organizational Effectiveness- Definition, Importance and Approaches to Organizational Effectiveness - The Goal Attainment Approach, The System Approach, The Strategic Approach.	L1,L2	6
Module V: **Emerging Organizational Forms** Organizations as Networks/ Clusters; Self Organizing Systems; Designing for Innovation and Change.	L1, L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1.Gareth Jones ,2012, Organizational Theory, Design, and Change, 7th Edition, Pearson Education.

Text and Reference Books:

1. Ackoff, R.L. (1999), Recreating the corporation: A Design of Organization for the 21st century, Ist edition, Oxford University Press.
2. Banner, D.K. &Gague, T.E. (1995), Designing Effective Organizations, Sage Publications.
3. Hall, R. H. (2008), Organizations: Structures, Processes and Outcomes, 10th Edition. Prentice Hall India
4. Robbins Stephens (2016), Organization Structure, Design and Applications, 16th edition, Pearson Education.
5. Richard L. Daft, (2020) **Organization Theory and Design Hardcover ,**South-Western College Publishing; 13th Revised edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	-	-	-	-	-	-	--	1	--	3
CO2	-	-	1	-	-	-	-	-	-	--	1	--	3
CO3	-	-	-	1	-	-	-	-	-	--	1	--	3
CO4	-	2	-	-	-	-	-	-	-	--	1	--	3
CO5	-	-	1	2	-	-	-	-	-	--	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

FINANCE:

EMF4213	**MANAGEMENT OF FINANCIAL INSTITUTIONS**	**L**	**T**	**P**	**C**
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In today's financial services marketplace, a financial institution exists to provide a wide variety of deposit, lending and investment products to individuals, businesses or both. While some financial institutions focus on providing services and accounts for the general public, others are more likely to serve only certain consumers with more specialized offerings.

To know which financial institution is most appropriate for serving a specific need, it is important to understand the difference between the types of institutions and the purposes they serve.

Course Objectives

1.To orient the finance students to the change in the financial industry.

2.To familiarize students with institutions of today & developing an understanding why they are the way they are, and why they are changing is the core aim of the course

Course Outcomes:

CO1: Describe the basic principles of Lending & Investments in a Commercial Bank.

CO2: Define and analyze the role of financial institutions in economic development.

Modules	**Blooms level***	**Number of hours**
Module I: Introduction Financial institutions and economic development, Types of Money, Process of Capital Formation, Technology of financial systems-Pooling, Netting, Credit substitution & Delegation.	L1,L2,	5
Module II: Financial intermediaries Understanding Financial Intermediaries- Commercial Banks, Central Bank, Cooperative Banks, Banking system in USA & India, International Banking, Retail and Wholesale Banking, Universal Banking, NBFC's	L1, L2, L3	8
Module III: Norms & Practices in the Banking Industry Principles of Lending, Study of Borrowers, Project Appraisal Criteria, Marketing of Bank Services, Prudential Norms - Narsimhan Committee Recommendations, Performance Analysis of Banks, Regulatory Institutions RBI & SEBI, Banking Innovations, Basle Committee Recommendations, Asset Liability Management in Commercial Banks.	L1, L2, L3,L4	8

Module IV: Developmental Financial Institutions Role of Developmental Banks in Industrial Financing, Resource Mobilization of Developmental Banks, Project Examination by Developmental Banks.	L1, L2, L3	7
Module V: Insurance Institutions Role of Insurance companies in Industrial Financing, Life insurance & General insurance, New developments in insurance as a sector in the Indian financial system, Bancassurance Model.	L1, L3,l4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Khan M Y, 1999, Indian Financial System, 2nd Ed., Tata McGraw Hill

Reference Books

1. Bhole L M, 2000, Financial Institutions and Markets: Structure, Growth & Innovations, 3rd Edition, Tata McGraw Hill
2. Dietrich J Kimball, 1996, Financial Services & Financial Institutions, Value Creation in theory and Practice, 10th Ed., Prentice Hall
3. Chandra, P. (1997), Financial Management: Theory & Practice, Tata McGraw Hill.
4. Gordon E. & Natarajan K. (2010) Financial Markets and Services, Himalaya Publishing House.
5. Nalini Prava Tripathy, Financial Services, PHI Learning Private Limited

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CP**	**HA**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	--	--	--	1	1	--	--
CO2	1	1	2	--	--	2	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly relate

EMF4214	INTERNATIONAL FINANCIAL MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course on International Finance for companies to look beyond domestic markets while making the financial decisions has given new dimensions to the way these decisions are taken. This has essentially led to changes in financial environment by linking domestic markets to global markets causing unprecedented increase in opportunities as well as risks. Management in such environment requires understanding of innovative conceptual and physical tools for better financial decision-making

Course Objectives

The objective of this course is to

Equipping the financial manager with concepts, tools that enable financial decisions making in a Global financial market for dealing various country currencies and help better achieve the objectives of the firm for dealing of international trade and finance.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Gain insight into developments in the world economy that have influenced the foreign exchange market.

CO2: Identify the concept of foreign investments and their role in the economic development of a country.

CO3: Evaluate the dynamics of foreign exchange rates and implication of cross rates.

CO4: Evaluate the relationship between forward rates and future spot rates.

CO5: Examine the foreign exchange rate exposure and risk management.

Modules	Blooms level*	Number of hours
Module I: International Financial Environment Finance function in global business scenario, International Monetary System, International Financial Markets and Instruments, Balance of Payments, Recent Developments	L1,L2	6
Module II: Foreign Exchange Markets Spot and Forward Foreign Exchange Markets, Speculation and Arbitrage in Foreign Exchange Markets and Implications of Market Efficiency, Currency Swaps, Currency Futures and Options.	L1, L4, L6	6
Module III: Foreign Exchange Rate Determination Theories of Exchange Rate Determination, Fundamental International Parity Conditions – Purchasing Power and	L1, L2,L3,L4,L6	6

Interest Rate Parity, Forecasting Exchange Rates - Technical Forecasting, Time Series Modelling, Fundamental Forecasting.		
Module IV: Foreign Exchange Rate Exposure and Risk Management Transaction, Translation and Operating Exposure, Exposure from Equity and Borrowing in International Financial Markets, Hedging tools for Management of Transaction Exposure and Interest Rate Exposure, Degree of Hedge.	L1, L2,L3,L4,L6	6
Module V: Issues in Foreign Investments Analysis Examination of International Investment Proposals, Discounted Cash Flow Analysis, Tax Adjusted Present Value Approach, Political Risk Analysis, External Investment Decision – Measuring Total Returns on Foreign Investments, Optimal International Asset Allocation.	L1, L2,L3,L4,L6	6
Module VI: Finance of Foreign Trade Income terms, foreign letters of credit, export & import finance, rules governing letters of credit, export import policy (Case Studies)	L1, L2,L3,L4,L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & Reference Books:

1. Levi, M. D. (1996), International Finance, McGraw Hill International.
2. Apte, P. G. (1995), International Financial Management, Tata McGraw Hill
3. Errunza, V.R., Singh, D. and Srinivasan, T.S. (1994), International Business Finance,Global Business Press.
4. Seth, A.K.(2000), International Financial Management, Galgotia Publishing Company.
5. Hull, J. C. (1999), Introduction to Futures and Options Markets, Prentice Hall of India.
6. Edwards, F. R. and Ma, C. W. (1992), Futures and Options, McGraw-Hill International.
7. Kolb, R. W. (1997), Understanding Futures Markets, Prentice Hall of India.
8. Rebonato, R. (1996), Interest Rate Option Models: Understanding, Analysing and Using Models forExotic
9. Interest Rate Options, John Wiley and Sons.
10. Kohn, M.(1998), Financial Institutions and Markets, Tata McGraw Hill Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	1	2	1	--	--

CO2	1	1	--	--	--	--	--	--	1	2	1	--	--
CO3	1	1	--	--	--	--	--	--	2	2	1	--	--
CO4	1	1	--	--	--	--	--	--	2	2	1	--	--
CO5	1	1	-	-	-	-	-	-	2	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

EMF 4215	Security Analysis & Portfolio Management	L	T	P	C
Version 1.1	Latest approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course is providing the knowledge about the Investment, Indian Capital market, financial products selection, stock exchange operations, regulating bodies role in the stock market, construction of portfolio management with the support of various theories and techniques.

Course Objectives

The objective of this course is to

1. To provide a clear understanding of the changing domestic and global investment scenario in general and Indian capital market.
2. To know the availability of various financial products and operations of stock exchanges.
3. To understand Important theories, techniques, regulations and certain advancements in theory of investment
4. To gain and evaluate sound investment decisions both in the context of individual security and portfolio investment.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Analyze the risk –return relationship involved in the security investment.

CO2: Recognize the impact of economy, industry and company on security performance and apply investment theories

CO3: Examine the various investment avenues performances based on various theories

CO4: Constructing the best portfolio selection, evaluation and modifications.

Modules	Blooms level*	Number of hours
Module I: Introduction to Investments Investments: Introduction, Avenues for Investment, Investments and speculation, Features of a Good Investment Programme, Process of Investment Decision making, Risk Involved in Investments, Systematic and Unsystematic Risk.	L1,l2	8
Module II: The Stock Markets in India Nature and Functions of the stock Market, OTCEI, BSE & NSE & Role of Depositories, Valuation of Securities.	L1, L2, L4	7
Module III : Security Analysis Fundamental Security Analysis: Economic analysis; Industry Analysis and Company Analysis, Technical Security Analysis.	L1, L2,L3,L4	7

Module VI : Portfolio analysis and Management Portfolio – Meaning, advantages, selection problems: Markowitz portfolio theory; expected return and risk for portfolios; the efficient frontier; the efficient frontier and investor utility; the selection of optimal portfolio, Sharpe's Single Index Model, Capital Asset Picing Model. .	L4,L5,L6	7
Module V : Portfolio Evaluation and Rivison Portfolio performance evaluation, Sharpe ratio, Treynor Ratio and Jensen's Ratio	L4,L5,L6	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1.Chandra, P.(2002), Investment Analysis, Tata McGraw Hill

Reference Books:

1. Fischer, D.E. and Jordan, R.J. (1995), Security Analysis & Portfolio Management, Prentice Hall of India
2. Bhat, Sudhindra;(2009); Security Analysis & Portfolio Management; Excel Books
3. Dash, A.P.;(2009); Security Analysis & Portfolio Management; I.K. International
4. Bhatt, S.N.;(2011); Security Analysis & Portfolio Management; Biztantra
5. Rangnatham M., Madhumalathi, R.,(2006); Security Analysis & Portfolio Management; Pearson Education
6. Khatri, Dhanesh;(2010); Security Analysis & Portfolio Management; MacMillan India Ltd.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**C**	**S**	**A**	**EE**
Weightage (%)	50	5	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	1	2	1	--	--
CO2	1	1	--	--	--	--	--	--	--	2	1	--	--
CO3	1	1	--	--	--	--	--	--	--	2	1	--	--
CO4	1	1	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MASTER OF BUSINESS ADMINISTRATION
(EXECUTIVE FULL TIME)

THIRD SEMESTER

EMF4301	Consumer Behavior	L	T	P	C
Course Version	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic Marketing concepts				
Co-requisites	NA				

Catalogue Description:
The increasing trend of customer centric organizations makes it imperative to understand the psyche of consumer to the fullest. Virtually all companies are striving to gain maximum knowledge about the way consumer thinks and behave so that proper direction can be given to the marketing strategy. This paper on consumer behaviour aims to familiarize students about the importance of understanding consumers for the success of an organization. It makes a connection between customer behaviour principles and the elements of marketing strategy.

Course Objectives:
The objectives of this course are to-
1: Make the student understand the concepts/theories pertaining to consumer behaviour and reveal its importance in the context of marketing.
2: Make the student well versed with the various factors that influence consumer behaviour.
3: Enable the student to examine the consumer decision-making process.
4: Provide with knowledge to the student so that he may describe the target market and determine the positioning strategy according to consumer characteristics and behaviour.

Course Outcomes (CO):
On completion of this course, the students will be able to-
CO1: Memorize the various concepts and discuss the rationale for studying consumer behaviour.
CO2: Identify and explain factors which influence consumer behaviour inclusive of society and culture.
CO3: Demonstrate and evaluate how knowledge of consumer behaviour can be applied to marketing.
CO4: Use communication skills both orally and in writing within marketing contexts.

Modules	Blooms level*	Number of hours
Module I Consumer Behavior: Understandings and Applications, Consumer Research	L1, L2	5
Module II Consumer as an Individual: Consumer Motivation, Consumer Personality, Consumer Perception, Consumer Learning, Consumer Attitude formation and change.	L1, L2,L3,L4	13
Module III	L1, L2,L3,L4	13

Consumers in their Social Setting: Reference Groups and Family Influences, Social Class and Consumer Behavior, Influence of Culture and Sub Cultures on Consumer Behavior.		
Module IV Consumer Decision Making Process	L1,L2,L3,L4,L5	3
Module V Opinion Leadership, Diffusions of Innovations and Adoption	L1,L2	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Schiffman, L.G., Wisenblit,J, J.& Kumar, S.R.(2016). Consumer Behavior (11th ed.). Noida, India: Pearson
2. Loudon, D. L. & Bitta, A. J.(2002). Consumer Behavior. N. Delhi, India: Tata-McGraw-Hill
3. Gupta, S.L. & Pal, S (2006).Consumer Behavior. N. Delhi, India: Sultan Chand &Sons.

Reference Book/s:

1.Blackwell, R.D., Miniard, P.W. &.Engel, J.F.(2007). Consumer Behavior. Kundli, India: Thomsons South-Western.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	--	2	--	--	--	--	--	2	1	--	--
CO2	1	-	-	--	--	2	--	--	--	2	1	--	--
CO3	1	-	--	2	--	--	--	--	--	-	1	3	-
CO4	1	-	--	--	--	--	2	--	--	-	1	3	1

1: strongly related, 2: moderately related and 3: weakly related

EMF4302	GLOBAL BUSINESS ENVIRONMENT	L	T	P	C
Version 1.1	Latest Version	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of business practices preferred but not compulsory				
Co-requisites					

Catalog Description

In this course the students are introduced with various rapidly changing developments and momentum of domestic and global business. The students are familiarized with aspects related to international and external business environment. Thereafter, changing developments in Indian economic reforms, industrial and financial environment in the country are discussed in detail. This is followed by discussion about labor environment in business. Fourth, there is a detailed analysis regarding planning and economic development in India. Finally, details of international regime, institutions, and trade blocs are discussed. The overall aim of this course is to make the students aware of various changes taking place in the business paradigm.

Course Objectives:

The objective of this course is to:

1. Make students acquainted with meaningful knowledge about the various dimensions of domestic and international business environment and also international trade regime.
2. Enable students to apply the theoretical concepts in work place related to financial and economic policies influencing business environment.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Explain the various changes taking place in international business environment along with fundamental knowledge on domestic business.

CO2: Analyze the sequence of developments in Indian economic reforms, industrial and financial environment.

CO3: Describe the changing paradigms in labour environment and Indian economic planning and development.

CO4: Discuss holistically the growth, development and significance of international trade regime, financial institutions, trade blocs and trade dispute settlements.

Modules	Blooms level*	Number of hours
Module I: Global Business and Its Environment Significance, nature and scope of international business; An Overview of Business Environment – Economic Environment, Political Environment, Legal Environment and Cultural Environment	L1, L2, L4	7

Module II: Globalization and Theories of International Trade Globalization of World Economy; Globalization of Business; Feature of Current Globalization; Stages of Globalization, Essential Conditions for Globalization and Globalization of Indian Business; Theories- Theory of Mercantilism, Absolute advantage, Comparative advantage, Hecksher-Ohlin theory, The new product life cycle theory.	L1, L2, L4	7
Module III: International Economic Institutions and Trade Blocks International Monetary Fund (IMF) – Primary functions, organisation and management, resources, IMF and international liquidity; World Bank; Asian Development Bank; GATT- the Uruguay Round, World Trade Organization (WTO), GATS, TRIPs, Trading Blocks - European Union, ASEAN, APEC, NAFTA and SAARC.	L1, L2, L4	7
Module IV: International Trade and Payments Government Influence on Trade; Foreign Trade Policy; Balance of Payment (BoP) - meaning, balance of trade and balance of payment, nature of balance of payment accounting, components of balance of payments disequilibrium, correction of balance of payment disequilibrium; Balance of Payment of India	L1, L2, L4	8
Module V: International Investment Types of Foreign Investment; Significance of Foreign Investment – Foreign Direct Investment (FDI); Factors affecting International Investment, Foreign Investment in India – The new policy, FII investments, mergers and acquisitions.	L1, L2, L4, L6	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Francis Cherulinam, (2008), International Business, Himalaya Publishing House
2. Daniels, J.D.,Radebaugh L.H.,Sullivan D.P. & Prashant Salwan (2011), International Business: Environments and Operations, Pearson Hall, Delhi
3. Sundaram and Black, (2009), International Business Environment, Prentice-Hall of India Pvt. Ltd.
4. Bhalla and Raju, (2010), International Business Environment, Sage Publication
5. Apte, P. G. (1998), International Financial Management, Tata McGraw Hill
6. Charles Hill,(2007), International Business, McGraw Hill

Reference Books

1.John D. Daniels Lee H Radebaugh, (2007), International Business: Environments and Operations. Addison Wesley.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	2	--	--	1	--
CO2	1	1	2	--	--	--	--	2	--	--	--	1	--
CO3	1	1	2	--	--	--	--	2	--	1	1	1	--
CO4	1	1	1	--	--	--	2	2	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4303	CORPORATE GOVERNANCE AND LEGAL ASPECTS OF BUSINESS	L	T	P	C
Version 1.1	Latest Version	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course give an overview of various Codes, Systems, Standards and Practices for Corporate Governance. It discuss various Legal Aspects of Business so that the students are able to interpret the provisions of the important laws and apply the same in commercial and industrial enterprises.

Course Objectives

The objective of this course is:

1. To give an understanding of Codes, Systems, Standards and Practices for Corporate Governance.
2. To give an insight to the various Legal Aspects of Business so that the students can interpret the provisions of some of the important laws and apply the same in commercial and industrial enterprises.

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss the Overview of Corporate Governance, Business Ethics and Corporate Social Responsibility.

CO2: Explain Indian Contract Act, 1872 and its provisions**.**

CO3: Explain Sale of Goods Act, 1930 and its provisions.

CO4: Explain Negotiable Instruments Act, 1881 and its provisions.

CO5: Explain Company Law and its provisions.

Modules	Blooms level*	Number of hours
Module I: Corporate Governance An Overview, Agents & Institutions in Corporate Governance, Role of Board of Directors and Auditors, Code of Corporate Governance, Business Ethics and Corporate Social Responsibility.	L1, L2	7
Module II: Indian Contract Act, 1872 Nature and kinds of Contracts, Offer, Acceptance and Consideration, Principles Governing Capacity of Parties and Free Consent, Performance and Discharge of Contract, Breach of Contract and its Remedies.	L1, L2	8
Module III: Sale of Goods Act, 1930 Sale and Agreement to Sell, Goods – Different types of Goods, Passing of Property in Goods, Conditions and Warranties, Doctrine of Caveat emptor, Rights of an unpaid Seller.	L1, L2	7

Module IV: Negotiable Instruments Act, 1881 Meaning of Negotiability and Negotiable Instruments – Bill of Exchange and Promissory Note, Cheque – Endorsement – Dishonour of Cheques	L1,L2	6
Module V: Company Law Companies Act, 1956-Meaning and types of companies, Formation of a company, Memorandum and Articles of Association, Share Capital and Shareholders, Prospectus, Company Meetings and Proceedings, Powers, Duties, Liabilities of Directors and Winding up of Company	L1, L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & Reference Books:

1. Das SC (2009), Corporate Governance- Codes, Systems, Standards and Practices, PHI Learning Pvt Ltd., New Delhi
2. Fernando AC (2009), Corporate Governance- Principles, Policies and Practices, Pearson Education
3. Gulshan SS (2003), Elements of Mercantile Law, Excel Books, N. Delhi
4. Kuchhal MS (2010), Business Law, Vikas Publication
5. Tulsian PC, (2002), Relevance of Business Law, Tata McGraw Hills.
6. Singh Avtar, (2006), Elements of Mercantile Law, S.Chand & Sons.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	1	-	-	-	-	1	1	--	--	--
CO2	1	1	-	1	-	-	-	-	1	1	--	--	--
CO3	1	1	-	1	-	-	-	-	1	1	--	--	--
CO4	1	1	-	1	-	-	-	-	1	1	--	--	--
CO5	1	1	-	1	-	-	-	-	1	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4304	MANAGEMENT CONTROL SYSTEM	L	T	P	C
Version 1.1	Latest Version	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course covers the topic of management control systems (MCS) and provides an overview of different systems managers have at their disposal in running different types of businesses, in different situations, different industries, e.g. manufacturing, public sector, NGOs, and when businesses are facing different challenges. Research on how individuals and organisations respond to the introduction of control systems or to changes to existing systems is discussed. In addition, the course highlights unintended consequences and complexities of control outlining manager` coping strategies. Likewise, the role of controllers in organisations as well as the impact of digitalization on control is discussed.

Course Objectives:
The objective of this course is to:
1. To familiarize students on the following:
2. Developing a conceptual understanding of planning and control systems in functional areas of management. Operations
3. Planning and Control systems, Finance Planning and Control, Resources Planning and control. Strategic planning in a dynamic business environment

Course Outcomes: On completion of this course, the students will be able to:
CO 1: Demonstrate a profound knowledge of MCS that managers` are using to run businesses and direct behaviour of individuals.
CO 2: Discuss variations in using MCS across different industries.
CO 3: Discuss unintended consequences and complexities coming along with the use of MCS.
CO 4: Critically evaluate the costs of control.

Modules	Blooms level*	Number of hours
Module I: The Management Control Environment The Nature of Management Control Systems – Basic Concepts – Boundaries of Management Control – Road Map for the Reader - Understanding Strategies – Goals – The Concept of Strategy – Corporate-Level Strategy – Business Unit Strategies– Behaviour in Organisations – Goal Congruence – Internal Factors That Influence Goal Congruence – The Formal Control System – Types of Organisations – Functions of the Controller – Behavioral Aspect of Management Control Responsibility Centres: Revenue and Expense Centres – Responsibility Centres – Revenue Centres – Expense Centres – Administrative and Support Centres – Research and	L1, L2	12

Development Centres – Marketing Centres –Profit Centres – General Considerations – Business Units as Profit Centres – Other Profit Centres – Measuring Profitability – Transfer Pricing – Objectives of Transfer Prices – Transfer Price Methods – Pricing Corporate Methods – Pricing Corporate Services – Administration of Transfer Prices, Measuring and Controlling Assets Employed – Structure of the Analysis – Measuring Assets Employed – EVA versus ROI – Evaluating Managers – Evaluating the Economic Performance of the Entity –		
Module II: The Management Control Process Strategic Planning – Nature of Strategic Planning – Analysing Proposed New Programmes – Analysing Ongoing Programmes – Strategic Planning Process. Budget Preparation – Nature of a Budget – Other Budgets – Budget Preparation Process – Behavioural Aspects - Quantitative Techniques . Analyzing Financial Performance Reports – Calculating Variances – Variations in Practice – Limitations in Variance Analysis – Cost Variance - Cost Control – Aspects in Cost Control. Performance Measurement – Performance Measurement Systems - Interactive Control Management Compensation – Research Findings on Organisational Incentives – Characteristics of Incentive – Compensation Plans – Incentives for Corporate Officers – Incentives for Business Unit Managers – Agency Theory.	L1, L2, L4	12
Module III: Variations In Management Control Controls for Differentiated Strategies – Corporate Strategy - Business Unit Strategy – Top Management Style . Service Organisations – Service Organisations in General – Professional Service Organisations – Financial Service Organisations – Health Care Organisations – Non-profit Organisations. Multinational Organisations – Cultural Differences – Transfer Pricing – Exchange Rates. Management Control of Projects – Nature of project – The Control Environment – Project Planning – Project Execution – Project Evaluation.	L1, L2, L4	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Management Control Systems by Robert N Anthony and Vijay Govindarajan –Tata McGraw Hill – 12th Edition

References:

1. Harvard Business Review
2. http://www.tuck.dartmouth.edu/people/vg/
3. http://www.tuck.dartmouth.edu/people/vg/blog/
4. http://blogs.hbr.org/govindarajan/
5. http://www.thinkers50.com/biographies/68

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	2	--	--	1	--
CO2	1	1	2	--	--	--	--	2	--	--	--	1	--
CO3	1	1	2	--	--	--	--	2	--	1	1	1	--
CO4	1	1	1	--	--	--	2	2	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

MARKETING:

EMF4305	**CUSTOMER RELATIONSHIP MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
In this course the concept of relationship management, different forms, CRM process & practices are discussed. It also deals in detail the technological tools & techniques to build customer relationship. Issues and challenges pertaining to CRM are discussed to comprehend the latest trends to deal with customers. The aim of this course is to make the students familiar with the basics of customer relationship management.

Course Objective
The objective of this course is to:
1. Equip the students with elementary knowledge about customer relationship management and its applicability in different sectors of business as well as consumer market.
2. To provide knowledge about identification, acquisition, retention of customers to maximize profit.
3. To enhance student's knowledge about CRM process, practices in business economy and update with technological tools & techniques.
4. To provide in-depth understanding of CRM implementation in various sectors such as, banking, retail, insurance, airlines etc.

Course Outcomes
After completing this course students will be able to:

CO1: State the concepts and benefits of CRM and the competitive advantages it provide to organizations.
CO2: Interpret how technology can be leveraged to enhance CRM initiatives and can have exposure to best CRM practices in different sectors.
CO3: Describe the utilization of technology in managing customer relationships.
CO4: Design a roadmap to develop CRM to and understand the role of CRM process in diverse organizations.
CO5: Explain customer profiling and its market implications and would learn the need of data mining & its business value.

Modules	Blooms * Level	Number of hours
Module-I: Introduction and Significance of Customer Relationship Management Understanding principles of Customer Relationship; Relationship Building Strategies; Building Customer Relationship Management by Customer Retention marketing	L1, L2	9

automation; call center and customer care; automating the contact center; customer service for success. Cost of acquiring customers; turning customer acquisition into customer loyalty; internet and its effect on CRM; CRM Model.		
Module-II: Terms of CRM Salesforce automation; key areas of salesforce automation; salesforce automation and mobile CRM; field force automation; evolution of eCRM; multichannel CRM; CRM in business to business marketing; enterprise resource planning; supply chain management; supplier relationship management; partner relationship management.	L1, L2, L5	9
Module-III: CRM Architecture & Process Introduction to CRM Process, IT Tools in CRM; Data Warehousing Integrating Data ; Data Mining; Learning from Information Using Date Mining Technology like OLAP etc major types of data analysis; click stream analysis; personalization and collaborative filtering; defining CRM readiness; defining CRM functionality; defining technical requirements; development approaches towards purchasing CRM software.	L1, L2	9
Module-IV: CRM Implementation CRM Implementation Road Map, Pre-implementation checklist; CRM development team; CRM implementation; avoiding failures in implementing CRM; selling CRM idea inside the organization; CRM roadblocks-process, perception, privacy and politics; future of CRM.	L1, L2	9

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation*

Text Books

1. G Shainesh & Jagdish N Sheth, (2006) Customer Relationship Management-A Strategic Approach, Macmillan India, New Delhi.
2. Alok Kumar, Chhabi Sinha, Rakesh Sharma (2009) Customer Relationship Management – Concepts and Application, Biztantra.

References Books

1. Jill Dyche (2006) The CRM Hand book (2006) Pearson Education.
2. Judith W.Kincaid (2007) Customer Relationship Management- Getting it Right, Pearson Education.
3. Ronald S (2001), Accelerating Customer Relationships, Swift, PHI.
4. S.Shajahan (2009) Relationship Marketing, Tata McGraw Hill.
5. Alok Kumar Rai (2009) Customer relationship Management Concepts and Cases, PHI.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	1	--	--	--	1	1	1	1	--	2
CO2	1	2	--	1	--	--	--	1	1	1	1	--	2
CO3	1	--	--	2	--	--	--	2	1	1	1	--	2
CO4	1	2	--	2	--	--	--	1	1	1	1	--	2
C05	1	--	--	2	--	--	--	1	1	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

EMF4306	**Marketing of Services**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course aims at enabling executive students to apply services marketing concepts and principles to the unique challenges and opportunities of emergent services market to create customer value. Sessions include interactive lectures, discussions, business/simulation games, business case analyses, problem analyses, student presentations and talks by visiting speakers from industry.

Course Objectives

The objective of this course is to

1. Provide insights about the foundations of services marketing, customer expectations of services and gap existing in the service delivery processes and service Quality.
2. Develop blueprint for the services sector and develop a better appreciation of the necessary strategies to create a service excellence.
3. To provide an in-depth appreciation and understanding of the unique challenges inherent in managing and delivering quality services and the successful implementation of a customer focus in service-based businesses.

Course Outcomes

On completion of this course, the students will be able to

CO1: Recognize the challenges faced in services delivery as outlined in the services gap.

CO2: Critically analyze the perceive service shortcomings with reference to ingredients to create service excellence.

CO3: Discuss key linkages between marketing and other business functions in the context of designing and operating an effective service system.

CO4: Provide a theoretical and practical basis for assessing service performance of various growing Service Sectors and report on this in a professional, logical and coherent way.

CO5: Identify and discuss characteristics and challenges of managing service firms in the modern world.

Modules	Blooms level*	Number of hours
Module I-Understanding Services and Consumer Behavior Service Sector and its structure. Drivers of service sector growth. Nature of services: Tangibility Spectrum; Defining the service offering; Flower of Service. Goods vs. Services; the service marketing challenges and implications for marketers for each service characteristic.Categorizing Service Processes,Consumer	L1, L2, L4	7

behavior in services; Search, Experience and Credence attributes. Service Encounters and the types ,The expanded Services Mix.		
Module II-Focus on Customers Customers' expectations of service. Desired and Adequate service, Zone of Tolerance. Managing customer expectations and perceptions in services. Service Quality Dimensions. Customer Satisfaction vs. Service Quality. The impact of service failure and recovery. Types of Customer Complaint Actions and Complainers. Service Guarantees. Service Recovery Strategies.	L2, L4, L6	8
Module –III-Strategy Design and Delivery Service Blueprinting. Operational service product designing and adding value. Evidence of service and Servicescape. The Service Triangle. Boundary–Spanning Roles. Strategies for closing the delivery gap.	L2, L4	7
Module IV-Managing Services through intermediaries, Pricing Stratrgies Role of Distribution in Services. Channel Conflicts and other key problems. Key Intermediaries for Service Delivery. Understanding Demand and Capacity constraints. Strategies for matching Capacity and Demand. Approaches to Pricing Services	L2, L4, L6	6
Module V Exposure to various growing Service Sectors, viz.: Banking, Insurance, Hospitality, Education, Telecom, and Health Care etc.	L2, L6	8

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Lovelock C. H. & Wirtz, J. (5th ed., 2004). Service Marketing: People, Technology, Strategy. Pearson Education.
2. Zeithaml V. A. and Bitner M. J. (2003), Services Marketing, 3rd Edition, Tata McGraw Hill, Delhi.

Reference Books:

1. Hoffman, K. D. J. & Bateson, E.G. (2003), Essential of Service Marketing: Concepts Strategies and Cases, Thomson South Western.
2. Kurtz D. L. and Clow K. E. (2003). Services Marketing. Biztantra.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Class participation / Case Study**	**Attendance**	**Class Test / Mid Semester Assessment**	**End of term Examination**
Distribution (%)	**10**	**5**	**15**	**70**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**

CO1	1	3	3	-	-	-	-	-	-	1	1	--	--
CO2	1	3	2	-	-	-	-	3	-	1	1	--	--
CO3	1	2	-	2	--	-	-	-	3	1	1	--	--
CO4	1	2	-	-	-	-	3	-	3	1	1	--	--
CO5	1	2	-	-	--	-	-	-	-	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4307	RETAIL MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description:
The course will primarily concentrate on retail stores along with web and catalog based businesses. The course is designed to prepare students for positions in the FMCG/Pharmaceutical/Electronics/Consumer Durable/Fashion/Apparel retail businesses or positions in the real estate companies with additional interest in mall management. The course also benefit students interested in starting their own entrepreneurial retail operation. Additionally this course aims at familiarizing students with emergence of malls as a new format of market with emphasis on mall management principles and practices.

Course Objectives
The objectives of this course are to:
1. Develop fundamental competencies in retail management.
2. Provide the students exposure to understanding of retail strategy, retail operations management, innovation in retail, and the key issues impacting growth in retail firms.
3. Exploring careers in a retailing firm.
4. Help students in selling products or services to retailers, private equity investment in retailers, retail consulting or analysis.
5. Understand key issues retail supply chain management, store operations, merchandising and procurement management, customer segmentation/management and Mall management

Course Outcome
On completion of this course, the students will be able to:
CO1: Identify the concept of organized and unorganized retail, retail formats, store layout, category management.
CO2: Explain application of different retail strategies in retail firms.
CO3: Identify and analyze retail operations, merchandise planning, and trade area analysis.
CO4: State and prepare theories of retail development and business models in retail.
CO5: Design strategies related to innovative retail startups; build the retail value chain and evaluating merchandise performance.

Modules	Blooms Level*	Number of hours
Module I-Introduction to Retailing Introduction, Meaning of Retailing, Economic Significance of Retailing, Retailing Management Decision Process, Product Retailing vs. Service Retailing, Types of Retailers, Indian vs. Global Scenario, Difference between organized and	L1, L2	7

unorganized retailing, Issues and challenges of retailing in India.		
Module II: Store Planning, Design and Layout **Store Planning-** Introduction, Types of Retail Stores Location, Factors Affecting Retail Location Decisions, Country/Region Analysis, Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies **Store Design-** Atmospherics, Retailing Image Mix, Space mix **Store Layout**- Effective retail space management based on Store Layout	L1, L2	7
Module III- Retail Merchandise Management **Retail Merchandising**: Introduction, Understanding Merchandising Management, Activities of a Merchandiser, Retail Merchandising Management Process **Private Branding in Retail-**Introduction, Difference between a Store/Private Brand and a National Brand, Growth Drivers of Private Label, Advantages of Private Label, Disadvantages of Private Label	L1, L2, L5	7
Module IV: Store Operations POS (Point of Sale) / Cash process, Customer service and accommodation, Retail selling process, Retail floor and shelf management, Retail accounting and cash management, Merchandise and category management. Visual merchandising and displays, Retail technology and retail automation, POS and Back-end Technologies.	L1, L2	7
Module V: Mall Management **Introduction** – Defining the shopping mall, Difference between Shopping Mall and other retail formats, **Shopping Centre / Mall Location:** Existing mall traffic, Clean environment, Designated parking area, Medium to high rental cost, Strengths and Weaknesses of the Mall format; Licenses and Permits for mall operations, **Positioning & Zoning of mall** – formulating the right tenant mix and its placement in a mall**, Facility management** – Infrastructure, Traffic and ambience management, Finance management, Lifestyle centers and their management, Indian scenario of mall management practices.	L1, L2	8

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation*

Text Book

1.Michael Levy, Barton A Weitz and Ajay Pandit, (2008), Retailing Management, Tata McGraw Hill

Reference Book

1. Swapna Pradhan, (2015), Retailing Management: Text and Cases, McGraw Hill Education.
2. R Vedamani&Gibbson, (2008), Retail Management: Functional Principals and Practices, Jaico publications.
3. Patrick M. Dunne & Robert F Lusch, (2002), Retail Management, Cengage Learning.

4. Berry Berman & Joel R. Evans, (2009), Retail Management – A Strategic Approach, Pearson Education.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	1	1	1	--	1	1	1	--	--
CO2	1	1	--	1	1	1	1	--	1	1	1	--	--
CO3	1	1	--	1	1	1	1	2	1	1	1	--	--
CO4	1	1	--	1	1	1	1	2	1	1	1	--	--
CO5	1	1	--	1	1	1	1	2	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4308	E-COMMERCE	L	T	P	C
Version: Latest Approved	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
In this course the students will learn the basic and advanced concepts of e-commerce and m-commerce. In basic concepts, the students will learn about the basic terms of e-commerce, business models, EDI, e-marketing concepts and in advanced concepts, the students will learn about various payment systems and security techniques in e-commerce.

Course Objectives
The course enables students to:
1. Understand, appreciate and learn to create their presence in cyber space.
2. Grasp e-commerce concepts, the opportunities, and the threats and teaches them the strategies of making businesses viable and successful.

Course Outcomes
On completion of this course, the students will be able to
CO1: Define the concept of e-commerce and its various business models.
CO2: Explain the working of Electronic Data Interchange in e-commerce
CO3: Compare the various e-marketing techniques that may be used for e-business promotion. CO4: Design the e-commerce website architecture for an e-business organization.
CO4: Outline the security architecture and propose viable solution for managing the e-commerce website.

Modules	Blooms level*	Number of hours
Module I: E-Commerce Concept Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services. Concept of EDI, Difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI, Software Concept of Electronic Signature, Access Control.	L1, L2	7
Module II: Types of E-Commerce Meaning of B2C, B2B, C2C, P2P, Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts, Application of B2B- E-distributor, B2B service provider,	L2, L3	8

benefits of B2B on Procurement, Just in time delivery, Consumer to consumer and peer to peer business model introduction and basic concepts.		
Module III: E-Marketing Traditional Marketing V/S E-Marketing, Impact of Ecommerce on markets, Marketing issue in E-Marketing, Promoting your E-Business, Direct marketing, one to one marketing.	L1, L2, L4	5
Module IV: E-Finance Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking, E-Trading- Stock marketing, Trading v/s E-Trading, Importance of E-Trading, Advantages of E-trading, operational aspects of E-Trading.	L1, L2	5
Module V: E-Payment Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards.	L1, L2, L3	6
Module VI: Key System Applications for the Digital Age Enterprise Systems – Supply Chain Management & Customer Relationship Management Systems, Using Enterprise Applications and Achieving Operational Excellence & Customer Intimacy, E-Commerce: Digital Market & Digital Goods, M-Commerce: Services & Applications, Enterprise Applications: New Opportunities and Challenges.	L1, L2, L3	5

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text:

1.Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education

References:

1. Ravi Kalakota & Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.
2. Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
3. J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	**10**	**5**	**5**	**5**	**5**	**70**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1										1		
CO2	1	2									1		

CO3	2	1	1								1		
CO4									2		1		

1: strongly related, 2: moderately related and 3: weakly related

HUMAN RESOURCE MANAGEMENT:

EMF4309	**PERFORMANCE MANAGEMENT**	L	T	P	C
Version 1.1	LATEST VERSION	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course will help students to understand the concept of performance management and its various methods used in the organization . It would also provide an insight into the fundamentals of competency management and models used to develop competency in the organization .

Course Objectives
The main objectives of this course are to:
1. To understand the conceptual approach to performance management and its process.
2. To understand competency mapping as a performance management tool

Course Outcomes
On completion of this course, the students will be able to
CO1: To understand performance management and its process.
CO2: Understand and describe the concept of competency mapping and competency management framework.
CO3.Explain Competency mapping as a performance management tool.
CO4: Evaluate the concept of performance management and competency mapping in real business situation.

Modules	Blooms level*	Number of hours
Module I: Introduction to Performance Management Conceptual Approach to Performance Management, Determinants of Job Performance: Person and System Factor, Components of Effective Performance Management, Performance Management Cycle	L1, L2	8
Module II: Process of Performance Appraisal Need And Methods for Performance Appraisal, RSDQ Model, Performance Review - Reengineering Performance Appraisal System, Performance Analysis, Performance Review Discussion, Performance Monitoring and Feedback	L1, L2	8
Module III: Competency Mapping Concept and Definition of Role and Competency, Characteristics of Competency, Competency Versus Competence, Performance Versus Competency, Types of Competencies, Context and Relevance of Competencies in Modern Organizations.	L1, L2	6
Module IV: Competency Management Framework Macro View of Competency Management Framework, Strategic	L1,L2	6

Framework, Lancaster Model of Managerial Competence, Competency Modeling Framework		
Module V: Competency mapping as a performance management tool Building Competency Models, The McBer Generic Managerial Competency Model, Competency Causal Flow Model, Ftors Affecting The Human Performance System, Profiling Competency Framework for a Particular Role, Competency Gap	L1, L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text and reference Books:

1. Armstrong, Michael and Berron, Angela (2008), Performance Management and Development, Jaico Publications
2. Cardy Robert L. (2008), Performance Management Concepts, Skills and Exercises, Prentice Hall India
3. Rao T V (2008), Performance Management and Appraisal Systems-HR Tools for Global Competitiveness, Response Books
4. Sahu R K (2007) Performance Management System, Excel Books

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	-	-	-	2	1	2	-	1	--	-
CO2	1	1	-	-	-	-	2-	1	2	-	1	--	-
CO3	1	1	-	-	-	-	2	1	2	-	1	--	-
CO4	1	1	-	-	-	-	2	1	2	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

EMF4310	INDUSTRIAL RELATIONS and LABOR LAWS	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course describes about origin and importance of Labour laws governing general functioning of employees in an organization and the provisions under these laws.

Course Objectives
The objective of the course is to
1. Acquaint students with the origin and importance of Labour laws governing general functioning of employees in an organization.
2. Educate student with the important provisions under these laws.
3. Develop the right perspective of this delicate responsibility to deal with union constructively and to maintain industrial democracy.

Course Outcomes
On completion of this course, the students will be able to
CO1:Be aware of the present state of Industrial relations in India.
CO2: Be acquainted with the concepts, principles and issues connected with trade unions,
CO3: Learn collective bargaining, workers participation, grievance redressal, and employee discipline and dispute resolution
CO4: Understand the various processes and procedures of handling Employee Relations.

Modules	Blooms level*	Number of hours
Module I: Evolution and Structure of Industrial Relations Concept; Theoretical perspective – Unitary, Pluralistic, Marxist, and Trusteeship perspectives; Approaches to industrial relations; Structure of industrial relations system in India; Major actors and their role in industrial relations; Industrial relations since globalization in India; Industrial relations policy in India; Pre-requisites and functional requirements of good IR programme.	L1, L2	7
Module II: Industrial Conflict and Dispute Resolution Definition of industrial disputes; Causes and classification of industrial disputes; Prevention of industrial disputes; Industrial disputes in India; Recent development; Industrial Disputes Act, 1947 – Machinery for resolution of industrial disputes (conciliation, adjudication, and arbitration); Strikes; lock-outs; lay-off; Retrenchment; Authorities and their powers and procedures under the Act	L1, L2	8
Module III: Trade Unionism and Collective Bargaining	L1, L2	7

Trade unions – Characteristics, functions, Types/Structure; Trade unions and Productivity; Trade Unions Act, 1926 – Definition, Registration of trade unions, Authorities and their Powers and Procedures under the Act; Penalties for offence under the Act; Collective Bargaining – Definition, legal framework, Bargaining forms and Tactics, negotiating skills, Process of Collective bargaining, collective bargaining as an integral part of IR strategy, Pre-requisites for the successful functioning of collective bargaining		
Module IV: Discipline and Grievance Handling Discipline – Definition, Difficult employees, Approaches to Discipline, Causes, Disciplinary Process, Essentials of Good Disciplinary System, Code of Discipline and Industrial Relations. Grievance Handling – Definition of grievance, Legal framework, Need, Causes of grievance, Tracing the grievance, Model Grievance Procedure, Grievance management in Indian industries.	L1,L2	6
Module V: Industrial Democracy, Internal Labour Organisation, Labour Policy, Labour Administration Industrial Democracy – Concept and significance; Workers' Participation in Management – concept, rational, status of workers' participation in management in India; Experience of Yugoslavia; Labour Policy of Government of India; Labour Administration – Central Machinery, States/ Union Territories Machinery; Consultative Machinery.	L1, L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evalutation*

Text Books: Text & References:

1. Sharma, R C, Industrial Relations and Labour Legislation, PHI Learning Pvt. Ltd., 2016
2. Venkatratnam, C.S., Industrial Relations, Oxford University Press, New Delhi, 2014
3. MonappaArun 1989, Industrial Relations, Tata McGraw Hill, New Delhi, 2007
4. Sen, Ratna, Industrial Relation in India: Shifting Paradigms, Macmillan Publication, New Delhi, 2005
5. Mamoria. C. B, Dynamics of Industrial Relations in India, Himalaya Publishing House, Mumbai, 2004

Journals & Periodicals:

1. Indian Journal of Industrial Relations
2. Indian Law Reporter
3. Indian Journal of Labour Economics
4. Indian Labour Year Book

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	3	3	3	2	2	3	2	-	1	--	-
CO2	1	3	2	2	3	3	1	3	2	-	1	--	-
CO3	1	1	2	2	2	2	2	3	2	-	1	--	-
CO4	1	1	1	1	3	1	1	3	2	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

EMF4311	TRAINING AND MANAGEMENT DEVELOPMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Students should have knowledge of basic HR processes				
Co-requisites					

Catalog Description
This course provides students with an overview of the role of Training and Development in Human Resource Management. The key elements covered include: needs analysis, program design, development, administration, delivery and program evaluation. Other topics include adult learning theory, transfer of training, career planning, counselling, training techniques, budgeting and trends in training.

Course Objectives
The objective of this course is to:
1. Explore the methods of training and development,
2. Designing courses appropriate for different levels of employees respecting their specific needs and interests, mission, structure and purpose of the internal training function,
3. Development of internal consulting skills necessary to function effectively inside organizations, ROI of the training department, and performance based instruction and learning inside organizations.

Pre-Requisites: An understanding of human resource functions is deemed to be there in the students.

Course Outcomes
On completion of this course, the students will be able to
CO1: Identify the role of training and development in human resources management.
CO2: Explain the psychology of the learning process on which training is based.
CO3: Summarise the training needs of an organization.
CO4: Interpret various methods, techniques and sources of training.
CO5: Show the value of the training once completed from the individual employee and the organization's viewpoint.

Modules	Blooms level*	Number of hours
Module I: Introduction to concept Organization vision & plans, assessment of training needs, setting training objectives, designing training programmes, Spiral model of training	L1, L2	7
Module II: Training methods Training methods: On the job training, job instruction training, apprenticeship, coaching, job rotation, syndicate method, knowledge based methods, lecture, conferences, programmed learning,	L1, L2	8

simulation methods, case study, vestibule training, laboratory training, in-basket exercise, experiential methods		
Module III: Management Development Program Methods Understudy, Coaching, Action Learning, Role Play, Management Games, Seminars, University related programs, special projects, behavioral modeling, job rotation, case study, multiple management, sensitivity training. Post training: Input overload, unrealistic goals, linkage failure. Training impact on individuals and organizations: Training Evaluation-Evaluating- Programs, Participants. Objectives and worth of training, 7 habits of highly effective people	L1, L2, L3	7
Module IV: Organizational Development(OD) Definition Foundations of OD, Managing the OD Process, Action Research and OD. OD Interventions: Overview of OD Interventions, Team Interventions Inter-group and Third-Party Peacemaking Interventions. Comprehensive OD Interventions, Structural Interventions and the Applicability of OD, Training Experiences. Issues in Consultant –Client Relationships, System Ramifications, Power, Politics and OD	L1,L2	6
Module V: Influence of business and market conditions on training and employee development, Evaluating possible structures and functions for identifying training in organizations, Methods and techniques for identifying training needs, Writing basic "blueprints" (instructional designs), Developing materials based on behavioral objectives tied to an organizations business objective, Describe applicable training evaluation, ROI of training and apply them to the workplace, Describe and understand human performance improvement (HPI) and the value of HPI to an organization	L1, L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text and Reference Books:

1. Blanchard P.Nick & Thacker James, W. (2010). Effective Training, Systems, Strategies and Practices. New Delhi: Pearson Publishers.
2. French Wendell, Bell Cecil and Vohra Veena. (2017). Organisation Development, Behavioral Science Interventions for Organisation Improvement.
3. Vivien Martin. (2006). Managing projects in human resources: Training and development. Kogan Page.
4. Ronald. Sims. (1998), Reinventing training and development. Greenwood Publishing.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	-	-	-	-	-	-	-	1	-	1

CO2	-	2	-	-	-	-	-	-	--	-	1	-	1
CO3	-	1	-	-	-	-	-	-	-	-	1	-	1
CO4	1	1	-	-	-	-	-	-	-	-	1	-	1
CO5	1	2	-	-	-	-	-	-	-	-	1	-	`

1: strongly related, 2: moderately related and 3: weakly related

FINANCE:

EMF4312	**MANAGEMENT OF FINANCIAL SERVICES**	L	T	P	C
Version 1.1	Latest Version	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Financial services are the economic services provided by the finance industry, which encompasses a broad range of businesses that manage money, including credit unions , banks leasing, hire purchase and consumer credit companies, stock brokerages, unions, banks, leasing, hire purchase and consumer credit insurance companies, accountancy companies, consumer-finance companies, stock brokerages, investment funds, individual managers and some government-sponsored enterprises.

Course Objectives

The objective of this course is to

1. Understand the role of Financial Services in producing and maximizing value.
2. Acquaint with the basic Financial Services and their need.
3. Understand the Financial Services industry& regulators and managers for quantifying and dealing with critical factors affecting the Financial Services industry.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Outline the Indian Financial systems with various financial instruments.

CO2: Compare the various investment avenues with risk and return trade off.

CO3: Recognize various instruments traded in capital markets, merchant & Investment Banking and apply stock trading techniques.

CO4. Review the process of leasing, hire purchase and consumer credit.

Modules	**Blooms level***	**Number of hours**
Module I: Introduction Financial services and Value production, Value added in Financial Services, ROI in Financial Services, Elements in the Financial Services value chain, Role of Financial Services in Economic Development .	L1,L2	4
Module II: Merchant & Investment Banking Meaning, Importance & Role in the Indian Financial System, Corporate Counselling, Project Counselling and Appraisal, Loan Syndication and Accessing Debt and Capital Markets, Procedural aspects of public issues, bought out deals, Book Building, Pre-Issue Decision; Post Issue Management and related provisions of Companies Act and SEBI guidelines for Protection of Interests of	L1, L2, L3	8

Investors, New Products in Capital Markets.		
Module III: Leasing Hire Purchase and Consumer Credit Development of Leasing Hire Purchase and Consumer Credit, Types of Leasing, Pricing Methodology and Financial Analysis, Taxation, Legal Framework for Leasing and Hire Purchase Companies, Leasing Vs. Buying- NPV, Securitization, Banking Services related to leasing.	L1, L2,L3,L 4	5
Module IV: Venture Capital Financing International Experiences in Venture Capital Financing, Venture Capital Financing in India, Pitfalls to be Avoided, Private Equity and growth of Entrepreneurship.	L1, L2,L3	4
Module V: Mutual Funds Mutual Funds types, Exchange Traded Funds, Fund of Funds, Organization and Management, Regulations of Mutual Funds .	L1, L2,L3	5
Module VI: Other Financial services Factoring Services - Features, Merits and Demerits, Cost Benefit Analysis, Forfeiting – Features, Merits and Demerits, Credit Rating: Concept of Credit Rating, Types of Credit Rating, Advantages and Disadvantages of Credit Rating, Credit Rating Agencies and Their Methodology and Process, Individual Credit Rating, Sovereign Credit Rating Practices, Indian Experience up to now, Housing Finance, Custodial Services	L1, L2,	6
Module VII: An introduction to marketing of Financial Services Features Marketing Of Financial Services, Cross Selling of Banking Services, Up-Selling, Wealth Management.	L1,L2	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & Reference Books:

1. Khan M Y, (1999), Indian Financial System, Tata McGraw Hill
2. Chandra, P.(1999), Financial Management: Theory and Practice, Tata McGraw Hill.
3. Dietrich J KiMGTll,(1996), Financial Services & Financial Institutions, Value Creation in theory and Practice, Prentice Hall
4. Pandey, I.M. (1999), Financial Management, Vikas Publishing House
5. Sriram, K. (1996), Handbook of Leasing, Hire Purchase and Factoring, ICFAI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

PO,CO,PSO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	1	1	1	1		--
CO2	1	1	--	--	--	--	--	1	1	1	1		--
CO3	1	1	--	--	--	--	--	1	1	1	1	1	--
CO4	1	1	--	--	--	--	--	--	1	2	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4313	STRATEGIC FINANCIAL MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Strategic financial management is the study of finance with a long-term view considering the **strategic** goals of the enterprise. **Financial management** is nowadays increasingly referred to as "**Strategic Financial Management**" to give it an increased frame of reference. Topics reflect the changing environment of financial management in organizations and include capital investment decision making, the role of intangibles in value creation, financial performance metrics, strategic financial planning and control, strategic valuation decisions, growth strategies for increasing value, the restructuring of financial processes.

Course Objectives

The objective of this course is to

1. Provide knowledge of strategic financial management in the area of finance domain.
2. Understand the value chain analysis and shareholders' value analysis.
3. Examine and analyze the Strategic cost analysis and corporate restructuring.
4. Evaluate valuation of business enterprise.

Course Outcomes

On completion of this course, the students will be able to:
CO1: Explain the role of strategy in the area of business finance.
CO2: Assess the various tools of value chain analysis.
CO3: Apply the concepts and tools to solve business accounting problems.
CO4: Evaluate the need for corporate restructuring and its strategies.
CO5: Explain innovative financial reengineering concept and its applications.
CO6: Demonstrate the valuation of business units and brands.

Modules	Blooms level*	Number of hours
Module I Strategic Financial Management Strategy and the Strategist The 'Nine References' for Strategic Financial Management Strategic Investigation of Growth on Profit-Leakages (A qualitative assessment)	L1,L2	6
Module II Value Chain Analysis Value chain and Investment Strategic Business Units (SBU'S) Responsibility Accounting	L1, L2, L3,L6	6

Activity Based Costing (ABC) and objective Based Costing (OBC) Economic Value Added Owners Value Added (OVA)		
Module III Strategic Cost Analysis Discussion on the Case-Problem Cost Profit-Sales Analysis Using a Product/Project as Profit Centre Ratios	L1, L2, L3	6
Module IV Financial Aspects of Corporate Restructuring What is Corporate Restructuring? Scope for Restructuring Symptoms for Restructuring Operational Symptoms Strategic Symptoms Financial Symptoms Market, Economy-level and Global Symptoms Financial Aspects of Various Restructuring Exercises (for Various Purposes)	L1, L2, L3,L6	6
Module V Innovative Financial Engineering Project-Finance Instrument Venture Finance Futuristic Securitisation Special Purpose vehicle	L1, L2	6
Module VI Valuation Valuation of a Business Enterprise Approaches to Enterprise Valuation Based on Various Objectives Realisable Value Vs Replacement Cost Realisable Value Valuation of the Company's Intrinsic Strength Important Conclusion The Components of Business Valuation Brand Valuation Various Methods of Brand Valuation	L1, L2,L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Jakhotiya G P Strategic Financial Management Vikas Publishing House, 2004

Reference Books:

1. Khan, M.Y. & Jain, P.K., Basic Financial Management, Tata McGraw Hill, ND, 2002.
2. Brealey, R.A. & Myers, S.C., Principles of Corporate Finance, Tata McGraw McGraw Hill, ND, 2002.

3. Khan, M.Y., India Financial Services, Tata McGraw Hill, ND, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	2	3	2	1	2	1	--	--
CO2	1	1	--	--	--	2	--	2	1	2	1	--	--
CO3	1	1	--	--	--	2	--	2	1	2	1	--	--
CO4	1	1	2	--	--	2	--	2	1	2	1	--	--
CO5	1	1	--	--	--	2	--	2	1	2	1	--	--
CO6	1	1	--	--	--	2	--	2	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

EMF4314	PROJECT MANAGEMENT AND CONTROL	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course is about planning, analysis, selection, and implementation and review the capital expenditure investments.

Course Objective:
The aim of course to:

1. Make the students familiar with the planning, analysis, selection, and implementation and review the capital expenditure investments.
2. Acquaint the student with the application of mathematical and statistical tools for analyzing managerial problems in order to arrive at a decision w.r.t. the capital expenditures.

Course Outcomes:
By the end of the course the participants should be better able to:
CO1: list and describe the sources of project financing.
CO2:Analyze the feasibility and risks involved in large projects, and evaluate the project's profitability.

Modules	Blooms level*	Number of hours
Module I: Planning of Projects Capital Expenditures, Phases of Capital Budgeting, Levels of Decision Making, Facets of Project Analysis, Portfolio Planning Tools, Strategic Position and Action Evaluation (SPACE), Generation of Ideas, Monitoring the Environment, Corporate Appraisal, Project Rating Index, Demand Forecasting, Market Planning	L1, L2	9
Module II: Technical Analysis Material Inputs and Utilities, Manufacturing Process, Product Mix, Plant Capacity, Location and Site, Machineries and Equipments, Structures and Civil Work, Project Charts and Layouts, Work Schedule	L1, L3,L4	6
Module III: Financial Analysis Cost of Project, Means of Finance, Estimates of Sales and Production, Cost of Production, Working Capital Requirements and its Financing, Profitability Projections, Break Even Point, Projected Balance Sheets, Multi Year Projections, Basic Principles for Measuring Project Cash Flows, Components of the Cash Flow Stream, Biases in Cash Flow Estimation	L1, L3,L4	9

Module IV: Project Risk Types and Measures of Project Risk, Sensitivity Analysis, Scenario Analysis, Optimal Timing, Social Cost Benefit Anaysis, Net Benefit in terms of Economic Prices, Measurement of the Impact on Distribution, Savings Impact and its value, Income Distribution Impact, Little-Mirrlees Approach, Shadow Prices	L1, L3,L4	7
Module V: Project Management and Review Forms of Project Organization, Project Planning, Project Control, Human Aspects of Project Management, Pre-requisites for Successful Project Implementation, Performance Evaluation, Abandonment Analysis, Administrative Aspects of Capital Budgeting	L1, L3,L4	5

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Chandra P.(2002), Projects: Planning, Analysis, Financing, Implementation & Review, Tata McGraw-Hill Publishing.
2. Meredith J.R. & Mantel S.J., Jr.(2000), Project Management: A Managerial Approach, Ed. John Wiley & Sons.
3. Machiraju H.R.(2001), Introduction to Project Finance: An Analytical Perspective, Vikas Publishing House Pvt. Ltd.

Reference Books:

1. Patel B.M.(2000),Project Management: Strategic Financial Planning Examination & Control, Vikas Publishing House Pvt. Ltd.
2. Finnerty J. D.(1996), Project Financing: Asset-Based Financial Engineering, Wiley
3. Newbold C.R.,(1998), Project Management in the Fast Lane: Applying Theory & Constraints, St. Lucie Press
4. Anthony R.N. & Govindrajan V.(1998), Management Control Systems, Tata McGraw-Hill
5. Desai V.(1997), Project Management, Himalaya Publishing House

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	**5**	**5**	**5**	**5**	**10**	**70**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	1	--	--	--	--	--	1	1	--	--
CO2	1	1	--	1	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MASTER OF BUSINESS ADMINISTRATION
(EXECUTIVE FULL TIME)

FOURTH SEMESTER

EMF4437	**DISSERTATION**	L	T	P	C
Version 1.1	Latest Approved	0	0	0	15
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Under this, it is usual to give the student some discretion in the choice of topic for the dissertation and the approach to be adopted. The dissertation topic is related to the field of specialization. Deciding this is often the most difficult part of the dissertation process, and requires thorough preparation and background research.

The aim of the dissertation is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.

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Course Objectives

The objective of this course is to

1. Understand and apply theoretical frameworks to the chosen area of study.
2. Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently**.**

Course Outcomes

On completion of Dissertation,the students will be able to

CO1:Describe a relevant area of career development, career coaching, coaching or work-related learning studies.

CO2: Identify research methods and state research questions.

CO3: Critically analyze and evaluate the knowledge and understanding in relation to the agreed area of study.

CO4: Integrate theory and practice for the development of responses on the basis of the evaluation and analysis undertaken.

CO5: Communicate in written form by integrating, analyzing and applying key texts and practices.

CO6: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

Planning the dissertation	**Blooms level***	**Number of hours**
• Selecting a topic for investigation. • Establishing the precise focus of the study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility. • Drawing up initial dissertation outlines considering the	L1, L2 ,L3,L4,L5,L6	6hours a Week

aims and objectives of the dissertation. Workout various stages of dissertation • Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Modes of Evaluation: Viva/ Report Examination

Examination Scheme:

Components	**Content & Layout of Report**	**Conceptual Framework**	**Objectives & Methodology**	**Implications & Conclusions**	**Viva-Voce**
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	--	--	--	1	--	--	--	1	--
CO2	--	1	--	--	--	--	--	--	--	--	--	1	--
CO3	--	1	2	--	--	--	--	--	--	--	--	1	--
CO4	1	--	--	--	--	--	--	--	--	--	--	1	--
CO5	--	--	--	--	--	--	1	--	--	--	--	1	2
CO6	--	--	--	--	--	--	--	--	1	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

Amity Business School

Master of Business Administration
(Sustainability Management)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

PROGRAM OUTCOMES

PO1	Synthesize the knowledge and skills acquired in the domain of marketing, human resource, operations and finance to overcome the challenges of a sustainable business.
PO2	Evaluate business issues within the context of ethics and social sustainability and inculcate among students the awareness of the mandatory compliances that are pertinent to their respective organizations.
PO3	Enable students to formulate, evaluate and implement crucial business strategies considering the 3 Ps of People, Profit and Planet to make a sustainable business organization.
PO4	Enable students to strategize around designing, developing and marketing products based on their perceived environmental sustainability.
PO5	Enable students to become sustainable change leaders and create an inclusive workplace by understanding and appreciating diversity.
PO6	Encourage entrepreneurial capabilities and in the process recognizing and pursuing opportunities to create social value.

Master of Business Administration (Sustainability Management)

Programme Mission:

The mission of the MBA programme is to foster an environment of academic excellence in Business Management through research and innovation, industry integration, internationalization and extension activities and develop highly trained and employable professionals with specialization in the area of Marketing & Sales, Finance, Banking & Finance, Human Resource Management, International Business, Information Technology, E-Commerce and Hospital & Healthcare, who are socially responsible and globally minded professional to meet the current and emerging needs of business and society.

Programme Description:

The two year full time Masters in Business Administration programme is to educate and prepare students with the knowledge, analytical ability, and management perspectives and skills needed to lead, to motivate and to manage diversified workforce, rapid technological change and competitive marketplace while considering the principles of ethical, legal and corporate governance fundamentals.

MSM4101	MANAGEMENT PROCESS & ORGANIZATIONAL BEHAVIOR	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of general Management				
Co-requisites	Student must have basic understanding of General Management.				

Catalog Description
To help the students to develop cognizance of the importance of human behaviour.

Course Objective:
The course Aims to:
1. Help the students gain understanding of the functions and responsibilities of the manager.
2. Provide the student understand Human Behaviour in organizations so as to improve his managerial effectiveness.

Course Outcome:
Upon successful completion of the course a student will be able to:
CO1: The students will be able to demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization and diversified cultural settings.
CO2:To enable students to describe how people behave under different conditions.
CO3:Students will analyze the complexities associated, critically evaluate and apply decisions appropriately.
CO4:To enable students to synthesize related information and evaluate options for the most logical and optimal solution so that they would be able to predict and control human behaviour and improve results.

Modules	Blooms level*	Number of hours
Module I: Management vs. Manager Evolution of management thought, Functions of management, Roles and Skills of a manager, Emerging challenges of management.	L1, L2	6
Module II: Organization Nature and structure of organization, Types of organizations, Line and staff relationships, Formal and informal organizations.	L1, L2,	6
Module III: Introduction to Organization Behaviour Overview of organization behaviour and its importance, Organization models.	L1, L2,	6
Module IV: Individual Behaviour Individual behaviour, Perception and learning, Personality, Values & attitudes, Motivation: Concept theory and application	L1, L2, L3, L4, L5, L6	6
Module V: Group Behaviour Group dynamics, Communication, Leadership, Power and politics, Conflicts and negotiation.	L1, L2, L3, L4, L5, L6	6
Module VI: Organizational Culture and Change Management Organisational culture, Organisational change and development, Work stress and its management**.**	L1, L2, L3, L4, L5, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books;

- Luthans, F. (2010), Organizational Behaviour, Mcgraw-Hill Education India Pvt.Ltd - New Delhi.
- Robbins, S.P. (2016), Organizational Behaviour, Sixteenth Edition, Pearson Education.
- **Reference Books:**
- Greenberg, J. & Baron, R.A. (2005), Behaviour in Organizations, Pearson Education.
- Newstrom John W. and Davis Keith, (1993), Organizational Behaviour: Human Behaviour at Work, Tata McGraw Hill, New Delhi
- P. Subba Rao (2010), Management andOrganisation and Behaviour, Himalaya Publishing House, New Delhi
- Pierce Gardner with Dunham (2011)Managing Organizational Behaviour. Cengage Learning India.

Modes of Evaluation: Class Test /Home Assignment/ Power Point Presentation/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**PPT**	**A**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, PPT: Power Point Presentation, A: Attendance EE: End Semester Examination

Modes of Evaluation: Presentation/Viva/ Report /Assignment Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	1	1	1			1	1		
CO2	1	1					1			1			
CO3	1	1					1			1			
CO4	1	1	1	1	1	1	1			1	1		

1: strongly related, 2: moderately related and 3: weakly related

MSM4102	BUSINESS & ENVIRONMENTAL LEGISLATION	L	T	P	C
		3	0	0	3

Catalog Description

Course Objectives
The objective of this course is to
Course Outcomes

Modules	Blooms level*	Number of hours
MODULE 1: Water (Prevention and Control of Pollution) Act, 1974 (Water Act)- Objectives, Definitions and sections, Goals of Clean water Act, Features of the legislation, Industries covered, Sources of water pollution		5
MODULE 2: Air (Prevention and Control of Pollution) Act, 1981 (Air Act)- Objectives, Definitions and sections, Features of the legislation, Industries covered, Sources of Air pollution,		5
MODULE 3:Environment (Protection) Act, 1986 (EP Act) – E-waste management rules, Bio-medical waste management rules, Construction and Demolition Waste Management Rules, Hazardous and Other Waste, Manufacture, Storage and Import of Hazardous Chemicals Rules, Plastic Waste Management Rules.		9
MODULE 4: National Green Tribunal Act Purpose of Green Tribunal Act, Difference between courts and Green Tribunal, Definition and sections, Dispute settlements, Relief, compensation and restitution, Procedures and powers of the tribunal **MODULE 5: Environmental Permits** Concept of an integrated permit system, Consent to establish (CTE), Consent to operate (CTO), Renewals under Water Act and Air Act, Categories of industries under Pollution Index (PI), Regulatory bodies and authorities.		9 8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books
Reference Books

Modes of Evaluation: Class Test/Assignment /Written Examination

Components	ME	A	Q/S	Asn	CT	EE
Weightage (%)	10	5	5	5	5	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	--	1	2	2	--	--	--	--	1	1	--	3	--
CO2	--	1	2	2	--	--	--	--	1	1	--	3	--
CO3	--	1	--	--	--	--	--	--	1	1	2	3	--
CO4	--	1	1	1	--	--	--	--	1	1	1	--	--
CO5	--	--	--	1	--	--	--	--	1	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

MGT4103	ACCOUNTING FOR MANAGERS	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The intent of this course is to acquaint the students with fundamental concepts and processes of accounting so that they are able to appreciate the nature of item presented in the annual accounts of an organization. The student will be able to familiarize with the significant tools and techniques of financial analysis further useful in the interpretation of the financial statements. The aim of this course does not focus on to make the student's expert accountant but to have a good comprehension on the management planning and control systems. However the principal focus will be related to the interpretation and use of the financial data by non-accounting students to gain the ability of using accounting information as a tool in applying solutions for managerial problems, evaluating the financial performance, and interpreting the financial structure.

Course Objectives

The objective of this course is to:

1. Equip the students to develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, students will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts.
2. Develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Outcome:

On completion of this course, the students will be able to:

CO1: To enable the students to combine practice and theoretical knowledge of financial accounting.
CO2: To demonstrate the decision making skills to the students in the financial analysis context,
CO3: To develop an ability to identify and analyze complex financial accounting problems and opportunities in real life situations.
CO4: To develop skills in applying management accounting techniques to assist in decision making

Modules	Blooms Level	Number of Hours
Module 1: Introduction The Financial Accounting Framework, Accounting Policies, Need of Accounting. Users of Accounting Information, Accounting Cycle, Accounting and Management Control. Balance sheet- Classification Items of Balance Sheet, Formats of Balance Sheet. Preparation of Balance Sheet. Income Statement- Realization vs. Accrual Principle, Format of Income Statement), Preparation of Income Statement (IAS,GAAP&IFRS), Depreciation Accounting.	L1, L2, L3	8
Module 2: Measuring and Reporting Measuring and Reporting Assets, Liabilities & Equity: Cost of sales and Inventories, Debentures, Investments, Shareholder Equity; Human Resource	L1, L2, L5	8

Accounting: Valuation of Human Resources, Recording and Disclosure in Financial Statements.		
Module 3: Analyzing and Interpreting Financial Statements Financial Statement Analysis – Basic Relationship, Overall Measures, Profitability Ratios, Investment Utilization Ratios, Financial Condition Ratios, Making Comparisons. The Statement of Cash Flows-Profit versus Cash, Purpose and Use of Cash Flow Statement, Format of Cash Flow Statement (AS-3), Preparation of Cash Flow Statement (IAS,GAAP& IFRS).	L4, L5, L6	9
Module 4: Management Accounting Emergence of Management Account, Managerial costing and Cost-Volume- Profit Analysis, Budgeting and Budgetary control, Variance Analysis .	L1, L2, L5	5
Module 5: Cost Accounting Elements of Cost, Cost Classification and Allocation, Cost sheet, Process Costing, Job Costing.	L1, L2, L5	5

*Bloom's Level:L1 – Knowledge; L2-Comprehension, L3 – Application, L4 – Analysis, L5 – Synthesis, L6 - Evaluation

Text Books

1. Anthony, N.R; Hawkings, F. D; Merchant, A.K (2014), Accounting Text and Cases, 13th Edition, McGraw Hill.
2. Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, McGraw Hill.

Reference Books

1. Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing House
2. Narayanaswamy R (2014), Finanacial Accounting – A Managerial Perspective, Prentice Hall of India.
3. Maheshwari S N; Maheshwari SK and Maheshwari SK, 3rd Edition, A Text Book for Accounting for Management, Vikas Publishing House.
4. Tulsian, P.C (2006), Financial Accounting, Tata McGraw Hill.
5. Banerjee, A (2005), Financial Accounting, Excel Books.
6. Ghosh,T.P (2005), Fundamentals of Management Accounting, Excel Books
7. M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.

Modes of Evaluation: Quiz/Assignment/Presentation/Written Examination

Examination Scheme:

Components	Assessment 1 Group Presentation	Assessment 2 In Class Quiz	Class Test/Mid Term Exam	Attendance	External
Weightage (%)	**10**	**5**	**10**	**5**	**70**

CT: Class Test, HA: Home Assignment, Q: Quiz, P: Presentation, EE: End Semester Examination, Att: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	-	1	1	--	--	--	--	--	--	1	--	--	--
CO2	1	1	1	--	--	--	1	--	--	1	--	--	--
CO3	1	1	--	1	--	--	--	--	--	1	--	--	--
CO4	1	1	--	--	--	--	--	--	--	1	--	--	--

MSM4104	UNDESTANDING HUMAN BEHAVIOR FOR INCLUSIVITY	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description:
The course covers the various dimensions of human behaviour and human resource management in the backdrop of increasing emphasis on the creation of an inclusive workplace.

Course Objective:
The objective of this course is to
1. To help students understand the fundamentals of human behaviour in workplace settings.
2. To enable students to understand the significance of an inclusive workplace.
3. To prepare students to be able to manage diverse workplace behaviours.

Course Outcomes:
On completion of the course the students will be able to:
CO1: Demonstrate an understanding of the concepts of human resources management at workplace.
CO2: Differentiate between human resource policies and sustainable human resource policies.
CO3: Understand the significance of being a sustainable leader while appreciating workplace diversity.
CO4: Understand the importance of creating a workplace which is free from any employment or non-employment related discrimination.

Modules	Blooms level*	Number of hours
Module I: Introduction to Human Resource Management Nature and Scope of HRM, HRM basic functions: Human resource planning, Recruitment, Selection, Training & Development, Performance Appraisal, Emerging trends in HRM: employee engagement, cross cultural management, Work-life integration	L1, L2, L3	5
Module II: Introduction to Human Behaviour Nature & significance of human behaviour, Concept of an inclusive workplace, Sustaining motivation among people, Role of emotional intelligence in creating empathy and inclusivity.	L1, L2, L3	8
Module III: Understanding behaviour in group settings Teams v/s groups, Why teams, Designing and sustaining efficient teams, Managers v/s Leaders, Becoming a sustainable leader, Role of sustainable leadership in creating an inclusive workplace, Corporate Governance and sustainable leadership.	L1, L2, L3	9
Module IV: Sustainability and Managing Change Introduction to Change management, Role of organizational design,	L1,L2,L3,L4	4

structure and culture in driving sustainable change.		
Module V: Creating a sustainable workplace Equal employment opportunities, Diversity and inclusion at workplace, promoting cultural sensitivity, Managing across cultures, Promoting gender diversity, Developing women leaders, Policies on POSH	L1, L2,L3,L4	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- David A. Decenzo ,Stephen P. Robbins , Susan L. Verhulst,(2015), Human Resource Management ,eleventh edition , Wiley
- Dessler G (2014) A Framework for Human Resource Management, 7 edition (2014), Pearson Education India;
- Robbins, SP, Organizational Behaviour, Pearson Education
- Frost S, Alidina R-K, (2019), Building an Inclusive Organization: Leveraging the Power of a Diverse Workforce, Kogan Page

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	**5**	**5**	**5**	**5**	**10**	**70**

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment,
EE- External Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1	2	2		2	
CO2	2	2	2		2	
CO3	2	2	2		2	
CO4	2	2	2		2	

1: strongly related, 2: moderately related and 3: weakly related

MSM4105	SUSTAINABLE MARKETING CONCEPTS	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Objectives:
Course Objectives: The purpose of the course is to educate the students about various aspects of marketing at Social Organization, working towards public good. Course will also provide knowledge of marketing tools to promote social change and to achieve social goals. It will focus on the roles of different stakeholders such as Government, Corporate Social Responsibility Entities as well as Non-profit Organizations.

Pre-requisites: Student should have completed the basic course of Marketing Management

Course Content / Syllabus:

Module I :Introduction to Sustainable marketing	**15%weightage**
Developments and Challenges, Alternative Concepts: No-Profit Marketing, Sustainable marketing Role of Stakeholders such as Government, Corporate Social Responsibility Entities as well as Non-profit Organizations	
Module II: Social Messaging and Communication	**15%weightage**
Identifying consumers and beneficiaries, Achieving Social Goals through Marketing, Decision processes-Implications for the Promotion of pro-social behavior, Social Messaging, Learning & behavior modification, Fare Trade Principles	
Module III: Marketing Mix	**20%weightage**
Marketing Orientation towards Non-profit/ social change promotion, 4Ps of Social Marketing, Strategic Marketing Planning: Value Proposition, Branding, Segmentation, Targeting, Positioning, Competitive Advantage, Community based Social marketing	
Module IV: Understanding Campaigns	**20%weightage**
Ongoing Marketing Campaign sin non-profits: e.g. arts, education, health, rural development, charities Developing an effective marketing Campaign: Objective formulation, Identifying Audience, reducing barriers, communicating effectively; Evaluation, Monitoring and Control for Marketing Initiatives, Prominent Cases	
Module V: Corporate Social Responsibility	**15%weightage**
Cause Marketing: Introduction, Need and Relevance, Corporate Social Responsibility: Introduction, Regulations and Linkages with Non-Profits, CSR utility towards Brand & Image Building and Recruitment	
Module VI: Latest Trends	**15%weightage**
Latest trends in Social Marketing, Employee volunteering, Multi stakeholder Initiatives, Campaign Financing & Regulations, Use of Information Technology.	

Student Learning Outcomes: After Completion of Course Students will be able to:

- Understand social/ Non-profit marketing concept and role of different stakeholders;

 Plan, perform and monitor effective Marketing Campaign sin the Non-Profits environment;
 Identify and Interpret social marketing orientation of NGO's;
 Relate to the role of private sector, partnerships and alliances to the non-profit sector;

Pedagogy for Course Delivery: This class will be taught using a mix of theory and the case methods. It will cover important course content and be illustrated by case examples.

- Lectures & Case Study Discussion
- Group Project
- Group Discussion

List of Professional Skill Development Activities (PSDA):
i. Analyzing Social Marketing Campaigns & Designing Social Marketing Campaigns
ii. Stakeholder Identification

Assessment/ Examination Scheme:

Theory L/T (%)	**Lab/ Practical/ Studio (%)**	**End Term Examination**
40%	NA	60%

Continuous Assessment/ Internal Assessment					
Components	**Mid Term Exam**	**Project**	**Viva**	**Attendance**	**End Term Examination**
Linkage of PSDA with Internal Assessment Component, if any		Analyzing Social Marketing Campaigns; Designing Social Marketing Campaigns	Stakeholder Identification		
Weightage (%)	10%	15%	10%	5%	60%

Text Reading:

- Consumer India : Inside the Indian Mind and Wallet, by Dheeraj Sinha
- Consumer Behaviour by Schiffman and Kanuk PHI publications 7th edition.

References:

- India After Gandhi by Ramachandra Guha.

Additional Reading:

- Solomon. R. Michael. (2004) Consumer Behavior. Pearson Prentice Hall of India.
- Understanding Indian Consumers by Durairaj Maheswaran & Thomas Puliyel
- Winning in the Indian Market: Understanding the Transformation of Consumer India By Rama Bijapurka

MSM4106	APPLICATION OF DISRUPTIVE TECHNOLOGIES IN BUSINESS	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Description:
Disruptive technology significantly alters the way businesses or entire industries operate. It often forces companies to change the way they approach their business for fear of losing market share or becoming irrelevant. Disruptive Technologies are the ultimate challenge in current business environment. This course will review in detail the basis of Disruptive Technologies ie. Disruptive Innovation and how these technologies are impacting the Business.

Course Objectives: The aim of this course is to

- To understand how Organizations need to evolve to address the changing business landscapes.
- To study how technological innovations leads to technology disruptions and how these innovations bring value to the organization.
- To understand how these technologies are end angering the organization or industry in which we operate.
- To study whether these technologies are easily adopted oris the organization experiencing difficulty integrating these new technologies.

Course Structure

Module No.	Course Contents	Weightage
1	Introduction to Disruptive Technologies - Determining technology trends by a historical review, overview of how technological disruption happens, “Disruptive Technologies: Understand, Evaluate, Respond,. Positive & Negative Effects Of Disruptive Technology“ Application of Various Disruptive technologies in Business	20%
2	BI Disruption- Effective & timely decisions using BI, Role of mathematical models using BI, BI Architecture, Descriptive Analytics – Data warehousing, Business Analytics: Emerging Trends and Future Impacts, Application of BI Disruptions in industry	20%
3	Artificial Intelligence Disruption- Introduction to AI , Various AI Tools, Problem solving to find the “best” solution in the problem space. How AI helps to Reason &Interpret to justify solutions or sub-solutions, language comprehension to handle for data/ problem/ knowledge representation, Business decision using AI a process to find better ways for solving a problem (or a class of problems). Application of AI in Automobile, healthcare, retail sector	20%

4	IOT & Smart application Disruptions- Introduction to IoT , Future Factor Concepts, Brown field IoT, Smart Objects, Smart Applications, Four Aspects in Business to Master IoT, Value Creation from Big Data and Serialization Application of IoT in Industry (Home Management, eHealth., banks, Retail sector)	20%
5	Block chain Disruptions – Introduction to the Block chain , Its Origin, Block chain working, Benefits of Block chain and Challenges. Block chain Database vs Traditional Database, Public, Private and Hybrid Blockchain, Smart contract working and its benefits Application of Block chain in Supply chain ,KYC, Healthcare etc.	20%

Learning Outcomes:

On successful completion of this course, students should be able to:

- Analyze the processes that have enabled certain technologies to change our lives.
- Illustratethepositiveandnegativeconsequencesofdisruptivetechnologies.
- Devise the understanding of the key elements that need to be evaluated when trying to anticipate and manage disruptive technologies in the market place.
- Manage the dynamic aspects of technology-enabled market places as away to understand industry disruption.

Pedagogy for Course Delivery: This course pedagogy will involve a blended learning approach, having formal lectures, Case studies, group project work; and student presentations of the work in progress, as well as online lectures and tutorials.

List of Professional Skill Development Activities (PSDA):

1. Student will be divided into a group of 4-5and will present on any one Disruptive Technology in the class.
2. Students will explore the application of disruptive technology in any area /domain and document it in a form of case study and then present the same in the class.
3. Students will submit a 10 page write up on how the disruptive technology is impacting the society in general & business in particular.

Continuous Assessment/ Internal Assessment					**End Term Examination**
Components(Dropdown)	Mid-Term Exam	Project	Presentation	Attendance	
Weightage(%)	10%	10%	5%	5%	70%

MSM4201	FINANCIAL MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course introduces an investigation of the firm's acquisition and financial activities, to include working capital management, capital budgeting, capital structure strategies, and valuation theory. The practical application of financial policy is stressed for decision-making purposes.

Course Objectives
The objective of this course is to
1. Provide the students relevant, systematic, efficient and actual knowledge of financial management that can be applied in practice with making financial decisions and resolving financial problems.
2. Help the students to acquire the basic knowledge by means of combining theoretical cognitions and practical attitudes to enable them to understand the financial problems in business practice.

Course Outcomes
On completion of this course, the students will be able to
CO1: Describe the financial environment within which organisations must operate.
CO2: Analyse the financial objectives of various types of organisations and the respective requirements of stakeholders
CO3: Explain and analyse the alternative sources of finance and investment opportunities and their suitability in particular circumstances
CO4: Assess the factors affecting investment decisions and opportunities presented to an organisation.
CO5: Apply techniques in managing working capital
CO6: Analyse company's performance and make appropriate recommendations.

Modules	Blooms level*	Number of hours
Module I: Introduction A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm.	L1,L2	4
Module II: Valuation Concepts Time Value of Money, Risk and Return, Financial and Operating Leverage.	L1, L2 ,L4	4
Module III: Financing Decisions Capital Structure and Cost of Capital**,** Marginal Cost of Capital.	L1, L2,L4	7
Module IV: Capital Budgeting Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction.	L1,L2,L3,L4,L6	10
Module V: Working Capital Management Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of	L1,L2,L3	5

Working Capital.		
Module VI: Dividend Policy Decisions An introduction**:** Different Schools of Thought on Dividend Policy.	L1,L2,L4	6

**Bloom's Level: L1-Knowledge;L2-Comprehension;L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Pandey, I.M. (2016), Financial Management, 11th Edition,Vikas Publishing House**.**
2. Chandra, P. (2017), Financial Management: Theory and Practice, 9th Edition,Tata McGraw Hill
3. Rustagi, R.P,Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.

Reference Books

1. Damodaran, A.(2007), Corporate Finance: Theory and Practice, Wiley & Sons.
2. Van Horne, J.C. (2011), Financial Management and Policy, Prentice Hall of India.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	1	2	--	--
CO2	1	1	--	--	--	2	2	--	--	1	2	--	--
CO3	1	1	--	--	--	--	1	--	--	1	2	--	2
CO4	1	1	--	--	--	--	2	--	--	1	2	--	--
CO5	1	1	--	--	--	--	--	--	2	1	2	--	--
CO6	1	1	--	--	--	--	1	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

MSM4202	BUSINESS RESEARCH METHODS	L	T	P	C
Course Version	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description:
The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Objectives :
The objectives of this course are to ensure that students are able to-

1:Understand the basic framework of research process.
2:Comprehend of various research designs and techniques.
3:Identify various sources of information for literature review and data collection.
4:Understand some basic concepts of research and its methodologies.
5: Understand as how to organize and conduct research in a more appropriate manner andwrite a research report, thesis and a research proposal.

Course Outcomes :
On completion of this course, the students will be able to:
CO1: Apply a range of quantitative and / or qualitative research techniques to business and management problems / issues
CO2: Determine and apply research approaches, techniques and strategies in the appropriate manner for managerial decision making
CO3: Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process
CO4: Synthesize and Evaluate different research approaches utilised in the different industries and be able to critically assess the overall process of designing a research study from its inception to its final report preparation.

Modules	Blooms level*	Number of hours
Module I: Introduction Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation of hypothesis, research designs, drafting a research proposal	L1, L2	2
Module II: Measurement and Data Collection Primary data, secondary data, design of questionnaire, sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques, measures of central tendency mean, median, mode; measures of dispersion, data processing	L1, L2,L3,L4, L6	8
Module III: Data Analysis I Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test,	L1, L2,L3,L4,L5,L6	6

Chi- square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test		
Module IV: Data Analysis-II Simple linear regression: coefficient of determination, significance tests, residual analysis, Multivariate techniques: multiple linear regression: Multiple coefficient of determination, interpretation of regression coefficients, heteroscedasticity, multicollinearity, outliers, auto regression, factor analysis, cluster analysis (concept)	L1,L2,L3,L4,L5,L6	4
Module V: Report Writing Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report	L1,L2,L3,L4,L6	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited

Reference Book/s:

1 .Zikmund, William C (1997). *Business Research Methods (5th Ed.)*. The Dryden Press, Harcourt Brace College Publishers

2 Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Term Exam EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	-	--	--	--	-	--	1	3	-	-
CO2	1	1	-	--	--	-	--	-	-	1	2	-	-
CO3	1	2	--	-	--	--	-	--	--	1	3	-	-
CO4	1	1	--	--	3	-	2	--	--	1	3	2	2

1: strongly related, 2: moderately related and 3: weakly related

MSM4203	OPERATIONS MANAGEMENT	L	T	P	C
Version 1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Operations Management deals with the design and operation of the systems for production of goods and services. It will explore the approaches and analyze strategic decisions in operations management with a focus on designing products and processes, allocating scarce resources to strategic alternatives, and do long-range capacity and facility planning. These operations functions help in achieving the organization's long-range objectives. Subsequent focus will be on medium and short term planning and controlling. Care will be taken to strike a balance between theoretical and practical perspectives in manufacturing and service organizations.

Course Objectives

1. To develop an understanding of how the operations, have strategic importance and can provide a competitive advantage in the workplace.
2. To understand the relationship between operations and other business functions.
3. To understand techniques of location and facility planning; line balancing; job designing; and capacity planning in operations management.
4. To understand the supply chain function starting from Demand Management through Inventory Management.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness

CO2. Classify and apply various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments

CO3. Practice aggregate capacity plans and MPS in operation environments

CO4. Analyze suitable supply chain principles and practices in the operations.

CO5. Compare and apply various inventory control methods

Modules	Blooms level*	Number of hours
Module I: Introduction Operations in manufacturing and services, responsibility of Operations Manager, Operations strategy and competitiveness, process analysis, manufacturing process and service process selection and design, job design and work measurement	L1, L2, L3	6
Module II: Strategic Decisions Facility location decisions, factors affecting location, location techniques: factor rating method, centroid method, facility layout, process layout, systematic layout planning, product layout, line balancing, fixed position layout, service operations layout, types of capacity, capacity planning: long term and short term, economies of scale	L1, L2, L3	8
Module III: Operating Decisions Aggregate Planning, production planning and control (PPC), benefits of PPC, Master Production Scheduling, Operations scheduling: loading, sequencing,	L1, L2, L3	8

priority rules and techniques, Materials Requirement Planning (MRP), concerns in MRP		
Module IV: Supply Chain Management Recent issues in SCM: Role of IT in SCM, CRM Vs SCM, structure of supply chain, benchmarking concept, features and implementation, outsourcing decisions, value addition in SCM	L1, L2, L4, L5	8
Module V: Inventory Management Inventory management: Objectives, factors, process, inventory costs, inventory models, inventory control techniques: ABC, VED, EOQ, SED analysis, Just-in-Time (JIT), JIT vs traditional systems of operations, JIT in services	L1, L3, L4, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Production and Operations Management, S.N. Cherry, McGraw Hill Publications, 3/e, 4th reprint 2007
2. Production and Operations Management , Sunil Chopra, Peter Meindle, Prentice Hall of India
3. Supply Chain Management, R.B. Handfield, Prentice Hall of India
4. Supply Chain Management, Ajay Garg, McGraw Hill Publications
5. Introduction to Supply Chain Management, Frederick Shiller& Gerald J Liberman , Tata McGraw Hill edition
6. Operation Research, H..A.Taha, Prentice Hall India
7. Introduction to Operation Research, B.E .Gillet ,Tata McGraw Hill

Reference Books

1. RichardB.Chase,RaviShankarandF.RobertJacobs(2014);Operations&Supply Chain Management; McGraw-Hill - 2014 (14thEdition).
2. CharyS.N.TheoryandProblemsinProduction&OperationsMgt.;TataMcGraw Hill(14th Edition).
3. Krajewski Lee; Operations Mgt. Process for ValueChains; Prentice Hall (8th Edition)
4. Russell S. Roberta & Taylor, Operations Mgt., Prentice Hall (4thEdition).

Modes of Evaluation: Class Test/Assignment /Written Examination

Examination Scheme:

Components	**ME**	**A**	**Q/S**	**Asn**	**CT**	**EE**
Weightage (%)	10	5	5	5	5	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; Asn- Assignment, EE- External Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	2	1	2	--	--	--	--	--	--	1	1	3	1
CO2	2	1	2	--	--	2	--	2	--	1	--	3	1
CO3	--	1	--	1	--	1	--	2	--	1	--	--	2
CO4	--	1	1	1	--	--	--	3	--	1	2	--	2
CO5	--	1	1	1	--	--	--	--	--	1	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

MSM4204	EXCEL FOR MANAGERS	L	T	P	C
Version 1.1	Latest Approved	1	0		1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers. This course will provide all the tools necessary to create and use basic and advanced spreadsheets.

Course Objectives
After completion of this course, students will be able to
1. Learn the various methods for entering and editing data
2. Understand the various ways to write simple formulas.

Course Outcomes
On completion of this course, the students will be able to
CO1: Describe the features offered by spreadsheet program.
CO2: Demonstrate their knowledge of features of basic excel.
CO3: Illustrate the usage of functions in excel.
CO4: Apply the option of charts and graphs in Ms Excel.

Modules	Blooms level*	Number of hours
Module 1: Getting Started with Excel Introduction to Spreadsheets: Launching Excel, entering data in spreadsheet, widening rows and columns, applying basic formatting in spreadsheet, saving work in excel. Entering Data into cells:Using autofill, sort & filter feature, creating lists, inserting & deleting rows and columns. Wrapping & merging text and cells,	L1, L2, L3	2
Module 2: Basics in excel Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel. Setting the page orientation and print area.Adding hyperlinks to cells, inserting images, objects, equations and symbols.	L1, L2, L3	2
Module 3: Charts & Formulas in Excel Understanding Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart. Using Basic functions- average, sum, min, max, product etc. date functions, time functions. Math Operators in Excel, combining mathematical operators.	L1, L2, L3, L4	2
Module 4: Functions in Excel Logical- using IF, AND, OR, NOT, TRUE, FALSE Functions. Textual- using TRIM, UPPER, LOWER, REPLACE Functions.Import data into excel, Look up functions with index and match. Rounding, sum product, conditional counts and conditional sums, Filtering data, pivot table, pivot charts, conditional formatting.	L1, L2, L3	4
Module 5: Financial and Statistical Functions in Excel	L1, L2	4

Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager, IRR. Statistical functions: Max, Min, Average, Large, Rank, Small, Var, Std Dev.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Textbooks

1. Business Analysis with Microsoft Excel by Conrad George Carlberg,Que Publishing, second edition, ISBN 0974415626.

References

1. Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons, 2012, ISBN 9781118559703

Modes of Evaluation: Class Test/Assignment /Written Examination

Examination Scheme:

Components	Written Test	Practical	V/P	File/Assignment	Attendance
Weightage (%)	20	30	30	15	5

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1								1	1			
CO2									1	1			
CO3									1	1			
CO4									1	1			

1: strongly related, 2: moderately related and 3: weakly related

MSM4205	ECONOMICS FOR MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of economic science preferred but not compulsory				
Co-requisites					

Catalog Description

In this course the students are introduced with various concepts of economic science that relates to decision making process in management of business organization. To begin with, introductory concepts of economic theory and their implications on managerial decision process are analyzed. Thereafter concepts related to demand analysis, demand forecasting supply analysis, and equilibrium market conditions are discussed in detail. The next phase deals extensively concepts related to production theory, cost theory and revenue aspects. Third, various concepts related to market structure are discussed in detail. Finally, various macroeconomic concepts, policy perspectives of government and other institutions are explored in detail. The overall aim of this course is to make the students familiar with working knowledge of economic decision process based on rational choice approach in workplace.

Course Objectives:

The objective of this course is to:

1. Introduce to students theoretical concepts of economic science so that they can analyze situations and improve upon their managerial decision process in workplace.
2. Provide students with meaningful exposure about the micro and macro level variables and government policies that influence business operations and strategies of the firm under dynamic business environment in an increasingly globalized and integrated business architecture.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain basic concepts of economic analysis, demand and supply dynamics, demand forecasting techniques and their application, and analyze the working of free market mechanism and appreciate how forces of demand and supply reinforce each other for attaining market equilibrium.

CO2: Analyze rationally the dynamics of production and cost aspects in order to make a holistic assessment of the complexities inherent in production system.

CO3: Describe the various forms of market structure and their implications in managerial decision process.

CO4: Discuss holistically the various macroeconomic aspects of business, economic variables affecting business operations, and implications of government policies in shaping the dynamics of business environment.

Modules	Blooms level*	Number of Hr
MODULE 1: Introduction to Managerial Economics, Demand Analysis and Demand Forecasting: *Introduction to Managerial Economics:* Meaning and Nature of Managerial Economics, Significance of Managerial Economics, Scope of Managerial Economics. *Demand Analysis:* Meaning of Demand, Determinants of Demand, Individual and Market Demand Functions, Individual and Market Demand Curves, Law of Demand, Exception of Law of Demand. *Elasticity of Demand:* Types of Elasticity of Demand, Significance of Elasticity of Demand. *Demand Forecasting*: Purpose of Demand Forecasting, Steps Involved in Forecasting, Determinants of Demand Forecasting, Methods of Demand Forecasting.	L1, L2, L4, L5	7
MODULE 2: Theory of Supply, Production, Cost and Revenue Analysis:	L1, L2,	11

Supply: Law of Supply, Determinants of Supply, Shift of Supply and Change in Supply, Elasticity of Supply, Kinds of Elasticity of Supply, Determinants Elasticity of Supply. *Theory of Production:* Meaning of Production, Short –run Analysis of Production, Law of Variable Proportion, the Three Stages of Production, Returns to Scale. *Analysis of Cost*: Cost and Managerial Decision-making, Types of Cost, Cost Function, Relationship between Production and Cost, Short Run Cost Function, Long Run Cost Function, Relation between Short-run and Long-run Cost Curves, *Economies of Scale.* Break-Even Analysis. Concept of Revenue.	L4, L5, L6	
MODULE 3:Market Structure and Price Determination *Perfect Competition:* Introduction of Perfect Competition, Characteristics of Perfect Competition, Demand Curve of Firm and Industry, Equilibrium of the Firm in the Short Run and Long Run. Effects of Tax Imposition under Perfect Competition. *Monopoly:* Assumptions, Causes of Monopoly, Demand, Average Revenue and Marginal Revenue of a Monopolistic, Profit Maximization Price Determinants of the Monopolist in Short-run and Long-run. Measures of Monopoly Power. *Monopolistic Competition:* Assumptions, Product Differentiation, Demand Curve, Equilibrium of the Firm in Short-run and Long-run, Selling cost and Monopolistic Competition. *Oligopoly:* Assumptions, Non-collusive Oligopoly and Collusive Oligopoly, Kinked Demand Curve Analysis.	L1, L2, L3, L4	8
MODULE 4: Macroeconomics Analysis *National Income:* An Indicator of Economic Activity, The Parameters that Influence Level of Economic Activity. *Business Cycles:* Characteristics of Business Cycle, Phases of Business Cycle, Ill Effects of Business Cycles, General Measure to Control Business Cycles. *The Role of Government in Market Economy and Strategic Business Implications:* Rationale of Government Intervention, Government Macroeconomic Policy Measures – GST, Demonetization – and their impact on Business; Macro Economic variables and their functional relationship; Economic Functions of Government in a Market Economy, Legal and Social Framework, Restraining Unfair Competition and Increasing Market Power, Reallocation of Resources in the Presence of Externalities, Redistribution of Income, Regulation of Natural Monopoly, Stabilization of Economy; *Macroeconomic Variables affecting Business:*Consumption Function, Saving Function, Investment Multiplier; Transaction, Precautionary, Speculative Demand for Money; Liquidity Preference; Components of Money Supply; Fiscal Policy & Monetary Policy and their implications on business and management; Inflation and Deflation - Demand pull and Cost push inflation; Government policies to control inflation. *International Trade Regime and its implications on Business:* GATT, World Trade Organization, Regional Trade Agreements – EU, NAFTA, ASEAN, SAFTA, MERCUSOR.	L1, L2, L3, L4, L5, L6	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Thomas, Christopher R., S. Charles Maurice, Sumit Sarkar, Managerial Economics, 9th Edition, Tata McGraw Hills.
2. Samuelson, Paul A., and William Nordhaus, Economics, 19th Edition, McGraw Hills India Pvt. Ltd.
3. Krugman, Paul and Maurice Obstfeld (2008), International Trade Policy, Pearsons.
4. Salvatore, D (2010), Managerial Economics, Oxford University Press

Reference Books

1. Peterson, H.C and Lewis, W.C. (2005), Managerial Economics, Prentice Hall of India

2. Bhattacharya, Govind and Debasis Bhattacharya. (2018), GST and Its Aftermath: Is Consumer Really the King, SAGE Publications.
3. Gupta, G.S. (2006), Managerial Economics, Tata McGraw Hill
4. Mishra, S.K., and V.K. Puri. (2009), Indian Economy, Himalaya Publishing House.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	--	2	1	1	--	--
CO2	1	1	2	--	--	--	--	2	--	1	1	--	--
CO3	1	1	2	--	--	--	--	--	--	1	1	2	2
CO4	1	1	1	--	--	--	2	2	2	1	1	2	2

1: strongly related, 2: moderately related and 3: weakly related

MSM4206	BUSINESS ANALYTICS	L	T	P	C
Version 1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course providesan introduction to data analytics to be used in business. The students will learn how data analysts describe, predict and make informed business decisions in various business domains like marketing, human resources, finance and operations. The aim of the course is to develop basic data literacy and an analytic mindset in students that will help them to make strategic decisions based on data.

Course Objective:

1. To investigate data to establish new relationships and patterns
2. To analyze the correlation between different variables for the predictive analytic and predictive modelling
3. To analyze the possibility of default and generate customer records
4. To understand and explore problems in business
5. To make the use of tools such as Excel and open source to interpret data
6. To use analytics to solve business problems

Course Outcomes

On successful completion of these programs, students will be able to:

CO1. Understand, integrate, and apply relevant knowledge and skills in a global context

CO2. Identify and describe complex business problems in terms of analytical models

CO3. Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives

CO4. Translate results of business analytic projects into effective courses of action

CO5. Communicate technical information to both technical and non-technical audiences in speech, in writing, and graphically

Modules	Blooms level*	Number of hours
Module I: Introduction to Business Analytics Importance and role of data driven decisions. Business Analytics – Definition, Market, Trends; Paradigm Shift from Data to Insight and from Business Intelligence to Business Analytics; Examples and Types of Business Analytics Analysis- Forecasting & Predictive Modeling; Descriptive, Prescriptive and Predictive Analytics. Data Summarization, Data visualization – Various visualization techniques, standardized reporting and Pivot Tables – Using Excel	L1, L2, L3	6
Module II: Data Mining Introduction to Data Mining; Crucial processes in data mining; Data Warehousing; Data Mining Techniques and Exploratory Data Analysis; Data Mining Tool – XL Miner.	L1, L2, L3, L5	8
Module III: Decision Making & Optimization Decision making under uncertainty – Decision Trees and Risk Profiles; Sensitivity Analysis; Optimizing complex decisions – Optimization of a large number of decisions while accounting for different kinds of physical and business decisions. Introduction to Optimization Techniques –Linear	L1, L2, L3, L4, L5, L6	8

Programming; Optimization – Use of Excel to solve business problems like marketing mix, capital budgeting and portfolio optimization.		
Module IV: Big Data and Introduction to R Introduction to Big Data, Big Data driven decisions in business organizations – Benefits and Security/Privacy concerns. Building Business and Economic Models –Tools to leverage data for Prediction purposes; Logistic Regression. Introduction to Machine Learning; Statistical Learning vs. Machine Learning; Major classes of Learning Algorithms –Supervised Vs Unsupervised Learning. Introduction to R Programing	L1, L2, L3, L4, L5, L6	8
Module V: Simulation using R and Excel Hands on Regression using R; Introduction to Simulation; Applications of Simulation and Building a Simulation Model. (Using Excel and R) Capstone Project.	L1, L2, L3, L4, L5, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Aczel, D.A., Sounderpandian, J., Saravanan, P. and Joshi, R. (2012). *Complete Business Statistics (7th ed.*). New Delhi, India: McGraw Hill Education (India) Private Limited
2. Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited
3. Gujrati, Damodar N and Sangeetha (2011). *Basic Econometrics (4th Ed.).* New Delhi, India: McGraw Hill Education (India) Private Limited
4. Beri, C. (2016). *Business Statistics*. New Delhi, India: McGraw Hill Education (India) Private Limited
5. Kothari, C.R. (2009). *Research Methodology: Methods and Techniques (2nd revised ed.).* New Delhi, India: New Age International Publisher
6. Sharma, J.K. (2013). *Operation Research: Theory and Applications (5th ed.).* New Delhi, India: Macmillan Publishers India limited
7. Stephen Powell and Ken Baker., "The Art of Modeling with Spreadsheet"
8. Data, data everywhere, "Special report on managing information,Economist", February 27th, 2010.
9. Liberatore and Luo, "The Analytics Movement, Interfaces, Articles in Advance", pp. 1–12, 2010.
10. "Using R for Data Analysis and Graphics". Introduction, Code andCommentary

Reference Books

1. Frederick Shiller & Gerald J Liberman. *Introduction to Operation Research*. New Delhi, India: Tata McGraw- Hill Education (India) Private Limited
2. Albright and Winston. Business Analytics: Data Analysis and Decision Making, 5th Edition
3. Gillet, B.E. *Introduction to Business Research*. Tata McGraw Hill

Modes of Evaluation: Class Test/Assignment /Written Examination

Examination Scheme:

Components	**ME**	**A**	**Q/S**	**L**	**CT**	**EE**
Weightage (%)	10	5	5	5	5	70

ME- Mid Term Examination; A- Attendance; Q/S- Quiz/Seminar; L- Lab, EE- External Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1		1	2	--	--	--	--	--	--	1	1	--	1

CO2	1	1	2	--	--	--	--	--	--	1	2	--	2
CO3	1	1	--	--	--	--	--	--	--	1	2	--	3
CO4	1	1	1	1	--	--	--	--	--	1	3	3	3
CO5	1	--	--	1	--	--	--	--	--	1	3	--	3

1:strongly related, 2: moderately related and 3: weakly related

MSM4207	SUSTAINABLE DEVELOPMENT & SUSTAINABILITY	L	T	P	SW/FW	C
Version 1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Objectives

1. The course seeks to build an inter-disciplinaryperspectiveonunderstandingsustainabledevelopment concerns and challenges.
2. This course familiarizes students with current debates and perspectives in analyzing constraints and opportunities for sustainable development.

Pre-requisites: Basic understanding of the concept of sustainability.

Student Learning Outcomes:

1. To be able to implement world policies based on sustainable development, cooperative responsibility and environmental security.
2. To be able to study sustainable alternatives for strengthening local economies.
3. To be able to build capacity of communities, with special emphasis on those regions or populations characterized by poverty, marginalization and exclusion.

Course Contents/ Syllabus:

	Weightage (%)
Module I: Perspective of Sustainable Development	**40**
Descriptors/ Topics Definitions & principles of Sustainable Development; Origin and evolution of the Sustainable Development;Notionofcarryingcapacity;BrundtlandCommissionReport;UNConferenceonHumanEnvironment1972;Earth Summit 1992; World Summit 2002; The role of population growth, migration, technological change, industrialization and international politics; Millennium Development Goals: Status (Global and Indian), Sustainable Development Goals: Status (Global and Indian);Indicators of environment and social development.	
Module II: Concept of Sustainability	**30**
Descriptors/Topics Definitionsustainability;Dimensionsofsustainability;Measuringsustainability:indicatorsandcertifications;Governance and scales of decision-making; Consumption patterns and ecological footprints; Resources, Wealth Distribution and Quality of Life; Environmentalsecurity;Measuring,monitoringandimprovingsustainabilityperformance;Establishingsustainabilityindicators,developinggoalsandimprovementprogram;Lifecycleassessment;Principles and guidelines of corporate sustainability.	
Module III: Sustainable Development Challenges and Response	**30**

Descriptors/ Topics Challenges to sustainable development: limited awareness, poor education systems, social barriers, governance, conflict between governments, political will, technology; Responses to sustainable development: Public Policy (Community Participation and Participatory Learning);Economics and Policy Coherence; Rural development & environmental sustainability; ESP: Equality, sustainability and peace; Sustainable developmentinprivatesector;Internationalcooperationonsustainabledevelopment; Sustainable development: future scenarios. Case studies	

Pedagogy for Course Delivery:
The subject methodology will follow the teaching approach which takes into account the students' own knowledge and their autonomous learning. In this regard, classes focus on a combination of lectures and participatory dynamics. **T**he structure of each unit includes a daily compulsory reading, followed by oral presentations by the students which will lead to class debates, group works and other activities. These activities will be complemented by lectures.

Continuous Assessment/ Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Presentation**	**Attendance**	
Weightage(%)	10	05	10	05	70

Text & References:

Text

- Elliott, J.A.2006 An Introduction to Sustainable Development .3rded. Abingdon, Oxon; New York: Routledge. Rogers,
- P.P., Jalal.,K.F., andJ. A.Boyd2008.An Introduction to Sustainable Development. Earthscan

References

- Adams,W.M.200.Green Development: Environment and Sustainability in the Third World, Routledge, New York.
- Agyeman, J., Bullard, R.D. and B. Evans (Eds.) 2003. Just Sustainabilities: Development in an Unequal World. London: EarthscanBarbier,E.2005. NaturalResources&EconomicDevelopment',CambridgeUniversit yPress,Cambridge.
- Peet, R. and M. Watts (Eds.) 2004. Liberation Ecologies: Environment, Development, Social Movements. London: Routledge. Robbins, P.2004Political Ecology: A Critica lIntroduction. Blackwell Publishing.

Text Books

- P.Armstrong."DisruptiveTechnologies:Understand,Evaluate,Respond",KoganPagePublishers.(2017)
- Efraim Turban,R amesh Sharda,Dursun Delen,"Decision Support and Business IntelligenceSystems",9thEdition,Pearson2013.
- Qiangfu ZHAO and Tatsuo Higuchi, Artificial Intelligence: from fundamentals to intelligent searches, Kyoritsu, 2017, ISBN:978-4-320-12419-6 (inJapanese
- IntroductiontoArtificial Intelligence,ShinjiAraya,KYORITSUSHUPPAN,ISBN4-320-12116-3(inJapanese)

- Internetofthings(IOT)Technologies,Applications,Challenges andsolutionsbyBK Tripathy(Editor),J Anuradha
- Blockchainand thesupplychain:: Concepts,Strategies andPracticalApplicationsbyNickVyas,AljosjaBeije
- NewArtificialIntelligence(Fundamental),TakashiMaedaand FumioAoki,Ohmsha,ISBN4-274-13179(inJapanese)

References:

- LarissaT.Moss,S.Atre,"BusinessIntelligenceRoadmap:TheCompleteProjectLifecycleofDecisionMaking",AddisonWesley,2003.
- CarloVercellis,"Business Intelligence:DataMiningand OptimizationforDecisionMaking",WileyPublications,2009.
- DavidLoshinMorgan,Kaufman,"Business Intelligence:TheSavvyManager"sGuide",SecondEdition,2012.
- CindiHowson,"SuccessfulBusinessIntelligence: SecretstoMakingBIa KillerApp",McGraw-Hill,2007.
- RalphKimball,MargyRoss,WarrenThornthwaite,JoyMundy,BobBecker,"TheDataWarehouse LifecycleToolkit", WileyPublicationInc.,2007

MSM4301	STRATEGIC MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces the key concepts, tools, and principles of strategy formulation and competitive analysis. It is concerned with managerial decisions and actions that affect the performance and survival of business enterprises. The course is focused on the information, analyses, organizational processes, and skills and business judgment managers must use to devise strategies, position their businesses, define firm boundaries and maximize long-term profits in the face of uncertainty and competition.

Course Objectives

The objective of this course is to

1. Introduce students to the key concepts, tools and principles of business policy and strategic management.
2. Expand the student's capacity to integrate and appreciate the changes in the environment that shape the strategy of a business and lead to developing a competitive edge.
3. Develop the perspective of students towards understanding the culmination of different functional areas into building up of a corporate strategy.
4. Expose the students to the various approaches in crafting business strategy, tools that aid in reasoning carefully about strategic options, and learning how companies use what-if analysis to evaluate action alternatives and make sound strategic decisions.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify and explain the various levels at which strategic decision making happens in an organization.

CO2: Analyse the internal and external environment of business that will lead to formulation of strategic plans.

CO3: Determine the suitability of strategies that firms have developed in the real world scenario to achieve valueable outcomes.

CO4: Prepare strategic analysis and choice in order to determine alternative courses of action that could best enable the firm to achieve its mission and objectives.

CO5: Review strategy implementation to gain competitive advantage.

Modules	Blooms level*	Number of hours
Module I: Introduction and Purpose of Strategy Formulation Evolution and Introduction of strategic management, Concept of Strategy, corporate, Business and Functional Levels of Strategy, Mission, Vision, Objectives, Approaches to four Phases in Strategic Management Process, Stakeholders in business and their roles in strategic management, Strategic decision making.	L1,L2	7
Module II: Environmental Analysis Analysing company's External Environment: PESTLE Analysis; Preparing an Environmental Threat and Opportunity Profile (ETOP), Analysing Industry Environment: Industry Analysis – Porter's Five Forces Model of competition, Strategic Group analysis.	L1, L2 ,L4	7

Module III: Analysis of Organizational Competencies Analysing Company's Internal Environment Resource based view of a firm, meaning, types & sources of competitive advantage, analysing company's Resources and Competitive Position, VRIO Framework; Benchmarking as a method of comparative analysis, Competitive advantage; Concept of a Core competence and Distinctive competitiveness, Characteristics of Core Competencies; Value Chain Analysis Using Porter's Model; Organizational Capability Profile: Strategic Advantage Profile.s	L1, L2,L3	7
Module IV: Strategic Analysis and Choice Generic Competitive Strategies: Meaning of Generic competitive strategies, Low cost, Differentiation, Focus – when to use which strategy; Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic alliances & Collaborative Partnerships), Retrenchment – Turnaround, Divestment, Liquidation, Outsourcing Strategies; Offensive and Defensive Strategies, Blue Ocean Strategy, Strategy in the age of Internet and E-commerce; Portfolio Analysis Business Portfolio Analysis – BCG Matrix – GE 9 Cell Model; Evaluation of Strategic Alternatives: SWOT Analysis, Grand Strategy Selection Matrix.	L1,L2,L3	8
Module V: Strategy Implementation and Evaluation Strategy Implementation, Barriers to implementation of strategy, Mc Kinsey's 7s Framework; Organization Structures for Strategy Implementation, Leadership Implementation, Functional Implementation, Strategic evaluation review and control.	L1, L2,L3,L6	7

**Bloom's Level: L1-Knowledge;L2-Comprehension;L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Kazmi, A.(2015), Business Policy and Strategic Management 4th edition), Tata Mc Graw Hill.
2. Wheelen and Hunger,(2018),Strategic Management and Business Policy :Globalisation, Innovation and Sustainability, Pearson Education.

Reference Books

1. Pearce and Robinson (2017), Strategic Management: Formulation, Implementation and Control, Tata McGraw Hill.
2. David Fred R.(2018)Strategic Management Concepts: A Competitive Advantage Approach, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	2	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	2	2	--	--	--	1	--	2
CO3	1	1	--	2	--	--	1	--	--	--	1	--	--
CO4	1	1	--	--	--	--	2	--	--	2	1	--	--
CO5	1	1	--	--	--	--	2	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MSM4302	SUSTAINABLE DEVELOPMENT & CLIMATE CHANGE	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Objectives:

This course familiarizes students with the development of the Earth's atmosphere, its dynamic nature and variability in terms of the global energy balance. It appraises the students on the management of climate change through mitigated and adaptive measures. It enhances the understanding on the varied impacts of climate change on various sectors and introduces about the international and national bodies like UNFCCC, IPCC, Kyoto Protocol; national and international policies, laws & regulations applicable to climate change.

Pre-requisites: Basic understanding of the environment and natural resources.

Student Learning Outcomes: On successfully completing this course, the students will be able to:

- Explain the green house effect, including consideration of natural and anthropogenic greenhouse gases, and their principal sources and sinks;
- Describe the natural carbon cycle and human impacts on the carbon cycle;
- Demonstrate an understanding of the range of options available for reducing global green house gase missions, including the use of carbons inks and carbon sequestration;
- Describe the various incentives and mechanisms used to promote greenhouse gas emissions reductions;
- Evaluate Global and National policies on climate change;
- Assess and select low-carbon products and services.

Course Contents/ Syllabus:

	Weightage (%)
Module I: Introduction to Climate Change	**25%**
Descriptors/Topics Green House Effect and Global Warming, Radiative Forcing, Feedback Mechanism, Global Warming Potential(GWP), Green House Gase missions from various natural & anthropogenic sources, Natural causes of climate change – Milankovitch cycles, Schwabe cycles, Eccentricity and Obliquity, Records of climate change (glacial cycles, ocean sediments, corals, treerings), Earthenergy balance, Ozone Layer Depletion, ENSO-El Nino and La Nina Effects	
Module II: Climate Change Vulnerability and Impacts	**25%**
Descriptors/Topics Potential impacts of climate change on water resources, agriculture, forest, natural ecosystems, infrastructure & energy sector, coastalzones, human habitats (rural &urban) and health. Approaches and tools of assessment of climate change.	
Module III: Climate Change Adaptation	**25%**

Descriptors/ Topics Definition of adaptation and mitigation; Adaptation options for terrestrial, freshwater & oceaneco system and their confluences. Adaptation options available for human systems like human health, human settlement, agriculture and food security and energy industry under various climate change scenarios. Carbon Sequestration–Carbon Capture and Storage	
Module IV: Climate Change Policy and Law	**25%**
Descriptors /Topics International & national legislative frame work in the field of climate change agreements, UNFCCC and Implementation (JI), decisions of the COP and COP/ MOP, DNA, CDM-EB and all Subsidiary Bodies, Introduction to REDD and REDD Plus.	

Pedagogy for Course Delivery: The course will be delivered through lecture mode. During tutorial sessions, written assignments, quiz and seminar presentations on various topics related to the course will be organized. Class room interactions on one to one basis will be an integral part of the learning experience. Students will be supplied with study materials regularly.

Assessment/ Examination Scheme:

Theory Assessment (L&T):

Continuous Assessment/ Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Presentation**	**Attendance**	
Weightage(%)	10	05	10	05	70

Text:

- GilbertM.Masters,IntroductiontoEnvironmentalEngineeringandScience
- Hardy,John T,ClimateChange-Causes, Effects,and Solutions,John Wiley&SonsApril2003
- StephenJCulver, BioticResponse to GlobalChange CambridgeUniversityPressJuly2000
- EditedbySteffen,W., Jäger,J.,Carson, D.J., Bradshaw,C.Challenges of aChangingEarthSpringer2003
- AnilMarkandya andKirstenHalsnaes Ed,ClimateChangeandSustainableDevelopment:Prospects forDevelopingCountriesEarthscan2002
- GlobalWarmingTheComplete Briefing,ThirdEdition,Johan Houghton,Cambridge UniversityPress.

References:

- IPCC Fourthand Fifth Assessment Report
- www.unfccc.int
- www.cdmrulebook.com
- www.carbonyatra.com
- www.earthscan.co.uk

MSM4303	SUSTAINABILITY REPORTING & CSR	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Objectives:

By the end of this course, students will be able to:

- Apply the principles and theories of sustainability management as a frame for strategic planning towards organizational sustainability goals
- Identify and prioritize sustainability issues based on importance to internal and external stakeholders and impact on the environment and/ or society
- Demonstrate working knowledge of how sustainability norms, rules and regulations are created by governments, NGOs, investors, companies and other stakeholder groups, and the processes needed for companies to measure, manage, and report on progress against sustainability targets**.**
- Overall understanding on CSR

Student Learning Outcomes:

1. Students can have an understanding about the multiple dimensions and complexity of sustainability achievement.
2. Students can evaluate sustainability using an evidence-based disciplinary approach and integrate economic, ecological, and social perspectives, the work area
3. Students think critically understand the needs and relevance of sustainability reporting and role of CSR in society
4. Students, as members of society can recognize and assess how sustainability impacts their lives and how their actions impact sustainability.

Course Contents/ Syllabus:

	Weightage (%)
Module I: Introduction to Sustainability Reporting	15
Descriptors/ Topics Linkage between Environment, Business and Society; Sustainability and the Role of Corporation; The Triple Bottom Line approach to business; Role of financial and non-financial disclosures and reporting; What is Sustainability Reporting; Need for Sustainability Reporting; Benefits of sustainability Reporting; Sustainability Report as a tool for sustainability risk assessment and stakeholder communication on sustainability performance.	
Module II: Sustainability related management standards and Indices	40
Descriptors/ Topics GRI Framework: disclosure requirements; Performance Indicators [Economic, Environmental, Labour Practices, Human Rights, Society, Product Responsibility] UN Global compact; IFC Social and Environmental Management System; SA8000; ISO27000and28000	

Security management System Standards; ISO 50001 Energy Management System; DowJones Sustainability Index; FTSE 4GoodIndices; Domini Social Index; Ethibel Sustainability Index; BSE Greenex.	
Module III: Planning a Sustainability Report	15
Descriptors/Topics Analysis and Research; Prerequisites of a Sustainability Report; Structure of a Sustainability Report; The concept of sustainability indicators; Stakeholder engagement including identification, mapping and prioritization; Indicator development (including performance measurement and monitoring) and materiality assessment information for inclusion in sustainability report, writing and designing the report Verification and Assurance of Sustainability Reports (assurance Standards) Future of sustainability reporting.	
Module IV: Sustainability Reporting	15
Descriptors/ Topics Current and future trends: Role of regulators, institutional framework, stakeholder engagement;; Challenges before firms DPE	
Guidelines for PSUs on CSR and Sustainable Development; National Voluntary guidelines; Sustainability Reporting Practices by Corporate Sector (Experiences haring will be done by executives from companies from different sectors); Advocacy for Sustainability Reporting.	
Module V: Corporate Social Responsibility	15
Descriptors/Topics Background of CSR, Business, Society and CSR; Legal Act and economic perspectives, Thrust Areas of CSR; Theories of CSR; Stakeholder analysis and engagement; CSR planning and implementation; Need Mapping; Prioritization; Roll-out; Creating Local Partnerships; Implementing, evaluating and scaling up CSR to maximize shared value; Approaches of CSR implementation through Cases	

Pedagogy for Course Delivery

Lecture Plan/Session Plan: The subject methodology will follow the teaching approach which takes into account the students' own knowledge and their self- learning. In this regard, classes focus on a combination of lectures and participatory method. **T**he structure of each unit includes a daily compulsory reading and by oral presentations by the students which will lead to class debates, group works and other activities. These activities will be complemented by lectures and video presentation.

Assessment/ Examination

Continuous Assessment/ Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Presentation**	**Attendance**	
Weightage(%)	15	10	10	05	60

Text & References:

Text

- Baxi,C.V.andR. SinhaRoy2011.CorporateSocialResponsibility,VikasPublishingHouse,NewDelhi.
- Rogers,P.P.,Jalal.,K.F.,andJ.A.Boyd2008.AnIntroductiontoSustainableDevelopment.Earthscan.

References

- Adams,W.M.200. Green Development:Environment and Sustainabilityinthe Third World, Routledge, NewYork.
- Agyeman,J.,Bullard,R.D.andB.Evans(Eds.)2003.Just Sustainability's:DevelopmentinanUnequalWorld. London:Earthscan
- Singh,S.K.2006.TripleBottomLine ReportingandCorporate Sustainability,PHIlearning, NewDelhi.
- Unerman,J.,Bebbington, J., and B. O'Dwyer2007. SustainabilityAccountingand Accountability. Routledge, NewYork.

MSM4304	HUMAN DIMENSIONS OF SUSTAINABILITY	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Objectives:

In a new geological age, human activity is having profoundly damaging and potentially irreversible impacts upon the planet. This course aims at understanding the human dimensions of sustainability issues, encompassing societal, political, economic, technological and cultural aspects, as they relate to the broad, interconnected topics of land, global change, energy, water, biodiversity and food. The course helps to analyse the human dimensions of environmental change and sustainability issues are: Transitions Theory, Social-Ecological Systems and Political Ecology.

Student Learning Outcomes:

1. Engage critically with a range of contemporary environmental change and sustainability topics, especially regarding the societal, political, economic, technological and cultural aspects of managing and responding to contemporary environmental change and sustainability problems;
2. Criticallyreflectontheinterrelationshipsbetweenenvironmentalchange and sustainability;
3. Evaluateandgainadeeperunderstandingofparticularenvironmentalchange and sustainability.

Pre-requisites: Introduction to Sustainable development and sustainability

Course Contents/Syllabus:

Modules	Weightage(%)
Module I: Introduction Descriptors/Topics Introduction to human dimensions of sustainability issues; Sustainability and societal, political, economic, technological and cultural aspects; Origins and Evolution: History of international efforts for environment and sustainability	25
Module II: Analytical Perspective : Origins and Evolution	
Descriptors/ Topics Transitions Theory; Social-Ecological Systems; Political Ecology; Economic development, wealth and poverty, social development, and the environment in an integrated systems perspective	25
Module III: Issues & Challenges	
Descriptors/ Topics Sustainability issues in regard to land, climate change, energy conservation and water supplies, biodiversity, food and governance; Relevance of sustainability as a priority for communities, national governments, and the international system; Sustainable Development Goals and the need for an integrated approach to their implementation;	25

Module IV: Education for Sustainable Development and Responsible Living	
Descriptors/Topics Understanding sustainable development at the individual level; Action plan to live in a more sustainable way; Explain the importance of sustainability too the land to accompany them as they implement more sustainable practices	25

Pedagogy for Course Delivery

(a) **Lecture Plan/Session Plan:** The subject methodology will follow the teaching approach which takes into account the students' own knowledge and their self- learning. In this regard, classes focus on a combination of lectures and participatory method. The structure of each unit includes a daily compulsory reading and by oral presentations by the students which will lead to class debates, group works and other activities. These activities will be complemented by lectures and video presentation.

Assessment/ Examination Scheme:

Continuous Assessment/ Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Presentation**	**Attendance**	
Weightage(%)	15	10	10	05	60

Text & References:

- Blaikie,P.(1995)Changingenvironmentsor changingviews:Apoliticalecologyfordevelopingcountries,Geography80pp.203
- Folke, C., Hahn, T., Olsson, P. & Norberg, J. (2005) Adaptive Governance of Social-ecological systems, Annual Review of Environmental Resources 30 pp. 441-73Griggs, D., Stafford-Smith, M., Gaffney, O., Rockström, J., Öhman, M.C., Shyamsundar, P., Steffen, W., Glaser, G., Kanie, N., & Noble, N., (2013) Policy:Sustainabledevelopment goalsfor peopleandplanet,Nature495pp.305-307http://www.nature.com/nature/journal/v495/n7441/full/495305a.html
- Loorbach, D., Frantzeskaki, F. & Avelino, F. (2017) Sustainability Transitions Research: Transforming Science and Practice for Societal Change, Annual Review ofEnvironment and Resources 42 pp. 599-626
- Peet,R.,Robbins,P.&Watts,M.(2011)Global Political Ecology.NewYork: Routledge
- Robbins, P. (2012) Political Ecology: A critical introduction (2nd edition) Chichester, UK: Wiley-Blackwell (read Part 1: 1 Political versus Apolitical Ecologies(p11))
- Rotmans,J. &Loorbach, D. (2009)ComplexityandTransition Management,Journal of IndustrialEcology13 (2)pp. 184-196.

MSM4305	BUSINESS CERTIFICATION FOR SUSTAINABILITY	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Objectives:

Sustainability certification for business is not than just a stamp of approval but also a commitment to a society to ingrain eco-friendly ways into each part of the company that really make an impact on society as a whole. The objective of this course is to develop an understanding of how going green can save money, increase customers and provide a new way to business for going up. The course shall explain the relevance of sustainability on the specific areas which can help companies to make a difference to the world.

Pre-requisites: Introduction to Sustainable development and sustainability

Student Learning Outcomes:

1. Understanding eco-friendly programs relevant to the companies;
2. Analysing impact of sustainable solutions on businesses and eliminate carbone mission;
3. Evaluate the importance of sustainability certifications as voluntary standard relating to environmental, social, ethical and food safety issues;
4. Critically reflect understanding of third party certification;

Course Contents/ Syllabus:

Modules	Weightage(%)
Module I: Introduction Descriptors/Topics Meaning and Benefits of sustainable business certification; Business commitment to environmentalism and social responsibility; Best practices in green business certification	25
Module II: Green programs and social initiatives	
Descriptors/Topics Eco-friendly and socially-responsible programs for the companies; Importance of leadership and expert guidance; Self-assessmentofcompany'ssustainabilityeffortsandidentifyareastofocustobecomegreen.Eliminateoperationalcarbon emissions from the facilities	25
Module III: Reporting	
Descriptors/Topics Corporate Sustainability Reporting Standards; Public disclosure of Corporate information; Sustainability reporting by independent organization: Global Reporting Initiative(GRI) Sustainability Accounting Standards Board(SASB) Task Forceon Climate-Related Financial Disclosures	25

Module IV: Third Party Certifications	
Descriptors/Topics Importance & Impact of Third party Certification on business ThirdpartycertificationorganizationsincludingLEED,ISO,B-Corp, andGreenBusiness Bureau;	25

Pedagogy for Course Delivery:

(b) **Lecture Plan/Session Plan:** The subject methodology will follow the teaching approach which takes into account the students' own knowledge and their self-learning. In this regard, classes focus on a combination of lectures and participatory method. The structure of each unit includes a daily compulsory reading and by oral presentations by the students which will lead to class debates, group works and other activities. These activities will be complemented by lectures and video presentation.

Assessment / Examination Scheme:

Continuous Assessment/ Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Presentation**	**Attendance**	
Weightage(%)	15	10	10	05	60

MSM4401	MANAGEMENT IN ACTION-SOCIAL, ECONOMIC & ETHICAL ISSUES	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives:

- Developunderstandingoftheprofessionalprerequisitestopracticeofmanagementintermsofrequiredskillsandattitudetorespondproactivelytorapiddiscontinuous Change in business environment.
- Develop students the attributes of a consultant.
- Developabilitytosensetheongoingconflictbetweenenvironmentalchangeandinternaldesireofmanagement for stability.
- DevelopingaresponsibleattitudetowardsethicalpracticesandSocialresponsibilitytowardsthestakeholders

Pre-requisites:

Interest to learn concepts of consultancy and appreciate the importance of ethics in business

Student Learning Outcomes: On completion of this course students will be able to:

- Examine the dynamic global corporate environment.
- Understand the working knowledge of managing a consulting firm.
- Integrate a systematic/structured approach in diagnose and providing solutions to management problems.
- Analyze and apply their critical thinking skills in solving Management problems
- Appraise the ethicalprinciplesandcorporatesocialresponsibilitytocurrentbusinessscenario.

Course Contents/Syllabus:

	Weightage(%)
Module I: Introduction	**15%**
Descriptors/Topics Modern Management Practices and Issues Involved, Outsourcing Management Services and Evolution of Management Consultancy, Skills-set required for Management Consultants. Consulting and performance counseling**.**	
Module II: The Process of Management Consulting	**15%**
Descriptors/Topics Consulting Proposals. Identification and Definition of Problem, Fact-Finding Leading to Solution Development and Implementation, Developing Strategic and Tactical Plans and Subcontracting, Pricing of Consultancy, Acquiring & Developing Talents for Consulting.	
Module III: In-house Management versus Management Outsourced	**15%**
Descriptors/Topics Why a Sense of Skepticism and Unease Towards Management Consultants. Costversus Value of Advice, Separating Consulting Success from Consulting, Disaster. Some Revealing Situations.	
Module IV: Cross Cultural Management Systems and Processes	**15%**

Descriptors/Topics Types of organizational culture, Strength of organizational culture, Function of organizational culture, Importance of culture to the organization, Cultural Models, Cross-Cultural Perspectives, Geert Hofstede and Cross-Cultural Issues	
Module V: Economic and Social Issues in Management	**20%**
Descriptors/Topics Adaptation to Changing Environment In General and Economic Environment in Particular, Economic Growth and Change Areas, Emerging Opportunities in Various Sectors including Social Sector, Management Practice and Cultural Issues, The global Political Situation, The Global Competitive Environment and the internal scene in India, War Game.	
Module VI: Ethical Issues in Management	**20%**
Relationship among Various Stakeholders, Reasons for Conflict of Interests Among Stakeholders, Corporate Governance and Ethics. Why Unethical Decisions Leading to Conflictsare Taken, Power and Politics, Initiatives on Corporate Governance by the Governments.	

Pedagogy for Course Delivery: The course will be taught using case studies and digital resources, with assigning individual project assignment and research paper.

List of Professional Skill Development Activities (PSDA):

1) Case Study–.Identifying the management related issues in organization and developing a consultancy proposal and resolutions
2) Developing a research paper on corporate social responsibility or on success of Outsourcing practices in competitive Business scenario.
3) Viva on project

Assessment/ Examination Scheme: Theory Assessment(L&T):

	Continuous Assessment/ Internal Assessment						**End Term Examination**
Components	**Assignment**	**Case study**	**Report Writing**	**Viva**	**Class Test**	**Attendance**	
Weightage(%)	10	10	10	5	10	5	50

References:

- Parekh,DeepakS, (1999),TheRealMeaningof CorporateGovernance,IndianManagement.
- Cogner,JayA,DavidFinegoldandEdwardELawlerIII,(1998),AppraisingBoardroomPerformance,HarvardBusiness Review.
- Kumar Mangalam (1999) ,Birla Committee Report on Corporate Governance – Legislation alone is not Enough, Activating Adult Committees. Shareholder – FriendlySteps,The Hindu,
- Sodarn,Kailash,(1999),Transparencyin CorporateGovernance,IndianManagement, Vol.38, No.10.

Any other Study Material:

- ReferringtotheArticles andresearchofMickinsey,BCG,Deolitte
- SRWire: Thecorporate social ResponsibilityNewswire

MSM4403	SUSTAINABLE ENTERPRISE & LEADERSHIP	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Objective
This course examines a wide variety of leadership styles in sustainable enterprise development with the intent to investigate their long-term application to a more global vision of leadership. Particular attention will be paid to those individuals and institutions that are changing world for better.

Pre-requisites
The student opting for this course should have interest in leadership and global environment.

Student Learning Outcomes

- Understand key concepts of global leadership
- Discuss pressing global issues that require leaders' attention.
- Personalize and implement the practices of altruistic leadership
- Discovercharacteristicsandchallengesofleadershipintheglobalenvironment
- Gaininsightstomoreeffectivepersonalleadershipincross-culturalsettings

Course Contents/Syllabus

	Weightage(%)
Module I: Introductions and Overview	25
Leadership and management for sustainable enterprise development; Introductions and assessment of needs for sustainable business solution; Perspectives on global leadership and management **Leadership and Management in a Globalized World** Leadership with global perspective of human and ecological survival; Globalization Implications for shifts in Leadership.	
Module II: Leadership Dimension	25
Leadership: The Individual Dimension The EMERGE Solution to Wicked Challenges: Public Leadership for Sustainable Development Values Integration for Professional and Personal Grounding From Personal to Systems Mastery: The Leadership Role Profile **Leadership: The Team Dimension** Team Concepts and Applications Leadership and Followership Cross-cultural Awareness and Communications	
Module III: Leadership: The Organizational and Societal Context	25
Leadership: The Organizational and Societal Context Inspirational Visioning: From Rhetoricto Empowerment and Action Norming New Solutions **The Powers to Lead** Leadership and Smart P ower Releasing th Full Potential of Followers	

Convening Coalitions for the Public Good	
Module IV: Building and Sustaining a Culture of Authentic Leadership	**25**
• Leadership and Management Development • The Performance Learning Approach and Collective Individualism • Concluding Thoughts on Public Leadership and Management	

Pedagogy for Course Delivery
This class will be taught using a mix of theory, latest concepts from research publications in leading International Journals and the case method.

Assessment/ Examination Scheme:
Theory Assessment(L&T):

Continuous Assessment/ Internal Assessment					**End Term Examination**
Components	**Project**	**Viva**	**Class Test**	**Attendance**	
Weightage(%)	10 %	5%	10 %	5%	70%

Text & References

- Brinkerhoff,D.and B.Crosby. 2002. ManagingPolicyReform:Concepts andToolsfor DecisionMakers inDevelopingandTransitioningCountriesKumarianPress.
- Nye,J.S.Jr.,2008.ThePowerstoLead.OxfordUniversityPress.
- Wheatley,MargaretJ.2007.FindingourWay: Leadership foranUncertainTime.BerrettKoehler Publishers(Paperback)

MSM4404	CREATIVITY AND INNOVATION IN DESIGNING SUSTAINABLE SOLUTIONS	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

This course is designed to introduce the student to the practices necessary to stimulate and manage innovation in a business for designing sustainable solutions. Students will be given frameworks and methods for designing, developing, and implementing innovation in real work situations. The aim of the course is to provide the perspective and skill base necessary to manage innovation-focused projects, people, and ventures. This course will help in developing creative problem-solving skills to identify emerging opportunities and challenging conventional wisdoms. The creative and innovative solutions that come from interactive learning experiences are examined for their ability to be successfully exploited as innovations, in the competitive market.

Prerequisites:
The student opting for this course should have successfully completed the course "Entrepreneurship and New Venture Creation" offered by the university. This course focuses on the understanding the concept of innovation and creativity from a real-life perspective. The student should have a keen sense of understanding analytical thinking as the course is designed to help the students use new techniques to think creatively and innovatively.

Student Learning Outcomes

1. The student who completes the course will be better positioned to interpret and examine the impact of innovation and creativity in business. The student will be better placed to identify, infer and apply different creative thinking techniques and model them against principles of creative management.
2. Graduates of the course will be better positioned to construct the processes and determinants of the successful exploitation of innovation. By the end of the course, the student should be able to develop and formulate managerial strategies to shape innovative performance by capturing merging trends
3. Thecoursewillhelpthestudentassessandevaluatecreativedevelopmentwithinanorganizationandsupportaplanofactiontoenhancetheability to think creatively and foster innovation.

Course Structure

	Weightage(%)
Module I: Introduction to Innovation	**15%**
Defining innovation and its relevance in developing sustainable business solutions Need and importance of innovation, types of innovation, innovation v/s invention Lateral & horizontal technique of innovation Need for Creativity and Innovation in start-ups and existing organizations Drivers to Innovation; Barriers and Challenges to Innovation Game changer	
Module II: Idea Generations	

Creativity & Innovation Nature of Creativity: Person, Process, Product and Environment Generation of ideas, Capturing & Processing of thoughts Methods for generating and evaluating creative ideas including brain storming, mapping, metaphors, networking, intuition ,judgment and imaging	**20%**
Module III: Idea Conversion	**15%**
Evaluating ideas, conversion and implementation of ideas Business Dimension of Innovation and nature of Innovation Making the Idea a reality, Connecting the dots, Lasting & differentiating leadership, motivation &success	
Module IV: Models of Innovation	**20%**
Static and dynamic models of Innovation, Incremental versus Radical innovation Abernatty- Clark Model, Henderson Clark Model, Disruptive Technological Changes	
Module VL: Managing Creativity and Innovation	**30%**
Assessing Personal Creativity and Ability to Innovate Enhancing Creative and Innovative Abilities Entrepreneurial Tools for Creativity and Innovation—Exploring the Intersection, Developing and Contributing to a Creative-Innovation Team Evolving a Culture of Creativity and Innovation in Organizations	

Pedagogy for Course Delivery:
This class will be taught using the theory and case method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques.

List of Professional Skill Development Activities (PSDA):

i. Identifying the problem and searching for an appropriate solution through Design thinking framework
ii. Searching for newer plat forms for efficacy of the idea

Assessment

Continuous Assessment/ Internal Assessment						**End Term Examination**
Components	**Midterm**	**Term paper**	**Home Assignment**	**Project and viva voce**	**Attendance**	
Weightage(%)	10%	10%	5%	20%	5%	50%

Text:

- TheSeedofInnovation, DundonE,PHI,ISBN:978-8120332683
- GettingtoInnovation,VanGundyA.B.,PHI,ISBN:978-8120335782

References:

- Sharma, Apoorv and Joshi, Manoj and Shukla, Balvinder, Is Accelerator an Option? Impact of Accelerator in Start-up Eco-System! (May 19, 2014).Availableat SSRN:https://ssrn.com/abstract=2438846orhttp://dx.doi.org/10.2139/ssrn.2438846
- Joshi, Manoj and Shukla, Balvinder, A Perspective of Innovation in Entrepreneurial Firms (July 28, 2014).

Available atSSRN: https://ssrn.com/abstract=2442757
orhttp://dx.doi.org/10.2139/ssrn.2442757

- Research on Innovation: A Review and Agenda for Marketing Science, Hauser J, Tellis G J, Griffin A, Marketing Science Vol 25, No. 6, November-December2006
- DisruptiveInnovationforSocialChange,byChristensenCM,BaumannH,Harvard BusinessReview,December2006

Journals

- HarvardBusinessReview
- InternationalJournalof EntrepreneurshipandInnovation, IPPublishing
- Journalof BusinessVenturing-Elsevier
- JournalofEntrepreneurshipinEmergingMarkets,Emerald
- Technology, Innovation,EntrepreneurshipandCompetitiveStrategy,Emerald

AnyotherStudyMaterial:

- EntrepreneurshipTheoryattheCrossroads:ParadigmsandPraxis,ManimalaMJ,DreamtechPress, ISBN:81-77224603
- ONInnovation,JonesT,EssentialIdeas,LLC,ISBN:978-0615684505
- TenTypesofInnovation:TheDisciplineofBuildingBreakthroughs,KeeleyL,PikkelR,QuinnB, Wiley,ISBN:978-1118504246
- Innovation:TheFiveDisciplinesforCreatingWhatCustomersWant,CarlsonCR,WilmotWW,CrownBusiness, ASIN:B00E28O51Q
- SeedsofInnovation,Dundon,E,Amacom,ASIN:B000SES3X4
- ThenewageofInnovation,PrahaladCK,KrishnanMS,ISBN-13:978-0071598286
- TheGameChanger,LafleyAG,RamCharan,PenguinIndia,ISBN:978-0143065173
- Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation, Georg von Krogh, Kazuo Ichijo,OUP USA,ISBN: 978-0195126167

MSM4405	GREEN MARKETING & ENVIRONMENTAL PRODUCT DESIGN	L	T	P	SW/FW	C
Version 1.1	Latest Approved	3	0	0	3	6
Pre-requisites/Exposure						
Co-requisites						

Course Objectives: The course aims to explain the strategies for green marketing and to introduce students to the role of environmental marketing within society and within the economic system. It further helps in developing student's understanding of the breadth of activities that fall within the domain of green marketing

Student Learning Outcomes

- Demonstrate knowledge of concepts and definitions of sustainability marketing
- Understand ways to deliver superior customer value based on sustainability principles
- Understandcommercial,institutional,ecologicalandsocialperspectivesof sustainability marketing
- Evaluate the relationship between sustainability with marketing mix

Course Structure

	Weightage(%)
Module I: Green Marketing Strategy and the Four P's of Marketing	**15%**
Explain green marketing strategy and how to be stin corporate a green strategy into a company's overall vision. Define how sustainability works in the marketing mix. Understand consumer market segmentation. Describe marketing tools to help promote a brand	
Module II: Sustainable Marketing Mix	**30%**
4Ps of Marketing based on sustainability principles Consumer Target Market Segmentation Eco-friendly environmental packaging	
Module III: Environmental Product Design	**15%**
Minimize materials use Minimize the negative impact of the production process Maximize the efficiency of the distribution process.	
Module IV: Tools for developing Sustainable business model	**20%**
Product, service Design and packaging Life Cycle Analysis Design for Environment MET Matrix, ecological foot print and environmental check lists	
Module V: Issues & Challenges	20%

Basic environmental problems Decision making and implementing appropriate strategies to address environmental problems. Total Quality Environmental Management Strategic Opportunities in Green Marketing	

Pedagogy for Course Delivery:

This class will be taught using the theory and case method. In addition to assigning the case studies, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the consumer. The instructor will cover the ways to think innovatively liberally using thinking techniques.

Assessment

Continuous Assessment/ Internal Assessment						**End Term Examination**
Components	**Mid term**	**Term paper**	**Home Assignment**	**Project and viva voce**	**Attendance**	
Weightage(%)	10%	10%	5%	20%	5%	50%

Reference Material

- The New Rules of Green Marketing: Strategies, Tools, and Inspirationfor Sustainable Branding by Jacquelyn Ottman
- Green Marketing Management by Robert Dahlstrom,
- Principles of Sustainability by Simon Dresner, 2nd Edition"
- Strategies fortheGreenEconomy:OpportunitiesandChallengesintheNewWorldofBusinessbyJoelMakower
- Natural Capitalism by L. Hunter.
- Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage" by Daniel Esty

Amity Business School

Master of Business Administration
(Banking & Finance)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Business Administration
(Banking & Finance)

Syllabus - First Semester

MANAGEMENT PROCESS AND ORGANIZATION BEHAVIOUR

Course Code: MBF4101 **Credit Units: 03**

Course Objective:
To help the students gain understanding of the functions and responsibilities of the manager and to provide the student understand Human Behaviour in organizations so as to improve his managerial effectiveness.

Course Contents:
Module I: Management vs. Manager
Evolution of management thought, Functions of management, Roles and Skills of a manager, Emerging challenges of management.

Module II: Organization
Nature and structure of organization, Types of organizations, Line and staff relationships, Formal and informal organizations.

Module III: Introduction to Organization Behaviour
Overview of organization behaviour and its importance, Organization models.

Module IV: Individual Behaviour
Individual behaviour, Perception and learning, Personality, Values & attitudes, Motivation: Concept theory and application

Module V: Group Behaviour
Group dynamics, Communication, Leadership, Power and politics, Conflicts and negotiation.

Module VI: Organizational Culture and Change Management
Organisational culture, Organisational change and development, Work stress and its management**.**

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Luthans, F. (2010), Organizational Behaviour, Mcgraw-Hill Education India Pvt.Ltd - New Delhi.
- Robbins, S.P. (2016), Organizational Behaviour, Sixteenth Edition, Pearson Education.
- Greenberg, J. & Baron, R.A. (2005), Behaviour in Organizations, Pearson Education.
- Newstrom John W. and Davis Keith, (1993), Organizational Behaviour: Human Behaviour at Work, Tata McGraw Hill, New Delhi
- P. Subba Rao (2010), Management and Organisation and Behaviour, Himalaya Publishing House, New Delhi
- Pierce Gardner with Dunham (2011)Managing Organizational Behaviour. Cengage Learning India.

ACCOUNTING FOR MANAGEMENT

Course Code: MBF4102 **Credit Units: 03**

Course Objective:
Participants in this course will develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, participants will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts. In addition the course develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Contents:
Module I: Introduction
The Financial Accounting Framework, Accounting Policies, Need of Accounting. Users of Accounting Information, Accounting Cycle, Accounting and Management Control.Balance sheet-Dual Aspect principle, Classification Items of Balance Sheet, Formats of Balance Sheet.Preparation of Balance Sheet. Income Statement- Realization vs. Accrual Principle, Format of Income Statement), Preparation of Income Statement (IAS,GAAP&IFRS) Depreciation Accounting.

Module II: Measuring and Reporting
Measuring and Reporting :Cost of sales and Inventories, Debentures, Investments, Shareholder Equity. Human Resource Accounting-Valuation of Human Resources, Recording and Disclosure in Financial Statements

Module III: Management Accounting
Contrast between Management Accounting and Financial Accounting and Reporting, Types of Management Accounting Information and their uses, General Observation on Management Accounting. Statement of Cash Flows-Profit versus Cash, Purpose and Use of Cash Flow Statement, Format of Cash Flow Statement (AS-3), Preparation of Cash Flow Statement (IAS,GAAP& IFRS).

Module IV: Analyzing and Interpreting Financial Statements
Financial Statement Analysis – Basic Relationship, Overall Measures, Profitability Ratios, Investment Utilization Ratios, Financial Condition Ratios, Making Comparisons.Du-pontanalysis.Interpretations of calculated Ratios.

Module V: Cost Accounting: The behavior of cost- Relation of cost to volume, BEP & Profit graph-CVP analysis, Full cost and its uses. Techniques of costing.Standardcosting.Strategic planning and budgeting.

Examination Scheme:

Components	Assessment 1 Group Presentation	Assessment 2 In Class Quiz	Class Test/Mid Term Exam	Attendance	External
Weightage (%)	10	5	10	5	70

Core Text Book:
- Anthony, N.R; Hawkings, F. D; Merchant, A.K (2014), Accounting Text and Cases, 13th Edition, McGraw Hill.

- Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, McGraw Hill.

References Book:

- Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing house
- Narayanaswamy R (2014), Finanacial Accounting – A Managerial Perspective, 5th Edition, Prentice Hall of India.
- Maheshwari S N; Maheshwari SK and Maheshwari SK, 3rd Edition, A Text Book for Accounting for Management, Vikas Publishing House.
- M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.

MARKETING MANAGEMENT

Course Code: MBF4104 **Credit Units: 03**

Course Objective:
The objective of this course is to provide the students exposure to modern marketing concepts, tools, and techniques, and help them develop abilities and skills required for the performance of marketing functions.

Course Contents:
Module I: Understanding Marketing in New Perspective
Fundamentals of Marketing, Customer Value and Satisfaction, Customer Delight, Conceptualizing Tasks and Philosophies of Marketing Management, Value Chain, Scanning the Marketing Environment, Marketing Mix Elements, Difference between marketing and Selling, Relationship marketing, Social marketing, Strategic Planning in marketing, formulating the marketing plan.

Module II: Analyzing Consumers & Selecting Markets
The factors influencing consumer behavior. The stages in the buying process, the buying decision making process, factors effecting the buying decision., Market Segmentations, Levels of Market Segmentations, Patterns, Procedures, Requirement for Effective Segmentation, Evaluating the Market Segments, Selecting the Market Segments, Tool for Competitive Differentiation, Developing a Positioning Strategy.

Module III: Managing Product & Pricing Strategies
Classification of products, New Product development, stages of product development, Adoption process, Product mix decisions and line management, Length, width and depth of a line, line analysis, and brand management, product life cycle, stages in lifecycle and factors affecting each stage, Managing product life cycles. Setting the price, adapting the price, initiating and responding the price changes,

Module IV: Designing: Managing the Integrated Communication
Channel functions and flows. Channel design decisions. Channel management decisions. Channel dynamics; vertical horizontal and multi channel marketing systems. Market Logistics decisions. Effective Communication, Integrated Marketing Communication, Marketing Communication Process, Promotion mix, Advertising, Personal Selling, Sales Promotion and Publicity and Public Relations, Direct Marketing,

Module V: Emerging Trends in Marketing
An Introduction to Internet Marketing, Multi Level Marketing, E-Marketing, Green Marketing, Event Marketing, Types of Events, Sponsorship, Cause Related Marketing, Marketing for Non Profit Organizations Marketing Strategies for Leaders, Challenges, Followers and Nichers

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Kotler, Keller, Koshy, Jha, (2008), Marketing Management– A South Asian Perspective, Pearson India Pvt.
- Kurtz, (2008) Principles of Marketing, Cengage Learning, India,
- S. Neelamegham, (2009), Marketing In India,Vikas publishing house,
- Biplo Bose, (2008), Marketing Management, Himalaya Publishing House.
- Paul Baines, Chris Fill, Kelly Page, (2009), Marketing, Oxford University Press
- Winner (2009), Marketing Management, Pearson India Pvt.
- William L. Pride and O.C. Ferrell, (1993) Marketing Concepts and Strategies, Boston, Houghton Mifflin.
- Czinkota and Kotabe, (2007) Marketing Management, Cengage Learning, India
- Evans, (2008), Marketing Management, CengageLearning,India
- RajanSaxena, (2010) , Marketing Management,Tata McGraw Hill

QUANTITATIVE TECHNIQUES IN MANAGEMENT

Course Code: MBF4106 **Credit Units: 03**

Course Objective:
The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the business environment using contemporary software.

Course Contents:
Module I: Introduction
Application of Statistics in Business; Classification of Data; Interpretation of computer output of diagrammatic and graphical presentation of data, measures of central tendency, measures of dispersion and skewness.

Module II: Probability and Probability Distributions
Concepts of Probability, addition theorem, multiplication theorem, Baye's Theorem; continuous and discrete probability distribution:Binomial Probability Distribution, Poisson Probability Distribution and Normal Probability Distribution.

Module III: Sampling and Sampling Distribution
Sampling: Basic Concept, Types of Sampling, Errors and Precautions in sampling, size of sample, Parameter and Statistic, Sampling Distribution of the mean, Sampling distribution of proportion, Estimation – point estimation, Interval Estimation,

Module IV: Tests of Hypothesis
Null and Alternative hypothesis, One-Tailed and Two-Tailed tests of hypothesis, Type I and Type II error, rejection rule using p – Value and critical value approach. Hypothesis Testing to compare two populations: Test for one sample mean, Test for two population means (Independent Samples), Tests for two population means (Dependent Samples), Tests for two population proportions (Independent Samples), Tests for two population variances (Dependent Samples), F-test, Chi – Square Test

Module V: Forecasting Techniques
Correlation - Karl Person, Spearman's Rank methods, simple linear regression analysis – Estimated regression equation, least squares method, coefficient of determination, interpretation of computer output for Regression, Introduction to time series, trend analysis

Module VI: Introduction to SPSS, performing univariate and bivariate analysis on SPSS

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Anderson D.R; Sweeny D.J, Williams T.A (2002), Statistics for Business and Economics, Cengage learning.
- KazinierL.J.,& Pohl N.F. (2004), Basic Statistics for Business and Economics, New York: McGraw Hill.
- Levin Richard I. & Rubin David S.(1998), Statistics for Management, Pearson Education India
- Stephen .K.C. (2002), Applied Business Statistics: Text, Problems and Cases. New York: Harper and Row.
- Sharma, J.K. (2007), Business Statistics, Pearson Education India.

FINANCIAL ENVIRONMENT

Course Code: MBF4107 **Credit Units: 02**

Course Objectives:
Financial system of a country is closely related to the economic development. There is drastic change in the functioning of financial system in this era of liberalization, privatization and globalisation. The purpose to study Indian financial environment is to give a clear understanding and knowledge of financial system in the present scenario.

Course Contents:
Module I: Financial System
Financial System: Meaning and Significance-Functions of the financial system -Financial Assets-Financial markets- Classification-Financial instruments-weakness of Indian Financial System.

Module II: Money Market
Money market: Definition-Features-Objectives-Features of a developed money market- Importance of Money market-Composition of Money market-Operations and Participants- Money market Instruments-features of Indian money market-Recent developments.

Module III: Capital Market
Primary, Secondary and Capital Markets: New issue market-meaning-functions-methods floating new issue - intermediaries in the new issue market-merchants bankers and their functions -Recent trends in new issue market - Stock Exchanges-Functions-Structure of stock exchanges-BSE-NSE- listing of securities-Advantages of listing-methods of trading in stock exchanges-on line trading-stock indices

Module IV: Financial System
Financial Institutions: commercial banks- development financial institutions- Non-banking financial corporation-Mutual Funds, insurance companies – Objectives and functions.

Module V: Monetary Policy and Regulatory Institutions
Monetary Policy of India: Objectives, Monetary Operations- Open Market Operations, CRR, SLR, Bank Rate Policy, Credit Ceiling, Credit Authorization Scheme, Moral Suasion, Repo Rate and Reverse Repo Rate.
Regulatory Institutions – RBI – Role and Functions. The Securities and Exchange Board of India – Objectives –Functions –Powers -SEBI guidelines for Primary and Secondary Market.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Financial Environment 01 Edition by Brighouse, Ane Books Pvt. Ltd (2009)
- Indian Financial System and Development by Vasant Desai, Himalaya Publishing House.
- Indian Financial System by Gordan and Natarajan, Himalaya Publishing House.
- Indian Financial System by M.Y.Khan, Tata McGraw Hill

HUMAN RESOURCE MANAGEMENT

Course Code: MBF4108 **Credit Units: 03**

Course Objective:
The objective of this course is to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India.

Course Contents:
Module I: Human Resource Management in Perspective
Nature and scope of HRM, HRM functions, HRM models, understanding concepts of Personnel Management, Human Resource Development and Strategic Human Resource Management, HR Environment, Changing Role of HR.

Module II: Meeting Human Resource Requirements
Job Analysis, Job Description, Strategic Human Resource Planning, Recruitment, Selection Process, Methods – Interview, Tests, Placement and Induction

Module III: Training & Developing of Employees
Training and Development, Understanding of Performance Management Systems, Potential Appraisal, Career Development

Module IV: Managing Compensation
Job evaluation, Methods of Job Evaluation, Strategic Compensation, Equity Theory, Components of Pay Structure, Designing and Administration of Wage and Salary Structure, Wage Regulations in India

Module V: Employee Relations
Overview of Industrial Relations, Industrial disputes, Collective Bargaining, Workers Participation and Management, Grievance handling

Module VI: Emerging Trends in HRM
Overview of Human Resource Information System (HRIS), Introduction to HR Audit, IHRM Practices, Cross- Cultural and Diversity Management, Work-life integration, Human Resource Outsourcing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- David A. Decenzo ,Stephen P. Robbins , Susan L. Verhulst,(2015), **Human Resource Management** ,eleventh edition , Wiley;
- Prasad. L.M, (2014) Human Resource Management, Third Edition, Sultan Chand & Sons; New Delhi.
- Chhabra T.N,(2014) Human Resource Management: Concepts and Issues, Edition 2014,Dhanpat Rai& Co
- Dessler G (2014) **A Framework for Human Resource Management,** 7 edition (2014), Pearson Education India;
- Michael Armstrong , Stephen Taylor,(2017), **Armstrong's Handbook of Human Resource Management Practice,** 14 edition (3 February 2017), Kogan Page;

INFORMATION TECHNOLOGY AND E-COMMERCE

Course Code: MBF4109 **Credit Units: 02**

Course Objective:
This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. The course will expose the students to the latest trends in e-business models, electronic payment systems and data & information security

Course Contents:

Module I: Modern Computer Systems
Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation, (e.g. Delhi Metro , Digitally Controlled Car engines etc.), Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources

Module II: Data Resource Management
Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts.SQL Query handling, Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers. Storage Technologies and Architecture (DAT, NAS, SAN etc.). Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis

Module III: Telecommunications and Computer Networks
Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Network Topologies, Web 2.0/3.0, Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,Features of 3G & 4G technologies, VOIP and IPTV.

Module IV: Electronic Commerce Systems
Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services.

Module V: E-Commerce Business Models & EDI
Concept of EDI, Difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI.Various business models in Ecommerce likeB2C, B2B, C2C.

Module VI: E-Payment Systems and Security Management
Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards.
The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types.Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd
- Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education

- Ravi Kalakota& Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.
- Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
- J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.

Syllabus - Second Semester

FINANCIAL MANAGEMENT

Course Code: MBF4201 **Credit Units: 03**

Course Objective:
The objective of this course is to develop an understanding of short-term and long-term financial decisions of a firm and various financial tools used in taking these decisions. It is also aimed to develop the understanding of the financial environment in which a company operates and how it copes with it.

Course Contents:

Module I: Introduction
A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm.

Module II: Valuation Concepts
Time Value of Money, Risk and Return, Financial and Operating Leverage.

Module III: Financing Decisions
Capital Structure and Cost of Capital**,** Marginal Cost of Capital.

Module IV: Capital Budgeting
Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction.

Module V: Working Capital Management
Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of Working Capital.

Module VI: Dividend Policy Decisions
An introduction**:** Different Schools of Thought on Dividend Policy.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Chandra, P. (2006), Financial Management: Theory and Practice, Tata McGraw Hill.
- Damodaran, A.(2004), Corporate Finance: Theory and Practice, Wiley & Sons.
- Van Horne, J.C. (2006), Financial Management and Policy, Prentice Hall of India.
- Brearly, R. A. and Myers, S. C. (2006), Principles of Corporate Finance, Tata McGraw Hill
- Pike, R and Neale, B. (1998), Corporate Finance and Investment: Decisions and Strategies, Prentice Hall of India
- Rustagi, R.P. (1999),Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.
- Pandey, I.M. (1999), Financial Management, Vikas Publishing House

BUSINESS RESEARCH METHODS

Course Code: MBF4203 **Credit Units: 02**

Course Objective:
The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Contents:
Module I: Introduction
Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation of hypothesis, research designs, drafting a research proposal

Module II: Measurement and Data Collection
Primary data, secondary data, design of questionnaire, sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques, measures of central tendency mean, median, mode; measures of dispersion, data processing

Module III: Data Analysis I
Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test, Chi- square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test

Module IV: Data Analysis-II
Simple linear regression: coefficient of determination, significance tests, residual analysis,
Multivariate techniques: multiple linear regression: Multiple coefficient of determination, interpretation of regression coefficients, heteroscedasticity, multicollinearity, outliers, auto regression, factor analysis, cluster analysis (concept)

Module V: Report Writing
Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Case study must be included in the discussion.

Text & References*:*

- Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited
- Zikmund, William C (1997). *Business Research Methods (5th Ed.)*. The Dryden Press, Harcourt Brace College Publishers
- Kothari C R, (2014) Research Methodology: Methods & Techniques, Vikas Publishing House Pvt.Ltd
- Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India
- Srivastava, Shenoy and Sharma (2002)., Quantitative Techniques for Business Decisions, 4th Ed , Allied Publishers
- Bajpai, Naval (2013). *Business Research Methods*. Pearson
- Shajahan, S. (2004) , Research Methods for Management 2nd Edition, Jaico Publishers
- Kumar, Ranjit (2005), Research Methodology, Pearson Education

INTERNATIONAL BUSINESS ENVIRONMENT & PRACTICES

Course Code: MBF4204 **Credit Units: 03**

Course Objective:
This course provides a comprehensive overview of the role that international business plays in the global economy.This knowledge shall help to understand the complexities, risks and opportunities of international business and provide a global perspective on international trade, including foreign investments, impact of financial markets, international marketing, and the operation of MNC's. Learn business practices organizations adopt to tap global opportunities. Create awareness on career opportunities that exist in international business.

Course Contents:
Module I: Introduction to International Business
Globalisation - Meaning and implications ; Globalisation of markets and production ; Drivers of Globalisation; Importance, nature and scope of International business; Modes of entry into International Business; Internationalization process and managerial implications; Multinational Corporations and their involvement in International Business: Issues in foreign investments, technology transfer, pricing and regulations; International collaborative arrangements and strategic alliances.

Module II Theoretical Foundations of International Trade
Reasons for international trade: Mercantilist and neo-mercantilist view; Theories of international trade: Absolute and comparative advantage theories: Modern theories of trade; Gains from trade; Foreign trade multiplier; Terms of trade. The new product life cycle theory, The new trade theory, Porter's diamond model ; Instruments of International trade policy – tariffs, subsidies, local content requirements, administrative policies, anti dumping policies, political and economic arguments for intervention.

Module III: International Business Environment
Economic, Political, Cultural and Legal environments in International Business.Framework for analyzing international business environment. World trade and protectionism –Tariff and non-tariff barriers; Foreign investments-Pattern, Structure and effects; Movements in foreign exchange and interest rates and their impact on trade and investment flows. Introduction to Export and Import Finance – Methods of payment in International Trade.

Module IV:International Economic Institutions and Agreements
WTO, WTO and Developing Countries, IMF, World Bank, UNCTAD, International commodity trading and agreements. Instruments of International trade policy – tariffs, subsidies, local content requirements, administrative policies, anti dumping policies, political and economic arguments for intervention ;GATT, WTO, IPR, TRIPS, TRIMS, GATS, Ministerial Conferences, Uruguay round of negotiations.WTO dispute settlement mechanism.

Module V:Regional Economic Groupings in Practice:
Levels of Regional Economic Integration; Regionalism vs. Multilateralism; Important Regional Economic Groupings in the World, Regional Integrations, Trading Blocks - European Union, ASEAN, APEC, NAFTA, SAARC, ANDEAN PACT and MERCOSUR.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Daniels, J.D.,RadebaughL.H.,Sullivan D.P. &PrashantSalwan (2011), International Business: Environments and Operations, Pearson Hall, Delhi
- Bennet, Roger, International Business, Financial Times, Pitman Publishing, London
- Sundaram and Black, (2009),International Business Environment**,** Prentice-Hall of India Pvt. Ltd.
- Bhalla and Raju, (2010), International Business Environment, Sage Publication
- Apte, P. G. (1998), International Financial Management, Tata McGraw Hill
- Francis Cherulinam, (2008), International Business, Himalaya Publishing House
- Charles Hill,(2007), International Business, McGraw Hill

OPERATIONS MANAGEMENT

Course Code:MBF4205 **Credit Units: 03**

Course Objective:
The course aims at developing an understanding of the strategic and functional issues in the operational environment of any organization, of the various decisions involving the operational activities, and of the methods enabling them taking the best possible alternative decision.

Course Contents:
Module I: Introduction
Operations in manufacturing and services, responsibility of Operations Manager, Operations strategy and competitiveness, process analysis, manufacturing process and service process selection and design, job design and work measurement

Module II: Strategic Decisions
Facility location decisions, factors affecting location, location techniques: factor rating method, centroid method, facility layout, process layout, systematic layout planning, product layout, line balancing, fixed position layout, service operations layout, types of capacity, capacity planning: long term and short term, economies of scale

Module III: Operating Decisions
Aggregate Planning, production planning and control (PPC), benefits of PPC, Master Production Scheduling, Operations scheduling: loading, sequencing, priority rules and techniques, Materials Requirement Planning (MRP), concerns in MRP

Module IV: Supply Chain Management
Recent issues in SCM: Role of IT in SCM, CRM Vs SCM, structure of supply chain, benchmarking concept, features and implementation, outsourcing decisions, value addition in SCM

Module V: Inventory Management
Inventory management: Objectives, factors, process, inventory costs, inventory models, inventory control techniques: ABC, VED, EOQ, SED analysis, Just-in-Time (JIT), JIT vs traditional systems of operations, JIT in services

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Chase, Jacob, Aquilano, Agarwal (2008),Operations Management for Competitive Advantage, Tata McGraw-Hill
- Evans & Collier (2007), Operations Management: An Integrated Goods and Service Approach, Cengage
- Chase et al, Operations Management, Tata McGraw Hill
- K. Aswathappa, K. ShridharBhat, Production and Operations Management, HPH
- Garg, Ajay, *Production and Operations Management*. MCGraw Hill, New Delhi
- Heizer, Render, Jagadeesh (2009), Operations Management, Pearson Education, India
- Klassen& Manor (2007), Cases in Operations Management, Sage Publishers
- Krajewski, Ritzman, Malhotra (2007), Operations Management: Processes and Value Chains, Prentice-Hall
- Mahadevan (2007), Operations Management: Theory and Practice, Pearson Education, India
- Russell and Taylor (2009), Operations Management along the Supply Chain, Wiley
- Shroeder (2009), Operations Management: Contemporary Concepts and Cases, Tata McGraw-Hill
- S.P. Singh, Production and Operations Management, Vikas Publication

GENERAL BANKING OPERATIONS

Course Code: MBF4207 **Credit Unit: 03**

Course Objectives
The Course inputs will help the students to understand the various types of Customers, Mobilisation of Resources, Payment & Settlement system used by Indian Banks; IT enabled services and importance of Customer service with an overview of related procedures.

Course Content:

Module I : An Overview of Banking
Definition of Banking; Roles of Banks: Intermediation, Payment System, Financial Services; Banking Services and Products: Payment and Remittance Services, Collection Services, Foreign Exchange, Deposit Services, Loan or Credit Services, Distribution, Collection of Taxes and Bills, Demand Accounts, Safe Keeping, Advisory Service; Banking Channels, Various Facilities.

Module II: Types of Customers
Individuals; Mandate Holder/Power of Attorney; Nomination; Joint Accounts; Minors; Illiterates, Deaf and Dumb, Blind, Aged Persons; Operations of Bank Accounts of Sick/Old/Incapacitated Customers; Executor and Administrator; Proprietorship Concerns; Partnership Firms; Joint Stock Companies; Hindu Undivided Family (HUF); Trusts; Societies and Associates; Clubs; Self Help Groups (SHGs) Government Departments and Municipal Bodies.

Module III: Types of Deposits and Account Opening
Demand Deposit; Savings Accounts; Current Accounts; Term Deposits; 2 in 1 Accounts; Recurring Deposits.Know Your Customer (KYC) Policy: Customer Acceptance Policy, Customer Identification Procedure, Monitoring, Due Deligence, KYC Documentation, Verification of Documents; Introduction: Types of Introducers; Financial Inclusions; Opening Accounts of Individuals; Accounts of Proprietary Concerns; Accounts of Parternship Firms; Accounts of Companies; Accounts of Societies and Associations; Accounts of Trusts; General Precaution.

Module IV: Banker Customer Relationship
Relationship: Debtor-Creditor, Pledgee-Pledgor, Agent-Pricipal, Agent of Third Parties, Lessor-Lessee, Advisor-Advisee; Bank's Rights and Obligations, Right of General Lein; Right of Set Off; Right of Appropriation; Obligations of Maintain Secrecy of Account Information; Extent of Secrecy; Disclosure Authorisation by Law; Disclosure Permitted as per Banking Practice.

Module V: Cash, Cheques Collection, Payment and Remittance Services
Storage of Cash: Dual Control, Denomination wise Storage; Registers; Cash Processing; Currency Chests; Counterfiet Notes; Acceptance of Notes and Coins and Exchange of Soiled/torn/mutilated/defective notes; Reporting Transactions exceeding Rs. 10 lacs; Teller Counter; Activities: Opening Cash, Cash Receipt, Cash Payment, Closing Cash.
Local Cheque Clearing; Speed Clearing; Electronic Clearing Services (ECS); Upcountry Cheque Collection; Liability of Collecting Banker; Protection to the Collecting Banker.Pay orders (PO)/Banker's Cheque; Demand Draft; Electronic Fund Transfer. Cheque Truncation System

Examination Scheme:

Components	A	CPA	HA	CT	EE
Weightage (%)	5	10	5	10	70

Text & References:
- Banking Theory and Practice K.C.Shekhar&LekshmyShekhar , Vikas
- Banking Theory Law & Practice Sundaram&Varshney Sultan Chand & Sons
- RBI Website and reading of an Economic / Business daily and a Business Magazine regularly
- Banking Products and Services, IIBF, Taxman
- Principles and Practices of Banking, IIBF, Macmillan 2005(REPRINT 2010)

LEGAL & REGULATORY ASPECTS OF BANKING

Course Code: MBF4208 **Credit Unit: 03**

Course Objectives:
This course covers the overview of banking legislations in India. Through this course students will be able to know about banking concepts, banking laws, corporate governance processes for settlement of disputes, role of RBI in BANKING.

Course Contents:
Module I: Regulations and Compliance
Provisions of RBI Act 1935, Banking Regulation Act 1949 Banking Companies [Acquisition and transfer of undertakings Act 1970 & 1980].
Government and RBI's powers- Opening of new banks and branch licensing - Constitution of board of directors and their rights - Banks share holders and their rights - CRR/SLR concepts - Cash/currency management - winding up - amalgamation and mergers - powers to control advances - selective credit control - monetary and credit policy - Audit and Inspection - supervision and control - board for financial supervision - its scope and role - disclosure of accounts and balance sheets - submission of returns to RBI etc Corporate Governance.

Module II: Legal aspects of banking operations
Case laws on responsibility of paying /collecting banker Indemnities/guarantees - scope and application - obligations of a banker - pre cautions and rights-laws relating to bill finance, LC and Deferred Payments - Laws relating to securities - valuation of securities - modes of charging securities - lien, pledge, mortgage, hypothecation etc - registration of firms/companies - creation of charge and satisfaction of charge.

Module III: Banking Related Laws
Law of limitation Provisions of Bankers Book Evidence Act Special features of Recovery of Debts Due to Banks and Financial Institutions Act, 1993 TDS Banking Cash Transaction tax Service Tax Asset Reconstruction Companies TheSecuritisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002 The Consumer Protection Act, 1986 Banking Ombudsman LokAdalats Lender's Liability Act.

Module IV: Commercial Laws with reference to banking operations
Indian Contract Act, 1872 (Indemnity, Guarantee, Bailment, Pledge and Agency etc) The Sale of Goods Act, 1930 (Sale and Agreement to Sell, Definitions, Conditions and Warranties, Express and Implied, Right of unpaid Seller etc) The Companies Act, 1956 Definition, features of company, Types of Companies, Memorandum, Articles of Association, Doctrines of Ultravires, indoor management and constructive notice, membership of company - acquisition - cessation, rights and duties of members and register of members. Prospects and directors.
Indian Partnership Act, 1932 Definition and types of partnership, relation of partners to one another - Relation of partners to third parties, Minor admitted to the benefits of Partnership, Dissolution of firm, Effect of non - registration Foreign Exchange Management Act 2000.Prevention of Money Laundering Act Right to Information Act Information Technology Act.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Banking Laws by R.N. Chaudhary, Allahabad Law Agency, Allahabad, 2011
- Banking by N.T. Somashekar, New Age Publishing House, New Delhi, 2009
- Mercantile Law by ND Kapoor 29th edition, Sultan Chand Publications, 2011

ECONOMICS FOR MANAGEMENT

Course Code: MBF4209 **Credit Units: 02**

Course Objective:
To familiarize the students with theoretical concepts of modern Economic Analysis for Management so that they can use these as inputs in managerial decision making process. In this course adequate emphasis has been given on making students understand and critically analyze key economic variables both at micro and macro levels in the domestic and international domains. The idea is that such comprehensive understanding of economic concepts will allow them to apply the acquired knowledge in business operations and make strategies for the firm operating under a dynamic business environment.

Course Contents:
Module I: Introduction to Managerial Economics, Demand Analysis and Demand Forecasting
Introduction to Managerial Economics: Meaning and Nature of Managerial Economics, Significance of Managerial Economics, Scope of Managerial Economics. Demand Analysis: Meaning of Demand, Determinants of Demand, Individual and Market Demand Functions, Individual and Market Demand Curves, Law of Demand, Exception of Law of Demand. Elasticity of Demand: Types of Elasticity of Demand, Significance of Elasticity of Demand. Demand Forecasting: Purpose of Demand Forecasting, Steps Involved in Forecasting, Determinants of Demand Forecasting, Methods of Demand Forecasting.

Module II: Theory of Supply, Production, Cost and Revenue Analysis
Supply: Law of Supply, Determinants of Supply, Shift of Supply and Change in Supply, Elasticity of Supply, Kinds of Elasticity of Supply, Determinants Elasticity of Supply. Theory of Production: Meaning of Production, Short –run Analysis of Production, Law of Variable Proportion, the Three Stages of Production, Returns to Scale. Analysis of Cost: Cost and Managerial Decision-making, Types of Cost, Cost Function, Relationship between Production and Cost, Short Run Cost Function, Long Run Cost Function, Relation between Short-run and Long-run Cost Curves,. Economies of Scale. Break-Even Analysis.Concept of Revenue.

Module III: Market Structure and Price Determination
Perfect Competition: Introduction of Perfect Competition, Characteristics of Perfect Competition, Demand Curve of Firm and Industry, Equilibrium of the Firm in the Short Run and Long Run. Effects of Tax Imposition under Perfect Competition. Monopoly: Assumptions, Causes of Monopoly, Demand, Average Revenue and Marginal Revenue of a Monopolistic, Profit Maximization Price Determinants of the Monopolist in Short-run and Long-run. Measures of Monopoly Power. Monopolistic Competition: Assumptions, Product Differentiation, Demand Curve, Equilibrium of the Firm in Short-run and Long-run, Selling cost and Monopolistic Competition. Oligopoly: Assumptions, Non-collusive Oligopoly and Collusive Oligopoly, Kinked Demand Curve Analysis.

Module IV: Macroeconomics Analysis
National Income: An Indicator of Economic Activity, The Parameters that Influence Level of Economic Activity. Business Cycles: Characteristics of Business Cycle, Phases of Business Cycle, Ill Effects of Business Cycles, General Measure to Control Business Cycles.
The Role of Government in Market Economy and Strategic Business Implications: Rationale of Government Intervention, Government Macroeconomic Policy Measures – GST, Demonetization – and their impact on Business; Macro Economic variables and their functional relationship; Economic Functions of Government in a Market Economy, Legal and Social Framework, Restraining Unfair Competition and Increasing Market Power, Reallocation of Resources in the Presence of Externalities, Redistribution of Income, Regulation of Natural Monopoly, Stabilization of Economy;
Macroeconomic Variables affecting Business: Consumption Function, Saving Function, Investment Multiplier; Transaction, Precautionary, Speculative Demand for Money; Liquidity Preference; Components of Money Supply; Fiscal Policy & Monetary Policy and their implications on business and management; Inflation and Deflation - Demand pull and Cost push inflation; Government policies to control inflation.
International Trade Regime and its implications on Business: GATT, World Trade Organization, Regional Trade Agreements – EU, NAFTA, ASEAN, SAFTA, MERCUSOR.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Thomas, Christopher R., S. Charles Maurice, Sumit Sarkar, Managerial Economics, 9th Edition, Tata McGraw Hills.
- Samuelson, Paul A., and William Nordhaus, Economics, 19th Edition, McGraw Hills India Pvt. Ltd.
- Krugman, Paul and Maurice Obstfeld (2008), International Trade Policy, Pearsons.
- Gupta, G.S. (2006), Managerial Economics, Tata McGraw Hill
- Salvatore, D (2010), Managerial Economics, Oxford University Press
- Peterson, H.C and Lewis, W.C. (2005), Managerial Economics, Prentice Hall of India
- Dwivedi, D.N. (2010), Essentials of Business Economics, Vikas Publishing House Pvt Ltd.

BUSINESS ANALYTICS

Course Code: MBF4210 **Credit Units: 02**

Course Objective:
The course provides an introduction to data analytics to be used in business. The students will learn how data analysts describe, predict and make informed business decisions in various business domains like marketing, human resources, finance and operations.The aim of the course is to develop basic data literacy and an analytic mindset in students that will help them to make strategic decisions based on data.

Course Contents:
Module I: Introduction to Business Analytics
Importance and role of data driven decisions. Business Analytics – Definition, Market, Trends; Paradigm Shift from Data to Insight and from Business Intelligence to Business Analytics; Examples and Types of Business Analytics Analysis- Forecasting & Predictive Modeling; Descriptive, Prescriptive and Predictive Analytics. Data Summarization, Data visualization – Various visualization techniques, standardized reporting and Pivot Tables – Using Excel

Module II: Data Mining
Introduction to Data Mining; Crucial processes in data mining; Data Warehousing; Data Mining Techniques and Exploratory Data Analysis; Data Mining Tool – XL Miner.

Module III: Decision Making & Optimization
Decision making under uncertainty – Decision Trees and Risk Profiles; Sensitivity Analysis;
Optimizing complex decisions – Optimization of a large number of decisions while accounting for different kinds of physical and business decisions. Introduction to Optimization Techniques –Linear Programming; Optimization – Use of Excel to solve business problems like marketing mix, capital budgeting and portfolio optimization.

Module IV: Big Data and Introduction to R
Introduction to Big Data, Big Data driven decisions in business organizations – Benefits and Security/Privacy concerns.
Building Business and Economic Models –Tools to leverage data for Prediction purposes; Logistic Regression.
Introduction to Machine Learning; Statistical Learning vs. Machine Learning; Major classes of Learning Algorithms –Supervised Vs Unsupervised Learning.
Introduction to R Programing

Module V: Simulation using R and Excel
Hands on Regression using R;Introduction to Simulation; Applications of Simulation and Building a Simulation Model. (Using Excel and R)
Capstone Project.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Aczel, D.A., Sounderpandian, J., Saravanan, P. and Joshi, R. (2012). *Complete Business Statistics (7th ed.*). New Delhi, India: McGraw Hill Education (India) Private Limited
- Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited
- Gujrati, Damodar N and Sangeetha (2011). *Basic Econometrics (4th Ed.).* New Delhi, India: McGraw Hill Education (India) Private Limited
- Beri, C. (2016). *Business Statistics*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Kothari, C.R. (2009). *Research Methodology: Methods and Techniques (2nd revised ed.).* New Delhi, India: New Age International Publisher

- Sharma, J.K. (2013). *Operation Research: Theory and Applications (5th ed.).* New Delhi, India: Macmillan Publishers India limited
- Albright and Winston. Business Analytics: Data Analysis and Decision Making, 5th Edition.
- Stephen Powell and Ken Baker., "The Art of Modeling with Spreadsheet"
- Data, data everywhere, "Special report on managing information,Economist", February 27th, 2010.
- Liberatore and Luo, "The Analytics Movement, Interfaces, Articles inAdvance", pp. 1–12, 2010.
- "Using R for Data Analysis and Graphics". Introduction, Code andCommentary,

EXCEL FOR MANAGERS

Course Code: MBF4211 **Credit Units: 01**

Course Overview:
Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers.This course will provide all the tools necessary to create and use basic and advanced spreadsheets. After completion of this course, students will be able to learn the various methods for entering and editing data and also learn the various ways to write simple formulas.

Course Contents:
Module-I: Getting Started with Excel
Introduction to Spreadsheets: Launching Excel, entering data in spreadsheet, widening rows and columns, applying basic formatting in spreadsheet, saving work in excel. Entering Data into cells:Usingautofill, sort & filter feature, creating lists, inserting & deleting rows and columns. Wrapping & merging text and cells,

Module-II: Basics in excel
Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel. Setting the page orientation and print area.Adding hyperlinks to cells, inserting images, objects, equations and symbols.

Module-III: Charts & Formulas in Excel
Understanding Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart. Using Basic functions- average, sum, min, max, product etc. date functions, time functions. Math Operators in Excel, combining mathematical operators.

Module-IV: Functions in Excel
Logical- using IF, AND, OR, NOT, TRUE, FALSE Functions. Textual- using TRIM, UPPER, LOWER, REPLACE Functions.Import data into excel, Look up functions with index and match. Rounding, sum product, conditional counts and conditional sums, Filtering data, pivot table, pivot charts, conditional formatting.

Module-V: Financial and Statistical Functions in Excel
Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager, IRR. Statistical functions: Max, Min, Average, Large, Rank, Small, Var, Std Dev.

Examination Scheme:

Components	Written Test	Practical	V/P	File/Assignment	Attendance
Weightage (%)	20	30	30	15	5

Suggested Readings & Textbooks
- Business Analysis with Microsoft Excel by Conrad George Carlberg,,Que Publishing, second edition, ISBN 0974415626.
- Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons , 2012, ISBN 9781118559703

Web Resources
- https://spreadsheeto.com/
- https://www.tutorialspoint.com/excel/

Syllabus - Third Semester

STRATEGIC MANAGEMENT

Course Code: MBF4301 **Credit Units: 03**

Course Objective:
The course is designed to help students to understand the concept of strategy and strategic management process. Acquaint students with basic concepts and principles of strategic management, develop and prepare organizational strategies that will be effective for the current dynamic environment and likewise to impart the strategic management conceptual framework which will increase students' skills and knowledge in identifying and describing organizations' strategic posture and direction.

Course Contents:
Module I: Introduction and Purpose of Strategy Formulation
Evolution and Introduction of strategic management, Concept of Strategy, corporate, Business and Functional Levels of Strategy, Mission, Vision, Objectives, Approaches to four Phases in Strategic Management Process, Stakeholders in business and their roles in strategic management, Strategic decision making.

Module II: Environmental Analysis
Analyzing company's External Environment: PESTLE Analysis; Preparing an Environmental Threat and Opportunity Profile (ETOP), Analyzing Industry Environment: Industry Analysis – Poter's Five Forces Model of competition, Strategic Group analysis.

Module III: Analysis of Organizational Competencies
Analyzing Company's Internal Environment Resource based view of a firm, meaning, types & sources of competitive advantage, analyzing company's Resources and Competitive Position, VRIO Framework; Benchmarking as a method of comparative analysis, Competitive advantage; Concept of a Core competence and Distinctive competitiveness, Characteristics of Core Competencies; Value Chain Analysis Using Porter's Model; Organizational Capability Profile: Strategic Advantage Profile;

Module IV: Strategic Analysis and Choice
Generic Competitive Strategies: Meaning of Generic competitive strategies, Low cost, Differentiation, Focus – when to use which strategy; Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic alliances & Collaborative Partnerships), Retrenchment – Turnaround, Divestment, Liquidation, Outsourcing Strategies; Offensive and Defensive Strategies, Blue Ocean Strategy, Strategy in the age of Internet and E-commerce; Portfolio Analysis Business Portfolio Analysis – BCG Matrix – GE 9 Cell Model; Evaluation of Strategic Alternatives: SWOT Analysis, Grand Strategy Selection Matrix.

Module V: Strategy Implementation and Evaluation
Strategy Implementation, Barriers to implementation of strategy, Mc Kinsey's 7s Framework; Organization Structures for Strategy Implementation, Leadership Implementation, Functional Implementation, Strategic evaluation review and control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

- Kazmi, A. Business Policy and Strategic Management (2nd edition), Tata McGraw Hill
- Kachru, Strategic Management, Excel Books
- Wheelen and Hunger,(2008),Essentials of Strategic Management, Prentice Hall India.
- Ramaswamy and Namakumari,(1999), Strategic Planning: Formulation of Corporate Strategy Text and Cases, Macmillan India Ltd.,

- Jausch&Glueck,(1988), Business Policy and Strategic Management, (5th Ed.), McGraw Hill.
- Thomson & Strickland,(2008), Business Policy and Strategic Management, (12th Ed.), McGraw Hill.
- Carpenter, Strategic Management, Pearson
- Trehan, Strategic Manageemnt,Wiley
- Pearce John 'A & Robinson R.B,(1997), Strategic Management: Strategy Formulation and Implementation, (3rd Ed.), AI.T.B.S. Publishers & Distributors
- Regular reading of all latest Business journals: HBR, Business World, Business India, Business Today

TECHNOLOGY IN BANKING

Course Code: MBF4303 **Credit Unit: 02**

Course Objectives:
Revolutionarydevelopments in technology continue to transform the banking and financialindustry. Distribution of banking services through the Internet is an important part of this transformation. Throughthis course studentswillbe able to understandvarioustool& techniques of e-banking. Studentswillalsounderstandvarious types of cyber law.

Course Contents:
Module I: BranchOperation and CoreBanking
Introduction and Evolution of Bank Management - Technological Impact in Banking Operations - Total BranchComputerization - Concept of Opportunities - CentralizedBanking - Concept, Opportunities, Challenges &Implementation

Module II: DeliveryChannels
Overview of deliverychannels - Automated Teller Machine (ATM) - Phone Banking - Call centers - Internet Banking - Mobile Banking - PaymentGateways - Card technologies - MICR electronic clearing

Module III: Back office Operations
Bank back office management - Inter branchreconciliation - Treasury Management - Forex Operations - Risk Management - Data centre Management - Net work Management - Knowledge Management - Customer Relationships Management (CRM)

Module IV: Interbank Payment System
Interface withPayment system Network - Structured Financial Messaging system - ElectronicFundtransfer - RTGS - NegotiatedDealingSystems& Securities SettlementSystems - Electronic Money, E Cheques

Module V: Contemporary Issues in Banking Techniques
Analysis of RangarajanCommittee Reports - E Banking - Budgeting - Banking Softwares

Module VI: Overview of Cyber Law
Scope of Cyber Law: Nature of Cyber Space; Cyber Property; Cyber Personality; Cyber Transactions; Cyber Jurisprudence: Concepts of Historical, Analytical and Ethical Jurisprudence; Relationship between Meta Society Laws and Cyber Law; How Cyber Law need to bedeveloped. Cyber Crimes and Cyber Laws; Types of Cyber Crimes; Legal Provisions regarding Cyber Crimes; Investigation and adjudication of cyber crimes; Digital evidence; Methodology of Cyber Crime Investigation; Basic Investigation Techniques.

ExaminationScheme:

Components	**CT**	**CT**	**CP**	**A**	**EE**
Weightage (%)	10	10	05	05	70

Text:
- Financial Services Information Systems - Jessica Keyes Auerbach publication; 2nd edition (March 24, 2000)

References:
- Kaptan S S&Choubey N S., "E-Indian Banking in Electronic Era", Sarup& Sons, New Delhi, 2003
- Vasudeva, "E - Banking", Common Wealth Publishers, New Delhi, 2005
- Turban Rainer Potter, Information Technology, John Wiely& Sons Inc
- Banking Technology - Indian Institute of Bankers Publication
- J. Rosenoer, Cyberlaw: The Law Of The Internet (Springer Verlag 1996).

RETAIL ASSETS & RURAL BANKING

Course Code: MBF4305 **Credit Units: 03**

Course Objective:
Rural Banking enjoys a special place in the Indian Banking. Expansion of Rural Credit Post Bank Nationalization of Bank has been phenomenal. This will expose the students to Rural Banking &Micro Finance

Course Contents:
Module I: Home Loans
Introduction and Overview of Housing Finance, Basics of Housing Finance, Essentials of HousingLoanProposals, Process of Home Loans, Assessment of HousingLoans, Housing Finance in metro branches, Rural Housing Finance, Documentation, Recovery.

Module II: Vehicle / Consumer Finance
Introduction and Overview, Essential of consumerloans and vehicleloans-Processing of loans-quantum of finance-margin-rate of interest-Disbursement, Insurance, Security Collaterals and othersecurities. Documentation, Inspection-recovery-legal issues. Securitization of consumerloans.

Module III : Financing in Rural Areas
Basics of financing in Rural Areas –Role of Information and communication Technology Sources, Creditdeliverychannels – Money Lenders in rural society, Role of commercial Banks, RRBS, Co-operative Banks, Role of NABARD and SIDBI, BankingCorrespondents Direct Selling Agents, Mobile Money. Lead Bank Scheme – objectives Implementation and Impact, Service Area Approach – objectives, Implementation and Impact

Module IV: Agriculture Credit
Important Financial Parameters and Financial Analysis of the Farmers- Concepts and Terminology, Important Schemes Kissan Credit Cards, Investment Credit, Loans for Farm Mechanization and Minor Irrigation Schemes, Dairy Loans and Cold Storages, Micro Finance Institutions - Concept of self Help Group, MFIS and Banks, Micro Finance Delivery Channels, Recent Crisis in Micro Finance Model, RBI &Recent Crisis .

Module V: Micro Finance
Financial Inclusion and Inclusive growth for Rural Development Rural Micro Insurance Scheme RSBY.Bank Finance for SME-- Introduction, Financial requirements of SME's, Appraisal of SME Proposals, Credit Rating of SME Borrowers CGTMSE

Module VI: Emerging Trends in Rural Banking
Emerging Trends in Rural Banking – Bottom of the Pyramid financing the poor as they are Bankable, guidelines of GOI & RBI on Financial Inclusion

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text&References:

- Banking Theory & Practice – L.C. Shekhar&LakshemyShekhar, (VIKAS)
- Micro- Finance Perspective & Operations, IIBF, MACMILLAN
- Bank Finance for Small & Medium Enterprises - S.K.Bagchi (JAICO)

INTERNATIONAL FINANCIAL MANAGEMENT

Course Code: MBF4306 **Credit Units: 03**

Course Objective:
The possibility for companies to look beyond domestic markets while making the financial decisions has given new dimensions to the way these decisions are taken. This has essentially led to changes in financial environment by linking domestic markets to global markets causing unprecedented increase in opportunities as well as risks. Management in such environment requires understanding of innovative conceptual and physical tools for better financial decision-making. The course on International Finance aims at equipping the financial manager with concepts, tools that enable financial decisions making in a global market and help better achieve the objectives of the firm.

Course Contents:
Module I: International Financial Environment
Finance function in global business scenario, International Monetary System, International Financial Markets and Instruments, Balance of Payments, Recent Developments.

Module II: Foreign Exchange Markets
Spot and Forward Foreign Exchange Markets, Speculation and Arbitrage in Foreign Exchange Markets and Implications of Market Efficiency, Currency Swaps, Currency Futures and Options.

Module III: Foreign Exchange Rate Determination
Theories of Exchange Rate Determination, Fundamental International Parity Conditions – Purchasing Power and Interest Rate Parity, Forecasting Exchange Rates - Technical Forecasting, Time Series Modelling, Fundamental Forecasting.

Module IV: Foreign Exchange Rate Exposure and Risk Management
Transaction, Translation and Operating Exposure, Exposure from Equity and Borrowing in International Financial Markets, Hedging tools for Management of Transaction Exposure and Interest Rate Exposure, Degree of Hedge.

Module V: Issues in Foreign Investments Analysis
Examination of International Investment Proposals, Discounted Cash Flow Analysis, Tax Adjusted Present Value Approach, Political Risk Analysis, External Investment Decision – Measuring Total Returns on Foreign Investments, Optimal International Asset Allocation.

Module VI: Finance of Foreign Trade
Income terms, foreign letters of credit, export & import finance, rules governing letters of credit, export import policy (Case Studies)

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Levi, M. D. (1996), International Finance, McGraw Hill International.
- Apte, P. G. (1995), International Financial Management, Tata McGraw Hill
- Errunza, V.R., Singh, D. and Srinivasan, T.S. (1994), International Business Finance,Global Business Press.
- Seth, A.K.(2000), International Financial Management, Galgotia Publishing Company.
- Hull, J. C. (1999), Introduction to Futures and Options Markets, Prentice Hall of India.
- Edwards, F. R. and Ma, C. W. (1992), Futures and Options, McGraw-Hill International.
- Kolb, R. W. (1997), Understanding Futures Markets, Prentice Hall of India.
- Rebonato, R. (1996), Interest Rate Option Models: Understanding, Analysing and Using Models forExotic
- Interest Rate Options, John Wiley and Sons.
- Kohn, M.(1998), Financial Institutions and Markets, Tata McGraw Hill Publishing
- Articles from selected journals and magazines.

MANAGEMENT OF FINANCIAL SERVICES

Course Code: MBF4307 **Credit Units: 03**

Course Objective:
At the end of this course the students will understand: Role of Financial Services in producing and maximizing value. Understanding basic Financial Services and their need. Factors determining dynamism in the Financial Services industry. Understanding the interface of regulators and managers for quantifying and dealing with critical factors affecting the Financial Services industry.

Course Contents:
Module I: Introduction
Financial services and Value production, Value added in Financial Services, ROI in Financial Services, Elements in the Financial Services value chain, Role of Financial Services in Economic Development

Module II: Merchant & Investment Banking
Meaning, Importance & Role in the Indian Financial System, Corporate Counselling, Project Counselling and Appraisal, Loan Syndication and Accessing Debt and Capital Markets, Procedural aspects of public issues, bought out deals, Book Building, Pre-Issue Decision; Post Issue Management and related provisions of Companies Act and SEBI guidelines for Protection of Interests of Investors, New Products in Capital Markets

Module III: Leasing Hire Purchase and Consumer Credit
Development of Leasing Hire Purchase and Consumer Credit, Types of Leasing, Pricing Methodology and Financial Analysis, Taxation, Legal Framework for Leasing and Hire Purchase Companies, Leasing Vs. Buying- NPV, Securitization, Banking Services related to leasing

Module IV: Venture Capital Financing
International Experiences in Venture Capital Financing, Venture Capital Financing in India, Pitfalls to be Avoided, Private Equity and growth of Entrepreneurship

Module V: Mutual Funds
Mutual Funds types, Exchange Traded Funds, Fund of Funds, Organization and Management, Regulations of Mutual Funds

Module VI: Other Financial services
Factoring Services - Features, Merits and Demerits, Cost Benefit Analysis, Forfeiting – Features, Merits and Demerits, Credit Rating: Concept of Credit Rating, Types of Credit Rating, Advantages and Disadvantages of Credit Rating, Credit Rating Agencies and Their Methodology and Process, Individual Credit Rating, Sovereign Credit Rating Practices, Indian Experience up to now, Housing Finance, Custodial Services.

Module VII: An introduction to marketing of Financial Services Features
Marketing Of Financial Services, Cross Selling of Banking Services, Up-Selling, Wealth Management

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Khan M Y, (1999), Indian Financial System, Tata McGraw Hill
- Chandra, P.(1999), Financial Management: Theory and Practice, Tata McGraw Hill.
- Dietrich J KiMGTll,(1996), Financial Services & Financial Institutions, Value Creation in theory and Practice, Prentice Hall
- Pandey, I.M. (1999), Financial Management, Vikas Publishing House
- Sriram, K. (1996), Handbook of Leasing, Hire Purchase and Factoring, ICFAI.
- Bhole L M, (2000), Financial Institutions and Markets: Structure, Growth & Innovations, Tata McGraw Hill
- Regular reading of the Financial & Business Journals, Analyst, Economist is essential.

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Course Code: MBF4308 **Credit Units: 03**

Course Objective:
This course aims at providing a clear understanding of the changing domestic and global investment scenario in general and Indian capital market in particular with reference to availability of various financial products and operations of stock exchanges. Important theories, techniques, regulations and certain advancements in theory of investment will be covered with an aim of helping the participants make sound investment decisions both in the context of individual security and portfolio investment.

Course Contents:
Module I: Background of Capital market/Corporate Governance and Methods of Fund Raising
Importance of Strong Capital market in Economy, Investment opportunities available to Investors, relation of demographic characteristics with investment pattern of individuals, Process of investment in Financial assets, intermediaries and Role of SEBIOTCEI//ROC/Stock exchanges-Listing agreement, clause 49, Importance of Corporate Governance and changes taking place/required in the law.Salient features and operation of stock exchanges,Trading arrangements, Changing scenario of Indian stock market.Relationship of Primary market with Secondary market, raising of Funds by IPO/FPO/Right issue and intermediaries involved. Merchant banking and its functions, contemporary issue in Capital market.

Module II: Debt
Malkiels's Law, Interrelationship of Bond Market and Stock market, International events and its impact on security market Risk and return in the context of Portfolio, , Common stock valuation models, Term structure of Interest Rates,Role of FII"S, DII/MF /QIB in Capital market.Participatory notes and its Impact, index formation..

Module III
Fundamental analysis-Economic &industry analysis, concept of Business Cycles, Indicators of economic prosperity, Industry analysis, Company analysis, Company valuation.DOW"s Theory, Various Technical analysis tools like Moving averages, Volume Analysis, Indicators, RSI, Patten analysis,Candlesicks,Market breadth analysis, Trend analysis,Elliot wave Rules Fibonacci numbers, ROC/RSI, CAPM and Fama and French challenge, lagging indicators and leading indicators analysis, reading and interpretations of technical patterns and charts,Other tools to Forecast the market and take Entry and exit decisions.

Module IV
Arbitrage pricing theory, Generating the efficient frontier,Efficient market theory, Valuation by PE ratio /Book value to price value analysis,Motivation for partitioning of risk, Markowitz Risk -return optimisation,

Module V
Types of Mutual Funds--SIP/ELSS, Tax Implications. , Investment Banking, Role of Fund Manager, Portfolio management services, Churning and revision of Portfolio, Portfolio re balancing and up gradation, Sharpe"performance Index, Trennor"performance Index, Jensen's performance Index.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Chandra, P.(2002), Investment Analysis, Tata McGraw Hill
- Fischer, D.E. and Jordan, R.J. (1995), Security Analysis & Portfolio Management, Prentice Hall of India
- Bhat, Sudhindra;(2009); Security Analysis & Portfolio Management; Excel Books
- Dash, A.P.;(2009); Security Analysis & Portfolio Management; I.K. International
- Bhatt, S.N.;(2011); Security Analysis & Portfolio Management; Biztantra
- Rangnatham M., Madhumalathi, R.,(2006); Security Analysis & Portfolio Management; Pearson Education
- Khatri, Dhanesh;(2010); Security Analysis & Portfolio Management; MacMillan India Ltd.

PROJECT PLANNING, APPRAISAL AND CONTROL

Course Code: MBF4309 **Credit Units: 03**

Course Objective:
The objective of the course is to make the students familiar with the planning, analysis, selection, implementation and review the capital expenditure investments. The aim is to acquaint the student with the application of mathematical and statistical tools for analyzing managerial problems in order to arrive at a decision w.r.t. the capital expenditures.

Course Contents:
Module I: Planning of Projects
Capital Expenditures, Phases of Capital Budgeting, Levels of Decision Making, Facets of Project Analysis, Portfolio Planning Tools, Strategic Position and Action Evaluation (SPACE), Generation of Ideas, Monitoring the Environment, Corporate Appraisal, Project Rating Index, Demand Forecasting, Market Planning

Module II: Technical Analysis
Material Inputs and Utilities, Manufacturing Process, Product Mix, Plant Capacity, Location and Site, Machineries and Equipments, Structures and Civil Work, Project Charts and Layouts, Work Schedule

Module III: Financial Analysis
Cost of Project, Means of Finance, Estimates of Sales and Production, Cost of Production, Working Capital Requirements and its Financing, Profitability Projections, Break Even Point, Projected Balance Sheets, Muti Year Projections, Basic Principles for Measuring Project Cash Flows, Components of the Cash Flow Stream, Biases in Cash Flow Estimation

Module IV: Project Risk
Types and Measures of Project Risk, Sensitivity Analysis, Scenario Analysis, Optimal Timing, Social Cost Benefit Anaysis, Net Benefit in terms of Economic Prices, Measurement of the Impact on Distribution, Savings Impact and its value, Income Distribution Impact, Little-Mirrlees Approach, Shadow Prices

Module V: Project Management and Review
Forms of Project Organization, Project Planning, Project Control, Human Aspects of Project Management, Pre-requisites for Successful Project Implementation, Performance Evaluation, Abandonment Analysis, Administrative Aspects of Capital Budgeting

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Chandra P.(2002), Projects: Planning, Analysis, Financing, Implementation & Review, Tata McGraw-Hill Publishing.
- Meredith J.R. & Mantel S.J., Jr.(2000), Project Management: A Managerial Approach, Ed. John Wiley & Sons.
- Machiraju H.R.(2001), Introduction to Project Finance: An Analytical Perspective, Vikas Publishing House Pvt. Ltd.
- Patel B.M.(2000),Project Management: Strategic Financial Planning Examination & Control, Vikas Publishing House Pvt. Ltd.
- Finnerty J. D.(1996), Project Financing: Asset-Based Financial Engineering, Wiley
- Newbold C.R.,(1998), Project Management in the Fast Lane: Applying Theory & Constraints, St. Lucie Press
- Anthony R.N. &Govindrajan V.(1998), Management Control Systems, Tata McGraw-Hill
- Desai V.(1997), Project Management, Himalaya Publishing House

ADVANCE CORPORATE FINANCE

Course Code:MBF4310 **Credit Units: 03**

Course Objective:
The goal of this course is to develop the analytical skills for making corporate investment with regards to financial decisions and risk analysis. This course will examine various theories including the concept of present value, the opportunity cost of capital, discounted cash flow analysis, a consortium of valuation techniques, issues between short & long term financial management, risk and return, capital asset pricing model, capital budgeting, corporate capital structure and financing decisions, dividend policy, investment and financial decisions in the international context, including exchange rate/interest rate risk analysis, and issues of corporate governance and control. In essence, we will explore the very patterns of corporate finance that has shaped the familiar yet complex terrain of today's global economy.An equally important component of this course is its emphasis on developing your critical auditory and erudite writing skills to a level that is commensurate with university standards. The course teaching methodologies will be composed of lectures, homework assignments and a group project.

Course Contents:
Module-I: Introduction
Finance and Finance Manager, role of a Finance Manager, Ownership vs. Management, Do Managers really look after interest of shareholders. Expectations from a Finance Manager, Concepts of risk and return, Concepts of Time value of money.

Module-II: Common Stocks
How common stocks are traded, Valuation of common stocks, pricing vs valuation, today's price vs next year's price. Capitalization rate, DCF valuation and varying growth rates, link between stock price and earning per share, valuation format, Mini Case: Reeby Sports. Issuance of common stocks,

Module-III: Project Evaluation
Accounting Income vs Cash flows, Pros and cons of investment decision criteria, Why NPV leads to better decision making, Verdict on IRR, NPV vs IRR, XIRR, MIRR, Mutually Exclusive vs Independent Projects, Note on deprecation in estimating cash flows, choosing between long term and short term Equipments, optimal timing of investment, where positive NPV come from, Making sure managers maximize NPV,

Module-IV: Dividend Policy and Capital Structure
How Dividends are paid, Dividend controversy, stocks repurchase, relevance of dividends in perfect capital markets, dividend and taxes, how much a firm should borrow, cost of financial distress, does debt policy matter, effect of leverage in tax free economy, pecking order of financing choices,

Module-V: Short term financial planning and cash management
Links between short term and long term financial financing decisions, comforts of surplus cash, options for short term financing, dynamic financing, how much cash should firm hold, investing idle cash, money market investments,

Module-VI: Corporate control and governance
Financial goals and strategy, shareholder value analysis,, managerial implications of shareholder value, corporate governance and balanced scorecard.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Texts:
- Principles of Corporate Finance, 12 th edition, Richard Brealey and Stewart Myers, McGraw-Hill Financial, 2017
- Corporate Finance, by Stephen A. Ross, Randolph W. Westerfield and Jeffrey Jaffe (RWJ), 10th edition, McGraw-Hill 2013.

BUSINESS VALUATION

Course Code: MBF4311 **Credit Units: 03**

COURSE DESCRIPTION AND OBJECTIVES:
The objective of this course is to develop a detailed understanding of the tools used by market professionals and corporate managers to analyze the value of companies and stocks. The central theme of the course will be the pricing of equity securities using discounted cash flow and relative valuation techniques. Students will apply what they've learned to the valuation of a specific company, with the goal of becoming an expert on that firm. After completing this course, students should be able to: (i) Develop quantitative models for firm and equity valuation based on DCF and multiples. (ii) Identify and interpret accounting and non-accounting information necessary for valuation. (iii) Identify and interpret the key value drivers for a firm or industry. (iv) Critically analyze firm and equity valuation models and assumptions developed by others. (v) Present valuation analyses and assumptions in a professional manner.

Course Contents:

Module-I: Introduction to Valuation
Valuation vs. Pricing.A philosophical basis for Valuation, Misconceptions about Valuation, Biasness in Valuation, Uncertainties in Valuation.Approaches to Valuation, Understanding Financial Statements, Basics of Risk.

Module-II: Discounted Cash Flow Valuation
Discounted Cashflow Valuation: Basis for Approach, Going Concern versus Liquidation Valuation, Equity Valuation versus Firm Valuation, Three pathways to DCF value, Advantages & Disadvantages of DCF Valuation, Riskless Rates and Risk Premiums, Estimating Risk Parameters and Costs of Financing, Measuring Earnings,Earnings to Cash Flows, Estimating Growth, Closure in Valuation: Estimating Terminal Value, Free Cash flow to Equity Models,

Module-III: Relative Valuation
Fundamental Principles of Relative Valuation, Choices with multiples- Earnings Multiples, Book Value Multiples,Choosing the Comparable firm: Making the comparison, Revenue and Sector-Specific Multiples, Advantages &Disadvantages of Relative Valuation, DCF vs Relative valuation.

Module-IV: Applicability of Valuation (Cases and research papers); Valuing Financial Services firm, Valuing Firms with Negative Earnings, Valuing Young and Start-up Firms, Valuing Private Firms, valuing Acquisitions and Takeovers,

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Textbook
- Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, Second Edition, University Edition
- by AswathDamodaran

Recommended other Textbook
- Krishna G. Palepu and Paul M. Healy: *Business Analysis & Valuation Using Financial Statements*, Text Only(PHB) 5th Edition, Cengage Learning 2012.
- Joshua Rosenbaum and Joshua Pearl: *Investment Banking: Valuation, Leveraged Buyouts, and Mergers and Acquisitions*, John Wiley & Sons; 2nd edition (2013), ISBN: 1118656210

CORPORATE RESTRUCTURING

Course Code:MBF4312 **Credit Units: 03**

Description
The significance of Merger, Acquisition and Corporate Restructuring cannot be overemphasized in a rapidly changing economic environment and consequent pressure on companies to cope with the emerging challenges. This subject deals with the different strategies of corporate restructuring and its impact on the shareholders' value.

Objectives
1. To understand the various types of activities that falls under the purview Corporate Restructuring
2. To understand intricacies of Corporate Restructuring
3. To understand motives and methods of M&A
4. To deal with Issues involved in takeover

Assessment
The subject would comprise of both theory and numerical solving. The assessment of the learner would be done through assignments, case discussion, articles on current research & issues, problem solving and simulation. The students would be expected to do a project, quiz and comprehend the application part of the concepts taught in the class.

Course Contents:

Module-I: Introduction: Corporate Restructuring: Concept and Form: Merger, Consolidation, Acquisition, Divestiture, Demerger, Carve out, Joint venture, Delisting of Securities. M&A as a Growth Strategy, Takeover and Defence Tactics, Funding of Acquisition, LBO and MBO.

Module-II:
Growth strategy and Merger & Acquisition: Growth strategy: Intensive, integrative and Diversification growth, Theory of M&A: Monopoly theory, Efficiency Theory, Valuation theory, Raider Theory and Empire Building Theory, Case study.

Module-III:
Takeover and Defence Tactics: Friendly Vs Hostile Takeover, Takeover Tactics: Dawn Raid, Bear hug, Saturday night special, proxy fight, Successful Takeover Tactics in India - Defence Tactics: Crown jwels, blank cheque, Shark repellents, Poison pill and put, people pill, Green nail and buy-back as takeover defence tactic - Intents of Target Companies.

Module-IV:
Legal aspect: Companies Act, 2013, SEBI (Buy -back of Securities) Regulation, 1998, SEBI (Substantial Acquisition of Shares and Takeover) Regulation, 1997, SEBI (Delisting of Securities) Guidelines, 2003 and Listing agreement clauses of NSE and BSE (40 A and 40 B)

Module-V:
Accounting and Taxation aspect: Methods of Accounting for M&A, Accounting for Demerger, Tax issues relating to M&A: Capital Gain, Carry forward and Set Off Losses, Numerical Problems

Module-VI:
Funding and Valuation: Payment Consideration, Sources of Fund, LBO and Going Private.
Valuation of Target Company: Concept of Value of a Company, Methods of Enterprise and Equity Valuation, Dividend Discount Model, DCF Model, Shareholder's Value Creation: MVA Approach and EVA Approach.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Recommended Textbooks

- Prasad G. Godbole, “Merger, Acquisition and Corporate Restructuring”, Vikas Publishing
- NishikantJha, “Mergers, Acquisitions and Corporate Restructuring”, Himalaya Publishing House
- SudiSudarshan, “Creating Value from Mergers and Acquisitions, the Challenges”, Pearson

Reference books

- Sharplin , ‘Strategic Management’, McGraw Hill
- Donald M. DePamphilis, ‘Mergers, Acquisitions and Other Restructuring Activities’, Elsevier publisher
- Weston J.Fred&E.F.Brigham , “Managerial Finance”, Drydon Press
- James. C. Van Horne, “Financial Management and Policy”, Prentice Hall of India
- Richard A.Brealey and StewatC.Myers , “Principles of Corporate Finance”, Tata McGraw Hill
- PradipM.Khandwalla, “Innovative Corporate Turnarounds”, Saga Publications, New Delhi
- PradipM.Khandwalla, “The Fourth Eye”, Saga Publications, New Delhi
- Kharbaunder O.P. and Stallworthy E.A, “Company Resource: How to Manage a Business Turnaround”, Heinemann, London
- Prasad G Godbole, “Merger Acquisition and Corporate Restructuring”, Vikas Publishing

FINANCIAL MODELING USING MS- EXCEL/SPREADSHEET

Course Code:MBF4313 **Credit Units: 03**

Introduction

Modeling techniques for accurate financial forecasting are used in many areas of finance, such as derivatives, valuation, project evaluation, deal structuring, portfolio management and the like. In the course, the participants will learn the model building skills required to build powerful models in finance with the help of excel. There are many features of model building that are common irrespective of the final model that one intends to build. In the course we will also emphasize on the different model building skills that one should have irrespective of the final use that one is going to make of it.

By the end of the course the participants should be better able to:

- Understand the basic and advanced features of excel
- Understand how to build models in excel to suit one's purpose
- Building models in different areas of finance including investments, corporate finance and derivatives
- Identifying and controlling the key sensitivities with advanced spreadsheet simulation
- Understand how risk can be built into the model to enhance decision making process

Course Contents:

Module-I: Understanding the Basic Featuresof Excel : Introduction to Modeling, Introduction to Excel,Database Functions in Excel Creating Charts Using Forms and Control Toolbox Understanding Finance Functions present in Excel Creating Dynamic Models

Module-II: Simulation using Excel: Different Statistical Distributions used in Simulation Generating Random Numbers that follow a particular distribution Building Models in Finance using Simulation

Module-III: Excel in Capital Budgeting, valuation: Preparing common size statements directly from Trial Balance Forecasting Financial Statements using Excel Analysing Financial Statements by using Spreadsheet Model ; Determining Project Viability Risk Analysis in Project Appraisal Simulation in Project Appraisal; Determination of Value Drivers, DCF Valuation, Risk Analysis in Valuation; Determining Efficient Portfolio, Creating Dynamic Portfolios Portfolio Insurance Fixed Income Portfolio Management using Excel.

Module-IV: Understanding Subroutines and Functions and building simple financial models using subroutines and functions Recording and Editing Macros Subroutines and Functions Decision Rules Message Box and Input Box Debugging, **Designing Advanced Financial Models** using VBA User Forms Other Advanced Features Actual Model Building.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(**C -** Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V -** Viva; **CT -** Class Test; A- Attendance; **EE -** End Semester Examination)

Text & References:

Text:

- Benninga, S., 2008, Financial Modeling, The MIT Press, Third Edition

References:

- J & S: Jackson M. and Staunton M., 2001, Advanced Modelling in Finance using Excel and VBA, John Wiley and Sons Ltd
- B & M: Brealey R.A. and Myers S., 2003, Principles of Corporate Finance, Seventh Edition, McGraw Hill
- Financial Analysis and Modeling using Excel and VBA – ChandanSengupta
- Building Financial Models, John Tjia

FINANCIAL RISK MANAGEMENT

Course Code: MBF4314 **Credit Units: 03**

Course Objectives:
The FRM challenges candidates to understand and apply a range of knowledge and skills necessary to function effectively as a risk manager. Its curriculum is updated annually by a group of distinguished risk professionals and leading academics with diverse backgrounds, ensuring that the designation meets the evolving demands of the financial industry. The FRM helps professionals in risk management, investment management, or other critical areas of the financial services industry to broaden their knowledge of the different types of financial risk and enhance their current skill set. Those who are just beginning their careers benefit from the breadth of the curriculum, which exposes candidates to the major strategic aspects of risk management. More established practitioners often choose to become Certified FRMs in order to ensure that they are apprised of the latest trends in risk management, or because they want to challenge themselves by testing their knowledge against an elite pool of risk managers.

Course Contents:

Module I: Foundations of Risk Management
Basic risk types, measurement and management tools, Creating value with risk management; The role of risk management in corporate governance; Enterprise Risk Management (ERM); Financial disasters and risk management failures; The Capital Asset Pricing Model (CAPM); Risk-adjusted performance measurement; Multifactor models; Data aggregation and risk reporting; Ethics and the GARP Code of Conduct.

Module II: Financial Markets and Products
Structures and functions of financial institutions, Structure and mechanics of OTC and exchange markets Structure, mechanics, and valuation of forwards, futures, swaps, and options ; Hedging with derivatives; Interest rates and measures of interest rate sensitivity; Foreign exchange risk; Corporate bonds; Mortgage-backed securities

Module III : Valuation and Risk Models
Value-at-Risk (VaR)-VaR mapping • Expected shortfall (ES), Stress testing and scenario analysis • Option valuation • Fixed income valuation • Hedging • Country and sovereign risk models and management • External and internal credit ratings • Expected and unexpected losses • Operational risk

Module IV: Basel-I, Basel-II, Solvency-II, Basel 2.5, Basel-III:
The reasons for regulating Banks, Bank Regulation Pre-1988, 1988BIS Accord, The G-30 Policy recommendation, Netting, 1996 Amendment, Basel II, Credit Risk capital under Basel II, Operational Risk capital under Basel II, Pillar 2- Supervisory Review, Pillar 3- Market Discipline, Basel 2.5, Basel-III.

Module V: Credit Risk Measurement and Management
• Credit analysis • Default risk: Quantitative methodologies • Expected and unexpected loss • Credit VaR • Counterparty risk • Credit derivatives • Structured finance and securitization

Module VI: Operational and Integrated Risk Management
Risk-adjusted return on capital (RAROC) • Economic capital frameworks and capital planning • Liquidity risk measurement and management • Failure mechanics of dealer banks • Stress testing banks • Third-party outsourcing risk • Risks related to money laundering and financing of terrorism • Regulation and the Basel Accords
Banking Resolution and Deposit Insurance Act (BRDI) 2017, Insolvency and Bankruptcy Code (IBC).

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text Books & References:

- John C. Hull, Risk Management and Financial Institutions, 4th Edition (Hoboken, NJ: John Wiley & Sons, 2015).
- Keep on updating of www.garp.org/frm (Global association of Risk professional)
- Michel Crouhy, Dan Galai, and Robert Mark, The Essentials of Risk Management, 2nd Edition (New York, NY: McGraw-Hill, 2014).
- James Lam, Enterprise Risk Management: From Incentives to Controls, 2nd Edition (Hoboken, NJ: John Wiley & Sons, 2014)
- René Stulz, "Risk Management, Governance, Culture and Risk Taking in Banks," FRBNY Economic Policy Review, (August 2016): 43-59.
- Edwin J. Elton, Martin J. Gruber, Stephen J. Brown and William N. Goetzmann, Modern Portfolio Theory and Investment Analysis, 9th Edition (Hoboken, NJ: John Wiley & Sons, 2014).
- Noel Amenc and Veronique Le Sourd, Portfolio Theory and Performance Analysis (West Sussex, UK: John Wiley & Sons, 2003).
- ZviBodie, Alex Kane, and Alan J. Marcus, Investments, 10th Edition (New York, NY: McGraw-Hill, 2013).
- "Principles for Effective Data Aggregation and Risk Reporting," (Basel Committee on Banking Supervision Publication, January 2013).
- Michael Miller, Mathematics and Statistics for Financial Risk Management, 2nd Edition (Hoboken, NJ: John Wiley & Sons, 2013).
- James Stock and Mark Watson, Introduction to Econometrics, Brief Edition (Boston, MA: Pearson, 2008).
- Robert McDonald, Derivatives Markets, 3rd Edition (Boston, MA: Addison-Wesley, 2013).
- Frank Fabozzi (editor), The Handbook of Fixed Income Securities, 8th Edition (New York, NY: McGraw-Hill, 2012).
- AswathDamodaran, "Country Risk: Determinants, Measures and Implications - The 2017 Edition" (July 19, 2017).
- Gunter Meissner, Correlation Risk Modeling and Management (New York, NY: John Wiley & Sons, 2014).
- Jon Gregory, The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital (West Sussex, UK: John Wiley & Sons, 2015)
- "Principles for the Sound Management of Operational Risk," (Basel Committee on Banking Supervision Publication, June 2011)
- Philippa X. Girling, Operational Risk Management: A Complete Guide to a Successful Operational Risk Framework (Hoboken, NJ: John Wiley & Sons, 2013).
- Bruce Tuckman and Angel Serrat, Fixed Income Securities: Tools for Today's Markets, 3rd Edition (Hoboken, NJ: John Wiley & Sons, 2011)
- Case studies published from various journals.

FIXED INCOME SECURITIES ANALYSIS

Course Code: MBF4315 **Credit Units: 03**

Course Objectives:
This course is intended to analyze the fixed income securities markets and its implications for investments. It will analyze the market characteristics, instruments, selling techniques, pricing and valuation issues, floating rate instruments, relations with money market instruments, risk and return of fixed income securities, portfolio management techniques, term structure modeling, bond indexing, corporate debt and convertibles, bonds with embedded options, municipal bonds markets, corporate bonds & credit risk analysis, interest rate risk management with swaps, options and futures, bond management & trading. The course intends to cover the specific features of the Indian Fixed Income Securities Markets.The course will construct several Excel based techniques to analyze bond valuation, term structure, portfolio statistics and risk mapping

Course Contents:

Module-I: Overview of Fixed Income Securities, The Grammar of Fixed Income Securities, Fixed Income Markets, Institutional Arrangements, Market Participants and Instruments, Investors Perspectives, & Market Conventions, features of a government securities market

Module-II: Bond Valuation, Time Value of Money, Price and Yield Conventions, Bond Valuation under flat term structure, Yield & return, & horizon return,Valuation of other Bonds, Floating Rate securities, index bonds, illiquid bonds

Module-III: Understanding market linkages, bonds and money market instruments, MIFOR Curve Risk Identification in Bonds: Duration, Convexity, and Immunization Risk measurement in fixed income securities using value at risk, Corporate Debt, Valuation, valuation of convertibles
Yield Curve Analysis: Par Value, Zero, Spot Curve, Bootstrapping, spot & forward rates, (Nelson-Seigel model of the Indian NSE)

Module-IV: Government securitiesauction& Bidding, Uniform vs discriminatory auction, biddingbehavior, winners curse analysisAuction Game: students run a game in groups, with bidding an upcoming auction, using real time market prices, and finalist selected based on their success, performance in WI trade, Bond Indexing, methodology for constructing a bond index, index return comparison

Module-V: Portfolio construction, setting portfolio objectives, interpreting portfolio parameters, Passive vs Active portfolio management strategies, bullet vs barbell, other strategies.Global Bond Markets, foreign currency bonds, dual currency bonds, analysis of global bond spread behavior in recent times.

Module-VI: Fixed Income Derivative Markets: FRAs, Interest rate Swaps, swap pricing and swap curve,Fixed Income Derivative Markets: Interest rate futures, Fixed Income Derivative Markets: Interest Rate Options, Caps & Floors pricing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Textbook:

- Frank Fabozzi, Bond Markets, Analysis, and Strategies, Seventh or Eighth Edition,
- Pearson Suresh Sundaresan, Fixed Income Markets and Their Derivatives, 2009,

SUMMER INTERNSHIP EVALUATION

Course Code: MBF4335 **Credit Units: 06**

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**)

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. **Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.**

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include **five sections** in the order described below.

1. **The Title Page –** An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content – A**n outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student

undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

- **Title or Cover Page**
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgements**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**
  A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

  Examples
  For research article
  Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic Escherichia coli O157: H7. ClinMicrobiol Infect, 8(suppl 1): 116–117.
  For book
  Kowalski,M.(1976) Transduction of effectiveness in Rhizobium meliloti. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Internship File & Internship Report

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Examination Scheme:

Continuous Evaluation by faculty guide	15%
Continuous evaluation by CRC	15%
Feedback from industry guide	35%
Report, Presentation & Viva Voce	35%
TOTAL	**100%**

Syllabus - Fourth Semester

BANK ACCOUNTING& AUDIT

Course Code: MBF4401 **Credit Units: 02**

Course Objectives:
The course will help the students to understand the concepts of accounting and auditing of banks and their applications. The course will help students in analysis of the work of an auditor of a bank as well as interpretation of the financial.

Course Contents:

Module I: Overview of Auditing
Meaning, Objects, Basic Principles, Auditing and Assurance Standards and Techniques. Classification of Audit, Audit planning, qualities of auditor, advantages and limitations of audit.

Module II: Internal Control, Internal Check and Internal Audit
Introduction, Necessity of Internal Check: Difference between Internal Check and Internal Control, Fundamental Principles of Internal Check, Difference between Internal check and Internal audit.

Module III: Audit Procedure
Vouching, definition, features, examining vouchers, Vouching of Cash book and trading transactions, Verification and Valuation of Assets & Liabilities: Meaning, definition and objects, Vouching vs. Verification

Module IV: Bank Accounting
Accounting concepts and conventions, Accounting in Banks and Balance Sheet, Preparation of financial statements, Significant features of accounting systems of banks, Principal books of accounts, Discussion with final accounts of public sector, private sector and private banks in India

Module V: Special Areas of Audit
Tax audit and Management audit - Recent Trends in Auditing – Basic considerations of audit in EDP Environment. Credit Audit

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text:
- Contemporary Auditing by Kamal Gupta, Tata McGraw Hill,2004

Reference:
- Auditing by T.R. Sharma, SahityaBhawan Publication, 2008
- Bank Audit by Kamal Garg, Bharat Law House, 2013
- Practical Guide to Bank Audit by Prakash Vohra, Jain Book Depot, 2012
- Journal of Accounting, Auditing & Finance

RISK MANAGEMENT IN BANKING

Course Code: MBF4403 **Credit Units: 03**

Course Objectives:
The basic objective to be met is to make the students understand the various risks associated with banks and to create a fundamental awareness about identification, measurement and management of various banking risks.

Course Contents

Module I: Risk Management in Banks
Structure of Risk Management, Concept and types of Banking Risk, Importance of Risk Management, Risk Management Process, Various operations of Banks in relation to risk, Banking Regulations on Risks.

Module II: Risk Management Frame work in Banks
Elements of Risk Management Frame work; Systematic Risk Management in Banks; Involvement of the management in the Risk Management Frame work. Tools and Techniques for Managing different risks in banks, Risk Management Strategies.

Module III: Market Risk Management in Banks
Interest Rate Risk: Types of Interest rate risks; Identification of Interest Rate Risk, Management of Interest Rate Risk; Gap Methodology; Duration Analysis. BASEL-I, BASEL-II, BASEL-III, Capital Adequecy
Liquidity Risk: Liquidity Risk identification and the Need for managing it in the Long/short Run; Fundamental Approach to Long Run Liquidity Risk Management; Technical Approach to short Run Liquidity Risk Management
Foreign Exchange Risk: Nature and Magnitude of Exchange risk; Tools and Techniques for Managing Forex Risk; Managing the currency risk

Module IV: Credit Risk Management in Banks
Identification of Credit Risk: Drivers of Credit Risk; Capital Adequacy Requirements; Bank for International Settlements (BIS) Risk-Based Capital Requirements Frame Work

Module V: Operational Risk Management in Banks
Operational Risk and Its Evolution; Major Sources of Operational Risk; Measurement of Operational Risk; Management of Operational Risk. Market Risk Management in Banks- Operational Risk and Sources of Risk Measuring operational Risk and Value-at-Risk (VaR); Approach to VaR

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Risk Management and Financial Institutions 3rd Edition by John C. Hull, Wiley India Pvt Ltd (2012)
- Financial Risk Management by Vivek and Asthana, Himalaya Publishing
- Risk Management in Banks ICFAI
- Financial Risk Management Edinburgh Business School
- Risk Management S B Verma, Deep & Deep Publications
- Managing Bank Risk Morton Glantz – Published by Academic Press
- Risk Management (publication of IIBF and Macmillan)

CUSTOMER RELATIONSHIP MANAGEMENT IN BANKING

Course Code: MBF4404 **Credit Units: 02**

Course Objectives:
The basic objective to be met is to make the students understand the various of cutomer relationship management in banking and to create a fundamental awareness about tools, techniques, implementation and strategies of CRM in banking.

Course Contents

Module I: Overview of CRM
Introduction - Definition of CRM; Emergence of CRM; CRM process framework; relation parities; CRM programs. Effects of liberalization on CRM-Knowledge management and winning markets through effective CRM.

Module II: Technological tools for CRM
Data mining for CRM; changing patterns of E-CRM, solutions in the future; framework for deploying value of customers in an organizations; E-CRM deriving values of Customer Relationship; implementing a technology based solutions.

Module III: Implementing CRM
Optional allocation rules for CRM; measuring the effectiveness of relationship marketing; past, present and future of CRM, Characteristic of good customer satisfaction survey-contact management; organizing for CRM, Relationship management in B2B commerce.

Module IV CRM Services and Strategies
Status of CRM in India; benefits of implementing a CRM system; CRM in Banking CRM strategies-strengthening relationship that lead towards increased business, Certifies Public Accounting (CPA) firms; Relationship marketing strategies and customer perceived service quality, Organizing for relationship managements, Winning strategies and processes for effective CRM in Banking.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- CRM at the speed of light, Paul Greenberg, Tata McGraw-hill
- CRM by Jagdish N Shet and AtulParvatiya, Tata McGraw-hill

TREASURY BANKING

Course Code: MBF4405 **Credit Units: 03**

Course Objective:
To Equip students proficient in understanding of the IPO process. Learn how IPOs are arranged, managed, priced and distributed.The sequence of the issue process, with timelines. The role of merchant bankers in the issue process.Key regulations and documentation requirements To make students acquainted with depository receipts and basics of their issuance process. To understand the nitty-gritty of merger and acquisition& role of an Investment bank in facilitating the deal.

Course Contents:

Module I: Introduction
Overview of investment Banking, Forms of Bank investment, Key Elements of Investment Banking, Principles and Culture of Investment Banking Regulation of Investment Banking, Short-term investment,Long-term investment, Investment in Foreign Exchange.

Module II: Initial Public Offering - Issuance Process
IPO, Preparation/approvals stage- Decision to go for IPO Appointment of lead manager and legal counsel Due Diligence Draft red herring prospectus Filing with SEBI and stock exchanges
Marketing and estimation of price range- Pre-marketing Road shows Book building
Launch and completion-Pricing and allocation ROC filing of final prospectus Listing

Module III:
Depository receipts- ADR GDR EDR IDR-need, ADR- issuance process, tax treatment, regulations, Fungibility, reverse fungibility. Form 20F, F6. IDR-Guidelines.

Module IV:
Bonds Issuance process.Redemption/ Rollover of Debentures. FCCB, Commercial paper- Issuance process, Commercial paper- Redemption process.

Module V:
Merger and Acquisition overview. Types of transactions under M&A. M&A deal drivers. Role of an Investment bank in M&A transaction.

Module VI:
Offer document, Key features of offer documents, Cover page-General risk clause, issuer absolute responsibility. Inner page nformation, No complaint information.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Investment Banking : Concepts, Analysis and Cases 1st Edition, by PratapGiriSubramanyam, Tata McGraw - Hill Education (2007)
- Investment Banking: Valuation, Leveraged Buyouts, and Mergers & Acquisitions (Wiley Finance)
- Investment Banking Explained: An Insider's Guide to the Industry, by Michel Fleuriet
- Monkey Business, by John Rolfe and Peter Troob
- Goldman Sachs: The Culture of Success, by Lisa Endlich
- Investment Banking: The Dream Begins, 3rd Edition by Tapan Jindal

ENTREPRENEURSHIP DEVELOPMENT

Course Code: MBF4413 **Credit Units: 02**

Course Contents:

Module I: Decision to Become an Entrepreneur

Introduction to Entrepreneurship: What Is Entrepreneurship? Why Become an Entrepreneur?, Characteristics of Successful Entrepreneurs ,Common Myths About Entrepreneurs, Types of Start-Up Firms ,Changing Demographics Of Entrepreneurs.

Entrepreneurship's Importance: Economic Impact of Entrepreneurial Firms, Entrepreneurial Firms' Impact on Society, and Entrepreneurial Firms' Impact on Larger Firms.

The Entrepreneurial Process: Decision to Become an Entrepreneur, Developing Successful Business Ideas Moving from an Idea to an Entrepreneurial Firm, Managing and Growing an Entrepreneurial Firm.

Module II: Developing Successful Business Ideas

Identifying And Recognizing Opportunities: Observing Trends, Solving a Problem ,Finding Gaps In The Marketplace **,**Personal Characteristics of the Entrepreneur .

Techniques for Generating Ideas: Brainstorming, Focus Groups Library and Internet Research, Other Techniques.

Encouraging and Protecting New Ideas: Establishing a Focal Point for Ideas, Encouraging Creativity at the Firm Level, Protecting Ideas from Being Lost or Stolen, Find a mentor.

Feasibility Analysis: Product/Service Feasibility Analysis, Industry/Target Market Feasibility Analysis, organizational Feasibility Analysis, Financial Feasibility Analysis.

The Business Plan: Reasons for Writing a Business Plan , Who Reads the Business Plan—And What Are They Looking For? Guidelines for Writing a Business Plan, Outline Of the Business PlanandExploring Each Section of the Plan Oral Presentation of a Business Plan, Questions and Feedback to Expect from Investors.

Industry and Competitor Analysis: Studying Industry Trends, The Five Forces Model, The Value of the Five Forces Mode, Industry Types and the Opportunities They Offer , Identifying Competitors ,Sources of Competitive Intelligence, Completing a Competitive Analysis Grid.

Business Models: The Importance and Diversity of Business Models, How Business Models Emerge, Potential Fatal Flaws of Business Models, Components of An Effective Business Model**,** Core Strategy, Strategic Resources, Partnership Network, customer interface.

Module III: Moving from an Idea to an reality

Initial Ethical and Legal Issues Facing a New Firm: Establishing a Strong Ethical Culture for a Firm, Choosing an Attorney for a Firm, Drafting a Founders' Agreement.

Obtaining Business Licenses and Permits: Business Licenses, Business Permits, Choosing a Form of Business Organization, Sole Proprietorship, Partnerships, Corporations, Limited Liability Company.

Introduction To Financial Management : Financial Objectives of a Firm, The Process of Financial Management, Financial Statements ,Forecasts ,Pro Forma Income Statement ,Pro Forma Balance Sheet, Pro Forma Statement of Cash Flows, Ratio Analysis.

Building a New-Venture: Recruiting and Selecting Key Employees, Roles of the Board of Directors Board of Advisers, Lenders and Other Professionals.

Getting Financing or Funding: The Importance, Sources of Personal Financing, Preparing to Raise Debt or Equity Financing, business Angels, Venture Capital, Initial Public Offering, Commercial Banks, SBA Guaranteed Loans, Other Sources of Debt Financing, Leasing, Strategic Partners.

Module IV: Managing and Growing the new venture

Marketing Issues: Segmenting the Market, Selecting a Target Market, Establishing a Unique Positioning, Branding, 4Ps/7Ps Of Marketing For New Ventures.

The Importance of Intellectual Property: Determining What Intellectual Property to Legally Protect, The Four Key Forms of Intellectual Property, Types of Patents, Who Can Apply for a Patent? The Process of Obtaining a Patent, Patent Infringement, The Four Types of Trademarks, What Is Protected Under Trademark Law? Exclusions from Trademark Protection, The Process of Obtaining a Trademark, What Is Protected by a Copyright? Exclusions from Copyright Protection,

How to Obtain a Copyright , Copyright Infringement, Copyrights and the Internet , Conducting an Intellectual Property Audit, The Process of Conducting an Intellectual Property Audit.

Preparing for and Evaluating the Challenges of Growth : Appreciating the Nature of Business Growth ,Staying Committed to a Core Strategy ,Planning for Growth, Knowing and Managing the Stages of Growth , Challenges Of Growth **,** Strategies for Firm Growth (internal and external),Franchising**.**

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Text & References:

- Alejandro Cremades (2016) , The Art of Startup Fundraising: Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Wiley, New York.
- Burton and Bragg (2006),Accounting and Finance for your Small Business. John Wiley and Sons, New York.
- Peter Drucker (2015), Innovation And Entrepreneurship. Harper Collins, India.
- Nandan H (2013), Fundamentals of Entrepreneurship. Prentice Hall India Learning Private Limited; Third edition: India.

DISSERTATION

Course Code: MBF4437 **Credit Units: 06**

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:
- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation
- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Examination Scheme:

Contents & Layout of the Report	30
Conceptual Framework	10
Objectives & Methodology	15
Implications & Conclusions	15
Viva/ Presentations	30
TOTAL	**100**

FINANCIAL ENGINEERING

Course Code:MBF4406 **Credit Units: 03**

Course Objective:
Finance has evolved as an exciting discipline in terms of innovations it has witnessed in recent past. This aspect known as Financial Engineering starts where financial analysis ends. The objective of the course is to enable the students to think in terms of innovative solutions to financial problems with particular emphasis on understanding new risks, which the changing scenario of finance is creating for individuals and firms and equip them with innovative tools of financial engineering called derivatives and skills to use them in forming effective strategies to cope with the changing environment and hedge against the financial risks.

Course Contents:
Module I: Introduction
Changing Environment and Increasing Price Risks, Financial Engineering as a response to Increased Risks, Types of Risks and Risk Management, Tools of Risk Management, Conceptual and Physical Tools of Financial Engineering, Effect of Speculation and Arbitrage on Market Efficiency, Derivative Market in India

Module II: Futures and Forwards
The Futures Markets, Buying and Selling Futures, Devising a Hedging Strategy Using Futures, Stock Index Futures, Value at Risk, Short Term and Long Term Interest Rate Futures, Foreign Currency Futures and Commodity Futures

Module III: Swaps
Structure of a Swap, Interest Rate Swaps, Currency of Swaps, Commodity Swaps, Other Swaps, Credit Risk, Role of a Swap Dealer.

Module IV: Options
Options Markets; Properties of Stock Option Prices; Option Pricing Models – Binomial Model, Black-Scholes; Model, Single Period Options – Calls and Puts, Payoff Diagrams of Simple and Complex Option Strategies, Cash Settled Options, Multi-Period Options – Caps, Floors, Collars, Captions, Swaptions and Compound options, Cross-currency Futures and Options.

Module V: Other Innovations
Debt Market Innovations, Mortgage Backed Securities, Hybrid Securities, Asset-Liability Management

Module VI: Recent Trends
Exotic Options, Synthetic Instruments, Developments in Equity-Based Strategies, Direct and Cross Hedges, Future Trends and Issues in Financial Engineering.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Hull, J. C. (1999), Introduction to Futures and Options Markets, Prentice Hall of India.
- Edwards, F. R. and Ma, C. W. (1992), Futures and Options, McGraw-Hill International.
- Rebonato, R. (1996), Interest Rate Option Models: Understanding, Analyzing and Using Models for Exotic Interest Rate Options, John Wiley and Sons.
- Kolb, R. W. (1997), Understanding Futures Markets, Prentice Hall of India.
- Marshall, J. F. and Bansal, V. K. (2006). Financial Engineering: A Complete Guide to Financial Innovation, Prentice Hall of India.
- Articles from selected journals and magazines.

CORPORATE TAX PLANNING

Course Code: MBF4408 **Credit Units: 03**

Course Objective:
At the end of the course, the students should be able to understand Indian accounting Standards and the impact of USGAAP on Financial Statements. To create an understanding of the accounting of Mergers and Acquisitions and Valuation of goodwill & Shares.
In addition to Corporate Accounting the students should be able to demonstrate an understanding of the tax provisions enabling them to make use of legitimate tax shelters, deductions, exceptions, rebates and allowances; with the ultimate aim of minimizing the corporate tax liability.

Course Contents:
Module I: Accounting Norms
Various Accounting Standards in India and comparison with International accounting Standards and US.GAAP.

Module II: Accounting for Merger and Acquisitions
Accounting for Acquisition of Business, Calculation of Purchase consideration and Profit (Loss) Prior to Incorporation.Accounting for Amalgamation in the nature of Merger and in the nature of Purchase.

Module III: Valuation of Goodwill and Shares
Valuation of Goodwill – Different Methods of Valuation of Goodwill, Valuation of Shares – Net Asset Backing Method and Yield Method.

Module IV: Basic Concepts of Income Tax
Introduction to Income Tax Act, 1961, Residential Status, Exempted Incomes of Companies An overview of various provisions of Business & profession & Capital gains – applicable to companies
Goods and Services Tax – Features - Implications - Rate slap - Model - Products Excluded From GST – Registration Procedure

Module V: Assessment of Companies
Computation of taxable income, MAT, Set off & carry forward of losses in companies, Deductions from Gross total income applicable to companies, Tax planning with reference to new projects/expansions/rehabilitation plans including mergers, amalgamation or de-mergers of companies, Concept of avoidance of double taxation.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Singhania V.K. &SinghaniaKapil , Direct Taxes law & practices, Taxmann
- Ravi M Kishore, Advanced Accounting, Taxmann.
- Lakhotia , R.N. &Lakhotia, Corporate Tax Planning, Vision books
- Singhania, V.K., Student's guide to Income Tax, Taxmann
- International dictionary of taxation by Indian Tax Institute, 1st Edition.
- Maheshwari S.N and Maheshwari S.K Advanced Accountancy, Vikas Publishing House.

INVESTMENT BANKING

Course Code: MBF4409 **Credit Units: 03**

Course Objective:
To Equip students proficient in understanding of the IPO process. Learn how IPOs are arranged, managed, priced and distributed.The sequence of the issue process, with timelines. The role of merchant bankers in the issue process.Key regulations and documentation requirements To make students acquainted with depository receipts and basics of their issuance process. To understand the nitty-gritty of merger and acquisition& role of an Investment bank in facilitating the deal.

Course Contents:
Module I: Introduction
Overview of investment Banking, Forms of Bank investment, Key Elements of Investment Banking, Principles and Culture of Investment Banking Regulation of Investment Banking, Short-term investment,Long-term investment, Investment in Foreign Exchange.

Module II: Initial Public Offering - Issuance Process
IPO, Preparation/approvals stage- Decision to go for IPO Appointment of lead manager and legal counsel Due Diligence Draft red herring prospectus Filing with SEBI and stock exchanges
Marketing and estimation of price range- Pre-marketing Road shows Book building
Launch and completion-Pricing and allocation ROC filing of final prospectus Listing

Module III
Depository receipts- ADR GDR EDR IDR-need, ADR- issuance process, tax treatment, regulations, Fungibility, reverse fungibility. Form 20F, F6. IDR-Guidelines.

Module IV
Bonds Issuance process.Redemption/ Rollover of Debentures. FCCB, Commercial paper- Issuance process, Commercial paper- Redemption process.

Module V
Merger and Acquisition overview. Types of transactions under M&A. M&A deal drivers. Role of an Investment bank in M&A transaction.

Module VI
Offer document, Key features of offer documents, Cover page-General risk clause, issuer absolute responsibility. Inner page nformation, No complaint information.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:
- Investment Banking : Concepts, Analysis and Cases 1st Edition, by PratapGiriSubramanyam, Tata McGraw - Hill Education (2007)
- Investment Banking: Valuation, Leveraged Buyouts, and Mergers & Acquisitions (Wiley Finance)
- Investment Banking Explained: An Insider's Guide to the Industry, by Michel Fleuriet
- Monkey Business, by John Rolfe and Peter Troob
- Goldman Sachs: The Culture of Success, by Lisa Endlich
- Investment Banking: The Dream Begins, 3rd Edition by Tapan Jindal

BEHAVIOURAL FINANCE

Course Code:MBF4410 **Credit Units: 03**

Course Description:
This course is intended to complement other finance courses that are mainly based on the traditional paradigm which assumes that investors and managers are generally rational. Specifically, this course has three main objectives. First, we aim to examine how the insights of behavioural finance theories shed light on the behaviour of individual investors and finance professionals in investment decision-making and corporate financial decision-making. Second, we explore the possibility to improve investment performance and corporate performance by recognising the cognitive biases and applying appropriate 'debiasing' techniques. Finally, we investigate the implications of behavioural finance for the construction of good corporate governance mechanisms.

Course Objectives:
After this students will be able to:
- Identify persistent or systematic behavioral factors that influence investment behavior
- Understand and critically discuss the differences between a behavioural finance perspective and a traditional finance perspective
- Understand and critically discuss the cognitive biases and errors of judgment that affect financial decisions
- Critically evaluate behavioural influences involving individuals investment decisions
- Critically evaluate behavioural influences involving corporate (executive) financial decisions
- Critically discuss important developments in this new area and the associated practical insights they provide

Course Contents:

Module I: Psychology & Finance: Behavioral Finance an overview, Traditional vs behavioral finance, Morals & Ethics: why they matter in the business world.

Module II:Behavioral Corporate Finance: Corporate Governance, Loyalty issues, corporate ethics issues, agency conflicts**,** Behavioral portfolio management.

Module III: Behavioral Biases in Finance: Definition of average investor; Behavioral Biases & corporate decision (valuation, capital budgeting, capital structure, dividend policy and Mergers & Acquisition), Belief biases: Biases of average investor, Forecasting Biases, overconfidence, self control, Limited attention and categorization.

Module IV: Investors Decision: Perceived risk on financial product, Social interactions and positional concerns. The role of advisors, advertising, Emotion & Investment Decision, Investment decision cycle: judgment under uncertainty, group behavior: Conformism, herding, fatal attraction.

Module V: Supply by firms and managerial decisions: Supply of securities and firm investment characteristics (market timing, catering) by rational firms; Associated institutions; Relative horizons and incentives; Biased managers.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V -** Viva; **CT -** Class Test; A-Attendance; **EE -** End Semester Examination)

Text & References:

Text:

- Behavioral Finance: Insights into Irrational Minds and Markets, by James Montier

References:

- Behavioral Finance: Understanding the Social, Cognitive, and Economic Debates, by Burton and Shah
- Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing, by Shefrin
- Big picture overviews by the giants of the field, each with their own focus:
- Animal Spirits by Akerlof and Shiller
- Thinking, Fast and Slow by Daniel Kahneman.
- Irrational exuberance by Robert Shiller
- Engaging historical account of how these ideas came about, and their influence to date: The Undoing Project by Michael Lewis
- Detailed coverage of market anomalies and/or trading strategies based on them:
- Expected Returns: An Investor's Guide to Harvesting Market Rewards, by AnttiIlmanen
- Quantitative Value: a Practitioner's Guide to Automating Intelligent Investing and Eliminating Behavioral Errors, by Wesley Gray
- The Missing Risk Premium: Why Low Volatility Investing Works, by Erik Falkenstein

FINTECH: TECHNOLOGY INNOVATION IN FINANCIAL SERVICES

Course Code:MBF4411 **Credit Units: 03**

Introduction

F**inancial technology**, also known as **fintech**, is an economic industry composed of companies that use technology to make financial services more efficient. Financial technology companies are generally startups trying to this intermediate incumbent financial systems and challenge traditional corporations that are less reliant on software.

This course aims to give an insight in the financial technology revolution, and the disruption, innovation and opportunity therein. We will see the global fintech investment space; this course will aggregate diverse industry expertise into a single informative course to provide students with the answers they need to capitalize on this lucrative market. Key industry developments are explained in detail, and critical insights from cutting-edge practitioners offer first-hand information and lessons learned.

The financial technology sector is booming, and entrepreneurs, bankers, consultants, investors and asset managers are scrambling for more information: Who are the key players? What's driving the explosive growth? What are the risks? This course collates insights, knowledge and guidance from industry experts to provide the answers to these questions and more.

By the end of the course the participants should be better able to:

- Get up to speed on the latest industry developments
- Grasp the market dynamics of the 'fintech revolution'
- Realize the sector's potential and impact on related industries
- Gain expert insight on investment and entrepreneurial opportunities
- Learn about the modeling skills and emerging technologies

Course Contents:

Module-I : Introduction to fintech :

FinTech – Breaking the financial services value chain.

Payments; Deposits and Lending; Capital Raising; Investment Management; Market Provisioning; Insurance

FinTech Hubs

The history of fintech

Module-II: Technology :Blockchain, wearables and other emerging technologies, Financial modeling and Fintech : Big Data 102 and Artificial Intelligence 102

Module-III: FinTech Solutions

- Robo-Advisors
- Rewiring the Deal – The Path Forward for B2B Supply Chains
- Payments and Point of Sales (POS) Innovation
- Predictive Algorithms – Building Innovative Online Banking Solutions
- Big Data is the Cornerstone of Regulatory Compliance Systems
- FinTech Solutions in Complex Contracts Optimization
- Behavioural Biometrics – A New Era of Security
- Ultra-Fast Text Analytics in Trading Strategies
- Regulated Crowdfunding Ecosystems
- Remittances – International FX Payments at Low Cost
- Payment Solutions Including Apple Pay
- FinTech Innovation for Wearables

Module-IV: The future of Fintech

- Using emerging technologies
- The future of financial services
- Innovation through big data
- The API economy

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V -** Viva; **CT -** Class Test; A- Attendance; **EE -** End Semester Examination)

Text & References:

- Feld, Brad and Jason Mendelson. (2011). *Venture Deals.* Wiley & Sons.
- Damodaran, A. (2009). *The dark side of valuation: Valuing young, distressed, and complex businesses.* Ft Press.
- Smith, J., Smith, R. L., Smith, R., & Bliss, R. (2011). *Entrepreneurial finance: strategy, valuation, and deal structure.* Stanford University Press.
- Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. Random House LLC.
- Metrick, A. and A. Yasuda. (2010). *Venture Capital and the Finance of Innovation.* Wiley.
- Meyer, M. H., & Crane, F. G. (2010). *Entrepreneurship: An innovator's guide to startups and corporate ventures.* SAGE Publications.
- Ralston, Geoff. 2015. "A Guide to Seed Fundraising." Online book, http://www.themacro.com/articles/2016/01/how-to-raise-a-seed-round/
- Lerner, Josh, Ann Leamon, and FeldaHardymon. *Venture Capital, Private Equity, and the Financing of Entrepreneurship.* New York: John Wiley & Sons, 2012.
- Skinner, Chris. *Digital Bank: Strategies to Launch or Become a Digital Bank.* Marshall Cavendish, 2014.
- Haycock, James. *Bye Bye Banks?: How Retail Banks are Being Displaced, Diminished and Disintermediated by Tech Startups and What They Can Do to Survive.*
- Tapscott, Don. *Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World.* Portfolio, 2016.
- McMillan, Jonathan. *The End of Banking: Money, Credit, and the Digital Revolution.* Zero/One Economics, 2014.
- Sironi, Paolo. *FinTech Innovation: From Robo-Advisors to Goal Based Investing and Gamification*(The Wiley Finance Series), Wiley, 2016.

PRIVATE EQUITY AND ENTREPRENEURIAL FINANCE

Course Code:MBF4412 **Credit Units: 03**

Description

Private equity is composed of funds and investors that directly invest in **private** companies, or that engage in buyouts of public companies, resulting in the delisting of public **equity**. In finance, **private equity** is a type of **equity** and one of the asset classes consisting of **equity** securities and debt in operating companies that are not publicly traded on a stock exchange. A **private equity** investment will generally be made by a **private equity** firm, a venture capital firm or an angel investor. With support of Private equity, the new entrepreneur will hope up to start a new firm for the benefit of economic development.

Objectives

1. To understand the various types of activities that falls under the purview of Private equity. Corporate Restructuring
2. To understand intricacies of raising of various methods of financing
3. To deal with Issues involved in Private financing and entrepreneurial development activities.
4. To examine key elements of understanding a business from a private equity investment perspective

Assessment

The subject would comprise of both theory and numerical solving. The assessment of the learner would be done through assignments, case discussion, articles on current research & issues, problem solving and simulation. The students would be expected to do a project, quiz and comprehend the application part of the concepts taught in the class.

Course Contents:

Module-I: Introduction: Over view of the Private Equity Industry, Development and Growth, terminology, and categories within the asset class, participants, anatomy of funds and partnership agreements, perspectives and negotiations and perspectives of companies

Module-II: The Fundamentals of Private Equity Investing:,financing, structuring and negotiating - buyout and growth capital transactions, and managing the portfolio company over the life of the investmentand including an exit and / or value realization transaction.

Module-III: Understanding and Evaluating Private Equity Firms in Financial Markets: We will consider how the financial community assesses firms and chooses which funds to invest in and how funds assemble portfolios of companies and how LP investors assemble their portfolios of LP interests. Other topics will include understanding and managing LP liquidity options; the rise and role of other alternative investment vehicles, most notably hedge funds and sovereign wealth funds; the publicly traded private equity firm; the impact of the financial crisis and current issues under discussion in the area of financial regulation

Module-IV: Private Equity in Secondary Markets – Key components of value creation- Relative value Matrix – Industry Value creation.

Module-V: Private Equity - corporate governance and ethics - Iinvestments in developing markets - Sourcing of private equity - Deals and management of portfolio company - Expectations and Negotiation

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Reference books

- Jason A. Scharfman, Private Equity Operational Due Diligence: Tools to Evaluate Liquidity, Valuation, and Documentation, + Website , ISBN: 978-1-118-11390-5, March 2012
- Stowell D, An Introduction To Investment Banks, Hedge Funds, And Private Equity – 2011, Elsevir (2011), **ISBN :** 978-9380931074

Case studies published from various journals.

Amity Business School

MBA-Executive (Working Professionals)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Business Administration (Executive Working Professional)

Programme Mission:

The mission of the MBA programme is to foster an environment of academic excellence in Business Management through research and innovation, industry integration, internationalization and extension activities and develop highly trained and employable professionals with specialization in the area of Marketing & Sales, Finance, Banking & Finance, Human Resource Management, International Business, Information Technology, E-Commerce and Hospital & Healthcare, who are socially responsible and globally minded professional to meet the current and emerging needs of business and society.

Programme Description:

The two year full time Masters in Business Administration programme is to educate and prepare students with the knowledge, analytical ability, and management perspectives and skills needed to lead, to motivate and to manage diversified workforce, rapid technological change and competitive marketplace while considering the principles of ethical, legal and corporate governance fundamentals.

Programme Outcome (PO):

PO1	Apply the knowledge of marketing, human resource management, finance and other functional areas of management to solve complex management issues in volatile business environment
PO2	Student shall have ability to acquire & evaluate new knowledge through Business Research Methods, have the ability to identify, define, investigate, and solve critical business issues using management principles, analyse data/information and interpret results for reaching optimum solutions.
PO3	Student shall be able to understand global issues from different perspectives, recognize the opportunities to improve the business value chain as an entrepreneur and shall develop and display basic business acumen & business skills and be able to apply different forms of communication in diversified cultural settings.
PO4	Student shall able to critically think to assess societal, health, safety, legal, and cultural issues and apply range of strategies for solving a problem and decision making
PO5	Student shall be able to practice ethical principles and commit to professional ethics and responsibilities and norms of the management practice.
PO6	Student shall develop range of Leadership skills and shall demonstrate excellent interpersonal skills, understanding of group dynamics and effective teamwork, including awareness about personal strengths and limitations.
PO7	Student shall be able to communicate effectively on complex management activities with various stakeholders being able to comprehend and write effective reports, design documentation, make effective presentations, and give & receive clear instructions.
PO8	Student shall recognize the need for, and have the ability to engage in independent

	and life-long learning in the broadest context of technological change.
PO9	Student shall be able to create, select, and apply appropriate techniques, resources, and modern management and IT tools including prediction and modeling to make decisions.

PSO 1			**PSO 2**					**PSO 3**
Student shall be able to describe fundamental knowledge of general and functional management courses & relevant technological tools to identify opportunities relating their existing industry knowledge base			Student shall able to apply technical and management knowledge in the domain of finance, marketing, human resources and information technologies to solve complex business and management problems in global business environment					Student shall be able to apply specific and cross functional knowledge to solve critical
Fundamental Business Management	**Functional Management domain**	**Research, Analysis and Technical Management Domain**	**M&S/IT&EC/Finance/HR/BA**					**NTCC**
Economics for Managers	Marketing Management	Business Statistics	Sales and Distribution Management	Database Management System for Business	Mergers, Acquisitions & Re-Structuring	Compensation and Reward Management	Programming for Analytics using R	Research Project
Information Technology for Managers	Accounting for Managers	Operations & Supply Chain Management	Marketing of Services	E-Commerce Fundamentals	Management of Banks and Financial Institutions	Learning and Development	Programming for Analytics using Python	Dissertation
Strategic Management	Strategic Human Resource Management	Research Methods & Report Preparations	Consumer Behaviour	System Analysis & Design	Security Analysis and Portfolio Management	Organizational Development & Change	Visual Analytics-Tableau/ Power BI	

			Advertising Management and Sales Promotion	Dynamic Web Design & Development	Corporate Valuation	Performance Management System	Econometrics	
			Retail Management	Data Warehousing & Data Mining	Fintech	International Human Resource Management	Predictive Analytics-I Machine Learning using R	
			Digital Marketing	ERP for Businesses	Strategic Financial Management	Leadership Development	Predictive Analytics-II Machine Learning using Python	
			Strategic Brand Management	Digital Marketing	International Finance	Strategic Human Resource Management	Big Data Analytics-Hadoop	
			Customer Relationship Management	E-Supply Chain Management	Private Equity and Entrepreneurial Finance	Talent Management and Succession Planning	Data Mining	

Semester - I

MWP4101	**MARKETING MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Marketing management emphasizes upon the practical aspects of marketing concepts and management functions performed by professionals. This is a beginner's course in Marketing and shall cover the basics. The course helps in developing an understanding of the challenges of marketing management in manufacturing and service industries: analyzing marketing environments; evaluating strategic alternatives and designing and implementing marketing programmes involving decisions about products/services, pricing, distribution and promotion. The course serves to familiarize participants with basic marketing concepts, environment, strategies and methodology.

Course Objectives

The objectives of this course are to:

1. Provide the students exposure to modern marketing concepts, tools and techniques.
2. Enhance student's knowledge to prepare for general management responsibilities by focusing on the input of the marketing perspective across all functions.
3. Explain different consumer-specific characteristics as well as certain psychological processes influencing buying behavior.
4. Provide different dimensions of marketing such as STP, business environment, distribution channels, marketing communication, and social media marketing to enable the students to design and analyze the functional aspects in emerging market.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Comprehend the holistic marketing efforts to develop, design and implement marketing programs. They will also be able to examine challenges, responsibilities, and risks managers face in today's workplace.

CO2: Acquire a comprehensive knowledge about how values are created, communicated and delivered to the target audiences.
CO3: Explain how to control the elements of the marketing mix—product policy, channels of distribution, communication, and pricing—to satisfy customer needs profitably
CO4: Devise strategic approaches to manage different marketing dimensions in uplifting the consumer as well as business market.
CO5: Describe the marketing communication and its applicability along with understanding new-age media, advertising, sales promotion, personal selling etc.

Modules	Blooms Level*	Number of hours
Module I: Understanding Marketing in New Perspective Fundamentals of Marketing, Customer Value and Satisfaction, Customer Delight, Philosophies of Marketing Management, Value Chain, Marketing Mix, Environmental scanning, Strategic Planning in marketing, formulating the marketing plan. STP. The factors influencing consumer behaviour. Buying process, the buying decision making process, factors effecting the buying decision. The industrial buying process.	L1, L2	10
Module II: Managing Product & Pricing Strategies Classification of products, New Product development, stages of product development, Adoption process, Product mix decisions, product life cycle stages, Managing product life cycles. Setting the price, adapting the price, initiating and responding the price changes.	L1, L2, L3, L4	8
Module III: Managing Channels and the Integrated Marketing Communication. Channel functions and flows. Channel design decisions. Channel management decisions. Channel dynamics. Integrated Marketing Communication, Marketing Communication Process, Promotion mix, Advertising, Personal Selling, Sales Promotion and Publicity and Public Relations, Direct Marketing.	L1, L2, L3	10
Module IV: Emerging Trends in Marketing An Introduction to Internet Marketing, Multi Level Marketing, E-Marketing, Green Marketing, Event Marketing, Types of Events,	L1, L2, L3	8

Sponsorship, Cause Related Marketing, Marketing for Non Profit Organizations Marketing Strategies for Leaders, Challengers, Followers and Nichers.		

***Bloom's Level:**
L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Text Book

- Marketing Management (12th ed.)- A South Asian Perspective: Kotler, Keller, Koshi & Jha: Pearson Education.

Reference Books

1. Marketing Management; Planning, Implementation & Control (5th ed.) by V S Ramaswamy & S Namakumari, McMillan.
2. Fundamental of Marketing: Stanton, Etzel, Walker; McGraw Hill.
3. S. Neelamegham, (2009) Marketing in India, Vikas publishing house.
4. Marketing Management, Saxena, Ranjan, Tata McGraw Hill, New Delhi.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	1	1	--	1	1	1	--	1
CO2	1	1	1	1	--	1	1	--	1	1	1	--	1
CO3	1	1	1	1	--	1	1	--	1	1	1	--	1
CO4	1	1	1	1	--	1	1	--	1	1	1	--	1
C05	1	1	1	1	--	1	1	--	1	1	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

MWP4105	ACCOUNTING FOR MANAGERS	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The intent of this course is to acquaint the students with fundamental concepts and processes of accounting so that they are able to appreciate the nature of item presented in the annual accounts of an organization. The student will be able to familiarize with the significant tools and techniques of financial analysis further useful in the interpretation of the financial statements. The aim of this course does not focus on to make the student's expert accountant but to have a good comprehension on the management planning and control systems. However the principal focus will be related to the interpretation and use of the financial data by non-accounting students to gain the ability of using accounting information as a tool in applying solutions for managerial problems, evaluating the financial performance, and interpreting the financial structure.

Course Objectives

The objective of this course is to:

1. Equip the students to develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, students will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts.
2. Develop skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.
3. To make the students to understand the corporate financial resources

Course Outcome

On completion of this course, the students will be able to:

CO1: Explain the theoretical and practical aspects of financial accounting.

CO2: Prepare financial statements as per the Accounting principles and standards.

CO3:Evaluate Depreciation and Inventory valuation of the given organization

CO4: Demonstrate the decision-making skills in financial analysis context.

CO5: Having an ability to use techniques, skills and modern managerial tools & techniques necessary for business practice

CO6: Comprehend the role of financial manager, objectives of financial management and sources of finance.

CO7: Apply the recent trends of accounting in business decision-making.

Modules	Blooms level*	Number of hours
Module I: Accounting Basics Accounting Concepts, Branches of Accounting, Policies, Accounting Principles, Accounting Standards, International Financial Reporting System, Accounting Equation Approach, Posting to ledger accounts, Trial Balance, Cash Book and Bank Reconciliation Statement **Final Accounts** Income Statement, Balance Sheet. Final Accounts with Adjustments-Provision for doubtful debts, Discount on Debtors and Creditors, Bad Debts, Interest on Capital, Prepaid expenses, outstanding expenses, etc.,	L1, L2	9
Module II: Financial Statement Analysis Relation and Comparison of Accounting data and using financial statement information, Ratio Analysis and Interpretation of Ratios, Comparison betweenFund flow and Cash flow analysis, Preparation of Cash Flow Statement (AS3).	L1, L2,L3, L4	9
Module III: Cost and Management Accounting Elements of cost, Cost Classification and Allocation, Cost Sheet, Method of Inventory Valuation, Marginal Costing and Cost Volume Profit Analysis, Budgeting & Variance Analysis	L1, L2, L4, L5	9
Module IV: Basics of Finance Meaning, nature and scope of finance goal – profit vs. wealth maximization; Finance decisions – investment, financing and dividend decisions, Time Value of Money. **Contemporary Issues in Accounting and Finance** Guest Lecture from industry experts on contemporary Accounting practices in decision making and role of financial managers.	L1, L2,L3, L5, L6	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Anthony A. Atkinson, Robert S. Kaplan, S. Mark Young, Ella Mae Matsumura, G. Arunkumar (2014), Management Accounting: Information for Decision Making and Strategy Execution, 6th edition, Pearson Education, India.
2. Horngren T. Charles, (2012), Cost Accounting: A Managerial Emphasis, 15th edition, Pearson Education, India
3. Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, McGraw Hill.

4. Khan M.Y, Jain P.K, (2009), Management Accounting, 5th edition, McGraw Hill, India
5. I.M.Pandey, (2015), Financial Management, 11th edition, Vikas Publishing, India.

Reference Books

1. Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing House.
2. Narayanaswamy R (2014), Finanacial Accounting – A Managerial Perspective, Prentice Hall of India.
3. M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.
4. Debarshi Bhattacharyya, (2010), Management Accounting, 1st edition, McGraw Hill, India
5. Khan M.Y, Jain P.K, (2014), Financial Management- Text, Problems and Cases, 7th edition, McGraw Hill.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**P1**	**C1**	**CT1**	**EE**
Weightage (%)	10	10	20	60

CT: Class Test, A: Attendance, EE: End Semester Examination; A: Attendance, C: Case Analysis

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	--	1	--	--	--	--	--	1	2	--
CO2	1	1	2	1	2	--	2	--	--	1	2	--
CO3	1	1	--	2	2	--	--	--	2	1	2	--
CO4	2	1	--	--	--	--	--	--	2	1	2	--
CO5	2	1	--	1	--	--	1	--	--	1	2	--
CO6	2	1	--	1	--	--	3	--	--	1	2	--
CO7	1	1	--	1	--	--	1	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4106	BUSINESS STATISTICS	L	T	P	C
Version	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course not only exposes the students to the theory of probability and sampling distribution but also includes the various types of statistical tools which are to be used in the present rapidly changing business environment. Its main focus is on the application of data analytic tools to enable the students to make correct decision making under the complex and dynamic business scenario. The content of the course will also include the different forecasting techniques with main focus on the quantitative technique that would be immensely beneficial for the students to make the predictions correctly. Numerous empirical examples and real business cases are used to illustrate applications of the material covered

Course Objectives

The aim of this course is to:

1. Develop the understanding of the various statistical models used for decisions making
2. To appreciate the problems of obtaining or gathering the desired information or data.
3. To understand the types of classification of data, representation of data in the form of diagrams, graphs or tables.
4. To appreciate the basics of central value, dispersion, skewness etc and their applications in real business problems.
5. To examine the problems related to theory of probability, various types of probability distribution and particularly Baye's theorem and their application in real-life problems.
6. To describe the process of hypothesis testing for large and small samples and its uses in business problems
7. To equip with the knowledge of correlation, regression and time series; enabling them to make the correct future predictions

Course Outcomes

On completion of this course, the students will be able to:

CO1. Define and apply basic statistical concepts to various field of management

CO2: Apply statistical methods such as statistical collection, species characteristics, statistical series, tabular and graphical representation of data, measures of central tendency, and dispersion for managerial decision making.

CO3. Apply various forecasting techniques.

CO4. Describe different types of probability distributions

CO5. Explain and analyze a given business problem and applying required statistical hypothesis and sampling tool accordingly

CO6. Define the decision theories for practical business problems.

Modules	Blooms level*	Number of hours
Module I: Introduction Application of Statistics in Business & Management; Basic Concepts of Statistical Studies: Variable and Classification of Data; Diagrammatic & Graphical Presentation of Data, Measures of Central Tendency, Measures of Dispersion	L1, L2	9
Module II: Forecasting Techniques Simple Correlation & Regression Analysis, Time Series Analysis-Introduction, Variation in Time Series, Trend Analysis, Cyclical Analysis, Seasonal Analysis, Irregular Variation	L1, L2, L3	9
Module III: Probability & Probability Distributions Probability: Basic Terminology in Probability, Types of Probability, Probability rules, Probabilities under condition of Statistical Independence, Probabilities under condition of Statistical dependence, Baye's Theorem Probability Distributions: Binomial Distribution, Poisson Distribution, The Normal Distribution	L2,L3	9
Module IV: Sampling, Estimation and Testing of Hypotheses Sampling & Sampling Distribution: Parameter and Statistic, Point and Interval Estimation, Interval Estimation of three common parameters viz. Mean Standard Deviation and Proportion. Hypothesis Testing for a Single Population: Concept of Hypothesis, Test involving a population mean, Test involving a population proportion, Test involving population Standard Deviation, Test for two population means (Independent Samples), Tests for two population means (Dependent Samples), Tests for two population proportions (Independent Samples),Tests for two population variances (Dependent Samples), F-test, Non-parametric Tests (Chi – Square Test)	L1, L2	9

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Levin R.I. & Rubin S.R. 2012, Statistics for Management, 7th Ed. Prentice Hall Of India
2. Gupta S P, Statistical Methods, S. Chand & Co. New Delhi, 35th edition

Reference Books

1. Anderson David R, Sweeny Dennis J, Williams Thomas A, Statistics for Business and Economics 12th ed,Cengage learning, 2018.
2. Keller Gerald, Statistics for Management, Cengage Learning, 2014
3. Rubin & Levin, Statistics for Management, Eighth edition, Pearson, Prentice Hall of India, 2017.
4. Vohra N.D., Quantitative Techniques in Management, Tata McGraw Hill, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**C**	**A**	**CT**	**EE**
Weightage (%)	10	5	5	70

CT: Class Test, A: Attendance, EE: End Semester Examination; A: Attendance, C: Case Analysis

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	--	--	--	--	--	--	--	1	--	--
CO2	1	1	--	--	--	--	--	--	--	1	--	--
CO3	1	1	--	--	--	--	--	--	--	1	--	--
CO4	1	1	--	--	--	--	--	--	2	1	--	--
CO5	1	1	--	--	--	--	--	--	2	1	--	--
CO6	1	1	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4107	ECONOMICS FOR MANAGERS	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure	Basic knowledge of managerial economic science preferred but not compulsory				
Co-requisites					

Catalog Description

In this course the students are introduced with various concepts of economic science that relates to decision making process based on rational choice approach. To begin with, introductory concepts of economic theory and their implications on managerial decision process are analyzed. Thereafter concepts related to demand analysis, demand forecasting supply analysis, and equilibrium market conditions are discussed in detail. The next phase deals extensively concepts related to production theory, cost theory and revenue aspects. Third, various concepts related to market structure are discussed in detail. Finally, various macroeconomic concepts, policy perspectives of government and other institutions are explored in detail. The overall aim of this course is to make the students familiar with working knowledge of the fundamentals of economic theory relevant to business and industry.

Course Objectives:

The objective of this course is to:

1. Make the students aware of the theoretical concepts of managerial economic science so that they can analyze situations and improve upon their managerial decision process in workplace.
2. Provide students with extensive exposure about the micro and macro level variables that influence business operations and strategies of the firm and business environment and regulatory framework under which they operate.
3. Enhance students' understanding of application of various theoretical perspectives of managerial economics into practical working environment in order deal with industry complexities in an efficient manner.
4. Explain the various macroeconomic policy initiatives in terms of their implications in management and business decision process thereby facilitating optimization of resources.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain basic concepts of managerial economics, demand and supply dynamics, demand forecasting techniques and their application, and analyze the working of free market mechanism and appreciate how forces of demand and supply reinforce each other for attaining market equilibrium.

CO2: Analyze rationally the dynamics of production and cost aspects in order to make a holistic assessment of the complexities inherent in production system.

CO3: Describe the various forms of market structure and their implications in managerial decision process.

CO4: Discuss holistically the various macroeconomic aspects of business and implications of government policies in shaping the dynamics of business and industry.

Modules	Blooms level*	Number of hours
MODULE 1: Theory of demand and supply Nature and scope of economic analysis: its relevance for managerial decision making, Demand analysis: nature of demand for a product-individual demand and market demand, demand by market segmentation. Demand function and determinants of demand. Supply function: determinants of supply of a product, law of supply. Elasticity of supply. Concept of elasticity of demand- income, cross, price and advertizing elasticity. Theorems on the price elasticity of demand. Applications of the concept of price elasticity of demand in business decisions. Demand forecasting need for forecasting and techniques of forecasting. Free Market Mechanism. Cost concepts: costs relevant for management decision making. Economies of scale: internal and external. Cost function: cost and output relationship. Short run and long run.	L1, L2, L3, L4	10
MODULE 2: Theory of production and cost Production analysis: Production function-neo-classical, Least cost combination of inputs for a firm. Concept of an isoquant-smooth curvature and right angle. Returns to scale and returns to a factor. Expansion path of a firm. Cost Analysis: Cost relevant for management decision making. Economies of scale: Internal and External, Cost Function: Cost and output relationship. Short Run and Long run. An Analysis of the Objectives of a Business Firm: Profit Maximization Model.	L1, L2,L3, L4, L5	8
MODULE 3: Market Structure: Price and Output decisions Pricing and Output decisions – Perfectly Competitive and Monopoly Market Pricing and Output Decisions-Under Monopolistically Competitive Market- Product Differentiation; Price Discriminating Monopolist; Models of Oligopolistic Market: Collusive and Non-Collusive Oligopoly structure. Price Rigidity – The Kink Demand Curve Model and Price War. Price Leadership Models, Cartels and Collusion.	L1, L2,L3, L4	8
MODULE 4: Macroeconomics Analysis Economic Policy and Analysis: Macro Economic Variables and Functional Relationships. Business Environment: Exogenous Variables. Factors Influencing the Business Environment. National Income Analysis: National Income Aggregates. Circular Flow of income, Money-Incorporating Savings Investment, Foreign Trade and Government Sector. Government Macroeconomic Policy Measures – GST, Demonetization – and their impact on Business; Consumption Function, Saving Function and investment Function. Concepts of Investment Multiplier. Factors Influencing Consumption Function- Objective, Subjective and Structural. Demand and Supply of Money: Transaction,	L1, L2,L3, L4, L5	10

Precautionary and Speculative Demand for Money; Liquidity preference function; Components of Money Supply. Business Cycles: An Analysis of Fluctuation in the level of Economic Activity. Phases of Business Cycles. Inflation and Deflation: Demand – Pull and Cost – Push Inflation. Impact of Inflation on Employment, Price Level and other Macro Economic Variables and Analysis of Policies to control inflation. Deflation. Monetary Policy: Objectives of Monetary Policy. Function of Central Bank. Credit Policy and its implications on the Corporate Sector. Fiscal Policy: meaning, objectives and impact on economy. Money Market, Capital Market and Foreign Exchange Market.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Salvatore, D. Managerial Economics, 8th Edition, Oxford University Press
2. Krugman, Paul and Maurice Obstfeld. (2008), South Asian Edition, International Trade Policy, Pearsons.
3. Thomas, Christopher R., S. Charles Maurice, Sumit Sarkar, Managerial Economics, 9th Edition, Tata McGraw Hills.
4. Samuelson, Paul A., and William Nordhaus, Economics, 19th Edition, McGraw Hills India Pvt. Ltd.

Reference Books

1. Peterson, H.C and Lewis, W.C., Managerial Economics, Prentice Hall of India
2. Bhattacharya, Govind and Debasis Bhattacharya. (2018), GST and Its Aftermath: Is Consumer Really the King, SAGE Publications.
3. Gupta, G.S. (2006), Managerial Economics, Tata McGraw Hill
4. Mishra, S.K., and V.K. Puri. Indian Economy, 27th Edition, Himalaya Publishing House.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	2	--	--	--	--	--	--	1	--	--
CO2	1	1	1	--	--	--	1	--	--	1	1	1
CO3	1	1	1	--	--	--	2	1	--	1	1	1
CO4	1	1	1	--	--	--	2	2	--	1	2	1

1: strongly related, 2: moderately related and 3: weakly related

MWP4108	ORGANIZATIONAL BEHAVIOUR AND HUMAN RESOURCE MANAGEMENT	L	T	P	C
Version 1.1	Latest approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The general purpose of this course is to familiarize students with the basic principles and techniques of human resource management. This course takes a practical approach that integrates contributions of behavioural sciences with the technical aspects of implementing the HR function in the real world.

Course Objectives:

The objective of this course is to:

1. Appreciate the importance of human resource management as a field of study and as a central management function;
2. Understand the implications for human resource management of the behavioral sciences, government regulations.
3. Know the elements of the HR function (e.g. – recruitment, selection, training and development, etc.) and be familiar with each element's key concepts & terminology; and
4. Apply the principles and techniques of human resource management gained through this course to the discussion of major personnel issues and the solution of typical case problems.

Course Outcomes:

On completion of the course the students will be able to:

CO1: Explain and apply the concepts of human resources management.

CO2: Demonstrate a basic understanding of different tools and techniques used in forecasting and planning human resource requirements.

CO3: Interpret the industry regulations that will effect employees and employers and apply them effectively.

CO4: Analyze and solve key issues related to the human elements, both nationally and internationally such as employee acquisition, retention compensation, appraisal, training, career planning and diversity.

Modules	Blooms level*	Number of hours
Module I: Introduction to Human Resource Management and Organization Behavior • Understanding Organisation, Significance of Scientific study of Human Behaviour, Hawthorn Studies it's importance & implication, Motivation Process. • Perspectives of Organisation, Perception & Impression, Personality & Attitudes, Learning Values. • Typical responsibilities of HR departments and how they are affected by the corporate culture, environmental forces, and government regulations. • Staffing processes-Recruitment and SelectionMethods – Interview, Tests, Placement and Induction.	L1,L2	12
Module II: Compensation & Benefits • This unit focuses on compensation and related issues. • Forms of and bases for compensation, job evaluation and compensation/evaluation systems. • Methods of Job Evaluation, Strategic Compensation, Equity Theory, Components of Pay Structure, • Designing and Administration of Wage and Salary Structure, Wage Regulations in India		
Module III : HRD and Performance Management • Training and Development,deciding who is to be trained, in what and how they are to be trained, and how effective was the training for the employee and her/his organizational component. • Understanding of Performance Management Systems,performance evaluation as a system including process and procedures used in developing reliable and valid standards, criteria, and evaluation mechanisms • Potential Appraisal, • Career Development. Career development theories; occupational	L1,L2	12

educational, and personal/social information sources and delivery systems		
Module IV : Global Human Resource Management & Future Issues • Overview of Human Resource Information System (HRIS), • Introduction to HR Audit, IHRM Practices, Cross- Cultural and Diversity Management, • Work-life integration, Human Resource Outsourcing Declining productivity, substantial demographic shifts, changing employee attitudes and expectations, innovation technologies,	L1,L2	12
• Significant trends in human resource management and how they can be addressed through innovative and effective organizational strategies.	L1,L2	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books:

- David A. Decenzo ,Stephen P. Robbins , Susan L. Verhulst,(2015), Human Resource Management ,eleventh edition , Wiley;
- Prasad. L.M, (2014) Human Resource Management, Third Edition, Sultan Chand & Sons; New Delhi.

Reference Books:

- Chhabra T.N,(2014) Human Resource Management: Concepts and Issues, Edition 2014,Dhanpat Rai & Co
- Dessler G (2014) A Framework for Human Resource Management, 7 edition (2014), Pearson Education India;
- Michael Armstrong , Stephen Taylor,(2017), Armstrong's Handbook of Human Resource Management Practice, 14 edition (3 February 2017), Kogan Page

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	-	-	-	-	2	2	-	1	-	-
CO2	1	1	-	-	-	-	2-	2	-	1	-	-
CO3	1	1	-	-	-	-	2	2	-	1	-	-
CO4	1	1	-	-	-	-	2	2	-	1	-	-
CO5	1	1	-	-	-	-	2	2	-	1	-	-
CO6	1	1	-	-	-	-	-	-	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

MWP4109	INFORMATION TECHNOLOGY FOR MANAGERS	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn the concepts of computer evolution, database management systems, networking fundamentals and management information system.The aim of this course is to make the students familiar with the basic concepts of Information Technology that assists managers in executing their tasks with efficiency.

Course Objectives

This course will expose students to

1. Developments in computer technology and understand the advancements in Information Technology.
2. Introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts and information systems.
3. The latest trends in information system development and its relevance in present scenario for modern businesses.

Course Outcomes

On completion of this course, the students will be able to

CO1: State the strategic use of Information Technology in Business and differentiate between functional and cross functional information systems.

CO2: Describe the concepts related to databases and networking.

CO3: Apply the knowledge of Information Technology in managing the broad array of responsibilities in the business organization.

CO4: Analyze how are information systems transforming business and what is their relationship to globalization.

CO5: Review and assess the available tools and technologies pertaining to organization's information system.

Modules	Blooms level*	Number of hours
Module I: Information Technology Infrastructure Defining IT Infrastructure, Evolution of Computer Systems, Input, output and storage technologies, Contemporary hardware and software platforms(Open Source, Web Software etc.), Introduction to Cloud Computing Storage of Data Resources.	L1, L2	4
Module II: Databases and Information Management Organizing Data in traditional file environment , Introduction to	L2, L3	4

Databases and Database Management System, Types of DBMS, Capabilities of Databases, Designing databases through Entity Relationship Diagrams, Concept of Data Warehouses and Data Marts, Tools for Business Intelligence: Multidimensional data analysis and Data Mining.		
Module III: Telecommunications and Networking in Business Networking and Communication Trends, Computer Networks Types of networks, Advantages of Network Environment, Network in large companies, Network Topologies, Various network components, Physical Transmission Media, Business Uses of Internet, Intranet and Extranet, Internet Addressing and Architecture, Internet Services	L1, L2	4
Module IV: Information System Essentials: Role of information systems in business, Introduction to MIS and its relevance for business firms, Components of MIS, Types of information systems, Digital firms and business processes, Strategic Business Objectives of information systems, Dimensions of Information Systems, Collaboration and teamwork, Tools and technologies for collaboration and teamwork, Information System function in Business- Roles and Responsibilities of IT Department Personnel	L1, L2	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Kenneth C. Lauden and Jane P. Lauden (2017), Management Information Systems: Managing the Digital Firm, Pearson Education, 15th Edition, ISBN 978-0134639710.

Reference Books

1. Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press.
2. Norton P (2010), Introduction to Computers, Tata McGraw-Hill
3. Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1									1			
CO2	1	2								2			
CO3	2	1	1							2			
CO4									2	1			
CO5		1							2	1			

1: strongly related, 2: moderately related and 3: weakly related

Semester - II

MWP4206	BUSINESS ENVIRONMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of business practices preferred but not compulsory				
Co-requisites					

Catalog Description

In this course the students are introduced with various rapidly changing developments and momentum of domestic and global business. The students are familiarized with aspects related to international and external business environment. Thereafter, changing developments in Indian economic reforms, industrial and financial environment in the country are discussed in detail. This is followed by discussion about labor environment in business. Fourth, there is a detailed analysis regarding planning and economic development in India. Finally, details of international regime, institutions, and trade blocs are discussed. The overall aim of this course is to make the students aware of various changes taking place in the business paradigm.

Course Objectives:

The objective of this course is to:

5. Make students acquainted with meaningful knowledge about the various dimensions of domestic and international business environment and also international trade regime.
6. Enable students to apply the theoretical concepts in work place related to financial and economic policies influencing business environment.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Explain the various changes taking place in international business environment along with fundamental knowledge on domestic business.

CO2: Discuss the sequence of developments in Indian economic reforms, industrial and financial environment.

CO3: Describe the changing paradigms in labour environment and Indian economic planning and development.

CO4: Discuss holistically the growth, development and significance of international trade regime, financial institutions, trade blocs and trade dispute settlements.

Modules	Blooms level*	Number of hours
MODULE 1: Overview of Business Environment Meaning and types of business environment, Internal and external environment, Micro and macro environment, Factors (Cultural, social, Political economic legal, demographic and technological) effecting business environment. Industrial financial institutions (IDBI, SIDBI, ICICI, IFCI etc.	L1, L2	10

Module II: Globalization and Theories of International Trade Globalization of World Economy; Globalization of Business; Feature of Current Globalization; Stages of Globalization, Essential Conditions for Globalization and Globalization of Indian Business; Theories- Theory of Mercantilism, Absolute advantage, Comparative advantage, Hecksher-Ohlin theory, The new product life cycle theory.	L1, L2, L4	10
Module III: International Economic Institutions and Trade Blocks International Monetary Fund (IMF) – Primary functions, organization and management, resources, IMF and international liquidity; World Bank; Asian Development Bank; GATT- the Uruguay Round, World Trade Organization (WTO), GATS, TRIPs, Trading Blocks - European Union, ASEAN, APEC, NAFTA and SAARC.	L1, L2, L4	8
Module IV: International Trade and Payments: Government Influence on Trade; Balance of Payment (BoP) - meaning, balance of trade and balance of payment, Types of Foreign Investment; Significance of Foreign Investment – Foreign Direct Investment (FDI); FII investments	L1, L2, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Rakesh Mohan Joshi, International Business, Oxford University Press.
2. Francis Cherulinam, (2008), International Business, Himalaya Publishing House
3. Daniels, J.D.,Radebaugh L.H.,Sullivan D.P. & Prashant Salwan (2011), International Business: Environments and Operations, Pearson Hall, Delhi
4. Sundaram and Black, (2009), International Business Environment, Prentice-Hall of India Pvt. Ltd.
5. Bhalla and Raju, (2010), International Business Environment, Sage Publication
6. Charles Hill,(2007), International Business, McGraw Hill

Reference Books

1.John D. Daniels Lee H Radebaugh, (2007), International Business: Environments and Operations. Addison Wesley.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	--	--	--	2	2	--	--	1	--
CO2	1	1	2	--	--	--	--	2	--	--	--	1	--
CO3	1	1	2	--	--	--	--	2	--	1	1	1	--
CO4	1	1	1	--	--	--	2	2	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4204	Research Methodology & Report Preparation	L	T	P	C
Course Version	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description:
The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Objectives :
The objectives of this course are to ensure that students are able to-

1:Understand the basic framework of research process.
2:Comprehend of various research designs and techniques.
3:Identify various sources of information for literature review and data collection.
4:Understand some basic concepts of research and its methodologies.
5: Understand as how to organize and conduct research in a more appropriate manner andwrite a research report, thesis and a research proposal.

Course Outcomes :
On completion of this course, the students will be able to:
CO1: Apply a range of quantitative and / or qualitative research techniques to business and management problems / issues
CO2: Determine and apply research approaches, techniques and strategies in the appropriate manner for managerial decision making
CO3: Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process
CO4: Synthesize and Evaluate different research approaches utilised in the different industries and be able to critically assess the overall process of designing a research study from its inception to its final report preparation.

Modules	Blooms level*	Number of hours
Module I: Introduction Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation of hypothesis, research designs, drafting a research proposal	L1, L2	9
Module II: Measurement and Data Collection Primary data, secondary data, design of questionnaire,	L1, L2,L3,L4, L6	9

sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques, measures of central tendency mean, median, mode; measures of dispersion, data processing		
Module III: Data Analysis I Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test, Chi- square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test	L1, L2,L3,L4,L5,L6	9
Module IV: Report Writing Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report	L1,L2,L3,L4,L5,L6	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited

Reference Book/s:

1 .Zikmund, William C (1997). *Business Research Methods (5th Ed.)*. The Dryden Press, Harcourt Brace College Publishers

2 Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Term Exam EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	-	--	--	--	-	--	1	3	-	-
CO2	1	1	-	--	--	-	--	-	-	1	2	-	-
CO3	1	2	--	-	--	--	-	--	--	1	3	-	-
CO4	1	1	--	--	3	-	2	--	--	1	3	2	2

1: strongly related, 2: moderately related and 3: weakly related

MWP4205	FUNDAMENTALS OF DATA ANALYTICS	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Course Description

The course is designed at par with current industry needs for data analysis. It includes many cutting-edge learning modules which will provide a rich experience and exposure to different modern data analytical tools and techniques to the students.

Course Objectives:

1. To provide detail knowledge of data analytics and data science
2. To provide basic understanding of MS excel as a tool of data analysis
3. To help the students to know about different types of data, sources of data and data generation techniques
4. To provide the basic understanding of salesforce platform

Course Outcomes

On completion of this course, the students will be able to,

CO1: To develop a comprehensive understanding about data analytics and data science. It will help the students to identify the business problems where data analytics can used.
CO2: To develop basic understanding of MS Excel that can further be used to apply basic data analytic tools.
CO3: To develop an integrated knowledge about different types of data, data sources and data generation techniques which will help the students in decision making.
CO4: To develop the knowledge about wave analysis using salesforce platform. It will help the students to create various dashboards to understand the real business situation and suggesting possible solutions.

Modules	Blooms level*	Number of hours
Module I: Introductionto Data Analytics • Introduction to Data Analytics • Data Analytics vs Data Science • Data Analytics in business needs • Data Analysis Types, Process, Techniques and Tools • Role of Data Analyst in Analytics • ELT Process • DWH, Benefit of DWH, Use, Type of DWH	L1, L2,L5, L6.	8
Module II: Data Analytics using MS-Excel • Data Analysis with Excel, Advantages, Business need and usage • Data Import – Text, CSV, JSON, XML, SQL Query • Data Table, Pivot Table • Excel Formula, usage, advantages, formula use in Data Analysis. • What-If-Analysis, scenario Manager, Goal Seek, Solver. • Data Visualization with Charts – Histogram, Run Chart, Line, Scatter, Bar • Functions – Financial, Logical, Text and Mathematical	L1, L2,L3, L5, L6.	8
Module III: Introduction to Data Science • Data Mining Process Techniques and Tools • Exploratively Data Analysis • Machine learning, Advantage Algorithms, Types • Machine learning VS Statistical Learning • Supervised ML VS Unsupervised ML vs Reinforcement ML	L1, L2,L5, L6.	8
Module IV: Industry Wave Analytics using Salesforce CRM • SFDC Data Analysis, Advantages, Industry Needs and Usage • Reports, Reports Types – Tabular, Summary, Matrix, Joined • Charts – Line, Bar, Pie, Funnel, Scatter, Donut • Dashboard: Executive Dashboard, Sales & Service Dashboards • Reports & Dashboards Access and Security with Users, Groups and Roles	L1, L2,L3, L5, L5, L6.	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Reference Books

1. Introduction to Data Mining by *Pang-Ning Tan & Vipin Kumar*
2. Business Analytics: The Science of Data - Driven Decision Making by *U Dinesh Kumar*
3. Microsoft Excel Data Analysis and Business Modeling by *Wayne L. Winston*
4. Advance/Data Analysis with Excel by *Manisha Nigam*
5. Data Science for Business by *Foster Provost*
6. Data Science for Business Professionals by *Probyto Data Science and Consulting Pvt. Ltd.*
7. Salesforce Lightning Reporting and Dashboards by *Yu Johan*
8. Pro Salesforce Analytics Cloud: A Guide to Wave Platform, Builder, and Explorer by *William Smith & Helen Sun*

Modes of Evaluation: Quiz/Assignment/ Practical lab/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1	1	1	2	2	1
CO2	1	1	1	-	2	1
CO3	2	1	1	-	1	1
CO4	2	1	1	2	3	1

1: strongly related, 2: moderately related and 3: weakly related

MWP4207	FINANCIAL MANAGEMENT	L	T	P	C
Version 1.1		2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

The focus of this course is in the area of financial management. Course will explain know financial management and its interface with other areas of management, applying time value of money in investment decision-making and understanding cost of capital in financing decisions of firms. It helps to understand how firms meet their financial objectives utilising financial decision-making. This course will also explain financial tools and techniques, which can be used to help firms maximize value by improving decisions relating to capital budgeting, capital structure, and working capital management.

Course Objectives

1. To familiarize the students with basic concepts of financial management and financial system.
2. To understand concept of time value of money and its implication.
3. To evaluate the investment proposals.
4. To understand the management of working capital in an organization.
5. To analyze capital structure and dividend decision.

Course Outcomes:

At the end of the course the student will be able to:
CO 1:Understand the basic financial concepts
CO2: Apply time value of money
CO3:Evaluate the investment decisions
CO4: Estimate working capital requirements
CO5: Analyze the capital structure and dividend decisions

Modules	Blooms level*	Number of hours
Module I Meaning and objectives of Financial Management, changing role of finance managers. Interface of Financial Management with other functional areas. changing role of finance managers. Emerging issues in Financial Management-Risk Management, Behavioural Finance, Financial Engineering, Derivatives (Theory)	L1,L2	4
Module II Time value of money& Cost of capital Meaning of Time value of money –Future value of single cash flow & annuity, present value of single cash flow, annuity & perpetuity.	L1, L2, L3,L4, L6	7

Simple interest & Compound interest, Capital recovery & loan amortization. (Theory & Problem). **Sources of Financing:** Shares, Debentures, Term loans, Venture Capital, Angel investing and private equity (Theory Only). **Cost of Capital:** Basic concepts. Cost of debenture capital, cost of preferential capital, cost of equity capital including CAPM - Determination of Weighted average cost of capital (WACC) (Theory & Problems). **Case Study on WACC.**		
Module III Investment Decision & Capital Structure Planning **Investment Decision**: Capital budgeting process, Investment evaluation techniques – Net present value, Internal rate of return, Modified internal rate of return, Profitability index, Payback period, accounting rate of return (theory &Problems) **Capital structure Planning**: Practical considerations in designing capital structure, Theories of capital structure – NI approach, NOI approach, Modigliani Miller approach, Traditional approach(Theory only). **Planning the capital structure: EBIT and EPS analysis(Case Study)**	L1, L2, L3,L4, L6	7
Module IV Working Capital Management Concept of working capital, working capital finance, Factors influencing working capital requirements ,current asset finance policy, Estimation of operating cycle and cash cycle, Estimation of working capital requirements of a firm **Case study on Working Capital Determination**	L1, L2,L3,L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Textbooks				
Sl. No.	**Title of the book**	**Name of the Author/s**	**Publisher Name**	**Edition and year**
1	Financial Management	Khan M. Y.& Jain P. K,	TMH	7/e,
2	Financial Management	Prasanna Chandra	TMH	9/e,
3	Financial Management: A Strategic Perspective	Nikhil Chandra Shil & Bhagaban Das	Sage Publications	1/e, 2016
Reference Books				
1	Financial Management	I M Pandey	Vikas Publishing	11/e, 2012
2	Principles of Corporate Finance	Brealey, Myers, Allen & Mohanty	McGraw Hill Education	11/e, 2014
3	Cases in Financial Management	I.M.Pandey & Ramesh Bhat	McGraw Hill Education	3/e, 2015
4	Corporate Finance	Vishwanath S. R.	Sage Publications	3/e, 2019

Theory: 40%, Problems:60%

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**CAP**	**Q /S**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

CPA: Case Discussion/ Presentation/ Analysis, Q/S : Quiz / Seminar, A : Attendance, ME : Mid-term Examination, EE: End semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	--	--	--	2	--	2	1	2	1	--
CO2	1	1	--	--	--	2	--	2	1	2	1	--
CO3	1	1	--	--	--	2	--	2	1	2	1	--
CO4	1	1	--	--	--	2	--	2	1	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4208	OPERATIONS AND SUPPLY CHAIN MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Course Description

This course is designed to explain the basic theories and techniques of operations and supply chain management to examine the prevailing issues and problems in changing business environment and to show how enterprises can augment their effectiveness and competitiveness by focusing on different operations and supply chains.

Course Objectives:

1. To provide the basic understanding of different operational strategies to be used in manufacturing and service providing organizations.
2. To provide knowledge about various types of inventories, costs of inventories and control of inventories
3. To provide an understanding about different types of supply chains and their issues
4. To provide an insight about the modern trends and challenges of supply chains

Course Outcomes

On completion of this course, the students will be able to,

CO1: To develop a comprehensive understanding about different operational strategies so that students can analyze and apply them in given situation.

CO2: To develop insights about inventory management so that students can understand various types of inventory control techniques and use them efficiently under a given situation.

CO3: To develop an integrated knowledge about different designs of supply chains, key issues, problems, and suggested solutions.

CO4: To help the students understand the latest trends in supply chains, contemporary challenges like greening, flexibility, and adaptability etc. of supply chains.

Modules	Blooms level*	Number of hours
Module I: Introduction Operations in manufacturing and service organizations, scope of operations management, operations strategy and competitiveness, facility location decisions, factors affecting location, location techniques: factor rating method, centroid method, types of production systems- continuous and intermittent production systems, facility layout, process layout, systematic layout planning, product layout, fixed position layout, service operations layout, capacity planning: long term and short term, operations scheduling: loading, sequencing, priority rules and techniques, economies of scale	L1, L2,L3, L4, L5, L6.	8
Module II: Inventory Management	L1,	8

Inventory management: Objectives, factors, process, inventory costs, inventory models, inventory control techniques: ABC, VED, EOQ, SED analysis, Just-in-Time (JIT), JIT vs traditional systems of operations, JIT in services	L2,L3, L5, L6.	
Module III: Supply Chain Management: An Overview The Basics of Supply Chain Management- Introduction, Definition of Supply Chain Management, Key Drivers of Supply Chain Management, Components of Supply Chains, Cycle View of Supply Chain, Problems in SCM and Suggested Solutions, Supply Chain Benchmarking	L1, L2,L5, L6.	8
Module IV: Recent Trends in Supply Chain Management New Developments in Supply Chain Management, Outsourcing Supply Chain Operations, Co-Maker ship, The Role of E-Commerce in Supply Chain Management, Green Supply Chain Management, Distribution Resource Planning, World Class Supply Chain Management	L1, L2,L3, L5, L5, L6.	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

TextBooks:

1. Production and Operations Management, S.N. Cherry, McGraw Hill Publications, 3/e, 4th reprint 2007
2. Production and Operations Management, Sunil Chopra, Peter Meindle, Prentice Hall of India
3. Supply Chain Management, R.B. Handfield, Prentice Hall of India
4. Supply Chain Management, Ajay Garg, McGraw Hill Publications
5. Introduction to Supply Chain Management, Frederick Shiller& Gerald J Liberman, Tata McGraw Hill edition
6. Operation Research, H..A.Taha, Prentice Hall India
7. Introduction to Operation Research, B.E .Gillet ,Tata McGraw Hill:

Reference Books

1. RichardB.Chase,RaviShankarandF.RobertJacobs(2014);Operations&Supply Chain Management; McGraw-Hill - 2014 (14thEdition).
2. CharyS.N.TheoryandProblemsinProduction&OperationsMgt.;TataMcGraw Hill(14th Edition).
3. Krajewski Lee; Operations Mgt. Process for ValueChains; Prentice Hall (8th Edition)

Russell S. Roberta & Taylor, Operations Mgt., Prentice Hall (4thEdition).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	1	1	2	2	1
CO2	1	1	1	-	2	1
CO3	2	1	1	-	1	1
CO4	2	1	1	2	3	1

1: strongly related, 2: moderately related and 3: weakly related

MWP4231	TERM PAPER-I	L	T	P	C
Version 1.1	Latest Approved	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Course Description

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Course Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inflation
- Unemployment
- Fiscal Deficit
- Poverty
- Education
- Malnutrition
- Rural Development
- Regional Imbalance
- Globalization
- Foreign Direct Investment
- Current trends in consumer behavior
- Innovative management
- Company rituals and corporate culture

- Negotiation and diplomacy
- Effective advertising
- International trade trends in the USA
- Geo-arbitrage and business success
- Advantages of increasing brand awareness
- Social media as a new market
- Healthy work environment and employee diversity

Evaluation Scheme

Organisation and relevance of content	**Literature Review**	**Bibliography**	**Presentation**	**Total**
30	30	20	20	100

SEMESTER-III

MWP4302	STRATEGIC MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces the key concepts, tools, and principles of strategy formulation and competitive analysis. It is concerned with managerial decisions and actions that affect the performance and survival of business enterprises. The course is focused on the information, analyses, organizational processes, and skills and business judgment managers must use to devise strategies, position their businesses, define firm boundaries and maximize long-term profits in the face of uncertainty and competition.

Course Objectives

The objective of this course is to

1. Introduce students to the key concepts, tools and principles of business policy and strategic management.
2. Expand the student's capacity to integrate and appreciate the changes in the environment that shape the strategy of a business and lead to developing a competitive edge.
3. Develop the perspective of students towards understanding the culmination of different functional areas into building up of a corporate strategy.
4. Expose the students to the various approaches in crafting business strategy, tools that aid in reasoning carefully about strategic options, and learning how companies use what-if analysis to evaluate action alternatives and make sound strategic decisions.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify and explain the various levels at which strategic decision making happens in an organization.

CO2: Analyse the internal and external environment of business that will lead to formulation of strategic plans.

CO3: Determine the suitability of strategies that firms have developed in the real world scenario to achieve valueable outcomes.

CO4: Prepare strategic analysis and choice in order to determine alternative courses of action that could best enable the firm to achieve its mission and objectives.

CO5: Review strategy implementation to gain competitive advantage.

Modules	Blooms level*	Number of hours
Module I: Introduction and Purpose of Strategy Formulation Evolution and Introduction of strategic management, Concept of Strategy, corporate, Business and Functional Levels of Strategy,	L1,L2	7

Mission, Vision, Objectives, Approaches to four Phases in Strategic Management Process, Stakeholders in business and their roles in strategic management, Strategic decision making.		
Module II: Environmental Analysis Analysing company's External Environment: PESTLE Analysis; Preparing an Environmental Threat and Opportunity Profile (ETOP), Analysing Industry Environment: Industry Analysis – Porter's Five Forces Model of competition, Strategic Group analysis.	L1, L2 ,L4	7
Module III: Analysis of Organizational Competencies Analysing Company's Internal Environment Resource based view of a firm, meaning, types & sources of competitive advantage, analysing company's Resources and Competitive Position, VRIO Framework; Benchmarking as a method of comparative analysis, Competitive advantage; Concept of a Core competence and Distinctive competitiveness, Characteristics of Core Competencies; Value Chain Analysis Using Porter's Model; Organizational Capability Profile: Strategic Advantage Profile.s	L1, L2,L3	7
Module IV: Strategic Analysis and Choice Generic Competitive Strategies: Meaning of Generic competitive strategies, Low cost, Differentiation, Focus – when to use which strategy; Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic alliances & Collaborative Partnerships), Retrenchment – Turnaround, Divestment, Liquidation, Outsourcing Strategies; Offensive and Defensive Strategies, Blue Ocean Strategy, Strategy in the age of Internet and E-commerce; Portfolio Analysis Business Portfolio Analysis – BCG Matrix – GE 9 Cell Model; Evaluation of Strategic Alternatives: SWOT Analysis, Grand Strategy Selection Matrix.	L1,L2,L3	8
Module V: Strategy Implementation and Evaluation Strategy Implementation, Barriers to implementation of strategy, Mc Kinsey's 7s Framework; Organization Structures for Strategy Implementation, Leadership Implementation, Functional Implementation, Strategic evaluation review and control.	L1, L2,L3,L6	7

**Bloom's Level: L1-Knowledge;L2-Comprehension;L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Kazmi, A.(2015), Business Policy and Strategic Management 4th edition), Tata Mc Graw Hill.
2. Wheelen and Hunger,(2018),Strategic Management and Business Policy :Globalisation, Innovation and Sustainability, Pearson Education.

Reference Books

1. Pearce and Robinson (2017), Strategic Management: Formulation, Implementation and Control, Tata McGraw Hill.

2. David Fred R.(2018)Strategic Management Concepts: A Competitive Advantage Approach, Pearson Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	2	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	2	2	--	--	--	1	--	2
CO3	1	1	--	2	--	--	1	--	--	--	1	--	--
CO4	1	1	--	--	--	--	2	--	--	2	1	--	--
CO5	1	1	--	--	--	--	2	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4311	INNOVATION AND ENTREPRENEURSHIP	L	T	P	C
Course Version	Latest Approved	2	1	0	3
Pre-requisites/Exposure	NA				
Co-requisites	NA				

Catalog Description:
The objective of the course is to provide students an understanding of entrepreneurship & the process of creating and grooming a new venture. students will be introduced to the basic terminology, typology of innovations and historical context for better comprehension. Also issues of innovation management will be introduced. Students will become familiar with the impact of innovation on competitiveness as well as individual companies with innovative processes and aspects that affect it, including applicable methods and innovation management techniques.The course also focuses on giving the students the concept of an entrepreneur who is willing to accept all the risks & put forth the effort necessary to create a new venture. The challenge rolls out in a learning environment corresponding to current and future workplace requirements - cross-functional and virtual teams with crowd-sourced work tasks, multicultural work force and extremely demanding organisation, planning and communication skills.

Course Objectives:
The objectives of this course are to ensure that-
1: The student is able to understand the concepts and theories related to entrepreneurship.
2: The student has gained up to date understanding of the field in regard to the process of assessing the commercial potential of new markets.
3: The student has acquired a cutting edge understanding when it comes to identifying opportunities and challenges affiliated with the organization and financing of new initiatives such as new business ventures.
4: The candidate is also aware of challenges affiliated with the rapid growth of new business ventures.

Course Outcomes (CO):
On completion of this course, the students will be able to-
CO1: Apply the various principles of entrepreneurship.
CO2: Apply the theories of viability of businesses, new business proposals, and opportunities within existing businesses;
CO3: Apply the principles of entrepreneurial management and develop strategic plans and prepare a startup business plan emphasizing financing, marketing, and organizing;
CO4: Able to define, identify and evaluate the concept related not only to creating but also to defend an entrepreneurial marketing plan along with developing pro forma financial statements.

Modules	Blooms level*	Number of hours
Module I: **Entrepreneurship:** What Is Entrepreneurship? Why Become an Entrepreneur? Characteristics of Successful Entrepreneurs ,Common Myths About Entrepreneurs, Types of Start-Up Firms ,Changing Demographics Of Entrepreneurs.	L1, L2	9
Module II: Innovation: the basic definition and classification. The relationship of innovation and entrepreneurship, creation of competitive advantage based on innovation.Innovative models. Product, process, organizational and marketing innovation and their role in business development. Sources of innovation, transfer of technology. Barriers to innovation in business, innovation failure.	L1, L2,L3,L4, L6	9
Module III: Developing Successful Business Ideas **Identifying And Recognizing Opportunities:** Observing Trends, Solving a Problem, Finding Gaps In The Marketplace**,**Personal Characteristics of the Entrepreneur.Techniques for Generating Ideas, Team Formation, Product/ Market Fit, Customer Validation, Prototyping, Feasibility Analysis. **The Business Plan:** Reasons for Writing a Business Plan , Who Reads the Business Plan—And What Are They Looking For? Outline Of the Business Plan.	L1, L2,L3,L4	9
Module IV:Moving from an Idea to a reality Obtaining Business Licenses and Permits: Introduction to various form of business organization (sole proprietorship, partnership, corporations, Limited Liability company), mission, vision and strategy formulation. Intellectual Property. **Getting Financing or Funding:** The Importance, Sources of Personal Financing, Preparing to Raise Debt or Equity Financing, Venture Capital, Initial Public Offering, Commercial Banks, Other Sources of Debt Financing. **Managing and Growing the new venture:** Segmenting the Market, Selecting a Target Market, Establishing a Unique Positioning, Branding, 4Ps/7Ps Of Marketing For New Ventures	L1,L2,L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1**.** Robert D. Hisrich, Michael P. Peters, Dean A Shepherd, *Entrepreneurship*, 6th edition, Tata McGraw-Hill Publishing company Ltd. New Delhi

Reference Book/s:

1. Barringer, Bruce R. &Ireland, R. D. (2012).*Entrepreneurship: Successfully Launching New Venture,4th edition.* New Jersey.USA: Pearson Education

2.M.J.Dollinger (2003), *Entrepreneurship: Strategies and Resources*, 3rd edition, Delhi: Pearson Education

3.Clifton, Davis S and Fyffe, David E, “Project Feasibility Analysis”, 1977 John Wiley, New York.
S. Carter and D. Jones-Evans, Enterprise and small business- Principal Practice and Policy, Pearson Education (2006)
T. H. Byers, R. C. Dorf, A. Nelson, Technology Ventures: From Idea to Enterprise, McGraw Hill (2013)
Prasad, Rohit (2013), Start-up sutra: what the angels won’t tell you about business and life, Hachette India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**CT**	**HA**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME: Mid Term Exam EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	3	--	2	--	--	--	1	--	1	1	1	--
CO2	1	1	2	--	--	--	--		--	1	2	1	--
CO3	1	3	--	2	--	--	--	--	--	2	1	1	1
CO4	1	2	--	--	--	--	--	--	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4337	PROJECT-I	L	T	P	C
Course Version	Latest Approved	-	-	-	8
Pre-requisites/Exposure	NA				
Co-requisites	NA				

Catalog Description

Under this, it is usual to give the student some discretion in the choice of topic for the Research Project and the approach to be adopted. The Research Project topic is related to the field of specialization. Deciding this is often the most difficult part of the Research Project process, and requires thorough preparation and background research.

The aim of the Research Project is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.

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Course Objectives

The objective of this course is to

1. Understand and apply theoretical frameworks to the chosen area of study.
2. Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently.

Course Outcomes

On completion of Research Project, the students will be able to

CO1: Describe a relevant area of career development, career coaching, coaching or work-related learning studies.

CO2: Identify research methods and state research questions.

CO3: Critically analyze and evaluate the knowledge and understanding in relation to the agreed area of study.

CO4: Integrate theory and practice for the development of responses on the basis of the evaluation and analysis undertaken.

CO5: Communicate in written form by integrating, analyzing and applying key texts and practices.

CO6: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

Planning the Research Project	Blooms level*	Number of hours

• Selecting a topic for investigation. • Establishing the precise focus of the study by deciding on the aims and objectives of the Research Project, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility. • Drawing up initial Research Project outlines considering the aims and objectives of the Research Project. Workout various stages of Research Project • Devising a timetable to ensure that all stages of Research Project are completed in time. The timetable should include writing of the Research Project and regular meetings with your Research Project guide	L1, L2 ,L3,L4,L5,L6	6hours a Week

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Modes of Evaluation: Viva/ Report Examination

Examination Scheme:

Components	Content & Layout of Report	Conceptual Framework	Objectives & Methodology	Implications & Conclusions	Viva-Voce
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	--	--	--	--	--	--	1	--	--	--	1
CO2	--	1	--	--	--	--	--	--	--	--	--	1
CO3	--	1	2	--	--	--	--	--	--	--	--	1
CO4	1	--	--	--	--	--	--	--	--	--	--	1
CO5	--	--	--	--	--	--	1	--	--	--	--	1
CO6	--	--	--	--	--	--	--	--	1	--	--	1

1: strongly related, 2: moderately related and 3: weakly related

Specialization in Marketing – Elective Subjects (Any 2)

MWP 4304	MARKETING OF SERVICES	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course has been designed to equip students to become more effective managers of any service organization by familiarizing them with the basic characteristics of services, their implications on design and delivery, and the ways to achieve sustainable competitive advantage by managing critical parameters**.**

.**Course Objectives**

The objective of this course is to

1. Develop blueprint for the services sector and develop a better appreciation of the necessary strategies to create a service excellence.
2. Provide insights about the foundations of services marketing, customer expectations of services and gap existing in the service delivery processes and service Quality.
3. Provide an in-depth appreciation and understanding of the unique challenges inherent in managing and delivering quality services and the successful implementation of a customer focus in service-based businesses.

Course Outcomes

On completion of this course, the students will be able to

CO1: Recognize the challenges faced in services delivery as outlined in the services gap.

CO2: Critically analyze the perceive service shortcomings with reference to ingredients to create service excellence.

CO3: Discuss key linkages between marketing and other business functions in the context of designing and operating an effective service system.

CO4: Provide a theoretical and practical basis for assessing service performance using company examples and report on this in a professional, logical and coherent way.

CO5: Identify and discuss characteristics and challenges of managing service firms in the modern world including cultural implications.

Modules	Bloom's level*	Number of hours
Module I **Service Economy & Nature of Services**-Service Economy, Nature of services, Characteristics of services, Services marketing mix, Tangibility Spectrum, Flower of Service,Service marketing challenges and implications for marketers for each service characteristic, Categorizing Service Processes, Self Service Technologies; **Assessing Business Opportunities**-Competitive strategies, Perceptual Mapping, Segmenting and Targeting the market.	L1, L2, L4	9

Module II **Consumer Behaviour& Understanding Customer Requirements-** Search, Experience and Credence Attributes, Service Encounters, Desired and Adequate service, Zone of Tolerance. Managing customer expectations and perceptions in services. Service Quality Dimensions. Customer Satisfaction vs. Service Quality, **Impact of Service Failure and Recovery**- Types of Customer Complaint Actions and Complainers. Service Guarantees, Service Recovery Strategies. .	L1, L2, L5, L4	10
Module III **Service Design and Development**- Challenges to Services Design, New Service Development, Service Blueprint, Service Innovations; **Aligning Strategy, Design and Delivery -** Servicescape, Service Triangle, Boundary–Spanning Roles, Gap Model & Strategies for closing the delivery gap.	L2, L3	7
Module IV **Service Pricing**-Types of customer value, Methods of pricing; **Service Communications**- Briefing about Integrated Communication Mix, **Service Delivery Channels**- Role of Distribution in Services, Channel Conflicts, Key Intermediaries for Service Delivery; **ServiceDemand & Capacity** - Understanding Demand and Capacity constraints. Strategies for matching Capacity and Demand; **Understanding of various service sectors (Group Project)-**Exposure to various growing Service Sectors, viz.: Banking, Insurance, Hospitality, Education, Telecom, and Health Care etc.	L2, L3, L5, L6	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books:

1. Valarie A Zeithaml Mary Jo Bitner, Dwayne Gremler, Ajay Pandit. (2007), Services Marketing: Integrating customer focus across the firm, Tata McGraw Hill
2. Christopher Lovelock. (2010), Services Marketing: People, Technology, Strategy. Pearson Education, Indian subcontinent adaptation.

Reference Books:

1. RajendraNargundkar, (2006), Services Marketing: Text and Cases. Tata McGraw-Hill Publishing Co. Ltd.
2. Harsh V. Verma, (2010), Services Marketing, Text and Cases. Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CPA: Case Discussion/Presentation/Analysis TP: Project Q/S: Quiz/Seminar
A: Attendance ME: Mid Term Exam EE: End Term Examination
CO, PO and PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	-	-	-	-	-	-	1	1	--	--
CO2	1	3	2	-	-	-	-	2	-	1	1	--	--
CO3	1	2	-	1	--	-	-	-	3	1	1	--	--
CO4	1	3	-	-	-	-	3	-	3	1	1	--	--
C05	1	2	-	-	--	-	-	-	-	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4312	SALES & DISTRIBUTION MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course has been designed to help students learn sales management concepts and how to apply them to solve business problems and to function as effective managers. It deals with all important back-end management of sales and front-end personal selling issues with a view to handle the situations professionally and improves the outcome with result orientation.

Course Objectives

The objective of this course is to

1. Acquaint the students with the concepts which are helpful in developing and managing sales force and marketing channels so as to gain competitive advantage.
2. Familiarize students with the concepts, techniques and the practical aspects of the key decision-making variables in distribution channel management.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the importance of managing sales and distribution in the competitive market.

CO2: Comprehend and differentiate the concept of sales and distribution, design, develop, and manage sales and distribution in the changing business scenario.

CO3: Explain the basic principles of sales management and demonstrate an understanding of the role of the sales force as a part of the marketing mix.

CO4: Apply in a competent manner sales management tool such as sales forecasting, sales compensation methods, sales budgeting, sales reports, quotas, sales analysis, and evaluation of performance by means of a team project that creates a sales force plan.

Modules	Blooms level*	Number of hours
Module I **Sales Management, Personal Selling and Marketing Strategy –**Concept, Objectives of Sales Management,Theories of Selling,Buyer-Seller Dyads, Sales Potential and Sales Forecasting, Personal Selling Objectives and Strategies, Determining the kind of sales personnel and the size of the sales force,Determining sales related marketing policies	L1, L3,L5	9
Module II **Sales Force Management** - Job Analysis,Recruitment and Selection Process, Interview, Sales TrainingProgramme, MotivatingSales Personnel **Sales Force Compensation**- Types of compensation plans for sales	L1, L2, L3, L4	9

personnel,Sales meetings and sales contests,Evaluating and supervising sales personnel		
Module III **Sales Territory-** Reasons for establishing or revising Sales Territories, optimizing sales territory; **Sales Quotas-** Objectives in using Quotas, Types of Sales Quotas and Quota setting procedures; **Sales Budget**: Purpose and Procedure;**Sales Target**: Types and Procedure;Sales Technology and Sales Force Automation	L1,L4, L6	9
Module IV **Distribution Management-** Marketing Channel Members, Types, Functions and Design, Channel Intensity, Costs and Margins, Channel Management for Rural Markets. **Managing Channel Partners**: Roles, Objectives and Methods, Channel Information Systems, Supply Chain Management, International Sales and Channel Management	L1, L2, L4, L6	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Still, Cundiff and Govoni. (2009), Sales Management, Decisions, Strategies and Cases, Prentice Hall of India Pvt. Ltd.
2. Douglas J. Dalrymple, Cron and Decarlo.(2003), Sales Management, John Wiley & Sons Inc.

Reference Books:

1. Charles M. Futrell (2010). Fundamentals of Selling. Tata McGraw Hill
2. Gerald L Manning, Michael Ahearne and Barry L Reece (2011). Selling Today, Prentice Hall Pub.
3. Ingram, Laforge, Avila, Schwepker Jr., Williams.(2009), Analysis and Decision Making, Segment Books

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CPA:Case Discussion/Presentation/Analysis TP:Project Q/S:Quiz/Seminar

A: Attendance ME: Mid Term Exam EE: End Term Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	3	3	-	-	-	-	3	-	1	1	--	--
CO2	1	3	2	-	-	-	-	2	-	1	1	3	--
CO3	1	2	-	1	--	-	3	-	2	1	1	--	--
CO4	1	3	-	-	-	-	3	-	3	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4313	CONSUMER BEHAVIOR	L	T	P	C
Course Code		3	0	0	3
Pre-requisites/Exposure	Basic Marketing concepts				
Co-requisites	NA				

Course Description:
Consumer Behaviour is full of complexities due to involvement of umpteen variables. Each of these variable influences each other in the buying process. The course therefore will help students stimulate their minds to think coherently about consumers by identifying relevant variables, describing their basic characteristics and specifying how the variable relates to each other. An attempt will be to make the subject easier by examine in an organized fashion the consumer behavioural aspects such as personality, learning, perception of a variety of external situation,motives and so and so forth.

Course Objectives:
On the successful completion of this module the student will be able to:
1. Understand the characteristics and significance of consumer behaviour.
2. Understand the influencing factors on consumer behaviour
3. Understand the various models and theories of consumer behaviour and apply them suitably for making decisions

Course Outcomes (CO):
On completion of this course, the students will be able to-
CO1: Memorize the various concepts and discuss the rationale for studying consumer behaviour.
CO2: Identify and explain factors which influence consumer behaviour inclusive of society and culture.
CO3: Demonstrate how knowledge of consumer behaviour can be applied to marketing.
CO4: Employ communication skills both orally and in writing within marketing contexts.

Modules	Blooms level*	Number of hours
Module I: Introduction to Consumer Behaviour Understandings and Applications of consumer behaviour, Factors Influencing Buyer Behaviour, Difference in individual buyer behaviour and organizational buyer behaviour, Market segmentation, Consumer Research: Importance of Consumer research in marketing decision making	L1, L2,L3	8
Module II: Environmental influences ***Consumers in their Social Setting***: Influence of Culture, Sub-culture, Social Class and Social Groups on consumer behavior,	L1, L2,L3,L4	8

Family Influences: Concept, Family Decision Making, The family Life Cycle ***Personal influences****:* Nature and significance of personal influence, Opinion Leadership ***Reference groups***: Types of reference groups, Application of reference group in Consumer behaviour		
Module III: Individual Determinants of Consumer Behaviour Consumer needs, Types and Systems of need, Maslow's Hierarchy of Needs, Consumer Motivation: Basics of Motivation and their significance in marketing, Needs, Goals, role of motive, Motivation Research , Personality and self concept: its relevance in consumer behaviour, Consumer Perception, Consumer Learning, Consumer Attitude Formation and change,	L1, L2,L3,L4	12
Module IV: Consumer Decision Making Process Types of buying behaviour, Routinised Response, Limited and Extensive Problem Solving Behaviour, Steps in buying decision process, Diffusions of Innovations and Adoption ***Organizational Buying Behaviour:*** The concepts of Buying Centre, Types of decision situations, Factors influencing organizational buyer behaviour, Organizational buyer's decision process.	L1,L2,L3,L4,L5	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Schiffman, L.G., Wisenblit,J, Ramesh.S, 2018). *Consumer Behavior* (12th ed.*)*. Noida, India: Pearson
2. Hawkins, Motherbaugh, Mookerjee (2017). Consumer Behaviour (12th ed.) Tata-McGraw-Hill
3. Loudon, D. L. & Bitta, A. J. (2002). *Consumer Behavior*. N. Delhi, India: Tata-McGraw-Hill
4. Gupta, S.L. & Pal, S (2006).*Consumer Behavior*. N. Delhi, India: Sultan Chand &Sons.

Reference Book/s:

1. Blackwell, R.D., Miniard, P.W. &.Engel, J.F.(2007). *Consumer Behavior.* Kundli, India: Thomsons South-Western.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, Q/S: Seminar/Viva/Quiz, ME:Mid Term EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	-	--	2	--	--	--	--	--	2	1	--
CO2	1	-	-	--	--	-	--	--	--	2	1	--
CO3	1	-	--	2	--	--	--	--	--	-	1	3
CO4	1	-	--	--	--	--	2	--	--	-	1	3

1: strongly related, 2: moderately related and 3: weakly related

MWP4314	ADVERTISING MANAGEMENT & SALES PROMOTION	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course, the concept of advertisement management, advertising objectives & budget setting, message and media tactics, and sales promotion are discussed in detail. Various relevant concepts such as creative approaches, copywriting, illustrations, understanding consumer behaviour are also discussed in detail. The main aim of this course is to familiarize the students with the role of advertising in the context of promoting products and services. Advertising is one of the most used promotional tools.

Course Objectives

The objective of this course is to

1. Describe the advertising process and key decision areas for effective management of this function.
2. Provide the framework and knowledge with which to communicate some of the excitement and vitality that characterizes the advertising business.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the advertising planning & decision- making process.

CO2: Develop creative solutions to address advertising and marketing communications challenges.

CO3: Perform a market segmentation analysis, determine the organization's target market/audience and define the consumer behaviour of each segment.

CO4: Discuss the decisions which need to be made in budgeting and planning for promotion

Modules	Blooms level*	Number of hours
MODULE I- Introduction to IMC&Advertisement **IMC**: Role of advertising within marketing program and communication mix, sales promotion, public relations, publicity and integrating different elements **Advertisement**- Introduction, Types of Advertisements;Social, Economic and Legal Implications of advertisements; Ethical issues in Advertising, Emerging concepts of Advertisements.	L1, L2 ,L3,L4	6

MODULE 2: Advertising Planning and Message Strategy **Advertising Planning and decision making*:*** Planning framework, Situation analysis, advertising plan, Communication and persuasion process. **Setting Advertisement Objectives-** DAGMAR Approach, **Ad. Agencies-** Types,Selection and Remuneration; Planning Advertisement Campaigns. **Message Tactics-*Creative approaches*:** Rational and emotional creative approaches; ***Copywriting:*** Illustrating, layout, creative styles; ***Copy testing:***Strategy, diagnostic copy tests.	L1, L2, L3, L4, L5	12
MODULE 3: Media Strategy and Effectiveness **Setting Media Budgets**:Budget allocation, Budgeting methods; Media Planning, Scheduling, & Buying; Print, Broadcast & Interactive Online Media; Creativity in Advertising; Copy Writing;Measuring Advertising Effectiveness.	L1, L2, L3	12
MODULE 4: Sales Promotion **Sales Promotion:**Introduction, Role & Scope, Need and objectives of sales promotion;Consumer & Trade Promotions, Sales promotion Strategies, Measurement of impact of sales promotion. **Promotional offers**- Coupons, Price-offs, Premiums, Sweepstakes, Refund and Rebates, Sampling, Loyalty Programmes, POP displays, Dealer loader, Celebrity Endorsements.	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text Books

3. Batra, R., Myers, J. G., & Aaker, D. A. (2006). *Advertising management*. New Delhi: Pearson Education.
4. George E.Belch and Michael A.Belch – Advertising and Promotion and Integrated MarketingCommunication Perspective – Tata McGraw Hill.
5. Arens, W. F. (2008). *Contemporary advertising*. New Delhi: Prentice Hall.
6. William Wills, John Burnett and Sandra Mriarty – Advertising Principles and Practice – Pearson,ND.
7. John. S. Wright Wills. L.Winter, Jr. and SherliyerK.Leigler, Advertising – Tata McGraw Hill.
8. Manendra Mohan – Advertising Management Concepts and Cases – Tata McGraw Hill.
9. Percy & Elliot – Strategic Advertising Management, Oxford University Press.
10. AK.S.A.Chunnawala and K.C.Sethia – Foundations of Advertising Theory and Practice – Himalaya.

Reference Books

1. Guinn O', T. C., Allen, C. T., &Semenik, R. J. (2009). *Advertising management with integrated brand promotion*. New Delhi: Cengage Learning.
2. Moriarty, S., Mitchell, N., & Wells, W. (2008). *Advertising principles and practice* (8th ed.). New Delhi: Pearson Education.

3. Sandage, C. H., Fryburger, V., & Rotzoll, K. B. (1983). *Advertising theory and practice*. Homewood: Richard D Irvin.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	1	--	--
CO4	1	--	--	1	--	--	--	--	--	--	1	--	

1: strongly related, 2: moderately related and 3: weakly related

Specialization in Finance – Elective Subjects (Any 2)

MWP4305	MERGERS, ACQUISITIONS AND RE-STRUCTURING	L	T	P	C
Version 1.1	Latest Approved	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course aims to develop a comprehensive understanding of mergers and acquisitions (M&A) from the perspective of the corporate executive. This course will cover all major elements of the acquisition process including corporate strategy, valuation, due diligence, financing decisions, transaction structures, restructuring options, takeover defense and integration. It will also uses cases and real-world applications to develop skills necessary to prepare and evaluate the rationale for a proposed transaction.

Course Objectives

The objective of this course is to:

1. Make students learn how to analyze the mechanisms underlying the creation (and destruction) of value in mergers, acquisitions and corporate restructuring.
2. Examine the reasons to acquire, choice of target and recognition of the anticipated challenges, risks and pitfalls of the approach.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Explain the rationale behind the use of mergers and acquisitions by a firm's managers, the key pitfalls and recommendations for maximizing the chances for long-term success, **through appropriate form of restructuring.**

CO2: Analyze the Regulatory framework, theories and synergies of M&A.

CO3: Identify and explain the role of merchant banking in M&A.

CO4: Analyze the theories and valuation models under M&A.

CO5: Explain valuation practices in India and taxation aspects **along with merger study methodologies.**

CO6: Interpret post-merger results.

Modules	Blooms level*	Number of hours
Module I: **Basics of Mergers and Acquisition** Corporate Restructuring-objectives of merger, demerger, acquisition, types of merger, competition, Horizontal, Vertical, Conglomerate. **Diversification via Acquisition,** **Introduction to Acts and policies** Merger & Acquisition and Amalgamation as per AS-14. **Tax Benefit of**	L1, L2, L4.	**10**

Merger & Acquisition. **De-mergers, Reverse Mergers, Spin-offs, Split-up, Split-Off, Carve-outs and Targeted Stock Offerings.**		

Module II: Role of SEBI SEBI regulations on Merger & Acquisition, Takeover Code. **Defensive Strategies** Defensive actions on takeover bids. **Merchant Banking and M&A** Role of Merchant Bankers in Mergers & Acquisition	L1,L2	**8**
Module III: M&A Models and Theories Valuation Models on Merger & Acquisition: (a) DCF Model, (b) Public Enterprises, (c) Book Value, (d)Adjusted Book value (e) Three Stage growth model. **Ratio Analysis and Valuation Strategies** Swap Ratio, Valuation Practices in India, LBO, MBO. Case Study- Any contemporary Indian Banks and Indian MNCs.	L1,L2,L3,L4	**8**
***Module IV: Empirical Evidence on Mergers:** **Merger Study Methodologies, Empirical Research on Mergers.** ***Post Merger Integration:** **The path to Integration, Retaining and Integrating Human Resources, Integrating Financial and Tangible Resources.**	L1,L2, L3, L6.	**10**

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Prasad G. Godbole (2013), "Merger, Acquisition and Corporate Restructuring", Second Edition,Vikas Publishing.
2. Chandrasekhar Krishnamurti and Vishwanath S.R. "Merger, Acquisition and Corporate Restructuring, Text and Cases". SAGE TEXTS
3. Nishikant Jha, "Mergers, Acquisitions and Corporate Restructuring", Himalaya Publishing House

Reference Books

1. N Kapil Kanwal and Kapil Sheeba(2018), "Mergers and Acquisitions: Strategy Valuation, Leveraged Buyouts and Financing,2nd Edition. Wiley.
2. Patil Ashish (2016), Mergers and Acquisitions -The Art of Science, SAAA Capital Pte. Ltd.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	P1	C1	CT1	EE
Weightage (%)	10	10	20	60

P: Presentation; CT: Class Test; Q/S:Quiz/Seminar; A: Attendance; ME: Mid Term Exam; EE: End Term Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	--	1	--	--	--	--	--	2	1	1
CO2	1	1	2	1	2	--	2	--	--	2	1	--
CO3	1	1	--	2	2	--	--	--	2	2	1	--
CO4	2	1	--	--	--	--	--	--	2	2	1	--
CO5	2	1	--	1	--	--	1	--	--	2	1	--
CO6	2	1	--	2	--	--	2	--	--	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4315	**MANAGEMENT OF BANKS AND FINANCIAL INSTITUTIONS**	L	T	P	C
Version	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course will provide an overview of banking with an introduction to the financial institutions and banking sector through an explanation of the roles and services provided by banks.A financial institution (FI) is a company engaged in the business of dealing with financial and monetary transactions such as deposits, loans, investments, and currency exchange. ... Virtually everyone living in a developed economy has an ongoing or at least periodic need for the services of financial institutions. This course deals with the financial Institutions Banking and Non Bankingtogether.

Course Objectives

The aim of the course is to

1. Orient the finance students to the change in the banking industry. The financial industry much like the computer industry is changing rapidly.
2. Familiarized with institutions of today.
3. Develop an understanding why they are the way they are, and why they are changing is the core aim of the course.
4. To introduce the students to the management of financial institutions in Indian context.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Define and summarise the Indian Banking Financial systems with various financial instruments.

CO2: Explain and comparing the various investment avenues with risk and return trade off.

CO3: Determine various instruments traded in capital markets, merchant & Investment Banking and apply stock trading techniques.

CO4: Demonstrate the process of banking institutions.

CO5: Define the opportunities and challenges in the financial inclusions in banking activities and financial services.

CO6: Understand the sources of the risks of a bank (e.g., interest rate risk, market risk, credit risk, liquidity risk, etc.).

Modules	Blooms level*	Number of hours
Module I: Introduction Financial system, and its evolution,Money, Process of Capital	L1, L2	9

Formation., Banking and Financial Institutions and economic development, Role of Development Banks in Industrial Financing.		
Module II: Banking System & Operations. Banking system and structure in India- Types of banks in operation and their functions, Retail and Wholesale Banking, Near Banks, Rural Banking. Cooperative Banking. Universal Banking, International Banking, Evolution of modern commercial banks, Asset Liability Management in Commercial Banks; Banking structure, Merchant Banking, Matching revenues and costs, capital adequacy; Accounting policies and related matters, Direct investments, and credit programmes. Central banking and monetary policy: Central banking functions; Money creation, process and control; monetary policy. Role of SEBI.	L2, L4	9
Module III: Other Financial Institutions NBFC Evolution and present status. Insurance Companies: Economics of insurance, The insurance industry and its regulation; LIC, GIC, Mutual fund, AMCs. Role of Insurance companies in Industrial Financing.Development finance institutions: Concept, role of DFIs, Sources of funds, DFIs in India, Khan Committee Report and Universal banking; Recent trends. Ministry of Finance- Fiscal Policy, IRDA, NPS.	L3	9
Module IV: Financial Inclusion Financial Inclusion in India: Challenges, Scope of Financial Inclusion in banking activities & financial services. **Types and the sources**of risks to financial institutions: Interest rate risk, Credit risk, Liquidity risk, Loan sale and securitization, Foreign exchange risk, etc.	L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book

Khan,M, Financial Institutions and Markets, Tata McGraw Hill Publishing Company Limited, 2005

Reference Books

1.Cornett and Sauunders, Fundamentals of Financial Institutions Management, McGraw Hill Publishing Company Limited, 2008.
2.Jeff Madura, Financial Markets and Institutions, South-Western College Publishing
3.Bhole L.M., Third Edition, Financial Institutions and Markets; Structure, Growth and Innovations, Tata McGraw Hill Publishing Company Limited, 2017.
4.Gordon and Natarajan, Financial Markets and Services, Himalaya Publishing House
5.Patahak.V Bharati, The Indian Financial System Pearson Education, Fifth Edition, 2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	C	V	Att	EE
Weightage (%)	10	5	5	5	5	70

CT: Class Test, HA: Home Assignment, V: Viva, EE: End Semester Examination; Att: Attendance, C: Case Analysis

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	--	--	1	--	--
CO2	1	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	--	--	--	--	--	3	--	1	--	--
CO4	1	--	--	--	--	--	--	--	--	1	--	--
CO5	1	--	1	--	--	--	--	--	--	1	--	--
CO6	1	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4316	**SECURITY ANALYSIS & PORTFOLIO MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course is providing the knowledge about the Investment, Indian Capital market, financial products selection, stock exchange operations, regulating bodies role in the stock market, construction of portfolio management with the support of various theories and techniques.

Course Objectives

The objective of this course is to:

1. Provide a clear understanding of the changing domestic and global investment scenario in general and Indian capital market in particular with reference to availability of various financial products and operations of stock exchanges.
2. Understand important theories, techniques, regulations and certain advancements in theory of investment will be covered with an aim of
3. Help the participants make sound investment decisions both in the context of individual security and portfolio investment.
4. Having problem solving ability – solving social issues and business problems

Course Outcomes

On completion of this course, the students will be able to:

CO1: Analyze the risk –return relationship involved in the security investment.

CO2: Recognize the impact of economy, industry and company on security performance and apply
investment theories

CO3: Examine the various investment avenues performances based on various theories

CO4: Constructing the best portfolio selection, evaluation and modifications.

CO5: Evaluate the performance of different portfolios by applying quantitative tools to identify the best investment alternatives in designing and re-designing the portfolio.

Modules	Blooms level*	Number of hours
Module I: Introduction to Investments Investments: Introduction, Avenues for Investment, Investments and speculation, Features of a Good Investment Programme, Process of Investment Decision making, Factors contributing to total risk: default risk, interest risk, market risk, management risk, Purchase power risk, Systematic and Unsystematic risk.	L1,l2, L3, L4	8

Module II: The Stock Markets in India Nature and Functions of the stock Market, OTCEI, BSE & NSE & Role of Depositories, Valuation of Securities, Bond and fixed income instruments valuation –valuation of equity and preference shares.	L1, L2, L4	8
Module III :Fundamental and TechnicalAnalysis Concept of intrinsic value. Objectives and beliefs of fundamental analysts. Economy-IndustryCompany framework, Economic analysis and forecasting. Technical analysis: Points and figures chart, bar chart, RSA, RSI, Moving average analysis, Moving Average Convergence Divergence, Candlesticks	L1, L2,L3,L4, L5, L6	9
Module IV : Portfolio analysis and Management Markowitz portfolio theory; expected return and risk for portfolios; the efficient frontier; the efficient frontier and investor utility; Capital Market Theory, Capital Market Line & Separation Theorem,Sharpe's Single Index Model, Capital Asset Pricing Model theories. **Portfolio Performance Evaluation** Passive Vs Active management - Passive strategies and active strategies of Portfolio Management. Asset Allocation Strategies. Portfolio Evaluation Measures – Sharpe ratio, Treynor ratio and Jensen's Alpha. Portfolio monitoring and revision	L4,L5	11

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text &Reference Books:

1. Chandra, P.(2002), Investment Analysis, Tata McGraw Hill
2. Fischer, D.E. and Jordan, R.J. (1995), Security Analysis & Portfolio Management, Prentice Hall of India
3. Bhat, Sudhindra;(2009); Security Analysis & Portfolio Management; Excel Books
4. Dash, A.P.;(2009); Security Analysis & Portfolio Management; I.K. International
5. Bhatt, S.N.;(2011); Security Analysis & Portfolio Management; Biztantra
6. Rangnatham M., Madhumalathi, R.,(2006); Security Analysis & Portfolio Management; Pearson Education
7. Khatri, Dhanesh; (2010); Security Analysis & Portfolio Management; MacMillan India Ltd.

Reference Books:

1. Frank K. Reilly, Keith C. Brown, (2012), Investment Analysis and Portfolio Management, 10th Edition, Cengage Learning. Herbert B. Mayo, (2017), Investments – An introduction, 12thEdition, Cengage Learning

2. Prasanna Chandra, (2017), Investment Analysis and Portfolio Management,5th edition, McGraw Hill
3. Dhanesh kumar Khatri, (2012), Investment management and Security analysis – Text and cases, 2ndedition, Trinity Press.
4. M. Ranganatham, R. Madhumathi, (2011), Security Analysis and Portfolio Management, 2ndedition, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT**	**HA**	**C**	**S**	**A**	**EE**
Weightage (%)	50	5	5	5	5	70

C – Case Discussion, HA – Home assignment, CT – Class Test, S – Seminar, A : Attendance , EE: End semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	--	--	--	--	--	--	1	2	1	--
CO2	1	1	--	--	--	--	--	--	--	2	1	--
CO3	1	1	--	--	--	--	--	--	--	2	1	--
CO4	1	1	--	--	--	--	--	--	--	2	1	--
CO5	1	1	--	--	--	--	--	--	--	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4317	**CORPORATE VALUATION**	L	T	P	C
Version 1.1		2	0	2	3
Pre-requisites/Exposure	Basic knowledge of financial management				
Co-requisites					

The course focuses on valuation of corporations using DCF and Non-DCF approaches. This course explain the role of government, securities markets and financial institutions in the context of IPOs, M&A, bankruptcy conditions. It helps as to how to calculate free cash flows to firm and equity, cost of capital, valuation during share buyback etc. It provides analytical skills in valuation of intangible assets like patents, copyrights etc too.

Course Objectives:

1. Identify the purpose of corporate valuation and to obtain an overview of the basic corporate valuation process
2. To familiarize the students with the standard techniques of corporate valuation.
3. To develop analytical skills and communication strategies for discussing corporate valuation.
4. To understand the valuation in the contexts of IPOs, M&As, Bankruptcy cases

Course outcomes:

At the end of the course the student will be able to:

1. Understand corporate valuation and valuation process
2. Familiarize with the standard techniques of corporate valuation
3. Develop analytical skills relevant for corporate valuation and value based management
4. Critically evaluate IPOs, M&As, Bankruptcy cases

Modules	Blooms level*	Number of hours
Module I Module 1: **Corporate Valuation Overview** Approaches to Valuation-Features of the valuation process**:** Enterprise DCF Model-Analysing historical performance-Estimating the cost of Capital-Forecasting performance-Estimating the continuing value-Calculating and interpreting the results-Other DCF models: Equity DCF Model: Dividend discount model, free cash flow to Equity (FCFE) model-Adjusted present value model-Economic profit model-Applicability and Limitations of DCF	L1,L2,L3,L4,L6	8

analysis (Theory and problems)		
Module 2 **Non-DCF Approaches to Valuation** Book value approach, Adjusted book value approach, Stock and debt approach (numerical problems in each of these methods), Relative valuation-Steps involved in Relative valuation-Equity valuation multiples-Enterprise valuation multiples-Choice of multiple-Best practices using multiples-Assessment of relative evaluation. (Theory and problems).	L1, L2, L3,L4, L6	7
Module 3:**Advanced Issues in Valuation** Valuation of companies of different kinds-valuation in different contexts-Loose ends of valuation-Valuation of intangible assets: Patents, trademarks, copyrights and licenses; Franchises; Brands (Theory and problems).	L1, L2, L3,L4	6
Module 4:**Strategic Financing Decisions** Valuation and financing Decisions in ideal capital markets, share buyback and valuation. (Theory), Agency costs of Debt, financial distress, Bankruptcy. Role of Government, securities Markets and financial institutions in IPO valuations and M&As. (Theory)	L1, L2,L3	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation*

Textbooks				
Sl. No.	**Title of the book**	**Name of the Author/s**	**Publisher Name**	**Edition and year**
1	Corporate Valuation and Value Creation	Prasanna Chandra	Tata McGraw Hill	2011
2	Damodaran on Valuation	Aswath Damodaran	John Wiley and Sons	2/e, 2006

Reference Books				
1	Corporate Valuation: A Guide for Managers and Investors	Philip R Daves, Michael C. Ehrhardt, and Ron E. Shrieves	Cengage Learning	2003
2	Corporate Valuation	David Frykman, Jakob Tolleryd	Prentice Hall	2003
3	The Valuation Handbook: Valuation Techniques from Today's Top Practitioners	Rawley Thomas, Benton E. Gup	John Wiley & Sons	2010

Theory: 40%, Problems:60%

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	CAP	Q /S	A	ME	EE
Weightage (%)	10	5	5	10	70

CPA: Case Discussion/ Presentation/ Analysis, Q/S : Quiz / Seminar, A : Attendance, ME : Mid-term Examination, EE: End semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	1	1	--	--	--	2	--	2	1	2	1	--
CO2	1	1	--	--	--	2	--	2	1	2	1	--
CO3	1	1	--	--	--	2	--	2	1	2	1	--
CO4	1	1	--	--	--	2	--	2	1	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

Specialization in Human Resource Management– Elective Subjects (Any 2)

MWP4318	COMPENSATION AND REWARD MANAGEMNT	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description:

Catalog Description
In this course the concept of compensation and reward and its effect on employee motivation and productivity is discussed. The subject includes compensation structure ,its elements, and current trends in business organisations .

Course Objectives
1.The objective of this course is to familiarize students with the dynamics of wage and salary administration
2. To develop an understanding of the elements of compensation and current trends in India.

Course Outcomes
On completion of this course, the students will be able to
CO1: Describe and design compensation system and its elements.
CO2: Discuss the knowledge on Economic and Behavioural Dimensions of Compensation Management
CO3: Explain the compensation package for various groups
CO4: Describe appropriate compensable factors to determine rates of pay.

Modules	Blooms level*	Number of hours
Module I: Introduction • Concept of Compensation, • Concept of Reward and Reward System, • Economic Theory of Wages, Limitations of Economic Theories. • Wage and Salary Administration at micro level, Wage concepts, • Methods of Job Evaluation, Role of various parties – Employees, Employers, Unions & Government, Overview of Legislations affecting Compensation	L1, L2	12
Module II:Compensation Structure- Indian Practices • Salary Progression, Methods of Payment, Limitations of the Job Related Compensation, • Competency based Compensations, • Elements of Managerial Compensation- A New Approach, VRS, Pay the Person, Rewarding Excellence, Individualizing the Pay System,	L1, L2,L3	12

Executive compensation, International Compensation • Performance linked Compensations- Performance Appraisal		
Module III: Elements of Compensation • Variable Compensation, • Principles of Reward Strategy, Perquisites, Bonuses & Incentives Scope and Process, • Ethical Considerations, Social Security, Sharing Productivity Gains with Employees, • Gain Sharing, Team Based Pay, • The Role of Compensation in Sales Force Success, Constructing pay structure	L1,L2,L3	12
Module IV: **Incentive Schemes / Payment by Results,Benefits and Services** • Types of Incentive Schemes/ Systems and Plans, Merits and Demerits of Incentives • Concept of Benefit- Strategic Perspectives on Benefits, • Type of Benefits, • Factor Influencing Choice of Benefit Package, Administration of Benefits and Services.	L1, L2	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & Reference Books:

- Compensation & Reward Management, BD Singh, 2ndedition, Excel books, 2012.
- Compensation, Milkovich& Newman, 9th edition, 2017, Irwin/McGraw-Hill.
- Compensation and Benefit Design, Bashker D. Biswas, FTPress, 2012.
- An Introduction to Executive Compensation, Steven Balsam, Academic Press, 2002.

REFERENCE BOOKS:

- Strategic Compensation, Joseph J. Martocchio, 3rd Edition, Prentice Hall, 2004.
- Compensation Management in Knowledge based world, Richard I. Anderson, 10th edition, Pearson Education.
- Compensation Management, ErSoniShyam Singh, Excel Books.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1									1			
CO2	2	1		2		2	2	1	1	1			
CO3	2	2				1	1	1	2	1			
CO4	2	2								1			

MWP4320	ORGANIZATIONAL DEVELOPMENT AND CHANGE	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Catalogue:
Change is the only constant that we can rely on in the business world. It is critical that organizations understand change, promote change, cope with change, and value change. The training focuses on developing the critical skills to effectively managing change in the workplace and covers how to motivate people through the change process. Industry professionals need to deal with changes every day. Hence the course will help them understand the nuances of managing changes smoothly in organizations.

Course Objective:
The course aims to:

1. Provide a conceptual input of meaning, characteristics, processes & influences of Organizational Development & Change Management.
2. Impart skill sets through experiential learning. The course gives various OD theoretical frameworks in detail which provides comprehensive overview of human capital from the perspective of organizational excellence in the light of transitional phases of Indian Industries.
3. Introduce students to a planned process of bringing about change in organizations and the theoretical models available for the same.

Course Outcomes:
On completion of the course the students will be able to:
CO1. Explain theories and current research concerning individuals, groups, and organizations to the process of change
CO2. Explain and act upon the differences between insider and outsider approaches to consulting and OD interventions
CO3. Identify the ongoing activities within an organization and design and plan the implementation of selected OD interventions.
CO4.Make use of the OD models and change management tools to lead teams in uncertain times.

Modules	Blooms level*	Number of hours
Module I:An Introduction to Organisational Development Meaning and definition, History of OD, Relevance of organizational	L1, L2	10

development for managers, Characteristics of OD, Assumptions of OD, The Lab Training , The Survey Research & Feedback, The Action Research, Factors affecting OD, Role of Managers		
Module II: OD Interventions Interventions designed at Individuals, Dyads, and Triads, Teams & Groups. Team Interventions, Inter-Group Interventions, Structural Interventions, Comprehensive Interventions, Issues in Client-Consultant Relationship.	L1, L2	8
Module III:Change Management Global Organisation, Adaptations of change in organisation Learning and preparing for the change, Leveraging data to drive organizational change, Consulting approaches and skills .	L1, L2, L3	8
Module IV:Leading OD and change in unprecedented times Changing, adapting and navigating in the new business environment, Understanding the effectiveness of the remote worker and remote working teams, Addressing new age work behaviour arising out of social distancing, Managing mental wellbeing through stressful situation.	L1,L2, L3	10

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Text & Reference Books:

1. Wendell L. French and Cecil N. Bell Jr., (2008), *Organization Development and Transformation*, Prentice Hall India
2. Cummings, T.G &Worley, C.G.(2013), *Organizational Development and Change,* Cengage learning – India, 10th edition.
3. Palmer I, Dunford R, Akin G, (2010), '*Managing Organizational Change - A Multiple Perspectives Approach*, Tata McGraw Hill

Examination scheme:

Components	**A**	**CT**	**Q/S/V**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, Q/S/V: Quiz/Seminar/Viva, HA: Home Assignment, EE: End term examinations.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2									1			
CO2	2	2								1			
CO3	1									1			
CO4	1									1			

1: Strongly related, 2: Moderately related and 3: Weakly related

MWP4321	PERFORMANCE MANAGEMENT SYSTEM	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course will help students to understand the significance of appraisal for an Organization and Individual. It will develop an understanding of various appraisal methods and measurements to manage the performances of employees. It would also provide an insight into the fundamentals of competency management

Course Objectives
This course will help students to:

1. Understand the difference between the scope of performance appraisal and performance management.
2. Develop an understanding of various appraisal methods and measurements to manage the performances of employees.
3. Provide an insight into the fundamentals and current trends of performance management in the industry.

Course Outcomes
On completion of this course, the students will be able to:
CO1: Identify performance aims, objectives, priorities and targets.
CO2: Explain effective performance management practices and policies to improve organizational and employee performance
CO3: Describe the importance of defining roles, identifying competencies, and hiring, training, coaching and counselling for skills needed for successful job performance.
CO4:Describe an organization's performance management process that is compliant with law and supports organizational mission and strategy

Modules	Blooms level*	Number of hours
Module I: Introduction to Performance Management Performance Management: Scope and Significance – Advantages of Performance Management, Organizational Structure – Impact of Organizational structure and Operational Problems Performance management process – Performance Planning – Performance Appraisal - Performance Mentoring – Performance Management Strategic Planning.	L1, L2	10

Module II:Elements of Performance Management Performance Management and Employee Development: Performance Management Skills, performance Management Framework, Employee Assessment system, Role of HR Professionals in Performance management.	L1, L2	8
Module III: Reward system and legal issues Reward Systems and Legal Issues: Reasons for introducing contingent Pay Plan, Problems associated with contingent pay plans- Selecting a contingent pay plan- Pay Structures- Job Evaluation- Broad Banding- Legal Principles affecting Performance Management.	L1, L2,L3	8
Module IV: Current trends in performance management Performance management issues and their effects, performance measurement and balanced score card, strategy maps, creating performance measures, Key result areas, performance management in the world of data.	L1,L2, L3	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Suggested readings:

- Soumendra Narian Bagchi, Performance Management, 2e, Cengage Learning 2013.
- Herman Aguinis, Performance management, 3e, Pearson, 2014.
- A S Kohli, T.Deb, Performance Management, Oxford Higher Education, 2012.
- Cardy Robert L. (2012), Performance Management Concepts, Skills and Exercises, Prentice Hall India

Examination Scheme:

Components	**A**	**CT**	**Q/S/V**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test; HA: Home Assignment ; Q: Quiz; V: Viva-voce; A: Attendance ; EE: End Semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	-	-	-	-	-	-	-	1	--	--
CO2	1	-	-	-	-	-	-	-	-	-	1	--	--
CO3	1	-	-	-	-	-	-	-	-	-	1	--	--
CO4	1	-	-	-	-	-	-	-	-	-	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Specialization in Information Technology and E-Commerce – Elective Subjects (Any 2)

MWP4322	**DATABASE MANAGEMENT SYSTEM FOR BUSINESS**	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn about the importance and usage of database management systems in the modern day organizations. The students shall grasp sound knowledge of various types of databases that exist, creation of data warehouse and application areas of data mining. Also, the students will be learning SQL, the language of databases.

Course Objectives

The course aims to make the students:

1. Understand the basic and advanced concepts in databases and database management systems.
2. Grasp the importance of databases in day to day life.
3. Gain a hands-on experience on the SQL-the language of databases.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the basic terminology used in databases.

CO2: Describe the concepts related to databases architecture.

CO3: Apply the knowledge of SQL in creating databases using DBMS software for a business organization.

CO4: Compare and contrast various types of keys used in database creation.

CO5: Review and assess the organization's data and network security aspects.

Modules	Blooms level*	Number of hours
Module I: Introduction to DBMS Definition of DBMS, Concept and Goals of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Database Languages, Database Users, Database Abstraction.	L1, L2	4
Module II: Relational Database & ER Model **Relational Database**: Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules, **ER Model:** Entity Type, Entity Set, Relationship type, Relationship sets,	L2, L3, L4	4

Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER diagrams.		
Module III: SQL SQL Language, DDL,DML and DCL commands. Data definition, Data retrieval and update operations on MS ACCESS and SQL Server DBMS.	L2, L3, L4	4
Module IV: Transaction Management and Concurrency Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management.	L2, L3, L4	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Elmasari, Navathe (2015), "Database Systems", Pearson, ISBN 978-8131792476
2. Korth, Silbertz, Sudarshan (2013), "Database System Concepts". McGraw Hill. ISBN **978-**9332901384

Reference Books

1. Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
2. Date C J." An Introduction to Database Systems", Addision Wesley.
3. *Database Systems: The Complete Book (2nd edition)* by Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom (ISBN 978-0131873254, Pearson Prentice Hall, 2009)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

CPA: Case Discussion/Presentation/Analysis, TP: Project, Q/S:Quiz/Seminar
A: Attendance, ME: Mid Term Exam, EE: End Term Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1										1		
CO2	1										1		
CO3	2								1		1		
CO4								1	2		1		
CO5				1				2			1		

1: strongly related, 2: moderately related and 3: weakly related

MWP4323	E-COMMERCE FUNDAMENTALS	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn the fundamental concepts of e-commerce which includes various e-commerce business models, electronic data interchange, electronic payment systems and security issues related to computer systems. The aim of this course is to make the students familiar with the basic concepts of Information Technology and E-commerce.

Course Objectives

This course will expose students to:

1. To develop the techno managers with deep understanding of managerial aspects as to use Information Technology effectively and efficiently.
2. To help the students with a view to emulate, entrepreneurial ventures in e-commerce and m-commerce.
3. To prepare the students to cope with the ever changing IT- Industry and to useInformation technology to gain competitive advantage in business.

Course Outcomes

On completion of this course, the students will be able to

CO1: State the strategic use of Information Technology in Business and differentiate between functional and cross functional information systems.

CO2: Describe the concepts related to databases and networking.

CO3: Apply the knowledge of Information Technology in managing the broad array of responsibilities in the business organization.

CO4: Design the e-commerce website for various e-business organization using e-commerce models.

CO5: Review and assess the organization's data and network security aspects.

Modules	Blooms level*	Number of hours
Module I: Electronic Commerce Systems Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services.	L1, L2	6
Module II: E-Commerce Business Models & EDI Concept of EDI, Difference between paper based Business and EDI	L1, L2	6

Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI.Various business models in Ecommerce likeB2C, B2B, C2C.		
Module III: E-Payment Systems and Security Management Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards. The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types.Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.	L1, L2	6
Module IV: E-Marketing and E-Finance Traditional Marketing V/S E-Marketing, impact of Ecommerce on markets, marketing issue in E-Marketing, promoting your E-Business, Direct marketing, one to one marketing Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking; E-Trading- Stock marketing, trading v/s E-Trading, importance of E-Trading, advantages of E-trading, operational aspects of E-Trading.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education
2. Ravi Kalakota& Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.

Reference Books

3. Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
4. J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1										1		
CO2									1		1		
CO3	1										1		
CO4									1		1		

1: strongly related, 2: moderately related and 3: weakly related

MWP4324	SYSTEM ANALYSIS & DESIGN	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn the fundamentals concepts creating business systems using various software development methodologies. The students will learn about each stage of system development in detail including database design and development, testing the systems and their maintenance.

Course Objectives

The objective of this course is to:

1. Prepare students in conceptualizing and defining scope and domain of system analysis and design.
2. make the student learn about system development life cycle using conventional and structural look.

Course Outcomes

On completion of this course, the students will be able to

CO1: Name and outline the understanding of key concepts of software development.

CO2: Comprehend the software development process and different models used.

CO3: Create Data Flow Diagrams and Entity Relationship diagrams.

CO4: Differentiate between various types of software testing techniques.

Modules	Blooms level*	Number of hours
Module I: Systems Development Environment System & its parts, Types and Characteristics, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, JAD), System Development Models (Waterfall model & Spiral Model, V&V) Identifying and Selecting Projects, Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects, Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)	L1, L2	4
Module II: System & Data Analysis (Data AnalyzingModeling) Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling –	L1, L2	4

DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Modeling Methodologies (Bottom Up method & Top Down Method)		
Module III: System & Database Design System Design (Objectives, Phases, Purpose), System Design Goals, Type of Design, System Design Methodologies, Database Design: DBMS – an introduction, Overview of Data Models, Relational Database Model – Well-structured relations, Keys, Schema & Subschema, Structure, Facilities & Users, Constraints, Anomalies, Functional Dependency, Normalization, Roles & Duties of System Administration.	L1, L2	4
Module IV: System Implementation & Operation Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures. Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance)	L1, L2	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books& References

Text Book:

1. Valacich George Hoffer, Essentials of System Analysis & Design, Second Edition, Prentice-Hall India.

Reference Books:

1. James A. Senn, Analysis and Design of information systems.
2. Kroeber, Donald W. and Watron, Hugh J., Computer Based Information Systems.
3. E. M. Awad, Systems Analysis & Design.
4. Dennis Wixom and Wiley, Systems Analysis and Design – An Applied Approach**.**

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	**10**	**5**	**5**	**5**	**5**	**70**

C - **Case Discussion/ Presentation;** HA - **Home Assignment;** P - **Project;** S - **Seminar;** V - **Viva;** Q - **Quiz;** CT - **Class Test;** A - **Attendance;** EE - **End Semester Examination**

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1									1			
CO2	1	2								1			
CO3								1		1			
CO4	1						1		1	1			

1: strongly related, 2: moderately related and 3: weakly related

MWP4325	DYNAMIC WEB DESIGN & DEVELOPMENT	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the students will learn the fundamentals concepts creating business systems using various software development methodologies. The students will learn about each stage of system development in detail including database design and development, testing the systems and their maintenance.

Course Objectives

The course aims to enable students to:

1. Develop applications in PHP using various concepts like arrays, user defined functions, Sessions
2. Understand and establish the connectivity between PHP and database
3. Develop programs to add records, retrieve records and delete records from a table.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain the key concepts of web development and cascading style sheets.

CO2: Apply the advanced CSS features for web designing.

CO3: Define the programming constructs related to PHP.

CO4: Create HTML forms using PHP.

Modules	Blooms level*	Number of hours
Module I: Introduction to Web Development & Cascading Style Sheets Web pages, Static and Dynamic web pages, Client side VS Server side, Introduction to HTML, HTML Elements, HTML attributes, Styling and formatting HTML, Forms, Tables. CSS Basics: CSS Introduction: CSS Syntax, CSS Id & Class, CSS How CSS Styling: Styling Backgrounds, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables CSS Box Model: CSS Border, CSS Outline, CSS Margin, CSS Padding	L1, L2, L5	6
Module II: CSS Advanced CSS Grouping/Nesting, CSS Dimension, CSS Display, CSS Positioning, CSS Floating, CSS Align, CSS Pseudo-class, CSS Pseudo-element, CSS Navigation Bar, CSS Image Gallery, CSS Image Opacity, CSS Image Sprites CSS Media Types, CSS Attribute Selectors	L1, L2, L5	6

Module III: Introduction to PHP, Decisions, Loop & Functions Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html. What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function,Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function	L1, L2, L5	6
Module IV: Handling HTML Forms using PHP, Working with Files and Directories Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission. Understanding, file & directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.	L1, L2, L5	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book & Reference

1. "Learning PHP AND MySQL", books by ' O' riley Press

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1										1		
CO2									1		1		
CO3	1										1		
CO4									1		1		

1: strongly related, 2: moderately related and 3: weakly related

Specialization in Business Analytics – Elective Subjects (Any 2)

MWP4326	**PROGRAMMING FOR ANALYTICS USING R**	L	T	P	C
Version 1.1	Date of Approval: Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course offers the specialization on R (powerful language used widely for data analysis and statistical computing). This course facilitates a good understanding on the process of data manipulation and visualization. The course provides ample working examples on statistical data analysis using R.

Course Objectives
The objective of this course is to:
1. Provide learning on how to program in R, how to use R for effective data analysis, how to install and configure software necessary for a statistical programming environment.
2. Provide applications on statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code.
3. Facilitate hands on experience to various real world business problems using R.

Course Outcomes
On completion of this course, the students will be able to:
CO1: Analyze different datasets using R
CO2: Explore real time data at various levels using appropriate visualizations
CO3: Apply critical programming language concepts such as data types, iteration, control structures, functions, and boolean operators by writing R programs and through examples

Modules	Blooms level*	Number of hours
MODULE 1: Introducing to R , R Data Structures , Help functions in R , Vectors , Scalars , Declarations , recycling , Common Vector operations , Using all and any, Vectorized operations , NA and NULL values , Filtering , Vectorized if-then else , Vector Equality , Vector Element names.	L1, L2,L3	9
MODULE 2: Matrices, Arrays And Lists: Creating matrices , Matrix operations , Applying Functions to Matrix Rows and Columns , Adding and deleting rows and columns , Vector/Matrix Distinction , Avoiding Dimension Reduction , Higher Dimensional arrays , lists , Creating lists ,	L1, L2,L3	9

General list operations , Accessing list components and values , applying functions to lists , recursive lists.		
MODULE 3: Data Frames: Creating Data Frames , Matrix-like operations in frames , Merging Data Frames , Applying functions to Data frames , Factors and Tables , factors and levels , Common functions used with factors , Working with tables - Other factors and table related functions - Control statements , Arithmetic and Boolean operators and values , Default values for arguments - Returning Boolean values , functions are objects , Writing Upstairs - Recursion , Math and Simulations in R.	L1, L2,L3	9
MODULE 4: Input/ Output , accessing keyboard and monitor , reading and writing files , accessing the internet , String Manipulation , Graphics , Creating Graphs , Customizing Graphs , Saving graphs to files , Creating three-dimensional plots Interfacing R with Python , Basic Statistics , Regression Basic Idea, Linear Model , Generalized Linear models , Non-linear models , Time Series and Auto-correlation.	L1, L2,L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Beginning R – The Statistical Programming Language by Mark Gardener, Wiley, 2013
2. Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R by Robert Knell, Amazon Digital South Asia Services Inc, 2013.
3. "THE ART OF RPROGRAMMING "A Tour of Statistical Software Design By Norman Matloff, No Starch Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	1	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP 4327	**PROGRAMMING FOR ANALYTICS USING PYTHON**	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course is designed in such a way that leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, regular expressions, working with binary data, and using the extensive functionality of Python modules.

Course Objectives
The objective of this course is to:
1. Equip students with the concepts of the fundamental programming concepts including data structures, networked application program interfaces, and databases, using the Python programming language.
2. Provide applications on statistical, machine learning, information visualization, text analysis, and social network analysis techniques through popular python toolkits to gain insights into data analysis process.

Course Outcomes
On completion of this course, the students will be able to
CO1: Create applications for data retrieval and processing
CO2: Conduct an inferential statistical analysis of various business problems
CO3: Explain fundamental Python functionality and features used for data science
CO4: Apply techniques such as lambdas and manipulate csv files

Modules	Blooms level*	Number of hours
MODULE 1: Installing Python; basic syntax, interactive shell, editing, saving, and running a script, Concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation.	L1, L2,L3	9
MODULE 2: Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary,	L1, L2,L3	9

octal, hexadecimal numbers.		
MODULE 3: Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries. Design with functions: arguments and return values; formal vs actual arguments, named arguments, Recursive functions.	L1, L2,L3	9
MODULE 4: Simple Graphics and Image Processing: digital images, image file formats, image processing Simple image manipulations with 'image' module (convert to bw, greyscale, blur, etc).Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects OOP, continued: inheritance, polymorphism, abstract classes; exception handling, try block.Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames.	L1, L2,L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Core Python Programming by Wesley Chun,Prentice Hall
2. Fundamentals of Python: First Programs By Kenneth Lambert,Course Technology, Cengage Learning
3. Learning Python by David Ascher and Mark Lutz,Oreilly

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4328	**VISUAL ANALYTICS- TABLEAU /POWER BI**	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/ Exposure					
Co-requisites					

Catalog Description
This course familiarizes the students on data visualization tools. This course is designed to provide a fundamental and strategic understanding on the concepts of Business Intelligence using Tableau.

Course Objectives
The objective of this course is to:
1. Equip students with the concepts of BIs and its types and how to connect to and import data, author reports using Power BI Desktop, and publish those reports to the Power BI service
2. Emphasize on how to create dashboards and share with business users—on the web and on mobile devices

Course Outcomes
On completion of this course, the students will be able to:
CO1: Connect, import, shape, and transform data for business intelligence (BI)
CO2: Visualize data, author reports, and schedule automated refresh of your reports
CO3: Create and share dashboards based on reports in Power BI desktop and Excel
CO4: Use natural language queries and create real-time dashboards

Modules	Blooms level*	Number of hours
MODULE 1: **Tableau:** Data visualization and its significance, Connecting Tableau to a Data File - CSV File, Navigating Tableau, creating calculated fields, adding colors, adding labels and formatting, exporting worksheet. **Power BI**: What is Power BI? Installing Power BI Desktop & Project Setup, Connecting Power BI Desktop to Source Files, Working in the Query Editor, Understanding the Data Model & Creating Visuals.	L1, L2,L3	8
MODULE 2: **Tableau:** working with data extracts, working with time series data, understanding aggregation, granularity and level of detail, creating an area chart and learning about highlighting, adding a filter and quick	L1, L2,L3	8

filter. **Power BI:** Understanding the Power BI Desktop Workflow, Exploring the Interface of the Data Model, Understanding the Query Editor Interface, Keeping & Removing Rows, Working with Filters, Removing Empty Rows, Working with Columns, Replacing Values, Formatting Data & Handling Formatting Errors.		
MODULE 3: **Tableau:** Relationships v/s joins, Joining data, blending data, data joining v/s data blending, dual axis chart. **Power BI:** Pivoting & Unpivoting Data, Splitting Columns, Creating Groups & Cleaning Up Project, The Star Schema, Query Duplicates vs References, Creating the DIM-Region Table & Removing Duplicates, Merging Queries, Understanding "Extract", Working with Conditional Columns, Understanding Basic Mathematical Operations, Performance Optimization	L1, L2,L3,L4	10
MODULE 4: **Tableau:** Creating a map, scatter plot, working with hierarchies, applying filters to multiple worksheets, create interactive dashboard, storytelling. **Power BI:** Understanding Relationships, Cross Filter Direction & Many-to-Many, Understanding the DAX Basics, Applying the DAX Basics, Creating Visuals in the Report View	L1, L2,L3,L4,L5	10

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation

Text and Reference Books

1. Microsoft Business Intelligence Tools for Excel Analysts: Michael Alexander, Jared Decker, Bernard Wehbe, John Wiley & Sons, 2014
2. Introducing Microsoft Power BI: Alberto Ferrari and Marco Russo, Microsoft Press 2016
3. Getting started with Watson Analytics: IBM Corporation 2015
4. Tableau Your Data! Fast and Easy Visual Analysis with Tableau Software: Daniel G. Murray and the InterWorks BI Team, John Wiley & Sons 2013
5. Beginning Big Data with Power BI and Excel 2013: Neil Dunlop, Apress 2015

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	IP	EE	EP
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4329	**ECONOMETRICS**	L	T	P	C
Version 1.1	Latest Approved	2	0	1	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the both fundamental and strategic understanding on identification of business problem and how to approach that problem using econometric techniques. This course facilitates a good learning on the estimation of parameters and forecasting of any indicator/variable related to business/ economy at both micro and macro level. Also, this course covers the quantitative analysis, model building and policy making for any economic/business problem. The course starts with simple and multiple linear regressions, followed by topics of special interest to deal with model specification, endogenous variables, binary choice data, and time series data. The aim of the course is to make the students familiar with statistical techniques and quantitative analysis.

Course Objectives

The objective of this course is to

1. Provide a good understanding on identification of problem, estimation of parameters and interpretation of results.
2. Equip the students with major statistical tools and techniques using various statistical software such as STATA, R, SPSS, Eview.
3. Explore the mathematical background of these concepts and techniques, and demonstrate their use through practical examples and interactive experiments.
4. Facilitate hands on experience to various real world business problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Translate data into models to make forecasts and to support decision making in a wide variety of fields, ranging from macroeconomics to finance and marketing.

CO2: Use statistical software or programming languages to combine data sets and estimate econometric models.

CO3: Analyse binary response data, panel and time series data using appropriate statistical models.

CO4: Explain problems imposed by endogeneity and simultaneity bias and how to resolve these problems using appropriate statistical models.

Modules	Blooms level*	Number of hours
MODULE 1: Parametric Tests and Non Parametric Test	L1, L2,L3	9

Nature, meaning and scope of econometrics; Simple and general linear regression model —Assumptions, Estimation (through OLS approach) and properties of estimators; Gauss-Markov theorem; Concepts and derivation of R2 and adjusted R2; Concept and analysis of variance approach and its application in regression analysis; Dummy Variable, Stationarity.		
MODULE 2: Autocorrelation Nature, test, consequences and remedial steps of problems of auto-correlation	L1, L2,L3,L4	9
MODULE 3: Heteroscedasticity Nature, test, consequences and remedial steps of problems of heteroscedasticity.	L1, L2,L3,L4	9
MODULE 4: Multicollinearity Nature, test, consequences and remedial steps of problems of Multicollinearity.	L1, L2,L3,L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text Books

11. Gujarati, D.N. (1995), *Basic Econometrics* (2nd Edition), McGraw Hill, New Delhi.
12. Theil, H. (1981), *Introduction to Econometrics*, Prentice Hall of India, New Delhi.

Reference Books

1. A. Koutsoyiannis, *The theory of Econometrics: An introduction exposition of econometric methods*, Educational low-priced books scheme, McMillan Education (1992)
2. Christopher Dougherty, *Introduction to Econometrics*, Oxford University Press (3rd edition)
3. Amemiya, T. (1985), *Advanced Econometrics*, Harvard University Press, Cambridge, Mass.
4. Baltagi, B.H. (1998), *Econometrics*, Springer, New York.
5. Goldberger, A.S. (1998), *Introductory Econometrics*, Harvard University Press, Cambridge

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**P**	**EE**
Weightage (%)	5	15	10	70

IP: Internal Practical, P: Project, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	1	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	1	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Semester- IV

MWP4411	ENVIRONMENTAL GOVERNANCE AND SUSTAINABILITY	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Environmental problems and global environmental change are multifaceted, trans-boundary, multi-level and multi-sector issues, that need to be dealt with at all administrative levels and with an integrated approach across policy areas. By applying theories of governance, we will discuss what this may imply in practice for the policy-making and implementation of environmental politics at different levels. The course introduces key theoretical concepts useful for the understanding of environmental change as a policy problem. This course explores the crucial link between governance and sustainable development. Sustainable development has emerged as the global norm and dominant approach to reconcile the goals of economic development, environmental quality and social equity. Governance can be understood as the rules, mechanisms, processes and institutions through which important decisions are made and implemented. The course discusses the contested nature of both these concepts, and investigates how both are combined in local, national, regional and international policy-making about environment and development challenges such as poverty, global inequalities, loss of biodiversity, deterioration of global eco-systems, and the threat of climate change to human societies.

Course Objectives

The objectives of this course are to:

1. Provide the students exposure to environmental governance practices.
2. Enhance student's knowledge towards concepts of sustainable development and global institutional arrangements for the governance of different dimensions of environment
3. Familiarize students with contemporary environmental issues, including alternative sources of energy and climate change, as well as with the most important global and regional institutions that create the global environmental governance architecture.
4. Comprehend and critically discuss the contemporary sustainable development agenda.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Classify and compare different Environmental Governance practices employed by multiple factors across different levels.
CO2: Describe the rationale behind regulatory, community-based, and market/incentive-based approaches to environmental governance, as well as newer approaches in integrated governance.
CO3: Describe different initiatives and strategy for sustainable development and also able to analyze the implementation of the Sustainable Development Goals.
CO4: Describe and understand the complexity of environmental problems, and drivers of and societal solutions to global environmental change.
CO5: Conduct analyses of Environmental Governance practices.

Modules	Blooms Level*	Number of hours
Module 1: **Introduction to the challenges and players in environmental governance:** Overview of environmental governance, Contemporary Discourses on Governance in India, problem and prospects of environmental governance in India, Democracy, Development and Governance. **Environmental Governance**: Human–Environment Interaction, Green Governance: Sustainable Human Development. Global environmental change. Governance of ecological conflicts and disasters, global ecological governance in particular in regard to climate change.	L1, L2	10
Module 2: Good Governance Initiatives in India: Government, Governance and Public Service Delivery in India, E-Governance in India. Democratic Decentralization and Local Governance in India. People's Participation in Governance, Citizen's Charter and Right to Information in India Corporate Social Responsibility: the Indian Experience.	L1, L2, L3	8
Module-3: Sustainable Development: Issues and Challenges-I **Introduction to Sustainable Development:** Parameters of sustainable development, Approaches to the study of SD, Issues and challenges. **Developmental issues**: Natural resource exploitation, Patterns of Industrialization, Inequitable Growth, Global and Regional dimensions	L1, L2, L3	9
Module-4: Sustainable Development: Issues and Challenges-II **Initiatives towards sustainable development:** State Initiatives global initiatives, Civil Societies and Community Initiatives, **Strategy for sustainable development:** Community Knowledge, Harness Technology, Innovative Practices, Cooperation and Partnership. SDGs.	L1, L2, L3	9

***Bloom's Level:**
L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation
Text Books

- Environmental Governance in India by Dr. Devasish Sarkar and Ravi Ghosh. Global Vision Publishing House; 2nd edition.
- Environmental Governance in India: Issues and Challenges, by Prakash Chand Kandpal, Sage Publication.
- Governance: Issues and Challenges, by **Abhay Prasad Singh and, Krishna Murari**, Pearson Publication, 2018.
- Evans, J. P. (2011) Environmental Governance. Routledge, London.

Reference Books

- Adger, N. et al. (2003) Governance for sustainability: towards a `thick' analysis of environmental decision making, Environment and Planning A 35, pp. 1095 – 1110
- Adger, W. N. and A. Jordan (2009). Governing Sustainability. Cambridge, Cambridge University Press.
- Biermann, F, Pattberg, P. and Zelli, F. (eds). (2010). Global Climate Governance Beyond 2012: Architecture, Agency and Adaptation, Cambridge University Press.
- Evans, J. P. (2011) Environmental Governance. Routledge, London
- Glasbergen, P., Bierman, F., Mol, A. (eds) (2007) Partnerships, Governance and Sustainable Development: Reflections on Theory and Practice Cheltenham, UK: Edward Elgar Publishing.
- Lange, P., Driessen, P.J., Sauer, A., Bornemann, B., Burger, P. (2013) Governing Towards SustainabilityżConceptualizing Modes of Governance, Journal of Environmental Policy and Planning 15(3), p403-425
- Meadowcroft, J., Langhelle, O., Ruud, A. (2012) Governance, Democracy and Sustainable Development: Moving Beyond the Impasse. Cheltenham, UK: Edward Elgar Publishing.
- Young, O. R. (2002). "Evaluating the success of international environmental regimes: where are we now?" Global Environmental Change 12(1): 73-77

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	1	1	--	1	1	1	--	1
CO2	1	1	1	1	--	1	1	--	1	1	1	--	1
CO3	1	1	1	1	--	1	1	--	1	1	1	--	1
CO4	1	1	1	1	--	1	1	--	1	1	1	--	1
C05	1	1	1	1	--	1	1	--	1	1	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

MWP4412	E-BUSINESS ESSENTIALS	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course aims to make the students understand the nuts and bolts of forming an e-business and prepares students to evaluate the requirements of an e-business and develop e –business plans. As business environment is witnessing so many changes every day, it gets vital for business organizations to recognize and learn to create their presence in cyber space.

Course Objectives

The objective of this course is to:

1. Introduce the students to the world of e-business, the openings and the risks and makes them learn the strategies of making businesses successful worldwide.
2. Make the students understand the nuts and bolts of forming an e-business and prepares students to evaluate the requirements of an e-business and develop e –business plans

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the digital technologies necessary for e-business.

CO2: Identify and use the database to improve business performance and decision making.

CO3: Create a web design for an e-business web portal.

CO4: Analyze the processes associated with e-payment systems, e-marketing, e-procurement and e-distribution.

Modules	Blooms level*	Number of hours
Module 1: Introduction to E-Business The impact of the electronic communications on traditional businesses, difference between e-commerce and e-business, E-business opportunities, Business adoption of digital technologies for e-commerce and e-business, E-business risks and barriers to business adoption, Management responses to e-commerce and e-business, Business models for e-commerce.	L2 ,L4	4
Module 2: E-Business Web Design Elements of site design, site navigation, site structure, page and content design, web accessibility. Components of a business model, classification of business webs, comparison and valuation of networks, price formation process. Internet, intranet and extranet, choosing an ISP and Internet terminology Acquiring e-business systems, development of	L2, L4	4

web based content and services, Software and services for web-site development and testing , testing process, environment, database creation and data migration, content management and maintenance		
Module 3: E-Marketing & E-Procurement E-Marketing: comparison of communication media, development model for online customers, online promotion strategies. E-procurement: strategic and operational procurement, information support for e-procurement, types, catalog management.	L2,L4,L5	4
Module 4: E-Payment Systems and E-Distribution E-payments: credit card based procedures, SSL, SET, paypal and very-sign, Secure e-commerce transactions, principles, approaches to develop secure systems, digital certificates, symmetric and asymmetric encryption, digital signatures, PKI's and CA's. E-Distribution: components and types, online, offline and hybrid types, SCM and ESD: architecture, functions and services, digital watermarks.	L2,L4	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books*:*

1. A. Meier, H. Stormer, 2009, *E-Business and E-commerce: Managing the Digital Value Chain,* Springer
2. D. Chaffey, 2009, *E-Business and e-commerce management,* 4th ed, Pearson/Prentice Hall.

References Books:

1. In Lee, 2007, *E-business innovation and Process Managemen,* Cybertech Publishing
2. A. Cordella, A. Martin, M. Shaikh S. Smithson, 2011, *Management and innovation of e-business,* London School of Economics and Political Science
3. Kenneth C. Laudon, Jane p. Laudon 2012: *Management information System: Managing the Digital Firm,* 12th ed, Pearson/Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	**10**	**5**	**5**	**5**	**5**	**70**

C- Case Discussion/Presentation; HA - Home Assignment; V- Viva; CT - Class Test; A - Attendance; EE - End Semester Examination

CO, PO and PSO mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	-	-	-	-		3		1	-	-
CO2	1	-	2	-	-	-	-		2		1	-	-
CO3	1	-	1	-	-	-	-		3		1		-
CO4	1	-	3	3	-	-	-		2		1		-

1: strongly related, 2: moderately related and 3: weakly related

MWP4437	PROJECT-II	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Under this, it is usual to give the student some discretion in the choice of topic for the dissertation and the approach to be adopted. The dissertation topic is related to the field of specialization. Deciding this is often the most difficult part of the dissertation process, and requires thorough preparation and background research.

The aim of the dissertation is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.

Course Objectives

The objective of this course is to

1. Understand and apply theoretical frameworks to the chosen area of study.
2. Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently**.**

Course Outcomes

On completion of Dissertation, the students will be able to

CO1: Describe a relevant area of career development, career coaching, coaching or work-related learning studies.

CO2: Identify research methods and state research questions.

CO3: Critically analyze and evaluate the knowledge and understanding in relation to the agreed area of study.

CO4: Integrate theory and practice for the development of responses on the basis of the evaluation and analysis undertaken.

CO5: Communicate in written form by integrating, analyzing and applying key texts and practices.

CO6: Demonstrate advanced critical research skills in relation to career development or work-related learning studies.

Planning the dissertation	**Blooms level***	**Number of hours**
• Selecting a topic for investigation. • Establishing the precise focus of the study by deciding on the	L1, L2 ,L3,L4,L5,L6	6hours a Week

aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility. • Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation • Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Modes of Evaluation: Viva/ Report Examination

Examination Scheme:

Components	Content & Layout of Report	Conceptual Framework	Objectives & Methodology	Implications & Conclusions	Viva-Voce
Weightage	30	10	15	15	30

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	1	--	--	--	1	--
CO2	--	1	--	--	--	--	--	--	--	--	--	1	--
CO3	--	1	2	--	--	--	--	--	--	--	--	1	--
CO4	1	--	--	--	--	--	--	--	--	--	--	1	--
CO5	--	--	--	--	--	--	1	--	--	--	--	1	2
CO6	--	--	--	--	--	--	--	--	1	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

Specialization in Marketing – Elective Subjects (Any 2)

MWP 4413	RETAIL MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Catalog

The course will primarily concentrate on retail stores along with web and catalog-based businesses. The course is designed to prepare students for positions in the FMCG/Pharmaceutical/Electronics/Consumer Durable/Fashion/Apparel retail businesses or positions in the real estate companies with additional interest in mall management. The course also benefits students interested in starting their own entrepreneurial retail operation. Additionally, this course aims at familiarizing students with emergence of malls as a new format of market with emphasis on mall management principles and practices.

Course Objectives

The objectives of this course are to:

1. Develop fundamental competencies in retail management.
2. Provide the students exposure to understanding of retail strategy, retail operations management, innovation in retail, and the key issues impacting growth in retail firms.
3. Exploring careers in a retailing firm.
4. Help students in selling products or services to retailers, private equity investment in retailers, retail consulting or analysis.
5. Understand key issues retail supply chain management, store operations, merchandising and procurement management, customer segmentation/management and Mall management

Course Outcome

On completion of this course, the students will be able to:

CO1: Identify the concept of organized and unorganized retail, retail formats, store layout, category management.

CO2: Explain application of different retail strategies in retail firms.

CO3: Identify and analyze retail operations, merchandise planning, and trade area analysis.

CO4: State and prepare theories of retail development and business models in retail.

CO5:Identify strategies related to innovative retail startups; build the retail value chain and evaluating merchandise performance.

Modules	Blooms Level*	Number of hours
Module I-Introduction to Retailing Introduction, Meaning of Retailing, Economic Significance of Retailing,	L1, L2	8

Retailing Management Decision Process, Product Retailing vs. Service Retailing, Types of Retailers, Indian vs. Global Scenario, Difference between organized and unorganized retailing, Issues and challenges of retailing in India.		
Module II: Store Planning, Design and Layout **Store Planning**- Introduction, Types of Retail Stores Location, Factors Affecting Retail Location Decisions, Country/Region Analysis, Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies **Store Design-** Atmospherics, Retailing Image Mix, Space mix **Store Layout**- Effective retail space management based on Store Layout	L1, L2	9
Module III- Retail Merchandise Management **Retail Merchandising**: Introduction, Understanding Merchandising Management, Activities of a Merchandiser, Retail Merchandising Management Process **Private Branding in Retail-**Introduction, Difference between a Store/Private Brand and a National Brand, Growth Drivers of Private Label, Advantages of Private Label, Disadvantages of Private Label	L1, L2	10
Module IV: Store Operations POS (Point of Sale) / Cash process, Customer service and accommodation, Retail selling process, Retail floor and shelf management, Retail accounting and cash management, Merchandise and category management. Visual merchandising and displays, Retail technology and retail automation, POS and Back-end Technologies.	L1, L2	9

***Bloom's Level:**
L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Text Book

- Michael Levy, Barton A Weitz and Ajay Pandit, (2008), Retailing Management, Tata McGraw Hill

Reference Books

1. Swapna Pradhan, (2015), Retailing Management: Text and Cases, McGraw Hill Education.
2. R Vedamani&Gibbson, (2008), Retail Management: Functional Principals and Practices, Jaico publications.
3. Patrick M. Dunne & Robert F Lusch, (2002), Retail Management, Cengage Learning.
4. Berry Berman & Joel R. Evans, (2009), Retail Management – A Strategic Approach, Pearson Education.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	1	1	1	2	--	1	1	--	--
CO2	1	1	--	3	1	1	1	2	--	1	1	--	--
CO3	1	1	--	3	1	1	1	2	--	1	1	--	--
CO4	1	1	--	2	1	1	1	2	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4414	**DIGITAL MARKETING**	L	T	P	C
Version 1.1	Latest Approved	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Students will learn the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand. The course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

Course Objectives
The objectives of this course are to:

1. To understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy.
2. Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media.
3. Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan.
4. Learn how to measure digital marketing efforts and calculate ROI.
5. Explore the latest digital ad technologies.

Course Outcomes
On completion of this course, the students will be able to:

CO1: Gain knowledge about digital marketing strategy and planning.
CO2: Create and/or improve a strategy for measuring and improving digital media effectiveness
CO3: Examine online advertising including ad networks and behavioral targeting.
CO4: Devise Emerging trends in digital marketing.
CO5: Analyze how to create search engine optimization strategy for own business.

Modules	Blooms Level*	Number of hours
Module 1: Introduction to Digital Marketing: Understanding Digital Marketing, Importance of Digital Marketing. Difference between traditional and digital marketing. Understanding Digital Marketing Process; Digital Marketing Planning and Strategy. **Website Planning and Creation:** Understanding websites; Understanding domain names & domain extensions; Web server & web hosting, Different types of web servers; Different types of websites; Planning & Conceptualizing a Website; Building website using CMS in Class.	L1, L2, L3	10
Module 2: Digital Advertising (PPC, Digital Display and YouTube): Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing. Concept of Online Advertising. Types of Online Advertising, Display Advertising, Contextual advertising, Payment models and bidding strategies for online advertising, Different Online advertising platforms. Pay per click advertising.	L1, L2, L3	9
Module 3: Search Engine Optimization (SEO): Introduction to Search Engine Optimization, History and Growth of SEO, Functions of search engines. Concept of search engine result page. Understanding keywords; On page optimization; Off Page optimization; Creating SEO Strategy for your business. Keywords, Google Adwords.	L1, L2, L3, L6	9
Module 4: Emerging trends in Digital Marketing: Affiliate Marketing; Email Marketing, Social Media Marketing- Face book marketing, LinkedIn Marketing, Twitter Marketing, Video Marketing and VIDEO & AUDIO (PODCASTING) marketing; and Mobile Web Marketing and Content Marketing.	L1, L2, L3, L4, L6	8

Bloom's Level*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Text Book

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.

Reference Books

1. The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
2. The Beginner's Guide to Digital Marketing (2015). Digital Marketer. Pulizzi,J.(2014) Epic Content Marketing, Mcgraw Hill Education.
3. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
4. Ryan, D. (2014). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited.
5. Digital Marketing, VandanaAhuja, Oxford Publication.
6. Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
7. Social Media for Business – Stories of Indian Brands, By Sorav Jain
8. Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	1	1	--	1	1	--	1	1	--	--
CO2	1	--	--	1	1	--	1	1	--	1	1	--	--
CO3	1	--	--	1	1	--	1	1	--	1	1	--	--
CO4	1	--	--	1	1	--	1	1	--	1	1	--	--
C05	1	--	--	1	1	--	1	1	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP 4415	Strategic Brand Management	L	T	P	C
Course Code		3	1	0	4
Pre-requisites/Exposure	Basic Marketing concepts				
Co-requisites	NA				

Catalog Description

This course will give and in-depth understanding of the development and management of brands. It traces and highlights the intricacies involved in balancing both brand and company strategic objectives. Students will be introduced to the meanings of new brands, why some new brands fail and others succeed, and the problems faced by marketers during the various stages of the development process. Finally, concepts and theories on branding, such as the naming of new brands, brand awareness, brand personality, brand loyalty, and how to build brand equity, will be discussed.

Course Objectives

The objectives of this course are to:

1. Introduce students to fundamental concepts and principles of product and brand Management.
2. Provide the students knowledge about different tools which are available to help managers measure and visualize their brand positions to aid with strategic planning.
3. Explain product and branding strategies which can be applied in the decision making framework and to analyze branding techniques and extension strategies.
4. Provide different concept of strategic branding process, brand equity, identity, personality, etc for effective application in real life business environment.
5. Explain the best practices for brand valuation. It will also discuss how brand portfolio strategy and brand architecture increases the value of a firm's brands.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Define the key components of brand and related concepts involved in formulating both competitive and corporate strategies to enhance brand equity.

CO2: Design branding strategies, tools and techniques to business opportunities and problems.

CO3: Interpret strategically and confidently in making branding decisions..

CO4: Apply practical skills in designing branding strategies, brand portfolio, brand elements, communications etc.

CO5: Analyze different conditions that a firm should pursue a global branding strategy against portfolio of local brands

Modules	Blooms level*	Number of hours
Module I: Product Strategy Development Elements of Product Strategy, Product Mix and Line decisions. Positioning Strategy, Product Strategy over Life Cycle, New Product Development Process	L1, L2,L3	8
Module II: Introduction to Strategic Brand Management Concept of branding, the challenges faced by brand managers, the value of a brand to customers and the organization, Branding Challenges & Opportunities, Strategic Brand Management Process, Brand & Line Extensions, Marketing Mix for Brand Extensions, Co – Branding. Upward and Downward stretching of brands.	L1, L2,L3,L4	8
Module III: Elements to build Effective Brands Criteria to choose brand elements, Creation of brand personality, brand personality scale, brand image sources, Brand identity dimensions	L1, L2,L3,L4	12
Module IV: Managing the Brand Systems The brand equity concept, Brand Equity Models – Customer Based Brand Equity, Aaker Model, Brand hierarchy Brand Awareness, Brand Loyalty, Brand Associations, Brand Recognition, Recall. Brand Architecture.	L1,L2,L3,L4,L5	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

1. Keller K.L., Parameswaran, Jacob (2011), Strategic Brand Management: Building, Measuring, and Managing Brand Equity, 3rd edition, Prentice Hall.

Reference Book:

1. Kirti Dutta. (2012), Brand Management: Principles and Practices, Oxford Publication.
2. Sengupta S. (2010), Brand Positioning, Tata McGraw-Hill
3. Kapferer J. L. (1994), Strategic Brand Management, Free Press

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	1	--	--	1	1	1	1	1	--	--
CO2	1	--	--	1	--	--	1	1	1	1	1	--	--
CO3	1	--	--	1	--	--	1	1	1	1	1	--	--
CO4	1	--	--	1	2	--	1	1	1	2	1	--	--
C05	1	--	1	2	2	--	1	1	1	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4416	CUSTOMER RELATIONSHIP MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course examines customer relationship management (CRM) and its application in marketing, sales, and service. Effective CRM strategies help companies align business process with customer centric strategies using people, technology, and knowledge. Companies strive to use CRM to optimize the identification, acquisition, growth and retention of desired customers to gain competitive advantage and maximize profit. Anyone interested in working with customers and CRM technology and would like to be responsible for the development of any major aspect of CRM will find this course beneficial. Emphasis is given on both conceptual knowledge and hands-on learning using a leading CRM software.

Course Objective

The objective of this course is to:

1. Equip the students with elementary knowledge about customer relationship management and its applicability in different sectors of business as well as consumer market.
2. To provide knowledge about identification, acquisition, retention of customers to maximize profit.
3. To enhance student's knowledge about CRM process, practices in business economy and update with technological tools & techniques.
4. To provide in-depth understanding of CRM implementation in various sectors such as, banking, retail, insurance, airlines etc.

Course Outcomes

After completing this course students will be able to:

CO1: State the concepts and benefits of CRM and the competitive advantages it provides to organizations.

CO2: Interpret how technology can be leveraged to enhance CRM initiatives and can have exposure to best CRM practices in different sectors.

CO3: Describe the utilization of emerging technology in managing customer relationships.

CO4: Design a roadmap to develop CRM to and understand the role of CRM process in diverse organizations.

CO5: Explain customer profiling and its market implications and would learn the need of data mining & its business value.

Modules	Blooms * Level	Number of hours
Module I **Customer Relationship Management**- Introduction, Meaning and Definition of CRM, Importance of CRM, Concept and Growth of Relationship Marketing, Scope of Relationship Marketing, Concept of Lifetime Customer and Customer Loyalty, Benefits and difficulties of CRM.	L1, L2	7
Module II **CRM Process and Implementation** - Introduction, Customer Development Process, Customer Retention, Customer satisfaction, Importance of customer retention, Customer Retention Strategies, Customer Life Time Value, Types of Relationship Management, CRM process for B2B markets.	L1, L2	9
Module III **Technological Support in CRM** - Introduction, Technological Applications in CRM, Types of Technological Applications in CRM, Customer Databases and Information Systems, Database Marketing Strategies, CRM Software Solutions for B2C and B2B Markets, Accounting Systems for Customer Acquisition and Retention Costs, Customer Loyalty and Profitability through Technology. .	L1, L2, L3, L4, L5	12
Module IV: **e-CRM – Emerging Trend in CRM** - Introduction, Importance of e-CRM in Service Marketing, Challenges involved in formulating and implementing e-CRM strategies, e-CRM architecture and its components, Five engines of e-CRM, Evolution of e-customer and e-marketing, e-CRM for personalized services.	L1, L2, L3	8

***Bloom's Level:**
L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Text Books

1. G Shainesh& Jagdish N Sheth, (2006) Customer Relationship Management-A Strategic Approach, Macmillan India, New Delhi.
2. Alok Kumar, Chhabi Sinha, Rakesh Sharma (2009) Customer Relationship Management – Concepts and Application, Biztantra.
3. Zikmund. Customer Relationship Management, Wiley 2012.

References Books

1. Jill Dyche (2006) The CRM Hand book (2006) Pearson Education.
2. Judith W.Kincaid (2007) Customer Relationship Management- Getting it Right, Pearson Education.
3. Ronald S (2001), Accelerating Customer Relationships, Swift, PHI.
4. S.Shajahan (2009) Relationship Marketing, Tata McGraw Hill.
5. Alok Kumar Rai (2009) Customer relationship Management Concepts and Cases, PHI.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	1	--	--	--	1	1	1	1	--	2
CO2	1	2	--	1	--	--	--	1	1	1	1	--	2
CO3	1	--	--	2	--	--	--	2	1	1	1	--	2
CO4	1	2	--	2	--	--	--	1	1	1	1	--	2
C05	1	--	--	2	--	--	--	3	1	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

MWP4417	Fintech	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

The objectives of this course are to understand the basic concept of Fin Tech and its major areas including Money and Payment, Digital Finance and Alternative Finance. Major technological trends, including crypto currencies, Block chain, AI and Big Data. FinTech Regulation and RegTech. The subjects also dive into the fundamental role of Data and Security in data-driven finance. Business and regulatory implications of technology for the financial industry. Ways to analyze and evaluate what is driving technology innovation in Finance.

Course Outcomes

On completion of this course, the students will be able to:

CO1: To understand the role of Fin tech in banking and finance industry
CO2: To understand the role of technology Is playing in revolutionizing the banking and finance sector.
CO3: To understand different types of upcoming digital tools impacting the banking and finance sector.

Modules	Blooms Level*	Number of hours
Module 1: FinTech: Introduction Transformation – FinTech Evolution: Infrastructure, Banks Startups and Emerging Markets - Collaboration between Financial Institutions and Startups –Introduction to Regulation Industry - The Future of RegTech and other Technologies Impacting it.	L1, L2, L3	10
Module 2: Payments, Crypto currencies and Blockchain Introduction - Individual Payments –Digital Financial Services –	L1, L2, L3	9

Mobile Money – Regulation of Mobile Money – SFMS - RTGS - NEFT –NDS Systems – Crypto currencies —What is Blockchain? – The Benefits from New Payment Stacks		
Module 3: Digital Finance and Alternative Finance Introduction – Brief History of Financial Innovation – Digitization of Financial Services - FinTech & Funds- Crowd funding– Regards, Charity and Equity - P2P and Marketplace Lending – New Models and New Products - What is an ICO	L1, L2, L3, L6	9
Module 4: Data & Tech Introduction - History of Data Regulation – Data in Financial Services – Application of Data Analytics in Finance - Methods of Data Protection: GDPR Compliance and Personal Privacy – How AI is Transforming the Future of FinTech – Digital Identity – Change in mindset: Regulation 1.0 to 2.0 (KYC to KYD) - AI & Governance – New Challenges of AI and Machine The Future of Data-Driven Finance - Case Studies	L1, L2, L3, L4, L6	8

Bloom's Level*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Text Book

1. Agustin Rubini, "Fintech in a Flash: Financial Technology Made Easy", Zaccheus, 3rd Edition, 2018

2. Susanne Chishti and Janos Barberis, "The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries", John Wiley, 1st Edition, 2016

Reference Books

1. Theo Lynn, John G. Mooney, Pierangelo Rosati, Mark Cummins, "Disrupting Finance: FinTech and Strategy in the 21st Century", Palgrave, 1st edition, 2018
2. Abdul Rafay, "FinTech as a Disruptive Technology for Financial Institutions", IGI Global, January, 2019
3. Bernardo Nicoletti , The Future of FinTech: Integrating Finance and Technology in Financial Services, Palgrave Macmillan, August, 2018

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	1	1	--	1	1	--	1	1	--	--
CO2	1	--	--	1	1	--	1	1	--	1	1	--	--
CO3	1	--	--	1	1	--	1	1	--	1	1	--	--
CO4	1	--	--	1	1	--	1	1	--	1	1	--	--
C05	1	--	--	1	1	--	1	1	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4419	Private Equity & Entrepreneurial Finance	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives
The objectives of this course are to understand the different sources of finance available for new ventures as well as entrepreneurs in India. The course will help the student to understand various financial opportunities available at different stages of business.

Course Outcomes
On completion of this course, the students will be able to:

CO 1: Understand the importance of financial management and managing a new venture.
CO 2: Analyze the various sources of investment and also know the support provided by the state and central government for entrepreneurship.
CO 3: Determine the various financial support schemes provided different institutions to the entrepreneurs.

Modules	Blooms Level*	Number of hours
Module 1: Financing and Managing New Venture Importance of Financial Management as an integral part of Entrepreneurship -Conducting a feasibility analysis - What lenders and investors look for in a business plan.	L1, L2, L3	10
Module 2: Sources of Finance Various sources of Investment Basics of Venture Capital and Angel Investment - Start-up Culture - Various measures of encouragement and support being provided by the State and Central Government for strengthening the Entrepreneurial Culture	L1, L2, L3	9
Module 3: Institutional Financial Support Schemes and functions of rate of Industries - District Industries Centres (DICs) - Industrial Development Corporation (IDC) - State Financial Corporation (SFCs)	L1, L2, L3, L6	8
Module 4: Financial support to small scale Industries Small Scale Industries Development Corporations (SSIDCs) -Khadi and Village Industries Commission (KVIC) - Technical Consultancy	L1, L2, L3, L4, L6	10

Organisation (TCO) - Small Industries Service Institute (SISI) - National Small Industries Corporation (NSIC) - Small Industries Development Bank of India (SIDBI).		

Bloom's Level*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Text Book

1. Vasant Desai Dynamics of Entrepreneurial Development and Management 5th Himalaya Publishing House 2009
2. Lall, Madhurima, and ShikhaSahai Entrepreneurship 1st Excel Book 2008
3. Charantimath, Poornima Entrepreneurship Development and Small Business Enterprises 2nd Pearson Education 2012
4. ArunaKaulgud Entrepreneurship Management 1st Vikas publishing house 2009
   Reference Books

Reference Books

1 Robert Hisrich,& Michael Peters Entrepreneurship 1st Tata Mc-Graw – Hill, New Delhi 2009

2 Dollinger Entrepreneurship 1st Pearson 2009

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	1	1	--	1	1	--	1	1	--	--
CO2	1	--	--	1	1	--	1	1	--	1	1	--	--
CO3	1	--	--	1	1	--	1	1	--	1	1	--	--
CO4	1	--	--	1	1	--	1	1	--	1	1	--	--
C05	1	--	--	1	1	--	1	1	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP 4406	**STRATEGIC FINANCIAL MANAGEMENT**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Strategic financial management is the study of finance with a long term view considering the strategic goals of the enterprise. Financial management is nowadays increasingly referred to as "Strategic Financial Management" so as to give it an increased frame of reference. It has the role to establish that the organization will finance its operations to achieve each milestone and maximize its profits.

Course Objectives

The objective of this course is to:

1. Provide insight knowledge of strategic financial management in the area of finance domain.
2. Understand the value chain analysis and shareholders' value analysis.
3. Know the Strategic cost analysis and corporate restructuring.
4. Understand valuation of business enterprise.

Course Outcomes

On completion of this course, the students will be able to:

CO1 : Understand the role of strategy in the area of business finance

CO2 : Assess the various tools of value chain analysis, cost analysis and business accounting

CO3 : Evaluate the need for corporate restructuring and its strategies

CO4 : Develop the ability to carry out the valuation of business units and brands.

Modules	Blooms level*	Number of hours
Module I Strategic Financial Management Strategy and the Strategist The 'Nine References' for Strategic Financial Management Strategic Investigation of Growth on Profit-Leakages (A qualitative assessment), Risk analysis in capital budgeting, Types of risk and project appraisal, Certainty equivalent and risk adjusted discount rate approaches, Sensitivity analysis, Scenario analysis	L1,L2	9
Module II Strategic Cost Analysis Discussion on the Case-Problem	L1, L2, L4, L6	9

Cost Profit-Sales Analysis Using a Product/Project as Profit Centre Ratios, Strategic Business Units (SBU'S) Activity Based Costing (ABC) and objective Based Costing (OBC) Economic Value Added Owners Value Added (OVA)		
Module III Financial Aspects of Corporate Restructuring, Types of Restructuring, M&A process and structure, Types of mergers, Drivers of M&A, Merger payoffs, M&A and share price behaviour, Corporate acquisitions, Corporate divestitures, Equity carve outs, Spin offs and leverage buy outs, Financial restructuring, Corporate Turnarounds, Valuation issues in M&A	L1, L2, L3,L4, L5, L6	9
Module IV Valuation Valuation of a Business Enterprise Approaches to Enterprise Valuation Based on Various Objectives Realisable Value Vs Replacement Cost Realisable Value Valuation of the Company's Intrinsic Strength Important Conclusion The Components of Business Valuation Brand Valuation Various Methods of Brand Valuation	L1, L2,L3,L4,L6	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation*

Text Book:

1. Jakhotiya G P Strategic Financial Management Vikas Publishing House, 2004

Reference Book:

1. Khan, M.Y. & Jain, P.K., Basic Financial Management, Tata Macgraw Hill, ND, 2002
2. Brealey, R.A. & Myers, S.C., Principles of Corporate Finance, Tata Macgraw Hill, ND, 2002
3. Khan, M.Y., India Financial Services, Tata Macgraw Hill, ND, 2002
4. Damodaran, A, Applied Corporate Finance, Wiley, latest Edition
5. Khan, M.Y. and Jain P.K., Financial Management, Tata McGraw-Hill, Latest Edition.
6. Hiller, D. Grinblatt, M. and Titman, S , Financial Markets and Corporate Strategy, McGraw- Hill, 2nd Edition, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CAP**	**Q /S** Khan, M.Y. and Jain P.K., Financial	**A**	**ME**	**EE**

		Management, Tata McGraw-Hill, Latest Edition..			
Weightage (%)	10	5	5	10	70

CPA: Case Discussion/ Presentation/ Analysis, Q/S : Quiz / Seminar, A : Attendance, ME : Mid-term Examination, EE: End semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	--	--	--	2	--	2	1	2	1	--
CO2	1	1	--	--	--	2	--	2	1	2	1	--
CO3	1	1	--	--	--	2	--	2	1	2	1	--
CO4	1	1	--	--	--	2	--	2	1	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

Specialization in Human Resource Management: Any 2

MWP4420	INTERNATIONAL HUMAN RESOURCE MANAGEMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is designed to provide students with an understanding of three interrelated aspects of managing in the global workplace.General human resource management (HRM) in the multinational enterprise. Engaging in and supporting global mobility. Building awareness of present and emerging international human resource management trends. The course places equal value on building students' understanding of the theoretical foundations and practical implications of working in aglobal HRM environment.

Course Objectives

The main objective of this course is to:

1. Inculcate deep understanding of the concepts of International Human Resource and to explore the dynamics of global businessdevelopment.
2. It also aims at preparing students about examining significant business opportunities and maximization of returns with understanding of cross culturalmanagement,
3. Understanding of the essential differences in managing human Resources, at all levels in foreign environment.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Identify the concepts, functions and processes of international human resource management

CO2: Describe the various complexities in international HRM like designing expatriate assignments and assignee compensation packages.

CO3: Explain the current issues in International HRM.

Modules	Blooms Level*	Number of hours

Module I: Human Resource in a comparative perspective Domestic HRM, International HRM, Differences between domestic and international HRM, Perspectives of international HRM: Ethnocentric, Polycentric, Regio centric, Geocentric, International Human Resource Management – Competencies for Global Manager.	L1, L2	8
Module II: International HRP, Recruitment and Selection Organization Structure in multinational organizations, Global Human Resource Planning, Issues in Supply of International Human Resources, Recruitment and Selection, Demographic shifts in the workforce and its affects on demand and supply of human resource, Models of IHRM-PCNs, HCNs, TCNs, How to structure expatriate assignments, Who is and who is not an expatriate, Role of expatriates and non-expatriates, Repatriation.	L1, L2	10
Module III: Structuring international compensation Complexities, Objectives of International Compensation Management, Component and Structure of International Compensation Package, Taxation methods- Tax equalization, tax protection, Mirror payroll, Protecting expatriates' salary against exchange rate fluctuations, Split pay concept.	L2,L3	10
Module IV: Managing globally diverse workforce Managing people in international context, Determinants of cultural identity, Frameworks for mapping the culture, Geert Hoefstede, Clyde Cluckhohn, TE Hall, FonsTrompenaars, Industrial relations in international context	L1,L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3 Application;L4:Analysis; L5:Synthesis,L6:Evaluation*

Suggested Readings:

1. Dowling P.J, Festing M and Engle A.D (2012), International Human Resource Management (7th edition), Cengage.
2. Rao T V (2010), Performance Management and Appraisal Systems-HR Tools for Global Competitiveness, Sagepublications
3. Vance C.M and Paik. Y. Managing a Global Workforce: Challenges and Opportunities in International HRM (2nd Edition) Prentice Hall India.
4. Sharma, Radha, 2002, 360 degree feedback, competency mapping and assessment centres,TMH.

Components	A	CT	Q/S/V	HA	EE
Weightage (%)	5	10	10	5	70

Modes of Evaluation: Quiz/Assignment Seminar/Written Examination

Examination Scheme:

A: Attendance, CT: Class test, Q/S/V: Quiz, Seminar, Viva, HA: Home assignment, EE: End term examinations

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	1	--	1
CO2	-	1	-	-	-	-	-	-	-	-	1	--	1
CO3	1	1	-	-	-	-	-	-	-	-	1	--	1
CO4	1	-	1	-	-	-	-	-	-	-	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

MWP4421	LEADERSHIP DEVELOPMENT	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course sets the tone regarding leadership. It will help students reflect upon their own leadership styles and identify the areas that they need to work on to go ahead and become leaders who can transform organizations. The course will help develop understanding of the concepts and challenges in the process of becoming a transformational leader who understands his followers and carves each of them into a leader in himself/herself.

Course objectives

1. The objectives of this course areto:
2. Develop fundamental competencies of leadership.
3. Develop relevant skills, maintain self awareness, compensate for weakness, planning and operations.
4. Clarify roles, monitoring performance, coaching and mentoring, team building, vision, encourage innovation.

Course Outcomes:

On completion of this course, students will be able to

CO1:Identify a comprehensive set of skills like time management, meeting management, agenda setting, group dynamics and team building.
CO2: Explain how to develop relationships, manage conflicts and work across cross-cultural differences.
CO3: Identify and reflect on their personal leadership styles/behavior and enable themselves eventually to emerge as transformation leaders for their organization.

Modules	Blooms level*	Number of hours
Module I: The leader The leader personality, Leadership concept, Interaction between the Leader, the Followers, and the Situation, Overview of Major Approaches, Perspectives on Effective Leadership Behavior – Ohio State Leadership and Michigan Leadership Studies, Leadership Traits and Skills - Findings in Early Research, Specific Traits Related to Leadership Effectiveness – Personality, Intelligence, and Emotional Intelligence, conception of power	L1, L2	10

and authority		
Module II: The situation Nature of leadership -Management, Situational aspects of leadership, Contingency Theories of Leadership – Normative Decision Model, Situational Leadership Model, Contingency Model-LPC, Path-Goal Theory, Participative Leadership, Delegation, and Empowerment - Decision Procedures of Managers, Self-concept theory of Charismatic and Transformational Leadership, Impression Management.	L1, L2	10
Module III: Leading teams Leading teams- functional teams, cross functional teams, self-managed work teams, taking decision in teams, leadership functions in meetings, leading a diverse workforce, ethical leadership, gender and leadership, leading in different cultures and managing diversity.	L1, L2	8
Module IV: The road ahead Leading through change and uncertainty, creating psychological safety in stressful times, how to build leadership brand in current times, embracing the discomfort of not knowing.	L1,L2	8

***Bloom's Level:**
L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Suggested Readings:

1. **Gary Yukl, (2003), Leadership in Organizations, Fifth Edition, Pearson Education, Inc.**
2. **Hughes, R.L,Ginett, R.C &Curphy, G.J (2006), Leadership – Enhancing the Lessons of Experience, Tata McGraw-Hill**

Examination Scheme

Components	A	CT	Q/S/V	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class test, Q/S/V: Quiz, Seminar, Viva, HA: Home assignment, EE: End term examinations

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	1	2		2		1	1	2		1	1	-	
CO2	1		1	2	2	1	1	2		2	2	-	
CO3	1	1	2	2	2	2	2	2		1	1	-	
CO4	1	2			2	1	1	1		1	1	-	

1: strongly related, 2: moderately related and 3: weakly related

MWP 4422	Strategic Human Resource Management	L	T	P	C
Version 1.1	Latest approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:
This module will discuss the concept of strategic Human resource management. The concept will place previous studies of Human Resource Management within a strategic, dimension. It will illustrate the concept of competitive advantage applied to human resources with the help of Strategic Human Resource management.

Course Objectives:
The objective of this course is to:
1. Identify ways that HR management operates as a strategic business partner in today's business organizations.
2. Develop means to evaluate human resources and the effectiveness of HR practices
3. Develop HR strategies to compete internationally

Course Outcomes
On completion of this course, the students will be able to
CO1: Describe the concept of Strategic HRM and Integration HR strategies with business strategies.
CO2: Discuss the strategies for employee shortages and surplus.
CO3: Discuss the strategies training and development, Performance Management and strategies of Retrenchment.
CO4: Judge the application of concepts in different situations.

Modules	Blooms level*	Number of hours
Module I: Introduction to Strategic HRM • Business strategy and organizational capability • Introduction to business and corporate strategies - Integrating HR strategies with business strategies – Developing HR plans and policies, Best fit approach vs Best practice approach, • Strategic planning in SBUs , • HR strategy in Multinational and Transnational companies. Technology and structure, • Workforce diversity,	L1, L2	12

• Demographic changes, • Global sourcing of labour - WTO and labour standards		
Module II: Recruitment, retention and Training and Development strategies • Strategies for employee shortages and surplus, • efficient utilization of human resources, • Recruitment process outsourcing, • Flexi timing , Quality of work life Work – life balance , Employee empowerment , Employee involvement , Autonomous work teams. • Creating learning organization - Competency mapping – Multi-skilling – Succession planning - Cross cultural training	L1, L2	12
Module III: Performance Management and Retrenchment strategies • Defining key result areas (KRA) - Result based performance - Linking performance to pay - Merit based promotions, Reward and Compensation Strategies • Performance based pay , Skill based pay , Team based pay ,Broad banding, Profit sharing,- Executive compensation , Variable pay • Downsizing - Voluntary retirement schemes (VRS), • HR Outsourcing , Early retirement plans, Project based employment.	L1,L2	12
Module IV: Behavioural issues in strategic implementation – • Matching culture with strategy • Human side of mergers and acquisitions - Leadership, power and politics • Employee morale, Personal values and business ethics • Global environment of HR: Change and diversity. • Competencies of HR Professional in a SHRM Scenario • Evaluating the Effectiveness of SHRM	L1, L2	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Book:

Mello Jeffrey, 2006, Strategic Human Resource Management, Thomson Learning

Reference Books:

1. Human Resource Management- Garry desseler, PHI, New Delhi 12th edition,
2. Agarwal, Tanuja, Strategic Human Resource Management,
3. Armstrong Michael, Strategic Human Resource Managemet, 2008
4. Greer Charles, Strategic Human Resource Management,Pearson education Asia New Delhi, 2006
5. Robbins, Stephen. P. Management, PHI, New Delhi, 2010
6. UdaiPareek, 2000, Understanding OrganisationalBehaviour, Oxford University Press.
7. Monappa, Arun, Managing human resources - Delhi: Macmillan, latest edition

8. Mejia, Luis R G,Managing human resource,4th, Pearson Education,New Delhi,2006
9. Beck, Robert C, Motivation theories and principles, Pearson Education,New Delhi, 5th

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	-	-	-	-	2	2	-	1	-	-
CO2	1	1	-	-	-	-	2-	2	-	1	-	-
CO3	1	1	-	-	-	-	2	2	-	1	-	-
CO4	1	1	-	-	-	-	2	2	-	1	-	-
CO5	1	1	-	-	-	-	2	2	-	1	-	-
CO6	1	1	-	-	-	-	-	-	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

MWP4423 Talent Management and Succession Planning	L	T	P	C
Version 1.1 Latest Approved	3	0	0	3
Pre-requisites/Exposure				
Co-requisites				

Catalog Description

In this course a clear understanding of the concepts of recruitment, selection, retention and development of human capital from the perspective of organizational excellence is discussed. The importance of Talent Acquisition, and management from the perspective of competitive business environment is understood and explained.

Course Objectives

The objective of this course is to

1. The objective of this course is to understand the concept and process of Talent Acquisition, and management .
2. To understated strategies for employee retention, and employee engagement in modern organizations**.**
3. To understand the concept ofGroup dynamics, managing differences at workplace and effective communication.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain Talent acquisition and retention in organizations.

CO2**:** Interpret and explain process of recruitment and selection, its traditional and modern methods and talent hunt at local and global level.

CO3: Describe the basics of Absenteeism and Turnover, Retention Management Process, in the organizations.

CO4: Discuss process and evaluation of Competency mapping and Succession planning.

Modules	Blooms level*	Number of hours
Module I: Talent Management and Competency Mapping • Meaning and significance of talent management - attracting talent, retaining talent, right sizing the workforce, • work life balance initiatives, providing HR leadership to business. • Developing and Using Application Forms: The Application Blank, Information Technology and HR: Recruiting on the Internet, Global Talent Search, Selection Process, Basic Selection Model:	L1, L2	12

The Decision Theory Approach, Basic Testing Concepts and Interviewing Candidates		
Module II: Performance Management and Competency Mapping • Performance management and employee development: 360 degree feedback as a developmental tool, performance management & reward systems: performance linked remuneration system, performance linked career planning & promotion policy. • Competency Mapping: Features of competency methods, approaches to mapping and case studies in competency mapping – • Competency mapping procedures and steps- business strategies - methods of data collection for mapping – • Developing competency models from raw data- data recording, analyzing the data, content analysis of verbal expression, validating the competency models.	L1, L2	12
Module III: Retention Management and employee engagement • Basics of Absenteeism, Turnover, Attrition and Retention of HR, • Importance of retention, • Retention Determinants, Retention Management Process, Retention interventions • Employee engagement- meaning and significance, constituents of engagement, conceptual framework of engagement, behaviors associated with engaged employees, engaged, not engaged, actively disengaged, • parameters to measure employee engagement, Q 12 model of Gallup, employee satisfaction survey .	L1, L2	12
Module IV: Succession planning: • Identifying managerial positions which are critical for the business – • Identifying second line of leaders and developing their capabilities to occupy the critical positions in the event of the exit of current incumbents – • Taking-up lateral hiring when there is discontinuity in the succession plans.	L1,L2,	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books:

Talent Management And Succession Planning, Cannon, James;Rita McGee, Chartered Institute of Personnel and Development, 2009.

Reference Books

1. Competence at work - Lyle M. Spencer, Signe M. Spencer. John Wiley 1993
2. Competency mapping, Assessment and Growth - Naik G.P, IIHRM, 2010.
3. Performance Management - Herman Aguinis, Pearson Education, 2007.
4. Talent Management Hand Book - Lance A. Berger & Dorothy R. Berger, Tata McGraw Hill.
5. Appraising and Developing Managerial Performance- Rao T. V, Excel Books
6. Performance Management - Dixit Varsha, 1/e, Vrinda Publications Ltd
7. A Handbook of Competency Mapping – Seema Sangi, Response Books, 2004
8. The Talent Management Hand Book - Lance A. Berger & Dorothy R. Berger, TMH.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

C - **Case Discussion/ Presentation;** HA - **Home Assignment;** P - **Project;** S - **Seminar;** V - **Viva;** Q - **Quiz;** CT - **Class Test;** A - **Attendance;** EE - **End Semester Examination**

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	-	-	-	2	1	-	-	1	--	-
CO2	1	1	1	-	-	-	2-	1	-	-	1	--	-
CO3	1	1	-	-	-	-	2	1	-	-	1	--	-
CO4	1	1	-	-	-	-	-2	1	-	-	1	--	-

1: strongly related, 2: moderately related and 3: weakly related

Specialization in IT and E-Commerce: Any 2

MWP4424	DATA WAREHOUSING & DATA MINING	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Every business organization is realizing the importance of data. They are harnessing the benefits offered by Data Warehouse and Data Mining as it allows them to see hidden patterns from the data and helps in framing business policies. This course emphasizes on utilizing the techniques offered by Data Warehousing and Data Mining.

Course Objectives

The aim of this course is to

1. Introduce the student to the evolution, role, function and impact of Data Warehouse and Data Mining.
2. Develop the students' ability to identify sources of information and how these can be used in the decision-making process by leveraging techniques of Data Warehouse and Data Mining.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key concepts and elements of Data Warehouse.

CO2: Decribe the evolution, role, function and impact of Data Mining.

CO3: Identify various sources of information and how it can be cleaned using data warehouse and data mining.

CO4: Apply the techniques of data mining to solve complex business problems.

Modules	Blooms level*	Number of hours
Module 1: DATA WAREHOUSING Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.	L2,L4	6
Module 2: BUSINESS ANALYSIS Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multi relational OLAP –	L2, L3	6

Categories of Tools – OLAP Tools and the Internet.		
Module 3 : DATA MINING AND TRENDS IN DATA MINING Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing,– Based Cluster Analysis – Outlier Analysis – Data Mining Applications.	L2, L4	6
Module 4: DATA MINING TECHNIQUES Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K means – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Other Classification Methods – Prediction	L2,L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5- Synthesis, L6-Evaluation

Text Books:

1. Jiawei Han, Micheline Kamber and Jian Pei"Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.
2. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.

Reference Books:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining", Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India
4. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**C1**	**V**	**A**	**CT**	**EE**
Weightage (%)	10	5	5	10	70

CPA: Case Discussion/Presentation/Analysis V: Viva A: Attendance CT: Class Test EE: End Term Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	-	-	-	-		3		1	-	-
CO2	1	-	2	-	-	-	-		2		1	-	-
CO3	1	-	1	-	-	-	-		3		1		-
CO4	1	-	3	3	-	-	-		2		1		-

1: strongly related, 2: moderately related and 3: weakly related

MWP 4426	**DIGITAL MARKETING**	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Students will learn the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand. The course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

Course Objectives
The objectives of this course are to:

6. To understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy.
7. Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media.
8. Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan.
9. Learn how to measure digital marketing efforts and calculate ROI.
10. Explore the latest digital ad technologies.

Course Outcomes
On completion of this course, the students will be able to:

CO1: Gain knowledge about digital marketing strategy and planning.
CO2: Create and/or improve a strategy for measuring and improving digital media effectiveness
CO3: Examine online advertising including ad networks and behavioral targeting.
CO4: Devise Emerging trends in digital marketing.

CO5: Analyze how to create search engine optimization strategy for own business.

Modules	Blooms Level*	Number of hours
Module 1: Introduction to Digital Marketing: Understanding Digital Marketing, Importance of Digital Marketing. Difference between traditional and digital marketing. Understanding Digital Marketing Process; Digital Marketing Planning and Strategy. **Website Planning and Creation:** Understanding websites; Understanding domain names & domain extensions; Web server & web hosting, Different types of web servers; Different types of websites; Planning & Conceptualizing a Website; Building website using CMS in Class.	L1, L2, L3	10
Module 2: Digital Advertising (PPC, Digital Display and YouTube): Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing. Concept of Online Advertising. Types of Online Advertising, Display Advertising, Contextual advertising, Payment models and bidding strategies for online advertising, Different Online advertising platforms. Pay per click advertising.	L1, L2, L3	9
Module 3: Search Engine Optimization (SEO): Introduction to Search Engine Optimization, History and Growth of SEO, Functions of search engines. Concept of search engine result page. Understanding keywords; On page optimization; Off Page optimization; Creating SEO Strategy for your business. Keywords, Google Adwords.	L1, L2, L3, L6	9
Module 4: Emerging trends in Digital Marketing: Affiliate Marketing; Email Marketing, Social Media Marketing- Face book marketing, LinkedIn Marketing, Twitter Marketing, Video Marketing and VIDEO & AUDIO (PODCASTING) marketing; and Mobile Web Marketing and Content Marketing.	L1, L2, L3, L4, L6	8

Bloom's Level*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Anaylysis; L5-Synthesis; L6-Evaluation

Text Book

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.

Reference Books

9. The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
10. The Beginner's Guide to Digital Marketing (2015). Digital Marketer. Pulizzi,J.(2014) Epic Content Marketing, Mcgraw Hill Education.
11. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
12. Ryan, D. (2014). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited.
13. Digital Marketing, VandanaAhuja, Oxford Publication.
14. Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
15. Social Media for Business – Stories of Indian Brands, By Sorav Jain
16. Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	1	1	--	1	1	--	1	1	--	--
CO2	1	--	--	1	1	--	1	1	--	1	1	--	--
CO3	1	--	--	1	1	--	1	1	--	1	1	--	--
CO4	1	--	--	1	1	--	1	1	--	1	1	--	--
C05	1	--	--	1	1	--	1	1	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4425	ERP FOR BUSINESSES	L	T	P	C
Version 1.1	Latest Approved	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In the face of intense competition and other business pressures on organizations, quality initiatives and continuous, incremental process improvement, though still essential, will no longer be sufficient. Such radical levels of change require powerful information technology tools such as ERP to facilitate the fundamental redesign of work. Students learn about the state-of-the-art techniques used in support of business process redesign.

Course Objectives

The students will be able to:

1. Grasp the concepts of enterprise resource planning
2. Have a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology
3. Integrate the ERP concepts with the organization's IT system.
4. Understand the concepts of business process reengineering.
   Develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.

Course Outcomes

On completion of this course, the students will be able to:

CO1: List and define the concepts, vies and latest methodologies of business process design.

CO2: Explain key concepts in the design and utilization of best business practices embedded in an Enterprise Resource Planning System.

CO3: Analyze the strategic options for ERP identification and adoption

CO4: Summarize the activities carried out under Business Process Reengineering.

Modules	Blooms level*	Number of hours
Module I: Introduction to ERP Overview of ERP, its importance, Evolution, ERP Packages, Advantages of ERP, and its future Functional Modules of ERP, Risks & Benefits of ERP, ERP & related technologies Integration of ERP, SCM and CRM applications	L1, L2	6

Module II: ERP Implementation Introduction, Why ERP, Reasons for Implementing ERP, Implementation Challenges ERP Implementation Life Cycle, Success & Failure Factors of an ERP Implementation ERP Package Selection and Evaluation ERP Implementation Process	L2, L3	6
Module III: Present and Future ERP and eBusiness, ERP, Internet and WWW, Future Directions and Trends in ERP	L1, L2	6
Module IV: Business Engineering and marketing of ERP BPR, ERP & IT – their linkage Business Model of ERP Marketing Dynamics & Competitive Strategy	L1, L2, L4	6
Module V: Practical aspects of ERP Introduction to ERP packages – SAP, BAAN, PeopleSoft & Open Source ERP	L1, L2, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Enterprise Resource Planning: Alexis Leon, TMH, 2nd Edition

References Book:

1. Michael Hammer and James Champy, Harper Business
2. Process Mapping: How to Reengineer Your Business Process, V. Daniel Hunt, John Wiley & Sons
3. The Essence of Business Process Reengineering, Joe Peppard and Philip Rowland, Prentice-Hall
4. Redesigning Enterprise Processes for e-Business, Omar A. El Sawy, McGraw-Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**P1**	**C1**	**CT1**	**EE**
Weightage (%)	10	10	20	60

C – Case Discussion, HA – Home assignment, CT – Class Test, S – Seminar, A: Attendance , EE: End semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**
CO1	1							1			1	
CO2	1	2						1			1	
CO3				1				1			1	
CO4	1							1			1	

1: strongly related, 2: moderately related and 3: weakly related

Specialization in Business Analytics: Any 2

MWP4428	**PREDICTIVE ANALYTICS-I MACHINE LEARNING USING R**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This course offers fundamental and applied evidence based knowledge to improve professional practice of students. It provides a detailed understanding of both supervised and unsupervised learning as it is vital for a data scientist. This course offer insight on text mining using "tidytext."

Course Objectives
The objective of this course is to:
1. Facilitate an introduction to machine learning techniques using several popular algorithms.
2. Internalize a core set of practical and effective machine learning methods and concepts, and apply them to solve some real world problems.

Course Outcomes
On completion of this course, the students will be able to:
CO1: Explain and apply a set of unsupervised learning concepts and methods, classification methods of increasing complexity (rules, trees, random forests), and associated optimization methods (gradient descent and variants)
CO2: Explain the common idioms of large-scale graph analytics, including structural query, traversals and recursive queries, PageRank, and community detection
CO3: Apply the popular algorithms of machine learning using R
CO4: Analyze and interpret the results using specific statistical tools and techniques in R.

Modules	Blooms level*	Number of hours
MODULE 1: Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection, Ridge regression, Lasso regression , Linear Discriminant Analysis , Logistic regression, Perception learning algorithm.	L1, L2,L3,L4	9
MODULE 2: Model Assessment and Selection: Bias, Variance, and model complexity, Bias-variance trade off, Optimism of the training error rate, Estimate of In-sample prediction error, Effective number of parameters, Bayesian approach and BIC, Cross- validation, Boot strap methods, conditional or expected test error.	L1, L2,L3,L4	9
MODULE 3: Additive Models, Trees and Boosting: Generalized additive models, Regression and classification trees, Boosting methods-exponential loss and AdaBoost, Numerical Optimization via gradient	L1, L2,L3,L4	9

boosting.		
MODULE 4: Neural Networks (NN), Support Vector Machines (SVM), and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, SVM for regression, K-nearest –Neighbour classifiers (Image Scene Classification) . Cross-validation and boot strap, Fitting classification and regression trees, K-nearest neighbours, Principal component analysis, K-means clustering,Web app development using R.	L1, L2,L3,L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis; L6-Evaluation*

Text and Reference Books

1. "Machine Learning Mastery with R", online Jason Brownee.
2. "Machine Learning with R,Expert techniques for predictive modeling", Brett Lantz,Pact Publication.
3. "Applied SupervisedLearning with R",Karthik Ramasubramanian and Jojo Moolayil, Pact Publication.
4. Trevor Hastie, Robert Tibshirani, Jerome Friedman , *The Elements of Statistical Learning-Data Mining, Inference, and Prediction* ,Second Edition , Springer Verlag, 2009.
5. G.James,D.Witten,T.Hastie,R.Tibshirani-*An introduction to statistical learning with applications in R*,Springer,2013.
6. E.Alpaydin, *Introduction to Machine Learning*, Prentice Hall Of India,2010

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	--	3	--	--	--	--	2	1	3	1	--	--
CO2	3	2	1	2	--	2	1	--	1	2	1	3	--
CO3	2	1	1	2	--	--	1	3	1	2	1	3	--
CO4	3	1	2	1	--	--	1	--	1	2	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4429	**PREDICTIVE ANALYTICS-II MACHINE LEARNING USING PYTHON**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course offers the specialization of Python staring with data strategy. This course covers the two core paradigms that account for most business applications of predictive modeling: classification and prediction. It also covers the use of partitioning to divide the data into training data (data used to build a model), validation data (data used to assess the performance of different models, or, in some cases, to fine tune the model) and test data (data used to predict the performance of the final model).

Course Objectives

The objective of this course is to:

1. Facilitates a good learning to students on how to make meaningful predictions for a wide range of business purposes.
2. Provide provides a sufficient understanding on development of statistical models and how to devise data-driven workflows.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Apply data science techniques to extract insights from a wide range of data sources and to provide an assessment basis for predictive models. Also, students shall be able to explain how ensemble models improve predictions

CO2: Visualize and explore data to better understand relationships among variables

CO3: Identify and implement appropriate performance measures for predictive models with popular algorithms

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to machine learning, ML python essentials: numpy, pandas, matplotlib. Data Cleaning: Reading the data – variations and examples, Data frames, Delimiters, Various methods of importing data in Python: csv method, open method in Pyton, reading data form a URL, reading .xlsor .xlsx files, Reading from an .xls or .xlsx file, Writing to a CSV or Excel file. Handling missing values, Creating dummy variables, Visualizing a dataset by basic plotting, Scatter plots, Histograms, Boxplots.	L1, L2,L3,L4	9
MODULE 2: Data Wrangling: Subsetting a dataset, Selecting columns, Selecting rows, Selecting a combination of rows and columns, Creating new columns, Generating random numbers and their usage, Seeding a random number, Generating random numbers following probability distributions, Probability density function, Cumulative density function, Uniform distribution, Normal distribution, Generating a dummy data frame, Grouping the data: aggregation, filtering, and transformation.	L1, L2,L3	9
MODULE 3: Statistical Concepts for Predictive Modelling, Random sampling and the central limit theorem Hypothesis testing, Null versus alternate hypothesis, Linear Regression with Python: Understanding the math behind linear regression, Linear regression using simulated data, Fitting a linear regression model and checking its efficacy, Finding the optimum value of variable coefficients ,Making sense of result parameters, p-values, Residual Standard Error, Implementing linear regression with Python, Linear regression using the stats model library, Multiple linear regression, Model validation, Training and testing data split , Handling categorical variables.	L1, L2,L3,L4	9
MODULE 4: Logistic Regression with Python, Linear regression versus logistic regression, Understanding the math behind logistic regression, Contingency tables, Conditional probability, Odds ratio, Estimation using the Maximum Likelihood Method, Likelihood function: Log likelihood function, Processing the data, Data exploration, Data visualization, Creating dummy variables for categorical variables, Feature selection, Implementing the model, Model validation and evaluation, Cross validation, Model validation, The ROC curve, Confusion matrix.Decision Tree and Ensemble Techniques: RandomForest, Bagging and Boosting, Adaboost in python. ML based Web app development.	L1, L2, L3,L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text Books

1. Pilgrim, Dive, "Introduction to Python", 3rd Edition, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist Learning with Python" 2nd Edition Green Tea Press,2002.
3. Manaranjan Pradhan and U Dinesh Kumar, "Machine Learning using Python" , Wiley Publication

4. Andreas C. Müller & Sarah Guido “Introduction to Machine Learning using python”,Oreilly Publications.

Reference Books

1. John V. Guttag, “Introduction to Computation and Programming using Python”, Prentice Hall of India, 2014.
2. Mark Lutz, “Learning Python: Powerful Object-Oriented Programming‖”, Fifth Edition, O‘Reilly, Shroff Publishers and Distributors, 2013.
3. Michale Bowles “Machine Learning in Python: Essential Techniques for Predictive Analysis” Wiley Publication.

Web Resources:

- Anaconda Scientific Python Distribution: https://store.continuum.io/cshop/anaconda/
- BLAS (Basic Linear Algebra Subprograms): http://www.netlib.org/blas/
- Graphviz - Graph Visualization Software: http://www.graphviz.org
- https://github.com/rasbt/python-machine-learning-book/blob/master/docs/references.md
- Installing Python: https://docs.python.org/3/installing/index.html
- IPython Notebook: https://ipython.org/ipython-doc/3/notebook/index.html
- Iris dataset: https://archive.ics.uci.edu/ml/datasets/Iris
- LAPACK — Linear Algebra PACKage: http://www.netlib.org/lapack/
- LIBLINEAR -- A Library for Large Linear Classification: http://www.csie.ntu.edu.tw/~cjlin/liblinear/
- LIBSVM -- A Library for Support Vector Machines https://www.csie.ntu.edu.tw/~cjlin/libsvm/
- Matplotlib Tutorial: http://matplotlib.org/users/beginner.html
- NumPy Tutorial: http://wiki.scipy.org/Tentative_NumPy_Tutorial
- Pandas Tutorial: http://pandas.pydata.org/pandas-docs/stable/tutorials.html
- Python: https://www.python.org
- scikit-learn: http://scikit-learn.org/stable/
- UCI Machine Learning Repository: http://archive.ics.uci.edu/ml/

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	--	2	--	2	1	--	1	2	1	--	--
CO2	2	1	--	2	--	2	1	--	1	--	1	--	--
CO3	2	1	--	2	--	2	1	--	1	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4441	**BIG DATA ANALYTICS- HADOOP**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course familiarizes the students on how to perform analytical operations on structured and unstructured data to gain insights from data processed through Hadoop. This offers a specialization on Big Data Platform and its use cases providing an overview of Apache Hadoop.

Course Objectives

The objective of this course is to:

1. Equip students with the concepts of how to use Pig, Hive, and Impala to practice and examine tremendous datasets stored in the HDFS, and use Sqoop and Flume for data ingestion.
2. Provide applications on components of Hadoop and Hadoop Eco-System such as Hadoop Cluster Architecture, Important Configuration files in a Hadoop Cluster, Data Loading Techniques, how to setup single node Hadoop clusterl installation of VM player and Hadoop, Important Configuration files in a Hadoop Cluster, Linux commands, Importing Hadoop Jars, Data Loading Techniques

Course Outcomes

On completion of this course, the students will be able to:

CO1: Identify Big Data and its Business Implications

CO2: Access and Process Data on Distributed File System

CO3: Manage Job Execution in Hadoop Environment

CO4: Develop Big Data Solutions using Hadoop Eco System

Modules	Blooms level*	Number of hours
MODULE 1: The 5 V's of Big Data(Volume, Variety, Velocity, Veracity, Value), Comparison of Traditional Data with Big Data, Management, analysing and challenges of Big Data, Big Data Sources, Big Data Applications, Big Data Architecture.	L1, L2,L3	9
MODULE 2: Introduction to Traditional RDBMS, OLTP, OLAP, Data Mining, Data Warehouse, Basic SQL Commands and queries: CREATE, INSERT, DELETE, UPDATE, SELECT Cloud Computing : Definition, Characteristics, Applications, Deployment Model, Service Models.	L1, L2,L3	9

MODULE 3: Introduction, Hadoop Framework, Hadoop Distributed File System, Map Reduce, Hive, Pig Sample Map Reduce Application, HIVE language capabilities, Pig Language capabilities, HIVE query examples, Pig Scripts examples.	L1, L2,L3	9
MODULE 4: Case Studies: Big Data in Marketing, Retail Hospitality, Customer Services, Decision Support using Big Data. Developing a Big Data Strategy. Visualizations - Visual Data Analysis Techniques - Interaction Techniques; Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association-Intelligence from unstructured information	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis;L6-Evaluation*

Text and Reference Books

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011
6. Jiawei Han, MichelineKamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	--	--	3	1	1	2	1	--	--
CO2	1	1	3	2	--	--	3	1	2	2	1	--	--
CO3	1	2	2	1	--	--	3	1	1	2	1	--	--
CO4	2	1	3	2	--	--	3	1	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MWP4442	**DATA MINING**	L	T	P	C
Version 1.1	Latest Approved	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Every business organization is realizing the importance of data. They are harnessing the benefits offered by Data Mining as it allows them to see hidden patterns from the data and helps in framing business policies. This course emphasizes on utilizing the techniques offered by Data Mining.

Course Objectives

This course enable students to:

1. Understand the basic concepts, principles, methods, implementation techniques, and applications of data mining, with a focus on major data mining functions such as cluster analysis.
2. Develops skills to use data mining software and other data mining techniques to solve business problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Evaluate and implement a wide range of emerging and new technologies to facilitate the knowledge discovery.

CO2: Assess raw input data, and process it to provide suitable input for a range of data mining algorithms.

CO3: Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining

CO4: Discover and measure interesting patterns from different kind of databases.

CO5: Determine data mining functionalities.

CO6: Identify appropriate data mining algorithms, and apply and interpret and report the output appropriately.

CO7: Describe complex data types with respect to spatial and web mining

CO8: Analyze data using the powerful data mining tool Weka.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data Mining What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Data Mining Goals, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications, Example: weather data, Data Warehouse and DBMS,	L1, L2	8

Multidimensional data model, OLAP operations, Example: loan data set. Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization		
Module II: Data mining knowledge representation and Attribute oriented Analysis **Data mining knowledge representation** Task relevant data, Background knowledge, Interestingness measures, Representing input data and output knowledge, Visualization techniques, Experiments with Weka – visualization. **Attribute oriented Analysis:** Attribute generalization, Attribute relevance, Class comparison, Statistical measures, Experiments with Weka - using filters and statistics.	L2, L3	8
Module III: Data mining algorithms **Association rules:** Motivation and terminology, Example: mining weather data , Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis, Experiments with Weka - mining association rules **Classification:** Basic learning/mining tasks, Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules, Experiments with Weka - decision trees, rules **Prediction:** The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), Linear models, Experiments with Weka - Prediction	L1, L2, L3	10
Module IV: Cluster Analysis: Concepts and Methods Basic issues in clustering, First conceptual clustering system: Cluster/2, Partitioning methods: k-means, expectation maximization (EM), Hierarchical methods: distance-based agglomerative and divisible clustering, Density Based, Grid based Methods, Conceptual clustering: Cobweb, Experiments with Weka - k-means, EM, Cobweb **Advanced techniques- Data Mining software and applications** Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing), Bayesian approach to classifying text, Web mining: classifying web pages, extracting knowledge from the web, Data Mining software and applications	L1, L2, L3	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & References:

1. Han, J., Kamber, M., & Pei, J. (2011). Data mining: Concepts and techniques (3rd ed.). Waltham: Morgan Kaufmann.
2. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**IP**	**EE**	**EP**
Weightage (%)	5	25	50	20

IP: Internal Practical, EE: End Semester Examination; EP: External Practical; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1							1			1		
CO2	1							1			1		
CO3	2							1	1		1		
CO4	1							1	2		1		
CO5	1			1				2			1		
CO6	1										1		
CO7	1										1		
CO8	1										1		

1: strongly related, 2: moderately related and 3: weakly related

Amity Business School

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Business Administration

Syllabus - First Semester

MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR

Course Code: MGT4101 **Credit Units: 03**

Course Objective:
To help the students gain understanding of the functions and responsibilities of the manager and to provide the student understand Human Behaviour in organizations so as to improve his managerial effectiveness.

Course Contents:
Module I: Management vs. Manager
Evolution of management thought, Functions of management, Roles and Skills of a manager, Emerging challenges of management.

Module II: Organization
Nature and structure of organization, Types of organizations, Line and staff relationships, Formal and informal organizations.

Module III: Introduction to Organization Behaviour
Overview of organization behaviour and its importance, Organization models.

Module IV: Individual Behaviour
Individual behaviour, Perception and learning, Personality, Values & attitudes, Motivation: Concept theory and application

Module V: Group Behaviour
Group dynamics, Communication, Leadership, Power and politics, Conflicts and negotiation.

Module VI: Organizational Culture and Change Management
Organisational culture, Organisational change and development, Work stress and its management**.**

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Luthans, F. (2010), Organizational Behaviour, Mcgraw-Hill Education India Pvt.Ltd - New Delhi.
- Robbins, S.P. (2016), Organizational Behaviour, Sixteenth Edition, Pearson Education.
- Greenberg, J. & Baron, R.A. (2005), Behaviour in Organizations, Pearson Education.
- Newstrom John W. and Davis Keith, (1993), Organizational Behaviour: Human Behaviour at Work, Tata McGraw Hill, New Delhi
- P. Subba Rao (2010), Management and Organisation and Behaviour, Himalaya Publishing House, New Delhi
- Pierce Gardner with Dunham (2011)Managing Organizational Behaviour. Cengage Learning India.

ACCOUNTING FOR MANAGEMENT

Course Code: MGT4102 **Credit Units: 03**

Course Objective:
Participants in this course will develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, participants will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts. In addition the course develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyze financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Contents:

Module I: Introduction
The Financial Accounting Framework, Accounting Policies, Need of Accounting. Users of Accounting Information, Accounting Cycle, Accounting and Management Control.Balance sheet-Dual Aspect principle, Classification Items of Balance Sheet, Formats of Balance Sheet.Preparation of Balance Sheet. Income Statement- Realization vs. Accrual Principle, Format of Income Statement), Preparation of Income Statement (IAS,GAAP&IFRS) Depreciation Accounting.

Module II: Measuring and Reporting
Measuring and Reporting :Cost of sales and Inventories, Debentures, Investments, Shareholder Equity. Human Resource Accounting-Valuation of Human Resources, Recording and Disclosure in Financial Statements

Module III: Management Accounting
Contrast between Management Accounting and Financial Accounting and Reporting, Types of Management Accounting Information and their uses, General Observation on Management Accounting. Statement of Cash Flows-Profit versus Cash, Purpose and Use of Cash Flow Statement, Format of Cash Flow Statement (AS-3), Preparation of Cash Flow Statement (IAS,GAAP& IFRS).

Module IV: Analyzing and Interpreting Financial Statements
Financial Statement Analysis – Basic Relationship, Overall Measures, Profitability Ratios, Investment Utilization Ratios, Financial Condition Ratios, Making Comparisons.Du-pont analysis.Interpretations of calculated Ratios.

Module V: Cost Accounting: The behavior of cost- Relation of cost to volume, BEP & Profit graph-CVP analysis, Full cost and its uses. Techniques of costing.Standard costing.Strategic planning and budgeting.

Examination Scheme:

Components	Assessment 1 Group Presentation	Assessment 2 In Class Quiz	Class Test/Mid Term Exam	Attendance	External
Weightage (%)	10	5	10	5	70

Core Text Book:

- Anthony, N.R; Hawkings, F. D; Merchant, A.K (2014), Accounting Text and Cases, 13th Edition, Mc Graw Hill.
- Ramachandran, N (2011), Financial Accounting for Management, 3rd Edition, Mc Graw Hill.

References Book:

- Bhattacharya, S.K. and Dearden, J, 3rd Edition, Accounting for Management, Text and Cases, Vikas Publishing house
- Narayanaswamy R (2014), Finanacial Accounting – A Managerial Perspective, 5th Edition, Prentice Hall of India.
- Maheshwari S N; Maheshwari SK and Maheshwari SK, 3rd Edition, A Text Book for Accounting for Management, Vikas Publishing House.
- M.N Arora 10th Edition, A Text Book of Cost and Management Accounting, Vikas Publishing House.

MARKETING MANAGEMENT

Course Code: MGT4104 **Credit Units: 03**

Course Objective:
The objective of this course is to provide the students exposure to modern marketing concepts, tools, and techniques, and help them develop abilities and skills required for the performance of marketing functions.

Course Contents:

Module I: Understanding Marketing in New Perspective
Fundamentals of Marketing, Customer Value and Satisfaction, Customer Delight, Conceptualizing Tasks and Philosophies of Marketing Management, Value Chain, Scanning the Marketing Environment, Marketing Mix Elements, Difference between marketing and Selling, Relationship marketing, Social marketing, Strategic Planning in marketing, formulating the marketing plan.

Module II: Analyzing Consumers & Selecting Markets
The factors influencing consumer behavior. The stages in the buying process, the buying decision making process, factors effecting the buying decision., Market Segmentations, Levels of Market Segmentations, Patterns, Procedures, Requirement for Effective Segmentation, Evaluating the Market Segments, Selecting the Market Segments, Tool for Competitive Differentiation, Developing a Positioning Strategy.

Module III: Managing Product & Pricing Strategies
Classification of products, New Product development, stages of product development, Adoption process, Product mix decisions and line management, Length, width and depth of a line, line analysis, and brand management, product life cycle, stages in lifecycle and factors affecting each stage, Managing product life cycles. Setting the price, adapting the price, initiating and responding the price changes,

Module IV: Designing: Managing the Integrated Communication
Channel functions and flows. Channel design decisions. Channel management decisions. Channel dynamics; vertical horizontal and multi channel marketing systems. Market Logistics decisions. Effective Communication, Integrated Marketing Communication, Marketing Communication Process, Promotion mix, Advertising, Personal Selling, Sales Promotion and Publicity and Public Relations, Direct Marketing,

Module V: Emerging Trends in Marketing
An Introduction to Internet Marketing, Multi Level Marketing, E-Marketing, Green Marketing, Event Marketing, Types of Events, Sponsorship, Cause Related Marketing, Marketing for Non Profit Organizations Marketing Strategies for Leaders, Challenges, Followers and Nichers

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Kotler, Keller, Koshy, Jha, (2008), Marketing Management– A South Asian Perspective, Pearson India Pvt.
- Kurtz, (2008) Principles of Marketing, Cengage Learning, India,
- S. Neelamegham, (2009), Marketing In India,Vikas publishing house,

- Biplo Bose, (2008), Marketing Management, Himalaya Publishing House.
- Paul Baines, Chris Fill, Kelly Page, (2009), Marketing, Oxford University Press
- Winner (2009), Marketing Management, Pearson India Pvt.
- William L. Pride and O.C. Ferrell, (1993) Marketing Concepts and Strategies, Boston, Houghton Mifflin.
- Czinkota and Kotabe, (2007) Marketing Management, Cengage Learning, India
- Evans, (2008), Marketing Management, Cengage Learning,India
- RajanSaxena, (2010) , Marketing Management,Tata McGraw Hill

QUANTITATIVE TECHNIQUES IN MANAGEMENT

Course Code: MGT4106 **Credit Units: 03**

Course Objective:
The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the business environment using contemporary software.

Course Contents:
Module I: Introduction
Application of Statistics in Business; Classification of Data; Interpretation of computer output of diagrammatic and graphical presentation of data, measures of central tendency, measures of dispersion and skewness.

Module II: Probability and Probability Distributions
Concepts of Probability, addition theorem, multiplication theorem, Baye's Theorem; continuous and discrete probability distribution:Binomial Probability Distribution, Poisson Probability Distribution and Normal Probability Distribution.

Module III: Sampling and Sampling Distribution
Sampling: Basic Concept, Types of Sampling, Errors and Precautions in sampling, size of sample, Parameter and Statistic, Sampling Distribution of the mean, Sampling distribution of proportion, Estimation – point estimation, Interval Estimation,

Module IV: Tests of Hypothesis
Null and Alternative hypothesis, One-Tailed and Two-Tailed tests of hypothesis, Type I and Type II error, rejection rule using p – Value and critical value approach. Hypothesis Testing to compare two populations: Test for one sample mean, Test for two population means (Independent Samples), Tests for two population means (Dependent Samples), Tests for two population proportions (Independent Samples), Tests for two population variances (Dependent Samples), F-test, Chi – Square Test

Module V: Forecasting Techniques
Correlation - Karl Person, Spearman's Rank methods, simple linear regression analysis – Estimated regression equation, least squares method, coefficient of determination, interpretation of computer output for Regression, Introduction to time series, trend analysis

Module VI: Introduction to SPSS, performing univariate and bivariate analysis on SPSS
Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Anderson D.R; Sweeny D.J, Williams T.A (2002), Statistics for Business and Economics, Cengage learning.
- KazinierL.J.,& Pohl N.F. (2004), Basic Statistics for Business and Economics, New York: McGraw Hill.
- Levin Richard I. & Rubin David S.(1998), Statistics for Management, Pearson Education India
- Stephen .K.C. (2002), Applied Business Statistics: Text, Problems and Cases. New York: Harper and Row.
- Sharma, J.K. (2007), Business Statistics, Pearson Education India.

LEGAL ASPECTS OF BUSINESS

Course Code: MGT4107 **Credit Units: 03**

Course Objective:
To give insight to various Legal Aspects of Business so that the students are able to interpret the provisions of some of the important laws and apply the same in commercial and industrial enterprises.

Course Contents:
Module I: Indian Contract Act, 1872
Nature and kinds of Contracts, Concepts related to offer, Acceptance and Consideration, Principles Governing Capacity of Parties and Free Consent, Legality of Objects, Performance and Discharge of Contract, Breach of Contract and its Remedies, Special contracts of Bailment and Pledge, Indemnity and Guarantee, Contract of Agency.

Module II: Negotiable Instruments Act, 1881
Meaning of Negotiability, Negotiable Instruments –Bill of Exchange, Promissory Note, Cheque: crossing of cheques, endorsement, dishonour of cheques

Module III: Sales and Goods Act, 1930
Sale and Agreement to Sell, Hire Purchase – Pledge – Mortgage – Hypothecation Lease. Goods – Different types of Goods, Passing of Property in Goods, Conditions and Warranties, Doctrine of Caveat emptor, Rights of an unpaid Seller.

Module IV: Indian Partnership Act, 1932
Meaning and definitions, Registration of partnerships, Types of partners, Dissolution, Limited Liability Partnership Act, 1932 – Meaning & definitions, Meaning of designated partner, Registration of LLP, Types of partners, Dissolution,

Module V: Intellectual Property Right
Intellectual Property Laws (IPR),Overview of Law & Procedure relating to Patents, trademarks & Copyrights, Infringement

Module VI: Company Act 1956
Companies Act, 1956-Meaning and types of companies, Formation of a company, Memorandum and Articles of Association, Share Capital and Shareholders, Prospectus and Issue of Shares, Buy Back of Shares, Debentures, Company Meetings and Proceedings, Powers, Duties, Liabilities of Directors and Winding up of Company.

Module VII: The Consumer Protection Act, 1986
Definitions of consumer, complaints, goods , services, meaning of consumer dispute, complaint- unfair trade practices, restrictive trade practices, rights of consumers, consumer redressal agencies

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Gulshan SS (2003), Elements of Mercantile Law, Excel Books, N. Delhi.
- Kuchhal MS (2010), Business Law, Vikas Publication
- Tulsian PC, (2002), Relevance of Business Law, Tata McGraw Hills.
- Singh Avtar, (2006), Elements of Mercantile Law, S.Chand& Sons.

HUMAN RESOURCE MANAGEMENT

Course Code: MGT4108 **Credit Units: 03**

Course Objective:
The objective of this course is to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India.

Course Contents:
Module I: Human Resource Management in Perspective
Nature and scope of HRM, HRM functions, HRM models, understanding concepts of Personnel Management, Human Resource Development and Strategic Human Resource Management, HR Environment, Changing Role of HR.

Module II: Meeting Human Resource Requirements
Job Analysis, Job Description, Strategic Human Resource Planning, Recruitment, Selection Process, Methods – Interview, Tests, Placement and Induction

Module III: Training & Developing of Employees
Training and Development, Understanding of Performance Management Systems, Potential Appraisal, Career Development

Module IV: Managing Compensation
Job evaluation, Methods of Job Evaluation, Strategic Compensation, Equity Theory, Components of Pay Structure, Designing and Administration of Wage and Salary Structure, Wage Regulations in India

Module V: Employee Relations
Overview of Industrial Relations, Industrial disputes, Collective Bargaining, Workers Participation and Management, Grievance handling

Module VI: Emerging Trends in HRM
Overview of Human Resource Information System (HRIS), Introduction to HR Audit, IHRM Practices, Cross- Cultural and Diversity Management, Work-life integration, Human Resource Outsourcing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- David A. Decenzo ,Stephen P. Robbins , Susan L. Verhulst,(2015), **Human Resource Management** ,eleventh edition , Wiley;
- Prasad. L.M, (2014) Human Resource Management, Third Edition, Sultan Chand & Sons; New Delhi.
- Chhabra T.N,(2014) Human Resource Management: Concepts and Issues, Edition 2014,Dhanpat Rai & Co
- Dessler G (2014) **A Framework for Human Resource Management,** 7 edition (2014), Pearson Education India;
- Michael Armstrong , Stephen Taylor,(2017), **Armstrong's Handbook of Human Resource Management Practice,** 14 edition (3 February 2017), Kogan Page;

INFORMATION TECHNOLOGY AND E-COMMERCE

Course Code: MGT4109 **Credit Units: 02**

Course Objective:
This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. The course will expose the students to the latest trends in e-business models, electronic payment systems and data & information security

Course Contents:

Module I: Modern Computer Systems
Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation, (e.g. Delhi Metro , Digitally Controlled Car engines etc.), Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources

Module II: Data Resource Management
Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts.SQL Query handling, Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers. Storage Technologies and Architecture (DAT, NAS, SAN etc.). Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis

Module III: Telecommunications and Computer Networks
Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Network Topologies, Web 2.0/3.0, Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,Features of 3G & 4G technologies, VOIP and IPTV.

Module IV: Electronic Commerce Systems
Meaning, Definition, Concept, Features, Function of E-Commerce, E-Commerce Practices v/s Traditional Practices, Scope and basic models of E-Commerce, Limitations of E-Commerce, Precaution for secure E-Commerce, proxy services.

Module V: E-Commerce Business Models & EDI
Concept of EDI, Difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI.Various business models in Ecommerce likeB2C, B2B, C2C.

Module VI: E-Payment Systems and Security Management
Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, Cyber cash Internet Cheques, Instant Paid payment system- Debit card, Direct Debit, Prepaid payment system- Electronic cash, Digicash, Netcash, Cybercash, Smart Cards.
The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types.Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd
- Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Elias M Awad, Electronic Commerce from Vision to fulfilment, Third Edition, Pearson Education
- Ravi Kalakota& Andrew B. Shinston, Electronic Commerce – A manager's Guide, Pearson Education.
- Bhaskar Bharat, Electronic Commerce - Technologies & Applications, Tata McGraw Hill.
- J. Christopher & T.H.K. Clerk, Global E-Commerce, University Press.

Syllabus - Second Semester

FINANCIAL MANAGEMENT

Course Code: MGT4201 **Credit Units: 03**

Course Objective:
The objective of this course is to develop an understanding of short-term and long-term financial decisions of a firm and various financial tools used in taking these decisions. It is also aimed to develop the understanding of the financial environment in which a company operates and how it copes with it.

Course Contents:
Module I: Introduction
A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm.

Module II: Valuation Concepts
Time Value of Money, Risk and Return, Financial and Operating Leverage.

Module III: Financing Decisions
Capital Structure and Cost of Capital**,** Marginal Cost of Capital.

Module IV: Capital Budgeting
Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction.

Module V: Working Capital Management
Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of Working Capital.

Module VI: Dividend Policy Decisions
An introduction**:** Different Schools of Thought on Dividend Policy.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Chandra, P. (2006), Financial Management: Theory and Practice, Tata McGraw Hill.
- Damodaran, A.(2004), Corporate Finance: Theory and Practice, Wiley & Sons.
- Van Horne, J.C. (2006), Financial Management and Policy, Prentice Hall of India.
- Brearly, R. A. and Myers, S. C. (2006), Principles of Corporate Finance, Tata McGraw Hill
- Pike, R and Neale, B. (1998), Corporate Finance and Investment: Decisions and Strategies, Prentice Hall of India
- Rustagi, R.P. (1999),Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.
- Pandey, I.M. (1999), Financial Management, Vikas Publishing House

BUSINESS RESEARCH METHODS

Course Code: MGT4203 **Credit Units: 02**

Course Objective:
The main objective of the course is to equip the students with the basic understanding of research methodology in changing business scenario. It will also provide them an insight into the application of dynamic analytical tools to face the stormy challenges aimed at fulfilling the purpose of business decision making.

Course Contents:

Module I: Introduction
Meaning of research, importance of scientific research in business decision making, types of research, complete research process, research methodology, criterion for good research, Identification of research problem and formulation of hypothesis, research designs, drafting a research proposal

Module II: Measurement and Data Collection
Primary data, secondary data, design of questionnaire, sampling fundamentals and sample designs, Qualitative and quantitative research, measurement and scaling techniques, measures of central tendency mean, median, mode; measures of dispersion, data processing

Module III: Data Analysis I
Cross tabulation, univariate analysis, bivariate analysis: Correlation, Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation, hypothesis testing, t-test, Z test, F-test, Chi- square test, Analysis of variance, Non-parametric tests: Sign test, Run test, Krushall-Wallis test

Module IV: Data Analysis-II
Simple linear regression: coefficient of determination, significance tests, residual analysis,
Multivariate techniques: multiple linear regression: Multiple coefficient of determination, interpretation of regression coefficients, heteroscedasticity, multicollinearity, outliers, auto regression, factor analysis, cluster analysis (concept)

Module V: Report Writing
Pre-Writing Considerations, structure of research report, common problems encountered while preparing the research report, presentation of research report, ethical issues while preparing a research report

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Case study must be included in the discussion.

Text & References*:*

- Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited
- Zikmund, William C (1997). *Business Research Methods (5th Ed.)*. The Dryden Press, Harcourt Brace College Publishers
- Kothari C R, (2014) Research Methodology: Methods & Techniques, Vikas Publishing House Pvt.Ltd
- Levin & Rubin (2004), Statistics for Management, 8th Ed, Prentice Hall of India

- Srivastava, Shenoy and Sharma (2002)., Quantitative Techniques for Business Decisions, 4th Ed , Allied Publishers
- Bajpai, Naval (2013). *Business Research Methods*. Pearson
- Shajahan, S. (2004) , Research Methods for Management 2nd Edition, Jaico Publishers
- Kumar, Ranjit (2005), Research Methodology, Pearson Education

INTERNATIONAL BUSINESS ENVIRONMENT & PRACTICES

Course Code: MGT4204 **Credit Units: 03**

Course Objective:
This course provides a comprehensive overview of the role that international business plays in the global economy.This knowledge shall help to understand the complexities, risks and opportunities of international business and provide a global perspective on international trade, including foreign investments, impact of financial markets, international marketing, and the operation of MNC's. Learn business practices organizations adopt to tap global opportunities. Create awareness on career opportunities that exist in international business.

Course Contents:

Module I: Introduction to International Business
Globalisation - Meaning and implications ; Globalisation of markets and production ; Drivers of Globalisation; Importance, nature and scope of International business; Modes of entry into International Business; Internationalization process and managerial implications; Multinational Corporations and their involvement in International Business: Issues in foreign investments, technology transfer, pricing and regulations; International collaborative arrangements and strategic alliances.

Module II: Theoretical Foundations of International Trade
Reasons for international trade: Mercantilist and neo-mercantilist view; Theories of international trade: Absolute and comparative advantage theories: Modern theories of trade; Gains from trade; Foreign trade multiplier; Terms of trade. The new product life cycle theory, The new trade theory, Porter's diamond model ; Instruments of International trade policy – tariffs, subsidies, local content requirements, administrative policies, anti dumping policies, political and economic arguments for intervention.

Module III: International Business Environment
Economic, Political, Cultural and Legal environments in International Business.Framework for analyzing international business environment. World trade and protectionism –Tariff and non-tariff barriers; Foreign investments-Pattern, Structure and effects; Movements in foreign exchange and interest rates and their impact on trade and investment flows. Introduction to Export and Import Finance – Methods of payment in International Trade.

Module IV:International Economic Institutions and Agreements
WTO, WTO and Developing Countries, IMF, World Bank, UNCTAD, International commodity trading and agreements. Instruments of International trade policy – tariffs, subsidies, local content requirements, administrative policies, anti dumping policies, political and economic arguments for intervention ;GATT, WTO, IPR, TRIPS, TRIMS, GATS, Ministerial Conferences, Uruguay round of negotiations.WTO dispute settlement mechanism.

Module V:Regional Economic Groupings in Practice:
Levels of Regional Economic Integration; Regionalism vs. Multilateralism; Important Regional Economic Groupings in the World, Regional Integrations, Trading Blocks - European Union, ASEAN, APEC, NAFTA, SAARC, ANDEAN PACT and MERCOSUR.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Daniels, J.D.,Radebaugh L.H.,Sullivan D.P. & Prashant Salwan (2011), International Business: Environments and Operations, Pearson Hall, Delhi
- Bennet, Roger, International Business, Financial Times, Pitman Publishing, London
- Sundaram and Black, (2009),International Business Environment**,** Prentice-Hall of India Pvt. Ltd.
- Bhalla and Raju, (2010), International Business Environment, Sage Publication
- Apte, P. G. (1998), International Financial Management, Tata McGraw Hill
- Francis Cherulinam, (2008), International Business, Himalaya Publishing House
- Charles Hill,(2007), International Business, McGraw Hill

OPERATIONS MANAGEMENT

Course Code:MGT4205 **Credit Units: 03**

Course Objective:
The course aims at developing an understanding of the strategic and functional issues in the operational environment of any organization, of the various decisions involving the operational activities, and of the methods enabling them taking the best possible alternative decision.

Course Contents:

Module I: Introduction
Operations in manufacturing and services, responsibility of Operations Manager, Operations strategy and competitiveness, process analysis, manufacturing process and service process selection and design, job design and work measurement

Module II: Strategic Decisions
Facility location decisions, factors affecting location, location techniques: factor rating method, centroid method, facility layout, process layout, systematic layout planning, product layout, line balancing, fixed position layout, service operations layout, types of capacity, capacity planning: long term and short term, economies of scale

Module III: Operating Decisions
Aggregate Planning, production planning and control (PPC), benefits of PPC, Master Production Scheduling, Operations scheduling: loading, sequencing, priority rules and techniques, Materials Requirement Planning (MRP), concerns in MRP

Module IV: Supply Chain Management
Recent issues in SCM: Role of IT in SCM, CRM Vs SCM, structure of supply chain, benchmarking concept, features and implementation, outsourcing decisions, value addition in SCM

Module V: Inventory Management
Inventory management: Objectives, factors, process, inventory costs, inventory models, inventory control techniques: ABC, VED, EOQ, SED analysis, Just-in-Time (JIT), JIT vs traditional systems of operations, JIT in services

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Chase, Jacob, Aquilano, Agarwal (2008),Operations Management for Competitive Advantage, Tata McGraw-Hill
- Evans & Collier (2007), Operations Management: An Integrated Goods and Service Approach, Cengage
- Chase et al, Operations Management, Tata McGraw Hill
- K. Aswathappa, K. Shridhar Bhat, Production and Operations Management, HPH
- Garg, Ajay, *Production and Operations Management*. MCGraw Hill, New Delhi
- Heizer, Render, Jagadeesh (2009), Operations Management, Pearson Education, India
- Klassen & Manor (2007), Cases in Operations Management, Sage Publishers

- Krajewski, Ritzman, Malhotra (2007), Operations Management: Processes and Value Chains, Prentice-Hall
- Mahadevan (2007), Operations Management: Theory and Practice, Pearson Education, India
- Russell and Taylor (2009), Operations Management along the Supply Chain, Wiley
- Shroeder (2009), Operations Management: Contemporary Concepts and Cases, Tata McGraw-Hill
- S.P. Singh, Production and Operations Management, Vikas Publication

MANAGEMENT SCIENCE

Course Code:MGT4207 **Credit Units: 03**

Course Objective:
The main objective of the course is to provide the students the insight into structures and processes that management science can offer and the enormous practical utility of its various utility. The course is designed to introduce the fundamental tools of management science and their application to real life business problems. It will help students to take well informed decisions in their corporate life.

Course Contents:

Module I: Introduction
Management Science: uses, scope, applications in managerial decision making; assumptions of management science models, decision making environments: decisions under certainty, uncertainty and risk situation; decision tree approach and its applications.

Module II: Linear Programming Problems
Linear Programming Problems: Modeling and Solution Methods- graphical method, simplex methods, problems with maximization and minimization objects, duality and its managerial interpretation;
Sensitivity analysis: meaning, Change in Objective Function Coefficients, Change in Right Hand Side Values, Change in Availability of resources and Addition of a new variable.

Module III: Transportation and Assignment Model
Transportation model: various methods of finding initial basic feasible solution and optimal solution, MODI method, degeneracy, unbalanced problems, prohibited route problems, maximization transportation problems
Assignment Model: Hungarian method for solution, unbalanced assignment problems, restrictions on assignments, travelling salesman problem.

Module IV: Game Theory
Two-Person Zero Sum Games, Pure Strategies: Games with Saddle Point, Mixed Strategies: Games without Saddle Point, Principle of Dominance, and Solution Methods for Games without saddle point – Algebraic Method, Arithmetic Method, Graphical Method.

Module V: Markov Chains
Markov Chains: introduction, characteristics, applications, state and transition probabilities, steady-state probability (equilibrium conditions), absorbing states and other applications of Markov Analysis.

Module VI: Simulation
Simulation: meaning, types of simulation, steps of simulation process, Monte Carlo simulation, applications of simulation

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Anderson David R, Sweeny Dennis J, Williams Thomas A (2007), An Introduction to Management Science Quantitative Approaches to Decision Making, Cengage Learning.
- Render Berry, Stair Ralph M., Hanna Michel E.(2008),Quantitative Analysis for Management, Pearson Education
- Sharma J.K. (2010), Operations Research: Theory & Application, Mac Millan India Ltd.
- Taha H.A (1998), Operations Research: An Introduction, Prentice Hall of India.
- Vohra N.D.(1998), Quantitative Techniques in Management, Tata McGraw Hill

ECONOMICS FOR MANAGEMENT

Course Code: MGT4209 **Credit Units: 02**

Course Objective:
To familiarize the students with theoretical concepts of modern Economic Analysis for Management so that they can use these as inputs in managerial decision making process. In this course adequate emphasis has been given on making students understand and critically analyze key economic variables both at micro and macro levels in the domestic and international domains. The idea is that such comprehensive understanding of economic concepts will allow them to apply the acquired knowledge in business operations and make strategies for the firm operating under a dynamic business environment.

Course Contents:

Module I: Introduction to Managerial Economics, Demand Analysis and Demand Forecasting
Introduction to Managerial Economics: Meaning and Nature of Managerial Economics, Significance of Managerial Economics, Scope of Managerial Economics. Demand Analysis: Meaning of Demand, Determinants of Demand, Individual and Market Demand Functions, Individual and Market Demand Curves, Law of Demand, Exception of Law of Demand. Elasticity of Demand: Types of Elasticity of Demand, Significance of Elasticity of Demand. Demand Forecasting: Purpose of Demand Forecasting, Steps Involved in Forecasting, Determinants of Demand Forecasting, Methods of Demand Forecasting.

Module II: Theory of Supply, Production, Cost and Revenue Analysis
Supply: Law of Supply, Determinants of Supply, Shift of Supply and Change in Supply, Elasticity of Supply, Kinds of Elasticity of Supply, Determinants Elasticity of Supply. Theory of Production: Meaning of Production, Short –run Analysis of Production, Law of Variable Proportion, the Three Stages of Production, Returns to Scale. Analysis of Cost: Cost and Managerial Decision-making, Types of Cost, Cost Function, Relationship between Production and Cost, Short Run Cost Function, Long Run Cost Function, Relation between Short-run and Long-run Cost Curves,. Economies of Scale. Break-Even Analysis.Concept of Revenue.

Module III: Market Structure and Price Determination
Perfect Competition: Introduction of Perfect Competition, Characteristics of Perfect Competition, Demand Curve of Firm and Industry, Equilibrium of the Firm in the Short Run and Long Run. Effects of Tax Imposition under Perfect Competition. Monopoly: Assumptions, Causes of Monopoly, Demand, Average Revenue and Marginal Revenue of a Monopolistic, Profit Maximization Price Determinants of the Monopolist in Short-run and Long-run. Measures of Monopoly Power. Monopolistic Competition: Assumptions, Product Differentiation, Demand Curve, Equilibrium of the Firm in Short-run and Long-run, Selling cost and Monopolistic Competition. Oligopoly: Assumptions, Non-collusive Oligopoly and Collusive Oligopoly, Kinked Demand Curve Analysis.

Module IV: Macroeconomics Analysis
National Income: An Indicator of Economic Activity, The Parameters that Influence Level of Economic Activity. Business Cycles: Characteristics of Business Cycle, Phases of Business Cycle, Ill Effects of Business Cycles, General Measure to Control Business Cycles.
The Role of Government in Market Economy and Strategic Business Implications: Rationale of Government Intervention, Government Macroeconomic Policy Measures – GST, Demonetization – and their impact on Business; Macro Economic variables and their functional relationship; Economic Functions of Government in a Market Economy, Legal and Social Framework, Restraining Unfair

Competition and Increasing Market Power, Reallocation of Resources in the Presence of Externalities, Redistribution of Income, Regulation of Natural Monopoly, Stabilization of Economy;
Macroeconomic Variables affecting Business: Consumption Function, Saving Function, Investment Multiplier; Transaction, Precautionary, Speculative Demand for Money; Liquidity Preference; Components of Money Supply; Fiscal Policy & Monetary Policy and their implications on business and management; Inflation and Deflation - Demand pull and Cost push inflation; Government policies to control inflation.
International Trade Regime and its implications on Business: GATT, World Trade Organization, Regional Trade Agreements – EU, NAFTA, ASEAN, SAFTA, MERCUSOR.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Thomas, Christopher R., S. Charles Maurice, Sumit Sarkar, Managerial Economics, 9th Edition, Tata McGraw Hills.
- Samuelson, Paul A., and William Nordhaus, Economics, 19th Edition, McGraw Hills India Pvt. Ltd.
- Krugman, Paul and Maurice Obstfeld (2008), International Trade Policy, Pearsons.
- Gupta, G.S. (2006), Managerial Economics, Tata McGraw Hill
- Salvatore, D (2010), Managerial Economics, Oxford University Press
- Peterson, H.C and Lewis, W.C. (2005), Managerial Economics, Prentice Hall of India
- Dwivedi, D.N. (2010), Essentials of Business Economics, Vikas Publishing House Pvt Ltd.

BUSINESS ANALYTICS

Course Code: MGT4210 **Credit Units: 02**

Course Objective:
The course provides an introduction to data analytics to be used in business. The students will learn how data analysts describe, predict and make informed business decisions in various business domains like marketing, human resources, finance and operations.The aim of the course is to develop basic data literacy and an analytic mindset in students that will help them to make strategic decisions based on data.

Course Contents:

Module I: Introduction to Business Analytics
Importance and role of data driven decisions. Business Analytics – Definition, Market, Trends; Paradigm Shift from Data to Insight and from Business Intelligence to Business Analytics; Examples and Types of Business Analytics Analysis- Forecasting & Predictive Modeling; Descriptive, Prescriptive and Predictive Analytics. Data Summarization, Data visualization – Various visualization techniques, standardized reporting and Pivot Tables – Using Excel

Module II: Data Mining
Introduction to Data Mining; Crucial processes in data mining; Data Warehousing; Data Mining Techniques and Exploratory Data Analysis; Data Mining Tool – XL Miner.

Module III: Decision Making & Optimization
Decision making under uncertainty – Decision Trees and Risk Profiles; Sensitivity Analysis;
Optimizing complex decisions – Optimization of a large number of decisions while accounting for different kinds of physical and business decisions. Introduction to Optimization Techniques –Linear Programming; Optimization – Use of Excel to solve business problems like marketing mix, capital budgeting and portfolio optimization.

Module IV: Big Data and Introduction to R
Introduction to Big Data, Big Data driven decisions in business organizations – Benefits and Security/Privacy concerns.
Building Business and Economic Models –Tools to leverage data for Prediction purposes; Logistic Regression.
Introduction to Machine Learning; Statistical Learning vs. Machine Learning; Major classes of Learning Algorithms –Supervised Vs Unsupervised Learning.
Introduction to R Programing

Module V: Simulation using R and Excel
Hands on Regression using R;Introduction to Simulation; Applications of Simulation and Building a Simulation Model. (Using Excel and R)
Capstone Project.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Aczel, D.A., Sounderpandian, J., Saravanan, P. and Joshi, R. (2012). *Complete Business Statistics (7th ed.*). New Delhi, India: McGraw Hill Education (India) Private Limited
- Cooper, R.D., Schindler, S. P. and Sharma, J.K. (2015). Business Research Methods. New Delhi, India: McGraw Hill Education (India) Private Limited
- Gujrati, Damodar N and Sangeetha (2011). *Basic Econometrics (4th Ed.).* New Delhi, India: McGraw Hill Education (India) Private Limited
- Beri, C. (2016). *Business Statistics*. New Delhi, India: McGraw Hill Education (India) Private Limited
- Kothari, C.R. (2009). *Research Methodology: Methods and Techniques (2nd revised ed.).* New Delhi, India: New Age International Publisher
- Sharma, J.K. (2013). *Operation Research: Theory and Applications (5th ed.).* New Delhi, India: Macmillan Publishers India limited
- Albright and Winston. Business Analytics: Data Analysis and Decision Making, 5th Edition.
- Stephen Powell and Ken Baker., "The Art of Modeling with Spreadsheet"
- Data, data everywhere, "Special report on managing information,Economist", February 27th, 2010.
- Liberatore and Luo, "The Analytics Movement, Interfaces, Articles inAdvance", pp. 1–12, 2010.
- "Using R for Data Analysis and Graphics". Introduction, Code andCommentary,

EXCEL FOR MANAGERS

Course Code: MGT4211 **Credit Units: 01**

Course Objective:
Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers.This course will provide all the tools necessary to create and use basic and advanced spreadsheets. After completion of this course, students will be able to learn the various methods for entering and editing data and also learn the various ways to write simple formulas.

Course Contents:
Module-I: Getting Started with Excel
Introduction to Spreadsheets: Launching Excel, entering data in spreadsheet, widening rows and columns, applying basic formatting in spreadsheet, saving work in excel. Entering Data into cells:Using autofill, sort & filter feature, creating lists, inserting & deleting rows and columns. Wrapping & merging text and cells,

Module-II: Basics in excel
Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel. Setting the page orientation and print area.Adding hyperlinks to cells, inserting images, objects, equations and symbols.

Module-III: Charts & Formulas in Excel
Understanding Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart. Using Basic functions- average, sum, min, max, product etc. date functions, time functions. Math Operators in Excel, combining mathematical operators.

Module-IV: Functions in Excel
Logical- using IF, AND, OR, NOT, TRUE, FALSE Functions. Textual- using TRIM, UPPER, LOWER, REPLACE Functions.Import data into excel, Look up functions with index and match. Rounding, sum product, conditional counts and conditional sums, Filtering data, pivot table, pivot charts, conditional formatting.

Module-V: Financial and Statistical Functions in Excel
Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager, IRR. Statistical functions: Max, Min, Average, Large, Rank, Small, Var, Std Dev.

Examination Scheme:

Components	Written Test	Practical	V/P	File/Assignment	Attendance
Weightage (%)	20	30	30	15	5

Suggested Readings & Textbooks
- Business Analysis with Microsoft Excel by Conrad George Carlberg,, Que Publishing, second edition, ISBN 0974415626.
- Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons , 2012, ISBN 9781118559703

Web Resources
- https://spreadsheeto.com/
- https://www.tutorialspoint.com/excel/

SPECIALISATION - FINANCE & ACCOUNTING
CORPORATE FINANCIAL REPORTING & ANALYSIS

Course Code: FIN4201 **Credit Units: 03**

Course Objective:
The International Financial Reporting Standards (IFRS) issued by International Accounting Standards Board (IASB) are gaining recognition as Global Reporting Standards. While appreciating the emerging diversities and complexities in the world of accounting and the need for knowledge of IFRS in relation to the convergence of the Indian Accounting Standards. The objective of this Subject is to enhance the knowledge of IFRS issued by IASB as well as to provide practical framework to the student in the globalization scenario.

Course Content:
Module-I:
Brief overview of Indian Accounting Standard and different accounting standards at international level.Rational of Accounting Standards. IFRS Framework, Features of IFRS, Genesis of IFRS, Journey of IAS to IFRS, Advantage of adopting. IFRS.Challenges in Adopting IFRS.Difference between Indian GAAP and IFRS.

Module-II:
Concept of Fair Value Accounting Concept of Adoption and convergence. Significant Difference between Ind AS and IFRS. Problem of Carve Out. Timeline for Adoption for Ind- As, Concept of Fair Value Accounting Presentation of Financial Statement as per Ind-AS1, Statement of Change in Equity, Cash Flow Statement and Ind AS 7.

Module-III:
Treatment of Inventories as per Ind AS 2-; Property plant and equipment- Ind AS 16, recognition, measurement, cost model, revaluation model, depreciation and impairment of assets and related disclosures, Revenue recognition Ind AS 18- scope, revenue from sales of goods, Services, interest royalties and dividends and disclosures, Financial Instruments: Presentation, Recognition and Measurement (Ind AS 32 and 39), Ind AS 33 Earnings per Share .

Module-IV:
First time adoption of accounting standard: Recognition and measurement, Presentation and Disclosure
Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Recommended Text Book& Reference:
- Wiley IFRS: Practical Implementation Guide and Workbook; By Abbas, Graham, Liesel; Wiley publications, 3rd edition
- Faculty material will be provided
- International Financial Reporting Standards, Produced and printed on behalf of: The Institute of Chartered Accountants of India, website of Ministry of Corporate Affairs.
- International Financial Reporting Standards (IFRSs) - published by Taxmann Publications P Ltd.
- A Guide through International Financial Reporting Standards July 2008 -Published by IASB.
- IFRS : A Quick Reference Guide by Robert Kirk
- Wiley IFRS: Practical implementation guide and workbook by Abbas Ali Mirza, Graham J. Holt and Magnus Orrell5. Wiley IFRS 2008: Interpretation and application of International Accounting and Financial Reporting Standards 2008 by Eva K. Jermakowic

FINANCIAL MARKETS & INSTITUTIONS

Course Code:FIN4202 **Credit Units: 03**

Introduction
This course is an introduction to the theory and principles of international financial markets and institutions. It covers basic theory and operation of financial systems. A practical approach is adopted in this course through the use of case studies and real life examples.

Course Objective:

- To provide students with an introduction to the theory and practice of financial markets and institutions.
- To helps students to gain a thorough understanding of the workings of financial markets and of financial instruments
- To introduce the students to the management of financial markets and institutions in an international context.

Course Contents:

Module-I: Introduction to the Financial System
Introduction to Indian Financial System, Assets and liabilities, portfolio, financial instruments, stocks and flows, lending, borrowing, and wealth, weakness of Indian Financial System.

Module-II: Money Market
Call money market, Treasury bills market, Commercial bills market, Commercial papers and certificates of deposits, Discount and Finance House of India, Government Securities Market, Recent developments.

Module-III: Capital Market
Impact of monetary policy, Industrial securities market, Primary market and Secondary market. Nature and role of financial system: Financial system and markets, Efficiency and stability, Technology, Government intervention in the financial system, SEBI, Discount market, 'parallel' markets, capital markets, stock markets, bonds, equities, mutual fund, hedge funds, private equity, financial crisis, custodial services, stock exchanges, depository services: NSDL, CDSL.

Module-IV: Institutions: Banking
Evolution of modern commercial banks, Evolution of bank assets, liabilities and activities; Banking structure, Merchant Banking, Matching revenues and costs, capital adequacy; Accounting policies and related matters, Direct investments, and credit programmes. Central banking and monetary policy: Central banking functions; Money creation, process and control; monetary policy.

Module-V: Other Financial Institutions
NBFC Evolution and present status. Insurance Companies: Economics of insurance, The insurance industry and its regulation; LIC, GIC. Development finance institutions: Concept, role of DFIs, Sources of funds, DFIs in India, Khan Committee Report and Universal banking; Recent trends. Ministry of Finance- Fiscal Policy, IRDA, NPS

Module-VI: International Financial Markets
The world capital market, the New Tiger Economics, Trends in the global financial markets

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT - Class Test; A - Attendance; EE - End Semester Examination)

Text & References:

- *Gordon and Natarajan, Financial Markets and Services, Himalaya Publishing House.*
- Khan, M.Y, Financial Services, Tata McGraw Hill.
- Jeff Madura, Financial Markets and Institutions, South-Western College Publishing.
- B.C Vasant Desai, The Indian Financial System, Himalaya Publishing House.
- Bhole L.M, Financial Institutions and Markets, Tata McGraw Hill.

FINANCIAL STATEMENT ANALYSIS

Course Code: FIN4203 **Credit Units: 03**

Course Objective:
This course is designed to prepare students to interpret and analyze financial statements for tasks such as credit and security analyses, lending and investment decisions, and other decisions that rely on financial data. This course explores in greater depth financial reporting from the perspective of financial statement users. Students develop a sufficient understanding of the concepts and recording procedures and therefore are able to interpret various disclosures in an informed manner. Students learn to compare companies financially, understand cash flow, and grasp basic profitability issues and risk analysis concepts. Ultimately, students who complete this course develop a more efficient and effective approach to researching, interpreting, and analyzing financial statements.

Course Contents:

Module-I: Introduction to Financial Statements
Income Statement- Introduction, Revenue Recognition, Expense recognition, Comprehensive income, Accrual concept, Balance Sheet-Introduction, Components, measurement base of Balance sheet, Cash Flow statement- Format, Analysis of Cash flow statement.

Module-II: Financial Ratios
Introduction, Financial Analysis tools and techniques, Internal liquidity ratios, operating profitability ratios, Return on investment ratios, financial risk ratios, growth potential ratios, Return on equity and du pont system, Basic earning per share, dilutive earning per share, uses and limitations of ratio analysis.

Module-III: Analysis of Assets
Investment securities, Inventory analysis- conversion of inventory methods, long term assets- capitalizing vs. expensing, depreciation accounting, capitalizing intangible assets, Asset Impairment, natural assets.

Module-IV: Aanlysis of Liabilities
Introduction, Income Tax- terminology, Deferred tax accounting, Long term bonds- total interest cost component, retirement or conversion of bonds, interest rate impact on bond value, Leases- operating vs. financing lease, determining the value of lease and lease assets.

Module-V: Red Flags
Introduction, Accounting shenanigans, causes of accounting shenanigans, finding shenanigans.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required text:
- Prescribed Textbook:
- "The Analysis and use of Financial Statements", (3rd Ed.), Gerald I. White, Ashinpaul C. Sondhi and Dov Fired, Wiley-India.
- Financial Reporting and Analysis CFA level 1, latest edition

SPECIALISATION- HUMAN RESOURCE

MEASUREMENT IN HUMAN RESOURCE

Course Code: HRM4201 **Credit Units: 03**

Course Objective:
This course helps practice the tools and techniques which can be subsequently used to quantify several parameters of the effective management of human capital, including the functions of HR. It provides a set of powerful skills to communicate with and influence key decision-makers within an organization.

Course Contents:

Module I: Introduction and the Challenges of Measurement
Introduction: Meaning & Definition of HR Measurement – Importance; Development of Concept. HR Measurement for HR Professionals; Investment in Human Resources. Efficient use of Human Resource, Adopting the Right Perspective: Understanding the Role of Workforce in Strategy Implementation

Module II: Developing Measurement Metrics
Understanding and Developing the Right Metrics: Tools to Manage the Implementation of Strategy, Implementing The Metrics. Benchmarking HR, Different Types of Scorecards- Balance Score Card, HR Score Card

Module III: Designing the Metrics
Principles of Good Measurement. Cost-Benefit Analyses for HR Interventions
Measuring HR Alignment. Measuring Hiring and Staffing, Measuring the Value of Compensation and Benefits. Measurement of Training and Development

Module IV: Specific Topics in Measurement
Measuring the Value of Employee Relations and Retention Program, Models for Assessing Return on Investment, Assesing Value of Outsourcing and Call Centers .

Module V: TQM and HR Audit
Role of TQM in HR Measurement. HR Audit, Implementing HR Audit, Methodology and Issues, HRD Scorecard, HRD Audit – The Indian Experiences and Cases, People Capability Maturity Model (PCMM), Measuring Intellectual Capital and Web Based HR Systems

Module VI: Human Resource Information System
Role of Information System in Human Resource Decision Making, Designing and Implementation of HRIS, Organizing Data, Personnel Audit and Personnel Research, Computer Applications in HRM Functions (uses and trends)

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Fitz-EnzJac,(2001), How to Measure Human Resource Management, McGraw Hill
- Mello Jeffrey A., (2008), Strategic Human Resource Management, Thompson Press.
- Rao T.V.(1999), HRD Audit, Response Books

TALENT ACQUISITION AND DEVELOPMENT

Course Code: HRM4202 **Credit Units: 03**

Course Objective:
The course aims at clear understanding of the concepts of recruitment, selection, retention and development of human capital from the perspective of organizational excellence.

Course Contents:

Module I: Job Analysis and HR Planning
Job Analysis, Writing Job Descriptions, Job Specification, Job Analysis in a Jobless World and Human Resource Planning and Forecasting

Module II: Recruiting and Selection
Developing and Using Application Forms: The Application Blank, Information Technology and HR: Recruiting on the Internet, Global Talent Search, Selection Process, Basic Selection Model: The Decision Theory Approach, Basic Testing Concepts and Interviewing Candidates

Module III: Retention Management
Basics of Absenteeism, Turnover, Attrition and Retention of HR, Importance of retention, Retention Determinants, Retention Management Process, Retention interventions

Module IV: Process and evaluation of Training and development
Establishing objectives, preparing the parameters, designing the programs, methods, trainers and training styles, Training for Trainers, Trainer Certifications, Training Evaluation – Need for evaluation, Concept of Return on Investment, Cost – Benefit Analysis.

Module V: Training and Development for Modern Organizations
Concept and Need for Learning Organizations, Creativity, Managing Change, Team Playing and Effective Group Dynamics, Managing differences at workplace, Effective Communication, Managing Cultural Diversity, Sensitivity Training, Total Quality Management, Computer Based Training.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Raymond Noe (2016) Employee Training & Development, McGraw-Hill Education.
- Dipak Kumar Bhattacharyya (2015), Training and Development: Theories and Applications, Sage Publications Pvt. Limited.
- Dessler, G. (2011), Human Resource Management, Prentice Hall of India
- Lynton R.P and Pareek U (2011). Training for Development. SAGE Publications, New Delhi
- Srivastava, S., (2001), The Employee Recruitment and Retention Handbook, Amacom.
- Wexley, K & Lathan Gary, (2012), Developing & Training HR in Organization., Prentice Hall India

GLOBAL HUMAN RESOURCE MANAGEMENT

Course Code: HRM4203 **Credit Units: 03**

Course Objective:
The main objective of this course is to inculcate deep understanding of International Human Resources and to explore the dynamics of global business development. It also aims at preparing students about examining significant business opportunities and maximization of returns with understanding of cross cultural management, as primary causes of failure in multinational ventures stem from lack of understanding of the essentials differences in managing human Resources, at all levels in foreign environment.

Course Contents:
Module I: Internationalization
Evolution of International Business, Stages of internationalization, Modes of entering International business Relationship between International Strategy and SIHRM- International Human Resource Management – Competencies for Global Manager

Module II: Organisation Structure, International HRP, Recruitment and Selection
Organisation Structure and HRM, Global Human Resource Planning, Issues in Supply of International Human Resources, Recruitment and Selection

Module III: International Compensation Management
Complexities, Objectives of International Compensation Management, Component and Structure of International Compensation Package, Executive Rewards and Compensation, Approaches to International Compensation Management

Module IV: Human Resource Professional – Molester Navigation
Context for International Perfect Management, Framework for Performance Management, Re-partriation, Cross-Cultural issues across all continents

Module V: Understanding Cross Culture: Issues & Perspectives
Understanding Culture, Introduction, Key Concepts, Determinants of Cultural Identity,
Frameworks for Mapping the Culture, Geert Hoefstede, Clyde Cluckhohn, TE Hall, FonsTrompenaars Studies of National Culture, Managing Workforce Diversity, Adjusting to the New Culture

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- K. Aswathappa, Dash Sadhna (2007), International Human Resource Management: Text and Cases, Tata McGraw Hill Education.
- Anne-Wil Harzing, Ashly Pinnington (2017), International Human Resource Management, Sage Publications India Private Limited; Fourth edition.
- Bhatia S.K. (2005), International Human Resource Management, Deep & Deep Publications
- Evans Paul, Vladimir Pucik, Jean-Louis Barsoux (2010), The Global Challenge – Frameworks for International Human Resource Management, Mc Graw Hill
- Rao P L,(2008), International Human Resource Management, Excel Books

SPECIALISATION – INTERNATIONAL BUSINESS

INTERNATIONAL TRADE PROCEDURES AND DOCUMENTATION

Course Code: IBM4201 **Credit Units: 03**

Course Objective:
Learning the importance and procedural & documentation aspects of export-import of goods and services; impart knowledge of governments, departments, international institutions involved ; teach an Export Manager to develop a systematic methodology to handle exports ; understand the relevance and importance of various government policy measures for export as well as import.

Course Contents:
Module I: Introduction
Export documentation Framework – the need, entities & documents as per requirement of (a) the contract (b) Govt. of India (c) Importing country d) for claiming export assistance.

Module II: Documents for processing export order and legal implications
Processing of Product enquiry/quotation, Purchase/Export Order, Letter of intent, Payment Terms, International Transport Modes, INCOTERMS, advising & scrutiny of a Letter of Credit (L/C), seeking L/C amendments, International Chamber of Commerce's UCPDC articles.

Module III: Export/Import Documents
How to make Commercial, Financial, Transport, Title, Official, Insurance, Export assistance Documents & Certificates for Exports.Ensuring error-free export documentation as per L/C. How to open L/C, apply for license and make Customs/ Sales Tax documents for imports. International Transactions involving Documents Against Payment and Document Against Acceptance. Negotiation of Export Bills, Bank realization, late payment follow-up.

Module IV: Central Excise, Sales Tax, Customs and Port Clearances
Clearance of Export & Import Cargo, Role of Clearing and Forwarding Agents, Shipment of Export Cargo, Excise, Sales Tax & Customs Department regulation compliance. Port and Shipping clearance of Export and Import cargo.

Module V: EXIM Policy Framework
EPCG Scheme, Duty Exemption Pass Book Scheme, Export Oriented Units, Export houses, Trading houses, Export Processing Zones, Special Economic Zone, Bank, RBI, DGFT, Customs & FEMA regulatory compliances.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Export Import Procedures, Documentation and Logistics: C. Rama Gopal, New Age International Publishers, New Delhi
- Nabhi (2011-12)1999, How to Export, Nabhi Publications
- RBI MuMGTi, Export Procedures and Documentation
- Handbook of Exim Procedures and Documentation – Govt. of India Publication Division
- Handbook of DGFT Publications – Ministry of Commerce, Govt. of India.

GROWTH PROSPECTS OF THRUST AREAS OF INDIAN EXPORTS

Course Code: IBM4202 **Credit Units: 03**

Course Objective:
The course will enable the students to understand trend and composition of India's export and also the existing and potential export destination of Indian products. The course will also help the students to understand how Foreign Trade policy of India has promoted export from India.

Learning Outcomes:
On the successful completion of this course the student will be able to:
- Examine the past and present scenario and trend of Indian exports
- Understand the factors effecting India's international trade
- Assess the status, potential, challenges and strategies for furthering exports in key thrust markets

Course Contents:

Module I: Introduction
India's International Trade-Present Scenario
Trends in India's Export
Future outlook.
Common Provisions for Export from India Schemes

Module II:Institutional Framework for Export Promotion of Thrust Sectors
Role of EPCs and other Trade Promotion bodies is promoting Export from India
Role of EoUs, EHTPs, STPs, BTPs and SEZs in India's Export

Module III: Foreign Trade Policy-2015-20
India's foreign trade and investment policy;
Policy making body and mechanism
Special Focus Initiatives
General Provisions Regarding Imports and Exports
Promotional Measures
Duty Exemption / Remission Schemes
Export Promotion Capital Goods Scheme

Module IV: Focus on Specific Growth Sectors
Gems and Jewellery
Leather and Footwear
Apparel & Textiles
Agriculture and Processed Food
Marine Products
Engineering Sector
Pharmaceutical, Chemical and Allied Products
Handicrafts, Carpets and Handloom
IT Products
Services

Module V: Study of Specific Markets
USA: World biggest importer and Exporter
EU: Single Largest market
Countries under Trade Promotion Program of Ministry of Commerce
Trade with Russia under Debt-Repayment Agreement.
Focus Latin American Countries

Focus African Countries
Focus CIS
Focus ASEAN

Learning Methods:
Tutorials, Interactive sessions, Case studies, Field visits, Management games, Extensive research projects, Seminars, Weekend experience in companies - the course is covered by adopting a combination of lecture methods, class presentation by groups of students, self study sessions. Each student is required to do the back ground reading from the specified chapters of the prescribed book before coming to class. Cases are also to be analyzed, discussed in groups (teams) outside the class as preparatory work.

Examination Scheme:

Components	**P1**	**C1**	**A**	**H1**	**EE**
Weightage (%)	10	10	5	05	70

Text & References:
Text:
- Garg Pawan Kumar, 2002, Export of India's major products: Problem & Prospects, New Century Publications

References:
- Foreign Trade Policy of India 2009-14.
- Annual Economic Survey of India
- Press Releases of Department of Commerce
- Garg Pawan Kumar, 2002, Export of India's major products: Problem & Prospects, New Century Publications
- Foreign Trade Performance Analysis of Department of Commerce
- Pratima, Dikshit, Dynamics of Indian Export Trade, Deep & Deep Publications, 2002
- Weiss Kenneth D., Building an Import/Export Business, 3rd Edition, Wiley Authors:, 2002
- Website of Ministry of Commerce, www.commin.nic.in
- RBI Bulletins
- Newsletters of Trade Promotion Organisations and Export Promotion Councils.

PRINCIPLES OF GLOBAL BUSINESS MANAGEMENT

Course Code: IBM4203 **Credit Units: 03**

Course Objective:
The main purpose of this paper is to familiarize the participants with the various aspects of Principles of Global Management, with a view that conducting business is exciting, challenging and globally oriented. This course will provide the students with an integrated and practical approach to understand the concepts of Global Management and also to provoke critical thinking about various principles, guidelines and practices of Global Business Management.

Learning Outcomes:
The learning outcomes that students are expected to achieve in this course include:

- Develop a clear understanding of the conceptual frameworks and definitions of specific terms that are integral to the international management literature.
- Attain a clear understanding of the various factors that help determine the appropriateness of different management strategies for different types of international ventures.
- Examine ethical issues that are pertinent to international business management practices and to the personal value system of the student.
- Explore and evaluate different career opportunities, specific regional locations, and organizations where the students may seek to pursue an international business management career

Course Contents:

Module I: Globalization and trends in Management System
Introduction to Globalization; Globalization of Business: Historical Perspective; Measuring Globalization; Drivers of Globalization; Concept of International Business; Domestic versus International Business; Managing in Global Marketplace

Module II:International Trade Theory
Introduction and basis of Trade Theories; Theory of Mercantilism; Theory of Absolute Advantage; Heckscher-Ohlin Theory; The Product Life Cycle Theory; Theory of Competitive Advantage; Theory of Comparative Advantage; Porter's Diamond Model

Module III:International Institutions and Economic Integrations
World Trade Organization; World Bank; International Monetary Fund and Concept of SDR; International Monetary System; Framework of PTAs and FTAs; India's Participation in PTA's; Major Regional Trade Agreements-NAFTA,SAFTA,APTA,GCC,SAARC,BRICS.

Module IV: Forms and Modes of Global Business Expansion
Reasons for International Business Expansion; Entry Decisions; Different Entry Modes; Selecting an entry mode; Comprehensive Model for Market Entry; Strategic Alliances; Modes of FDI and FII; Concept and significance of balance of payments account; Balance of payment deficits and correction policies.

Module V:Elements of Global Business Environment & Functional Areas of Global Business
The Cultural Environment; The concept of culture; The strategy for managing across culture; Cross-cultural differences & similarities; The Political and Legal Environment; The Political system and its functions; Impact of Political system on management decision; Legal & political strategies in International Business; The Economic Environment Facing Global Business; Classifying Economic System; Key Macroeconomic issues; Adapting to Foreign Economic System; Global Marketing; Global Production and Operational Strategies; Global Human Resource Management; Global Accounting and Financial Management; Global Strategic Management

Learning Methods:
Tutorials, Interactive sessions, Case studies, Field visits, Management games, Extensive research projects, Seminars, Weekend experience in companies - the course is covered by adopting a combination of lecture methods, class presentation by groups of students, self study sessions. Each student is required to do the back ground reading from the specified chapters of the prescribed book before coming to class. Cases are also to be analyzed, discussed in groups (teams) outside the class as preparatory work.

Examination Scheme:

Components	**H1**	**P1**	**C1**	**H2**	**A**	**EE**
Weightage (%)	5	10	5	5	5	70

Text & References:

- Hill Charles W I and Jain Arun Kumar (2009) International Business: Competing in Global Marketplace, Tata McGraw Hills Publishing Co. Ltd.
- Weihrich Heinz, Cannice Mark and Koontz Harold (2010), Management: A Global and Entrepreneurial Perspective, Tata McGraw Hills Publishing Co. Ltd.
- Daniels John, Radedaugh Lee and Sullivan Daniel(2010), International Business, Pearson Education, 13th Edition.
- Luthans Fred and Doh Jonathan. (2008), International Management Cultural Strategy and Behaviour, Tata McGraw Hills Publishing Co. Ltd.
- Wild John J., Wild Kenneth L. and Han Jerry C.Y.(2010), International Business: The Challenges of Globalization, Prentice Hall, 5th Edition
- Daily Newspaper: Business Standard, Economic Times, Business Line, The Financial Express
- Periodicals: The Week, Economist, Business World, Business Week

GLOBAL HUMAN RESOURCE MANAGEMENT

Course Code: IBM4204 **Credit Units: 03**

Course Objective:
The main objective of this course is to inculcate deep understanding of International Human Resources and to explore the dynamics of global business development. It also aims at preparing students about examining significant business opportunities and maximization of returns with understanding of cross cultural management, as primary causes of failure in multinational ventures stem from lack of understanding of the essentials differences in managing human Resources, at all levels in foreign environment.

Course Contents:

Module I: Internationalization
Evolution of International Business, Stages of internationalization, Modes of entering International business Relationship between International Strategy and SIHRM- International Human Resource Management – Competencies for Global Manager

Module II: Organisation Structure, International HRP, Recruitment and Selection
Organisation Structure and HRM, Global Human Resource Planning, Issues in Supply of International Human Resources, Recruitment and Selection

Module III: International Compensation Management
Complexities, Objectives of International Compensation Management, Component and Structure of International Compensation Package, Executive Rewards and Compensation, Approaches to International Compensation Management

Module IV: Human Resource Professional – Molester Navigation
Context for International Perfect Management, Framework for Performance Management, Re-partriation, Cross-Cultural issues across all continents

Module V: Understanding Cross Culture: Issues & Perspectives
Understanding Culture, Introduction, Key Concepts, Determinants of Cultural Identity,
Frameworks for Mapping the Culture, Geert Hoefstede, Clyde Cluckhohn, TE Hall, Fons Trompenaars
Studies of National Culture, Managing Workforce Diversity, Adjusting to the New Culture

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- K. Aswathappa, Dash Sadhna (2007), International Human Resource Management: Text and Cases, Tata McGraw Hill Education.
- Anne-Wil Harzing, Ashly Pinnington (2017), International Human Resource Management, Sage Publications India Private Limited; Fourth edition.
- Bhatia S.K. (2005), International Human Resource Management, Deep & Deep Publications
- Evans Paul, Vladimir Pucik, Jean-Louis Barsoux (2010), The Global Challenge – Frameworks for International Human Resource Management, Mc Graw Hill
- Rao P L,(2008), International Human Resource Management, Excel Books

SPECIALISATION – INFORMATION TECHNOLOGY

FUNDAMENTALS OF COMPUTERS

Course Code: ITM4201 **Credit Units: 03**

Course Objective: The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of computers.

Course Contents:

Module-I: Introduction to Computers

Introduction of Computer, Generations of Computer, Importance, Characteristics, Block Diagram: Input unit, Output unit, Memory unit, CPU (ALU +CU), Input and output devices, Computer Memory: Cache, Primary memory and Secondary memory.

Module-II: Number System

Data Representation: Number systems, character representation codes, Binary, Octal, hexadecimal and their inter conversions. Binary addition & subtraction

Module-III: Computer Software

Introduction to computer software: Hardware/Software interaction, fetch-Decode-Execute Cycle, Software Classification- System software, Application Software, Utility Software, Communication Software, Performance monitoring Software, Freeware, shareware and open source software

Module-IV: Operating Systems

Introduction to Operating Systems, Functions- job management, batch processing, online processing, data management, virtual storage, I/O management. Classification- Desktop, server, mainframe, multitasking, multithreading, real time.

Module-V: Applications of Computers

Applications of Computers in business & industry, home, education & training, entertainment, science medicine & engineering, mobile computing, business on the web, web advertising, secure transactions.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

Text:

- Alexis Leon & Mathews Leon, “Fundamentals if Information technology”, second edition, Leon Press ISBN 978-81-8209-245-7
- Shrivastava-Fundamental of Computer& Information Systems (Wiley Dreamtech)
- P.K. Sinha and Priti Sinha, “Computer Fundamentals”, BPB publication.

References:

- ITL ESL – Introduction to Information Technology (Pearson, 2nd Edition).

MANAGEMENT INFORMATION SYSTEM

Course Code: ITM4202 **Credit Units: 03**

Course Objective:
This course focuses on the relationships among management, information, and systems as well as the relationship between a manager's need for information and his/her position in the organization, how hardware, software, data, people, and procedures are combined to form an information system, how information technology can be used by a business organization to gain a competitive advantage why a knowledge of information systems is crucial to anyone who plans a career in business Organization.

Course Contents:

Module I: Organizations, Management and Information
Meaning of MIS, Components of MIS, IS in Business, Data Information and knowledge, Characteristics of Information in context, Issues with Information, System and Subsystems, Organization as a System, Different Organizational Structures: Hierarchical Structure – (Different Levels of Management, Information disposition at different levels), Matrix Structure, Business Process (Management, Operational and Support).

Module II: Information Technology Architecture
Managing Hardware Assets – Considerations in Procurement and installation, Managing Software Assets – Consideration in procurement and configuration, Data Resource Management (Database Management System – Types and Structure of Database, Data Warehousing – Phases in building Data Warehouses in an organization, Data Mining – Data Mining Applications, Data Banking)

Module III: Management and Organizational Support Systems for the Firm
Information, Decision and Management, Decision Support System (Phases in Decision Making, Problems and Decision Types, DSS components, and Analytical Models in Decision Making), Executive Information System – Characteristics and benefits, Managing Knowledge (Knowledge Engineering, Knowledge Management Activities and Knowledge Representation Methodologies), Artificial Intelligence (Domains of AI, AI in Business), Expert System (Components, Benefits and Limitations, Suitability Criteria for ES)

Module IV: Building Information Systems in the Digital Firm
Organizational Planning – Planning at distinct Managerial Levels, Approaches in Planning (Top Down, Bottom Up, Planning through CSF), IT and IS Planning – Prerequisites and factors, IT and IS Architecture (Centralized, Decentralized and Distributed), Implementing IT and IS (Factors and Resistance in implementation), Change Management with BPR, System Development (System Development Life Cycle-Overview, Prototyping), Evaluating Factors for IT and IS services.

Module V: Managing Information Systems in the Digital Firm
Managing Security (Security Challenges of IT, Business and Technological Ethics), Computer Crime (Tools for Computer Crime, Tools for Security Management), IS Security Management Control (Information System Control, Auditing the Security), Managing World Wide Information System (Managing Multi Site IT and IS – Cultural and Technical Differences), World Wide IT and IS Strategies (Multinational, International and Global Strategies)

Module VI: Key System Applications for the Digital Age
Enterprise Systems – Supply Chain Management & Customer Relationship Management Systems, Using Enterprise Applications and Achieving Operational Excellence & Customer Intimacy, E-Commerce: Digital Market & Digital Goods, M-Commerce: Services & Applications, Enterprise Applications: New Opportunities and Challenges.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V -** Viva; **Q -** Quiz; **CT -** Class Test; **A -** Attendance; **EE -** End Semester Examination

Text & References:

- MIS- A Digital Firm Perspective, W S Jawadekar, 4th Edition, McGraw Hill
- MIS by O'Brien, Ninth Edition, McGraw Hill

INTERNET FUNDAMENTALS

Course Code: ITM4203 **Credit Units: 03**

Course Objectives: The aim of this course is to provide conceptual and technological developments to the students in the field of Internet and web designing with the emphasis on comprehensive knowledge of Internet, its applications and the widely deployed protocols.

Course Contents:

Module-I: Introduction to Internet:

Internet, Growth of Internet, Owners of the Internet, Anatomy of Internet, ARPANET and Internet history of the World Wide Web, basic Internet Terminology, Net etiquette. Internet Applications – Commerce on the Internet, Governance on the Internet, Impact of Internet on Society – Crime on/through the Internet.

Module-II: ISP and IP Addressing

Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, standard address, domain name, DNS, IPv4, IPv6.Modems and time continuum, communications software; internet tools.

Module-III: Internet Protocols & Electronic Mail

Introduction to email- creating User ids, Passwords, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management and protocols- SMTP, POP3, IMAP, MIME, Newsgroups, mailing lists, chat rooms. Introduction to internet protocols- TCP/IP, OSI, Telnet and FTP

Module-IV: Web Browsing and HTML

Introduction, Miscellaneous Web Browser details, searching the www: Directories search engines and meta search engines, search fundamentals, search strategies and keywords, working of the search engines. Basics of HTML & formatting and hyperlink creation.

Module-V: Internet Security:

Security and Privacy issues on Internet, Introduction to Cryptography, Public Key & Private Key Cryptography, Encryption schemes, Secure Web document security protocols, Digital Signatures, Firewalls.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text Book:

- Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp – 2001, TMH
- Internet & World Wide Programming, Deitel, Deitel & Nieto, 2000, Pearson Education

Reference Books:

- Complete idiots guide to java script,. Aron Weiss, QUE, 1997
- Ivan Bayross, "Web Enabled Commercial Application Development using HTML, Javascript, DHTML and PHP", 4th edition, BPB Piblications

WEB DESIGN USING HTML

Course Code: ITM4204 **Credit Unit: 03**

Course Objective:
To make the students understand the basics of web designing and to impart knowledge about the web page and website creation and making the students aware about the technologies available and their applications.

Course Contents
Module I: Web Design Introduction
Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design Concept, Brief History of Internet, What is World Wide Web. Why create a web site, Web Standards, Audience requirement.

Module II: HTML Basics
What is HTML, HTML Documents, Basic structure of an HTML document, creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Module III:Elements of HTML
Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls. XML, Java Script

Module IV: CSS
CSS Introduction: CSS Syntax, CSS Id & Class, CSS How. **CSS Styling:** Styling Backgrounds, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables. **CSS Box Model:** CSS Border, CSS Outline, CSS Margin, CSS Padding

Module V: CSS Advanced
CSS Grouping/Nesting, CSS Dimension, CSS Display, CSS Positioning, CSS Floating, CSS Align, CSS Pseudo-class, CSS Pseudo-element, CSS Navigation Bar, CSS Image Gallery, CSS Image Opacity, CSS Image Sprites. CSS Media Types, CSS Attribute Selectors

Module VI: Dreamweaver & Web Site
Dreamweaver Basics, Dreamweaver shortcuts, Dreamweaver panels, Dreamweaver toolbars, Dreamweaver automation, Source code formatting
Web Site: Creating the Web Site, Saving the site, working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- HTML 5 in simple steps, Kogent Learning Solutions Inc Dreamtech Press
- A beginner's guide to HTML NCSA
- Creating a Web Page and Web Site, Murray,Tom/Lynchburg
- HTML, XHTML, and CSS Bible ,Steven M. Schafer, 5ed Wiley India
- Beginning HTML, XHTML, CSS, and JavaScript, John Duckett Wiley India
- Beginning CSS: Cascading Style Sheets for Web Design ,Ian Pouncey, Richard York Wiley India
- Learning Web Technologies: HTML, Javascript , Kogent Wiley India

SPECIALISATION – MARKETING & SALES

MARKETING RESEARCH

Course Code : MKT4201 **Credit Units: 03**

Course Objective:
To facilitate the understanding and learning of fundamental concepts in the area of marketing research. To provide the students with research tools and techniques to conduct research and make effective analysis for effective decision making.

Course Contents:
Module-I: Introduction and Early Phases of Marketing Research
Introduction to Marketing Research: Objectives , Overview , Definition of Marketing Research , A Classification of Marketing Research, The Marketing Research Process; Defining the Marketing Research Problem and Developing an Approach: Importance of Defining the Problem ,The Process of Defining the Problem and Developing an Approach, Marketing Research Problem ,Defining the Marketing Research Problem, Components of the Approach.

Module-II: Research Design Formulation
Research Design : Definition, Exploratory Research, Descriptive Research, Cross-Sectional Designs, Longitudinal Designs, Relative Advantages and Disadvantages of Longitudinal and Cross-Sectional Designs, Causal Research, Relationships Among Exploratory, Descriptive, and Causal Research, Potential Sources of Error, Marketing Research Proposal; **Exploratory Research Design-Secondary Data:** Criteria for Evaluating Secondary Data, Classification of Secondary Data; **Exploratory Research Design- Qualitative Research**: Primary Data: Qualitative Versus Quantitative Research, Rationale for Using Qualitative Research , A Classification of Qualitative Research Procedures; **Descriptive Research Design**: Survey and Observation; **Causal Research Design**: Experimentation; Measurement and Scaling: Fundamentals and Comparative Scaling and non-comparative Scaling Techniques; **Questionnaire:** Preparations and errors; **Sampling:** Design and Procedures , Final and Initial Sample Size Determination.

Module-III: Data Collection and Preparation
Fieldwork, Data Preparation, The Data-Preparation Process, Questionnaire Checking, Editing ,Treatment of Unsatisfactory Responses, Coding, Coding Questions , Developing a Data File, Transcribing, Data Cleaning, Consistency Checks, Treatment of Missing Responses, Statistically Adjusting the Data, Scale Transformation, Selecting a Data Analysis Strategy .

Module-IV: Analysis
Frequency Distribution, Cross-Tabulation, and Hypothesis Testing, Analysis of Variance and Covariance, Correlation and Regression, Discriminant and Logit Analysis, Factor Analysis, Cluster Analysis, Multidimensional Scaling and Conjoint Analysis, Structural Equation Modeling and Path Analysis,

Module-V: Reporting
Report Preparation and Presentation, Importance of the Report and Presentation The Report Preparation and Presentation Process, Report Preparation, Report Format.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Suggested readings:

- Aaker, D. (2009). *Marketing Research* (9th ed.). San Francisco: Wiley
- Bradley, N. (2008). *Marketing research: Tools and techniques* (2nd ed.).Delhi: Oxford University Press.
- Burns, A. C., & Bush, R. F. (2007). *Marketing research* (6th ed.). New Delhi: Prentice Hall.
- Churchill, G., Iacobucci, D., & Israel, D. (2009). *Marketing research: A South Asian perspective*. Delhi: Cengage Learning India.
- Malhotra, N. (2006*). Marketing research: An applied orientation* (6th ed.). New Delhi: Pearson Education.
- Zikmund, W. G., & Babin, B. J. (2009). Exploring marketing research (10thed.). USA: Cengage South-Western.

MARKETING OF SERVICES

Course Code: MKT4202 **Credit Units: 03**

Course Objective:
The course has been designed to equip students to become more effective managers of any service organization by familiarizing them with the basic characteristics of services, their implications on design and delivery, and the ways to achieve sustainable competitive advantage by managing critical parameters.

Course Contents:
Module I: Understanding Services and Consumer Behavior
Service Sector and its structure. Drivers of service sector growth. Nature of services: Tangibility Spectrum; Defining the service offering; Flower of Service. Goods vs. Services; the service marketing challenges and implications for marketers for each service characteristic. Categorizing Service Processes.Self Service Technologies. Consumer behavior in services; Search, Experience and Credence attributes. Service Encounters and the types; Moments of Truth. The expanded Services Mix.

Module II: Focus on Customers
Customers' expectations of service.Desired and Adequate service, Zone of Tolerance.Managing customer expectations and perceptions in services.Service Quality Dimensions.Customer Satisfaction vs. Service Quality.The impact of service failure and recovery.Types of Customer Complaint Actions and Complainers.Service Guarantees.Service Recovery Strategies.

Module III: Aligning Strategy, Design and Delivery
Service Blueprinting.Operational service product designing and adding value.Evidence of service and Servicescape.The Service Triangle.Boundary–Spanning Roles.Strategies for closing the delivery gap.

Module IV: Delivering Services through Intermediaries. Managing Demand and Capacity. Pricing Services
Role of Distribution in Services. Channel Conflicts and other key problems. Key Intermediaries for Service Delivery.Understanding Demand and Capacity constraints.Strategies for matching Capacity and Demand. Approaches to Pricing Services

Module V: Service Sector Study (Group Project)
Exposure to various growing Service Sectors, viz.: Banking, Insurance, Hospitality, Education, Telecom, and Health Care etc.Live-Project by each group, on any one of the growing sectors of services; Group Presentations / Viva on assigned date.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Valarie A Zeithaml Mary Jo Bitner, Dwayne Gremler, Ajay Pandit. (2007), Services Marketing: Integrating customer focus across the firm, Tata McGraw Hill
- Christopher Lovelock. (2010), Services Marketing: People, Technology, Strategy. Pearson Education, Indian subcontinent adaptation.
- RajendraNargundkar, (2006), Services Marketing: Text and Cases. Tata McGraw-Hill Publishing Co. Ltd.
- Harsh V. Verma, (2010), Services Marketing, Text and Cases. Pearson Education.

DISTRIBUTION AND LOGISTICS MANAGEMENT

Course Code: MKT4203 **Credit Units: 03**

Course Objective:
The course is meant for managers under formation. Rapid innovations in technology, especially in the field of distribution and logistics, have made corporate operations complex. Thus, this course develops the framework for channel creation and formation. It reflects the importance of channel management issues and helps the students in understanding the company's route to markets and the downstream part of value chain.

Course Contents:
Module I: Introduction to Distribution
Distribution System- Role, Scope, Functions & Structure, Types of channels, Levels of channels, Cost, Control and Customer service, Selection of Channels, partners, Motivation of channels, Factors affecting channel design. Channel Design and Implementation – segmenting, targeting, gap analysis, establishment of new channels or refining existing channels, Recent developments in information technology

Module II: Channel Flows and Concepts
Channel Flows – definition and concepts, Relevance of channel structure on Membership Issues. Vertical Integration of Marketing Channels – costs, benefits, and need.

Module III: Channel Institutions
Retailing: Strategic Issues in Retailing. Merchandising Techniques: Franchising; nature and scope, Wholesaling, Assorting, Distribution of supplementary services, and Intermediaries for service delivery. New age technologies: SAP, ERP and Electronic channels.Vendor rating andManagement

Module IV: Power, Conflict & Controlling
Channel Conflict – nature and degree, sources, consequences, conflict resolution strategies, Channel Performance: Monitoring & evaluation, identifying power sources, and channel coordination.

Module V: Logistics System
Logistics System – concept, objective and scope, the system elements, transportation, warehousing, inventory management, packing and unitization, communication and control, importance, Strategic Logistics Planning – logistics strategy, implementation and management. Containerization and Chartering Containerization

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Bert Rosenbloom.(2008), Marketing Channels. South Western Cengage Learning.
- DK Agrawal.(2008), Logistics and Supply Chain Management. Macmillan India.
- Havaldar and Cavale.(2008), Sales and Distribution Management- Text and Cases. T ataMcGraw Hill.
- Stern & El-Ansary. (2009), Marketing channels. Pearson PHI Publication.
- V.V. Sople. (2010), Logistics Management.Pearson Publication.

STRATEGIC BRAND MANAGEMENT

Course Code: MKT4204 **Credit Units: 03**

Course Overview:
Countless ideas are generated every second. But only a few are able to materialize as real brands. With the proliferation of a wide variety of brands, consumers today are spoilt by choices. New brands are the lifeblood of all businesses. It is essential for an organization to develop new or modify existing brands to meet changing consumer needs and competitor's actions. Investing in their development isn't an optional extra – it is crucial to long term business growth and profitability. But embarking on the development process is risky. It needs considerable planning and proper management

Course Coverage:
This course will give and in-depth understanding of the development and management of brands. It traces and highlights the intricacies involved in balancing both brand and company strategic objectives. Students will be introduced to the meanings of new brands, why some new brands fail and others succeed, and the problems faced by marketers during the various stages of the development process. Finally, concepts and theories on branding, such as the naming of new brands, brand awareness, brand personality, brand loyalty, and how to build brand equity, will be discussed.

Learning Outcomes:
The overall objective of the course is to introduce students to fundamental concepts and principles of product and brand Management

- How product and branding strategies can be applied in the decision making framework
- Understanding of strategic branding process
- Various elements and components of brand and how they interact
- Analyze branding techniques and extension strategies
- Understanding of Brand equity

Course Contents:

Module I: Product Strategy Development
Elements of Product Strategy, Product Mix and Line decisions.Positioning Strategy, Product Strategy over Life Cycle, New Product Development Process

Module II: Introduction to Strategic Brand Management
Concept of branding, the challenges faced by brand managers, the value of a brand to customers and the organization, Branding Challenges & Opportunities, Strategic Brand Management Process

Module III: Elements to build Effective Brands
Criteria to choose brand elements, Creation of brand personality, brand personality scale, brand image sources, Brand identity dimensions

Module IV: Brand Re-vitalization
Brand & Line Extensions, Marketing Mix for Brand Extensions, Co – Branding. Upward and Downward stretching of brands.

Module V: Managing the Brand Systems
The brand equity concept, Brand Equity Models – Customer Based Brand Equity, Aaker Model, Brand hierarchy Brand Awareness, Brand Loyalty, Brand Associations, Brand Recognition, Recall. Brand Architecture.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Keller K.L. (2008), Strategic Brand Management: Building, Measuring, and Managing Brand Equity, Prentice Hall.
- Sengupta S. (2010), Brand Positioning, Tata McGraw-Hill
- Kapferer J. L. (1994), Strategic Brand Management, Free Press

Websites

www.interbrand.com
www.trendwatching.com
www.brandchannel.com

Other readings:

- Business Magazines ,News papers and other journals
- **Indian Journal Of Marketing (ISSN 0973-8703)**
- Journal of Marketing Management (ISSN 0267-257X)
- Students are advised to keep up-to-date in the subject matter by reading articles published in newspapers, marketing magazines, business newsletters, market visits, and even checking out new brand launches.

SPECIALISATION - E-COMMERCE

E-BUSINESS ESSENTIALS

Course Code: ECM4201 **Credit Units: 3**

Course Objectives

The course aims to make the students understand the nuts and bolts of forming an e-business and prepares students to evaluate the requirements of an e-business and develop e –business plans. As business environment is witnessing so many changes every day, it gets vital for business organizations to recognize and learn to create their presence in cyber space. This course pays particular attention to introducing the students to the world of e-business, the openings and the risks and makes them learn the strategies of making businesses successful worldwide.

Course Contents

Module-I: Introduction to E-Business

The impact of the electronic communications on traditional businesses, difference between e-commerce and e-business, E-business opportunities, Business adoption of digital technologies for e-commerce and e-business, E-business risks and barriers to business adoption, Management responses to e-commerce and e-business, Business models for e-commerce.

Module-II: Database & Network Requirements for E-Business

Database approach to data management, using databases to improve business performance and decision making, managing data resources, designing databases. Networking and Communication Trends, Key Digital Networking Technologies, communication networks,

Module-III: E-Business Web Design

Elements of site design, site navigation, site structure, page and content design, web accessibility. Components of a business model, classification of business webs, comparison and valuation of networks, price formation process. Internet, intranet and extranet, choosing an ISP and Internet terminology Acquiring e-business systems, development of web based content and services, Software and services for web-site development and testing , testing process, environment, database creation and data migration, content management and maintenance

Module-IV: E-Marketing & E-Procurement

E-Marketing: comparison of communication media, development model for online customers, online promotion strategies. E-procurement: strategic and operational procurement, information support for e-procurement, types, catalog management.

Module-V: E-Payment Systems

E-payments: credit card based procedures, SSL, SET, paypal and very-sign, Secure e-commerce transactions, principles, approaches to develop secure systems, digital certificates, symmetric and asymmetric encryption, digital signatures, PKI's and CA's

Module-VI: E-Distribution & M-Business

E-Distribution: components and types, online, offline and hybrid types, SCM and ESD: architecture, functions and services, digital watermarks. M-Business: mobile devices, mobile applications and mobile communication, mobile payments, mobile ticketing, mobile websites

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- A. Meier, H. Stormer, 2009, *E-Business and E-commerce: Managing the Digital Value Chain,* Springer
- D. Chaffey, 2009, *E-Business and e-commerce management,* 4th ed, Pearson/Prentice Hall.
- In Lee, 2007, *E-business innovation and Process Managemen,* Cybertech Publishing
- A. Cordella, A. Martin, M. Shaikh S. Smithson, 2011, *Management and innovation of e-business,* London School of Economics and Political Science
- Kenneth C. Laudon, Jane p. Laudon 2012: *Management information System: Managing the Digital Firm,* 12th ed, Pearson/Prentice Hall.

MANAGEMENT INFORMATION SYSTEM

Course Code: ECM4202 **Credit Unit: 03**

Course Objective:
This course focuses on the relationships among management, information, and systems as well as the relationship between a manager's need for information and his/her position in the organization, how hardware, software, data, people, and procedures are combined to form an information system, how information technology can be used by a business organization to gain a competitive advantage why a knowledge of information systems is crucial to anyone who plans a career in business Organization.

Course Contents:

Module I: Organizations, Management and Information
Meaning of MIS, Components of MIS, IS in Business, Data Information and knowledge, Characteristics of Information in context, Issues with Information, System and Subsystems, Organization as a System, Different Organizational Structures: Hierarchical Structure – (Different Levels of Management, Information disposition at different levels), Matrix Structure, Business Process (Management, Operational and Support).

Module II: Information Technology Architecture
Managing Hardware Assets – Considerations in Procurement and installation, Managing Software Assets – Consideration in procurement and configuration, Data Resource Management (Database Management System – Types and Structure of Database, Data Warehousing – Phases in building Data Warehouses in an organization, Data Mining – Data Mining Applications, Data Banking)

Module III: Management and Organizational Support Systems for the Firm
Information, Decision and Management, Decision Support System (Phases in Decision Making, Problems and Decision Types, DSS components, and Analytical Models in Decision Making), Executive Information System – Characteristics and benefits, Managing Knowledge (Knowledge Engineering, Knowledge Management Activities and Knowledge Representation Methodologies), Artificial Intelligence (Domains of AI, AI in Business), Expert System (Components, Benefits and Limitations, Suitability Criteria for ES)

Module IV: Building Information Systems in the Digital Firm
Organizational Planning – Planning at distinct Managerial Levels, Approaches in Planning (Top Down, Bottom Up, Planning through CSF), IT and IS Planning – Prerequisites and factors, IT and IS Architecture (Centralized, Decentralized and Distributed), Implementing IT and IS (Factors and Resistance in implementation), Change Management with BPR, System Development (System Development Life Cycle-Overview, Prototyping), Evaluating Factors for IT and IS services.

Module V: Managing Information Systems in the Digital Firm
Managing Security (Security Challenges of IT, Business and Technological Ethics), Computer Crime (Tools for Computer Crime, Tools for Security Management), IS Security Management Control (Information System Control, Auditing the Security), Managing World Wide Information System (Managing Multi Site IT and IS – Cultural and Technical Differences), World Wide IT and IS Strategies (Multinational, International and Global Strategies)

Module VI: Key System Applications for the Digital Age
Enterprise Systems – Supply Chain Management & Customer Relationship Management Systems, Using Enterprise Applications and Achieving Operational Excellence & Customer Intimacy, E-Commerce: Digital Market & Digital Goods, M-Commerce: Services & Applications, Enterprise Applications: New Opportunities and Challenges.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V**-Viva; **Q**-Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- MIS-A Digital Firm Perspective, W S Jawadekar, 4th Edition, McGraw Hill
- MIS by O'Brien, Ninth Edition, McGraw Hill

INTERNET FUNDAMENTALS

Course Code: ECM4203 **Credit Units: 3**

Course Objectives
The aim of this course is to provide conceptual and technological developments to the students in the field of Internet and web designing with the emphasis on comprehensive knowledge of Internet, its applications and the widely deployed protocols.

Course Contents:

Module-I: Introduction to Internet
Internet, Growth of Internet, Owners of the Internet, Anatomy of Internet, ARPANET and Internet history of the World Wide Web, basic Internet Terminology, Net etiquette. Internet Applications – Commerce on the Internet, Governance on the Internet, Impact of Internet on Society – Crime on/through the Internet.

Module-II: ISP and IP Addressing
Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, standard address, domain name, DNS, IPv4, IPv6.Modems and time continuum, communications software; internet tools.

Module-III: Internet Protocols & Electronic Mail
Introduction to email- creating User ids, Passwords, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management and protocols- SMTP, POP3, IMAP, MIME, Newsgroups, mailing lists, chat rooms. Introduction to internet protocols- TCP/IP, OSI, Telnet and FTP,

Module-IV: Web Browsing and HTML
Introduction, Miscellaneous Web Browser details, searching the www: Directories search engines and meta search engines, search fundamentals, search strategies and keywords, working of the search engines. Basics of HTML & formatting and hyperlink creation.

Module-V: Internet Security:
Security and Privacy issues on Internet, Introduction to Cryptography, Public Key & Private Key Cryptography, Encryption schemes, Secure Web document security protocols, Digital Signatures, Firewalls.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text Book:
- Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp – 2001, TMH
- Internet & World Wide Programming, Deitel, Deitel & Nieto, 2000, Pearson Education

Reference Books:
- Complete idiots guide to java script,. Aron Weiss, QUE, 1997
- Ivan Bayross, "Web Enabled Commercial Application Development using HTML, Javascript, DHTML and PHP", 4th edition, BPB Piblications

WEB DESIGN USING HTML

Course Code: ECM4204 **Credit Units: 03**

Course Objective: To make the students understand the basics of web designing and to impart knowledge about the web page and website creation and making the students aware about the technologies available and their applications.

Course Contents:

Module I: Web Design Introduction

Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design Concept, Brief History of Internet, What is World Wide Web. Why create a web site, Web Standards, Audience requirement.

Module II:HTML Basics

What is HTML, HTML Documents, Basic structure of an HTML document, creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Module III:Elements of HTML

Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls. XML, Java Script

Module IV: CSS

CSS Introduction: CSS Syntax, CSS Id & Class, CSS How. **CSS Styling:** Styling Backgrounds, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables. **CSS Box Model:** CSS Border, CSS Outline, CSS Margin, CSS Padding

Module V: CSS Advanced

CSS Grouping/Nesting, CSS Dimension, CSS Display, CSS Positioning, CSS Floating, CSS Align, CSS Pseudo-class, CSS Pseudo-element, CSS Navigation Bar, CSS Image Gallery, CSS Image Opacity, CSS Image Sprites. CSS Media Types, CSS Attribute Selectors

Module VI: Dreamweaver & Web Site

Dreamweaver Basics, Dreamweaver shortcuts, Dreamweaver panels, Dreamweaver toolbars, Dreamweaver automation, Source code formatting

Web Site: Creating the Web Site, Saving the site, working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- .HTML 5 in simple steps, Kogent Learning Solutions Inc Dreamtech Press
- A beginner's guide to HTML NCSA
- Creating a Web Page and Web Site, Murray,Tom/Lynchburg
- HTML, XHTML, and CSS Bible ,Steven M. Schafer, 5ed Wiley India
- Beginning HTML, XHTML, CSS, and JavaScript, John Duckett Wiley India
- Beginning CSS: Cascading Style Sheets for Web Design ,Ian Pouncey, Richard York Wiley India
- Learning Web Technologies: HTML, Javascript , Kogent Wiley India

Syllabus - Third Semester

STRATEGIC MANAGEMENT

Course Code: MGT4301 **Credit Units: 03**

Course Objective:
The course is designed to help students to understand the concept of strategy and strategic management process. Acquaint students with basic concepts and principles of strategic management, develop and prepare organizational strategies that will be effective for the current dynamic environment and likewise to impart the strategic management conceptual framework which will increase students' skills and knowledge in identifying and describing organizations' strategic posture and direction.

Course Contents:

Module I: Introduction and Purpose of Strategy Formulation
Evolution and Introduction of strategic management, Concept of Strategy, corporate, Business and Functional Levels of Strategy, Mission, Vision, Objectives, Approaches to four Phases in Strategic Management Process, Stakeholders in business and their roles in strategic management, Strategic decision making.

Module II: Environmental Analysis
Analyzing company's External Environment: PESTLE Analysis; Preparing an Environmental Threat and Opportunity Profile (ETOP), Analyzing Industry Environment: Industry Analysis – Poter's Five Forces Model of competition, Strategic Group analysis.

Module III: Analysis of Organizational Competencies
Analyzing Company's Internal Environment Resource based view of a firm, meaning, types & sources of competitive advantage, analyzing company's Resources and Competitive Position, VRIO Framework; Benchmarking as a method of comparative analysis, Competitive advantage; Concept of a Core competence and Distinctive competitiveness, Characteristics of Core Competencies; Value Chain Analysis Using Porter's Model; Organizational Capability Profile: Strategic Advantage Profile;

Module IV: Strategic Analysis and Choice
Generic Competitive Strategies: Meaning of Generic competitive strategies, Low cost, Differentiation, Focus – when to use which strategy; Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic alliances & Collaborative Partnerships), Retrenchment – Turnaround, Divestment, Liquidation, Outsourcing Strategies; Offensive and Defensive Strategies, Blue Ocean Strategy, Strategy in the age of Internet and E-commerce; Portfolio Analysis Business Portfolio Analysis – BCG Matrix – GE 9 Cell Model; Evaluation of Strategic Alternatives: SWOT Analysis, Grand Strategy Selection Matrix.

Module V: Strategy Implementation and Evaluation
Strategy Implementation, Barriers to implementation of strategy, Mc Kinsey's 7s Framework; Organization Structures for Strategy Implementation, Leadership Implementation, Functional Implementation, Strategic evaluation review and control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

- Kazmi, A. Business Policy and Strategic Management (2nd edition), Tata Mc Graw Hill
- Kachru, Strategic Management, Excel Books
- Wheelen and Hunger,(2008),Essentials of Strategic Management, Prentice Hall India.
- Ramaswamy and Namakumari,(1999), Strategic Planning: Formulation of Corporate Strategy Text and Cases, Macmillan India Ltd.,
- Jausch & Glueck,(1988), Business Policy and Strategic Management, (5th Ed.), McGraw Hill.
- Thomson & Strickland,(2008), Business Policy and Strategic Management, (12th Ed.), McGraw Hill.
- Carpenter, Strategic Management, Pearson
- Trehan, Strategic Manageemnt,Wiley
- Pearce John 'A & Robinson R.B,(1997), Strategic Management: Strategy Formulation and Implementation, (3rd Ed.), AI.T.B.S. Publishers & Distributors
- Regular reading of all latest Business journals: HBR, Business World, Business India, Business Today

SUMMER INTERNSHIP EVALUATION

Course Code: MGT4335 **Credit Units: 06**

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**)

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. **Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.**

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include **five sections** in the order described below.

1. **The Title Page –** An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content –** An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

- **Title or Cover Page**
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgements**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**
  A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

  Examples
  For research article
  Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic Escherichia coli O157: H7. Clin Microbiol Infect, 8(suppl 1): 116–117.
  For book
  Kowalski,M.(1976) Transduction of effectiveness in Rhizobium meliloti. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Internship File & Internship Report

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Examination Scheme:

Continuous Evaluation by faculty guide	15%
Continuous evaluation by CRC	15%
Feedback from industry guide	35%
Report, Presentation & Viva Voce	35%
TOTAL	**100%**

SPECIALISATION: FINANCE & ACCOUNTING

ADVANCE CORPORATE FINANCE

Course Code: FIN4301 **Credit Units: 03**

Course Objective:
The goal of this course is to develop the analytical skills for making corporate investment with regards to financial decisions and risk analysis. This course will examine various theories including the concept of present value, the opportunity cost of capital, discounted cash flow analysis, a consortium of valuation techniques, issues between short & long term financial management, risk and return, capital asset pricing model, capital budgeting, corporate capital structure and financing decisions, dividend policy, investment and financial decisions in the international context, including exchange rate/interest rate risk analysis, and issues of corporate governance and control. In essence, we will explore the very patterns of corporate finance that has shaped the familiar yet complex terrain of today's global economy.An equally important component of this course is its emphasis on developing your critical auditory and erudite writing skills to a level that is commensurate with university standards. The course teaching methodologies will be composed of lectures, homework assignments and a group project.

Course Contents:

Module-I: Introduction
Finance and Finance Manager, role of a Finance Manager, Ownership vs. Management, Do Managers really look after interest of shareholders. Expectations from a Finance Manager, Concepts of risk and return, Concepts of Time value of money.

Module-II: Common Stocks
How common stocks are traded, Valuation of common stocks, pricing vs valuation, today's price vs next year's price. Capitalization rate, DCF valuation and varying growth rates, link between stock price and earning per share, valuation format, Mini Case: Reeby Sports. Issuance of common stocks,

Module-III: Project Evaluation
Accounting Income vs Cash flows, Pros and cons of investment decision criteria, Why NPV leads to better decision making, Verdict on IRR, NPV vs IRR, XIRR, MIRR, Mutually Exclusive vs Independent Projects, Note on deprecation in estimating cash flows, choosing between long term and short term Equipments, optimal timing of investment, where positive NPV come from, Making sure managers maximize NPV,

Module-IV: Dividend Policy and Capital Structure
How Dividends are paid, Dividend controversy, stocks repurchase, relevance of dividends in perfect capital markets, dividend and taxes, how much a firm should borrow, cost of financial distress, does debt policy matter, effect of leverage in tax free economy, pecking order of financing choices,

Module-V: Short term financial planning and cash management
Links between short term and long term financial financing decisions, comforts of surplus cash, options for short term financing, dynamic financing, how much cash should firm hold, investing idle cash, money market investments,

Module-VI: Corporate control and governance
Financial goals and strategy, shareholder value analysis,, managerial implications of shareholder value, corporate governance and balanced scorecard.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Texts:

- Principles of Corporate Finance, 12 th edition, Richard Brealey and Stewart Myers, McGraw-Hill Financial, 2017
- Corporate Finance, by Stephen A. Ross, Randolph W. Westerfield and Jeffrey Jaffe (RWJ), 10th edition, McGraw-Hill 2013.

BUSINESS VALUATION

Course Code: FIN4302 **Credit Units: 03**

Course Objective:
The objective of this course is to develop a detailed understanding of the tools used by market professionals and corporate managers to analyze the value of companies and stocks. The central theme of the course will be the pricing of equity securities using discounted cash flow and relative valuation techniques. Students will apply what they've learned to the valuation of a specific company, with the goal of becoming an expert on that firm. After completing this course, students should be able to: (i) Develop quantitative models for firm and equity valuation based on DCF and multiples. (ii) Identify and interpret accounting and non-accounting information necessary for valuation. (iii) Identify and interpret the key value drivers for a firm or industry. (iv) Critically analyze firm and equity valuation models and assumptions developed by others. (v) Present valuation analyses and assumptions in a professional manner.

Course Contents:
Module-I: Introduction to Valuation
Valuation vs. Pricing.A philosophical basis for Valuation, Misconceptions about Valuation, Biasness in Valuation, Uncertainties in Valuation.Approaches to Valuation, Understanding Financial Statements, Basics of Risk.

Module-II: Discounted Cash Flow Valuation
Discounted Cashflow Valuation: Basis for Approach, Going Concern versus Liquidation Valuation, Equity Valuation versus Firm Valuation, Three pathways to DCF value, Advantages & Disadvantages of DCF Valuation, Riskless Rates and Risk Premiums, Estimating Risk Parameters and Costs of Financing, Measuring Earnings,Earnings to Cash Flows, Estimating Growth, Closure in Valuation: Estimating Terminal Value, Free Cash flow to Equity Models,

Module-III: Relative Valuation
Fundamental Principles of Relative Valuation, Choices with multiples- Earnings Multiples, Book Value Multiples,Choosing the Comparable firm: Making the comparison, Revenue and Sector-Specific Multiples, Advantages &Disadvantages of Relative Valuation, DCF vs Relative valuation.

Module-IV: Applicability of Valuation (Cases and research papers); Valuing Financial Services firm, Valuing Firms with Negative Earnings, Valuing Young and Start-up Firms, Valuing Private Firms, valuing Acquisitions and Takeovers,

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Textbook
- Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, Second Edition, University Editionby Aswath Damodaran

Recommended other Textbook
- Krishna G. Palepu and Paul M. Healy: *Business Analysis & Valuation Using Financial Statements*, Text Only(PHB) 5th Edition, Cengage Learning 2012.
- Joshua Rosenbaum and Joshua Pearl: *Investment Banking: Valuation, Leveraged Buyouts, and Mergers and Acquisitions*, John Wiley & Sons; 2nd edition (2013), ISBN: 1118656210

CORPORATE RESTRUCTURING

Course Code: FIN4303 **Credit Units: 03**

Description
The significance of Merger, Acquisition and Corporate Restructuring cannot be overemphasized in a rapidly changing economic environment and consequent pressure on companies to cope with the emerging challenges. This subject deals with the different strategies of corporate restructuring and its impact on the shareholders' value.

Objectives
- To understand the various types of activities that falls under the purview Corporate Restructuring
- To understand intricacies of Corporate Restructuring
- To understand motives and methods of M&A
- To deal with Issues involved in takeover

Assessment
The subject would comprise of both theory and numerical solving. The assessment of the learner would be done through assignments, case discussion, articles on current research & issues, problem solving and simulation. The students would be expected to do a project, quiz and comprehend the application part of the concepts taught in the class.

Course Contents
Module-I: Introduction: Corporate Restructuring: Concept and Form: Merger, Consolidation, Acquisition, Divestiture, Demerger, Carve out, Joint venture, Delisting of Securities. M&A as a Growth Strategy, Takeover and Defence Tactics, Funding of Acquisition, LBO and MBO.

Module-II:
Growth strategy and Merger & Acquisition: Growth strategy: Intensive, integrative and Diversification growth, Theory of M&A: Monopoly theory, Efficiency Theory, Valuation theory, Raider Theory and Empire Building Theory, Case study.

Module-III:
Takeover and Defence Tactics: Friendly Vs Hostile Takeover, Takeover Tactics: Dawn Raid, Bear hug, Saturday night special, proxy fight, Successful Takeover Tactics in India - Defence Tactics: Crown jwels, blank cheque, Shark repellents, Poison pill and put, people pill, Green nail and buy-back as takeover defence tactic - Intents of Target Companies.

Module-IV:
Legal aspect: Companies Act, 2013, SEBI (Buy -back of Securities) Regulation, 1998, SEBI (Substantial Acquisition of Shares and Takeover) Regulation, 1997, SEBI (Delisting of Securities) Guidelines, 2003 and Listing agreement clauses of NSE and BSE (40 A and 40 B)

Module-V:
Accounting and Taxation aspect: Methods of Accounting for M&A, Accounting for Demerger, Tax issues relating to M&A: Capital Gain, Carry forward and Set Off Losses, Numerical Problems

Module-VI:
Funding and Valuation: Payment Consideration, Sources of Fund, LBO and Going Private.
Valuation of Target Company: Concept of Value of a Company, Methods of Enterprise and Equity Valuation, Dividend Discount Model, DCF Model, Shareholder's Value Creation: MVA Approach and EVA Approach.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Recommended Textbooks

- Prasad G. Godbole, "Merger, Acquisition and Corporate Restructuring", Vikas Publishing
- Nishikant Jha, "Mergers, Acquisitions and Corporate Restructuring", Himalaya Publishing House
- Sudi Sudarshan, "Creating Value from Mergers and Acquisitions, the Challenges", Pearson

Reference books

- Sharplin , 'Strategic Management', McGraw Hill
- Donald M. DePamphilis, 'Mergers, Acquisitions and Other Restructuring Activities', Elsevier publisher
- Weston J.Fred & E.F.Brigham , "Managerial Finance", Drydon Press
- James. C. Van Horne, "Financial Management and Policy", Prentice Hall of India
- Richard A.Brealey and Stewat C.Myers , "Principles of Corporate Finance", Tata McGraw Hill
- Pradip M.Khandwalla, "Innovative Corporate Turnarounds", Saga Publications, New Delhi
- Pradip M.Khandwalla, "The Fourth Eye", Saga Publications, New Delhi
- Khar baunder O.P. and Stallworthy E.A, "Company Resource: How to Manage a Business Turnaround", Heinemann, London
- Prasad G Godbole, "Merger Acquisition and Corporate Restructuring", Vikas Publishing

INTERNATIONAL FINANCIAL MANAGEMENT

Course Code: FIN4304 **Credit Units: 03**

Course Objective:
The possibility for companies to look beyond domestic markets while making the financial decisions has given new dimensions to the way these decisions are taken. This has essentially led to changes in financial environment by linking domestic markets to global markets causing unprecedented increase in opportunities as well as risks. Management in such environment requires understanding of innovative conceptual and physical tools for better financial decision-making. The course on International Finance aims at equipping the financial manager with concepts, tools that enable financial decisions making in a global market and help better achieve the objectives of the firm.

Course Contents:
Module I: International Financial Environment
Finance function in global business scenario, International Monetary System, International Financial Markets and Instruments, Balance of Payments, Recent Developments.

Module II: Foreign Exchange Markets
Spot and Forward Foreign Exchange Markets, Speculation and Arbitrage in Foreign Exchange Markets and Implications of Market Efficiency, Currency Swaps, Currency Futures and Options.

Module III: Foreign Exchange Rate Determination
Theories of Exchange Rate Determination, Fundamental International Parity Conditions – Purchasing Power and Interest Rate Parity, Forecasting Exchange Rates - Technical Forecasting, Time Series Modelling, Fundamental Forecasting.

Module IV: Foreign Exchange Rate Exposure and Risk Management
Transaction, Translation and Operating Exposure, Exposure from Equity and Borrowing in International Financial Markets, Hedging tools for Management of Transaction Exposure and Interest Rate Exposure, Degree of Hedge.

Module V: Issues in Foreign Investments Analysis
Examination of International Investment Proposals, Discounted Cash Flow Analysis, Tax Adjusted Present Value Approach, Political Risk Analysis, External Investment Decision – Measuring Total Returns on Foreign Investments, Optimal International Asset Allocation.

Module VI: Finance of Foreign Trade
Income terms, foreign letters of credit, export & import finance, rules governing letters of credit, export import policy (Case Studies)

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Levi, M. D. (1996), International Finance, McGraw Hill International.
- Apte, P. G. (1995), International Financial Management, Tata McGraw Hill
- Errunza, V.R., Singh, D. and Srinivasan, T.S. (1994), International Business Finance,Global Business Press.
- Seth, A.K.(2000), International Financial Management, Galgotia Publishing Company.
- Hull, J. C. (1999), Introduction to Futures and Options Markets, Prentice Hall of India.
- Edwards, F. R. and Ma, C. W. (1992), Futures and Options, McGraw-Hill International.
- Kolb, R. W. (1997), Understanding Futures Markets, Prentice Hall of India.

- Rebonato, R. (1996), Interest Rate Option Models: Understanding, Analysing and Using Models forExotic
- Interest Rate Options, John Wiley and Sons.
- Kohn, M.(1998), Financial Institutions and Markets, Tata McGraw Hill Publishing
- Articles from selected journals and magazines.

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Course Code: FIN4305 **Credit Units: 03**

Course Objective:
This course aims at providing a clear understanding of the changing domestic and global investment scenario in general and Indian capital market in particular with reference to availability of various financial products and operations of stock exchanges. Important theories, techniques, regulations and certain advancements in theory of investment will be covered with an aim of helping the participants make sound investment decisions both in the context of individual security and portfolio investment.

Course Contents:

Module I: Background of Capital market/Corporate Governance and Methods of Fund Raising
Importance of Strong Capital market in Economy, Investment opportunities available to Investors, relation of demographic characteristics with investment pattern of individuals, Process of investment in Financial assets, intermediaries and Role of SEBIOTCEI//ROC/Stock exchanges-Listing agreement, clause 49, Importance of Corporate Governance and changes taking place/required in the law.Salient features and operation of stock exchanges,Trading arrangements, Changing scenario of Indian stock market.Relationship of Primary market with Secondary market, raising of Funds by IPO/FPO/Right issue and intermediaries involved. Merchant banking and its functions, contemporary issue in Capital market.

Module II: Debt
Malkiels's Law, Interrelationship of Bond Market and Stock market, International events and its impact on security market Risk and return in the context of Portfolio, , Common stock valuation models, Term structure of Interest Rates,Role of FII"S, DII/MF /QIB in Capital market.Participatory notes and its Impact, index formation..

Module III
Fundamental analysis-Economic &industry analysis, concept of Business Cycles, Indicators of economic prosperity, Industry analysis, Company analysis, Company valuation.DOW"s Theory, Various Technical analysis tools like Moving averages, Volume Analysis, Indicators, RSI, Patten analysis,Candlesicks,Market breadth analysis, Trend analysis,Elliot wave Rules Fibonacci numbers, ROC/RSI, CAPM and Fama and French challenge, lagging indicators and leading indicators analysis, reading and interpretations of technical patterns and charts,Other tools to Forecast the market and take Entry and exit decisions.

Module IV
Arbitrage pricing theory, Generating the efficient frontier,Efficient market theory, Valuation by PE ratio /Book value to price value analysis,Motivation for partitioning of risk, Markowitz Risk -return optimisation,

Module V
Types of Mutual Funds--SIP/ELSS, Tax Implications. , Investment Banking, Role of Fund Manager, Portfolio management services, Churning and revision of Portfolio, Portfolio re balancing and up gradation, Sharpe"performance Index, Trennor"performance Index, Jensen's performance Index.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Chandra, P.(2002), Investment Analysis, Tata McGraw Hill
- Fischer, D.E. and Jordan, R.J. (1995), Security Analysis & Portfolio Management, Prentice Hall of India
- Bhat, Sudhindra;(2009); Security Analysis & Portfolio Management; Excel Books
- Dash, A.P.;(2009); Security Analysis & Portfolio Management; I.K. International
- Bhatt, S.N.;(2011); Security Analysis & Portfolio Management; Biztantra
- Rangnatham M., Madhumalathi, R.,(2006); Security Analysis & Portfolio Management; Pearson Education
- Khatri, Dhanesh;(2010); Security Analysis & Portfolio Management; MacMillan India Ltd.

FINANCIAL MODELING WITH MS-EXCEL

Course Code:FIN4306 **Credit Units: 03**

Introduction

Modeling techniques for accurate financial forecasting are used in many areas of finance, such as derivatives, valuation, project evaluation, deal structuring, portfolio management and the like. In the course, the participants will learn the model building skills required to build powerful models in finance with the help of excel. There are many features of model building that are common irrespective of the final model that one intends to build. In the course we will also emphasize on the different model building skills that one should have irrespective of the final use that one is going to make of it.

By the end of the course the participants should be better able to:

- Understand the basic and advanced features of excel
- Understand how to build models in excel to suit one's purpose
- Building models in different areas of finance including investments, corporate finance and derivatives
- Identifying and controlling the key sensitivities with advanced spreadsheet simulation
- Understand how risk can be built into the model to enhance decision making process

Course Contents:

Module-I: Understanding the Basic Featuresof Excel : Introduction to Modeling, Introduction to Excel,Database Functions in Excel Creating Charts Using Forms and Control Toolbox Understanding Finance Functions present in Excel Creating Dynamic Models

Module-II: Simulation using Excel : Different Statistical Distributions used in Simulation Generating Random Numbers that follow a particular distribution Building Models in Finance using Simulation

Module-III: Excel in Capital Budgeting, valuation: Preparing common size statements directly from Trial Balance Forecasting Financial Statements using Excel Analysing Financial Statements by using Spreadsheet Model ; Determining Project Viability Risk Analysis in Project Appraisal Simulation in Project Appraisal; Determination of Value Drivers, DCF Valuation, Risk Analysis in Valuation; Determining Efficient Portfolio, Creating Dynamic Portfolios Portfolio Insurance Fixed Income Portfolio Management using Excel.

Module-IV: Understanding Subroutines and Functions and building simple financial models using subroutines and functions Recording and Editing Macros Subroutines and Functions Decision Rules Message Box and Input Box Debugging, **Designing Advanced Financial Models** using VBA User Forms Other Advanced Features Actual Model Building.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(**C** - Case Discussion/ Presentation; **HA** - Home Assignment; **Q** – Quiz; **V** - Viva; **CT** - Class Test; A-Attendance; **EE** - End Semester Examination)

Text & References:

Text:

- Benninga, S., 2008, Financial Modeling, The MIT Press, Third Edition

References:

- J & S: Jackson M. and Staunton M., 2001, Advanced Modelling in Finance using Excel and VBA, John Wiley and Sons Ltd
- B & M: Brealey R.A. and Myers S., 2003, Principles of Corporate Finance, Seventh Edition, McGraw Hill
- Financial Analysis and Modeling using Excel and VBA – Chandan Sengupta
- Building Financial Models, John Tjia

FINANCIAL RISK MANAGEMENT

Course Code: FIN4307 **Credit Units: 03**

Course Objectives:
The FRM challenges candidates to understand and apply a range of knowledge and skills necessary to function effectively as a risk manager. Its curriculum is updated annually by a group of distinguished risk professionals and leading academics with diverse backgrounds, ensuring that the designation meets the evolving demands of the financial industry. The FRM helps professionals in risk management, investment management, or other critical areas of the financial services industry to broaden their knowledge of the different types of financial risk and enhance their current skill set. Those who are just beginning their careers benefit from the breadth of the curriculum, which exposes candidates to the major strategic aspects of risk management. More established practitioners often choose to become Certified FRMs in order to ensure that they are apprised of the latest trends in risk management, or because they want to challenge themselves by testing their knowledge against an elite pool of risk managers.

Course Contents:

Module I : Foundations of Risk Management
Basic risk types, measurement and management tools, Creating value with risk management; The role of risk management in corporate governance; Enterprise Risk Management (ERM); Financial disasters and risk management failures; The Capital Asset Pricing Model (CAPM); Risk-adjusted performance measurement; Multifactor models; Data aggregation and risk reporting; Ethics and the GARP Code of Conduct.

Module II: Financial Markets and Products
Structures and functions of financial institutions, Structure and mechanics of OTC and exchange markets Structure, mechanics, and valuation of forwards, futures, swaps, and options ; Hedging with derivatives; Interest rates and measures of interest rate sensitivity; Foreign exchange risk; Corporate bonds; Mortgage-backed securities

Module III : Valuation and Risk Models
Value-at-Risk (VaR)- VaR mapping • Expected shortfall (ES), Stress testing and scenario analysis • Option valuation • Fixed income valuation • Hedging • Country and sovereign risk models and management • External and internal credit ratings • Expected and unexpected losses • Operational risk

Module IV : Basel-I, Basel-II, Solvency-II, Basel 2.5, Basel-III:
The reasons for regulating Banks, Bank Regulation Pre-1988, 1988BIS Accord, The G-30 Policy recommendation, Netting, 1996 Amendment, Basel II, Credit Risk capital under Basel II, Operational Risk capital under Basel II, Pillar 2- Supervisory Review, Pillar 3- Market Discipline, Basel 2.5, Basel-III.

Module V : Credit Risk Measurement and Management
• Credit analysis • Default risk: Quantitative methodologies • Expected and unexpected loss • Credit VaR • Counterparty risk • Credit derivatives • Structured finance and securitization

Module VI : Operational and Integrated Risk Management
Risk-adjusted return on capital (RAROC) • Economic capital frameworks and capital planning • Liquidity risk measurement and management • Failure mechanics of dealer banks • Stress testing banks • Third-party outsourcing risk • Risks related to money laundering and financing of terrorism • Regulation and the Basel Accords

Banking Resolution and Deposit Insurance Act (BRDI) 2017, Insolvency and Bankruptcy Code (IBC).

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text Books & References:

- John C. Hull, Risk Management and Financial Institutions, 4th Edition (Hoboken, NJ: John Wiley & Sons, 2015).
- Keep on updating of www.garp.org/frm (Global association of Risk professional)
- Michel Crouhy, Dan Galai, and Robert Mark, The Essentials of Risk Management, 2nd Edition (New York, NY: McGraw-Hill, 2014).
- James Lam, Enterprise Risk Management: From Incentives to Controls, 2nd Edition (Hoboken, NJ: John Wiley & Sons, 2014)
- René Stulz, "Risk Management, Governance, Culture and Risk Taking in Banks," FRBNY Economic Policy Review, (August 2016): 43-59.
- Edwin J. Elton, Martin J. Gruber, Stephen J. Brown and William N. Goetzmann, Modern Portfolio Theory and Investment Analysis, 9th Edition (Hoboken, NJ: John Wiley & Sons, 2014).
- Noel Amenc and Veronique Le Sourd, Portfolio Theory and Performance Analysis (West Sussex, UK: John Wiley & Sons, 2003).
- ZviBodie, Alex Kane, and Alan J. Marcus, Investments, 10th Edition (New York, NY: McGraw-Hill, 2013).
- "Principles for Effective Data Aggregation and Risk Reporting," (Basel Committee on Banking Supervision Publication, January 2013).
- Michael Miller, Mathematics and Statistics for Financial Risk Management, 2nd Edition (Hoboken, NJ: John Wiley & Sons, 2013).
- James Stock and Mark Watson, Introduction to Econometrics, Brief Edition (Boston, MA: Pearson, 2008).
- Robert McDonald, Derivatives Markets, 3rd Edition (Boston, MA: Addison-Wesley, 2013).
- Frank Fabozzi (editor), The Handbook of Fixed Income Securities, 8th Edition (New York, NY: McGraw-Hill, 2012).
- AswathDamodaran, "Country Risk: Determinants, Measures and Implications - The 2017 Edition" (July 19, 2017).
- Gunter Meissner, Correlation Risk Modeling and Management (New York, NY: John Wiley & Sons, 2014).
- Jon Gregory, The xVA Challenge: Counterparty Credit Risk, Funding, Collateral, and Capital (West Sussex, UK: John Wiley & Sons, 2015)
- "Principles for the Sound Management of Operational Risk," (Basel Committee on Banking Supervision Publication, June 2011)
- Philippa X. Girling, Operational Risk Management: A Complete Guide to a Successful Operational Risk Framework (Hoboken, NJ: John Wiley & Sons, 2013).
- Bruce Tuckman and Angel Serrat, Fixed Income Securities: Tools for Today's Markets, 3rd Edition (Hoboken, NJ: John Wiley & Sons, 2011)
- Case studies published from various journals.

FIXED INCOME SECURITIES ANALYSIS

Course Code: FIN4308 **Credit Units: 03**

Course Objectives:
This course is intended to analyze the fixed income securities markets and its implications for investments. It will analyze the market characteristics, instruments, selling techniques, pricing and valuation issues, floating rate instruments, relations with money market instruments, risk and return of fixed income securities, portfolio management techniques, term structure modeling, bond indexing, corporate debt and convertibles, bonds with embedded options, municipal bonds markets, corporate bonds & credit risk analysis, interest rate risk management with swaps, options and futures, bond management & trading. The course intends to cover the specific features of the Indian Fixed Income Securities Markets.The course will construct several Excel based techniques to analyze bond valuation, term structure, portfolio statistics and risk mapping

Course Contents:
Module-I: Overview of Fixed Income Securities, The Grammar of Fixed Income Securities, Fixed Income Markets, Institutional Arrangements, Market Participants and Instruments, Investors Perspectives, & Market Conventions, features of a government securities market

Module-II: Bond Valuation, Time Value of Money, Price and Yield Conventions, Bond Valuation under flat term structure, Yield & return, & horizon return,Valuation of other Bonds, Floating Rate securities, index bonds, illiquid bonds

Module-III: Understanding market linkages, bonds and money market instruments, MIFOR Curve Risk Identification in Bonds: Duration, Convexity, and Immunization Risk measurement in fixed income securities using value at risk, Corporate Debt, Valuation, valuation of convertibles
Yield Curve Analysis: Par Value, Zero, Spot Curve, Bootstrapping, spot & forward rates, (Nelson-Seigel model of the Indian NSE)

Module-IV: Government securitiesauction & Bidding, Uniform vs discriminatory auction, biddingbehavior, winners curse analysisAuction Game: students run a game in groups, with bidding an upcoming auction, using real time market prices, and finalist selected based on their success, performance in WI trade, Bond Indexing, methodology for constructing a bond index, index return comparison

Module-V: Portfolio construction, setting portfolio objectives, interpreting portfolio parameters, Passive vs Active portfolio management strategies, bullet vs barbell, other strategies.Global Bond Markets, foreign currency bonds, dual currency bonds, analysis of global bond spread behavior in recent times.

Module-VI: Fixed Income Derivative Markets: FRAs, Interest rate Swaps, swap pricing and swap curve,Fixed Income Derivative Markets: Interest rate futures, Fixed Income Derivative Markets: Interest Rate Options, Caps & Floors pricing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Required Textbook:
- Frank Fabozzi, Bond Markets, Analysis, and Strategies, Seventh or Eighth Edition,
- Pearson Suresh Sundaresan, Fixed Income Markets and Their Derivatives, 2009,

MANAGEMENT OF FINANCIAL SERVICES

Course Code: FIN4309 **Credit Units: 03**

Course Objective:
At the end of this course the students will understand: Role of Financial Services in producing and maximizing value. Understanding basic Financial Services and their need. Factors determining dynamism in the Financial Services industry. Understanding the interface of regulators and managers for quantifying and dealing with critical factors affecting the Financial Services industry.

Course Contents:

Module I: Introduction
Financial services and Value production, Value added in Financial Services, ROI in Financial Services, Elements in the Financial Services value chain, Role of Financial Services in Economic Development

Module II: Merchant & Investment Banking
Meaning, Importance & Role in the Indian Financial System, Corporate Counselling, Project Counselling and Appraisal, Loan Syndication and Accessing Debt and Capital Markets, Procedural aspects of public issues, bought out deals, Book Building, Pre-Issue Decision; Post Issue Management and related provisions of Companies Act and SEBI guidelines for Protection of Interests of Investors, New Products in Capital Markets

Module III: Leasing Hire Purchase and Consumer Credit
Development of Leasing Hire Purchase and Consumer Credit, Types of Leasing, Pricing Methodology and Financial Analysis, Taxation, Legal Framework for Leasing and Hire Purchase Companies, Leasing Vs. Buying- NPV, Securitization, Banking Services related to leasing

Module IV: Venture Capital Financing
International Experiences in Venture Capital Financing, Venture Capital Financing in India, Pitfalls to be Avoided, Private Equity and growth of Entrepreneurship

Module V: Mutual Funds
Mutual Funds types, Exchange Traded Funds, Fund of Funds, Organization and Management, Regulations of Mutual Funds

Module VI: Other Financial services
Factoring Services - Features, Merits and Demerits, Cost Benefit Analysis, Forfeiting – Features, Merits and Demerits, Credit Rating: Concept of Credit Rating, Types of Credit Rating, Advantages and Disadvantages of Credit Rating, Credit Rating Agencies and Their Methodology and Process, Individual Credit Rating, Sovereign Credit Rating Practices, Indian Experience up to now, Housing Finance, Custodial Services.

Module VII: An introduction to marketing of Financial Services Features
Marketing Of Financial Services, Cross Selling of Banking Services, Up-Selling, Wealth Management

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Khan M Y, (1999), Indian Financial System, Tata McGraw Hill
- Chandra, P.(1999), Financial Management: Theory and Practice, Tata McGraw Hill.
- Dietrich J KiMGTll,(1996), Financial Services & Financial Institutions, Value Creation in theory and Practice, Prentice Hall
- Pandey, I.M. (1999), Financial Management, Vikas Publishing House
- Sriram, K. (1996), Handbook of Leasing, Hire Purchase and Factoring, ICFAI.
- Bhole L M, (2000), Financial Institutions and Markets: Structure, Growth & Innovations, Tata McGraw Hill
- Regular reading of the Financial & Business Journals, Analyst, Economist is essential.

PROJECT PLANNING, APPRAISAL AND CONTROL

Course Code: FIM4310 **Credit Units: 03**

Course Objective:

The objective of the course is to make the students familiar with the planning, analysis, selection, implementation and review the capital expenditure investments. The aim is to acquaint the student with the application of mathematical and statistical tools for analyzing managerial problems in order to arrive at a decision w.r.t. the capital expenditures.

Course Contents:

Module I: Planning of Projects

Capital Expenditures, Phases of Capital Budgeting, Levels of Decision Making, Facets of Project Analysis, Portfolio Planning Tools, Strategic Position and Action Evaluation (SPACE), Generation of Ideas, Monitoring the Environment, Corporate Appraisal, Project Rating Index, Demand Forecasting, Market Planning

Module II: Technical Analysis

Material Inputs and Utilities, Manufacturing Process, Product Mix, Plant Capacity, Location and Site, Machineries and Equipments, Structures and Civil Work, Project Charts and Layouts, Work Schedule

Module III: Financial Analysis

Cost of Project, Means of Finance, Estimates of Sales and Production, Cost of Production, Working Capital Requirements and its Financing, Profitability Projections, Break Even Point, Projected Balance Sheets, Muti Year Projections, Basic Principles for Measuring Project Cash Flows, Components of the Cash Flow Stream, Biases in Cash Flow Estimation

Module IV: Project Risk

Types and Measures of Project Risk, Sensitivity Analysis, Scenario Analysis, Optimal Timing, Social Cost Benefit Anaysis, Net Benefit in terms of Economic Prices, Measurement of the Impact on Distribution, Savings Impact and its value, Income Distribution Impact, Little-Mirrlees Approach, Shadow Prices

Module V: Project Management and Review

Forms of Project Organization, Project Planning, Project Control, Human Aspects of Project Management, Pre-requisites for Successful Project Implementation, Performance Evaluation, Abandonment Analysis, Administrative Aspects of Capital Budgeting

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Chandra P.(2002), Projects: Planning, Analysis, Financing, Implementation & Review, Tata McGraw-Hill Publishing.
- Meredith J.R. & Mantel S.J., Jr.(2000), Project Management: A Managerial Approach, Ed. John Wiley & Sons.
- Machiraju H.R.(2001), Introduction to Project Finance: An Analytical Perspective, Vikas Publishing House Pvt. Ltd.
- Patel B.M.(2000),Project Management: Strategic Financial Planning Examination & Control, Vikas Publishing House Pvt. Ltd.
- Finnerty J. D.(1996), Project Financing: Asset-Based Financial Engineering, Wiley
- Newbold C.R.,(1998), Project Management in the Fast Lane: Applying Theory & Constraints, St. Lucie Press
- Anthony R.N. & Govindrajan V.(1998), Management Control Systems, Tata McGraw-Hill
- Desai V.(1997), Project Management, Himalaya Publishing House

SPECIALISATION – HUMAN RESOURCE

SOCIAL AND INDUSTRIAL PSYCHOLOGY

Course Code: HRM4301 **Credit Units: 03**

Course Objective:
The Objectives of this course are to understand human behaviour in social and industrial settings. A student will be able to comprehend the causes of behaviour as well as the methods of improvement by going through this course.

Course Contents:
Module I: Social and Industrial Psychology
Definition, Nature and Background.

Module II: Social Perception & identity
Non-Verbal Communication, Theories of Attribution, Impression Formation and Impression Management.Self Concept, Self-esteem, Self-Efficacy, Self-Monitoring and Self-Focusing.

Module III:Social Influence
Conformity, Compliance and Obedience.

Module IV: Employment Testing
Testing Abilities, Testing Personality, Testing Skills and Achievements, Using and not Using Tests. The Interview, Application Blanks and Biographical Inventories, References and Background Investigations.

Module V: Safety Psychology
Safety Management and Safety Psychology, Differential Accident Liability.

Module VI: Human Performance
Time & Motion Study, Resistance to Time and Motion Studies, Breaking Resistance, Human Engineering, Coding Displays and Control, Principles Of Human Performance. Perceptual – Motor Skills, Information Processing Behaviour, Monitoring Behaviour.

Module VII:Ergonomics and Work Conditions
Ergonomics Approach Work Design Anthropometrics Approach, Biomechanical Approach, Psychological Approach, Human and Computer Interaction in the Work Place

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Blum & Naylor (1968), Industrial Psychology, CBS Publishers & Distributors
- Baron Robert A. and Byrne Donn (1995), Social Psychology: Understanding Human Interactions, Prentice Hall India
- Miner John B. (1992), Industrial - Organizational Psychology, McGraw-Hill
- Muchinshy. M. Paul (2008),Psychology Applied to Work, Hypergraphic
- S.C. Tailor, L.A. Peplau and D.O. Sears (1995). Social Psychology, Prentice Hall, New Jersey

INDUSTRIAL RELATIONS

Course Code: HRM4302 **Credit Units: 03**

Course Objective: The objective of the course is to familiarize students with the anatomy of industrial relations and how to deal with the issues and problems involved in the management of industrial relations, especially in the context of industrial structure in our country.

Course Contents:

Module I: Evolution and Structure of Industrial Relations
Concept; Theoretical perspective – Unitary, Pluralistic, Marxist, and Trusteeship perspectives; Approaches to industrial relations; Structure of industrial relations system in India; Major actors and their role in industrial relations; Industrial relations since globalization in India; Industrial relations policy in India; Pre-requisites and functional requirements of good IR programme.

Module II: Industrial Conflict and Dispute Resolution
Definition of industrial disputes; Causes and classification of industrial disputes; Prevention of industrial disputes; Industrial disputes in India; Recent development; Industrial Disputes Act, 1947 – Machinery for resolution of industrial disputes (conciliation, adjudication, and arbitration); Strikes; lock-outs; lay-off; Retrenchment; Authorities and their powers and procedures under the Act

Module III: Trade Unionism and Collective Bargaining
Trade unions – Characteristics, functions, Types/Structure; Trade unions and Productivity; Trade Unions Act, 1926 – Definition, Registration of trade unions, Authorities and their Powers and Procedures under the Act; Penalties for offence under the Act; Collective Bargaining – Definition, legal framework, Bargaining forms and Tactics, negotiating skills, Process of Collective bargaining, collective bargaining as an integral part of IR strategy, Pre-requisites for the successful functioning of collective bargaining.

Module IV: Discipline and Grievance Handling
Discipline – Definition, Difficult employees, Approaches to Discipline, Causes, Disciplinary Process, Essentials of Good Disciplinary System, Code of Discipline and Industrial Relations.
Grievance Handling – Definition of grievance, Legal framework, Need, Causes of grievance, Tracing the grievance, Model Grievance Procedure, Grievance management in Indian industries.

Module V: Industrial Democracy, Internal Labour Organisation, Labour Policy, Labour Administration
Industrial Democracy – Concept and significance; Workers' Participation in Management – concept, rational, status of workers' participation in management in India; Experience of Yugoslavia; Labour Policy of Government of India; Labour Administration – Central Machinery, States/ Union Territories Machinery; Consultative Machinery.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Sharma, R C, Industrial Relations and Labour Legislation, PHI Learning Pvt. Ltd., 2016
- Venkatratnam, C.S., Industrial Relations, Oxford University Press, New Delhi, 2014
- Monappa Arun 1989, Industrial Relations, Tata McGraw Hill, New Delhi, 2007
- Sen, Ratna, Industrial Relation in India: Shifting Paradigms, Macmillan Publication, New Delhi, 2005

- Mamoria. C. B, Dynamics of Industrial Relations in India, Himalaya Publishing House, Mumbai, 2004

Journals & Periodicals:

- Indian Journal of Industrial Relations
- Indian Law Reporter
- Indian Journal of Labour Economics
- Indian Labour Year Book

ORGANIZATIONAL CHANGE AND DEVELOPMENT

Course Code: HRM4303 **Credit Units: 03**

Course Objective:
The Objective of the course is to provide a conceptual input of meaning, characteristics, processes & influences of Organizational Development & Change Management. The course also intends to impart skill sets through experiential learning. The course gives various OT theoretical frameworks in detail which provides comprehensive overview of human capital from the perspective of organizational excellence in the light of transitional phases of Indian Industries.

Course Contents:
Module I: An Introduction to Organisation change and development
Meaning of Change, Why Organization Change, Factors causing & Need for Change, Content & Process Levers of Change, Nature, basic assumptions, Characteristics & Techniques, Historical framework of OD, The Lab Training Stem, The Survey Research & Feedback Stem, The Action Research Stem, , Factors affecting OD, Role of Managers

Module II: Change Management Models
Managing Planned Change **Models & Techniques involved in Change Mgmt**,
Total Quality Management, Systems Model of Change, Lewin's Force Field Analysis Model, The Continuous Change Process Model, Change and Transition Management Model, Business Process Reengineering.

Module III: Typology of OD Interventions
Interventions designed at Individuals, Dyads, and Triads, Teams & Groups. Team Interventions, Inter-Group Interventions, Structural Interventions, Comprehensive Interventions, Issues in Client-Consultant Relationship.

Module IV: Process of Organisational Development
Meaning of Change Agents, Types of Change Agents, Characteristics of Successful Change Agents, Advantages and Disadvantages of Internal and External Change Agents, Steps in organisation development process, Process Consultation, The Process of Organisation Development,

Module V: Action Research
Introduction to Action Research, AR as Process & Approach.

Module VI: Future of OD
Changing Values & Cultural Model, Theories of Planned Change, Organizing for the Future, Organization as Learning Systems, Implications for Future Managers.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Wendell L. French and Cecil N. Bell Jr., (2008),Organization Development and Transformation, Prentice Hall India
- Thomas G. Cummings and Christopher G. Worley (2002). Organizational Development and Change, Thompson learning – India
- Palmer I, Dunford R, Akin G, (2010), 'Managing Organizational Change - A Multiple Perspectives Approach, Tata McGraw Hill

PERFORMANCE AND COMPETENCY MANAGEMENT

Course Code: HRM4304 **Credit Units: 03**

Course Objective:
This course will help students to understand the significance of appraisal for an Organization and Individual.It will develop an understanding of various appraisal methods and measurements to manage the performances of employees. It would also provide an insight into the fundamentals of competency management.

Course Contents:

Module I: Introduction to Performance Management
Conceptual Approach to Performance Management, Determinants of Job Performance: Person and System Factor, Components of Effective Performance Management, Performance Management Cycle Linkage of performance management system with HR Practices.

Module II: Process of Performance Appraisal
Need And Methods for Performance Appraisal, RSDQ Model, Performance Review - Reengineering Performance Appraisal System, Performance Analysis, Performance Review Discussion, Performance Monitoring and Feedback. Linkage pays with performance

Module III: Competency Mapping
Concept and Definition of Role and Competency, Characteristics of Competency, Competency Versus Competence, Performance Versus Competency, Types of Competencies, Context and Relevance of Competencies in Modern Organizations.

Module IV: Competency Management Framework
Macro View of Competency Management Framework, Strategic Framework, Lancaster Model of Managerial Competence, Competency Modeling Framework

Module V: Competency Mapping as a Performance Management Tool
Building Competency Models, TheMcBer Generic Managerial Competency Model, Competency Causal Flow Model, Factors Affecting The Human Performance System, Profiling Competency Framework for a Particular Role, Competency Gap

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Armstrong, Michael and Berron, Angela (2008), Performance Management and Development, Jaico Publications
- Rao T V (2008), Performance Management and Appraisal Systems-HR Tools for Global Competitiveness, Response Books
- Cardy Robert L. (2008), Performance Management Concepts, Skills and Exercises, Prentice Hall India
- Sahu R K (2007), Performance Management System, Excel Books
- Sanghi, Seema The Handbook of Competency Mapping, Sage Pub, 2007
- Competency Mapping: A prerequisite for HR excellence by LovySarikal
- Sharma, Radha, 360 degree feedback, competency mapping and assessment centres, TMH, 2003
- McClelland, David Competence at work, Spenser & Spenser, 19

TRAINING AND DEVELOPMENT

Course Code: HRM4305 **CreditUnits: 03**

Course Objective:
This course is designed to provide in depth understanding and enable the students to manage training processes and system for developing human resource of the organization.

Course Contents:

Module I: Introduction to Training and Development
Training – concept, and rationale; training process: role of stakeholders in training programme; Organization and Management of training function; Training needs assessment – organizational analysis, operational analysis, person analysis; competency mapping; Learning theories, learning process.

Module II: Training Design
Designing the training programme: process of learning in training programme – attributes and factors influencing; learning process; learning styles; training climate and pedagogy; developing training modules; Training aids

Module III:Training Methods and Techniques
Training methods and techniques – role playing, business games, in basket exercises, laboratory training; incidents and cases; seminars, syndicates and group discussion; lecture, programmed instructions; inspirational techniques – brainstorming, mind mapping, creative problem solving; Management Development

Module IV:Evaluation of training
Evaluation of training – need for evaluation, principles of evaluation, criteria and approaches; return on investment in training, process of calculating ROI in training;

Module V: Emerging Trends in Training and Development
Emerging trends in training and development; new perspectives on training – cross cultural training, e-learning, knowledge management

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:
Text:
- Noe, Raymond A, "Employee Training and Development" Tata McGraw Hill Education; 6th edition 2013

References:

- Agochia, Devendra, Every Trainer's Handbook, New Delhi; Sage Publications
- De Simone, R.L. and Harris, D.M., Human Resource Development, Thomson Learning
- Sahu, R.K., Training for Development , Excel Books, New Delhi
- Blanchard, P Nick, and James W. Thacker, Effective Training – Systems, Strategies, and Practices, Pearson Education, New Delhi
- Goldstein, Training in Organization , Thomson Learning, Bombay
- McGrath, Training for Life and Leadership in Industry, Prentice Hall of India, New Delhi

STRATEGIC HUMAN RESOURCE MANAGEMENT

Course Code: HRM4306 **Credit Units: 03**

Course Objective:
This subject provides an understanding of the strategic contribution of the Human Resource Management (HRM) function. This course will place previous studies of human resource management within a strategic, dimension so as to illustrate the concept of competitive advantage applied to human resources. The emphasis will be on the strategic significance of HRM.

Course Contents:

Module I: The Concept of Strategy
Strategy Defined, Key Concepts of Strategy, Formulations of Strategy, Strategic Management, the Process of Strategic Management

Module II:Human Capital Management
Human Capital Management Defined, Human Capital Management and HRM, The Concept of Human Capital, Intellectual Capital, Social Capital and Organizational Capital, Human Capital Measurement and Approaches to Measurement.

Module III: The Concept of Strategic HRM
An Investment Perspective of HRM, Strategic HRM, Aims of SHRM, Strategic HR Vs Traditional HR, Challenges in SHRM, Approaches and Models To SHRM and The Evolving Strategic Role of HR, Barriers to Strategic HR.

Module IV: Components of Strategic HRM
HR Strategy defined Purpose, Types of HR Strategies, Content of HR Strategies, Formulating HR Strategy, Criteria for an Effective HR Strategy, Integrating the Business and HR Strategies.

Module V: Impact of SHRM on Business Performance
Human Resource Evaluation - Definition and Overview, Rationale for HR Evaluation, Measures Of HRM Performance, Approaches to HR Evaluations, Evaluation of SHRM , Future Trends In Strategic HRM Approaches- Career Management, Mentoring Relationship, Work-Life Integration

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Mello Jeffrey A., (2014), Strategic Human Resource Management,4th edition Thompson Press Publishing.
- AgarawalaTanuja (2007)Strategic Human Resource Management, Oxford University Press.
- Armstrong Michael (2011), Strategic Human Resource Management: Strategy and Action, Kogan Page
- Mahey C and Salman G., (1996), Strategic Human Resource Management, 5 th edition Oxford Blackwell.
- Srinivas R. Kandula, (2002), Strategic Human Resource Development, Prentice Hall India.

COLLECTIVE BARGAINING AND NEGOTIATION PROCESS

Course Code: HRM4307 **Credit Units: 03**

Course Objectives

- To promote understanding of the concept and theories of collective bargaining as also of legal framework of collective bargaining.
- To understand the intricacies of the process of collective bargaining, build awareness about the status, issues and problems of collective bargaining in India, and have a brief idea about collective bargaining in different countries.
- To build awareness about the various skills of negotiation and understand issues related to negotiation.

Course Contents:

Module I: The Conceptual and Legal Framework of Collective Bargaining – concept; definition; main characteristics; nature; necessity and significance; stakeholders in collective bargaining; legal framework.

Module II: Theories of Collective Bargaining – Hick's analysis of wages setting under collective bargaining; collective choice model of negotiation; Abehavioural theory of negotiation.

Module III: Process of Collective Bargaining – Negotiation stage – identification of problem(s); preparation of negotiations (constitution of negotiating teams, bargaining power, data collection); negotiation of agreement (haggling bargaining, boulwarism bargaining, continuous bargaining), drafting of collective bargaining agreement; follow-up action: **contract administration.**

Module IV: Collective bargaining in India and Abroad – Forms of bargaining; levels of bargaining; pre-requisites for successful collective bargaining; coverage and duration of agreements; the question of managerial prerogatives; difficulties in the bargaining process and administration of agreements; growth and status of collective bargaining in India; assessment of collective bargaining in India; collective bargaining as an integral part of industrial relations strategy; prospects of collective bargaining.

Module V: International scenario of collective bargaining - A snapshot of collective bargaining in different countries of the world.

Module VI: Negotiation – Definition; key negotiating skills; benefits of having good negotiators on board; key activities; points to be kept in view while negotiating; stages of negotiation; outcomes; goals; bottom-line; BATNA; context; leverage and threats; negotiation style; cultural differences; body language; listening; space and distance; building a common reality; persuasion; ultimatums; anger; distractions; giving up; managing differences; distributive and integrative negotiations; negotiating strategies and strategy model; Tactics in negotiation; Role of power in negotiations; communication in negotiations; non-verbal communications in negotiations; International negotiations.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Patil, B.R., Collective Bargaining, Hyderabad, University Press, 1994.
- Sur, M., Collective Bargaining, New Delhi, Asia Publishing House, 1965.
- Sharma, R.C., Industrial Relations and Labour Legislation, Delhi, PHI Learning (P) Ltd., 2016
- VenkataRatnam, C.S., Industrial Relations, Oxford University Press, New Delhi, 2014
- Dunlop, J.T. and Chamberlain, N.W., Frontiers of Collective Bargaining, New York, Harper, 1967.
- International Labour Organisation, Collective Bargaining: A Workers' Manual, Geneva, 1973.
- Dunning, H., Negotiating and Writing a Collective Agreement, Geneva, ILO, 1985.
- Pillertla, M., Negotiation: How to deal and reach agreements in business, Norwich, Format Publishing, 2006.
- Rao, S.L., Successful Negotiation – Strategies and tactics for mutual gain, New Delhi, Wheeler Publishing, 1994.
- Barnes, G.P., Successful Negotiating – Letting the other person have your way, Delhi, Jaico Publishing House, 2008.

SPECIALISATION: INTERNATIONAL BUSINESS

INTERNATIONALFINANCIALMANAGEMENT AND FOREIGN EXCHANGE MANAGEMENT

Course Code: IBM4301 **Credit Units: 03**

Course Objective:
The possibility for companies to look beyond domestic markets while making the financial decisions has given new dimensions to the way these decisions are taken. This has essentially led to changes in financial environment by linking domestic markets to global markets causing unprecedented increase in opportunities as well as risks. Management in such environment requires understanding of innovative conceptual and physical tools for better financial decision-making. The course on International Financial Management aims at equipping the financial manager with concepts, tools that enable financial decisions making in a global market and help better achieve the objectives of the firm. International boundaries are blurring therefore MNCs can raise funds from international financial management. The purpose of this paper is to equip the students with financial and investment decisions of MNCs.

The investment decisions of MNCs involves basics & trading mechanics of Indian & International FX Markets ; Read, understand, covert, calculate rates and negotiate FX rates ; Understand linkages of money markets, interest rates, economic & world events to FX rates ; Understand FX Hedging, Speculation & Arbitrage trading strategies ; Use FX Derivatives (Forwards/Futures/Options/Swaps) to hedge FX risk ; Know Regulatory compliances

Course Contents:

Module I: International Financial Environment :
An overview of multinational financial management, Finance functions in multinational firms. International Monetary System, International Financial Markets and Instruments, Balance of Payments, Trading Terminologies & Mechanism, Currency Convertibility.

Module II: International Financial and Foreign Exchange Markets
Spot and Forward Foreign Exchange Markets, Speculation and Arbitrage in Foreign Exchange Markets and Implications of Market Efficiency. International capital money markets; euro dollar and currency market; financial market instruments – GDRs, ADRs, Euro issues, CP and ECB

Module III: International Financial Management
Multinational capital budgeting, cost of capital and capital structure decisions; dividend policy of multinational firm; Management of funds of MNC's operating in different countries; Political Risk Analysis. International working capital management; international cash management; international receivable management; managing short term assets and liabilities;

Module IV: Foreign Exchange Rate Determination and Arithmetic.
Exchange Rate Determination, Cross-currency calculations, Interest Rate & Purchasing Power Parity, Exchange Arithmetic, Types of Transaction and Settlement Dates, Exchange Rate Quotations and Arbitrage, Forward Quotations.

Module V: Foreign Exchange Rate Exposure & Trading Strategies
Transaction, Translation and Operating Exposure. FX Trading Strategies for Hedging, Speculation & Arbitrage.

Module VI: Foreign Exchange Risk Management using Derivatives
Concept of Hedging, Hedging strategies of Corporates, FX Risk Management using Currency Derivatives like Forwards, Futures, Options & Swaps.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE -** End Semester Examination

Text & References:

Text:

- Jeff Madura, International Corporate Finance, Cengage Learning.
- Levi, M. D. (1996), International Finance, McGraw Hill International.
- Apte, P. G. (2014), International Financial Management, Seventh Edition, Tata McGraw Hill

References:

- Errunza, V.R., Singh, D. and Srinivasan, T.S. (1994), International Business Finance, Global Business Press.
- Thummuluri Siddaiah (2010), International Financial Management, Pearson Education.
- Seth, A.K.(2000), International Financial Management, Galgotia Publishing Company.
- Hull, J. C. (1999), Introduction to Futures and Options Markets, Prentice Hall of India.
- Edwards, F. R. and Ma, C. W. (1992), Futures and Options, McGraw-Hill International.
- Kolb, R. W. (1997), Understanding Futures Markets, Prentice Hall of India.
- Rebonato, R. (1996), Interest Rate Option Models: Understanding, Analysing and Using Models for Exotic
- Interest Rate Options, John Wiley and Sons.
- Kohn, M.(1998), Financial Institutions and Markets, Tata McGraw Hill Publishing

RISK AND INSURANCE IN INTERNATIONAL TRADE

Course Code:IBM4302 **Credit Units: 03**

Course Objective:
The course aims at making the students conversant with risk of cross border business (Trade, Investments and Long Term Projects) and the techniques available for mitigating those risks. The role of Insurers and the products and services offered by them would help equip the students with decisions making tools.

Learning Outcomes:
At the end of the course, the student will be able to:
- Understand the concept of risk in business management
- Learn various techniques available to assess and mitigate those risks
- Develop strategic alternatives
- Evaluate different kinds of risks and their impact on different areas

Course Contents:

Module I: Risk Management Overview
Concept of Business Risk; Meaning of Business Risk; Nature of Business Risk; Causes of Business Risk; Types of Business Risk including International Risk

Module II: Identification of Risk and types of risk
Sources of Risk; Measurement of Risk; Kinds of exposures; Political Risk; Credit Risk; Interest Rate Risk; Transport Risk; Foreign Exchange Risk

Module III: Evaluation of Risk and mitigation of Risk in Trade
Evaluation of exposures; Basic strategies for evaluation of Risk; Exercise on evaluation of Risk**;** Payment Risk; UCP 600 – Cases; URC 522 – Cases

Module IV: Concept of Marine Risk
Concept of Marine Insurance; Content of Marine Policy; Laws governing Marine Insurance; Kinds of Losses; Need for cargo Insurance; Principles Governing the Contract of Insurance; Types of Insurance Documents; Risks Coverage; Claim Procedures; Liability Insurance; Concept of Seller contingency Insurance

Module V: Modern Techniques of Risk Management
Concept of Risk Management Techniques; Identifying Risk Management Techniques; Types of Techniques; Risk Management Alternatives; Concept of Risk Management Institutions-ECGC; Concept of Hedging tools; Strategy Development and Implementation

Learning Methods:
Tutorials, Interactive sessions, Case studies, Field visits, Management games, Extensive research projects, Seminars, Weekend experience in companies - the course is covered by adopting a combination of lecture methods, class presentation by groups of students, self study sessions. Each student is required to do the back ground reading from the specified chapters of the prescribed book before coming to class. Cases are also to be analyzed, discussed in groups (teams) outside the class as preparatory work.

Examination Scheme:

Components	**C1**	**V**	**A**	**CT**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

Text:

- Singh MP & Chopra VS, 2005, Risk Management in International Trade, Universal Publishers, 1st Edition

References:

- Shapiro A C, 2004, Multinational Financial Management, Prentice Hall of India
- Jain P K, Peurard J and Yadav S, 2003, International Financial Management, Prentice Hall of India
- E C G C Brochures and Marine Risk Policy

WTO AND INTERNATIONAL REGULATORY ENVIRONMENT

Course Code: IBM4303 **Credit Units: 03**

Course Objective:
The primary objective of this course is to provide the students with a thorough understanding of the global, economic, political and legal environment prevalent in international trade. The major focus of this course is to highlight the international norms and regulatory bodies for enhancing global trade. Finally the students will be able to analyze the various nuances associated with international trade.

Learning Outcomes:
On the successful completion of this module the student will be able to:
- Understand the concept of global and national regulatory environment in business management
- Appreciate the role of various bodies in the international regulatory environment
- Evaluate the various measures taken by different nations to regulate their business environments
- Impact of WTO agreements in regulating trade in developed and developing countries

Course Contents:

Module I: Introduction to WTO and GATT-
Historical background, Bretton Woods origins, evolution from GATT to WTO, Origin of WTO, Objectives and functions of WTO, organization structure, Membership, ministerial conferences, Principles of trading system, Decision Making procedure. Dispute Settlement Mechanism, Introduction to Service trade and the GATS, Service negotiation, WTO and Developing Countries-India and WTO.

Module II: International Trading Environment and Rules Governing International Trade under WTO
Multilateral and Plurilateral Trading System and the legal framework - MFN and NTC clauses, Unfair Trade Practices and Barriers to Trade (Non technical),Agreements on Antidumping, Subsidies and countervailing measures, Pre-shipment Inspections, The Cotton Arrangements (1961-73), The Multifibre Arrangements (1974-94).

Module III: Protectionism in International Trade & Major Regional Trade Agreements
Determination of Tariff, Types of Tariff & Role, Effective Rate of Protection, Welfare effect: Small nation vis a vis large nation, Concept of Binding Tariff, Concept of Trade Creation and Diversion,NAFTA, LAFTA, SAFTA, EEC, ASEAN,BIMSTEC,EU,ASEAN,GCC,ECOWAS, SAARC.

Module IV: Measures to Regulate Trade Environment
Sanitary and Phyto Sanitary Measures, Technical Barriers to Trade, Safeguards and Rules of Origin Agreement on Agriculture, Trade Related Intellectual Property Rights (TRIPS),Trade Related Investment Measures (TRIMS),General Agreements on Trade and Services.

Module V: Current ongoing Negotiations: WTO and Developing Countries
Evaluation of Regional trading agreements among developed and developing countries, Overlaps of conflict and jurisdiction between WTO and RTA, Issues in DOHA negotiation, Compatibility of Rules of Origin in Free Trade Agreements with article XXIV.

Learning Methods:
Tutorials, Interactive sessions, Case studies, Field visits, Management games, Extensive research projects, Seminars, Weekend experience in companies - the course is covered by adopting a combination of lecture methods, class presentation by groups of students, self study sessions. Each student is required to do the back ground reading from the specified chapters of the prescribed book

before coming to class. Cases are also to be analyzed, discussed in groups (teams) outside the class as preparatory work.

Examination Scheme:

Components	C1	V	A	CT	EE
Weightage (%)	10	5	5	10	70

Text & References:

- Exports of India's Major Products: Problems and Products, Oxford University Press, 2001, Pawan Kr Graga
- ChauhanSandeep-GATT to WTO – Deep & Deep Publication Pvt. Ltd., 2001 Edition
- VermaM.L -Foreign Trade Management in India, Vikas Publishing House, 2002
- Prasad, H Ashok, ed., Exim dynamic of service and WTO, Common Wealth Publishers, New Delhi,1996
- Mathur, Vibha, WTO and India, New Century, New Delhi, 2005
- Garg, Hema, W T O and regionalism in world trade, New Century, New Delhi, 2004
- Mattoo, Aditya, Ed., India and the WTO, Rawat Publications, Jaipur, 2004
- Das, Bhagirath Lal, WTO and the multinational trading system, Book Well, New Delhi, 2003
- Hoekman, Bernard, Development trade & the WTO: a handbook, The World press, Washington, 2002
- Bhandari Surendra –WTO and Developing Countries-Deep and Deep Publication
- Bhagirath Lal Das-An Introduction to the WTO Agreements-Third World Network and Zed Books, Anne O Krueger –WTO as an International Organisation Oxford University Press.
- Shenkar, Oded & Yadang Lou, (2004) International Business, John Wiley & Sons
- Cherunilum, Francis (2002) Business Environment Text & Cases, 12th Ed. Himalya Publishing House.
- Lori Wallach, Michelle Sforza, (1999),The WTO: five years of reasons to resist corporate globalization
- Elimma Ezeani, (2010),The WTO and its development obligation: prospects for global trade
- Bhagirath Lal Das, (2003)WTO: the Doha Agenda : the new negotiations on world trade
- T. K. Bhaumik, (2006),The WTO: a discordant orchestra
- Aaditya Mattoo, Robert Mitchell Stern, (2000),India and the WTO
- Asif Hasan Qureshi, (2008), Interpreting WTO agreements: problems and perspectives
- Debroy Bibek, 2005, Economic and Social Environment, Oscar Publications

GLOBAL BUSINESS OPERATIONS

Course Code:IBM4304 **Credit Units: 03**

Course Objective:
Understand implications of global business operations for business firms and their managers; Address complications associated with business operations in today's global economy; Gain exposure to the terminologies, institutions & challenges of managers operating in the global arena; Examine the different strategies that businesses can adopt to compete in the global marketplace and enter specific foreign markets; Explore the role played by marketing, operations, and human resource management within a Global Business Operations.

Course Contents:

Module I: Global Opportunities
International Business challenges in the 21st Century, Emerging super powers, Opportunities in the Liberalized Global Trade & Investment scenario, Why go global?, Stages of going global, Barriers and complexities of Cross Border Operations.

Module II: International Eco system
The eco system, economic indicators and characteristics of operating in North America (USA), Europe (EU), Asia (China), Latin America (Brazil), Africa (South Africa) & Middle-East (UAE).

Module III: Structuring Global Operations & Strategic Alliances
Trade vs Invest, FDI vs FII route ; Route for strategic alliances - JV, equity, non-equity, subsidiaries, branches etc ; Stages-Strategy Development, Partner Assessment, Contract Negotiation, Alliance Operation, Alliance Termination etc ; Case studies of MNC's operating in India & Indian companies operating abroad.

Module IV: Global Cross-Culture & Value Issues
Cultural diversity &it's challenges; Country-specific cultural challenges; Implications & cultural adjustments
Managing cross-cultural diversity; Ethics, corruption & Corporate Social Responsibility (CSR); Business culture & practices prevalent in U.S.A, U.K., China, Brazil, Russia& Saudi Arabia.

Module V: Global Mergers & Acquisition (M&A's)
Case studies on corporate India's Acquisitions & Mergers abroad. Role of Investment Banks & Consultants in global A&M's. Latest FDI & FII trends, FDI & reverse FDI within & outside India.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Manab Thakur, Gene E. Burton & B.N. Srivastava (1997), International Management, Concepts & Cases, Tata McGraw-Hill Publishing Co
- Janet Morrison (2011), International Business Environment, Palgrave Macmillan
- Mia Mikic (2000), International Trade, Macmillan Press.

FOREIGN TRADE POLICY

Course Code: IBM4305 **Credit Units: 03**

Course Objective:
Know the world's top economies and their Trade Policies, Regional & bi-lateral agreement.; Learning the direction, composition & procedures of India's Foreign Trade Policy 2009-2014; Knowing which Assistance, Promotion Schemes and Incentives exporters enjoy; knowing Import Tariffs & Customs duties; Learning International Documentary & Govt. Regulatory compliances

Course Contents:
Module I: World Trade & Economic integration
Why Trade, Link between Trade & Economic growth, World's leading economies, Complexities & Barriers to free trade, World's Top Trading Nations, Emerging markets. Free Trade Areas, Customs Union, Common Markets, Economic Unions; Regional Economic Blocks- EU, NAFTA, MERCOSUR, SAARC, SAFTA, APEC, ASEAN, ECOWAS, GCC, OPEC. Global integration, WTO, IMF, World Bank. Harmonized Commodity Description & Coding System, ISO Currency codes.

Module II: Overview of India's Foreign Trade Policy
The Foreign Trade (Development & Regulation) Act, Objectives of India's Trade Policy 2015-2020, Post 1991 India's Trade Liberalization, India's Economic Indicators, Export/Import data & major Trading partner countries. How to start an Export/Import business, Import Export Code (IEC), Registration cum Membership Certificate (RCMC) with appropriate Export Promotion Council (EPC). Commercial, Financial, Transport, Title, Govt., Insurance, Export Assistance Documents & Certificates used in Exports. Licenses & Customs documents for imports.

Module III: India Trade Policy 2015-20: General Provisions regarding Exports and Imports
Prohibitions (Country and Product specific), Export/Import through State Trading Enterprise (STE), Import of specific categories of Goods, Second Hand Goods, Free Exports, Exemptions, Third Party Exports, Export of specific categories

Module IV: Export Promotion Policies
Export Promotion Council, Export from India Scheme, MEIS, SEIS, Duty Exemption/ Remission Scheme, Duty Free Import Authorisation Scheme, Export Promotion Capital Goods Scheme, Special Economic Zones, EOU/EHTP/STP/BTP/FTZ, Deemed Exports.

Module V:Trade Policy of Leading Trade Economies vis-a-vis Indian Trade Policy
Indo European Union, US & China Trade Policy. Expansion of trade to Latin America, Africa & Asia.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- India Trade Policy 2015-20, dgft.gov.in
- R.K. Jain (2010), Foreign Trade Policy and Handbook of Procedures (2009- 2014) (Vol 1), Jain Book Depot
- Nabhi (2011-12)(1999), How to Export, Nabhi Publications

INTERNATIONAL ECONOMICS AND POLICY

Course Code: IBM4306 **Credit Units: 3**

Course Objective:
Learn the significance of International Trade & Globalization; Introduction to International Economic Indicators & Terminologies; Exposure to World Economies, Transformations & Emerging markets; Visualize & cope with Global Changes in Business scenario; Understanding the role of Govt., International Institutions & Trade Policies

Course Contents:
Module I: Globalization & Emerging Trends
Theory of Comparative Advantage, Standard Trade Model, The Hecksher-Ohlin and other Trade Theories, Competitive Advantage of Nations, International Investment, FDI, FII, Major developments in World economy, Emerging Markets - China, Africa, Asia, East Europe, Latin American & Russia.

Module II: International Economic Indicators and Trade Policy.
Free Trade, Balance of Payments, GNP, GDP, Per-Capita Income, Purchasing Power, Trade Restrictions-Tariffs, Non Tariff Barriers and the Political Economy of Protectionism.

Module III: Global Trade & Policy.
Economic, Commercial, Political, Financial, Marketing, Cultural, Legal & Policy issues & their management, Global Trade of major economies- U.S., EU, China, Japan, India, Latin America, Russi**a**.Conflict between Industrialized & Developing Countries, Export-Import Restrictions and Promotion, Investment Policies, Relevance to India's Economy.

Module IV: Regional Economic Integration & Economic Transformation.
Levels of Economic Integration& Trade Blocks- EU, EFTA, NAFTA, CARICOM, ACM, ECSCA, ASEAN, SAARC, SAPTA, Cartels, OPEC. Transformation of Europe, Russia, East Europe, China, Africa

Module V: Operation of International Monetary System:
Flexible versus Fixed Exchange Rates, European Monetary System and Macroeconomic Policy Coordination, The International Monetary System- Past, Present and Future.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Salvatore, Introduction to International Economics, 10e, Wiley
- Dominick Salvatore, International Economics-Trade and Finance, 11e, Wiley
- Krugman, Paul and Obsfeld, Maurice, International Economics- Theory and Policy, 10e, Pearson
- Jhingan, M.L., International Economics
- Cherunilam, Francis, International Economics
- Schmiltoft, Sweet & Mexwell (2000), Export Trade
- Rao, M.B., and Manjula Guru, WTO and International Trade, Vikas Publishing House Pvt. Ltd.
- Charles W.H. Hall, International Business, Competing in the Global Market Place, Tata McGraw Hill
- UCPDC-600, International Chamber of Commerce, Paris
- Cateora & Hess, International Marketing, Richard D Irwin Inc.
- Eitleman & Stonehill, Multinational Business Finance, Wesley Pub. Co.
- IMF References, The World Economic Outlook

INTERNATIONAL MARKETING

Course Code:IBM4307 **Credit Units: 03**

Course Objective:
In today's dynamic global scenario people who succeed will have to learn the art of managing functions across domestic borders. Thus the course aims at exposing the students to the international business activities. The course would develop a general perspective about managing international business both in operational as well as strategic context.

Course Contents:
Module I: Introduction to International Marketing
Concept of International Marketing, Domestic vs. International marketing, International trade theories of: absolute advantage, comparative advantage and IPLC; Importance of International Marketing, International marketing orientations, Internationalization of Indian Firms Framework.

Module II: International Marketing Environment & Business Strategies
International Marketing Environment-Economic Environment, Social & Cultural environment, Political &Legal Environment.
International Business Strategies- International Market Entry& Expansion Strategies, Stages of Development Models.

Module III: Product& Price Strategy for International Market
Product Strategy for International Market -Identification of products for International Markets, Product Standardization vs Adaptation in International Markets, New product launch for International Markets, Concept of International Product Life cycle theory, Role of Services in International Market.
Pricing Strategy for International Market- Pricing Approaches for International Markets, Terms of delivery & payment in International Transactions, Counter Trade, Dumping, Grey Marketing, Transfer Pricing.

Module IV: Distribution &Promotion Strategy for International Market
Distribution strategy for International Market- Concept of International distribution, Types of distribution Channels, Channel Intermediaries in International Markets, Structure of Distribution Channels in International Markets.
Promotion Strategy for International Market- International Marketing Communication Mix, Tools for International Communication, International Trade Fairs & Exhibitions.

Module V- Contemporary Issues in International Marketing
Global E- Marketing, Emerging issues in International Marketing, Ethical Issues in International Marketing, India: Emerges at the Global Stage

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Keegan Warren & Bhargava Naval (2011), Global Marketing Management, Pearson
- Cateora Philip, Graham John & Salwan Prashant (2010), International Marketing, Mc Graw Hill
- Paul Justin & Kapoor Ramneek (2010), International Marketing, Mc Graw Hill
- Joshi Rakesh Mohan (2009), International Business, Oxford Higher Education
- Vasudeva PK (2010), International Marketing, Excel Books
- Harvard Business Review, Global Business Review (Sage Publications), Global Forum – ITC Geneva

SPECIALISATION: INFORMATION TECHNOLOGY

NETWORKING FUNDAMENTALS

Course Code: ITM4301 **Credit Units: 03**

Course Objective:
The goal of this course is to introduce you to fundamental networking concepts and technologies. The course aims at training the student for the following: Install, maintain, and troubleshoot computer hardware; connect a variety of peripherals to a PC and correctly configure them. This course will assist you in developing the skills necessary to plan and implement small networks across a range of applications.

Course Contents:

Module I: Introduction to Networks
Elements of Network, Introduction to different types of Networks-LAN,WAN,MAN,SAN and others, Network topologies- Bus, Ring, Star, Mesh. Working, Advantages and Limitations of each topology.

Module II: Network Hardware
Introduction to Network hardware: Workstation, printer, Server, UPS. Cable types, Networking devices and their role- Hub, repeater, amplifier, bridge, switch, router, gateway, firewall, multiplexer, de-multiplexer, modem, wireless Access Point.

Module III: Introduction to Networks & OSI Model
OSI Model and functionality of each layer of OSI model, data entities at each layer- Segment, packet and frame. Protocols and services supported by OSI layers, Application layer protocols- HTTP, FTP, TFTP, ICMP, DNS, DHCP, Telnet, SSH, SMTP, POP, IMAP etc.

Module IV: TCP/IP Model
Introduction to TCP/IP model and the functionality of each of the layers, Protocols working at each layer. TCP-communicating with reliability, UDP- Communicating with low overhead, IPv4, IPv4 addresses for different purposes, assigning addresses, calculating addresses, sub-netting,

Module V: Routing Algorithms
Routing- handling data packets. Routing algorithms, Congestion control Algorithms, Quality of service, Internetworking, Network-Layer in the internet.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Texts &References

- A.S.Tanenbaum, “Computer Networks”; Pearson Education Asia, 4 Ed. 2003.
- Behrouz A.Forouzan, “Data Communication and Networking”, 3rd Ed. Tata MCGraw Hill, 2004.
- William stallings, “Data and computer communications”, Pearson education Asia, 7 Ed., 2002.

DATABASE MANAGEMENT SYSTEMS

Course Code: ITM4302 **Credit Units: 03**

Course Objectives
The course aims to make the students understand the basic and advanced concepts in databases and database management systems. Students will be able to understand the importance of databases in day to day life. The course will also provide the students, a hands-on experience on the SQL-the language of databases.

Course Contents:

Module I: Introduction to DBMS
Definition of DBMS, Concept and Goals of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Database Languages, Database Users, Database Abstraction.

Module II: Relational Database & ER Model
Relational Database: Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views
ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER diagrams.

Module III: Relational Model Objects
Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules, Relational operators, Relational Algebra

Module IV: SQL
SQL Language, DDL,DML and DCL commands. Data definition, Data retrieval and update operations on MS ACCESS and SQL Server DBMS.

Module V: Database Applications and Types
Distributed Database, Object Oriented Database, Multimedia Database, Data Mining, Digital Libraries. Data Warehouse.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Elmasari, Navathe, "Fundamentals of Database Systems", Addision Wesley.
- Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.
- Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
- Date C J." An Introduction to Database Systems", Addision Wesley.

DIGITAL MARKETING

Course Code: ITM4303 **Credit Units: 03**

Course Overview:
The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Participants will complete the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand.

Course Objectives:
Digital Marketing Course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

- To Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy
- Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media
- Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan
- Learn how to measure digital marketing efforts and calculate ROI
- Explore the latest digital ad technologies

Course Contents:

Module-I: Digital Marketing Overview:
What is Digital Marketing? Understanding Marketing Process? Why Digital Marketing Wins Over traditional Marketing? Understanding Digital Marketing Process; Digital Marketing Planning and Strategy

Module-II: Website Planning and Creation:
Understanding Internet; Difference between Internet & web; Understanding websites; Understanding domain names & domain extensions; What is web server & web hosting? Different types of web servers; Different types of websites; Planning & Conceptualising a Website; Building website using CMS in Class.

Module-III: Digital Advertising (PPC, Digital Display and YouTube):
Google AdWords Overview; Understanding Adwords Algorithm; Creating Search Campaigns; Types of Search Campaigns - Standard, All features, dynamic search & product listing. Tracking Performance/Conversion: What is conversion tracking? Why is it important, how to set up conversion tracking. Optimizing Search Campaigns: How to optimize campaigns at the time of creation? Optimizing campaign via adgroups.Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing .
What is Online Advertising? Types of Online Advertising, Display Advertising, Contextual advertising, what are Payment Modules?Different Online advertising platforms Creating Banner Ads Using Tools.

Module-IV: Emerging trends in Digital Marketing:
Affiliate Marketing- Affiliate marketing history**,** Affiliate marketing scenario in India**,** Different ways to do affiliate marketing. **Email Marketing-** What is email marketing and how it works? Types of email marketing- Opt-in & bulk emailing; Setting up email marketing account, creating a broadcast email. What are auto responders? Setting up auto responders; Tricks to land in inbox instead of spam folder; **Social Media Marketing-**Concept**,** How social media marketing is different than others Forms

of Internet marketing, Understanding Facebook marketing, Linkedin Marketing, Twitter Marketing, Video Marketing **and** VIDEO & AUDIO (PODCASTING) marketing; **and Mobile Web Marketing-** Understanding Mobile Devices, Mobile Marketing Measurement and Analytics; Fundamentals of Mobile Marketing, Creating mobile website through wordpress; Using tools to create mobile websites; Using tools to create mobile app Advertising on mobile (App & Web); Content Marketing on mobile. **Content Marketing-**Introduction to content marketing, Objective of content marketing, Content marketing 7 step strategy building process, How to write great compelling content, Optimizing content for search engines, How to increase opt-in email list with content marketing with examples.

Module-V: Search Engine Optimization (SEO):
What is SEO? Introduction to SERP, What are search engines? How search engines work? Major functions of a search engine; what are keywords? Different types of keywords ; Google keyword planner tool; Keywords research process; Understanding keywords; On page optimization; Off Page optimization; Top tools for SEO; Monitoring SEO process; Preparing SEO reports, How to create SEO Strategy for your business, What is link juice? Importance of domain and page authority?How to optimize exact keywords for your business. What is Google Panda Algorithm, Google Penguin and Google EMD Update. How to save your site from Google Panda, Penguin and EMD Update, How to recover your site from Panda, Penguin and EMD.

Module-VI: E-Commerce and Payment Gateway:
What is ecommerce? Top ecommerce websites around the world & it's scenario in India; Difference between E-Commerce software and Shopping Cart; software Payment Gateways, Merchant Accounts & Logistics for physical goods. Integrating Woo-commerce and setting up an ecommerce store on WordPress. Case studies on ecommerce websites. How to do Google Product Listing Ads (PLA) for ecommerce websites.How to do SEO for an ecommerce website.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.
- The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
- The Art of Digital Marketing by Ian Dodson.
- Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
- Digital Marketing, VandanaAhuja, Oxford Publication.
- Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
- Social Media for Business – Stories of Indian Brands, By Sorav Jain
- Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Websites:
SEOMoz.org ;mashable.com; http://www.convinceandconvert.com; ClickZ.com ; eMarketer forrester.com; contentmarketinginstitute.com ; adage.com; adweek.com

Final Project: Group Paper and Presentation
Students will work in instructor-selected groups of four or five to complete a 15-20 page digital marketing plan utilizing the concepts and frameworks covered in the course. Papers should be double-spaced using 12-point font and 1-inch margins, and submitted accordingly. All groups will be required to give a presentation in class highlighting the important points of their plan and submit their presentation slides for review. Presentations will take place in class via web conference on prescribed date. Students will need to ensure their audio is working well in order to present. All students will be required to complete evaluations of the group presentations given in class. 25% will be deducted per day for late papers and slides.

INTRODUCTION TO CLOUD COMPUTING

Course Code: ITM4304 **Credit Units: 03**

Course Objective:
This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Contents:
Module-I: Cloud Computing Overview
Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

Module-II: Cloud Insights
Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

Module-III: Cloud Architecture- Layers and Models
Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption.Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

Module-IV: Cloud Simulators- CloudSim and GreenCloud
Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture, Understanding Working platform for CloudSim, Introduction to GreenCloud

Module-V: Introduction to VMWare Simulator
Basics of VMWare, virtualization, advantages of virtualization, using Vmware workstation, creating virtualmachines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:
Text:

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

References:

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

SYSTEM ANALYSIS AND DESIGN

Course Code: ITM4305 **Credit Units: 03**

Course Objective:
The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: Systems Development Environment. (Information system development life cycle)
System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology modeling tool)
Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)
Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System Design
System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Roles & Duties of System Administration. Succeeding as System Analyst, Interpersonal kills, Management skills, Analytical skills and Technical skills.

Module V: System Implementation & Operation (System Management)
Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing
System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; **HA -** Home Assignment; **P -** Project; **S -** Seminar; **V** - Viva; **Q** - Quiz; **CT** - Class Test; **A** - Attendance; **EE** - End Semester Examination

Text & References:

Text:

- Valacich George Hoffer, Essentials of System Analysis & Design, Second Edition, Prentice-Hall India.

References:

- James A. Senn, Analysis and Design of information systems.
- Kroeber, Donald W. and Watron, Hugh J., Computer Based Information Systems.
- E. M. Awad, Systems Analysis & Design.
- Dennis Wixom and Wiley, Systems Analysis and Design – An Applied Approach.

DYNAMIC WEB DESIGN & DEVELOPMENT

Course Code: ITM4306 **Credit Units: 03**

Course Objective:
To develop applications in PHP using various concepts like arrays, user defined functions, Sessions which makes the students to understand and to establish the connectivity between PHP and database and develop programs to add records, retrieve records and delete records from a table.

Course Contents:
Module I: Introduction to Web Development & Cascading Style Sheets
Web pages, Static and Dynamic web pages, Client side VS Server side, Introduction to HTML, HTML Elements, HTML attributes, Styling and formatting HTML, Forms, Tables.
CSS Basics: CSS Introduction: CSS Syntax, CSS Id & Class, CSS How
CSS Styling: Styling Backgrounds, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables. **CSS Box Model:** CSS Border, CSS Outline, CSS Margin, CSS Padding

Module II: CSS Advanced
CSS Grouping/Nesting, CSS Dimension, CSS Display, CSS Positioning, CSS Floating, CSS Align, CSS Pseudo-class, CSS Pseudo-element, CSS Navigation Bar, CSS Image Gallery, CSS Image Opacity, CSS Image Sprites. CSS Media Types, CSS Attribute Selectors

Module III: Introduction to PHP, Decisions, Loop & Functions
Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.
What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function,Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function

Module IV: Handling HTML Forms using PHP, Working with Files and Directories
Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission.
Understanding, file & directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.

Module V: Session and Cookie, Database Connectivity with MySql, Exception Handling
Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins.)
Understanding Exception and error, Try, catch, throw. Error tracking and debugging.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- . Learning PHP, MySQL, books by ‘ O’ riley Press

CYBER SECURITY SYSTEM

Course Code: ITM4307 **Credit Units: 03**

Course Objective:
In today's networked world, most of the organizations and enterprises depend on different kinds of Information Technology solutions, say e-commerce, e-governance, e-learning, e-banking etc.. All communications must be secured and under control since the information stored and conveyed is ultimately an invaluable resource of the business. Securing vital resources and information in the network is the most challenging feat for system enterprise. Therefore the need of the hour is to update the knowledge on the network security issues and solutions. This course gives students an insight into security aspects of networks. Students will be able to learn about concepts related to cyber security, cryptography techniques, various security management practices and network security techniques.

Course Contents:

Module-I: Introduction and Cryptography Basics
Basic Concepts: Threats, Vulnerabilities, risk, confidentiality, integrity, availability, security policies, security mechanisms, prevention and detection. **Basic Cryptography:** Introduction to Cryptography, Types: Symmetric and Asymmetric Cryptography, Digital Signature, Modes of operation, Hash Function, Applications of Cryptography

Module-II: Cyber Security
Principles of Cyber Security, Cyber Security Models, Cyber Security Architecture. **Cyber Security Management concepts**: Security governance, management models, roles and functions. **Enterprise Roles and Structures:** Information security roles & positions, Alternative enterprise structures and interfaces, Case Study: Corporate Security

Module-III: Security Management Practices
Security Plans & Policies: Levels of planning, the system security plan (SSP), Policy development and implementation. **Risk Management:** Principles of Risk, Types of Risk, Risk strategies, The Risk Management Framework. **Security Laws & Standards:** Security Assurance, Security Laws, International Standards, Security Audits, SEE-CMM

Module-IV: Information & Network Security
Overview of Identification & Authorization, Intrusion Detection System & Intrusion Prevention Susie. Overview of Firewalls, Types of firewalls, Features of Firewalls. VPN Security, Security in multimedia network, various computing platforms: High performance computing, Grid Computing, Cloud & Virtualization

Module-V: System & Application Security
Secure Architecture: Designing Secure Operating System, Information Security Models. **System Security:** Desktop Security, Email Security: PGP, SMIME, Web Security: Web Authentication, SSL, SET.
Wireless Networks & Security: Components of wireless network, Security issues in wireless network

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Text & References

- Rhodes-Ousley, Mark. *Information Security: The Complete Reference*, Second Edition, . Information Security Management: Concepts and Practice. New York, McGraw-Hill, 2013.
- Allan Friedman, P. W. Singer, *Cybersecurity and Cyberwar: What Everyone Needs to Know*, Oxford University Press IndiaISBN 978-0199918119, 2016
- Chwan-Hwa (John) Wu, J. David Irwin, *Introduction to Computer Networks and Cybersecurity***,** CRC Press**,** ISBN 9781466572133, 2013

SOFTWARE PROJECT MANAGEMENT

Course Code: ITM4308 **Credit Units: 03**

Course Objective:
The course will enable students to understand the need for Software Project Management. Students will also learn about techniques for software cost estimation and activity planning.

Course Contents

Module-I: Project Evaluation and Project Planning
Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

Module-II: Project Life Cycle and Effort Estimation
Software process and Process Models – Choice of Process models – mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II A Parametric Productivity Model – Staffing Pattern.

Module-III: Activity Planning and Risk Management
Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules.

Module-IV: Project Management and Control
Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

Module-V: Staffing in Software Projects
Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

- Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.
- Robert K. Wysocki "Effective Software Project Management" – Wiley Publication,2011.
- Walker Royce: "Software Project Management"- Addison-Wesley, 1998.

SPECIALISATION: MARKETING & SALES

ADVERTISING AND SALES PROMOTION

Course Code: MKT4301 **Credit Units: 03**

Course Objective:
The main objective of this course is to familiarize the students with the role of advertising in the context of promoting products and services. Advertising is one of the most used promotional tools. It will help students to understand the advertising process and key decision areas for effective management of this function.

Course Contents:

Module-I: Introduction
Evolution of advertisement, Advertiser, Facilitating Institutions, advertising and society, advertising and regulations; ***Advertising Planning and decision making:*** Planning framework, Situation analysis, advertising plan, Communication and persuasion process.

Module-II: Objective Setting and Market Positioning
IMC: Role of advertising within marketing program and communication mix, sales promotion, public relations, publicity and integrating different elements; ***Setting goals and objectives:*** *Behavioral dynamics, advertising response variables, DAGMAR.* ***How advertising works:*** Low-Involvement learning, Central versus Peripheral routes to persuasion, ELM, Cognitive response model.

Module-III: Message Strategy
Attention and comprehension:Attention, Comprehension, Recall, Interpretation; ***Understanding Benefit-based attitude:*** Attitude levels, Means-Ends and Laddering Analysis, Multi-attribute models, Segmentation using attitude structure; ***Associating feelings with brands:*** Modeling the feelings response to advertising, transformational advertising, role of classical conditioning; brand personality associations; ***WOM Advertising:*** Informational influence and Normative influence.
Message Tactics-*Creative approaches*: Rational and emotional creative approaches, Using Endorser, Distraction Effect; ***Copywriting:*** Illustrating, layout, creative styles; ***Copy testing:*** Strategy, diagnostic copy tests; ***Production and implementation:*** Advertising production process, model of the creation and production process, Client-Agency relationship.

Module-IV: Media Strategy and tactics
Setting Media Budgets: Budget allocation, budgeting methods; ***Media Tactics:*** Media class decisions, media vehicle decisions, media option decisions, scheduling and timing decision, creativity in media planning.

Module-V: Sales Promotion
Introduction, Role & Scope, Consumer & Trade Promotions, Sales promotion Strategy, Promotional offers- coupons, price-offs, premiums, sweepstakes, refund and rebates, sampling, loyalty programmes, POP displays, Dealer loader, Celebrity Endorsements.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Suggested Readings

- Arens, W. F. (2008). *Contemporary advertising*. New Delhi: Prentice Hall.
- Batra, R., Myers, J. G., & Aaker, D. A. (2006). *Advertising management*. New Delhi: Pearson Education.
- Guinn O', T. C., Allen, C. T., & Semenik, R. J. (2009). *Advertising management with integrated brand promotion*. New Delhi: Cengage Learning.
- Moriarty, S., Mitchell, N., & Wells, W. (2008). *Advertising principles and practice* (8th ed.). New Delhi: Pearson Education.
- Sandage, C. H., Fryburger, V., & Rotzoll, K. B. (1983). *Advertising theory and practice*. Homewood: Richard D Irvin.

MARKETING OF FINANCIAL SERVICES

Course Code: MKT4302 **Credit Units: 03**

Course Description:
Marketing of financial services is inimitable in its variety, stringent regulatory compliances and distinctive challenges, even though many of the concepts of marketing in financial services are similar to marketing in other industries.
Marketing of financial services can take place at B-2-B, B-2-C level, or both. Marketing often differs in an important way from other financial services functions, in that it is both quantitative and qualitative – it is both creative and analytical.

Objectives:
This course aim to develop the student's ability to:
1. Explore opportunities in the financial services sector;
2. Develop and implement effective marketing strategies to optimize a company's chance of success in the markets in which it operates;

Course Contents:

Module-I:
Financial Services: The significance and relevance of principles of marketing to financial services organizations (FSOs). Introduction to various theories, nature and characteristics of financial services marketing versus marketing of goods.
Marketing Environment: Analyzing marketing environment of financial services in India. Introduction to basic tools, techniques and models used to analyze the context within which any, FSO, operates.

Module-II:
Segmentation and positioning of Financial Market: Various bases of segmenting the financial services industry; Targeting and positioning of financial market.
Product Conceptualization: Introductionto the idea of financial product, various levels of product; product branding, product mix, PLC & new product development(NPD).

Module-III:
Decisions related to pricing, promotion: Pricing: Study of various factors and strategies; Promotion: Study of communication process; Promotion mix: Advertising, Publicity, Personal Selling, PR & sales promotion.
Decisions related to Distribution: Analysis of various strategies adopted for channel selection.

Module-IV:
Extended Marketing mix for FSOs: Processes: Balancing the demand-supply gap; Peoples-Managing employees and customers; managing Physical Evidence i.e. understanding the image created by tangible items such as décor, etc.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Suggested Texts:

- Alan Wilson (2006), *Marketing Financial Services*, Chartered Institute of Bankers: Scotland.
- Dhananjay Bapat (2013), *Marketing of Financial Services*, Biztantra: Delhi.
- Indian Institute of Banking & Finance (2015), *Managing and Marketing of Financial Services.* Taxman: Delhi.

DIGITAL MARKETING

Course Code: MKT4303 **Credit Units: 03**

Course Overview
The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Participants will complete the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand.

Course Objectives
Digital Marketing Course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

- To Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy
- Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media
- Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan
- Learn how to measure digital marketing efforts and calculate ROI
- Explore the latest digital ad technologies

Course Contents:

Module-I: Digital Marketing Overview:
What is Digital Marketing? Understanding Marketing Process? Why Digital Marketing Wins Over traditional Marketing? Understanding Digital Marketing Process; Digital Marketing Planning and Strategy

Module-II: Website Planning and Creation:
Understanding Internet; Difference between Internet & web; Understanding websites; Understanding domain names & domain extensions; What is web server & web hosting? Different types of web servers; Different types of websites; Planning & Conceptualising a Website; Building website using CMS in Class.

Module-III: Digital Advertising (PPC, Digital Display and YouTube):
Google AdWords Overview; Understanding Adwords Algorithm; Creating Search Campaigns; Types of Search Campaigns - Standard, All features, dynamic search & product listing. Tracking Performance/Conversion: What is conversion tracking? Why is it important, how to set up conversion tracking. Optimizing Search Campaigns: How to optimize campaigns at the time of creation? Optimizing campaign via adgroups. Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing .
What is Online Advertising? Types of Online Advertising, Display Advertising, Contextual advertising, what are Payment Modules? Different Online advertising platforms Creating Banner Ads Using Tools.

Module-IV: Emerging trends in Digital Marketing:
Affiliate Marketing- Affiliate marketing history**,** Affiliate marketing scenario in India**,** Different ways to do affiliate marketing. **Email Marketing-** What is email marketing and how it works? Types of email marketing- Opt-in & bulk emailing; Setting up email marketing account, creating a broadcast email. What are auto responders? Setting up auto responders; Tricks to land in inbox instead of spam folder; **Social Media Marketing-**Concept**,** How social media marketing is different than others Forms

of Internet marketing, Understanding Facebook marketing, Linkedin Marketing, Twitter Marketing, Video Marketing **and** VIDEO & AUDIO (PODCASTING) marketing; **and Mobile Web Marketing-** Understanding Mobile Devices, Mobile Marketing Measurement and Analytics; Fundamentals of Mobile Marketing, Creating mobile website through wordpress; Using tools to create mobile websites; Using tools to create mobile app Advertising on mobile (App & Web); Content Marketing on mobile. **Content Marketing-**Introduction to content marketing, Objective of content marketing, Content marketing 7 step strategy building process, How to write great compelling content, Optimizing content for search engines, How to increase opt-in email list with content marketing with examples.

Module-V: Search Engine Optimization (SEO):
What is SEO? Introduction to SERP, What are search engines? How search engines work? Major functions of a search engine; what are keywords? Different types of keywords ; Google keyword planner tool; Keywords research process; Understanding keywords; On page optimization; Off Page optimization; Top tools for SEO; Monitoring SEO process; Preparing SEO reports, How to create SEO Strategy for your business, What is link juice? Importance of domain and page authority? How to optimize exact keywords for your business. What is Google Panda Algorithm, Google Penguin and Google EMD Update. How to save your site from Google Panda, Penguin and EMD Update, How to recover your site from Panda, Penguin and EMD.

Module-VI: E-Commerce and Payment Gateway:
What is ecommerce? Top ecommerce websites around the world & it's scenario in India; Difference between E-Commerce software and Shopping Cart; software Payment Gateways, Merchant Accounts & Logistics for physical goods. Integrating Woo-commerce and setting up an ecommerce store on WordPress. Case studies on ecommerce websites. How to do Google Product Listing Ads (PLA) for ecommerce websites. How to do SEO for an ecommerce website.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Text & References:

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.
- The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
- The Art of Digital Marketing by Ian Dodson.
- Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
- Digital Marketing, VandanaAhuja, Oxford Publication.
- Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
- Social Media for Business – Stories of Indian Brands, By Sorav Jain
- Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Websites:
SEOMoz.org ;mashable.com; http://www.convinceandconvert.com; ClickZ.com ; eMarketer forrester.com; contentmarketinginstitute.com ; adage.com; adweek.com

Final Project: Group Paper and Presentation
Students will work in instructor-selected groups of four or five to complete a 15-20 page digital marketing plan utilizing the concepts and frameworks covered in the course. Papers should be double-spaced using 12-point font and 1-inch margins, and submitted accordingly. All groups will be required to give a presentation in class highlighting the important points of their plan and submit their presentation slides for review. Presentations will take place in class via web conference on prescribed date. Students will need to ensure their audio is working well in order to present. All students will be required to complete evaluations of the group presentations given in class. 25% will be deducted per day for late papers and slides.

INTERNATIONAL MARKETING

Course Code: MKT4304 **Credit Units: 03**

Course Objective:
In today's dynamic global scenario people who succeed will have to learn the art of managing functions across domestic borders. Thus the course aims at exposing the students to the international business activities. The course would develop a general perspective about managing international business both in operational as well as strategic context.

Course Contents:
Module I: Introduction to International Marketing
Concept of International Marketing, Domestic vs. International marketing, International trade theories of: absolute advantage, comparative advantage and IPLC; Importance of International Marketing, International marketing orientations, Internationalization of Indian Firms Framework.

Module II: International Marketing Environment & Business Strategies
International Marketing Environment-Economic Environment, Social & Cultural environment, Political &Legal Environment.
International Business Strategies- International Market Entry& Expansion Strategies, Stages of Development Models.

Module III: Product& Price Strategy for International Market
Product Strategy for International Market -Identification of products for International Markets, Product Standardization vs Adaptation in International Markets, New product launch for International Markets, Concept of International Product Life cycle theory, Role of Services in International Market.
Pricing Strategy for International Market- Pricing Approaches for International Markets, Terms of delivery & payment in International Transactions, Counter Trade, Dumping, Grey Marketing, Transfer Pricing.

Module IV: Distribution &Promotion Strategy for International Market
Distribution strategy for International Market- Concept of International distribution, Types of distribution Channels, Channel Intermediaries in International Markets, Structure of Distribution Channels in International Markets.
Promotion Strategy for International Market- International Marketing Communication Mix, Tools for International Communication, International Trade Fairs & Exhibitions.

Module-V: Contemporary Issues in International Marketing
Global E- Marketing, Emerging issues in International Marketing, Ethical Issues in International Marketing, India: Emerges at the Global Stage

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Keegan Warren & Bhargava Naval (2011), Global Marketing Management, Pearson
- Cateora Philip, Graham John & Salwan Prashant (2010), International Marketing, Mc Graw Hill
- Paul Justin & Kapoor Ramneek (2010), International Marketing, Mc Graw Hill
- Joshi Rakesh Mohan (2009), International Business, Oxford Higher Education
- Vasudeva PK (2010), International Marketing, Excel Books
- Harvard Business Review, Global Business Review (Sage Publications), Global Forum – ITC Geneva

DIRECT MARKETING

Course Code: MKT4305 **Credit Units: 03**

Course Objective:
Direct marketing is quickly becoming an integral part of the marketing strategies of general marketing as well as the method of operation of traditional direct marketers. The course focuses on the marketing perspectives and technologies that are distinctly direct marketing and with the interrelationship of direct marketing with the general marketing field.

Course Contents:
Module I: Conceptual Framework of Direct Marketing
Basics and scope of Direct Marketing, Objectives of Direct Marketing, Advantage & Disadvantage of Direct Marketing, Integrated Direct Marketing, Business, Strategic & Direct Marketing planning, Strengths& weakness of Social Media

Module II: Analyzing & Encashing Marketing opportunities for Direct Marketing
Research design for direct marketers, The Customer Database: Analysis and Application, Consumer & Business mailing list, offer, Media of direct marketing, Telemarketing, Internet E-communications, Managing Direct Sales Force.

Module III: Managing the Creativity Process in Direct Marketing
Introducing Creative Practices and techniques, Direct Marketing Creativity, Basic Steps of Managing catalogue & print advertising, Innovation through Creativity & testing The Strategic drivers of Creative Practices.

Module IV: Direct Marketing into Business
B to B Marketing, Making a lead generation programme, Overview of E-commerce.retaining and activating customers

Module V: Direct Marketing Implementation and Control
Marketing Intelligence- Modeling for business decision support, Mathematics tool for control in Direct marketing, Future of Direct Marketing.

Module VI: Emerging Trends
Integrating the concepts with other functions of Management
Live project to be undertaken starting with conception of idea to final execution.,
Case studies
Latest emerging trends and practices.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Bob stone & Ron Jacobs, Successful Direct Marketing Methods, Tata McGraw Hill.
- Nash & Edward L, Direct Marketing Hand Book, Tata McGraw Hill

RETAIL MANAGEMENT

Course Code: MKT4306 **Credit Units: 03**

Course Objective:
The primary objective of the course is to develop fundamental competencies in retail management. The course is designed to prepare students for positions in the FMCG/Pharmaceutical/Electronics/Consumer Durable/Fashion/Apparel retail businesses or positions in the real estate companies with additional interest in mall management. The course also benefit students interested in starting their own entrepreneurial retail operation. Additionally this course aims at familiarizing students with emergence of malls as a new format of market with emphasis on mall management principles and practices.

Course Contents:

Module-I: Introduction to Retailing
Introduction, Meaning of Retailing, Economic Significance of Retailing, Retailing Management Decision Process, Product Retailing vs. Service Retailing, Types of Retailers, Indian vs. Global Scenario, Difference between organized and unorganized retailing, Issues and challenges of retailing in India

Module-II:Store Planning, Design and Layout
Store Planning- Introduction, Types of Retail Stores Location, Factors Affecting Retail Location Decisions, Country/Region Analysis, Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies
Store Design- Atmospherics, Retailing Image Mix, Space mix
Store Layout- Effective retail space management based on Store Layout

Module-III: Retail Merchandise Management
Retail Merchandising: Introduction, Understanding Merchandising Management, Activities of a Merchandiser, Retail Merchandising Management Process
Private Branding in Retail-Introduction, Difference between a Store/Private Brand and a National Brand, Growth Drivers of Private Label, Advantages of Private Label, Disadvantages of Private Label

Module-IV: Store Operations
POS (Point of Sale) / Cash process, Customer service and accommodation, Retail selling process, Retail floor and shelf management, Retail accounting and cash management, Merchandise and category management. Visual merchandising and displays, Retail technology and retail automation, POS and Back-end Technologies.

Module-V: Mall Management
Introduction – Defining the shopping mall, Difference between Shopping Mall and other retail formats, **Shopping Centre / Mall Location:** Existing mall traffic, Clean environment, Designated parking area, Medium to high rental cost, Strengths and Weaknesses of the Mall format; Licenses and Permits for mall operations, **Positioning & Zoning of mall** – formulating the right tenant mix and its placement in a mall**, Facility management** – Infrastructure, Traffic and ambience management, Finance management, Lifestyle centers and their management, Indian scenario of mall management practices.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Michael Levy, Barton A Weitz and Ajay Pandit, (2008), Retailing Management, Tata McGraw Hill
- R Vedamani&Gibbson, (2008), Retail Management: Functional Principals and Practices, Jaico publications
- Patrick M. Dunne & Robert F Lusch, (2002), Retail Management, Cengage Learning
- Berry Berman & Joel R. Evans, (2009), Retail Management – A Strategic Approach, Pearson Education

Learning Resources:

- Images Retail magazine
- Cygnus Report on Retail Sector
- CII Report on Retail Scenario in India
- Images Malls in India
- Images Year Book
- AT Kearney Report

SALES MANAGEMENT

Course Code: MKT4307 **Credit Units: 03**

Course Objective:
This course has been designed to help students learn sales management concepts and how to apply them to solve business problems and to function as effective managers. It deals with all important back end management of sales and front end personal selling issues with a view to handle the situations professionally and improve the outcome with result orientation.

Course Contents:

Module I
Changing world of Sales Management and Professionalism in sales. Classification of Personal Selling approaches. Sales jobs, Qualification and skill required for success. Organizational buyer behavior and buying situations. Contrasting Transactional and Relationship Selling models, Sales Teams. Sales management Competencies for effective and outstanding results. Developing Sales Management Strategy / Objectives and Sales Force Roles. Buyer-Seller Daydic Relationship.

Module II
Recruitment planning process: Job analysis, description, qualifications, buyer's perspective and methods of locating prospective candidates. Selection: Application forms, Types of Interviews, Testing and Validating the hiring process.
Sales Training: Determining training needs, Training analysis, Methods of Evaluating sales Training and building a sales training program. Instructional methods used in training.

Module III
Motivation and the reasons for motivating sales people. Maslow's Hierarchy of Needs related to the sales force motivators and company's actions to fill needs. Methods of giving status to sales people to motivate them.
Sales force compensation. Components of compensation and their purpose. Comparison of various compensation plans. Optimizing sales compensation: Customer – Product Matrix and relating it to the appropriate compensation plans.

Module IV
Sales territory; Reasons for establishing or revising Sales Territories, Setting up and revising Sales Territories: Market build-up and Work load method; optimizing sales territory.
Sales quotas; Objectives in using Quotas, Types of Sales Quotas and Quota setting procedures. Reasons when not to use Quotas.

Module V
Personal Selling process: Prospecting: Developing a prospect base, Strategic prospecting, Sources of prospects, common causes of customer attrition, Preparing a prospect list and organizing information. Planning the initial sales call and approach: Pre call information on the Buyer and Organisation, Call Objectives, Planning the approach. Sales Presentation techniques: Types of presentation techniques, Presentation sequence, Adoptive Selling Model. Demonstrations: Demonstration plans, actions, custom fitting demonstrations, use of sales tools. Handling customer objections: types of objections, types of close, Trial Close. Closing the sales.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Still, Cundiff and Govoni. (2009), Sales Management, Decisions, Strategies and Cases, Prentice Hall of India Pvt. Ltd.
- Ingram, Laforge, Avila, Schwepker Jr., Williams.(2009), Analysis and Decision Making, Segment Books
- Douglas J. Dalrymple, Cron and Decarlo.(2003), Sales Management, John Wiley & Sons Inc.
- Charles M. Futrell (2010). Fundamentals of Selling. Tata McGraw Hill
- Gerald L Manning**,** Michael Ahearne and Barry L Reece (2011). Selling Today, Prentice Hall Pub.

CONSUMER BEHAVIOUR

Course Code:MKT4308 **Credit Units: 03**

Course Objective:
The course will enable the students to define the concept of consumer behavior and reveal its importance in the context of marketing, to identify various factors that influence consumer behavior and also to examine the intricacies involved in the consumer decision-making process.

Course Contents:
Module-I: Introduction:
Introduction to CB, Model of Consumer buying Decision Making, Participants in buying process, Individual v/s org buying behavior, Concept of consumer Research, Consumer Research Process, Consumer Research Design, Identifying segments, Addressing the needs of market, Profitability of segmentation, Criteria of segmentation, Bayesian Analysis, Value of brand, Brand Loyalty, Seven R's of marketing mix, Inter-market segmentation, STP.

Module-II:Consumer as an Individual:
***Consumer demographics*:** Analysis, Consumer life styles and lifestyle marketing VALS, LOV; ***Motivation*:** Types of Needs and Goals, Nature and role of motive, Classifying motives, Motive arousal, Motivation Research; ***Personality*:** Personality theories, Measuring Personality, How self concept develops, Consistency of Self; ***Perception*:** Active Search, Passive reception, concepts related to perception, Marketing Implications; ***Learning**:* Cues, Response, Reinforcement, Characteristics of Memory systems, Theories of learning; ***Attitude*:** Characteristics of attitude, Functions of attitude, Sources of attitude development. , Attitude theories and models, Strategies for changing attitude.

Module-III: Environmental influences on CB:
Group Dynamics: Importance of group dynamics in decision making, Characteristics of group, Types of groups; ***Reference groups***: Types of reference groups, Application of reference group in CB; ***Family***: Significance of family in CB, Family life cycle, Family purchasing decision; ***Social Class***: Meaning of social class, Process of social stratification, Nature of social class, Social class measurement, Role of social class in segmenting markets, Social class and consumer behavior; ***Culture:*** What is culture, The content of culture, Culture as a process. ***Sub-Culture:*** Defining subculture, Analyzing subculture; ***Personal Influence*** : Nature and significance of personal influence, Who are opinion leaders, Why do opinion leader attempts to influence others, Why followers accept personal influence, The market maven,., Marketing Implications of Personal influence, Identifying and using opinion leaders directly, Creating opinion leaders, Simulating opinion leadership, Stifling opinion leadership, Identifying OL

Module-IV: Consumer Decision Making Process
Decision Process:Buying decision process, Nicosia Model, Howard Sheth Model, Engel –Kollat-Blackwell Model, Types of buying behavior, Steps in buying decision process, Impulse purchase and customer loyalty; ***Diffusion of innovation:***What is an innovation, Types of Innovation, The Adoption process, The Diffusion process.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Suggested books:

- Schiffman, L.G., Wisenblit,J, J.& Kumar, S.R.(2016). *Consumer Behavior* (11th ed.*)*. Noida, India: Pearson
- Loudon, D. L. & Bitta, A. J.(2002). *Consumer Behavior*. N. Delhi, India: Tata-McGraw-Hill
- Blackwell, R.D., Miniard, P.W. &.Engel, J.F.(2007). *Consumer Behavior*. Kundli, India: Thomsons South-Western.
- Gupta, S.L. & Pal, S (2006).*Consumer Behavior*. N. Delhi, India: Sultan Chand &Sons.

SPECIALISATION: E-COMMERCE

DIGITAL MARKETING

Course Code: ECM4301 **Credit Units: 03**

Course Overview
The course examines digital marketing strategy, implementation and executional considerations for B-to-B and B-to-C brands and provides a detailed understanding of all digital marketing concepts. Participants will complete the course with a comprehensive knowledge of and experience with how to develop an integrated digital marketing strategy, from formulation to implementation. Strong focus will be on developing student's business skills and growing real-world experience of the digital media sector to enhance their knowledge to cope with employability demand.

Course Objectives
Digital Marketing Course is an initiative designed to educate students and practitioners in the area of Digital Marketing analytics and make them ready for jobs or prepare them to launch campaign for their own organisations.

- To Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy
- Understand the major digital marketing channels - online advertising: Digital display, video, mobile, search engine, and social media
- Learn to develop, evaluate, and execute a comprehensive digital marketing strategy and plan
- Learn how to measure digital marketing efforts and calculate ROI
- Explore the latest digital ad technologies

Course Contents:
Module-I: Digital Marketing Overview:
What is Digital Marketing? Understanding Marketing Process? Why Digital Marketing Wins Over traditional Marketing? Understanding Digital Marketing Process; Digital Marketing Planning and Strategy

Module-II: Website Planning and Creation:
Understanding Internet; Difference between Internet & web; Understanding websites; Understanding domain names & domain extensions; What is web server & web hosting? Different types of web servers; Different types of websites; Planning & Conceptualising a Website; Building website using CMS in Class.

Module-III: Digital Advertising (PPC, Digital Display and YouTube):
Google AdWords Overview; Understanding Adwords Algorithm; Creating Search Campaigns; Types of Search Campaigns - Standard, All features, dynamic search & product listing. Tracking Performance/Conversion: What is conversion tracking? Why is it important, how to set up conversion tracking. Optimizing Search Campaigns: How to optimize campaigns at the time of creation? Optimizing campaign via adgroups.Creating Display Campaign; Types of display campaigns- All features, Mobile app, Remarketing, Engagement. Optimizing Display Campaign and Re-marketing .
What is Online Advertising? Types of Online Advertising, Display Advertising, Contextual advertising, what are Payment Modules?Different Online advertising platforms Creating Banner Ads Using Tools.

Module-IV: Emerging trends in Digital Marketing:
Affiliate Marketing- Affiliate marketing history**,** Affiliate marketing scenario in India**,** Different ways to do affiliate marketing. **Email Marketing-** What is email marketing and how it works? Types of email marketing- Opt-in & bulk emailing; Setting up email marketing account, creating a broadcast email. What are auto responders? Setting up auto responders; Tricks to land in inbox instead of spam folder; **Social Media Marketing-**Concept**,** How social media marketing is different than others Forms

of Internet marketing, Understanding Facebook marketing, Linkedin Marketing, Twitter Marketing, Video Marketing **and** VIDEO & AUDIO (PODCASTING) marketing; **and Mobile Web Marketing-** Understanding Mobile Devices, Mobile Marketing Measurement and Analytics; Fundamentals of Mobile Marketing, Creating mobile website through wordpress; Using tools to create mobile websites; Using tools to create mobile app Advertising on mobile (App & Web); Content Marketing on mobile. **Content Marketing-**Introduction to content marketing, Objective of content marketing, Content marketing 7 step strategy building process, How to write great compelling content, Optimizing content for search engines, How to increase opt-in email list with content marketing with examples.

Module-V: Search Engine Optimization (SEO):
What is SEO? Introduction to SERP, What are search engines? How search engines work? Major functions of a search engine; what are keywords? Different types of keywords ; Google keyword planner tool; Keywords research process; Understanding keywords; On page optimization; Off Page optimization; Top tools for SEO; Monitoring SEO process; Preparing SEO reports, How to create SEO Strategy for your business, What is link juice? Importance of domain and page authority?How to optimize exact keywords for your business. What is Google Panda Algorithm, Google Penguin and Google EMD Update. How to save your site from Google Panda, Penguin and EMD Update, How to recover your site from Panda, Penguin and EMD.

Module-VI: E-Commerce and Payment Gateway:
What is ecommerce? Top ecommerce websites around the world & it's scenario in India; Difference between E-Commerce software and Shopping Cart; software Payment Gateways, Merchant Accounts & Logistics for physical goods. Integrating Woo-commerce and setting up an ecommerce store on WordPress. Case studies on ecommerce websites. How to do Google Product Listing Ads (PLA) for ecommerce websites.How to do SEO for an ecommerce website.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Marketing 4.0: Moving from Traditional to Digital by P. Kotler. Wiley Publication.
- The Essentials of E-Marketing, 4th edition by Quirk Education (E-Book)
- The Art of Digital Marketing by Ian Dodson.
- Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, by Damian Ryan and Calvin Jones. KoganPage Publication, 3rd edition.
- Digital Marketing, VandanaAhuja, Oxford Publication.
- Digital Marketing Insights 2017, Social Beat Digital Marketing LLP, Kindle Edition.
- Social Media for Business – Stories of Indian Brands, By Sorav Jain
- Total E-mail Marketing: Maximizing your results from Integrated E-marketing (E-marketing essentials): Dave Chaffey.

Websites:
SEOMoz.org ;mashable.com; http://www.convinceandconvert.com; ClickZ.com ; eMarketer forrester.com; contentmarketinginstitute.com ; adage.com; adweek.com

Final Project: Group Paper and Presentation
Students will work in instructor-selected groups of four or five to complete a 15-20 page digital marketing plan utilizing the concepts and frameworks covered in the course. Papers should be double-spaced using 12-point font and 1-inch margins, and submitted accordingly. All groups will be required to give a presentation in class highlighting the important points of their plan and submit their presentation slides for review. Presentations will take place in class via web conference on prescribed date. Students will need to ensure their audio is working well in order to present. All students will be required to complete evaluations of the group presentations given in class. 25% will be deducted per day for late papers and slides.

DATABASE MANAGEMENT SYSTEMS

Course Code: ECM4302 **Credit Units: 3**

Course Objectives
The course aims to make the students understand the basic and advanced concepts in databases and database management systems. Students will be able to understand the importance of databases in day to day life. The course will also provide the students, a hands-on experience on the SQL-the language of databases.

Course Contents:

Module I: Introduction to DBMS
Definition of DBMS, Concept and Goals of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Database Languages, Database Users, Database Abstraction.

Module II: Relational Database & ER Model
Relational Database: Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views
ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constraint, Keys, Mapping, Design of ER diagrams.

Module III: Relational Model Objects
Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules, Relational operators, Relational Algebra

Module IV: SQL
SQL Language, DDL,DML and DCL commands. Data definition, Data retrieval and update operations on MS ACCESS and SQL Server DBMS.

Module V: Database Applications and Types
Distributed Database, Object Oriented Database, Multimedia Database, Data Mining, Digital Libraries. Data Warehouse.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Elmasari, Navathe, "Fundamentals of Database Systems", Addision Wesley.
- Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.
- Majumdar & Bhattacharya, "Database Management System", Tata McGraw Hill.
- Date C J." An Introduction to Database Systems", Addision Wesley.

NETWORKING FUNDAMENTALS

Course Code: ECM4303 **Credit Units: 03**

Course Objective:
The goal of this course is to introduce you to fundamental networking concepts and technologies. The course aims at training the student for the following: Install, maintain, and troubleshoot computer hardware; connect a variety of peripherals to a PC and correctly configure them. This course will assist you in developing the skills necessary to plan and implement small networks across a range of applications.

Course Contents:

Module I: Introduction to Networks
Elements of Network, Introduction to different types of Networks-LAN,WAN,MAN,SAN and others, Network topologies- Bus, Ring, Star, Mesh. Working, Advantages and Limitations of each topology.

Module II: Network Hardware
Introduction to Network hardware: Workstation, printer, Server, UPS. Cable types, Networking devices and their role- Hub, repeater, amplifier, bridge, switch, router, gateway, firewall, multiplexer, de-multiplexer, modem, wireless Access Point.

Module III: Introduction to Networks & OSI Model
OSI Model and functionality of each layer of OSI model, data entities at each layer- Segment, packet and frame. Protocols and services supported by OSI layers, Application layer protocols- HTTP, FTP, TFTP, ICMP, DNS, DHCP, Telnet, SSH, SMTP, POP, IMAP etc.

Module IV: TCP/IP Model
Introduction to TCP/IP model and the functionality of each of the layers, Protocols working at each layer. TCP-communicating with reliability, UDP- Communicating with low overhead, IPv4, IPv4 addresses for different purposes, assigning addresses, calculating addresses, sub-netting,

Module V: Routing Algorithms
Routing- handling data packets. Routing algorithms, Congestion control Algorithms, Quality of service, Internetworking, Network-Layer in the internet.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Texts & references

- A.S.Tanenbaum, “Computer Networks”; Pearson Education Asia, 4 Ed. 2003.
- Behrouz A.Forouzan, “Data Communication and Networking”, 3rd Ed. Tata MCGraw Hill, 2004.
- William stallings, “Data and computer communications”, Pearson education Asia, 7 Ed., 2002.

SOFTWARE DEVELOPMENT METHODOLOGIES

Course Code:ECM4304 **Credit Units: 03**

Course Objective:
The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software. The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly based on the classical analysis-design-implementation framework.

Course Contents:
Module I: Introduction
Phases of software life cycle, Software life cycle models: Waterfall, iterative waterfall, Prototype, Evolutionary and Spiral models.

Module II: Software Metrics and Project Planning
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, and Information Flow Metrics. Static, Single and multivariate models, COCOMO model,Risk management, risk identification, risk abatement and risk mitigation, risk migration.

Module III: Software Requirement Analysis, design and coding
Problem Analysis, Software Requirement and Specifications and its documentation, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding.

Module IV: Software Reliability, Testing and Maintenance
Failure and Faults, Reliability Models: Basic Model, Software process, reliability metrics
Functional testing: Boundary value analysis, Equivalence class testing, path testing, mutation testing, unit testing, integration and system testing, Debugging: error seeding.
Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

Module V: UML
Introduction to UML, Use Case Diagrams, Class Diagram: State Diagram in UMLActivity Diagram in UMLSequence Diagram in UMLCollaboration Diagram in UML.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

References:

- R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
- P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
- Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
- James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
- Sommerville, "Software Engineering", Addison Wesley, 1999.

SOFTWARE PROJECT MANAGEMENT

Course Code: ECM4305 **Credit Units: 03**

Course Objective:
The course will enable students to understand the need for Software Project Management. Students will also learn about techniques for software cost estimation and activity planning.

Course Contents

Module-I: Project Evaluation and Project Planning
Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

Module-II: Project Life Cycle and Effort Estimation
Software process and Process Models – Choice of Process models – mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II A Parametric Productivity Model – Staffing Pattern.

Module-III: Activity Planning and Risk Management
Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules.

Module-IV: Project Management and Control
Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

Module-V: Staffing in Software Projects
Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.
- Robert K. Wysocki "Effective Software Project Management" – Wiley Publication,2011.
- Walker Royce: "Software Project Management"- Addison-Wesley, 1998.

TECHNOLOGY IN BANKING

Course Code: ECM4306 **Credit Units: 03**

Course Objectives:
Revolutionary developments in technology continue to transform the banking and financial industry. Distribution of banking services through the Internet is an important part of this transformation. Through this course students will be able to understand various tool & techniques of e-banking. Students will also understand various types of cyber law.

Course Contents:
Module I: Branch Operation and Core Banking
Introduction and Evolution of Bank Management - Technological Impact in Banking Operations - Total Branch Computerization - Concept of Opportunities - Centralized Banking - Concept, Opportunities, Challenges & Implementation

Module II: Delivery Channels
Overview of delivery channels - Automated Teller Machine (ATM) - Phone Banking - Call centers - Internet Banking - Mobile Banking - Payment Gateways - Card technologies - MICR electronic clearing

Module III: Back office Operations
Bank back office management - Inter branch reconciliation - Treasury Management - Forex Operations - Risk Management - Data centre Management - Net work Management - Knowledge Management - Customer Relationships Management (CRM)

Module IV: Interbank Payment System
Interface with Payment system Network - Structured Financial Messaging system - Electronic Fund transfer - RTGS - Negotiated Dealing Systems & Securities Settlement Systems - Electronic Money, E Cheques

Module V: Contemporary Issues in Banking Techniques
Analysis of Rangarajan Committee Reports - E Banking - Budgeting - Banking Softwares

Module VI: Overview of Cyber Law
Scope of Cyber Law: Nature of Cyber Space; Cyber Property; Cyber Personality; Cyber Transactions; Cyber Jurisprudence: Concepts of Historical, Analytical and Ethical Jurisprudence; Relationship between Meta Society Laws and Cyber Law; How Cyber Law need to be developed. Cyber Crimes and Cyber Laws; Types of Cyber Crimes; Legal Provisions regarding Cyber Crimes; Investigation and adjudication of cyber crimes; Digital evidence; Methodology of Cyber Crime Investigation; Basic Investigation Techniques.

Examination Scheme:

Components	**CT**	**CT**	**CP**	**A**	**EE**
Weightage (%)	10	10	05	05	70

Text:
- Financial Services Information Systems - Jessica Keyes Auerbach publication; 2nd edition (March 24, 2000)

References:

- Kaptan S S & Choubey N S., "E-Indian Banking in Electronic Era", Sarup & Sons, New Delhi, 2003
- Vasudeva, "E - Banking", Common Wealth Publishers, New Delhi, 2005
- Turban Rainer Potter, Information Technology, John Wiely & Sons Inc
- Banking Technology - Indian Institute of Bankers Publication
- J. Rosenoer, Cyberlaw: The Law Of The Internet (Springer Verlag 1996).

DYNAMIC WEB DESIGN & DEVELOPMENT

Course Code: ECM4307 **Credit Units: 03**

Course Objective:
To develop applications in PHP using various concepts like arrays, user defined functions, Sessions which makes the students to understand and to establish the connectivity between PHP and database and develop programs to add records, retrieve records and delete records from a table.

Course Contents:

Module I: Introduction to Web Development & Cascading Style Sheets
Web pages, Static and Dynamic web pages, Client side VS Server side, Introduction to HTML, HTML Elements, HTML attributes, Styling and formatting HTML, Forms, Tables.
CSS Basics: CSS Introduction: CSS Syntax, CSS Id & Class, CSS How
CSS Styling: Styling Backgrounds, Styling Text, Styling Fonts, Styling Links, Styling Lists, Styling Tables
CSS Box Model: CSS Border, CSS Outline, CSS Margin, CSS Padding

Module II: CSS Advanced
CSS Grouping/Nesting, CSS Dimension, CSS Display, CSS Positioning, CSS Floating, CSS Align, CSS Pseudo-class, CSS Pseudo-element, CSS Navigation Bar, CSS Image Gallery, CSS Image Opacity, CSS Image Sprites
CSS Media Types, CSS Attribute Selectors

Module III: Introduction to PHP, Decisions, Loop & Functions
Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.
What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function,Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function

Module IV: Handling HTML Forms using PHP, Working with Files and Directories
Capturing Form, Data Dealing with Multi-value filed, and Generating File uploaded form, redirecting a form after submission.
Understanding, file & directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading.

Module V: Session and Cookie, Database Connectivity with MySql, Exception Handling
Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.
Introduction to RDBMS, Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins.)
Understanding Exception and error, Try, catch, throw. Error tracking and debugging.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- . Learning PHP, MySQL, books by ‘ O’ riley Press

SYSTEM ANALYSIS AND DESIGN

Course Code: ECM4308 **Credit Units: 03**

Course Objective:
The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: Systems Development Environment. (Information system development life cycle)
System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology modeling tool)
Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)
Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System Design
System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Roles & Duties of System Administration. Succeeding as System Analyst, Interpersonal kills, Management skills, Analytical skills and Technical skills.

Module V: System Implementation & Operation (System Management)
Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing
System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:

Text:

- Valacich George Hoffer, Essentials of System Analysis & Design, Second Edition, Prentice-Hall India.

References:

- James A. Senn, Analysis and Design of information systems.
- Kroeber, Donald W. and Watron, Hugh J., Computer Based Information Systems.
- E. M. Awad, Systems Analysis & Design.
- Dennis Wixom and Wiley, Systems Analysis and Design – An Applied Approach.

CYBER SECURITY SYSTEM

Course Code: ECM4309 **Credit Units: 03**

Course Objective:
In today's networked world, most of the organizations and enterprises depend on different kinds of Information Technology solutions, say e-commerce, e-governance, e-learning, e-banking etc.. All communications must be secured and under control since the information stored and conveyed is ultimately an invaluable resource of the business. Securing vital resources and information in the network is the most challenging feat for system enterprise. Therefore the need of the hour is to update the knowledge on the network security issues and solutions. This course gives students an insight into security aspects of networks. Students will be able to learn about concepts related to cyber security, cryptography techniques, various security management practices and network security techniques.

Course Contents:

Module-I: Introduction and Cryptography Basics
Basic Concepts: Threats, Vulnerabilities, risk, confidentiality, integrity, availability, security policies, security mechanisms, prevention and detection. **Basic Cryptography:** Introduction to Cryptography, Types: Symmetric and Asymmetric Cryptography, Digital Signature, Modes of operation, Hash Function, Applications of Cryptography

Module-II: Cyber Security
Principles of Cyber Security, Cyber Security Models, Cyber Security Architecture. **Cyber Security Management concepts**: Security governance, management models, roles and functions. **Enterprise Roles and Structures:** Information security roles & positions, Alternative enterprise structures and interfaces, Case Study: Corporate Security

Module-III: Security Management Practices
Security Plans & Policies: Levels of planning, the system security plan (SSP), Policy development and implementation. **Risk Management:** Principles of Risk, Types of Risk, Risk strategies, The Risk Management Framework. **Security Laws & Standards:** Security Assurance, Security Laws, International Standards, Security Audits, SEE-CMM

Module-IV: Information & Network Security
Overview of Identification & Authorization, Intrusion Detection System & Intrusion Prevention Susie. Overview of Firewalls, Types of firewalls, Features of Firewalls. VPN Security, Security in multimedia network, various computing platforms: High performance computing, Grid Computing, Cloud & Virtualization

Module-V: System & Application Security
Secure Architecture: Designing Secure Operating System, Information Security Models. **System Security:** Desktop Security, Email Security: PGP, SMIME, Web Security: Web Authentication, SSL, SET.
Wireless Networks & Security: Components of wireless network, Security issues in wireless network

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References

- Rhodes-Ousley, Mark. *Information Security: The Complete Reference*, Second Edition, . Information Security Management: Concepts and Practice. New York, McGraw-Hill, 2013.
- Allan Friedman, P. W. Singer, *Cybersecurity and Cyberwar: What Everyone Needs to Know*, Oxford University Press IndiaISBN 978-0199918119, 2016
- Chwan-Hwa (John) Wu, J. David Irwin, *Introduction to Computer Networks and Cybersecurity***,** CRC Press**,** ISBN 9781466572133, 2013

Syllabus - Fourth Semester

TOTAL QUALITY MANAGEMENT

Course Code: MGT4428 **Credit Units: 02**

Course Objective:
The aim of this course is to provide a structured learning framework to students in order that they can understand that total quality management is a philosophy, methodology and system of tools aimed to create and maintain mechanism of organization's continuous improvement. It will also help the students to understand the main principles of business and social excellence; generate knowledge and skills to use models and quality management methodology for the implementation of total quality management in any sphere of business and public sector.

Course Contents:

Module I: Introduction
Definition of quality, brief history, quality in manufacturing and service industries, quality and price, quality and market share, quality and cost, quality and competitive advantage
Evolution of the concept of total quality management, elements of total quality management, benefits of total quality management, the Deming management philosophy, the Juran philosophy, the Crosby philosophy

Module II: Organization for Quality
Quality objectives, quality policy, leadership for quality, quality and organization culture, cross functional teams, quality circles, suppliers/customers partnership

Module III: Quality Control
Concept of quality control, quality assurance, concept of process variation, sampling inspection vs. 100% inspection, acceptance sampling by attributes: Operating Characteristics (OC) curves; producer risk: AQL, RQL, TQL, AOQL
Statistical Process Control: advantages of SQC, construction of control charts: X-R chart, np chart, C-chart, U chart, Pareto analysis (20/80 rule)

Module IV: Benchmarking and Kaizen
Benchmarking, rationale of benchmarking, approach and process, prerequisite of benchmarking, obstacles of successful benchmarking, perceptual benchmarking, concept of Kaizen, kaizen vs innovation, Kaizen practice

Module V: Quality Management Systems
Quality certification, quality management principles, ISO 9001:2000, ISO 14000, Capability Model Maturity Integration (CMMI): Fundamentals and Concepts, quality system audit, types of quality audit

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Garg, Ajay K. (2012). *Production and Operations Management.* McGraw-Hill, New Delhi
- Cherry, S.N. (2012). *Production and Operations Management (5th ed.)*. McGraw-Hill, New Delhi
- Crosby, Philip B., Completeness: Quality for 21st Centuary, Dutton, New York, 1992
- Drummond, Helga, The TQM Movement: What Total Quality Management is All Movement, UBS Publication, New Delhi, 1992
- Juran, J.M. & Gryna, F.M., Quality Planning and Analysis
- Lock, Dennis, Handbook of Quality, Jaico Publishing House, Mumbai, 1996
- Ross, Joel E., TQM: Text, Cases and Readings, St. Lucie Press, New York, 1993

ENTREPRENEURSHIP DEVELOPMENT

Course Code: MGT4429 **Credit Units: 02**

Course Contents:

Module I: Decision to Become an Entrepreneur

Introduction to Entrepreneurship: What Is Entrepreneurship? Why Become an Entrepreneur?, Characteristics of Successful Entrepreneurs ,Common Myths About Entrepreneurs, Types of Start-Up Firms ,Changing Demographics Of Entrepreneurs.

Entrepreneurship's Importance: Economic Impact of Entrepreneurial Firms, Entrepreneurial Firms' Impact on Society, and Entrepreneurial Firms' Impact on Larger Firms.

The Entrepreneurial Process: Decision to Become an Entrepreneur, Developing Successful Business Ideas Moving from an Idea to an Entrepreneurial Firm, Managing and Growing an Entrepreneurial Firm.

Module II: Developing Successful Business Ideas

Identifying And Recognizing Opportunities: Observing Trends, Solving a Problem ,Finding Gaps In The Marketplace **,**Personal Characteristics of the Entrepreneur .

Techniques for Generating Ideas: Brainstorming, Focus Groups Library and Internet Research, Other Techniques.

Encouraging and Protecting New Ideas: Establishing a Focal Point for Ideas, Encouraging Creativity at the Firm Level, Protecting Ideas from Being Lost or Stolen, Find a mentor.

Feasibility Analysis: Product/Service Feasibility Analysis, Industry/Target Market Feasibility Analysis, organizational Feasibility Analysis, Financial Feasibility Analysis.

The Business Plan: Reasons for Writing a Business Plan , Who Reads the Business Plan—And What Are They Looking For? Guidelines for Writing a Business Plan, Outline Of the Business PlanandExploring Each Section of the Plan Oral Presentation of a Business Plan, Questions and Feedback to Expect from Investors.

Industry and Competitor Analysis: Studying Industry Trends, The Five Forces Model, The Value of the Five Forces Mode, Industry Types and the Opportunities They Offer , Identifying Competitors ,Sources of Competitive Intelligence, Completing a Competitive Analysis Grid.

Business Models: The Importance and Diversity of Business Models, How Business Models Emerge, Potential Fatal Flaws of Business Models, Components of An Effective Business Model**,** Core Strategy, Strategic Resources, Partnership Network, customer interface.

Module III: Moving from an Idea to an reality

Initial Ethical and Legal Issues Facing a New Firm: Establishing a Strong Ethical Culture for a Firm, Choosing an Attorney for a Firm, Drafting a Founders' Agreement.

Obtaining Business Licenses and Permits: Business Licenses, Business Permits, Choosing a Form of Business Organization, Sole Proprietorship, Partnerships, Corporations, Limited Liability Company.

Introduction To Financial Management : Financial Objectives of a Firm, The Process of Financial Management, Financial Statements ,Forecasts ,Pro Forma Income Statement ,Pro Forma Balance Sheet, Pro Forma Statement of Cash Flows, Ratio Analysis.

Building a New-Venture: Recruiting and Selecting Key Employees, Roles of the Board of Directors Board of Advisers, Lenders and Other Professionals.

Getting Financing or Funding: The Importance, Sources of Personal Financing, Preparing to Raise Debt or Equity Financing, business Angels, Venture Capital, Initial Public Offering, Commercial Banks, SBA Guaranteed Loans, Other Sources of Debt Financing, Leasing, Strategic Partners.

Module IV: Managing and Growing the new venture

Marketing Issues: Segmenting the Market, Selecting a Target Market, Establishing a Unique Positioning, Branding, 4Ps/7Ps Of Marketing For New Ventures.

The Importance of Intellectual Property: Determining What Intellectual Property to Legally Protect, The Four Key Forms of Intellectual Property, Types of Patents, Who Can Apply for a Patent? The Process of Obtaining a Patent, Patent Infringement, The Four Types of Trademarks, What Is Protected Under Trademark Law? Exclusions from Trademark Protection, The Process of Obtaining a Trademark, What Is Protected by a Copyright? Exclusions from Copyright Protection,
How to Obtain a Copyright , Copyright Infringement, Copyrights and the Internet , Conducting an Intellectual Property Audit, The Process of Conducting an Intellectual Property Audit.
Preparing for and Evaluating the Challenges of Growth : Appreciating the Nature of Business Growth ,Staying Committed to a Core Strategy ,Planning for Growth, Knowing and Managing the Stages of Growth , Challenges Of Growth **,** Strategies for Firm Growth (internal and external),Franchising**.**

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Text & References:

- Alejandro Cremades (2016) , The Art of Startup Fundraising: Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know. Wiley, New York.
- Burton and Bragg (2006),Accounting and Finance for your Small Business. John Wiley and Sons, New York.
- Peter Drucker (2015), Innovation And Entrepreneurship. Harper Collins, India.
- Nandan H (2013), Fundamentals of Entrepreneurship. Prentice Hall India Learning Private Limited; Third edition: India.

DISSERTATION

Course Code: MGT4437 **Credit Units: 06**

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.

- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:
- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

For books, the following details are required:
Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation
- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?

5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Examination Scheme:

Contents & Layout of the Report	30
Conceptual Framework	10
Objectives & Methodology	15
Implications & Conclusions	15
Viva/ Presentations	30
TOTAL	**100**

SPECIALISATION: FINANCE & ACCOUNTING

FINANCIAL ENGINEERING

Course Code: FIN4401 **Credit Units: 03**

Course Objective:
Finance has evolved as an exciting discipline in terms of innovations it has witnessed in recent past. This aspect known as Financial Engineering starts where financial analysis ends. The objective of the course is to enable the students to think in terms of innovative solutions to financial problems with particular emphasis on understanding new risks, which the changing scenario of finance is creating for individuals and firms and equip them with innovative tools of financial engineering called derivatives and skills to use them in forming effective strategies to cope with the changing environment and hedge against the financial risks.

Course Contents:

Module I: Introduction
Changing Environment and Increasing Price Risks, Financial Engineering as a response to Increased Risks, Types of Risks and Risk Management, Tools of Risk Management, Conceptual and Physical Tools of Financial Engineering, Effect of Speculation and Arbitrage on Market Efficiency, Derivative Market in India

Module II: Futures and Forwards
The Futures Markets, Buying and Selling Futures, Devising a Hedging Strategy Using Futures, Stock Index Futures, Value at Risk, Short Term and Long Term Interest Rate Futures, Foreign Currency Futures and Commodity Futures

Module III: Swaps
Structure of a Swap, Interest Rate Swaps, Currency of Swaps, Commodity Swaps, Other Swaps, Credit Risk, Role of a Swap Dealer.

Module IV: Options
Options Markets; Properties of Stock Option Prices; Option Pricing Models – Binomial Model, Black-Scholes; Model, Single Period Options – Calls and Puts, Payoff Diagrams of Simple and Complex Option Strategies, Cash Settled Options, Multi-Period Options – Caps, Floors, Collars, Captions, Swaptions and Compound options, Cross-currency Futures and Options.

Module V: Other Innovations
Debt Market Innovations, Mortgage Backed Securities, Hybrid Securities, Asset-Liability Management

Module VI: Recent Trends
Exotic Options, Synthetic Instruments, Developments in Equity-Based Strategies, Direct and Cross Hedges, Future Trends and Issues in Financial Engineering.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Hull, J. C. (1999), Introduction to Futures and Options Markets, Prentice Hall of India.
- Edwards, F. R. and Ma, C. W. (1992), Futures and Options, McGraw-Hill International.
- Rebonato, R. (1996), Interest Rate Option Models: Understanding, Analyzing and Using Models for Exotic Interest Rate Options, John Wiley and Sons.
- Kolb, R. W. (1997), Understanding Futures Markets, Prentice Hall of India.
- Marshall, J. F. and Bansal, V. K. (2006). Financial Engineering: A Complete Guide to Financial Innovation, Prentice Hall of India.
- Articles from selected journals and magazines.

INVESTMENT BANKING

Course Code: FIN4402 **Credit Units: 03**

Course Objective:
To Equip students proficient in understanding of the IPO process. Learn how IPOs are arranged, managed, priced and distributed.The sequence of the issue process, with timelines. The role of merchant bankers in the issue process.Key regulations and documentation requirements To make students acquainted with depository receipts and basics of their issuance process. To understand the nitty-gritty of merger and acquisition& role of an Investment bank in facilitating the deal.

Course Contents:

Module-I: Introduction
Overview of investment Banking, Forms of Bank investment, Key Elements of Investment Banking, Principles and Culture of Investment Banking Regulation of Investment Banking, Short-term investment,Long-term investment, Investment in Foreign Exchange.

Module-II: Initial Public Offering - Issuance Process
IPO, Preparation/approvals stage- Decision to go for IPO Appointment of lead manager and legal counsel Due Diligence Draft red herring prospectus Filing with SEBI and stock exchangesMarketing and estimation of price range- Pre-marketing Road shows Book buildingLaunch and completion-Pricing and allocation ROC filing of final prospectus Listing

Module-III
Depository receipts- ADR GDR EDR IDR-need, ADR- issuance process, tax treatment, regulations, Fungibility, reverse fungibility. Form 20F, F6. IDR-Guidelines.

Module-IV
Bonds Issuance process.Redemption/ Rollover of Debentures. FCCB, Commercial paper- Issuance process, Commercial paper- Redemption process.

Module-V
Merger and Acquisition overview. Types of transactions under M&A. M&A deal drivers. Role of an Investment bank in M&A transaction.

Module-VI
Offer document, Key features of offer documents, Cover page-General risk clause, issuer absolute responsibility. Inner page nformation, No complaint information.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:
- Investment Banking : Concepts, Analysis and Cases 1st Edition, by Pratap Giri Subramanyam, Tata McGraw - Hill Education (2007)
- Investment Banking: Valuation, Leveraged Buyouts, and Mergers & Acquisitions (Wiley Finance)
- Investment Banking Explained: An Insider's Guide to the Industry, by Michel Fleuriet
- Monkey Business, by John Rolfe and Peter Troob
- Goldman Sachs: The Culture of Success, by Lisa Endlich
- Investment Banking: The Dream Begins, 3rd Edition by Tapan Jindal

BEHAVIORAL FINANCE

Course Code:FIN4403 **Credit Units: 03**

Course Description:
This course is intended to complement other finance courses that are mainly based on the traditional paradigm which assumes that investors and managers are generally rational. Specifically, this course has three main objectives. First, we aim to examine how the insights of behavioural finance theories shed light on the behaviour of individual investors and finance professionals in investment decision-making and corporate financial decision-making. Second, we explore the possibility to improve investment performance and corporate performance by recognising the cognitive biases and applying appropriate 'debiasing' techniques. Finally, we investigate the implications of behavioural finance for the construction of good corporate governance mechanisms.

Objectives:
After this students will be able to:
- Identify persistent or systematic behavioral factors that influence investment behavior
- Understand and critically discuss the differences between a behavioural finance perspective and a traditional finance perspective
- Understand and critically discuss the cognitive biases and errors of judgment that affect financial decisions
- Critically evaluate behavioural influences involving individuals investment decisions
- Critically evaluate behavioural influences involving corporate (executive) financial decisions
- Critically discuss important developments in this new area and the associated practical insights they provide

Course Contents:

Module I: Psychology & Finance: Behavioral Finance an overview, Traditional vs behavioral finance, Morals & Ethics: why they matter in the business world.

Module II:.Behavioral Corporate Finance: Corporate Governance, Loyalty issues, corporate ethics issues, agency conflicts**,** Behavioral portfolio management.

Module III: Behavioral Biases in Finance: Definition of average investor; Behavioral Biases & corporate decision (valuation, capital budgeting, capital structure, dividend policy and Mergers & Acquisition), Belief biases: Biases of average investor, Forecasting Biases, overconfidence, self control, Limited attention and categorization.

Module IV: Investors Decision: Perceived risk on financial product, Social interactions and positional concerns. The role of advisors, advertising, Emotion & Investment Decision, Investment decision cycle: judgment under uncertainty, group behavior: Conformism, herding, fatal attraction.

Module V: Supply by firms and managerial decisions: Supply of securities and firm investment characteristics (market timing, catering) by rational firms; Associated institutions; Relative horizons and incentives; Biased managers.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V** - Viva; **CT** - Class Test; A-Attendance; **EE -** End Semester Examination)

Text & References:

Text:

- Behavioral Finance: Insights into Irrational Minds and Markets, by James Montier

References:

- Behavioral Finance: Understanding the Social, Cognitive, and Economic Debates, by Burton and Shah
- Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing, by Shefrin
- Big picture overviews by the giants of the field, each with their own focus:
- Animal Spirits by Akerlof and Shiller
- Thinking, Fast and Slow by Daniel Kahneman.
- Irrational exuberance by Robert Shiller
- Engaging historical account of how these ideas came about, and their influence to date: The Undoing Project by Michael Lewis
- Detailed coverage of market anomalies and/or trading strategies based on them:
- Expected Returns: An Investor's Guide to Harvesting Market Rewards, by Antti Ilmanen
- Quantitative Value: a Practitioner's Guide to Automating Intelligent Investing and Eliminating Behavioral Errors, by Wesley Gray
- The Missing Risk Premium: Why Low Volatility Investing Works, by Erik Falkenstein

FINTECH: TECHNOLOGY INNOVATION IN FINANCIAL SERVICES

Course Code:FIN4404 **Credit Units: 03**

Introduction

F**inancial technology**, also known as **fintech**, is an economic industry composed of companies that use technology to make financial services more efficient. Financial technology companies are generally startups trying to this intermediate incumbent financial systems and challenge traditional corporations that are less reliant on software.

This course aims to give an insight in the financial technology revolution, and the disruption, innovation and opportunity therein. We will see the global fintech investment space; this course will aggregate diverse industry expertise into a single informative course to provide students with the answers they need to capitalize on this lucrative market. Key industry developments are explained in detail, and critical insights from cutting-edge practitioners offer first-hand information and lessons learned.

The financial technology sector is booming, and entrepreneurs, bankers, consultants, investors and asset managers are scrambling for more information: Who are the key players? What's driving the explosive growth? What are the risks? This course collates insights, knowledge and guidance from industry experts to provide the answers to these questions and more.

By the end of the course the participants should be better able to:

- Get up to speed on the latest industry developments
- Grasp the market dynamics of the 'fintech revolution'
- Realize the sector's potential and impact on related industries
- Gain expert insight on investment and entrepreneurial opportunities
- Learn about the modeling skills and emerging technologies

Course Contents:

Module-I: Introduction to fintech:

FinTech – Breaking the financial services value chain.

Payments; Deposits and Lending; Capital Raising; Investment Management; Market Provisioning; Insurance

FinTech Hubs

The history of fintech

Module-II: Technology : Blockchain, wearables and other emerging technologies, **Financial modeling and Fintech : Big Data 102 and Artificial Intelligence 102**

Module-III: FinTech Solutions

- Robo-Advisors
- Rewiring the Deal – The Path Forward for B2B Supply Chains
- Payments and Point of Sales (POS) Innovation
- Predictive Algorithms – Building Innovative Online Banking Solutions
- Big Data is the Cornerstone of Regulatory Compliance Systems
- FinTech Solutions in Complex Contracts Optimization
- Behavioural Biometrics – A New Era of Security
- Ultra-Fast Text Analytics in Trading Strategies
- Regulated Crowdfunding Ecosystems
- Remittances – International FX Payments at Low Cost
- Payment Solutions Including Apple Pay
- FinTech Innovation for Wearables

Module IV: The future of Fintech

- Using emerging technologies
- The future of financial services
- Innovation through big data
- The API economy

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **Q** – Quiz; **V -** Viva; **CT -** Class Test; A-Attendance; **EE -** End Semester Examination)

Text & References:

- Feld, Brad and Jason Mendelson. (2011). *Venture Deals.* Wiley & Sons.
- Damodaran, A. (2009). *The dark side of valuation: Valuing young, distressed, and complex businesses.* Ft Press.
- Smith, J., Smith, R. L., Smith, R., & Bliss, R. (2011). *Entrepreneurial finance: strategy, valuation, and deal structure.* Stanford University Press.
- Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. Random House LLC.
- Metrick, A. and A. Yasuda. (2010). *Venture Capital and the Finance of Innovation.* Wiley.
- Meyer, M. H., & Crane, F. G. (2010). *Entrepreneurship: An innovator's guide to startups and corporate ventures.* SAGE Publications.
- Ralston, Geoff. 2015. "A Guide to Seed Fundraising." Online book, http://www.themacro.com/articles/2016/01/how-to-raise-a-seed-round/
- Lerner, Josh, Ann Leamon, and Felda Hardymon. *Venture Capital, Private Equity, and the Financing of Entrepreneurship.* New York: John Wiley & Sons, 2012.
- Skinner, Chris. *Digital Bank: Strategies to Launch or Become a Digital Bank.* Marshall Cavendish, 2014.
- Haycock, James. *Bye Bye Banks?: How Retail Banks are Being Displaced, Diminished and Disintermediated by Tech Startups and What They Can Do to Survive.*
- Tapscott, Don. *Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World.* Portfolio, 2016.
- McMillan, Jonathan. *The End of Banking: Money, Credit, and the Digital Revolution.* Zero/One Economics, 2014.
- Sironi, Paolo. *FinTech Innovation: From Robo-Advisors to Goal Based Investing and Gamification* (The Wiley Finance Series), Wiley, 2016.

PRIVATE EQUITY AND ENTREPRENEURIAL FINANCE

Course Code: FIN4405 **Credit Units: 03**

Description

Private equity is composed of funds and investors that directly invest in **private** companies, or that engage in buyouts of public companies, resulting in the delisting of public **equity**. In finance, **private equity** is a type of **equity** and one of the asset classes consisting of **equity** securities and debt in operating companies that are not publicly traded on a stock exchange. A **private equity** investment will generally be made by a **private equity** firm, a venture capital firm or an angel investor. With support of Private equity, the new entrepreneur will hope up to start a new firm for the benefit of economic development.

Objectives

- To understand the various types of activities that falls under the purview of Private equity. Corporate Restructuring
- To understand intricacies of raising of various methods of financing
- To deal with Issues involved in Private financing and entrepreneurial development activities.
- To examine key elements of understanding a business from a private equity investment perspective

Assessment

The subject would comprise of both theory and numerical solving. The assessment of the learner would be done through assignments, case discussion, articles on current research & issues, problem solving and simulation. The students would be expected to do a project, quiz and comprehend the application part of the concepts taught in the class.

Course Contents :

Module-I: Introduction: Over view of the Private Equity Industry, Development and Growth, terminology, and categories within the asset class, participants, anatomy of funds and partnership agreements, perspectives and negotiations and perspectives of companies

Module-II: The Fundamentals of Private Equity Investing:,financing, structuring and negotiating - buyout and growth capital transactions, and managing the portfolio company over the life of the investmentand including an exit and / or value realization transaction.

Module-III: Understanding and Evaluating Private Equity Firms in Financial Markets: We will consider how the financial community assesses firms and chooses which funds to invest in and how funds assemble portfolios of companies and how LP investors assemble their portfolios of LP interests. Other topics will include understanding and managing LP liquidity options; the rise and role of other alternative investment vehicles, most notably hedge funds and sovereign wealth funds; the publicly traded private equity firm; the impact of the financial crisis and current issues under discussion in the area of financial regulation

Module-IV: Private Equity in Secondary Markets – Key components of value creation- Relative value Matrix – Industry Value creation.

Module-V: Private Equity - corporate governance and ethics - Iinvestments in developing markets - Sourcing of private equity - Deals and management of portfolio company - Expectations and Negotiation

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Reference books

- Jason A. Scharfman, Private Equity Operational Due Diligence: Tools to Evaluate Liquidity, Valuation, and Documentation, + Website , ISBN: 978-1-118-11390-5, March 2012
- Stowell D, An Introduction To Investment Banks, Hedge Funds, And Private Equity – 2011, Elsevir (2011), **ISBN :** 978-9380931074

Case studies published from various journals.

CORPORATE TAX PLANNING

Course Code:FIN4406 **Credit Units: 03**

Course Objective:
At the end of the course, the students should be able to understand Indian accounting Standards and the impact of USGAAP on Financial Statements. To create an understanding of the accounting of Mergers and Acquisitions and Valuation of goodwill & Shares.
In addition to Corporate Accounting the students should be able to demonstrate an understanding of the tax provisions enabling them to make use of legitimate tax shelters, deductions, exceptions, rebates and allowances; with the ultimate aim of minimizing the corporate tax liability.

Course Contents:

Module I: Accounting Norms
Various Accounting Standards in India and comparison with International accounting Standards and US.GAAP.

Module II: Accounting for Merger and Acquisitions
Accounting for Acquisition of Business, Calculation of Purchase consideration and Profit (Loss) Prior to Incorporation.Accounting for Amalgamation in the nature of Merger and in the nature of Purchase.

Module III: Valuation of Goodwill and Shares
Valuation of Goodwill – Different Methods of Valuation of Goodwill, Valuation of Shares – Net Asset Backing Method and Yield Method.

Module IV: Basic Concepts of Income Tax
Introduction to Income Tax Act, 1961, Residential Status, Exempted Incomes of Companies An overview of various provisions of Business & profession & Capital gains – applicable to companies Goods and Services tax – Features - Implications - Rate slap - Model - Products Excluded From GST – Registration Procedure

Module V: Assessment of Companies
Computation of taxable income, MAT, Set off & carry forward of losses in companies, Deductions from Gross total income applicable to companies, Tax planning with reference to new projects/expansions/rehabilitation plans including mergers, amalgamation or de-mergers of companies, Concept of avoidance of double taxation.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Singhania V.K. &Singhania Kapil , Direct taxes law & practices, Taxmann
- Ravi M Kishore, Advanced Accounting, Taxmann.
- Lakhotia , R.N. &Lakhotia, Corporate Tax Planning, Vision books
- Singhania, V.K., Student's guide to Income Tax, Taxmann
- International dictionary of taxation by Indian Tax Institute, 1st Edition.
- Maheshwari S.N and Maheshwari S.K Advanced Accountancy, Vikas Publishing House.

SPECIALISATION: HUMAN RESOURCE

COMPENSATION AND REWARD MANAGEMENT

Course Code: HRM4401 **Credit Units: 03**

Course Objective:
This course helps students to learn how compensation system operates to attract, retain and motivate competent work force.

Course Contents:

Module I: Introduction
Concept of Compensation, System of Compensating, Concept of Reward and Reward System, Economic Theory of Wages, Limitations of Economic Theories. Wage and Salary Administration at micro level, Wage concepts, Methods of Job Evaluation, Role of various parties – Employees, Employers, Unions & Government, Overview of Legislations affecting Compensation

Module II: Compensation Structure- Indian Practices
Salary Progression, Methods of Payment, Limitations of the Job Related Compensation, Competency based Compensations, Performance linked Compensations- Performance Appraisal

Module III: Elements of Compensation
Variable Compensation, Principles of Reward Strategy, Perquisites, Bonuses & Incentives Scope and Process, Ethical Considerations, Social Security, Sharing Productivity Gains with Employees, Gain Sharing, Team Based Pay, The Role of Compensation in Sales Force Success, Constructing pay structure

Module IV: Incentive Schemes / Payment by Results
Types of Incentive Schemes/ Systems and Plans, Merits and Demerits of Incentives

Module V: Benefits and Services
Concept of Benefit- Strategic Perspectives on Benefits, Type of Benefits, Factor Influencing Choice of Benefit Package, Administration of Benefits and Services

Module VI: Current Trends in Compensation and Reward Management
Elements of Managerial Compensation- A New Approach, VRS, Pay the Person, Rewarding Excellence, Individualizing the Pay System, Executive compensation, International Compensation

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Singh B.D. (2007). Compensation and Reward Management, Excel Books, New Delhi.
- Milkovich& Newman (2005), Compensation , McGraw-Hill
- Henderson Richard (2006), Compensation Management in a Knowledge - Based World, Prentice Hall India
- Armstrong Michael &Murlis Helen (2005), Reward Management A Handbook of Remuneration, Strategy and Practice, Kogan Page

PSYCHOLOGICAL TESTING

Course Code: HRM4402 **Credit Units: 03**

Course Objective:
To develop an understanding of the concept of psychological testing by providing a theoretical background of psychological assessment of personality tests and their applications and the ethics of the usage of different types of psychological tests.

Course Contents:

Module I: Functions and Origins of Psychological Testing
Concept of Psychological Testing, Nature and Use of Psychological Tests, Historical Antecedents of Modern Testing

Module II: Technical and Methodological Principles
Norms and Meaning of Test Scores, Reliability and Validity

Module III: Personality Testing
Self-Report Inventories and Scales- MBTI and FIRO-B
Projective Techniques- TAT, Sentence Completion Test
Measures of Styles and Types
Situational Tests
Self-Concepts and Personal Constructs
Observer Reports

Module IV: Applications of testing
Educational Testing
Occupational Testing

Module V: Ethical and Social Considerations in Testing
Protection of Privacy and Confidentiality
Communicating Test Results

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Anastasi, A. and Urbina, S.,(2005) Psychological Testing,Pearson Education
- Freeman, Frank S (1962). Theory Practice of Psychological Testing. Oxford and IBH.
- Edward Hoffman (2004), Psychological Testing at work, Tata McGraw-Hill.
- Charles Jackson (2001), Understanding Psychological Testing, Jaico Publishing House.

LABOUR LEGISLATIONS IN INDIA

Course Code: HRM4403 **Credit Units: 03**

Course Objective: To familiarize students with the intricacies of main labour laws, problems involved and recent developments in the arena of labour legislation.

Course Contents:

Module I: Labour Legislation

Origin of labour legislation, Purposes of labour legislation, Classification of labour laws, an overview of labour laws prevalent in our country.

Module II: The Employees' Compensation Act, 1923

Object of the Act, Definitions, Reports of fatal accidents and serious bodily injuries, Employers' liability for compensation, Amount of compensation, Penalties, Powers of Commissioners, Case Study.

Module III: The Employees' State Insurance Act, 1948

Object and applicability of the Act, Definitions; Registration of factories and establishments under the Act, Employees' State Insurances Corporation – Standing Committee, Medical Benefits Council, Principal Officers, etc., Employees' State Insurance Fund, Contribution period and benefit periods, Benefits available under the Act, Liabilities of the employers, Penalties for offences, Critical Comments and recent developments, Case study.

Module IV: The Employees' Provident Fund and Miscellaneous Provisions Act, 1952

Object of the Act, Definitions and applicability of the Act, Employees' Provident Fund Schemes – Employees' Pension Scheme, 1971, Employees' Deposit-Linked Scheme, 1976, Employees' Pension Scheme, 1995, Appellate Tribunals, Authorities and their powers under the Act, Critical comments and Recent Developments, Case study.

Module V: The Payment of Gratuity Act, 1972

Object of the Act, Definitions and applicability of the Act, Determination of Amount of Gratuity, Authorities and their power under the Act, Liability of employers, Penalties for offences under the Act, Critical Comments and recent developments, Case study.

Module VI: The Industrial Employment (Standing Orders) Act, 1946

Object of the Act, Definitions and applicability of the Act, Certification of Standing Orders, Authorities and their powers under the Act, Penalties and Procedures under the Act, Critical comments and recent developments, Case study.

Module VII: The Factories Act, 1948

Object of the Act, Definitions and applicability of the Act, Health, Safety and Welfare Provisions under the Act, Authorities and their powers under the Act, Penalties for offence under the Act, Critical Comments and recent developments, Case study.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

Text:

- Sharma, R C, Industrial Relations and Labour Legislation, PHI Learning Pvt. Ltd., 2016
- Taxmann'sLabour Laws, Taxmann Publications (P) Ltd., New Delhi, 2012
- Kapoor, K.D., Handbook of Industrial Law, Sultan Chand & Sons, New Delhi, 2001
- Srivastava, S.C., Industrial Relations and Labour Laws, Vikas Publishing House, Noida, 2009

Journals/Periodicals: Indian Law Reporter

DYNAMICS OF LEADERSHIP

Course Code: HRM4404 **Credit Units: 03**

Course Objective:
The primary objective of the course is to develop fundamental competencies of leadership. The course also benefits students in developing relevant skills, maintain self awareness, compensate for weakness, planning operations, clarifying roles, monitoring performance, coaching and mentoring, team building, vision, encourage innovation.

Course Contents:

Module I: Introduction
Leadership concept, Interaction between the Leader, the Followers, and the Situation, Overview of Major Approaches, Perspectives on Effective Leadership Behavior – Ohio State Leadership and Michigan Leadership Studies, Assessing Leadership and Measuring its Effects.

Module II: The Leader
Political Power and Strategic Leadership, Managing Leadership in Different Cultures, Leadership Traits and Skills - Findings in Early Research, Specific Traits Related to Leadership Effectiveness – Personality, Intelligence, and Emotional Intelligence.

Module III: The Followers
Define Motivation, Satisfaction, and Performance – Need Theories, Cognitive Theories, Situational Approaches, Groups, Team Building.

Module IV: The Situation
Contingency Theories of Leadership – Normative Decision Model, Situational Leadership Model, Contingency Model, Path-Goal Theory, Participative Leadership, Delegation, and Empowerment - Decision Procedures of Managers, Charismatic and Transformational Leadership, Impression Management, Integrating Leader and Follower Roles, Leading Change in Organizations, Vision – Change Processes, Implementation, Guidelines for increasing Learning and Innovation.

Module V: Leadership Skills: Towards Integrating, A Conceptual Framework
Typical Activity Patterns of Managers, Self-Help Activities – Designing Effective Training, Developmental Activities – Learning from Experience: Basic Leadership Skills, Advanced Leadership Skills, Building High Performance Teams.

Module VI: Term Paper
Creating Essence of Leadership – Choose your Leader and Write a paper on his Leadership Style.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Gary Yukl, (2006), Leadership in Organisations, Pearson Prentice Hall.
- Hughes GinettCurphy, (2006), Leadership – Enhancing the Lessons of Experience, Tata McGraw-Hill.

ORGANIZATIONAL DESIGN AND STRUCTURAL PROCESSES

Course Code: HRM4405 **Credit Units: 03**

Course Objective:
To develop an understanding of the nature, functioning and design of organization as social collectives and to develop theoretical & practical insights & problem solving capabilities for effectively managing the organizational processes. This course aims to provide a comprehensive perspective on new emergent organizational forms by discussing them in the context of environment, systems & processes.

Course Contents:

Module I: Overview of Organizations
Defining Organizations, Types of Organizations, Determinants of Organization Design, Parameters of Organization Design, Definition of Organizational Structure, Complexity, Formalization and Centralization

Module II: Organization & Environment
Organizational Environment, Specific and General Environment, Sources of Uncertainty in Organizational Environment, Hyper-Turbulence; Networks and Business Eco-Systems; Technological Discontinuities; Paradigm Shift

Module III: Types of Organization
Organization Design, Approaches to Organizational Design, Basic Challenges of Organizational Design, Organizational Design for Different Excellences, New Design Option

Module IV: Organizational Effectiveness
Organizational Effectiveness- Definition, Importance and Approaches to Organizational Effectiveness - The Goal Attainment Approach, The System Approach, The Strategic Approach.

Module V: Emerging Organizational Forms
Organizations as Networks/ Clusters; Self Organizing Systems; Designing for Innovation and Change.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Ackoff, R.L. (1999), Recreating the corporation: A Design of Organization for the 21st century. Oxford University Press.
- Banner, D.K. &Gague, T.E. (1995), Designing Effective Organizations, Sage Publications.
- Hall, R. H. (2002), Organizations: Structures, Processes and Outcomes, 8th Edition. Prentice Hall India
- Robbins Stephens (2009), Organization Structure, Design and Applications, Pearson Education
- Richard L. Daft ,(2012) **Organization Theory and Design Hardcover ,**South-Western College Publishing; 11th Revised edition (21 March 2012)
- Aquinas P. G. **(2008) Organization Structure and Design: Applications and Challenges Paperback – 30 Sep 2008,**Excel Books (30 September 2008)

MANAGERIAL COUNSELLING

Course Code: HRM4406 **Credit Units: 03**

Course Objective:
To understand the concept and process so as to develop the professional counseling skills among the students.

Course Contents:

Module I: Introduction
Self-Development of Managers as Counselors, Barefoot Counseling, Assertiveness and Interpersonal Skills for Counselors, Counseling Relationship.

Module II: Approaches to Counseling
Development of Counseling Skill, Introduction to the Important Schools of Counseling, Psychoanalytic Foundations, Transactional Analysis, Gestalt Therapy, Rational Emotive Therapy, Person-Centered Approach to Counseling, An Integrated Model, Essentials of Skills, Nonverbal Clues.

Module III: Counseling Process
Counseling Interventions in Organizations, Empathy, Listening and Responding, Effective Feedback, Role conflict in counselling, Genuineness, Social Skills at workplace

Module IV: Counseling at Work
Performance Counseling, Counseling in Problem Situations, Interpersonal Conflicts, Midlife Blues, Integration and Action Plan.

Module V: Current Trends in Counselling
Modern trends in counselling, role of a counsellor, Importance of mindfulness, Counselling in Indian Industries.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Welfel E.R. and Patterson Lewis E (2007), The Counselling Process, Thomson
- Singh Kavita (2010), Counselling Skills for Managers, Prentice Hall India
- Rao. S.N (2010), Counselling and Guidance, Tata McGraw Hill
- Felthman C. and Dryden W (2010), Brief Counselling- A Practical Integrative Approach, Tata McGraw Hill
- Mc. Grath E.H. Basic managerial skills for all, PHI, New Delhi
- Michael Reddy, The Managers guide to counselling at work, Universities, press
- Eric Parsloe, The Managers as coach & mentor, Universities, press
- David Fantoma, Social Skills at work, Universities, press

SPECIALISATION: INTERNATIONAL BUSINESS

LEVERAGING INFORMATION TECHNOLOGY IN GLOBAL BUSINESS

Course Code: IBM4401 **Credit Units: 03**

Course Objective:
The aim of this unit is to introduce the student to the evolution, role, function and impact of Information Technology (IT) and Information Systems (IS) in international business operations. It will develop the students' ability to identify sources of information and how these can be used in the decision-making process by leveraging IT and networking.

This course requires the students to develop practical applications ability and knowledge as well as the ability to recommend how IS and IT should be used in global business. Students will also demonstrate their understanding of fundamental business issues of the Information Age Enterprise through in-class discussion of real-world business cases.

Learning Outcomes:
At the end of the course students will be able to:

- Explain key concepts and elements of information technology and information systems
- Examine the evolution, role, function and impact of IT & IS in global business operation.
- Identify sources of information and assess how they can be used in the decision making process by leveraging information technology and networks.

Course Contents:

Module I: Information Technology in Management
Fundamentals of Information Technology in management
Organizations, Environments, IT & IS
E-business/E-commerce in global scenario: Role in transforming business and management in organizations with focus on IB
Use of communication systems in information management

Module II: Information Systems within Business Management
Introduction to common used system and models
Relationship between IS, organizations and business processes
Types of IS(TPS, OAS, MIS, DSS, ESS and SIS)
Information management and decision making
Managing international Information systems

Module III: Knowledge based systems
Intelligent support systems & concepts of Artificial Intelligence
Data Mining & Data warehousing
Emerging trends in Information management systems

Module IV: Managerial implications of IT/IS in Global business
Planning, Organizing and controlling
Information Security, Tools and techniques
Legal and Ethical issues
Future of Information management

Module V: Practical aspects and applications of IT/IS
Introduction to MIS packages and tools
Web interface and techniques
Introduction to ERP & CRM solutions

Learning Methods:
This course is based upon interaction between the students and the teachers. Wherever possible a link should be made between the academic underpinning and its practical application. Students will be given time to develop skills and analyse the benefits and limitations of the use of IS and IT in organisations. A 'hands on' approach will ensure that students can use integrated programmes and have a wide range of knowledge of different applications. The practical knowledge can be used to develop an awareness of how IT and IS can be adopted by organisations to improve business efficiency. This will be achieved via a tutor-developed case study, an evaluation of a local organisation, guest lectures and industry visits. Part of the learning process will also be producing a paper (in groups) on a relevant topic.

Examination Scheme:

Components	**C1**	**V**	**A**	**CT**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Laudon Kennith and Laudon Jane (2005) – Management Information Systems: Managing the Digital Firm, 9th Edition, Prentice Hall of India.
- Turban, McLean and Wetherbe (2004) – Information Technology for Management 4th Edition, John Wiley & Sons
- Rober Murdic G. (1998) - Management Information Systems, Prentice Hall of India
- Jawadekar W.S. (1998) - Management Information Systems, Tata McGraw Hill

INTERNATIONAL SUPPLY CHAIN MANAGEMENT

Course Code:IBM4402 **Credit Units: 03**

Course Objective:
Developing an understanding of the various components of an integrated supply chain management suited to global markets; Teaching criticality of an efficient supply chain with "zero defects" in the WTO border-less world ; Understanding the micro aspects of global distribution and logistics; imparting knowledge of Multi-modal Transport operators , ocean & air transportation in world trade.

Course Contents:

Module I: Global Supply Chain – Overview
Introduction &Importance of Supply Chain Management, Developing Supply Chain as a Competitive Tool for Customer Satisfaction and Corporate Profitability, Channel Structure, Supplier Network Development, Outsourcing., Supply Chain Logistics Operations.

Module II: Strategic Issues in Supply Chain Management
Value chain and value delivery system, Concept of multi-modal transportation and infrastructure needs; Transportation Choices and Third Party Logistics, Fourth Party Logistics Distribution Channel Design, Strategic Alliances, Communication Flow of Supply Chain, Documentation needs and liabilities; Inter-functional coordination, Inter-corporate cooperation, Outsourcing in Supply Chain;Vendor Management & Development, Strategic Lead Time Management, Warehousing

Module III: International Logistic System
Concept, Objectives & Scope, The System Elements, International Transportation Issues, Warehousing, Inventory Management, Packaging and Unitization Issues, Communication and Control, Centralized and Decentralized Logistic Management, Third Party Logistics (3PL), Multimodal Transport Operator (M.T.O.)

Module IV: Air & Ocean Transport and Chartering
The General Structure of shipping industry, Characteristics of Shipping Industry, Liner and Tramp Operations and Significance, World Seaborne Trade and World Shipping, Composition of World Seaborne Trade, Problems of Developing Countries, Liner Freighting Practice, Principles – Freight Structure, Voyage Charter, Time Charter, Barboat Charter. Indian Shipping, Growth and Perspective, Problems of Shipping Industry, Shipping Policy, International Air Transport System, Air Transport and PDM Approach to Export Distribution, International Set – up for Air Transport, Air Freight Rates, India's Export – Import Trade by Air, Problems and Prospects, Law Relating to Carriage of Goods

Module V: Managing the Supply Chain Performance
SCM and Information Technology, IT Enabled Supply Chain Management, Inter-firm Integration: Implementation Issues, Application of ERP, JIT, Optimization of Supply Chain, Retailing Management, Waste Elimination and Lean Thinking in Supply Chain; Supply chain performance measurement systems; Supply Chain Balanced Score Card.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Bowersox, Closs and Cooper (2008), Supply Chain Logistics Management, Tata McGraw-Hill
- Chopra, Meindl and Kalra (2008), Supply Chain Management: Strategy, Planning, and Operation, Pearson Education
- Rangaraj, Raghuram and Srinivasan (2009), Supply Chain Management for Competitive Advantage: Concepts and Cases, Tata McGraw-Hill
- Ray (2010). Supply Chain Management for Retail, Tata McGraw-Hill
- Shah (2009), Supply Chain Management: Text and Cases, Pearson Education
- Simchi-Levi, et al (2008), Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies, Tata McGraw-Hill
- Wisner, Leong and Tan (2005), Principles of Supply Chain Management, Cengage

INTERNATIONAL TRADE FINANCE

Course Code: IBM4403 **Credit Units: 03**

Course Objective:
Understand ways in which International Trade is undertaken, settled and financed; Appreciate the need and role of various entities engaged in International Trade and Finance; Recognise the terminology used in International Trade, Finance and commercial contracts; Know how to avail finance from International Financial Markets & Institutions for trade and global business; Understand international payment systems & Regulatory compliances; Study Global Mergers & Acquisition trends.

Course Contents:

Module I: Globalization, Trade & Finance
Complexities of international trade, Meaning of Int'l Trade Finance, need of various entities like exporters, importers, merchants, traders, overseas representatives, banks, borrowers, lenders, Logistics, Forwarders etc. International Commercial Terms (INCOTERMS), Protection against credit, political, economic and transit risks.

Module II: Global Financial Ecosystem
World's major Financial Markets for Equity, Debt, Foreign Exchange & Commodities. International Lending institutions World Bank, IMF, ADB, EBRD, Export-Import Bank of India, Export Credit Guarantee Corporation of India, Buyers credit, Supplier credit, Role of credit-rating agencies.

Module III: International Trade Finance & Payment Systems
Modes of Payments in Trade, obtaining payments through Documents against Payment, Documents against Acceptance, Bills of Exchange, Letters of Credit & its types, Bill discounting with Banks, Factoring & Forfeiting, Foreign currency cheques, drafts, telegraphic transfers (TT's) & SWIFT. **Regulatory Framework-DGFT, RBI, ICC, FEDAI, FEMA.**

Module IV: International Banking
Role of International Banks, Correspondent Banking, Nostro/Vostro Accounts. Bid/Ask rate determination for Bills, TT's, Traveler's Cheques. Risks of OTC products & ISDA regulations. Availing pre-shipment & post-shipment finance, **Bank Gurantees,Domestic Trade Financing,** External Commercial Borrowing (ECB's). Payment, settlement and clearing systems in foreign currency including SWIFT, CHIPS, CHAPS & Electronic banking. RBI Regulatory compliances, late payments & bad debts.

Module V: Global Mergers & Acquisition & (M&A)
FDI & FII statistics, FDI & reverse FDI within & outside India. Case studies on corporate India's acquisitions & mergers abroad. Role of International Banks, Investment Banks, Hedge Funds, Private Equity, Pension Funds etc. ECB's, ADR's GDR's.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- International Trade Finance, Indian Institute of Banking and Finance
- Paul Cowdell and Derek Hyde (Feb 2003) International Trade Finance, Institute of Financial Services
- Apte, P. G. (1998), International Financial Management, Tata McGraw Hill
- Levi, M. D. (1996), International Finance, McGraw Hill International.
- UCPDC-600, International Chamber of Commerce, Paris

GLOBAL SOURCING AND BUSINESS DEVELOPMENT

Course Code:IBM4404 **Credit Units: 03**

Course Objective:
This course will explore the opportunities and challenges that managers face in global competition. We will deal with companies that operate across country boundaries and the managerial issues in selling and sourcing on a global basis. Globalization is not the same as just doing business in a foreign country; that is, after all, domestic business from the perspective of managers in that country. Theimportance of establishing supply relationships with foreign sources requires companies todevelop competencies in strategic sourcing, purchasing and importation of goods. This coursewill emphasize the strategic and operational elements of establishing and maintaining globalrelationships. Emphasis is also given to make the budding HR professionals thoroughly prepared to recognize negotiation situations so as to Plan, Implement, and Complete Successful Negotiations to maximize results.

Learning Outcomes:
As an outcome of this course, students will be able to:
- Explain the importance of global sourcing in supply chain management
- Describe the global sourcing process.
- Understand negotiation strategies and skills between nations
- Analyse buyer-supplier relationships
- Develop an insight on the relationship between negotiation and global sourcing

Course Contents:

Module I: Understanding Basics of Global Sourcing
Definition, need and relevance of Global Sourcing; Evolution of sourcing; Purchasing a dynamic profession- origins of purchasing and transition to supply chain management; Five major developments- cross functional teams, supply chain and supply networks, supply alliances, strategic sourcing, e-procurement, global sourcing

Module II:Types of Global Sourcing
Global sourcing of HR, Accounting or Finance; Global sourcing of Procurement/Supply Chain; Global sourcing of Innovation; Global sourcing Governance: PMO, contracts, key roles; Emerging Trends, Sourcing in BPO

Module III: International Sourcing Decisions
Manufacturing/National brands; Private label brands; Premium branding; International sourcing; Costs associated with global sourcing decisions; Foreign currency fluctuations; Tariffs; Free trade zones and Retailing; Managerial issues associated with Global sourcing decisions; International vendor management

Module IV: Negotiation fundamentals
The nature of Negotiation; Strategy and Tactics of Distributive Bargaining; Integrative Negotiation; Negotiation Strategy and Planning; Negotiation sub-processes; Perception; Cognition and Emotion; Communication; Finding and using negotiation Power;
Influence:Routes to Influence; Role of Receivers in Influence; Ethics in Negotiation**;** Relationships in Negotiation: Key Elements in Managing Negotiations within Relationships
Parties in Negotiation: Coalitions, The nature of Multi-party negotiation

Module V: Foundations of Entrepreneurship Development
Concept and Need of Entrepreneurship Development Definition of Entrepreneur, Entrepreneurship, Innovation, Invention, Creativity, Business Idea, Opportunities through change.

Concepts of Entrepreneur, Manager, Intrapreneur / Corporate Entrepreneur – comparative study – Roles, Responsibilities, Career opportunities. Entrepreneurship as a career, Entrepreneurship as a style of management, The changing role of the entrepreneur: mid career dilemmas – Closing the window: Sustaining Competitiveness – Maintaining competitive advantage. Entrepreneurial Traits External Influences on Entrepreneurship Development: Socio-Cultural, Political, Economical, Personal. Entrepreneurial culture with special reference to Intrapreneurship / Corporate Entrepreneurship.
Entrepreneurial Success and Failure: Reasons and Remedies.

Learning Methods:
Tutorials, Interactive sessions, Case studies, Extensive research projects, Seminars, - the course is covered by adopting a combination of lecture methods, class presentation by groups of students, self study sessions. Each student is required to do the back ground reading from the specified chapters of the prescribed book before coming to class. Cases are also to be analyzed, discussed in groups (teams) outside the class as preparatory work.

Examination Scheme:

Components	**C1**	**V**	**A**	**CT**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:
- Cohens, Negotiating Skill for Managers
- Lacity, M., and Willcocks, L., Global Information Technology Outsourcing: Search for Business Advantage, John Wiley & Sons, Chichester, 2001
- Burt, Dobbler,, Starling, TMGH, World Class Supply Management
- Spangle M.L. & Isenhart M.W., Negotiation
- Chary, Production and Operations Management
- Nicholas, Competitive Manufacturing Management
- Lewicki, Saunder & Barry, Negotiation
- Donaldson, T & Werhane P, Ethical Issues in Business
- Dono Hue & Kolt, Managing Interpersonal Conflict
- Zartman I.W., The Negotiation Process: Theories and Applications
- Fleming Peter, Negotiating in a Week

INTERNATIONAL COMMODITY MANAGEMENT

Course Code: IBM4405 **Credit Units: 3**

Course Objective:
Knowing which countries dominate world trade in commodities; Familiarization with international commodity markets; Functions and mechanism of Indian and International Commodity Exchanges; Learning to identify commodity risks and formulating suitable strategies to minimize it.

Course Contents:

Module I: International Commodity Trading
Changing Int'l Trade scenario & in 21st Century; Commodities – Definition, Features, History, Participants, Structure; systems of commodity, Top Exporter & Importer countries of World's most traded commodities, India's place in World Markets.

Module II: .World's Commodity Exchanges
Major Commodity Exchanges in World - USA, Canada, Latin America, Europe, China, Asia, Africa & Oceanic: History, Shareholding, Products & contract specifications.

Module III: Indian Commodity Exchanges
Turnover, Evolution, Forward Market Commission, Contracts Act: Regional & National Commodity Exchanges, Structure, Shareholding, Turnover, Products Traded on National Exchanges MCX, NCDEX, NMCE, ICEX.

Module IV: Commodity Derivatives
Derivatives - Definition, Types, OTC vs Exchange Traded, Participants, Evolution, Economic Functions & benefits, Risks. Commodity Futures & Options - Characteristics, Terminologies, Margins, Physical Delivery, Assignment, Warehousing, Quality specifications, Membership, Charges; Trading, Clearing & Settlement; Strategies for Hedging, Speculation & Arbitrage. Types of Orders, Difference between & Options & Futures, Right/Obligation of Buyer/Seller, Call/Put Options.

Module V: World's Most Traded Commodities
Presentations on Cotton, Edible oils (Rapeseed, Soy, Palm Oil), Tea, Coffee, Sugar, Wheat, Crude Oil, Steel, Rice, Pulses, Rubber, Gold, Silver, Copper etc - World Trade, India's share, Production, Global demand & supply, Consumption & price patterns, Quality, Trading, Contract specifications, substitutes etc.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Niti Nandini Chatnani**,** Commodity Markets - Operations, Instruments and Application, Tata McGraw Hill Education Private Limited, New Delhi
- NCDEX Institute of Commodity Markets & Research (NICR), Study Manual for Commodity Trading

CROSS CULTURAL MANAGEMENT AND MANAGEMENT OF MULTINATIONAL COMPANIES

Course Code:IBM4406 **Credit Units: 03**

Course Objective:
The course seeks to impart understanding of Cross Cultural Management, so as to be able to relate it to managerial activity in the new geo-economy. The Course Contents provide exposure to the diverse management styles across the globe and impart understanding of different approaches to comparative analysis of each management style.
The course study provides knowledge of mechanics of doing business abroad. The importance of cultural, economic, political and environmental aspects when doing business abroad is reinstated while highlighting the challenges, which management faces today in a global environment.
The course also introduces the importance of Business Ethics and how it pertains to social responsibility of Cross Cultural Managers and the role ethics play in the management of transnational companies.

Learning Outcomes:
Ability to integrate and apply concepts about managing in different work cultures.
Appreciation cross-cultural and ethical issues faced by managers in global enterprises.
Ability to understand the work culture and management style of Multi National Organisations.
Enhance skill to manage international Business Negotiations
Enhance the ability to work in groups. Provide opportunities for students to exercise leadership skills.
Polish verbal and written communication skills, as well as presentation skills through projects.

Course Contents:

Module I: Introduction
Concept of Cross cultural Management, The Concept of International Comparative Management; Definition of Culture and impact of the culture on International Business.

Module II: Modalities of Cross-Cultural Dimensions
Kluckhohn and Strodtbeck`s Cultural Dimension; Hofstede's Cultural Dimensions ;Trompenaars Cultural Dimensions ; Hall and Hall's Cultural Dimension

Module III: Styles of Management and its impact on the International Business
Japanese Style of Management; German style of Management; UK style of Management; French style of Management; Spanish style of Management; Style of Management of United States companies; Management Characteristics of West European Companies; Styles of Management in African Countries; Style of Management of Latin American Countries
Indian style of Management

Module IV: Cross Cultural Leadership and Business Ethics with focus on Corporate Governance
Differences in managerial behavior; Cultural influences on leaders and their behavioural patterns; Business Ethics and Corporate Governance; Business Ethics and Management of Change in the International Organisation; Comparative Analysis of Cultural Patterns in Different Economics and the issues, which affect the good governance

Module V: Management of Multinational companies and Concept of International Negotiation
Management of Multinational Companies - Problems & Prospects of MNCs in an International environment; Culture and Communication; Major Obstacles to Intercultural Communication; Nonverbal Communication; Subtle art of negotiation; Managing Negotiation with Multinational Companies

Learning Methods:
A series of lectures will impart information and be complemented by interactive tutor-led and student-led discussion. Teaching consists of 2½ hours per week. The unit has thus been designed to use a variety of teaching methods that should help students to study the various aspects of international business environment. Formative tasks and presentations will enable students to build towards the completion of their assignment during the delivery of the unit.

Examination Scheme:

Components	**C1**	**V**	**A**	**CT**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:
Text:
- Daniels, J. D. and Radebaugh, L. H. International Business: Environments and Operations, 10th Edition. Prentice-Hall, Inc., New Jersey. ISBN: 0-13-121726-7. (referred to as D&R)

References:

- Hill, C. W. (2005). International Business: Competing in the Global Marketplace. McGraw-Hill
- Griffin, R. W. and Pustay, M. W. (2002). International Business: A Managerial Perspective. FT/Prentice Hall. 3rd edition.
- Griffin, R. W. and Pustay, M. W. (2005). International Business. FT/Prentice Hall. 4th edition.
- Hibbert, E. (1997). International Business Strategy and Operations. MacMillan Press Ltd.
- Henry, C. M. and Springborg, R. Globalization and the Politics of Development in the Middle East. Cambridge University Press.
- Rugman, A. M. and Hodgetts, R. M. (2003). International Business. 3rd Ed. Pearson Education Limited. ISBN: 0-273-67374-2. (referred to as R&H)
- Tayeb, M. (2003). International Management: Theories and Practice. Prentice Hall.
- Todaro, M. P. (2000). Economic Development, 7th Edition. Pearson Education Limited. ISBN: 0-201-64858-X.
- Pandey, Janak, Sinha Durganand, Asian contributions to Cross-Cultural Psychology, SAGE Publications

SPECIALISATION: INFORMATION TECHNOLOGY

DATA WAREHOUSING & DATA MINING

Course Code: ITM4401 **Credit Units: 03**

Course Contents:

Module-I: DATA WAREHOUSING

Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

Module-II: BUSINESS ANALYSIS

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multi relational OLAP – Categories of Tools – OLAP Tools and the Internet.

Module-III: DATA MINING AND TRENDS IN DATA MINING

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing,– Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

Module-IV: CLUSTERING AND APPLICATIONS

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K means – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint

Module-V: ASSOCIATION RULE MINING AND CLASSIFICATION

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Other Classification Methods – Prediction

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

TEXT BOOKS:

1. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier, 2007.

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining", Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India
4. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

LEVERAGING INFORMATION TECHNOLOGY IN GLOBAL BUSINESS

Course Code: ITM4402 **Credit Units: 03**

Course Objective:
The aim of this unit is to introduce the student to the evolution, role, function and impact of Information Technology (IT) and Information Systems (IS) in international business operations. It will develop the students' ability to identify sources of information and how these can be used in the decision-making process by leveraging IT and networking.

This course requires the students to develop practical applications ability and knowledge as well as the ability to recommend how IS and IT should be used in global business. Students will also demonstrate their understanding of fundamental business issues of the Information Age Enterprise through in-class discussion of real-world business cases.

Learning Outcomes:
At the end of the course students will be able to:

- Explain key concepts and elements of information technology and information systems
- Examine the evolution, role, function and impact of IT & IS in global business operation.
- Identify sources of information and assess how they can be used in the decision making process by leveraging information technology and networks.

Course Contents:

Module I: Information Technology in Management
Fundamentals of Information Technology in management
Organizations, Environments, IT & IS
E-business/E-commerce in global scenario: Role in transforming business and management in organizations with focus on IB
Use of communication systems in information management

Module II: Information Systems within Business Management
Introduction to common used system and models
Relationship between IS, organizations and business processes
Types of IS(TPS, OAS, MIS, DSS, ESS and SIS)
Information management and decision making
Managing international Information systems

Module III: Knowledge based systems
Intelligent support systems & concepts of Artificial Intelligence
Data Mining & Data warehousing
Emerging trends in Information management systems

Module IV: Managerial implications of IT/IS in Global business
Planning, Organizing and controlling
Information Security, Tools and techniques
Legal and Ethical issues
Future of Information management

Module V: Practical aspects and applications of IT/IS
Introduction to MIS packages and tools
Web interface and techniques
Introduction to ERP & CRM solutions

Learning Methods:
This course is based upon interaction between the students and the teachers. Wherever possible a link should be made between the academic underpinning and its practical application. Students will be given time to develop skills and analyse the benefits and limitations of the use of IS and IT in organisations. A 'hands on' approach will ensure that students can use integrated programmes and have a wide range of knowledge of different applications. The practical knowledge can be used to develop an awareness of how IT and IS can be adopted by organisations to improve business efficiency. This will be achieved via a tutor-developed case study, an evaluation of a local organisation, guest lectures and industry visits. Part of the learning process will also be producing a paper (in groups) on a relevant topic.

Examination Scheme:

Components	**C1**	**V**	**A**	**CT**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Laudon Kennith and Laudon Jane (2005) – Management Information Systems: Managing the Digital Firm, 9th Edition, Prentice Hall of India.
- Turban, McLean and Wetherbe (2004) – Information Technology for Management 4th Edition, John Wiley & Sons
- Rober Murdic G. (1998) - Management Information Systems, Prentice Hall of India
- Jawadekar W.S. (1998) - Management Information Systems, Tata McGraw Hill

MARKETING OF IT SOLUTIONS

Course Code: ITM4403 **Credit Units: 03**

Course Objective:
"Marketing and Management of Software Solutions" course is in two parts, the first one exposes the students to various typical features of solutions marketing and the second part to the Management of software solutions.

Course Contents:

Module I: Introduction to IT Sector
Introduction to software, industry, software business models: service, product, hybrid models

Module II: Solutions Marketing
IT marketing, internet marketing, sales cycle, service development lifecycle

Module III: Introduction to marketing strategies for cloud computing
PAAS, SAAS, IAAS

Module IV: Customer Handling
Writing proposals, handling proposals, customer handling strategies, account planning, relationship building

Module V: IT investment and Budgeting
Product pricing, service pricing, TPO, TCO

Module VI: IT solutions – implementation and maintenance
PM, Implementation and Maintenance of IT solutions

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Bob H (2009), Software Project Management, Tata McGraw Hill
- Kelkar, SA (2009), Software Project Management, PHI
- Kishor Swapna(2010), Software Requirements & Destinations, Tata McGraw Hill
- Royce (2009), Software Project Management, Pearson Education

MANAGERIAL DESCISION SUPPORT SYSTEMS

Course Code: ITM4404 **Credit Units: 03**

Course Objective:
The course is devoted to introduce decision support systems; show their relationship to other computer based information systems, demonstrate DSS development approaches, and show students how to utilize DSS capacities to support different types of decisions

Course Contents:

Module-I: DECISION MAKING AND INFORMATION SYSTEMS
Decision making concepts, rational & irrational decision making, Problems in making rational decisions, Business Value of Improved Decision Making, Information, Decision & Management.Types of Decisions, Types of Information. The Decision-Making Process, Herbert Simon Model of Decision Making

Module-II: DECISION SUPPORT SYSTEMS
Introduction to Decision Support Systems. Characteristics & Components of DSS- Data Management, Model Management, User Interface Management and Knowledge management. Decision Analysis by Analytical Modeling. Managers and Decision Making in the Real World, High-Velocity Automated Decision Making

Module-III: Types of DSS
The Concept of Decision Support Systems; Group Support Systems; Enterprise Information Systems; Knowledge Management Systems; Expert Systems; Artificial Neural Networks; Advanced Intelligent Decision Support Systems; Hybrid Support Systems

Module-IV: BUSINESS INTELLIGENCE IN THE ENTERPRISE
What Is Business Intelligence?, The Business Intelligence Environment, Business Intelligence and Analytics Capabilities, Management Strategies for Developing BI and BA Capabilities. Decision Support for Operational and Middle Management. Decision Support for Senior Management: The Balanced Scorecard and Enterprise Performance Management Methods. Group Decision-Support Systems (GDSS)

Module-V: INTELLIGENT DECISION SUPPORT SYSTEMS
Concepts and Definitions of Artificial Intelligence; Evolution of Artificial Intelligence; The Artificial Intelligence Field; Basic Concepts of Expert Systems; Applications of Expert Systems; Structure of Expert Systems; How Expert Systems Work; Problem Areas Suitable for Expert Systems; Benefits and Capabilities of Expert Systems; Problems and Limitations of Expert Systems; Expert System Success Factors; Types of Expert Systems; Expert Systems on the Web

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Decision Support Systems and Intelligent Systems, Seventh Edition, Efraim Turban, Jay E. Aronson, Richard V. McCarthy, Prentice-Hall of India, 2007
- Decision Support Systems, A Knowledge-Based Approach, Clyde W. Holsapple and Andrew B. Whinston
- Decision Support Systems For Business Intelligence by Vicki L. Sauter

SEARCH ENGINE OPTIMIZATION

Course Code: ITM4405 **Credit Units: 3**

Course Objective:

Course Contents:

Module-I: SEO Basics
Introduction about Domain, World Wide Web, Difference between Portal & Search Engine, Importance of Search Engine, Working of search engine, Difference between directories & search engine. Website performance monitor in search engine

Module-II:
Introduction to SEO, Web Traffic, Need of SEO, Working of SEO, Steps in SEO, Types of SEO techniques : Black Hat Techniques, White Hat Techniques,

Module-III: Keyword Research & Analysis
Introduction to Keyword research: Types of keywords, Keyword research methodology, keywords analysis tools, Preparing keyword list, localized keyword research, Keyword density, Keyword prominence, keyword stuffing

Module-IV: On Page Optimization
Basis of website designing, Essentials of good website designing, HTML Basics for SEO : Page Title, Meta Descriptions & Meta Keywords, Headings, Bod Text, Image & Alt tag, Invisible text, HTML Site Map Creation, Web Master Tools

Module-V: Off Page SEO Optimization
Page Rank, Link Popularity, Link Building, Types of Link Building, Book Marking, Article Submission Blog Marketing, Blog commenting, XML Site Ma submission, Customer review submission, press release submission, search engine submission

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- The Art of SEO: Mastering Search Engine Optimization 3rd Edition by Eric Enge, Stephan Spencer and Jessie Stricchiola, O Reilly Publication
- Search engine optimization 2017: Learn SEO with smart internet marketing strategies Paperbackby Adam Clarke,
- Search Engine Optimization All-in-One For Dummies 3rd Edition by Bruce Clay

TOOLS FOR BUSINESS INTELLIGENCE

Course Code: ITM4406 **Credit Units: 03**

Course Objective:
This course provides an introduction to the concepts of business intelligence (BI) as components and functionality of information systems. The course aims at examining Business Intelligence (BI) as a broad category of applications and technologies for gathering, storing, analyzing, sharing and providing access to data to help enterprise users make better managerial decisions. Students will be able to learn the principles and best practices for how to use data in order to support fact-based decision making

Course Contents:
Module-I: Business Intelligence: An Introduction
Introduction, Definition, History and Evolution, Business Intelligence Segments, Difference between Information and Intelligence, Defining Business Intelligence Value Chain, Factors of Business Intelligence System, Real time Business Intelligence, Business Intelligence Applications.

Module-II: Business Intelligence Types:
Types of Business Intelligence, Business Intelligence Platform, Dynamic roles in Business Intelligence, Roles of Business Intelligence in Modern Business- Challenges of BI, Multiplicity of Business Intelligence Tools, Types of Business Intelligence Tools, Modern Business Intelligence, the Enterprise Business Intelligence, Information Workers

Module-III: Business Intelligence Life Cycle
Introduction, Business Intelligence Lifecycle, **Enterprise Performance Life Cycle (EPLC)**Framework Elements, Life Cycle Phases, Human Factors in BI Implementation, BI Strategy, Objectives and Deliverables, Transformation Roadmap, Building a transformation roadmap, BI Development Stages and Steps, Parallel Development Tracks, BI Framework

Module-IV: Introduction to Data Warehousing& Data Mining
Data Warehousing, Advantages and Disadvantages, Data Mart, Online Analytical Processing (OLAP), Characteristics, Tools, Difference between OLAP and OLTP, Multidimensional Data Model. Definition of Data Mining, Data mining parameters, How Data Mining works?, Types of relationships, Architecture of Data Mining, Kinds of Data which can be mined, Functionalities of Data Mining, Classification on Data Mining system, Various risks in Data Mining, Advantages and disadvantages of Data Mining

Module-V: Business Intelligence User Model
Introduction, Evolution of Business Intelligence, Business Intelligence Opportunity Analysis Overview, Content Management System, End User Segmentation, Basic Reporting and Querying, Online Analytical Processing, OLAP Techniques, OLAP Applications, Applying the OLAP to Data Warehousing, Benefits of using OLAP, Dashboard, Advanced/Emerging BI Technologies, Future of Business Intelligence

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- Business Intelligence and Analytics. Systems for Decision Support, 10th Edition. R. Sharda, D. Delen, & E. Turban; Pearson/Prentice Hall, © 2015. ISBN-13: 978-0-13-305090-5
- Business Intelligence: A Managerial Perspective on Analytics**,** R. Sharda, D. Delen, 3rd edition, Pearson Education **ISBN-13:** 978-0133051056

SPECIALISATION: MARKETING & SALES

CUSTOMER RELATIONSHIP MANAGEMENT

Course Code: MKT4401 **Credit Units: 03**

Course Objective:
This course examines customer relationship management as a key strategic process for organizations. Composed of people, technology, and processes, an effective CRM optimizes the selection or identification, acquisition, growth and retention of desired customers to maximize profit. Anyone interested in being an architect of CRM within his or her organization, or responsible for the development of any major aspect of CRM will find this course beneficial. CRM discussions and projects will address both organizational customers (B2B) and consumers/households (B2C).

Course Contents:

Module I: Introduction and Significance of Customer Relationship Management
Evolution of Customer Relationship Management, Benefits of CRM, Transaction vs. Relationship orientation, CRM process framework, Types of CRM, an Insight into CRM , e-CRM and m-CRM.

Module II: Managing Customer Relationship
Relationship Building as a process, Bonding for customer relationship; Relationship Building Strategies, the ladder of loyalty, Building Customer Relationship Management by Customer Retention, Stages of Retention, Sequences in Retention Process, Customer Defection, Strategies to Prevent Defection and Recover Customers. Market share vs. Share of customers, Lifetime Value of customers and Segmentation of customers.

Module III: CRM Process
The CRM cycle i.e. Assessment Phase; Planning Phase; The Executive Phase, 4C's (Elements) of CRM Process, Customer Acquisition Strategies, Cross selling and up selling strategies, Customer Equity, Customer Metrics, Customer Complaint Management.

Module IV: CRM practices in Business Economy (B 2 C and B 2 B Market)
Growth of Service in India, Service Customer Classification, Service Marketing Mix, Service Recovery, Characteristics of Business Markets, Importance of CRM in B2B and B 2 C Markets, Key Account Management, Supplier-Channel Management, CRM practices and application in Banking Industry, Retail Industry, Aviation Industry, Hospitality Industry, Pharmaceutical Industry, Telecom Industry and Product Markets.

Module V: Technological Tools for Customer Relationship Management
Components of e-CRM; Data management and construction of databases for data warehousing and data mining. CLTV, ACD (automatic call distribution), IVR (interactive voice response), CTI (computer telephony integration), web enabling the call center, automated intelligent call routing, logging and monitoring. Functional components of CRM solution; Contact centre for CRM.

Module VI: Issues and Challenges in Implementation of CRM
CRM Implementation Road Map, building organizational capabilities through Internal Marketing, CRM Roadblocks (4P's), Phased development, Challenges of CRM implementation, Learning from customer defections, Evaluating customer retention programs, Emerging trends in CRM.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Alok Kumar, Chhabi Sinha, Rakesh Sharma (2009) Customer Relationship Management – Concepts and Application, Biztantra.
- Alok Kumar Rai (2009) Customer relationship Management Concepts and Cases, PHI
- G Shainesh & Jagdish N Sheth, (2006) Customer Relationship Management-A Strategic Approach, Macmillan India, New Delhi.
- Jill Dyche (2006) The CRM Hand book (2006) Pearson Education.
- Judith W.Kincaid (2007) Customer Relationship Management- Getting it Right, Pearson Education.
- Ronald S (2001), Accelerating Customer Relationships, Swift, PHI.
- S.Shajahan (2009) Relationship Marketing, Tata McGraw Hill

E-SUPPLY CHAIN MANAGEMENT

Course Code: MKT4402 **Credit Units:03**

Course Contents:

Module-I: Introduction to SCM
Concept of supply chain, integrated supply chain, Growth of Supply chain; Strategic decision in supply chain; Supply Chain Management as a Management Philosophy; Scope &function of SCM,.

Module-II: SCM Strategies Performance
Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics.; Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

Module-III: Role of IT in Supply chain
Uses of IT in inventories, transportation & facilities within a supply chain; SCM frame Work-macro Processes, Advent of internet business technologies; Supply chain information System Design-Planning, Capacity, Performance requirement ,manufacturing requirement ,Operation , Transportation ,Inventory development ; E-Business –Role in Supply chain, Framework ,Impact on Cost;

Module-IV: Impact of IT on integrated SCM and DSS
Infrastructure, impact of e-commerce; framework for IT integrated SCM, Impact of integrating IT with SCM; Decision support systems for SCM: introduction DSS, Components, types, processing information, specific types of DSS, Information Technology (IT) Support System for Effective Supply Chain Decision Making.

Module-V: SCM Inventory management& Relationship Management
Overview, benefits, key features, warehouse and inventory control, purchasing and vendormanagement, Optimised manufacturing process; Supplier Relationship Management**:** Integrating suppliers into the value chain, Defining purchasing and SRM, Internet driven SRM environment, implementation of e-SRM

Module-VI: The future of IT in the Supply Chain
Internal Supply Chain management, Supply relationship management, Transactionmanagement ,Data mining –Methods and application area in supply chain.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Texts & references

- W.J. Hopp and M.L. Spearman. Factory Physics: Foundations of Manufacturing Management. Irwin, McGraw-Hill, 1996.
- N. Viswanadham. Analysis of Manufacturing Enterprises, Kluwer Academic Publishers, 2000.
- Sridhar Tayur, Ram Ganeshan, Michael Magazine (editors). Quantitative Models for Supply Chain Management, Kluwer Academic Publishers, 1999.
- R.B. Handfield and E.L. Nochols, Jr. Introduction to Supply Chain Management. Prentice Hall, 1999.
- N. Viswanadham and Y. Narahari. Performance Modeling of Automated manufacturing Systems. Prentice Hall of India, 1998.

- Sunil Chopra and Peter Meindel. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, 2002.
- Jeremy F. Shapiro. Modeling the Supply Chain, Duxbury Thomson Learning, 2001.
- David Simchi Levi, Philip Kaminsky, and Edith Simchi Levi. Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. Irwin McGraw-Hill, 2000.

SCM Review: http://www.manufacturing.net/scm/index.asp?layout=siteInfoWebzine
ASCET Project: http://www.ascet.com/
Supplychainbrain.com: http://www.supplychainbrain.com/
Managing the Digital Enterprise: http://digitalenterp

INDUSTRIAL MARKETING

Course Code: MKT4403 **Credit Units: 03**

Course Objective:
To provide an understanding of industrial market characteristics, evolution of strategies and to learn practical application of different concepts of industrial market

Course Contents:

Module I
Introduction to industrial marketing, environment of industrial and consumer marketing, nature of an industrial buyer, standard product classification
Industrial buying behaviour, individual vs. group decision making, concept of buying center and environmental & organizational influences, buy-grid framework and its practical application, after-sales service (AMC)
Industrial market segmentation, targeting and positioning techniques; sequential segmentation, niche market

Module II
Industrial channel, types, nature, difference between merchant, agents and broker, selection criteria, channel conflicts, channel integration (VMS), marketing strategies, policy, sales management practices training, motivation and examination., e-commerce
Industrial marketing communication, advertising, publicity and sales promotion Trade shows – exhibits – Catalogs – Samples – promotionalletters – Promotional novelties

Module III
New product development through in-house (R&D) and technology transfer, different stages in NPD, different types of test markets; IPRs, patent, copyright, non-disclosure agreement (NDA), industrial PLC and effect of various external and internal environmental factors

Module IV
Different types of bids – tender and auction, two parts bid, price discovery mechanism under different market scenarios, OEM and their impact on pricing policies, break-even point calculation
Line of credit and mode of payment, its implication on working capital management, Pricing Objectives - Price Decision Analysis –Breakeven analysis – net pricing – discount pricing – trade discounts – eographic
pricing – factory pricing – freight allowance pricing – Terms of Sale – Outrightpurchase – Hire-purchase – Leasing

Module V
Industrial marketing research techniques, marketing intelligence, sales and demand forecast in industrial market
Industrial marketing in international context, Incoterms, role of contingency factors affecting industrial marketing decisions
Brief introduction to nature of turnkey and BOT projects, its contractual agreement; leasing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Havaldar, K.K., (2009). Industrial Marketing: Text and Cases, McGraw Hill
- Reeder, Robert R., Reeder, Betty H., Brierty, Edward G. (2009). Industrial Marketing: Analysis, Planning and Control,PHI Learning
- Newspapers- Economic Times, Business Standard, Financial Express, Brand Equity
- Magazines- Advertising and Marketing, Business World, Business India
- Reading about followingorganizations/ standard reports/ publications is suggested:
  - Directorate General of Supplies and Disposals (DGS & D)
  - Business Monitor International (BMI)
  - National Industrial Classification (NIC)
  - International Standard Industrial Classification (ISIC)
  - Thomas Register (USA)
  - Business Marketing Association (BMA)
  - Directorate General of Commercial Intelligence and Statistics (DGCI&S)
  - Export Credit Guarantee Corporation (ECGC)
  - Minerals and Metals Trading Corporation of India Limited (MMTC)
  - M-Junction
  - Transport Corporation of India (TCI)

COMPETITIVE MARKETING

Course Code:MKT4404 **Credit Units: 03**

Course Objective:
To develop skills for analyzing market competition and design competitive marketing strategies to be a winner at the market place.

Course Contents:

Module-I: Introduction
Introduction to the competitive marketing strategies: Understanding the competitor, Outwitting, outmaneuvering and outsmarting the competition; Competitor learning;

Module-II: Competitor analysis
Marketplace strategy – Scope, posture and goals; Competitive strategic analysis: Activity/value chain, Alliances, Networks, Capabilities and competencies, Assets and Assumptions.

Module-III: Growth Strategies
Competitive market strategies for emerging industries, strategies for mature and declining brands and fragmented industries; projecting the Competitor's Future Marketplace strategies; Marketing warfare strategies: Market leader strategies, market challenger strategies, market niches strategies

Module-IV: Portfolio Analysis
PLC, Portfolio Matrix, Porter's Strategies Framework. Designing and Managing value networks and marketing channels – channel design decisions, channel management decisions, channel dynamics;

Module-V: Managing Communication
Integrated marketing communication; Managing Advertising , sales promotion, public relations and Direct marketing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Suggested Readings

- Aaker, D. A. (2008). *Strategic market management* (7th ed.). India: Wiley.
- Craven, D. W., & Nigel, F. P. (2008). *Strategic marketing* (9th ed.).McGraw-Hill Higher Education.
- Etzel, M. J., Walker, B. J., Stanton, W. J., & Pandit, A. (2010). *Marketing*(14th ed.). New Delhi: Tata McGraw Hill.
- Fahey, L. (1999). *Outwitting, outmaneuvering and outperforming competitors*. New York: John Wiley & Sons.
- Kotler, P., Keller, K., Koshy, A., & Jha, M. (2009). *Marketing management: A South Asian perspective* (13th ed.). New Delhi: Pearson Education.
- Rao, V. R., & Steckel, J. H. (1998). *Analysis for strategic marketing.* New Delhi: Pearson Education.

MARKETING OF NON-PROFIT ORGANIZATION

Course Code: MKT4405 **Credit Units: 03**

Course Objectives:
The course aims at familiarizing the students with the application of the concept & need of marketing in Non-Profitorganization.

Course Contents:

Module I- Introduction to Non-Profit Organization
Concept& Characteristics, Non- Profit Organization in India, Types,Problems, Need of Marketing of Non-Profit Organization.

Module II-NPOs and Image Management
Differentiation of NPOs: Concept of Responsive Organization- Image management, image causation, imagemodification, Mission, Exchange, Environment affecting operations of NPOs(Publics), Image & Satisfactionmeasurement.

Module III- Managing Marketing efforts
Understanding Consumer Behavior; **Product**- Product Mix, Product Mix decisions for Non-profit Organization; Pricing for Non Profit organizations.

Module IV- NPOS Market Segmentation & Promotion Mix
Market Segmentation for Non- profit Organization, Target Marketing; **Promotion**: Advertising, personal selling, sales promotion and Public Relations for Non- profit Organization.

Module V- Managing Human and Financial Resource
Managing Human Resource: Attracting People, Analyzing people, Recruitment, Members and membershipcriterion, Volunteers.
Managing Financial Resource: Donor Marketing, Attracting Funds, Analyzing Donor markets, Fund raisinggoalsand strategy.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Texts & References:
- Philip Kotler: Marketing of Non-Profit Organizations.
- Andresen Alan R: Strategic marketing for NPOs
- Roberto Eduado L: Social Marketing

BUSINESS AT BOTTOM OF PYRAMID

Course Code: MKT4406 **Credit Units: 03**

Course Objective:
The main objective of the course is to develop a deeper understanding of BOP markets among the students. This course will expose the students to the theoretical concepts and frameworks to better understand opportunities and challenges at the BOP markets. They will be in a position after the course to appreciate various complexities involved in doing business at the BOP.

Course Contents:

Module-I: Introduction
The Market at the Bottom of the Pyramid, The Power of Dominant Logic, The Nature of the BOP Market, Potential of BOP market in India ,Challenges offered by Indian BOP market.

Module-II: The Fortune at the Bottom of the Pyramid
There Is Money at the BOP, Access to BOP Markets, The BOP Markets Are Brand Conscious, The BOP Market Is Connected, BOP Consumers Accept Advanced Technology Readily ;The Market Development Imperative :Create the Capacity to Consume ,The Need for New Goods and Services ,Trust Is a pre-prerequisite ;Benefits to the Private Sector , Developing Products and Services for the BOP, Twelve Principles of Innovation for BOP Markets ,

Module-III: BOP: A Global Opportunity?
Engaging the BOP , Local Growth Opportunities ,Local Innovations and Global Opportunity ,BOP Solutions for Developed Markets ,Lessons for MNCs from BOP Markets, The Cost of Managing, Learning to Live in a Network of Relationships; The Ecosystem for Wealth Creation, Reducing Corruption.

Module-IV: Development as Social Transformation
Development as Social Transformation ,Breaking Down Barriers to Communication, BOP Consumers Upgrade ,Gaining Access to Knowledge, Identity for the Individual, Women Are Critical for development ,Evolving Checks and Balances

Module-V: Innovative Practices at the Bottom of the Pyramid
The Market at the Bottom of the Pyramid, Known Problems and Known Solutions: What Is the Missing Link? Known Problems and Unique Solutions, Known Problems and System wide Reform, Scaling Innovations, Creating Enabling Conditions for the Development of the Private Sector

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Suggested Readings:

- Collier, Paul. The Bottom Billion. Why Poor Countries are Failing and What Can Be Done About It. New York: Oxford University Press, 2007.
- Easterly, William. The White Man’s Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good. Oxford: Oxford University Press, 2007.
- Yunus, Muhammad. Creating a World without Poverty. Philadelphia: Public Affairs (Perseus Book Group), 2006.
- C.K.Prahlad, Bottom of Pyramid; Pearsons edition1.

SPECIALISATION: E-COMMERCE

SOCIAL MEDIA ANALYTICS

Course Code: ECM4401 **Credit Units: 03**

Course Objective:
Social media not only provides marketers with a means of communicating with their customers, but also a way to better understand their customers. This course will provide students with an advanced understanding of social media, marketing plans and social media analytics.

Course Contents:

Module-I: Introduction
Introduction to various social network platforms- Twitter, Facebook, Google+, LinkedIn and their features. Utilizing social media for Business. Promoting business on social media.

Module-II: Mining Twitter
Introduction to Twitter, Exploring Twitter's API and Terminology, exploring trending topics, searching for keywords, extracting tweet entities with frequency analysis, computing tweet diversity, examining patterns in retweets, visualizing frequency data with histograms.

Module-III: Mining Facebook & LinkedIn
Introduction, Understanding the Social Graph API, the Open Graph Protocol, Analyzing Social Graph Connections, analyzing facebook pages, examining friendships.
Introduction, Making LinkedIn API Requests, Data Clustering, normalizing data for analysis, measuring similarity, clustering algorithms.

Module-IV: Mining Google+
Introduction, Exploring the Google+ API, Term Frequency, Inverse Document Frequency, Querying Human Language Data with TF-IDF 1. Introducing the Natural Language Toolkit, Applying TF-IDF to Human Language,Finding Similar Documents , Analyzing Bigrams in Human Language Reflections on Analyzing Human Language Data

Module-V: Mining Web pages
Scraping, Parsing, and Crawling the Web, Breadth-First Search in Web Crawling, Discovering Semantics by Decoding Syntax. Natural Language Processing Illustrated Step-by-Step. Sentence Detection in Human Language Data. Document Summarization. Entity-Centric Analysis: A Paradigm Shift. Gisting Human Language Data. Quality of Analytics for Processing Human Language Data

Module-VI: Twitter Cookbook
Discovering the Trending Topics, Searching for Tweets, Collecting Time-Series Data, Extracting Tweet Entities Finding the Most Popular Tweets in a Collection of Tweets, Tabulating Frequency Analysis, Finding Users Who Have Retweeted a Status, Extracting a Retweet's Attribution, Making Robust Twitter Request, Resolving User Profile Information Extracting Tweet Entities from Arbitrary Text. Getting All Friends or Followers for a User, Analyzing a User's Friends and Followers Harvesting a User's Tweets. Crawling a Friendship Graph

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

Text:

- “Mining the Social Web”. 2nd Edition. Matthew A. Russell, O'Reilly Media. 2013
- “Social Media Mining: An Introduction”, Reza Zafarani, Mohammad Ali Abbasi, and Huan Liu, Cambridge University Press, 2014

References:

- Hanneman, Robert and Mark Riddle. 2005. Introduction to Social Network Methods
- “Modern Information Retrieval: The Concepts and Technology behind Search (2nd Edition)”. Ricardo Baeza-Yates and Berthier Ribeiro-Neto ACM Press Books, 2011. ISBN-10: 0321416910, ISBN-13: 978-0321416919.
- Social Media Marketing, Tracy Tuten & Michael Solomon Pearson 2013 ISBN: 978013-2551793

M-COMMERCE & MOBILE APP DEVELOPMENT

Course Code: ECM4402 **Credit Units: 03**

Course Objective:
This course will examine the concepts, technology, and applications of mobile commerce, also called m-commerce. The students will be able to learn about the technology needed for m-commerce including mobile client hardware and software, and wireless communications technology. Then the course will examine the range of m-commerce applications.

Course Contents:

Module-I: Introduction
Introduction to e-commerce and mobile commerce, definition, applications, advantages, M-Commerce and e-commerce business models, Mcommerce value chain. Ethical and Social Issues in Mobile Commerce. Mobile computing, Pervasive computing, devices-PDAs, netbooks, smartphones

Module-II: WAP Protocol Suite
Underlying Technologies of M-Commerce-Wireless Application Protocol (WAP), WAP Browser, Enhanced Features of WAP 2.0.Various layers in WAP- Wireless Application Environment (WAE), Wireless Session protocol (WSP), Wireless Transaction protocol (WTP), Wireless Transport layer Security (WTLS), Wireless Datagram protocol (WDP)

Module-III: MOBILE COMMERCE: THEORY AND APPLICATIONS
The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – E–commerce in The Automotive Industry – Location– Based Services: Criteria For Adoption And Solution Deployment – The Role of Mobile Advertising In Building A Brand – M–commerce Business Models

Module-IV: BUSINESS– TO– BUSINESS MOBILE E– COMMERCE
Enterprise Enablement – Email and Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking and Maintenance/Management – Remote IT Support – Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation – Security.

Module-V: The Android Platform:
Introduction to the Android platform and the Android Studio IDE, Android components, Activities.**User Interface Design**: Intents, Activity lifecycle, UI Design: Widgets and Layouts, UI Events, Event Listeners.

Module-VI: Graphics Support in Android:
Drawables, Basics of Material Design, 2D graphics: Canvas/Drawing using a view **Multimedia in Android**: Audio playback and MediaPlayer, SoundPool **Week 5: Networking support**: Basics of networking in Android, AsyncTask, HttpURLConnection

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

Text(s):

- E.Brian Mennecke, J.Troy Strader, "Mobile Commerce: Technology, Theory and Applications", Idea Group Inc., IRM press, 2003.
- Ravi Kalakota, B.Andrew Whinston, "Frontiers of Electronic Commerce", Pearson Education, 2003.

References:

- P. J. Louis, "M-Commerce Crash Course", McGraw- Hill Companies February 2001.
- Paul May, "Mobile Commerce: Opportunities, Applications, and Technologies Of Wireless Business" Cambridge University Press March 2001.

E-CUSTOMER RELATIONSHIP MANAGEMENT

Course Code: ECM4403 **Credit Units: 03**

Course Objective:
This course examines customer relationship management as a key strategic process for organizations. Composed of people, technology, and processes, an effective CRM optimizes the selection or identification, acquisition, growth and retention of desired customers to maximize profit. Anyone interested in being an architect of CRM within his or her organization, or responsible for the development of any major aspect of CRM will find this course beneficial. CRM discussions and projects will address both organizational customers (B2B) and consumers/households (B2C).

Course Contents:

Module I: Introduction and Significance of Customer Relationship Management
Evolution of CRM, Need for CRM, Benefits of CRM, Transaction vs. Relationship orientation, Introduction and Objectives of a CRM Process, an Insight into CRM , e-CRM and m-CRM.

Module II: Managing Customer Relationship
Relationship Building as a process, Relationship Building Strategies, the ladder of loyalty, Building Customer Relationship Management by Customer Retention, Stages of Retention, Sequences in Retention Process, Customer Defection, Strategies to Prevent Defection and Recover Customers. Market share vs. Share of customers, CLV and Segmentation of customers.

Module III: CRM Process
The CRM cycle i.e. Assessment Phase; Planning Phase; The Executive Phase, Modules in CRM, 4C's (Elements) of CRM Process, Customer Acquisition Strategies, Cross selling and up selling strategies, Customer Equity, Customer Metrics, Customer Complaint Management.

Module IV: CRM practices in Business Economy (B 2 C and B 2 B Market)
Growth of Service in India, Service Customer Classification, Service Marketing Mix, Service Recovery, Characteristics of Business Markets, Importance of CRM in B2B and B 2 C Markets, Key Account Management, Supplier-Channel Management, CRM practices and application in Banking Industry, Retail Industry, Aviation Industry, Hospitality Industry, Pharmaceutical Industry, Telecom Industry and Product Markets.

Module V: Technological Tools for Customer Relationship Management
Components of e-CRM, Data management and construction of databases for Data warehousing and data mining. Analytical and operational CRM, CLTV, what is ACD (automatic call distribution), IVR (interactive voice response), CTI (computer telephony integration), web enabling the call center, automated intelligent call routing, logging and monitoring.

Module VI: Issues and Challenges in Implementation of CRM
CRM Implementation Road Map, building organizational capabilities through Internal Marketing, CRM Roadblocks (4P's), Phased development, Learning from customer defections, Evaluating customer retention programmes, Emerging trends in CRM.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Alok Kumar, Chhabi Sinha, Rakesh Sharma (2009) Customer Relationship Management – Concepts and Application, Biztantra.
- Alok Kumar Rai (2009) Customer relationship Management Concepts and Cases, PHI
- G Shainesh & Jagdish N Sheth, (2006) Customer Relationship Management-A Strategic Approach, Macmillan India, New Delhi.
- Jill Dyche (2006) The CRM Hand book (2006) Pearson Education.
- Judith W.Kincaid (2007) Customer Relationship Management- Getting it Right, Pearson Education.
- Ronald S (2001), Accelerating Customer Relationships, Swift, PHI.
- S.Shajahan (2009) Relationship Marketing, Tata McGraw Hill

TOOLS FOR BUSINESS INTELLIGENCE

Course Code: ECM4404 **Credit Units: 03**

Course Objective:
This course provides an introduction to the concepts of business intelligence (BI) as components and functionality of information systems. The course aims at examining Business Intelligence (BI) as a broad category of applications and technologies for gathering, storing, analyzing, sharing and providing access to data to help enterprise users make better managerial decisions. Students will be able to learn the principles and best practices for how to use data in order to support fact-based decision making

Course Contents:
Module-I: Business Intelligence: An Introduction
Introduction, Definition, History and Evolution, Business Intelligence Segments, Difference between Information and Intelligence, Defining Business Intelligence Value Chain, Factors of Business Intelligence System, Real time Business Intelligence, Business Intelligence Applications.

Module-II: Business Intelligence Types:
Types of Business Intelligence, Business Intelligence Platform, Dynamic roles in Business Intelligence, Roles of Business Intelligence in Modern Business- Challenges of BI, Multiplicity of Business Intelligence Tools, Types of Business Intelligence Tools, Modern Business Intelligence, the Enterprise Business Intelligence, Information Workers

Module-III: Business Intelligence Life Cycle
Introduction, Business Intelligence Lifecycle, **Enterprise Performance Life Cycle (EPLC)**Framework Elements, Life Cycle Phases, Human Factors in BI Implementation, BI Strategy, Objectives and Deliverables, Transformation Roadmap, Building a transformation roadmap, BI Development Stages and Steps, Parallel Development Tracks, BI Framework

Module-IV: Introduction to Data Warehousing& Data Mining
Data Warehousing, Advantages and Disadvantages, Data Mart, Online Analytical Processing (OLAP), Characteristics, Tools, Difference between OLAP and OLTP, Multidimensional Data Model. Definition of Data Mining, Data mining parameters, How Data Mining works?, Types of relationships, Architecture of Data Mining, Kinds of Data which can be mined, Functionalities of Data Mining, Classification on Data Mining system, Various risks in Data Mining, Advantages and disadvantages of Data Mining

Module-V: Business Intelligence User Model
Introduction, Evolution of Business Intelligence, Business Intelligence Opportunity Analysis Overview, Content Management System, End User Segmentation, Basic Reporting and Querying, Online Analytical Processing, OLAP Techniques, OLAP Applications, Applying the OLAP to Data Warehousing, Benefits of using OLAP, Dashboard, Advanced/Emerging BI Technologies, Future of Business Intelligence

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References
- Business Intelligence and Analytics. Systems for Decision Support, 10th Edition. R. Sharda, D. Delen, & E. Turban; Pearson/Prentice Hall, © 2015. ISBN-13: 978-0-13-305090-5
- Business Intelligence: A Managerial Perspective on Analytics**,** R. Sharda, D. Delen, 3rd edition, Pearson Education **ISBN-13:** 978-0133051056

ADVANCEMENTS IN ELECTRONIC PAYMENT SYSTEMS

Course Code: ECM4405 **Credit Units: 3**

Course Objective:
The course will enable students to understand different kinds of payment methods and requirements for a secure electronic payment system. Students will also be able to learn about different forms of electronic money, how money moves through the world's banking systems, how security is achieved in payment systems.

Course Contents:
Module-I: Introduction to E-Commerce
Introduction to e-commerce & e-business, features, benefits & limitations of e-commerce, traditional & e-commerce, various business models. Applications of e-commerce in various sectors.

Module-II: Electronic Payment Systems Types
Meaning, definition and features of electronic payment system Types- Digital Token-Based Electronic Payment Systems, Smart Cards & Stored value cards, Credit Card- Based Electronic Payment Systems, Brick & Mortar Payment Systems. Digital wallets, Risks associated with payment systems.

Module-III: Protocols for EPS
Security requirements for EPS- Authentication, Trust, Privacy, Non-repudiation and availability. Network Protocols, Secure Socket Layer (SSL)- Introduction and its working, Secure Hypertext Transfer Protocol (S-HTTP), Secure Electronic Transactions (SET), Authentication Techniques- Shared Secrets and Tokens.

Module-IV: E-Banking
Introduction to e-banking, features, services, advantages & limitations of e-banking. Types of e-banking systems, Growth in e-banking, Risks associated with e-banking. Safe Internet banking. NEFT, RTGS, SWIFT transfers, ACH transactions.

Module-V: Electronic Invoice Presentment and Payment
Electronic statement delivery, EIPP providers: biller service providers, customer service providers. Thick vs. thin consolidation. Reconciliation. Bill data mining. B2B integration. Invoice elimination: scan-based trading (SBT).
Module-VI: Security Environment
Security threats in e-payment systems, malicious code and unwanted programs, Phishing & identity theft, hacking & cyber crimes, credit card frauds/theft, spoofing. Protecting Internet Communications, Encryption, Symmetric & Asymmetric cryptography, Digital Envelops, Digital Signatures.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References
Text(s)

- Awad, E., Electronic Commerce: From Vision to Fulfillment, 3/E, Prentice Hall, 2006, ISBN: 0-13-173521-7
- Davis, W., Benamati, J., E-Commerce Basics: Technology Foundations and E-Business Applications, Prentice Hall, 2003, ISBN: 0-201-74840-1

References

- Ford, W., Baum, M., Secure Electronic Commerce: Building the Infrastructure for Digital Signatures and Encryption, 2/E, Prentice Hall, 2001, ISBN: 0-13-027276-0
- *Protocols for Secure Electronic Commerce*, by M. H. Sherif, Second Edition, ISBN 0849315093.

SEARCH ENGINE OPTIMIZATION

Course Code: ECM4406 **Credit Units: 03**

Course Objective
The course will enable students the craft of optimizing websites for Search Engines. Students will learn about how the search engine works, the techniques for conducting SEO and keywords searching.

Course Contents:

Module-I: SEO Basics
Introduction about Domain, World Wide Web, Difference between Portal & Search Engine, Importance of Search Engine, Working of search engine, Difference between directories & search engine. Website performance monitor in search engine

Module-II:
Introduction to SEO, Web Traffic, Need of SEO, Working of SEO, Steps in SEO, Types of SEO techniques : Black Hat Techniques, White Hat Techniques,

Module-III: Keyword Research & Analysis
Introduction to Keyword research: Types of keywords, Keyword research methodology, keywords analysis tools, Preparing keyword list, localized keyword research, Keyword density, Keyword prominence, keyword stuffing

Module-IV: On Page Optimization
Basis of website designing, Essentials of good website designing, HTML Basics for SEO : Page Title, Meta Descriptions & Meta Keywords, Headings, Bod Text, Image & Alt tag, Invisible text, HTML Site Map Creation, Web Master Tools

Module-V: Off Page SEO Optimization
Page Rank, Link Popularity, Link Building, Types of Link Building, Book Marking, Article Submission Blog Marketing, Blog commenting, XML Site Ma submission, Customer review submission, press release submission, search engine submission

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References

- The Art of SEO: Mastering Search Engine Optimization 3rd Edition by Eric Enge, Stephan Spencer and Jessie Stricchiola, O Reilly Publication
- Search engine optimization 2017: Learn SEO with smart internet marketing strategies Paperbackby Adam Clarke,
- Search Engine Optimization All-in-One For Dummies 3rd Edition by Bruce Clay

E-SUPPLY CHAIN MANAGEMENT

Course Code: ECM4407 **Credit Units:3**

Course Contents:

Module I-Introduction to SCM
Concept of supply chain, integrated supply chain, Growth of Supply chain; Strategic decision in supply chain; Supply Chain Management as a Management Philosophy; Scope &function of SCM,.

Module II-SCM Strategies Performance
Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics.; Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

Module III- Role of IT in Supply chain
Uses of IT in inventories, transportation & facilities within a supply chain; SCM frame Work-macro Processes, Advent of internet business technologies; Supply chain information System Design-Planning, Capacity, Performance requirement ,manufacturing requirement ,Operation , Transportation ,Inventory development ; E-Business –Role in Supply chain, Framework ,Impact on Cost;

Module IV- Impact of IT on integrated SCM and DSS
Infrastructure, impact of e-commerce; framework for IT integrated SCM, Impact of integrating IT with SCM; Decision support systems for SCM: introduction DSS, Components, types, processing information, specific types of DSS, Information Technology (IT) Support System for Effective Supply Chain Decision Making.

Module V-SCM Inventory management& Relationship Management
Overview, benefits, key features, warehouse and inventory control, purchasing and vendormanagement, Optimised manufacturing process; Supplier Relationship Management**:** Integrating suppliers into the value chain, Defining purchasing and SRM, Internet driven SRM environment, implementation of e-SRM

Module VI- The future of IT in the Supply Chain
Internal Supply Chain management, Supply relationship management, Transactionmanagement ,Data mining –Methods and application area in supply chain.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Texts & references

- W.J. Hopp and M.L. Spearman. Factory Physics: Foundations of Manufacturing Management. Irwin, McGraw-Hill, 1996.
- N. Viswanadham. Analysis of Manufacturing Enterprises, Kluwer Academic Publishers, 2000.
- Sridhar Tayur, Ram Ganeshan, Michael Magazine (editors). Quantitative Models for Supply Chain Management, Kluwer Academic Publishers, 1999.
- R.B. Handfield and E.L. Nochols, Jr. Introduction to Supply Chain Management. Prentice Hall, 1999.
- N. Viswanadham and Y. Narahari. Performance Modeling of Automated manufacturing Systems. Prentice Hall of India, 1998.

- Sunil Chopra and Peter Meindel. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, 2002.
- Jeremy F. Shapiro. Modeling the Supply Chain, Duxbury Thomson Learning, 2001.
- David Simchi Levi, Philip Kaminsky, and Edith Simchi Levi. Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. Irwin McGraw-Hill, 2000.

SCM Review: http://www.manufacturing.net/scm/index.asp?layout=siteInfoWebzine
ASCET Project: http://www.ascet.com/
Supplychainbrain.com: http://www.supplychainbrain.com/
Managing the Digital Enterprise: http://digitalenterp

Master of Business Administration
(Hospital & Healthcare Management)

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Business Administration
(Hospital & Healthcare Management)

Syllabus – First Semester

HOSPITAL ORGANIZATION & MANAGEMENT PROCESS

Course Code: HHM4101 **Credit Units: 04**

Course Objective: This subject focuses on acquainting the student with the principles and practices essential for managing a hospital. The subject encompasses management principles, functions and processes, discussing their significance and role in effective and efficient management of health care organizations.

Course Contents:

Module I- Unique features of Hospital Management

Hospital as an organization, Characteristics of a Modern Hospital, Growing significance of management in organizations; Evolution of Management Thought- Frederic Taylor's scientific Management, Henry Fayol's principles of management, concept of bureaucracy, human relations approach, Behavioral approach, Systems theory of organization, Contingency Theory of organization, Management by Objectives (MBO).

Module II- Management Functions

Management process and functions, Nature of management process and managerial functions - Planning, Organizing, Staffing, Directing, Coordinating and Controlling, Application of managerial functions to health care organizations.

Module III- Organization Concepts and Processes

Nature and structure of organization, Types of organizations-Functional, Divisional, Departmental and Matrix forms, Formal and Informal organizations, Line and Staff Relationships; Decision-Making Process-Setting priorities for planning and decision-making, Guidelines for improved decision-making, Modern approach to decision making;Leadership- Traits of leaders, Functions of leadership, Significance of leadership,

Module IV-Behavioral Concepts and Theories

Cognitive process, Perception process and its stages, Creativity and problem solving; Motivation-motivation process, different types of motives, selected theories of motivation- McGregor's theory X and theory Y, Maslow's theory, Herzberg's two-factor theory of motivation, Vroom' Expectancy theory, Motivating medical and paramedical professionals; Conflict management, Team building, Concepts of organization Behavior, Major components of OB – personality development, transactional analysis.

Module V- Social Responsibilities of Management

Management and society, Culture and Management, Management ethics, Social Objectives and Responsibilities of management, Corporate Social Responsibility- Hospitals and Social responsibility

Examination Scheme

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text and References

- McGibbony, *Hospital Organization & Management*
- *Hospital administration & management Theory* and Practice R Kumar, S.L. Goel
- Koontz 'O' Donnel and Weirch: Management (Tokyo,McGraw Hill).
- Last and Tenscnzing: Organisation and Mangement(New York: McGraw Hill 1980).
- Peter F.Drucker: The Practice of Management (Bombay:Allied Publishing Co., 1989).
- Fred Luthans. Organisational behavior, McGraw Hill Co., Tokyo.
- Keith Davis. Human Behavior at Work, Tata McGraw Hill, New Delhi.

ACCOUNTING FOR MANAGEMENT

Course Code: HHM4102 **Credits Units: 03**

Course Objective: Participants in this course will develop the essential ability of all managers, to use complex accounting information as a platform for decision-making. As the course unfolds, participants will build an increasingly sophisticated level of understanding of the language of accounting and its key concepts. In addition the course develops skills in interpreting earnings statements, balance sheets, and cash flow reports. This ability to analyse financial statements will enable participants to deal more effectively with strategic options for their businesses or business units.

Course Contents:

Module I:Accounting Basics
Introduction, Foundations, Accounting policies, Accounting and management control, Branches of accounting, Recording of transactions and classification, Trial Balance & Errors, Cash book

Module II:Final Accounts
Preparation, Adjustments, Analysis, Depreciation Accounting, Reserves &Provisions.Form and contents of financial statements with reference to Indian Companies Act.

Module III:Financial Statement Analysis
Relation and Comparison of Accounting data and using financial statement information, Ratio Analysis, Cash flow analysis.Determination of Existing and future capital requirement.

Module IV: Cost Accounting
Elements of cost, Cost Classification and Allocation, Cost Sheet

Module V:Management Accounting
Emergence of Management Accounting, Marginal Costing and Cost Volume Profit Analysis, Budgeting & Variance Analysis.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Bhattacharya, S.K. and Dearden, J (2006),Accounting for Management, Vikas Publishing House
- Narayanaswamy R (2005),Finanacial Accounting – A Managerial Perspective, Prentice Hall of India.
- Maheshwari S N and S K Maheshwari (2006), Accounting for Management, Vikas Pub. House.
- Tulsian, P.C (2006), Financial Accounting, Tata McGraw Hill.
- Banerjee, A (2005), Financial Accounting, Excel Books.

MARKETING MANAGEMENT

Course Code: HHM4103 **Credit Units: 03**

Course Objective:
The objective of this course is to provide the students exposure to modern marketing concepts, tools, and techniques, and help them develop abilities and skills required for the performance of marketing functions.

Course Contents:

Module I: Understanding Marketing in New Perspective
Fundamentals of Marketing, Customer Value and Satisfaction, Customer Delight, Conceptualizing Tasks and Philosophies of Marketing Management, Value Chain, Scanning the Marketing Environment, Marketing Mix Elements, Difference between marketing and Selling, Relationship marketing, Social marketing, Strategic Planning in marketing, Formulating the marketing plan.

Module II: Analyzing Consumers & Selecting Markets
Factors influencing consumer behavior, Buying decision-making process; Market Segmentation-Bases of market segmentations, Patterns, Procedures, Requirement for Effective Segmentation, Evaluating the Market Segments, Selecting the Market Segments, Tool for Competitive Differentiation, Developing a Positioning Strategy.

Module III: Managing Product & Pricing Strategies
Classification of products, New Product development-stages of product development, Product mix decisions and line decisions, Brand management, Product Life-cycle- stages in lifecycle and factors affecting each stage, managing product life cycles; Pricing- setting the price, adapting the price, initiating and responding the price changes.

Module IV: Designing & Managing the Integrated Communication
Channel functions and flows, Channel design decisions, Channel management decisions, channel dynamics, Vertical, horizontal and multi-channel marketing systems, Market Logistics decisions; Integrated Marketing Communication- marketing communication process, Promotion Mix-Advertising, Personal Selling, Sales Promotion, Publicity and Public Relations, Direct Marketing.

Module V: Emerging Trends in Marketing
An Introduction to Internet Marketing, Multi-Level Marketing, E-Marketing, Green Marketing, Event Marketing- Types of Events, Sponsorship, Cause Related Marketing, Marketing for Non Profit Organizations Marketing Strategies for Leaders, Challenges, Followers and Nichers.

Examination Scheme

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts & References:

- Kotler, Keller, Koshy, Jha, (2008), Marketing Management– A South Asian Perspective, Pearson India Pvt.
- Kurtz, (2008) Principles of Marketing, Cengage Learning, India,
- S. Neelamegham, (2009), Marketing In India,Vikas publishing house,
- Biplo Bose, (2008), Marketing Management, Himalaya Publishing House.
- Paul Baines, Chris Fill, Kelly Page, (2009), Marketing, Oxford University Press
- Winner (2009), Marketing Management, Pearson India Pvt.

BIOSTATISTICS

Course Code: HHM4104 **Credit Units: 03**

Course Objective:
The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the Hospital environment.

Course Contents:

Module I- Introduction to Statistics
Variables -Types of Variables ,Sampling-Sample size and Sampling techniques Data Collection – Types of data (Primary and Secondary Data) , Methods of Data Collection - Respondents, interviews, observation, questionnaire, survey, direct and indirect research techniques, Data Collection in Quantitative and Qualitative Research , Organizing the data.

Module II- Data Analysis
Data Analysis – techniques and tools, Manual and Computerized, Use of statistical software in data analysis - univariate, bivariate and multivariate analysis.

Module III- Data Presentation
Data Presentation - frequency distribution, charting of data – Bar Chart, Pie chart, Line Diagram, Tables, Histogram.

Module IV-Demography and Vital Statistics
Mortality and Morbidity Rates, Birth Rates, Specific Death Rates, Fertility Rates, Abortion Rates.

Module V-Hospital Statistics
Application of statistics in healthcare and hospital settings - utilization of the basic data, sources of health statistics, problems in collection of sickness data, measurement of sickness, vital statistics.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- B.K. Mahajan. *Methods in Biostatistics*, Jaypee Brothers
- P.S.S. Sundar Rao. *An Introduction to Biostatistics: A manual for students in Health Sciences*, J.Richard Prentice Hall, 1996.
- Daniel, Wayne.W. *Bio-Statistics: A foundation for Analysis in the Health Sciences*, John Wiley and Sons Pub, 1991.
- K. Vishwas Rao. *Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology*, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. *Bio-Statistics perspective in Health care research and practice*, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), *Handbook of Statistics*, Elsevier Science Pub, 1988.

MEDICAL TERMINOLOGY AND MEDICAL RECORDS

Course Code: HHM4105 **Credit Units: 02**

Course Objective:
This course provides an opportunity to develop skills for interpreting and understanding medical terms and abbreviations that are essential for working with auto accident, personal injury, or medical malpractice cases. The course includes a study of techniques for interpreting medical records related to these types of cases. The student will learn basic concepts related to records including; determination of accuracy, how technology can impact record retrieval, what to look for within the record and the basic principles of medical summaries.

Course Contents:

Module I- Medical Records
Definition, Characteristics of 'Good' Medical Record , Values of 'Good' Medical Record to various users , Required Characteristics of entries in medical Records , Responsibility for Medical Record Quality, Medical Record Forms and their Content , Incomplete Record Control.

Module II- Utility of Medical Records
Utility & functions of Medical Records in Health care delivery System, Organizations & management of Medical Records Department, Role of Hospital managers & MRD personnel in Medical record keeping, Reports & returns in Medical Record System.

Module III- Medico-Legal Aspects of Medical Records
Basic knowledge of legal aspects of Medical Records including Factories Act, WorkmenCompensation Act & Consumer Protection Act, Procedures of Medical Auditing & its importance.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Ettinger, A. G., & Burch, P. F. (2007). Medical Terminology Essentials. (2nd d.) EDC Paradigm: St. Paul, MN.
- Walston-Dunham, B. (2006). Medical Malpractice: Law and Litigation, Thompson – Delmar Learning: Clifton Park, NY
- A medical dictionary (Taber's, Stedman's, etc.). This will be an invaluable resource throughout this course.

ESSENTIALS OF HEALTHCARE SYSTEMS

Course Code: HHM4106 **Credit Units: 03**

Course Objective:
To provide the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Course Contents:

Module I- Health and Development
Conceptof Health, disease ,illness and sickness; Health indicators, Health and its determinants, Health burden and issues ,DALY, Major health challenges, Social context of Health- Culture, health belief model, social stress; Gender & Health, Nutrition & Health , Nutritional Trnsition, Communicable and non-communicable health problems.

Module II- Health systems and Policies
Evolution of Health Planning in India, Concept & Elements of Primary Health Care, Rural Health care system in India-Structure & Current scenario, Organization and management of Public Healthcare system, issues in healthcare delivery system, National health Mission-NRHM & NUHM, National Health Policy, National population policy, Reproductive and child health programme, Universal Immunization coverage, Health sector Reforms, Five year plans, Public Private Partnership in Health Sector.

Module III- National health Programme
Management and implémentation of National Heath Programme- Revised National Tuberculosis Control Programme, National AIDS control programme, National Programme for Control Of Blindness, Vector Borne Diseases Control Programme, National leprosy Eradication Programme, National Cancer Control Programme, National Diabetes Control Programme, National Mental Health Programme and others.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- K Park, *Preventive and Social Medicine*, BansaridasBhanot Publishing House.
- Maxcy-Rosenau-Last, *Public Health & Preventive Medicine*, 14th Edition Ed Robert Wallace
- Brijesh C Purohit. *Health Care System in India*: *Towards Measuring Efficiency in Delivery of Services*,

HUMAN RESOURCE MANAGEMENT

Course Code: HHM4108 **Credit Units: 03**

Course Objective:
The objective of this course is to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India. Attention will also be paid to help them develop their communication and decision making skills through case discussions, role plays etc.

Course Contents:

Module I: Introduction to Human Resource Management
Nature and scope of HRM, HRM functions, Role and Responsibilities of the Human Resource Manager , HRM models, understanding concepts of personnel management, Human Resource Development and Strategic Human Resource Management, HR Environment , changing Role of HR

Module II: Meeting and Acquiring Human Resource Requirements
Job Analysis, Job Description, Job specification, Strategic Human Resource Planning, Recruitment, Selection Process, Methods – Interview, Tests, Induction and Placement, Promotion and Transfer

Module III: Development of Human Resources
Training and Development, Managing Careers, Understanding Performance Appraisal

Module IV: Managing Compensation
Compensation, Components of compensation, Job evaluation, methods of job evaluation, Designing and administration of wage and salary structure

Module V:Separation Processes
Turnover, Retirement, Layoff, Retrenchment and Discharge, VRS

Module VI:Emerging Trends and Challenges in HRM
Overview of Human Resource Information System (HRIS), Introduction to HR Audit, IHRM Practices, Cross- Cultural and Diversity Management, Work-life integration, Human Resource Outsourcing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Snell S and Bohlander G (2007). Human Resource Management, Cengage Learning (Thomson Learning).
- Aswathappa. K, (2005),Human Resource Management- Text & Cases, Tata McGraw Hill, New Delhi
- Dessler G (2005).Human Resource Management Pearson Education, India
- Mathis R L and Jackson J H (2006). Human Resource Management, Cengage Learning (Thomson Learning).

INFORMATION TECHNOLOGY& E-COMMERCE

Course Code: HHM4109 **Credit Units: 02**

Course Objective:
This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. The course will expose the students to the latest trends in computer.

Course Contents:
Module I: Modern Computer Systems
Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation , (e.g. Delhi Metro , Digitally Controlled Car engines etc.) , Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources

Module II: Data Resource Management
Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts. SQL Query handling , Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers. Storage Technologies and Architecture (DAT, NAS, SAN etc.) . Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis

Module III: Telecommunications and Computer Networks
Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Web 2.0/3.0 , Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,3G & 4G technologies, VOIP and IPTV.

Module IV: Electronic Commerce Systems
Introduction to e-Commerce and M-Commerce, Advantages and Disadvantages of each. Concept of B2B, B2C, C2C , with examples. Concept of Internet Banking and Online Shopping, Electronic Payment Systems. Project Discussion :- Development of e-commerce store (Web Site Development, Internet Publicity , Payment Gateway, Packaging & Delivery , After Sales Support) .

Module V: E-governance
Concept of e-governance , World Perspective , Indian Perspective , Technologies for e-governance , e-governance as an effective tool to manage the country's citizens and resources, Advantages and Disadvantage of E-governance, E-governance perspective in India. Discussion on MCA21 Project ,Bhoomi etc. .

Module VI: Security Management
The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software , Hacking etc.) and counter measure. Definition of Cyber Crime and Types. Antivirus, Firewalls, Anti-Spyware , Security Audit, Discussion on Overview of IT-ACT 2000.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons
- Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Jawadekar, WS (2009); Management Information System; Tata McGraw Hill
- Mclead R & Schell G (2009), Management Information Systems; Pearson Prentice Hall
- O'Brein, JA (2009); Introduction to Information Systems; Tata McGraw Hill

Syllabus - Second Semester

FINANCIAL MANAGEMENT

Course Code: HHM4201 **Credit Units: 03**

Course Objective:
The objective of this course is to develop an understanding of short-term and long-term financial decisions of a firm and various financial tools used in taking these decisions. It is also aimed to develop the understanding of the financial environment in which a company operates and how it copes with it.

Course Contents:

Module I: Introduction
A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm.

Module II: Valuation Concepts
Time Value of Money, Risk and Return, Financial and Operating Leverage.

Module III: Financing Decisions
Capital Structure and Cost of Capital**,** Marginal Cost of Capital.

Module IV: Capital Budgeting
Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction.

Module V: Working Capital Management
Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of Working Capital.

Module VI: Dividend Policy Decisions
An introduction**:** Different Schools of Thought on Dividend Policy.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Text & References:

- Chandra, P. (2006), Financial Management: Theory and Practice, Tata McGraw Hill.
- Damodaran, A.(2004), Corporate Finance: Theory and Practice, John Wiley & Sons.
- Van Horne, J.C. (2006), Financial Management and Policy, Prentice Hall of India.
- Brearly, R. A. and Myers, S. C. (2006), Principles of Corporate Finance, Tata McGraw Hill
- Pike, R and Neale, B. (1998), Corporate Finance and Investment: Decisions and Strategies, Prentice Hall of India
- Rustagi, R.P. (1999), Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.

RESEARCH METHODOLOGY

Course Code: HHM4203 **CreditUnits: 03**

Course Objective: To provide basic understanding towards research principles and methods. To introduce important analytical tools for research data analysis. To assist in the development of research proposals/reports

Course Contents:

Module I: Basics of Research
Definitions and designs, uses of research in healthcare, formulation of research problems, developing hypothesis, writing research questions

Module II
Sampling, Design, and development of interview schedule, questionnaire construction, pre-testing (reliability & validity), research ethics

Module III
- Data collection: field work, mapping and listing operations, selecting of respondents and MIS for major research projects
- Data Management: editing, entry and preparing data sets for analysis
- Data analysis: using SPSS/ epi.info/ use of matrices

Module IV: Qualitative Research
- Development of conceptual framework
- Qualitative methods: FGDs, in-depth interviews, biographics, participatory methods, participant observation etc.

Module V:Research Ethics
History of ethics in health research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent, vulnerable subjects and special treatments, standards of care – principles, review processes etc.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Text & References

- Gummersson, E. *Qualitative methods in Management Research*, Sage publications
- Verkevieser et al, *Designing and conducting Health Systems Research Projects* WHO and IDRC
- Grundy F and Reinke W A, *Health Practice Research and formalize Managerial Methods*, Geneva, WHO
- *Designing and conducting Health surveys*, Jossey Bass Publishers.

HEALTH ECONOMICS

Course Code: HHM4204 **Credit Units: 03**

Course Objective:
The primary aim of this subject is to provide a clear, concise introduction to micro economic concepts, health economics as applied to hospital sector.

Course Contents:

Module I: Nature and scope of Economics
Basic Economic Concepts - Using Economics to study Health Issues - Nature and relevance of Economics to Health and Medical care, Concept of Health- Health Determinants, Valuation & Measurement of Health Demand analysis.

Module II: Utility Analysis
Laws of Demand and Supply, The Demand for Health, The Demand for Medical Care, Concept of Elasticity, Cost functions, Policies to Contain Costs Supply and cost analysis

Module III: Demand and Supply
Market forms- Demand and Supply of Medical and Healthcare Services, Price determination under various configurations

Module IV: Analyzing Medical care Markets
- Medical Care Market Place, The competitive market Model, Market Failure in Medical Markets, Government Intervention in Medical Markets.
- Market for Medical Professionals and medical services, Alternative Models of Hospital Behavior- Utility Maximizing Model, Physician Control Models, Trends towards Multi Hospital Systems.
- Role of Private Sector and PPP

Module V: Healthcare system
Indian Healthcare system - Expenditure and Allocations under Five-Year Plans

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- Ceri J Phillips. *Health Economics- An introduction for health professionals*, Blackwell publishing.
- Clewer Ann and D Perkins. *Economics for healthcare management*, Prentice Hall.
- Folland S, A.C. Goodman, and M. Stano, *The economics of health & Healthcare*, Prentice Hall
- *Principles of Health Economics for developing countries*, The World bank.

HOSPITAL PLANNING

Course Code: HHM4205 **Credit Units: 03**

Course Objective
To expose the students to planning and operation of hospitals in a detailed manner which will include all facets of hospital planning activities covering every department that is involved both in clinical care as well as supportive services. A chapter on research in Hospital Services and Resources is also added to give impetus for research in this field.

Course Contents

Module I: Introduction to Hospital Planning
Conception of idea, formation of hospital planning team, market survey, feasibility study, selection of location, Financial planning of hospitals, Macro level planning.
Conception to commissioning- site development, architects brief working drawings and specifications, engineering drawing, equipment planning, bed distribution, space allocation, interior designing and construction of building - commissioning, shake down period

Module II
Planning for the out-patient services and emergency services, day care services
Planning for patient care units –Inpatient services and intensive care units
Planning for surgical suites.
Planning for labor and delivery suites-LDRP suites

Module III
Planning for laboratory service, blood banking and Radiological services.

Module IV
Conceptual planning for advanced facilities like Cardiac catheterization laboratory, various endoscopy units, Extra corporeal shock wave lithotripsy, radiotherapy unit, IVF unit and Dialysis unit

ModuleV
Planning for supportive services-medical gases, HVAC, House-keeping, CSSD, Food and beverages.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts & References:

- *Hospitals: Facilities Planning and Management*, GD Kunders by Tata Mcgraw Hill
- *Modern Trends in Planning & Designing of Hospitals: Principles and Practice*: Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar, SidharthSatpathy, by Jaypee – 2007
- *Hospital Planning*: Charles Butler, Addison Erdman
- Dr Malhotra's series: *Step by Step – Hospital designing & Planning*, by Jaypee 2007

HOSPITAL MATERIALS MANAGEMENT

Course Code: HHM4206 **Credit Units: 03**

Course Objective:
Hospitals carry a large inventory of drugs, sophisticated and highly costly equipment besides beds, furniture and linen. The student should be conversant with Inventory and various methods of control and Purchase management.

Course Contents:

Module I: The Materials Function
Definition, scope and importance of materials management, objectives of materials management, functional areas of materials management, documents used in materials function, material identification codes, role of computers in the materials management, special features of materials management applied to hospitals.

Module II: Stores Management
Responsibilities and functioning of stores, Types of stores in hospitals, Location and layout of stores, Stock verification techniques, Control of pilferages, Standardization and codification.

Module III: Inventory Management
Definition of inventory- Need of control, objectives of inventory control, scope & importance, categories of materials in hospital, hospital, Cost associated with inventories- Ordering cost, carrying cost, over stocking cost, under stocking cost, other costs associated with service level. Inventory control Techniques, Economic order quantity (EOQ), inventory models: safety stocks, fixation of re-order level,

Module IV: Purchase Management
Objectives and responsibilities of purchasing, Vendor evaluation techniques, Price and quality considerations, Tendering procedures, Types of purchasing.

Module V: Legal aspects
Letter of credit, Duty of customs, Types of hospital imports, import procedures & Documentation, government policy.

Module VI: Maintenance Management & Disposal
Maintenance of equipment, Inventory control of spares, Maintenance contracts, Disposal of Waste and Scrap

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Procurement and Materials management for Hospitals*, Rex H Gregor, Harold C. Mickey
- *Material Management* by Dr. PawanArora, Global India Publication Pvt Ltd
- *Handbook of Materials Management*, P. Gopalkrishnan, EasternEconomy Edition.

INTERNATIONAL BUSINESS ENVIRONMENT & PRACTICES

Course Code:HHM4207 **Credit Units:03**

Course Objective:
This course provides a comprehensive overview of the role that international business plays in the global economy. This knowledge shall help to understand the complexities, risks and opportunities of international business and provide a global perspective on international trade, including foreign investments, impact of financial markets, international marketing, and the operation of MNC's. Learn business practices organizations adopt to tap global opportunities. Create awareness on career opportunities that exist in international business.

Course Contents:

Module I: Globalisation& Multinational Corporations
Globalisation - Meaning and implications ; Globalisation of markets and production ; Drivers of Globalisation ;
Modes of entry into international business; The globalisation debate - arguments for and against ; Differences between domestic and international business ; Multinational Corporations- Definition, Types, Organisation, Design & Structures, Head quarters and Subsidiary relations.

Module II: Introduction to International Trade
Theories- Theory of Mercantilism, Absolute advantage, Comparative advantage, Hecksher-Ohlin theory, The new product life cycle theory, The new trade theory, Porter's diamond model ; Instruments of International trade policy – tariffs, subsidies, local content requirements, administrative policies, anti dumping policies, political and economic arguments for intervention ; GATT, WTO, IPR, TRIPS, TRIMS, GATS, Ministerial Conferences, Uruguay round of negotiations; Introduction to International Supply chain management & Logistics; Introduction to current EXIM policy.

Module III: International Business Environment
Implication of environment differences: a) Economic factors – the determinants of economic development ; b) Political and Legal factors c) Cultural factors -Culture, Values, Norms, Social, Religious, Ethical, Language, Education; Regional Integrations, Trading Blocks - European Union, ASEAN, APEC, NAFTA, SAARC, ANDEAN PACT and MERCOSUR ; Global sourcing and its impact on Indian Industry - India's competitive advantage & potential threats in industries like IT, Textiles, Gems &Jewellery, Engineering etc.

Module IV: Introduction to International Financial Systems
International Financial Markets – Equity, Debt, Foreign Exchange & Commodities; Role & funding facilities of World Bank & International Monetary System; International Financial Risks of Trade Payments, FDI's, FII's, Expatriation, Repatriation, Currency fluctuations etc.; Introduction to Foreign Exchange Market – functions, nature, trading, rate determination, currency convertibility; Introduction to Export and Import Finance – Methods of payment in International Trade.

Module V: Introduction to International Business Practices
Country Risk Analysis – How to assess Political, Social & Economic risks; International Marketing – Potential, Barriers, Entry strategies, Market selection, localization, organizational structures in order to compete effectively globally; Decision-making and controlling practices; Developing individual/team/organizational skills, knowledge & capabilities in intercultural communication, international marketing, cross-cultural operations, international negotiations & settlement of international business disputes; Indian companies becoming Multinationals – Potential, Need and Problems; International Regulatory & Dispute Settlement Mechanisms; Practices in Social Responsibility and Ethics in International operations.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Daniels, J.D.,RadebaughL.H.,Sullivan D.P. &PrashantSalwan (2011), International Business: Environments and Operations, Pearson Hall, Delhi
- Sundaram and Black, (2009), International Business Environment, Prentice-Hall of India Pvt. Ltd.
- Bhalla and Raju, (2010), International Business Environment, Sage Publication
- Apte, P. G. (1998), International Financial Management, Tata McGraw Hill
- Francis Cherulinam, (2008), International Business, Himalaya Publishing House
- Charles Hill,(2007), International Business, McGraw Hill

EPIDEMIOLOGY

Course Code:HHM4208 **Credit Units: 03**

Course Objective
To provide an introduction to the basic concepts and methods of epidemiology and to highlight inter-relationship between epidemiology and medicine to understand evidence based medicine.

Course Contents

Module I: Introduction
To familiarize on concepts and use of epidemiology, methods to measure and describe health of population and risk measurement.

Module II:Descriptive epidemiology
Determinants of disease, natural history of disease, epidemiological principles in prevention and control of disease, risk measurement, measurement of morbidity and mortality, incidence, prevalence, age adjustment and survival analysis, use of morbidity and mortality, epidemiological study designs.

Module III: Study designs
- Epidemiological study designs and analysis, its application and use in the community.
- Bias, cofounding and interaction; nutritional surveillance.
- Studies: Descriptive studies - Sampling and survey methods; Analytic studies - case control method and cohort method; Intervention studies.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Gordis Leon *Epidemiology* (3rd edition) ,W B Saunders and Co.
- Beaglehole. R. Bonita, et. al *Basic Epidemiology* : WHO Publication
- David E., et. al. *Foundations of Epidemiology* : Oxford University Press.
- Katz Mitchell: *Study Design and Statistical Analysis*: A Practical Guide for Clinicians
- Last, J.M., Spasoff, R.A. Harris, S. S. and Thuriaux, M.C. (Eds): *A Dictionary of Epidemiology*, Oxford University Press, 4th Ed., 2001.
- Mayer Dan, *Essential Evidence-Based Medicine Series: Essential Medical Texts for Students and Trainees*
- Silman and McFarland: *Epidemiological Studies- A Practical Guide*, 2nd Edition
- Timmreck Thomas C: *An Introduction to Epidemiology*, Third Edition 2002.

EXCEL FOR MANAGERS

Course Code: HHM4209 **Credit Units: 01**

Course Overview:
Microsoft Excel is a very popular business productivity application for the management and manipulation of data. With the right training and understanding of Excel, businesses and individual users can unlock the world of opportunities that this powerful business application offers.This course will provide all the tools necessary to create and use basic and advanced spreadsheets. After completion of this course, students will be able to learn the various methods for entering and editing data and also learn the various ways to write simple formulas.

Course Contents:
Module-I: Getting Started with Excel
Introduction to Spreadsheets: Launching Excel, entering data in spreadsheet, widening rows and columns, applying basic formatting in spreadsheet, saving work in excel. Entering Data into cells:Usingautofill, sort & filter feature, creating lists, inserting & deleting rows and columns. Wrapping & merging text and cells,

Module-II: Basics in excel
Protecting & sharing workbooks, freeze panes, understanding normal, page layout and page break preview in excel. Setting the page orientation and print area.Adding hyperlinks to cells, inserting images, objects, equations and symbols.

Module-III: Charts & Formulas in Excel
Understanding Charts: Inserting bar charts, pie charts, column charts and line charts in spreadsheets, formatting and resizing the chart. Using Basic functions- average, sum, min, max, product etc. date functions, time functions. Math Operators in Excel, combining mathematical operators.

Module-IV: Functions in Excel
Logical- using IF, AND, OR, NOT, TRUE, FALSE Functions. Textual- using TRIM, UPPER, LOWER, REPLACE Functions.Import data into excel, Look up functions with index and match. Rounding, sum product, conditional counts and conditional sums, Filtering data, pivot table, pivot charts, conditional formatting.

Module-V: Financial and Statistical Functions in Excel
Financial functions: Time value of money- Present value, Future value, PMT with beginning date, PMT with ending date, NPV, Goal seek, Scenario Manager, IRR. Statistical functions: Max, Min, Average, Large, Rank, Small, Var, Std Dev.

Examination Scheme:

Components	Written Test	Practical	V/P	File/Assignment	Attendance
Weightage (%)	20	30	30	15	5

Suggested Readings & Textbooks
- Business Analysis with Microsoft Excel by Conrad George Carlberg,,Que Publishing, second edition, ISBN 0974415626.
- Excel 2013 for Dummies by Greg Harvey, John Wiley & Sons , 2012, ISBN 9781118559703

Web Resources
- https://spreadsheeto.com/
- https://www.tutorialspoint.com/excel/

TERM PAPER

Course Code: HHM4231 **Credit Units: 04**

Course Objective:
The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge by undertaking a **significant practical unit of examining and analyzing various aspects of healthcare management** at a level commensurate with the learning outcomes of the various courses taken upto them in the ongoing semester.
For students of the first semester, the required term paper is primarily a self- worded structured report written by the students after interpreting & analyzing various primary & secondary records of intelligent interviews/readings from several sources on a particular sector.

Conduct of Term Paper
The term paper will be executed & submitted by students individually.

- The students have to decide the topic of study / hospital of interest **within two weeks of the start of the semester**.
- A Faculty Mentor will be assigned to each group of students undertaking a Team Paper.
- Special Time slot to conduct the research will be included in the timetable.
- The Mentor will conduct weekly sessions to guide & follow up the students as well as to clarify any queries or problem faced by the students.
- Weekly review of the Work in Progress will be maintained by Faculty Mentor & will carry 20% weightage during the final evaluation.
- This will be substantiated through a proper economic diary maintained by the students documenting their daily objectives, plan of action, activities undertaken, documentation of reading & referencing material, analysis (if any) & learning outcomes.
- Students may use innovative tools & techniques to maintain this diary such as e-concepts, online blogs, charts, graphs etc.
- Students will be given some discretion in the choice of topic for the term paper and the approach to be adopted.
- The term paper has to be formulated with multi-disciplinary aspects explained in the section below.

Focus Areas of Study

1. Hospital organization & Management Process (HOMP)

Analysis of organisational process of 5 hospitals (include public and private hospitals) while maintaining a scrap book of the latest news & views.

2. Medical Records (MR)
   - Role of E-codes in injury prevention.
   - Differentiation of roles and functions of medical record practitioners
   - Bar code tracking system enhances record- and film-handling productivity
   - Evaluation of use of bar coding in medical record processing
   - Trends in utilization management: legal implications for health record administration

3. Management in Healthcare Systems (MEHS)
   a. A brief overview of the major management functions of health systems.
   b. Procurement Management in Healthcare Systems
   c. Cultural Variation in healthcare consumption in 5 Asian Countries including India: National and individual drivers in mild medical conditions

4. Epidemiology (ED)
   a. Epidemiology and RiskFactors for Isolation of Multi-Drug ResistantOrganisms in patients
   b. Overview of NutritionalEpidemiology
   c. RiskAssessmentStudies : Epidemiology
   d. Epidemiology of Endophthalmitis and Treatment trend in India

e. Epidemiology of cause of death in Childrenwith Acute RespiratoryDistress Syndrome

5. Quality Management in Hospitals (QMH)
    a. Assessing the organizational characteristics influencing Quality Improvement implementation in Indian Hospitals
    b. Basic quality tools applied in Indian healthcare system
    c. Total Quality Management Approach to improve patient safety by preventing medication error incidences
    d. A Holistic Approach for Conceptualizing Hospital Service Quality

Needless to add, effective deployment of Self -Development, Interpersonal Skills & techniques of Business Communication is integral to all aspects of the term paper and will be evaluated accordingly.

General Guidelines

- All students must submit an *independently written* report of their term paper project.
- All contents need to be sourced from reliable primary & secondary sources; references for which **MUST** be maintained in proper format.
- At least one middle level or senior level person of a hospital from healthcare sector has to be interviewed face to face.

- Though the term paper is more a descriptive report covering the 'What, Why and How' aspects; participation in leg work or field research of a hospital (s) will add value to the study.

- The paper should utilise class room learning and industry exposure to evaluate issues on hand and suggest remedial/progressive measures that may be taken by a hospital(s).

Assessment & Evaluation:

The term paper will be in the form of an integrated report and assignment.

- A board consisting of all the faculty members who are teaching the students in the first semester will conduct the final evaluation.
- The faculty mentor assigned to the students will do the continuous evaluation.

All reports will be examined most strictly for plagiarism.

Components	**Continuous Assessment & Economic Diary**	**Presentation**	**Content & Layout of Report**	**Analysis**	**Conclusion & Recommendations**	**Viva/ Defending Questions**
Weightage (%)	20%	15%	20%	20%	10%	15%

Syllabus - Third Semester

MEDICAL & HEALTH LAWS

Course Code: HHM4302 **CreditUnits: 03**

Course Objective:
To acquaint the students with various legal aspects concerning type and character of the health care organizations and its duties towards patients and its employees. To familiarize the students in matters of liability of hospital medical negligence and medical malpractice in diagnosis, administration of drugs, surgery etc.

Course Contents:
Module I
Law and establishment of hospitals-private and public, legal requirements under Medical Council Acts.

Module II
Basic concepts of labour laws in India.Hospitals as an 'industry' - application of labour enactments - discipline in hospitals-' disciplinary action - a study of valid requirements of domestic enquiry. Trade union act

Module III
Essentials of Contractual obligations in hospital services - requisites of a valid contract - sale and purchase of goods- duties towards patients - code of ethics - violation legal consequences.

Module IV
Legal aspects relating to organ transplantation, MTP Act, 1971, Basics of Drugs and Cosmetic Acts, anesthesia. ESI Act, PNDT Act, Human experimentation, clinical trials, industrial dispute act

Module V
Legal liability of hospitals - criminal, civil and tortuous; liability for negligence, consumer protection law, absolute liability and vicarious liability, legal remedies available to patients: remedies under contract law, tort, criminal law and consumer protection Act. Medical Jurisprudence.

Module VI
Medical ethics & auditory procedures
Ethical principles, Civic rights, Consumer protection act, CPA, Patient complaints, powers & procedures of the district forum, State and National commission, Role of supreme court, Patient appeals, Autopsy, Tort liability, Vicarious liability, Medical negligence, Central & state laws, Use of investigational drugs, Introduction/need & procedures for medical audit, Audit administration & Regulating committees.
Confidentiality and professional secrecy, ethics of trust and ethics of rights – autonomy and informed consent, under trading of patient rights – universal accessibility – equity and social justice, human dignity.
Medical ethics – basic issues, importance, process of developing and implementing ethics and values in an institution – codes of conduct: Hippocrates oath and declaration of Geneva – MCI regulation – professional conduct, etiquette and ethics

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text&References:

- *Medico-legal Aspects of Patient Care*, 3rd Edition, R. C. Sharma, Peepee Publishers & Distributers- 2008

MANAGEMENT OF CLINICAL SERVICES

Course Code: HHM4303 **Credit Units: 03**

Course Objective:
To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of both clinical services in a hospital.To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:
Module I: Patient centric management
Concept of patient care, Patient-centric management, Organization of hospital departments, Roles of departments/managers in enhancing care, Patient counseling & Practical examples of patient centric management in hospitals.Patient safety and patient risk management.

Module II: Quality in patient care management
Defining quality, Systems approach towards quality, towards a quality framework, Key theories and concepts, Models for quality improvement & Variations in practice

Module III: Patient classification systems
Types of patient classification systems, ICD 9 (CM, PM), Casemix classification systems, DRG, HBG, ARDRG.

Module IV: Patient Medical Records
Policies & procedures for maintaining medical records.e-records, legal aspects of medical records, its safety, preservation and storage.

Module V: Overview
Hospital operations management, role and decisions, Difference of hospital operations from other sevice and manufacturing organizations.

Module VI: Out Patient Services
Overview of the department, day care, accident and emergency services, physical medicine and rehabilitation, occupational therapy unit, physiotherapy department

Module VII: In Patient Services
Ward design (general & specialized), critical care services – ICU, CCU, NICU, , medical services, surgical services – operation theater, nuclear medicine, burn unit, nursing services and administration.

Module VIII: Specialty Services
Pediatrics, Obs&Gynec, ENT, Ophthalmology, Orthopedic, Psychiatry, Anesthesia, Dental

Module IX: Super-specialty Services
Cardiology, Thoracic Surgery, Neurology, Neurosurgery, Nephrology- Dialysis Unit, Transplantation Services.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Management of Hospitals & Health services*: Strategic issues and performance, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*
- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century*Vol 1 Kumar R, S.L. Goel
- *Hospital Management, Dr. A.K. Malhotra,* Global India Publications Pvt ltd, New Delhi
- *Hospital Management : A guide to departments,* Howard S. Roland, Beatrice L Rowland

STRATEGIC MANAGEMENT

Course Code: HHM4304 **Credit Units: 03**

Course Objective:
The course is designed to help students to understand the concept of strategy and strategic management process. Acquaint students with basic concepts and principles of strategic management, develop and prepare organizational strategies that will be effective for the current dynamic environment and likewise to impart the strategic management conceptual framework which will increase students' skills and knowledge in identifying and describing organizations' strategic posture and direction.

Course Contents:
Module I: Introduction and Purpose of Strategy Formulation
Evolution and Introduction of strategic management, Concept of Strategy, corporate, Business and Functional Levels of Strategy, Mission, Vision, Objectives, Approaches to four Phases in Strategic Management Process, Stakeholders in business and their roles in strategic management, Strategic decision making.

Module II: Environmental Analysis
Analyzing company's External Environment: PESTLE Analysis; Preparing an Environmental Threat and Opportunity Profile (ETOP), Analyzing Industry Environment: Industry Analysis – Poter's Five Forces Model of competition, Strategic Group analysis.

Module III: Analysis of Organizational Competencies
Analyzing Company's Internal Environment Resource based view of a firm, meaning, types & sources of competitive advantage, analyzing company's Resources and Competitive Position, VRIO Framework; Benchmarking as a method of comparative analysis, Competitive advantage; Concept of a Core competence and Distinctive competitiveness, Characteristics of Core Competencies; Value Chain Analysis Using Porter's Model; Organizational Capability Profile: Strategic Advantage Profile;

Module IV: Strategic Analysis and Choice
Generic Competitive Strategies: Meaning of Generic competitive strategies, Low cost, Differentiation, Focus – when to use which strategy; Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic alliances & Collaborative Partnerships), Retrenchment – Turnaround, Divestment, Liquidation, Outsourcing Strategies; Offensive and Defensive Strategies, Blue Ocean Strategy, Strategy in the age of Internet and E-commerce; Portfolio Analysis Business Portfolio Analysis – BCG Matrix – GE 9 Cell Model; Evaluation of Strategic Alternatives: SWOT Analysis, Grand Strategy Selection Matrix.

Module V: Strategy Implementation and Evaluation
Strategy Implementation, Barriers to implementation of strategy, Mc Kinsey's 7s Framework; Organization Structures for Strategy Implementation, Leadership Implementation, Functional Implementation, Strategic evaluation review and control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

- Kazmi, A. Business Policy and Strategic Management (2nd edition), Tata McGraw Hill
- Kachru, Strategic Management, Excel Books
- Wheelen and Hunger,(2008),Essentials of Strategic Management, Prentice Hall India.
- Ramaswamy and Namakumari,(1999), Strategic Planning: Formulation of Corporate Strategy Text and Cases, Macmillan India Ltd.,
- Jausch&Glueck,(1988), Business Policy and Strategic Management, (5th Ed.), McGraw Hill.
- Thomson & Strickland,(2008), Business Policy and Strategic Management, (12th Ed.), McGraw Hill.
- Carpenter, Strategic Management, Pearson

- Trehan, Strategic Manageemnt,Wiley
- Pearce John ‘A & Robinson R.B,(1997), Strategic Management: Strategy Formulation and Implementation, (3rd Ed.), AI.T.B.S. Publishers & Distributors
- Regular reading of all latest Business journals: HBR, Business World, Business India, Business Today

OPERATIONS RESEARCH

Course Code: HHM4305 **CreditUnits: 03**

Course Contents:

Module I: Introduction
The OR approach to problem-solving and decision-making, Scope and limitations of OR in managerial decision-making.

Module II: Introduction to OR Techniques
Linear Programming, Decision Tree Analysis, Queuing theory, PERT/CPM, Replacement models, Sensitivity analysis, Assignment models, Inventory control models, Forecasting.

Module III: Applications of OR in Hospitals and Health Agencies
Resource allocation, Health services planning, Deployment of health human power, Materials Management, Equipment replacement, Patient scheduling.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- *Operations Research in Hospitals: Diagnosis and Prognosis*, David H. Stimson, Ruth H. Stimson
- *Operations Research and Healthcare: A handbook of methods and Applications*, Margaret L. Brandeau, Francois Sainfort, William P. Pierskalla
- *Patients hospitals and Operational Research*, Taylor Francis
- *Operations Research* by P. Rama Murthy
- *Operations Research: Methods, Models and Applications*, Jay E, Aronson and Stanley Zionts

QUALITY MANAGEMENT IN HOSPITALS

Course Code: HHM4307 **Credit Units: 03**

Course Objective:
The objective of this paper is to introduce the student to the concept and practice of Quality Management and Control.

Course Contents:

Module-I: Introduction
Aspects of quality - Quality mission, policy and objectives; concepts, evolution and determinants of quality; interpretation and process of quality audits; cost of quality and economics of quality.

Module II-Total Quality Management
Definition, underlying concepts, implementation and measurement of TQM, Internal Customer Supplier relationship, QFD, Quality Circles, Quality Improvement teams, team work and motivation in TQM implementation, training and education, role of communication in implementing TQM.

Module III- Management of Processes
Management of Process I
Process in service organization and their control, simple seven tools of quality control: Check Sheet, Histogram, Scatter diagram, Process Mapping, Cause and Effect diagram, Pareto analysis, control charts and Advanced tools of quality.
Management of Process II
SQC: Control Charts for variables – X, Xbar, and R charts and control charts for attributes-p, Np, and c charts. Acceptance sampling plan and occurrence.Vendor selection and vendor rating.

Module IV- Management of Quality
Facets of quality, quality planning, quality improvement methods. Kaizen, quality audits, medical audit, accreditation, nursing care standards, Six Sigma, JIT and NABI.

Module V- Systems approach to Quality
Introduction to ISO 2000, ISO 14000, and ISO 18000.
Documentation of quality systems, quality manual, procedure manuals, work instruction manuals and records for ISO 2000.Bench Marking and Business Process Reengineering. Definition, methodology and design, evaluation and analysis.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts &Reference Books:

- SundaraRaju, S.M., Total Quality Management: A Primer, Tata McGraw Hill, 1995.
- Srenivasan, N.S. and V. Narayana, Managing Quality – Concepts and Tasks, New Age International, 1996.
- Shailendra Nigam, *Total Quality Management (An Integrated Approach)*, Excel Books, New Delhi, 2005.
- James R Evans, James W Dean, Jr., *Total Quality (Management, Organisation and Stragtegy)*, Excel Books, New Delhi, 2nd Edition.

MANAGEMENT OF SUPPORT & UTILITY SERVICES

Course Code: HHM4308 **Credit Units: 03**

Course Objective:
To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of non clinical services in a hospital.
To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:

Module-I: Support Services
Diagnostic-Radiology & Imaging Services, Hospital Laboratory etc, Blood Bank & Transfusion Services, Ambulance Services, Pharmacy, CSSD, Oxygen Manifold/Concentrator, Dietary Service, Hospital Laundry and Linen, Medical Social Worker, Marketing and Public Relations, Finance and Administrative Departments, Outsourcing.

Module-II: Utility Services
Housekeeping, Hospital Engineering and Maintenance, Biomedical Department, Medical Records-confidentiality of records, reception, enquiry, registration and admission, central billing and accounts, Cafeteria/canteen, Mortuary.

Module-III: Biomedical Waste Management and Hazards in Hospital
Definition of Biomedical Waste, BMW – Segregation, collection, transportation, disposal, Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Monitoring & controlling of cross infection (Protective devices), BMW from Administrative point (Budget, Health check-up, Insurance)

Module-IV: Other Hospital Functional Activities
Hospital Acquired Infection - Source and Control, Modern trends in Hospital Administration, Telemedicine.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Management of Hospitals & Health services*: Strategic issues and performance, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*
- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century*Vol 1 Kumar R, S.L. Goel
- *Hospital Management, Dr. A.K. Malhotra,* Global India Publications Pvt ltd, New Delhi.
- *Hospital Management : A guide to departments,* Howard S. Roland, Beatrice L Rowland.

SUMMER INTERNSHIP EVALUATION

Course Code: HHM4335 **Credits Units: 06**

Course Objective:
To provide on the job experience, as an understudy in a hospital, to help the student understand systems and procedures and learn to make decisions considering the Hospital as an integral unit.

Duration: 2 months

Objectives of Training:
- To collect the information about organization
- To learn about the differentprojects run by the organization
- To befamiliarwithcommunicationprocedurebetweenhealthworkersand community
- To identify practical things aboutproject planning and implementation
- To discover the problems faced in implementing the project
- To learn about working of the information system
- To know about method and source of evaluation

Format for Report Writing
1. Title of the project
2. About the organization
3. Introduction and objectives of the project/ programme / organization
4. Funding agency—about the agency, how to get funding, Nature of funding agency
5. Staffing pattern of the project with their functions
6. Major activities going under project
7. Results achieved so far (target Vs achievement)
8. Role of the candidate in the project/programme / organization
9. Evaluation by the candidate

Guidelines for presentation-
- Powerpoint presentation
- Timeforpresentation: 20minutes
- Time for discussion: 10 minutes

Examination Scheme:

Components	**Presentation**	**Report submitted**	**Viva-voce**
Weightage (%)	25	50	25

Syllabus - Fourth Semester

HOSPITAL MANAGEMENT INFORMATION SYSTEM

Course Code: HHM4401 **CreditUnits: 04**

Course Objective:
To understand the various indicators of health and health information system and health management information system in hospitals.

Course Contents:

Module I: Introduction
Concept of information as a resource, Understanding the principles of information systems, Classification of information systems in hospitals.

Module II: Managing Hospital Information Systems
Setting strategic objectives for information systems, organizing an information systems department, Principles of systems development, Importance of security and confidentiality of data.

Module III: Role of Information Technology in Hospitals
Principles of information processing, Role of information technology in information processing, Role of database management systems, Role of communication in managing hospital information systems.

Module IV: Management Information System
Concept of Management Information System (MIS).Developing indicators, identifying data and developing tools of measurement. Use of MIS: monitoring progress and evaluation, hospital planning, monitoring employees, monitoring health development, decision making. Computerization of MIS: demonstration and critical analysis of different MIS software packages used in health projects in hospitals.

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References

- *Management Information System (MIS) in Hospitals: A computer based approach for quality in hospital services and administration*, by Anil Kumar Saini
- S.C. Joshi & S.N. Mehta. *National Information System: Planning and Management*, Global vision publishing house.
- *Information Technology in health care: Socio technical approaches, 2010.* IOS Press BV

HEALTH INSURANCE AND MEDICAL TOURISM

Course Code: HHM4402 **CreditUnits: 02**

Course Objective:
To acquaint students to the concept of HI and various HI products, so that the students are ready for challenges of healthcare insurance which is emerging as a sector holding great promise.

Course Contents:

Module I: **Introduction**
History of Health Insurance, Principles of Health Insurance, Health Insurance Products, Group Insurance Products, current trends in Health Insurance - International and Indian scenario.

Module II:
Economic and financial management of Health Insurance

Module III:
Scope of Medical Tourism in India

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

Text&References:

- Usha Mehta, A.D. Narde. *Health Insurance in India and Abroad*, Allied Publishers.
- Thomas K. T., SakthivelR.*Health Insurance In India*: *Overcoming Challenges and Looking Ahead*, Lambert Academic Publishing, 2012.
- Michelle A. Green, JoAnne C. Rowell. *Understanding Health Insurance- A guide to billing and reimbursement.*
- William S Stevens. *Health Insurance- Current Issues and Background*, Nova Science Publishers.

ENTREPRENEURSHIP & CONSULTANCY IN HEALTHCARE

Course Code: HHM4406 **Credit Units: 03**

Course Objective:
To create interest in students to start a venture, learn the intricacies of starting as enterprise, identifying opportunities, inculcating enterprising values with orientation towards setting up own enterprises and equip the student to take up consultancy work in various facets of hospital management.

Course Contents:
Module I- Overview of Entrepreneurship
Overview: Definition and Meaning of Entrepreneurship Characteristics and Function of Entrepreneur Importance and Limitations of Entrepreneurship: Entrepreneurial Laboratory: Types of Entrepreneurs Entrepreneurship Games Innovation and Entrepreneurship.
Idea Generation: Brain Storming in terms for Project Ideas, Normal Group Technique; Creativity. Lateral Thinking; Research &Development, Reverse Engineering IPR, Patenting ;Environment Scanning Opportunities in Health care ; NGO Collaboration.

Module II- Feasibility Study
Operational Feasibility, Technical Feasibility, Market Feasibility, Financial Feasibility, Economic Forecasting Project Report Writing; Support Systems for New Enterprise Creation, New Enterprise Identification and Selection Enterprise Establishment and Management.

Module III-Sources of Finance
Short Term Sources – Instruments – Long term Sources – Instruments – Sources – Commercial Banks, Development Agencies. Indian and International Funding Organizations Capita Market Venture and Startup Capital.

Module IV-Overview of Health care Consultancy
Consulting industry with specific reference to hospital and Health care Consulting Perspective.Professionalism& Ethics in Consulting Consultant – Client Relation ship, Behavioral roles of consultants.

Module V-Consulting Process in Health care
Entry: Initial Contracts – Preliminary Problem Diagnosis – Terms and Reference – Assignment Strategy and Plan – Proposal to the Clint – Consulting Contract.
Diagnosis: Conceptual Frame work of Diagnosis – Diagnosing Purpose and Problem - Defining Necessary Facts – Sources and Ways of Obtaining Facts – Data Analysis – Feedback.
Action Planning: Possible Solutions – Evaluating Alternatives – Presentation of Action. Implementation & Termination: Consulting in Various Areas of Health care Management.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts &References:

- J.B.Patel and D.G.Allampally ,Manual on how to Prepare a Project Report, Entrepreneurship development Institute Ahmadabad.
- .J.B.Patel and S.S.Modi ,Manual on Business Opportunity dentification& Selection, Entrepreneurship
- Development Institute Ahmadabad.
- Edward Bono ,Lateral Thinking, Penguin Books, London 1990
- Holt HG David ,Entrepreneurship, Prentice Hall India Publisher, New Delhi 2001.
- S.S.Khanka, Entrepreneurial Development S. Chand & Co New Delhi 2007.

HOSPITAL SERVICES MARKETING

Course Code:HHM4407 **Credit Units:04**

Course Objective :
The objective of this course is to enhance the marketing skills of the student withspecial reference to Hospital Services marketing.

Course Contents:

Module-I:
Concept of Service Marketing, characteristics of service marketing, Expanded service marketing mix, Scope of hospital services marketing.

Module-II:
Service Consumer Behaviour – Search, Experience and Credence attributes; Market segmentation, targeting and positioning; Service Triangle.

Module-III:
Designing health care service products – New Service Development process, PLC, Physical evidence, Pricing Strategies, Channel management in Hospitals, Franchisee management.

Module-IV:
Internal marketing -Importance and Objectives, Roles of a service employee, Internal marketing strategies; External marketing, Interactive marketing.

Module-V:
Service Distribution; Service Demand and Capacity Management; Service Quality Management– GAP model, SERVQUAL model – Service recovery strategies.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts &Reference Books :

- Ramamohana Rao, K., Services Marketing, Pearson Education (Asia),
- Kotler Philip, Marketing Management (Millennium Edition), PH1, New Delhi, 2006.
- Zeithamlbitner, Yalarie A., Service Marketing – Cases in Marketing Management, MC Graw Hill, New York, 2007
- Srinivasan, R., Services Marketing (The Indian Context), Prentice Hall India, New Delhi, 2006
- Bhattacharya. C., Services Marketing, Excel Books, New Delhi, 2006.
- Ravi Shankar, Services Marketing (Indian Perspective), Excel Books New Delhi, 2004.

DISASTER MANAGEMENT

Course Code:HHM4408 **CreditUnits: 02**

Course Objective
To learn, identify and assess disasters in the community. To set-forth policies and procedures for disaster preparedness and to prepare disaster plan.

Course Contents

Module I: Basics of Disaster Management
Basics of disaster management and Mass casualties, Classification of disaster on the basis of origin, source, onset response; Disaster Phases, Disaster Process, Effects of Disasters, Disasters and Health Problems, Triaging, Impact of Disasters on the Hospitals, Disaster Response – local, national & International, Disaster Management Act – 2005.

Module II: Disaster preparedness
Policies & procedures for general safety, fire safety procedure for evacuation, Components of Disaster Plan – Pre-hospital & Hospital, Hospital disaster plan formulation & implementation, crisis management.

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text&References:

- *A guide to emergency health management after natural disasters*, American health organization scientific publication.
- *Emergency vector control after Natural disaster*, American health organization scientific publication.
- *District Health facilities*, WHO regional publication western pacific services.
- *Medical supply management after natural disaster*, American health organization scientific publication.

DISSERTATION

Course Code: HHM4437 **CreditUnits: 06**

The Aim of the Dissertation
The aim of the dissertation is to provide the students with an opportunity to further their intellectual and personal development in their chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of their degree.
The dissertation can be defined as a scholarly inquiry into problem(s) or issues(s), involving a systematic approach to gathering and analysis of information / data and leading to production of a structured report.

The Dissertation Topic
It is usual to give the student some discretion in the choice of topic for the dissertation and the approach to be adopted. Kindly ensure that the dissertation is related to the field of specialization.
Deciding this is often the most difficult part of the dissertation process, and requires thorough preparation and background research.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that the student wishes to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.
Few restrictions are placed on the choice of the topic. Normally, it is expected that the topic is:

- Relevant to business, defined broadly;
- Related to one or more of the subjects or areas of study within the core program and specialization stream;
- Clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to the student's knowledge;
- Of value and interest to the student's personal and professional development.

Planning the dissertation
This entails the following:

- Selecting a topic for investigation.
- Establishing the precise focus of the study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The dissertation plan/ outline or Synopsis
It is recommended that the students should have a synopsis/dissertation plan to guide them right from the outset. Essentially, the synopsis/dissertation plan is an outline of what the student intends to do, chapter wise and therefore should reflect the aims and objectives of the dissertation in detail along with detailed bibliography and critical review of literature.

There are several reasons for having a dissertation plan

- It provides the correct area of focus
- It provides the faculty-guide with an opportunity, at an early stage, to make constructive comments and help guide the direction of the research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up confidence.
- In many ways, the plan encourages the student to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of the dissertation report in order to allow appropriate changes in the scope and even direction of work as it progresses.

Keeping records

This includes the following:

- Making a note of everything read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (Students may consider starting a card index or database from the outset).
- Making an accurate note of all quotations at the time they are read.
- Make clear what is a direct a direct quotation and what is a paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to the major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, give a list of all the references used. These should be cross - references with the text. For articles from journals, the following details are required e.g.
  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.
  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996
- Finally, include appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

Guidelines for the assessment of the dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s)
2. If there is more than one objective, do these constitute parts of a whole?
3. Are the objectives and methodology of practical relevance to the business world/economy?
4. Has the student done sufficient background reading and reviewed the available literature critically?
5. Has the student developed an appropriate analytical framework for addressing the problem at hand?
6. Is this based on up-to-date developments in the topic area?
7. Has the student collected information / data suitable to the frameworks?
8. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
9. Has the student succeeded in drawing conclusion form the analysis?
10. Do the conclusions relate well to the objectives of the project?
11. Has the student been regular in his work?
12. Layout of the written report.
13. Confidence and knowledge of the student while answering questions and giving the presentation.

Examination Scheme:

Contents & Layout of the Report	30
Conceptual Framework	10
Objectives & Methodology	15
Implications & Conclusions	15
Viva/ Presentations	30
TOTAL	**100**

MILITARY TRAINING FOUNDATION

Programme Structure

SINGLE SEMESTER COURSE

Course Code	Course Title	Lecture (L) Hours Per	Tutorial (T) Hours Per Week	Practical (P) Hours Per	Total Credits
GEN2051	Military Training Foundation	-	-	-	3
	TOTAL				**3**

MILITARY TRAINING FOUNDATION

Syllabus

MILITARY TRAINING FOUNDATION

Course Code: GEN2051 **Credit Units: 03**

SINGLE SEMESTER COURSE

Introduction

In accordance with the National Youth Policy which envisages that youth of the country should spend at least one fifth of their total time spent in an educational institution on outdoor activities. In furtherance of our National Youth Policy compulsory military training is being conducted for UG students at Amity University Gurgaon. A tented camp has been established at the sprawling campus at Amity University Gurgaon, surrounded by forest land and orchards within the campus, the camp gives a feeling of living in field conditions, in the wild.

Proposal

It is proposed to introduce military training (MTC) for under graduate students as an open elective, as part and parcel of the flexi credit system, wherein a student can design his own degree from a basket of courses.

Aim& Objectives

The aim of Military Training for UG students is :-

- To inculcate an essence of camaraderie and brotherhood amongst the students.
- To bring energy and team spirit amongst participants.
- To expose the students to the essentials of physical well-being and fitness.
- To give exposure to students regarding adventure training.
- To inculcate leadership qualities in students.
- To expose students to subjects of general awareness such as role of armed forces in nation building, map reading and fire fighting.

Methodology

MTC is organized as a combined camp for both boys and girls,however, separate infrastructure for boys and girls have been created at AUG.

Assessment

Assessment of a student is based on the following :-

(a) Participating in all activities and successfully completing the course.
(b) Performance in the assimilation exercise held at the end of the course.
(c) Participation in debate and class participation.
(d) Exhibiting leadership qualities i.e. leading drill contingents.

Maximum of three credit will be given to participants.

Three modules have been designed to fulfill the aim and objectives of this Military Training Foundation Course as under :-

(a) Module I - Military Training.
(b) Module II - Leadership and Motivation.
(c) Module III - Adventure training.

MODULES: MILITARY TRAINING CAMAPS (MTC)

Module-I: Military Training

Part-A

1.1 Introduction of Basic principles of Camping.
1.2 Drill aspect of discipline.
1.3 Camp Layout.
1.4 Hygiene and sanitation of camp.
1.5 Introduction to Armed Forces.
1.6 Role of Armed force in Nation building.

Part-B

I. Conducting drill.
II. Camp setting.
III. General fitness exercises.
IV. Obstacle crossing.
V. Weapon firing.

Module-II: Leadership and Motivation

Part-A

2.1 National character and values
2.2 Role and importance of Leadership
2.3 Law of Armed Conflict
2.4 Team play and group cohesion

Part-B

I. Tug of war
II. Task assignment and conduct
III. Group Discussion
IV. Games
V. Fire safety drills
VI. March past

Module-III: Adventure Training

Part-B

I. Trekking
II. Rappelling
III. Rope Climbing

ACCOUNTING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
COM2151	Financial Accounting-I	3	-	-	3
COM2251	Financial Accounting-II	3	-	-	3
COM2351	Corporate Accounting	3	-	-	3
COM2451	Financial Management	3	-	-	3
COM2551	Cost Accounting	3	-	-	3
COM2651	Management Accounting	3	-	-	3
	TOTAL				**18**

ACCOUNTING

Syllabus - Semester First

FINANCIAL ACCOUNTING-I

Course Code: COM2151 **Credit Units: 03**

Course Objective:
To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:
Module I
Financial Accounting Concepts, importance and scope, Single entry vs Double entry system of accounting. Journal, Ledger, Trial Balance, Errors and their rectification, Cash Book, Bank reconciliation statement.

Module II
Final accounts, receipts and payments, income and expenditure accounts, balance sheet.

Module III
Depreciation accounting and its methods, Inventory valuation and its methods. Accounting for Hire Purchase Transactions, Journal entries and ledger accounts in the books of Hire Vendors and Hire purchaser

Module IV
Inland Branches: Dependent branches only and ascertainment of profit by debtors method and stock and debtors method.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain &Narang, Financial Accounting
- Sehgal, A and Sehgal,D “Advanced Accounting”, Part – 1, Taxmann Applied services, New Delhi

Syllabus - Semester Second

FINANCIAL ACCOUNTING-II

Course Code: COM2251 **Credit Units: 03**

Course Objective:
To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:
Module I
Consignment and Joint Venture Accounts:
(i) ***Consignments:*** Features, Accounting treatment in the books of the consignor and consignee.
(ii) ***Joint Ventures:*** Accounting procedures: Joint Bank Account, Records Maintained by Co- venturer of (a) all transactions (b) only his own transactions. (Memorandum joint venture account).

Module II
Accounting for bills of exchange - bills receivable and payable, acceptance, endorsement, discounting, dishonour and renewal of bills, accommodation bills.

Module III
Partnership
Admission of a partner: partnership deed, goodwill valuation and treatment. Sacrificing ratio.
Retirement and death of a partner: gaining ratio, goodwill treatment
Dissolution of partnership: revaluation of assets and liabilities. Legal Position, Accounting for simple dissolution,
Applications of rule in case of Garner Vs. Murray in case of insolvency of partner(s)
(excluding piecemeal distribution and sale of a firm to a company).

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain &Narang, Financial Accounting

Syllabus - Semester Third

CORPORATE ACCOUNTING

Course Code: COM2351 **Credit Units: 03**

Course Objective:
This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:
Module I- Introduction to Corporate Accounts
Statutory records to be maintained by a company; Accounting for share capital transactions- issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of equity shares; redemption of preference shares - statutory requirements, disclosure in balance sheet; rights issue.

Module II
Issue & Redemption of debentures - accounting treatment and procedures; conversion of debentures into shares; Final accounts of Limited liability companies; Preparation of Profit & Loss account, Profit & Loss appropriation & Balance Sheet account in accordance with the provisions of existing companies act(excluding managerial remuneration).

Module III
Holding and subsidiary companies - accounting treatment and disclosures; consolidation of accounts.

Module IV
Valuation of Goodwill and shares
Good will- Meaning, definition, elements, types and methods of valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module V
Accounting treatment for amalgamation with reference to As-14 (excluding intercompany transactions & holdings), absorption and reconstruction of companies; internal & external reconstruction, Liquidation – Preparation of Liquidator's Statement of affairs, deficiency /surplus statement, calculation of pro rata treatment of uncalled capital.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- S.N. Maheswari, Financial Accounting
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting

Syllabus - Semester Fourth

FINANCIAL MANAGEMENT

Course Code: COM2451 **Credit Units: 03**

Course Objective:
To give insight into financial decision making and composition of different securities in the total Capital structure.

Course Contents:
Module I
Nature, Scope & Objectives of Financial Management, Goals of Financial Management, Time value of money, Concept of risk & return (including capital asset pricing model.

Module II
Financing Decisions: Operating & Financial leverage, Capital structure theories; NI, NOI and MM & Traditional Approach, Factors determining capital structure. Concept & measurement of cost of capital, weighed Average cost of capital.

Module III
Capital Budgeting Decisions: Capital budgeting process; estimation of relevant cash flows, Non-discounted& discounted cash flows techniques- pay back, ARR, NPV, IRR, and profitability index;
Module IV
Investment Decisions – capital budgeting – significance – techniques of evaluation of investment Proposals- payback method – return on investment method, net present value method – Case Studies

Module IV
Dividend Decisions – dividend policy – determinants of dividend policy – types of dividend policy – forms of dividend. Different Schools of thought on dividend policy (Gordon, Walter, MM).
Module V
Working Capital Management – meaning – importance of adequate working capital- excess or Inadequate working capital – determinants of working capital requirement – cash management, Receivable management and inventory management – sources of working capital.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:

- S N Maheshwari, Financial Management.
- Khan and Jain, Financial Management.
- Dorai Raj. S.N, Financial Management.
- Sharma and Sashi Gupta, Financial Management.
- I M Pandey, Financial Management.
- James C Vanhorne, Financial Management.
- Prasanna Chandra, Financial Management.
- PN Reddy &Appanaiah, Financial Management.

Syllabus - Semester Fifth

COST ACCOUNTING

Course Code: COM2551 **Credit Units: 03**

Course Objective:
To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:
Module I: Cost Accounting
Introduction – Meaning of Cost, costing and Cost Accounting – Comparison between Financial Accounts and Cost Accounts –Cost concepts and Classification of Costs – Cost Module – Cost Center, cost object – Preparation of cost sheet

Module II: Material Costing
Issue of materials, Methods of pricing of material issues- LIFO, FIFO- Weighed Average Method, Simple Average Method; Inventory Control- Concept & techniques like fixing of stock levels, EOQ, ABC analysis, perpetual & periodic inventory systems, material losses & their treatment.

Module III: Labour Costing
Control of labour cost – Labour Turn Turnover – Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking – Idle time, causes and treatment – Overtime – Methods of Wage Payment, Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

Module IV: Overhead Costing
Definition, Classification, allocation, apportionment & absorption of overhead, treatment of over & under absorption

Module V:
Costing Methods Introduction - Job Costing – Batch Costing – Contract Costing-
Process Costing – principles – distinction between Process and Job – Preparation of process accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products. Service costing. Marginal costing- introduction, contribution, PVR, BEP Chart and Margin of safety.

Module VI:
Reconciliation of Cost and Financial Accounts - Need for reconciliation – Reasons for difference in profits – Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- N.K. Prasad: Cost Accounting
- Nigam & Sharma: Cost Accounting
- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal: Cost Accounting
- Jain &Narang: Cost Accounting
- S.P. Iyengar: Cost Accounting
- S.N. Maheshwari: Cost Accounting
- Horngren: Cost Accounting: A Managerial Emphasis
- M. N. Arora: Cost Accounting
- Dutta: Cost Accounting

Syllabus - Semester Sixth

MANAGEMENT ACCOUNTING

Course Code: COM2651 **Credit Units: 03**

Course Objective:
To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:
Module I: Management Accounting
Nature & Scope: Meaning and Definition - Objectives of Management Accounting - Management Accounting and Financial Accounting - Management Accounting and Cost Accounting - Utility of Management Accounting - Limitations of Management Accounting - Position of Management Accountant in the Organisation.

Module II: Analysis and Interpretation of Financial Statements - I
Concept of Financial Statements and their Nature - Limitations of Financial Statements - Analysis and Interpretation - Tools - Comparative Financial Statements - Common size Statements - Trend Percentages Ratio Analysis - Nature and Interpretation - Utility and Limitations of Ratios - Short-term Financial Ratios - Long-term Financial Ratios - Profitability Ratios - Proprietary and Yield Ratios - Turnover Ratios - DUPONT Control Chart

Module III:Cash Flow Analysis
Distinction of cash from funds-utility of cash flow statement construction of cash flow statement

Module IV: Responsibilty Accounting and Standard Costing
Concept of Responsibility Accounting - Cost Centers and Profit Centers - Contribution by Segments

Module V: Budgets and Budgetary Control
Concept of Budgets and Budgetary Control - Nature and Objectives of Budgetary Control - Advantages and Limitations of Budgetary Control - Establishing a system of Budgetary Control - Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget etc. - Flexible Budgets and Master Budgets

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Dr. S.N. Maheswari , Management Accounting
- Sexana, Management Accounting
- Made Gowda, Management Accounting
- Dr. S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy &Appanaiah, Essentials of Management Accounting

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Commerce (Honors)

Syllabus - First Semester

FINANCIAL ACCOUNTING-I

Course Code: COM2151 **Credit Units: 03**

Course Objective:
To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:
Module I: Introduction
Financial Accounting Concepts, importance and scope, Single entry vs Double entry system of as accounting. Journal, Ledger, Trial Balance, Errors and their rectification, Cash Book, Bank reconciliation statement.

Module II: Accounting Standards & IFRS, GAAP
Meaning of Accounting Standards, Types of Accounting Standards, Meaning of IFRS, Types of IFRS, Difference between IFRS & Indian GAAP,

Module III: Depreciation Accounting-(AS 6) & bill of exchange
Depreciation accounting and its methods, Inventory valuation and its methods. Bill of Exchange – Meaning, Parties of Bills of Exchange, Journal Entry in the books of drawer & drawee in different cases, Dishonor of bill & renewal of bill, Insolvency of drewee.

Module IV: Final Account of Sole Proprietor & Incomplete Record
Final accounts – Meaning Preparation of trading, Profitable Loss Account and Balance Sheet with adjustment, Non Profit organization – Meaning, Preparation of receipts and payments, income and expenditure accounts & balance sheet.

Module V: Royalties & Voyage Account
Meaning of Royalties, Short working, Short working recrupt, Journal entry in the books of landlord & lessee, Preparation of Ledger Accounts. Voyage account – Meaning, Preparation of voyage account in case of complete & Incomplete voyage account.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting

- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal,D "Advanced Accounting", Part – 1, Taxmann Applied services, New Delhi

BUSINESS ORGANIZATION AND MANAGEMENT

Course Code: COM2101 **Credit Units: 03**

Course Objective:
This course aims to provide students with an understanding of the principles and practices of organisation and management. This course enables students to understand the fundamental management theories and their evolution, identify the elements of the organizational environments, manage resources and develop the ability to make sound decision within an organization.

Course Contents:

Module I: Introduction
Introduction to business, Business firms - Forms of organisation - sole proprietors, Partnership, Joint-Hindu family, Joint stock Company, Co-operative organisations - Public Enterprises, BPO, E-commerce and M-commerce.

Module II: Management
Introduction - Meaning, nature and characteristics of Management - Scope and functional areas of management - Social responsibility of management and Ethics.

Module III: Planning
Nature importance and purpose of planning - Planning process, Objectives - Types of plans (Meaning only) - Decision-making – importance & steps.

Module IV: Organising & Staffing
Nature and purpose of organisation, Principles of organisation - Types of organization - Departmentation, Committees - Centralisation Vs decentralisation of authority and responsibility - Span of Control - MBO and MBE(Meaning only) - Nature and importance of staffing - Process of selection & recruitment(in brief) – retaining (training and compensation).

Module V: Directing
Meaning and nature of directing - Leadership styles - Motivation theories (Maslow's, Herzberg, Mcgregors X & Y theory), Ouchi's Theory- Communication meaning and importance, barriers to communication, types of communication - Coordination meaning and importance.

Module VI: Controlling
Meaning and steps in controlling - Essentials of a sound control system - Methods of establishing control(in brief) – Balance score card, Economic value added, Market value added.

Module VII: Management in perspective
Change Management, Knowledge Management, Learning organization, Managing Diversity, Corporate Governance.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Koontz & O'Donnell, Management.
- Drucker, Peter: Management Tasks, Responsibilities and Practices
- Basu, "Business Organisation and management", Tata Mcgraw Hill, New Delhi
- M.C. Shukla: Business Organisation & Management, S. Chand
- Rustum & Davan, Principles and practice of Management.
- Jagadish Prakash: Business Organisation & Management
- Newman, H. William Summer, Etc.: The process of Management

MICROECONOMIC THEORY AND APPLICATIONS

Course Code: COM2102 **Credit Units: 03**

Course Objective:
The objective of this paper is to make the student to understand how the business organizations work by applying economic principles in their business management. The course will attempt to relate theory to practice and try to instill in students the ability to apply basic microeconomic concepts to the understanding of everyday phenomena.

Course Contents:
Module I: Introduction
Nature and scope of economics; Difference between micro and macroeconomics, Nature of economic problem. Basic postulates, Role of price mechanism. Theory of Demand and Analysis: Demand-demand determinants – law of demand-characteristics exceptions -Elasticity of demand – price elasticity – types – determining factors- change in demand and elasticity of demand-business applications of price elasticity- concepts of income and cross elasticity of demand. Measurement of price elasticity of demand by total outlay method.

Module II: Consumer Behaviour
Consumer sovereignty-limitations. Approaches to the study of consumer behaviour-cordinal approach-the law of equi-marginal utility, ordinal approach – indifference curve analysis-properties – consumer surplus – meaning-analysis limitations. Price, income and substitution effects. Giffen goods. Engel curve.

Module III: Theory of Production and Cost
Concept of Production Function. Isoquants, marginal rate of technical substitution, Law of variable proportions. The concepts of firm and industry. Revenue and cost curves - short and long run. Equilibrium of the firm.

Module IV: Market Structures
Market structures & business decisions; Objectives of Business firm

a) Perfect competition: Profit Maximization, and equilibrium of firm & industry; Short-run and long-run supply curves; price and output determination, practical applications
b) Monopoly: Determination of price under monopoly; Equilibrium of a firm; Comparison between perfect competition and monopoly; Multi plant monopoly, Price discrimination; Practical applications.
c) Monopolistic Competition: Meaning & Characteristics; Price and Output determination under monopolistic Competition; Excess capacity under monopolistic competition.
d) Oligopoly: Characteristics, indeterminate pricing and output; classical models of oligopoly; price leadership; Collusive oligopoly, kinked demand curve.

Module V: Income Distribution & Factor Pricing
Demand for factors, supply of factor, backward bending supply curve for labour, concepts of economic rent; Functional distribution of income

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:

- I.C. Dhingra, Principles of Microeconomics- Sultan Chand & Sons
- H.L. Ahuja- Microeconomics
- Baumol, W.J. Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi.
- Bach, G.L, Economics, Prentice Hall of India, New Delhi.
- Gould, J.P. and Edward P.L, Microeconomic Theory, Richard, Irwin. Homewood.
- Koutsoyiannis, A, Modern Microeconomics, Macmillan.
- Lipsey, R.G. and K.A. Chrystal, Principles of Economics, Oxford University Press, Oxford.

PRINCIPLES OF MARKETING

Course Code: COM2104 **Credit Units: 03**

Course Objective:
To help students to understand the concept of marketing and its applications, also to expose the Students to the latest trends in marketing.

Course Contents:

Module I: Introduction
Nature and scope of marketing- Importance of marketing as a business function - and in the economy - Marketing concepts - Traditional and Modern, Selling V/S marketing - Marketing Environment.

Module II
Markets and Segmentation. Meaning of Market - Various types of markets and their characteristics. Concept of market segmentation and its Importance - bases for market segmentation.
Consumer behaviour Nature, scope & significance of consumer behaviour - factors affecting consumer behaviour.

Module III
Product - concept of product - consumer and Industrial goods - product planning and development packaging - role and functions - Brand name and Trademark - after sale service - product life cycle concept.

Module IV
Price - Importance of price in the marketing mix, factor affecting price of a product / service, Pricing Strategies.

Module V
Distribution channels - concept and role - types of distribution channels - Factors affecting choice of a distribution channel.

Module VI
Promotion : Method of promotion - optimum promotion mix.
Meaning and Importance of advertising - advertising medias - ethics of good advertising.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Philip Kotler: Marketing Management, Prentice Hall of India Ltd, New Delhi.
- Dr. C. N. Sontakki: Marketing Management Kalyani Publications New Delhi.
- Marchannd & B. Vardharajan: An introduction to Marketing, Vikas Publishing House, Delhi.
- Mohammad Amanatuallh: Principles of Modern Marketing. Kalyani Publications New Delhi.

E-COMMERCE

Course Code: COM2103 **Credit Units: 03**

Course Objective:
The subject will provide students with the knowledge to cover wide-ranging aspects of conducting business on the Internet.

Course Contents:

Module I: E-Commerce Concept
Meaning, definition, concept, features, function of E-Commerce, E-Commerce practices v/s traditional practices, scope and basic models of E-Commerce, limitations of E-Commerce, precaution for secure E-Commerce, proxy services. Concept of EDI, difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI, Software Concept of Electronic Signature, Access Control.

Module II: Types of E-Commerce
Meaning of B2C, B2B, C2C, P2P. Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts. Application of B2B- E-distributor, B2B service provider, benefits of B2B on Procurement, Just in time delivery. Consumer to consumer and peer to peer business model Introduction and basic concepts.

Module III: E-Marketing
Traditional Marketing V/S E-Marketing, Impact of Ecommerce on markets, Marketing issue in E-Marketing, Promoting your E-Business. Direct marketing, one to one marketing, Marketing Strategies

Module IV: E-Finance
Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking. E-Trading-Stock marketing, trading v/s E-Trading, Importance of E-Trading, Advantages of E-trading, operational aspects of E-Trading.

Module V: E-Payment
Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, cyber cash Internet cheques. Instant Paid payment system- Debit card, direct debit. Prepaid payment system- Electronic cash, digicash, Netcash, cybercash, smart cards.

Module VI: E-Security
How sites are hacked security on the internet, Firewall, Network & Website Security, Benefits of Internet Firewall.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Computer Today, S. Bansundara
- E-Commerce: The Cutting Edge of Business, Kamblesh Bajaj and Debjani Nag, McGraw Hill
- E-Commerce, S. Jaiswal

READINGS IN MANAGEMENT

Course Code: COM2130 **Credit Units: 02**

Objectives

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: COM2131 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT

Course Code: COM2132 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.

- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III : Collection of information and data relating to the topic and analysis of the same.
Step IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Step V : The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP

Course Code: COM2133 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus - Second Semester

FINANCIAL ACCOUNTING-II

Course Code: COM2251 **Credit Units: 03**

Course Objective:
To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:
Module I: Partnership
Admission of a partner: partnership deed, goodwill valuation and treatment. Sacrificing ratio.
Retirement and death of a partner: gaining ratio, goodwill treatment
Dissolution of partnership: revaluation of assets and liabilities. Legal Position, Accounting for simple dissolution,
Applications of rule in case of Garner Vs. Murray in case of insolvency of partner(s)
(excluding piecemeal distribution and sale of a firm to a company).

Module II: Branch & Departmental Accounting
Branch & Departmental Accounting – Meaning, Types of Branch, Methods of Recording, Journal Entries in case of dependent branch, ascertainment of profit by debtors method and stock and debtors method. Departmental Account – Meaning, Methods of Recording, Transaction in case of departments

Module III: Consignment and Joint Venture Accounts
(i) ***Consignments:*** Features, Accounting treatment in the books of the consignor and consignee.
(ii) ***Joint Ventures:*** Accounting procedures: Joint Bank Account, Records Maintained by Co- venturer of (a) all transactions (b) only his own transactions. (Memorandum joint venture account).

Module IV: Hire purchase and Installment Payment System
Hire purchase - Meaning, Accounting for Hire Purchase Transactions, Journal entries and ledger accounts in the books of Hire Vendors and Hire purchaser. Instalment payment system, difference between hire purchase system & instalment payment system - Journal entries and ledger accounts in the books of Hire Vendors and Hire purchaser

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal,D “Advanced Accounting”, Part – 1, Taxmann Applied services, New Delhi

BUSINESS MATHEMATICS

Course Code: COM2201 **Credit Units: 04**

Course Objective:
To familiarize the students with basic mathematical tools and the application of the same to business and economic situations.

Course Contents:

Module I
Arithmetic Progressions, Geometric progressions and Harmonic Progressions: Definition of A.P, G.P and H.P. Simples Examples

Module II: Matrices and determinants
Definition of a matrix; Types of matrices; Algebra of matrices; properties of determinants; calculation of values of Determinants upto third order; Adjoint of a matrix, Finding inverse of a matrix; Rank of a matrix, Solution of system of linear equations by Cramer's Rule and Matrix Inverse Method (including not more than three variables).

Module III: Differentiation
Definition; Derivative using first Principle; Method of Differentiation of sum, difference, product and Quotient of two functions; Derivative if compositive, inverse, exponential, Logarithmic, parametric and Implicit functions; second order derivative, Application of Differentiation.

Module IV: Maxima and minima
Case of one variable involving Second Order derivative; Average Cost, Average revenue functions, marginal cost, marginal revenue, Elasticity of demand, Application of Maxima or Minima.

Module V: Integration
Integration as anti-derivative process; Standard forms; Method of Integration by substitution, by parts and by use of partial fractions. Definite integral and their properties; Finding areas in simple cases; Determination of Cost, revenue and demand function; Consumer's surplus and Producer's surplus.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Kumbhojkar G.V.: Business Mathematics
- Shantinarayan: Text Book of Matrics.
- Bhagwat K Pawate: Elements of Calculus.
- Soni R.S.: Business Mathematics, Pitamber Publishing House
- Kapoor V.K.: Business mathematics, Sultan Chand & Sons, Delhi.

BUSINESS AND ECONOMIC LAWS

Course Code: COM2202 **Credit Units: 03**

Course Objective:
The objective of the course is to impart basic knowledge that a common person comes across in this various business dealings and, make him aware of the relevant case laws

Course Contents:

Module I: Introduction
Meaning and Scope of business law – Sources of Indian Business Law.

Module II: Indian Contract Act
Definition – types of contract – essentials – offer, acceptance, consideration, capacity of parties – free consent (meaning only) – legality of object and consideration – various modes of discharge of a contract – remedies for breach of contract ,contract of indemnity and guarantee, bailment and pledge, law of agency.

Module III: Indian Sale of Goods Act
Formation of a contract, Condition and warranties, Transfer of ownership, Performance of the contract, Rights of unpaid seller.

Module IV: Negotiable Instruments Act
Definition of a negotiable instrument; instruments negotiable by law and by custom; types of negotiable instruments; parties to a negotiable instrument - duties, rights, liabilities and discharge; material alteration; crossing of cheques;

Module V: Indian Partnership Act
Definition and nature of partnership - Rights and duties of partner - Types of partners - Incoming and outgoing and minor as a partner - Dissolution of partnership - Registration of firm

Module VI: Consumer Protection Act. [COPRA] 1986
Back ground – definitions of 1) Consumer 2) Consumer Dispute 3) Complaint 4) Deficiency 5) Service Consumer Protection Council – Consumer Redressal Agencies – District Forum, State Commission and National Commission.

Module VII: Foreign Exchange Management Act 1999
Objectives, Scope and salient features – offences under the Act.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Tulsian - Business Law, Tata Mcgraw Hill, New Delhi.
- Aswathappa. K & Ramachandra – Business Law, HPH, Mumbai.
- Kapoor N.D. - Business Law, Sultan Chand & Co.
- Bare Acts.
- Nabhi - Business Law, Indian Law House, Mumbai.
- Garg, Sareen, Sharma & Chawla - Business Law.
- M.C. Kuchhal, Business Law.

ADVERTISING MANAGEMENT

Course Code: COM2205 **Credit Units: 03**

Course Objectives: To develop an in -depth understanding of the modern concepts and latest techniques of advertising and personal selling and sales force management which constitute a fast - growing area of marketing.

Course Contents:

Module I: **Advertising Management**

Communication Basics: Communication and marketing; Communication process; Communication response hierarchy models; Cognitive processing of communication; EKB model; Marketing communication mix; Integrated marketing communication – an introduction; Advertising - Its importance and nature; Advertising and publicity; Advertising management process; Advertising objectives; DAGMAR Approach; Determination of Target Audience and positioning; Advertising budget – factors influencing budget decision and methods.

Module II: Advertising Message and Media Decisions

Creativity and advertising; Creative process; Creative appeals and execution styles; Developing advertising copy for print ad - headline, body copy, logo, illustration and layout. Media Decisions – Types of media, Advertising through Internet and interactive media; Developing media plan; media selection and scheduling.

Module III: Organization and Evaluation of Advertising Efforts

Centralized and decentralized systems; Inhouse agency arrangements; Advertising agencies – selection, compensation and appraisal of advertising agency; managing advertising agency relations; IMC services; Reasons for evaluating Advertising Effectiveness; Advertising testing process - Before and after advertising tests and techniques.

Module IV: Advertising in India

Social and regulatory aspects of advertising in India. Recent developments and issues in advertising. Section B: Sales Management

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Aaker, David A., Rajeev Batra and John G. Mayers, Advertising Management, Prentice Hall of India.
- Belch. George and Michael Belch, Advertising and Promotion: An Integrated Marketing Communications Perspective, McGraw Hill Education.
- Still, Richard R., Sales Management: Decisions, Strategies and Cases, Pearson Education India
- Anderson B. Robert, Professional Selling, Universe.
- Johnston, Mark W. and Greg W. Marshall, Sales Force Management: Leadership, Innovation, Technology, Routledge.
- Spiro, Rosann, William J. Stanton and Gregory A. Rich, Management of a Sales Force, McGraw Hill Education.
- Hair, Sales Management, Cengage Learning.
- Johnston, mark W. and Greg W. Marshall, Contemporary Selling: Building Relationships and Creating Value, Routledge.
- Sharma, Kavita, Advertising: Planning and Decision Making, Taxmann.

COMPUTER APPLICATIONS IN BUSINESS

Course Code: COM2204 **Credit Units: 03**

Course Objective:
To provide computer skills and knowledge for commerce students, and to make them complacent with the use of new tools of IT.

Course Contents:

Module I
General features of a Computer. Generation of computers. Personal Computer, Workstation, Mainframe Computer and super Computers. Computer applications – data processing, information processing, Application areas of computer.

Module II
Computer organization. Central processing module. Computer memory- primary memory and secondary memory. Secondary storage devices – magnetic and optical media. Input and output modules. OMR, OCR, MICR, scanner, mouse, Modem.

Module III
Computer hardware and software. Machine language and high level language. Application software. Computer program. Operating system. Computer virus, Antivirus and Computer security, Windows OS and its features.
Computer arithmetic. Binary, octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of database and its applications.

Module IV
Introduction to MS office Packages- Ms-Word – Editing a Document – Move and Copy text – Formatting text and paragraph – Finding and Replacing text and spelling checking – Using tabs, Tables, and other features, Enhancing document – using mail merge and other features.
Introduction to Worksheet- Getting started with excel – Editing Cells and using commands and functions – Moving And Coping, Inserting and Deleting Rows and Columns – Getting help and formatting a worksheet – Printing the worksheet – Creating Charts – using formulae and functions in excel. Introduction to Power Point Presentation

Module V
Computer Networks & Internet Technology
Introduction to Computer Networks, Networking components, Classification and types of Networks, Network Topologies – Overview with Advantages and Disadvantages, Communication Channels, Client Sever Architecture, LAN concepts.
Introduction to internet intranet and Extranet, Myths about the Internet, Basic concepts of internet, Domain Name Service, Internet Protocols and Addressing, Services of internet, Internet and support Technologies, Censorship and Privacy issues

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Craig Stinson "Running Microsoft Windows-98" – Microsoft press.
- Joshua C. Nossiter. " Using Excel – 5 for Windows"
- "Working with Word" – Aptech Computer Education
- "Power Point Presentation" – Aptech Computer Education.
- Malhotra, Computer Applications in Business
- Rajaraman V, Analysis and Design of Information System, Prentice Hall of India, New Delhi
- Murdick, RG and Ross, JE Information Systems for Modern Management
- Kanter, J, Management Oriented MIS, Prentice Hall of India
- Bhattacharya SK, Management Planning and Information Systems

ANALYSIS AND DESIGN OF BUSINESS SYSTEMS

Course Code: COM2206 **Credit Units: 03**

Course Objective:
The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:
Module I: The systems development Environment. (Information system development life cycle)
System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II : System Planning and Selection (Graphic technology modeling tool)
Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)
Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System & Database Design
System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Database Design, Database Management System – an introduction, Overview of Data Models, Relational Database Model – Well structured relations, Keys, Schema & Subschema, Structure, Facilities & Users, Constraints, Anomalies, Functional Dependency, Normalization, Roles & Duties of System Administration.

Module V: System Implementation & Operation (System Management)
Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing
System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

Text:

- Essentials of System Analysis & Design, Second Edition, Valacich George Hoffer, Prentice-Hall India

References:

- Analysis and Design of information systems, James A. Senn
- Computer Based Information Systems, Kroeber, Donald W. and Watron, Hugh J.
- Systems Analysis & Design, E. M. Awad.
- Systems Analysis and Design – An Applied Approach, Dennis Wixom, Wiley

INNOVATION & CREATIVITY MANAGEMENT

Course Code: COM2207 **Credit Units: 03**

Course Objective:
To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations is demanding such an approach.

Course Contents:

Module I:
Innovation Management- Introduction, characteristics, Components, Types, Models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing innovation, Nurturing innovation in e-business.

Module II:
Organizing for Innovation- Organizational theories and structures, traits of innovative organizations, current trends, factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, creativity crushers, fostering innovation climate and culture, The creativity Hit List.

Module III:
Research and Development management- Significance, Prerequisites, Process, Technology development approaches, management of R &D, In source to open source environment, R&D in small industry, Managing Creative employees, significance and challenges of managing creative employees, Traits of a creative person, motivation to creativity, strategies for unblocking creativity, factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, creative thinking, Tradition vs creative thinking.

Module IV:
Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, writing techniques, techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, new product development, packaging and positioning innovations, beyond product innovation, New product failures.

Module V:
Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.

Module VI:
Legal aspects of innovation- IPR, Indian Patents Act, trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

Text:

- Krishnamarcharyulu and Lalitha, *Innovation Management*, Himalaya Publishing House, New Delhi- 2007

References:

- Plsek, *Creativity, Innovation and Quality*, Prentice Hall of India, New Delhi-2003

HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: COM2208 **Credit Units: 03**

Course Objective:
The aim of this course is to facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way. Recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the Moral issues involved in Management areas and to provide an understanding of the interface between Social, Technological and Natural environments.

Course Contents:
Module I: Human Values
Morals, Values, Types of values, evolution of human values, Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character, Challenges at Work place

Module II: Values in Management
Relevance of values in Management, need for values in global change, values for managers, holistic approach for managers in decision making, problems related to stress in corporate management

Module III:
Workplace Rights and Responsibilities: Organizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behavior in large corporation.
Work environment: Ethical and legal considerations, Organizational responses to offensive behavior and harassment. Ethics in a Global Context.

Module IV: Industrial Integrity
The epitome of industrial success, Integrity and organization, Exploring learning process of integrity, Consequences of lack of integrity.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text &References:
Text

- R R Gaur, R Sangal, G P Bagaria, 2010, *A Foundation Course in Human Values and Professional Ethics*, Excel Books

References:
- Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
- E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
- A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
- PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
- A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.

READINGS IN MANAGEMENT

Course Code: COM2230 **Credit Units: 02**

Objectives

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: COM2231 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT

Course Code: COM2232 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III : Collection of information and data relating to the topic and analysis of the same.
Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP

Course Code: COM2233 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop \
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

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Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus - Third Semester

CORPORATE ACCOUNTING

Course Code: COM2351 **Credit Units: 03**

Course Objective:
This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:
Module I- Accounting for Share Capital
Statutory records to be maintained by a company; Accounting for share capital transactions- issue of shares at par, at premium forfeiture and re-issue of shares; buy-back of equity shares; redemption of preference shares - statutory requirements, disclosure in balance sheet; rights issue, bonus shares.

Module II: Accounting For Debentures
Issue & Redemption of debentures - accounting treatment and procedures; conversion of debentures into shares

Module III: Valuation of Goodwill and shares
Good will- Meaning, definition, elements, types and methods of valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module IV: Amalgamation
Accounting treatment for amalgamation with reference to As-14 (excluding intercompany transactions & holdings), absorption and reconstruction of companies; internal & external reconstruction

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:
- S.N. Maheswari, Financial Accounting
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting
- Tulsian, Advanced Accounting

STATISTICAL METHODS IN RESEARCH-I

Course Code: COM2301 **Credit Units: 03**

Course Objectives:
To provide basic understanding of quantitative tools and their elementary application to business problems.

Course Contents:
Module I- Introduction to Statistics
Basic Concepts, Primary & Secondary data, classification of data, Graphical representation of data, frequency distribution.

Module II- Central Tendency and Dispersion
Measures of central tendency; Mean, Median, Mode, Geometric mean and Harmonic mean; Measures of dispersion; Range, Mean Deviation, Standard Deviation, Coefficient of variation, Quartile Deviation, Skewness and Kurtosis; Difference between these measures and their interpretation.

Module III- Correlation & Regression
Correlation- Concepts and importance, Positive & Negative correlation, Karl-Pearson's coefficient of correlation, Rank correlation coefficient, Spurious correlation, Coefficient of determination.
Regression-Concept, Difference between correlation & regression.

Module IV- Time Series and Index numbers
Time Series- Introduction, components of a time series, Multiplicative and additive models, Semi Average & Moving Average method;
Index Numbers- Concept, price relative, quantity relative, value relative, Laspeyre's, Passche's and Fisher's index numbers, Family Budget method, problems in construction and limitations of index numbers Tests for adequacy of index numbers.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:
Text:
- Fundamentals of Applied Statistics, V.K.Kapoor & S.C.Gupta, S. Chand & Sons, New Delhi.
- Theory and Problems of Statistics, M.R. Theory, McGraw-Hill Book, London.

References:
- Essential Mathematics for Economics, J. Black & J.F. Bradley, John Willey and Sons.
- Fundamental Method of Mathematical Economics, Chiang, McGraw-Hill New Delhi.
- Applied General Statistics. F.E. Croxton & D.J. Cowden, Prentice Hall, New Delhi.

CORPORATE LAW

Course Code: COM2302 **Credit Units: 03**

Course Objective:
To develop an understanding of the regulation of registered companies and to provide thorough understanding of the various provisions of the Indian Company Law

Course Contents:
Module I-
Brief History of Company Law : Definition and Characteristics, Lifting of Corporate Veil, Kinds of Companies, Exemptions and Privileges to Private Companies; Promoters' Liability, Pre- incorporation Contracts, Formation of Company. Memorandum and Articles of Association; Doctrine of Ultra-virus; Doctrine of Indoor Management.

Module II-
Prospectus: Meaning and contents, Deemed Prospectus; Shares and Debentures: Meaning, Types and their Allotment, Reduction of Share Capital, Buy-Back of Shares Borrowing Powers: Debentures-issue, floating and Fixed Charge; Registration of Mortgage and Charges, Disposal of Profits-Dividends, Issue of Bonus Shares.

Module III-
Directors, Managing Directors and Manager: Appointment, Retirement Removal, Duties and Rights, Company Management, Prevention of Mismanagement and Oppressions.

Module IV-
Role and Importance of Corporate Governance. Investigation, Winding up of Companies and Legal Provisions under the Indian Companies Act, 2013

Module V-
Company Secretary : Appointment, Position, Rights, Duties and Liabilities Meeting : Types, Requisites of a Valid Meeting, Members' Meeting : Statutory, Annual General Meeting, Extraordinary General Meeting. Regulatory Powers of SEBI and RBI with reference to Issue of Shares, Listing of Shares and borrowing powers.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- M.C. Shukla & Gulshan: Principles of Company Law.
- N.D. Kapoor: Company Law and Secretarial Practice.
- M.C. Bhandari: Guide to Company Law Procedures.
- Tuteja: Company Administration and Meetings.
- S.C. Kuchehal: Company Law and Secretarial Practice.
- Dr. P.N. Reddy and H.R. Appanaiah: Essentials of Company Law and Secretarial Practice, Himalaya Publishers.

HUMAN RESOURCE MANAGEMENT

Course Code: COM2303 **Credit Units: 03**

Course Objective:
To help students to understand the concept of human resource management to enable them to better manage the most important asset of any organisation which are people.

Course Contents:
Module I:
Human Resource Management: Relevance and spectrum, HRD: concept and evolution, Organization of HR Department, Role, Status and competencies of HR Manager, HR Policies. Emerging dimensions in HRM like empowerment, diversity etc.

Module II
Acquisition of Human Resource: Human Resource Planning- Quantitative and Qualitative dimensions; job analysis – job description and job specification; recruitment – Concept and sources; selection – Concept and process; test and interview; placement induction.

Module III
Training and Development: Concept and importance; identifying training and development needs; designing training programmes; role specific and competency based training; evaluating training effectiveness; training process outsourcing; management development systems; career development.

Module IV
Performance Appraisal System: nature and objectives; techniques of performance appraisal; potential appraisal and employee counseling; job changes - transfers and promotions.

Module V
Compensation: concept, policies and administration; job evaluation; methods of wage payments and incentive plans; fringe benefits; performance linked compensation. Maintenance: employee health and safety; employee welfare; social security; grievance handling and redressal.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text and References:

- S. P. Robbins, *Human Resource Management,* Prentice Hall of India, New Delhi
- Iam Beardwell and Len Holden, *Human Resource Management,* Macmillan, New
- Delhi
- R. Wayne Mondy, Robert M. Noe, *Human Resource Management*, Pearson Education, New Delhi
- Randy L. Desimone, Jon M. Wernea, David M. Harris, *Human Resource Management, International Student Edn, Thomson A.*
- A.K. Singh & B. R. Duggal, Human Resource Management, Sun India Publications,
- T. N. Chabra, *Human Resource Management*, Dhanpat Rai & Co, Delhi.

SALES AND DISTRIBUTION MANAGEMENT

Course Code: COM2304 **Credit Units: 03**

Course Objective:
The major objective of this course is to acquaint the students with the theory and practice of Management of Sales Operations.

Course Contents:
Module I: Introduction
Sales management- Concept, Objectives and functions. Evolution of sales management. Nature and role of Sales Manager's job. Sales management as a career. Emerging trends in sales management.

Module II: Sales Organization
Purpose of sales organization. Setting sales organization. Types of sales organization. Coordination of selling functions with other marketing activities. Sales forecasting.

Module III: Controlling sales effort
Sales Budget: Purpose and budgetary procedure. Quotas: Concept, Objectives and Types. Sales Territory: Concept and procedure of devising sales territories, Routing and Scheduling of Sales force. Sales Audit.

Module IV: Managing Sales Force
Concept of sales force management. Recruitment and Selection of sales personnel (domestic and international perspective). Cross Cultural challenges. Sales training. Compensating and motivating sales personnel. Controlling and evaluating sales personnel.

Module V: Distribution Management and channel control
Distribution channels: Concept and need. Distribution Channel Strategy. Managing distribution channel. Features of effective channel design. Channel Conflict: Concept and stages. Conflict management.

Module VI: Logistics Management
Objectives of logistics. Concept of logistics planning: inventory management decisions, transportation decisions, Location decisions.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
Text:
- Still Cundiff, Sales Management Decision Strategies, Fifth Edition, Printice Hall.
- Panda Tapan K., Sahadev Sunil, Sales and Distribution Management, 2005, Oxford University Press.

References:
- Kapoor Ramneek, Fundamentals of Sales Management, 2005, McMillan.
- Sudha GS, Sales & Advertising Management, 2005, Indus Valley Publications.
- Walker, Churchill Ford, Management of Sales Force

MERGERS AND ACQUISITIONS

Course Code: COM2305 **Credit Units: 03**

Course Objective:

The main objective of this course is to familiarize the students with the basic aspects of mergers and acquisitions.

Course Contents:

Module I: Mergers and Acquisitions – Overview
Introduction – Forms of Corporate Restructuring – Expansion – Mergers and Acquisitions – Tender Offers – Joint Ventures – Sell Offs – Spin Offs – Split Offs – Split Ups – Divestitures – Equity Carve outs - Corporate Control – Premium Buy Backs – Standstill Agreements – Anti- Takeover Amendments – Proxy Contests - Changes in Ownership Structures - Share Repurchases – Exchange Offers – Leveraged Buy – out – Going Private – Issue Raised by Restructuring – History of Merger Movements.

Module II: Mergers and Acquisitions
Economic Rationale for Major Types of Mergers - Horizontal Mergers – Vertical Mergers – Conglomerate Mergers - Concentric Mergers.

Module III: Theories of Mergers
Efficiency Theories – Differential Efficiency - Inefficient Management – Operating Synergy – Pure Diversification - Financial Synergy – Strategic Realignment to Changing Environments – Undervaluation – Information and Signaling – Agency Problems and Managerialism - Takeovers as a Solution to Agency Problems

Module IV: Divestment of Public Sector Undertakings and Leveraged Buy-outs
General Economic and Financial Factors illustration of an LBO Takeover Defenses
Anti-Takeover Amendments, Any case study

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

Text:

- The Complete Guide to Mergers and Acquisitions : Process Tools to Support M & A Integration at Every Level – Timothy J Galpin and Mark Herndon, 2007
- Mergers – What Can Go Wrong and How to Prevent it – Patrick A Gaughan (Wiley Finance)

References:

- Mergers and Acquisitions – Fred Weston
- M & A and Corporate Restructuring - Patrick A Gaughan (Wiley Finance Series)

TERM PAPER

Course Code: COM2331 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT

Course Code: COM2332 **Credit Units: 02**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III : Collection of information and data relating to the topic and analysis of the same.
Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

StepV : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP

Course Code: COM2333 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus - Fourth Semester

FINANCIAL MANAGEMENT

Course Code: COM2451 **Credit Units: 03**

Course Objective:
To give insight into financial decision making and composition of different securities in the total Capital structure.

Course Contents:
Module I
Nature, Scope & Objectives of Financial Management, Goals of Financial Management, Time value of money, Concept of risk & return (including capital asset pricing model.

Module II
Financing Decisions: Operating & Financial leverage, Capital structure theories; NI, NOI and MM & Traditional Approach, Factors determining capital structure. Concept & measurement of cost of capital, weighed Average cost of capital.

Module III
Capital Budgeting Decisions: Capital budgeting process; estimation of relevant cash flows, Non-discounted& discounted cash flows techniques- pay back, ARR, NPV, IRR, and profitability index;

Module IV
Dividend Decisions – dividend policy – determinants of dividend policy – types of dividend policy – forms of dividend. Different Schools of thought on dividend policy (Gordon, Walter, MM).

Module V
Working Capital Management – meaning – importance of adequate working capital- excess or Inadequate working capital – determinants of working capital requirement – cash management, Receivable management and inventory management – sources of working capital.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- S N Maheshwari, Financial Management.
- Khan and Jain, Financial Management.
- Dorai Raj. S.N, Financial Management.
- Sharma and Sashi Gupta, Financial Management.
- I M Pandey, Financial Management.
- James C Vanhorne, Financial Management.
- Prasanna Chandra, Financial Management.
- PN Reddy & Appanaiah, Financial Management.

AUDITING

Course Code: COM2401 **Credit Units: 03**

Course Objective:
To provide knowledge of auditing principles, procedures and techniques in accordance with the professional standards and requirements.

Course Contents:

Module I
Introduction to auditing Introduction – meaning - definition – difference between accountancy and auditing – types of audit - advantages of auditing – preparation before commencement of new audit

Module II
Internal check Meaning and objects of internal check – internal control-meaning definition-fundamental Principles-internal check as regards wages, cash sales, cash purchases - internal check in a departmental stores-internal audit – meaning-importance – advantage and disadvantages.

Module III
Verification and valuation of assets and liabilities: Meaning and objectives – position of an auditor as regards to the valuation of assets – verification and valuation of different items – assets –fixed assets - goodwill – stock in trade – investments – liabilities – capital – debentures – bills payable sundry creditors – contingent liabilities –

Module IV
Audit of different organizations drafting of audit program or trading and non-trading organization in a tabular form. Preparation of clean and qualified audit report with special reference to manufacturing and other Companies Audit Report 1975

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- TR Sharma, Auditing.
- BN Tandon, Practical Auditing.
- MS Ramaswamy, Principles and Practice of Auditing.
- Dinakar Pagare, Practice of Auditing.
- Kamal Gupta, Practical Auditing.
- P N Reddy & Appannaiah, Auditing.
- Shekar, Auditing.
- Pradeep Kumar, Auditing.
- Jagadeesh Prakash, Auditing

STATISTICAL METHODS IN RESEARCH-II

Course Code: COM2402 **Credit Units: 03**

Course Objectives:
To provide basic understanding of quantitative tools and their elementary application to business problems.

Course Contents:
Module I- Probability Theory
Independent, Dependent, Mutually Exclusive, Favourable, Exhaustive & Complementary events, Addition theorem, Conditional Probability, multiplication Theorem, Bayer's Theory.

Module II- Statistical Methods
Random Variable- Continuous & discrete; Discrete distribution- Binomial & Poisson, Bernoulli's trials; Continuous Distribution- Normal distribution, Properties of normal curve, importance & application

Module III- Tests of Hypothesis
Significance test: concepts and applications, acceptance and critical regions, null and alternative hypothesis, judgemental errors, level of significance. Power of a test, z test for testing of mean, proportion and equality of means, t- test, Chi square Test.

Module IV- Decision Tree
Decision Theory: Decision making, under certainity, uncertainity & risk, Bayersian Analysis, Decision tree.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Texts and References:
Text:
- Fundamentals of Applied Statistics, V.K.Kapoor & S.C.Gupta, S. Chand & Sons, New Delhi.
- Theory and Problems of Statistics, M.R. Theory, McGraw-Hill Book, London.

References:
- Business Statistics, J.K. Sharma, Pearson Education.
- Statistical Methods, S.P.Gupta, S. Chand and Sons, New Delhi.
- Applied General Statistics. F.E. Croxton & D.J. Cowden, Prentice Hall, New Delhi.

INCOME TAX LAW AND PRACTICE

Course Code: COM2403 **Credit Units: 03**

Course Objective:
To prepare the students with the concepts and theory of income tax accounting and to give a practical exposure to them

Course Contents:

Module-I: Introduction
Brief History of Income Tax, Legal Frame work, Cannons of Taxation – Finance Bill – Scheme of Income Tax. Definition: Assessee, Person, assessment year, previous year, income, Gross Total Income, Total Income, Agricultural Income (including integration of Agricultural Income with Non-Agriculture Income), Revenue and Capital (a) Receipts (b) Expenditure (c) Loss. Residential Status and Incidence of Tax.

Module II : Income from Salary
Income from Salary – Features of Salary Income – Basic Salary – Allowance, Perquisites section 89(1) – Tax Rebate U/S 88 – Problems.

Module III : Income from House Property
Income from House Property – Introduction – Annual value under different situations – deductions– problems.

Module IV : Profits from Business & Profession
Profits & Gains of Business & Profession – Introduction, Basic Principles, Basic Principles, Computation of Taxable profits of Business & Profession, deductions, problems.

Module V : Income from Capital Gains
Income from Capital Gains:- Introduction, Meaning & types of capital assets, Computation of Capital Gains, Problems.

Module VI : Income from Other Sources
Income from Other Sources:- Meaning, examples of income, Computation of income, Problems.

Module VII: Computation of Individual Tax Liability
Deductions from GTI: Rebates and reliefs, Clubbing provisions; set off and carry forward of losses. Assessment of an Individual

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- Dr. Vinod K. Singhania: Direct Taxes – Law and Practice, Taxmann publication.
- B.B. Lal: Direct Taxes, Konark Publisher (P) ltd.
- Bhagwathi Prasad: Direct Taxes – Law and Practice, Wishwa Prakashana.
- Dr. Mehrotra and Dr. Goyal: Direct Taxes – Law and Practice, Sahitya Bhavan Publication.
- Dinakar Pagare: Law and Practice of Income Tax, Sultan Chand and sons.
- Gaur & Narang: Income Tax.

BUSINESS INFORMATION AND DATABASE SYSTEM

Course Code: COM2404 **Credit Units: 03**

Course Objective:
The aim of this course is to introduce the students to the managerial issues relating to information systems, its role in organization and how information technology can be leveraged to provide business value.

Course Contents:

Module I:
MIS need and concepts, characteristics, Typology of MIS, Structure of MIS. Planning for MIS, System Development Methodologies, Conceptual and detailed designs of MIS, System Implementation strategies and process, System Evaluation and Maintenance.

Module II:
Introduction to data base management system- Data versus information, record, file; data dictionary, database administrator, functions and responsibilities, file-oriented system versus databases system.

Module III:
Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Data, Warehousing and Data Mining.

Module IV:
Database system architecture- Introduction, schemas, sub schemas and instances; data base architecture, data independence, mapping, data models, types of database systems.

Module V:
Data base security- Threats and security issues, firewalls and database recovery; techniques of data base security; distributed data base.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
Texts:

- James, A. O'Brien, *Introduction to Information Systems*, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2005.
- Kenneth C. Laudon and Jane P. Laudon, *Management Information Systems*, Prentice-Hall of India, New Delhi, 9th Edition, 2006.

References:

- Navathe, *Data Base System Concepts* 3rd, McGraw Hill.
- Date, C.J., *An Introduction to Data Base System* 7ed, Addision Wesley.
- Singh, C.S., *Data Base System*, New Age Publications, New Delhi.

PERSONAL FINANCIAL PLANNING

Course Code: COM2405 **Credit Units: 03**

Course Objective:
Post Liberalization, India has witnessed a phenomenal growth in her GDP. With the advent of MNC's, and growth in private business, individuals income and saving pattern has changed. Therefore the need arises to manage these funds in a manner that it is no more called as savings but addressed as a need for Personal financial planning. This course is essential for every student irrespective of the specialization as every individual needs to plan his finances.

Course Contents:
Module I: Introduction to personal financial planning and personal accounting
Concept of Personal Financial Planning: Need, Significance, Scope; Ethical issues in Personal Financial Planning; Changing per capita investors. Need to maintain Accounts, Methods: Traditional & Using Electronic Media. Applying for PAN & filing of Income Tax returns.

Module II: Investment Avenues
Real Assets: Investment in Real Assets: Real Estate, Precious Metals, Other Fixed assets. Their relative merits & demerits. Change in their returns over the past few years.
Financial Assets: Investments in securities: Through IPO, Secondary Market. Investment in G-sec; Debt instruments, Post Office instruments, Insurance Policies, Mutual Funds, Certificate of Deposits, Foreign Market.

Module III: Introduction to Income tax and Income from salary
Introduction to Income tax act 1961 and Finance Act. Previous year, Assessment year, Income, Total Income, Gross Total Income, Capital and Revenue Receipts / Expenditures, Exempted Incomes, Residential Status and incidence of Tax.
Salary, Exemption:- Leave encashment, Gratuity, Pension, Annuity, Pension fund, Allowance (HRA, Entertainment, Special allowance – dependent of expense ad not dependent on expenae, perquisites – rent free accommodation, Leave travel concession, medical facility), Deductions 80c to 80u.). Sections (2(9), 2(31), 2(7), 2(24), 3, 6, 14, 288A, 288B, 2(17), 4, 9, 45, 9(1)(ii), 9(1)(iv), 9(1)(v), 10, 11, 12, 17(1), 22,

Module IV: Income from house property, capital gains and other sources
Income from House Property(Types of house property, Exempted house property income, Computation of GAV and NAV, Treatment of unrealized, recovered and arrears of rent), Capital Gains and other Sources (Short term & Long term capital gain, Cost of acquisition, Cost of improvement, Index cost, Income that are taxed under other sources, Deduction under other sources, Tax treatment of lotteries, puzzles. Sections 23, 24, 2528, 30, 31, 32.

Module V: Tax planning
Concept, significance and problems of tax planning, Tax evasion and tax avoidance, Individual Taxation Slabs, Wealth Tax, Gift Tax, Capital Gains Tax, Service tax, Recent Tax saving schemes

Module VI: Retirement & Goal Planning
Concept of risk assessment of individual, Introduction to portfolio management, Retirement planning & investment: Income generation after retirement, liability management, anticipation of expenses. Investment for major goals: House, Family, Education, Medical, Wealth Management/ Financial Advisory companies. Their role, significance & growth.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:

Text:

- Chandra P, Investment analysis and Portfolio Management, 3rd edition, Tata McGraw Hill
- Lal & Vashisht, Direct Taxes, 29th Edition, Tata McGraw Hill.

References:

- V.K.Bhalla, Security analysis and Portfolio Management, 16th edition, S.Chand

TERM PAPER

Course Code: COM2431 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT

Course Code: COM2432 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

StepII : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III : Collection of information and data relating to the topic and analysis of the same.
Step IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP

Course Code: COM2433 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus - Fifth Semester

COST ACCOUNTING

Course Code: COM2551 **Credit Units: 03**

Course Objective:
To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:
Module I: Cost Accounting
Introduction – Meaning of Cost, costing and Cost Accounting – Comparison between Financial Accounts and Cost Accounts –Cost concepts and Classification of Costs – Cost Module – Cost Center, cost object –Preparation of cost sheet

Module II: **Material Costing**
Issue of materials, Methods of pricing of material issues- LIFO, FIFO- Weighed Average Method, Simple Average Method; Inventory Control- Concept & techniques like fixing of stock levels, EOQ, ABC analysis, perpetual & periodic inventory systems, material losses & their treatment.

Module III: Labour Costing
Control of labour cost – Labour Turn Turnover – Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking – Idle time, causes and treatment – Overtime – Methods of Wage Payment, Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

Module IV: **Overhead Costing**
Definition, Classification, allocation, apportionment & absorption of overhead, treatment of over & under absorption

Module V: Costing Methods Introduction
Unit Costing, Tender Costing Job Costing – Batch Costing – Contract Costing. Process Costing – principles – distinction between Process and Job – Preparation of process accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- N.K. Prasad: Cost Accounting
- Nigam & Sharma: Cost Accounting
- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal: Cost Accounting
- Jain & Narang: Cost Accounting
- S.P. Iyengar: Cost Accounting
- S.N. Maheshwari: Cost Accounting
- Horngren: Cost Accounting: A Managerial Emphasis
- M. N. Arora: Cost Accounting
- Dutta: Cost Accounting

MACRO ECONOMICS

Course Code: COM2501 **Credit Units: 03**

Course Objective:
This course aims at introducing the fundamentals of Macroeconomic theories, policies and models in a historical perspective. It will enable the students to develop a critical insight on Classical and Keynesian macroeconomic models, to understand the relationship between inflation and employment by providing exposure to the constructions of Friedman, Phelps & Phillips.

Course Contents:
Module I: Introduction to Macroeconomics
The roots of macroeconomics, macroeconomic concerns, the role of government in the macro economy, the components of the macro economy, the methodology of macroeconomics

Module II: Introduction to National Income Accounting
Concepts of GDP and national income, approaches to calculating GDP, GDP and personal income, Nominal and real GDP, Limitations of the GDP concept, GDP and the black economy.

Module III: Schools of Macroeconomic Thoughts
Classical, Neo Classical and Keynesian Models.; Say's Law of Markets and Classical Theory of Employment

Module IV: Keynesian Model
Aggregate expenditure and equilibrium output; Consumption function; theory of investment-marginal efficiency of capital; saving and investment; The Investment Multiplier and its application to LDC's

Module V: Money in the Modern Economy
Theories of Demand for Money: Quantity Theory and Keynes approach. Baumol and Tobin Contributions and Friedman's restatement of quantity theory Characteristics of a monetary economy; the supply of money and overall liquidity position; credit creation

Module VI: Inflation
The causes of inflation, level of prices and the value of money, The Fisher effect, the cost of inflation.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
Text:
- Mc Connell. C.R & H.C. Gupta, "Introduction to Macro Economics", Tata McGraw Hill, Delhi
- Gardner Ackeley, "Macro Economics".

References:

- J.E. Stiglitz, and C.E. Walsh (2002), *Principles of Economics*, 3rd Edition, W.W. Norton & Company, New York.
- R. Stone and G. Stone (1962), *National Income and Expenditure*, Bowes and Bowes London.
- Lipsey & Chrystal- Principles of Economics
- K.K. Dewett: Modern Economic Theory, New Delhi, Shyamlal Charitable Trust.

SUMMER INTERNSHIP EVALUATION

Course code: COM2535 **Credit Units: 06**

Objective:

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:

Every student of B.Com (Hons.) shall be required to undergo a practical training in an corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.

The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the fifth semester.

Chapter Scheme

Chapter I: Introduction 20 marks
Chapter II: Conceptual Framework/National/International Scenario 5 marks
Chapter III: Presentation, Analysis and Findings 35 marks
Chapter IV: Conclusion and Recommendations 15 marks

The report has to be type written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 80 to 100 pages and has to be submitted in two copies.

Evaluation Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks

Components of the Report

The outcome of Summer Internship is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions

a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).

c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).

d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

ACCOUNTING THEORY

Course Code: COM2502 **Credit Units: 04**

Course Objectives: The objective of this paper is to introduce the basics of accounting theory. The paper also tends to give a deep insight into the changing scenario of national and international accounting standards.

Course Contents:

Module I:

Accounting Theory: Meaning, need and structure development, Income measurement concept, valuation and capital maintenance concept, development of financial accounting standards in India and abroad.

Module II:

Corporate Reporting and Information disclosures: Concept of adequate disclosure, methods of disclosures, Indian company Law and disclosure practice. Current issues in corporate reporting: Reporting for investor and employees and social responsibility accounts, Social Accounting & Reporting. Revenue and Expenses recognition

Module III:

Productivity Accounting: Input output relationship and their Accounting. Human Resource Accounting: Concepts, Methods, Evaluation and Reporting.

Module IV:

Conceptual Framework of Accounting, Accounting Standards in India and Guidance, Notes on Various Accounting Aspects.

Module V:

Harmonization Accounting & Reporting: Nature of Harmonization, recommendation of the report of the advisory group on accounting and auditing RBI, International Accounting Standards Committee & International Accounting Standard Board (IASB), Obstacles in Harmonization

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:

Texts:

- Advanced accounts, Shukla & Grewal, S. Chand& Sons, Delhi
- An Introduction to Accounting Theory, L.S. Porwal, Tata McGraw Hill
- Corporate Financial Reporting, JawaharLal, Taxmann Publication(P) Ltd., New Delhi

References:

- Advanced Financial Accounting, B.D. Agarwal
- Advanced Accounts, H. Chakravarti
- Accounting Theory, R.K. Lele and JawaharLal, KitabMahal, Allahabad

ADVANCED CORPORATE ACCOUNTING

Course Code: COM2503 **Credit Units: 04**

Course Objectives: This course enables the students to develop advanced and thorough understanding of Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:
Module I:
Advanced problems on final Accounts of Companies

Module II:
Problems of Amalgamation, (AS-14) and Reconstruction, Aspects Of Corporate Reconstructuring.

Module III:
Consolidated Accounts of Holding and Group Companies.

Module IV:
Preparation of Final Accounts of Banking Companies and Insurance Companies.

Module V:
Preparation of Final Accounts of electricity Companies and Double Account System.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts and References:
Texts:
- Advanced Accounts, Batliboi
- Advanced Accounts, R.R. Gupta

References:
- Advanced Accounts, Shukla & Grewal
- Advanced Accounts, S.N. Maheswari
- Accountancy, W. Pickles
- Advanced Accountancy, R.L. Gupta

CORPORATE TAX LAW AND PRACTICE

Course Code: COM2504 **Credit Units: 04**

Course Objectives: To prepare the students with the concepts and theory of corporate tax law and practices and to give a practical exposure to them.

Course Contents

Module I
Computation of total income in case of companies including non-residents, Co-operative Society

Module II
Procedure for assessment: Section 139 to 148 (Return of Income)PAN, Assessments, Methods of Accounting, Accounting standards, Time limit for completion of Assessment, Rectification of mistake etc. Special procedure for assessment of search cases.

Module III
Liability in Special Cases: Legal representatives, Representative assesses: provisions applicable to firms, AOP & BOI, executors succession, shipping companies. Recovery of tax in respect of non-resident, persons leaving India, person trying to alienate their property, discontinuation of business & profession

Module IV
Collection and Recovery of tax, TDS, Advance payment of income tax, Interest u/s 234, Refunds and settlement of cases

Module V
Appeals & Revision, Acquisition of Immovable properties, provisions to counter evasion of tax, Penalties, Offences and Prosecutions, Authorized representation and miscellaneous provisions.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:

Texts:

- Income Tax Act, Taxmann, New Delhi
- Income Tax Rules, Taxmann, New Delhi

References:

- Direct taxes, V.K. Singhania, Taxmann, New Delhi
- Circulars and Notification issued by CBDT

BUSINESS TAXATION

Course Code: COM2505 **Credit Units: 04**

Course Objectives: The aim of this paper is to give a detailed knowledge and exposure to the various business taxes prevailing in the country.

Course Contents:

Module I-

C.S.T.: Constitutional History, Definitions, principle for determining different sales, Registration of Dealer, Rate of Tax.

C.S.T.: Determination of Taxable turn-over, Computation of Tax, Liability, Different forms used under C.S.T.

Module II-

Value Added Tax Act: Definitions, incidence and levy of tax, Computation Registration of Dealer, Exemptions Determination of taxable turn-over, computation of tax liability.

Module III-

C.S.T./V.A.T. : Tax authorities, filling of returns, assessments, payment and recovery of tax, appeal, revision and rectification.

Module IV-

Wealth Tax Act : Definitions, incidence of tax, deemed assets. exempted assets, computation of net wealth, Valuation of assets, assessment, appeals, penalties.

Module V-

Indian Tax System: Central and State Powers of taxation, Distribution of revenue between Centre and State. Finance Commission constitution, functions and recommendations.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:

Texts:

- Indirect Taxes, V.K. Singhania, Taxmann , New Delhi
- Central Sales Tax Act 1956

References:

- Bare Act of Value Added tax
- Central Sales tax Rules
- An Introduction to Rajasthan and Central Sales Tax Act, B.L.Gupta

Wealth Tax Rules, Taxmann, New Delhi

Syllabus - Sixth Semester

MANAGEMENT ACCOUNTING

Course Code: COM2651 **Credit Units: 03**

Course Objective:
To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:
Module I: Management Accounting
Nature & Scope: Meaning and Definition - Objectives of Management Accounting - Management Accounting and Financial Accounting - Management Accounting and Cost Accounting - Utility of Management Accounting - Limitations of Management Accounting - Position of Management Accountant in the Organisation.

Module II: Analysis and Interpretation of Financial Statements - I
Concept of Financial Statements and their Nature - Limitations of Financial Statements - Analysis and Interpretation - Tools - Comparative Financial Statements - Common size Statements - Trend Percentages
Ratio Analysis - Nature and Interpretation - Utility and Limitations of Ratios - Short-term Financial Ratios - Long-term Financial Ratios - Profitability Ratios - Proprietary and Yield Ratios - Turnover Ratios - DUPONT Control Chart

Module III: Cash Flow Analysis & Fund Flow Analysis
Distinction of cash from funds-utility of cash flow statement construction of cash flow statement

Module IV: Responsibilty Accounting and Standard Costing
Concept of Responsibility Accounting - Cost Centers and Profit Centers - Contribution by Segments, Standard Costing

Module V: Budgets and Budgetary Control
Concept of Budgets and Budgetary Control - Nature and Objectives of Budgetary Control - Advantages and Limitations of Budgetary Control - Establishing a system of Budgetary Control - Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget etc. - Flexible Budgets and Master Budgets

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Dr. S.N. Maheswari , Management Accounting
- Sexana, Management Accounting
- Made Gowda, Management Accounting
- Dr. S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy & Appanaiah, Essentials of Management Accounting

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Course Code: COM2606 **Credit Units: 03**

Course Objectives : To equip the students with advanced analytical tools, models and financial theory necessary for making sound investment decisions and optimum portfolio choice as well as understanding the paradigms by which financial securities are valued

Course Contents:

Module I: Introduction

Investment environment, various asset classes and financial instruments. Investment process. Return-risk analysis and impact of taxes and inflation. Types and sources of risks. Risk Aversion. Diversification and Hedging. Contemporary issues in investment management- Socially responsible investing (SRI), Ethical investing etc.

Module II: Analysis of Fixed Income Securities:

Bond fundamentals; Types of bonds; valuation of bonds; bond yields; bond price- yield relationship; analysis of risks in bonds-duration and convexity. Bond portfolio management- passive bond management and active bond management including bond immunization strategies.

Module III: Equity Analysis

Measurement of return and risk of equity shares. Approaches to equity analysis. Fundamental Analysis- Economy, Industry, Company Analysis; Equity Valuation Models (DDM, P/E Ratio model and Free Cash Flow Valuation approach).Forecasting P/E ratio. Technical Analysis – Market indicators and specific stock indicators including Bollinger bands. Efficient market hypothesis. Tests of market efficiency and empirical evidence. Assumption of Investor's rationality and its critique. Behavioural Finance- behavioural biases (Framing, Mental accounting, Regret avoidance and Prospect theory).

Module IV: Portfolio Analysis, Selection and Management

Risk aversion and capital allocation to risky assets and risk free asset; Risk tolerance and asset allocation; Optimal risky portfolio- Markowitz portfolio selection model. Sharpe's single Index Model and optimal portfolio construction. Capital Asset Pricing Model (CAPM) and Market Anomalies (Size effect, Value effect, Seasonality effect, Overreaction effect etc) . Extensions of CAPM (Zero beta CAPM and Merton's Inter temporal CAPM).Arbitrage Pricing Theory and Multifactor Asset Pricing Models. Active and Passive portfolio management. Investment strategies-value investing, momentum and contrarian strategies etc. Portfolio performance evaluation (Sharpe index, Treynor Index, Jensen's alpha, Information ratio, Fama's decomposition measure).Portfolio revision.

Module V: Financial Derivatives: Futures-types and payoffs. Pricing of financial futures and commodity futures (Cost of carry model). Options- types and valuation using Black and Scholes Model. Put call parity. Options trading strategies. Exotic options, Portfolios of futures and options synthetics. Financial engineering. Department of Commerce, University of Delhi 39 Note: Some case studies related to above topics are required to be discussed.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Bodie, Zvi., Kane Alex and Alan J. Marcus, Investments, McGraw Hill.
- Reilly, Frank K, and Brown, Keith C., Investment Analysis and Portfolio Management, Cengage Learning.
- Chandra, P., Security Analysis and Portfolio Management, Tata McGraw Hill.
- Vishwanath, R and Krishna Murthi C., Investment Management, Springer

DISSERTATION

Course Code: COM2637 **Credit Units: 09**

Objectives:
The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Bibliography: 5 marks

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

The Components of a Dissertation

A Dissertation should have the following components:
1) Cover Page: This should contain the title of the, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Dissertation).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the work, and in writing the report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:
- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Step V: The following documents are to be attached with the Dissertation:
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.
Annexures,
References / Bibliography

Guidelines for Evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Cover Page / Title page

Project Report on
Title of the Project
XXXXXXXXXXXXXXXXX
(Submitted for the partial fulfilment for the awardof Degree of B.Com. Honours in Accounting / Taxation/ …….
To
Amity College of Commerce

Submitted by

Name of the Candidate :.....
Registration No. .....
Name of the College .....
College Roll No. .....

Supervised by
Name of the Supervisor:
Designation

Month & Year of Submission

University Logo and Name

Student's Declaration

I hereby declare that the Project Work with the title (in block letters) .....
.....
submitted by me for the partial fulfilment of the degree of B.Com. Honours in Accounting & Finance / Marketing / Taxation / Computer Applications in Business is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.
I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Signature
Name of the candidate:

Registration No.

Place:
Date:

Examples of a few broad areas for Dissertation (List is indicative, not exhaustive)

- Any topic concerning local economic /entrepreneurial issues / **New Business Proposal**
- IFRS and Indian Accounting Standard – Opportunities & Challenges
- Revised Schedule VI
- Credit Rating
- Risk Management
- Credit Risk Management in Banks: Opportunities & Challenges.
- Subprime Meltdown and its after effect with case study from Indian Industry.
- Corporate Frauds/ White Collar Frauds
- Financial Inclusion
- Micro-finance Institutions in India.
- Carbon Credit
- Direct Tax Code (DTC)
- Goods and Service Tax (GST)
- Role of MSMEs in the Indian Economic Development
- Public Sector Undertakings and Indian Economic Development
- Business & Government
- Corporate Social Responsibilities
- Corporate Governance
- Financial Sector Reforms
- On-line Banking
- NPA Management
- Business Process Outsourcing
- Capital Market
- Environmental Accounting
- Environmental Management
- Financial Statement Analysis
- Performance Analysis
- Working Capital Management
- Cash Management
- Debtors Management

- Inventory Management
- Mergers & Acquisitions
- e-Commerce
- Study on Aviation Sector in India.
- Venture Capital
- Equity Linked Savings Scheme
- Insurance Industry in India
- Analysis of Mutual Funds
- Study of Non-Performing Assets
- Risk and Return Analysis
- Commercialization of Sports in India.
- The Sub-Prime Crisis.
- Rural and Agricultural Banking
- Marketing Strategy of different companies for their different products and Promotional Strategies
- Market Research
- Study on the Market Awareness of Intellectual Property
- Preservation & Storage of Agricultural Products
- Marketing Strategy of Ball/ Gel Pens
- Brand Repositioning
- Customer Relationship Management
- Sales & Distribution Management
- Customer Awareness
- Industrial Marketing Vs. Consumer
- Study of Consumer Behaviour
- " Is attractive packaging really a necessity or an eyewash?" A study on packaging of some selected companies-
- Consumer Behaviour
- After Sales Service and Customer Satisfaction
- Effectiveness of Advertising
- Direct Marketing & Networking

ADVANCED ACCOUNTS

Course Code: COM2602 **Credit Units: 04**

Course Objectives:

Course Contents:
Module I-
Valuation of Assets: Inventories, Goodwill, Shares and Business, (AS-26).

Module II-
Investment Accounts: Accounting Standard 13, Accounting for Financial asset and Instrument.

Module III-
Agricultural Farm Accounting, Hotel Accounting, Accounting for inflation.

Module IV-
Fund Based Accounting, Introduction to Government Accounting, Corporate Social Accounting and Environmental Accounting.

Module V-
Value Added Statement, Economic Value Added (EVA) Statement, Human Resource Accounting.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P**- Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:
Texts:
- Advanced Accounting, Batliboi
- Advanced Accounts, M.C. Shukla & T.S. Grewal
- Advanced Accountancy, R.L.Gupta

References:
- Advanced Accountancy, Jain & Narang
- Advanced Accountancy, H. Chakraborthy
- Advanced Accountancy, M.C.K. Nambiar

ADVANCED COST ACCOUNTING

Course Code: COM2603 **Credit Units: 04**

Course Objectives:

Course Contents:

Module I: Cost Book-Keeping
Non-integrated Accounting system, Accounting Ledgers And Control Accounts, Integrated Accounting, Reconciliation of Cost & Financial Accounts.

Module II: Process Costing
Basic Concept, Joint products and By-products, work-in-progress, (Equivalent production), inter-Process profits, Uniform Costing and inter firm comparisons.

Module III: Activity Based Costing
Problems of Traditional Costing, Cost analysis under ABC, Institution of ABC, Benefits and Weaknesses, Life Cycle Costing; Target Costing.

Module IV: Cost Management System
Total Quality Management, Benchmark, Back-flush Costing, Reengineering, Cost Reduction and value Analysis: Concept and Techniques.

Module V:
Service Costing, Marginal Costing, Standard Costing, Decision Making, Make or buy, Add or Drop, Operate/Shutdown, Sell/Process.

Examination Scheme:

Components	**A**	**P**	**HA**	**CTT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
Text:
- Principles and Practice of Cost Accounting, N. K. Prasad
- Cost Accounting, C.D. Vashisht & V. K. Saxena, Sultan Chand& Sons, New Delhi.

References:
- Principles & Practice of Cost Accounting, Asish K Bhattacharyya ,Wheller Publishing, N. Delhi
- Management Accounting, J. Batty
- Advanced Cost Accounting & Cost System, M. Kishore Ravi
- Accounting For Management, Guru Prasad Murthy
- Decisional Phenomena And Management Accountants, Backer and Jucobson

INDIRECT TAXES INCLUDING GST

Course Code: COM2604 **Credit Units: 04**

Course Objectives: To provide students with adequate theoretical and working knowledge about GST and its practical application in unification of indirect tax system in India. The course intends to make students aware of the latest developments and changes being incorporated in GST at the systemic level and its implications in the process of economic and financial integration.

Course Contents:

Module I-

Origin of GST – Evolution of GST concept, How GST came into existence, GST Laws, Constitutional Perspectives – Cooperative Federalism in economic system, Application of GST in tax sharing – CGST/SGST/IGST, Classification of goods and services in GST assessment, Exemption from Tax, Composition levy.

Module II-

Basic Framework of GST – Unification of indirect tax system, GST Council – composition, objectives, functions and significance, Tax sharing and disbursement mechanism between the Centre and states, Responsibilities of various stakeholders – government, firms, traders, consumers,. Registration, Tax invoice, Returns.

Module III-

Administration of GST – GST Network, Registration, Tax Invoice, Credit & Debit Notes, Electronic way bill for interstate movement of goods, Computation of GST Liability, Input Tax Credit, Concept of times value of supply, Filing of Returns, Payment of Tax, Search, Seizure & arrest, Demand & Recovery, Offences & Penalties.

Module IV-

Safeguard Measures – Anti-profiteering clause, Reverse charge mechanism, Assessment & Audit, Inspection – Concept of HSN and SAC, Advance Ruling, Appeals & Revision, Implications on Tax terrorism, corruption, tax evasion and black money

Module V-

Comparative analysis between GST in India and other countries such as Canada, France, Australia and China, Advantages and Disadvantages.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

Text:

- GST Council, Government of India, Publications.
- Singh, Awdhesh (2018), *GST Made Simple: A Complete Guide to Goods and Services Tax in India*, Centax Publications.

References:

- Bhattacharjee Govind and Debasis Bhattacharya (2018), *GST and Its Aftermath – Is Consumer Really the King?* SAGE Publications.
- Garg, Rakesh (2016), *Handbook of GST in India: Concepts and Procedures*, Bloomsbury.

PUBLIC FINANCE AND TAX PRACTICES

Course Code: COM2605 **Credit Units: 04**

Course Objective:

Course Contents:
Module I:
Origin and Development of Public Finance
Meaning, public finance and federal finance, public finance and private finance, principle
Principles of Taxation and Government Expenditure
Benefit approach, allocation of public goods, ability to pay approach, excess burden of taxes

Module II:
Raising of Public Funds
Sources and classification of public revenues, incidences and shifting of taxes
Distribution of Public Funds
Effect on production, employment, distribution and stability, public debt and fiscal deficit

Module III:
Public Debt Management and Taxation
Development of Federal Finance in India
The constitutional arrangements, Finance Commissions

Module IV: Central and StateFinances
Sources and uses of funds, effects of Fiscal Policy, relation between planning and central budgeting
State Finances- Sources and uses of funds, issues of federalism

Module V: Financing of Five-year Plans
Changing scenario of Indian tax Structure, new economic policy since 1991
Indian Fiscal Policy and Deficit Financing

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	15	5	5	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:
Texts:
• R. Mursgrave, The Theory of Public Finance, McGraw Hill
• R. Mursgrave and P.B. Mursgrave, Public Finance in Theory and Practice, McGraw Hill
• J. M. Buchanan, Public Finance

References:
• Due and Friedlandar, Public Finance
• S. Ganguli, Public Finance, World Press
• B. M. Bhargava, Public Finance
• B. M. Bhargava, The Theory and Working of Union Public of India
• Vaish and Agarwal, Public Finance, Wiley Eastern

Amity College of Commerce

Master of Commerce

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Commerce

Syllabus - First Semester

ORGANIZATION THEORY AND BEHAVIOUR

Course Code: COM4101 **Credit Units: 03**

Course Objective:

The objective of the course is to develop a theoretical understanding among students about the structure and behaviour of organization as it develops over time. The course will also make them capable of realizing the competitiveness for firms.

Course Contents:

Module-I : Introduction to Organizational Theories and Behaviour

Organizational Theories and Behaviour: Classical, Neo -classical and Contemporary. Authority, Power, status, formal and informal structure. Flat and Tall structures. Bureaucratization of organizations. Organizational Behaviour-concepts, determinants, models, challenges and opportunities of OB. Transaction cost and organizational behaviours. Contributing disciplines to the OB. Individual Behaviour: Foundations of individual behaviour, values, attitudes, personality and emotions. Theory X and Theory Y, Chris Argyris behaviour patterns, Perceptual process.

Module-II : Group Decision making and Communication

Group Decision making and Communication: Concept and nature of decision making process, Individual versus group decision making, Nominal group technique and Delphi technique, models of communication, communication effectiveness in organizations. Feedback, TA, Johari Window.

Module-III : Motivation

Motivation: Need hierarchy, Maslow's Need Hierarchy, Two factor theory, Contemporary theories of motivation (ERG, Cognitive evaluation, goal setting, equity) expectancy model. Behaviour modification, Motivation and organizational effectiveness.

Module-IV : Leadership, Power and Conflict

Leadership, Power and Conflict: Concept and theories, Behavioral approach, Situational approach, Leadership effectiveness, Contemporary issues in leadership . Power and conflict. Bases of Power, power tactics, sources of conflict patterns, levels and conflict resolution strategies.

Module-V

Organizational Culture, Organizational Development and Stress Management: Concept and determinants of organizational culture, Organizational Development: concept and intervention techniques. Individual and organizational factors to stress, consequences of stress on individual and organization, management of stress. Case Studies: Some cases of real business world are required to be discussed.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

1. Robbins; S.P., *Organizational Behaviour* (13th edition), Prentice Hall of India Pvt. Ltd., New Delhi, 2008.

2. Luthans, Fred, *Organizational* Behaviour, 11th Edition, Mc Graw Hill International, New York, 2007.

3. Robins S.P., *Organizational Theory: Structure Design and Application,* 3rd ed. Prentice Hall of India Pvt. Ltd., 2007.

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

Course Code: COM4102 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint the students with the use of quantitative models in decision making.

Course Contents:
Module-I : Introduction
Introduction: Quantitative approach to management decision making. Linear Programming: Mathematical formulation of linear programming problems and their solution using graphic approach and simplex algorithm. Duality Sensitivity analysis. Big M Method

Module-II : Transportation
Transportation: Solving the problem, testing optimality MODI method. Cases of unbalanced problems, degeneracy, maximization objective, multiple solutions and prohibited routes.

Module-III
Assignment: Solving the problem. Cases of unbalanced problems, multiple optimum solutions, maximization objective and unacceptable assignments. Integer Programming: problem Formulation and solution.

Module-IV
Game Theory: Games of pure strategy. Games of mixed strategy. Dominance. Queuing Theory: Elements of a queuing system. Models with Poisson arrival and services rates, single server and infinite and finite population.

Module-V: Sequencing
Sequencing: n-jobs to be processed on two machines in the same order of machines. N-jobs to be processed on m machines in the same order of machines – by converting it into a two – n machine case. Two jobs to be processed on machines in the different orders of machines.

(The emphasis should be on concepts and application of concepts)
Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P-**Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT-**Class Test; **EE**-End Semester Examination

Suggested Readings:

- Levin, R.I., D.S. Rubin and J.P. Stingson, "*Quantitative Approaches toManagement"*, 1986, McGraw - Hill.
- Vohra N.D., "*Quantitative Techniques in Management "*, 3rd Edition, The McGraw Hill companies, 2006.
- Bierman H. Jr, C.P. Bonini and W.H. Hausman, "Quantitative Analysis for Business Decisions", 7th Edition, Homewood, Ill., Irwin 1983
- Taha, Hamdy A., "Operations Research: An Introduction", 8 th Edition, Prentice – Hall of India.

ECONOMIC ANALYSIS FOR BUSINESS

Course Code: COM4103 **Credit Units: 03**

Course Objective:
To familiarize the students with theoretical concepts of modern Economic Analysis so that they can use these as inputs in managerial decision making process. Emphasis would be laid on the understanding of key economic variables both at micro and macro level which influence the business operations and strategies of the firm and the under which they operate.

Course Content:

Module I: Theory of Demand and Supply
Nature and scope of economic analysis: its relevance for managerial decision making, Demand analysis: nature of demand for a product- individual demand and market demand, demand by market segmentation. Demand function and determinants of demand. Supply function: determinants of supply of a product, law of supply. Elasticity of supply.
Concept of elasticity of demand- income, cross, price and advertizing elasticity. Theorems on the price elasticity of demand. Applications of the concept of price elasticity of demand in business decisions. Demand forecasting-need for forecasting and techniques of forecasting. Cost concepts: costs relevant for management decision making. Economies of scale: internal and external. Cost function: cost and output relationship.

Module II: Theory of Production and Cost
Production analysis: Production function-neo-classical, Cobb- Douglas, Leontief. Least cost combination of inputs for a firm. Concept of an isoquant-smooth curvature and right angle. Returns to scale and returns to a factor. Expansion path of a firm. Cost Analysis: Cost relevant for management decision making. Economies of scale: Cost Function: Cost and output relationship. An Analysis of the Objectives of a Business Firm: Profit Maximization Model, Baumoul's Sales Maximization Model, Marris's Model of 'Managerial Enterprise' Williamson's Model Of 'Managerial Discretion.

Module III: Market Structure: Price and Output Decisions
Pricing and Output decisions – Perfectly Competitive and Monopoly Market Pricing and Output Decisions- Under Monopolistically Competitive Market- Product Differentiation; Price Discriminating Monopolist; Models of Oligopolistic Market: Price Rigidity – The Kinky Demand Curve Model Interdependence - The Cournot Model, Price Leadership Models, Cartels and Collusion.

Module IV: Macro Economics Analysis
Economic Policy and Analysis: Macro Economic Variables and Functional Relationships. Business Environment: Factors Influencing the Business Environment. National Income Analysis. Models of Circular Flow of Money-Incorporating Savings Investment, Foreign Trade and Government Sector. Consumption Function, Saving Function and investment Function. Concepts of Investment Multiplier. Factors Influencing Consumption Function. Demand and Supply of Money: Transaction, Precautionary and Speculative Demand for Money; Liquidity preference function; Components of Money Supply. Business Cycles: An Analysis of Fluctuation in the level of Economic Activity. Phases of Business Cycles.

Inflation and Deflation: Demand – Pull and Cost – Push Inflation. Impact of Inflation . Analysis of Policies to control inflation. Deflation. Monetary Policy: Objectives of Monetary Policy. Function of

Central Bank. Credit Policy and its implications on the Corporate Sector. Fiscal Policy: meaning, objectives and impact on economy. Money Market, Capital Market and Foreign Exchange Market.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Text &References:

- Gupta, G.S. (2006), Managerial Economics, Tata McGraw Hill
- Peterson, H.C and Lewis, W.C. (2005), Managerial Economics, Prentice Hall of India
- R Ferguson, R., Ferguson, G.J and Rothschild, R. (1993) Business Economics, Macmillan.
- Chandra, P.(2006), Project: Preparation, Appraisal, Implementation and Review, Tata McGraw Hill.

FINANCIAL MANAGEMENT AND POLICY

Course Code: COM4104 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint the students with the basic analytical techniques and methods of financial management of business firms. The course also provides students the exposure to certain sophisticated and analytical techniques that are used for taking financial policy decisions.

Course Contents:
Module-I : Introduction
Financial Management: Nature, objectives and scope; financial decision-making and types of financial decisions ; role of a finance manager in a firm and Agency problem. Risk-Return framework for financial decision -making.

Module-II : Capital Budgeting
Capital Budgeting Decisions: Nature and Kinds of Capital Budgeting Decisions; techniques of evaluating capital budgeting decisions, capital budgeting decisions under constraints and with multiple objectives using Mathematical Programming Models; Capital budgeting decisions under inflation; Capital budgeting decisions under uncertainty and their evaluation using Statistical Decision Theory. Analysis of Real life capital budgeting decisions-some case studies.

Module-III : Capital Structure
Capital Structure: Concept; financial leverage and its impact on the valuation of firm; theories of capital structure, optimal capital structure; determinants of capital structure.

Module-IV : Dividend Policy
Dividend Policy: Dividend and its form; cash dividend, right and bonus shares, and buy-back of shares; theories of dividend policy and their impact on the value of a firm; types of dividend policy-constant pay-out ratio and constant dividend amount policies; determinants of dividend policy and some case studies.

Module-V: Working Capital Management
Working Capital Planning and Management: Basics of working capital planning and management; estimation of working capital requirement; working capital policy and its management of cash, account s receivables and inventories; Mathematical and Simulation Models for Working Capital Decisions; financing working capital.

Module-VI: Corporate Restructuring
Corporate re-structuring: Mergers and Acquisitions -types; sources of takeover gains; valuation and financing of acquisitions; Analysis of some case studies. The empirical evidences on theories and the case studies relevant for above topics are required be discussed.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:
1. Van Horne, James C., *Financial Management and Policy* , Prentice Hall of India 12th Ed, 2008.
2. Pandey I. M., *Financial Management*, 9th Ed. Vikas Publishing.
3. Ross S.A., R.W. Westerfield and J. Jaffe, *Corporate Finance*, 7th Ed. McGraw Hill.
4. Brealey R.A. and S.C. Myers, *Principles of Corporate Finance* , McGraw Hill, 6th Ed.
5. Damodaran, *A, "Corporate Finance: Theory and Practice "*. John Wiley & Sons, 2nd Ed., 2001.

AUDITING

Course Code: COM4105 **Credit Units: 03**

Course Objective:
To provide knowledge of auditing principles, procedures and techniques in accordance with the professional standards and requirements.

Course Contents:
Module-I: Introduction
Introduction to auditing Introduction – meaning- definition – difference between accountancy and auditing – types of audit—advantages of auditing – preparation before commencement of new audit

Module-II: Internal Check & Control
Internal check - Meaning and objects of internal check – internal control-meaning definition-fundamental Principles-internal check as regards wages, cash sales, cash purchases - internal check in a departmental stores-internal audit – meaning-importance – advantage and disadvantages. Duties and Responsibilities of an auditor.

Module-III: Valuation & Verification of Assets & Liabilities
Verification and valuation of assets and liabilities: Meaning and objectives – position of an auditor as regards to the valuation of assets – verification and valuation of different items – assets –fixed assets - goodwill – stock in trade – investments – liabilities – capital – debentures – bills payable sundry creditors – contingent liabilities –

Module-IV
Audit of different organizations drafting of audit program or trading and non-trading organization in a tabular form. Preparation of clean and qualified audit report with special reference to manufacturing and other Companies Audit Report 1975

Module-V
Visit an audit firm, write about the procedure followed by them in Auditing the books of accounts of a firm. Record the verification procedure with respect to any one fixed asset.
Prepare a qualified or clean audit report for a given situation.
Audit Program, Draft an audit program.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P-**Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Text & References:
- TR Sharma, Auditing.
- BN Tandon, Practical Auditing.
- MS Ramaswamy, Principles and Practice of Auditing.
- Dinakar Pagare, Practice of Auditing.
- Kamal Gupta, Practical Auditing.
- P N Reddy & Appannaiah, Auditing.
- Shekar, Auditing.
- Pradeep Kumar, Auditing.
- Jagadeesh Prakash, Auditing

COMPUTER APPLICATIONS IN BUSINESS

Course Code: COM4106 **Credit Units: 03**

Course Objective:
The purpose of this course is to equip the students with fundamental aspects of computers and communication and their application in Commerce.

Course Contents:
Module-I: Introduction
Introduction to Data Information, and knowledge and IT. Changing decision making scenario; Quality of information role of IT in information generation and value addition.

Module-II: Computer Hardware & Software
Computer Hardware and Software: Types of computer systems – micro, mini, mainframe, super. Personal Database Management System: Concept of Database Management System, database Design - Physical and Logical. Data computers –its main component and configuration. Operating system, Application Software. Programming Language.

Module-III : Introduction to Internet
Internet and World Wide Web: History and future of Internet. Web client and Web-Server. Web page and Website. Domain Name System. WWW as a marketplace. Client side programming and server - side programming.

Module-IV
Desktop Application: Important features of Word processing, Presentation, Graphics and Spreadsheet Application Software. Statistical Packages: for Analysis of Variance Multi-variate analysis, Factor, Cluster Discriminant and Regression Analysis.

Module-V : Database Management system
Databases Management System: Concept of Database Management System. Database Design – Physical and Logical. Data bases and tables Forms, Queries and Reports. SQL. Client server Architecture, Distributed Databases.

Module-VI : Networking
Fundamentals of Networking and Communication: LAN, MAN, WAN, Networking Topologies Data communication. Broad Band Communication, Wireless Mobile Communication.

Module-VII: Management Information System
Management information system: Transaction processing system (TPS) Traditional v/s contemporary TPS. Decision support system (DSS). Expert system. Recent developments in Computer Application.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:
1. Comer, Douglas E. (2007), the Internet Book, New Delhi : PHI Learning Private Limited).
2. Morley, Deborah and Charles S. parker (2007) Fundamentals of Computers (New Delhi : Learning India Pvt. Ltd.)
3. Leon a. and Leon M., (2002) Fundamental of Information Technology, Vikas Software Manuals.
4. Laudon, Kenneth C. and Jane P. Laudon, (2003), Management Information Systems (New Delhi: Prentice Hall of India).

Syllabus - Second Semester

MANAGERIAL ACCOUNTING

Course Code: COM4201 **Credit Units: 03**

Course Objective:
The objective of the course is to enable students to acquire sound Knowledge of concepts, methods and techniques of management accounting and to make the students develop competence with their usage in managerial decision making and control.

Course Contents:
Module-I: Introduction
Management Accounting – Nature and Functions; Financial vs. Management Accounting; Cost vs. Management Accounting; Role of Management Accountant, Cost Concepts and Classifications.

Module-II: Cost-Volume-Profit Analysis
Cost-Volume-Profit (CVP) Analysis – Contribution Margin; Break – Even Analysis; Profit Volume (P/V) Analysis; Multiple -Product Analysis; Optimal use of Limited Resources, Relevant Information and Short -Run Managerial Decisions – Managerial Decision Making; Decision Making Process; Differential Analysis; Types of Managerial Decisions – Make/Buy, Add/Drop, Sell/ Process Further, Operate/Shutdown, Special Order, Product-Mix, Pricing Decisions.

Module-III: Budgeting
Budgeting – Nature and functions; Preparation of Different Types of Budgets, Fixed Versus Flexible Budgeting.

Module-IV: Marginal and Standard Costing
Variable and Absorption Costing – Concept, Comparison, Applications of Variable Costing, Preparation of Income Statements. Standard Costing – Concept, Advantages; Types of Standards; Variance Analysis; Materials, Labour, Overhead; Managerial Uses of Variances.

Module-V: Responsibility Accounting
Responsibility Accounting and Divisional Performance Measurement – Advantages and Disadvantages of Divisionalisation; Concept of Responsibility Accounting; Responsibility Centres – Cost Centre, Revenue Centre, Profit Centre, Investment Centre, Responsibility Performance Reporting, Divisional Performance Measurement – Measures of Performance; Return on Investment (ROI) Versus Residual Income (RI); Non- Financial Performance Measures; Transfer Pricing Methods.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Atkinson Anthony A., Rajiv D. Banker, Robert Kaplan and S. Mark *Young,Management Accounting,* Prentice Hall, 2001.
- Horngreen Charles T., and Gary L. S undem and William O. Stratton, *Introduction to Management Accounting*, Prentice Hall of India, 2006.
- Drury Colin, *Management and Cost Accounting* , Thomson Learning, 2001. 4. Garison R.H. and E.W. Noreeb, *Managerial Accounting*, McGraw Hill, 2000.
- Ronald W. Hilton, Managerial Accounting, McGraw Hill Education, 2006.
- Jawahar Lal, Advanced Management Accounting, Text, Problems and Cases, S. Chand & Co., New Delhi, 2009

BUSINESS ENVIRONMENT

Course Code: COM4202 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint students with the concepts of macro–economics and the macro environment in which a business organization operates. The course would also make the student capable of analyzing and understanding the macro economic policies of the government implemented from time to time and assess their impact on business.

Course Contents:
Module-I: Introduction
Basic IS-LM frame-work, Asset markets, the demand for and the supply of real balances and their interest elasticities. Implications of modified IS and LM functions on relative efficacy of fiscal and monetary policies. Short and long run aggregate supply and shifts in aggregate supply. Aggregate demand, aggregate supply and the price level. Interaction of aggregate demand and aggregate supply and the determination of real income. Shifts in aggregate demand, demand management policies.

Module–II: Open Economy
Exchange rate regimes, foreign exchange markets, Asset choices in an open economy and capital flows. Trade flows, External balances, IS -LM-BOP curve analysis and implications for policy choices. Expectations and Economic Behaviour.

Module–III: Inflation and Unemployment
Inflation and unemployment: Impact of unemployment on IS -Curve. Theories of unemployment, types, causes and costs of unemployment. Inflation and unemployment, policy alternatives. Real Business Cycles.

Module– V: Macro-Economic Environment
Macro-economic environment, Economic Growth (Theories in Modern Context) its variables and strategic planning. Macro economic indicators and forecasting of macro-economy. Economic Policies and Macro Economic movements in an open economy.

Module–V
Globalization, Liberalization and Business environment. Economic Planning and the emerging environment.

Module–VI: Business Laws
Environmental Laws, Costs and Business Behaviour. Consumer Laws, Cost and Business Behaviour, W.T.O. and emerging business environment.

NOTE: - This course is to be taught with contemporary issues relevant in the environment of Indian business with notable examples and illustrations.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

The basic readings have been provided below and additional readings will be provided on year to year basis.

- Branson William H., *Macro Economic* Theory and Policy, First East – West Press, 3rd edition 2005.
- Dornbusch, R. and S. Fischer *Macro Economic* 6th edition Publisher Tata McGraw Hill.
- Oliver Blanchard *Macro Economic* 4th edition Pearson Education, LPE.
- Mankiw, N. Gregory, *Macro Economic* 4th edition. Macmillan.

CORPORATE ACCOUNTING

Course Code: COM4203 **Credit Units: 03**

Course Objective:
This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of Companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:

Module-I: Accounting for Shares and Debentures
Accounting for share capital transactions - issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of shares; redemption of preference shares - statutory requirements, disclosure in balance sheet; rights issue, with advanced problems. Issue of debentures - accounting treatment and procedures; redemption of debentures; conversion of debentures into shares, different methods for redemption of debentures.

Module-II: Final Accounts of Company
Preparation and presentation of final accounts of joint stock companies as per company law requirements; provisions and reserves; determination of managerial remuneration; appropriation out of profits; transfer of profits to reserves; payment of dividend, transfer of unpaid dividend to Investor Education and Protection Fund; bonus shares and payment of interest out of capital.

Module-III
Accounting treatment for amalgamation, absorption and reconstruction of companies; internal and external reconstruction, Advanced Problems.

Module-IV: Holding & Subsidiary Company
Holding and subsidiary companies - accounting treatment and disclosures; consolidation of accounts.

Module-V: Valuation of Goodwill & Shares
Valuation of Goodwill and Shares
Goodwill - Meaning – Definition – Elements of goodwill – Types of Goodwill – Purchased Goodwill – Nonpurchased or inherent Goodwill – Valuation of Non-purchased Goodwill – Average Profit Method – Super Profit Method – Capitalization of Average Profit Method – Capitalization of Super Profit Method – annuity method Shares - Meaning – need for valuation – factors affecting valuation – methods of valuation – Asset Backing or Intrinsic Value Method –Yield Valuation Method – Dividend Yield –Fair Value method – value of right shares – valuation of preference shares.

Module-VI: Liquidation Accounts
Voluntary Liquidation – Preparation of Liquidator's Statement of affairs – order of payment - Calculation of commission on Assets Realized – payment to unsecured creditors – payment to Unsecured creditors other than preferential creditors – calculation of pro rata- treatment of uncalled Capital – liability of contributors.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- S.N. Maheswari, Financial Accounting
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting
- Tulsian, Advanced Accounting

MARKETING MANAGEMENT

Course Code: COM4204 **Credit Units: 03**

Course Objective:
The objective of the course is to familiarize the students with the basic concepts and principles of marketing and to develop their conceptual and analytical skills to be able to manage marketing operations of a business firm.

Course Contents:

Module-I: Introduction
Introduction : Traditional view of marketing; Evolution of marketing concept; Modern concept of marketing; Marketing functions and role; Marketing management process- a strategic perspective.

Module-II: Marketing Environment
Marketing Environment: Significance of scanning marketing environment; Economic, demographic, socio-cultural, technical, political and legal environment of marketing in India. Buyer's behaviour- Consumer vs. business buying behaviour; Consumer buying decision process and influences; Industrial buying process.

Module-III: Market Segmentation
Market Segmentation, Targeting and Positioning: Bases and procedure for segmenting a consumer market; Criteria for effective market segmentation; Target market selection and strategies; Positioning – concept, bases and process.

Module-IV: Product Decision
Product Decision: Product concept and classification; Major product decisions; New product development; Consumer adoption and innovation diffusion, Product life cycle – concept and appropriate strategies to be adopted at different stages. Pricing Decisions:- Objectives of pricing; Factors affecting price of a product; Procedure for setting price; Pricing policies and strategies.

Module-V: Distribution Decision
Distribution Decisions: Channels of distribution – concept and importance; Different types of distributions, middlemen and their functions; Channel management, Selection, motivation and performance appraisal of distribution middlemen; Retailing and wholesaling – Developments and Indian perspective; Distribution logistics – concept, importance and major logistics decisions.

Module-VI: Promotion Decision
Promotion Decisions: Meaning a nd importance of promotion; Communication process; Promotion tools- their effectiveness; determining optimal promotion mix; Developing and implementing a promotional campaign; Promoting through internet; Promotion scene in India.

Module-VII: Marketing Planning
Marketing Planning, Organizing and Control: Marketing planning process; Different ways of organizing the marketing department; Sales, cost and profit analysis.

Module-VIII:
Social, Ethical and Legal Aspects of Marketing; Consumer Protection in India; Services marketing, rural marketing, direct marketing, internet marketing and other marketing developments – Issues, salient features and their applications in India.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Kotler Philip and Kevin Keller *Marketing Management*, 13th ed., Pearson Prentice – 2008.
- Kotler, Philip, and Gary Armstrong, *Principles of Marketing*, 12th ed., Pearson Prentice-Hall 2008.
- Etzel, Michael J., Bruce J.Walker and William J. Stanton, *Fundamentals of Marketing*, 11th ed.,, McGraw Hill, 2008.
- McCarthy, E. Jerome, Joseph P. Cannon a nd William D. Perrault, Jr., *Basic Marketing: A Managerial Approach*, 9th ed., McGraw Hills, 2008.
- Keller, Philip, Keller Kevin lane, Koshy Abraham, Jha Mithileshwar, Marketing Management : A South Asian Perspective, 13 th Edition, 2008

E-COMMERCE

Course Code: COM4205 **Credit Units: 03**

Course Objective:
The purpose of this course is to develop understanding of Web - based Commerce and equip them to assess e-commerce requirements of a business and develop e –business plans and to interact with various IT professionals who m ay be developing e-commerce applications.

Course Contents:
Module-I: Introduction
Introduction to Electronic Commerce: Meaning, nature and scope; Business application of e-commerce; Global trading environment and adopting of e -commerce, evolution of World Wide Web, future of Web.

Module–II
Web-site Design: Web sites as market place; Role of web site in B2C e -commerce; Web site strategies; Web site design principles; push and pull approaches; Alternative methods of customer communication such as e -mail, BBA; E-mail etiquette and e-mail security.

Module–III
Business Models of E-Commerce; B2B, B2C, B2G and other models of e - commerce; Applications of e-commerce to supply chain management; Product and service digitisation; Remote servicing, procurement and online marketing and advertising; Applications to Customer Relationship Management. Business to Consumer E-Commerce Applications: Cataloging, Order planning and order generation; Cost estimation ad pricing; Order receipt and accounting; Order selection and prioritization; Order scheduling , fulfilling and delivery, Order billing, Post sales services.

Module–IV
Business to Business E-Commerce: Need and alternative models of B2B e - commerce; Using public and private computer networks for B2B trading; EDI and paperless trading; characteristic featur es of EDI service arrangement; Internet based EDI; EDI architecture and standards; Vans; Costs of EDI infrastructure; Reasons for slow acceptability of EDI for trading; E -marketing-Traditional web promotion; Web counters; Web advertisements. XML, XML -EDI and its application.

Module–V: E-Payment System
Electronic Payment System: Types of payment systems –e-cash and currency servers, e-cheques, credit cards, smart cards; electronic purses and debit cards; Operational, credit and legal risk of e - payment, Risk management options for epayment systems, Set standards.

Module–VI
Security Issues in E-Commerce: Risks of e-commerce –Types and sources of threats, Protecting electronic commerce assets and intellectual property; Firewalls; Client server network security; Data and message security; S ecurity tools; Digital identity and electronic signature; Encryption and concepts of public and private key infrastructure; Risk management approach to e -commerce security.

Module–VII : Environment of E-commerce
Environment of E-Commerce: Issues regarding language, culture and infrastructure, Legal environment-borders and jurisdiction, contracting and contract enforcement;58 International cyber laws – cyber laws – Aims and salient Provisions; Cyber laws in India and their limitations; Taxation and e-commerce, Ethical Issues in e - commerce.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P-**Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT-**Class Test; **EE**-End Semester Examination

Suggested Readings:

- Laudon, Kenneth C. and Carol Guercio Traver (2002) E -commerce: business, technology, society. (New Delhi : Pearson Educatin).
- Awad, Elias M. (2007), Electronic Commerce: From Vision to Fulfillment (New Delhi : Pearson Education).
- Kalakota, Ravi and Marcia Robinson (2001). Business 2.0: Roadmap for Success (New Delhi : Pearson Education).
- Smith, P.R. and Dave Chaffey (2005), eMarketing eXcellence; The Heart of eBusiness (UK : Elsevier Ltd.)

HUMAN RESOURCE MANAGEMENT

Course Code: COM4206 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint student s with the techniques and principles to manage human resource of an organization. This knowledge would make the student scapable of employing these techniques to harness the best of each individual working in the organization.

Course Contents:
Module-I: Introduction
Nature of Human Resource Management, concepts, functions, themes and controversies. HRM, Job Analysis and Job Design: Role of HR manager, Human resource planning and HR effectiveness. Job analysis techniques, job evaluation techniques, job description, job specification, job design approaches, job characteristics, approach to job design.

Module-II: Business & Human Resource Strategy
Business Strategy and Human Resource Strategy: Concepts and Relationship. Contemporary global trends and management of human resources.

Module-III: Staffing
Recruitment, Selection, Training and Development: Factors affecting recruitment, sources of recruitment (internal and external), basic selection model, psychological tests for selection. Requirement of a good test for selection. Training and Development.

Module-IV: Performance appraisal
Performance appraisal: Objectives, PA process, comparing actual performance with standards, Methods of appraisal.

Module-V: Diversity at Work
Diversity at Work: Managing diversity, causes of diversity, the paradox of diversity, diversity with special reference to handicapped, women and aging. Empowerment and gender issues. Compensation Management, Personnel audit and Research: Wage versus salary, determination of compensation, incentives schemes, fringe benefits and labour welfare. Personnel audit and research. Emerging horizons in HRM.

Module-VI: Career Development
Career planning and succession concepts, approaches and issues.

Module-VII: HRIS and IR
Human Resource information system: Developing HR information system. Employees relations: Shifting forms from industrial relation to employees relations. Handling employees' grievances.

Case Studies: Some Cases relating the learning from the course to business world are required to be discussed.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- De Cenzo and Robins, *Fundamentals* of *Human Resource Management* , 8th Edition, Prentice Hall of India, 2005.
- Decenzo, David A. and Robbins, S.P. *Fundamentals of Human Resource Management*, 9th Edition, Wiley and Sons Ltd., John, 2006.
- Flippo, Edwin B., *Personnel Management*, McGraw Hill, Tokyo, 1984-2000.

Syllabus - Third Semester

CORPORATE LAW

Course Code: COM4301 **Credit Units: 03**

Course Objectives:
The objective of the course is to familiarize the students with the nature of legal regulatory environment of corporate enterprises in India.

Course Contents:
Module–I
Provisions of the Companies Act, 2013 and case law relating to Managerial remuneration, Accounts and audit. The Companies Amendment Act, 2015 (Their Main Provisions).

Module–II
Prevention & Money Laundry Act, 2002 – Definition, Punishment for the offence of Money Laundry, Obligation of Banking Companies, Appellate Tribunal, Special Court, Fines & Penalties.

Module–III
SEBI Act, 1992 – Functions of SEBI. Powers of SEBI in relation to securities markets. Guidelines for Securities issues.

Module–IV
Consumer Protection Act, 1986 – Objectives. Rights of consumers. Mechanism of Redressal of Consumer grievances.

Module–V
Environment Protection Act, 1986 – Objectives. Powers of the Central Government, Major Provisions.

Module–VI
Foreign Exchange Management Act (FEMA). Emerging issues in Corporate Laws and Governance. Introduction, Definition, Regulation & Management of Foreign Exchange, Contravention & Penalties, Miscellaneous Provision in Brief.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Mayson, French & Ryan, *Company Law*, 25th edn, 2009, Oxford University Press.
- Brenda Hannigan, *Company Law*, 2009 edn, LexisNexis, UK.
- Ramaiya A, Guide to *Company Law*, 2009 edn, Wadhwa Nagpur.
- The Institute of Company Secretaries of India , *Company Law, Course Study Material* ,2009
- Puliani Ravi & Mahesh Puliani, *Manual of Companies Act & Corporate Lawsincluding SEBI Rules, Regulations, Etc* , Vol 1 & 2, 2009 edn, Bharat Law House Pvt.Ltd, New Delhi.
- Jain D. K, *Company Law Ready Reckoner*, 2009 edn, Bharat Law House Pvt. Ltd,New Delhi.
- Bindal C. M, Mittal P. K, Frequently *Asked Questions on Company Law (Problems &Solutions)*, 2006 edn, Bharat Law House Pvt. Ltd, New Delhi.

COST ACCOUNTING

Course Code: COM4302 **Credit Units: 03**

Course Objective:
To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:

Module I: Cost Accounting
Introduction – Meaning of Cost, costing and Cost Accounting – Comparison between Financial Accounts and Cost Accounts – Application of Cost Accounting – Designing and installing a Cost Accounting system – Cost concepts and Classification of Costs – Cost Module – Cost Center – Elements of Cost – Preparation of cost sheet – Tenders and Quotations – Problems.

Module II: Labour Costing
Control of labour cost – Labour Turn Turnover – Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking – Idle time, causes and treatment – Overtime – Methods of Wage Payment, Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

Module III: Overhead Costing
Definition – Classification of overheads – Procedure for accounting and control of overheads – Allocation of overheads – Appointment of overheads – Apportionment of Service department costs to production departments – Repeated Distribution method – Simultaneous equation method – absorption of OH's – Methods of Absorption – Percentage of direct material cost – Direct Labour Cost – Prime Cost, Direct Labour hour rate and Machine Hour Rate – Problems.

Module IV: Costing Methods
Costing Methods Introduction - Job Costing – Batch Costing – Contract Costing-
Process Costing – principles – distinction between Process and Job – Preparation of process accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products. Service costing. Unit, Output and Operating Costing,

Module V:
Reconciliation of Cost and Financial Accounts - Need for reconciliation – Reasons for difference in profits – Problems on preparation of Reconciliation statements including Memorandum Reconciliation account,

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- N.K. Prasad : Cost Accounting
- Nigam & Sharma : Cost Accounting
- Khanna Pandey & Ahuja : Practical Costing
- M.L. Agarwal : Cost Accounting
- Jain & Narang : Cost Accounting
- S.P. Iyengar : Cost Accounting
- S.N. Maheshwari : Cost Accounting
- Horngren : Cost Accounting : A Managerial Emphasis
- M. N. Arora : Cost Accounting
- Dutta : Cost Accounting
- Khan & Jain : Cost Accounting

ADVANCE BUSINESS STATISTICS AND RESEARCH METHODOLOGY

Course Code: COM4303 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint students with some of the important statistical techniques for managerial decision making .The emphasis will be on their applications to business and economic situations.

Course Contents:
Module-I: Probability and Expectation
Probability and Expectation: Approaches to probability. Addition, multiplication and Bayes Theorem, Mathematical Expectation. Probability Distribution: Binomial, Poisson, Exponential, Beta and Normal Distributions.

Module-II: Statistical Decision Theory
Statistical Decision Theory: Risk and uncertainty, Expected value approach, Marginal analysis, Decision tree.

Module-III: Sampling and Sampling Distributions
Sampling and Sampling Distributions: Methods of sampling, Sampling distribution of a statistic and its standard error. Point Estimation and interval estimation, Properties of an estimator.

Module-IV: Hypothesis Testing
Hypothesis Testing; Power of a test, Large sample tests for proportions, means and standard deviations. Small sample tests –t and F tests. Design of Experiments and analysis of variance. Non-Parametric Tests: Chi-square test, Sign test, Median test and Rank correlation test.

Module-V: Inventory Control
Inventory Control: Techniques of selective control, Economic order quantity (EOQ) models- classical, gradual replenishment without shortages, price breaks and planned stock outs, Deciding optimum safety stock and reorder level. PERT/CPM: Networking with one estimate of time. Networks with three estimates of time. Time-cost trade-off. PERT/cost. Resource allocation and resource leveling.

Module-VI: Regression Analysis
Regression Analysis: Simple and linear regression analysis up to three variables. Statistical Quality Control: Control charts for variables and attributes, Acceptance sampling.

Case Studies: Application of statistics to some cases of business enterprise are required to be discussed.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Levin, R.I. and D.S. Rubin, *Statistics for Management* , Prentice-Hall of India.
- Spiegel, M.R. *Theory and Problems of Statistics* , Schaum Publishing Company.
- Aczel, Amir D., *Complete Business Statistics*, McGraw Hill, 1999.
- Kazmeir Leonard J., Norval F. Pohl, *Basic Statistics for Business and Economics* , McGraw Hill International (2nd ed.)

INCOME TAX LAW AND PRACTICE

Course Code: COM4304 **Credit Units: 03**

Course Objective:
To prepare the students with the concepts and theory of income tax accounting and to give a practical exposure to them

Course Contents:
Module I:
(a) Conceptual Frame-work: Definitions: Residential status and incidence of tax.
(b) Exemptions and exclusions: Exempted income and incomes not included in total income

Module II:
Heads of Income (1): (i) Salaries (ii) Income from House Property

Module III:
Head of Income (2):Profits and gains of Business or Profession; depreciation allowance, capital gains and income from other sources

Module IV:
Deductions from GTI: Rebates and reliefs, Clubbing provisions; set off and carry forward of losses. Assessment of an Individual

Module V:
Assessment of H.U.F./Firm/A.O.P.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:
Texts:
- Income Tax, Kanga & Palkiwala, N.M. Tripathi & Sons Ltd., Bombay
- India Income Tax Law, Sampat Ayenger

References:
- Income Tax Law and Accounts, R.R. Gupta Agra Book Store
- Income Tax Law and Accounts for M.Com., H.C. Mehrotra, Sahitya Bhawan,Agra
- Income Tax Manual, Government of India publication
- Student's Guide to Income Tax, Singhania, Vinod K. & Monika, Taxma

TAX PLANNING & TAX MANAGEMENT

Course Code: COM4305 **Credit Units: 03**

Course Objectives:
To Provide an in depth knowledge of tax-laws and their impact on management decisions. The course will help the students to understand the intricacies of tax planning and management.

Course Contents:
Module-I: Recognised Methods of Tax Planning, Problems of Tax Planning and Tax Management

Module-II: Tax Planning for Individuals and H.U.F.

Module-III: Tax Planning For Non-corporate entities: Partnership firms and Association of person

Module-IV: Corporate Tax Planning
Tax Planning for Corporate entities, Public and Private Companies, Tax incentives, Tax incentives for Industrial growth, tax holidays and other reliefs and rebates

Module-V: Assessment of Charitable Trust, Assessment of Non-Resident, Special procedure for assessment of search cases, Application of Computer technique in Tax Management

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings

- Singhania, V.K. : Direct Taxes Law and Practice, Taxman Publications (Pvt.) Ltd., Delhi
- Sukumar Bhattacharya : Indian Income Tax Law and Practice, Wadhwa & Co., Agra Nagpur
- Srinivas, E.A.: Corporate Tax Planning, Tata Mcgraw Hill Publishing Co. Ltd.
- Palkiwala, N.A. and Palkiwala, B.A.: Law and Practice of Income Tax, N M. Tripathi Bombay
- Iyengar Sampat, A.C.: Law of Income Tax, Bharat Publishing House Allied Publishers
- Shah, D.D. : A Treatise on Tax Planning N.M. Tripathi , Bombay
- Lakhotia, R.U. : How to Save Income Tax by Tax Planning , Asia Pub. House, Calcutta
- Raina, H.P. : Corporate Taxation A Hand Book , Orient Law House , New Delhi/ Allahabad
- Lakhotia , R.N. : Tax Management , A Pitmans Publication, Calcutta
- Study Material of the Institute of Company Secretaries of India

MANAGEMENT CONTROL AND INFORMATION SYSTEM

Course Code: COM4306 **Credit Units: 03**

Course Objective:
The objective of this course is to acquaint the students about the concept and application of management control system in large organizations and to make them familiar with modern control techniques.

Course Contents:

Module –I: Introduction
Nature of Control Function; evolution of control system in an organization; strategic planning; organization goals and strategies; role of controller in an organization; converting corporate vision into long term planning, management control system in corporate governance.

Module-II: Management Control Process
Management Control Structure; Responsibility centers – Expense, Administrative and support, Research & Development, Marketing and Profit; Management Control Process: Programming and budgeting. Preparation and process of budgets, Budgetary Control, Zero based budgeting.

Module III: Management Information System
Control reports and follow-up action, Problems of implementation and administration of Control System, Process of MIS Development, Strategic Planning and MIS Design, MIS implementation, MIS data, information and communication, Problem solving and decision making, Security control measures, managing international information system.

Module IV: Performance Reports
Analyzing financial performance reports; calculating variances and limitations of variance analysis; Preparation and presentation of MIS reports using advanced Excel and Power point techniques; emerging concepts – Virtualization and digitization, Grid Computing, and Cloud Delivery model.

Module V: Decision Support System and Ethical Challenges
Introduction to ERP; Managerial issues in implementation of ERP, business processes using ERP, introduction to Artificial intelligence and data mining for decision making; ethical responsibility of business professional; social and environmental issues in conducting ethical behavior.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:
- Robert N. Anthony and V. Govindrajan, *Management Control Systems*, 13th ed., Richard D. Irwin, 2006.

- Joseph A. Maciariello and Calvin J. Kirby, *Management Control System*, 2nd ed. Prentice Hall, 1994.
- R.J. Tricker, *Management Information and Control System*, John Wiley and Sons, 1995.
- Shyam Sunder, *Theory of Accounting and Control* , South Western College Publishing

FINANCIAL MARKET AND INSTITUTIONS

Course Code: COM4307 **Credit Units: 03**

Course Objective:
The purpose of the course is to provide a sound information and knowledge of broad framework of Financial System and its constituents. The course will provide the students an understanding of the inter-linkages and regulatory frame-work within which the system operates in India.

Course Contents:
1. Financial markets: Nature, Functions and Efficiency: Financial system and economic development, flow of funds in Indian economy; Indian financial system: an overview.

2. Construction and uses of flow of fund matrix. Analysis of supply and demand for funds. Sectoral and Intersectoral flows.

3. Financial markets: Money market: Organisation, Instruments, Functioning and its Regulation. Capital market: Primary and Secondary markets and their organisation. SEBI and its role as regulator.

4. Interest rate: Level, maturity and structure of interest rate. Term structure of interest rates. Financial repression and Interest rates. The Yield-curve.

5. Financial Intermediation: Depository Institutions, Commercial Banks and Industrial finances. Bank Credit: Working Capital and Bank funds; Term lending. Developing. a credit information system. Performance of Indian banking. Regulatory aspect of Banking.

6. Non-Depository Institutions: Mutual Funds: Measuring performance of Mutual Funds, Chit funds Organisation, functioning and regulatory aspects. UTI and Private sector mutual funds. Insurance Public and private Organisation: Life and Non-life insurance companies: LIC & GICs working and regulatory framework; Pension Funds: Organisation and working of pension funds.

7. Financial Instruments: Equity shares; new issue market and secondary market-the allocative and operational efficiency, preference shares. Private placement-channels. Debentures and other fixed income securities. Engineered financial and monetary instruments.

8. Foreign Capital: foreign capital as a source of finance. Place of foreign capital in the overall framework of Indian Financial system. The regulatory framework and NRI investments.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:
- Kohn Meir, '*Financial Institutions and Markets'*, Oxford University Press 2nd Edition 2007.
- Madura Jeff, '*Financial Markets and Institutions'*, South Western Cengage Learning, 8th Edition 2008.
- Mishkin, Fredrick S. and Stanley G. Eakins, Pearson Education Ltd., 6th Edition.
- Resume Bank of India – Report on Currency & Finance.

PROJECT MANAGEMENT AND FINANCIAL SERVICES

Course Code: COM4308 **Credit Units: 03**

Course Objective:
The aim of the course is to enable the student to evolve a suitable framework for the preparation, appraisal, monitoring and control and hedge risk of industrial project. The course would also help to understand the role of financial services in project management and would make its student understand how to mobilise finance for domestic and international projects.
Course Outline:

Course Contents:
Module-I: Introduction
Objectives of Project Planning, monitoring and control of investment pro jects. Relevance of social cost -benefit analysis, identification of investment opportunities. Pre-feasibility studies.

Module-II: Project Report Preparation
Project Preparation: Technical feasibility, estimation of costs, demand analysis and commercial viability, risk analysis, collaboration arrangements; financial planning; Estimation of fund requirements, sources of funds. Loan syndication for the projects. Tax considerations in project preparation and the legal aspects.

Module-III: Project Appraisal
Project appraisal: Business criterion of growth, liquidity and profitability, social cost benefit analysis in public and private sectors, investment criterion and choice of techniques. Estimation of shadow prices and social discount rate.

Module-IV: Project Management
Project review/control-Evaluation of project. PERT/CPM. Cost and Time Management issues in Project planning and management.

Module-V: Financial Services & Depository Institutions
Financial services, need for financial services various types of financial service: Fund based and Non-Fund based. Characteristics and role of financial intermediaries. Depository Institutions and financial services. Commercial Banks and their changing role, functioning of banks. Financial Services and banking system.

Module-VI: Financial Services & Non-Depository Institutions
Non-Depository institutions: finance companies and mutual funds and pension funds: a financial services and their role. Financial Services and non depository institutions. Merchant Banking, Factoring, Forfaiting, Leasing, Securitisation, Custodial services, Credit Rating Mortgages. Performance, evaluation of mutual funds, Depository Services. Insurance: insurable and non-insurable risk. Types of insurable risks. Benefit of insurance to project planners. Benefits and limitations of – Risk Management Policy.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings;

- Khan M.Y., *Financial Services*, 4th ed., McGraw Hill, New Delhi, 2007 .
- Prasanna Chandra, *Project Preparation Appraisal and Implementation* , 5th ed., Tata McGraw Hill, 2002.
- Dietrich J.K. *Financial Services and Financial Institutions: Value Creation in Theory*and Practice, Prentice Hall, New Jersey, 1996.
- Clifford Gray, *Project Management*, Richard D. Irwin, 2005 (latest Edition).

INTERNATIONAL MARKETING

Course Code: COM4309 **Credit Units: 03**

Course Objective:
The course intends to familiarise the students with the concept and issues of international marketing and enable them to be able to analyse the foreign market environment and develop international marketing strategies for a business firm.

Course Contents:

Module-I: International Marketing
International Marketing: Nature and scope; International Market orientation and involvement; International marketing management process – an overview; International marketing information system.

Module-II: Analysing International Marketing Environment
Analysing International Marketing Environment: Framework for analyzing international marketing environment; Geographic, demographic, economic, socio - cultural, political and legal environment and their impact on international marketing decisions; Global trading environment and developments.

Module-III: International Market Segmentation
International Market Segmentation, Selection and Positioning; International Market Entry Mode Decisions.

Module-IV: International Product Policy
International Product Policy: Planning and development of products for foreign markets; Product standardization vs. adaptation; International trade product life cycle and implications.

Module-V: Pricing in International Markets
Pricing in International Markets: Pricing objectives; Determination of International Price; Delivery terms and price quotations; International pricing policies, Strategies; Transfer pricing; Pricing in the context of counter trade.

Module-VI: International Distribution
International Distribution: Distribution Channels and intermediaries for international markets; Selection, motivation and control of foreign middlemen; Global logistics issues and planning.

Module-VII: International Promotion
International Promotion: Complexities and issues in international promotion; Promotion tool for international markets; Developing the promotion campaign for foreign markets; Role of image. International Marketing Planning, Organization and Control; Contemporary developments and issues in international marketing.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Cateora, Phillip R., and John L. Grahm, *International Marketing*, 14th ed., McGraw Hill, 2009.
- Terpstra, Vern and Ravi Sarathy, *International marketing*, 8th ed., Harcourt Asia PTE Ltd., Singapore, 2000.
- Onkvist, S., and J.J. Shaw, *International Marketing,* : *Analysis and Strategy*, Prentice Hall of India Private Ltd., 1999
- Keegan, Warran J. and mark C. Green, *Global Marketing, 5th Pearson Education,2008.*
- Czinkota, Michael R. and I llka A. Ronkainon, International marketing, 8 th Edition, Cengage Learning, 2006.

ADVERTISING AND SALES MANAGEMENT

Course Code: COM4310 **Credit Units: 03**

Course Objective:
The course aims at enabling the students to develop an in -depth understanding of the modern concepts and latest techniques of advertising and personal selling and sales force management which constitute a fast -growing area of marketing.

Course Contents:
1. Section A
Advertising:
Module-I: Introduction to Communication
Communication Basics: Role of communication; Communication process and flows; Planning the promotion mix; Advertising: Nature and importance; Advertising and the economy; Advertising and publicity; Advertising management process – an overview; Determining target audience; Advertising objectives and positioning decisions; Advertising budget decisions.

Module-II: Message Decision
Message Decision: Determining advertising message; Developing advertising copy – Headline main copy, logo, illustration, appeal, layout, creativity in advertising. Media Planning: Types of media and their merits and limitations; Advertising through the internet; Media selection; Media scheduling.

Module-III: Organization of Advertising Operations
Organization of Advertising Operations : In -house vs. advertising agency arrangements; Managing advertising agency relations ; Evaluation of advertisement and campaign effectiveness – Before - and – after advertising tests and techniques.

Module-IV: Advertising in India
Advertising in India; Social and regulatory aspects of advertising. Recent developments and issues in advertising.

2. Section B
Sales Management:
Module-V: Fundamentals of Personal Selling
Fundamentals of Personal Selling: Nature and importance of selling; Types of selling; Personal selling, salesmanship and sales management; Process of effective selling; Strategic Sales management.

Module-VI: Sales Planning
Sales Planning: Setting personal selling objective; Market analysis and sales forecasting; Sales budget; Sales territory; Sales quota. Sales Organization: Organization structure; relationship of sales department with other departments; Distribution networks relationship.

Module-VII: Sales Force Management
Sales Force Management: Recruitment and selection; training and development; motivating, supervising and compensating sales personnel; Controlling the sales effort; Evaluation of sales personnel; Sales and cost analysis. Ethical and legal aspects of selling.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P-**Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT-**Class Test; **EE**-End Semester Examination

Suggested Readings:

- Aaker, David A., Rajeev Batra and John G. Mayers, *Advertising Management*, Prentice Hall of India, New Delhi.
- Belch. George and Michael Belch, Advertising and Promotion : An Integrated Marketing Communications Perspective 6 th Ed., McGraw Hill, 2004.
- Mandell, Maurice, *Advertising* , Prentice- Hall of India, New Delhi.
- Still, Richard R. Edward W. Cundiff and Norman A.P.Govoni, *Sales Management:Decisions, Strategies and cases*, Prentice Hall of India, New Delhi.
- Anderson B. Robert, *Professional Selling*, Prentice-Hall Inc.
- Spiro, Rosann, William J. Stanton and Greg Richo, *Management of a Sales Force*, McGraw Hill/Irwin, 2007.
- Pederson Carlton A/, Miburn D. Wright, Barton A, Weitz, *Selling Principles and Methods*, Richard D. Irwin, IIIinois.

HUMAN RESOURCE DEVELOPMENT

Course Code: COM4311 **Credit Units: 03**

Course Objective:
The objective of the course is to make student aware of the concepts, techniques and practices of human resource development. This course is intended to make students capable of applying the principles and techniques as professionals in organizations they work for.

Course Contents:
Module-I: Introduction
Human resource development: Concept and evolution, human resource mobilizations, HRD Conceptual base, strategic interventions in HRD sector and target groups, HRD mechanisms, processes and outcomes, HRD instruments, HRD.

Module-II: HRD and Management
HRD and Management: Attitude of top management towards HRD, Motivational aspects of HRD, Trends and Practices, Line manager and HRD.

Module-III: HRD Activities
HRD Activities: HRD culture and climate, Elements of HRD climate, measurement of HRD climate, factors to HRD climate, Determinant needs, developmental supervisor, HRD for Workers: HRD mechanisms for workers, Role of trade unions.

Module-IV: HRD in Organizations
HRD in Organizations: Government organizations, educational institutions, armed forces, police and industry, private sectors and public sectors units. Emerging Issues in HRD: Creating awareness and commitment to HRD, Industrial relations and HRD, Utilization of HRD efforts, Future of HRD, International comparison of HRD (Commonalities and differences.)

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P-**Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Werner, Jon M. and Randy L. Desimone, Human Resource Development, South - Western Educational Publishing, 6 th Edition, 2009
- Nadler, L (ed), Corporate Human Resources Development, Van Nostrand Reinho ld, 1980.
- Parek V. and T.V. Rao, Designing and Planning Human Resource Systems, Oxford

INDUSTRIAL RELATIONS

Course Code: COM4312 **Credit Units: 03**

Course Objective:
The objective of the course is to make student aware of the concept of industrial relations. The course will make them understand the importance of industrial relations for an organization and how these relations provide dynamics to organizations.

Course Contents:

Module-I: Industrial Relations
Industrial Relations: Concepts and scope, Historical development, Unilatarist, Pluralist and Marxist perspective of IR. Trade Unionism: role of trade un ions, trade union in India, national level Federations, Goals and objectives of unions and union leadership, weaknesses in trade unions, trade unions, politics and government. Theories of trade unionism. Cross cultural aspects of union management relations . Trade Union Act 1926: an overview. Union recognition; de -unionization strategies.

Module-II: Union Management Relations
Union Management Relations: conceptual framework, union management perspectives, organizational factors affecting union management relations. Public policies and union management relations, role of state, constitution and labour policies, ILO, Major events and international issues, changes affecting HR/IR perspectives, perspectives in India.

Module-III: Industrial Democracy
Industrial Democracy: concepts and scopes of industrial democracy, Worker's participation: Strategy, practices, behavioural science input/contribution and models. Rationale for participation, Issues in participation, strategies for making participation work and making participation more effective.

Module-IV: Dispute Resolution
Methods of industrial relation machinery in India; Statutory and non –statutory methods of industrial dispute resolution; Conciliation, mediation, arbitration and adjudication.

Module-V: Comparative Industrial Relations
Comparative Industrial Relations: principles of comparative analysis, variables of comparative analysis (culture, values, ideologies, politico -economic structure) Experience of UK, Yugoslavia, West Germany, Scandinavian countries and Japan.

Module-VI: Managing Industrial Relations
Managing Industrial Relations: Regulatory mechanisms, employee discipline, suspension, dismissal and retrenchment, employee grievance handling, Collective bargaining, negotiation skills, industrial conflict resolution. Labour Welfare: Rationale need and requirements.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Katz, Harry, Thomas A. Kochan, & A. J.S. Colvin, An Introduction to Collective Bargaining and Industrial Relations, 4 th Edition, The McGraw Hill Companies. 44
- C.S. Venkat Ratnam, *Industrial Relations*: Text and Cases, Oxford University Press, Delhi, 2006.
- Michael Salamon, *Industrial Relations: Theory & practice* , 4th Edition, Pearsonltigher Education, 2001.
- Farnham and Limlott, J., *Understanding Industrial Relations* (2nd ed) Cassell, 1983.

SUMMER INTERNSHIP EVALUATION

Course Code: COM4335 **Credit Units: 06**

GUIDELINES FOR INTERNSHIP FILE

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalise efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (Internship File). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The layout guidelines for the Internship File

- A4 size Paper
  - font: Arial (10 points) or Times New Roman (12 points)
  - line spacing: 1.5
  - top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

The File will include *five sections* in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. The Title Page--Title - An Internship Experience Report for (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. Table of Content--an outline of the contents by topics and subtopics with the page number and location of each section.
3. Introduction--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. Main Body--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. Appendices--include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

The Main Body will have three sections and will include the following items which will be evaluated for the final assessment:-

An analysis of the company/organization in which the student is working

A personal review of the student's management skills and how they have been developed through the programme.

The research report that the student has prepared on the project assigned to him by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it).

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the deadlines.

STUDENT ASSESSMENT RECORD (SAR)

Management File Item	Criteria for successful completion of the item
1. Analysis of organization (1500- 2000 words)	• Clear presentation of ideas and analysis • Provides an organizational diagram, following organization presentation conventions • Analysis covers the organization's: ➢ Business strategy and mission ➢ Structure ➢ Resources and assets ➢ Current financial performance ➢ Leadership/decision-making style ➢ Staffing and skill base ➢ Products/services and customers
2. Personal review of Management skills development (1000-1500 words)	• Clear presentation of ideas and analysis • Demonstrate awareness of own management skills • Presents critical analysis of own management effectiveness, supported with examples • Provides evidence of development of specific management skills e.g. strategic, financial, leadership • Explains how new skills and learning have benefited the organization and self
3. Design of Research Project (1500- 2000 words)	• Clear presentation of ideas and analysis • Justifies the choice of subject for the research project and why this might be beneficial to the organization • Selects and justifies appropriate research methods for the project • Demonstrate understanding of the key stages in undertaking a research project • Indicates which analytical/statistical tools would be most appropriate and why • The design plan takes account of the resourcing implications of carrying out the research e.g. staffing and other costs

Examination Scheme:

Report by Student (Internship File)	
a. Organization & Presentation/Language and clarity /substance of Contents covered and Comprehensiveness	20%
b. Research Report	30%
Industry Feedback (continuous)	20%
Presentation & Viva (At the end)	30%
Total	**100%**

Syllabus - Fourth Semester

INTERNATIONAL BUSINESS

Course Code: COM4401 **Credit Units: 03**

Course Objective:
The purpose of this course is to acquaint the students with nature, scope, structure and operations of international business and familiarize them with trends and developments in India's foreign trade and investments and policy framework.

Course Contents:
Module-I: Introduction
International Business: Its Importance, nature and scope; Modes of entry into international business; Management of international business operations – complexities and issues; IT and international business, India's involvement in International Business.

Module-II: Fundamentals of International Trade
Theoretical Foundations of International Trade: Reasons for international trade; theories of international trade; Gains from trade; Foreign trade multiplier; Terms of trade.

Module-III: Instruments of Commercial Policy
Instruments of Commercial Policy: Tariffs, quotas and other measures and their effects; World trade and protectionism. Balance of Payment Account: Current and Capital Account components and accounting system; Balance of payment deficits and adjustment policies.

Module-IV: International Business Environment
International Business Environment: Framework for analyzing international business environment; Domestic and foreign environments and their impact on international business decisions; World trading environment – Pattern and structure of world trade in goods and services; Counter trade. International Financial Environment: Exchange rate mechanism and arrangement; International money and capital markets; Foreign investment flows – Pattern, structure and effects. Movements in foreign exchange and interest rates and their impact on trade and investment flows.

Module-V: International Economic Institutions and Agreements
International Economic Institutions and Agreements: WTO, IMF, World bank, UNCTAD, Agreement on Textiles and Clothing, GSP, GSTP and other international agreements and treaties; International commodity trading and agreements- India's involvement and consequences .

Module-VI: Regional Economic Integration
Regional Economic Integration: Free trade area, customs union and common market; Theory of customs union; Trade creation and diversion effects; Regionalism vs. multilateralism; Structure and functioning of EC and NAFTA; Regional Economic Cooperation.

Module-VII: Multinational Companies
Multinationals (MNCs) in International Business: Issue in investment, technology transfer, pricing and regulations; International collaborations and strategic alliances. Contemporary Developments and Issues in International Business.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Danoes, John D. Radebaugh, Lee H., *and Daniel P. Sullivan International Business: Environment and Operations*, 12th ed., Prentice Hall, 2009.
- Griffin, Ricky W. and Pustay, Michael W, *International Business: A Managerial Perspective*, Prentice Hall, 2009.
- Hill, Charles, W.L., *International Business*, McGraw Hill Company, New York, 2009.
- Ball, Donald, Wendall H. McCulloch, Hichael Geringer, Michael S. Minor and Jeanne M. McNett, International Business: The Challenge of Global Competit ion, 12th edition, 2009, McGraw Hill Co.

CORPORATE TAX PLANNING

Course Code: COM4402 **Credit Units: 03**

Course Objective:
The aim of this course is to familiarize the student with major latest provisions of the Indian tax laws and related judicial pronouncements pertaining to corporate enterprises having implications for various aspects of Corporate planning with a view to derive maximum possible tax benefits admissible under the law.

Course Contents:
Module-I: Introduction
Meaning of tax planning and management, tax evasion and tax avoidance; Nature and scope of tax planning and management in the corporate sector; Justification of corporate tax planning and management.

Module-II: Computation of corporate tax
Computation of corporate tax: Carry forward and set off of losses in the case of certain companies under Sec. 79 of Income -tax Act, 1961; Computation of taxable income of companies; Computation of the amount of corporate tax liability; Minimum Alternate Tax; Tax on distributed profits of domestic companies; Tax on income distributed to unit holders.

Module-III
Implications of Tax concessions and incentives for corporate decisions in respect of setting up a new business, location of business and nature of business.

Module-IV: Tax Planning
Tax planning with reference to financial management decisions: Capital structure decisions; Dividend Policy; Bonus Share; Investments and Capital Gains. Tax planning with reference to managerial decisions: Owning or leasing of an asset; purchasing of assets by installment system or Hire System; Purchasing of an asset out of own funds or out of borrowed capital; manufacturing or buying; Repairing, replacing, renewing or renovating an asset; Sale of assets used for scientific research; Shutting down or continuing operations.

Module-V
Foreign collaborations and incidence of taxation on domestic companies ; provisions for relief in respect of double taxation; important Double Taxation Avoidance Agreements with different countries like USA, UK, Germany, France, etc.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT-**Class Test; **EE**-End Semester Examination

Suggested Readings:
- E.A. Srinivas, *Corporate Tax Planning*, Tata McGraw Hill.
- Vinod K. Singhania, Taxmann's *Direct Taxes Planning and Management.*
- V.S. Sundaram, *Commentaries on the Law of Income- Tax in India*, Law Publishers,
- Allahabad.
- A.C. Sampath Iyengar, *Law of Income Tax*, Bharat Publishing House, Allahabad.
- Taxman, *The Tax and Corporate Law* Weekly.
- Bhagmati Prasad, Direct Taxes Laws Practice, Wishwa Prakashan.

STRATEGIC MANAGEMENT

Course Code: COM4403 **Credit Units: 03**

Course Objective:
The objective of the course is to help the students develop an understanding of the basic inputs in making and implementing corporate strategic decisions and also familiarize them with the issues and practices involved.

Course Contents:
Module-I: Introduction
Introduction: Concept and Role of Corporate Strategy. Levels of Strategy. Basic Model of Strategic Management. Approaches to Strategic Decision Making. Strategic Role of Board of Directors and Top Management. Strategic implications of social and ethical issues.

Module-II: Strategic Analysis
Strategic Analysis: Analysis of Broad Environment - Environmental Profile; Constructing Scenarios. Analysis of Operating Environment - Michael Porters Model of Industry Analysis. Analysis of Strategic Advantage – Resource Audit; Value Chain Analysis; Core Competences; SWOT Analysis. Analysis of Stakeholder Expectations – Corporate Mission, Vision, Objectives and Goals.

Module-III: Strategic Choice
Strategic Choice: Generating Strategic Alternatives. Strategic options at Corporate Level – Stability, Growth and Defensive Strategies. External Growth Strategies – Merger, Acquisition, Joint Venture and Strategic Alliance. Evaluation of Strategic Alternatives – Product Portfolio Models. Selection of a suitable Corporate Strategy – Concept of Strategic Fit. Strategic options at SBU Level - Michael Porters' Competitive Strategies; Operationalising Competitive Strategies.

Module-IV: Strategic Implementation
Strategic Implementation: Strategic implementation issues. Planning and allocating resources. Organization Structure and Design. Functional Strategies – Production, Human Resource, Finance, Marketing and R. & D. Managing Strategic Change. Strategic Control.

Module-V: Strategic Review
Strategic Review: Evaluating Strategic Performance – Criteria and Problems. Concept of Corporate Restructuring.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Arthure A. Thompson et -al, Crafting and Executing Strategy : Text and Readings, 15th ed., McGraw Hill, 2007.
- Grant, Robert M., *Contemporary Strategy Analysis* , 5th ed., 2005 Blackwell Publishers, Massachussets, U.S.A.
- Hitt M.A. et. al., *Strategic Management*, South Western, 2009. 4. Ansoff, H. Igor, R.P. Declorch and R.I. Hayes, From *Strategic Planning to Management*, Wiley,1976.

INDUSTRIAL LAW

Course Code: COM4404 **Credit Units: 03**

Course Objective:
The course is designed to provide an understanding of certain industrial legislations in the context of the Indian Socio – economic conditions.

Course Contents:
Module-I: The factories Act, 1948
The factories Act, 1948 : Objects, provisions relating to hazardous process, health, safety, welfare, working hours, leave etc. of workers, approval, licensing and registration of factories , manager and occupier – their obligations, power of the authorities under the Act, penal provisions.

Module-II: The payment of Bonus Act, 1965
The payment of Bonus Act, 1965: Object, Scope and Application, Definitions, Calculation of amount payable as Bonus, Eligibility for Bonus, Disqualification for Bonus; Minimum & maximum Bonus, Set on & Set off of Allocable Surplus, Application of Act in Establishment in Public Sector, Bonus linked with Production or Productivity.

Module-III: The Employees State Insurance Act, 1948
The Employees State Insurance Act, 1948: Objects, Definitions, Application, Employees State Insurance Scheme, Employees' State Insurance corporation, Constitution-Powers and Duties of the Corporation, Wings of the Corporation, Employees' State Insurance Fund, Contribution, Benefits.

Module-IV: The Industrial Disputes Act, 1947
The Industrial Disputes Act, 1947: Objects, authorities for settlement of industrial disputes, reference of industrial disputes, procedure, powers and duties of authorities, settlements and awards, strikes , lock-outs, lay-off, retrenchment, transfer and closure, unfair labour practices, miscellaneous provision.

Module-V: The Trade Unions Act, 1926
The Trade Unions Act, 1926: Objects, registration of trade unions, rights and liabilities of registered trade unions -procedure, penalties. The Workmen's compensation Act, 1923: Objects, Employer's liability for compensation, amount of compensation, distribution of compensation, notice and claims, remedies of employers against stranger, commissioners for workmen's compensation.

Module-VI: The Employees' Provident Funds & Miscellaneous provision Act, 1952
The Employees' Provident Funds & Miscellaneous provision Act, 1952: Objects, Schemes under the Act. Employees' Provident Fund Scheme, Employees' pension Scheme, 1995, Employees' Deposit linked Insurance Scheme, Determination and Recovery of Money due from and by employers, protection against attachment.

Module-VII: Wage Act, 1936
The payment of Wage Act, 1936: Objects, Application, responsibility for payment of wages, wage periods, time-limits, Deduction from wages , remedy available to worker for delay or unauthorized education.

Module-VIII: Payment of Gratuity Act, 1972
The Payment of Gratuity Act, 1972: Object, continuous service, controlling authority, payment of Gratuity, Compulsory insurance, Nomination, Recovery of Gratuity, Protection of Gratuity.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Malik P. L, *Labour and Industrial Law, 9th edn, 2009, Eastern* Book Company, Lucknow.
- Sharma J. P, *Simplified Approach to Labour* Laws 3rd edn, 2009, Bharat Law House Pvt. Ltd, New Delhi.
- Kumar H. L, *Digest of Labour Cases-1990 –2009,* Universal Law Publishing Co Pvt Ltd, Delhi.
- Singh Avtar, *Introduction to Labour & Industrial Law,* 2009 edn, Wadhwa and Company, Nagpur.
- Sharma J. P, *Employees' Provident Funds and Miscellaneous Provisions Act, 1952 with frequently Raised Queries including Schemes & Rules,* 2nd edn, 2009, Bharat Law House Pvt. Ltd, New Delhi
- Sharma J. P, *Employees' State Insurance Act, 1948 with Frequently Raised Queries,* 2nd edn, 2009, Bharat Law House Pvt. Ltd, New Delhi
- Sharma J. P, *Factories Act, 1948 with Frequently Raised Queries* , 2nd edn, 2009, Bharat Law House Pvt. Ltd, New Delhi

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INTERNATIONAL ACCOUNTING

Course Code: COM4405 **Credit Units: 03**

Course Objective:
The objective of this course is to develop some conceptual knowledge and understanding of international accounting issues among students. In addition, this course makes students capable of tackling issues in prevailing regulatory environments.

Course Contents:
Module-I: Introduction
International Dimensions of accounting and control: Multinational enterprise, Inter-nationalisation of capital markets, Internationalization of accounting profession. Operational and conceptual issue.

Module-II
Foreign currency translations, methods and practices, & their applications. Specific Reporting Issues: Regulatory Disclosure Requirements; Foreign Operations Disclosure; Social Responsibility Disclosures.

Module-III: Managerial Accounting Issues
Managerial Accounting Issues: Strategic Planning; Management Control Systems; Performance Evaluation of foreign operations.

Module-IV: International Standards and Organization
International Standards and Organization: Advantages, supporting and deterring forces; International and Regional Efforts in Standard Setting; International Standards setting process, Harmonisation; International Accounting Standards Board; Accounting and Auditing Standards.

Module-V: Financial Statement Analysis of companies
Financial Statement Analysis of companies and countries differences in accounting principles, foreign currency statements and Ratio Analysis.

Module-VI: Transfer Pricing
Transfer pricing, methods, objectives, strategies. Emerging issues in International Accounting.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Radebaugh L. H. and S.J. Gray, *International Accounting*, and Multinational Enterprises, John Wiley & Sons, 2002 .
- Sandagaran S.M., *International Accounting*, South Western, 2001.
- Gray, S.J., *International Accounting and Transnational Decisions* , Butterworth, London, U.K.,
- Holzer H. Peter, *International Accounting*, Horper and Row Publishers, New York.
- Frederick D.S. Choi and Gary K. Meek, *International Accounting*, Pearson Education, 2005
- Shirin Rathore, *International Accounting* Prentice Hall of India, 2008.

PRINCIPLES & PRACTICE OF TAXATION & INDIAN TAX SYSTEM

Course Code: COM4406 **Credit Units: 03**

Course Objective:
The purpose of this course is to familiarize and update the students with the basic principles of taxation and the actual operation of income tax in the Indian economy.

Course Contents:

Module I
International comparison of taxes; Tax-GDP ratios; Direct and indirect taxes –inflation adjustment schemes in selected countries. The problems of international double taxation – The assignment rules: source versus residence – methods to alleviate international tax duplication: Tax credit relief; Double tax treaties: OECD Models; United Nations Model – International tax avoidance and evasion; transfer pricing; Tax havens – Anti-avoidance measures.

Module II
Tax bases and tax policy – Determinants of tax yield – Classification of taxes: Direct and indirect taxes; OECD classification; Progressive, proportional and regressive taxes; Ad-valorem and specific taxes. Taxes and inflation; Taxes and savings; Taxes and Labour supply – Tax equity : Benefit principle of Taxation; Ability-to-pay principle of taxation.

Module III
Incidence of Taxation: Factors determining extent of tax shifting – Taxation and efficiency: Excess burden of taxation; Administrative costs; Compliance costs – Tax incentives: Various forms; Rationale; Problems created by tax incentives. Tax avoidance and tax evasion – Tax ratio, taxable capacity and tax effort. Trends in tax- GDP ratio – relative roles of direct and indirect taxes;

Module IV
Distribution of tax burden – Buoyancy and elasticity of tax revenue – Tax evasion. Distribution of taxation powers between the Center and the States in the constitution of India; Restrictions on the taxation powers of the States; sharing of Central taxes; Rationale for constitutional arrangements.

Module V
Residential status and income tax liability – incomes exempt from tax – tax holiday schemes. Set off and carry forward of losses – Rebates – tax incentives for savings. Tax treatment of capital gains – Main features of company taxation – Taxation of partnership firms – Taxation of small traders (presumptive tax) – Tax amnesties.
Case Studies : Some case studies involving the learning from the course.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Richard Musgrave and Peggy Musgrave, Public Finance in Theory and Practice (New York: McGraw Hill Book Company, 5th Edition, 1989).38
- Richard Goode, Government Finance in Developing Countries (New Delhi. TataMcGraw Hill Publishing Company Ltd., 1986)
- Government of India, Ministry of Finance, Report of the Indirect Taxation Enquiry Committee (Chairman, L.K.Jha), Part I (November 1977) and Part II (January 1978).
- Government of India , Ministry of Finance, Speeches of Union Finance Ministers, 1947-48 to 1984-85 (New Delhi, 1984).
- Vinod K. Singhania, Direct Taxes: Law and Practice (Delhi :Taxmann Publications (P) Ltd.,) Latest edition.

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Course Code: COM4407 **Credit Units: 03**

Course Objective:
The objective of the course is to establish a conceptual frame work for the study of security analysis and portfolio management. This course will provide the student the ability to understand and utilise the skill of optimising returns. The focus at different places is to build models and discuss their validity and application to practical situations.

Course Contents:
Module-I: Introduction
Nature, process and scope of financial assets investment decisions; Structure of Indian Securities market-An overview; Sources of Financial Information.

Module-II: Risk & Return
Securities Analysis: two-parameters frame work; understanding of return and risk of a security; types of return and risk; sources of risk

Module-III: Fixed Income Security Analysis
Analysis of Fixed Income Securities: Bond fundamentals; valuation of bonds; analysis of risk in bonds-duration and convexity; bond portfolio management strategies-passive, semi-active and active along with immunization strategies. Certificate of Deposits, Debentures.

Module-IV: Variable Income Securities Analysis
Analysis of Variable Income Securities (Equity): Approaches to security (equity) analysis-Fundamental Analysis along with valuation models of equity and Technical Analysis, Efficient market hypothesis.

Module-V: Portfolio Management
Portfolio Theories and Management: Traditional and Modern Portfolio Theories; Single and multi-index models. Markowitz Model; Sharpe's Single Index Model; Capital Asset Pricing Model (CAPM) and Arbitr age Pricing Model (APT): performance evaluation of portfolios; problems associated with revision of portfolio. Active and Passive portfolio management

Module-VI: Financial Engineering
Financial Derivatives: Futures, Options, Portfolios of futures and options synthetics, Exotics and Financially engineered products.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Fischer, Donald E. and Ronald, J. Jordan, "*Security Analysis and Portfolio Management*", 6th Edition Prentice Hall of India, 2007.
- Frank, K. Reilly, and Keith, C. Brown, "*Investment Analysis and Portfolio Management*", 8th Edition, Thomson, 2007.
- Sharpe William F, and Bailey Jeffery V, Alexander Gordon J, " *Investments*", 6th Edition, Prentice Hall of India, 1995.
- Hull J.C. Options, "Futures and Other Derivatives", 6 th Edition Prentice Hall, 1997.

INTERNATIONAL FINANCIAL MANAGEMENT

Course Code: COM4408 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint the students with financial management problems of multinational corporations and prepare them to tackle these problems.

Course Contents:

Module I
International Monetary System: Developments in the international monetary system, gold standard, Bretton Woods system of exchange rate, exchange rate regime since mid-1970s. IMF and international Liquidity. System of exchanging currencies. Exchange rate quotation and determination: direct and indirect quotes, bid and ask quote, spot and forward quote, cross rates. Determination of exchange rate in spot and forward market. PPP theory, IRP theory, Monetary theories of exchange rate determination, Overshooting models.

Module II
Foreign exchange market – spot and forward. Participants in foreign exchange market – arbitraging, hedging and speculation, covered interest rate arbitrage. Borrowing and investing markets. Tax consideration and investment. Exchange rate risk: translation, transaction and real operating exposure – their measurement and management. Investment decisions of multinational corporations (MNCs): International capital budgeting – estimation of cash flows, the cost of capital. Portfolio consideration of a multinational corporation.

Module III
International Financial markets: Multilateral development banks, Euro-currency markets, Euro-banking, Market for international securities – international bonds, Euro notes and Euro-notes and Euro-commercial papers, Medium-term Euro-notes. Market for derivatives, currency futures, options and synthetics, currency risk management, financial swaps and interest – rate risk management. Assessment and management of political risk.

Module IV
International working capital management: Cash management. Management of receivables and inventory. Financing of foreign trade: Foreign trade documents, modes of payment, Preshipment, post-shipment and medium-term credit, Forfaiting. International accounting: Consolidation and harmonisation of accounts. Transfer pricing.

Module V
Case Studies: Some case studies involving the conceptual learning from the course are required to be discussed.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Levi, Maurice, International Finance, New York, McGraw Hill Inc., 1996.
- Eiteman, David K., Arthur Stonehill and Michael H. Moffett, Multinational Business Finance, Reading mass., Addision – Wesley Publishing company,1998.
- Shapiro, Allen C., Multinational Financial Management, New Delhi, Prentice Hall India Pvt. Ltd., 1995.
- Apte P.G., Multinational Financial Management, New Delhi, Tata McGraw Hill, 1998
- 5.Seth A.K., International Financial Management, New Delhi, Galgotia Publishing

MARKETING RESEARCH

Course Code: COM4409 **Credit Units: 03**

Course Objective:
The course aims at exposing the students to the concept, tools and techniques of marketing research and developing their skills to be able to apply research techniques to aid marketing decision making.

Course Contents:
Module I
Introduction : Meaning, nature and importance of marketing research; Marketing research and scientific method; Research reliability and validity; Problems in conducting marketing research; Marketing information system (MIS); Ways of conducting marketing research; Syndicated research.

Module II
Marketing Research Process : Steps involved in conducting marketing research; Problem identification; Determining information needs; Developing marketing research proposal.

Module III
Research Design : Meaning and importance; Types of research designs – explorative, descriptive and conclusive researches; Secondary data – sources, uses and limitations; Primary data collection methods – questioning techniques and observation methods; Online data sources and research; Questionnaire preparation.

Module IV
Sample Design and Field Work : Defining universe and sampling unit; Determining sampling frame; Probability and non-probability sampling methods; Sample size determination; Field work and data collection – sampling and non-sampling errors.
Data Analysis and Report Preparation: Data editing, coding tabulation and graphical presentation; Univariate and multivariate data analyses techniques and their applications in marketing research; Report preparation, presentation and follow-up.

Module V
Marketing Research Applications : Consumer research – behaviour and motivation research, attitude measurement and scaling techniques; Product research; Advertising research; Marketing and sales forecasting; Sales analysis. Marketing Research in India : Status, organization and developments; Ethical issues in marketing research.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings :

- Harper W. Boyd, Ralph Westfall and Stanley F. Stasch, Marketing research: Text and Cases, 2005.
- Malhotra, Naresh K., Marketing Research, 5th Ed., Prentice Hall of India.
- Cooper, Donald R. and Pamela S. Schindler, Marketing Research, Tata McGraw Hill, 2005.
- Paul E. Green, et.al., Research for Marketing Decisions, Prentice-Hall of India Pvt. Ltd, New Delhi.
- Donald S. Tull and Del I. Hawkins, Marketing Research: Measurement and Methods, Prentice-Hall of India Pvt. Ltd. New Delhi, 1998

CONSUMER BEHAVIOUR

Course Code: COM4410 **Credit Units: 03**

Course Objective:
The course aims to explore the core concepts and theories of shopper behavior at individual, group and organizational level so that students may use these as inputs in marketing decision making.

Course Contents:

Module I
Consumer demographics, consumer life styles. Retailing implications of consumer demographics and lifestyle. Consumer profiles. Lifestyle marketing. Environmental factors and individual factors affecting consumers.

Module II
Consumer as an Individual, Motivation, Needs, Goals, Personality, Self and Self Images, Perception, Imagery, Learning, Cues, Response, Reinforcement, Behavioral Learning and Cognitive Learning Theory, Brand Loyalty.

Module III
Attitude, Attitude Formation and Change. Shopping attitudes and behavior, where people shop. Consumer Buying Decision Process, types of consumer decision making. Impulse purchases and customer loyalty.

Module IV
Group Dynamics and Reference Groups, Family Decision Making, Social Class, Culture, Subculture

Module V
Opinion Leadership Process, Diffusions of Innovations, Adoption Process.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P-**Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Assel Henry (2006), Consumer Behaviour & Marketing Action, Thompson Press
- Seth & Mittal (2003), Consumer Behaviour : A Managerial Perspective, Thompson Press
- Schiffman and Kanuk (2009), Consumer Behaviour, Prentice Hall of India

TRAINING AND DEVELOPMENT

Course Code: COM4411 **Credit Units: 03**

Course Objective:
The objective of the course is to familiarize the students with basic concepts and principles of Training and Development of Human Resource and train them to understand the learning environment of a firm. The knowledge so obtained will make them capable of providing training to Human Resource of a business firm.

Course Contents:
Module I
Conceptual Framework: The functions of training, relationship of training to organizational individual goals, Factors effecting successful training process, Skills of a successful trainer – Internal and external trainer. Training and Learning: The learning process, learning curve, principles of learning, training guidelines, experience versus training, kinds of training, system approach to training, programmed instruction, transfer of training.

Module II
Training Needs Assessment and Curriculum Development: Identification of Training and Development needs, training needs assessment-various approaches (the job and the Individual), Advantages and disadvantages of basic needs assessment techniques, Assessing curriculum needs, curriculum standards, matching organisational training needs, Developing training materials.

Module III
Training Methods: Three Stages of training (Preparatory, implementation and followup stage), On the job and off-the job methods,, experiential versus non-experiential methods.

Module IV
Evaluation of Training and Development, and Emerging Pattern: Reasons of evaluating training, Criteria for evaluation, problems of evaluation, steps involved in evaluation, methods for training evaluation, analysis and costing of training. Emerging Pattern of Training and development in India. Two Indian case studies to be discussed in the class.

Module V
Case Studies: Some cases to be discussed in the class relating to the learning from the course to business world are required to be discussed.

Examination Scheme:

Components	A	P	C	CT	EE
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Prior John, Handbook of Training and Development Jaico, Publishing House, Bombay, 1997.
- Donald F. Michalak and Edwin G. Yager, Making the Training Process Work, Harper and Row, New York, 1979.
- Jack J. Phillips, Handbook of Training Evaluation and Measurement Methods, 3rdEdition, Houston, Gulf Publishing Co., 1997.
- Lynton R, Pareek, U, Training for Development, 2nd Edition, New Delhi, Vistaar, 1990.

MANAGEMENT OF TRANSFORMATION

Course Code: COM4412 **Credit Units: 03**

Course Objective:
The objective of the course is to make the students develop the art or unlearning for thinking afresh to provide new solutions to the problems which can act as benchmarks for others to follow.

Course Contents:
Module I
Introduction: Concept, nature and process of planned change. Resistance to change. Emerging Horizons of management in changing Environment. Concepts of transformation vs. change. Transformational Leadership. Charismatic vs. Noncharismatic Leadership.
Leadership from Within: Concept, need and importance of developing leadership from within. Distinction between leadership from without and leadership from within. Steps for developing leadership from within.

Module II
Turnaround Management: Definition of sickness. Causes and Symptoms of Sickness. Prediction of sickness. Revival of sick unit – Role of BIFR, SICA, Financial Institutions. Behavioural, economic and technical issues in Turnaround Management. Learning from the success stories of organisations where turnaround management strategies have been adopted and sick or potentially sick companies have been turned around.

Module III
Business Process Reengineering as a tool of managing transformation: BPR – An imperative for survival. Reengineering imperative in USA, the re-engineering scenario in Europe, the re-engineering imperative in India, Instances of re -engineering in Indian organisations (Case studies). Five steps methodology to implement BPR.

Module IV
Management of Transformation through New Technology and Innovations: Technological revolution – adoption and adaptation of technology (problems of technology transfer). Innovative Technology – autonomous vs. induced inventions. Management of New Technology in relation to organisational productivity and quality of work life. Learning experiences from real life case studies.

Examination Scheme:

Components	**A**	**P**	**C**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P-**Project/Seminar/Quiz/Viva/Home Assignment; C-Case Discussion **CT**-Class Test; **EE**-End Semester Examination

Suggested Readings:

- Sawhney, Mohan and Jeff Zabin, The Seven Steps to NIRVANA: Strategic Insights into e-Business Transformation, Tata McGraw Hill, New Delhi, 2001.
- Bender, Peter Urs, Leadership from Within, Macmillan India Ltd., Delhi, 1997.
- Hammer, M. and J. Champy, Reengineering the Corporation, Harper Business, 2004.
- Khandwalla Pradip, Turnaround excellence: In sights from 120 cases, Response Book (A Division of Sage Publication, New, 2001
- Noori, H. and Radford, Readings and Cases in Management of New Technology, Prentice Hall, New York, 1990.
- Whittaker, D.H., Managing Innovations, Cambridge University Press, Cambridge, 2008.

DISSERTATION

Course Code: COM4437 **Credit Units: 06**

The Aims of the Dissertation
The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

The Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialisation.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning your dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.

- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.
  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.
  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

Guidelines for the assessment of the dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?

9. Has the student been regular in his work?
10. Layout of the written report.

Examination Scheme:

Dissertation:	75
Viva Voce:	25
Total:	**100**

Amity Institute of Behavioural & Allied Sciences

Bachelor of Arts - Applied Psychology (Honors)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Arts - Applied Psychology (Honors)

Syllabus – First Semester

INTRODUCTORY PSYCHOLOGY

Course Code: PSY2151 **Credit Units: 03**

Course Objective:
This course is designed to introduce the science of psychology. It identifies and defines the theories, terms, methods, and various fields of psychology. This course can be used as a foundation towards continued education in more specific areas of psychology. General Psychology encourages students to study in depth the notions of modern scientific psychology. Upon completion of this course, student should have the following objectives:

- To know the major personalities important to the field of general psychology and the ideas, theories, and schools with which they are associated.
- To know the major terms associated with general psychology and their meanings.
- To know the major concepts associated with the area of general psychology.

Course Content

Module I:
Meaning, Definition, Nature and Goals of Psychology

Module II:
Scope of Psychology; Branches and Fields of Psychology

Module III:
Background of Psychology: Historical Perspective

Module IV:
Schools of Psychology: Structuralism, Functionalism, Behaviorism, Gestaltism, Psychoanalysis, Humanism, Existentialism, Cognitive

Module V:
Methods of Psychology: Introspection, Observation, Experimental, Interview, Questionnaire, Survey

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, N. Delhi
- Hilgard& Atkinson:Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow:Psychology. 3rd Edition Broalu&Benewmark Publishers
- Guilford, J. P.: GeneralPsychology. New York: D. VanNostrand
- Mohsin, S.M.: Elementary Psychology. MotilalBanarasidas.
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Morris, C. G. & Maisto, A. A.: Psychology: An Introduction. (12thed.).Upper Saddle River, NJ: Prentice Hall.

References:

- Atkinson &Hilgard: Psychology: An Introduction. CengageLearning EMEA
- Kosslyn& Rosenberg :Psychology (3rded.). Allyn& Bacon
- Lahey, B. B. & Majors, M.: Psychology: An Introduction. Tata McGraw Hill Humanities/Social Sciences/Lingua

ELEMENTARY STATISTICS

Course Code: PSY2101 **Credit Units: 03**

Course Objective:

The paper on Statistics introduces quantification of psychological data and gives primary research orientation to the students. Understanding Statistics and basic logic of Statistics is crucial to being able to read Psychology research article. Further by mastering the basic logic and ways of thinking about Statistics, students will be unusually well prepared for the advanced courses.

Course Contents:

Module I:
Meaning, Definition, Importance and Limitations of Statistics in Psychology
Population and Sample: Types of Sampling

Module II:
Primary and Secondary Data
Classification and Tabulation of Data,
Frequency Distribution

Module III:
Graphical presentation of Data: Histograms, Frequency polygon, Frequency Curve, Cumulative Frequency Curve (Ogive), Cumulative Percentage Curve

Module IV:
Measures of Central Tendency: Meaning, Application and Computation of Mean, Median and Mode

Module V:
Measures of Variability: Range and Variation; Average deviation, Quartile deviation and Standard deviation

Examination Scheme:

Components	**CT**	**CT / H / P / V / Q**	**CT**	**A**	**EE**
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Garrettt, H. E.:Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd. Bombay
- Aron/Aron&Coups:Statistics for Psychology(5th Ed).Pearson Education
- Howitt, D. &:Introduction to Statistics in Psychology (5th Ed). Cramer, D.England: Pearson Education Limited.
- Sprinthall, R.C. :Basic Statistical Analysis. Prentice Hall College Div
- Downie, N. M.:Basic Statistical Methods. Harper & Row Publishers, New York
- Colman, A. M.:Psychological Research Methods and Statistics. London and New York: Longman.
- Gupta, S. C.:Fundamentals of Statistics. N. Delhi: Himalaya
- Siegel, S.: (1956), Non Parametric Statistics, New York, McGraw Hill
- Broota, S.: (1992), Experimental Design in Behaviour Research, New Delhi
- Mohsin, S. M.:Fundamental Statistics for the BehaviouralSciences.MotilalBanarasidas, Patna

References:

- Agrawal, B. L.**:**Basic Statistics. New Age International
- Guilford, J.P.:Fundamental Statistics in Psychology and Education. McGraw Hill Kogakusha Ltd.
- Minimum, E. W., King, H. M. & Bear G., (1993), Statistical Reasoning in Psychology & Education, 3rd Edition, New York: John Willey & Sons
- Freeman: Statistics in Psychology

EXPERIMENTAL PSYCHOLOGY- I

Course Code: PSY2102 **Credit Units: 03**

Course Objective:

The basic general objective of Experimental Psychology is to familiarize the student with a basic and broad understanding of the scientific method and its application to the problems of Psychology. The course focuses on the logic, principles and practices of modern science and how it is applied to understanding the nature of reality. Successful completion of this course will prepare the student for graduate work and advanced experimental concepts.

Course Contents:
Module I:
Meaning and History of Experimental Psychology
Nature of Science and Scientific Methods, Scope of Experimental Psychology

Module II:
Steps of Experimental Method
Problem and Hypothesis: Nature, Types and Sources
Variables: Nature and types and control of Variables.

Module III:
Sensory Process: Meaning and Types of Senses, Sensation and Sensitivity
Visual Sense- Structure and Functioning of Eye
Hearing Sense- Structure and Functioning of Ear
Chemical Senses- Sense of Smell and Sense of Taste
Skin Senses- Sense of Touch or Pressure, Sense of Temperature and Pain
Body Senses- Kinesthetic Sense and Vestibular Sense

Module IV:
Attentional Process: Nature, Types and Determinants of attention

Module V:
Perceptual Process: Meaning and Nature of Perception
Principal of Perceptual organization
Perception of Space, Depth–Visual Monocular Cues and Binocular Cues, Perception of Distance and Direction Perceptual constancy
PerceptualIllusions; Delusions and Hallucinations

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Morgan &King : Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Myers, A. &Wadsworth Hansen, C. H. : Experimental Psychology (6th ed.).
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction
- Munn, N.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co.
- Sdorow: Psychology. 3rd Edition Broalu&Benewmark Publishers
- D'Amoto, M, R: Experimental Psychology: Methodology Psycho- Physicsand Learning. TMH Ed. Tata McGraw Hill Publishing Company Limited, New Delhi.

References:

- Sharma, R. N. & Sharma, R.: Experimental Psychology. Atlantic
- Sharan, A. K.: Experimental Psychology. Anmol Publication
- Kantowitz: Experimental Psychology. USA: Wadsworth Cengage Learning

PSYCHOLOGICAL PRACTICAL- I

Course Code: PSY2103 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To familiarize the students with the use of elementary statistical techniques
4. To encourage and guide the students to undertake a small-scale research project.

Note: Total 5practicals will be conducted in the first semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Alexander Pass-a-long Test of Intelligence	Intelligence
2	Muller Lyre Apparatus with stand	Perception Illusion
3	Division of Attention Board with reset 6 digit Impulse counter	Attention
4	Leadership Style Scale	Leadership
5	Depth Perception	Perception
6	Marital Coping Scale	Relationship

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

SYSTEMS AND APPROACHES IN PSYCHOLOGY

Course Code: PSY2104 **Credit Units: 03**

Course Objective:
The paper on System and Theories gives a brief history of psychology and the developments within the discipline.

Course Contents:

Module I:Development of Psychology as a Discipline
Contribution of Weber, Fechner, Helmholtz, Galton,
Ebbinghaus, Mc Keen Cattell.

Module II: Structuralism, Functionalism
Wundt and Titchner as the founder of structuralism, structuralism as a system
Founding of Functionalism: Dewey and Angell

Module III: Behaviourism
WatsonianBehaviourism: systematic criteria and critical evaluation.

Module IV: Gestalt psychology
Founding the Gestalt psychology, Gestalt qualities, factors in organization, insight and productive thinking, Gestalt psychology as a system,

Module V: Psychoanalysis
Basic postulates, Freud, Jung and Adler's contributions to Psychoanalysis, critical evaluation.

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Leahy, T. H., (1991): A History of Modern Psychology; New York: Prentice Hall
- Wolman, B. B. (1979): Contemporary Theories and Systems in Psychology; London: Freeman Book Company
- Chaplin, J. P.&Krawice, T. S. (1979): Systems and Theories in Psychology; New York: Holt Rinechart& Winston
- Mar, M. H.&Hillix, W. A. (1986): Systems and Theories in Psychology; New York: McGraw Hill

References:

- Paranjp, A. C. (1994): Meeting East and West; New York: Plenum Press
- Sartre, J. P. (1956): History & Theories of Psychology

HUMAN RIGHTS, VALUES AND ETHICS

Course Code: PSY2105 **Credit Units: 03**

Course Objective:

The course will address the evolution of international human rights and of the legal instruments designed for their protection. It will study the theoretical foundations of the idea of human rights in India.

Course Contents:

Module I: Introduction to Human Rights
Historical Perspective of Human rights
Meaning and Evolution of Human rights
Theories of Human Rights
Universalization of Human Rights
General Conditions Underlying the idea of human rights

Module II: Human Rights in Indian Context
Indian constitution and Human rights
Implementation of human rights in India
Personal and family rights
Group rights and right to equality

Module III: Human Rights Education
History and Determinants if Human Right Education
Principles of Human Rights Education
Awareness of Human Rights in Children
Protection of Human Rights in School
Global Need of Human Right Education

Module IV: Human and Civil Rights
Property Rights - Copyright - Intellectual Property
Crime and Social Deviance: Anomie
Ethics
Police — Law Enforcement: International Law Enforcement Agencies and National Law Enforcement Agencies

Module V: Values and ethics In India
Human Rights: Values and Ethics
Indian and Western Values and Ethics

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Shelley, Wright (2001): International Human Rights, Decolonisation and Globalization: Becoming Human. London: Routledge.
- Anthony J. Langlois. (2001): The Politics of Justice and Human Rights: Southeast Asia and Universalist Theory. Cambridge: Cambridge University Press.

References:

- Parish, Steven M. (1994): Moral Knowing in a Hindu Sacred City. N.Y.: Columbia University Press.

READINGS IN PSYCHOLOGY

Course Code: PSY2130 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme:

Report on the Book in 3000 words	**Written Test**
50 marks	50 marks

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2132 **Credit Units:03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions

a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor(Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).

- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

ARTICLE/ FEATURE WRITING

Course Code: PSY2136 **Credit Units: 01**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation

- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

Syllabus – Second Semester

ABNORMAL PSYCHOLOGY

Course Code: PSY2251 **Credit Units: 03**

Course Objective:
Abnormal psychology is a branch of psychology that deals with psychopathology and abnormal behavior that causes suffering to the individual and others around him or her, and interferes with functioning in a significant way. The term covers a broad range of disorders, from depression to obsession-compulsion to sexual deviation and many more. The study of abnormal psychology also includes learning about the factors, situations, and conditions that cause mental disorders and how they may be best treated.

Course Content:
Module I: Introduction
Concept of abnormality: Criteria and Perspectives
Classification: DSM IV-R, conceptual and operational evaluation.
Casual factors in Psychopathological Behaviour
(a) Biological determinants
(b) Psychological determinants
(c) Socio-cultural determinants

Module II: Neurosis and Psychosis
Concept and Difference between both the two

Module III: Neurotic Disorder
Generalized anxiety disorders
Obsessive-Compulsive disorders
Phobic Disorders
Eating Disorder

Module IV: Mood Disorders
Depression

Bipolar Disorder

Module V: Psychotic Disorder
Bipolar disorders:Manic, Depressive, Mixed
Psychotic depression
Delusional Disorder
Schizophrenia

Module VI: Mental Retardation and Development Disorders
Levels of mental retardation, Organic factors in mental retardation.
Autism: Clinical picture and casual factors.
Childhood Disorder

Module VII: Substance Abuse Disorders
Alcoholism
Drug Addition

Module VIII:
Psychosomatic Disorder
Somatoform Disorders
Personality Disorders

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:
Text:

- Page, J.D.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Shanmugam, T.E.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Coleman, J.C.: Abnormal Psychology and Modern Life. Bombay: D.B. Taraporewala Sons.&OCLtd.
- Davison G.C.& Neale, J. M.: Abnormal Psychology. New York: John Willey&Sons.
- Carson, R.C., Butcher, J.N. &Mineka, S.: Abnormal Psychology and Modern Life. Delhi: & Person Education, 2000
- Sarason, I. G. &Sarason, B. R.: Abnormal Psychology: The Problem of Maladaptive Behaviour, 11th Ed. Prentice-Hall
- Mangal, S. K.: Abnormal Psychology. New Delhi: Sterling Publishers Pvt Ltd

References:

- Comer, R. J.: Abnormal Psychology, 5th Ed. Worth Publishers
- Kumar, V.: Abnormal Psychology: Causes and Treatment. AadiPublications
- Kaur, R.: Abnormal Psychology: New Trends and Innovations Delhi: Deep & Deep Publications (P) Ltd.

ADVANCED STATISTICS

Course Code: PSY2201 **Credit Units: 03**

Course Objective:
The paper on statistics introduces quantification of psychological data and gives primary research orientation to the students.

Course Contents:
Module I: The Normal Curve
Characteristics and Problems in Normal Probability Curve (NPC), The Standard Normal Curve.

Module II: Significance of mean
Computation of the standard error of mean, application and interpretation, Z-test, The 't' distribution, Degrees of freedom, Levels of significance, Standard error of difference between two independent means (t-test: Large & small samples), Type I and Type II errors

Module III: Chi-Square Test (Non-Parametric Method)
Meaning, Test of Hypothesis with equal probability, Chi-Square with 2*2 table

Module IV: Analysis of Variance
Hypothesis testing with the help of One way ANOVA (f-test)

Module V: Parametric Vs Non-parametric Stats
Introduction, Assumptions, basic differences, uses of parametric and Non-parametric tests

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Garrettt, H. E.:Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd. Bombay
- Aron/Aron&Coups:Statistics for Psychology(5th Ed).Pearson Education
- Howitt, D. &:Introduction to Statistics in Psychology (5th Ed). Cramer, D.England: Pearson Education Limited.
- Sprinthall, R.C. :Basic Statistical Analysis. Prentice Hall College Div
- Downie, N. M.:Basic Statistical Methods. Harper & Row Publishers, New York
- Colman, A. M.:Psychological Research Methods and Statistics. London and New York: Longman.
- Gupta, S. C.:Fundamentals of Statistics. N. Delhi: Himalaya
- Siegel, S.: (1956), Non Parametric Statistics, New York, McGraw Hill
- Broota, S.: (1992), Experimental Design in Behaviour Research, New Delhi
- Mohsin, S. M.:Fundamental Statistics for the BehaviouralSciences.MotilalBanarasidas, Patna

References:

- Agrawal, B. L.**:**Basic Statistics. New Age International
- Guilford, J.P.:Fundamental Statistics in Psychology and Education. McGraw Hill Kogakusha Ltd.
- Minimum, E. W., King, H. M. & Bear G., (1993), Statistical Reasoning in Psychology & Education, 3rd Edition, New York: John Willey & Sons
- Freeman: Statistics in Psychology

EXPERIMENTAL PSYCHOLOGY-II

Course Code: PSY2202 **Credit Units: 03**

Course Objective:
The basic general objective of Experimental Psychology is to familiarize the student with a basic and broad understanding of the scientific method and its application to the problems of Psychology. The course focuses on the logic, principles and practices of modern science and how it is applied to understanding the nature of reality. Successful completion of this course will prepare the student for graduate work and advanced experimental concepts

Course Contents:
Module I: **Psychophysics**
Basic Concepts, Stimulus and Differential Threshold
Determination of Thresholds: Method of Limits,
Method of Average Error, Method of Constant Stimuli

Module II: Motivation
Meaning, Definition and Nature of Motivation, Motivational Cycle
Needs– Biological and Psychosocial, Drive and Incentive
Classification of Motives– Biogenic and Psycho-social Motives
Theories of Motivation–Need and Drive Reduction Theory, Instinctive and Social Theory, Self-Urges Theory, Goal-oriented Actualization Theory.

Module III: Emotion
Meaning, Nature and Characteristics of Emotions
Aspect of Emotions- Bodily and Physiological Changes
Theories of Emotion: James-Lange Theory, Cannon-Bard Theory, Schachterand Singer's Cognitive Theory, Lindsey's Activation Theory.

Module IV:Learning
Meaning, Nature and Types of learning (Verbal, Motor, Concept etc)
Theories of Learning –Trial and Error Theory, Classical Conditioning Theory, Operant / Instrumental Conditioning, Insight Learning Theory

Transfer of Training: Meaning, Types and Theories of Transfer of Training

Module V:Learning disabilities
Reading Disorder/Developmental dyslexia
Disorder of written expression/Dysphasia/Aphasia
Math Disability/Dyscalculia.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Morgan &King : Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Myers, A. &Wadsworth Hansen, C. H. : Experimental Psychology (6th ed.).
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction
- Munn, N.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co.
- Sdorow: Psychology. 3rd Edition Broalu&Benewmark Publishers
- D'Amoto, M, R: Experimental Psychology: Methodology Psycho- Physicsand Learning. TMH Ed. Tata McGraw Hill Publishing Company Limited, New Delhi.

References:

- Sharma, R. N. & Sharma, R.: Experimental Psychology. Atlantic
- Sharan, A. K.: Experimental Psychology. Anmol Publication
- Kantowitz: Experimental Psychology. USA: Wadsworth Cengage Learning

PSYCHOLOGICAL PRACTICAL- II

Course Code: PSY2203 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Mirror Drawing	Motor Learning
2	Rey Auditory Verbal Learning Test	Verbal Learning
3	Emotions & Expressions	Emotion
4	Coopersmith Self Esteem Inventory	Self Esteem
5	Emotional Intelligence Test	Intelligence
6	Quality Of Marital Relationship scale	Relationship

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

INDUSTRIAL PSYCHOLOGY

Course Code: PSY2204 **Credit Units: 03**

Course Objective:
Industrial psychology is the branch of psychology that applies psychological theories and principles to organizations. Often referred to as I/O psychology, this course focuses on the topics like increasing workplace productivity and related issues such as the physical and mental well-being of employees.

Course Contents:
Module I: Introduction to Industrial Psychology
Definition, Subject matter, & Goals
Development of Industrial Psychology, Present status & future prospects

Module II: **Personnel selection**
Determining job requirements: Uses and types of job information, and job analysis
Recruiting job applicants: Recruitment techniques
Personal history assessment: Standard application blanks, bio data items, resume and letter of reference
Assessment of current behavior: Interviews, psychological testing and assessment Centers

Module III: Employee training and Development
Training needs assessment
Training design
Techniques for training knowledge and skill
Training programme evaluation

Module IV: Evaluating Job Performance
Uses of performance evaluation: Downsizing, fair employment, employment-at-will and seniority
Sources of evaluation: The evaluator and performance information
Appraisal rating systems: Graphic rating scales and rating errors
Non-rating evaluation methods: Checklists and comparison method

Module V: Conditions of Work &Accidents
Conditions of Work: Physical Conditions for work- Illumination, Noise, Colour, Temperature, Humidity.

Temporal Condition for Work- Hours for Work, Length of Work Week, Flexible Working Hours, Rest Pauses and Shift work
Psychological Conditions of Work-Boredom, Monotony and Fatigue
Industrial Accident- Definition, Causes and Prevention

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Robbins, S.P. &Sanghi, S. (2007). Organizational behavior (11th ed.). New Delhi: PearsonEducation
- Berry, L.M. (1998), reprint 2010. Psychology at work: An introduction to Industrial andOrganizational Psychology. N.Y. McGraw-Hill International Editions
- Blum & Naylor. Industrial Psychology, CBS Publishers & Distributors.
- Aamodt, M.G. (2007). Industrial and Organizational Psychology: An applied approach.US: Thomson & Wadsworth.
- Robbins, S.P.; Judge, T.A.; and Sanghi, A. (2009). Organizational Behaviour. N.D.:Pearson Prentice Hall.
- Miner, J.B. (1992). Industrial-Organizational Psychology. N.Y.: McGraw-Hill
- Luthans, F. (1995). Organizational behavior (7th ed). New York: McGraw- Hill, inc.

References:

- Pandit, R., Kulkarni, A.V. & Gore, C. (1999). Manasashastra: Audyogikaanivyavasayikupayojan.Nagpur: Pimpalapure& Co.
- Schultz, D. and Schultz, S. E. (2006)Psychology and work today. 8th ed. N.D.: PearsonEdu.
- McShane, et al. (2006). 1st reprint. Organizational Behaviour. N.D.: Tata McGraw-Hill

ORGANIZATIONAL BEHAVIOUR

Course Code: PSY2205 **Credit Units: 03**

Course Objective:
To learn how the findings of psychology are applied to the problems involving human behavior in the workplace for providing optimum solutions.

Course Contents:
Module I: Nature and Scope of Organizational Psychology
Organizational Psychology: Meaning, subject matter and functions of Organizational Psychology
Development, Current status and Future of Organizational Psychology

Module II: Work Motivation
Theories
Job Design: Job enlargement, Job enrichment and Job characteristics models

Module III: Organizational Attitude and Behaviour
Job Satisfaction, Job Involvement, Organizational Commitment: Concepts, Determinants and Consequences.

Module IV: Influence, Power and Politics in Organization
Introduction: Individual bases of Power, Group or Subunit power
Structural determinants, Organizational Politics and its ethical implication

Module V: Organizational Culture
Nature, Formation and maintenance of organizational culture
Consequences of organizational culture
Work culture in the Indian context

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE

Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Robbin's S.P. (1993). Organizational Behaviour: Concepts Controversies and Applications; (6th Ed.) New Delhi: Prentice Hall.
- Bass, B.H. &Berrett, G.V. (1981). People, Work, and Organizations an Introduction to Industrial and Organizational Psychology; Boston: Allyn and Bacon, INC.
- Feldman, D.C. &Aenold, H.J. (1985). Managing Individual and Group Behaviour in Organizations; New York: McGraw-Hill.
- Smith, R.D., (1988). Organizational Behaviour; New York: McGraw-Hill.
- Luthans, F. (1998). Organizational Behaviour; New York: McGraw-Hill

References:

- Davis, K. &Newstroms, J.W. (1989). Human Behaviour at Work: Organizational Behaviour; New York: McGraw-Hill
- Sekaran, U. (1989). Organizational Behaviour: Text and Cases; New Delhi: Tata Mcdraw Hill
- Cascio, W. (1993). Applied Psychology in Personal Management; New York: Prentice Hall

READINGS IN PSYCHOLOGY

Course Code: PSY2230 **Credit Units: 02**

Objectives:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme:

Report on the Book in 3000 words	**Written Test**
50 marks	50 marks

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2232 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).

- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

ARTICLE/ FEATURE WRITING

Course Code: PSY2236 **Credit Units: 01**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students with an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles.Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation

- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

Syllabus – Third Semester

BASIC COGNITIVE PSYCHOLOGY

Course Code: PSY2351 **Credit Units: 03**

Course Objective:
Cognitive Psychology is an objective, empirical discipline that tends to favor an experimental approach. This paper of Psychology is crucial to understand the basis of mental activity and human behaviour. The students of Psychology will need to have this knowledge about the normal mental operation of adults in order to understand more complex processes and their disorder. The subject emphasizes cognitive aspects to show the more up to date developments. In this paper of Psychology, Students will:

- Gain factual knowledge of the terminology, methods, and research findings in the field of cognitive psychology.
- Learn the fundamental theories and principles of cognitive psychology including being able to critique them.
- Learn how professionals in the field of cognitive psychology go about the process of gaining new knowledge.

Course Content:
Module I:
Introduction, History and Background of Cognitive Psychology

Module II:
Thinking: Nature, and Types of Thinking:
Tools of thinking- Images, Concept, Symbols and Signs, Language, Muscle Activities and Brain Function

Module III:
Reasoning: Meaning and Types of Reasoning: Deductive and Inductive Reasoning

Module IV:
Problem solving: Meaning and Method of Problem solving

Decision Making: Meaning, types and hindrances

Module V:
Intelligence: Meaning, Nature and Theories of intelligence: Unitary Theory, Multifactor Theory, Two Factor Theory, and Group Factor Theory.
Genetic and Environmental Influence on Intelligence
Classification of Intelligence Test
Concept of Mental Age and IQ

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Kellogg, R. T.: Fundamentals of Cognitive Psychology. New Delhi: Sage Publication
- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Solso, R. L.: Cognitive Psychology (8th ED.). Delhi: Pearson Education
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow: Psychology. 3rd Edition Broalu&Benewmark Publishers
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Haberlandt, K.: Cognitive Psychology. Allyn& Bacon

References:

- Esgate, A. &Groome, D.: An Introduction to Applied Cognitive Psychology. England: Psychology Press.
- Best, B. J.: Cognitive Psychology. (3rded.). West Publishing Company

SOCIAL PSYCHOLOGY

Course Code: PSY2301 **Credit Units: 03**

Course Objective:
Social Psychology is the study of social interaction and social influence. As such, it remains one of the most comprehensive and personally relevant areas within the field of psychology. This course has following objectives.

- To expand your knowledge about social psychology and human behavior.
- To foster respect for human diversity, particularly with regard to matters of gender, race and ethnicity.
- To enable students to(a) understand the forces that create group differences in patterns of social behavior, (b) understand and tolerate the behavior of other people, particularly that of members of the diverse array of groups and social categories to which they do not belong,(c) recognize the limits in generalizing psychological research to all cultural/gender/ethnic/age groups, and (d) understand the dynamics of intergroup relationships, conflict, and cooperation.

Course Contents:
Module I: Introduction
Meaning and Nature of Social Psychology
Scope and Development of Social Psychology
Methods and their Application**:** Experimental Method**,** Observation Method**,** Correlational Method**,**
Interview and Questionnaire
Socio-metry
Relationship of Social Psychology with other discipline

Module II: Social Perception and Cognition
Perceiving ourselves: Self-Concept, Self-esteem and Self-Presentation
Perceiving others: Forming impressions and role of verbal and non-verbal cues
Attribution: Understanding the causes of others' behavior
Attribution Biases

Module III: Interpersonal Attraction
Concept and Meaning of interpersonal attraction
Factors affecting interpersonal attraction,

Theories of interpersonal attraction: Reinforcement Theory, Complementary Theory, Exchange Theory

Module IV: Prosocial Behaviour
Meaning and Nature
Social exchange theory, Bystander effect
Determinants of prosocial behavior

Module V: Aggression
Meaning and Determinants of Aggression: Social, Cultural, Personal and Situational
Prevention and Control of Aggression

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Myers, D. G.: Social Psychology (10th Ed). New York: McGraw Hill
- Feldman, R. S.: Social Psychology: Theories, Research and Application. New York: McGraw Hill
- Secord, P.F. &Backman, C. N.: Social Psychology. USA: McGraw-Hill
- Baran, R.A. & Byrne, D.: Social Psychology. Boston, MA: Pearson Allyn and Bacon.
- Aronson, E., Wilson, T. D.: Social Psychology (7th ed.). Upper Saddle &Akert, R. M. River, NJ: Prentice Hall.
- Wrightsman, L. S.: Social Psychology. Brooks/Cole Pub. Co.
- Alcock, J. E.; Carment, D. W.; Sadava, S. W.; Collins, J. E. & Green, J. M.:A textbook of Social Psychology (6th Ed)Scarborough, Ontario: Prentice Hall / Alliyn& Bacon
- Sharma, R. K. & Sharma, R.:Social Psychology. New Delhi: Atlantic Publishers and Distributers

References:

- Krutchfield, R. S.: Theories and Problems of Social Psychology
- Baumeister, R. F.& Belmont, C.A.: Social Psychology and Human Nature (2nd Bushman, B. J. ed). Thomson/Wadsworth
- Kuppuswamy: Introduction to Social Psychology

PSYCHOLOGICAL PRACTICAL- III

Course Code: PSY2302 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the third semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Aggression Questionnaire	Aggression
2	Draw A Person Intellectual Ability Test	Intelligence
3	Multidimensional Self Concept Scale	Self-Concept
4	Swaroop Mehta Test Of Thinking Strategy	Thinking
5	Critical Thinking For Activities of Daily Living and Communication	Thinking
6	Marital Compatibility Index	Relationship

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

SPORTS PSYCHOLOGY

Course Code: PSY2304 **Credit Units: 03**

Course Objectives:

- To trace the development of sports psychology as an independent discipline with its multidimensional perspectives;
- to identify the relationship of personality and situational factors with performance on individual and team events; and
- to apply the psychological interventions in sports

Course Contents:

Module I:
Nature, Historical & recent perspectives on sports psychology

Module II:
The role of stress, arousal, anxiety and attention in the performance of individual and team sports

Module III:
Motivation, skills and performance, personality profiles of successful sports persons

Module IV:
Cognitive and social psychological dimensions of individual & team sports

Module V:
Training/Coaching techniques, cognitive and behavioral interventions, the role of Sports Psychologists

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Jarvis, M.: Sport Psychology. Routledge Publication
- Sejwal, S. M. (2011): Sport Psychology. Pacific Publication.

References:

- Thatcher: Sports and Exercise Psychology

SUMMER PROJECT EVALUATION-I

Course Code: PSY2335 **Credit Units: 03**

Course Objective:
To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training.
It will also help students to develop report writing skills.
Duration: Two Months (June- July)

Methodology:
Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor from their respective Institute. Students will submit their summer project reports with their supervised daily reporting. Immediately after returning from their summer vacations. This would require primary data collection.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	**100 Marks**

HEALTH PSYCHOLOGY

Course Code: PSY2303 **Credit Units: 03**

Course Objective:
To enable students to understand the concept of social gerontology and health and its relationship to the well –being of the individual in everyday life

Course Contents:
Module I: Introduction & Methodology
Definition of Health Psychology; Mind-Body Relationship; Changing Patterns of Illness;
Medical Acceptance; Health care services
Research Methodology- Anecdotal method, Case Study method, Correlation Research, Experimental method

Module II: Models of Health
Bio-Psycho-Social Model

Module III: The Immune System
Psycho-Neuro Immunology- the Immune System & immune functioning. Disorders of the Immune System- Infectious Diseases (viral infections & disease); Co-factor theory; Behavioral factors and common cold; AIDS (Transmission of HIV-AIDS & its consequences, coping with AIDS); Cancer- (Psychological factors in Cancer, causes of cancer)

Module IV: Health Promotion & Disease Prevention
Stress- Meaning of stress; Theories of stress (Selye& Lazarus); Responses to stress; Dimensions of Stress; Coping with Stress.Health compromising behavior- Alcohol abuse, Drug abuse, Smoking

Module V: Health Enhancing Behaviour
Improving health & wellbeing: Personality and Individual Differences
Stress- Hardiness; Motive patterns; gaining a sense of control; Enhancing Support

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE

Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

Text:

- Allen Felicity. Health Psychology: theory and practice, Published by Allen &Unwin, 1998
- Friedma. Health Psychology: Health Psychology, 2nd Edition, Published by Academic Internet Publishers Incorporated, 2006
- Shelley E. Taylor. HealthPsychology (McGraw-Hill Companies (2011)
- Dimatteo, M.R. & Martin, L.R.:HealthPsychology. Allyn and Bacon

References:

- Dalal, A. K. New Directions in HealthPsychology. Sage Publications
- Ogden Jane. Health Psychology: A Textbook, Published by Open University Press, 2000

READINGS IN PSYCHOLOGY

Course Code: PSY2330 **Credit Units: 02**

Course Objective:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme:

Report on the Book in 3000 words	**Written Test**
50 marks	50 marks

TERM PAPER

Course Code: PSY2331 **Credit Units: 02**

Course Objective:
The rationale behind introducing the term paper for BA (H) Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Term Paper:

1. Topic
2. Introduction
3. Review Research
4. Key Learning: minimum 5 pgs handwritten
5. Conclusion
6. References
7. No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Compilation of Term Paper	50 Marks
Viva Voce	25 Marks
Presentation of Term Paper	25 Marks
Total	**100 Marks**

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2332 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).

- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP/CERTIFICATION

Course Code: PSY2333 **Credit Units: 01**

Course Objective

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Experimental Psychology
- Health Psychology
- Industrial Psychology
- Organizational Behaviour
- Sports Psychology
- Social Psychology
- Cognitive Psychology

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Group Activity
Role Play
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

ARTICLE/FEATURE WRITING

Course Code: PSY2336 **Credit Units: 01**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles.
   Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning

- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

Syllabus – Fourth Semester

LIFE SPAN DEVELOPMENT

Course Code: PSY2451 **Credit Units: 03**

Course Objective:

Developmental psychology, also known as human development, is the scientific study of systematic psychological changes, emotional changes, and perceptual changes that occur in human beings over the course of their life span. Originally concerned with infants and children, the field has expanded to include adolescence, adult development, aging, and the entire life span. Developmental psychology includes issues such as the extent to which development occurs through the gradual accumulation of knowledge versus stage-like development, or the extent to which children are born with innate mental structures versus learning through experience. The objective of this paper is:

1. To provide an understanding of Physical, cognitive, affective, moral, social and neural development during infancy, childhood, and adolescence.
2. To critically evaluate the role of heredity, maturation, and the environment in development.
3. To critically examine the relationship between scientific theories of development and the reality of development in everyday life.

Course Content

Module I: Introduction
Meaning and Concept of Development: Life Span Perspective,
Theoretical Perspective on Development,
Factors influencing development

Module II: The Start to Life
Conception and Prenatal Development: The Interaction of Heredity and Environment;
Birth and newborn: Birth Complications, Competent Newborn.

Module III: Development in Infancy and Toddlerhood (birth to 2years)
Physical Development
Cognitive Development: Roots of Language
Social and Personality Development

Module IV: Development in Childhood
The Preschool years(3-6 Years)
Physical Development;
Cognitive Development: Language Development
Social and Personality Development
The Middle Childhood(6-12 Years)
Physical Development
Cognitive Development: Intellectual and Language development
Social and Personality Development

Module V: Development in Adolescence and Young Adulthood
Adolescence (12-19 years)
Physical Development
Cognitive development in Adolescence and School Performance
Social and Personality Development
Young Adulthood (19-35 years)
Physical Development: Physical Limitations and Challenges
Cognitive Development: Intelligence and Higher Education
Social and Personality Development:Forging Relationship and Choosing Career

Module VI: Development in Middle and Late Adulthood
Middle Adulthood(35-55 years)
Physical Development: Sexuality and Health
Cognitive Development:Memory and Remembering
Social and Personality Development: Cultural Dimensions
Late Adulthood (55 years to death)
Physical Development: Health and Wellness
Cognitive Development: Memory and Forgetting
Social and Personality Development: Successful Aging
Death, Dying and Bereavement

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D: Human Development (10th Ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Prentice Hall

- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Heatherington, E.M. &Parke, R.D.: Child Psychology: A Contemporary ViewpointNew York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A.: Allyn and Bacon.
- Crain, W.: Theories of Development. Englewood Cliffs, New Jersey: Prentice Hall.
- Newman, B.M. & Newman,P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.

References:

- Brodzinsky, D.M.; Gormly, A.V. &Anibron, S.R.:Life Span Human Development; New Delhi: CBSPublication
- Santrock, J.W.:A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.
- Bukatko, D. &Daehler, M.W.:Child Development: A Thematic Approach. New York: Houghton Mifflin Company.

PERSONALITY

Course Code: PSY2401 **Credit Units: 03**

Course Objective:

The paper introduces description, evaluation and application of major personality theories for personality development. The objective of studying Personality may be defined in its importance because the more you know about personalities, the better you will be able to understand why people do the things they do, and how to communicate with them By studying personality types, one can find out if he or she is an extrovert, an introvert, phobic, narcissist and so forth. The study of Personality can also bring awareness to the truth that there are many different types of people who require certain sensitivities. Following are the objectives that can be achieved after a study of personality:

1) Increment in personal integrity
2) Increment in personal freedom
3) Objectification of self and other
4) Increasing tolerance and understanding of others:

Course Contents:

Module I: Introduction

Concept and Definition of Personality: Western Perspective, Eastern Perspective
Personality as a Trait, Personality asTypes
Methods of Personality Assessment: Testing Method, Observational method

Module II: Determinants of Personality

Nature / Nurture Controversy:
Biological Determinants: Role of Genes and Endocrine Glands
Role of Physical Environment: Natural Environment, Constructed Environment, Behavioural
Role of Socio – Cultural Environment: Early Social Experiences and Impact of parenting styles

Module III: Trait and Type Theories of Personality

Trait (Biological) and Type Theories: Allport, Cattell, Eysenck, Sheldon, and Friedman

Module IV: Psychoanalytic Theories of Personality
Sigmund Freud, Alfred Adler, Erich Fromm, Karen Horney and Erik Erikson's View

Module V: Social-Cognitive and Humanistic Theories of Personality
Behavioural Theory: Skinner
Social-Cognitive Theory: Miller & Dollard; Bandura
Humanistic Theory: Abraham Mashlow; Carl Rogers

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

Text:

- Adams, D.P. (1990). An Introduction to Personality Psychology; New York: Harcourt brace &Javanvich.
- Hall, C.S. &Lindzey, G. (1998). Theories of Personality: New Delhi: Wiley Eastern Ltd.
- Feist, J. (1985), Theories of personality: New York, Holt Rineharat& Winston
- Mairet, P. (1977). Existentialism & Humanism of J.P. Sartre; London, Methuen
- Kuppuswamy, B. (1990). Elements of Ancient Indian Psychology: Delhi: Konark publishers
- Allport, G.W. (1996). Pattern in Growth in Personality: New York: Holt Rinechart& Winton
- McCelland, D.C. (1951). Personality: New York: Holt Rinechart& Winston.

References:

- Paranjpe, A.C. (1984). Theoretical Psychology, Meeting of East and West; New York, Penguin Press
- Monte, F.E. (1977). Beneath the Mask-An Introduction to Theories of Personality: New York: Prager.
- Cambridge, M.A. (1982). TheEvolving Self Problem and Process in Human Development: New York: Harvard University Press

PSYCHOLOGICAL PRACTICAL- IV

Course Code: PSY2402 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the Fourth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Developmental Screening Test	Development
2	Memory Drum Apparatus	Memory
3	Vocational Preference Inventory	Personality-Non Projective
4	Students Stress Scale	Stress
5	Authentic Leadership Questionnaire	Leadership
6	Thematic Apperception Test	Personality-Projective

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

ENVIRONMENTAL PSYCHOLOGY

Course Code: PSY2405 **Credit Units: 03**

Course Objective:
The paper on Environmental Psychology imparts knowledge on individual's relation to environment, the processes involved therein and manner of research done.

Course Contents:
Module I: Introduction to Environmental Psychology
Concept of Environment: Physical, Social and Institutional, Origin & Scope

Module II: Approaches to the study of Environmental Psychology
Approaches in Environmental Psychology: Arousal Approach, Understanding Approach, Adaptation Level Approach, Behavior Constraint Approach

Module III: Environmental Stress
Environmental Stress: Population, Pollution, Environmental Remodeling, Environmental Competence, Environmental Awakening, Social Accommodation
Coping with environmental Stress

Module IV: Environmental Assessment
Management of Natural Environment, Natural Hazards, Development and changing environment.

Module V: Applications of Environmental Psychology to Community Problems
The Built Environment: Architectural Factors and Social behaviour in Housing, Human responses to protect the environment

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Nagar, D. Environmental Psychology. New Delhi: Concept Publishing Company.
- Paul, A. Bell; Thomas C Greene; Jeffery D. Fisher; Andrew S. Baum. Environmental Psychology Published by Routledge, 2005
- Mirilia Bonnes, Gianfranco Secchiaroli, Claire Montagna, EnvironmentalPsychology: a Psycho-social Introduction. Published by SAGE, 1995

References:

- Trivedi, P.R. Environmental Education. New Delhi: APH Publishing Corporation.

APPLIED SOCIAL PSYCHOLOGY

Course Code: PSY2406 **Credit Units: 03**

Course Objective:

Social Psychology is the study of social interaction and social influence. As such, it remains one of the most comprehensive and personally relevant areas within the field of psychology. This course has following objectives.

- To expand your knowledge about social psychology and human behavior.
- To foster respect for human diversity, particularly with regard to matters of gender, race and ethnicity.
- To enable students to (a) understand the forces that create group differences in patterns of social behavior, (b) understand and tolerate the behavior of other people, particularly that of members of the diverse array of groups and social categories to which they do not belong, (c) recognize the limits in generalizing psychological research to all cultural/gender/ethnic/age groups, and (d) understand the dynamics of intergroup relationships, conflict, and cooperation.

Course Contents:

Module I: Introduction

Social Psychology in the workplace, Social Psychology in the clinic,
Social Psychology of poverty and deprivation. Psychology of collective behaviour.

Module II: Group Process

Group Structure: Nature and Function
Task Performance: Social Interaction, Social facilitation, Social Loafing
Conformity: Factors affecting Conformity
Coordination in Groups and Group Cohesiveness

Module III: Attitude

Nature and Determinants of Attitude
Formation, Change and Measurement of Attitudes: Likert Scale, Thrustone Scale, Bogardus Scale

Module IV: Prejudices, Discrimination and Stereotypes
Nature and Components of Prejudice, Discrimination and Stereotypes
Acquisition and techniques of Reduction.

Module V: Leadership
Definition, Nature and Function of Leadership
Types, Qualities and Theories of Leadership: Trait Approach, Situational Approach, Interactional Approach

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

Text:

- Myers, D. G.: Social Psychology (10th Ed). New York: McGraw Hill
- Feldman, R. S.: Social Psychology: Theories, Research and Application. New York: McGraw Hill
- Secord, P.F. &Backman, C. N.: Social Psychology. USA: McGraw-Hill
- Baran, R.A. & Byrne, D.: Social Psychology. Boston, MA: Pearson Allyn and Bacon.
- Aronson, E., Wilson, T. D.: Social Psychology (7th ed.). Upper Saddle &Akert, R. M. River, NJ: Prentice Hall.
- Wrightsman, L. S.: Social Psychology. Brooks/Cole Pub. Co.
- Alcock, J. E.; Carment, D. W.; Sadava, S. W.; Collins, J. E. & Green, J. M.:A textbook of Social Psychology (6th Ed)Scarborough, Ontario: Prentice Hall / Alliyn& Bacon
- Sharma, R. K. & Sharma, R.:Social Psychology. New Delhi: Atlantic Publishers and Distributers

References:

- Krutchfield, R. S.: Theories and Problems of Social Psychology
- Baumeister, R. F.& Belmont, C.A.: Social Psychology and Human Nature (2nd Bushman, B. J. ed). Thomson/Wadsworth
- Kuppuswamy: Introduction to Social Psychology

PHYSIOLOGICAL PSYCHOLOGY

Course Code: PSY2403 **Credit Units: 03**

Course Objective:
The paper on Physiological Psychology correlates the discipline to the physiological aspect of human life and emphasizes the need to study physiology for complete understanding of human beings.

Course Contents:
Module I:
Introduction:Psychology and Behaviour
Physiological Psychology: Definition, History and Techniques used

Module II:
Neural Conduction Mechanism: Structure of Neuron,Synapses, Reflexes and Nerve Impulse Transmission
Module III:
Nervous System:Central Nervous System: Brain and Spinal Cord
Peripheral Nervous System

Module IV:
Influence of Nervous System on Behaviour
Endocrinal glands: their location and function

Module V:
Impact of the functioning of Endocrine Gland on Behaviour
Genes and Behaviour

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Levinthal, C. F.:Introduction to Physiological Psychology (3rd Ed.). Prentice Hall, Inc
- Carlson, N. R.: Physiology ofBehaviour, 10thEd.Allyn& Bacon
- Kalat, J. W.: Biological Psychology. USA: Wadsworth CengageLearning
- Jafar M.: Physiological Psychology.APH Publishing Corporation.
- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd

References:

- Sdorow: Psychology. 3rd Edition Broalu&BenewmarkPublishers
- Lahey, B. B. & Majors, M.: Psychology: An Introduction: Humanities/Social Sciences/Lingua. Tata McGraw Hill
- Hilgard&Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co

ADVANCE COGNITIVE PROCESS

Course Code: PSY2404 **Credit Units: 03**

Course Objective:
The objective of this course is to study the concept, principles and theories of cognition and its application in cognitive psychology. This will facilitate the students to develop an understanding of the cognitive skills in themselves and others.

Course Contents:
Module I: Intelligence
New dimensions of intelligence: Social Intelligence & Emotional Intelligence

Module II: Memory
Meaning and Definition, Memory Stages (Encoding, Storage and Retrieval)
Information Processing Model
Types of Memory: Sensory Register, Short Term and Long Term Memory
Methods of Measuring Memory
Techniques of Improving Memory

Module III: Forgetting
Nature, Causes and Theories of Forgetting: Trace Decay Theory, Interference Theory, Consolidation Theory and Repressive Forgetting

Module IV: Language
Meaning, Definition and Elements of Language: Phonology, Syntax, Semantics, Morphology, Pragmatics

Module V: Language disorders
Communication disorders
Semantic pragmatic disorders
Brocas area

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Kellogg, R. T.: Fundamentals of Cognitive Psychology. New Delhi: Sage Publication
- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Solso, R. L.: Cognitive Psychology (8th ED.). Delhi: Pearson Education
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow: Psychology. 3rd Edition Broalu&Benewmark Publishers
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Haberlandt, K.: Cognitive Psychology. Allyn& Bacon

References:

- Esgate, A. &Groome, D.: An Introduction to Applied Cognitive Psychology. England: Psychology Press.
- Best, B. J.: Cognitive Psychology. (3rded.). West Publishing Company

READINGS IN PSYCHOLOGY

Course Code: PSY2430 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Evaluation Scheme:

Report on the Book in 3000 words	**Written Test**
50 marks	50 marks

TERM PAPER

Course Code: PSY2431 **Credit Units: 02**

Course Objective:

The rationale behind introducing the term paper for BA Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Term Paper:

1. Topic
2. Introduction
3. Review Research
4. Key Learning: minimum 5 pgs handwritten
5. Conclusion
6. References
7. No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Compilation of Term Paper	50 Marks
Viva Voce	25 Marks
Presentation of Term Paper	25 Marks
Total	**100 Marks**

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2432 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)
The Steps of a Project Report
Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at

the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).

- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP/CERTIFICATION

Course Code: PSY2433 **Credit Units: 01**

Course Objectives:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:

- Experimental Psychology
- Health Psychology
- Industrial Psychology
- Organizational Behaviour
- Sports Psychology
- Social Psychology
- Cognitive Psychology

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Group Activity
Role Play
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

ARTICLE/FEATURE WRITING

Course Code: PSY2436 **Credit Units: 01**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:
1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)
- Personality theories
- Emotional Intelligence
- Positive thinking

- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

Syllabus – Fifth Semester

PSYCHOMETRIC TESTING

Course Code: PSY2551 **Credit Units: 03**

Course Objective:
Psychological assessment is a process of testing that uses a combination of techniques to help arrive at some hypotheses about a person and their behavior, personality and capabilities. Psychological assessment is also referred to as psychological testing, or performing a psychological battery on a person. A psychological assessment is the attempt of a skilled professional, usually a psychologist, to use the techniques and tools of psychology to learn either general or specific facts about another person, either to inform others of how they function now, or to predict their behavior and functioning in the future. Psychologists are the only profession that is expertly trained to perform and interpret psychological tests. Below are the objectives of studying this particular paper of Psychology:

- To train the students in various psychological assessment techniques.
- To impart skills necessary for selecting and applying different tests for different purposes such as evaluation, training and rehabilitation.

Course Content:

Module 1: Introduction
History ofPsychological Testing
Meaning, Definition and Types of Psychological Testing
Ethical issues in Psychological Testing

Module 2: Measurement
Nature and significance of Measurement
Distinction between assessment and measurement
Levels of measurement

Techniques of Attitude Measurement

Module 3: Construction of Test
Steps of constructing a Psychological Test
Reliability: Meaning, types and factors affecting reliability
Validity: Meaning, types and factors affecting Validity
Characteristics of a good Psychological Test

Module 4: Assessment of General and Special Abilities
Aptitude: Multidimensional aptitude Battery-II
Creativity: Creativity Assessment Packet (CAP)
Learning: Human Maze learning

Module 5: Application of Testing
Assessment in Educational and Occupational Set-up: Achievement Test
Assessment in Clinical Set-up and in Counselling

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:
Text:

- Anastasi, A. & Urbina, S.: Psychological Testing. U.S.A.: Prentice Hall International Inc.
- Graham, J. R. & Lilly, R. S.: Psychological Testing. New Jersey: Prentice Hall Inc.
- Kaplan, R. K. &Sacuzzo, D. P.: Psychological Testing- Principles, Applications and Issues. New Delhi: Cengage Learning India Pvt. Ltd
- Aiken, L.R. &Groth-Marnat, G.: Psychological Testing and Assessment (12th Ed.) Pearson Education
- Freeman, F. S.: Psychological Testing. Oxford University Press

References:

- Hasan, Q.: Personality Assessment: A fresh Psychological Look. New Delhi: Gyan Publishing House
- Kline, T. J. B.: Psychological Testing – A Practical Approach to Design and Evaluation. New Delhi: Vistaar Publication

PSYCHOLOGICAL PRACTICAL- V

Course Code: PSY2501 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the Fifth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Multidimensional aptitude Battery-II (MAB-II)	Aptitude
2	Human Maze Learning	Learning
3	Creativity Assessment Packet	Creativity
4	Childrens Inventory of Anger(CHIA)	Aggression
5	Constructive Thinking Inventory(CTI)	Thinking
6	D2 Test of Attention	Attention

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

EDUCATIONAL PSYCHOLOGY

Course Code: PSY2503 **Credit Units: 03**

Course Objective:
Students will be able to apply the findings of experimental, social and child psychology to cognitive development in the areas of theories related to learning, motivation, and transfer of learning. Students will also be able to describe individual differences and problems of adjustment in the classroom

Course Contents:

Module I: Relationship of Psychology to Education
Nature and Scope of Educational Psychology
Methods of Educational Psychology: Differential, Clinical and Experimental.

Module II: Concept of Growth and Development
Physical, Mental, Social and Emotional Development during childhood and adolescence

Module III: Individual Differences
Individual Differences: Concept and Areas
Determinants of Individual Differences
Role of Heredity and Environment in developing Individual Differences
Implications of Individual differences for organizing educational programmes

Module IV: Learning
Concept of learning
Theories of learning; Connectionism, Trial Error conditioning and Gestalt
Perpetual approach to learning; Gagne's hierarchy of learning types;
Factors influencing learning, Educational Implications

Module V: Motivation

Theories of motivation
Factors affecting motivation, Educational Implications

Module VI: Personality
Meaning of personality
Trait and type approaches to personality
Assessment of personality by subjective, objective and projective techniques
Role of teacher in fostering individual's personality

Module VII: Creativity
Creativity: nature and characteristics
Development of creativity, theories

Module VIII:Special education for:
Exceptional Children: Gifted, Mental Retardation
Educational Implications

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Dash, M. & Dash, N.: Fundamentals of Educational Psychology
- Mangal, S. K.: Advanced Educational Psychology; Prentice Hall of India Pvt. Ltd
- Pathak, R.P.: Educational Psychology. Pearson
- Chauhan, S.S.: Advanced Educational Psychology. Vikas Publishing House

References:

- Chandra, S.S.: Educational Psychology Evaluation & Statistics. R Lall

SUMMER PROJECT EVALUATION-II

Course Code: PSY2535 **Credit Units: 06**

Course Objective:
To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training.
It will also help students to develop report writing skills.
Duration: Two Months (June- July)

Methodology:
Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor from their respective Institute. Students will submit their summer project reports with their supervised daily reporting. Immediately after returning from their summer vacations. This would require primary data collection.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	**100 Marks**

CLINICAL PSYCHOLOGY

Course Code: PSY2502 **Credit Units: 03**

Course Objective:
Clinical Psychology is an integration of science, theory and clinical knowledge for the purpose of understanding, preventing, and relieving psychologically-based distress or dysfunction and to promote subjective well-being and personal development. In many countries, clinical psychology is a regulated mental health profession. Keeping pace with the disciplinary advances and with the goal of acquiring specialized knowledge, the paper would allow students to nurture their academic interest in clinical and other research domains of psychology, along with personal growth and citizenship. The faculty is expected to perform the following functions so that the objective of the concerned programme can be obtained:

- Integrate the course contents with the clinical viewpoint in a service setting.
- To train them into skills and competencies which are required for practice as a psychologist.
- To sensitize them to the ethics of profession.
- To impart knowledge and skills required for diagnosis of psychopathological conditions.
- To prepare students in specific areas in which professional psychological services can be rendered.
- To develop self-reflective skills.

Course Content:
Module I: Foundation of Clinical Psychology
Introduction to Clinical Psychology: Meaning and nature of discipline,
Historical Development of Clinical Psychology

Module II: Contemporary Issues
Professional Activities of Clinical Psychologist
Subspecialties of Clinical Psychology
Organizations in Clinical Psychology

Ethical and Legal Issues in Clinical Psychology

Module III: Diagnosis and Assessment
Nature and Purpose of Clinical Diagnosis and Assessment
Stages in the Assessment Process
Clinical Assessment Techniques

Module IV: Psychotherapy
Definition, Goals and Stages of Psychotherapy
Essential Process in Psychotherapy
Models of Psychotherapy: Individual Therapy, Group Therapy, Couples Therapy, Family Therapy

Module V: Approaches to Psychotherapy
Psychodynamic Psychotherapy
Behaviuoral Psychotherapy
Cognitive Psychotherapy
Humanistic Psychotherapy

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:
Text:

- Plante, T. G.: Contemporary Clinical Psychology. New York: John Willey & Sons, Inc.
- Bellack, A. S. &Hersen, M.: Introduction to Clinical Psychology. New York: Oxford University Press
- Korchin, S. J.: Modern Clinical Psychology. Delhi CRR Publishers and Distributers
- Ray, S. D.: The Practice of Psychotherapy. New Delhi: New Age International
- Hecker, J. E. & Thorpe, G. L: Introduction to Clinical Psychology. Delhi: Pearson Education
- Herbert, M.: Clinical Child Psychology: Social Learning, Development and Behaviour. New York: John Willey & Sons, Inc.
- Field, A. P. & Field: Clinical Psychology. Learning Matters
- Hatton, C. Bromley, J., &Craine, A.: Clinical Psychology. New York: John Willey & Sons, Inc

References:

- Pomerantz, A. M.: Clinical Psychology- Science, Practice and Culture. New Delhi: Sage Publications
- Matthews, J. R.: Introduction to Clinical Psychology. New York: Oxford Anton, B. S. University Press
- Kumar, A.: Clinical Psychology. Anmol Publications

CHILD PSYCHOLOGY

Course Code: PSY2504 **Credit Units: 03**

Course Objective:
This paper introduces the students to the biological foundations, various developmental stages and theories from prenatal to childhood. The Students will also learn the applications of child psychology in various settings.

Course Contents:
Module I: Introduction to Child Psychology
Definition and Concept of Childhood
Early history and beginnings of Child Psychology
Biological factors in Child Psychology (Prenatal, Natal and New-Natal Development,
Nature Vs Nurture: Genetics and Social atmosphere

Module II: Biological Foundation
Biology and Heredity
Stages in Prenatal Development: The germinal period, the period of embryo, the period of the foetus
Influences on Prenatal Development
Child Birth and Birth complication

Module III: Motor and Sensory Development
Motor Development: Contributions of Motor Development, Principles of Motor Development, Sequence of Motor Development and Motor Skills,
Environmental influences on Motor Development
Sensory Development: Vision, hearing, taste and smell, cutaneous senses, early deprivation and enrichment of senses.

Module IV: Cognitive Development and Development of Language
Piaget's cognitive development theory of intelligence- Structure and processes, stages, evaluation
Language Development- What is Language? Components of language and its development

Pre-linguistic development- receptivity to language, first speech sound
Bilingual Vs Multilingualism

Module V: Emotional and Social Development
Functions of emotions, Production and recognition of emotion
Early emotional development- Smiling, laughter, attachment, fear, jealousy, aggression, Izzard's Theory of Differential Emotions
Emotional Intelligence, Social intelligence
Social Development- Agents of socialization: Family- Parental control, sibling relationship; School; Peer group; Media- TV, books/journals, computers

Module VI: Moral Development
Meaning of moral behavior, How morality is learned? Patterns of moral development, Kohlberg's Theory
Meaning of discipline, essentials and techniques of discipline, evaluation of discipline
Hazards in moral development

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:
Text:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D.: Human Development (10th Ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Pearson
- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Heatherington, E.M. &Parke, R.D.: Child Psychology: A Contemporary ViewpointNew York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A.: Allyn and Bacon.
- Shrimali, S. S.: Child Development
- Prasad, D.C.: Fundamentals of Child Psychology. MD Publications Pvt. Ltd.
- Bukatko, D. &Daehler, M.W.: Child Development: A Thematic Approach. New York: Houghton Mifflin Company.

References:

- Brodzinsky, D.M.; Gormly, A.V. &Anibron, S.R.:Life Span Human Development; New Delhi: CBSPublication
- Santrock, J.W.:A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.
- Newman, B.M. & Newman, P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.

SCIENTIFIC RESEARCH PAPER-I

Course Code: PSY2505 **Credit Units: 03**

Course Objective:
The scientific research papers for Graduate Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the research paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this research paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Scientific Research Papers:

- Topic :-
- Introduction :-
- Review Research :-
- Objective
- Methodology
- Analysis
- Discussion
- Conclusion :-
- References & Bibliography:-

No. of pages in the compilation of the paper 20-30 (minimum 20 pages)

Examination Scheme:

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2532 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.

- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Syllabus – Sixth Semester

COUNSELLING PSYCHOLOGY

Course Code: PSY2651 **Credit Units: 03**

Course Objective:
The paper of Counselling Psychology covers its history, theories, activities, specialties and trends. It concentrates on the importance of the personhood of counselors and of the multicultural, ethical and legal environments in which counselors operate. This paper focuses on the context and process of counseling to provide a range of high quality and responsive counseling skills and its applications to help oneself and others.

Course Contents:
Module I: Introduction
Meaning, Definitions and Goals of counselling
Role of Counsellor in different Setting
Characteristics of a good counsellor

Module II: Counselling Process
Building Counselling Relationship
Working in a Counselling Relationship
Termination of Counselling Relationship

Module III: Counselling Approaches
Insight-Oriented Counselling: Client-Centred
Action-Oriented Counselling: Behavioural
Testing, Assessment and Diagnosis in Counselling

Module IV: Counselling Applications
Child Counselling and Counselling in School
Adolescent Counselling and Counselling in College
Career Counselling: Theories of Career Development
Group Counselling and Family Counselling
Addiction Counselling

Module V: Theories and Techniques of Counselling
Psychodynamic Approaches
Humanistic Approach
Cognitive Approach
Behavioural Approaches

Module VI: Current Issues in Counselling
Ethical and Legal Issues
Mental Health Counselling
Counselling in a Multicultural Society
Counselling with Diverse Population

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:
Text:

- Rao, S. N.: Counselling and Guidance (2nd Ed.). Tata McGraw Hill
- Belkin, G.S.: Introduction to Counselling. W.C.: Brown Publishers
- Nelson, J.:The Theory and Practice of Counselling Psychology. NewYork: Hollt Rinehart & Winston
- Gibson,R. L.&Mitchell, M. H.: Introduction to Counselling and Guidance (7th).New Delhi Prentice-Hall of India Pvt. Ltd
- Gladding, S. T.: Counselling: A Comprehensive Profession (6th Ed.). Dorling Kindersley India Pvt. Ltd.
- Hansen, J. H. &Rosberg, R.H: Counselling: Theory and Process (5th Ed.). Allyn& Bacon
- Pal, O. B.: Guidance and Counselling. New Delhi: MotilalBanarsidasPublishers Private Ltd.
- Milner, J., Byrne, P. O. &Campling, J.: Assessment in Counselling: Theory, Process and Decision-Making. Palgrave MacMillan
- Patterson, L.E.: The Counselling Process. Wadsworth Publishing

References:

- Welfel, E.R., & Patterson, L.E: The Counselling Process: A Multi-theoritical Integrative Approach. Thomson Brooks / Cole

SCHOOL COUNSELLING

Course Code: PSY2601 **Credit Units: 02**

Course Objective:
This is to enable the students to develop an understanding of counseling within school setup, which is collaborative work of counselor and other school staff.

Course Contents:
Module I: Introduction
Guidance & Counseling
Need and importance of guidance and counseling in school

Module II: Counselor in Educational Setting
Elementary School, Middle School, Secondary School & Higher Secondary
Counseling & Curriculum
Counseling & Family

Module III: Role of Personal Guidance
Principal, Teacher, Counselor, Career Counselor, Parents & other Specialists
Importance of holistic approach in counseling

Module IV: Mental Health of Students
Typical difficulties of students
Supportive Services
Self Help Material
Role of Faith & Spirituality in Students mental Health
Students' perspective of Mental Health

Module V: Experience of Transition

Concept of Change, Adjustment & Transition
Transition & Students' experiences

Module VI: Indian Education System: The Changing Perspective

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

Text:

- Belkin, G.S. (1998). Introduction to Counselling; W.C.: Brown Publishers
- Nelson, J. (1982). The Theory and Practice of Counselling Psychology; New York: Hollt Rinehart & Winston.
- Ben, N. Ard, Jr. (Ed.) (1997). Counselling and Psychotherapy: Classics on Theories and Issues; Science and Behaviour Books Co.
- Brammer, L.M. &Shostrom, E.L. (1977). Therapeutic psychology: Fundamentals of Counselling Psychotherapy (3rd Ed.). Englewood Cliffs: Prentice Hall

References:

- Udupa, K.N. (1985). Stress and its Management by Yoga; Delhi: MotiLalBansari Das.
- Windy, D. (1988) (ed.). Counselling in Action; New York: Sage Publication.

PSYCHOLOGICAL PRACTICAL-VI

Course Code: PSY2602 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the sixth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Multidimensional Anxiety Questionnaire(MAQ)	Anxiety
2	College Adjustment Scale(CAS)	Adjustment
3	Career Attitude And Strategies Inventory(CASI)	Career Attitude
4	Educational Assessment Checklist For Children With Intellectual Disability(EACCID)	Child Disability
5	Sensory Processing Measure(SPM)	Sensation
6	Self Esteem Index(SEI)	Self Esteem

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

DISSERTATION (BASED ON APPLIED PSYCHOLOGY)

Course Code: PSY2637 **Credit Units: 09**

Course Objective:

- To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training.
- It will also help students to develop report writing skills.

Duration: Four Months (Jan. - April)

Methodology:

Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor**.** Students will submit their reports after **90 Hrs of Fieldwork (15 days* 6hrs per day),** with their supervised daily reporting, at the end of the academic year. **The days for fieldwork are two days in a week including Saturday.** The student will submit the Log Sheet to their internal supervisor on every Monday.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	**100 Marks**

SCIENTIFIC RESEARCH PAPER-II

Course Code: PSY2605 **Credit Units: 03**

Course Objective:
The research article or scientific papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers:

- Topic :-
- Introduction :-
- Review Research :-
- Objective
- Methodology
- Discussion
- Conclusion :-
- References & Bibliography:-

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Components	**Compilation**	**Viva**	**Presentation**
Weightage (%)	50	25	25

POSITIVE PSYCHOLOGY

Course Code: PSY2606 **Credit Units: 03**

Course Objective:
To enable students to understand the theory and research related to positive psychology and equip students to develop and apply positive psychology for enhancement of their self and others**.**

Course Contents:
Module I: Introduction to Positive Psychology
Introductory & Historical Overview
Positive Psychology, Prevention & Positive Therapy

Module II: Positive Emotional States and Processes
Broaden & Build Theory of Positive Emotions
Positive Emotions: Hope & Optimism, Love, Empathy
The Positive Psychology of Emotional Intelligence

Module III: Positive Psychology and Relationship to Goals
Importance of Goals
Values in actions
Developing Positive Personality

Module IV: Strengths & Virtues & Positive Institutions
Tyranny of Wisdom
Character Strengths and Virtues
Resilience in the phase of challenge & Loss

Module V: Applications of Positive Psychology
Going Positive
Understanding & Changing Human Behaviour

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

- C. R. Snyder, Shane J. Lopez.The Handbook of Positive Psychology
- C. R. Snyder, Shane J. Lopez. Positive Psychology: The Scientific and Practical Explorations of Human Strengths
- Rich Gilman, Michael Furlong, E. Scott Huebner. A Handbook of Positive Psychology in Schools
- Snyder, C.R., Lopez, S.J. &Pedrotti, J.T. (2011): Positive Psychology: The Scientific and Practical Explorations Of Human Strengths (2nd Ed). Sage Publication, Inc.

References:

- Goleman, Daniel: Emotional Intelligence
- IlonaBoniwell. Positive Psychology in a Nutshell

GENDER PSYCHOLOGY

Course Code: PSY2607 **Credit Units: 03**

Course Objective:

This course is designed to introduce students to psychological theories and research regarding the differences and similarities between men and women and the effects of gender in social situations. Students will learn to understand the complexity and diversity of gendered experiences in the social settings of their own and other cultures

Course Contents:

Module I: Introduction to Gender Psychology

Historical antecedents of sex and gender within Psychology
Defining Sex and Gender
Perspectives in Gender: Social, Economic, Political & Biological
Gender Identity: Biological basis of Gender

Module II: Gender and Life Course

Physical, Social, Moral and Cognitive Development

Module III: Gender Roles & Stereotypes

Masculinity and Femininity
Religious Context
Global/Cultural Context
Effects of stereotypes and roles
Media and Depiction of gender

Module IV: Gender Difference

Defining gender differences (Physical and Cognitive)
Emergence of Gender Differences: Intellectual and Cognitive abilities
Determinants of gender differences: Social and affective behavior

Gender Identity & Sex Stereotype Behavior

Module V: Gender and Mental Health
Health & Fitness,
Stress, Coping & Psychopathology,
Treatment for Mental Disorders

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:
Text:

- Brannon L. Gender Psychological Perspectives , 2/E. Misclenious Publishers
- Brannon, L. (2001). Gender: Psychological Perspectives (3rd edition).Needam Heights, MA: Allyn and Bacon.
- Mustin R.T. &Marecek J., (1990). Making a Difference: Psychology and the Construction of Gender. New Haven: CT: Yale UP
- Golombok S. &Fivush R. (1994). Gender Development. Cambridge, UK: Cambridge UP

References:

- Kimmel, M. S. and Aronson, A. (2000). The Gendered Society Reader; New York: Oxford University Press.

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2632 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

BEHAVIOURAL SCIENCE - COURSES BEING OFFERED IN VARIOUS PROGRAMMES

Achieving Academic Excellence

Programme Structure
Curriculum & Scheme of Examination

AMITY UNIVERSITY HARYANA

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PROGRAMME STRUCTURE OF BEHAVIOURAL SCIENCE COURSES BEING OFFERED IN VARIOUS PROGRAMMES

UNDERGRADUATE -4 YEAR PROGRAMMES AND UNDERGRADUATE –INTEGRATED LAW PROGRAMMES (BA LLB, B.COM LLB & BBA LLB)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	BEH2151	Understanding Self for Effectiveness	1	-	-	1
2	BEH2251	Problem Solving and Creative Thinking	1	-	-	1
3	BEH2351	Group Dynamics and Team Building	1	-	-	1
4	BEH2451	Stress and Coping Strategies	1	-	-	1
5	BEH2552	Personality, Nationalism and Human Values	1	-	-	1
6	BEH2652	Interpersonal Communication	1	-	-	1
7	BEH2751	Relationship Management	1	-	-	1
8	BEH2851	Personal & Professional Excellence	1	-	-	1

UNDERGRADUATE -3YEAR PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	BEH2151	Understanding Self for Effectiveness	1	-	-	1
2	BEH2251	Problem Solving and Creative Thinking	1	-	-	1
3	BEH2351	Group Dynamics and Team Building	1	-	-	1
4	BEH2451	Stress and Coping Strategies	1	-	-	1
5	BEH2551	Individual, Society and Nations	1	-	-	1
6	BEH2651	Interpersonal Communication and Relationship Management	1	-	-	1

POSTGRADUATE PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	BEH4151	Self-Development and Interpersonal Skills	1	-	-	1
2	BEH4251	Behavioural Communication and Relationship Management	1	-	-	1
3	BEH4351	Leading Through Teams	1	-	-	1
4	BEH4451	Professional Excellence	1	-	-	1

INTEGRATED PROGRAMMES (UNDERGRADUATE-POSTGRADUATE)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	BEH2151	Understanding Self for Effectiveness	1	-	-	1
2	BEH2251	Problem Solving and Creative Thinking	1	-	-	1
3	BEH2351	Group Dynamics and Team Building	1	-	-	1
4	BEH2451	Stress and Coping Strategies	1	-	-	1
5	BEH2551	Individual, Society and Nations	1	-	-	1
6	BEH2651	Interpersonal Communication and Relationship Management	1	-	-	1
7	BEH4151	Self-Development and Interpersonal Skills	1	-	-	1
8	BEH4451	Professional Excellence	1	-	-	1
9	BEH4351	Leading Through Teams	1	-	-	1

SYLLABUS-UNDERGRADUATE-4 YEAR PROGRAMMES & UNDERGRADUATE- INTEGRATED LAW PROGRAMMES (BA LLB, B.COM LLB & BBA LLB)

Syllabus - First Semester

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH2151 **Credit Units: 01**

Course Objective:
This course aims at imparting**:**

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

Course Contents:
Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,HarcourtCollege Publishers
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Syllabus – Second Semester

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH2251 **Credit Units: 01**

Course Objective:
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:
Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process
Perception
Expression
Emotion
Intellect
Work environment

Module III: Problem Solving Process
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action
Construction of POA
Monitoring
Reviewing and analyzing the outcome

Module V: Creative Thinking
Definition and meaning of creativity
The nature of creative thinking
- Convergent and Divergent thinking

- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer &Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

Syllabus – Third Semester

GROUP DYNAMICS AND TEAM BUILDING

Course Code: BEH2351 **Credit Units: 01**

Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

Course Contents:

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,HarcourtCollege Publishers.
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books.
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour.
- Dressers, David and Cans, Donald: The Study of Human Interaction.
- Lapiere, Richard. T – Social Change.
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company.
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers.

Syllabus - Fourth Semester

STRESS AND COPING STRATEGIES

Course Code: BEH2451 **Credit Units: 01**

Course Objective:
To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:
Module I: Stress
Meaning & Nature
Characteristics
Types of stress

Module II: Stages and Models of Stress
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interactional model
Pressure – environment fit model of stress

Module III: Causes and symptoms of stress
Personal
Organizational
Environmental

Module IV: Consequences of stress
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

Syllabus – Fifth Semester

PERSONALITY, NATIONALISM AND HUMAN VALUES

Course Code: BEH2552 **Credit Units: 01**

Course Objective:
This course aims at enabling students towards:
Understand the importance of individual differences
Better understanding of self in relation to society and nation
Facilitation for a meaningful existence and adjustment in society
Inculcating patriotism and national pride

Course Contents:

Module I: Individual differences& Personality
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (adjustment mechanisms)
Intuition, Jugement, Perception & Sensation (MBTI)
BIG5 Factors

Module II: Managing Diversity
Defining Diversity
Affirmation Action and Managing Diversity
Increasing Diversity in Work Force
Barriers and Challenges in Managing Diversity

Module III: Socialization
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society and Nation

Module IV: Patriotism and National Pride
Sense of pride and patriotism
Importance of discipline and hard work
Integrity and accountability

Module V: Human Rights, Values and Ethics
Meaning and Importance of human rights
Human rights awareness
Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

Syllabus – Sixth Semester

INTERPERSONAL COMMUNICATION

Course Code: BEH2652 **Credit Units: 01**

Course Objective:
This course provides practical guidance on

- Enhancing personal effectiveness and performance through effective interpersonal communication
- Enhancing their conflict management and negotiation skills

Course Contents:

Module I: Interpersonal Communication: An Introduction
Importance of Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Behavioural Communication
Meaning and Nature of behavioural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

Module III: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles

Module IV: Conflict Management
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

Module V: Negotiation Skills
Meaning and Negotiation approaches (Traditional and Contemporary)
Process and strategies of negotiations
Negotiation and interpersonal communication

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon.
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- HarvardBusinessSchool, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers

Syllabus – Seventh Semester

RELATIONSHIP MANAGEMENT

Course Code: BEH2751 **Credit Units: 01**

Course Objective:
To understand the basis of interpersonal relationship
To understand various communication style
To learn the strategies for effective interpersonal relationship

Course Contents:

Module I: Understanding Relationships
Importance of relationships
Role and relationships
Maintaining healthy relationships

Module II: Bridging Individual Differences
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

Module III: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

Module IV: Theories of Interpersonal Relationships
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

Module V: Impression Management
Meaning & Components of Impression Management
Impression Management Techniques (Influencing Skills)
Impression Management Training-Self help and Formal approaches

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- HarvardBusinessSchool, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

Syllabus – Eighth Semester

PERSONAL AND PROFESSIONAL EXCELLENCE

Course Code: BEH2851 **Credit Units: 01**

Course Objective:
Importance of Personal and Professional excellence
Inculcating the components of excellence

Course Contents:

Module I: Components of Excellence
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

Module II: Managing Personal Effectiveness
Setting goals to maintain focus
Dimensions of personal effectiveness (self disclosure, openness to feedback and perceptiveness)
Integration of personal and organizational vision for effectiveness
A healthy balance of work and play
Managing Stress creatively and productively

Module III: Personal Success Strategy
Time management
Handling criticism and interruptions
Dealing with difficult people
Mapping and evaluating the situations
Identifying long-term goals

Module IV: Positive Personal Growth
Understanding & Developing positive emotions
Positive approach towards future
Resilience during loss and challenge

Module V: Professional Success
Building independence & interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Dr. Michael J. Provitera: Mastering Self-Motivation: Preparing Yourself for Personal Excellence
- George Leonard: Mastery: The keys to success and long-term fulfillment.
- Arlene R. Barro: Win Without Competing! Career Success the Right Fit Way

SYLLABUS - UNDERGRADUATE-3 YEAR PROGRAMMES

Syllabus - First Semester

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH2151 **Credit Units: 01**

Course Objective:
This course aims at imparting**:**

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

Course Contents:
Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Module VI: End-of-Semester Appraisal
Viva based on personal journal

Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,HarcourtCollege Publishers
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Syllabus – Second Semester

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH2251 **Credit Units: 01**

Course Objective:
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:
Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process
Perception
Expression
Emotion
Intellect
Work environment

Module III: Problem Solving Process
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action
Construction of POA
Monitoring
Reviewing and analyzing the outcome

Module V: Creative Thinking
Definition and meaning of creativity
The nature of creative thinking
- Convergent and Divergent thinking

- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer &Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

Syllabus – Third Semester

GROUP DYNAMICS AND TEAM BUILDING

Course Code: BEH2351 **Credit Units: 1**

Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

Course Contents:

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms,Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
ConsensusBuilding
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,HarcourtCollege Publishers.
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books.
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour.
- Dressers, David and Cans, Donald: The Study of Human Interaction.
- Lapiere, Richard. T – Social Change.
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company.
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers.

Syllabus – Fourth Semester

STRESS AND COPING STRATEGIES

Course Code: BEH2451 **Credit Units: 01**

Course Objective:
To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:
Module I: Stress
Meaning & Nature
Characteristics
Types of stress

Module II: Stages and Models of Stress
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interact ional model.
Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress
Personal
Organizational
Environmental

Module IV: Consequences of stress
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

Syllabus – Fifth Semester

INDIVIDUAL, SOCIETY AND NATIONS

Course Code: BEH2551 **Credit Units: 01**

Course Objective:
This course aims at enabling students towards:
- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- To inculcate patriotism and National pride.
- To enhance personal and professional excellence

Course Contents:

Module I: Individual differences& Personality
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (Adjustment Mechanisms)
Intuition, Judgment, Perception & Sensation (MBTI)
BIG5 Factors

Module II: Socialization
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society & Nation

Module III: Patriotism and National Pride
Sense of Pride and Patriotism
Importance of Discipline and hard work
Integrity and accountability

Module IV: Human Rights, Values and Ethics
Meaning of Human Rights
Human Rights Awareness
Importance of human rights
Values and Ethics- Learning based on project work on Scriptures like Ramayana, Mahabharata, Gitaetc

Module V: Personal and Professional Excellence
Personal excellence:
- Identifying Long-term choices and goals
- Uncovering talent, strength and style

Alan P. Rossiter's eight aspects of Professional Excellence
Resilience during challenge and loss

Continued Reflection (Placements, Events, Seminars, Conferences, Projects, Extracurricular Activities, etc.)

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

Syllabus – Sixth Semester

INTERPERSONAL COMMUNICATION & RELATIONSHIP MANAGEMENT

Course Code: BEH2651 **Credit Units: 01**

Course Objective:
This course aims at imparting an understanding of:
Interpersonal communication and relationship
Strategies for healthy interpersonal relationship
Effective management of emotions
Building interpersonal competence

Course Contents:
Module I: Interpersonal Communication
Importance of Behavioural/ Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles
Bridging differences in Interpersonal Relationship through TA
Communication Styles

Module III: Conflict Management and Negotiation
Meaning and Nature of conflicts
Styles and techniques of conflict management
Meaning of Negotiation
Process and Strategies of Negotiation
Interpersonal Communication: Conflict Management and Negotiation

Module IV: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationship Skills
Types of Interpersonal Relationships
Relevance of Interpersonal Communication in Relationship Development

Module V: Impression Management
Meaning & Components of Impression Management
Impression Management Techniques
Impression Management Training-Self help and Formal approaches

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.
- Rosenfeld, P., Giacalone, R.A. and Catherine, A.R. (2003). Impression Management: Building and Enhancing Reputations at Work. Thomson Learning, Singapore.

SYLLABUS – POSTGRADUATE PROGRAMMES

Syllabus – First Semester

SELF-DEVELOPMENT AND INTERPERSONAL SKILLS

Course Code: BEH4151 **Credit Units: 01**

Course Objective:
This course aims at imparting an understanding of:
Self and the process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and their effect on work behaviour
Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self
Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth
Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power
Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence
Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude
Understanding Attitudes
Formation of Attitudes
Types of Attitudes

Effects of Attitude on
Behaviour
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book Company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- ChatterjeeDebashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

Syllabus – Second Semester

BEHAVIOURAL COMMUNICATION AND RELATIONSHIP MANAGEMENT

Course Code: BEH4251 **Credit Units: 01**

Course Objective:
This course aims at imparting an understanding of:
Process of Behavioural communication
Aspects of interpersonal communication and relationship
Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioural Communication
Scope of Behavioural Communication
Process – Personal, Impersonal and Interpersonal Communication
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication in relationship management

Module II: Managing Individual Differences in Relationships
Principles
Types of issues
Approaches
Understanding and importance of self disclosure
Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships
Elements of satisfying relationships
Conforming and Disconfirming Communication
Culturally Relevant Communication
Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication
Imperatives for Interpersonal Communication
Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel
Types – Self and Other Oriented
Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Harvard Business School, Effective Communication: United States of America
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

Syllabus – Third Semester

LEADING THROUGH TEAMS

Course Code: BEH4351 **Credit Units: 01**

Course Objective:
This course aims to enable students to:
Understand the concept and building of teams
Manage conflict and stress within team
Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

Module I: Teams: An Overview
Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team & Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III: Team Building
Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams

Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Syllabus – Fourth Semester

PROFESSIONAL EXCELLENCE

Course Code: BEH4451 **Credit Units: 01**

Course Objective:
This course aims at imparting an understanding of:
Build and leverage your professional reputation
Maintain focus in pressure situations
Make a balanced choice between professional and personal commitments

Course Contents:
Module I: Individual, Society and Nation
Individual Differences and Dimensions of Personality
Socialization Process
Relating to the Nation: Values, Culture, Religion
Sense of pride and Patriotism
Managing Diversity

Module II: Components of Excellence
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.
Developing professional power: Goal-setting, time management, handling criticism, interruptions and time wasters

Module III: Career Planning
Knowing one's Interest and Aptitude
Identifying available Resources
Setting goals to maintain focus:
Developing Positive attributes in personality
Self-reliance and Employability skills

Module IV: Stress Management for Healthy Living
Meaning and Nature of Stress
Stages of stress
Causes and Consequences of stress: Personal, Organizational and Environmental
Personal Styles and strategies of coping

Module V: Professional Success
Building independence &interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers
- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
- Kamalavijayan, D. (2005). Information and Knowledge Management. Macmillan India Ltd. Delhi

SYLLABUS - INTEGRATED PROGRAMMES (UNDERGRADUATE-POSTGRADUATE)

Syllabus – First Semester

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH2151 **Credit Units: 01**

Course Objective:
This course aims at imparting**:**

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

Course Contents:
Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,HarcourtCollege Publishers
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Syllabus - Second Semester

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH2251 **Credit Units: 01**

Course Objective:
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:
Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process
Perception
Expression
Emotion
Intellect
Work environment

Module III: Problem Solving Process
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action
Construction of POA
Monitoring
Reviewing and analyzing the outcome

Module V: Creative Thinking
Definition and meaning of creativity
The nature of creative thinking

- Convergent and Divergent thinking
- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal

Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer &Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

Syllabus – Third Semester

GROUP DYNAMICS AND TEAM BUILDING

Course Code: BEH2351 **Credit Units: 01**

Course Objective:
To inculcate in the students an elementary level of understanding of group/team functions.
To develop team spirit and to know the importance of working in teams.

Course Contents:

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,HarcourtCollege Publishers.
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books.
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour.
- Dressers, David and Cans, Donald: The Study of Human Interaction.
- Lapiere, Richard. T – Social Change.
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company.
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers.

Syllabus – Fourth Semester

STRESS AND COPING STRATEGIES

Course Code: BEH2451 **Credit Units: 01**

Course Objective:
To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:
Module I: Stress
Meaning & Nature
Characteristics
Types of stress

Module II: Stages and Models of Stress
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interactional model.
Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress
Personal
Organizational
Environmental

Module IV: Consequences of stress
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	SAP	Journal for Success (JOS)	A	Mid Term Test / CT / Assignment	VIVA / Presentation
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

Syllabus – Fifth Semester

INDIVIDUAL, SOCIETY AND NATIONS

Course Code: BEH2551 **Credit Units: 01**

Course Objective:
This course aims at enabling students towards:
- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- To inculcate patriotism and National pride.
- To enhance personal and professional excellence

Course Contents:

Module I: Individual differences& Personality
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (Adjustment Mechanisms)
Intuition, Judgment, Perception & Sensation (MBTI)
BIG5 Factors

Module II: Socialization
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society & Nation

Module III: Patriotism and National Pride
Sense of Pride and Patriotism
Importance of Discipline and hard work
Integrity and accountability

Module IV: Human Rights, Values and Ethics
Meaning of Human Rights
Human Rights Awareness
Importance of human rights
Values and Ethics- Learning based on project work on Scriptures like Ramayana, Mahabharata, Gitaetc

Module V: Personal and Professional Excellence
Personal excellence:
- Identifying Long-term choices and goals
- Uncovering talent, strength and style

Alan P. Rossiter's eight aspects of Professional Excellence
Resilience during challenge and loss

Continued Reflection (Placements, Events, Seminars, Conferences, Projects, Extracurricular Activities, etc.)

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

Syllabus – Sixth Semester

INTERPERSONAL COMMUNICATION AND RELATIONSHIP MANAGEMENT

Course Code: BEH2651 **Credit Units: 01**

Course Objective:
This course aims at imparting an understanding of:
Interpersonal communication and relationship.
Strategies for healthy interpersonal relationship
Effective management of emotions.
Building interpersonal competence.

Course Contents:
Module I: Interpersonal Communication
Importance of Behavioural/ Interpersonal Communication
Types – Self and Other Oriented
RapportBuilding – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles
Bridging differences in Interpersonal Relationship through TA
Communication Styles

Module III: Conflict Management and Negotiation
Meaning and Nature of conflicts
Styles and techniques of conflict management
Meaning of Negotiation
Process and Strategies of Negotiation
Interpersonal Communication: Conflict Management and Negotiation

Module IV: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationship Skills
Types of Interpersonal Relationships
Relevance of Interpersonal Communication in Relationship Development

Module V: Impression Management
Meaning & Components of Impression Management
Impression Management Techniques
Impression Management Training-Self help and Formal approaches

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.
- Rosenfeld, P., Giacalone, R.A. and Catherine, A.R. (2003). Impression Management: Building and Enhancing Reputations at Work. Thomson Learning, Singapore.

Syllabus – Seventh Semester

SELF-DEVELOPMENT AND INTERPERSONAL SKILLS

Course Code: BEH4151 **Credit Units: 01**

Course Objective:
This course aims at imparting an understanding of:
Self and the process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and their effect on work behaviour
Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self
Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth
Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power
Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence
Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude
Understanding Attitudes
Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behaviour
Perception
Motivation

Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book Company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- ChatterjeeDebashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

Syllabus – Eighth Semester

PROFESSIONAL EXCELLENCE

Course Code: BEH4451 **Credit Units: 01**

Course Objective:
This course aims at imparting an understanding of:
Build and leverage your professional reputation
Maintain focus in pressure situations
Make a balanced choice between professional and personal commitments

Course Contents:
Module I: Individual, Society and Nation
Individual Differences and Dimensions of Personality
Socialization Process
Relating to the Nation: Values, Culture, Religion
Sense of pride and Patriotism
Managing Diversity

Module II: Components of Excellence
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.
Developing professional power: Goal-setting, time management, handling criticism, interruptions and time wasters

Module III: Career Planning
Knowing one's Interest and Aptitude
Identifying available Resources
Setting goals to maintain focus:
Developing Positive attributes in personality
Self-reliance and Employability skills

Module IV: Stress Management for Healthy Living
Meaning and Nature of Stress
Stages of stress
Causes and Consequences of stress: Personal, Organizational and Environmental
Personal Styles and strategies of coping

Module V: Professional Success
Building independence &interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers
- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
- Kamalavijayan, D. (2005). Information and Knowledge Management. Macmillan India Ltd. Delhi

Syllabus – Ninth Semester

LEADING THROUGH TEAMS

Course Code: BEH4351 **Credit Units: 01**

Course Objective:
This course aims to enable students to:
Understand the concept and building of teams
Manage conflict and stress within team
Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:
Module I: Teams: An Overview
Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team & Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III: Team Building
Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams

Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme: Total Internal (100)

Components	**SAP**	**Journal for Success (JOS)**	**A**	**Mid Term Test / CT / Assignment**	**VIVA / Presentation**
Weightage (%)	25	10	5	30	30

SAP: Social Awareness Programme, A: Attendance, CT: Class Test

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, McCann&Margerison, Charles: Team Management, 1992 Edition, viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

Amity Institute of Behavioural & Allied Sciences

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Science - Clinical Psychology

Syllabus – First Semester

INTRODUCTORY PSYCHOLOGY

Course Code: PSY2151 **Credit Units: 3**

Course Objective:
This course is designed to introduce the science of psychology. It identifies and defines the theories, terms, methods, and various fields of psychology. This course can be used as a foundation towards continued education in more specific areas of psychology. General Psychology encourages students to study in depth the notions of modern scientific psychology. Upon completion of this course, student should have the following objectives:

- To know the major personalities important to the field of general psychology and the ideas, theories, and schools with which they are associated.
- To know the major terms associated with general psychology and their meanings.
- To know the major concepts associated with the area of general psychology.

Course Content

Module I:
Meaning, Definition, Nature and Goals of Psychology

Module II:
Scope of Psychology; Branches and Fields of Psychology

Module III:
Background of Psychology: Historical Perspective

Module IV:
Schools of Psychology: Structuralism, Functionalism, Behaviorism, Gestaltism, Psychoanalysis, Humanism, Existentialism, Cognitive

Module V:
Methods of Psychology: Introspection, Observation, Experimental, Interview, Questionnaire, Survey

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, N. Delhi
- Hilgard& Atkinson:Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow:Psychology. 3rd Edition Broalu&Benewmark Publishers
- Guilford, J. P.: GeneralPsychology. New York: D. VanNostrand
- Mohsin, S.M.: Elementary Psychology. MotilalBanarasidas.
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Morris, C. G. & Maisto, A. A.: Psychology: An Introduction. (12thed.).Upper Saddle River, NJ: Prentice Hall.

References:

- Atkinson &Hilgard: Psychology: An Introduction. CengageLearning EMEA
- Kosslyn& Rosenberg :Psychology (3rded.). Allyn& Bacon
- Lahey, B. B. & Majors, M.: Psychology: An Introduction. Tata McGraw Hill Humanities/Social Sciences/Lingua

ELEMENTARY STATISTICS

Course Code: PSY2101 **Credit Units: 03**

Course Objective:

The paper on Statistics introduces quantification of psychological data and gives primary research orientation to the students. Understanding Statistics and basic logic of Statistics is crucial to being able to read Psychology research article. Further by mastering the basic logic and ways of thinking about Statistics, students will be unusually well prepared for the advanced courses.

Course Contents:

Module I:
Meaning, Definition, Importance and Limitations of Statistics in Psychology
Population and Sample: Types of Sampling

Module II:
Primary and Secondary Data
Classification and Tabulation of Data,
Frequency Distribution

Module III:
Graphical presentation of Data: Histograms, Frequency polygon, Frequency Curve, Cumulative Frequency Curve (Ogive), Cumulative Percentage Curve

Module IV:
Measures of Central Tendency: Meaning, Application and Computation of Mean, Median and Mode

Module V:
Measures of Variability: Range and Variation; Average deviation, Quartile deviation and Standard deviation

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Garrettt, H. E.:Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd. Bombay
- Aron/Aron&Coups:Statistics for Psychology(5th Ed).Pearson Education

- Howitt, D. &:Introduction to Statistics in Psychology (5th Ed). Cramer, D.England: Pearson Education Limited.
- Sprinthall, R.C. :Basic Statistical Analysis. Prentice Hall College Div
- Downie, N. M.:Basic Statistical Methods. Harper & Row Publishers, New York
- Colman, A. M.:Psychological Research Methods and Statistics. London and New York: Longman.
- Gupta, S. C.:Fundamentals of Statistics. N. Delhi: Himalaya
- Siegel, S.: (1956), Non Parametric Statistics, New York, McGraw Hill
- Broota, S.: (1992), Experimental Design in Behaviour Research, New Delhi
- Mohsin, S. M.:Fundamental Statistics for the BehaviouralSciences.MotilalBanarasidas, Patna

References:

- Agrawal, B. L.**:**Basic Statistics. New Age International
- Guilford, J.P.:Fundamental Statistics in Psychology and Education. McGraw Hill Kogakusha Ltd.
- Minimum, E. W., King, H. M. & Bear G., (1993), Statistical Reasoning in Psychology & Education, 3rd Edition, New York: John Willey & Sons
- Freeman: Statistics in Psychology

EXPERIMENTAL PSYCHOLOGY- I

Course Code: PSY2102 **Credit Units: 03**

Course Objective:

The basic general objective of Experimental Psychology is to familiarize the student with a basic and broad understanding of the scientific method and its application to the problems of Psychology. The course focuses on the logic, principles and practices of modern science and how it is applied to understanding the nature of reality. Successful completion of this course will prepare the student for graduate work and advanced experimental concepts.

Course Contents:
Module I:
Meaning and History of Experimental Psychology
Nature of Science and Scientific Methods, Scope of Experimental Psychology

Module II:
Steps of Experimental Method
Problem and Hypothesis: Nature, Types and Sources
Variables: Nature and types and control of Variables.

Module III:
Sensory Process: Meaning and Types of Senses, Sensation and Sensitivity
Visual Sense- Structure and Functioning of Eye
Hearing Sense- Structure and Functioning of Ear
Chemical Senses- Sense of Smell and Sense of Taste
Skin Senses- Sense of Touch or Pressure, Sense of Temperature and Pain
Body Senses- Kinesthetic Sense and Vestibular Sense

Module IV:
Attentional Process: Nature, Types and Determinants of attention

Module V:
Perceptual Process: Meaning and Nature of Perception
Principal of Perceptual organization
Perception of Space, Depth–Visual Monocular Cues and Binocular Cues, Perception of Distance and Direction Perceptual constancy
PerceptualIllusions; Delusions and Hallucinations

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Morgan &King : Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Myers, A. &Wadsworth Hansen, C. H. : Experimental Psychology (6th ed.).
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction
- Munn, N.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co.
- Sdorow: Psychology. 3rd Edition Broalu&Benewmark Publishers
- D'Amoto, M, R: Experimental Psychology: Methodology Psycho- Physicsand Learning. TMH Ed. Tata McGraw Hill Publishing Company Limited, New Delhi.

References:

- Sharma, R. N. & Sharma, R.: Experimental Psychology. Atlantic
- Sharan, A. K.: Experimental Psychology. Anmol Publication
- Kantowitz: Experimental Psychology. USA: Wadsworth Cengage Learning

PSYCHOLOGICAL PRACTICAL-I

Course Code: PSY2103 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To familiarize the students with the use of elementary statistical techniques
4. To encourage and guide the students to undertake a small-scale research project.

Note: Total 5practicals will be conducted in the first semesteramongthe list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Alexander Pass-a-long Test of Intelligence	Intelligence
2	Muller Lyre Apparatus with stand	Perception Illusion
3	Division of Attention Board with reset 6 digit Impulse counter	Attention
4	Leadership Style Scale	Leadership
5	Depth Perception	Perception
6	Marital Coping Scale	Relationship

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

SYSTEMS AND APPROACHES IN PSYCHOLOGY

Course Code: PSY2104 **Credit Units: 03**

Course Objective:
The paper on System and Theories gives a brief history of psychology and the developments within the discipline.

Course Contents:

Module I: Development of Psychology as a Discipline
Contribution of Weber, Fechner, Helmholtz, Galton,
Ebbinghaus, Mc Keen Cattell.

Module II: Structuralism, Functionalism
Wundt and Titchner as the founder of structuralism, structuralism as a system
Founding of Functionalism: Dewey and Angell

Module III: Behaviourism
WatsonianBehaviourism: systematic criteria and critical evaluation.

Module IV: Gestalt psychology
Founding the Gestalt psychology, Gestalt qualities, factors in organization, insight and productive thinking, Gestalt psychology as a system,

Module V: Psychoanalysis
Basic postulates, Freud, Jung and Adler's contributions to Psychoanalysis, critical evaluation.

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:
Text:

- Leahy, T. H., (1991): A History of Modern Psychology; New York: Prentice Hall
- Wolman, B. B. (1979): Contemporary Theories and Systems in Psychology; London: Freeman Book Company
- Chaplin, J. P.&Krawice, T. S. (1979): Systems and Theories in Psychology; New York: Holt Rinechart& Winston
- Mar, M. H.&Hillix, W. A. (1986): Systems and Theories in Psychology; New York: McGraw Hill

References:

- Paranjp, A. C. (1994): Meeting East and West; New York: Plenum Press
- Sartre, J. P. (1956): History & Theories of Psychology

HUMAN RIGHTS, VALUES AND ETHICS

Course Code: PSY2105 **Credit Units: 03**

Course Objective:

The course will address the evolution of international human rights and of the legal instruments designed for their protection. It will study the theoretical foundations of the idea of human rights in India.

Course Contents:

Module I: Introduction to Human Rights
Historical Perspective of Human rights
Meaning and Evolution of Human rights
Theories of Human Rights
Universalization of Human Rights
General Conditions Underlying the idea of human rights

Module II: Human Rights in Indian Context
Indian constitution and Human rights
Implementation of human rights in India
Personal and family rights
Group rights and right to equality

Module III: Human Rights Education
History and Determinants if Human Right Education
Principles of Human Rights Education
Awareness of Human Rights in Children
Protection of Human Rights in School
Global Need of Human Right Education

Module IV: Human and Civil Rights
Property Rights - Copyright - Intellectual Property
Crime and Social Deviance: Anomie
Ethics
Police — Law Enforcement: International Law Enforcement Agencies and National Law Enforcement Agencies

Module V: Values and ethics In India
Human Rights: Values and Ethics
Indian and Western Values and Ethics

Examination Scheme:

Components	CT	CT / H / P / V / Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Shelley, Wright (2001): International Human Rights, Decolonisation and Globalization: Becoming Human. London: Routledge.
- Anthony J. Langlois. (2001): The Politics of Justice and Human Rights: Southeast Asia and Universalist Theory. Cambridge: Cambridge University Press.

References:

- Parish, Steven M. (1994): Moral Knowing in a Hindu Sacred City. N.Y.: Columbia University Press.

READINGS IN PSYCHOLOGY

Course Code: PSY2130 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme:

Report on the Book in 3000 words	**Written Test**
50 marks	50 marks

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2132 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor(Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

ARTICLE/ FEATURE WRITING

Course Code: PSY2136 **Credit Units: 01**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		

10	30	20	40	100

Syllabus - Second Semester

ABNORMAL PSYCHOLOGY

Course Code: PSY2251 **Credit Units: 03**

Course Objective:
Abnormal psychology is a branch of psychology that deals with psychopathology and abnormal behavior that causes suffering to the individual and others around him or her, and interferes with functioning in a significant way. The term covers a broad range of disorders, from depression to obsession-compulsion to sexual deviation and many more. The study of abnormal psychology also includes learning about the factors, situations, and conditions that cause mental disorders and how they may be best treated.

Course Content:
Module I: Introduction
Concept of abnormality: Criteria and Perspectives
Classification: DSM IV-R, conceptual and operational evaluation.
Casual factors in Psychopathological Behaviour
(a) Biological determinants
(b) Psychological determinants
(c) Socio-cultural determinants

Module II: Neurosis and Psychosis
Concept and Difference between both the two

Module III: Neurotic Disorder
Generalized anxiety disorders
Obsessive-Compulsive disorders
Phobic Disorders
Eating Disorder

Module IV: Mood Disorders
Depression
Bipolar Disorder

Module V: Psychotic Disorder
Bipolar disorders:Manic, Depressive, Mixed
Psychotic depression
Delusional Disorder
Schizophrenia

Module VI: Mental Retardation and Development Disorders
Levels of mental retardation, Organic factors in mental retardation.
Autism: Clinical picture and casual factors.

Childhood Disorder

Module VII: Substance Abuse Disorders
Alcoholism
Drug Addition
Module VIII:
Psychosomatic Disorder
Somatoform Disorders
Personality Disorders

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:
Text:

- Page, J.D.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Shanmugam, T.E.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Coleman, J.C.: Abnormal Psychology and Modern Life. Bombay: D.B. Taraporewala Sons.&OCLtd.
- Davison G.C.& Neale, J. M.: Abnormal Psychology. New York: John Willey&Sons.
- Carson, R.C., Butcher, J.N. &Mineka, S.: Abnormal Psychology and Modern Life. Delhi: & Person Education, 2000
- Sarason, I. G. &Sarason, B. R.: Abnormal Psychology: The Problem of Maladaptive Behaviour, 11th Ed. Prentice-Hall
- Mangal, S. K.: Abnormal Psychology. New Delhi: Sterling Publishers Pvt Ltd

References:

- Comer, R. J.: Abnormal Psychology, 5th Ed. Worth Publishers
- Kumar, V.: Abnormal Psychology: Causes and Treatment. AadiPublications
- Kaur, R.: Abnormal Psychology: New Trends and Innovations Delhi: Deep & Deep Publications (P) Ltd.

ADVANCED STATISTICS

Course Code: PSY2201 **Credit Units: 03**

Course Objective:
The paper on statistics introduces quantification of psychological data and gives primary research orientation to the students.

Course Contents:
Module I: The Normal Curve
Characteristics and Problems in Normal Probability Curve (NPC), The Standard Normal Curve.

Module II: Significance of mean
Computation of the standard error of mean, application and interpretation, Z-test, The 't' distribution, Degrees of freedom, Levels of significance, Standard error of difference between two independent means (t-test: Large & small samples), Type I and Type II errors

Module III: Chi-Square Test (Non-Parametric Method)
Meaning, Test of Hypothesis with equal probability, Chi-Square with 2*2 table

Module IV: Analysis of Variance
Hypothesis testing with the help of One way ANOVA (f-test)

Module V: Parametric Vs Non-parametric Statistics
Introduction, Assumptions, basic differences, uses of parametric and Non-parametric tests

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Garrettt, H. E.:Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd. Bombay
- Aron/Aron&Coups:Statistics for Psychology(5th Ed).Pearson Education
- Howitt, D. &:Introduction to Statistics in Psychology (5th Ed). Cramer, D.England: Pearson Education Limited.
- Sprinthall, R.C. :Basic Statistical Analysis. Prentice Hall College Div
- Downie, N. M.:Basic Statistical Methods. Harper & Row Publishers, New York
- Colman, A. M.:Psychological Research Methods and Statistics. London and New York: Longman.

- Gupta, S. C.:Fundamentals of Statistics. N. Delhi: Himalaya
- Siegel, S.: (1956), Non Parametric Statistics, New York, McGraw Hill
- Broota, S.: (1992), Experimental Design in Behaviour Research, New Delhi
- Mohsin, S. M.:Fundamental Statistics for the BehaviouralSciences.MotilalBanarasidas, Patna

References:

- Agrawal, B. L.**:**Basic Statistics. New Age International
- Guilford, J.P.:Fundamental Statistics in Psychology and Education. McGraw Hill Kogakusha Ltd.
- Minimum, E. W., King, H. M. & Bear G., (1993), Statistical Reasoning in Psychology & Education, 3rd Edition, New York: John Willey & Sons
- Freeman: Statistics in Psychology

EXPERIMENTAL PSYCHOLOGY-II

Course Code: PSY2202 **Credit Units: 03**

Course Objective:
The basic general objective of Experimental Psychology is to familiarize the student with a basic and broad understanding of the scientific method and its application to the problems of Psychology. The course focuses on the logic, principles and practices of modern science and how it is applied to understanding the nature of reality. Successful completion of this course will prepare the student for graduate work and advanced experimental concepts

Course Contents:
Module I: **Psychophysics**
Basic Concepts, Stimulus and Differential Threshold
Determination of Thresholds: Method of Limits,
Method of Average Error, Method of Constant Stimuli

Module II: Motivation
Meaning, Definition and Nature of Motivation, Motivational Cycle
Needs– Biological and Psychosocial, Drive and Incentive
Classification of Motives– Biogenic and Psycho-social Motives
Theories of Motivation–Need and Drive Reduction Theory, Instinctive and Social Theory, Self-Urges Theory, Goal-oriented Actualization Theory.

Module III: Emotion
Meaning, Nature and Characteristics of Emotions
Aspect of Emotions- Bodily and Physiological Changes
Theories of Emotion: James-Lange Theory, Cannon-Bard Theory, Schachterand Singer's Cognitive Theory, Lindsey's Activation Theory.

Module IV: Learning
Meaning, Nature and Types of learning (Verbal, Motor, Concept etc)
Theories of Learning –Trial and Error Theory, Classical Conditioning Theory, Operant / Instrumental Conditioning, Insight Learning Theory
Transfer of Training: Meaning, Types and Theories of Transfer of Training

Module V:Learning disabilities
Reading Disorder/Developmental dyslexia
Disorder of written expression/Dysphasia/Aphasia
Math Disability/Dyscalculia.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Morgan &King : Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Myers, A. &Wadsworth Hansen, C. H. : Experimental Psychology (6th ed.).
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction
- Munn, N.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co.
- Sdorow: Psychology. 3rd Edition Broalu&Benewmark Publishers
- D'Amoto, M, R: Experimental Psychology: Methodology Psycho- Physicsand Learning. TMH Ed. Tata McGraw Hill Publishing Company Limited, New Delhi.

References:

- Sharma, R. N. & Sharma, R.: Experimental Psychology. Atlantic
- Sharan, A. K.: Experimental Psychology. Anmol Publication
- Kantowitz: Experimental Psychology. USA: Wadsworth Cengage Learning

PSYCHOLOGICAL PRACTICAL- II

Course Code: PSY2203 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Mirror Drawing	Motor Learning
2	Rey Auditory Verbal Learning Test	Verbal Learning
3	Emotions & Expressions	Emotion
4	Coopersmith Self Esteem Inventory	Self Esteem
5	Emotional Intelligence Test	Intelligence
6	Quality Of Marital Relationship scale	Relationship

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

INDUSTRIAL PSYCHOLOGY

Course Code: PSY2204 **Credit Units: 03**

Course Objective:
Industrial psychology is the branch of psychology that applies psychological theories and principles to organizations. Often referred to as I/O psychology, this course focuses on the topics like increasing workplace productivity and related issues such as the physical and mental well-being of employees.

Course Contents:
Module I: Introduction to Industrial Psychology
Definition, Subject matter, & Goals
Development of Industrial Psychology, Present status & future prospects

Module II: **Personnel selection**
Determining job requirements: Uses and types of job information, and job analysis
Recruiting job applicants: Recruitment techniques
Personal history assessment: Standard application blanks, bio data items, resume and letter of reference
Assessment of current behavior: Interviews, psychological testing and assessment Centers

Module III: Employee training and Development
Training needs assessment
Training design
Techniques for training knowledge and skill
Training programme evaluation

Module IV: Evaluating Job Performance
Uses of performance evaluation: Downsizing, fair employment, employment-at-will and seniority
Sources of evaluation: The evaluator and performance information
Appraisal rating systems: Graphic rating scales and rating errors
Non-rating evaluation methods: Checklists and comparison method

Module V: Conditions of Work &Accidents
Conditions of Work: Physical Conditions for work- Illumination, Noise, Colour, Temperature, Humidity.
Temporal Condition for Work- Hours for Work, Length of Work Week, Flexible Working Hours, Rest Pauses and Shift work
Psychological Conditions of Work-Boredom, Monotony and Fatigue
Industrial Accident- Definition, Causes and Prevention

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Robbins, S.P. & Sanghi, S. (2007). Organizational behavior (11th ed.). New Delhi: PearsonEducation
- Berry, L.M. (1998), reprint 2010. Psychology at work: An introduction to Industrial andOrganizational Psychology. N.Y. McGraw-Hill International Editions
- Blum & Naylor. Industrial Psychology, CBS Publishers & Distributors.
- Aamodt, M.G. (2007). Industrial and Organizational Psychology: An applied approach.US: Thomson & Wadsworth.
- Robbins, S.P.; Judge, T.A.; and Sanghi, A. (2009). Organizational Behaviour. N.D.:Pearson Prentice Hall.
- Miner, J.B. (1992). Industrial-Organizational Psychology. N.Y.: McGraw-Hill
- Luthans, F. (1995). Organizational behavior (7th ed). New York: McGraw- Hill, inc.

References:

- Pandit, R., Kulkarni, A.V. & Gore, C. (1999). Manasashastra: Audyogikaanivyavasayikupayojan.Nagpur: Pimpalapure& Co.
- Schultz, D. and Schultz, S. E. (2006)Psychology and work today. 8th ed. N.D.: PearsonEdu.
- McShane, et al. (2006). 1st reprint. Organizational Behaviour. N.D.: Tata McGraw-Hill

ORGANIZATIONAL BEHAVIOUR

Course Code: PSY2205 **Credit Units: 03**

Course Objective:

To learn how the findings of psychology are applied to the problems involving human behavior in the workplace for providing optimum solutions.

Course Contents:

Module I: Nature and Scope of Organizational Psychology

Organizational Psychology: Meaning, subject matter and functions of Organizational Psychology
Development, Current status and Future of Organizational Psychology

Module II: Work Motivation

Theories
Job Design: Job enlargement, Job enrichment and Job characteristics models

Module III: Organizational Attitude and Behaviour

Job Satisfaction, Job Involvement, Organizational Commitment: Concepts, Determinants and Consequences.

Module IV: Influence, Power and Politics in Organization

Introduction: Individual bases of Power, Group or Subunit power
Structural determinants, Organizational Politics and its ethical implication

Module V: Organizational Culture

Nature, Formation and maintenance of organizational culture
Consequences of organizational culture
Work culture in the Indian context

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Robbin's S.P. (1993). Organizational Behaviour: Concepts Controversies and Applications; (6th Ed.) New Delhi: Prentice Hall.
- Bass, B.H. &Berrett, G.V. (1981). People, Work, and Organizations an Introduction to Industrial and Organizational Psychology; Boston: Allyn and Bacon, INC.
- Feldman, D.C. &Aenold, H.J. (1985). Managing Individual and Group Behaviour in Organizations; New York: McGraw-Hill.
- Smith, R.D., (1988). Organizational Behaviour; New York: McGraw-Hill.
- Luthans, F. (1998). Organizational Behaviour; New York: McGraw-Hill

References:

- Davis, K. &Newstroms, J.W. (1989). Human Behaviour at Work: Organizational Behaviour; New York: McGraw-Hill
- Sekaran, U. (1989). Organizational Behaviour: Text and Cases; New Delhi: Tata Mcdraw Hill
- Cascio, W. (1993). Applied Psychology in Personal Management; New York: Prentice Hall

READINGS IN PSYCHOLOGY

Course Code: PSY2230 **Credit Units: 02**

Objectives:

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Evaluation Scheme:

Report on the Book in 3000 words	**Written Test**
50 marks	50 marks

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2232 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

ARTICLE/FEATURE WRITING

Course Code: PSY2236 **Credit Units: 01**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students with an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles.Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		

10	30	20	40	100

Syllabus – Third Semester

BASIC COGNITIVE PSYCHOLOGY

Course Code: PSY2351 **Credit Units: 03**

Course Objective:
Cognitive Psychology is an objective, empirical discipline that tends to favor an experimental approach. This paper of Psychology is crucial to understand the basis of mental activity and human behaviour. The students of Psychology will need to have this knowledge about the normal mental operation of adults in order to understand more complex processes and their disorder. The subject emphasizes cognitive aspects to show the more up to date developments. In this paper of Psychology, Students will:

- Gain factual knowledge of the terminology, methods, and research findings in thefield of cognitive psychology.
- Learn the fundamental theories and principles of cognitive psychology including being able to critique them.
- Learn how professionals in the field of cognitive psychology go about the process of gaining new knowledge.

Course Content:
Module I:
Introduction, History and Background of Cognitive Psychology

Module II:
Thinking: Nature, and Types of Thinking:
Tools of thinking- Images, Concept, Symbols and Signs, Language, Muscle Activities and Brain Function

Module III:
Reasoning: Meaning and Types of Reasoning: Deductive and Inductive Reasoning

Module IV:
Problem solving: Meaning and Method of Problem solving
Decision Making: Meaning, types and hindrances

Module V:
Intelligence: Meaning, Nature and Theories of intelligence: Unitary Theory, Multifactor Theory, Two Factor Theory, and Group Factor Theory.
Genetic and Environmental Influence on Intelligence
Classification of Intelligence Test
Concept of Mental Age and IQ

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Kellogg, R. T.: Fundamentals of Cognitive Psychology. New Delhi: Sage Publication
- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Solso, R. L.: Cognitive Psychology (8th ED.). Delhi: Pearson Education
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow: Psychology. 3rd Edition Broalu&Benewmark Publishers
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Haberlandt, K.: Cognitive Psychology. Allyn& Bacon

References:

- Esgate, A. &Groome, D.: An Introduction to Applied Cognitive Psychology. England: Psychology Press.
- Best, B. J.: Cognitive Psychology. (3rded.). West Publishing Company

SOCIAL PSYCHOLOGY

Course Code: PSY2301 **Credit Units: 03**

Course Objective:
Social Psychology is the study of social interaction and social influence. As such, it remains one of the most comprehensive and personally relevant areas within the field of psychology. This course has following objectives.

- To expand your knowledge about social psychology and human behavior.
- To foster respect for human diversity, particularly with regard to matters of gender, race and ethnicity.
- To enable students to(a) understand the forces that create group differences in patterns of social behavior, (b) understand and tolerate the behavior of other people, particularly that of members of the diverse array of groups and social categories to which they do not belong,(c) recognize the limits in generalizing psychological research to all cultural/gender/ethnic/age groups, and (d) understand the dynamics of intergroup relationships, conflict, and cooperation.

Course Contents:
Module I: Introduction
Meaning and Nature of Social Psychology
Scope and Development of Social Psychology
Methods and their Application**:**Experimental Method**,** Observation Method**,** Correlational Method**,**
Interview and Questionnaire
Socio-metry
Relationship of Social Psychology with other discipline

Module II: Social Perception and Cognition
Perceiving ourselves: Self-Concept, Self-esteem and Self-Presentation
Perceiving others: Forming impressions and role of verbal and non-verbal cues
Attribution: Understanding the causes of others' behavior
Attribution Biases

Module III: Interpersonal Attraction
Concept and Meaning of interpersonal attraction
Factors affecting interpersonal attraction,
Theories of interpersonal attraction: Reinforcement Theory, Complementary Theory, Exchange Theory

Module IV:ProsocialBehaviour
Meaning and Nature
Social exchange theory, Bystander effect
Determinants of prosocial behavior

Module V: Aggression
Meaning and Determinants of Aggression: Social, Cultural, Personal and Situational

Prevention and Control of Aggression

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Myers, D. G.: Social Psychology (10th Ed). New York: McGraw Hill
- Feldman, R. S.: Social Psychology: Theories, Research and Application. New York: McGraw Hill
- Secord, P.F. &Backman, C. N.: Social Psychology. USA: McGraw-Hill
- Baran, R.A. & Byrne, D.: Social Psychology. Boston, MA: Pearson Allyn and Bacon.
- Aronson, E., Wilson, T. D.: Social Psychology (7th ed.). Upper Saddle &Akert, R. M. River, NJ: Prentice Hall.
- Wrightsman, L. S.: Social Psychology. Brooks/Cole Pub. Co.
- Alcock, J. E.; Carment, D. W.; Sadava, S. W.; Collins, J. E. & Green, J. M.:A textbook of Social Psychology (6th Ed)Scarborough, Ontario: Prentice Hall / Alliyn& Bacon
- Sharma, R. K. & Sharma, R.:Social Psychology. New Delhi: Atlantic Publishers and Distributers

References:

- Krutchfield, R. S.: Theories and Problems of Social Psychology
- Baumeister, R. F.& Belmont, C.A.: Social Psychology and Human Nature (2nd Bushman, B. J. ed). Thomson/Wadsworth
- Kuppuswamy: Introduction to Social Psychology

PSYCHOLOGICAL PRACTICAL-III

Course Code: PSY2302 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the third semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Aggression Questionnaire	Aggression
2	Draw A Person Intellectual Ability Test	Intelligence
3	Multidimensional Self Concept Scale	Self-Concept
4	Swaroop Mehta Test Of Thinking Strategy	Thinking
5	Critical Thinking For Activities of Daily Living and Communication	Thinking
6	Marital Compatibility Index	Relationship

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

HEALTH PSYCHOLOGY

Course Code: PSY2303 **Credit Units: 03**

Course Objective:
To enable students to understand the concept of social gerontology and health and its relationship to the well –being of the individual in everyday life

Course Contents:
Module I: Introduction & Methodology
Definition of Health Psychology; Mind-Body Relationship; Changing Patterns of Illness;
Medical Acceptance; Health care services
Research Methodology- Anecdotal method, Case Study method, Correlation Research, Experimental method

Module II: Models of Health
Bio-Psycho-Social Model

Module III: The Immune System
Psycho-Neuro Immunology- the Immune System & immune functioning. Disorders of the Immune System- Infectious Diseases (viral infections & disease); Co-factor theory; Behavioral factors and common cold; AIDS (Transmission of HIV-AIDS & its consequences, coping with AIDS); Cancer- (Psychological factors in Cancer, causes of cancer)

Module IV: Health Promotion & Disease Prevention
Stress- Meaning of stress; Theories of stress (Selye& Lazarus); Responses to stress; Dimensions of Stress; Coping with Stress.Health compromising behavior- Alcohol abuse, Drug abuse, Smoking

Module V: Health Enhancing Behaviour
Improving health & wellbeing: Personality and Individual Differences
Stress- Hardiness; Motive patterns; gaining a sense of control; Enhancing Support

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

Text:
- Allen Felicity. Health Psychology: theory and practice, Published by Allen &Unwin, 1998

- Friedma. Health Psychology: Health Psychology, 2nd Edition, Published by Academic Internet Publishers Incorporated, 2006
- Shelley E. Taylor. HealthPsychology (McGraw-Hill Companies (2011)
- Dimatteo, M.R. & Martin, L.R.:HealthPsychology. Allyn and Bacon

SUMMER PROJECT EVALUATION-I

Course Code: PSY2335 **Credit Units: 03**

Course Objective:
To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training.
It will also help students to develop report writing skills.
Duration: Two Months (June- July)

Methodology:
Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor from their respective Institute. Students will submit their summer project reports with their supervised daily reporting. Immediately after returning from their summer vacations. This would require primary data collection.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	**100 Marks**

SPORTS PSYCHOLOGY

Course Code: PSY2304 **Credit Units: 03**

Course Objectives:

- To trace the development of sports psychology as an independent discipline with its multidimensional perspectives;
- to identify the relationship of personality and situational factors with performance on individual and team events; and
- to apply the psychological interventions in sports

Course Contents:

Module I:
Nature, Historical & recent perspectives on sports psychology

Module II:
The role of stress, arousal, anxiety and attention in the performance of individual and team sports

Module III:
Motivation, skills and performance, personality profiles of successful sports persons

Module IV:
Cognitive and social psychological dimensions of individual & team sports

Module V:
Training/Coaching techniques, cognitive and behavioral interventions, the role of Sports Psychologists

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:
Text:

- Jarvis, M.: Sport Psychology. Routledge Publication
- Sejwal, S. M. (2011): Sport Psychology. Pacific Publication.

References:

- Thatcher: Sports and Exercise Psychology

READINGS IN PSYCHOLOGY

Course Code: PSY2330 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme:

Report on the Book in 3000 words	**Written Test**
50 marks	50 marks

TERM PAPER

Course Code: PSY2331 **Credit Units: 02**

Course Objective:
The rationale behind introducing the term paper for BA (H) Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Term Paper:

1. Topic
2. Introduction
3. Review Research
4. Key Learning: minimum 5 pgs handwritten
5. Conclusion
6. References
7. No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Compilation of Term Paper	50 Marks
Viva Voce	25 Marks
Presentation of Term Paper	25 Marks
Total	**100 Marks**

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2332 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP/ CERTIFICATION

Course Code: PSY2333 **Credit Units: 01**

Course Objective
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:

- Experimental Psychology
- Health Psychology
- Industrial Psychology
- Organizational Behaviour
- Sports Psychology
- Social Psychology
- Cognitive Psychology

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Group Activity
Role Play
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

ARTICLE/ FEATURE WRITING

Course Code: PSY2336 **Credit Units: 01**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles.
   Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

Syllabus – Fourth Semester

LIFE SPAN DEVELOPMENT

Course Code: PSY2451 **Credit Units: 03**

Course Objective:
Developmental psychology, also known as human development, is the scientific study of systematic psychological changes, emotional changes, and perceptual changes that occur in human beings over the course of their life span. Originally concerned with infants and children, the field has expanded to include adolescence, adult development, aging, and the entire life span. Developmental psychology includes issues such as the extent to which development occurs through the gradual accumulation of knowledge versus stage-like development, or the extent to which children are born with innate mental structures versus learning through experience. The objective of this paper is:

1. To provide an understanding of Physical, cognitive, affective, moral, social and neural development during infancy, childhood, and adolescence.
2. To critically evaluate the role of heredity, maturation, and the environment in development.
3. To critically examine the relationship between scientific theories of development and the reality of development in everyday life.

Course Content

Module I: Introduction
Meaning and Concept of Development: Life Span Perspective,
Theoretical Perspective on Development,
Factors influencing development

Module II: The Start to Life
Conception and Prenatal Development: The Interaction of Heredity and Environment;
Birth and newborn: Birth Complications, Competent Newborn.

Module III: Development in Infancy and Toddlerhood (birth to 2years)
Physical Development
Cognitive Development: Roots of Language
Social and Personality Development

Module IV: Development in Childhood
The Preschool years(3-6 Years)
Physical Development;
Cognitive Development: Language Development
Social and Personality Development
The Middle Childhood(6-12 Years)
Physical Development
Cognitive Development: Intellectual and Language development
Social and Personality Development

Module V: Development in Adolescence and Young Adulthood
Adolescence (12-19 years)
Physical Development

Cognitive development in Adolescence and School Performance
Social and Personality Development
Young Adulthood (19-35 years)
Physical Development: Physical Limitations and Challenges
Cognitive Development: Intelligence and Higher Education
Social and Personality Development:Forging Relationship and Choosing Career

Module VI: Development in Middle and Late Adulthood
Middle Adulthood(35-55 years)
Physical Development: Sexuality and Health
Cognitive Development:Memory and Remembering
Social and Personality Development: Cultural Dimensions
Late Adulthood (55 years to death)
Physical Development: Health and Wellness
Cognitive Development: Memory and Forgetting
Social and Personality Development: Successful Aging
Death, Dying and Bereavement

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D: Human Development (10th Ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Prentice Hall
- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Heatherington, E.M. &Parke, R.D.: Child Psychology: A Contemporary ViewpointNew York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A.: Allyn and Bacon.
- Crain, W.: Theories of Development. Englewood Cliffs, New Jersey: Prentice Hall.
- Newman, B.M. & Newman,P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.

References:

- Brodzinsky, D.M.; Gormly, A.V. &Anibron, S.R.:Life Span Human Development; New Delhi: CBSPublication
- Santrock, J.W.:A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.
- Bukatko, D. &Daehler, M.W.:Child Development: A Thematic Approach. New York: Houghton Mifflin Company.

PERSONALITY

Course Code: PSY2401 **Credit Units: 03**

Course Objective:
The paper introduces description, evaluation and application of major personality theories for personality development. The objective of studying Personality may be defined in its importance because the more you know about personalities, the better you will be able to understand why people do the things they do, and how to communicate with them By studying personality types, one can find out if he or she is an extrovert, an introvert, phobic, narcissist and so forth. The study of Personality can also bring awareness to the truth that there are many different types of people who require certain sensitivities. Following are the objectives that can be achieved after a study of personality:

1) Increment in personal integrity
2) Increment in personal freedom
3) Objectification of self and other
4) Increasing tolerance and understanding of others:

Course Contents:

Module I: Introduction
Concept and Definition of Personality: Western Perspective, Eastern Perspective
Personality as a Trait, Personality asTypes
Methods of Personality Assessment: Testing Method, Observational method

Module II: Determinants of Personality
Nature / Nurture Controversy:
Biological Determinants: Role of Genes and Endocrine Glands
Role of Physical Environment: Natural Environment, Constructed Environment, Behavioural
Role of Socio – Cultural Environment: Early Social Experiences and Impact of parenting styles

Module III: Trait and Type Theories of Personality
Trait (Biological) and Type Theories: Allport, Cattell, Eysenck, Sheldon, and Friedman

Module IV: Psychoanalytic Theories of Personality
Sigmund Freud, Alfred Adler, Erich Fromm, Karen Horney and Erik Erikson's View

Module V: Social-Cognitive and Humanistic Theories of Personality
Behavioural Theory: Skinner
Social-Cognitive Theory: Miller & Dollard; Bandura
Humanistic Theory: Abraham Mashlow; Carl Rogers

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

Text:

- Adams, D.P. (1990). An Introduction to Personality Psychology; New York: Harcourt brace &Javanvich.
- Hall, C.S. &Lindzey, G. (1998). Theories of Personality: New Delhi: Wiley Eastern Ltd.
- Feist, J. (1985), Theories of personality: New York, Holt Rineharat& Winston
- Mairet, P. (1977). Existentialism & Humanism of J.P. Sartre; London, Methuen
- Kuppuswamy, B. (1990). Elements of Ancient Indian Psychology: Delhi: Konark publishers
- Allport, G.W. (1996). Pattern in Growth in Personality: New York: Holt Rinechart& Winton
- McCelland, D.C. (1951). Personality: New York: Holt Rinechart& Winston.

References:

- Paranjpe, A.C. (1984). Theoretical Psychology, Meeting of East and West; New York, Penguin Press
- Monte, F.E. (1977). Beneath the Mask-An Introduction to Theories of Personality: New York: Prager.
- Cambridge, M.A. (1982). TheEvolving Self Problem and Process in Human Development: New York: Harvard University Press

PSYCHOLOGICAL PRACTICAL- IV

Course Code: PSY2402 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the Fourth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Developmental Screening Test	Development
2	Memory Drum Apparatus	Memory
3	Vocational Preference Inventory	Personality-Non Projective
4	Students Stress Scale	Stress
5	Authentic Leadership Questionnaire	Leadership
6	Thematic Apperception Test	Personality-Projective

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

PHYSIOLOGICAL PSYCHOLOGY

Course Code: PSY2403 **Credit Units: 03**

Course Objective:
The paper on Physiological Psychology correlates the discipline to the physiological aspect of human life and emphasizes the need to study physiology for complete understanding of human beings.

Course Contents:

Module I:
Introduction: Psychology and Behaviour
Physiological Psychology: Definition, History and Techniques used

Module II:
Neural Conduction Mechanism: Structure of Neuron, Synapses, Reflexes and Nerve Impulse Transmission

Module III:
Nervous System: Central Nervous System: Brain and Spinal Cord
Peripheral Nervous System

Module IV:
Influence of Nervous System on Behaviour
Endocrinal glands: their location and function

Module V:
Impact of the functioning of Endocrine Gland on Behaviour
Genes and Behaviour

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Levinthal, C. F.:Introduction to Physiological Psychology (3rd Ed.). Prentice Hall, Inc
- Carlson, N. R.: Physiology ofBehaviour, 10thEd.Allyn& Bacon
- Kalat, J. W.: Biological Psychology. USA: Wadsworth CengageLearning
- Jafar M.: Physiological Psychology.APH Publishing Corporation.
- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd

References:

- Sdorow: Psychology. 3rd Edition Broalu&BenewmarkPublishers
- Lahey, B. B. & Majors, M.: Psychology: An Introduction: Humanities/Social Sciences/Lingua. Tata McGraw Hill
- Hilgard&Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co

ADVANCE COGNITIVE PROCESS

Course Code: PSY2404 **Credit Units: 03**

Course Objective:
The objective of this course is to study the concept, principles and theories of cognition and its application in cognitive psychology. This will facilitate the students to develop an understanding of the cognitive skills in themselves and others.

Course Contents:

Module I: Intelligence
New dimensions of intelligence: Social Intelligence & Emotional Intelligence

Module II: Memory
Meaning and Definition, Memory Stages (Encoding, Storage and Retrieval)
Information Processing Model
Types of Memory: Sensory Register, Short Term and Long Term Memory
Methods of Measuring Memory
Techniques of Improving Memory

Module III: Forgetting
Nature, Causes and Theories of Forgetting: Trace Decay Theory, Interference Theory, Consolidation Theory and Repressive Forgetting

Module IV: Language
Meaning, Definition and Elements of Language: Phonology, Syntax, Semantics, Morphology, Pragmatics

Module V: Language disorders
Communication disorders
Semantic pragmatic disorders
Brocas area

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Kellogg, R. T.: Fundamentals of Cognitive Psychology. New Delhi: Sage Publication
- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Solso, R. L.: Cognitive Psychology (8th ED.). Delhi: Pearson Education
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow: Psychology. 3rd Edition Broalu&Benewmark Publishers
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Haberlandt, K.: Cognitive Psychology. Allyn& Bacon

References:

- Esgate, A. &Groome, D.: An Introduction to Applied Cognitive Psychology. England: Psychology Press.
- Best, B. J.: Cognitive Psychology. (3rded.). West Publishing Company

ENVIRONMENTAL PSYCHOLOGY

Course Code: PSY2405 **Credit Units: 03**

Course Objective:
The paper on Environmental Psychology imparts knowledge on individual's relation to environment, the processes involved therein and manner of research done.

Course Contents:
Module I: Introduction to Environmental Psychology
Concept of Environment: Physical, Social and Institutional, Origin & Scope

Module II: Approaches to the study of Environmental Psychology
Approaches in Environmental Psychology: Arousal Approach, Understanding Approach, Adaptation Level Approach, Behavior Constraint Approach

Module III: Environmental Stress
Environmental Stress: Population, Pollution, Environmental Remodeling, Environmental Competence, Environmental Awakening, Social Accommodation
Coping with environmental Stress

Module IV: Environmental Assessment
Management of Natural Environment, Natural Hazards, Development and changing environment

Module V: Applications of Environmental Psychology to Community Problems
The Built Environment: Architectural Factors and Social behaviour in Housing, Human responses to protect the environment

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Nagar, D. Environmental Psychology. New Delhi: Concept Publishing Company.
- Paul, A. Bell; Thomas C Greene; Jeffery D. Fisher; Andrew S. Baum. Environmental Psychology Published by Routledge, 2005
- Mirilia Bonnes, Gianfranco Secchiaroli, Claire Montagna, EnvironmentalPsychology: a Psycho-social Introduction. Published by SAGE, 1995

References:

- Trivedi, P.R. Environmental Education. New Delhi: APH Publishing Corporation.

APPLIED SOCIAL PSYCHOLOGY

Course Code: PSY2406 **Credit Units: 03**

Course Objective:
Social Psychology is the study of social interaction and social influence. As such, it remains one of the most comprehensive and personally relevant areas within the field of psychology. This course has following objectives.

- To expand your knowledge about social psychology and human behavior.
- To foster respect for human diversity, particularly with regard to matters of gender, race and ethnicity.
- To enable students to (a) understand the forces that create group differences in patterns of social behavior, (b) understand and tolerate the behavior of other people, particularly that of members of the diverse array of groups and social categories to which they do not belong, (c) recognize the limits in generalizing psychological research to all cultural/gender/ethnic/age groups, and (d) understand the dynamics of intergroup relationships, conflict, and cooperation.

Course Contents:
Module I: Introduction
Social Psychology in the workplace, Social Psychology in the clinic,
Social Psychology of poverty and deprivation, Psychology of collective behaviour

Module II: Group Process
Group Structure: Nature and Function
Task Performance: Social Interaction, Social facilitation, Social Loafing
Conformity: Factors affecting Conformity
Coordination in Groups and Group Cohesiveness

Module III: Attitude
Nature and Determinants of Attitude
Formation, Change and Measurement of Attitudes: Likert Scale, Thrustone Scale, Bogardus Scale

Module IV: Prejudices, Discrimination and Stereotypes
Nature and Components of Prejudice, Discrimination and Stereotypes
Acquisition and techniques of Reduction

Module V: Leadership
Definition, Nature and Function of Leadership
Types, Qualities and Theories of Leadership: Trait Approach, Situational Approach, Interactional Approach

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

Text:

- Myers, D. G.: Social Psychology (10th Ed). New York: McGraw Hill
- Feldman, R. S.: Social Psychology: Theories, Research and Application. New York: McGraw Hill
- Secord, P.F. &Backman, C. N.: Social Psychology. USA: McGraw-Hill
- Baran, R.A. & Byrne, D.: Social Psychology. Boston, MA: Pearson Allyn and Bacon.
- Aronson, E., Wilson, T. D.: Social Psychology (7th ed.). Upper Saddle &Akert, R. M. River, NJ: Prentice Hall.
- Wrightsman, L. S.: Social Psychology. Brooks/Cole Pub. Co.
- Alcock, J. E.; Carment, D. W.; Sadava, S. W.; Collins, J. E. & Green, J. M.:A textbook of Social Psychology (6th Ed)Scarborough, Ontario: Prentice Hall / Alliyn& Bacon
- Sharma, R. K. & Sharma, R.:Social Psychology. New Delhi: Atlantic Publishers and Distributers

References:

- Krutchfield, R. S.: Theories and Problems of Social Psychology
- Baumeister, R. F.& Belmont, C.A.: Social Psychology and Human Nature (2nd Bushman, B. J. ed). Thomson/Wadsworth
- Kuppuswamy: Introduction to Social Psychology

READINGS IN PSYCHOLOGY

Course Code: PSY2430 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Evaluation Scheme:

Report on the Book in 3000 words	**Written Test**
50 marks	50 marks

TERM PAPER

Course Code: PSY2431 **Credit Units: 02**

Course Objective:
The rationale behind introducing the term paper for BA Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Term Paper:

1. Topic
2. Introduction
3. Review Research
4. Key Learning: minimum 5 pgs handwritten
5. Conclusion
6. References
7. No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Compilation of Term Paper	50 Marks
Viva Voce	25 Marks
Presentation of Term Paper	25 Marks
Total	**100 Marks**

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2432 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4)Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP/ CERTIFICATION

Course Code: PSY2433 **Credit Units: 01**

Course Objectives:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:

- Experimental Psychology
- Health Psychology
- Industrial Psychology
- Organizational Behaviour
- Sports Psychology
- Social Psychology
- Cognitive Psychology

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Group Activity
Role Play
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

ARTICLE/FEATURE WRITING

Course Code: PSY2436 **Credit Units: 01**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of an article is to provide the students an opportunity to further enhance their knowledge in an area of their choice by undertaking different **aspects of human behavior and analyzing it** at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.
The purpose of the article is for the students to draw upon their interest in currently published research literature with the aim of furthering theoretical work in the field of interest.

Guidelines:

1. The article will be related to the contemporary Psychological issue and the topic will be given by the department. The article will be written in around 3000 words.
2. The presentation of the article is scheduled to be held before the commencement of Semester examinations.
3. The article will carry 100 marks that will be marked on the basis of selection of topic, article writing and viva.
4. There are a number of types of articles that are published in psychological journals, including reports of empirical studies (psychological reports), review articles, case studies and theoretical articles. Students may critically assess existing theories, identifying flaws or arguing for the superiority of one theory over another. This is often done through examining a theory's internal consistency and evaluating the level of empirical support for the theory (i.e. studies/experiments). This type of theoretical analysis is what we are expecting from students at undergraduate level.

Examples of a few broad areas for articles (List is indicative, not exhaustive)

- Personality theories
- Emotional Intelligence
- Positive thinking
- Learning
- Self concept
- motivation
- Emotion
- Cognitive process
- Cross cultural Psychology
- Memory enhancement

EVALUATION

Selection of topic & its significance	Article writing		Viva	Total
	Content	References(studies quoted)		
10	30	20	40	100

Syllabus – Fifth Semester

PSYCHOMETRIC TESTING

Course Code: PSY2551 **Credit Units: 03**

Course Objective:
Psychological assessment is a process of testing that uses a combination of techniques to help arrive at some hypotheses about a person and their behavior, personality and capabilities. Psychological assessment is also referred to as psychological testing, or performing a psychological battery on a person. A psychological assessment is the attempt of a skilled professional, usually a psychologist, to use the techniques and tools of psychology to learn either general or specific facts about another person, either to inform others of how they function now, or to predict their behavior and functioning in the future. Psychologists are the only profession that is expertly trained to perform and interpret psychological tests. Below are the objectives of studying this particular paper of Psychology:

- To train the students in various psychological assessment techniques.
- To impart skills necessary for selecting and applying different tests for different purposes such as evaluation, training and rehabilitation.

Course Content:

Module 1: Introduction
History of Psychological Testing
Meaning, Definition and Types of Psychological Testing
Ethical issues in Psychological Testing

Module 2: Measurement
Nature and significance of Measurement
Distinction between assessment and measurement
Levels of measurement
Techniques of Attitude Measurement

Module 3: Construction of Test
Steps of constructing a Psychological Test
Reliability: Meaning, types and factors affecting reliability
Validity: Meaning, types and factors affecting Validity
Characteristics of a good Psychological Test

Module 4: Assessment of General and Special Abilities
Aptitude: Multidimensional aptitude Battery-II
Creativity: Creativity Assessment Packet (CAP)
Learning: Human Maze learning

Module 5: Application of Testing
Assessment in Educational and Occupational Set-up: Achievement Test
Assessment in Clinical Set-up and in Counselling

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Anastasi, A. & Urbina, S.: Psychological Testing. U.S.A.: Prentice Hall International Inc.
- Graham, J. R. & Lilly, R. S.: Psychological Testing. New Jersey: Prentice Hall Inc.
- Kaplan, R. K. &Sacuzzo, D. P.: Psychological Testing- Principles, Applications and Issues. New Delhi: Cengage Learning India Pvt. Ltd
- Aiken, L.R. &Groth-Marnat, G.: Psychological Testing and Assessment (12th Ed.) Pearson Education
- Freeman, F. S.: Psychological Testing. Oxford University Press

References:

- Hasan, Q.: Personality Assessment: A fresh Psychological Look. New Delhi: Gyan Publishing House
- Kline, T. J. B.: Psychological Testing – A Practical Approach to Design and Evaluation. New Delhi: Vistaar Publication

PSYCHOLOGICAL PRACTICAL- V

Course Code: PSY2501 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the Fifth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Multidimensional aptitude Battery-II (MAB-II)	Aptitude
2	Human Maze Learning	Learning
3	Creativity Assessment Packet	Creativity
4	Childrens Inventory of Anger(CHIA)	Aggression
5	Constructive Thinking Inventory(CTI)	Thinking
6	D2 Test of Attention	Attention

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

CLINICAL PSYCHOLOGY

Course Code: PSY2502 **Credit Units: 03**

Course Objective:
Clinical Psychology is an integration of science, theory and clinical knowledge for the purpose of understanding, preventing, and relieving psychologically-based distress or dysfunction and to promote subjective well-being and personal development. In many countries, clinical psychology is a regulated mental health profession. Keeping pace with the disciplinary advances and with the goal of acquiring specialized knowledge, the paper would allow students to nurture their academic interest in clinical and other research domains of psychology, along with personal growth and citizenship. The faculty is expected to perform the following functions so that the objective of the concerned programme can be obtained:

- Integrate the course contents with the clinical viewpoint in a service setting.
- To train them into skills and competencies which are required for practice as a psychologist.
- To sensitize them to the ethics of profession.
- To impart knowledge and skills required for diagnosis of psychopathological conditions.
- To prepare students in specific areas in which professional psychological services can be rendered.
- To develop self-reflective skills.

Course Content:
Module I: Foundation of Clinical Psychology
Introduction to Clinical Psychology: Meaning and nature of discipline,
Historical Development of Clinical Psychology

Module II: Contemporary Issues
Professional Activities of Clinical Psychologist
Subspecialties of Clinical Psychology
Organizations in Clinical Psychology
Ethical and Legal Issues in Clinical Psychology

Module III: Diagnosis and Assessment
Nature and Purpose of Clinical Diagnosis and Assessment
Stages in the Assessment Process
Clinical Assessment Techniques

Module IV: Psychotherapy
Definition, Goals and Stages of Psychotherapy
Essential Process in Psychotherapy
Models of Psychotherapy: Individual Therapy, Group Therapy, Couples Therapy, Family Therapy

Module V: Approaches to Psychotherapy
Psychodynamic Psychotherapy
Behaviuoral Psychotherapy
Cognitive Psychotherapy
Humanistic Psychotherapy

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Plante, T. G.: Contemporary Clinical Psychology. New York: John Willey & Sons, Inc.
- Bellack, A. S. &Hersen, M.: Introduction to Clinical Psychology. New York: Oxford University Press
- Korchin, S. J.: Modern Clinical Psychology. Delhi CRR Publishers and Distributers
- Ray, S. D.: The Practice of Psychotherapy. New Delhi: New Age International
- Hecker, J. E. & Thorpe, G. L: Introduction to Clinical Psychology. Delhi: Pearson Education
- Herbert, M.: Clinical Child Psychology: Social Learning, Development and Behaviour. New York: John Willey & Sons, Inc.
- Field, A. P. & Field: Clinical Psychology. Learning Matters
- Hatton, C. Bromley, J., &Craine, A.: Clinical Psychology. New York: John Willey & Sons, Inc

References:

- Pomerantz, A. M.: Clinical Psychology- Science, Practice and Culture. New Delhi: Sage Publications
- Matthews, J. R.: Introduction to Clinical Psychology. New York: Oxford Anton, B. S. University Press
- Kumar, A.: Clinical Psychology. Anmol Publications

SUMMER PROJECT EVALUATION - II

Course Code: PSY2535 **Credit Units: 06**

Course Objective:
To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training.
It will also help students to develop report writing skills.
Duration: Two Months (June- July)

Methodology:
Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor from their respective Institute. Students will submit their summer project reports with their supervised daily reporting. Immediately after returning from their summer vacations. This would require primary data collection.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	**100 Marks**

EDUCATIONAL PSYCHOLOGY

Course Code: PSY2503 **Credit Units: 03**

Course Objective:
Students will be able to apply the findings of experimental, social and child psychology to cognitive development in the areas of theories related to learning, motivation, and transfer of learning. Students will also be able to describe individual differences and problems of adjustment in the classroom

Course Contents:

Module I: Relationship of Psychology to Education
Nature and Scope of Educational Psychology
Methods of Educational Psychology: Differential, Clinical and Experimental.

Module II: Concept of Growth and Development
Physical, Mental, Social and Emotional Development during childhood and adolescence

Module III: Individual Differences
Individual Differences: Concept and Areas
Determinants of Individual Differences
Role of Heredity and Environment in developing Individual Differences
Implications of Individual differences for organizing educational programmes

Module IV: Learning
Concept of learning
Theories of learning; Connectionism, Trial Error conditioning and Gestalt
Perpetual approach to learning; Gagne's hierarchy of learning types;
Factors influencing learning, Educational Implications

Module V: Motivation
Theories of motivation
Factors affecting motivation, Educational Implications

Module VI: Personality
Meaning of personality
Trait and type approaches to personality
Assessment of personality by subjective, objective and projective techniques
Role of teacher in fostering individual's personality

Module VII: Creativity
Creativity: nature and characteristics
Development of creativity, theories

Module VIII: Special education for:
Exceptional Children: Gifted, Mental Retardation
Educational Implications

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Dash, M. & Dash, N.: Fundamentals of Educational Psychology
- Mangal, S. K.: Advanced Educational Psychology; Prentice Hall of India Pvt. Ltd
- Pathak, R.P.: Educational Psychology. Pearson
- Chauhan, S.S.: Advanced Educational Psychology.Vikas Publishing House

References:

- Chandra, S.S.: Educational Psychology Evaluation & Statistics. R Lall

CHILD PSYCHOLOGY

Course Code: PSY2504 **Credit Units: 03**

Course Objective:
This paper introduces the students to the biological foundations, various developmental stages and theories from prenatal to childhood. The Students will also learn the applications of child psychology in various settings.

Course Contents:
Module I: Introduction to Child Psychology
Definition and Concept of Childhood
Early history and beginnings of Child Psychology
Biological factors in Child Psychology (Prenatal, Natal and New-Natal Development,
Nature Vs Nurture: Genetics and Social atmosphere

Module II: Biological Foundation
Biology and Heredity
Stages in Prenatal Development: The germinal period, the period of embryo, the period of the foetus
Influences on Prenatal Development
Child Birth and Birth complication

Module III: Motor and Sensory Development
Motor Development: Contributions of Motor Development, Principles of Motor Development, Sequence of Motor Development and Motor Skills,
Environmental influences on Motor Development
Sensory Development: Vision, hearing, taste and smell, cutaneous senses, early deprivation and enrichment of senses.

Module IV: Cognitive Development and Development of Language
Piaget's cognitive development theory of intelligence- Structure and processes, stages, evaluation
Language Development- What is Language? Components of language and its development
Pre-linguistic development- receptivity to language, first speech sound
Bilingual Vs Multilingualism

Module V: Emotional and Social Development
Functions of emotions, Production and recognition of emotion
Early emotional development- Smiling, laughter, attachment, fear, jealousy, aggression, Izzard's Theory of Differential Emotions
Emotional Intelligence, Social intelligence
Social Development- Agents of socialization: Family- Parental control, sibling relationship; School; Peer group; Media- TV, books/journals, computers

Module VI: Moral Development
Meaning of moral behavior, How morality is learned? Patterns of moral development, Kohlberg's Theory
Meaning of discipline, essentials and techniques of discipline, evaluation of discipline
Hazards in moral development

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D.: Human Development (10th Ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Pearson
- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Heatherington, E.M. &Parke, R.D.: Child Psychology: A Contemporary ViewpointNew York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A.: Allyn and Bacon.
- Shrimali, S. S.: Child Development
- Prasad, D.C.: Fundamentals of Child Psychology. MD Publications Pvt. Ltd.
- Bukatko, D. &Daehler, M.W.: Child Development: A Thematic Approach. New York: Houghton Mifflin Company.

References:

- Brodzinsky, D.M.; Gormly, A.V. &Anibron, S.R.:Life Span Human Development; New Delhi: CBSPublication
- Santrock, J.W.:A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.
- Newman, B.M. & Newman, P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.

SCIENTIFIC RESEARCH PAPER-I

Course Code: PSY2505 **Credit Units: 03**

Course Objective:
The scientific research papers for Graduate Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the research paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this research paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Scientific Research Papers:

- Topic :-
- Introduction :-
- Review Research :-
- Objective
- Methodology
- Analysis
- Discussion
- Conclusion :-
- References & Bibliography:-

No. of pages in the compilation of the paper 20-30 (minimum 20 pages)

Examination Scheme:

Components	**Compilation**	**Viva**	**Presentation**
Weightage (%)	50	25	25

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2532 **Credit Units: 03**

Course Objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Syllabus – Sixth Semester

COUNSELLING PSYCHOLOGY

Course Code: PSY2651 **Credit Units: 03**

Course Objective:
The paper of Counselling Psychology covers its history, theories, activities, specialties and trends. It concentrates on the importance of the personhood of counselors and of the multicultural, ethical and legal environments in which counselors operate. This paper focuses on the context and process of counseling to provide a range of high quality and responsive counseling skills and its applications to help oneself and others.

Course Contents:
Module I: Introduction
Meaning, Definitions and Goals of counselling
Role of Counsellor in different Setting
Characteristics of a good counsellor

Module II: Counselling Process
Building Counselling Relationship
Working in a Counselling Relationship
Termination of Counselling Relationship

Module III: Counselling Approaches
Insight-Oriented Counselling: Client-Centred
Action-Oriented Counselling: Behavioural
Testing, Assessment and Diagnosis in Counselling

Module IV: Counselling Applications
Child Counselling and Counselling in School
Adolescent Counselling and Counselling in College
Career Counselling: Theories of Career Development
Group Counselling and Family Counselling
Addiction Counselling

Module V: Theories and Techniques of Counselling
Psychodynamic Approaches
Humanistic Approach
Cognitive Approach
Behavioural Approaches

Module VI: Current Issues in Counselling
Ethical and Legal Issues
Mental Health Counselling
Counselling in a Multicultural Society
Counselling with Diverse Population

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Rao, S. N.: Counselling and Guidance (2nd Ed.). Tata McGraw Hill
- Belkin, G.S.: Introduction to Counselling. W.C.: Brown Publishers
- Nelson, J.:The Theory and Practice of Counselling Psychology. NewYork: Hollt Rinehart & Winston
- Gibson,R. L.&Mitchell, M. H.: Introduction to Counselling and Guidance (7th).New Delhi Prentice-Hall of India Pvt. Ltd
- Gladding, S. T.: Counselling: A Comprehensive Profession (6th Ed.). Dorling Kindersley India Pvt. Ltd.
- Hansen, J. H. &Rosberg, R.H: Counselling: Theory and Process (5th Ed.). Allyn& Bacon
- Pal, O. B.: Guidance and Counselling. New Delhi: MotilalBanarsidasPublishers Private Ltd.
- Milner, J., Byrne, P. O. &Campling, J.: Assessment in Counselling: Theory, Process and Decision-Making. Palgrave MacMillan
- Patterson, L.E.: The Counselling Process. Wadsworth Publishing

References:

- Welfel, E.R., & Patterson, L.E: The Counselling Process: A Multi-theoritical Integrative Approach. Thomson Brooks / Cole

SCHOOL COUNSELLING

Course Code: PSY2601 **Credit Units: 02**

Course Objective:
This is to enable the students to develop an understanding of counseling within school setup, which is collaborative work of counselor and other school staff.

Course Contents:
Module I: Introduction
Guidance & Counseling
Need and importance of guidance and counseling in school

Module II: Counselor in Educational Setting
Elementary School, Middle School, Secondary School & Higher Secondary
Counseling & Curriculum
Counseling & Family

Module III: Role of Personal Guidance
Principal, Teacher, Counselor, Career Counselor, Parents & other Specialists
Importance of holistic approach in counseling

Module IV: Mental Health of Students
Typical difficulties of students
Supportive Services
Self Help Material
Role of Faith & Spirituality in Students mental Health
Students' perspective of Mental Health

Module V: Experience of Transition
Concept of Change, Adjustment & Transition
Transition & Students' experiences

Module VI: Indian Education System: The Changing Perspective

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References:

Text:

- Belkin, G.S. (1998). Introduction to Counselling; W.C.: Brown Publishers
- Nelson, J. (1982). The Theory and Practice of Counselling Psychology; New York: Hollt Rinehart & Winston.
- Ben, N. Ard, Jr. (Ed.) (1997). Counselling and Psychotherapy: Classics on Theories and Issues; Science and Behaviour Books Co.
- Brammer, L.M. &Shostrom, E.L. (1977). Therapeutic psychology: Fundamentals of Counselling Psychotherapy (3rd Ed.). Englewood Cliffs: Prentice Hall

References:

- Udupa, K.N. (1985). Stress and its Management by Yoga; Delhi: MotiLalBansari Das.
- Windy, D. (1988) (ed.). Counselling in Action; New York: Sage Publication.

PSYCHOLOGICAL PRACTICAL-VI

Course Code: PSY2602 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To familiarize the students with the use of elementary statistical techniques
- To encourage and guide the students to undertake a small-scale research project.

Note: Total 5 practicals will be conducted in the sixth semester among the list of following practicals out of which first three practicals are compulsory.

Course Content:

1	Multidimensional Anxiety Questionnaire(MAQ)	Anxiety
2	College Adjustment Scale(CAS)	Adjustment
3	Career Attitude And Strategies Inventory(CASI)	Career Attitude
4	Educational Assessment Checklist For Children With Intellectual Disability(EACCID)	Child Disability
5	Sensory Processing Measure(SPM)	Sensation
6	Self Esteem Index(SEI)	Self Esteem

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

DISSERTATION (BASED ON CLINICAL PSYCHOLOGY)

Course Code: PSY2637 **Credit Units: 09**

Course Objective:

- To enable the students with the practical exposure in their core area of interest (Corporate Sector, NGOs, Hospitals etc.), which in turn will be the pathway to their personal and professional training.
- It will also help students to develop report writing skills.

Duration: Four Months (Jan. - April)

Methodology:

Students get opportunity in diversified Institutes e.g. Corporate Sector, Schools, NGOs and Hospitals. They will be guided by an internal and external supervisor**.** Students will submit their reports after **90 Hrs of Fieldwork (15 days* 6hrs per day),** with their supervised daily reporting, at the end of the academic year. **The days for fieldwork are two days in a week including Saturday.** The student will submit the Log Sheet to their internal supervisor on every Monday.

Examination Scheme:

Internal Faculty Interaction	20 Marks
Feedback from External Supervisor	20 Marks
Viva Voce	30 Marks
Report Writing	30 Marks
Total	**100 Marks**

PSYCHOLOGY OF CHILDREN WITH SPECIAL NEEDS

Course Code: PSY2603 **Credit Units: 03**

Course Objective:
To enable students to understand and apply concepts of psychology to the development of education of challenged and gifted students

Course Contents:
Module I: Children with mild differences in behavior & learning
Children with Speech & Learning Disabilities
Children with Learning Disabilities
Children with Intellectual Disabilities
Children and youth with behavior disorders
Children who are Gifted, Creative and Talented

Module II: Children with Sensory Impairments
Children and youth with Hearing Impairments
Children with Visual Impairments

Module III: Children with Low Incidence Disabilities
Children with Special Health Care Needs
Children with Neurological Disabilities
Children with Pervasive Developmental Disorders
Children with Severe & Multiple Disabilities

Module IV: Interventions with Infants, Preschoolers, young adults and families

Module V: Special Education across the Life Span
Early Childhood Special Education
Transitioning to Adulthood

Module VI: Special Education- Curriculum for the Handicapped
Special Education
Individualized Education Program (IEP)
Integrated Education- Models of Integration
Inclusive Education
Community based instruction (Ecological)
Action Research- Meaning and Nature

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation;**V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Session Exam

Text & References:

Text:

- Panda K.C., Education of Exceptional Children
- Pillai M.G., Exceptional Children- Causes & Assessment
- Prasad S.B., Special Education

References:

- Horn, John Louis: The Education of Exceptional Children
  - Robert T. Brown; Cecil R. Reynolds. Psychological perspectives on childhood exceptionality: a handbook (Edition: 99)

PSYCHOLOGY OF EXCEPTIONAL AND GIFTED CHILDREN

Course Code: PSY2604 **Credit Units: 03**

Course Objective:
The major goal of this course is for the student to gain an awareness, knowledge and understanding of the complexity of the exceptional child.

Course Contents:
Module I: Foundations of Special Education
Introduction to children who are exceptional
Issues and trends in special education
Risk factors & children at risk
Collaborating with parents & families

Module II: Special Education- Curriculum for the Gifted
Approaches to curriculum
Differentiated curriculum
Enrichment approaches

- Interdisciplinary instruction
- Independent Study
- Mentorship Programs
- Internship
- Enrichment triad/revolving door model
- Curriculum compacting programs

Acceleration approach

- Advanced placement
- Ability grouping
- Individualized instruction

Module III: Identify and discuss Individualized Educational Plans
Developing, Implementation & Assessment, Implications for curriculum development

Module IV: Critical Attitudes towards Special Children & Youth prior to 20th century
Legislation & litigation concerning the Education of Special Children
Disability Act, 1995
An overview of different organizations working for Exceptional Children
Categories of Exceptionality and the effects of labeling

Module V: Attitudes, Expectations and Alternative Approaches in teaching Special Children
Mainstreaming, Integration, Inclusion, Special Services
Dealing with teachers, parents, Special students & Non-handicapped Students

Module VI: Instructional Planning for each of the Exceptionality
Developing appropriate instructional strategies for use with each of the Exceptionalities
Modification of given instructional units to meet the needs of students with each of the Exceptionalities
Development of a management plan for working with Special students within the regular classroom

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

CT-Class Test; **H**-Home Assignment; **P**-Presentation-Viva; **Q**-Quiz; **A**- Attendance; **EE**-End Session Exam

Text & References

Text:

- Panda K.C. Education of Exceptional Children
- Pillai M.G. Exceptional Children- Causes & Assessment
- Prasad S.B. Special Education

References:

- Horn, John Louis: The Education of Exceptional Children
- Robert T. Brown; Cecil R. Reynolds. Psychological perspectives on childhood exceptionality: a handbook (Edition: 99)

SCIENTIFIC RESEARCH PAPER-II

Course Code: PSY2605 **Credit Units: 03**

Course Objective:
The research article or scientific papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers:

- Topic :-
- Introduction :-
- Review Research :-
- Objective
- Methodology
- Discussion
- Conclusion :-
- References & Bibliography:-

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Components	**Compilation**	**Viva**	**Presentation**
Weightage (%)	50	25	25

PROJECT (WITH PRESENTATION & EVALUATION)

Course code: PSY2632 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Amity Institute of Behavioural & Allied Sciences

Master of Arts - Counselling Psychology

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Arts - Counselling Psychology

Syllabus – First Semester

HISTORY AND SCHOOLS OF PSYCHOLOGY

Course Code: PSY4101 **Credit Units: 02**

Course Objective:
One of the primary goals of this paper is for students to learn the philosophical roots and historical events that have shaped the field of psychology. This will include an exploration of underlying philosophical assumptions, individual contributors, and various schools that served to shape the emerging field of psychology. A second goal is for students to acquire a basic understanding of Western and Indian thought, to articulate a perspective of their own, and apply that perspective to their professional work. This course aims at helping the students to understand basic principles, historical background and main theoretical perspectives, i.e., various schools of modern scientific psychology.

Course Contents:
Module I: Introduction of Psychology
Nature of Psychology, Understanding Science and Status of Psychology as a Science
Approaches / Methods of Psychology

Module II: Historical Background of Psychology
Pre-Socratic Philosophers: Socrates, Plato and Aristotle
Patristic Philosophy – Focus on Augustine,
Scholastic Philosophy – Focus on Aquinas

Module III: Indian Philosophy
Indian Philosophy and Modern Psychology
Sri Aurobindo and his Philosophy of the Individual Self

Module IV: Schools of Psychology
Structuralism
Functionalism
Gestalt
Psychoanalysis
Behaviourism

Module V: Forces of Psychology
Psychoanalytic
Behavioural (Cognitive-Behavioural)
Humanistic - Existential
Transpersonal

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE

Weightage (%)	7	10	8	5	70

Text & References:

Text:

- Hergenhahn, B.R. (1992). An introduction to the history of psychology. (2nd ed.). Wadsworth Publishing Company: Belmont, California.
- Leahey, T.H. (2004). A history of psychology: Main currents in psychological thought. (6thed.). Pearson Education: Delhi.
- Brennan, J.F., (1982) History of Modern Psychology.
- Radhakrishnan, S. (2003). Indian Philosophy, Vol. 1 & 2. New Delhi; Oxford University Press.
- Robinson, D.N. (1995). An intellectual history of psychology. (3rd ed.). Arnold: London.
- Pojman, L. (2002). Philosophy, Quest for Truth. New York; Oxford University Press.

References:

- Sorley, W.R. (1999). A History of Philosophy. New Delhi; Omsons Publications.
- Cunningham, G.W. (1999). Problems of Philosophy. New Delhi; Omsons Publications.
- Angermeier, W.F. (1984). The Evolution Of Operant Learning and Memory, A Comparative Ethological Psychology
- Bermuidez, J. L (2006) (Ed). Philosophy of Psychology: Contemporary Readings.
- Gentile, B.F. & Miller, B.O. (2009). Foundations of psychological thought: A history of psychology. Sage: New Delhi.
- Jones, D. &Elcock, J. (2001). History and theories of psychology: A critical perspective. Arnold: London.
- Lawson, R.B., Graham, J.E., & Baker, K.M. (2007). A history of psychology: Globalization, ideas, and applications. Prentice Hall: New Delhi.

COGNITIVE PSYCHOLOGY

Course Code: PSY4102 **Credit Units: 02**

Course Objective:
The course deals with the understanding of higher mental processes and its relevance in daily living. The study of normal processes is essential to enable the understanding of neurological or abnormal dysfunctions. The objective of this course is (a) to provide an understanding of normal metal processes and their relationship to brain, mind and behavior, and (b) to study the concept of cognition and its application in cognitive psychology. This will facilitate the students develop the cognitive skills in themselves and others.

Course Contents:
Module I: Historical Background
Psychophysical approach
Information processing approach
Ecological Approach
Contemporary Cognitive Psychology

Module II: Attention and Perception
Theories of Attention and current developments: Broadbent's filter theory, Triesman's attenuation theory, automatic and controlled processing, switching attention.
Perceptual learning and development
Perception of shape, space and movement
Implicit perception and sensory integration theory
Cognitive – Attentional Theory: Information Processor, Cognitive Timer

Module III: Learning
General Phenomenon of Learning: Learning vs Maturation, Native Response Tendencies Theoretical issues of learning: Classical conditioning, Instrumental conditioning Verbal learning: Stimulus material, Trigram Methods-Serial Learning, Paired Associate Learning Discrimination Learning: Nature, Theories-Algebraic Summation Theory, Relational Theory, Transposition Effect

Module IV: Memory & Forgetting
Sensory memory, STM, LTM, Working memory
Metamemory: Semantic & Episodic Memory
Models of Semantic knowledge
Theories of forgetting
Mnemonics

Module V: Thinking and Language Formation
Concept formation and categorization
Judgment and Decision-making
Reasoning & Problem solving: Stages – Preparation, Production, Judgment and Incubation
Structure of language, its acquisition and Formation
Language and Thinking: Linguistic Determinism, language and Cognition

Module VI: Learning and Language Disorder
Reading Disorder/Developmental Dyslexia
Disorder of written expression / Dysphasia / Aphasia
Math Disability / Dyscalculia
Auditory Processing Disorder
Speech and Language pathology
Specific language Impairment

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

Text & References:
Text:

- Solso, R.L.,(2004). Cognitive Psychology, 6th ed.; Delhi: Pearson Education
- Matlin M W (2005).Cognition, Wiley & Sons, Inc.
- Haberlandt, K. Cognitive Psychology. Allyn and Bacon, Boston.
- Anderson, J.R. Cognitive Psychology and its implications. 5th Edi.: Worth Publishers
- Smity, E. E. &Kosslyn, S (2007). Cognitive Psychology: Mind and Brain. Prentice Hall.
- Sen, A.K. &Pande, P. (Eds.) (1998). Current issues in cognitive psychology, Delhi Campus
- Posner, M. (Ed.) (1989). Foundations of cognitive science. London: MIT Press

References:

- Ittyearh, M., &Broota, K.D. (1983). Inter and Intra Model Processing of Sensory-Specific Information. Perceptual and Motor Skills 56. 507-517
- John A & Proctor R (2004). Attention: Theory and Practice. Sage.
- Rock, I. (1995). Perception; NY: Scientific American
- Demjber, & Warm, J.S. (1979). Psychology of perception; NY: Holt
- Wilhit, S.C., & Payne, D.E. (1992). Learning and Memory: The Basis of Behaviours; Needham Heights, Mass: Allyn and Bacon
- Kintsch, W.(1970). Learning, Memory and conceptual process. John Wiley &Son,New York
- Houston, J.P. Fundamentals of Learning and Memory (3rd Ed.). harcourt brace Jovanovich, Inc, New York.
- Newell, A., & Simon H. (1972). Human Problem solving; NJ: Prentice Hall.

ADVANCED SOCIAL PSYCHOLOGY

Course Code: PSY4103 **Credit Units: 03**

Course Objective:

Knowledge in social psychology is inevitable for any postgraduate psychology student to conceptualize the subject matter of the social individual in its deepest sense. Building from the preliminary knowledge of social psychology at the undergraduate level, this course offers the learners a more hands-on experience on the social behavior dynamics. This course is structured to provide the students a culturally informed and contextualized view of the discipline. The students are encouraged to appreciate and analyze the changing cultural diversity in the present Indian society, therefore, equipping them to approach the social issues with its implications. This course enables students to achieve integrative understanding of social psychological theory and research. It also helps in acquiring a thorough familiarity with methodological issues and thinking critically and analytically about experimental research in social psychology.

Course Contents:

Module I: Basic Concepts in Social Psychology

Definition, nature and Growth of Social Psychology; Alternative conceptions of social psychology: Social Structure, Social Stratification and Power Development of social psychology in India; Current status of the discipline and its indigenization Social Psychology in the New Millennium: Influence of A Cognitive Perspective, Exporting Social Psychology, Adoption of a Multicultural Perspective Emerging alternative methods in social psychology;

Module II: Attitude and Attitude Change

Attitude - Behaviour Link: Influence of attitude on behavior: responsible factors – aspects of the situation, aspects of the attitude Attitude Change: Approach to attitude change- Persuation approach, cognitive approach Attitudes resistto change: reactance, forewarning, selective avoidance, active defense biased assimilation and attitude polarization

Module III: Prosocial Behaviour

Concept of Prosocial Behaviour, Latance Darley's five step model, situational factors: Attraction, Attributions and Prosocial Models Theories of Prosocial Behaviour: Empathy - Altruism Theory, Egoistic Theory, Genetic Selfishness.

Module IV: Social Issues

Mass violence, Terrorism, Mob behavior, Natural Disaster
Environmental stresses and social behavior.
Social psychological perspectives on health and illness.
Psychological effects of unemployment.
Social and ethnic minorities and law

Module V: Applied Social Psychology

Applied Social Psychology in India: Challenges and possibilities, Need for indigenization Applied Social Psychology and developing countries; Emerging themes Multidisciplinary approach to the study of social change; Policy oriented research; Need for reorienting Social Psychology Methods of Applied Social Psychology: Laboratory experiment, Field experiment, Field study

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

Text & References:

Text:

- Aronson, E., Wilson, T.D., and Akert, R.M. (1999). Social Psychology (3rd ed.). New York: Longman.
- Fraser, C., and Burchell, B. (2001). Introducing Social Psychology. Cambridge: Polity.
- Baron, R.A. & Byrne, D. (1988). Social Psychology: Understanding Human Interaction (5th Ed0. New Delhi: Prentice Hall of India, Pvt. Ltd.
- Baron, R.A. & Byrne, D. (2003). Social Psychology (10th Ed). New Delhi: Prentice Hall of India, Pvt. Ltd.
- Jones, E.E.& Gerard, H.B. (1967). Social Psychology: John Wiley Sons.
- Feld, R.S. (1988). Social Psychology (2nd Ed). New Delhi: Prentice Hall, Upper Soddle River
- Brehm, S.S., and Kassin, S.M. (1996). Social Psychology (3rd ed.). Boston: Houghton Miffin.

References:

- Billig, M. (1982). Ideology and Social Psychology. Oxford: Basil Blackwell.
- Doise, W. (1978). Groups and Individuals: Explanations in Social Psychology. Cambridge: Cambridge University Press
- Kuppuswami, B. An Introduction to Social Psychology
- Kulkarni, P.D. (1979). Social Policy and Social Development in India. Madras, Association of Schools of Social work in India
- Sharma, P. N. &Shastri, C. (1984). Social Planning: Concepts and Techniques. Lucknow, Print House
- Dalal, A.K. and Misra, G. (2002). Social Psychology in India: Evolution and emerging trends. In A.K. Dalal and G.Misra (Eds.), New directions in Indian Psychology (Vol 1: Social Psychology). (pp.19-49). New Delhi: Sage.
- Gergen, K.J. (1985). The social constructionist movement in modern psychology. American Psychologist, 40, 266-275.
- Gilbert, D.T., Fiske, S.T., and Lindzey. G. (Eds). (1998). The handbook of social psychology (4th ed.). New York: Oxford University Press.
- Kapur, R.L. (1994). Violence in India: A Psychological Perspective. D.L.N. Rao Murthy Oration, Indian Journal of Psychiatry, 36(4), 163-169.
- McGhee, P. (2001). Thinking about experimental social psychology. In P. McGhee, Thinking psychologically (pp. 119-139). New York: Palgrave.
- Michener, H.A., Delamater, J.D., and Myers, D.J. (2004). Social Psychology (5th ed.). Belmont, CA: Wadsworth/ Thomson Learning.
- Moghaddam, F.M. (1987). Psychology in the three worlds: As reflected by the crisis in social psychology and the move toward indigenous third world psychology. AmericanPsychologist, 42, 912-920.
- Moghaddam, F.M. (2005). The staircase to terrorism: a psychological exploration. American Psychologist, 60, 161-169.
- Pancer, S.M. (1997). Social psychology: The crisis continues. In D. Fox and I. Prilleltensky (Eds.), Critical Psychology: An introduction (pp. 150-165). London: Sage.
- Pandey, J. (Ed.). (1980). Perspectives on experimental social psychology in India. ND: Concept.
- Parker, L., and Shotter, T. (Eds.). (1990). Deconstructing social psychology. London: Routledge.

PERSONALITY THEORY

Course Code: PSY4104 **Credit Units: 02**

Course Objective:
This course introduces critical evaluation of different theories in the background of the empirical evidence. It enables students to

1. Become familiar with the major theories and traditions related to the study of personality and personal growth.
2. To articulate the underlined themes, methodology and assumption of each theory to enhance understanding of personality and behaviour.
3. To orient the students in application of this knowledge in case analysis and therapeutic formulation
4. To develop the skills in personality assessment.

Course Contents:
Module I: Introduction to Personality
Nature of personality theory: Present status
Theory in Broader perspective
Grouping among theories: Different perspectives on personality, Dispositional Perspective

Module II: Type and Trait Approaches to Personality
Trait (Biological) and Type Theories: Allport, Cattell, Eysenck, Sheldon and Friedman
Alternative Five factor Model.

Module III: Psychoanalytic Approach to Personality
The Freudian Theory: Topographic model, Structural model, Instincts, Defense Mechanism.
The Neo Analytic Theory: Alfred Adler: Striving for superiority; parental influence on personality development, birth order Carl Jung: Collective Unconscious Karen Horney: Erik Erikson: Concept of Ego, Stages of Personality Development Harry Stock Sullivan: Personifications

Module IV: Behavioural and Cognitive Approach
Skinners Radical Behaviours
Social Learning Theory: Dollard and Miller
Social cognitive Theory: Bandura

Module V: Humanistic and Existential Approach
Abraham Maslow's and Carl Rogers' Theory,
Kelly and Rollo May

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

Text & References:

Text:

- Allport, G.W.(1961), Pattern & Growth in personality; New York; Halt
- Hall, G.S. &Lindzey, G.(1985), Theories of Personality (3rd ed.). New Delhi; Wiley Eastern.
- Hall, C.S., Lindzey, G. &Camobell, J.B. (2002). THEORY of personality, 4TH edition. John Wiley and Sons

References:

- Eysenck, H.J. (1981), Model of Personality. New York: Springer &Verlog,.
- Cattell, R.B. &Klings, P.(1977),The scientific analysis of Personality & Motivation: London Academic Press
- Friedman, H.S. &Schustack, M.W. (2004). Personality, 2nd edition. Pearson Education Pvt.Ltd. India.
- Hergenhann, B.R. &olson, M.H. (1999). An Introduction to Theories of Personality, 5th Ed, Prentice Hall, Upper Saddle River, New Jersey.
- Ewen, R.B. (1980). An Introduction to Theories of Personality. Academic Press, Inc. (London) Ltd.

PARAMETRIC STATISTICAL METHOD

Course Code: PSY4105 **Credit Units: 03**

Course Objective:
The Present paper focuses on providing knowledge about the basics of statistics. It will give clear understanding to the students about application of parametric statistical methods. Parametric tests are generally more powerful in that the likelihood (probability) of a test reaching the correct conclusion is greater. Besides this, a module is added in last so to make students aware of parametric statistics in SPSS. Thereby they can understand the procedures and applications of parametric statistics using SPSS.

Course Contents:
Module I: Basics
Nature, Meaning and importance of statistics Concept of Reasoning, population, sample and probability theory in statistical inferences Categories of statistics: Descriptive and Inferential Variables and their types Scales of Measurement: Nominal, Ordinal, Interval, Ratio.

Module II: Statistical conjecture
Sampling and its kinds: Probability sampling method and Non-Probability sampling method.
Difference between Objectives and Hypothesis
Hypothesis testing: One-tailed and Two-tailed tests, Type I and Type II errors

Module III: Statistics and Test of Significance
Meaning, concept and importance of determining reliability of statistics in data analysis Standard error of mean, standard deviations, percentages and correlation coefficients Significance of difference between means-critical ratio and t-test calculation (large and small sample) assumption & uses One-Way and Two Way ANOVA.

Module IV: Correlation and Regression
Correlation: concept, types, assumption and Utility of Cor-relational Analysis in Psychological Research Bi-serial Correlation, Point Bi-serial Correlation, Partial Correlation, Tetra-choric Correlation Simple and Multiple linear regression, its uses, concepts and assumptions Difference between Simple linear and multiple regressions

Module V: Introduction to SPSS and parametric statistics in SPSS
Introduction to SPSS, its usage and functioning
Understanding the concepts of Parametric tests in SPSS
Learning data entry

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Minium E.W. King, H.M & Bear G, 1993. Statistical Reasoning in Psychology and Education (3rd Ed.) N Y: John Willey and Sons
- Garett, H.E., (2004), Statistics in Psychology and Education (11th ed.); New Delhi: Paragon International
- Gupta S.P.: Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in Correlational Research, New Delhi: Wiley Eastern 1989.
- Downie, N.M.: Basic Statistical Methods. New York: Harper and Publishers
- Howitt, D & Cramer, D: Introduction to SPSS statistics in psychology
- James K. Lindsey : Parametric Statistical Inference, Oxford science Publication.
- Cox, D.R.: Principles of statistical inferences.

References:

- Edward, A.E.: Experimental Design in Psychological Research (3rd Ed.), New Delhi: American Publishing Co. 1971
- Berger. R.L: Statistical Inferences, Cole Pub. Co.
- Wesley O. J & Geisser. S: Modes of Parametric Statistical Inference. Wiley-Interscience
- Rice, J.A: Mathematical Statistics & Data Analysis, South western.
- Salkind, N & Green, S: SPSS Quick Starts.

PRACTICUM- I

Course Code: PSY4106 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the first semester among the list of following practicals

Course Content:

1	Continuous Visual Memory Test (CVMT)	Memory
2	Illinois Test of Psycholinguistic Abilities – Third Edition (ITPA-3)	Language
3	16 PF Questionnaire - Fifth Edition with Hand scoring	Personality
4	Tennessee Self-Concept Scale - Second Edition (TSCS:2)	Self-Concept
5	Developmental Test of Visual Perception – Adolescence and Adult	Perception
6	Test of Memory and Learning – Second Ed. (TOMAL-2)	Memory and Learning

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-I

Course Code: PSY4107 **Credit Units: 04**

Course Objective:
To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

Syllabus – Second Semester

PSYCHOPATHOLOGY

Course Code: PSY4201 **Credit Units: 03**

Course Objective:

- To acquaint students with various manifestations of psychopathology
- To impart knowledge and skills required for diagnosis of psychological conditions.
- To introduce them to different perspectives and models of etiology.
- To develop skills required for psychopathological formulation.

This course enables students to the study and prediction of adaptive and maladaptive behaviours and its processes across lifespan. It also enables students to understand different diagnostic and educational models of psychopathology.

Course Content:

Module I: Classification and Theoretical Models

Systems of Classification, basic features; DSM-IV TR, ICD-10, similarities and differences Major Theoretical Models of Psychopathology: The medical model, Psychoanalytic model, Behaviouristic model, Humanistic-existential models, Interpersonal approach, Systems approach.

Module II: Diagnosis and Prognosis

Problems and methods of diagnosis: physiological examination, observation, case-history, interview method, psycho-diagnostic tests, measures of bodily functions, computer assisted diagnosis.

Module III: Mood and Anxiety Disorder

Bipolar disorders: Manic, Depressive, Mixed Depressive disorder: Major depression and dysthymia, Suicide Anxiety Disorders: Generalized anxiety disorder, phobia, panic disorder, post traumatic stress disorder and obsessive compulsive disorder

Module IV: Major Clinical Disorders

Schizophrenia
Other psychotic disorders: Bipolar, Delusional, psychotic depression

Module V: Somatoform Disorders

Conversion disorder, Somatization disorder, Hypochondriasis, Body dysmorphic disorder, Pain disorder

Module VI: Disorders of Infancy, Childhood and Adolescence

Developmental disorder: PDD, Rett Disorder, Asperger Disorder,
Behavioral Disorder: Conduct Disorder, Hyperactivity Disorder, ADHD,
Genetic Disorders: Down Syndrome

Module VII: Personality Disorder

Personality Disorder: Narcissistic Personality, Histrionic Personality, Antisocial (Psychopathic) Personality, Borderline Personality, Paranoid Personality, and Schizotype Personality

Module VIII: Sexual Dysfunctions and Paraphilias

Dysfunctions of Desire, Arousal, Orgasm and Pain

Paraphilias, Paedophilia and Rape
Gender identity disorders
Impotence and frigidity
Causes, preventing suicide

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Davison, G.C. & Neale, J.M. (1990): Abnormal Psychology. New York: John Wilay& Sons
- Carson, R.C. & Butcher, J.N. (1992): Abnormal Psychology and Modern Life (9th Ed.). New Yark: Haper & Collins.
- Hamilton, Max, (1994). Fish's: Clinical Psychopathology; Verghese Publishing House, Bombay
- Ahuja N (2002). A short text book of Psychiatry (5th edition). New Delhi. Jaypee Brothers.
- Sarason & Sarason (1998). Abnormal Psychology. New Delhi: Prentice Hall of India

References:

- Sarason & Sarason (2002), Abnormal Psychology; Pearson Education, Delhi
- Bennett, P. (2010). Abnormal and Clinical Psychology: An Introductory Textbook. New Delhi: Tata McGraw Hill Education pvt. Ltd.
- Sadock, B.J. & Sadock, V.A. (2003). Kaplan &Sadock's Synopsis of psychiatry: Behavioral sciences/clinical psychiatry (9th. Ed.). Philadelphia: Lippincott Williams & Wilkins
- Coleman, J.C. : Abnormal Psychology & Modern Life
- Lazarus and Folkman: Stress, appraisal and coping.

PSYCHOLOGICAL ASSESSMENT AND DIAGNOSIS

Course Code: PSY4202 **Credit Units: 03**

Course Objective:
The course teaches the students about the characteristics, objectives and wide ranging effects of psychological testing. It further describes the various testing methodologies and outlines capabilities and limitations of these methods.

Course Contents:
Module I: Introduction
Purpose of testing, types of test used, Bias & Fairness
Ethical Issues in Psychological Testing
Overview of Tests
Norms, Scoring Interpretation and Report Writings
Issues in measurement
Emerging trends of online testing

Module II: Cognitive functions and their assessment
Concept of Attention, Gestalt Theory, Memory and Forgetting, PGI Memory Scale
Theories of Intelligence
Intelligence Tests:
Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)
Bhatia Battery Weschler's Adult Performance Intelligence Scale (WAPIS)
Raven's Progressive Matrices (Colour Progressive Matrices, Standard Progressive Matrices and Advanced Progressive Matrices)
Binet Kamat Test
Weschler's Intelligence Scale for Children – Revised (WISC)
Wide Range Intelligence Test (WRIT)
Alexander Pass-a-long Test of Intelligence
Draw-A-person Intellectual Ability Test for Children, Adolescents and Adults (DAP:IQ)

Module III: Achievement Test
Wechsler Individual Achievement Test (WIAT)
Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)
Kaufman Test of Educational Achievement (KTEA)
Woodcock-Johnson Tests of Achievement (WJ)

Module IV: Assessment of Personality: Non-Projective Test
Cattell's 16 Personality Factor Inventory (16 PF)
California Q-Sort Tests
Myers Briggs Type Indicator (MBTI)
Minnesota Multiphasic Personality Inventory (MMPI)
Personality Inventory for Children
OMNI Personality Inventory (OMNI)
Bell's Adjustment Inventory
Eysenck's Personality Questionnaire
NEO™ Personality Inventory-3 (NEO™-PI-3) Adult / Adolescent

Module V: Assessment of Personality: Projective Tests
Introduction of Projective Techniques
Difference between Projective & Non-Projective Techniques
Thematic Apperception Test
Rorschach Inkblot Test
House-Tree-Person (H-T-P)
Sentence Completion Test

Module VI: Developmental Scales
Developmental Screening Test
Vineland's Social Maturity Scale
Measures of Psychosocial Development (MPD)
Gesells' Developmental Schedule

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:
Text:
- Freeman, F. S.,(1965), Theory and Practice of Psychological Testing; New Delhi: Oxford &IBTT

References:

- Jackson C.,(1998), Understanding Psychological Testing; Jaico Publishing House
- Anastasi&Urbina S.(2000), Psychological Testing ,7th Edition; Person Education (Singapore) Pte. Ltd.,
- Guilford J.P.: Psychometric Methods

CHILD PSYCHOLOGY

Course Code: PSY4203 **Credit Units: 02**

Course Objective:
Child Psychology is extremely important and tell us about the nature and development of children. This course introduces the methods, theories and main concepts used by psychologists to develop a real insight into the world of children. This study is intended for students of psychology, those training to work with children in a variety of professional roles, or anyone just interested in understanding how children develop. By studying child psychology, students can

- understand and accurately predict a reasonable norm for child development.
- understand children and equip them to become well-adjusted, more adaptable adults who are capable of living rich and varied lives.
- help our children through crises and enrich their daily lives by interacting with them in ways that are appropriate to their developmental levels.

Course Contents:
Module I: Introduction
Definition and Concept of Childhood
Early history and beginnings of child psychology
Biological factors in Child Psychology (Prenatal, Natal and New-Natal Development,
Nature vs Nurture: Genetics and Social atmosphere
Methods- Self Reports: Parental reports, Children's reports. Case Study, Experimental method,
Design- Longitudinal, Cross Sectional Sequential and Correlation

Module II: Biological Foundation
Biology and Heredity: Cell Division, The genetic code- Chromosome, DNA, Sex cells, Multiple offspring; Patterns of genetic inheritance: Dominant and Recessive, Stages in Prenatal Development: The germinal period; the period of embryo, the period of foetus Influences on Prenatal Development Child Birth: The states of normal labour: Birth complication- Anoxia, Preterm and Low Birth weight infants New Born: Sleeping- Sudden Infant Death Syndrome (SIDS); Crying; Feeding; All the reflexes.

Module III: Major Schools of Child Psychology
Psychoanalytic perspective (Freud and Erickson)
Behaviorist perspective- Social Learning Theory,
Piaget's Theory of Cognitive Development
Vygotsky's Theory of Socio-cognitive Development
Erikson's Eight Stages of Development

Module IV: Motor, Sensory and Cognitive Development
Motor Development: contributions of Motor Development, Principles of Motor Development, Sequence of Motor Development and Motor Skills,
Environmental influences on motor development
Sensory Development: Vision, hearing, taste and smell, cutaneous senses, early deprivation and enrichment of senses. Cognitive development- Structure and processes, stages, Evaluation

Module V: Development of Language
Language Development- What is Language, Components of language and its development
Pre-linguistic development- receptivity to language, first speech sound
Bilingual vs Multilingualism
Responsive communication and Verbal communication

Module VI: Emotional, Social and Moral Development
Early emotional development- Smiling, laughter, attachment, fear, jealousy, aggression, Izzard's Theory of Differential Emotions
Emotional Intelligence, Social intelligence
Social Development- Agents of socialization: Family-Parental control, sibling relationship; School; Peer group; Media- TV, books/journals, computers
Meaning of moral behavior, Patterns of moral development, Kohlberg's Theory
Meaning of discipline, essentials and techniques of discipline, evaluation of discipline

Module VII: Situational and Applied Child Psychology
Family dynamics
Peer relationships
Sibling relationships and birth order
Effects of divorce
Developing self-esteem
Understanding red flags

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:
Text:

- Schaffer, H. R. (2003): Introducing Child Psychology. Wiley
- Brain, C. & Mukherji, P. (2005): Understanding Child Psychology. Nelson Thornes
- Sharma, R. & Sharma, R. (2006): Child Psychology. Atlantic Publisher
- Hetherington, E.M. & Parke, R.D. (1986): Child Psychology: A contemporary viewpoint. McGraw-Hill
- Berk, L.E. (2006): Child Development. Pearson/Allyn and Bacon,

References:

- Sroufe, L.A., Cooper, R.G. & Marshall, M.E. (1988). Child Development: Its Nature and Course. Knopf
- Feldman, R.S. (2004): Child Development. Prentice Hall
- Papalia, D.E., Gross, D.L. & Feldman, R.D. (2003): Child development: a topical approach. McGraw-Hill

NON-PARAMETRIC STATISTICAL METHOD

Course Code: PSY4204 **Credit Units: 03**

Course Objective: The Present paper focuses on providing knowledge about the basics of nonparametric statistics. It will give clear understanding about differences between Parametric & Nonparametric Test Procedures. This paper will

1. Explain commonly used Nonparametric Test Procedures.
2. Perform Hypothesis Tests Using Nonparametric Procedures.
3. Going to teach student how to use SPSS with non-parametric statistics.

Course Contents:

Module I: Basics
What is Non-Parametric statistics: Nature, Meaning and Concept strengths and limitations of non-parametric procedures Parametric VS Non- Parametric Statistics
Four Levels of Measurement and Non-parametric statistics

Module 2: Tests of differences between Groups and Variables
The Friedman Two-way analysis of variance by ranks-Basic concepts, uses and computations
Test of differences between groups (Independent samples): Mann-Whitney U test computations, Kolmogorov-Smirnov test, uses Test of differences between variables (Dependent samples): Kruskal-Wallis ANOVA analysis of ranks, K-Sample Median test, uses and concepts

Module 3: Nominal Measures of Correlations
Concept definition assumptions of Nominal Measures of Correlations
The Phi-Coefficient, Contingency coefficient concepts uses and calculations
Tetrachoric**r**: Its uses, computation and comparison

Module 4: Chi-Square
Concept and Definition, its assumptions and use
Chi-Square Goodness of Fit (One-Sample Test)
Chi-Square Test of Independence

Module 5: Introduction to SPSS and Non-parametric statistics in SPSS
Introduction to SPSS, its usage and functioning
Understanding the concepts of Non-Parametric tests in SPSS
Learning data entry

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:
Text:

- Dowine, N.M.: Basic Statistical methods, Harper and Publishes New York.
- Gupta S.P. Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in correlational research, New Delhi: Wiley Eastern 1989.

- Salkind, N & Green, S.:SPSS Quick Starts.
- Howitt, D & Cramer, D.:Introduction to SPSS statistics in psychology.
- McNemar Q.:Psychological Statistics, 3rd Ed. New York, John Wiley 1962.
- Edward, A. E: Experimental Design in Psychological research (3rd Ed) New Delhi: American publishing.

Reference

- Higgins. J.J: Introduction to Modern Nonparametric Statistics.
- Siegal.S: Nonparametric statistics for the behavioral sciences.
- Castellan, J.N. and Siegal. S: Non-parametric statistics for behavioural sciences.
- Daniel, W. Wayne: Applied non-parametric statistics.ADVANCED COUNSELLING SKILLS

POSITIVE PSYCHOLOGY

Course Code: PSY4206 **Credit Units: 02**

Course Objective: To enable students to understand the theories and research related to positive psychology and equip students to develop and apply positive psychology for enhancement of self and others.

- To trace the development of positive psychology as an independent discipline with its multidimensional perspective.
- To study the relationship of personality and situational variables with positive psychology.
- To discuss strategies to enhance positive affect.

Course Contents:

Module I: Introduction to Positive Psychology
Positive Psychology: Concept, History, Nature and Scope
Art of Well Being
Defense Mechanism & Coping Strategies

Module II: Interpersonal Perspectives & Emotional Intelligence
Empathy Compassion, Love, Social relations
Hope & Optimism
Theory of Emotions
Emotional Intelligence & its importance

Module III: Strengths and Virtues
Tyranny of Wisdom
Character Strengths and Virtues
Resiliency in the phase of challenge & Loss

Module IV: Happiness
Theories, measures and Positive correlates of happiness
Traits associated with Subjective Happiness
Cross-cultural differences

Module V: Psychology of Positivisms
Positive Emotional States and Well Being with special emphasis on Forgiveness and Gratitude
Positive Institutions: Families, Religion, Spirituality and Well being.
Specific issues: Aging Well

Module VI: Positive Thinking and Applications of Positive Psychology

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Crompton, W.C. (2005), An Introduction to Positive Psychology, Singapore : Thomson.
- Snyder, C.R. and Lopez, S.J. (2005), Handbook of Positive Psychology, New York Oxford University Press.
- Carr, A. (2004), Positive Psychology: The Science of Happiness and Human Strengths, New York: Brunner – Routledge.
- Linley, P.A. and Joseph, S. (2004), Positive Psychology in Practice, New York : John Wiley and Sons.
- Peterson, C. (2006), Positive Psychology, New York: Oxford University Press.

References:

- Goleman & Daniel, Emotional Intelligence
- C. R. Snyder, Shane J. Lopez, The Handbook of Positive Psychology
- C. R. Snyder, Shane J. Lopez, Positive Psychology: The Scientific and Practical Explorations of Human Strengths
- Rich Gilman, Michael Furlong, E. Scott Huebner, A Handbook of Positive Psychology in Schools
- Ilona Boniwell, Positive Psychology in a Nutshell

PRACTICUM- II

Course Code: PSY4207 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals

Course Content:

1	Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)	Intelligence
2	Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)	Achievement
3	House-Tree-Person (H-T-P)	Personality: Projective
4	Rorschach Ink Blot Test	Personality: Projective
5	Personality Inventory for Children scoring kit	Personality:
6	OMNI Personality Inventory (OMNI) Introductory Kit	Personality:

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-II

Course Code: PSY4208 **Credit Units: 04**

Course Objective:
To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

SCIENTIFIC RESEARCH PAPER

Course Code: PSY4209 **Credit Units: 01**

Course Objective:
The scientific research papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers:

Topic
Introduction
Review Research
Objective
Methodology
Discussion
Conclusion
References & Bibliography

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Components	Compilation	Viva	Presentation
Weightage (%)	50	25	25

Syllabus – Third Semester

RESEARCH METHODS: EXPERIMENTAL DESIGN

Course Code: PSY4301 **Credit Unit: 02**

Course Objective:
Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents:
Module I: Introduction to Research
Meaning of Scientific Research
Objectives and Steps in Scientific Research
Defining research problem
Defining variables
Developing hypothesis

Module II: Evaluating Measures and Hypothesis
Need For Evaluating Measures
Reliability and Validity
Hypothesis testing: Type1 and Type 2
Going beyond hypothesis testing: Effect size and Power

Module III: Validity of Experimental Researches and Threats to them
Statistical Conclusion validity
Construct validity and External Validity
Establishing the cause and Effect
Single Group threat, Multiple Group threats, Social threats

Module IV: Experimental Designs-I
Two-Group experimental designs
- Within-subject Design
- Between-subject design
- General Linear Model

Module V: Experimental Designs-II
Factorial designs
Randomized Block designs
Hybrid Experimental Designs: Soloman four group designs
Mixed designs

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Shuttleworth, Martyn (2008). "Definition of Research". *Experiment Resources*. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed.). Upper Saddle River: Pearson.
- Trochim, W.M.K, (2006). Research Methods Knowledge Base.
- Montgomery, Douglas (2013). *Design and analysis of experiments* (8th ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Reference

- Review of Foundations for research: Methods of inquiry in education and the social sciences, by Kathleen B. deMarrais and Stephen D. Lapan. 2004. Reference & Research Book News 19:1**.**
- Denscombe, Martyn. 2007. The good research guide for small-scale social research projects. 3rd ed. Maidenhead, UK: Open University Press. 360 pages. ISBN: 0335220223. $48.50 (pbk).
- Baker, Lynda M. 2001. Review of Understanding Research Methods: An Overview of the Essentials, 2nd ed., by Mildred L. Patten. The Library Quarterly 71:96.
- Ellingson, L. L. 2007. Review of Qualitative research methods for the social sciences, 6th ed, by B. L. Berg. Communication Research Trends 26.1: 24.

PSYCHOTHERAPY

Course Code: PSY4302 **Credit Units: 03**

Course Objective:
The course enables students to learn various therapies and their applications in counselling field. The course aims to enable participants to acquire the development and therapies in counselling which can be used in a variety of settings, and also to understand the importance of the development of personal awareness in the effective application of counseling skills.

Course Contents:
Module I: Introduction
Psychotherapy: Meaning, Nature & Scope
Variables affecting Psychotherapy: Specific Variables: Client Variable, Therapist Variable, Process variables, Social & Environmental Variable
Non-Specific Variables: Spontaneous cure, Placebo Effect
Currents and Future Trends of Psychotherapy

Module II: Psychotherapy in India
Psychotherapy in the Indian context
Spirituality and psychotherapy
Yoga and Meditation

Module III: Varieties of Psychotherapy
Supportive therapy
Re-educative Therapy
Re-constructive therapy
Counselling vs. Psychotherapy

Module IV: Psychoanalytic Therapies
Freud's Psycho-analytic Therapy, Adlerian Psychotherapy, Brief Dynamic Therapies

Module V: Humanistic Therapies
Client-Centered Therapy, Existential Therapy and Gestalt Therapy

Module VI: Behavioral and Cognitive Behavior Therapy
Behavioral therapy, Cognitive Behavior therapy, Rational Emotive Behavior Therapy (Ellis)

Module VII: Few more Important Therapies
Family, Marital and Interpersonal Therapy
Therapies with Children and Adolescents
Group Therapy

Module VIII: Therapeutic Guidelines while working with
Women, Older clients, Clients with personality disorder
Grief and loss
Self-harm
Persons from disadvantaged context

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Golfried, H. R. & Davison, G. C.: Clinical Behaviour Therapy
- Sharf R., Theories of Psychotherapy & Counselling – Concepts and Cases; 2nd Edition.
- The Top 10: The Most Influential Therapists of the Past Quarter-Century. Psychotherapy Networker.: 2007, March/April (retrieved 7 Oct 2010)
- Henrik, R. (ed) *The Psychotherapy Handbook. The A-Z handbook to more than 250 psychotherapies as used today* (1980) New American Library.

References:

- Kirt S.H. & Clark: Cognitive Behaviour Therapy for Psychiatric Problems.
- Gurman & Kniskern: Handbook of Family Therapy.
- Kahn M.,: Between Therapist and Client- The New Relationship- Revised Edition
- Bryant, R.A.; Moulds, M.L.; Guthrie, R.M.; Nixon, R.D.V. (2005)."The Additive Benefit of Hypnosis and Cognitive-Behavioral Therapy in Treating Acute Stress Disorder"

COUNSELLING PSYCHOLOGY

Course Code: PSY4304 **Credit Unit: 03**

Course Objective: To produce graduates with a well-developed professional identity as counseling psychologists, including awareness and appreciation of context, development, and strength-based interventions. Thus, we seek to develop the professional skills of our students such that each is able to:

- Demonstrate understanding of the impact of multiple contexts on human behavior
- Demonstrate understanding of theories and techniques of developmentally-based health promotion and intervention for individuals, systems, and communities
- Appreciate the role of individual and cultural differences and diversity in human development and behavior

Course Contents:

Module I: Introduction

Meaning, Definition & Goals
Historical Background: Origin of Counseling within Philosophy and Medicine,
Influence from Psychology, Mental health development, the guidance movement and other influences
Difference between Counseling and other associated helping professions (psychotherapy, psychiatry, social work, guidance etc.)

Module II: Counseling Process

Settings for counseling
Steps in counseling
Therapeutic relationship: The importance of relationship, components of relationship, Facilitative conditions for the counseling relationship

Module III: Counseling Approach: Insight oriented

Psychodynamic Approach: Psychoanalytic, Adlerian
Humanistic Approach: Existential, Client-centered, Gestalt

Module IV: Counselling Approach: Action oriented & other approaches

Behavioural Approach: Operant-Conditioning, Classical-Conditioning.
Cognitive Approach: Cognitive Tharepy, Rational emotive therapy.
Other Approaches: Narrative Therapy, Expressive Therapy, and Biofeedback.

Module V: Current Issues in Counseling:

Ethical Issues: Professional Codes, Our divided loyalties, Areas of ethnical difficulty, recent trends
Legal Issues: Advice for the passionately committed counseling student
Mental Health Counseling
Counseling diverse population: Gender bias, Counseling the aged, the ethnic minorities, and the physically challenged

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Williams, E.N., Hayes, J.A., & Fauth, J. (2008). Therapist self-awareness: Interdisciplinary connections and future directions. In S. Brown & R. Lent (Eds.), Handbook of Counseling Psychology (4th ed) (pp. 267–283). NY: Wiley.
- Levy, K. N., &Scala, J. (2012). Transference, transference interpretations, and transference-focused psychotherapies. Psychotherapy, 49(3), 391-403. doi:10.1037/a0029371
- Ladany, N. & Inman, A. (2008) Handbook of Counseling Psychology, (4th ed.). John Wiley & Sons: New York.

References:

- Society of Counseling Psychologists. (n.d.). About counseling psychologists. Found online at http://www.apa.org/ed/accreditation/doctoral.html
- Brems, C. & Johnson, M. E. (1997). Comparison of recent graduates of clinical versus counseling psychology programs. Journal of Psychology, 131, 91-99.
- Disner SG, Beevers CG, Haigh EA, Beck AT. (2011) "Neural mechanisms of the cognitive model of depression". Nat Rev Neurosci. 2011 Jul 6;12 (8):467-77.
- Whyte, C (1978) "Effective Counseling Methods for High-Risk College Freshmen". Measurement and Evaluation in Guidance. January. 6. (4).198-2000

PRACTICUM- III

Course Code: PSY4308 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the third semester among the list of following practicals

Course Content:

1	Measures of Psychosocial Development (MPD)	Development
2	Culture Free Self-Esteem Inventories, 3rd Edition	Self-Esteem
3	State-Trait Anger Expression Inventory-2™ (STAXI-2)	Anger
4	Personality Inventory for Youth	Personality
5	Family Relations Test: Children's Version	Interpersonal Relationship
6	Wide Range Intelligence Test (WRIT)	Intelligence

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-III

Course Code: PSY4309 **Credit Units: 04**

Course Objective:
To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

SUMMER INTERNSHIP EVALUATION

Course Code: PSY4335 **Credit Units: 06**

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organisation)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. ***Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.***

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include ***five sections*** in the order described below.

1. **The Title Page –** An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content –** An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed

through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

- **Title or Cover Page**.
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgements**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**
  A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or

captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 30%
(based on Internship File and the observations of the faculty guide/ supervisor)

Feedback from Company/ Organization: 10%

Final Evaluation:
(Based on Internship Report, Viva/ Presentation) 60%

CLINICAL PSYCHOLOGY

Course Code: PSY4303 **Credit Units: 03**

Course objective:
Clinical psychology is the branch of psychology concerned with the assessment and treatment of mental illness, abnormal behavior and psychiatric problems. This field integrates the science of psychology with the treatment of complex human problems, making it an exciting career choice for people who are looking for a challenging and rewarding field.

Course Contents:
Module I: Introduction
Meaning and Nature of Clinical Psychology
Background of Clinical Psychology: First Fifty years of Clinical Psychology (Establishment of Psychological Clinics and Influence of World War I)
Clinical Psychology: between World War I and II; From World War II to Present

Module II: **Foundation of Clinical Psychology**
Historical origin, the Psychometric tradition, the influence of health and child guidance movement, the influence of Sigmund Freud & the American Psychologist's in America.
The influence of World War II on development of Clinical Psychology
Roots of Clinical Psychology in India: the pre-independence phase, post independence to the present scenario.

Module III: Development of clinical Psychology as a profession.
Activities of Clinical Psychologist: psychological assessment, Psychotherapy, research, community mental health programme, teaching, consultation, administration.
Differences & similarities with other mental health professions
Subspecialties of clinical Psychology: Clinical health Psychology, Forensic Psychology, Geropsychology, Clinical Neuropsychology, and child clinical psychology.
Professional identity, responsibilities

Module IV: Diagnosis and assessment.
Nature and purpose of Clinical diagnosis & assessment
Stages in the Assessment Process
Clinical Assessment Techniques: observation, interview, case-study, Psychological tests.

Module V:
Employment Setting for Clinical Psychologist
Subspecialties of Clinical Psychology
Organizations in Clinical Psychology
Ethical and Legal Issues in Clinical Psychology
Cultural issues, current scenario & future prospects.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References

Text

- Anastasi, A.: Psychological Testing, New York: MacMillan Publishing company.
- Bellack, A. S.**:** Introduction to Clinical Psychology. New York: Oxford & Hersen, M.University Press
- Karliger, F.N.: Foundations of Behavioural Research, New York: Holt Rinehart Winston.
- Korchin, S. J.**:** Modern Clinical Psychology. Delhi CRR Publishers and Distributers
- Ray, S. D.: The Practice of Psychotherapy. New Delhi: New Age International
- Plante, T. G.: Contemporary Clinical Psychology. New York: John Willey& Sons, Inc.
- Pomerantz, A. M. : Clinical Psychology- Science, Practice and Culture. New Delhi: Sage Publications
- Hecker, J. E.: Introduction to Clinical Psychology. Delhi: Pearson Thorpe, G. L.Education
- Matthews, J. R.: Introduction to Clinical Psychology. New York: Oxford Anton, B. S.University Press
- Herbert, M.: Clinical Child Psychology: Social Learning, Development And Behaviour.New York: John Willey & Sons, Inc.
- Kumar, A.: Clinical Psychology. Anmol Publications
- Field, A. P.: Clinical Psychology. Learning Matters & Field
- Hatton, C.: Clinical Psychology. New York: John Willey & Sons, Inc.

References:

- Barlow et al.(2010): Oxford Handbook of clinical psychology.1st Edition.
- Gross and Hersen., (2007): Handbook of clinical Psychology .Volume 1

DEVELOPMENTAL PSYCHOLOGY

Course Code: PSY4305 **Credit Units: 03**

Course objective:
To develop the understanding as to how developmental psychology focuses on the development of individuals across their lifespan within the context of family, peer groups, child-care and after-school programs, schools, neighborhoods, and larger communities and society. It considers the well-being of children, youth, and adults, vis-a-vis the cognitive, emotional, social, academic, and health domains

Course Contents

Module 1: Background of Developmental Psychology
Historical Background
Meaning, Nature and scope
Obstacles in studying Life-Span Development and its effect

Module2: Stages of Development
General Patterns of Development
Stages of Development- Physical, Cognitive, Emotional, Social and Moral

Module 3: Theoretical perspective on Development
Psychodynamic Theories: Freud, Erikson
Social Learning Theory: Albert Bandura
Cognitive Theory: Piaget
Attachment Theory: Bowlby
Socio Cultural Theory: Konrad-Lorens & Niko Tinbergen, Lev Vygotsky
Ecological Theory: Uric Bronfen Brenner
Ethology & Evolutionary Theory

Module 4: Development Related Disorders (DSM-IVTR and I.C.D-10)
Pervasive Developmental Disorder: Autism
Specific Developmental Disorder of Speech and Language
Specific Learning Disabilities-Reading, Spelling, and Arithmetical Disorder
Behavioral Disorders: Attention Deficit Hyperkinetic Disorder, Conduct Disorder, Oppositional defiant Disorder

Module 5: Adjustment Related Issues.
Adolescence: Psychological Hazards, Effects of Immaturity, and happiness in adolescence. Early Adulthood: Social Mobility, Sex-Role Adjustments, Personal & Social Hazards.Middle Age: Adjustment to Physical and mental changes, Vocational and marital hazards.Old Age: Changes in motor and mental abilities, Hazards to Personal and Social Adjustment.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D: Human Development (10th Ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Prentice Hall
- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Heatherington, E.M. & Parke, R.D.: Child Psychology: A Contemporary Viewpoint New York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A.: Allyn and Bacon.
- Crain, W.: Theories of Development. Englewood Cliffs, New Jersey: Prentice Hall.
- Newman, B.M. & Newman, P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.

References:

- Brodzinsky, D.M.; Gormly, A.V. & Anibron, S.R.: Life Span Human Development; New Delhi: CBS Publication
- Santrock, J.W.: A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.
- Bukatko, D. & Daehler, M.W.:Child Development: A Thematic Approach. New York: Houghton Mifflin Company.

EDUCATIONAL PSYCHOLOGY

Course Code: PSY4307 **Credit Units: 03**

Course Objective:
This course focuses on different aspects of learning and motivation with educational implication reference to students for the development of effective teaching.

Course Contents:
Module I: Educational Psychology
Meaning, Nature, Scope, Aim
Methods of educational psychology:
Observational, interview
Experimental, Case-study
Survey

Module II: Developmental Theories
Cognitive development - Piagetian foundations
Social development - Erikson's Stage theory
Language and thinking - Vygotsky's theory
Moral Development - Kohlberg's Theory

Module III: Learning
Definition, Nature, Qualitative Distinctions
Intentional Versus Incidental Learning
Rote Versus Meaningful Learning
Reception Versus Discovery Learning
Conditions of Learning: Attitude Learning, Motor, Informational, Intellectual, Skill Learning, Cognitive Strategy Learning.
Educational Implications for Counsellor.

Module IV: Behavioural and Cognitive views of learning
Educational implications of major learning theories for counselors

Module V: Motivation
Basic Concepts of motivation
Murray's Need Theory
Atkinson's Achievement Theory
Corno & Rohrkemper's Self – regulation theory
Covington: Self Worth Theory
Educational Implications for Counselors

Module VI: Special Education for
Gifted Children
Backward Children
Creative Children

Module VII: Career Counselling
Meaning and Relevance of Career Counselling
Information about various Occupations

World of Work
Application of Testing in Career Counselling

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text:

- Mangal, S. K., (2004), Advance Educational Psychology; New Delhi : Prentice Hall
- Sharma and Sharma.,(2006),Advanced Educational Psychology, New Delhi: Atlantic Publishers and Distributors.

***References*:**

- M Dash, Neena Dash; Fundamentals of Educational Psychology: *Atlantic Publishers & Distributors, New Delhi.*
- L S Vygotsky, (1999) Educational Psychology ;*Vanit Books, New Delhi*
- R K Prithi (Ed.2004) Educational Psychology: *Discovery Publishing House, New Delhi*

Syllabus – Fourth Semester

RESEARCH METHODS: NON-EXPERIMENTAL DESIGN

Course Code: PSY4401 **Credit Unit: 02**

Course Objective:
Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents:
Module I: Introduction
Nature and Purpose of Non-Experimental Research Designs and their importance
Advantages and Disadvantages of Non-experimental Research Designs
Differences between Experimental and Non-Experimental Research Designs
Types or Non-experimental Designs: Pure Descriptive design, Correlational Descriptive Design and Other type

Module II: Quasi- Experimental designs
Quasi- experimental research designs: their uses and importance
One-Group Designs
Non-equivalent control group designs
Pretest-Posttest Control Group Design

Module III: Non-Experimental Designs
Quantitative Non-Experimental Designs, Causal Comparative
Qualitative and Quantitative perspectives: Collecting qualitative data: Case study, interview, Observational method. Discourse Analysis, Grand narrative analysis, Ethnographic methodology.
Time series Designs

Module IV: Correlational Designs
Correlational research design: Its Basic nature and uses
Kinds of Correlational designs: Panel Design, Cross-Sectional Design and Longitudinal Designs
Concept and application of Multiple Regression Analysis (linear and stepwise)
Factor analysis and Its Implications

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Shuttleworth, Martyn (2008). "Definition of Research". Experiment Resources. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed). Upper Saddle River: Pearson.
- Trochim, W.M.K, (2006). Research Methods Knowledge Base.
- Montgomery, Douglas (2013). Design and analysis of experiments (8th ed). Hoboken, NJ: John Wiley & Sons, Inc. ISBN 9781118146927.

Reference:

- Kothari, C.R (2004), Research Methodology: Methods and Techniques.
- Kumar, R (2005), Research Methodology: A step-by-step beginners.
- Melville and Goddard (2004), Research Methodology: An introduction.
- Khan, J.A(2011), Research Methodology.

ADVANCE AND APPLIED COUNSELLING SKILLS

Course Code: PSY4403 **Credit Unit: 02**

Course Objective:
This course enables students to gather knowledge about theories of Advanced Counselling Skills. It is further designed to equip students with skills to practice as a Counselling Psychologist.

Course Contents:
Module I: Counsellor as a person
Personal characteristics: A composite model of human effectiveness, role of self awareness in counselling.
Role and Function of the Counsellor: Definition of Role, Generic roles, organizing roles & functions

Module II: Communication Skills – I
Basic Communication Skills: Attending skills, Listening skills, Integrating Listening Skills.
Exploration Skills: Probe, Immediacy, Self-disclosure, Interpretation, Confrontation.
Action Skills: Information giving, Advice giving, Goal setting, Reinforcement, Directives
Self-disclosure by counsellor – when and how
Helping clients develop and work on preferred scenarios, negotiating homework.
Managing resistance and other obstacles in counselling
Skills of closure and terminating

Module III: Techniques of Helping and working with emotions
Self monitoring of Thought, Feeling and Action, Facilitating problem solving
Understanding and Improving Self talk, rules and thinking patterns.
Behavioural Methods

Module IV: Counseling Applications
Pediatric Counseling: Dynamics and process
Adolescent Counselling: Concept and Issues
Group Counselling: Concept & Process.
Academic Counselling: Definition and Scope.
Marital and Family Counselling: Concept & Process.
Addiction counseling: Principles & Prevention
Geriatric Counselling: Concept and Scope.
Rehabilitation Counseling, And Crisis Intervention &Trauma Counseling

Module V: Assessment in psychology
The purpose of assessment in counselling, Assessment principles
Intelligence and general ability testing
Measuring Achievement and aptitude
Appraisal of personality
Spiritual assessment strategies
Applications of assessment: Treatment planning, evaluation and accountability.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Patri, V., & Anthors R.(2001), Counselling Psychology, Press, New Delhi

References:

- Nelson R Jones ,(2003), Basic Counselling Skills; Sage Publication, London
- Gerald C. (2001), Case Approach to Counselling Psycology; Brooks/Cole, Australia
- Crouch a. (1997), Inside Counselling ; Sage Publication, London
- Ivey A.E. & Ivey M. B. (1999), Intentional Interviewing & Counselling, 4th Edition.
- Woolfe R. & Dryden W. (2001)Handbook of Counselling Psychology; Sage Publication, London

PRACTICUM- IV

Course Code: PSY4412 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the fourth semester among the list of following practicals

Course Content:

1	NEO-4™ - Comprehensive Kit	Personality
2	Comprehensive Test of Non-verbal Intelligence-Second Edition (CTONI-2)	Intelligence
3	Neuropsychological Assessment Battery® (NAB®) Attention Module Kit	Attention
4	Detroit Tests of Learning Aptitude - Fourth Edition (DTLA-4)	Learning
5	Reynolds Intellectual Assessment Scales (RIAS)	Intelligence
6	General Health Questionnaire (GHQ)	Health

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-IV

Course Code: PSY4413 **Credit Units: 04**

Course Objective:
To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

DISSERTATION

Course Code: PSY4437 **Credit Units: 06**

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.

- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:
- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5

- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:	40%
(Based on Abstract, Regularity,	
Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	25
Conceptual Framework,	10
Objectives & Methodology and	10
Implications & Conclusions	15

MENTAL RETARDATION

Course Code: PSY4402 **Credit Unit: 03**

Course Objective:
The paper on Mental Retardation introduces nature of mental retardation, its classification, assessment and intervention programs.
Course Contents:

Module I:
Mental Retardation: Definition of mental retardation, Classification-Psychological Classification Medical and Educational Classification, Causes and Prevention

Module II:
Mental Retardation: Psycho-educational Assessment, Intelligence Tests, FACP, BASIC-MR, BASAL-MR

Module III:
Mental Retardation: Enhancing Skills- CTC, IEP, Prompting, Task Analysis, Channing, Shaping, Modeling, Reinforcement

Module IV:
Mental Retardation: Reducing maladaptive behaviours- Assessment of maladaptive behaviours, plan of behavior modification, techniques for decreasing problem behavior.

Module V:
Vocational Training and Empowering families having child with Mental Retardation, Special Sports, Acts and Policies

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad
- Thressiakutty A.T. and Govindrao L. (2001) Transition of Persons with Mental Retardation from School to Work, NIMH Secundrabad

References:

- Rao, T.A.S. (1992) Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundrabad
- Hallahan D.P. and Kauffman J.M. (1980) Exceptional Children, Prentice Hall
- National Trust, Govt. of India, Handbook for Teachers

CHILDHOOD PATHOLOGY AND EXCEPTIONAL CHILDREN

Course Code: PSY4405 **Credit Unit: 03**

Course Objective:

Objective of this course is to learn various categories of exceptionality, early identification, special and mainstream education

Course Contents:

Module I:

Developmental Disorders- Autism Spectrum Disorders, attention deficit hyperactivity disorder, Mental Retardation, Learning Disabilities, Hearing Impairment, Disability of Locomotion

Module II:

Bipolar disorder in children, conduct disorder, emotional disorders, eating disorders, enuresis
Psychological Assessment of Childhood disorders

Module III:

Special Education: Special Schools and Rehabilitation centres
Mainstreaming: assistive devices, adaptation, barrier free environment
Mainstreaming: Attitudinal change- teachers, non disabled students, Parents and Community

Module IV:

National Institutes in the field of disability: NIMH, NIVH, NIOH, AYJNIHH, NIEPMD, SVNIRTAR, Alimbco.
NGOs, Parent Organizations, Advocacy organization

Module V:

Legislative framework: Mental Health Act, RCI Act, Persons with Disability Act, National Trust Act, UNCRPD

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Hallahan D.P. and Kauffman J.M. (1980) Exceptional Children, Prentice Hall
- Cratty B.J. and Goldman R.L. (1995) Learning Disabilities: Contemporary Viewpoints, Harwood Academic Publishers
- Cruschank, W.M. (1975). Psychology of Exceptional Children and Youth, Englewood Cliffs N.J.: Prentice Hall

References:

- Rao, T.A.S. (1992) Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundrabad
- National Trust, Govt. of India, Handbook for Teachers
- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad

EMPLOYEE COUNSELING AND EMPOWERMENT

Course Code: PSY4409 **Credit Units: 3**

Course Objective:
To enable students to understand the diversity in organizations and equip them with skills to handle, manage and adjust to a culturally and socially diverse work environment.

Course Contents:
Module I: Mentoring Career
Improving various Professionally & Psychologically Skills, Performance & Capacity Development, Career Planning, Setting Goals, Interview Techniques, and Negotiation Skills

Module II: Work Life Counseling:
Managing work life: key to perform well; remain stress free, happy & successful at work.

- Dealing with Boss, Colleagues & Juniors
- Stress Management, Time Management, Crisis Management
- Enhancing Performance & Will Power
- Work-Life Balance, Motivation & Performance
- Meeting Challenges of Workplace Harassment, Discrimination

Module III: Personal Life Counseling:
Personality Development and Behavioural Management

- Understanding, Improving & Balancing Habits and Behavior
- Identifying Power within self
- Developing EQ & Emotional Intelligence, Developing Positive Psychology
- Utilizing Multiple Intelligence, Confidence Building
- Handling & Eradicating Stress & Phobia, Handling Frustration & Unhappiness
- Handling Ego/ Self Respect, Handling & eradicating Depression & Loneliness

Module IV: Introduction to Employee Counselling
Meaning, Nature & Scope
Types and functions of Employee Counselling
Coaching, Mentoring and Counselling

Module V: Differences and power
Concepts of prejudice, discrimination and oppression
Cultural and ethnicity as dimensions of differences
Race and racism in organizations
Gender and sexism in organization
Sexual orientation, physical ability, age, social class and other differences in workplace

Module VI: Conflict and Negotiation viz Employee Counselling
Concept of Conflict and Negotiation
Importance and relevance of Conflict and Negotiation in Employee Counselling

Module VII: Employee Empowerment and leadership
Change Management, Employee Involvement for Effective Change Management, Leadership Management, Motivation / Recognition / Retention.
Essentials of Leadership Quality

Self-leadership leads to Empowerment
Relevance of Empowerment in Employee Counselling

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text

- Luthans, F. Organizational Behaviour, McGraw – Hill International, 1998.
- Lashley, C (2001) Empowerment : HR strategies for service excellence Oxford,
- Lashley C (1997) Empowering Service Excellence: beyond the quick fix, London,
- Harold Koontz, O'Donnel and Weihrich, Management, Tata McGraw Hill, New Delhi, 1992.
- MonirH.Tayeb(2005). International Human Resource Management-, Oxford Publications.
- http://www.newdirectionscounseling.com/defcoun.html

References:

- Stephen P. Robbins, Organizational Behaviour: Concepts, Controversies, Applications, Prentice Hall, New Delhi, 2000.
- Hyman, J. and Mason, B. (1995) Managing employee involvement and participation.
- Ashkenas, Ulrich, The boundryless Organizations, Jossey- Bass.
- Dalton, Ernst Christ, Success for the Global managers, Jossey- Bass.
- Dhar&Ravishankar, Global Managers, Himalayan Publishing House.

ORGANIZATIONAL BEHAVIOR AND INDUSTRIAL RELATIONS

Course Code: PSY4410 **Credit Units: 03**

Course Objective:
To equip students with the basic knowledge of psychological processes in the organizations and skills for using the same for organizational development and to aims at orienting the students to the functions of Industrial relations with relevance to the Indian context.

Course Contents:
Module I: Evolution of management Thought
Organizational Behavior: Definition, goals, fundamental concepts
Concept, Determinants and Models
Historical development of industrial organizational psychology

Module II: Job analysis and selection
Job analysis – Definition and methods – Questionnaire method, checklist method, individual interview method, observation interview method, group method, technical conference method, diary method, work participation method and critical incident method
Selection – Application blank, psychological tests used in selection – Intelligence tests, personality tests, interest tests and aptitude tests (mention two tests in each area). Interview, guided interview, unguided interview, stress interview, group interview.

Module III:
Individual Behavior: Foundation of Individual Behaviour, Personality, Learning, Perception and Attribution, Values and Attitudes, motivation and job performance. Management's assumptions about people.
Group Behavior: Foundation of group behavior, Group Dynamics, Leadership: theories and styles. Conflict: Sources, Patterns, Levels and Resolution. Organizational Power and Politics.

Module IV:
Industrial Relation: Origin, Definition, Scope, Determinant, Socio-Economic, Technical,
Political factors affecting IR in changing Environment, Approaches to the study of IR
–Psychological, Human Relation, Socio,Gandhinian approach &It's Effect on
Management

Module V:
1. Present day industrial worker - comparison with predecessor Industrial disputes: meaning-causes. Importance of good labour management relations-causes of industrial unrest
2. Directive principles of State policy-creating and adopting labour policy.
3. Role of ILO in industrial relations.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Blum & Naylor, Industrial Psychology, CBS Publishers & Distributors.
- Robbins, Stephen P., Organizational Behaviour, Prentice -Hall, New Delhi, 9th ed., 2000.
- B.D.Singh (2007). Compensation and Reward Management, Excel Books, New Delhi.
- Luthans, F. Organizational Behaviour, McGraw – Hill International, 1998.
- Personnel Management and Industrial Relations –P.C.ShejwalkarandS.B.Malegaonkar.

References:

- Kaji H. Hona, Syndrome in workers occupationally exposed, Journal of Hard Surgery.
- Kadefore. R., Ergonomic model for workplace assessment, Human Factors Association of Canada.
- Malik P.L., Industrial Law Eastern, Lucknow, 1991.
- Muchinshy. M. Paul, Psychology Applied to Work – Wadsworth.
- The Future of Industrial Relations. New Delhi Sage, 1994. Niland JR.

PSYCHOLOGICAL PRACTICE IN PERSONNEL AND HUMAN RESOURCE MANAGEMENT

Course Code: PSY4411 **Credit Units: 03**

Course Objective:
To enable students to understand the concepts of psychology as applied in various aspects of human resources in organizations and equip them to develop modules in accordance with the optimum use of the same.

Course Contents:
Module I: The Human Resource Management
Structure of Human Resource Management, Role and Responsibilities of the Human Resource Manager; Human Resource Policies - Formulation and Essentials of Sound HR Policies

Module II: Challenges of Personnel Management: Individual and Competitiveness, balancing organizational demands and employees concerns-metaphors used to manage people.

Module III: Development of Human Resources
Learning, Training, Training and Development, Evaluation and Performance Appraisal

Module IV: Meeting HR requirements
Job Analysis and job Descriptions, diversity and empowered employees, career management and developing diverse talent pool, competency assessment- Perspective and Techniques

Module V: Employment Testing
Testing abilities, Testing personality, Testing skills and achievements, Using and not using tests.

Module VI: Contemporary Issues in HR
Strategic Human Resource Management, International Human
Resource Management Creating High Performing HR Systems: Wellness Programs and Work Life Balance and Green HRM

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Cascio (1998) Managing Human Resources. Delhi: Tata McGraw Hill.
- Cascio W.F. &Aguinis H. (2008), Applied Psychology in Human Resource Management, 6th Edition, Printice-Hall, USA
- Robert A. Baron and Donn Byrne, "Social Psychology: Understanding Human Interactions", New Delhi, Prentice Hall of India, 7th Ed.,1995.
- John B. Miner, "Industrial - Organizational Psychology", Singapore, McGraw-Hill, 1992.

References:

- Snell &Bohlander (2007) Human Resource Management, Thomson South Western.
- David S. Decenzo and Stephen P. Robbins, Personnel/Human Resource Management, Prentice Hall, New Delhi.
- William B. Werther Jr. and Keith Davis, Human Resources and Personnel Management, McGraw Hill, Singapore, 4th Ed.,1993 .
- ArunMonappa and Mirza S. Saiyadain, Personnel Management, Tata Mc-Graw Hill, New Delhi 1995.
- P Subba Rao, Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games, Himalaya, Mumbai,2000.
- BiswajeetPatanayak, Human Resource Management, Prentice Hall India, New Delhi 2001.

Amity Institute of Behavioural & Allied Sciences

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Arts - Applied Psychology

Syllabus - First Semester

BASIC PSYCHOLOGICAL PROCESSES

Course Code: PSY4109 **Credit Units: 02**

Course Objective
This paper of psychology is crucial to understand the basis of mental activity and human behavior. The students of psychology will need to have this knowledge about the normal mental operation of adults in order to understand more complex processes. The subject emphasizes cognitive and social aspects and it shows the more up to date developments. Basic Psychological Processes encourage students to study in depth the notion of modern scientific psychology.

Course Contents
Module I: Introduction of Psychology
Nature of Psychology, Understanding Science and Status of Psychology as a Science and humanities, Scope of Psychology
Methods of Psychology: Experimental, Observation, Survey Method, Archival method, Interview and case study
Schools of Psychology: Structuralism, Functionalism, Gestalt, Psychoanalysis, Behaviourism, Humanistic - Existential

Module II: Biology and Behaviour
Nervous System: Central and Peripheral Nervous Systems.
Brain and Behaviour: Hind Brain, Mid Brain, and Forebrain- various structures and its importance, Significance of Brain Lateralization, Split brain.
Neurons: Structure of neurons, Electrical and chemical neural impulse transmission, Role of Neuro-transmitters in behaviour
Endocrine Glands-Functions and Impact of hormones on behavior

Module III: Motivation and Emotion
Motivation: Meaning, Nature, Needs-Biological and Psychological, Instinct, Drive and Incentive
Classification of Motives- Physiological,Psychological (Personal), Socio-genic Motive
Theories of Motivation: Need and Drive Reduction Theory, Instinctive and Social Urges Theory, Goal Oriented Theory, Self-Actualization Theory (Maslow's Need hierarchy)
Emotion: Meaning, Nature, Physiological basis of emotions,
Theories-James Lange Theory, Cannon Bard Theory, Schachter and Singer's,Cognitive Theory, Lindsley's Activation Theory
Emotional Expression-display rules, facial feedback hypothesis, facial-affect programme

Module IV: Cognitive Processes (Thinking, Reasoning and Problem Solving)
Cognition- definition and process
Thinking- Nature, Types and Tools of Thinking
Reasoning: Meaning, Definition and Types
Decision Making: Meaning, Process and hindrances
Problem Solving: Meaning, Steps, Methods/Strategies

Module V: Psychology of Individual Differences
Concepts and Nature of Individual differences
Intelligence: Theories of intelligence- factor and cognitive theories.
Determinants of Intelligence: Genetic, Environmental influences.
Intelligence test: Characteristics and Types.
Newer trends- Intelligence Quotient, Emotional Quotient, Social Quotient, Spiritual Quotient
Gender Difference: Biological basis of gender difference, Role of hormones in gender related behaviour, Gender differences in social behaviour, Gender Differences in psychological adjustment, Factor or sources of gender differences

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

- Morgan,C.T, King,R.A., Weisz,J.R., and Schopler,J. (2004). *Introduction to Psychology*, 7th edition,24th reprint.NewDelhi: TataMcGraw-Hill.
- Feldman R.S (2011).*Understanding Psychology*, 10th edition.Delhi : Tata- McGraw Hill.
- Baron,R.A. *Psychology*.(1995). 3rd edition.Delhi:Prentice Hall.
- Munn,N.L.,Fernald,L.D., & Fernald,P.S.(1997) *Introduction to Psychology.* Delhi: Houghton Mifflin.
- Smith,E.E., Hoeksman,S,N.,Fredrickson,B.,Loftus,G.R.(2003) .
- Atkinson's & Hilgard'sIntroduction to Psychology.FirstReprint.Delhi Thomson Wadsworth

COGNITIVE PSYCHOLOGY

Course Code: PSY4102 **Credit Units: 02**

Course Objective
The course deals with the understanding of higher mental processes and its relevance in daily living. The study of normal processes is essential to enable the understanding of neurological or abnormal dysfunctions. The objective of this course is (a) to provide an understanding of normal metal processes and their relationship to brain, mind and behavior, and (b) to study the concept of cognition and its application in cognitive psychology. This will facilitate the students develop the cognitive skills in themselves and others.

Course Contents
Module I: Historical Background
Psychophysical approach
Information processing approach
Ecological Approach
Contemporary Cognitive Psychology

Module II: Attention and Perception
Theories of Attention and current developments: Broadbent's filter theory, Triesman's attenuation theory, automatic and controlled processing, switching attention.
Perceptual learning and development
Perception of shape, space and movement
Implicit perception and sensory integration theory
Cognitive – Attentional Theory: Information Processor, Cognitive Timer

Module III: Learning
General Phenomenon of Learning: Learning vs Maturation, Native Response Tendencies
Theoretical issues of learning: Classical conditioning, Instrumental conditioning
Verbal learning: Stimulus material, Trigram Methods-Serial Learning, Paired Associate Learning
Discrimination Learning: Nature, Theories- Algebraic Summation Theory, Relational Theory, Transposition Effect

Module IV: Memory & Forgetting
Sensory memory, STM, LTM, Working memory
Metamemory: Semantic & Episodic Memory
Models of Semantic knowledge
Theories of forgetting
Mnemonics

Module V: Thinking and Language Formation
Concept formation and categorization
Judgment and Decision-making
Reasoning & Problem solving: Stages – Preparation, Production, Judgment and Incubation
Structure of language, its acquisition and Formation
Language and Thinking: Linguistic Determinism, language and Cognition

Module VI: Language Learning Disorder

Reading Disorder/Developmental Dyslexia
Disorder of written expression / Dysphasia / Aphasia
Math Disability / Dyscalculia
Auditory Processing Disorder
Speech and Language pathology
Specific language Impairment

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- Solso, R.L.,(2004). Cognitive Psychology, 6th ed.; Delhi: Pearson Education
- Matlin M W (2005).Cognition, Wiley & Sons, Inc.
- Haberlandt, K. Cognitive Psychology. Allyn and Bacon, Boston.
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- Smity, E. E. &Kosslyn, S (2007). Cognitive Psychology: Mind and Brain. Prentice Hall.
- Sen, A.K. &Pande, P. (Eds.) (1998). Current issues in cognitive psychology, Delhi Campus
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References:

- Ittyearh, M., & Broota, K.D. (1983). Inter and Intra Model Processing of Sensory-Specific Information. Perceptual and Motor Skills 56. 507-517
- John A & Proctor R (2004). Attention: Theory and Practice. Sage.
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- Demjber, & Warm, J.S. (1979). Psychology of perception; NY: Holt
- Wilhit, S.C., & Payne, D.E. (1992). Learning and Memory: The Basis of Behaviours; Needham Heights, Mass: Allyn and Bacon
- Kintsch, W.(1970). Learning, Memory and conceptual process. John Wiley &Son,New York
- Houston, J.P. Fundamentals of Learning and Memory (3rd Ed.). harcourt brace Jovanovich, Inc, New York.

ADVANCED SOCIAL PSYCHOLOGY

Course Code: PSY4103 **Credit Units: 03**

Course Objective

Knowledge in social psychology is inevitable for any postgraduate psychology student to conceptualize the subject matter of the social individual in its deepest sense. Building from the preliminary knowledge of social psychology at the undergraduate level, this course offers the learners a more hands-on experience on the social behavior dynamics. This course is structured to provide the students a culturally informed and contextualized view of the discipline. The students are encouraged to appreciate and analyze the changing cultural diversity in the present Indian society, therefore, equipping them to approach the social issues with its implications. This course enables students to achieve integrative understanding of social psychological theory and research. It also helps in acquiring a thorough familiarity with methodological issues and thinking critically and analytically about experimental research in social psychology.

Course Contents

Module I: Basic Concepts in Social Psychology

Definition, nature and Growth of Social Psychology;
Alternative conceptions of social psychology: Social Structure, Social Stratification and Power
Development of social psychology in India; Current status of the discipline and its indigenization Social Psychology in the New Millennium: Influence of A Cognitive Perspective, Exporting
Social Psychology, Adoption of a Multicultural Perspective
Emerging alternative methods in social psychology;

Module II: Attitude and Attitude Change

Attitude - Behaviour Link: Influence of attitude on behavior: responsible factors – aspects of the situation, aspects of the attitude
Attitude Change: Approach to attitude change- Persuation approach, cognitive approach
Attitudes resistto change: reactance, forewarning, selective avoidance, active defense biased assimilation and attitude polarization

Module III: Prosocial Behaviour

Concept of Prosocial Behaviour, Latance Darley's five step model, situational factors: Attraction, Attributions and Prosocial Models
Theories of Prosocial Behaviour: Empathy - Altruism Theory, Egoistic Theory, Genetic Selfishness

Module IV: Social Issues

Mass violence, Terrorism, Mob behavior, Natural Disaster
Environmental stresses and social behavior.
Social psychological perspectives on health and illness.
Psychological effects of unemployment.
Social and ethnic minorities and law

Module V: Applied Social Psychology

Applied Social Psychology in India: Challenges and possibilities, Need for indigenization
Applied Social Psychology and developing countries; Emerging themes
Multidisciplinary approach to the study of social change; Policy oriented research; Need for reorienting Social Psychology

Methods of Applied Social Psychology: Laboratory experiment, Field experiment, Field study

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- Aronson, E., Wilson, T.D., and Akert, R.M. (1999). Social Psychology (3rd ed.). New York: Longman.
- Fraser, C., and Burchell, B. (2001). Introducing Social Psychology. Cambridge: Polity.
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References:

- Billig, M. (1982). Ideology and Social Psychology. Oxford: Basil Blackwell.
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- Pandey, J. (Ed.). (1980). Perspectives on experimental social psychology in India. ND:

Concept.
- Parker, L., and Shotter, T. (Eds.). (1990). Deconstructing social psychology. London: Routledge.

PERSONALITY THEORY

Course Code: PSY4104 **Credit Units: 02**

Course Objective
This course introduces critical evaluation of different theories in the background of the empirical evidence. It enables students to become familiar with the major theories and traditions related to the study of personality and personal growth. Course will also articulate the underlined themes, methodology and assumption of each theory to enhance understanding of personality and behavior to orient the students in application of this knowledge in case analysis and therapeutic formulation to develop the skills in personality assessment.

Course Contents
Module I: Introduction to Personality
Nature of personality theory: Present status
Theory in Broader perspective
Grouping among theories: Different perspectives on personality, Dispositional Perspective

Module II: Type and Trait Approaches to Personality
Trait (Biological) and Type Theories: Allport, Cattell, Eysenck, Sheldon and Friedman
Alternative Five factor Model.

Module III: Psychoanalytic Approach to Personality
The Freudian Theory: Topographic model, Structural model, Instincts, Defense Mechanism.
The Neo Analytic Theory: Alfred Adler: Striving for superiority; parental influence on personality development, birth order Carl Jung: Collective Unconscious Karen Horney:
Erik Erikson: Concept of Ego, Stages of Personality Development
Harry Stock Sullivan: Personifications

Module IV: Behavioural and Cognitive Approach
Skinners Radical Behaviours
Social Learning Theory: Dollard and Miller
Social cognitive Theory: Bandura

Module V: Humanistic and Existential Approach
Abraham Maslow's and Carl Rogers' Theory,
Kelly and Rollo May

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References
Text:
- Allport, G.W.(1961), Pattern & Growth in personality; New York; Halt
- Hall, G.S. &Lindzey, G.(1985), Theories of Personality (3rd ed.). New Delhi; Wiley Eastern.

- Hall, C.S., Lindzey, G. &Camobell, J.B. (2002). THEORY of personality, 4TH edition. John Wiley and Sons

References:

- Eysenck, H.J. (1981), Model of Personality. New York: Springer &Verlog,.
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PARAMETRIC STATISTICAL METHOD

Course Code: PSY4105 **Credit Units: 03**

Course Objective

The Present paper focuses on providing knowledge about the basics of statistics. It will give clear understanding to the students about application of parametric statistical methods. Parametric tests are generally more powerful in that the likelihood (probability) of a test reaching the correct conclusion is greater. Besides this, a module is added in last so to make students aware of parametric statistics in SPSS. Thereby they can understand the procedures and applications of parametric statistics using SPSS.

Course Contents

Module I: Basics

Nature, Meaning and importance of statistics
Concept of Reasoning, population, sample and probability theory in statistical inferences
Categories of statistics: Descriptive and Inferential
Variables and their types
Scales of Measurement: Nominal, Ordinal, Interval, Ratio

Module II: Statistical conjecture

Sampling and its kinds: Probability sampling method and Non-Probability sampling method.
Difference between Objectives and Hypothesis
Hypothesis testing: One-tailed and Two-tailed tests, Type I and Type II errors

Module III: Statistics and Test of Significance

Meaning, concept and importance of determining reliability of statistics in data analysis
Standard error of mean, standard deviations, percentages and correlation coefficients
Significance of difference between means-critical ratio and t-test calculation (large and small sample) assumption & uses
One-Way and Two Way ANOVA.

Module IV: Correlation and Regression

Correlation: concept, types, assumption and Utility of Cor-relational Analysis in Psychological Research
Bi-serial Correlation, Point Bi-serial Correlation, Partial Correlation, Tetra-choric Correlation
Simple and Multiple linear regression, its uses, concepts and assumptions
Difference between Simple linear and multiple regressions

Module V: Introduction to SPSS and parametric statistics in SPSS

Introduction to SPSS, its usage and functioning
Understanding the concepts of Parametric tests in SPSS
Learning data entry

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References:

Text:

- Minium E.W. King, H.M & Bear G, 1993. Statistical Reasoning in Psychology and Education (3rd Ed.) N Y: John Willey and Sons
- Garett, H.E., (2004), Statistics in Psychology and Education (11th ed.); New Delhi: Paragon International
- Gupta S.P.: Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in Correlational Research, New Delhi: Wiley Eastern 1989.
- Downie, N.M.: Basic Statistical Methods. New York: Harper and Publishers
- Howitt, D & Cramer, D: Introduction to SPSS statistics in psychology
- James K. Lindsey : Parametric Statistical Inference, Oxford science Publication.
- Cox, D.R.: Principles of statistical inferences.

References:

- Edward, A.E.: Experimental Design in Psychological Research (3rd Ed.), New Delhi: American Publishing Co. 1971
- Berger. R.L: Statistical Inferences, Cole Pub. Co.
- ***Wesley O. J****&Geisser. S: Modes of Parametric Statistical Inference. Wiley-Interscience*
- *Rice, J.A: Mathematical Statistics & Data Analysis, South western.*
- Salkind, N & Green, S: SPSS Quick Starts.

PRACTICUM-I

Course Code: PSY4106 **Credit Units: 03**

Course Objective

Present course give practical experience to the students in administering and scoring psychological tests and interpreting the scores to acquaint the students with the basic procedure and design of psychology experiments. Course will also encourage and guide the students to undertake a small-scale research project to apply the general concepts of psychology through experimentation and testing

Note: Total 5 practical will be conducted in the first semester among the list of following practical

Course Content

1	Memory
2	Language
3	Personality
4	Self-Concept
5	Perception
6	Memory and Learning

Examination Scheme

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-I

Course Code: PSY4107 **Credit Units: 04**

Course Objective

To develop student's skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

Syllabus - Second Semester

PSYCHOPATHOLOGY

Course Code: PSY4201 **Credit Units: 03**

Course Objective

To acquaint the students with various manifestations of psychopathology for imparting knowledge and skills required for diagnosis of psychological conditions. To introduce them to different perspectives and models of etiology and also to develop skills required for psychopathological formulation. This course will also enables students to the study and prediction of adaptive and maladaptive behaviours and its processes across lifespan. It also enables students to understand different diagnostic and educational models of psychopathology.

Course Content

Module I: Classification and Theoretical Models

Systems of Classification, basic features; DSM-IV TR, ICD-10, similarities and differences

Major Theoretical Models of Psychopathology: The medical model, Psychoanalytic model, Behaviouristic model, Humanistic-existential models, Interpersonal approach, Systems approach.

Module II: Diagnosis and Prognosis

Problems and methods of diagnosis: physiological examination, observation, case-history, interview method, psycho-diagnostic tests, measures of bodily functions, computer assisted diagnosis.

Module III: Mood and Anxiety Disorder

Bipolar disorders: Manic, Depressive, Mixed

Depressive disorder: Major depression and dysthymia, Suicide

Anxiety Disorders: Generalized anxiety disorder, phobia, panic disorder, post traumatic stress disorder and obsessive compulsive disorder

Module IV: Major Clinical Disorders

Schizophrenia

Other psychotic disorders: Bipolar, Delusional, psychotic depression

Module V: Somatoform Disorders

Conversion disorder, Somatization disorder, Hypochondriasis, Body dysmorphic disorder, Pain disorder

Module VI: Disorders of Infancy, Childhood and Adolescence

Developmental disorder: PDD, Rett Disorder, Asperger Disorder,

Behavioral Disorder: Conduct Disorder, Hyperactivity Disorder, ADHD,

Genetic Disorders: Down Syndrome

Module VII: Personality Disorder

Personality Disorder: Narcissistic Personality, Histrionic Personality, Antisocial (Psychopathic) Personality, Borderline Personality, Paranoid Personality, and Schizotype Personality

Module VIII: Sexuel Dysfunctions and Paraphilias

Dysfunctions of Desire, Arousal, Orgasm and Pain

Paraphilias, Paedophilia and Rape

Gender identity disorders

Impotence and frigidity

Causes, preventing suicide

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- Davison, G.C. & Neale, J.M. (1990): Abnormal Psychology. New York: John Wilay& Sons
- Carson, R.C. & Butcher, J.N. (1992): Abnormal Psychology and Modern Life (9th Ed.). New Yark: Haper& Collins.
- Hamilton, Max, (1994). Fish's: Clinical Psychopathology; Verghese Publishing House, Bombay
- Ahuja N (2002). A short text book of Psychiatry (5th edition). New Delhi. Jaypee Brothers.
- Sarason&Sarason (1998). AbnormalPsychology. New Delhi: Prentice Hall of India

References:

- Sarason&Sarason (2002), AbnormalPsychology; Pearson Education, Delhi
- Bennett, P. (2010). Abnormal and Clinical Psychology: An Introductory Textbook. New Delhi: Tata McGraw Hill Education pvt. Ltd.
- Sadock, B.J. &Sadock, V.A. (2003). Kaplan &Sadock's Synopsis of psychiatry: Behavioral sciences/clinical psychiatry (9th. Ed.). Philadelphia: Lippincott Williams & Wilkins
- Coleman, J.C. : AbnormalPsychology& Modern Life
- Lazarus and Folkman: Stress, appraisal and coping

PSYCHOLOGICAL ASSESSMENT AND DIAGNOSIS

Course Code: PSY4202 **Credit Units: 03**

Course Objective
The course teaches the students about the characteristics, objectives and wide ranging effects of psychological testing. It further describes the various testing methodologies and outlines capabilities and limitations of these methods.

Course Contents
Module I: Introduction
Purpose of testing, types of test used, Bias & Fairness
Ethical Issues in Psychological Testing
Overview of Tests
Norms, Scoring Interpretation and Report Writings
Issues in measurement
Emerging trends of online testing

Module II: Cognitive functions and their assessment
Concept of Attention, Gestalt Theory, Memory and Forgetting, PGI Memory Scale
Theories of Intelligence
Intelligence Tests:Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)
Bhatia Battery, Weschler's Adult Performance Intelligence Scale (WAPIS) ***BinetKamat Test***
Weschler's Intelligence Scale for Children – Revised (WISC)Wide Range Intelligence Test (WRIT)Alexander Pass-a-long Test of Intelligence
Draw-A-person Intellectual Ability Test for Children, Adolescents and Adults (DAP:IQ)
Raven's Progressive Matrices (Colour Progressive Matrices, Standard Progressive Matrices and Advanced Progressive Matrices)

Module III: Achievement Test
Wechsler Individual Achievement Test (WIAT)
Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)
Kaufman Test of Educational Achievement (KTEA)
Woodcock-Johnson Tests of Achievement (WJ)

Module IV: Assessment of Personality: Non-Projective Test
Cattell's 16 Personality Factor Inventory (16 PF)
California Q-Sort Tests
Myers Briggs Type Indicator (MBTI)
Minnesota Multiphasic Personality Inventory (MMPI)
Personality Inventory for Children
OMNI Personality Inventory (OMNI)
Bell's Adjustment Inventory
Eysenck'sPersonality Questionnaire
NEO™ Personality Inventory-3 (NEO™-PI-3) Adult / Adolescent

Module V: Assessment of Personality: Projective Tests
Introduction of Projective Techniques
Difference between Projective & Non-Projective Techniques
Thematic Apperception Test
Rorschach Inkblot Test
House-Tree-Person (H-T-P), Sentence Completion Test

Module VI: Developmental Scales
Developmental Screening Test
Vineland's Social Maturity Scale
Measures of Psychosocial Development (MPD)
Gesells' Developmental Schedule

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References
Text:

- Freeman, F. S.,(1965), Theory and Practice of Psychological Testing; New Delhi: Oxford &IBTT

References:

- Jackson C.,(1998), Understanding Psychological Testing; Jaico Publishing House
- Anastasi&Urbina S.(2000), Psychological Testing ,7th Edition; Person Education (Singapore) Pte. Ltd.,
- Guilford J.P.: Psychometric Methods

INDUSTRIAL-ORGANIZATIONAL (I-O) PSYCHOLOGY

Course Code: PSY4210 **Credit Units: 02**

Course Objective
To introduce the students with the basic knowledge of psychological processes in the organizations and skills for using the same for organizational development and to aims at orienting the students to the functions of Industrial relations with relevance to the Indian context.

Course Contents
Module I: Introduction to I-O
Scope of Industrial Psychology and its Psychological, Social and Economic Foundation
Human Factor in Industry
Historical development of industrial organizational psychology
Organizational Behavior: Definition, goals, fundamental concepts, Determinants
Models of OB

Module II: Individual and Group Behaviour
Individual Behavior: Foundation of Individual Behaviour, Personality, Learning, Perception and Attribution, Values and Attitudes, motivation and job performance. Management's assumptions about people, Group Behavior:Foundation of group behavior, Group Dynamics, Leadership: theories and styles. Conflict: Sources, Patterns, Levels and Resolution. Organizational Power and Politics

Module III: Job analysis and selection
Job analysis – Definition, Process and methods – Questionnaire method, checklist method, individual interview method, observation interview method, group method, technical conference method, diary method, work participation method and critical incident method. Recruitment: Definition, Importance and methods, Selection – Application blank, psychological tests used in selection – Intelligence tests, personality tests, interest tests and aptitude tests (mention two tests in each area). Interview, guided interview, unguided interview, stress interview, group interview. Different methods of Selection

Module IV:Organizational Culture and Industrial Relations
Organizational culture: Definition, Nature and scope, Formation and maintenance of Organizational culture. Industrial Relation: Origin, Definition, Scope, Determinant, Socio-Economic, Technical, Political factors affecting IR in changing Environment,
Role of ILO in industrial relations

Module V: Fatigue, Monotony and Personal factors
Meaning, Nature, Job fatigue work curve, Factor affecting fatigue and Reduction of fatigue
Comparison of fatigue work curves and monotonous work curve, Causes and education monotony
Personal and Social Factors in Industry: Motives, Incentives- Morale, Leadership and the causes of Industrial conflict.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- Blum & Naylor, Industrial Psychology, CBS Publishers & Distributors.
- Robbins, Stephen P., Organizational Behaviour, Prentice -Hall, New Delhi, 9th ed., 2000.
- B.D.Singh (2007). Compensation and Reward Management, Excel Books, New Delhi.
- Luthans, F. Organizational Behaviour, McGraw – Hill International, 1998.
- Personnel Management and Industrial Relations –P.C.Shejwalkar and S.B.Malegaonkar.

References:

- Kaji H. Hona, Syndrome in workers occupationally exposed, Journal of Hard Surgery.
- Kadefore. R., Ergonomic model for workplace assessment, Human Factors Association of Canada.
- Malik P.L., Industrial Law Eastern, Lucknow, 1991.
- Muchinshy. M. Paul, Psychology Applied to Work – Wadsworth.
- The Future of Industrial Relations. New Delhi Sage, 1994. Niland JR.

NON-PARAMETRIC STATISTICAL METHOD

Course Code: PSY4204 **Credit Units: 03**

Course Objective

The Present paper focuses on providing knowledge about the basics of nonparametric statistics. It will give clear understanding about differences between Parametric & Nonparametric Test Procedures. Paper will also explain commonly used Nonparametric Test Procedures and Perform Hypothesis Tests Using Nonparametric Procedures to teach student how to use SPSS with non-parametric statistics.

Course Contents

Module I: Basics

What is Non-Parametric statistics: Nature, Meaning and Concept strengths and limitations of non-parametric procedures
Parametric VS Non- Parametric Statistics
Four Levels of Measurement and Non-parametric statistics

Module II: Tests of differences between Groups and Variables

The Friedman Two-way analysis of variance by ranks-Basic concepts, uses and computations
Test of differences between groups (Independent samples): Mann-Whitney U test computations, Kolmogorov-Smirnov test, uses
Test of differences between variables (Dependent samples): Kruskal-Wallis ANOVA analysis of ranks, K-Sample Median test, uses and concepts

Module III: Nominal Measures of Correlations

Concept definition assumptions of Nominal Measures of Correlations
The Phi-Coefficient, Contingency coefficient concepts uses and calculations
Tetrachoric**r**: Its uses, computation and comparison

Module IV: Chi-Square

Concept and Definition, its assumptions and use
Chi-Square Goodness of Fit (One-Sample Test)
Chi-Square Test of Independence

Module V: Introduction to SPSS and Non-parametric statistics in SPSS

Introduction to SPSS, its usage and functioning
Understanding the concepts of Non-Parametric tests in SPSS
Learning data entry

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- Dowine, N.M.: Basic Statistical methods, Harper and Publishes New York.
- Gupta S.P. Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in correlational research, New Delhi: Wiley Eastern 1989.
- Salkind, N & Green, S.:SPSS Quick Starts.
- Howitt, D & Cramer, D.: Introduction to SPSS statistics in psychology.
- McNemarQ.: Psychological Statistics, 3rd Ed. New York, John Wiley 1962.
- Edward, A. E: Experimental Design in Psychological research (3rd Ed) New Delhi: American publishing.

Reference

- Higgins. J.J: Introduction to Modern Nonparametric Statistics.
- Siegal.S: Nonparametric statistics for the behavioral sciences.
- Castellan, J.N. and Siegal. S: Non-parametric statistics for behavioural sciences.
- Daniel, W. Wayne: Applied non-parametric statistics.

HEALTH PSYCHOLOGY

Course Code: PSY4205 **Credit Units: 02**

Course Objective

- To give a better understanding of the concept of health and it's various functions to understand its role in human behaviour.
- To acquaint the students with nature and significance of emerging areas of health psychology.
- To highlight the role of social, psychological and behavioural risk factors in health promotion and disease prevention.
- To introduce the students to types of stressors, their consequences, cognitive behavioural interventions for managing stress.
- To impart knowledge about causes and intervention for some prevalent stress related disorders / addictions.

Course Content

Module I: Introduction to Health

Historical background; Aims and Objectives of Health Psychology, Challenges for the future
Significance of Health Behaviour, Theory of Planned Behaviour: Attributive Theory, Health Locus of Control

Module II: Social Support & Health

Factors for Personality & Health Link, Types of Social Support, Link between social support & Health, Cross Cultural Images of Health

Module III: Life Style Disorder

CAD, CHD, Hypertension, Stroke, Obesity, peptic ulcer, Migraine, Asthma, and Diabetes: Overview, Implications & Management.

Module IV: Health Enhancing Behaviour

Stress: Meaning, Dimensions and Coping Strategies.
Improving Health & Well Being, Enhancing Support
Maintenance of Health: Diet and Nutrition, Relaxation Techniques: Jacobson Progressive Relaxation, Broota's Relaxation Response

Module V: Health Behaviour Modification

Cognitive Behvavioural approach, Relapse Prevention, Attitude & Health-Belief Model
Models of Mental Health: Clinical, Community and Social Action Model

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- Ogden, J. (1996): Health Psychology: A textbook Open University Press, Buckingham
- Shelly E. Taylor (2006): Health Psychology (6th Ed.). New Delhi: Tata McGraw-Hill
- Pitts, M. & Phillips, K. (1991): Psychology of Health: An Introduction. London: Routledge press
- Khatoon, N. (2012). Ed. Health Psychology. Pearson Education Inc. India
- Taylor, S.E. (1986): Health Psychology. New York: Random House

References:

- Lhermitte, F. (1986) Human Autonomy and the Frontal Lobes. Part II: Patient Behaviour in complex and social situation: The "Environmental Dependency Syndrome". Annuals of Neurology, 19, 335- 343.
- Strub and Black "Neuro-behavioural Disorder"
- Luria, A.R. (1966), Higher cortical functions in man, New York, basic books.
- Hecaen, H. and Albert, M.L. (I978), Human Neuropsychology, New York, John Wily and Sons.

PRACTICUM-II

Course Code: PSY4207 **Credit Units: 03**

Course Objective

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals

Course Content

1	Intelligence
2	Achievement
3	Personality: Projective
4	Personality: Projective
5	Personality:
6	Personality:

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-II

Course Code: PSY4208 **Credit Units: 04**

Course Objective

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

SCIENTIFIC RESEARCH PAPER

Course Code: PSY4209 **Credit Units: 01**

Course Objective

The scientific research papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers

Topic
Introduction
Review Research
Objective
Methodology
Discussion
Conclusion
References & Bibliography

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme

Components	**Compilation**	**Viva**	**Presentation**
Weightage (%)	50	25	25

Syllabus - Third Semester

APPLIED PSYCHOTHERAPY

Course Code: PSY4310 **Credit Units: 03**

Course Objectives
To provide knowledge and skills to students about counseling and psychotherapy and also to train them in using therapeutic and counseling techniques for effectively practicing

Course Contents

Module I: Basic Counseling and Psychotherapeutic Skills
Basic Skills: Empathy, Genuineness, unconditional positive regard, congruence, Listening, Para-phrasing, reflecting, summarizing
Advanced Skills: interpretation, insight, transference interpretation, exploring projections, identifying fail ure of therapy, identifying working with burnout, self-supervision, confrontation
Characteristics of effective counselor/ therapists
Challenges faced by novice
therapists: Dealing with anxiety, being oneself, self-disclosure, avoiding perfectionism, honesty with limit ations, understanding silence, demands from clients; Understanding once own self and Psychotherapy wit h self

Module II: **Therapeutic assessment and counseling session initiation**
Therapeutic assessment, History taking, and Formulation, setting goals
Contracting and its implications: Contracting for therapyand socialization, communicating ethical and pro fessional rights responsibilities, violations of contract, Initial session, crisis and support , Counseling session's opening and closing skills, Effective conduction of counseling sessions

Module III: Counseling and Psychotherapy Process
Initial phase: Psych- education, Supportive psychotherapy. Selecting techniques
Ice-breaking, exploration, Loss framework.
Dealing with Resistance: Techniques and applications
Transference and counter-transference

Module IV: Termination, Follow-up and Documentation
Termination: Evaluating and sharing progress, Issues in termination and resolution Follow-up: Systems a nd techniques, sustained changes
Documentation: Therapists documentation, Communication with other professionals and referrals
Legal implications: Legal communication, documentation, Legal issues in psychotherapy and counselling .

Module V: Therapeutic Case formulation and Demonstration
Two Hypothetical case formulation and demonstration by using
Role play (video recorded), evaluation of basic and advanced skills for simulated cases, Two Hypothetical case formulation and demonstration by using
Role play (video recorded) for contracting and skills for opening and closing,

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Archer, J., & McCarthy, C. J. (2008). Theories of Counseling and Psychotherapy: Contemporary. Ap plications. Upper Saddle River, New Jersey: Merrill Prentice Hall.
- Faiver, C., Eisengart, S., Colonna, S. (2003), The counselor intern's handbook.Brooks/Cole Publishi ng Company, Pacific Grove, California.
- Martin, D. G. (2011). Counseling and Therapy Skills . NY D.
- Morrison, J. (2007) The First Interview, Third Edition . Moursund, J., and Kenny, M. C. (2002). The Process of Counseling and Therapy (4th edition). Upper Saddle River, New Jersey: Prentice Hall.

Books

- Corey G. (2012). Theory and Practice of Counseling and Psychotherapy.
- Daniel Keeran. (2009). Effective Counseling Skills: the practical wording of therapeutic statement s and processes.
- Edward S. Neukrug (2010). Counseling Theory and Practice.
- D. Hutchinson D. R. (2011). The Counseling Skills Practice Manual
- John Sommers-Flanagan and Rita Sommers-Flanagan (2012). Counseling and Psychotherapy
- Theories in Context and Practice: Skills, Strategies, and Techniques.
- Wayne Perry .Basic Counseling Techniques:: A Beginning Therapist's Tool Kit (Second Edition)
- Wolberg, L. R. (2005). The Technique of Psychotherapy Part I and II. NJ: Jason Aronson Inc.

RESEARCH METHODS IN APPLIED PSYCHOLOGY

Course Code: PSY4311 **Credit Unit: 02**

Course Objective

Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents

Module I: Introduction to Research

Meaning of Scientific Research
Objectives and Steps in Scientific Research
Defining research problem
Defining variables
Developing hypothesis

Module II: Evaluating Measures and Hypothesis

Need For Evaluating Measures
Reliability and Validity
Hypothesis testing: Type1 and Type 2
Going beyond hypothesis testing: Effect size and Power

Module III: Validity of Experimental Researches and Threats to them

Statistical Conclusion validity
Construct validity and External Validity
Establishing the cause and Effect
Single Group threat, Multiple Group threats, Social threats

Module IV: Experimental Designs-I

Two-Group experimental designs Within-subject Design
Between-subject design
General Linear Model

Module V: Experimental Designs-II

Factorial designs
Randomized Block designs
Hybrid Experimental Designs: Soloman four group designs Mixed designs

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- Shuttleworth, Martyn (2008). "Definition of Research". Experiment Resources. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed.). Upper Saddle River: Pearson.
- Trochim, W.M.K, (2006). Research Methods Knowledge Base.
- Montgomery, Douglas (2013). Design and analysis of experiments (8th ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Reference:

- Review of Foundations for research: Methods of inquiry in education and the social sciences, by Kathleen B. deMarrais and Stephen D. Lapan. 2004. Reference& Research Book News 19:1.
- Denscombe, Martyn. 2007. The good research guide for small-scale social research projects. 3rd ed. Maidenhead, UK: Open University Press. 360 pages. ISBN: 0335220223. $48.50 (pbk).
- Baker, Lynda M. 2001. Review of Understanding Research Methods: An Overview of the Essentials, 2nd ed., by Mildred L. Patten. The Library Quarterly 71:96.
- Ellingson, L. L. 2007. Review of Qualitative research methods for the social sciences, 6th ed, by B. L. Berg. Communication Research Trends 26.1: 24.

INTERVIEWING AND COUNSELLING SKILLS

Course Code: PSY4312 **Credit Unit: 02**

Course Objective
This course enables students to gather knowledge about interview techniques and cultivate Advanced Counselling Skills. It is further designed to equip students with skills to practice as a Counselling Psychologist.

Course Contents
Module I: Counsellor as a person
Personal characteristics: A composite model of human effectiveness, role of self awareness in counselling.
Role and Function of the Counsellor: Definition of Role, Generic roles, organizing roles & functions

Module II: Communication Skills-I
Basic Communication Skills: Attending skills, Listening skills,Integrating Listening Skills.
Exploration Skills: Probe, Immediacy, Self-disclosure, Interpretation, Confrontation.
Action Skills: Information giving, Advice giving, Goal setting, Reinforcement, Directives
Self-disclosure by counsellor – when and how
Helping clients develop and work on preferred scenarios, negotiating homework.
Managing resistance and other obstacles in counselling
Skills of closure and terminating

Module III: Techniques of Helping and working with emotions
Self monitoring of Thought, Feeling and Action, Facilitating problem solving
Understanding and Improving Self talk, rules and thinking patterns.
Behavioural Methods

Module IV: Counseling Applications
Pediatric Counseling: Dynamics and process
Adolescent Counselling: Concept and Issues
Group Counselling: Concept & Process.
Academic Counselling: Definition and Scope.
Marital and Family Counselling: Concept & Process.
Addiction counseling: Principles & Prevention
Geriatric Counselling: Concept and Scope.
Rehabilitation Counseling, And Crisis Intervention &Trauma Counseling

Module V: Assessment in psychology
The purpose of assessment in counselling, Assessment principles
Intelligence and general ability testing
Measuring Achievement and aptitude
Appraisal of personality
Spiritual assessment strategies
Applications of assessment: Treatment planning, evaluation and accountability.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- Patri, V., &Anthors R.(2001), Counselling Psychology, Press, New Delhi

References:

- Nelson R Jones ,(2003), Basic Counselling Skills; Sage Publication, London
- Gerald C. (2001), Case Approach to CounsellingPsycology; Brooks/Cole, Australia
- Crouch a. (1997), Inside Counselling ; Sage Publication, London
- Ivey A.E. & Ivey M. B. (1999), Intentional Interviewing &Counselling, 4th Edition.
- Woolfe R. & Dryden W. (2001)Handbook of Counselling Psychology; Sage Publication, London

PRACTICUM-III

Course Code: PSY4308 **Credit Units: 03**

Course Objective

To give practical experience to the students in administering and scoring psychological tests and interpreting the scores and to acquaint the students with the basic procedure and design of psychology experiments and also to encourage and guide the students to undertake a small-scale research project to apply the general concepts of psychology through experimentation and testing

Note: Total 5 Practical will be conducted in the third semester among the list of following Practical

Course Content

1	Psychosocial Development
2	Self Esteem
3	State Trait Anger
4	Personality
5	Family and Interpersonal Relationship
6	Intelligence

Examination Scheme

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References

- Mohsin, S. M.: Experiments in Psychology. MotilalBanarasidas.
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Postman, L.Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-III

Course Code: PSY4309 **Credit Units: 04**

Course Objective
To cultivate the observation skills and techniques among students to gather and collect information from clients and documentation of data for conducting theoretically correct and practically relevant research

Methodology
Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report :	:	20 marks

SUMMER INTERNSHIP EVALUATION

Course Code: PSY4335 **Credit Units: 06**

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT
(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organisation)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.
In order to achieve these objectives, each student will maintain and submit a file **(Internship File)** and a report **(Internship Report)**.

INTERNSHIP FILE
The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. **Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.**

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of continuous evaluation of the project.

The File will include five sections in the order described below.
1. The Title Page – An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. Table of Content – An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. Introduction – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. Main Body – Should include a brief summary/ executive summary of the Internship Project Report that the student has worked on, an analysis of the company/organization in which the student is working, a personal review of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. Appendices – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

- Title or Cover Page. The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- Acknowledgements Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- Abstract A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- Table of Contents Titles and subtitles are to correspond exactly with those in the text.
- Introduction Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- Materials and Methods This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- Results and Discussion Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

Conclusion(s) & Recommendations

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

Implications for Future Research

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 30%

(based on Internship File and the observations of the faculty guide/ supervisor)

Feedback from Company/ Organization: 10%

Final Evaluation:

(Based on Internship Report, Viva/ Presentation) 60%

APPLIED PSYCHOPHYSIOLOGY AND BIOFEEDBACK

Course Code: PSY4313 **Credit Units: 03**

Course Objectives
To familiarize the students with various approaches, techniques and skills of counselling and psychotherapy in mental health problems To prepare the students to conduct different types of counselling and psychotherapies with different clinical and sub-clinical population To help them in identifying the processes of therapy and therapeutic change in the client and to enable them to conduct research in psychotherapy and report the findings

Course Contents
Module I: Introduction
Conceptual Issues, Client Variables in Counseling and Psychotherapy, Processes and Techniques of Psychotherapy

Module II: Modalities of Psychotherapy
Gestalt Therapy; Experiential and Transpersonal Psychotherapies, Art Therapy, Play Therapy, Family Therapy, Yoga and Other Indegenious therapies, Research Designs, Issues and Evaluation.

Module- III: Applied Research
Research in Psychotherapy: Experimental and Quasi-experimental designs. Ethical Issues in Psychotherapy

Module IV: Institutional visit
Supervised Practicum: Students will be provided demonstrations in the laboratory setting and visit institutions providing specialized services and produce at least 2 case records. 10 Hrs.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References:

- Bergin, A. E., & Garfield, S. L. (Eds.) (1994) Handbook of Psychotherapy and Behaviour Change, (4th Ed.). New York: Wiley.
- Finx, B.(2007) Fundamentals of Psychoanalytic Techniques. New York: Norton.
- Rama, S., Ballentine, R. &Ajaya, S. (1976) Yoga Psychotherapy. Pennsylvania: HIP.

HUMAN FACTORS PSYCHOLOGY AND ERGONOMICS

Course Code: PSY4314 **Credit Units: 03**

Course Objective
To gain an understanding of human strengths and limitations by studying human perception, cognition, memory, attention, biomechanics, and motor control/learning and also to gain an understanding of guidelines for displays, controls, anthropometry, office ergonomics, work physiology, and manual material handling.

Course contents

Module I: Introduction to Human Factor Psychology
Introduction to Human Factor Psychology and Ergonomics, Historical foundations, Biological basis of psychology and sensation, Human Information Processing

Module II: Visual system and Auditory and tactile systems
Visual system: sensation vs. perception (depth perception, motion perception, and pattern recognition), color vision, visual search, perceptual speed, perceptual organization, visual display. Auditory and tactile systems: audition and touch, RSI (Repetitive Strain Injury), designing for hearing and touch, haptic/tactile interfaces.

Module III: Memory and attention
Memory and attention: theories of attention, selective/divided attention, Multiple Resource Theory, reasoning, decision making, designing for memory.

Module IV: Performance measurement
Performance measurement: Psychometric tests (Simple/Choice Reaction Time tests, digit/word span, other visuo-spatial and cognitive tests, etc), Fitts' Law, Hicks' Law, quantitative and qualitative methods. Workload management: mental workload, stress, fatigue and coping.

Module V: Ergonomics science in a glance
Ergonomics science in a glance: introduction to anthropometry, work physiology and biomechanics.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References:

- Wickens, C. D., Lee, J. D. Liu, Y. & Becker, S. E. G., Second Ed. (2004).
- Introduction to human factors engineering. NY: Longman. Note. Used Wickens et al. text must be Second Edition. Casey, S. (1998).
- Set phasers on stun and other true tales of design, technology, and human error. Santa Barbara, CA: Aegean Publishing Co. Task description methods. Chapter 3. (pp. 81-145).
- In B. Kirwan& L. K. Ainsworth (eds.) (1992.)A guide to task analysis. London: Taylor & Francis. (Handout). Norman, D. (2002). Design of everyday things.NY:Basic Books. Paperback

FORENSIC AND LEGAL PSYCHOLOGY

Course Code: PSY4315 **Credit Units: 03**

Course Objectives

To introduce the students with knowledge and techniques of forensic psychology and further providing training in identification of criminals and forensic verification by using psychological methods

Course Contents

Module I: Introduction to forensic Psychology
Forensic Psychology: Introduction and overview, Historical Perspective, Fields of Forensic Psychology, Education and Training.

Module II: Criminal and Investigative Psychology
Criminal and Investigative Psychology: Police Psychology, Mental and Aptitude testing, Personality assessment. Occupational stress in Police and investigation, Hostage taking Police interrogation and false confession Criminal of Psychological autopsy, Geographical profiling and mental manpower, Criminal Identification

Module III: Violence and sexual offences
Psychological impacts of violence and sexual offences, Post-traumatic stress disorder, Family violence and victimization, Psychology of the bystanders 1

Module IV: Correctional Psychology
Correctional Psychology: Legal rights of inmates: Rights to treatment, Right top refuse treatment, Inmates with mental disorders, Solitary confinement, Psychological assessment in correction, Psychological methods of correction, Treatment of sexual offenders, Community-based correction, Group homes, Family preservation model, Substance abuse model, Prevention of violence.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References:

- Bartol, C. R. &Bartol, A. M. (2004) Introduction to forensic psychology. New Delhi: Sage.
- Blackburn, R., (1993) The psychology of criminal conduct: Theory research and practice. Chichester: Wiley & Sons.
- Dhanda, A. (2000) Legal order and mental disorder. New Delhi: Sage.
- Harari, L. (1981) Forensic psychology. London: Batsford Academic.

COMMUNITY PSYCHOLOGY

Course Code: PSY4316 **Credit Units: 03**

Course Objectives
To acquaint the students about the history & present status of community mental health services and also to develop a community based orientation towards mental health.

Course Contents

Module I: Introduction to Community Psychology
Historical and social contexts of community psychology: concept, evolution, scope and nature of community mental health.

Module II: Mental Health Models
Models of mental health services: mental, social, organizational and ecological

Module III: Community mental health intervention and rehabilitation
Community mental health intervention and community based rehabilitation (CBR): Issues, principles and programmes; evaluation of CBR; training the para-professional and non-professionals.

Module IV:
Community mental health in India: Prospects, Issues & challenges, Legal issues in mental health, role of NGO, Govt. and hospitals in mental health in India

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Bloom, B. (1973). Community Mental Health—A critical analysis. New Jeresey: General Learning Press
- Koch, C.H.(ed.) (1986). Community Clinical Psychology. London: Croon Helm.
- Mann, P.A. (1978). Community Psychology: Concepts and Application. New York: The Free Press.
- Rappaport, J. (1977). Community Psychology: Values, Research and Action. New York: Holt, Reindhart and Wingston.

PSYCHOLOGICAL PRACTICE IN PERSONNEL AND HUMAN RESOURCE MANAGEMENT

Course Code: PSY4317 **Credit Units: 03**

Course Objective
To enable students to understand the concepts of psychology as applied in various aspects of human resources in organizations and equip them to develop modules in accordance with the optimum use of the same.

Course Contents
Module I: The Human Resource Management
Structure of Human Resource Management, Role and Responsibilities of the Human Resource Manager; Human Resource Policies - Formulation and Essentials of Sound HR Policies

Module II: Challenges of Personnel Management: Individual and Competitiveness, balancing organizational demands and employees concerns-metaphors used to manage people.

Module III: Development of Human Resources
Learning, Training, Training and Development, Evaluation and Performance Appraisal

Module IV: Meeting HR requirements
Job Analysis and job Descriptions, diversity and empowered employees, career management and developing diverse talent pool, competency assessment- Perspective and Techniques

Module V: Employment Testing
Testing abilities, Testing personality, Testing skills and achievements, Using and not using tests.

Module VI: Contemporary Issues in HR
Strategic Human Resource Management, International Human
Resource Management Creating High Performing HR Systems: Wellness Programs and Work Life Balance and Green HRM

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References
Text:

- Cascio (1998) Managing Human Resources. Delhi: Tata McGraw Hill.
- Cascio W.F. &Aguinis H. (2008), Applied Psychology in Human Resource Management, 6th Edition, Printice-Hall, USA
- Robert A. Baron and Donn Byrne, "Social Psychology: Understanding Human Interactions", New Delhi, Prentice Hall of India, 7th Ed.,1995.
- John B. Miner, "Industrial - Organizational Psychology", Singapore, McGraw-Hill, 1992.

References:

- Snell &Bohlander (2007) Human Resource Management, Thomson South Western.
- David S. Decenzo and Stephen P. Robbins, Personnel/Human Resource Management, Prentice Hall, New Delhi.
- William B. Werther Jr. and Keith Davis, Human Resources and Personnel Management, McGraw Hill, Singapore, 4th Ed.,1993 .
- ArunMonappa and Mirza S. Saiyadain, Personnel Management, Tata Mc-Graw Hill, New Delhi 1995.
- P SubbaRao, Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games, Himalaya, Mumbai,2000.
- BiswajeetPatanayak, Human Resource Management, Prentice Hall India, New Delhi 2001.

Syllabus - Fourth Semester

REHABILITATION PSYCHOLOGY

Course Code: PSY4404 **Credit Units: 03**

Course Objective
Objective of this course is to learn profession of Rehabilitation Psychology, Psychological Assessment of persons with disabilities, Psychological Interventions and dealing with families

Course Contents

Module I: Introduction
Overview of the profession of Rehabilitation Psychology and practice, history, growth and scope, Role of Psychologist in Rehabilitation

Module II: Psychological Assessment
Psychological Assessment- Assessment of Cognition, aptitudes, psychopathology, work/vocational and daily functioning

Module III: Health Behavior
Health behavior: Theories of health behavior change, interventions strategies for individuals and families of disabled
Behaviour Modification and Cognitive Therapies in Rehabilitation

Module IV: Families and disability
Dealing with Families- Family's reactions to disabilities, coping styles, family counseling, Coordination with Multidisciplinary team

Module V: Community Based Rehabilitation
Community Based Rehabilitation – Goals of CBR, components of CBR, Role of Professionals, role of Community, Ethical Issues

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text:

- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Mohapatra C.S. (2004) Disability Management, NIMH, Secundrabad
- Robert G. Frank Timothy R.Elliott (2000). Handbook of Rehabilitation Psychology, APA Washington.
- Michael Brnes Anthony Ward (2009) Oxford Handbook of Rehabilitation Medicine

References:

- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad
- WHO (2004) Community Based Rehabilitation
- Tally A.B, Sivaraman K.P and Murali T(1998)Neurorehabilitaion Principles &practice, NIMHANS Bangalore India

PSYCHOMETRICS

Course Code: PSY4415 **Credit Units: 02**

Course Objectives
To acquaint students with advanced topics in psychometrics by supporting them in using the advanced psychometric models with psychometric data and also train students in writing report of the psychometric techniques

Course Contents

Module I: Psychometrics
Psychometrics: Concepts, Classical Test Theory and PracticingPsychometrics, Scaling, statistical concept s, Reliability: Conceptual basis and empirical estimation
Validity: Conceptual basis and empirical estimation, factor analysis and test dimensionality
Classical test theory: assumptions, ramification and practice
Threats to psychometric quality: Test bias, response bias. Special problems in CCT

Module II: Modern test Theory and Practice
Item Response Theory (IRT): basic concepts, models and estimations; Item and Item information;
Models for Nominal and graded responses, Nonparametric and Bayesian approach
Other IRT models and applications to non standard testing conditions

Module III: Generalizability Theory
Concepts, Generalizability and variance component G studies and D studies
Conducting and Interpreting Generalizability: One Facet design, two facet design, other designs.

Module IV: Applications
Psychometric Assessment in Occupational Settings.
Psychometric Clinical Assessment
Psychometrics in Educational Settings
Developing publication quality instrument and manual

Module V: **Presentations**
Multidimensional scaling,Profile analysis,Descriminant analysis,Software applications: R in particular;
Dominance (preference) scaling , Categorical modeling, Binary classifications;
Non-geometric and non Euclidian model, Confirmatory Factor analysis

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Reference

- Borsboom, D. (2005). Measuring the mind: Conceptual issues in contemporary psychometrics .Cam bridge , UK : Cambridge University Press .
- C.R. Rao (Editor), SandipSinharay (Editor). Handbook of Statistics, Volume 26: Psychometrics.
- John Rust and Susan Golombok (2009) Modern Psychometrics: The Science of Psychological Assess ment, Third Edition.
- JumNunnally and Ira Bernstein. (1994). Psychometric Theory.
- Lord, F. M., & Novick, M. R. (1968). Statistical theories of mental test scores. Reading , MA : Addis on-Wesley.
- PB , John Rust, Susan Golombok. (2008). Modern Psychometrics (3rd Revised edition).Taylor & Fra ncis Ltd: UK
- R. Michael Furr and Verne R. Bacharach (2013). Psychometrics: An Introduction

PRACTICUM-IV

Course Code: PSY4412 **Credit Units: 03**

Course Objective

To give practical experience to the students in administering and scoring psychological tests and interpreting the scores Also to acquaint the students with the basic procedure and design of psychology experiments Course will also encourage and guide the students to undertake a small-scale research project to apply the general concepts of psychology through experimentation and testing

Note: Total 5practicals will be conducted in the fourth semester among the list of following practicals

Course Content

1	Personality
2	Intelligence
3	Attention
4	Learning
5	Intelligence
6	Health

Examination Scheme

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References

- Mohsin, S. M.:Experiments in Psychology. MotilalBanarasidas
- Woodworth, R.S.:Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. &Egan, J. P.: Experimental Psychology: An Introduction.Harper and Row

FIELD PRACTICE-IV

Course Code: PSY4413 **Credit Units: 04**

Course Objective

To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.

Student will then present their findings in the form of a paper for seminar discussions.

Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

DISSERTATION

Course Code: PSY4437 **Credit Units: 06**

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.

- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:
- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:	40%
(Based on Abstract, Regularity,	
Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	25
Conceptual Framework,	10
Objectives & Methodology and	10
Implications & Conclusions	15

EMPLOYEE COUNSELLING AND EMPOWERMENT

Course Code: PSY4409 **Credit Units: 3**

Course Objective
To enable students to understand the diversity in organizations and equip them with skills to handle, manage and adjust to a culturally and socially diverse work environment.

Course Contents
Module I: Mentoring Career
Improving various Professionally & Psychologically Skills, Performance & Capacity Development, Career Planning, Setting Goals, Interview Techniques, and Negotiation Skills

Module II: Work Life Counseling
Managing work life: key to perform well; remain stress free, happy & successful at work.
Dealing with Boss, Colleagues & Juniors
Stress Management, Time Management, Crisis Management
Enhancing Performance & Will Power
Work-Life Balance, Motivation & Performance
Meeting Challenges of Workplace Harassment, Discrimination

Module III: Personal Life Counseling
Personality Development and Behavioural Management
Understanding, Improving & Balancing Habits and Behavior
Identifying Power within self
Developing EQ & Emotional Intelligence, Developing Positive Psychology
Utilizing Multiple Intelligence, Confidence Building
Handling & Eradicating Stress & Phobia, Handling Frustration & Unhappiness
Handling Ego/ Self Respect, Handling & eradicating Depression & Loneliness

Module IV: Introduction to Employee Counselling
Meaning, Nature & Scope
Types and functions of Employee Counselling
Coaching, Mentoring and Counselling

Module V: Differences and power
Concepts of prejudice, discrimination and oppression
Cultural and ethnicity as dimensions of differences
Race and racism in organizations
Gender and sexism in organization
Sexual orientation, physical ability, age, social class and other differences in workplace

Module VI: Conflict and Negotiation viz Employee Counselling
Concept of Conflict and Negotiation
Importance and relevance of Conflict and Negotiation in Employee Counselling

Module VII: Employee Empowerment and leadership
Change Management, Employee Involvement for Effective Change Management, Leadership Management, Motivation / Recognition / Retention.
Essentials of Leadership Quality
Self-leadership leads to Empowerment
Relevance of Empowerment in Employee Counselling

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Text & References

Text

- Luthans, F. Organizational Behaviour, McGraw – Hill International, 1998.
- Lashley, C (2001) Empowerment : HR strategies for service excellence Oxford,
- Lashley C (1997) Empowering Service Excellence: beyond the quick fix, London,
- Harold Koontz, O'Donnel and Weihrich, Management, Tata McGraw Hill, New Delhi, 1992.
- MonirH.Tayeb(2005). International Human Resource Management-, Oxford Publications.
- http://www.newdirectionscounseling.com/defcoun.html

References:

- Stephen P. Robbins, Organizational Behaviour: Concepts, Controversies, Applications, Prentice Hall, New Delhi, 2000.
- Hyman, J. and Mason, B. (1995) Managing employee involvement and participation.
- Ashkenas, Ulrich, The boundryless Organizations, Jossey- Bass.
- Dalton, Ernst Christ, Success for the Global managers, Jossey- Bass.
- Dhar&Ravishankar, Global Managers, Himalayan Publishing House.

PSYCHOLOGY OF SELLING, MARKETING AND ADVERTISING

Course Code: PSY4416 **Credit Units: 03**

Course Objectives

To impart the basic knowledge of main psychological theories that is relevant within the field of market psychology among students. How does psychology apply to marketing? Clearly, psychology and marketing are closely related. As a marketing strategist, you need be looking less at what your product has to offer per se and more to the psychology of the consumers to whom you want to sell it.

Course contents

Module I: Introduction

Understanding selling, marketing, advertising Psychology, Nature, scope and need , marketing, advertising Psychology of application of psychology principles in selling, marketing and advertising, The Monkey Business Illusion

Module II: Cognitive Skills: Disciplinary & Cultural Knowledge

Field of psychology complements the field of marketing Identify, main psychological theories and consumer behaviour, Judgment heuristics, rules of perception and marketing psychology, Role of personality, emotions, and motivation in consumer behaviour, Host-city manifestations of the influence of psychology on local consumer

Module III: Analytical Skills: Critical Thinking in Oral & Written Work

Marketing techniques in psychology, Importance of emotions in advertising campaigns, Work of locus of control in your own self-control

Module IV: Affective Skills: Attitudinal & Intrapersonal

Develop and convey empathy for the host peoples' attitudes towards consumption, Curiosity and Interface between marketing and psychology, Respond to psychology of marketing on critical-analytical levels and develop an open mind regarding local consumer habits

Module V: Behavioral Skills: Cultural Engagement & Interpersonal

Knowledge of psychology to become a more aware and self-directed consumer, Use course-related criteria when purchasing you consumer good in the host country, Knowledge of marketing psychology to engage positively with host people & culture

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Reference

- Raab, Gerhard; Goddard, G. Jason; Ajami, Riad A. The Psychology of Marketing: Cross-Cultural Perspectives. Farnham, Surrey, GB: Ashgate Publishing Group, 2010. p. 414.
- Bakir, Aysen; Palan, Kay M. "How Are Children's Attitudes Toward Ads and Brands Affected by GenderRelated Content in Advertising?" Journal of Advertising. Vol. 39 Issue 1. (Spring2010):35-48.
- Bawa, Anupam; Kansal, Purva. "Cognitive Dissonance and the Marketing of Services: Some Issues". Journal of Services Research. Vol. 8 Issue 2. (Oct2008): 31-51.
- Bhattacharjee, Amit. "Constraints and Consequences: Psychological Reactance in Consumption Contexts". Advances in Consumer Research - North American Conference Proceedings. Vol. 37. (2010):53-56.
- Bitektine, Alex. "Toward a Theory of Social Judgments of Organizations: The Case of Legitimacy, Reputation, and Status". Academy of Management Review. Vol. 36 Issue 1. (2011): 151-179.
- Bradley, Nigel. "Graphology: A Tool for Marketing". Marketing Review. Vol. 11 Issue 2 (Summer 2011):103- 115.
- Briñol, Pablo; Petty, Richard E.; Tormala, Zakary. "Self-Validation of Cognitive Responses to Advertisements". The Journal of Consumer Research. Vol. 30, Issue 4. (Mar2004):559-573.

PSYCHOLOGY OF CRIMINAL BEHAVIOUR AND CRIMINAL PROFILING

Course Code: PSY4417 **Credit Units: 03**

Course Objectives
To familiarize students with the emerging importance of psychology of criminal behaviour and criminal profiling and also to build awareness regarding the role of the psychologist in Forensic evaluations.

Course Contents

Module I: **Bases of criminal behavior**
Biological and psychological basis of criminal behavior
Theoretical models in Forensic psychology
Place of psychology in forensic science
Ethical principles and professional competencies

Module II: **Forensic assessment**
Empirical profiling of psychopathy
Detection of Malingering and Deception
Use of Brain Electrical Oscillation Signature (BEOS)
Psychology and law : custody issues, testimony, documentation

Module III: **Civil forensic procedures**
Eye witness memory
Jury selection
Child custody
Evaluation of child trauma

Module IV: Criminal Forensic procedures
Forensic evaluation of delinquency and criminal responsibility
Child sexual abuse evaluations
Violence risk assessment
Competence to stand trial

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

Reference

- Bull, R. (ed) 2011) Four volume set Forensic Psychology. LA: Sage publications
- Scott, Adrian (2010) Forensic psychology. NY: Palgrave MacMillan.

Books for reference

- Donohue, W.T. and Levensky, T.R. (2004)Handbook of Forensic Psychology. NY: Elsevier.
- Goldstein, A. M. Volume ed. Weiner, I.B. Series ed. (2003) Handbook of Psychology: Volume 11 For ensic psychology. NJ: J. Wiley and Sons.
- Heilbrun, K, Marczyk, G.R. and DeMatteo D. (2002) Forensic Mental Health Assessment : A Caseboo k. UK:OUP.
- McCaffrey, R.J. , Williams, A.D., Fisher, J.M. , Laing, L.C. (1997) The practice of forensic neuropsyc hology. NY: Plenum press.
- Weiner, I.B. and Hess, A.K. Ed. (2006) Handbook of Forensic Psychology. NJ: J.Wiley and Sons.

OCCUPATIONAL HEALTH PSYCHOLOGY

Course Code: PSY4418 **Credit Units: 03**

Course Objectives
To develop a general orientation towards abnormal behavior and disease process through various models of psychopathology.To understand causes of pathological behavior and its psychodiagnostic assessment. To develop skills for diagnosis and classification of mental disorders.

Course Contents
Module I: Stress and health
Stress and health:Occupational stress;
Daily hassles and their impact ;Lifestyle issues, nutrition, substance use
Positive psychology approaches, well being

Module II: **Core concepts in Health Psychology**
Psycho-neuro-immunology
Psychosocial support
Personality factors in illness and health
Health and illness perceptions

Module III : **Psychology in health care settings**
GAS, cognitive appraisal and diathesis stress model
Behavior change and wellness
Primary prevention
Training health care experts in communication skills

Module IV: **Community and social factors impacting health and well being**
Community health
Health and social relationships
Dispositional optimism and health
Lifestyles, social change and impact on health

Module V: Psychodiagnostics and Nonpharmacological management
Psychodiagnosis of major Mental Disorders of the Adults and their treatment: Stress and Anxiety Disorders, and Schizophrenia, Affective Disorders, Psychosomatic Disorders, Personality Disorders and Substance abuse.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Hersen, M., Kazdin, A. E., &Bellack, A. S. (1991) The Clinical Psychology Handbook Pergamon. New York
- Sweet, J. J. ,Rozensky, A. &Tovian, S. M. (1991) Handbook of Clinical Psychology in Clinical Practice. New York: Plenum.
- Walker, C. E. (2001) Handbook of Child Clinical Psychology. New York: John Wiley & Sons.

GUIDANCE AND COUNSELLING

Course Code: PSY4419 **Credit Units: 03**

Course Objectives
This course enables students to gather knowledge about techniques of guidance and Counselling. It is further designed to equip students to practice these learned skills in their day to day life.

Module I: Introduction
Concept of Guidance and Counseling Meaning, Nature, Goals and Principles; Need and Relevance Emergence and Growth of Guidance and Counseling Psychology; Guidance and counseling Movement in India Ethical and legal considerations

Module II: Oragnization of Programme
Organizing a Guidance Programme Principles of organizing an effective guidance program; Guidance activities at Elementary, Secondary and Senior Secondary level Meaning & Importance of Counseling Skills & Strategies; Stages of Counseling

Module III: Educational Guidance
Educational Guidance Nature, Pupil Personnel work, Pupil Appraisal information, School Curriculum and Guidance. Vocational Guidance Nature, Study of Occupations- Collecting and Disseminating occupational information; Theories of occupation choice Role of counselor in education and vocational guidance

Module IV: Counseling skills
Developing Empathy, rapport establishment, respect and genuineness Skills of Counselor Selection, implementation, evaluation, Observation, listening, silence, attending behaviour, use of questions & termination of counselling.

Module V: Approaches of Counseling
Approaches of Counseling: Directive, Non-directive and Eclectic. Guidance Personel in organizing Guidance Programmes,Theories of multicultural counseling: identity development, and social justice, Theories and models of individual, cultural, couple, family, and community resilience.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References:

- Arther J. J., (1971). Principles of Guidance Delhi : Tata McGraw Hill. - Bhatnagar, A., & Gupta N. (1999). Guidance &Counselling : Practical (Vol I & II) New Delhi: Vikas Publishing House.
- Bernard, H., &Fullmer, D.W. (1977) . Principles of Guidance , New York : Harper & Row. - Chauhan, V., &Jain., (2004). NireshanEvamPramarsh. Udaipur: AnkurPrakashan. - Gelso, C., &Fretz, B. (2001). Counselling Psychology. USA: Harcourt College.
- George, R.L., &Cristiani, T.S. (1995). Counselling Theory & Practice. Boston: Allyn& Bacon. - Nelson – Jones, R. (1994). The Theory and Practice of Counselling Psychology. London: Cassell.
- Gupta, S.K. (1985). Guidance and Counselling. Delhi: Mittal. - Kochhar, S.K. (1984). Educational and Vocational Guidance in Secondary Schools. New Delhi: Sterling.
- Palmer, S., & Mc Mohan, G. (1997). Handbook of Counselling Psychology. London: British association for counselling. - Pietrofessa, J.J., Bernstein, B., Minor, J., & Stanford, S. (1980). Guidance: An Introduction. Chicago: RanelMcNally College.

Master of Social Work (MSW)

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GURUGRAM

Master of Social Work (MSW)

Syllabus - First Semester

SOCIAL WORK: HISTORY, IDEOLOGIES, PERSPECTIVES AND CONTEMPORARY CONCERNS

Course Code: SCW4101 **Credit Units: 03**

Course Objective:

- To understand the history of evolution of social work profession, both in India and the West.
- To develop insights into the origin and development of ideologies, approaches to social change. To understand rationale, goals, ideals and ethics for social change.
- To understand the perceptions of people and social problems, the status of benefactors and their motives.
- To develop skills to understand contemporary reality in its historical context.
- To understand self as a part of own environment and explore own assumptions, ideals, values to develop sensitivity to marginalization of vulnerable groups.

Course Contents:

Module I: History of Social Work in India and Abroad
Charity, Philanthropy
Social Situations: Poverty, Problems of Immigrants, Orphanhood, Squalor, War Victims
Social Reform Movements
Remedial Social work

Module II: Ideologies of Social Work Practice in India
Advent of Missionary (Serampore Missionaries-1785 on wards); Gandhian Ideology and Sarvodaya Movement; Ambedkar Thoughts
Marxist Perspectives, Feminist Perspective; Social Movements and Development Perspectives;
Dalit Movements, Tribal Movements, Peasants Movements, Working Class Movements, Naxalite Movements, Women's Movements, Environment and Ecological Movements, Movements of Project Affected Persons
Contemporary Ideologies for Social Change: Neoliberalism and Globalisation – Post Modernism, Multiculturalism, Ideology of Non-Governmental Organizations.
Role of state in providing social welfare services

Module III: Evolution of Social Work
The basic principles and values of professional social work
Alignment of Scientific and Humanitarian Motives for Promoting Social Welfare
Evolution of professional social work in UK and USA
Evolution of Professional Social work in India
Marathi Mission Nagpada Neighbourhood House, Mumbai and Sir Dorabji Graduate School of Social Work, Mumbai

Module IV: Development and Social Analysis
Social Ideals of the Indian Constitution: Fundamental Rights; Human Rights
Socio-economic order and comparative economic system; Features, merits and demerits of Capitalism, Socialism and Mixed economy; Marxian political economy
Social Analysis: Significance; Tools and Methods; A Rights based Approach
A brief analysis of and Inter-linkages among socioeconomic, political and cultural systems in the Indian context

Module V: Dynamics of Development and Growth
Theories of Economic Development, Globalization and its impact on Developing Countries; Under-development and its causes
Contemporary Development Dynamics: A historical overview with reference to developing countries of Asia, Africa and Latin America, North-south relations, world trades, Multinational corporations and their influences on Third World economics.

Trends and counter trends in the global, political, economic, military, ecological and socio-cultural spheres.
Stages of growth theory:Structural internationalist theory, Privatization, liberalization and structural adjustment programmes - Role of international financial institutions.
Contemporary Concerns: Gender Issues: Gender discrimination; Gender based violence,
Issues of Vulnerable Groups: Street and Working Children; Persons with Disability; SC, ST, OBC and Minorities, HIV/ AIDS Infected and Affected,
Environmental Issues:Climate Change; Global Warming; Disasters, Social Work response to social problems

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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- Young, Pat, (1985). Mastering Social Welfare, Macmillan Master Series, London, Macmillan Education Ltd.
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BASICS OF SOCIAL WORK

Course Code: SCW4102 **Credit Units: 03**

Course Objective:

- To understand the concept of social work.
- To get acquainted with the approaches and ethics of social work.
- To understand the areas of social work.

Course Contents:

Module I: Concepts in Social Work and Social Work Practice

Objectives and Functions of Social Work; Methods of Social Work (Primary and Secondary methods of social work); Social Service; Social Services
Social Exclusion (marginalization, exploitation, oppression); Empowerment
Social Development, Social Change, Social Action, Social Activism
Human rights and Human Rights Perspective

Module II: Approaches

The Concept of Social Welfare; Welfare approach,
Remedial and Therapeutic Approach,
Social Development Approach
Conflict Oriented Approach

Module III: **The Profession of Social Work**

The Basic Values and Principles of Professional Social Work
Religious, Political and Utilitarian Values
Code of professional ethic
Professional status of Social work in India

Module IV: **Fields of Social Work**

Family & Child Welfare;
Women Centric Practice
Medical and Psychiatric Social Work
Criminology and Correctional Work

Module V: HRD and HRM

Social Welfare Administration
Urban and Rural Community Development;
Dalit and Tribal Community Organization
Livelihoods and Social Entrepreneurship

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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WORK WITH INDIVIDUALS AND FAMILIES: SOCIAL CASE WORK

Course Code: SCW4103 **Credit Units: 03**

Course Objective:

- To be introduced to the method of working with individuals
- To understand the various contexts and the dimensions of issues and problems that individuals face and critically analyze them
- To be exposed to the approaches of social work practice with individuals
- To acquire the skills and techniques of working with individuals
- To comprehend the diversity of practice settings

Course Contents:

Module I: Social Casework as a Method of Social Work

Concept and Definition of Casework; Adjustment and maladjustment; Historical development of Social Casework; Influence of psychoanalysis on casework.

Principles of Social Casework Practice: Individualization, Acceptance, Non-judgmental Attitude, Participation, Relationship, Purposeful expression of feelings, Controlled emotional involvement, Client Self Determination, and Confidentiality

Components of Casework: Person- client, significant others and collaterals; Problem- need, impaired social functioning; Place- agency, objectives, functions, policies and resources; Process- Study, assessment, intervention, evaluation, follow-up, termination.

Skills and Techniques of working with individuals and families: Supportive, resource enhancement and Counselling, Knowledge of resources (networking)

Essential qualities in the caseworker: empathy, non-possessive warmth, genuineness.

Self as a professional: Conflicts and dilemmas in working with individuals and families.

Module II: Approaches and Models to understand clients and their contexts

Psycho Social Diagnostic approach (Richmond), Supportive and Modificatory Approach (Hamilton), Classified Treatment method (Floence Hollies)

Psychoanalytical, Functional approach

Problem solving approach (Perlman), Crisis intervention (Rappaport), Competence based approach (Elleen Grabrill), Empowerment approach

Family intervention, Person-in-Environment Model

Transactional Analysis, Holistic approach, Eclectic approach.

Module III: Case work tools

Listening, Communication Skills, Rapport Building.

Interview, Observation, Home visit, collateral contacts, referrals

Records: Nature, purpose and principles of recording. Types of Recording: narrative, process, problem oriented record keeping. Case history taking Use of case work records as tool of intervention. Subjective –objective assessment plan (SOAP). Modeling, role-playing and confrontation

Case presentation as tool of professional development. Developing self awareness, JoHari window, dealing with stress and burnout

Module IV: Casework Process

Phase 1 – Exploration of person in environment

Phase 2 - Multidimensional assessment and planning, multidimensional intervention

Phase 3 – Helping: implementing intervention and goal attainment

Phase 4 – Termination and evaluation, follow up

Case worker - client Relationship; characteristics of professional relationship: transference, counter transference and resistance; sustaining the relationship; obstacles in client - worker relationship.

Module V:Application of Method

Types of problems faced by Individuals and families; individual differences and needs; Primary and secondary settings

Application of methods in family, women, and child welfare settings

Marriage Counselling centers

School settings

Medical and psychiatric settings
Correctional institutions and industry

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

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EE: End Semester Examination

References

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WORK WITH GROUPS: SOCIAL GROUP WORK

Course Code: SCW4104 **Credit Units: 03**

Course Objective:

- To understand of group work as a method of professional social work
- To learn theoretical approaches that inform group work practice.
- To gain insight into dimensions of group processes and group work practice
- To develop competencies for working with groups in diverse settings.

Course Contents:

Module I: Social groups and Group Work

Definition, Characteristics, and Importance Classification of Groups
Cooley, Sumner, MacIver & Page, Tosel and Rivas Theories of Group formation
Social Group Work – Concept, Historical development of Group Work, Values and Skills
Principles and Purpose of Group work

Module II: Theoretical approaches of group work practice

Psychoanalytic, Learning, Field, Social Exchange, Systems theories.
Stages of Group Development – Tuckman, Klien, Garland, Jones & Kolodny.
Models of social group work – Social goals, Remedial, Reciprocal models.
Programme development process, Programme Media.

Module III: Basic Group Processes

Sub-group, Group conflict, Group decision making,
Leadership in groups.
Group dynamics – Concept, and Areas – Communication and Interaction Patterns, Group Cohesion, Social Control Dynamics and Group Culture.

Module IV: Stages or Phases of Group work

Pre group formation, Beginning phase, Middle/Working phase and Termination phase, Follow up, Facilitation Skills and Techniques used in these Phases.

Module V: Group Work Practice in diverse settings

Disaster victims, Substance abusers, Alcohol Anonymous and elderly care – Role of group worker – Group psychotherapy, Group work Recording, Monitoring and Evaluation.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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RESEARCH METHODS IN SOCIAL WORK: QUANTITATIVE APPROACH

Course Code: SCW4105 **Credit Units: 03**

Course Objective:

- To develop an understanding about the scientific approach to human inquiry.
- To develop an appreciation of the value and approach in social work research in addressing problems in the field of professional practice.
- To develop attitudes and skills appropriate for social work research.
- To acquire the skills for data analyses and research writing

Course Contents:

Module I: Introduction

Meaning, purpose and Dimensions of Research, Paradigms of research: Quantitative and Qualitative Approaches; Types of variables; Levels of measurement

The main preoccupations of quantitative researchers: Measurement, Causality, Generalization, Replication.

Distinction between social research and social work research

Introduction to sampling, sampling error, types of probability sample, sample size, types of non-probability sampling

Module II: Analytic Techniques

Univariate analysis: Frequency tables, measures of central tendency, measures of dispersion

Bivariate analysis: Pearson's r, Spearman's rho

Inferential Analyses: measures of association, tests of significance (chi square, t-test,) analysis of variance (ANOVA)

Multivariate analysis: Regression; Factorial Ananlysis; Path Analysis

Module III: Social Work Research

Use of research in social work; Intervention research and practice based research, Difference between social science research and social work research.

Types of social work research: need assessment studies, situational analysis, monitoring and evaluation, impact assessment, policy research

Steps in Social Work Research: identification of problem; need assessment; selection of research design; baseline study; intervention; assessment of intervention effects/impact; data editing and classification, data processing and analysis, report writing.

Module IV: Research Designs in Social Work Research

Scientific Social Surveys and field studies

Experimental study design, logic of experimentation, causation and control, randomization and matching internal validity

Types of experimental design (pre-experiment, true experiment, quasi experiment, external validity)

Other research approaches supportive to social work research: Action research; Participatory research

Module V: Scaling Techniques and Psychometric worth of data

Objective tests and scales; Difference between test, scale, questionnaire and inventory,

Scaling Techniques: Likert, Thurstone, Guttman.

Reliability: The concepts of variance in and stability and consistency of measures; the maxmincon principle; Internal reliability; Inter-observer consistency. Types of reliability

Validity: Concept; Relationship between reliability and validity; Types of validity

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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FIELD WORK PRACTICUM-I

Course Code: SCW4107 **Credit Units: 04**

Course Objective:
The emphasis is on-learning skills which revolve around specific tasks where cause-effect relationships are understood, where the persons have problems but they are more victims of their life circumstances rattier than of pathology for which great knowledge of psychological and social dynamics would be required and lower order of skills of intervention is required to be utilized. The processes dealt with at the individual, group or community is specific. Show dynamics but do not require unusual skills of intervention. Administrative tasks are also specific, e.g. planning and programming around a specific service.

The specific objectives of field-work in the first semester may include:
Development of the knowledge of:
(a) Socio-economic background and the living condition of tire vulnerable groups and the problems confronting them.
(b) Problem-solving techniques utilized in the specific area of work of the organization where student is placed.
(e) The use of simple research procedures and maintenance of scientific data to assess problems/needs/agency.

Development of skills in:
(a) Work with individuals, families, groups and communities and seeing the need for an integrated approach to problem solving.
(b) Selecting and utilization of community resources.
(c) Work as a member of a team with other professional anti own discipline to, plan, organise and implement projects, programmes with emphasis cm the use of the process in problem-assessment and problem solving.

Development of professional attitudes, conducive to work with individual families group and communities, leading gradually to an awareness of self as a professional person. Efforts will be made to work out objectives in each semester for every student in field practicum according to the nature and services of the agency and his performance will be evaluated accordingly.

Methodology
Each student will engage themselves in interaction and observation of social phenomenon and processes in a subject/ field of their choice. Student will then present their findings in the form of a paper for seminar discussions. Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report :	40 marks
Viva-Voce :	30 marks
Internal Faculty and Interaction :	10 marks
Presentation/Daily Diary Report :	20 marks

SOCIAL WORK CAMP

Course Code: SCW4108 **Credit Units: 01**

Course Objective:
Urban/rural/tribal camps with duration of 7 to 10 days - provide opportunities to experience rural life, analyze rural dynamics, and observe the functioning of local self government and voluntary organizations. This experience aids peer participation in planning for activities for own group and those for local people. It also helps develop skills to carry out, evaluate, and report the experience.

Methodology

Student will then present their findings in the form of a paper for seminar discussions. Students will present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report:	40 marks
Viva-Voce:	30 marks
Internal Faculty and Interaction:	10 marks
Presentation/Daily Diary Report:	20 marks

Syllabus - Second Semester

SOCIAL POLICY AND SOCIAL WELFARE ADMINISTRATION

Course Code: SCW4201 **Credit Units: 03**

Course Objective:

- To gain knowledge of policy analysis and the policy formulation process.
- To acquire skills in critical analysis of social policies and development plans.
- To develop an understanding of social policy in the perspective of national goals as stated in the Constitution, particularly with reference to Fundamental Rights and the Directive Principles of State Policy.
- To critically understand the concept, content and process of social development.
- To develop the capacity to identify linkages among social needs, problems, development issues and policies.
- To locate strategies and skills necessary for social development and reinforce values of social justice, gender justice and equality.

Course Contents:

Module I: Social Policy and Constitution

Concept of social policy, sectoral policies and social services. Relationship between social policy and social development. Values underlying social policy and planning based on the Constitutional provisions (i.e. the Directive Principles of State Policy and Fundamental Rights) and the Human Rights. Different models of social policy and their applicability to the Indian situation.

Module II: Sectoral Social Policies in India

Evolution of social policy in India in a historical perspective.
Implementation of different sectoral policies related to education, health, social welfare, women, children, welfare of backward classes, social security, housing, youth, population and family welfare, environment and ecology, urban, rural and tribal development, and poverty alleviation.

Module III: Social Planning

Concept and scope of social planning;
Goals of social development. The popular restricted view of planning for social services;
The wider view as inclusive of all sectoral planning to achieve social goals.
Indian planning in a historical perspective; The Constitutional position of planning in India.
The legal status of the Planning Commission; Coordination between Centre and State;
Need for decentralization; Panchayath Raj; People participation.

Module IV: Social Development

Concept of social development; Current debates about development;
Approaches to development; Social Development Index and Social Progress Index; Social capital; Social development, community and reciprocity; Sustainable and equal society; Importance and challenges of a developing society;
Social development strategy of empowering people by transforming institutions

Module V: Procedures in registering an organization and its administrative processes

Societies Registration Act, 1860, Indian Trust Act, 1882, The Companies Act, 1956. Administrative Structure – Memorandum of Association, Bye laws, Constitution, Deed, Functions and responsibilities of governing board, committees and office bearers. Administrative structure of social welfare at the Central, State and Local level – Programmes of Central Social Welfare Board and State Social Welfare Boards.

Administrative Processes: Planning, Organizing, Staffing, Directing, Coordinating, Reporting and Budgeting (POSDCORB) – Mobilization of financial resources - Grants in Aid – Foreign Contribution Regulation Act, 1976 – Exemption from Income tax – Administrative skills – Writing reports, letters and minutes of meetings – Project formulation, implementation, monitoring and evaluation.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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SOCIAL WORK WITH COMMUNITIES

Course Code: SCW4202 **Credit Units: 03**

Course Objective:

- To gain knowledge about the primary method of social work practice with communities.
- To understand the techniques and approaches of social work practice with communities.
- To acquire the skill of working with communities.

Course Contents:

Module I: Community organization

History, Concept, Principles, Assumptions and Objectives
Community Organization and Community Development
Process of community organization: Study and Survey, Analysis, Assessment, Discussion, Organization, Action, Reflection, Modification and Continuation.

Module II: Models of community organization

Locality development, social planning, social action
Skills in community organization: Communication, Training, Consultation, Publicrelations, resource mobilization, liaisoning.
Approaches to community organization; General content, Specific content and Process objective.

Module III: Methods of community organization

Awareness creation, Planning and Organizing, Education, Networking, Participation, Leadership; Community organization with vulnerable communities; Migrants, Refugees, Slum dwellers and transgender.

Module IV: Social Action in Community Organization

Concept, Purpose, Strategies and Tactics in Social Action
Social Action as a method of social work
Approaches to social action; Paulo Friere, Saul Alinsky, Mahatma Gandhi and Ambedkar.

Module V: Concept of advocacy as a tool

Strategy for advocacy: Campaigning, Lobbying, Use of media and public opinion building in advocacy
Coalition and Network building, linking up protest movement with development work.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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PROJECT FORMULATION AND MANAGEMENT

Course Code: SCW4203 **Credit Units: 02**

Objectives

- To provide background information and tools to guide project identification and formulation.
- To demonstrate how project elements can be clearly specified and risks assessed and reduced.
- To set out how to link logical project design to work planning and budgeting.

Course Contents:

Module-I: Project Identification, Formulation and Design

Project – why, what – difference between project and program, Characteristics of project, Project Family tree, Classification of Project,

Project selection process, Feasibility and viability Analysis (technical, social, environmental and financial), Stakeholder Analysis, Logical framework analysis, Analysis of factors affecting sustainability

Project formulation and steps in formulation, Implementation planning, work plans, project design and network analysis, cost benefit analysis

Module-II: Project Management

Project Management (time, cost, quality, human resource, scope, project communication, risk management)

Project life cycle, Phases of project management, Project reporting, Waterfall versus cyclical project management

Tools and techniques for project management

Issues and challenges in project management: negotiation, conflict resolution, liaisoning and networking, management of resources

Project closure activities: Liabilities clearance, data backup, handover and disposal

Module-III: Budgeting and Financial Management

Participatory Budgeting

Gender Responsive Budgeting

Good Financial Practices

FDR, UC & SOE Preparation

Statutory Compliance with 12A, 80G, FCRA, TDS, etc.

Module-IV: Monitoring and Evaluation

Performance framework, Deliverables, Indicators, Data Management, Log Frame

Project Evaluation (ex-post & ex-ante): Tools for evaluation: Case studies of development project, Documentation of practices (success and failure)

Quality Control(Audit & Data verification), RDQA

Module-V: Documentation and Report writing

Project Appraisal (Social, technical, financial)

Project report (Technical & Financial)

Impact Analysis (Social, technical environmental and financial)

Project Closure

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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COMMUNITY ORGANIZATION AND SOCIAL ACTION

Course Code: SCW4204 **Credit Units: 03**

Course Objective:
To understand theory and practice of social work in community

Course Contents:
Module I: Community Work and Social Action
Definition of Community, Types of Communities. Difference between Rural and Urban Communities, Power Structure in the Community, Community Leaderships
Types of Community Leaders, Role of Community leaders in Community Development.

Module II: Strategies of Community Work and Social Action
Approaches to Community Work: Neighborhood Development, Systems and Radical, Politics and Community Work, Role of Community Organiser and Social Activist, Contemporary Social Action Interventions in India

Module III: Community Organization
Definition, Objectives, Community Organization as a Method of Social Work
Various approaches to Community Organization; General content approach, Specific content approach, Process content approach.
Community organization and Development

Module IV: Methods of Community Organization
Fact Finding, Planning, Group Decision Making, Conference and Committee Practice, Co-operative action negotiation, consultation, Methods of Conflict Resolutions, Resource Mobilization, Administration, Recording Evaluation, Skill required for Community Organization.

Module V: Application of Community Organization Methods
Application in Slums, Rural areas, during Flood, Famine and War.Community Organization for prompting Public Health and Family Welfare.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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RESEARCH METHODS IN SOCIAL WORK: QUALITATIVE APPROACH

Course Code: SCW4205 **Credit Units: 03**

Course Objective:

- To understand various styles of interpretation of qualitative data.
- To analyze the relative appropriateness of different analysis approaches for a particular qualitative study.
- To apply one or more analytic approaches to data they have been collected and write a report.
- To understand ethical issues for qualitative research.
- To manage qualitative data files effectively to ensure ease of use and participant confidentiality.
- To use the basic and intermediate functions of a computer software program for coding of textual data.

Course Contents:

Module I: Introduction

Differences between Qualitative and Quantitative research
Nature and traditions of qualitative research: Naturalism, Ethnomethodology, Emotionalism, Post-Modernism,
Deductive and Inductive approaches to data collection
Paradigmatic issues in Qualitative research

Module II: Qualitative Validity

Reliability and Validity: Types and procedures
Criteria for evaluating the worth of qualitative research: Credibility, Transferability, Dependability, Conformability. Triangulation
Collaborative Enquiry

Module III: Theoretical Background for Qualitative Research

Phenomenology: Realistic and Constitutive Phenomenology, Existential analysis,
Constructivism: Social constructivism and Psychological Constructivism
Metaphysics: Existentialism
Grounded theory: Goals and Perspectives, Methods: Axial coding and selective coding

Module IV: Methods of Data Collection

Interview: Purposes; Stages; Types: Structured, Semi-structured and Unstructured; Advantages and disadvantages associated with each; Interviewing Skills;
Focus group: Uses, recording and Transcription, size of groups, Limitations
Discourse analysis; Narrative analysis; Rhetorical analysis; Conversational analysis
Ethnography and participant Observation: Forms; Logistics; Advantages and disadvantages; Confidentiality; Taking and expanding field notes; Documenting; Being an effective participant observer
Documents as sources of data: Personal, Public, Organizational, Mass-Media, visual and virtual
Qualitative content analysis; mixed methods analysis

Module V: Use of Computers and Software

Qualitative Data Analysis (QDA) Softwares: Computer Assisted Qualitative Data Analysis Software (CAQDAS); MAXQDA
Defining Variables; Developing coding systems; Tabulating Data
Quantification in qualitative research: Thematic, Qausi-Quantification in qualitative research
Data Analysis and knowledge management

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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SKILL BASED PROJECT

Course Code: SCW4206 **Credit Units: 01**

Course Objective:
The aim of the skill based project is to help learners acquire specific skills to deal with situations encountered during practice and acquire skills for intervention. It provides learner with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

These may be for problems/ concerns, issues or situations like work with alcoholics, HIV/AIDS affected persons, adolescents for life skills development, youth for leadership development and couples for marital relationship and enrichment work with elderly. The skill based project is primarily to enhance skills/ develop new skills for practice in specific situation, specific problems and issues.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report Power Point Presentation & Viva

75 marks 25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1- Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2- Acknowledgement: Various organizations and individuals who might have provided assistance /cooperation during the process of carrying out the study.

3-Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4- Body of the Report: The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5- Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6- Annexures: Questionaires (if any) relevant reports etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration: Suitability of the topic.
Relevance of the topic.
Time available at the disposal.
Feasibility of data collection within the given time limit.
Challenges involved in the data collection (time & cost involved in the data collection, possibility ofgetting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario.
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

FIELD WORK PRACTICUM-II

Course Code: SCW4207 **Credit Units: 04**

Course Objective:
The emphasis is on-learning skills which revolve around specific tasks where cause-effect relationships are understood, where the persons have problems but they are more victims of their life circumstances rattier than of pathology for which great knowledge of psychological and social dynamics would be required and lower order of skills of intervention is required to be utilized. The processes dealt with at the individual, group or community is specific. Show dynamics but do not require unusual skills of intervention. Administrative tasks are also specific, e.g. planning and programming around a specific service.

The specific objectives of field-work in the second semester may include:

1. Development of the knowledge of:
   (a) Socio-economic background and the living condition of tire vulnerable groups and the problems confronting them.
   (b) Problem-solving techniques utilized in the specific area of work of the organization where student is placed.
   (e) The use of simple research procedures and maintenance of scientific data to assess problems/needs/agency.

2. Development of skills in :
   (a) Work with individuals, families, groups and communities and seeing the need for an integrated approach to problem solving.
   (b) Selecting and utilization of community resources.
   (c) Work as a member of a team with other professional anti own discipline to, plan, organise and implement projects, programmes with emphasis cm the use of the process in problem-assessment and problem solving.

3. Development of professional attitudes, conducive to work with individual families group and communities, leading gradually to an awareness of self as a professional person.
   Efforts will be made to work out objectives in each semester for every student in field practicum according to the nature and services of the agency and his performance will be evaluated accordingly.

Methodology
Each student will engage themselves in interaction and observation of social phenomenon and processes in a subject/ field of their choice. Student will then present their findings in the form of a paper for seminar discussions. Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report :	40 marks
Viva-Voce :	30 marks
Internal Faculty and Interaction :	10 marks
Presentation/Daily Diary Report :	20 marks

Syllabus - Third Semester

SOCIAL JUSTICE AND EMPOWERMENT

Course Code: SCW4302 **Credit Units: 03**

Course Objective:

- To understand the concept of social justice and acquire information on the legal rights of people.
- To develop an understanding of the legal system and get acquainted with the process of the legal system with emphasis on functioning in India.
- To understand the role of the police, prosecution, judiciary and correction.
- To gain insight into the problems faced by the people belonging to different strata of society, in interacting with this system.
- To develop an understanding of the processes and problems of public interest litigation and legal aid to marginalized.

Course Contents:

Module I: Social Justice
Meaning and Concept; Social legislation: Definitions and concept. Social justice as an essential basis of social legislations; Social legislations in a welfare state with special reference to India.
Rights: Concept and definitions; Types of Rights; Rights of women and children; Rights of Scheduled Castes and Scheduled Tribes; Rights of accused and offender under Constitution of India, Indian Penal Code and Criminal Procedure Code.

Module II: Division of Law
Substantive Law and Procedural Law. Legislations pertaining to Social Institutions: Marriage, divorce, maintenance of spouse, adoption.
Legislations for prevention of Crime and Deviance: Indian Penal Code (relevant chapters on Offences against Public Tranquility, Public Health, Safety, Convenience, Decency and Morals, Offences relating to Religion, Offences affecting the Human Body, Offences relating to Marriage and Cruelty).
Legislations pertaining to women

Module III: Criminal Justice System in India
Objectives of Criminal Justice System.
Police: Structure, powers and functions and their role in maintaining of peace and order in the society.
Prosecution: Meaning, structure and role in criminal justice; Trial participation.
Administration of criminal justice system; Understaffed police and judiciary, and lack of political will as ailments of criminal justice system in India

Module IV: Judicial System in India
Constitution of Supreme Court and High Court: Powers and functions.
District and Subordinate Courts: District Sessions Court, Magistrate Courts, Family Courts, Tribunals, Fast Track Courts, Lok Adalats.
Salient features of judicial system in India.
Judicialactivism.

Module-V: Correction and Correctional Laws
Corrective measures as per Criminal Procedure Code, Probation of Offenders Act, Juvenile Justice (Care and Protection of Children) Act. Legal Aid: Concept of legal-aid, history of legal-aid, persons needing legal-aid, legal-aid schemes.
Public Interest Litigation: Meaning, Concept, Process and Problems.
Right to Information Act- Provisions and implementation.
Role of Social Worker: Social Work intervention, need, methods.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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COMMUNICATION AND COUNSELLING

Course Code: SCW4303 **Credit Units: 03**

Course Objective:

- To understand the meaning and importance of communication in day-to-day life.
- To identify salient features of effective interpersonal communication and interviewing.
- To develop holistic understanding of Counselling as a tool for help.
- To acquire knowledge of various approaches: their theoretical under-pinnings for goals, values, processes and techniques.
- To develop and practice skills of communication and interviewing and applying it in real life situations.

Course Content:

Module I: Communication: Meaning and importance

Basics of Communication: Process, components, types Verbal and nonverbal communication; Interpersonal and Interpersonal communication; Education and communication for national development.

Interviewing: Objectives, principles of interviewing, interviewing skills: listening, reflection, questioning, confronting.

Formal verbal communication in seminars, conferences, lectures, group discussion, panel discussion, symposium, workshop, role playing, simulation exercises

Written communication: reports, letters, e mails, article/essay, project report.

Module II: Visual aids in communication

Posters, notice boards, flip charts, charts, flash cards, photographs, pamphlets, slide shows.

Mass Communication: Television, exhibition, newspapers and magazines, advertisements, radio, film, VCD/ DVD, social media and internet.

Impact of mass communication on society, family, marriage and child development.

Communication Analysis and Planning: Planning and executing a communication campaign on an issue using various methods of communication.

Module III: Counselling

Nature, goals and areas of counselling; ethics in counselling; cultural sensitivity in counselling; intentional Counselling and interviewing.

Counselling Situations: Developmental, preventive, educative, facilitative.

Process and stages of Counselling; Qualities of an effective counselor: Empathy, genuineness and non-possessive warmth

Counselling Skills: Building rapport, mind skills, feeling skills, relationship skills.

Module IV: Approaches to Counselling

Rogers Person-centeredApproach

Beck's Cognitive Therapy; Ellis' Ratioal Emotive Behaviour Therapy

Behaviour Counselling and Therapy: common principles, methods based on classical conditioning, methods based on instrumental conditioning

Gestalt Therapy: assumptions, games and exercises; Existential approaches

Eclectic model; Indigenous Approach: Mindfulness, meditation, yoga, philosophy of *Nishkam Karma* and Non-Doer.

Module V: Group and Relational Approaches

Couple and Family Counselling: Issues related to dysfunctional communication, roles and boundaries in the family; Intervention strategies

Group Counselling: Process, advantages and disadvantages

Counselling in family Counselling centers, family courts, counselling bureau, vocational Counselling centers, mental health centers, child guidance clinics, correctional institutions, de-addiction and rehabilitation center, educational institutions.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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FIELD WORK PRACTICUM-III

Course Code: SCW4304 **Credit Units: 04**

Course Objective:
The emphasis is on-learning skills which revolve around specific tasks where cause-effect relationships are understood, where the persons have problems but they are more victims of their life circumstances rattier than of pathology for which great knowledge of psychological and social dynamics would be required and lower order of skills of intervention is required to be utilized. The processes dealt with at the individual, group or community is specific. Show dynamics but do not require unusual skills of intervention. Administrative tasks are also specific, e.g. planning and programming around a specific service.

The specific objectives of field-work in the third semester may include:

1. Development of the knowledge of:
   (a) Socio-economic background and the living condition of tire vulnerable groups and the problems confronting them.
   (b) Problem-solving techniques utilized in the specific area of work of the organization where student is placed.
   (e) The use of simple research procedures and maintenance of scientific data to assess problems/needs/agency.

2. Development of skills in :
   (a) Work with individuals, families, groups and communities and seeing the need for an integrated approach to problem solving.
   (b) Selecting and utilization of community resources.
   (c) Work as a member of a team with other professional anti own discipline to, plan, organise and implement projects, programmes with emphasis cm the use of the process in problem-assessment and problem solving.

3. Development of professional attitudes, conducive to work with individual families group and communities, leading gradually to an awareness of self as a professional person.

Efforts will be made to work out objectives in each semester for every student in field practicum according to the nature and services of the agency and his performance will be evaluated accordingly.

Methodology
Each student will engage themselves in interaction and observation of social phenomenon and processes in a subject/ field of their choice. Student will then present their findings in the form of a paper for seminar discussions. Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report :	40 marks
Viva-Voce :	30 marks
Internal Faculty and Interaction :	10 marks
Presentation/Daily Diary Report :	20 marks

SUMMER INTERNSHIP EVALUATION

Course Code: SCW4335 **Credit Units: 06**

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organization)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.
In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE
The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. ***Item scan be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.***

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include ***five sections*** in the order described below.

1. **The Title Page –** An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content –** An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5.**Appendices -** Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT
The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to selectany one aspect of the organization and prepare a research report on it).The lay out of the report should be as per the standard layout prescribed by the organization wherein the student

undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

- **Title or Cover Page**.
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgements**.
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract**
  A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.
- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of

the thesis and any problem that have arisen that may be useful to document for future reference.

- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation:
(based on Internship File and the observations of the faculty guide/ supervisor) 30%

Feedback from Company/ Organization: 10%

Final Evaluation:
(Based on Internship Report, Viva/ Presentation) 60%

HUMAN RESOURCE DEVELOPMENT AND EMPLOYEE WELLNESS

Course Code: SCW4305 **Credit Units: 03**

Course Objective:

- To develop multi facets of the personality and to build self confidence. To develop a spirit of continuous learning and innovation.
- To strengthen the competency base of individuals, teams and organization and also familar with the organizational culture.
- To understand and further the organization culture.
- To appreciate the importance of bottom-line focus to the Human Resource function and trend toward HR Accountability.
- To understand the various approaches to and techniques of measuring HR issues.
- To create awareness of different types of information systems in an organization so as to enable the use of computer resources efficiently, for effective decision- making.

Course Content:

Module I: Human Resource Development (HRD)

Concept, origin and needs for HRD; Overview of HRD as a Total system; Approaches to HRD; human capital approach; social psychology approach and poverty alleviation approach
HRD and its dimension
Competency Mapping.

Module II: HRD Interventions

Performance Measurement Systems: Fundamental issues. Feedback sessions.
Organizational goal setting process, Key Result Area (KRA) and Key Performance Indicator (KPI),Coaching, Mentoring, career planning, career development, reward system, quality of work life.
HRIS: Computers and computer based Information Systems. Measuring HR: Changing role of HR, HR as a strategic partner, the need for measuring HR.
Approaches to measuring HR: Competitive Benchmarking, HR Accounting, HR Auditing, HR Effectiveness Index, HR Key Indicators, HR MBO (Management by Objectives).

Module III: Instructional Technology

Learning and HRD; Building Learning Organization; Learning as intellectual capital, Measuring learning
Architecting a learning organization, Organizational Learning, models and curriculum
Factors and principles of learning; group and individual learning; HRD trends; Behavioural Sciences; Transactional Analysis Concepts of continuous learning, Behaviour modeling and self-directed learning
Evaluating the HRD effort: Data gathering; analysis and feedback; HRD experience in Indian organizations; future of HRD - Organization culture and development.

Module IV: Talent Development

Concept and importance; Training Need Analysis, process of training, designing and evaluating training and development programs. Use of information technology, Types and Methods of Training: Training within industry (TWI), External training: on and off the job; Training methods; lecture, incident process, role play, structured and unstructured discussion, in-basket exercise, simulation, vestibule, training, management games, case study, programmed instruction, team development, and sensitivity training;
Review of training programs.

Module V: Employee Wellness

Concept, philosophy, principles and scope; Importance and relevance of wellness programs, Role of Welfare Officer as per the Factories Act 1948. Relevance - with reference to Accidents, Absenteeism, Alcoholism, Domestic Violence: Preventive and remedial measures. Employee Counselling. Role of Counselor in Organizations. Corporate Social Responsibility (CSR): CSR as a business strategy. Environmental management systems ISO 14001, ISO 26000: Social responsibility guidance standard, environmental impact assessment.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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- Cowling, Alan and James Philip TheEssence of Personnel Management and Industrial Relations, New Delhi, Pentice-Hall of India Pvt., Ltd.
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- Prasad, L. M. 1996 Organisational Behaviour, New Delhi, S. Chand & Co.
- Rao, T. V. 1990 HRD Missionary, New Delhi. Oxford & IBH.
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- Rudrabasavaraj, M. N. 1984 Human Factors in Administration, Bombay: Himalaya Publishing House,
- Sahni, P. and Sharma, K. K. 1988 Organisational Behaviour, New Delhi: Deep and Deep Publications.

MENTAL HEALTH AND PSYCHIATRIC SOCIAL WORK

Course Code: SCW4306 **Credit Units: 03**

Course Objective:

- Understand the concepts of mental health and mental illness.
- Understand the signs and symptoms, etiology, diagnosis and treatment of mental health problems.
- Understand different services for the care of mentally ill.
- Understand historical background of psychiatric social work in India and abroad.
- Understand the nature of psychiatric social work services and relevance of team work.
- Understand the nature of collaboration with voluntary organizations for the welfare of mentally ill.
- Identify the issues related to psychiatric social work department in hospitals and community mental health settings.

Course Contents:

Module I: Mental Health

Concept of health and illness; WHO's definition of Health; Mental health and mental illness; Deficit and competence based models of mental health; Classification of Mental Disorders: International Classification of Mental Disorders (ICD) and Diagnostic ans Statistical Manual of Mental Disorders (DSM) – 5.

Symptoms, etiology, diagnosis, prognosis and management of –Neuroses, Psychoses, Psycho physiologic disorders, Personality disorders, Psychiatric disturbances in children and adolescents, Organic psychotic conditions, Mental retardation.

Module II: Introduction to Psychiatric Social Work

Meaning and Scope: Historical background of psychiatric social work in India and abroad; Reasons for its development as a specialty.

Application of social work methods and other related techniques used in the field

Multi-disciplinary approach and team work in mental health care Problems of hospitalization; Impact of mental illness on the patient, family and community.

Module III: Practice of Social Work

Importance of home visit and visit to the place of work

Role of family in the treatment of mentally ill

Preparing the family and community for the return of the affected individual

Follow-up

Module IV: Care of mentally ill:

Day-care centre, night-care centre, half-way-home, sheltered workshop, Occupational therapy units;

Role of voluntary organizations, governmental-agencies and paraprofessionals in the welfare of mentally ill.

Role of social worker in mental health centers, departments of psychiatry, general hospitals, child guidance clinics, community mental health units, correctional institutions, industries, and family welfare centers.

Role of social worker in the management of substance abuse. Educational avenues in psychiatric social work; Research avenue in the field of mental health for social workers.

Module V: Organization of psychiatric social work

Psychiatric Departments: Functions and collaboration with other departments.

Community mental health and social work, NMHP, Innovations like Satellite clinics, district mental health programme etc.

Rehabilitation and Acts: Occupational therapy - Principles and practice - Psychosocial rehabilitation.

Mental Health Act, 1987.

The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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- Hudson, Barbara L. (1982). Social Work with Psychiatric Patients, London: Macmillan.
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- Jordan, William. (1972).The Social Worker in Family Situations, London: Routledge and Kegan Paul.
- Mishne, Judith (Ed.) (1980). Psychotherapy and Training in Clinical Social Work, New York: Gardner Press.

SOCIAL WORK WITH FAMILIES AND CHILDREN

Course Code: SCW4307 **Credit Units: 03**

Course Objective:

- To strengthen the professional competence of Social work Practice with families and children.
- To gain understanding of type of practice settings working with families and children.
- To understand the role of the profession and the stakeholders in the welfare of families and children.

Course Content:

Module I: Social Work with Families and Children

Working effectively with children and families, Values and Ethics in social work with children and families, Family as a Client System, Strengthening Family structure and Communication.

Module II: Process of Intervention

Social Worker-client relationship, Social Study, Assessment, Goal Setting, Contracting, Intervention; Development of practice skills: Conceptual skills, Interviewing skills – Informational interview, Diagnostic/Assessment interview, Therapeutic Interview, Recording skills, Evaluation.

Module III: Social Work Practice in different settings

Social Work interventions for children in different settings: school settings, correctional settings, institutionalized children, community based interventions, children in care and protection, adoption centres, street children, children abusing substances, children in clinical settings, Social work interventions for families in different settings: Family Counselling centres, short stay, Respite care, Destitute homes, Clinical settings.

Module IV: Role of the Social Worker

Role of the Social Worker while working with children and families**:** Case worker, Group Facilitator, Community Organizer, Case Manager, Enabler, Reformer, Project Manager, Researcher, Activist, Advocacy and Lobbying, Sensitisation, Campaigning, Social Audits, Trainer, Monitoring and Evaluation, Documentation, Fund Raising, Resource Mobilisation, Policy Planning, Catalyst, Change maker, Role Model, Community Organiser, Coordinator, Enabler, Reformer, Facilitator, Volunteer

Module V: Stakeholder's Participation

State, Global Community, NGO's, Institutions of National Importance, Judiciary, Bureaucrats, Policy Makers, Social Activist, Educational Institutions, PRI's, Self Help Groups, Community Leaders, Religious Institutions, Gram Panchayats, Police, Health Workers, Grassroot Level workers, Anganwadi Workers, ASHA's, Donors, Volunteers, Youth, Civil Society Organisation, Community Based Organisations.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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CORRECTIONAL ADMINISTRATION AND SERVICES

Course Code: SCW4308 **Credit Units: 03**

Course Objective:

- To acquaint with the correctional institution and non-institutional programmes.
- To understand the different services for juvenile, young and adults offenders and also to understand the legal provisions and procedures for their assistance.
- To understand the role of custodial staff in the process of correction and rehabilitation.
- To understand the structure, function, treatment and facilities provided by the institutions.

Course Content:

Module I: Institutional systems
Introduction to correctional administration. History of Correctional Administration in India: Concept, objectives and functions of Correctional administration.
Institutional protection for children and young offenders: Juvenile Justice (Care and Protection of Children) Act -2002, 2005.
Observation Home, Juvenile Homes for Boys and Girls and their functions. District Shelter for boys and girls and their functions.

Module II: Institutional Treatment for Released Offenders and Convicts
Prison: Historical development of prison system; Indian Prison Act, Prison Manual (Haryana).
Prison administration, prison Labour, prison discipline and prison education; Pre-release programs; Prisoners' Welfare Board.
Open-air prison: Historical development of open-air prison system, organization and administration.

Module III: Non-institutional systems
Probation: Historical development of probation system, principles and procedure.
Parole: Historical development of parole; functions and powers of Parole Board; Conditions under the Prison Manual. Indian Penal Code, provisions on Parole.
Pre-release preparation of the parolee

Module IV: After care services
Legal provision for establishing social institution.
Provision for assistance to released prisoners: Role of voluntary organization, corporate bodies and the state in the rehabilitation.
Prevention of Immoral Traffic Act: Its objectives; State Home for Women (Sthrinikethana)
Citizen committees, Police help-line.

Module V: Social work intervention
Scope of social work intervention in prisons.
Role of social worker in the prison administration.
Social work practice in correctional services: Nature, scope and challenges
Comprehensive assessments: of offenders, their families, and communities to identify offenders' needs, strengths, ability to cope and any support networks they may require.
A career in social work at correctional services

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Ahuja Ram, (2006). Criminology: New Delhi Rawat Publications
- Afzal Qadri, S.M, (2005). Ahmad Siddiqiue's : Criminology: Problems & Perspectives, Lucknow, Eastern Book Co.
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- Sethna, M. J, (1964). Society and the Criminal, Bombay, Kitab Mahal.
- Sirohi, J.P.S, (1983). Criminology and Correctional Administration, Allahabad, Allahabad Law Agency.

POPULATION AND ENVIRONMENT

Course Code: SCW4309 **Credit Units: 03**

Course Objective:

- To understand characteristics, determinants of population growth.
- To examine population policy, plan and initiatives.
- To understand inter-relatedness of human life, living organisms and environment.
- To examine utilization and management of resources.
- To develop skills to participate in activities related to the two areas.

Course Content:

Module I: Characteristics of population

Population, determinants of growth. global concerns - Characteristics of Indian Population – Distribution by age, sex, literacy and occupation – Fertility trends - Birth and death ratio. Population Policy, World Action Plan, Population Policy of India- Implementation; Initiatives – Government and NGO.

Module II: Family Planning

Objectives, scope, methods, implementation, mechanisms and progress.Concept and Scope of Population education, family life education, sex education, and family planning education.

Module III: Population and Environment

Interrelatedness of human life, living organisms; Environment and natural resource – Environment, lifestyle, degradation. Environment management, maintaining, improving, enhancing – Current issues of Environment

Module IV: Natural Resources and Diversity

Utilisation and management – Forest, land, water, air, energy sources - Pollution - Sources, treatment, prevention - Soil, water, air, noise - Waste matter - disposal, recycling, renewal, problems, issues – Programmes for forest, land and water management.

Module V: Environment Protection

Laws and Role of Social Worker: Acts related to environmental protection – Forest conservation- Water pollution – Standards and tolerance levels – Unplanned urbanization- Environmental movements in India Role of NGOs in Environmental issues – Government agencies in environmental protection – Social work initiatives at different levels.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Cassen, R.H 1978 India Population, Economy and Society, London: Macmillan.
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- Seshadri and Pandey, J (Eds.) Population Education, A Natural Source 1991 Book, New Delhi: NCERT.
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MANAGEMENT OF DEVELOPMENT AND WELFARE SERVICES

Course Code: SCW4310 **Credit Units: 03**

Course Objective:

- To understand the overall environment and its impact on the nature, structure and development of organizations in corporate, public and voluntary sectors in the context of social work profession.
- To understand policies and procedures involved in establishing and maintaining human service organizations.
- To acquire skills to network and participate in the management of resources human, material and environmental.
- To develop skills to participate in management of programmes, as a part of the inter-disciplinary team and initiate as well as develop new programmes.
- To develop ability to analyze the practices applied in specific settings.

Course Contents:

Module I: Social Services

Need for welfare and developmental organisations, Factors determining social welfare programmes, Development and Welfare organizations' response to societal needs; role of state, voluntary and corporate sector. Management services: Types of settings, organizational characteristics like origin, nature, size, structure, and design, organizational climate and impact of sociopolitical environment.
Management process: Vision, Planning, Organizing, Directing, Staffing, Coordination, Reporting, Budgeting. Establishment: Registration, different types of legislations, legal status, constitution, rules and procedure, goals - Financial resources: Organizational Budget, Sources of finance, Fund Raising, Records, Audit.

Module II: Physical Structure and Infrastructure

All activities related to acquiring, hiring and maintaining importable structure and infrastructure, maintenance of premises and daily upkeep. Enhancing the involvement and the potential of people in organization's executive boards, committees; professionals and other staff-relationship, communication, team work, and facilitating team building, supervision, and participation in training.

Module III: Programme Development

Programme management: long term, short term, and Documentation. Project proposals based on felt-needs, nature of resources, eligibility criteria, records, evaluation and research.
Impact analysis - Qualitative and quantitative

Module IV: Public Relations

Public relations need and its promotion by all in the organisation. Representing the organization, networking, public, corporate and voluntary sector, resource building, accountability, transparency, use of media for publicity.

Module V: Change and its Management

Understand and manage change, innovation in a rapidly changing social environment: for policy programmes and structure. Organizational understanding: Conflict, conflict resolution, creating positive climate.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Choudhari, D. Paul. (1983). Social Welfare Administration, Delhi: Atma Ram and Sons.
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- Slavin, S. (Ed.) ().1978 Managing Finance, Personnel and Information in Human Services, New York: Howorth Press.
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- Weiner, M. (1982). Human Service Management, Illinois: The Dorsey Press.Young,
- Pat (1985). Mastering Social Welfare, London, Macmillan Master Series, Macmil1an Education Ltd.

HUMAN RIGHTS AND SOCIAL WORK PRACTICE

Course Code: SCW4401 **Credit Units: 03**

Course Content:

Module I: Human Rights

Definition and Classification

Civil and Political Rights, Socio Economic and Cultural Rights. Universal Declaration of Human Rights

Similarities and Differences between Human Rights and Fundamental Rights

Module II: Human Rights Acts and Institutions

Indian Constitution and Relevant Articles relating to HR. The protection of Human Rights Act 1993. Structure and Function of National Human Rights Institutions National HR Commissions National SC/ST Commissions National commission for Women National commission for Minorities State Human Rights Institutions State HR commissions State commission for women State commission for Minorities.

Module III: Human Rights in the Context of Specific Population

SC/ST, Religious Minorities

Physical, Visual and Mentally Handicapped.

HIV/AIDS victims

Refugees, War victims

Prisoners, Custodial Violence,

Women and Children, Senior Citizens

Work situations

Module IV: Social Policy

Definition, need, evolution and constitutional base; Sources and instrument of social policy.

Social Planning and Social Development: Meaning of social planning, community planning and community participation. Planning machineries at the State and National levels

Five year plans and Social development; Concept and indicators; social change and social development in India.

Module V: Social Legislations

Salient Features of Child Labour Act, Right To Information Act, Suppression of Immoral Traffic Act and Prevention of Immoral Trafficking. Domestic Violence Act**.**

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

- Rebecca J. Cook, (1993). Human Rights of Women: National and International Perspectives, University of Pennsylvania Press.
- by James J. Lynch, Celia Modgil, Sohan Modgil,(1992). Human Rights, Education and Global Responsibilities Education, Taylor & Francis.
- Chauhan,O. P,(2004). Human Rights: Promotion and Protection, Anmol Publications Pvt. Ltd.
- Adamantia Pollis, Peter Schwab,(2000). Human Rights: New Perspectives, New Realities, Lynne Rienner Publishers.

GENDER AND DEVELOPMENT

Course Code: SCW4402 **Credit Units: 02**

Course Objective:

- Understand issues related to development and empowerment of women in India.
- Understand the efforts at the International, National state and local levels for development and empowerment of Indian women.
- Develop understanding and contribution of women's movements in development and empowerment of women.
- Skill of using different evaluation techniques for the development of field projects, schemes.
- Understand the value of training, advocacy, campaigns and network in the field of gender and development

Course Content:

Module I: Status of women in India

Historical review of status of women in Indian society; Status of women in family and religion; Educational and health status of women; Political, economic and legal status; Regional religion, caste, class variations in women's status in India.

Women's Movements: International women's movements; Women's movements in India in 19th and early 20th century; Nationalist movement; Post-1975 campaign

Gender equality and empowerment; Governmental efforts for women's development; National and State level women's Policy.

Module II: Situation of girl child in India

Sex determination, feticides and infanticide; Sex ratio and mortality; Malnutrition and health; Education

Early marriage and teenage pregnancies.

Problems of women: Physical and mental health problems; Dowry; Domestic violence; Divorce and dissertation; Rape, sexual abuse, sexual harassment.

Module III: Women and Law

Rights guaranteed under constitution; Family laws: marriage, divorce, maintenance, adoption

Laws related to offences against women: Sati, Property and Succession; Domestic Violence, Rape, Trafficking, Prenatal Diagnostic Test, and Sexual Harassment at work place

Provisions for empowerment; Family Courts, Mahila Adalat, National and State Commissions;

Special Cells for women; All women police stations

Module IV: Welfare and Development Organizations

Nature, characteristics and functions of welfare and development organizations in the context of gender development; Staff structure and staff policies in welfare organizations; The issue of attrition in welfare organizations; Team building in welfare organization. Administration of Welfare Organizations Administrative set up of Ministry of Women and Child Development at the central, state and district levels

Vision, mission, objectives, functions, systems and procedures at each level.

Module V: Training of Personnel

Need for training, types of training; Adult learner and principles of adult learning; Training cycle: Designing contents, implementation and evaluation of training

Participatory training methodology tools: and techniques; Trainer effectiveness: qualities and skills.

Strategies for advocacy, planning and use of media and Internet for advocacy

Networking for gender development; Use of networks at national, state and local levels; Role of public interest litigation, court judgments, National Human Rights Commission and other commissions.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

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SOCIAL WORK WITH URBAN, RURAL AND TRIBAL COMMUNITIES

Course Code: SCW4403 **Credit Units: 03**

Course Objective:

- To develop an understanding of Urban, tribal and rural communities.
- To understand the characteristics and problems of urban, tribal and rural communities.
- To acquire knowledge about the contribution of Governmental and Nongovernmental Organisations to urban, tribal and rural development.
- To develop an understanding of the functions of Panchayath Raj Institutions .Gain knowledge about the application of social work in tribal and rural development programmes.

Course Contents:

Module I: Tribe in Relation to Caste and Nation

Nature and Characteristics of Primitive Cultures: Tribes in India and their ecological distribution.
Important tribal groups in India
Emerging Trends in Tribal Social Institutions: Family and Kinship Systems, Jati Structure, Economic Structure, Political organizations.
Characteristics of Tribal Society: Economic, Social, Political and Cultural Problems of Tribal Life.

Module II: Government Programs for Tribal Societies

Post Independence Programs and their Impact on Tribal Societies Programmes of Voluntary Agencies and their Impact on Tribal Societies.
Analysis and Assessment of Tribal Communities; Special Problems of the Tribals in a different areas.
Social Work Practice in Tribal Development: Community organization as a method of intervention, Participatory Rural Appraisal (PRA), Logical Framework Approach/Analysis (LFA), Scope of other techniques of intervention in tribal community development.

Module III: Rural Society and Poverty

Historical perspective: Dynamics in the village society; Caste/class relationships; Control and Power, Conflict and Integration. Poverty in the rural context; Nature and manifestations.
Analysis of Basic Problems: Issues faced by the rural poor such as Indebtedness, Bonded labour, Low wages, Unemployment, Underemployment, and other forms of exploitations.
Current Rural Development Programs in India: Council for the Advancement of People's Action and Rural Technology (CAPART) and other Rural Development Statutory Bodies. Panchayat Raj System in Indian states and its role in rural and tribal development.
Role of social worker in tribal and rural development programs.

Module IV: Perspectives on Urban Community Development

Urban Economy: Urban economy in the context of land, labor, capital, technology, and organizations.
Concept and Meaning of Development: Basic Elements and Dimensions with an Urban Focus.
Economic Development in the Urban Context: Industrialization and Employment generation Different service sectors.
Infrastructure facilities: Road, Energy and Finance
Development of cities: production, distribution and the present shift; Economics of local Government – Revenue and tax collection and distribution for Development.

Module V: Urban Development and Civic Administration

Growth of High-rise as well as slums; Slum–city relationship and its problems
Role of civic administration
Voluntary Organizations (NGOs) and urban dwellers
Role of law and town planning in urban development.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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- Patel, M. L. (1994). Tribal Development without Tears, New Delhi, Inter-India Publications.
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FIELD WORK PRACTICUM-IV

Course Code: SCW4404 **Credit Units: 03**

Course Objective:
The emphasis is on-learning skills which revolve around specific tasks where cause-effect relationships are understood, where the persons have problems but they are more victims of their life circumstances rattier than of pathology for which great knowledge of psychological and social dynamics would be required and lower order of skills of intervention is required to be utilized. The processes dealt with at the individual, group or community is specific. Show dynamics but do not require unusual skills of intervention. Administrative tasks are also specific, e.g. planning and programming around a specific service.

The specific objectives of field-work in the Fourth semester may include:

1. Development of the knowledge of:
   (a) Socio-economic background and the living condition of tire vulnerable groups and the problems confronting them.
   (b) Problem-solving techniques utilized in the specific area of work of the organization where student is placed.
   (e) The use of simple research procedures and maintenance of scientific data to assess problems/needs/agency.

2. Development of skills in :
   (a) Work with individuals, families, groups and communities and seeing the need for an integrated approach to problem solving.
   (b) Selecting and utilization of community resources.
   (c) Work as a member of a team with other professional anti own discipline to, plan, organise and implement projects, programmes with emphasis cm the use of the process in problem-assessment and problem solving.

3. Development of professional attitudes, conducive to work with individual families group and communities, leading gradually to an awareness of self as a professional person.

Efforts will be made to work out objectives in each semester for every student in field practicum according to the nature and services of the agency and his performance will be evaluated accordingly.

Methodology
Each student will engage themselves in interaction and observation of social phenomenon and processes in a subject/ field of their choice. Student will then present their findings in the form of a paper for seminar discussions. Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report :	40 marks
Viva-Voce :	30 marks
Internal Faculty and Interaction :	10 marks
Presentation/Daily Diary Report :	20 marks

DISSERTATION

Course Code: SCW4437 **Credit Units: 06**

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of;
- information and to your own knowledge; of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.

- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.
  For books, the following details are required: Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996
- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:
Has the student made a clear statement of the objective or objective(s).
If there is more than one objective, do these constitute parts of a whole?
Has the student developed an appropriate analytical framework for addressing the problem at hand.
Is this based on up-to-date developments in the topic area?
Has the student collected information/data suitable to the frameworks?
Are the techniques employed by the student to analyse the data / information appropriate and relevant?
Has the student succeeded in drawing conclusion form the analysis?
Do the conclusions relate well to the objectives of the project?
Has the student been regular in his work?
Layout of the written report

Assessment Scheme:

Continuous Evaluation:	40%
(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	25
Conceptual Framework,	10
Objectives & Methodology and	10
Implications & Conclusions	15

INDUSTRIAL RELATIONS AND LABOUR LEGISLATION

Course Code: SCW4405 **Credit Units: 03**

Course Objective:

- To gain knowledge about labour legislations and labour welfare
- To understand the legal provisions relating to labour welfare in different industries
- To acquire the skills of working with the organized sector

Course Content:

Module I: Labour: Concept, Characteristics and Problems

Indian Labour: Labour in the organized and unorganized sectors. Labour Welfare: Concept, scope, Principles and Theories

Labour Welfare classification

Role and Functions of Labour Welfare Officer.

Objectives and functions of International Labour Organization (ILO); The role of ILO in Labour welfare implementation

ILO recommendations in India

Module II: Labour Legislations: Concept, need and historical development

Labour Legislation in India: Factories Act 1948; Occupational safety and health The Contract Labour (Regulations and Abolition) Act 1970; Tamil Nadu Payment of Subsistence Allowance Act 1981; Tamil Nadu Industrial Establishments (Conferment of Permanent Status to Workmen) Act, 1981.

Module III: Concept and Types of Wages

Legislations relating to Wages: The Payment of Wages Act 1936; The Minimum Wages Act 1948; The Equal Remuneration Act 1976; The Payment of Bonus Act, 1965.

Module IV: Concept of Social security

Legislations relating to social security: The ESI Act 1948 The Employees Provident Fund and Miscellaneous Provisions Act 1952; The Payment of Gratuity Act 1972; The Maternity Benefit Act 1961; Employees Compensation Act 1923; National festival and Holidays Act.

Module V: Legislations for Labour Welfare for Industries

The Plantation Labour Act 1951; The Mines Act 1952; The Motor Transport Workers Act 1961; Tamil Nadu Shops and establishment Act 1947; The Pondicherry Shops and Establishment Act 1964.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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REHABILITATION AND AFTER CARE SERVICES

Course Code: SCW4406 **Credit Units: 03**

Course Objective:

- To understand the concept of handicap, rehabilitation and the scope for practice.
- To identify the specific client categories requiring the rehabilitation services, problem specificity and rehabilitation service interventions.
- To acquaint oneself with different rehabilitation settings, different therapeutic approaches to rehabilitation process.
- To acquire the social work skills adapted to facilitate the process of rehabilitation, the rights and legal provisions provided for differently abled people and assimilate the knowledge of social work practice to disability specific client service.

Course Content:

Module I: Rehabilitation

Definition and scope for social work interventions. History, Philosophy and Principles of Rehabilitation

Definition of Impairment, Disability, Handicap

Causes of Handicap: Heredity, acquired, Major illnesses

Physical, neurological and psychiatric stress, vulnerability, coping and competence to deal with handicaps

Need for comprehensive psycho-social rehabilitation

Module II: Specific Rehabilitative Efforts

Rehabilitative efforts in various problem areas: physical handicap - vision, hearing; Orthopedic Handicap; Speech and Language Difficulties

Mental retardation and Neurological and Psychiatric disorders; alcohol and drug usage, terminal illnesses and due to accidents.

Module III: Intervention in rehabilitation

Planning and Assessment

Designing and implementing intervention, tools for assessment

Evaluation of effectiveness of intervention

Follow-up services.

Module IV: Rehabilitation Settings

Hospital based, day-care, night-care, quarter-way home, half- way-home, group home, hostels, long-stay homes

Vocational guidance centre, sheltered workshop, occupational therapy centre, community based rehabilitation centre, home care Inclusive education and other Approaches: Therapeutic community, Behaviour modifications, transactional analysis and eclectic approach

Module V: Practice of Social work in the process of rehabilitation

Methods: Case work, group work, community organization, research, administration and social action.

Legal provisions for differently abled people: The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995

Rehabilitation Council of India: Formation, scope and functions Governmental policies and programs, initiatives from the non- governmental sectors. International trends and national initiatives in the rehabilitation scenario.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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SOCIAL WORK WITH PWD

Course Code: SCW4407 **Credit Units: 03**

Course Objective:
• Gain knowledge about the concept of and different types of disabilities.
• Acquire an understanding of the theoretical models and approaches to disability
• Develop an attitude of respect and dignity towards persons with disability
• Become skilled at undertaking social work interventions with other stakeholders in the field of disability

Course Contents:
Module I: Concept of Disability and Impairment
ICIDH and WHO definitions of disability; causes, types Magnitude of various disabilities and their impact on persons with disability and their families
Discourses and models of disability
Developing an anti-oppressive and Inclusive understanding of disability

Module II: Types, Causes and Rehabilitative Concerns
Types of disability: physical, sensory, intellectual, multiple disabilities, learning developmental disabilities, psychosocial disability
Causes, types and care for persons with disabilities (medical and other interventions including aids and appliances)

Process of rehabilitation: early identification, education, vocational rehabilitation, social inclusion and empowerment within the family and community.
Understanding the experience of disability: Limitations, strengths and potentials of persons with disabilities

Module III: Impact of disability on individuals and their families
Reactions of parents/family members and individuals ways of coping with disability.
Needs and problems of persons with disability and their families across the life span and at critical stages in their lives
Social work intervention at each stage

Module IV: Disability Intervention at Individual and Family Levels
Individual level strategies: Self help and support groups; assertiveness training, life skills enrichment
Family level strategies: Family crisis intervention, family centered intervention, parent guidance, parent training
Role of social worker in different settings: Hospital and treatment centers, home, educational institutions, vocational rehabilitation centers, the community
Multidisciplinary rehabilitation teams and their roles.

Module V: Disability intervention at community and policy levels
Building awareness, community education, community based rehabilitation, advocacy and lobbying
Using international instruments (Salamanca Declaration, Standard Rules, UNCRPD) and legislations governing disability (Persons with Disability Act, 1995, RPD Bill, MHC Bill, RCI Act, National Trust Act, 1999) for advocacy
State's role in implementation of legislations.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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SOCIAL WORK WITH HIV/AIDS

Course Code: SCW4408 **Credit Units: 03**

Course Objective:

- To understand the issues related with HIV/AIDS positive cases.
- To develop an attitude of respect and dignity towards persons with HIV/AIDS.
- To become skilled at undertaking social work interventions with and HIV/AIDS cases.

Course Contents:

Module I: HIV and AIDS: The Current Landscape from a Death Sentence to a Chronic Disease
The History of the Epidemic; Nature of the retro virus; HIV as a Behaviourally acquired infection; Modes of transmission; Prevention of transmission of infection; Safer Behaviours
HIV Testing and Treatment; the issues of Confidentiality; Counselling Centers; High risk populations; Bridge populations
Enduring Themes of Stigma and Discrimination

Module II: National Response for HIV/AIDS Management
A Health Crisis; Risk Factors for HIV; Vulnerable Groups: Youth and children, women, prisoners
National Response to the HIV/AIDS Crisis: National AIDS Control Policy (NACP) I-IV and the Formation of NACO and SACS
Challenges of Positive Living; Approaching the Epidemic Holistically
Future for HIV/AIDS Social Work: Developing a New Agenda

Module III: HIV/AIDS Prevention for MSM and IDU
Risk factors for Men Who Have Sex with Men, Diverse ideologies and psychosocial settings of MSM
IDU practices and health risks; Nationwide distribution of IDUs
Intervention for HIV-Prevention among MSM and IDU: Condom distribution and syringe exchange programs
Intricacies of Counselling MSM and IDU

Module IV: HIV/AIDS Prevention and Care for At-Risk Adolescents and Young Adults
The Disproportionate Impact of HIV on Young People; Reasons for High Risk among Youth for HIV Infection
HIV/AIDS Education for Adolescents and Young Adults; Sex and reproductive education; Impacts of Drugs and Alcohol on HIV transmission; Adolescent Sexual Minorities, Sexual Behaviour Experimentation among Adolescents; Assessment with Adolescents and Young Adults; The HEADSS Assessment Model; Suicide Risk/Depression Screening of Adolescents
Community Level Interventions Targeted at Adolescents for HIV Prevention

Module V: HIV Case Management: The Social Work Perspective
The Hub of Service Provision
Understanding Social Work Case Management
Description of Supportive HIV Case Management Services
Common Risks in People Living with HIV or AIDS
The Top Five Skills of an HIV Case Manager
The Top Five Attitudes of an HIV Case Manager
Partnership with people affected by HIV/AIDS

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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HUMAN GROWTH AND DEVELOPMENT

Course Code: SCW4409 **Credit Units: 03**

Course Objective:

- Develop an overall understanding of the principles of growth, their relevance and application to behaviour at various phases in the life span.
- Develop sensitivity towards needs, developmental tasks and health status along with need for developmental programmes for the same.
- Apply the information of growth, development and health in social work practice in general and to individuals, groups and communities in particular.
- Understand the implications of family norms for status of individuals and developmental opportunities in the family by age and gender.
- Encourage to study the process of family socialization and understand family norms, ecology and dynamics.

Module I: Life Span: Beginning of life

Human reproductive system; Fertilization and Foetal development - Delivery and pre-natal and post-natal care and their importance in development. Principles of growth and development - Methods of studying human behaviour, Role of heredity and environment - Social customs traditions, values in parenting and child rearing practices, deprivation and development during stages of life span. Understanding of the Indian concept of life span stages.

Module II: Developmental periods

Developmental periods: Infancy, babyhood, childhood, puberty, adolescence -.Growth, hazards, lifestyle effects, Adulthood - Growth, personal and social adjustment, health, sexuality, vocational and marital adjustment.

Aging - Characteristics, hobbies, adjustment, physical and mental health, death, dying and bereavement. Special focus is on psychosocial development, moral development, and personality development vis-a-vis the influence of the contexts of development. (The contexts here refers to gender, family, significant others, neighbourhood, peers, school, community, work place and other larger contexts like the society and culture. Emphasis is placed on the Indian context of development, variations from the normal patterns of development and views on the stages).

Module III: Theories of Human Development

A critical look at the theories of human development - Freud's psychosexual theory,Erikson's psychosocial theory, learning theories.

Module IV: Basic human needs

Physical, psychological and intellectual needs, stress – Coping and social support.Motivation, frustration and conflicts - Emotions and emotional behaviour.

Module V: Personality and Intelligence

Personality: Definition, nature, types and assessment of personality.
Intelligence: Concept, levels of intelligence, influence of heredity and environment, assessment of intelligence. Relevance of Psychology to social work practice across the stages of development, period specific needs, tasks and challenges.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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DISASTER MANAGEMENT

Course Code: SCW4410 **Credit Units: 03**

Course Objective:

- Understand key concepts, theories and approaches of disaster management with specific reference to Indian context**.**
- Develop skills to analyse factors contributing to disaster**.** Develop an understanding of the process of disaster management**.** Develop an understanding of the social worker's role in the team for disaster management.

Course Contents:

Module I: Disasters

Concept, types and impact - Famine, floods, cyclones, hurricanes, warfare, earthquake, volcanoes; traditional and modern disaster threats and care factor, classification of disasters; Disaster management - Definition and concept; approaches to disaster management, importance and relevance of disaster management in the present environmental scenario, cases studies of disaster management.

Module II: Disaster and Social Work Intervention

Scope of disaster related intervention, intervention during disaster impact stage, trauma Counselling and crisis intervention, post disaster management, damage assessment and long term rehabilitation and reconstruction, networking and co-ordination between government, NGOs, donor agencies, local bodies, police, military etc.

Module III: Disaster Prevention and Preparedness

Vulnerability analysis, hazard mapping, community based disaster preparedness programmes, training for CBDP, preparedness for post-disaster emergency response and long term rehabilitation, organization and planning, logistics; resource utilization, specialized skills and training needs; public awareness and education; first-aid training, civil defense training.

Module IV: Institutions and Instruments in Disaster Response

International decade for natural disaster reduction and UN resolutions, administration of relief in India - National, state, district and local levels.

Module V:Disaster related legislations and policies

National and international donor agencies; NGOs, mental health institutions in disaster management and relief.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance,
EE: End Semester Examination

References

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Amity Institute of Behavioural & Allied Sciences

Master of Science - Clinical Psychology

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Science - Clinical Psychology

Syllabus – First Semester

HISTORY AND SCHOOLS OF PSYCHOLOGY

Course Code: PSY4101 **Credit Units: 02**

Course Objective:
One of the primary goals of this paper is for students to learn the philosophical roots and historical events that have shaped the field of psychology. This will include an exploration of underlying philosophical assumptions, individual contributors, and various schools that served to shape the emerging field of psychology. A second goal is for students to acquire a basic understanding of Western and Indian thought, to articulate a perspective of their own, and apply that perspective to their professional work. This course aims at helping the students to understand basic principles, historical background and main theoretical perspectives, i.e., various schools of modern scientific psychology.

Course Contents:
Module I: Introduction of Psychology
Nature of Psychology, Understanding Science and Status of Psychology as a Science
Approaches / Methods of Psychology

Module II: Historical Background of Psychology
Pre-Socratic Philosophers: Socrates, Plato and Aristotle
Patristic Philosophy – Focus on Augustine,
Scholastic Philosophy – Focus on Aquinas

Module III: Indian Philosophy
Indian Philosophy and Modern Psychology
Sri Aurobindo and his Philosophy of the Individual Self
Module IV: Schools of Psychology
Structuralism
Functionalism
Gestalt
Psychoanalysis
Behaviourism

Module V: Forces of Psychology
Psychoanalytic
Behavioural (Cognitive-Behavioural)
Humanistic - Existential
Transpersonal

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

Text & References:

Text:

- Hergenhahn, B.R. (1992). An introduction to the history of psychology. (2nd ed.). Wadsworth Publishing Company: Belmont, California.
- Leahey, T.H. (2004). A history of psychology: Main currents in psychological thought. (6th ed.). Pearson Education: Delhi.
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- Lawson, R.B., Graham, J.E., & Baker, K.M. (2007). A history of psychology: Globalization, ideas, and applications. Prentice Hall: New Delhi.

COGNITIVE PSYCHOLOGY

Course Code: PSY4102 **Credit Units: 02**

Course Objective:
The course deals with the understanding of higher mental processes and its relevance in daily living. The study of normal processes is essential to enable the understanding of neurological or abnormal dysfunctions. The objective of this course is (a) to provide an understanding of normal metal processes and their relationship to brain, mind and behavior, and (b) to study the concept of cognition and its application in cognitive psychology. This will facilitate the students develop the cognitive skills in themselves and others.

Course Contents:
Module I: Historical Background
Psychophysical approach
Information processing approach
Ecological Approach
Contemporary Cognitive Psychology

Module II: Attention and Perception
Theories of Attention and current developments: Broadbent's filter theory, Triesman's attenuation theory, automatic and controlled processing, switching attention.
Perceptual learning and development
Perception of shape, space and movement
Implicit perception and sensory integration theory
Cognitive – Attentional Theory: Information Processor, Cognitive Timer

Module III: Learning
General Phenomenon of Learning: Learning vs Maturation, Native Response Tendencies
Theoretical issues of learning: Classical conditioning, Instrumental conditioning
Verbal learning: Stimulus material, Trigram Methods-Serial Learning, Paired Associate Learning
Discrimination Learning: Nature, Theories- Algebraic Summation Theory, Relational Theory, Transposition Effect

Module IV: Memory & Forgetting
Sensory memory, STM, LTM, Working memory
Metamemory: Semantic & Episodic Memory
Models of Semantic knowledge
Theories of forgetting
Mnemonics

Module V: Thinking and Language Formation
Concept formation and categorization
Judgment and Decision-making
Reasoning & Problem solving: Stages – Preparation, Production, Judgment and Incubation
Structure of language, its acquisition and Formation
Language and Thinking: Linguistic Determinism, language and Cognition

Module VI: Learning and Language Disorder
Reading Disorder/Developmental Dyslexia
Disorder of written expression / Dysphasia / Aphasia
Math Disability / Dyscalculia
Auditory Processing Disorder
Speech and Language pathology
Specific language Impairment

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

Text & References:
Text:

- Solso, R.L.,(2004). Cognitive Psychology, 6th ed.; Delhi: Pearson Education
- Matlin M W (2005).Cognition, Wiley & Sons, Inc.
- Haberlandt, K. Cognitive Psychology. Allyn and Bacon, Boston.
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- John A & Proctor R (2004). Attention: Theory and Practice. Sage.
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- Wilhit, S.C., & Payne, D.E. (1992). Learning and Memory: The Basis of Behaviours; Needham Heights, Mass: Allyn and Bacon
- Kintsch, W.(1970). Learning, Memory and conceptual process. John Wiley &Son,New York
- Houston, J.P. Fundamentals of Learning and Memory (3rd Ed.). harcourt brace Jovanovich, Inc, New York.
- Newell, A., & Simon H. (1972). Human Problem solving; NJ: Prentice Hall.

ADVANCED SOCIAL PSYCHOLOGY

Course Code: PSY4103 **Credit Units: 03**

Course Objective:
Knowledge in social psychology is inevitable for any postgraduate psychology student to conceptualize the subject matter of the social individual in its deepest sense. Building from the preliminary knowledge of social psychology at the undergraduate level, this course offers the learners a more hands-on experience on the social behavior dynamics. This course is structured to provide the students a culturally informed and contextualized view of the discipline. The students are encouraged to appreciate and analyze the changing cultural diversity in the present Indian society, therefore, equipping them to approach the social issues with its implications. This course enables students to achieve integrative understanding of social psychological theory and research. It also helps in acquiring a thorough familiarity with methodological issues and thinking critically and analytically about experimental research in social psychology.

Course Contents:
Module I: Basic Concepts in Social Psychology
Definition, nature and Growth of Social Psychology;
Alternative conceptions of social psychology: Social Structure, Social Stratification and Power
Development of social psychology in India; Current status of the discipline and its indigenization Social Psychology in the New Millennium: Influence of A Cognitive Perspective, Exporting
Social Psychology, Adoption of a Multicultural Perspective
Emerging alternative methods in social psychology;

Module II: Attitude and Attitude Change
Attitude - Behaviour Link: Influence of attitude on behavior: responsible factors – aspects of the situation, aspects of the attitude
Attitude Change: Approach to attitude change- Persuation approach, cognitive approach
Attitudes resistto change: reactance, forewarning, selective avoidance, active defense biased assimilation and attitude polarization

Module III: Prosocial Behaviour
Concept of Prosocial Behaviour, Latance Darley's five step model, situational factors: Attraction, Attributions and Prosocial Models
Theories of Prosocial Behaviour: Empathy - Altruism Theory, Egoistic Theory, Genetic Selfishness

Module IV: Social Issues
Mass violence, Terrorism, Mob behavior, Natural Disaster
Environmental stresses and social behavior.
Social psychological perspectives on health and illness.
Psychological effects of unemployment.
Social and ethnic minorities and law

Module V: Applied Social Psychology
Applied Social Psychology in India: Challenges and possibilities, Need for indigenization
Applied Social Psychology and developing countries; Emerging themes
Multidisciplinary approach to the study of social change; Policy oriented research; Need for reorienting Social Psychology

Methods of Applied Social Psychology: Laboratory experiment, Field experiment, Field study

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

Text & References:

Text:

- Aronson, E., Wilson, T.D., and Akert, R.M. (1999). Social Psychology (3rd ed.). New York: Longman.
- Fraser, C., and Burchell, B. (2001). Introducing Social Psychology. Cambridge: Polity.
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- Kuppuswami, B. An Introduction to Social Psychology
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- Pandey, J. (Ed.). (1980). Perspectives on experimental social psychology in India. ND: Concept.
- Parker, L., and Shotter, T. (Eds.). (1990). Deconstructing social psychology. London:

Routledge.

PERSONALITY THEORY

Course Code: PSY4104 **Credit Units: 02**

Course Objective:
This course introduces critical evaluation of different theories in the background of the empirical evidence. It enables students to

1. Become familiar with the major theories and traditions related to the study of personality and personal growth.
2. To articulate the underlined themes, methodology and assumption of each theory to enhance understanding of personality and behaviour.
3. To orient the students in application of this knowledge in case analysis and therapeutic formulation
4. To develop the skills in personality assessment.

Course Contents:
Module I: Introduction to Personality
Nature of personality theory: Present status
Theory in Broader perspective
Grouping among theories: Different perspectives on personality, Dispositional Perspective

Module II: Type and Trait Approaches to Personality
Trait (Biological) and Type Theories: Allport, Cattell, Eysenck, Sheldon and Friedman
Alternative Five factor Model.

Module III: Psychoanalytic Approach to Personality
The Freudian Theory: Topographic model, Structural model, Instincts, Defense Mechanism.
The Neo Analytic Theory: Alfred Adler: Striving for superiority; parental influence on personality development, birth order
Carl Jung: Collective Unconscious
Karen Horney:
Erik Erikson: Concept of Ego, Stages of Personality Development
Harry Stock Sullivan: Personifications

Module IV: Behavioural and Cognitive Approach
Skinners Radical Behaviours
Social Learning Theory: Dollard and Miller
Social cognitive Theory: Bandura

Module V: Humanistic and Existential Approach
Abraham Maslow's and Carl Rogers' Theory,
Kelly and Rollo May

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	7	10	8	5	70

Text & References:

Text:

- Allport, G.W.(1961), Pattern & Growth in personality; New York; Halt
- Hall, G.S. &Lindzey, G.(1985), Theories of Personality (3rd ed.). New Delhi; Wiley Eastern.
- Hall, C.S., Lindzey, G. &Camobell, J.B. (2002). THEORY of personality, 4TH edition. John Wiley and Sons

References:

- Eysenck, H.J. (1981), Model of Personality. New York: Springer &Verlog,.
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- Ewen, R.B. (1980). An Introduction to Theories of Personality. Academic Press, Inc. (London) Ltd.

PARAMETRIC STATISTICAL METHOD

Course Code: PSY4105 **Credit Units: 03**

Course Objective:
The Present paper focuses on providing knowledge about the basics of statistics. It will give clear understanding to the students about application of parametric statistical methods. Parametric tests are generally more powerful in that the likelihood (probability) of a test reaching the correct conclusion is greater. Besides this, a module is added in last so to make students aware of parametric statistics in SPSS. Thereby they can understand the procedures and applications of parametric statistics using SPSS.

Course Contents:
Module I: Basics
Nature, Meaning and importance of statistics
Concept of Reasoning, population, sample and probability theory in statistical inferences
Categories of statistics: Descriptive and Inferential
Variables and their types
Scales of Measurement: Nominal, Ordinal, Interval, Ratio

Module II: Statistical conjecture
Sampling and its kinds: Probability sampling method and Non-Probability sampling method.
Difference between Objectives and Hypothesis
Hypothesis testing: One-tailed and Two-tailed tests, Type I and Type II errors

Module III: Statistics and Test of Significance
Meaning, concept and importance of determining reliability of statistics in data analysis
Standard error of mean, standard deviations, percentages and correlation coefficients
Significance of difference between means-critical ratio and t-test calculation (large and small sample) assumption & uses
One-Way and Two Way ANOVA.

Module IV: Correlation and Regression
Correlation: concept, types, assumption and Utility of Cor-relational Analysis in Psychological Research
Bi-serial Correlation, Point Bi-serial Correlation, Partial Correlation, Tetra-choric Correlation
Simple and Multiple linear regression, its uses, concepts and assumptions
Difference between Simple linear and multiple regressions

Module V: Introduction to SPSS and parametric statistics in SPSS
Introduction to SPSS, its usage and functioning
Understanding the concepts of Parametric tests in SPSS
Learning data entry

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Minium E.W. King, H.M & Bear G, 1993. Statistical Reasoning in Psychology and Education (3rd Ed.) N Y: John Willey and Sons
- Garett, H.E., (2004), Statistics in Psychology and Education (11th ed.); New Delhi: Paragon International
- Gupta S.P.: Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in Correlational Research, New Delhi: Wiley Eastern 1989.
- Downie, N.M.: Basic Statistical Methods. New York: Harper and Publishers
- Howitt, D & Cramer, D: Introduction to SPSS statistics in psychology
- James K. Lindsey : Parametric Statistical Inference, Oxford science Publication.
- Cox, D.R.: Principles of statistical inferences.

References:

- Edward, A.E.: Experimental Design in Psychological Research (3rd Ed.), New Delhi: American Publishing Co. 1971
- Berger. R.L: Statistical Inferences, Cole Pub. Co.
- Wesley O. J & Geisser. S: Modes of Parametric Statistical Inference. Wiley-Interscience
- Rice, J.A: Mathematical Statistics & Data Analysis, South western.
- Salkind, N & Green, S: SPSS Quick Starts.

PRACTICUM- I

Course Code: PSY4106 **Credit Units: 03**

Course Objective:

- To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
- To acquaint the students with the basic procedure and design of psychology experiments.
- To encourage and guide the students to undertake a small-scale research project.
- To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the first semester among the list of following practicals

Course Content:

1	Continuous Visual Memory Test (CVMT)	Memory
2	Illinois Test of Psycholinguistic Abilities – Third Edition (ITPA-3)	Language
3	16 PF Questionnaire - Fifth Edition with Hand scoring	Personality
4	Tennessee Self-Concept Scale - Second Edition (TSCS:2)	Self-Concept
5	Developmental Test of Visual Perception – Adolescence and Adult	Perception
6	Test of Memory and Learning – Second Ed. (TOMAL-2)	Memory and Learning

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-I

Course Code: PSY4107 **Credit Units: 04**

Course Objective:
To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

Syllabus – Second Semester

PSYCHOPATHOLOGY

Course Code: PSY4201 **Credit Units: 03**

Course Objective:

- To acquaint students with various manifestations of psychopathology
- To impart knowledge and skills required for diagnosis of psychological conditions.
- To introduce them to different perspectives and models of etiology.
- To develop skills required for psychopathological formulation.

This course enables students to the study and prediction of adaptive and maladaptive behaviours and its processes across lifespan. It also enables students to understand different diagnostic and educational models of psychopathology.

Course Content:

Module I: Classification and Theoretical Models

Systems of Classification, basic features; DSM-IV TR, ICD-10, similarities and differences

Major Theoretical Models of Psychopathology: The medical model, Psychoanalytic model, Behaviouristic model, Humanistic-existential models, Interpersonal approach, Systems approach.

Module II: Diagnosis and Prognosis

Problems and methods of diagnosis: physiological examination, observation, case-history, interview method, psycho-diagnostic tests, measures of bodily functions, computer assisted diagnosis.

Module III: Mood and Anxiety Disorder

Bipolar disorders: Manic, Depressive, Mixed

Depressive disorder: Major depression and dysthymia, Suicide

Anxiety Disorders: Generalized anxiety disorder, phobia, panic disorder, post traumatic stress disorder and obsessive compulsive disorder

Module IV: Major Clinical Disorders

Schizophrenia

Other psychotic disorders: Bipolar, Delusional, psychotic depression

Module V: Somatoform Disorders

Conversion disorder, Somatization disorder, Hypochondriasis, Body dysmorphic disorder, Pain disorder

Module VI: Disorders of Infancy, Childhood and Adolescence

Developmental disorder: PDD, Rett Disorder, Asperger Disorder,

Behavioral Disorder: Conduct Disorder, Hyperactivity Disorder, ADHD,

Genetic Disorders: Down Syndrome

Module VII: Personality Disorder

Personality Disorder: Narcissistic Personality, Histrionic Personality, Antisocial (Psychopathic) Personality, Borderline Personality, Paranoid Personality, and Schizotype Personality

Module VIII: Sexual Dysfunctions and Paraphilias
Dysfunctions of Desire, Arousal, Orgasm and Pain
Paraphilias, Paedophilia and Rape
Gender identity disorders
Impotence and frigidity
Causes, preventing suicide

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:
Text:

- Davison, G.C. & Neale, J.M. (1990): Abnormal Psychology. New York: John Wilay& Sons
- Carson, R.C. & Butcher, J.N. (1992): Abnormal Psychology and Modern Life (9th Ed.). New Yark: Haper & Collins.
- Hamilton, Max, (1994). Fish's: Clinical Psychopathology; Verghese Publishing House, Bombay
- Ahuja N (2002). A short text book of Psychiatry (5th edition). New Delhi. Jaypee Brothers.
- Sarason & Sarason (1998). Abnormal Psychology. New Delhi: Prentice Hall of India

References:

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- Bennett, P. (2010). Abnormal and Clinical Psychology: An Introductory Textbook. New Delhi: Tata McGraw Hill Education pvt. Ltd.
- Sadock, B.J. & Sadock, V.A. (2003). Kaplan &Sadock's Synopsis of psychiatry: Behavioral sciences/clinical psychiatry (9th. Ed.). Philadelphia: Lippincott Williams & Wilkins
- Coleman, J.C. : Abnormal Psychology & Modern Life
- Lazarus and Folkman: Stress, appraisal and coping

PSYCHOLOGICAL ASSESSMENT AND DIAGNOSIS

Course Code: PSY4202 **Credit Units: 03**

Course Objective:
The course teaches the students about the characteristics, objectives and wide ranging effects of psychological testing. It further describes the various testing methodologies and outlines capabilities and limitations of these methods.

Course Contents:
Module I: Introduction
Purpose of testing, types of test used, Bias & Fairness
Ethical Issues in Psychological Testing
Overview of Tests
Norms, Scoring Interpretation and Report Writings
Issues in measurement
Emerging trends of online testing

Module II: Cognitive functions and their assessment

Concept of Attention, Gestalt Theory, Memory and Forgetting, PGI Memory Scale
Theories of Intelligence
Intelligence Tests:
- **Slosson Intelligence Test** – Revised For Children and Adults (SIT-3/R)
- Bhatia Battery
- Weschler's Adult Performance Intelligence Scale (WAPIS)
- Raven's Progressive Matrices (Colour Progressive Matrices, Standard Progressive Matrices and Advanced Progressive Matrices)
- Binet Kamat Test
- Weschler's Intelligence Scale for Children – Revised (WISC)
- Wide Range Intelligence Test (WRIT)
- Alexander Pass-a-long Test of Intelligence
- Draw-A-person Intellectual Ability Test for Children, Adolescents and Adults (DAP:IQ)

Module III: Achievement Test
- Wechsler Individual Achievement Test (WIAT)
- **Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)**
- Kaufman Test of Educational Achievement (KTEA)
- Woodcock-Johnson Tests of Achievement (WJ)

Module IV: Assessment of Personality: Non-Projective Test
- Cattell's 16 Personality Factor Inventory (16 PF)
- California Q-Sort Tests
- Myers Briggs Type Indicator (MBTI)
- Minnesota Multiphasic Personality Inventory (MMPI)
- **Personality Inventory for Children**
- **OMNI Personality Inventory (OMNI)**
- Bell's Adjustment Inventory
- Eysenck's Personality Questionnaire
- NEO™ Personality Inventory-3 (NEO™-PI-3) Adult / Adolescent

Module V: Assessment of Personality: Projective Tests
Introduction of Projective Techniques
Difference between Projective & Non-Projective Techniques
Thematic Apperception Test
Rorschach Inkblot Test
House-Tree-Person (H-T-P)
Sentence Completion Test

Module VI: Developmental Scales
Developmental Screening Test
Vineland's Social Maturity Scale
Measures of Psychosocial Development (MPD)
Gesells' Developmental Schedule

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:
Text:
- Freeman, F. S.,(1965), Theory and Practice of Psychological Testing; New Delhi: Oxford &IBTT

References:

- Jackson C.,(1998), Understanding Psychological Testing; Jaico Publishing House
- Anastasi&Urbina S.(2000), Psychological Testing ,7th Edition; Person Education (Singapore) Pte. Ltd.,
- Guilford J.P.: Psychometric Methods

CHILD PSYCHOLOGY

Course Code: PSY4203 **Credit Units: 02**

Course Objective:
Child Psychology is extremely important and tell us about the nature and development of children. This course introduces the methods, theories and main concepts used by psychologists to develop a real insight into the world of children. This study is intended for students of psychology, those training to work with children in a variety of professional roles, or anyone just interested in understanding how children develop. By studying child psychology, students can

- understand and accurately predict a reasonable norm for child development.
- understand children and equip them to become well-adjusted, more adaptable adults who are capable of living rich and varied lives.
- help our children through crises and enrich their daily lives by interacting with them in ways that are appropriate to their developmental levels.

Course Contents:
Module I: Introduction
Definition and Concept of Childhood
Early history and beginnings of child psychology
Biological factors in Child Psychology (Prenatal, Natal and New-Natal Development,
Nature vs Nurture: Genetics and Social atmosphere
Methods- Self Reports: Parental reports, Children's reports. Case Study, Experimental method,
Design- Longitudinal, Cross Sectional Sequential and Correlation

Module II: Biological Foundation
Biology and Heredity: Cell Division, The genetic code- Chromosome, DNA, Sex cells, Multiple offspring; Patterns of genetic inheritance: Dominant and Recessive,
Stages in Prenatal Development: The germinal period; the period of embryo, the period of foetus
Influences on Prenatal Development
Child Birth: The states of normal labour: Birth complication- Anoxia, Preterm and Low Birth weight infants
New Born: Sleeping- Sudden Infant Death Syndrome (SIDS); Crying; Feeding; All the reflexes

Module III: Major Schools of Child Psychology
Psychoanalytic perspective (Freud and Erickson)
Behaviorist perspective- Social Learning Theory,
Piaget's Theory of Cognitive Development
Vygotsky's Theory of Socio-cognitive Development
Erikson's Eight Stages of Development

Module IV: Motor, Sensory and Cognitive Development
Motor Development: contributions of Motor Development, Principles of Motor Development, Sequence of Motor Development and Motor Skills,
Environmental influences on motor development
Sensory Development: Vision, hearing, taste and smell, cutaneous senses, early deprivation and enrichment of senses.
Cognitive development- Structure and processes, stages, Evaluation

Module V: Development of Language
Language Development- What is Language, Components of language and its development
Pre-linguistic development- receptivity to language, first speech sound
Bilingual vs Multilingualism
Responsive communication and Verbal communication

Module VI: Emotional, Social and Moral Development
Early emotional development- Smiling, laughter, attachment, fear, jealousy, aggression, Izzard's Theory of Differential Emotions
Emotional Intelligence, Social intelligence
Social Development- Agents of socialization: Family-Parental control, sibling relationship; School; Peer group; Media- TV, books/journals, computers
Meaning of moral behavior, Patterns of moral development, Kohlberg's Theory
Meaning of discipline, essentials and techniques of discipline, evaluation of discipline

Module VII: Situational and Applied Child Psychology
Family dynamics
Peer relationships
Sibling relationships and birth order
Effects of divorce
Developing self-esteem
Understanding red flags

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:
Text:

- Schaffer, H. R. (2003): Introducing Child Psychology. Wiley
- Brain, C. & Mukherji, P. (2005): Understanding Child Psychology. Nelson Thornes
- Sharma, R. & Sharma, R. (2006): Child Psychology. Atlantic Publisher
- Hetherington, E.M. & Parke, R.D. (1986): Child Psychology: A contemporary viewpoint. McGraw-Hill
- Berk, L.E. (2006): Child Development. Pearson/Allyn and Bacon,

References:

- Sroufe, L.A., Cooper, R.G. & Marshall, M.E. (1988). Child Development: Its Nature and Course. Knopf
- Feldman, R.S. (2004): Child Development. Prentice Hall
- Papalia, D.E., Gross, D.L. & Feldman, R.D. (2003): Child development: a topical approach. McGraw-Hill

NON-PARAMETRIC STATISTICAL METHOD

Course Code: PSY4204 **Credit Units: 03**

Course Objective: The Present paper focuses on providing knowledge about the basics of nonparametric statistics. It will give clear understanding about differences between Parametric & Nonparametric Test Procedures. This paper will

1. Explain commonly used Nonparametric Test Procedures.
2. Perform Hypothesis Tests Using Nonparametric Procedures.
3. Going to teach student how to use SPSS with non-parametric statistics.

Course Contents:

Module 1: Basics

What is Non-Parametric statistics: Nature, Meaning and Concept strengths and limitations of non-parametric procedures

Parametric VS Non- Parametric Statistics

Four Levels of Measurement and Non-parametric statistics

Module 2: Tests of differences between Groups and Variables

The Friedman Two-way analysis of variance by ranks-Basic concepts, uses and computations

Test of differences between groups (Independent samples): Mann-Whitney U test computations, Kolmogorov-Smirnov test, uses

Test of differences between variables (Dependent samples): Kruskal-Wallis ANOVA analysis of ranks, K-Sample Median test, uses and concepts

Module 3: Nominal Measures of Correlations

Concept definition assumptions of Nominal Measures of Correlations

The Phi-Coefficient, Contingency coefficient concepts uses and calculations

Tetrachoric**r**: Its uses, computation and comparison

Module 4: Chi-Square

Concept and Definition, its assumptions and use

Chi-Square Goodness of Fit (One-Sample Test)

Chi-Square Test of Independence

Module 5: Introduction to SPSS and Non-parametric statistics in SPSS

Introduction to SPSS, its usage and functioning

Understanding the concepts of Non-Parametric tests in SPSS

Learning data entry

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Dowine, N.M.: Basic Statistical methods, Harper and Publishes New York.
- Gupta S.P. Statistical methods, Sultan and Sons, New Delhi.
- Broota, K.D.: Experimental design in correlational research, New Delhi: Wiley Eastern 1989.
- Salkind, N & Green, S.:SPSS Quick Starts.
- Howitt, D & Cramer, D.:Introduction to SPSS statistics in psychology.
- McNemar Q.:Psychological Statistics, 3rd Ed. New York, John Wiley 1962.
- Edward, A. E: Experimental Design in Psychological research (3rd Ed) New Delhi: American publishing

Reference

- Higgins. J.J: Introduction to Modern Nonparametric Statistics.
- Siegal.S: Nonparametric statistics for the behavioral sciences.
- Castellan, J.N. and Siegal. S: Non-parametric statistics for behavioural sciences.
- Daniel, W. Wayne: Applied non-parametric statistics.

HEALTH PSYCHOLOGY

Course Code: PSY4205 **Credit Units: 02**

Course Objective:

- To give a better understanding of the concept of health and it's various functions to understand its role in human behaviour.
- To acquaint the students with nature and significance of emerging areas of health psychology.
- To highlight the role of social, psychological and behavioural risk factors in health promotion and disease prevention.
- To introduce the students to types of stressors, their consequences, cognitive behavioural interventions for managing stress.
- To impart knowledge about causes and intervention for some prevalent stress related disorders / addictions.

Course Content:

Module I: Introduction to Health

Historical background; Aims and Objectives of Health Psychology, Challenges for the future
Significance of Health Behaviour, Theory of Planned Behaviour: Attributive Theory, Health Locus of Control

Module II: Social Support & Health

Factors for Personality & Health Link, Types of Social Support, Link between social support & Health, Cross Cultural Images of Health

Module III: Life Style Disorder

CAD, CHD, Hypertension, Stroke, Obesity, peptic ulcer, Migraine, Asthma, and Diabetes: Overview, Implications & Management.

Module IV: Health Enhancing Behaviour

Stress: Meaning, Dimensions and Coping Strategies.
Improving Health & Well Being, Enhancing Support
Maintenance of Health: Diet and Nutrition, Relaxation Techniques: Jacobson Progressive Relaxation, Broota's Relaxation Response

Module V: Health Behaviour Modification

Cognitive Behvavioural approach, Relapse Prevention, Attitude & Health-Belief Model
Models of Mental Health: Clinical, Community and Social Action Model

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Ogden, J. (1996): Health Psychology: A textbook Open University Press, Buckingham
- Shelly E. Taylor (2006): Health Psychology (6th Ed.). New Delhi: Tata McGraw-Hill
- Pitts, M. & Phillips, K. (1991): Psychology of Health: An Introduction. London: Routledge press
- Khatoon, N. (2012). Ed. Health Psychology. Pearson Education Inc. India
- Taylor, S.E. (1986): Health Psychology. New York: Random House

References:

- Lhermitte, F. (1986) Human Autonomy and the Frontal Lobes. Part II: Patient Behaviour in complex and social situation: The "Environmental Dependency Syndrome". Annuals of Neurology, 19, 335- 343.
- Strub and Black "Neuro-behavioural Disorder"
- Luria, A.R. (1966), Higher cortical functions in man, New York, basic books.
- Hecaen, H. and Albert, M.L. (I978), Human Neuropsychology, New York, John Wily and Sons.

PRACTICUM- II

Course Code: PSY4207 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the second semester among the list of following practicals

Course Content:

1	Slosson Intelligence Test – Revised For Children and Adults (SIT-3/R)	Intelligence
2	Diagnostic Achievement Test For Adolescents – Second Edition (DATA-2)	Achievement
3	House-Tree-Person (H-T-P)	Personality: Projective
4	Rorschach Ink Blot Test	Personality: Projective
5	Personality Inventory for Children scoring kit	Personality:
6	OMNI Personality Inventory (OMNI) Introductory Kit	Personality:

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

FIELD PRACTICE-II

Course Code: PSY4208 **Credit Units: 04**

Course Objective:
To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

SCIENTIFIC RESEARCH PAPER

Course Code: PSY4209 **Credit Units: 01**

Course Objective:
The scientific research papers for Masters Students is to enhance the reading and writing habits of the students and to make them aware about the process of carrying out a research work. This helps them to develop insight into the course they are studying which creates an academic interest among the students. Presentation of the term paper plays an important role as it facilitates knowledge sharing and improvement in presentation skills which will further enhance the confidence of the students. The overall objective of this term paper is to develop research orientations in students and to make them understand and enhance skills in Research Methodology.

Guidelines for Research Article or Scientific Papers:

Topic
Introduction
Review Research
Objective
Methodology
Discussion
Conclusion
References & Bibliography

No. of pages in the compilation of the paper 25-30 (minimum 25 pages)

Examination Scheme:

Components	**Compilation**	**Viva**	**Presentation**
Weightage (%)	50	25	25

Syllabus – Third Semester

RESEARCH METHODS: EXPERIMENTAL DESIGN

Course Code: PSY4301 **Credit Unit: 02**

Course Objective:
Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents:
Module I: Introduction to Research
Meaning of Scientific Research
Objectives and Steps in Scientific Research
Defining research problem
Defining variables
Developing hypothesis

Module II: Evaluating Measures and Hypothesis
Need For Evaluating Measures
Reliability and Validity
Hypothesis testing: Type1 and Type 2
Going beyond hypothesis testing: Effect size and Power

Module III: Validity of Experimental Researches and Threats to them
Statistical Conclusion validity
Construct validity and External Validity
Establishing the cause and Effect
Single Group threat, Multiple Group threats, Social threats

Module IV: Experimental Designs-I
Two-Group experimental designs
- Within-subject Design
- Between-subject design
- General Linear Model

Module V: Experimental Designs-II
Factorial designs
Randomized Block designs
Hybrid Experimental Designs: Soloman four group designs
Mixed designs

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Shuttleworth, Martyn (2008). "Definition of Research". *Experiment Resources*. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed.). Upper Saddle River: Pearson.
- Trochim, W.M.K, (2006). Research Methods Knowledge Base.
- Montgomery, Douglas (2013). *Design and analysis of experiments* (8th ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Reference

- Review of Foundations for research: Methods of inquiry in education and the social sciences, by Kathleen B. deMarrais and Stephen D. Lapan. 2004. Reference & Research Book News 19:1**.**
- Denscombe, Martyn. 2007. The good research guide for small-scale social research projects. 3rd ed. Maidenhead, UK: Open University Press. 360 pages. ISBN: 0335220223. $48.50 (pbk).
- Baker, Lynda M. 2001. Review of Understanding Research Methods: An Overview of the Essentials, 2nd ed., by Mildred L. Patten. The Library Quarterly 71:96.
- Ellingson, L. L. 2007. Review of Qualitative research methods for the social sciences, 6th ed, by B. L. Berg. Communication Research Trends 26.1: 24.

PSYCHOTHERAPY

Course Code: PSY4302 **Credit Units: 03**

Course Objective:
The course enables students to learn various therapies and their applications in counselling field. The course aims to enable participants to acquire the development and therapies in counselling which can be used in a variety of settings, and also to understand the importance of the development of personal awareness in the effective application of counseling skills.

Course Contents:
Module I: Introduction
Psychotherapy: Meaning, Nature & Scope
Variables affecting Psychotherapy: Specific Variables: Client Variable, Therapist Variable, Process variables, Social & Environmental Variable
Non-Specific Variables: Spontaneous cure, Placebo Effect
Currents and Future Trends of Psychotherapy

Module II: Psychotherapy in India
Psychotherapy in the Indian context
Spirituality and psychotherapy
Yoga and Meditation

Module III: Varieties of Psychotherapy
Supportive therapy
Re-educative Therapy
Re-constructive therapy
Counselling vs. Psychotherapy

Module IV: Psychoanalytic Therapies
Freud's Psycho-analytic Therapy, Adlerian Psychotherapy, Brief Dynamic Therapies

Module V: Humanistic Therapies
Client-Centered Therapy, Existential Therapy and Gestalt Therapy

Module VI: Behavioral and Cognitive Behavior Therapy
Behavioral therapy, Cognitive Behavior therapy, Rational Emotive Behavior Therapy (Ellis)

Module VII: Few more Important Therapies
Family, Marital and Interpersonal Therapy
Therapies with Children and Adolescents
Group Therapy

Module VIII: Therapeutic Guidelines while working with
Women, Older clients, Clients with personality disorder
Grief and loss
Self-harm
Persons from disadvantaged context

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Golfried, H. R. & Davison, G. C.: Clinical Behaviour Therapy
- Sharf R., Theories of Psychotherapy & Counselling – Concepts and Cases; 2nd Edition.
- The Top 10: The Most Influential Therapists of the Past Quarter-Century. Psychotherapy Networker.: 2007, March/April (retrieved 7 Oct 2010)
- Henrik, R. (ed) *The Psychotherapy Handbook. The A-Z handbook to more than 250 psychotherapies as used today* (1980) New American Library.

References:

- Kirt S.H. & Clark: Cognitive Behaviour Therapy for Psychiatric Problems.
- Gurman & Kniskern: Handbook of Family Therapy.
- Kahn M.,: Between Therapist and Client- The New Relationship- Revised Edition
- Bryant, R.A.; Moulds, M.L.; Guthrie, R.M.; Nixon, R.D.V. (2005)."The Additive Benefit of Hypnosis and Cognitive-Behavioral Therapy in Treating Acute Stress Disorder"

CLINICAL PSYCHOLOGY

Course Code: PSY4303 **Credit Units: 03**

Course objective:
Clinical psychology is the branch of psychology concerned with the assessment and treatment of mental illness, abnormal behavior and psychiatric problems. This field integrates the science of psychology with the treatment of complex human problems, making it an exciting career choice for people who are looking for a challenging and rewarding field.

Course Contents:
Module I: Introduction
Meaning and Nature of Clinical Psychology
Background of Clinical Psychology: First Fifty years of Clinical Psychology (Establishment of Psychological Clinics and Influence of World War I)
Clinical Psychology: between World War I and II; From World War II to Present

Module II: **Foundation of Clinical Psychology**
Historical origin, the Psychometric tradition, the influence of health and child guidance movement, the influence of Sigmund Freud & the American Psychologist's in America.
The influence of World War II on development of Clinical Psychology
Roots of Clinical Psychology in India: the pre-independence phase, post independence to the present scenario.

Module III: Development of clinical Psychology as a profession.
Activities of Clinical Psychologist: psychological assessment, Psychotherapy, research, community mental health programme, teaching, consultation, administration.
Differences & similarities with other mental health professions
Subspecialties of clinical Psychology: Clinical health Psychology, Forensic Psychology, Geropsychology, Clinical Neuropsychology, and child clinical psychology.
Professional identity, responsibilities

Module IV: Diagnosis and assessment.
Nature and purpose of Clinical diagnosis & assessment
Stages in the Assessment Process
Clinical Assessment Techniques: observation, interview, case-study, Psychological tests.

Module V:
Employment Setting for Clinical Psychologist
Subspecialties of Clinical Psychology
Organizations in Clinical Psychology
Ethical and Legal Issues in Clinical Psychology
Cultural issues, current scenario & future prospects.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References

Text

- Anastasi, A.: Psychological Testing, New York: MacMillan Publishing company.
- Bellack, A. S.**:** Introduction to Clinical Psychology. New York: Oxford & Hersen, M.University Press
- Karliger, F.N.: Foundations of Behavioural Research, New York: Holt Rinehart Winston.
- Korchin, S. J.**:** Modern Clinical Psychology. Delhi CRR Publishers and Distributers
- Ray, S. D.: The Practice of Psychotherapy. New Delhi: New Age International
- Plante, T. G.: Contemporary Clinical Psychology. New York: John Willey& Sons, Inc.
- Pomerantz, A. M. : Clinical Psychology- Science, Practice and Culture. New Delhi: Sage Publications
- Hecker, J. E.: Introduction to Clinical Psychology. Delhi: Pearson Thorpe, G. L.Education
- Matthews, J. R.: Introduction to Clinical Psychology. New York: Oxford Anton, B. S.University Press
- Herbert, M.: Clinical Child Psychology: Social Learning, Development And Behaviour.New York: John Willey & Sons, Inc.
- Kumar, A.: Clinical Psychology. Anmol Publications
- Field, A. P.: Clinical Psychology. Learning Matters & Field
- Hatton, C.: Clinical Psychology. New York: John Willey & Sons, Inc.

References:

- Barlow et al.(2010): Oxford Handbook of clinical psychology.1st Edition.
- Gross and Hersen., (2007): Handbook of clinical Psychology .Volume 1

PRACTICUM- III

Course Code: PSY4308 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the third semester among the list of following practicals

Course Content:

1	Measures of Psychosocial Development (MPD)	Development
2	Culture Free Self-Esteem Inventories, 3rd Edition	Self-Esteem
3	State-Trait Anger Expression Inventory-2™ (STAXI-2)	Anger
4	Personality Inventory for Youth	Personality
5	Family Relations Test: Children's Version	Interpersonal Relationship
6	Wide Range Intelligence Test (WRIT)	Intelligence

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

Examination Scheme:

Components	A	File Demonstration	Viva	EE
Weightage (%)	5	35	35	25

FIELD PRACTICE-III

Course Code: PSY4309 **Credit Units: 04**

Course Objective:
To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

SUMMER INTERNSHIP EVALUATION

Course Code: PSY4335 **Credit Units: 06**

GUIDELINES FOR INTERNSHIP FILE AND INTERNSHIP REPORT

(These guidelines will be useful for undertaking an internship programme during the summer or at any other time wherein the student/ researcher works full time with a company/organisation)

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship programme can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain and submit a file (**Internship File**) and a report (**Internship Report**).

INTERNSHIP FILE

The Internship File aims to encourage students to keep a personal record of their learning and achievements throughout the Programme. It can be used as the basis for lifelong learning and for job applications. ***Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.***

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and his/her own personal contribution to the organization.

The File is essentially a comprehensive documentation of how one proceeds while working on the assignment and should be regularly checked by the faculty guide/ supervisor, issues discussed with the students, doubts if any clarified and signed as having done so. This will form the basis of **continuous evaluation** of the project.

The File will include ***five sections*** in the order described below.

1. **The Title Page –** An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content –** An outline of the contents of the file by topics and subtopics with the page number and location of each section.
3. **Introduction** – Short, but should include how and why you obtained the internship experience position and the relationship it has to your academic/professional and career goals.
4. **Main Body** – Should include a brief summary/ executive summary of the **Internship Project Report** that the student has worked on, an **analysis of the company/organization** in which the student is working, a **personal review** of the student's management skills and how they have been developed

through the programme, the daily tasks performed, major projects contributed to, dates and hours spent on a task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **Appendices** – Include pamphlets, forms, charts, brochures, technical and descriptive literature, graphs and other information related to your Internship experience.

INTERNSHIP REPORT

The **Internship Report** is the research report that the student has to prepare on the project assigned by the organization. (Incase a student is not assigned a specific research project in the organization, he has to select any one aspect of the organization and prepare a research report on it). The lay out of the report should be as per the standard layout prescribed by the organization wherein the student undertakes the Internship. In case, there is no layout prescribed by the organization the following components should be included in the report:

- **Title or Cover Page**.
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgements**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**
  A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or

captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly.
  Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

The Layout Guidelines for the Internship File & Internship Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 30%
(based on Internship File and the observations of the faculty guide/ supervisor)

Feedback from Company/ Organization: 10%

Final Evaluation:
(Based on Internship Report, Viva/ Presentation) 60%

COUNSELLING PSYCHOLOGY

Course Code: PSY4304 **Credit Unit: 03**

Course Objective: To produce graduates with a well-developed professional identity as counseling psychologists, including awareness and appreciation of context, development, and strength-based interventions. Thus, we seek to develop the professional skills of our students such that each is able to:

- Demonstrate understanding of the impact of multiple contexts on human behavior
- Demonstrate understanding of theories and techniques of developmentally-based health promotion and intervention for individuals, systems, and communities
- Appreciate the role of individual and cultural differences and diversity in human development and behavior

Course Contents:

Module I: Introduction

Meaning, Definition & Goals
Historical Background: Origin of Counseling within Philosophy and Medicine,
Influence from Psychology, Mental health development, the guidance movement and other influences
Difference between Counseling and other associated helping professions (psychotherapy, psychiatry, social work, guidance etc.)

Module II: Counseling Process

Settings for counseling
Steps in counseling
Therapeutic relationship: The importance of relationship, components of relationship, Facilitative conditions for the counseling relationship

Module III: Counseling Approach: Insight oriented

Psychodynamic Approach: Psychoanalytic, Adlerian
Humanistic Approach: Existential, Client-centered, Gestalt

Module IV: Counselling Approach: Action oriented & other approaches

Behavioural Approach: Operant-Conditioning, Classical-Conditioning.
Cognitive Approach: Cognitive Tharepy, Rational emotive therapy.
Other Approaches: Narrative Therapy, Expressive Therapy, and Biofeedback.

Module V: Current Issues in Counseling:

Ethical Issues: Professional Codes, Our divided loyalties, Areas of ethnical difficulty, recent trends
Legal Issues: Advice for the passionately committed counseling student
Mental Health Counseling
Counseling diverse population: Gender bias, Counseling the aged, the ethnic minorities, and the physically challenged

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Williams, E.N., Hayes, J.A., & Fauth, J. (2008). Therapist self-awareness: Interdisciplinary connections and future directions. In S. Brown & R. Lent (Eds.), Handbook of Counseling Psychology (4th ed) (pp. 267–283). NY: Wiley.
- Levy, K. N., &Scala, J. (2012). Transference, transference interpretations, and transference-focused psychotherapies. Psychotherapy, 49(3), 391-403. doi:10.1037/a0029371
- Ladany, N. & Inman, A. (2008) Handbook of Counseling Psychology, (4th ed.). John Wiley & Sons: New York.

References:

- Society of Counseling Psychologists. (n.d.). About counseling psychologists. Found online at http://www.apa.org/ed/accreditation/doctoral.html
- Brems, C. & Johnson, M. E. (1997). Comparison of recent graduates of clinical versus counseling psychology programs. Journal of Psychology, 131, 91-99.
- Disner SG, Beevers CG, Haigh EA, Beck AT. (2011) "Neural mechanisms of the cognitive model of depression". Nat Rev Neurosci. 2011 Jul 6;12 (8):467-77.
- Whyte, C (1978) "Effective Counseling Methods for High-Risk College Freshmen". Measurement and Evaluation in Guidance. January. 6. (4).198-2000

DEVELOPMENTAL PSYCHOLOGY

Course Code: PSY4305 **Credit Units: 03**

Course objective:
To develop the understanding as to how developmental psychology focuses on the development of individuals across their lifespan within the context of family, peer groups, child-care and after-school programs, schools, neighborhoods, and larger communities and society. It considers the well-being of children, youth, and adults, vis-a-vis the cognitive, emotional, social, academic, and health domains

Course Contents

Module 1: Background of Developmental Psychology
Historical Background
Meaning, Nature and scope
Obstacles in studying Life-Span Development and its effect

Module2: Stages of Development
General Patterns of Development
Stages of Development- Physical, Cognitive, Emotional, Social and Moral

Module 3: Theoretical perspective on Development
Psychodynamic Theories: Freud, Erikson
Social Learning Theory: Albert Bandura
Cognitive Theory: Piaget
Attachment Theory: Bowlby
Socio Cultural Theory: Konrad-Lorens & Niko Tinbergen, Lev Vygotsky
Ecological Theory: Uric Bronfen Brenner
Ethology & Evolutionary Theory

Module 4: Development Related Disorders (DSM-IVTR and I.C.D-10)
Pervasive Developmental Disorder: Autism
Specific Developmental Disorder of Speech and Language
Specific Learning Disabilities-Reading, Spelling, and Arithmetical Disorder
Behavioral Disorders: Attention Deficit Hyperkinetic Disorder, Conduct Disorder, Oppositional defiant Disorder

Module 5: Adjustment Related Issues.
Adolescence: Psychological Hazards, Effects of Immaturity, and happiness in adolescence. Early Adulthood: Social Mobility, Sex-Role Adjustments, Personal & Social Hazards.Middle Age: Adjustment to Physical and mental changes, Vocational and marital hazards.Old Age: Changes in motor and mental abilities, Hazards to Personal and Social Adjustment.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D: Human Development (10th Ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Prentice Hall
- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Heatherington, E.M. & Parke, R.D.: Child Psychology: A Contemporary Viewpoint New York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A.: Allyn and Bacon.
- Crain, W.: Theories of Development. Englewood Cliffs, New Jersey: Prentice Hall.
- Newman, B.M. & Newman, P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.

References:

- Brodzinsky, D.M.; Gormly, A.V. & Anibron, S.R.: Life Span Human Development; New Delhi: CBS Publication
- Santrock, J.W.: A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.
- Bukatko, D. & Daehler, M.W.:Child Development: A Thematic Approach. New York: Houghton Mifflin Company.

NEURO-PSYCHOLOGY

Course Code: PSY4306 **Credit Units: 03**

Course Objective:
The objective of this course is to give a better knowledge of brain and its various functions to understand its role in human behavior.

Course Contents:
Module I: Introduction
Understanding the concept of Neuropsychology
The rationale for Neuropsychological evaluation
Common problems with brain damage

Module II: Plasticity of Brain
Neuropsychological aspect of plasticity of brain
Cerebral cortex and lateralization / localization of functions

Module III: Frontal Lobe and Temporal Lobe Deficits
Behavioural/ emotional/ personality/ cognitive changes associated with the lobe functions.

Module IV: Parietal and Occipital Lobes Deficits
Behavioural / emotional/ cognitive functions associated with each lobe.

Module V: Neuropsychological Rehabilitation (Holistic Approach)
Planning, process and outcome of cognitive retraining
Role of family and larger community
Financial/ employment Rehabilitation
Neuropsychological Assessment
- Bender Gestalt Test
- Benton's Visual Retention Test

Module VI: Social Support and Health
Factors for Personality and Health Link
Types of Social Support
Link between social support and Health
Cross cultural images of health

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Luria, A.R. (1966), Higher cortical functions in man, New York, basic books.
- Hecaen, H. and Albert, M.L. (1978), Human Neuropsychology, New York, John Wily and Sons.
- Brannon, L. & Feist, J. (2007): Introduction to Health Psychology. Cengage Learning

References:

- Walsh, K. W. (I978), Neuropsychology a clinical approach, Edinburgh, Churchill Livingston.
- Vinken, P.J. & Bruyn, G.W. (1969) (Ed.), handbook of Clinical Neurology, Amesterdam, North Holland .
    - Kirshener, H.S, (1986) Behavioural Neurology, New York, Churchill Livingston.
- Lhermitte, F. (1986) Human Autonomy and the Frontal Lobes. Part II: Patient Behavioural in complex and social situation: The "Environmental Dependency Syndrome". Annuals of Neurology, 19, 335- 343.
    - Strub and Black Neuro-behavioural Disorder.
    - Taylor, SE (1986) Health Psychology Random House, New York.

Syllabus – Fourth Semester

RESEARCH METHODS: NON-EXPERIMENTAL DESIGN

Course Code: PSY4401 **Credit Unit: 02**

Course Objective:
Research Methodology is a way to find out the result of a given problem on a specific matter or problem that is also referred as research problem. In Methodology, researcher uses different criteria for solving/searching the given research problem. Different sources use different type of methods for solving the problem. So this course will enable the student to understand and apply basic research methods in psychology including research design, data analysis and report findings research conclusion apparently based on the parameters of particular research methods.

Course Contents:
Module I: Introduction
Nature and Purpose of Non-Experimental Research Designs and their importance
Advantages and Disadvantages of Non-experimental Research Designs
Differences between Experimental and Non-Experimental Research Designs
Types or Non-experimental Designs: Pure Descriptive design, Correlational Descriptive Design and Other type

Module II: Quasi- Experimental designs
Quasi- experimental research designs: their uses and importance
One-Group Designs
Non-equivalent control group designs
Pretest-Posttest Control Group Design

Module III: Non-Experimental Designs
Quantitative Non-Experimental Designs, Causal Comparative
Qualitative and Quantitative perspectives: Collecting qualitative data: Case study, interview, Observational method. Discourse Analysis, Grand narrative analysis, Ethnographic methodology.
Time series Designs

Module IV: Correlational Designs
Correlational research design: Its Basic nature and uses
Kinds of Correlational designs: Panel Design, Cross-Sectional Design and Longitudinal Designs
Concept and application of Multiple Regression Analysis (linear and stepwise)
Factor analysis and Its Implications

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Shuttleworth, Martyn (2008). "Definition of Research". Experiment Resources. Experiment-Research.com. Retrieved 14 August 2011.
- Creswell, J. W. (2008). Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed). Upper Saddle River: Pearson.
- Trochim, W.M.K, (2006). Research Methods Knowledge Base.
- Montgomery, Douglas (2013). Design and analysis of experiments (8th ed). Hoboken, NJ: John Wiley & Sons, Inc. ISBN 9781118146927.

Reference:

- Kothari, C.R (2004), Research Methodology: Methods and Techniques.
- Kumar, R (2005), Research Methodology: A step-by-step beginners.
- Melville and Goddard (2004), Research Methodology: An introduction.
- Khan, J.A(2011), Research Methodology.

MENTAL RETARDATION

Course Code: PSY4402 **Credit Units: 02**

Course Objective:
The paper on Mental Retardation introduces nature of mental retardation, its classification, assessment and intervention programs.

Course Contents:
Module I:
Mental Retardation: Definition of mental retardation, Classification-Psychological Classification Medical and Educational Classification, Causes and Prevention

Module II:
Mental Retardation: Psycho-educational Assessment, Intelligence Tests, FACP, BASIC-MR, BASAL-MR

Module III:
Mental Retardation: Enhancing Skills- CTC, IEP, Prompting, Task Analysis, Channing, Shaping, Modeling, Reinforcement

Module IV:
Mental Retardation: Reducing maladaptive behaviours- Assessment of maladaptive behaviours, plan of behavior modification, techniques for decreasing problem behavior.

Module V:
Vocational Training and Empowering families having child with Mental Retardation, Special Sports, Acts and Policies

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad
- Thressiakutty A.T. and Govindrao L. (2001) Transition of Persons with Mental Retardation from School to Work, NIMH Secundrabad

References:

- Rao, T.A.S. (1992) Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundrabad
- Hallahan D.P. and Kauffman J.M. (1980) Exceptional Children, Prentice Hall
- National Trust, Govt. of India, Handbook for Teachers

PRACTICUM- IV

Course Code: PSY4412 **Credit Units: 03**

Course Objective:

1. To give practical experience to the students in administering and scoring psychological tests and interpreting the scores.
2. To acquaint the students with the basic procedure and design of psychology experiments.
3. To encourage and guide the students to undertake a small-scale research project.
4. To apply the general concepts of psychology through experimentation and testing

Note: Total 5 practicals will be conducted in the fourth semester among the list of following practicals

Course Content:

1	NEO-4™ - Comprehensive Kit	Personality
2	Comprehensive Test of Non-verbal Intelligence-Second Edition (CTONI-2)	Intelligence
3	Neuropsychological Assessment Battery® (NAB®) Attention Module Kit	Attention
4	Detroit Tests of Learning Aptitude - Fourth Edition (DTLA-4)	Learning
5	Reynolds Intellectual Assessment Scales (RIAS)	Intelligence
6	General Health Questionnaire (GHQ)	Health

Examination Scheme:

Components	**A**	**File Demonstration**	**Viva**	**EE**
Weightage (%)	5	35	35	25

Text & References:

- Mohsin, S. M.: Experiments in Psychology. Motilal Banarasidas
- Woodworth, R.S.: Experimental Psychology. Oxford & IBH & Schlosberg, H. Publishing
- Postman, L. & Egan, J. P.: Experimental Psychology: An Introduction. Harper and Row

FIELD PRACTICE-IV

Course Code: PSY4413 **Credit Units: 04**

Course Objective:
To develop, in students the skills of observation, collection and documentation of data for conducting theoretically correct and practically relevant research

Methodology

Each student will engage themselves in interaction and observation of psychological processes in a subject/ field of their choice.
Student will then present their findings in the form of a paper for seminar discussions.
Similarly, field work will be done by students in their area of interest and present their practical observations, as a report with analysis and suggestions.

Examination Scheme:

Field/Seminar Report	:	40 marks
Viva-Voce	:	30 marks
Internal Faculty and Interaction	:	10 marks
Presentation/Daily Diary Report	:	20 marks

DISSERTATION

Course Code: PSY4437 **Credit Units: 06**

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.

- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:
- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5

- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:	40%
(Based on Abstract, Regularity,	
Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	25
Conceptual Framework,	10
Objectives & Methodology and	10
Implications & Conclusions	15

REHABILITATION PSYCHOLOGY

Course Code: PSY4404 **Credit Unit: 03**

Course Objective:
Objective of this course is to learn profession of Rehabilitation Psychology, Psychological Assessment of persons with disabilities, Psychological Interventions and dealing with families

Course Contents:
Module I:
Overview of the profession of Rehabilitation Psychology and practice, history, growth and scope, Role of Psychologist in Rehabilitation

Module II:
Psychological Assessment- Assessment of Cognition, aptitudes, psychopathology, work/vocational and daily functioning

Module III:
Health behavior: Theories of health behavior change, interventions strategies for individuals and families of disabled
Behaviour Modification and Cognitive Therapies in Rehabilitation

Module IV:
Dealing with Families- Family's reactions to disabilities, coping styles, family counseling, Coordination with Multidisciplinary team

Module V:
Community Based Rehabilitation – Goals of CBR, components of CBR, Role of Professionals, role of Community, Ethical Issues

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:
Text:

- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Mohapatra C.S. (2004) Disability Management, NIMH, Secundrabad
- Robert G. Frank Timothy R.Elliott (2000). Handbook of Rehabilitation Psychology, APA Washington.
- Michael Brnes Anthony Ward (2009) Oxford Handbook of Rehabilitation Medicine

References:

- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad
- WHO (2004) Community Based Rehabilitation
- Tally A.B, Sivaraman K.P and Murali T(1998) Neurorehabilitaion Principles &practice, NIMHANS Bangalore India

CHILDHOOD PATHOLOGY AND EXCEPTIONAL CHILDREN

Course Code: PSY4405 **Credit Unit: 03**

Course Objective:
Objective of this course is to learn various categories of exceptionality, early identification, special and mainstream education

Course Contents:
Module I:
Developmental Disorders- Autism Spectrum Disorders, attention deficit hyperactivity disorder, Mental Retardation, Learning Disabilities, Hearing Impairment, Disability of Locomotion

Module II:
Bipolar disorder in children, conduct disorder, emotional disorders, eating disorders, enuresis
Psychological Assessment of Childhood disorders

Module III:
Special Education: Special Schools and Rehabilitation centres
Mainstreaming: assistive devices, adaptation, barrier free environment
Mainstreaming: Attitudinal change- teachers, non disabled students, Parents and Community

Module IV:
National Institutes in the field of disability: NIMH, NIVH, NIOH, AYJNIHH, NIEPMD, SVNIRTAR, Alimbco.
NGOs, Parent Organizations, Advocacy organization

Module V:
Legislative framework: Mental Health Act, RCI Act, Persons with Disability Act, National Trust Act, UNCRPD

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:
Text:

- Hallahan D.P. and Kauffman J.M. (1980) Exceptional Children, Prentice Hall
- Cratty B.J. and Goldman R.L. (1995) Learning Disabilities: Contemporary Viewpoints, Harwood Academic Publishers
- Cruschank, W.M. (1975). Psychology of Exceptional Children and Youth, Englewood Cliffs N.J.: Prentice Hall

References:

- Rao, T.A.S. (1992) Manual on Developing Communication Skills in Mentally Retarded Persons, NIMH, Secundrabad
- National Trust, Govt. of India, Handbook for Teachers
- NIMH (1989) Mental Retardation : A Manual for Psychologist, Secundrabad
- Peshawaria R. and Venkatesan (1992) Behavioural Approach in Teaching Mentally Retarded Children, NIMH, Secundrabad

PSYCHOTHERAPEUTIC INTERVENTION IN CLINICAL SETTING

Course Code: PSY4406 **Credit Unit: 03**

Course Objective:
To equip students with the basic understanding of various types of therapies and their implications in different clinical settings

Course Contents

Module I: Introduction
Psychotherapy Overview of historical developments and current trends in psychotherapy, issues related to consent (assent in case of minors), planning and recording of counseling session; and setting goals; pre and post assessment, interviewing: objectives of interview, structured and unstructured interview, open and close ended questions, clarification, reflection, facilitation and confrontation, silences in interviews.

Module II: Behavior Therapy
Origin, Foundations; Principles and Methodologies, behavioral assessment, formulation and behavioral goals Systematic desensitization (in vivo and in vitro); Extinction: Flooding and Response Prevention, Implosion, Covert Sensitization, Negative Practice and stimulus satiation. Skill training: Assertiveness Training; Modeling; Behavioral Rehearsal. Operant procedures: Token economy, Contingency management. JPMR and Biofeedback

Module III: Cognitive Therapy
Cognitive behavior therapy: Cognitive model; automatic negative thoughts, schemas principles and assumptions, technique: Ellis's Rational Emotive Behavior Therapy (REBT) and Beck's cognitive therapy, dialectical behavior therapy

Module IV: Therapy in Special Condition
Chronic mental illness, Substance Abuse, Learning Disabilities and Mental retardation and such other conditions, where integrative/eclectic approach is the basis of clinical intervention

Module V: Biomedical Therapy
Electro-convulsive therapy, Drug therapy-Antipsychotic drugs, Anti depressant drugs and Anti anxiety drugs

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- An introduction to the Psychotherapies, 3rd edition, bLoch, S (2000) Oxford Medical Publications.
- Encyclopedia of Psychotherapy, vol. 1 and 2, Hersen M & Sledge W. (2002). USA.
- Techiniques of Psychotherapy, 4th edition, Parts 1 & 2, Wolberg, L.R. Grune and Stratton: NY.
- Theories of Psychotherapy and Counselling, 2nd edition, Sharf, R.S. (2000). Brooks/Cole; USA.

References:

- Bellack, A.S. & Hersen, M., (1998). Comprehensive Clinical Psychology, Vol., Elsiever Science Ltd.: Great Britain.
- Cognitive Behavior Therapy for Psychiatric Disorders. A Practical Guide, Hawton, K. Salkovskis, P.M., Kirk, J and Clark, D.M. (1989) Oxford University Press.

DIFFERENTIAL DIAGNOSTIC TECHNIQUES

Course Code: PSY4407 **Credit Unit: 03**

Course Objective:
Enable students to selecting an appropriate test for a particular purpose, administration, scoring and interpreting psychological test profile in clinical settings

Course Contents

Module I: Introduction
Case history; mental status examination; rationale of psychological test; behavioral observation, response recording and syntheses of information from different sources; formats of report writing, context of clinical assessment, types of referrals, ethical practice of assessment, selecting psychological tests.

Module II: Assessment of Cognitive Functions
Bender gestalt test, PGI Memory scale; Bhatia's battery of performance tests of intelligence
Binet's test of intelligence, Wechsler adult intelligence scale

Module III: Test for Differential Diagnosis
Tests for diagnostic clarification: A) Rorschach psychodiagnostics, B) Tests for thought disorders – color form sorting test, object sorting test, proverbs test, C) Minnesota multiphasic personality inventory; Multiphasic questionnaire, clinical analysis questionnaire, IPDE, D) screening instruments such as GHQ, hospital anxiety/depression scale etc. to detect psychopathology.

Module IV: Tests for Adjustment and Personality Assessment
Questionnaires and Inventories – 16 personality factor questionnaire, NEO-5 personality inventory, temperament and character inventory, Eyesenk's personality inventory, Eysenck's personality questionnaire, self-concept and self esteem scales, Rottor's locus of control scale, Bell's adjustment inventory (students' and adults'), subjective well-being questionnaires, QOL
Projective tests – sentence completion test, picture frustration test, draw-a-person test; TAT – Murray's and Uma Chowdhary's

Module V: Therapy in Special Condition
Psychological assessment of children: A) Developmental psychopathology check list, CBCL, B) Administration, scoring and interpretation of tests of intelligence scale for children such as SFB, C- 42 RPM, Malin's WISC, Binet's tests, and developmental schedules (Gesell's, Illingworth's and other) Vineland social maturity scale.

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Freeman, F.S. (1965). Theory and practice of psychological testing, Oxford and IHBN: New Delhi.
- Bellack, A.S. & Hersen, M (1998): Comprehensive Clinical Psychology: Assessment, Vol. 4. Elsiever Science Ltd.: Great Britain
- Exner, J.E. The Rorschach – A Comprehensive System, Vol. 1, 4th ed., John Wiley and sons: NY.
- Choudhary, U. An Indian modification of the Thematic Apperception Test. Shree Saraswathi Press: Calcutta

References:

- Hersen, M; Segal, D. L; Hilsenroth, M.J. (2004). Comprehensive handbook of psychological assessment, Vol. 1 & 2. John Wiley & Sons: USA
- Murray H.A. (1971): The Thematic Apperception Test manual, Harvard University Press.

COMMUNITY PSYCHOLOGY AND INTERVENTION

Course Code: PSY4408 **Credit Units: 03**

Course Objective:
This course provides an introduction to the community psychology. Rehabilitation and human service system and professionally prepares the students for becoming rehabilitation counselors. It lays emphasis on the stands, approaches and contemporary issues related to community and rehabilitation psychology.

Course Contents

Module I: Rehabilitation
Case history; mental status examination; rationale of psychological test; behavioral observation, response recording and syntheses of information from different sources; formats of report writing, context of clinical assessment, types of referrals, ethical practice of assessment, selecting psychological tests

Module II: Health Behavior
Theories of Health Behavior Change, Interventions Strategies For Individuals And Families of Disabled, Models Of Therapeutic Education For Successful Rehabilitation

Module III: Community issues
Evaluation of community needs, rehabilitation in community, social counseling, training in daily living skills, community awareness raising and increasing community involvement, facilitating access to loans, vocational training, information for local self-help groups, contacts with different authorities, school enrolment **.**

Module IV: Psychotherapy in the Indian Context
Historical perspective in psychological healing practices from the Vedic period and the systems of Ayurveda and Yoga, contemporary perspectives; socio-cultural issues in the Indian context in practice of psychotherapy; ongoing research related to process and outcome.

Module V: Mental Health Policies of Government (National Mental Health Program, Mental Health Act)

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	8	10	7	5	70

Text & References:

Text:

- Mann, A.P.; Community and Applications
- Rappaport, J.; Community Psychology: Values, Research and Action

Reference:

- Book, P. E.; Community Psychology Mental Health
- Kuppuswami, B.; An Introduction to Social Psychology
- Bates, A. P. & Julian, J.; Sociology— Understanding Social Behavior
- Broom, Leonard and Selzmick, Philip – A test with Adapted Readings
- Browning & Charles J.; Differential Impact of Family Disorganization on Male Adolescents in social problems.
- Burgers, E.W., and Lock, H.J.; 'The Family'
- Nimkoff, M.E. ;'The Family'
- Albert C. K.; Deviance and Control
- Gobbons, Don, C.; Deviant Behavior (2nd ed.)
- Jenkins, Richard L., "Motivation and Frustration in Delinquency" ; American Journal of Orthospsychiatry

POSITIVE PSYCHOLOGY

Programme Structure-2017

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
PSY2152	The Science of Happiness	3	-	3
PSY2252	Optimism and Success	3	-	3
PSY2352	Resilience and Well Being	3	-	3
PSY2452	Positive Psychology and Work Life	3	-	3
PSY2552	Creativity and Problem Solving	3	-	3
PSY2652	Positive Leadership & Competency Development	3	-	3
	TOTAL			**18**

POSITIVE PSYCHOLOGY

Syllabus - Semester First

THE SCIENCE OF HAPPINESS

Course Code: PSY2152 **Credit Units: 03**

Positive Psychology is the scientific study of human flourishing, and an applied approach to optimal functioning. It has also been defined as the study of the strengths and virtues that enable individuals, communities and organizations to thrive. The underlying premise of positive psychology is that you can learn to be happier just as you can learn a foreign language or to be proficient at golf. This rapidly growing field is shedding light on what makes us happy, the pursuit of happiness, and how we can lead more fulfilling, satisfying lives. The course focuses on the psychological aspects of a fulfilling and flourishing life. Topics include happiness, self-esteem, empathy, love, achievement, creativity, music, spirituality.

Course Objectives:

- To bring an experience marked by predominance of positive emotions and informing them about emerging paradigm of Positive Psychology
- Build relevant competencies for experiencing and sharing happiness as lived experience and its implications

Course Contents:

Module-I: Introduction to Positive Psychology
Positive Psychology: Concept, History, Nature, Dimension and scope of Positive Psychology
Seligman's PERMA

Module-II: Positive Emotional States and Processes
Positive Emotions and well being: Hope & Optimism, Love
The Positive Psychology of Emotional Intelligence
Influence of Positive Emotions

Module-III: Strengths and Virtues
Character Strengths and Virtues
Resilience in the phase of challenge & Loss
Empathy and Altruism

Module-IV: Happiness
Introduction to Psychology of happiness, well being and scope, Types of happiness- Eudaimonic and Hedonic
History of Happiness, Theories, Measures and Positive correlates of happiness
Traits associated with Happiness
Setting Goals for Life and Happiness

Module-V: Forgiveness and Gratitude
Forgiveness and Gratitude
Personal transformation and Role of suffering
Trust and Compassion

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	**10**	**10**	**5**	**5**	**70**

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam

Text & References:

- Argyle, M. 1987. *The psychology of happiness.* London: Methuen.
- Baumgardner, S.R. & Crothers, M.K. (2009). Positive Psychology. New Delhi: Pearson Education
- Carr, A. (2004). Positive Psychology. The Science of Happiness and Human Strengths. London: Routledge.
- Snyder, C.R.& Lopez. S. (2007). Positive Psychology. The scientific and Practical explorations of Human Strengths. Sage Publications
- Synder, C.R.& Lopez. S. (2007). Handbook of Positive Psychology. Oxford Publications.
- Snyder, C.R.& Lopez. S. (2007). Positive Psychology. The scientific and Practical explorations of Human Strengths. Sage Publications
- Haidt , J. (2006). The Happiness Hypothesis; Finding Modern Truth in Ancient Wisdom. New York: Basic Books.
- Peterson, C. (2006). A Primer in Positive Psychology. New York: Oxford University press.
- Seligman, M.E.P. (2002). Authentic happiness. New York: Free Press.
- Crompton, W.C. (2005), An Introduction to Positive Psychology, Singapore: Thomson.
- Snyder, C.R. and Lopez, S.J. (2005), Handbook of Positive Psychology, New York Oxford University Press.
- Carr, A. (2004), Positive Psychology: The Science of Happiness and Human Strengths, New York: Brunner – Routledge.
- Linley, P.A. and Joseph, S. (2004), Positive Psychology in Practice, New York : John Wiley and Sons.
- Peterson, C. (2006), Positive Psychology, New York: Oxford University Press. Goleman & Daniel, Emotional Intelligence
- Snyder, C.R., Lopez, S.J. & Pedrotti, J.T. (2011): Positive Psychology: The Scientific and Practical Explorations Of Human Strengths (2nd Ed). Sage Publication, Inc.
- Tal Ben-Shahar (2007) Happier: Learn the Secrets to Daily Joy and Lasting Fulfillment.

Syllabus - Semester Second

OPTIMISM AND SUCCESS

Course Code: PSY2252 **Credit Units: 03**

Course Objectives:
This course synthesizes and integrate wellness principles and strategies into life, education and work place settings, thereby contributing to enhanced productivity, the prevention of chronic lifestyle disease, enjoyment of life, and personal fulfillment
Moreover, students will become holistic thinkers and lifelong learners who are able to integrate information across multiple disciplines and apply knowledge, skills, critical thinking and problem solving to real world situations.

Course Contents:

Module-I: Optimism and Physical Health
Optimism and coping with physical illness
Optimism and quality of life
Complementary Strengths of Health Psychology and Positive Psychology

Module-II: Optimism and Psychological Health
Hope Theory
Self Esteem and Self efficacy
Well-being therapy
From Positive Potential to Positive Excellence: Steps to be optimistic

Module-III: Gratitude: Parent of all virtues
Optimism, Gratitude and Happiness
Characteristics of grateful people
Cultivating Gratitude-Becoming more grateful

Module-IV: Problem Solving Appraisal and Psychological Adjustment
Motivation and Resilience
Stress and Stress Management

Module-V: Positive Psychology in Practice
Promoting Human Flourishing in Work, Health, Education, and Everyday Life
Positive Psychology and Life Coaching
Integrating positive psychology in practice

Module-VI: Success
What is success?
SMART Goal Setting & Letters to Yourself, Self-Motivation
Human Psychological Capital
Skills Sought by Employees

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	**10**	**10**	**5**	**5**	**70**

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam

Text & References:

- Tal Ben-Shahar (2009). The Pursuit of Perfect: How to Stop Chasing Perfection and Start Living a Richer, Happier Life.
- Fredrickson, B. L. (2001). The Role of Positive Emotions in Positive Psychology: The Broadenand-Build Theory of Positive Emotions. American Psychologist, 56, 218-226.
- Doskoch, P. (2005). The Winning Edge. Psychology Today.
- Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. Journal of Personality & Social Psychology, 88, 377-389.
- Wiseman, R. (2003). The Luck Factor. The Skeptical Inquirer, 27 (3), 1-5.
- Dweck, Carol S. Mindset: The New Psychology of Success. New York: Random House, 2006. Chapters 1 – 3.
- Seligman, M. E. P. (2002). Positive Psychology, Positive Prevention, and Positive Therapy. In C. R. Snyder and S. J. Lopez (Eds.), *Handbook of Positive Psychology*, 528-540. Oxford University Press.
- Fredrickson, B. L. (2001). The Role of Positive Emotions in Positive Psychology: The Broadenand-Build Theory of Positive Emotions. *American Psychologist*, 56, 218-226.
- Blum, D. (1998). Finding Strength: How to Overcome Anything. *Psychology Today*, Document.
- Aspinwall, L. G., & Brunhart, S. N. (1996). Distinguishing optimism from denial: Optimistic beliefs predict attention to health threats. *Personalityand Social Psychology Bulletin, 22*, 993–1003.
- Carver, C. S., & Gaines, J. G. (1987). Optimism,pessimism, and postpartum depression. *Cognitive Therapy and Research, 11*, 449–462.
- Carver, C. S., Pozo, C., Harris, S. D., Noriega, V.,Scheier, M. F., Robinson, D. S., Ketcham, A. S.,Moffat, F. L., & Clark, K. C. (1993). How coping mediates the effect of optimism on distress: A study of women with early stage breast cancer.*Journal of Personality and Social Psychology, 65*, 375–390.
- Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. New York: Cambridge University Press.Seligman, M. E. P. (1991). *Learned optimism*. New York: Knopf
- Snyder, C. R. (1994). *The psychology of hope: You can get there from here*. New York: Free Press.
- Scheier, M. F., & Carver, C. S. (2001). Adapting to cancer: The importance of hope and purpose.In A. Baum & B. L. Andersen (Eds.), *Psychosocial interventions for cancer* (pp. 15–36). Washington, DC: American Psychological Association.
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and selfesteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67*, 1063–1078.

Syllabus - Semester Third

RESILIENCE AND WELL BEING

Course Code: PSY2352 **Credit Units: 03**

Course Objectives:
Wellbeing and resilience are vital to developing efficient problem solving skills, building and maintaining interpersonal relationships and realistic goal setting, all of which greatly enhance an individual's ability to perform and contribute meaningfully in daily life. The objective of this course is to develop an awareness of how mindfulness can allow one to navigate life's transitions, learn about Signs of resilience and wellbeing, and learn how to focus on wellbeing and resilience

Course Contents:

Module-I: Resilience
Meaning, Nature and Approaches
Theories of Resilience
Promoting Resilience

Module-II: Resilience in the phase of challenge & Loss,
Positive Response to loss, Resilience & Grit
Character Strengths and Virtues

Module-III: Post Traumatic Growth & Benefit Finding
Post Traumatic Growth, Models of PTG as Outcome, Models of PTG as a Coping Strategy
Benefit Finding, Meaning Making and Stress Inoculation
Types of Growth Outcome

Module-IV: Mindfulness and Well Being
Neuroscience of Well-being, Social / Emotional Wellbeing
Mindfulness-Based Interventions, Mindfulness and mental health
Mindfulness and Positive Thinking

Module-V: Subjective Wellbeing
Promoting Wellness: Integrating community and Positive Psychology
Building Resilience and Wellbeing

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam

Text & References:

- Jeste DV, Palmer BW. A call for a new positive psychiatry of ageing. Br J Psychiatry. 2013;202:81–3.
- Resnick B, Gwyther LP, Roberto KA, editors. Resilience in aging: concepts, research and outcomes. New York: Springer; 2011. 5.
- Massey S, Cameron A, Ouellette S, Fine M. Qualitative approaches to the study of thriving: what can be learned? J Soc Issues. 1998;54(2):337–55. .
- Albrecht G, Devlieger PJ. The disability paradox: high quality of life against all odds. Soc Sci Med. 1999;48(8):977–88. .
- Antonovsky A. Health, stress and coping. San Fransisco: Jossey-Bass; 1979. .
- Canvin K, Marttila A, Burstrom B, Whitehead M. Tales of the unexpected? Hidden resilience in poor households in Britain. Soc Sci Med. 2009;69:945–54.
- Gilhooly M, Hanlon P, Mowat H, Cullen B, Macdonald S, Whyte B. Successful ageing in an area of deprivation, part 1 – a qualitative exploration of the role of life experiences in good health in old age. Public Health. 2007;121:807–13.
- Wild K, Wiles JL, Allen RES. Resilience: thoughts on the value of the concept for critical gerontology. Aging Soc. 2013;33(1):137–58.
- Schoon I. Risk and resilience. Adaptation in changing times. Cambridge: Cambridge University Press; 2006.
- Luthar S, Cichetti D, Becker B. The construct of resilience: a critical evaluation and guidelines for future work. Child Dev. 2000;71(3):543–62.
- Masten A. Ordinary magic. Resilience processes in development. Am Psychol. 2001;56(3):227–38.
- Netuveli G, Wiggins RD, Montgomery SM, Hildon Z, Blane D. Mental health and resilience at older ages: bouncing back after adversity in the British Household Panel Survey. J Epidemiol Commun Health. 2008;62(11):987–91.
- Windle G. What is resilience? A review and concept analysis. Rev Clin Gerontol. 2011;21(2):152–69. .
- Moore A, Grime J, Campbell P, Richardson J. Troubling stoicism: sociocultural influences and applications to health and illness behaviour. Health (London). 2013;17(2):159–73.
- Windle G, Bennett KM, Noyes J. A methodological review of resilience measurement scales. Health Qual Life Outcomes. 2011;9:8.
- Langer N. Resilience and spirituality: foundations of strengths perspective counseling in the elderly. Edu Gerontol 2004;30(7):611–17.

Syllabus - Semester Fourth

POSITIVE PSYCHOLOGY AND WORK LIFE

Course Code: PSY2452 **Credit Units: 03**

Positive organizational psychology takes a strengths-based approach to work relationships, leadership and individual purpose in the workplace. In applying positive psychology to work settings, the goal is to improve organizational performance as well as individual performance, well-being, and fulfillment. This course is designed to explore Positive Psychology in the work place. It will focus on the application of positive subjective experiences and traits in organizations to improve workplace effectiveness. This course looks at historical trends as well as emerging changes in employees and the workplace. Directions for future research and implications for practice will be emphasized.

Course Objectives:

- Be able to summarize and identify applications of the theories, concepts, models and research in the field of positive organizational psychology.
- Personally reflect and deepen awareness of leadership skills, work attitudes, and analytical skills in relationship to the field.
- Demonstrate ability to be effective leaders and team members within business organizations, educational environments, and/or community settings.

Course Contents:

Module-I: The changing world of work
Introduction to positive psychology and its application to the workplace
Understand the world of work, upcoming trends that will affect work
Management of today's multi-generational and diverse work force

Module-II: Positive work environments for individuals and organizations:
Employee engagement- what causes individuals to join an organization and why they stay or leave, person-centered approach to engagement
Understand the concept of work as meaning
Impact of employee well-being on the organization and impact of feelings about work on the individual's well-being.
Bringing Positive Psychology to Organizational Psychology

Module-III: Enabling a positive work life
Understand the benefits of coaching, mindfulness, and strengths development in the workplace.
Work and home life balance.

Module-IV: Building psychological capital
Identify personal character strengths and understand their relationship with work satisfaction
Developing positivity and a positive team culture
Maintaining positive relationships at work

Module-V: Positive Organizations
Applying the strengths-based approach for high performance
Appreciative Inquiry – positive change management
Maintaining positive relationships at work

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	**10**	**10**	**5**	**5**	**70**

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam

Text & References:

- Csikszentmihalyi, M. (1990). Flow: The Psychology of Optimal Experience. New York: Harper and Row.
- Eden, D. & Aviram, A. (1993). Self-efficacy training to speed reemployment: Helping people to help themselves. Journal of Applied Psychology, 78(3) 352-360
- Compton, W. C. (2005). Introduction to Positive Psychology, 1st Ed. Belmont, CA: Thompson /Wadsworth.
- Peterson, C. (2006). A Primer in Positive Psychology. New York: Oxford University Press.
- Schultz, D. and Schultz, S. E. (2006). Psychology and work today. 8th ed. N.D.: Pearson Edu.
- Lomas, T., Hefferon, K., & Ivtzan, I. (2014). Applied positive psychology: Integrated positive practice. Thousand Oaks, CA: SAGE Publications.
- Lyubomirsky, S. (2013). The myths of happiness: What should make you happy, but doesn't, what shouldn't make you happy, but does. New York, NY: Penguin.
- Mahrer, A. R. (2009). The optimal person. Laval, QC: Howard Gontovnick Publications. Metz, T. (2013). Meaning in life. New York, NY: Oxford University Press
- Ungar, M. (2008). Resilience across cultures. British journal of social work, 38(2), 218-235.
- Badhwar, N. K. (2014). Well-being: Happiness in a worthwhile life. New York, NY: Oxford University Press.
- Oxford Handbook of Positive Psychology and Work Edited by Nicola Garcea, Susan Harrington, and P. Alex Linley.
- *Huy P. Phan and Bing H. Ngu (2017).* Positive Psychology: The use of the Framework of Achievement Bests to Facilitate Personal Floursh*ing.* I*n* "Quality of Life and Quality of Working Life", *book edited by Ana Alice Vilas Boas*,
- Cotton P., & Hart P. M. (2003). Occupational wellbeing and performance: A review of Organisational Heath research. *Australian Psychologist, 38*(2), 118-127.
- Hart, P.M., Caballero, C.L., & Cooper, W. (2010, July). *Understanding Engagement: Its Structure, Antecedents and Consequences.* Paper presented at the International Academy of Management and Business Summer Conference, Madrid.
- Hart P. M., & Cooper C. L. (2001). Occupational Stress: Towards a more integrated framework. In N. Anderson, D. S. Ones, H. K. Sinagal & C. Viswesvaran (Eds.), *Handbook of Industrial, Work and Organisational Psychology* (Vol. 2, p.93-114). London: Sage.
- Hart P. M., & Cotton, P. (2001). *Organisational correlates of fair and reasonable treatment and counterproductive behaviours.* Office of Public Employment, Victoria.
- Hart P. M., & Cotton P. (2003). Conventional wisdom is often misleading: Police stress in an organisational health framework. In M. F. Dollard, A. H. Winefield & H. R. Winefield (Eds.) *Occupational stress in the service professions* (p.103-138). London: Taylor and Francis.
- Hart P. M., Tan J., Sutherland, A., Wellington, C., & Cotton P. (2011). *Leading Teams: Working Well Evaluation Report*. WorkCover Authority of New South Wales.

Syllabus - Semester Fifth

CREATIVITY AND PROBLEM SOLVING

Course Code: PSY2552 **Credit Units: 03**

Course Objectives:
To enable the students:
- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module-I: Problem Solving Process
Problem-solving skills, including engaging with, researching and identifying strategies to solve unfamiliar problems and bring about change
Barriers to problem solving

Module-II: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
- Making Predictions and Reasoning
- Memory and Critical Thinking
- Emotions and Critical Thinking

Module-III: Creative Thinking
Definition and meaning of creativity
The nature of creative thinking
- Convergent and Divergent thinking
-Brain Storming
The six-phase model of Creative Thinking: ICEDIP model

Module-IV: Physical disability and Positive growth

Module-V: Change Management Skills

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer &Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

Syllabus - Semester Sixth

POSITIVE LEADERSHIP AND COMPETENCY DEVELOPMENT

Course Code: PSY2652 **Credit Units: 03**

Course Objectives:
The major objective is to learn the essential principles and techniques of applying Positive Psychology in a coaching context. The students will also learn about essential techniques of Positive Psychology Coaching, Understanding, experiencing, and practicing the techniques at the heart of effective coaching.

Course Contents:

Module-I: Positive Psychology and Individuals
An exploration of positive psychology applications in coaching, clinical and other settings
Recognize and use personal leadership strengths

Module-II: Positive Psychology and Organizations
Positive Psychology Coaching:
Essential Techniques of Positive Psychology Coaching
Coaching for Positive Change

Module-III: Positive organizational leadership
Explore and develop the elements of Authentic Leadership
Development and Positive Organizational Scholarship
Understand the role of positive emotions in the workplace and strength-based organizational development.

Module-IV: Positive Organizations and Appreciative Inquiry
Meaning in work
Creativity
Leadership Coaching and Positive Psychology

Module-V: Competence Development

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

A: Attendance, CT: Class Test, H/P/V/Q: Home Assignment/Presentation/Viva/Quiz,
EE: End Semester Exam

Text & References:
- Lift: Becoming a Positive Force in Any Situation (Ryan W. Quinn and Robert E. Quinn)
- The Deep Change Field Guide: A Personal Course to Discovering the Leader Within (Robert E. Quinn)
- The Best Teacher in You: How to Accelerate Learning and Change Lives (Robert E. Quinn, Katherine Heynoski, Mike Thomas and Gretchen M. Spreitzer) Suggested Readings

- Competing Values Leadership: Second Edition (Kim S. Cameron, Robert E. Quinn, Jeff DeGraff, and Anjan J. Thakor) • Building the Bridge as You Walk on It (Robert E. Quinn)
- Company of Leaders: Five Disciplines for Unleashing the Power in Your Workforce (Gretchen Spreitzer and Robert E. Quinn)
- Lyubomirsky, Sonja. *The How of Happiness: A New Approach to Getting the Life You Want*. New York: Penguin, 2008.
- Dweck, Carol S. *Mindset: The New Psychology of Success*. New York: Random House,2006.
- Neff, Kristin. *Self-Compassion: Stop Beating Yourself Up and Leave Insecurity Behind*.New York: William Morrow, 2011.
- Szabó, Peter, and Daniel Meier. *Coaching Plain & Simple: Solution-Focused Brief Coaching Essentials*. New York: W.W. Norton &, 2009.
- Theeboom, T., Beersma, B., and van Vianen, A. "Does Coaching Work? A Meta-Analysis of the Effects of Coaching Individual-Level Outcomes in an rganizational

PSYCHOLOGY

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
PSY2151	Introductory Psychology	2	1	-	3
PSY2251	Abnormal Psychology	2	1	-	3
PSY2351	Basic Cognitive Psychology	2	1	-	3
PSY2451	Life Span Development	2	1	-	3
PSY2551	Psychometric Testing	2	1	-	3
PSY2651	Counselling Psychology	2	1	-	3
	TOTAL				**18**

PSYCHOLOGY

Syllabus - Semester First

INTRODUCTORY PSYCHOLOGY

Course Code: PSY2151 **Credit Units: 3**

Course Objective:
This course is designed to introduce the science of psychology. It identifies and defines the theories, terms, methods, and various fields of psychology. This course can be used as a foundation towards continued education in more specific areas of psychology. General Psychology encourages students to study in depth the notions of modern scientific psychology. Upon completion of this course, student should have the following objectives:

- To know the major personalities important to the field of general psychology and the ideas, theories, and schools with which they are associated.
- To know the major terms associated with general psychology and their meanings.
- To know the major concepts associated with the area of general psychology.

Course Content

Module I:
Meaning, Definition, Nature and Goals of Psychology

Module II:
Scope of Psychology; Branches and Fields of Psychology

Module III:
Background of Psychology: Historical Perspective

Module IV:
Schools of Psychology: Structuralism, Functionalism, Behaviorism, Gestaltism, Psychoanalysis, Humanism, Existentialism, Cognitive

Module V:
Methods of Psychology: Introspection, Observation, Experimental, Interview, Questionnaire, Survey

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, N. Delhi

- Hilgard & Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow : Psychology. 3rd Edition Broalu & Benewmark Publishers
- Guilford, J. P.: General Psychology. New York: D. Van Nostrand
- Mohsin, S.M. : Elementary Psychology. Motilal Banarasi Das.
- Morris, C. G. & Maisto, A. A.: Psychology: An Introduction. (12thed.). Upper Saddle River, NJ: Prentice Hall.
- Atkinson &Hilgard: Psychology: An Introduction. Cengage Learning EMEA
- Kosslyn & Rosenberg : Psychology (3rded.). Allyn & Bacon
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Lahey, B. B. & Majors, M.: Psychology: An Introduction. Tata McGraw Hill Humanities/Social Sciences/Lingua

Syllabus - Semester Second

ABNORMAL PSYCHOLOGY

Course Code: PSY2251 **Credit Units: 3**

Course Objective:
Abnormal psychology is a branch of psychology that deals with psychopathology and abnormal behavior that causes suffering to the individual and others around him or her, and interferes with functioning in a significant way. The term covers a broad range of disorders, from depression to obsession-compulsion to sexual deviation and many more. The study of abnormal psychology also includes learning about the factors, situations, and conditions that cause mental disorders and how they may be best treated. Following are the objectives for the part of Psychology:

- To gain an appreciation of the fundamental issues that underlies the concept of mental abnormality.
- To become familiar with how, in terms of symptoms, the various psychological disorders present themselves.
- To appreciate different explanations of abnormality. That is, to understand the role of environment, genetic factors, psychodynamics, neuropsychology, and biochemistry in the determination of psychopathology.

Course Content:

Module I: Introduction
Concept of abnormality: Criteria and Perspectives
Classification: DSM IV-R, conceptual and operational evaluation.
Casual factors in Psychopathological Behaviour
(a) Biological determinants
(b) Psychological determinants
(c) Socio-cultural determinants

Module II: Neurosis and Psychosis
Concept and Difference between both the two

Module III: Neurotic Disorder
Generalized anxiety disorders
Obsessive-Compulsive disorders
Phobic Disorders
Eating Disorder

Module IV: Mood Disorders
Depression
Bipolar Disorder

Module V: Psychotic Disorder
Bipolar disorders: Manic, Depressive, Mixed
Psychotic depression
Delusional Disorder
Schizophrenia

Module VI: Mental Retardation and Development Disorders
Levels of mental retardation, Organic factors in mental retardation.
Autism: Clinical picture and casual factors.
Childhood Disorder

Module VII: Substance Abuse Disorders
Alcoholism
Drug Addition

Module VIII
Psychosomatic Disorder
Somatoform Disorders
Personality Disorders

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Page, J.D.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Shanmugam, T.E.: Abnormal Psychology. New Delhi: Tata McGraw Hill Publishing Company Limited
- Coleman, J.C.: Abnormal Psychology and Modern Life. Bombay: D.B. Taraporewala Sons.&OCLtd.
- Davison G.C.: Abnormal Psychology. New York: John Willey & Neale, J. M. Sons.
- Carson, R.C., Butcher, J.N. & Mineka, S.: Abnormal Psychology and Modern Life. Delhi: & Person Education, 2000
- Kaur, R.: Abnormal Psychology: New Trends and Innovations Delhi: Deep & Deep Publications (P) Ltd.
- Sarason, I. G. & Sarason, B. R.: Abnormal Psychology: The Problem of Maladaptive Behaviour, 11th Ed. Prentice-Hall
- Mangal, S. K.: Abnormal Psychology. New Delhi: Sterling Publishers Pvt Ltd
- Comer, R. J.: Abnormal Psychology, 5th Ed. Worth Publishers
- Kumar, V.: Abnormal Psychology: Causes and Treatment. Aadi Publications

Syllabus - Semester Third

BASIC COGNITIVE PSYCHOLOGY

Course Code: PSY2351 **Credit Units: 3**

Course Objective:
Cognitive Psychology is an objective, empirical discipline that tends to favor an experimental approach. This paper of Psychology is crucial to understand the basis of mental activity and human behaviour. The students of Psychology will need to have this knowledge about the normal mental operation of adults in order to understand more complex processes and their disorder. The subject emphasizes cognitive aspects to show the more up to date developments. In this paper of Psychology, Students will:

- Gain factual knowledge of the terminology, methods, and research findings in the field of cognitive psychology.
- Learn the fundamental theories and principles of cognitive psychology including being able to critique them.
- Learn how professionals in the field of cognitive psychology go about the process of gaining new knowledge.

Course Content
Module I:
Introduction, History and Background of Cognitive Psychology

Module II:
Thinking: Nature, and Types of Thinking:
Tools of thinking- Images, Concept, Symbols and Signs, Language, Muscle Activities and Brain Function

Module III:
Reasoning: Meaning and Types of Reasoning: Deductive and Inductive Reasoning

Module IV:
Problem solving: Meaning and Method of Problem solving
Decision Making: Meaning, types and hindrances

Module V:
Intelligence: Meaning, Nature and Theories of intelligence: Unitary Theory, Multifactor Theory, Two Factor Theory, Group Factor Theory.
Genetic and Environmental Influence on Intelligence
Classification of Intelligence Test
Concept of Mental Age and IQ

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Esgate, A. & Groome, D.: An Introduction to Applied Cognitive Psychology. England: Psychology Press.
- Kellogg, R. T.: Fundamentals of Cognitive Psychology. New Delhi: Sage Publication
- Morgan & King: Introduction to Psychology. Tata McGraw Hill Publishing Company Limited, N. Delhi
- Munn, N.L.: Psychology. Oxford & IBH Publishing Co Pvt. Ltd, New Delhi
- Solso, R. L.: Cognitive Psychology (8th ED.). Delhi: Pearson Education
- Best, B. J.: Cognitive Psychology. (3rd ed.). West Publishing Company
- Hilgard& Atkinson: Introduction to Psychology, 6th Ed. New Delhi: Oxford & IBH Publishing Co
- Sdorow: Psychology. 3rd Edition Broalu & Benewmark Publishers
- Mishra, B. K.: Psychology. PHI Learning Pvt. Ltd
- Haberlandt, K.: Cognitive Psychology. Allyn& Bacon

Syllabus - Semester Fourth

LIFE SPAN DEVELOPMENT

Course Code: PSY2451 **Credit Units: 3**

Course Objective:
Developmental psychology, also known as human development, is the scientific study of systematic psychological changes, emotional changes, and perceptual changes that occur in human beings over the course of their life span. Originally concerned with infants and children, the field has expanded to include adolescence, adult development, aging, and the entire life span. Developmental psychology includes issues such as the extent to which development occurs through the gradual accumulation of knowledge versus stage-like development, or the extent to which children are born with innate mental structures versus learning through experience. The objective of this paper is:

1. To provide an understanding of Physical, cognitive, affective, moral, social and neural development during infancy, childhood, and adolescence.
2. To critically evaluate the role of heredity, maturation, and the environment in development.
3. To critically examine the relationship between scientific theories of development and the reality of development in everyday life.

Course Contents:

Module1: Introduction
Meaning and Concept of Development: Life Span Perspective,
Theoretical Perspective on Development,
Factors influencing development

Module 2: The Start to Life
Conception and Prenatal Development: The Interaction of Heredity and Environment;
Birth and newborn: Birth Complications, Competent Newborn.

Module 3: Development in Infancy and Toddlerhood (birth to 2years)
Physical Development
Cognitive Development: Roots of Language
Social and Personality Development

Module 4: Development in Childhood
The Preschool years (3-6 Years)
Physical Development;
Cognitive Development: Language Development
Social and Personality Development
The Middle Childhood (6-12 Years)
Physical Development
Cognitive Development: Intellectual and Language development
Social and Personality Development

Module 5: Development in Adolescence and Young Adulthood
Adolescence (12-19 years)

Physical Development
Cognitive development in Adolescence and School Performance
Social and Personality Development
Young Adulthood (19-35 years)
Physical Development: Physical Limitations and Challenges
Cognitive Development: Intelligence and Higher Education
Social and Personality Development: Forging Relationship and Choosing Career

Module 6: Development in Middle and Late Adulthood
Middle Adulthood (35-55 years)
Physical Development: Sexuality and Health
Cognitive Development: Memory and Remembering
Social and Personality Development: Cultural Dimensions
Late Adulthood (55 years to death)
Physical Development: Health and Wellness
Cognitive Development: Memory and Forgetting
Social and Personality Development: Successful Aging
Death, Dying and Bereavement

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Hurlock, E. B.: Developmental Psychology. McGraw-Hill
- Papalia, D. E.; Olds, S. W. & Feldman, R.D: Human Development(10th ed.).New York: McGraw-Hill.
- Feldman, R. S.: Discovering the Life Span (2nd Ed.). Pearson
- Berk, L.E.: Child Development. New Delhi: Pearson Education.
- Brodzinsky, D.M.; Gormly, A.V. & Anibron, S.R.: Life Span Human Development; New Delhi: CBS Publication
- Heatherington, E.M. & Parke, R.D.: Child Psychology: A Contemporary Viewpoint New York: McGraw-Hill
- Kail R. V.: Children and their development. Prentice Hall Inc.
- Bee, H. & Boyd, D.: Life Span Development, Boston, M.A. : Allyn and Bacon.
- Bukatko, D. & Daehler, M.W.: Child Development: A Thematic Approach. New York: Houghton Mifflin Company.
- Crain, W.: Theories of Development. Englewood Cliffs, New Jersey: Prentice Hall.
- Newman, B.M. & Newman, P.R.: Development Through Life: A Psychosocial Approach. New York: Wadsworth Publishing Company.
- Santrock, J.W.: A Topical Approach to Life Span Development. New Delhi: Tata McGraw Hill.

Syllabus - Semester Fifth

PSYCHOMETRIC TESTING

Course Code: PSY2551 **Credit Units: 3**

Course Objective:
Psychological assessment is a process of testing that uses a combination of techniques to help arrive at some hypotheses about a person and their behavior, personality and capabilities. Psychological assessment is also referred to as psychological testing, or performing a psychological battery on a person. A psychological assessment is the attempt of a skilled professional, usually a psychologist, to use the techniques and tools of psychology to learn either general or specific facts about another person, either to inform others of how they function now, or to predict their behavior and functioning in the future. Psychologists are the only profession that is expertly t rained to perform and interpret psychological tests. Below are the objectives of studying this particular paper of Psychology:

- To train the students in various psychological assessment techniques.
- To impart skills necessary for selecting and applying different tests for different purposes such as evaluation, training and rehabilitation.

Course Content:

Module-I: Introduction
History of Psychological Testing
Meaning, Definition and Types of Psychological Testing
Ethical issues in Psychological Testing

Module-II: Measurement
Nature and significance of Measurement
Distinction between assessment and measurement
Levels of measurement
Techniques of Attitude Measurement

Module-III: Construction of Test
Steps of constructing a Psychological Test
Reliability: Meaning, types and factors affecting reliability
Validity: Meaning, types and factors affecting Validity
Characteristics of a good Psychological Test

Module-IV: Assessment of General and Special Abilities
Intelligence (DAP: IQ and Slosson Intelligence Test (SIT-3/R)
Creativity: Creativity Assessment Packet (CAP)
Achievement: Diagnostic Achievement Test for Adolescents (DATA-2)

Module-V: Application of Testing
Assessment in Educational and Occupational Set-up: Achievement Test
Assessment in Clinical Set-up and in Counselling

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	**10**	**10**	**5**	**5**	**70**

Text & References:

- Anastasi, A. & Urbina, S.: Psychological Testing. U.S.A.: Prentice Hall International Inc.
- Hasan, Q.: Personality Assessment: A fresh Psychological Look. New Delhi: Gyan Publishing House
- Graham, J. R. & Lilly, R. S.: Psychological Testing. New Jersey: Prentice Hall Inc.
- Kaplan, R. K. & Sacuzzo, D. P.: Psychological Testing- Principles, Applications and Issues. New Delhi: Cengage Learning India Pvt Ltd
- Kline, T. J. B.: Psychological Testing – A Practical Approach to Design and Evaluation. New Delhi: Vistaar Publication
- Aiken, L.R. & Groth-Marnat, G.: Psychological Testing and Assessemnt (12th Ed.) Pearson Education
- Freeman, F. S.: Psychological Testing. Oxford University Press

Syllabus - Semester Sixth

COUNSELLING PSYCHOLOGY

Course Code: PSY2651 **Credit Units: 3**

Course Objective:
The paper of Counselling Psychology covers its history, theories, activities, specialties and trends. It concentrates on the importance of the personhood of counselors and of the multicultural, ethical and legal environments in which counsellors operate. This paper focuses on the context and process of counselling to provide a range of high quality and responsive counseling skills and its applications to help oneself and others.

Course Contents:
Module I: Introduction
Meaning, Definitions and Goals of counselling
Role of Counsellor in different Setting
Characteristics of a good counsellor

Module II: Counselling Process
Building Counselling Relationship
Working in a Counselling Relationship
Termination of Counselling Relationship

Module III: Counselling Approaches
Insight-Oriented Counselling: Client-Centred
Action-Oriented Counselling: Behavioural
Testing, Assessment and Diagnosis in Counselling

Module IV: Counselling Applications
Child Counselling and Counselling in School
Adolescent Counselling and Counselling in College
Career Counselling: Theories of Career Development
Group Counselling and Family Counselling
Addiction Counselling

Module V: Theories and Techniques of Counselling
Psychodynamic Approaches
Humanistic Approach
Cognitive Approach
Behavioural Approaches

Module VI: Current Issues in Counselling
Ethical and Legal Issues
Mental Health Counselling
Counselling in a Multicultural Society
Counselling with Diverse Population

Examination Scheme:

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Rao, S. N.: Counselling and Guidance (2nd Ed.). Tata McGraw Hill
- Belkin, G.S.: Introduction to Counselling. W.C.: Brown Publishers
- Nelson, J.: The Theory and Practice of Counselling Psychology. New York: Hollt Rinehart & Winston
- Gibson, R. L. & Mitchell, M. H.: Introduction to Counselling. And Guidanc (7th).New Delhi Prentice-Hall of India Pvt. Ltd
- Gladding, S. T.: Counselling: A Comprehensive Profession (6th Ed.). Dorling Kindersley India Pvt. Ltd.
- Hansen, J. H. &Rosberg, R.H: Counselling: Theory and Process (5th Ed.). Allyn& Bacon
- Pal, O. B.: Guidance and Counselling. New Delhi: Motilal Banarsidas Publishers Private Ltd.
- Milner, J., Byrne, P. O. & Campling, J.: Assessment in Counselling: Theory, Process and Decision-Making. Palgrave MacMillan
- Patterson,L.E.: The Counselling Process. Wadsworth Publishing
- Welfel, E.R., & Patterson, L.E: The Counselling Process: A Multitheoritical Integrative Approach. Thomson Brooks / Cole

M. Phil in Clinical Psychology

Achieving Academic Excellence

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

Note: This is based on M.Phil (Clinical Psychology) Guidelines & Syllabus as given on the RCI website (www.rehabcouncil.nic.in/writereaddata/mphilcp09.pdf)

13109 M.PHIL IN CLINICAL PSYCHOLOGY

AIM AND OBJECTIVES

AIM

The aim of this course is to prepare the trainee to function as a qualified professional Clinical Psychologist in the areas of mental and physical health by offering Diagnostic, Therapeutic, Rehabilitative, Administrative services, and to work towards promoting the well-being and quality-of-life of individuals.

OBJECTIVES

The course is developed as a rigorous two-year program with extensive theoretical inputs and widespread clinical experience to acquire the necessary skills in the area of Clinical Psychology. On completion of the course, the trainee is expected to perform the following functions:

- Diagnose mental health problems.
- Conceptualize specific adult and child mental health problems within a psychological framework, giving due consideration to psychosocial/ contextual factors, and carryout relevant treatment/management.
- Apply psychological principles and techniques in rehabilitating persons with mental health problems and disabilities.
- Work with the psychosocial dimensions of physical diseases, formulate and undertake focused/targeted psychosocial interventions.
- Work with community to promote health, quality-of-life and psycho-logical well-being.
- Undertake research in the areas of clinical psychology such as, mental health/illness, physical health/diseases and relevant societal issues viz. misconception, stigma, discrimination, social tension, gender construction, life style etc.
- Undertake responsibilities connected with teaching and training in core and allied areas of Clinical Psychology.
- Undertake administrative and supervisory/decision-making responsibilities in mental health area.
- Provide expert testimony in the court of law assuming different roles.

REGULATIONS OF THE COURSE

Entry requirement

Minimum educational requirement for admission to this course will be M.A./M.Sc. degree in Psychology from a university recognized by the UGC with a minimum of 55% marks in aggregate, preferably with special paper in Clinical Psychology. For SC/ST/OBC category, minimum of 50% marks in aggregate is essential, as per GOI.

Admission Procedure

A selection committee that includes Head of the Department of Clinical Psychology shall make admission on the basis of an entrance examination, consisting of a written test, interview and practical. List of candidates so selected/admitted to the course should be sent to RCI within a month of admission formalities are completed. No changes shall be permitted once the list of admitted candidates for the academic year is sent to the council.

Duration

This is a fulltime clinical training course providing opportunities for appropriate practicum and apprenticeship experiences for 2 academic years, divided as Part - I and II.

Attendance

- Course of the study must, unless special exemption is obtained, continuously be pursued. Any interruption in a candidate's attendance during the course of study, due to illness or other extraordinary circumstances must be notified to the Head of the Institution/concerned authority and permission should be obtained. Under any circumstances the course must be completed within 4-yr from the date of enrollment.
- A minimum attendance of 80% (in the academic year) shall be necessary for taking the respective examination.
- Thirty days of causal leave, maximum of fifteen days per academic year, shall be permitted during the two-year course period.

MINIMUM PRESCRIBED CLINICAL WORK DURING THE TWO YEAR OF TRAINING

	_____ Number of Cases_____		
	Part – I	By the end of Part - II *	
1) Detailed case histories	50	70	
2) Clinical Interviews	40	60	
3) Full length Psycho-diagnostics	40	50	
4) Neuropsychological Assessment	5	10	
5) Therapeutics			
i) Psychological Therapies		200	hr.
ii) Behavior Therapies		200	hr.

Therapies should be not less than 50 hr. of work in each of the following areas:

a) Therapies with children

b) Individual therapies with adults
c) Family/marital/group/sex therapy
d) Psychological and/or neuropsychological rehabilitation

A logbook of the clinical work carried out under the supervision during each year of training, with sufficient details such as particulars of the client, diagnosis, duration and nature of intervention(s), number of sessions held etc. should be maintained by all trainees and must be produced the same to the examiners at the time of Part - I and II practical examinations.

* Includes the work done in Part - I

Requirement/Submission

- Two months prior to Part - I examination the candidates are required to submit five full-length Psycho-diagnostic Reports as outlined above.
- Two months prior to Part - II examination the candidates are required to submit five Psychotherapy Records as outlined above.
- Three months prior to Part - II examination the candidates are required to submit, in triplicate, a research Dissertation under the guidance of a clinical psychology faculty members as specified above.
- The application for appearing either Part - I or Part - II examination should be accompanied by a certificate issued by Head of Department that the candidate has carried out the specified minimum clinical work, submission, dissertation (in case of Part - II only) and has attained the required competence in core-tests (refer section on "Practical - Psychological Assessments" for the list of core-tests and an addendum), as prescribed in the syllabus.

Internal Assessment

In each paper 30% marks will be determined on the basis of written/clinical exams, viva-voce and supervised clinical work. These marks will be added to the marks allocated to the respective subjects in the yearly final examinations. The results of the final examinations will be declared on the basis of the total so obtained. The guidelines for allotting the internal marks may be prepared by the institution concerned.

EXAMINATION

- The examination will be held in two parts (Part - I and Part - II). Part -I is held at the end of first year and Part – II is held at the end of second year. A candidate will not be allowed to take the Part – II examination unless he/she has passed the Part – I examination.
- A candidate who has not appeared or failed in Part – I of the regular examination may be allowed to continue the course for the II year and be allowed to take the supplementary Part – I examination.
- A minimum period of three months additional training shall be necessary before appearing for the examination in case he/she fails to clear Part – I and/ or Part – II examination.
- A candidate has to complete the course successfully within a period of four years from the year of admission to the course.

Examination Fee

The prescribed examination fee as laid down from time to time by the concerned university to appear for Part – I and Part – II of the examination should be paid as per the regulations.

SCHEME OF EXAMINATION

Part – I (I Year)

Papers	Title	Duration	Marks: Final Examination (Maximum)	Marks: Internal Assessment (Maximum)	Marks: Total
Group "A"					
Paper I:	Psychosocial Foundations of Behavior and Psychopathology	3 hr.	70	30	100
Paper II:	Statistics and Research Methodology	3 hr.	70	30	100
Paper III:	Psychiatry	3 hr.	70	30	100
Practical:	Psychological Assessments and Viva Voce		70	30	100
Group "B"					
Submission of five cases of full-length Psychodiagnostics Report			None	100	100
					500

Part – II (II Year)

Papers	Title	Duration	Marks: Final Examination (Maximum)	Marks: Internal Assessment (Maximum)	Total
Group "A"					
Paper I:	Psychotherapy and Counseling	3 hr.	70	30	100
Paper II:	Behavioral Medicine	3 hr.	70	30	100
Paper III:	Biological Foundations of Behavior	3 hr.	70	30	100
Practical:	Psychological Therapies & Viva Voce		140	60	200
Group "B"					
Submission of five fully worked-out Psychotherapy Records			None	100	100
Group "C"					
Dissertation			70	30	100
					700

Board of Examination

A board consisting of 4 examiners of which 2 shall be external will conduct the examination. Other examiners, external or internal appointed for this purpose, will assist the board. The Chairman of the board of examiners will be the Head of the Department of Clinical Psychology who will also be an internal examiner.

Two examiners, one internal and one external, shall evaluate each theory paper and dissertation. Two examiners, of whom one shall be external, will conduct the practical/clinical and vivo-voce examination.

Minimum for Pass

- A candidate shall be declared to have passed in either of the two parts of the M.Phil examination if he/she obtains not less than 50% of the marks in:
    - i) Each of the theory paper
    - ii) Each of the practical and viva-voce examinations
    - iii) Each of the submissions
    - iv) The dissertation (in case of Part – II only)
- A candidate who obtains 75% and above marks in the aggregate of both the parts shall be declared to have passed with distinction. A candidate who secures between 60% and below 75% of marks in the aggregate of both the parts shall be declared to have passed M.Phil degree in I Class. The other successful candidates as per the clause (a) of the above shall be declared to have passed M.Phil degree in II Class. If a candidate fails to pursue the course on a continuous basis, or fails or absent himself/ herself from appearing in any of the university theory and practical examinations of Part-I and II, the class shall not be awarded. The merit class (Distinction / First Class) is awarded to only those candidates who pass both Part – I and II examinations in first attempt.
- No candidate shall be permitted to appear either of Part – I or II examination more than three times.

Appearance for each examination

- A candidate shall appear for all the Groups of Part – I and Part – II examination when appearing for the first time.
- A candidate in Part – I and Part – II, failing in any of the "Group-A" subjects has to appear again in all the "Group-A" subjects.
- A candidate in Part – I, failing in "Group-B" has to resubmit five full-length Psychodiagnostic Records.
- A candidate in Part – II, failing in "Group-B" has to resubmit five fully worked- out Psychotherapeutic Records.
- A candidate in Part – II, failing in "Group-C", has to reappear/resubmit the dissertation as asked for and/or outlined by the examiners.

CURRICULUM

&

EXAMINATION SCHEME

Syllabus - First Year (Part-I)

PAPER-I: PSYCHOSOCIAL FOUNDATION OF BEHAVIOR AND PSYCHOPATHOLOGY

Course Code: PSY5101 **Credit Units: 12**

Aims: The psychosocial perspectives attempt to understand human cognition, motives, perceptions and behavior as well as their aberrations as product of an interaction amongst societal, cultural, familial and religious factors. The overall aim is to introduce conceptualizations of mental health problems within the psychosocial framework, giving due considerations to contextual issues. Each Module in this paper pays attention to the different types of causal factors considered most influential in shaping both vulnerability to psychopathology and the form that pathology may take.

Objectives: By the end of Part-I, trainees are required to demonstrate ability to:

- Demonstrate a working knowledge of the theoretical application of the psychosocial model to various disorders.
- Make distinctions between universal and culture-specific disorders paying attention to the different types of sociocultural causal factors.
- Demonstrate an awareness of the range of mental health problems with which clients can present to services, as well as their psychosocial/contextual mediation.
- Carry out the clinical work up of clients with mental health problems and build psychosocial formulations and interventions, drawing on their knowledge of psychosocial models and their strengths and weaknesses.
- Apply and integrate alternative or complementary theoretical frameworks, for example, biological and/or religious perspectives, sociocultural beliefs and practices etc. in overall management of mental health problems.
- Describe, explain and apply current code of conduct and ethical principles that apply to clinical psychologists working in the area of mental health and illness.
- Describe Mental Health Acts and Policies, currently prevailing in the country and their implications in professional activities of clinical psychologists.

Academic Format of Modules: Learning would be mainly through clinical workup of clients presenting with range of mental health problems, and supplemented by lectures, seminars and tutorials, allowing trainees to participate in collaborative discussion.

Evaluation: Theory – involving long and short essays

Course Contents: Part-A (Psychosocial Foundations of Behavior)

Module - I: **Introduction**
Overview of the profession and practice; history and growth; professional role and functions; current issues and trends; areas of specialization; ethical and legal issues; code of conduct

Module - II: **Mental health and illness**
Mental health care – past and present; stigma and attitude towards mental illness; concept of mental health and illness; perspectives – psychodynamic, behavioral, cognitive, humanistic, existential and biological models of mental health/illness;

Module - III: Epidemiology
Studies in Indian context; tools available/standardized for epidemiological surveys; socio-cultural correlates of mental illness; religion and mental health; psychological well-being and quality of life - measures and factors influencing

Module - IV: Self and relationships
Self-concept, self-image, self-perception and self-regulations in mental health and illness; learned helplessness and attribution theories; social skill model; interpersonal and communication models of mental illness; stress diathesis model, resilience, coping and social support.

Module - V: Family influences
Early deprivation and trauma; neglect and abuse; attachment; separation; inadequate parenting styles; marital discord and divorce; maladaptive peer relationships; communication style; family burden; emotional adaptation; expressed emotions and relapse.

Module - VI: Societal influences
Discrimination in race, gender and ethnicity; social class and structure, poverty and unemployment; prejudice, social change and uncertainty; crime and delinquency; social tension & violence; urban stressors; torture & terrorism; culture shock; migration; religion & gender related issues with reference to India.

Module - VII: Disability
Definition and classification of disability; psychosocial models of disability; impact, needs and problems; issues related to assessment/certification of disability – areas and measures.

Module - VIII: **Rehabilitation**
Approaches to rehabilitation; interventions in the rehabilitation processes; models of adaptation to disability; family and caregivers issues; rights of mentally ill; empowerment issues; support to recovery.

Module - IX: Policies and Acts
Rehabilitation Policies and Acts; assistance, concessions, social benefits and support from government and voluntary organizations; contemporary challenges; rehabilitation ethics and professional code of conduct

Course Contents: Part-B (Psychopathology)

Module - X: **Introduction to psychopathology**
Definition; concepts of normality and abnormality; clinical criteria of abnormality; continuity (dimensional) versus discontinuity (categorical), and prototype models of psychopathology; classification and taxonomies – reliability and utility; classificatory systems, currently in use and their advantages and limitations.

Module - XI: **Signs and symptoms**
Disorders of consciousness, attention, motor behavior, orientation, experience of self, speech, thought, perception, emotion, and memory.

Module - XII: Psychological theories
Psychodynamic; behavioral; cognitive; humanistic; interpersonal; psychosocial; and other prominent theories/models of principal clinical disorders and problems, viz. anxiety, obsessive-compulsive, somatoform, dissociative, adjustment, sexual, substance use, personality, suicide, childhood adolescence, psychotic, mood disorders, and culture-specific disorders.

Module - XIII: **Indian thoughts**
Concept of mental health and illness; nosology and taxonomy of mental illness; social identity and stratification (Varnashrama Vyawastha); concept of – cognition, emotion, personality, motivation and their disorders

Examination Scheme:

	Internal Assessment (30 Marks)				**Final Exam**	**Total Marks**
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Term Exam

Text & References:

- An Introduction to Social Psychology, 2nd ed. Kuppuswamy, B. Konark Publishers: New Delhi
- Culture, Socialization and human development, Saraswathi, T.S (1999). Sage publications: New Delhi
- Asian perspectives in Psychology, Vol. 19. Rao, H.S.R & Sinha D. (1997). Sage publications: New Delhi
- Indian Social Problems, Vol.1 & 2, Madan G.R (2003). Allied Publishers Pvt. Ltd., New Delhi. Elements of ancient Indian Psychology, 1st ed. Kuppuswamy, B. (1990) Konark Publishers: New Delhi.
- Handbook of Social Psychology, Vol.1 & 5. Lindzey, G., & Aronson, E. (1975). Amerind Publishing: New Delhi
- Family Theories – an Introduction, Klein, D.M. & White, J.M. (1996). Sage Publications: New Delhi.
- Personality & Social Psychology: towards a synthesis, Krahe, Sage Publications: New Delhi Psychopathology, Buss A.H. (1966). John Wiley and sons: NY
- Making sense of illness: the social psychology of health and disease. Radley, A. (1994). Sage publications: New Delhi
- The sociology of mental illness. 3rd ed. Irallagher, B. J. (1995). Prentice hall: USA Oxford Textbook of Psychopathology, Millon, T., Blaney, P.H. & Davis, R.D. (1999). Oxford University Press: NY
- Abnormal Psychology, 13th ed, Carson, R.C, Butcher, T.N, Mureka, S. & Hooley, J.M. (2007). Dorling Kindersley Pvt Ltd: India
- Developmental Psychopathology, Achenback T.M. (1974). Ronald Press Co.: NY
- Fish's Clinical Psychopathology, Fish, F, & Hamilton, M (1979). John Wright & Sons: Bristol. Psychopathology in the aged, Cole, J.O. & Barrett, J.E. (1980). Raven Press: NY
- Abnormal Child Psychology, Mash, E.J & Wolfe, D.A. (1999). Wadsworth Publishing: U.S.A Handbook of Clinical Child Psychology, 3rd ed. Walker, C.E & Roberts, M.C. (2001). John Wiley & Sons: Canada.
- Clinical Child Psychology, Pfeiffer, S.I. (1985). Grune & Stratton: USA
- Mental Health of Indian Children, Kapur, (1995). Sage publications: New Delhi
- The Inner world: a psychoanalytic study of childhood and society in India, Kakar, S (1981). Oxford University press: New Delhi
- Applied Cross cultural psychology, Brislin, R. W. (1990). Sage publications: New Delhi

PAPER-II: PSYCHIATRY

Course Code: PSY5103 **Credit Units: 12**

Aim: The aim is to train in conceptualization of psychopathology from different etiological perspectives, eliciting phenomenology and arrive at the clinical diagnosis following a classificatory system and propose/carry out psychological interventions including psychosocial treatment/management for the entire range of psychological disorders. Also, to train in assessing the caregivers' burden, disability and dysfunctions that are often associated with mental disorders and intervene as indicated in a given case.

Objectives: By the end of Part-I, trainees are required to demonstrate ability to:

- Demonstrate an understanding of a clinically significant behavioral and psychological syndrome, and differentiate between child and adult clinical features/presentation.
- Understand that in many ways the culture, societal and familial practices shape the clinical presentation of mental disorders, and understand the role of developmental factors in adult psychopathology.
- Carryout the clinical work up of clients presenting with the range of mental health problems and make clinical formulations/diagnosis drawing on their knowledge of a pertinent diagnostic criteria and phenomenology.
- Summarizes the psychosocial, biological and socio-cultural causal factors associated with mental health problems and neuropsychological disorders with an emphasis on bio-psychosocial and other systemic models.
- Carryout with full competence the psychological assessment, selecting and using a variety of instruments in both children and adults.
- Describe various intervention programs in terms of their efficacy and effectiveness with regard to short and longer term goals, and demonstrate beginning competence in carrying out the indicated interventions, monitor progress and outcome.
- Discuss various pharmacological agents that are used to treat common mental disorders and their mode of action.
- Demonstrate an understanding of caregiver, and family burden and their coping style.
- Assess the disability/dysfunctions that are associated with mental health problems, using appropriate measures.
- Discuss the medico-legal and ethical issues in patients requiring chronic care and institutionalization.

Academic Format of Modules: The learning would be primarily through clinical workups of cases having psychiatric disorders. A mixed lectures/seminar format, allowing trainees to participate in collaborative discussion, could be adapted in addition, for imparting theory components.

Evaluation: Theory – involving long and short essays, practical/clinical exam in psychological assessment of psychiatric cases and comprehensive viva.

Course Contents:

Module - I: Introduction

Approach to clinical interviewing and diagnosis; case history; mental status examination; organization and presentation of psychiatric information; diagnostic formulation; classificatory system in use.

Module - II: Psychoses

Schizophrenia, affective disorders, delusional disorders and other forms of psychotic disorders – types, clinical features, etiology and management

Module - III: Neurotic, stress-related and somatoform disorders

Types, clinical features, etiology and management

Module - IV: **Disorders of personality and behavior**

Specific personality disorders; mental & behavioral disorders due to psychoactive substance use; habit and impulse disorders; sexual disorders and dysfunctions – types, clinical features, etiology and management.

Module - V: Organic mental disorders
Dementia, delirium and other related conditions with neuralgic and systemic disorders – types, clinical features, etiology and management.

Module-VI: Behavioral, emotional and developmental disorders of childhood and adolescence: types, clinical features, etiology and management.

Module - VII: Mental retardation
Classification, etiology and management

Module - VIII: Neurobiology of mental disorders
Neurobiological theories of psychosis, mood disorders, suicide, anxiety disorders, substance use disorders and other emotional and behavioral syndromes.

Module - IX: **Therapeutic approaches**
Drugs, ECT, psychosurgery, psychotherapy, and behavior therapy, preventive and rehabilitative strategies – halfway home, sheltered workshop, daycare, and institutionalization.

Module - X: Consultation-liaison psychiatry
Psychiatric consultation in general hospital; primary care setting

Module - XI: **Special populations/Specialties**
Geriatric, terminally ill, HIV/AIDS, suicidal, abused, violent and non-cooperative patients; psychiatric services in community, and following disaster/calamity

Module - XII: **Mental health policies and legislation**
Mental Health Act of 1987, National Mental Health Program 1982, the Persons With Disabilities (equal opportunities, protection of rights and full participation) Act 1995; Rehabilitation Council of India (RCI) Act of 1993, National Trust for Mental Retardation, CP and Autistic Children 1999, Juvenile Justice Act of 1986; ethical and forensic issues in psychiatry practice.

Examination Scheme:

	Internal Assessment (30 Marks)				**Final Exam**	**Total Marks**
Components	CT	H/P/V/Q	CT	A		
Weightage (%)	10	5	10	5	70	100

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Term Exam

Text & References:

- Comprehensive Textbook of Psychiatry, 6th ed., Vol. 1 & 2, Kaplan & Sadock, (1995). William & Wilkins: London.
- Oxford Textbook of psychiatry, 2nd ed., Gelder, Gath & Mayon, (1989). Oxford University Press: NY
- Symptoms in mind: Introduction to descriptive psychopathology, Sims A, Bailliere T, (1988) Textbook of postgraduate psychiatry, 2nd ed. Vol 1 & 2, Vyas, J.N. & Ahuja, N. (1999). Jaypee brothers: New Delhi.
- Child and Adolescent Psychiatry: Modern approaches, 3rd ed., Rutter, M. & Herson, L (1994) Blackwell Scientific Publications: London.

PAPER-III: STATISTICS AND RESEARCH METHODOLOGY

Course Code: PSY5106 **Credit Units: 12**

Aim: The aim of this paper is to elucidate various issues involved in conduct of a sound experiment/survey. With suitable examples from behavioral field, introduce the trainees to the menu of statistical tools available for their research, and to develop their understanding of the conceptual bases of these tools. Tutorial work will involve exposure to the features available in a large statistical package (SPSS) while at the same time reinforcing the concepts discussed in lectures.

Objectives: By the end of Part-II, trainees are required to demonstrate ability to:

- Understand the empirical meaning of parameters in statistical models
- Understand the scientific meaning of explaining variability
- Understand experimental design issues - control of unwanted variability, confounding and bias.
- Take account of relevant factors in deciding on appropriate methods and instruments to use in specific research projects.
- Understand the limitations and shortcomings of statistical models
- Apply relevant design/statistical concepts in their own particular research projects.
- Analyze data and interpret output in a scientifically meaningful way
- Generate hypothesis/hypotheses about behavior and prepare a research protocol outlining the methodology for an experiment/survey.
- Critically review the literature to appreciate the theoretical and methodological issues.

Academic Format of Modules: The course will be taught mainly in a mixed lecture/tutorial format, allowing trainees to participate in collaborative discussion. Demonstration and hands-on experience with SPSS program are desired activities.

Evaluation: Theory - involving long and short essays, and problem-solving exercises.

Course Contents:

Module - I: Introduction

Various methods to ascertain knowledge, scientific method and its features; problems in measurement in behavioral sciences; levels of measurement of psychological variables - nominal, ordinal, interval and ratio scales; test construction - item analysis, concept and methods of establishing reliability, validity and norms.

Module - II: Sampling

Probability and non-probability; various methods of sampling - simple random, stratified, systematic, cluster and multistage sampling; sampling and non-sampling errors and methods of minimizing these errors

Module - III: Concept of probability

Probability distribution - normal, poisson, binomial; descriptive statistics - central tendency, dispersion, skewness and kurtosis

Module - IV: Hypothesis testing

Formulation and types; null hypothesis, alternate hypothesis, type I and type II errors, level of significance, power of the test, p-value. Concept of standard error and confidence interval

Module - V: **Tests of significance- Parametric tests**

Requirements, "t" test, normal z-test, and "F" test including post-hoc tests, one-way and two-way analysis of variance, analysis of covariance, repeated measures analysis of variance, simple linear correlation and regression.

Module – VI: **Tests of significance - Non-parametric tests**

Requirements, onesample tests – sign test, sign rank test, median test, Mc Nemer test; two-sample test – Mann Whitney U test, Wilcoxon rank sum test, Kolmogorov-Smirnov test, normal scores test, chi-square test; ksample tests - Kruskal Wallies test, and Friedman test, Anderson darling test, Cramer-von Mises test.

Module - VII: Experimental design
Randomization, replication, completely randomized design, randomized block design, factorial design, crossover design, single subject design, non-experimental design.

Module - VIII: **Epidemiological studies**
Prospective and retrospective studies, case control and cohort studies, rates, sensitivity, specificity, predictive values, Kappa statistics, odds ratio, relative risk, population attributable risk, Mantel Haenzel test, prevalence, and incidence. Age specific, disease specific and adjusted rates, standardization of rates. Tests of association, 2 x 2 and row x column contingency tables

Module - IX: **Multivariate analysis**
Introduction, Multiple regression, logistic regression, factor analysis, cluster analysis, discriminant function analysis, path analysis, MANOVA, Canonical correlation, and Multidimensional scaling.

Module - X: Sample size estimation
Sample size determination for estimation of mean, estimation of proportion, comparing two means and comparing two proportions.

Module - XI: **Qualitative analysis of data**
Content analysis, qualitative methods of psychosocial research

Module - XII: **Use of computers**
Use of relevant statistical package in the field of behavioral science and their limitations

Examination Scheme:

	Internal Assessment (30 Marks)				**Final Exam**	**Total Marks**
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Term Exam

Text & References:

- Research Methodology, Kothari, C. R. (2003). Wishwa Prakshan: New Delhi
- Foundations of Behavioral Research, Kerlinger, F.N. (1995). Holt, Rinehart & Winston: USA.
- Understanding Biostatistics, Hassart, T.H. (1991). Mosby Year Book
- Biostatistics: a foundation for analysis in health sciences, 8th ed, Daniel, W.W. (2005). John Wiley and sons: USA
- Multivariate analysis: Methods & Applications, Dillon, W.R. & Goldstein, M. (1984), John Wiley & Sons: USA
- Non-parametric statistics for the behavioral sciences, Siegal, S & Castellan, N.J. (1988). McGraw Hill: New Delhi
- Qualitative Research: Methods for the social sciences, 6th ed, Berg, B.L. (2007). Pearson Education, USA.

PAPER-IV: PRACTICAL: PSYCHOLOGICAL ASSESSMENT INCLUDING VIVA-VOCE

Course Code: PSY5104 **Credit Units: 12**

Aim: To provide hands-on experience in acquiring the necessary skills and competency in selecting, administering, scoring and interpreting psychological tests often employed in clients with mental or neuropsychological disorders. Since psychological assessment involves integration of information from multiple sources, the trainees are required to be given extensive exposure in working up of cases and carrying out the assessment at all levels. Typical areas of focus for psychological assessment includes (not necessarily limited to): cognition, intelligence, personality, diagnostic, levels of adjustment, disability/functional capacity, neuropsychological functions, clinical ratings of symptomatology, variables that help/direct treatment, and assess treatment outcomes.

Objectives: By the end of Part-I, trainees are required to demonstrate ability to:

- Use relevant criteria to assess the quality and appropriateness of a psychological test and evaluate its strengths and weaknesses for clinical purposes.
- Able to carry out the clinical work-up and discuss the diagnostic possibilities based on the history and mental status examination of the clients with psychological/neuropsychological problems.
- Synthesize and integrate collateral information from multiple sources and discuss the rationale for psychological assessment as relevant to the areas being assessed.
- Select and justify the use of psychological tests and carry out the assessment as per the specified procedures in investigating the relevant domains.
- Interpret the findings in the backdrop of the clinical history and mental status findings and arrive at a diagnosis.
- Prepare the report of the findings as relevant to the clinical questions asked or hypothesis set up before the testing began, and integrate the findings in service activities.

Academic Format of Modules: Acquiring the required competency/skills would be primarily through clinical workups of cases having psychological/neuropsychological disorders and carrying out the indicated psychological assessments within the clinical context. Demonstration and tutorials shall be held for imparting practical/theory components of the psychological tests.

Evaluation: Practical/clinical – involve working up cases and carrying out the psychological assessment within clinical context and viva voce.

Course Contents:

Module - I: Introduction

Case history; mental status examination; rationale of psychological assessment; behavioral observations, response recording, and syntheses of information from different sources; formats of report writing

Module - II: Tests of cognitive functions

Bender gestalt test; Wechsler memory scale; PGI memory scale; Wilcoxen cord sorting test, Bhatia's battery of performance tests of intelligence; Binet's test of intelligence (locally standardized); Raven's progressive matrices (all versions); Wechsler adult intelligence scale – Indian adaptation (WAPIS – Ramalingaswamy's), WAIS-R.

Module - III: Tests for diagnostic clarification

A) Rorschach psychodiagnostics, B) Tests for thought disorders – color form sorting test, object sorting test, proverbs test, C) Minnesota multiphasic personality inventory; multiphasic questionnaire, clinical analysis questionnaire, IPDE, D) screening instruments such as GHQ, hospital anxiety/depression scale etc. to detect psychopathology.

Module - IV: **Tests for adjustment and personality assessment**

A) Questionnaires and inventories – 16 personality factor questionnaire, NEO-5 personality inventory, temperament and character inventory, Eyesenk's personality inventory, Eysenck's personality questionnaire, self-concept and self-esteem scales, Rottor's locus of control scale, Bell's adjustment inventory (students' and adults'), subjective wellbeing questionnaires, QOL , B) projective tests – sentence completion test, picture frustration test, draw-a-person test; TAT – Murray's and Uma Chowdhary's.

Module - V: **Rating scales**
Self-rated and observer-rated scales of different clinical conditions such as anxiety, depression, mania, OCD, phobia, panic disorder etc. (including Leyton's obsessional inventory, Y-BOCS, BDI, STAI, HADS, HARS, SANS, SAPS, PANSS, BPRS), issues related to clinical applications and recent developments.

Module - VI: Psychological assessment of children
A) Developmental psychopathology check list, CBCL, B) Administration, scoring and interpretation of tests of intelligence scale for children such as SFB, C-RPM, Malin's WISC, Binet's tests, and developmental schedules (Gesell's, Illingworth's and other) Vineland social maturity scale, AMD adaptation scale for mental retardation, BASIC-MR, developmental screening test (Bharatraj's), C) Tests of scholastic abilities, tests of attention, reading, writing, arithmetic, visuo-motor gestalt, and integration, D) Projective tests – Raven's controlled projection test, draw-a-person test, children's apperception test, E) Clinical rating scales such as for autism, ADHD etc.

Module - VII: **Tests for people with disabilities**
WAIS-R, WISC-R (for visual handicapped), blind learning aptitude test, and other interest and aptitude tests, Kauffman's assessment battery and such other tests/scales for physically handicapped individuals

Module - VIII: Neuropsychological assessment
LNNB, Halstead-Reitan battery, PGI-BBD, NIMHANS and other batteries of neuropsychological tests in current use

Core Tests:
1. Stanford Binet's test of intelligence (any vernacular version)
2. Raven's test of intelligence (all forms)
3. Bhatia's battery of intelligence tests
4. Wechsler adult performance intelligence scale
5. Malin's intelligence scale for children
6. Gesell's developmental schedule
7. Wechsler memory scale
8. PGI memory scale
9. 16 personality factor questionnaire
10. NEO-5 personality inventory
11. Temperament and character inventory
12. Children personality questionnaire
13. Clinical analysis questionnaire
14. Multiphasic questionnaire
15. Object sorting/classification test
16. Sentence completion test
17. Thematic apperception test
18. Children' apperception test
19. Rorschach psychodiagnostics
20. Neuropsychological battery of tests (any standard version)

A certificate by the head of the department that the candidate has attained the required competence in all of the above tests shall be necessary for appearing in the university examinations of Part – I. However, if the center opts to test and certify the competency in neuropsychological tests as part of the requirements for appearing in the university examinations of Part - II (i.e. excluding it from Part - I), it could be done so. In such case, the Practical/Clinical examinations of Part – II shall include an examination in this area, in addition to examination in Psychological Therapies.

Examination Scheme:

	Internal Exam (30)			Final Exam (70)		Total Marks
Components	File demonstration	Case Conference, Seminar, Journal	A	End Term Exam	Viva	
Weightage (%)	20	5	5	35	35	100

Text & References:

- Theory and practice of psychological testing, Freeman, F.S. (1965). Oxford and IHBN: New Delhi.
- Comprehensive handbook of psychological assessment, Vol 1 & 2, Hersen, M, Segal, D. L, Hilsenroth, M.J. (2004). John Wiley & Sons: USA
- Comprehensive Clinical Psychology: Assessment, Vol. 4, Bellack, A.S. & Hersen, M (1998). Elsiever Science Ltd.: Great Britain
- The Rorschach – A Comprehensive System, Vol 1, 4th ed., Exner, J.E. John Wiley and sons: NY.
- The Thematic Apperception Test manual, Murray H.A. (1971), Harvard University Press. An Indian modification of the Thematic Apperception Test, Choudhary, U. Shree Saraswathi Press: Calcutta.

PAPER-V: SUBMISSION OF PSYCHODIAGNOSTIC RECORDS

Course Code: PSY5105 **Credit Units: 12**

Course Contents:

Five full-length Psycho-diagnostic Records: out of which one record each should be related to, child and neuropsychological assessment. The records should include a summary of the clinical history organized under relevant headings, and a discussion on

a) rationale for testing,
b) areas to be investigated,
c) tests administered and their rationale,
d) test findings and
e) impression

Examination Scheme:

Components	Submission of five cases of full-length Psycho-diagnostics Report
Weightage (%)	100

Syllabus - Second Year (Part-II)

PAPER-I: PSYCHOTHERAPY AND COUNSELLING

Course Code: PSY5301 **Credit Units: 12**

Aim: Impart knowledge and skills necessary to carry out psychological interventions in mental health problems with required competency. As a prelude to problem-based learning within a clinical context, the trainees are introduced to factors that lead to development of an effective working therapeutic alliance, pre-treatment assessment, setting therapy goals, evaluation of success of therapy in producing desired changes, and variables that affect the therapy processes. Further, the aim is to equip the trainees with various theories of clinical problems, and intervention techniques, and their advantages and limitations.

Objectives: By the end of Part-II, trainees are required to demonstrate ability to:

- Describe what factors are important in determining how well patients do in psychotherapy?
- Demonstrate an ability to provide a clear, coherent, and succinct account of patient's problems and to develop an appropriate treatment plan.
- Demonstrate a sense of working collaboratively on the problem and ability to foster an effective alliance.
- Demonstrate a working knowledge of theoretical application of various approaches of therapy to clinical conditions.
- Set realistic goals for intervention taking into consideration the social and contextual mediation.
- Carry out specialized assessments and interventions, drawing on their knowledge of pertinent outcome/evidence research.
- Use appropriate measures of quantifying changes and, apply and integrate alternative or complementary theoretical approach, depending on the intervention outcome.
- Demonstrate skills in presenting and communicating some aspects of current intervention work for assessment by other health professionals, give and receive constructive feedback.
- Demonstrate ability to link theory-practice and assimilate clinical, professional, academic and ethical knowledge in their role of a therapist.
- Present a critical analysis of intervention related research articles and propose their own methods/design of replicating such research.

Academic Format of Modules: Acquiring the required competency/skills would be primarily through clinical workups and carrying out of various treatment techniques, under supervision, within clinical context. The trainees are required to be involved in all clinical service activities – institutional or community based, of the center. Demonstration, clinical issue seminar, clinical seminar, clinical case conferences are required to be planned to impart the necessary knowledge and skills.

Evaluation: Theory - involving long and short essays, and practical/clinical - involving workup and assessment of clinical cases with viva voce.

Course Contents:

Module - I: Introduction to Psychotherapy
Definitions, objectives, issues related to training professional therapists; ethical and legal issues involved in therapy work; rights and responsibilities in psychotherapy; issues related to consent (assent in case of minors); planning and recording of therapy sessions; structuring and setting goals; pre- and postassessment; practice of evidence-based therapies.

Module - II: Therapeutic Relationship
Client and therapist characteristics; illness, technique and other factors influencing the relationship

Module - III: Interviewing
Objectives of interview, interviewing techniques, types of interview, characteristics of structured and unstructured interview, interviewing skills (micro skills), open-ended questions, clarification, reflection, facilitation and confrontation, silences in interviews, verbal and non-verbal components

Module - IV: **Affective psychotherapies**
Origin, basis, formulation, procedures, techniques, stages, process, outcome, indications, and research & current status with respect to psychodynamic, brief psychotherapy, humanistic, existential, gestalt, person-centered, Adlerian, transactional analysis, reality therapy, supportive, clinical hypnotherapy, play therapy, psychodrama, and oriental approaches such as yoga, meditation, shavasana, pranic healing, reiki, tai chi etc.

Module-V: Behavior therapies
Origin, foundations, principles & methodologies, problems and criticisms, empirical status, behavioral assessment, formulations and treatment goals, Desensitization - (imaginal, in-vivo, enriched, assisted), Extinction - (graded exposure, flooding and response prevention, implosion, covert extinction, negative practice, stimulus satiation), Skill training - (assertiveness training, modeling, behavioral rehearsal), Operant procedures - (token economy, contingency management), Aversion - (faradic aversion therapy, covert sensitization, aversion relief procedure, anxiety relief procedure and avoidance conditioning), Self-control procedures - (thought stop, paradoxical intention, stimulus satiation), Biofeedback – (EMG, GSR, EEG, Temp., EKG), Behavioral counseling, Group behavioral approaches, Behavioral family/marital therapies.

Module - VI: Cognitive therapies
Cognitive model, principles and assumptions, techniques, indications and current status of rational emotive behavior therapy, cognitive behavior therapy, cognitive analytic therapy, dialectical behavior therapy, problem-solving therapy, mindfulness based cognitive therapy, schema focused therapy, cognitive restructuring, and other principal models of cognitive therapies.

Module – VII: Systemic therapies
Origin, theoretical models, formulation, procedures, techniques, stages, process, outcome, indications, and research & current status with respect to family therapy, marital therapy, group therapy, sex therapy, interpersonal therapy and other prominent therapies.

Module – VIII: Physiological therapies
Origin, basis, formulation, procedures, techniques, stages, process, outcome, indications, and current status with respect to progressive muscular relaxation, autogenic training, biofeedback, eye-movement desensitization and reprocessing, and other forms of evidence-based therapies

Module – IX: **Counseling**
Definition and goals, techniques, behavioral, cognitive and humanistic approaches, process, counseling theory and procedures to specific domains of counseling

Module - X: Therapy in special conditions
Therapies and techniques in the management of deliberate self harm, bereavement, traumatic, victims of man-made or natural disasters, in crisis, personality disorders, chronic mental illness, substance use, HIV/AIDS, learning disabilities, mental retardation, and such other conditions where integrative/eclectic approach is the basis of clinical intervention.

Module - XI: Therapy with children
Introduction to different approaches, psychoanalytic therapies (Ana Freud, Melanie Klein, Donald Winnicott); special techniques (behavioral and play) for developmental internalizing and externalizing disorders; therapy in special conditions such as psycho-physiological and chronic physical illness; parent and family counseling; therapy with adolescents

Module – XII: Psycho-education (therapeutic education)

Information and emotional support for family members and caregivers, models of therapeutic education, family counseling for a collaborative effort towards recovery, relapse-prevention and successful rehabilitation with regard to various debilitating mental disorders.

Module – XIII: Psychosocial rehabilitation
Rehabilitation services, resources, medical and psychosocial aspects of disability, assessment, group therapy, supportive therapy and other forms of empirically supported psychotherapies for core and peripheral members.

Module - XIV: **Psychotherapy in the Indian Context**
Historical perspective in psychological healing practices from the Vedic period and the systems of Ayurveda and Yoga, contemporary perspectives; socio-cultural issues in the Indian context in practice of psychotherapy; ongoing research related to process and outcome.

Module - XV: Contemporary issues and research
Issues related evidence-based practice, managed care, and research related to process and outcome.

Examination Scheme:

	Internal Assessment (30 Marks)				**Final Exam**	**Total Marks**
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Term Exam

Text & References:

- An introduction to the psychotherapies, 3rd ed., Bloch, S (2000). Oxford Medical Publications: NY Encyclopedia of Psychotherapy, Vol 1 & 2, Hersen M & Sledge W. (2002). Academic Press: USA
- The techniques of psychotherapy, 4th ed., Parts 1 & 2, Wolberg, L.R. Grune & Stratton: NY Theories of Psychotherapy & Counseling, 2nd ed., Sharf, R.S. (2000). Brooks/Cole: USA Handbook of Psychotherapy & Behavior change – An empirical analysis, Bergin, A.G. & Garfield, S. L. (1978). John Wiley & Sons: NY
- Comprehensive Clinical Psychology, Vol 6, Bellack, A.S. & Hersen, M., (1998). Elsiever Science Ltd: Great Britain
- Handbook of Individual Therapy, 4th ed., Dryden, W. (2002). Sage Publications: New Delhi. Psychotherapy: an eclectic integrative approach, 2nd ed. Garfield, S. L. (1995). John Wiley and sons: USA
- International handbook of behavior modification and therapy, Bellack, A.S., Hersen, M and Kazdin, A.E. (1985). Plenum Press: NY
- Behavior therapy: Techniques and empirical findings, Rimm D.C. & Masters J.C. (1979). Academic Press: NY.
- Handbook of Clinical Behavior therapy, Turner, S.M., Calhown K.S and Adams H.E. (1992). Wiley Interscience: NY
- Dictionary of Behavior Therapy, Bellack, H. Pergamon Press: NY
- Comprehensive Handbook of cognitive therapy, Freeman, A., Simon, K.M., Beutler L.E. & Arkowitz, M. (1988), Plenum Press: NY
- Cognitive Behavior Therapy for psychiatric problems: A practical guide, Hawton, K. Salkovskis, P.M., Kirk, J. and Clark, D.M. (1989). Oxford University Press: NY
- Rational Emotive Behaviour Therapy, Dryden, W. (1995). Sage publications: New Delhi Cognitive Therapy: an Introduction, 2nd ed, Sanders, D & Wills, F. (2005). Sage Publications: New Delhi
- Advances in Cognitive Behavior therapy, Dobson, K S and Craig, K D. (1996). Sage publications: USA
- Science and Practice of CBT, Clark, D M and Fairburn, C. G. (2001). Oxford University press: Great Britain.

- Counseling and Psychotherapy: theories and interventions. 3rd ed. Capuzzi, D and Gross D. R. (2003). Merrill Prentice Hall: New Jersey
- Handbook of psychotherapy case formulation. 2nd ed. Eells, T.D (2007). Guilford press: USA Psychoanalytic techniques, a handbook for practicing psychoanalyst, Wolman BB Basic Book: NY
- The Technique and Practice of psychoanalysis Vol. 1, Greenson, R.R. (1967). International Universities Press: USA.
- Psychotherapy: The analytic approach, Aronson, M. J and Scharfman, M.A. (1992). Jason Aronson Inc: USA
- New Approach of Interpersonal Psychotherapy, Klerman, G. L., Weissman, M. M (1993). American Psychiatric press: Washington
- Handbook of clinical child psychology, 3rd ed., Walker, C.E. & Roberts, MC (2001). John Wiley and Sons: Canada.
- Abnormal child psychology, Mash, E.J & Wolfe, D.A. (1999). Wadsworth Publishing: USA Clinical Practice of cognitive therapy with children and adolescents, Friedberg R.D. & McClure, J.M. Guilford Press, NY
- CBT for children and families, 2nd ed., Graham, P.J. (1998). Cambridge University Press: UK Handbook of clinical behavior therapy, Turner, S.M, Calhour, K.S. & Adams, H.E.(1992). Wiley Interscience: NY
- Basic family therapy, Baker, P, (1992). Blackwell Scientific Pub.: New Delhi
- Handbook of family and marital therapy, Wolman, B.B. & Stricker, G, (1983). Plenum: NY Introduction to Counseling and Guidance, 6th ed., Gibson, R.L. & Mitchell M.H. (2006), Pearson, New Delhi.

PAPER-II: BEHAVIOURAL MEDICINE

Course Code: PSY5302 **Credit Units: 12**

Aim: Health psychology, as one of the subspecialties of applied psychology, has made a notable impact on almost the entire range of clinical medicine. The field deals with psychological theories and methods that contribute immensely to the understanding and appreciation of health behavior, psychosocial and cultural factors influencing the development, adjustment to, treatment, outcome and prevention of psychological components of medical problems. The aim of behavioral medicine is to elucidate the effects of stress on immune, endocrine, and neurotransmitter functions among others, psychological process involved in health choices individuals make and adherence to preventive regimens, the effectiveness of psychological interventions in altering unhealthy lifestyles and in directly reducing illness related to various systems. Further, to provide the required skills and competency to assess and intervene for psychological factors that may predispose an individual to physical illness and that maintain symptoms, in methods of mitigating the negative effects of stressful situations/events, and buffering personal resources.

Objectives: By the end of Part-II, trainees are required to demonstrate ability to:

- Appreciate the impact of psychological factors on developing and surviving a systemic illness.
- Understand the psychosocial impact of an illness and psychological interventions used in this context.
- Understand the psychosocial outcomes of disease, psychosocial interventions employed to alter the unfavorable outcomes.
- Understand the rationale of psychological interventions and their relative efficacy in chronic disease, and carry out the indicated interventions.
- Understand the importance of physician-patient relationships and communication in determining health outcomes.
- Understand of how basic principles of health psychology are applied in specific context of various health problems, and apply them with competence.
- Demonstrate the required sensitivity to issues of death and dying, breaking bad news, and end-of-life issues.
- Carry out specialized interventions during period of crisis, grief and bereavement.
- Understand, assimilate, apply and integrate newer evidence-based research findings in therapies, techniques and processes.
- Critically evaluate current health psychology/behavioral medicine research articles, and present improved design/methods of replicating such research.
- Demonstrate the sense responsibility while working collaboratively with another specialist and foster a working alliance.

Academic Format of Modules: Format would be essentially same as Paper – I on Therapies. The competency/skills are imparted through supervised workups, assessment and practical work of carrying out various treatment techniques within clinical context. Depending on availability of resources at the parent center, the trainees may be posted for extra-institutional learning. Demonstration, clinical issue seminar, clinical seminar, clinical case conferences are required to impart the necessary knowledge and skills. Evaluation: Theory - involving long and short essays, and practical/clinical - involving workup and assessment of clinical cases with viva voce.

Course Contents:

Module-I: Introduction

Definition, boundary, psychological and behavioral influences on health and illness, neuroendocrine, neurotransmitter and neuroimmune responses to stress, negative affectivity, behavioral patterns, and

coping styles, psychophysiological models of disease, theoretical models of health behavior, scope and application of psychological principles in health, illness and health care.

Module – II: **Central nervous system**
Cognitive, personality, behavioral, emotional disturbances in major CNS diseases like cerebrovascular (stroke, vascular dementia etc.), developmental (cerebral palsy), degenerative (Parkinson's etc.), trauma (traumatic brain and spinal cord injury), convulsive (epilepsy), and infectious (AIDS dementia), assessment and methods for psychological intervention and rehabilitation with such patients.

Module – III: Cardiovascular system
Psychosocial, personality, lifestyle, and health practice issues, psychobehavioral responses including coping with illness and functional loss in hypertension, MI, following CABG and other cardiovascular conditions, salient issues with regard to quality-of-life and well-being, empirically proven methods of psychological management of CVS diseases.

Module – IV: **Respiratory system**
precipitants, such as emotional arousal, and other external stimuli, exacerbants such as anxiety and panic symptoms, effects, such as secondary gain, low self-esteem in asthma and other airway diseases, psychological, behavioral and biofeedback strategies as adjunct in the management.

Module – V: **Gastrointestinal system**
Evaluation of psychological factors including personality characteristics and stress/coping style in functional GI disorders such as irritable bowel syndrome, inflammatory bowel disease, peptic ulcer disease, esophageal disorder etc., role of psychotherapy, behavior modification, cognitive restructuring, biofeedback and relaxation training

Module – VI: Genitourinary/renal/reproductive system
Psychosocial issues in male/female sexual dysfunctions, micturition/voiding problems including primary / secondary enuresis, end-stage renal disease, dialysis treatment, primary and secondary infertility, empirically validated psychological and behavioral interventions in these conditions.

Module – VII: **Dermatology:**
Role of stress and anxiety in psychodermatological conditions such as psoriasis, chronic urticaria, dermatitis, alopecia and the impact of these on self-esteem, body image and mood, role of psychological interventions such as relaxation, stress management, counseling and biofeedback strategies.

Module – VIII: Oncology
Psychosocial issues associated with cancer - quality of life, denial, grief reaction to bodily changes, fear of treatment, side effects, abandonment, recurrence, resilience, assessment tools, and goals of interventions for individual and family, and therapy techniques.

Module – IX: HIV/AIDS
Model of HIV disease service program in India, pre- and post-test counseling, psychosocial issues and their resolutions during HIV progress, psychological assessment and interventions in infected adults and children, and family members/caregivers, highly active anti-retroviral treatments (HAART), neuropsychological findings at different stages of infection, issues related to prevention/spreading awareness and interventions in at risk populations.

Module – X: **Pain**
Physiological and psychological processes involved in pain experience and behavior, assessment tools for acute and chronic pain intensity, behavior, and dysfunctions/disability related to pain, psychological interventions such as cognitive, behavioral, biofeedback and hypnotic therapies.

Module – XI: **Terminally ill**

Medical, religious and spiritual definition of death and dying, psychology of dying and bereaved family, strategies of breaking bad news, bereavement and grief counseling, management of pain and other physical symptoms associated with end-of-life distress in patients with cancer, AIDS, and other terminal illness, professional issues related to working in hospice including working through one's own death anxiety, euthanasia – types, arguments for and against.

Module – XII: Other general clinical conditions

Application of psychological techniques and their rationale in the clinical care of patients in general medical settings where psychological services appears to affect the outcome of medical management positively, for example in diabetes, sleep disorders, obesity, dental anxiety, burns injury, pre- and postsurgery, preparing for amputation, evaluation of organ donors/recipient, pre- and post-transplantation, organ replacement, hemophiliacs, sensory impairment, rheumatic diseases, abnormal illness behavior, health anxiety etc.

Module – XIII: **Contemporary Issues**

Research and developments in health psychology, psychophysiology, psychoneuroimmunology, psychobiology, sociobiology and their implications, and effects of psychotherapy on the biology of brain

Examination Scheme:

	Internal Assessment (30 Marks)				**Final Exam**	**Total Marks**
Components	CT	H/P/V/Q	CT	A		
Weightage	10	5	10	5	70	100

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Term Exam

Text & References:

- International handbook of behavior modification and therapy, Bellack, A.S., Hersen, M and Kazdin, A.E. (1985). Plenum Press: NY
- Behavior therapy: Techniques and empirical findings, Rimm D.C. & Masters J.C. (1979). Academic Press: NY.
- Handbook of Clinical Behavior therapy, Turner, S.M., Calhown, K.S and Adams, H.E. (1992). Wiley Interscience: NY
- Dictionary of Behavior Therapy, Bellack Handbook of clinical psychology in medical settings, Sweet, J.J, Rozensky, R.H. & Tovian, S.M. (1991), Plenum Press: NY.
- Health Psychology, Dimatteo, M R and Martin, L.R. (2002). Pearson, New Delhi
- Biofeedback – Principles and practice for clinicians, Basmajian J.V. (1979). Williams & Wilkins Company: Baltimore
- Handbook of Psychotherapy and behaviour change, 5th ed., Lambert, M.J (2004). John Wiley and Sons: USA
- Behavioral Medicine: Concepts & Procedures, Tunks, E & Bellismo, A. (1991). Pergamon Press: USA Health Psychology, Vol 1 to Vol 4, Weinman, J, Johnston, M & Molloy, G (2006). Sage publications: Great Britain.

PAPER-III: BIOLOGICAL FOUNDATION OF BEHAVIOR

Course Code: PSY5306 **Credit Units: 12**

Aim: Brain disorders cause symptoms that look remarkably like other functional psychological disorders. Learning how brain is involved in the genesis of normal and abnormal behavioral/emotional manifestation would result in better clinical judgment, lesser diagnostic errors and increase sensitivity to consider and rule out a neuropsyhological origin or biochemical mediation of the psychopathology. Also, current researches have indicated many pharmacological agents dramatically alter the severity and course of certain mental disorders, particularly the more severe disorders. Therefore, the aim of this paper is to provide important biological foundations of human behavior and various syndromes. The main focus is the nervous system and its command center – the brain.

Objectives: By the end of Part-I, trainees are required to demonstrate ability to:

- Describe the nature and basic functions of the nervous system.
- Explain what neurons are and how they process information.
- Identify the brain's levels and structures, and summarize the functions of its structures.
- Describe the biochemical aspects of brain and how genetics increase our understanding of behavior.
- State what endocrine system is and how it regulates internal environment and affects behavior.
- Discuss the principles of psychopharmacology and review the general role of neurotransmitters and neuromodulators in the brain.
- Describe the monoaminergic and cholinergic pathway in the brain and the drugs that affect these neurons.
- Describe the role of neurons that release amino acid neurotransmitters and the drugs that affect these neurons.
- Describe what kinds of clinical symptoms are often associated with lesions of frontal, parietal, temporal and occipital lobes of the brain.
- Describe what kinds of neuropsychological deficits are often associated with lesions of frontal, parietal, temporal and occipital lobes of the brain, and carry out the indicated neuropsychological assessment employing any valid battery of tests.
- Describe what kinds of neuropsychological deficits are often associated with subcortical lesions of the brain.
- List symptoms that are typical of focal and diffuse brain damage.
- Enumerate the characteristics of clinical syndrome and the nature of neuropsychological deficits seen in various cortical and sub-cortical dementias.
- Describe the neuropsychological profile of principal psychiatric syndromes.
- Demonstrate an understanding of functional neuro-imaging techniques and their application in psychological disorders and cognitive neuroscience.
- Demonstrate an understanding of the principles involved in neuropsychological assessment, its strengths and weaknesses, and its indications.
- Describe the nature of disability associated with head injury in the short and longer term, methods of remedial training and their strengths and weakness.

Academic Format of Modules: The learning would be primarily through clinical assessment of cases with brain lesions and disorders. Lectures, seminars and demonstrations by the experts in specific discipline, disease, topics such as by Anatomist, Biochemist, Physiologist, Psychiatrist, Neurologist and Neurosurgeons are required to impart knowledge and skills in certain domains. Depending on the resources available at the center these academic activity can be arranged.

Evaluation: Theory– involving long and short essays, practical/clinical exam in neuropsychological assessment with cases having a brain lesion/disorder and comprehensive viva.

Course Contents: Part-A (Anatomy, Physiology and Biochemistry of CNS)

Module – I: **Anatomy of the brain**
Major anatomical sub-divisions of the human brain; the surface anatomy and interior structures of cortical and subcortical regions; anatomical connectivity among the various regions; blood supply to brain and the CSF system; cytoarchitecture and modular organization in the brain.

Module – II: Structure and functions of cells
Cells of the nervous system (neurons, supporting cells, blood-brain barrier); communication within a neuron (membrane potential, action potential); communication between neurons (neurotransmitters, neuromodulators and hormones).

Module – III: Biochemistry of the brain
Biochemical and metabolic aspects of Brain; medical genetics; structure and function of chromosomes; molecular methods in genetics; genetic variation; population genetics; single-gene inheritance; cytogenetic abnormalities; multi-factorial inheritance; biochemistry of genetic diseases.

Module – IV: Neurobiology of sensory and motor systems
Organization of sensory system in terms of receptors, relay neurons, thalamus and cortical processing of different sensations; principle motor mechanisms of the periphery (muscle spindle), thalamus, basal ganglia, brain stem, cerebellum and cerebral cortex.

Module – V: Regulation of internal environment
Role of limbic, autonomic and the neuro-endocrine system in regulating the internal environment; reticular formation and other important neural substrates regulating the state of sleep/wakefulness

Module – VI: Neurobiology of behavior
Neurobiological aspects of drives, motivation, hunger, thirst, sex, emotions, learning and memory;

Module – VII: Psychopharmacology: Principles of psycho pharmacology (pharmacokinetics, drug effectiveness, effect of repeated administration); sites of drug action (effects on production, storage, release, receptors, reuptake and destruction); neurotransmitters and neuromodulators (acetylcholine, monoamines, amino acids, peptides, lipids).

Course Contents: Part-B (Neuropsychology)

Module - VIII: Introduction:
Relationship between structure and function of the brain; the rise of neuropsychology as a distinct discipline, logic of cerebral organization; localization and lateralization of functions; approaches and methodologies of clinical and cognitive neuro-psycholoigsts.

Module- IX: Frontal lobe syndrome
Disturbances of regulatory functions; attentional processes; emotions; memory and intellectual activity; language and motor functions

Module-X: Temporal lobe syndrome
Special senses – hearing, vestibular functions and integrative functions; disturbances in learning and memory functions; language, emotions, time perception and consciousness

Module – XI: Parietal and occipital lobe syndromes
Disturbances in sensory functions and body schema perception; agnosias and apraxias; disturbances in visual space perception; color perception; writing and reading ability

Module–XII: Neuropsychological profile of various neurological and psychiatric conditions: Huntington's disease, Parkinson's disease, progressive supranuclear palsy, thalamic degenerative disease, multiple sclerosis, cortical and subcortical dementias, Alzheimer's dementia, AIDS dementia complex etc., and principal psychiatric syndromes such as psychosis, mood disorders, suicide, anxiety disorders, and other emotional and behavioral syndromes.

Module – XIII: **Functional human brain mapping**
QEEG, EP & ERP, PET, SPECT, FMRI

Module – XIV: **Neuropsychological assessment**
Introduction, principles, relevance, scope and indications for neuropsychological assessment and issues involved in neuropsychological assessment of children.

Module – XV: Neuropsychological rehabilitation
Principles, objectives and methods of neuro-rehabilitation of traumatic brain injury and brain diseased; scope of computer-based retraining, neuro-feedback, cognitive aids etc.

Examination Scheme:

	Internal Assessment (30 Marks)				**Final Exam**	**Total Marks**
Components	CT	H/P/V/Q	CT	A		
Weightage (%)	10	5	10	5	70	100

CT-Class Test; **H**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **A**-Attendance; **EE**-End Term Exam

Text & References:

- Clinical Neuroanatomy for Medical Students, Snell, R.S. (1992), Little Brown & Co.: Boston.
- Neuropsychology, a clinical approach, Walsh K. (1994), Churchill Livingstone: Edinburgh. Textbook of Medical Physiology, Guyton, A.C. Saunders Company: Philadelphia.
- Behavioral Neurology, Kirshner H.S, (1986). Churchill Livingstone: NY.
- Principles of neural science, Kandel, E. R, & Schwartz, J. H (1985). Elsevier: NY
- Foundations of physiological psychology, 6th ed., Carlson, N.R. (2005). Pearson Education Inc: India
- Essential psychopharmacology, Stahl, S.M. (1998). Cambridge University Press: UK
- Textbook of physiology, Vol 2, Jain, A.K (2005). Avichal Publishing Company: New Delhi.
- Handbook of clinical neurology, Vols, 2, 4, 45 and 46, Vinken, P J, & Bruyn, G W, (1969). North Holland Publishing Co.: Amsterdam
- Fundamentals of human neuropsychology, Kolb, B.I. Freeman & Company: NY
- Neuropsychology, a Clinical approach, 4th ed., Walsh, K (2003). Churchill Livingstone: Edinburgh
- Handbook of Cognitive Neuroscience, Gazaaniga, M. S. (1984). Plenum Press: NY
- Textbook of postgraduate psychiatry, 2nd ed., Vol 1 & 2, Vyas, J.N. & Ahuja, N (1999). Jaypee brothers: New Delhi.
- Handbook of clinical neurology, Vols, 2, 4, and 45, Vinken, PJ, & Bruyn, GW, (1969). North Holland Publishing Co.: Amsterdam Neuropsychological assessment of neuropsychiatric disorders, 2nd ed., Grant, I. & Adams, K.M. (1996). Oxford University Press: NY.
- Neuropsychology, a clinical approach, Walsh K. (1994), Churchill Livingstone: Edinburgh. Diagnosis & Rehabilitation in clinical neuropsychology, Golden, CJ, Charles, C.T. (1981). Spring Field: USA
- Principles of Neuropsychological Rehabilitation, Prigatano, G.P. (1999). Oxford University Press: NY
- Event Related brain potentials – Basic issues & applications, Rohrbaugh, J W (1990). Oxford University Press: NY.

- Neuropsychological assessment, Lezak, M.D. (1995), Oxford Univ. Press: NY Neuropsychological assessment of neuropsychiatric disorders, 2nd ed., Grant, I. & Adams, K.M. (1996), Oxford University Press: NY.
- Comprehensive clinical psychology- Assessment, Vol 4, Bellack A.S. & Hersen M. (1998). Elsiever Science Ltd.: Great Britain

PAPER-IV: PRACTICAL: PSYCHOLOGICAL THERAPIES INCLUDING VIVA-VOCE

Course Code: PSY5304 **Credit Units: 12**

Aim: Acquire and practice theoretical understanding, attitude and skills necessary to apply various psychotherapeutic interventions to mental health problems and to also develop skills and competency to intervene in stress associated with medical problems among patients as well as their care givers.

Objectives:

- Understanding the role of important client, counselor and context related factors in the psychotherapeutic process
- Systematic application of psychotherapeutic approaches in clinical conditions
- Carry out interventions considering relevant outcome research with ethical considerations
- Application and understanding of health psychology principles in various health conditions
- Working collaboratively with other health care professionals
- Appreciation of the role of social and cultural factors in intervention
- Learn strategies of raising and supporting mental health awareness

Core Topics for practical practice

1. Presenting a clear and precise account of client's problems and Skill of collaborative working
2. Developing appropriate treatment plans
3. Formulating realistic goals for intervention taking into consideration the social and contextual mediation
4. Using appropriate measures of quantifying therapeutic changes
5. Conducting specialized interventions
6. Identifying/making use of factors that help patients get better with psychotherapy
7. Skills in presenting and communicating aspects of current intervention work for assessment by other health professionals
8. Ability to link theory with practice assimilating clinical, professional, academic and ethical knowledge in their role of a therapist
9. Presenting a critical analysis of intervention related research articles and developing methods of replicating such research
10. Understanding, assimilating and integrating newer evidence based research findings in therapies, techniques and processes
11. Understanding psychosocial impact of an illness and relevant psychological interventions
12. Understanding the rationale of psychological interventions and their relative efficacy in various disorders
13. Understanding the importance of counselor-patient relationships in determining therapy outcomes
14. Application of health psychology principles in specific health problems
15. Sensitive handling of issues related to death and dying, breaking bad news and end of life concerns
16. Ability to carry out specialized interventions during periods of crisis, grief and bereavement
17. Understanding training aspects of psychotherapy and ethical/legal issues involved in therapy
18. Ability to conduct a well rounded interview in clinical settings
19. Developing interviewing and counseling micro skills

20. Understanding and application of behavior therapy approaches- classical conditioning based procedures, operant procedures, self control procedures, Biofeedback- in individual, group, family and marital counseling
21. Application of rational emotive behavior therapy, cognitive behavior therapy, cognitive analytic therapy, dialectical behavior therapy, problem solving therapy, mindfulness based cognitive therapy and schema focused therapy
22. Understanding progressive muscular relaxation, autogenic training, biofeedback, eye-movement desensitization and reprocessing
23. Application of psychoanalytic therapies (Ana Freud, Melanie Klein, Donald Winnicott); special techniques (behavioral and play) for developmental, internalizing and externalizing disorders in children
24. Understanding and application of eclectic/integrative approaches for managing deliberate self harm, traumatic conditions, victims of disasters, chronic mental illnesses
25. Understanding of Yoga, meditation, Shavasana, Pranik Healing, Reiki, Tai Chi, etc.
26. Understanding of psycho-education for family members and care givers
27. Understanding psychosocial aspects of disabilities and extending various kinds of rehabilitation services
28. Understanding of stressors, resources and support systems specific to the Indian social context
29. Understanding of Indian psychological healing practices
30. Ability to review literature, appreciate theoretical/methodological issues involved, analyze data and interpret results in a scientifically meaningful ways

Note: A certificate by the head of the department that the candidate has attained the required competence in all of the above tests shall be necessary for appearing in the university examinations of Part-I & II.

Examination Scheme:

	Internal Exam (60)			**Final Exam (140)**		**Total Marks**
Components	File demonstration	Case Conference, Seminar, Journal Club	A	End Term Exam	Viva	
Weightage (%)	45	10	5	70	70	200

PAPER-V: SUBMISSION OF PSYCHOTHERAPY RECORDS

Course Code: PSY5305 **Credit Units: 12**

Course Contents:

Five fully worked-out Psychotherapy Records, out of which one should be child therapy record. The records should include a summary of the clinical history organized under relevant headings, and a discussion on

a) reasons for intervention(s),
b) areas to be focused including short- and long-term objectives,
c) type and technique of intervention employed and rationale
d) therapy processes,
e) changes in therapy or objectives, if any, and the reasons for the same,
f) outcome,
g) prevention strategies,
h) future plans

Examination Scheme:

Components	Submission of five fully worked-out Psychotherapy Records
Weightage (%)	100

PAPER-VI: DISSERTATION

Course Code: PSY5337 **Credit Units: 10**

Under the guidance of a Clinical Psychology faculty member with Ph.D. or minimum 2-yr experience (post-qualification) in clinical teaching or clinical research. If the research work is of interdisciplinary nature requiring input/supervision from another specialist, co guide(s) from the related discipline may be appointed as deem necessary.

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of;
- information and to your own knowledge; of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation

- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required: Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996
- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)

- Line spacing: 1.5Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:
Has the student made a clear statement of the objective or objective(s).
If there is more than one objective, do these constitute parts of a whole?
Has the student developed an appropriate analytical framework for addressing the problem at hand.
Is this based on up-to-date developments in the topic area?
Has the student collected information/data suitable to the frameworks?
Are the techniques employed by the student to analyse the data / information appropriate and relevant?
Has the student succeeded in drawing conclusion form the analysis?
Do the conclusions relate well to the objectives of the project?
Has the student been regular in his work?
Layout of the written report

Assessment Scheme:

Continuous Evaluation:	30%
(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	70%
Contents & Layout of the Report,	25
Conceptual Framework,	15
Objectives & Methodology and	15
Implications & Conclusions	15

Amity School of Hospitality

Bachelor of Hotel Management

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Hotel Management

Syllabus – First Semester

FOOD PRODUCTION FOUNDATION-I

Course Code: HMC2101 **Credit Units: 02**

Course Objective:
The curriculum is based on to familiarize the students with the basic concepts of food such as –
- To make the students learn about the professionalism and basic etiquette of culinary art
- To make them learnt about raw material, uses, composition, benefits and methods
- To sharpen the culinary skills in the field of food production
- To impart knowledge of history of culinary art and changes along with the times
- To give the basic idea about physical and chemical composition of different food products.

Course Contents:

Cookery
Module – I :Food Service industry
1.1 Culinary History

Module – II :Standards of Professionalism
2.1 Levels of Skills
2.2 Attitude and Professionalism in Kitchen
2.3 Attires of chefs

Module – III :Kitchen Organization
3.1 Kitchen Brigade & Work Flow
3.2 Duties & responsibilities of various chefs
3.3 Interdepartmental Relationship

Module – IV :Kitchen Equipment
4.1 Introduction to Different Equipments
4.2 Safety procedure in handling equipment

Module – V :Basic Cookery Principles
5.1 Transfer of heat
5.2 Aims & Objective of Cooking
5.3 Effect of Heat on Cooking
5.4 Characteristic of Raw Materials
5.5 Preparation of ingredients
5.6 Cooking Times
5.7 Different fuels used in commercial kitchen
5.8 Methods of Cooking with advantages & disadvantages
5.9 Pre-Preparation
5.10 Culinary Terms Indian & Western

Module – VI : Commodities

6.1 Cereals – Types & Forms in Which The Products Are Available in The Market, Their Vernacular & English Names & Uses- Wheat, Rice, Maize, Oats, Barley, Ragi, Bajra & Other Millets
6.2 Pulses – Identification of The Wide Range of Pulses Available in The Market, The Vernacular & English Names and Uses.
6.3 Herbs, Spices & Condiments – Classification, Identification, Vernacular & English Names.
6.4 Fats & Oils – Types & Forms, Sources, Processing and Uses of Vanaspati, Margarine, Refined, Double Refined, Unrefined. Butter etc.

Bakery &Confectionery
Module – VII : Introduction to Bakery and Patisserie
7.1 History of Baking
7.2 Baking As An Art and Science

Module – VIII : Basic Principles of Bakery
8.1 Formulas and Measurements
8.2 Baking Process

Module – IX : Equipment Used in Bakery
9.1 Use, Care, Cleaning, Storage

Module – X : Ingredients Used in Bakery - Types and Use
10.1 Flour
10.2 Fat
10.3 Cream
10.4 Sugar
10.5 Milk
10.6 Egg

Module – XI : Definition and Terms Used in Bakery

Module – XII : Yeast Products
12.1 Importance of Yeast in Baking –
12.2 Types, Storage and Use

Module – XIII : Bread Making
13.1 Functions of ingredients Used
13.2 Steps in Bread Making
13.3 Bread Diseases –Origin and Remedies
13.4 Different Recipes of Breads - Rye Bread, Corn Bread, French bread, international Breads
13.5 Types of Rolls - Soft Rolls; Hard Rolls
13.6 Quick Breads.- Ingredients, Types of Batter and Dough, Examples

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**

Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

FOOD & BEVERAGE SERVICE FOUNDATION-I

Course Code: HMC2102 **Credit Units: 02**

Course Objective:

At the end of the semester the students will be able to –

Explain the growth and role of hotel industry and catering establishment
Understand the various types of hotels and their features
List and explain various catering establishment with their features
Explain staff organization structure of food and beverage department
Describe and understand job description of each personnel working in each F&B service outlet
List various F&B service equipments with its use and care.

Course Contents:

Module –I : Introduction to the World of Hospitality, Food & Beverage

1.1 Sectors of Hospitality industry
- 1.1.1 Railway
- 1.1.2 Airline
- 1.1.3 Cruise Liners
- 1.1.4 Industrial Catering
- 1.1.5 Institutional Catering

1.2 Major Hospitality Organisations - international & National
- 1.2.1 Oberoi, Taj Groups & Others

Module –II : Introduction to The Hotel industry

2.1 Classification of Catering Establishments
2.2 Types of F&B Outlets
2.3 Food & Beverage Departmental Organization
2.4 Duties & Responsibilities of F&B Staff at Various Levels
2.5 Attributes of a Hotelier

Module -III : Ancillary Departments

3.1 Still Room / Pantry
3.2 Wash Up (Kitchen Stewarding)
3.3 Plate Room

Module – IV : Restaurant Equipment

4.1 Glassware
4.2 Crockery
4.3 Silverware
4.4 Furniture
4.5 Linen

Module – V : Meals & Menu

5.1 Types of Meals
- 5.1.1 EMT
- 5.1.2 Breakfast
- 5.1.3 Lunch
- 5.1.4 Dinner

5.1.5 Brunch
5.1.6 High Tea
5.1.7 Afternoon Tea
5.1.8 Elevenses
5.2 Types of Menu
5.2.1 À La Carte & Table d'hôte
5.3 Courses of Menu
5.3.1 Course Item Examples with Accompaniments
5.3.2 Covers for Each Course

Module – VI : Service Procedures

6.1 Types of Services
6.1.1 Assisted
6.1.1.1 Platter to Plate / Silver
6.1.1.2 Pre-Plated
6.1.1.3 Host
6.1.1.4 Guéridon
6.1.2 Non-Assisted
6.2.1.1 Buffet – Sit-down, Standing
6.2.1.2 Single Service
6.2.1.3 Counter Service

Examination Scheme:

Components	**V**	**H**	**CT1**	**A**	**EE1**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE FOUNDATION

Course Code: HMC2103 **Credit Units: 02**

Course Objective:
At the end of the semester the students will be able to explain & understand-
The growth, role of tourism in hospitality and hotel industry
The classification and main features of hotels
The Front Office staff and organization structure, duties/responsibilities of each personnel
Appraisal of Front Office equipment and furniture, welcoming of guest and telephone handling

Course Contents:

Module – I : Introduction to the Hospitality Industry

Module – II : Classification of Hotels
- 2.1 Size and Types of Hotel
- 2.2 Levels of Service
- 2.3 Ownership and Affiliation

Module – III :Basic Criteria of Star Categorization of Hotels

Module – IV :Hotel Organisation
- 4.1 Organization Chart

Module – V :Types of Rooms

Module – VI :Functional Organisation of Front office
- 6.1 Different Sections of Front office Department & Their Brief Functions

Module – VII : Staff Organisation of Front office Department
- 7.1 Duties & Responsibilities of Front office Department

Module – VIII :Front Desk Layout and Equipment
- 8.1 Layout
- 8.2 Equipment and Its Utility

Module – IX :Rate Categories
- 9.1 Food Plans
- 9.2 Basis of Charging Room Rates
- 9.3 Tariff Card

Module – X :Front office Systems
- 10.1 Non-Automated
- 10.2 Semi- Automated
- 10.3 Fully- Automated

Examination Scheme:

Components	A	JE	P	CT	EE
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project: JE-Journal Evaluation

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSEKEEPING FOUNDATION

Course Code: HMC2104 **Credit Units: 02**

Course Objective:
At the end of the semester the students would have a through knowledge of:
Organization of Housekeeping department and its basic functioning
All agents and equipment used for cleaning of all possible surfaces
Room layouts and what are constitutes in a guest room
Pests found in the hotel and their control.

Course Contents:

Module – I : The Role of Housekeeping in Hospitality Operation
1.1 Role of Housekeeping in Guest satisfaction and repeat Business

Module – II : Introduction to Housekeeping Department
2.1 Identifying Housekeeping Responsibilities
2.2 Organizational Structure of Housekeeping Department for: Small Hotel, Medium Hotel, Large Hotel
2.3 Duties & Responsibilities of Housekeeping Staff
2.4 Personality Attributes of Housekeeping Staff
2.5 Layout of the Housekeeping Department

Module – III : Cleaning Equipments
3.1 General Consideration for Selection
3.2 Classification & Types of Equipments
3.3 Method of Use and Mechanism for Each Type
3.4 Care and Maintenance

Module – IV : Cleaning Agents
4.1 Classification
4.2 General Criteria for Selection
4.3 Use, Care & Storage
4.4 Distribution & Control

Module – V :Use of Computers in Housekeeping Department

Module – VI : Care and Cleaning of Different Surface
6.1 Metals, Glass, Ceramics, Wood, Wall finishes, Floor finishes

Module – VII : Inter-Departmental Coordination with
7.1 Front office
7.2 Maintenance
7.3 Food Production & Service Areas
7.4 Personnel
7.5 Purchase, Receiving & Stores
7.6 Laundry
7.7 Computer Centre
7.8 Security

7.9 Accounts & Credit
7.10 Other Departments

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

APPLICATION OF COMPUTERS

Course Code: HMC2105 **Credit Units: 01**

Course Objective:
The basic objective of the course is to introduce the students to the world of computers and computer technology. The students will be introduced to the basic concept of operating system, word processing, database, presentation.

Course Contents:
Module I: Computer Fundamentals
Elements of a Computer system
Characteristic of Computers
Classification of Computers
Limitations
Hardware features and uses
Generations of Computer
Primary and Secondary Storage Concepts
Data Entry Devices
Data Output Devices
Software Concepts
System Software
Application Software
Language Classification
Compilers and Interpreters

Module II: Operating Systems/Environment
Introduction to Windows
GUI/Features
What are Window & Window 95 and above
Part of a Typical Window and their functions

Examination Scheme:

Components	**V**	**H**	**A**	**CT**	**EE**
Weightage (%)	05	05	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:
- Basic Computers by IBM
- DOEAC 'O' Level *Information Technology by V.K. Jain BPB Publications*

References:
- Insider Internet Marketing by Jim Deniels
- The Birth of Internet Marketing & Communication by Don Stan Boch

FOOD PRODUCTION FOUNDATION LAB-I

Course Code: HMC2106 **Credit Units: 03**

Course Objective:
At the end of the semester the students will be able-
- To learn about the basics of food production in continental and Indian cuisine
- To make a menu and would be able to explain the meaning of the dishes
- To prepare the basic stock, sauce and soup
- To use the knife and other equipments confidently
- To cut all kind of vegetable cutting.

Course Contents:
Practical
Module – I : Cookery
- Identification of Kitchen Equipments
- Identification of raw materials
- Preparing & Cooking Vegetables
- Different cuts of vegetables
- Demonstration of various Cooking Methods
- Compiled 3 course menu

Module – II : Bakery & Confectionery
- Preparation of Breads using different Methods
- Identification & Understanding of Bread Ingredients
- Preparation of different types of bread rolls
- Preparation of Various Quick Breads – Muffins, Pancakes

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	JE	VV	INDENT	LE
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:
Text:
- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:
- Theory of Cookery by K Arora published, Frank Bros &Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan

FOOD & BEVERAGE SERVICE FOUNDATION LAB-I

Course Code: HMC2107 **Credit Units: 01**

Course Objective:
At the end of the semester the students will be able-
- To use and maintain all items of crockery, cutlery, glassware, flatware and hollowware used in a restaurant
- To arrange the restaurant and connected service area
- To serve water & food as per the standard rules

Course Contents:
Module – I : Basics of Service
- Service Grooming and Restaurant Etiquettes.
- Identification of equipments
- Mis-en-Place and Mis-en-Scene

Module – II : Essentials of Service
- Writing a Menu in French
- Food and Beverage service sequence
- Water pouring and seating a guest.
- Laying and relaying of Tablecloth
- Napkin folds
- Carrying a Salver or Tray
- Sideboard setup

Module – III :Service at Table
- Rules for laying table - Laying covers as per menus
- TDH and A la carte cover Layout
- Handling service gear
- Carrying plates, Glasses and other Equipment
- Clearing an ashtray
- Crumbing, Clearance and presentation of bill
- Sequence of Service of a Meal
- Breakfast table lay-up
- Silver service
- American service

Module – IV : Basics of Service
- Situation handling
- Restaurant reservation system
- Hostess desk functions
- Order taking – writing a food KOT, writing a BOT

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE FOUNDATION LAB

Course Code: HMC2108 **Credit Units: 01**

Course Objective:
At the end of the semester the students will be able-
- Understand the growth, role of tourism in hospitality and hotel industry
- Explain the classification and main features of hotels
- Describe Front Office staff and organization structure, duties/responsibilities of each personnel
- Do the Appraisal of Front Office equipment and furniture, welcoming of guest and telephone handling.

Course Contents:
- Basic Manners & Attributes for Front Office Operations.
- Communication Skills – Verbal & Non Verbal
- Telephone Handling
- Forms & Formats related to 1st Semester

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:
- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSEKEEPING FOUNDATION LAB

Course Code: HMC2109 **Credit Units: 01**

Course Objective:
At the end of the semester the students would have a thorough knowledge of-
- Use of cleaning agents
- Use of cleaning equipment (manual as well as mechanical)
- Cleaning of all kinds of surfaces in a hotel.

Course Contents:
- Identifying Cleaning Equipment & Agents
- Cleaning of Guest Room & Bathroom – Occupied / Vacant
- Cleaning of Various Surfaces
- Composition, Care and Cleaning of Various Surfaces
  - Metals - Brass, Copper, Silver, EPNS, Bronze, Chromium, Aluminum, Stainless Steel & Protective Finishes of Various Kinds
  - Glass-Various Type
  - Leather, Rexine
  - Plastic
  - Ceramic - Various Types
  - Wood- Various Types & Their Protective Finishes

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	5	15	5	5

End-Term: 70 Marks

Components	JE	VV	GP	LE
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:
Text:
- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

APPLICATION OF COMPUTERS LAB

Course Code: HMC2110 **Credit Units: 01**

Course Objective:
At the end of the semester the students would be able to-
- Create folders
- Shortcuts copy files & folders
- Deleting files and exploring windows etc.

Course Contents:

Module I: Window Operations
Creating Folders, Creating Shortcuts, C
opying Files/Folders, Renaming Files/Folders, Deleting Files
Exploring Windows
Quick Menu

Module II: MS Word
Creating a Document, Formatting Documents, Special Effects
Cut, Copy, Paste.
Table, Graphics.
Print Options.

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:
Text:
- Microsoft Work 2000 by Heidi Steele Techmedia Publications
- Basic Computers by IBM

References:
- Insider Internet Marketing by Jim Deniels
- The Birth of Internet Marketing & Communication by Don Stan Boch
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

FIELD WORK PROJECT-I

Course Code: HMC2111 **Credit Units: 02**

Course Objective:
Students of hospitality need to go through the basics of practical service exposure in different hospitality outlets. To maximize this exposure students will be send for different hospitality services in all the major & minor areas of operation & management within & outside the campus.

Methodology:
Students should be send for various learning opportunity outside the class room. They should submit the journal after the event is over to assigned faculty from the committee in following format.

- Name of the event
- Location
- Time
- Faculty Responsible
- Task Assigned
- Learning Outcome
- Suggestions

All the assignments should be duly authorized by the faculty responsible for the event.

Student services will be monitored & evaluated by the committee comprising of Program leader & faculty (as approved by HOI) and the marks will be allotted based on the performance, attitude, learning and utilization of knowledge in practical field.

Examination Scheme:

Components	**C**	**S**	**V**	**P**	**JE**
Weightage (%)	20	20	20	20	20

Syllabus - Second Semester

FOOD PRODUCTION FOUNDATION–II

Course Code: HMC2201 **Credit Units: 02**

Course Objective:
The curriculum is based on to familiarize the students with the basic concepts of food such as –
- To make the students learn about the professionalism and basic etiquette of culinary art
- To make them learnt about raw material, uses, composition, benefits and methods
- To sharpen the culinary skills in the field of food production
- To impart knowledge of history of culinary art and changes along with the times
- To give the basic idea about physical and chemical composition of different food products.

Course Contents:

Cookery
Module – I :Breakfast Cookery
1.1 Types of breakfast
1.2 International & Indian menu for breakfast
1.3 Various breakfast rolls

Module – II :Commodities
2.1 Elementary Pastas - Method of Manufacture, Ranges Available in The Market e.g. : Macaroni, Spaghetti, Noodle Etc. & Their Uses.
2.2 Milk & Milk Product - Forms in Which Available, Processing e.g. : Full Cream, Fresh Milk, Toned Milk, Skimmed Milk, Buffalo & Cow's Milk; Pasteurized, Sterilised, Dehydrated etc. Khoa, Paneer, Cream, Etc.
2.3 Cream - Process of Making Cream, Types of Cream
2.4 Cheese- Introduction, Types, Processing of Cheese, Serving of Cheese

Module – III :Stocks
2.5 Definition, Elements of Stock
2.6 Classification & uses
2.7 Special care during stock making

Module – IV :Sauces
2.8 Definition
2.9 Classification of Mother Sauces
2.10 Derivatives

Module – V :Soups
2.11 Definition
2.12 Classification With example

Module – VI :Vegetable Cookery
2.13 Basic Knowledge, Identification, Various Cuts.
2.14 Preparation, Storage, Nutritional Aspects

Module – VII :Fruits

2.15 Types, Classification
2.16 Preparation, Handling, Storage
2.17 Nutritional Aspects

Bakery & Patisserie

Module – VIII :Cookies

2.18 Definition, ingredients Used & Their Functions, Different Methods Used and Examples

Module – IX :Pastries

2.19 Definition of Pastries
2.20 Classification
2.21 Ingredients Used, Methods
2.22 Usage, Faults

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

FOOD & BEVERAGE SERVICE FOUNDATION-II

Course Code: HMC2202 **Credit Units: 02**

Module – I :Beverages

1.1 Classification
- 1.1.1 Non-Alcoholic Beverages
  - 1.1.1.1 Types of Waters
  - 1.1.1.2 Soft Drinks
  - 1.1.1.3 Juices / Syrups / Crushes
  - 1.1.1.4 Tea Coffee
- 1.1.2 Alcoholic Beverages
  - 1.1.2.1 Introduction
  - 1.1.2.2 Types

Module – II :Beer

Module – III :Wines

2.1 Introduction to Wines
2.2 Classification of Wines
2.3 Grapes & Factors Affecting Wine Quality
2.4 Vinification
2.5 Production of Red / White / Rosé Wines
2.6 Production of Fortified & Aromatised Wines
2.7 Production of Sparkling Wine
2.8 Wine Producing Regions of the World
2.9 France, Germany, Italy, Spain, Portugal
2.10 USA
2.11 Australia & India
2.12 Food & Wine Harmony

Examination Scheme:

Components	**V**	**H**	**CT1**	**A**	**EE1**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE OPERATION-I

Course Code: HMC2203 **Credit Units: 02**

Module – I :Reservation Activities

1.1 Importance of Reservations
1.2 Sources of Reservation
1.3 Modes of Reservation
1.4 Telephone Etiquette
1.5 Reservation Activities
1.6 Tools of Reservation
  1.6.1 Room Status Board
  1.6.2 Advance Letting Chart
  1.6.3 Density Control Chart
  1.6.4 Movement List / Expected Arrival List
1.7 Systems of Reservation
  1.7.1 Diary System
  1.7.2 Whitney System
1.8 Processing Group Reservation
1.9 Product Knowledge of Receptionists
1.10 Up-selling : Techniques
1.11 Over-booking : Why & How
1.12 Cancellation Procedure
1.13 Amendment Procedure

Module – II : Registration

2.1 Room Position

Module – III : Pre Arrival

3.1 Pre Registration Procedure

Module – IV : On Arrival Procedures

4.1 Receiving, Greeting, Welcoming A Guest
4.2 Assessing The Guest Requirements
4.3 Registration & Rooming Procedure

Module – V : Post Arrival Procedure

Module – VI : Chapter 2 to Chapter 5 for :

6.1 FIT
6.2 VIP
6.3 Group
6.4 Foreigner

Module – VII : Room Change Procedure

Module – VIII : Handling of Special Situations Like

8.1 DNS
8.2 DNA
8.3 RNA

8.4 NI (No information)
8.5 VIP / Spat / DG Guests
8.6 Scanty Baggage Guest
8.7 Refusing Accommodation
8.7.1 Black Listed Guest
8.7.2 Walking A Guest

Module – IX : Manual Key Control Procedure

Examination Scheme:

Components	**A**	**JE**	**P**	**CT**	**EE**
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project: JE-Journal Evaluation

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSE KEEPING OPERATION-I

Course Code: HMC2204 **Credit Units: 02**

Course Objective:
At the end of the semester the students will have a thorough knowledge of-
- Key Control & its importance
- All types of beds and mattresses
- Cleaning Procedures & schedule
- All routine and records maintained of H.K. department
- Pest Control

Module – I :Keys
1.1 Types of keys,
1.2 Key control

Module – II :Types of Beds and Mattresses

Module – III :Introduction to Cleaning
3.1 Principles of cleaning
3.2 Methods of organizing cleaning
3.3 Frequency of cleaning daily, periodic, special

Module – IV :Cleaning Organization
4.1 Guestroom Cleaning
4.1.1 Stacking of Chambers Maid Trolley
4.1.2 Pre – Preparation
4.1.3 Entering the guestroom
4.1.4 Bed Making
4.1.5 Bathroom Cleaning
4.1.6 Second Service
4.1.7 Turndown Service
4.2 Public Area CleaningHotel Entrance, Lobby, Front Office, Restaurants, Elevators, etc

4.3 Guest Room inspection

Module – V :Routine Systems and Records of Housekeeping Department
5.1 Room Occupancy Report,
5.2 Guest Room Inspection Checklists,
5.3 Work Orders, Log Sheet,
5.4 Lost and Found Register and Enquiry File,
5.5 Housekeeper's Report,
5.6 Guest's Special Requests Register,
5.7 Record of Special Cleaning,
5.8 Call Register,
5.9 VIP Lists.

Module – VI :Pest Control
6.1 Definitions of Pests & Control
6.2 Areas of infestations

6.3 Prevention & Control of Pests
6.4 Responsibility of Housekeeping in Pests Control

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

FOOD SCIENCE & NUTRITION

Course Code: HMC2205 **Credit Units: 01**

Course Objective:
At the end of the semester students will be able to-
- Understand functions of Foods which supply our nutritional needs
- Explain how to meet human need nutrients in terms of available foods
- Acquire techniques of preparation which help us meet our needs in an enjoyable manner
- Understand role of nutrients in menu planning

Course Contents:

Module I:Food Science
Definition and scope of Food Science

Module II:Nutrition & Nutrients
Introduction, Type of Nutrients (Macro & Micro Nutrients), Classification of various nutrients, Dietary Sources of various nutrients, Effect of cooking on Nutrients, Uses of various nutrients in food preparation

Module III: Nutrient specific chemical Processes
Dextrinization, Autoxidation (factors and prevention measures), Flavour reversion, Refining, Hydrogenation & winterization, **Gelation, Emulsification, Foamability, Viscosity,** Browning

Module IV:Food Processing
Definition, Objectives, Types of treatment, Effect of factors like heat, acid, alkali on food constituents

Module V: Evaluation of Food
Objectives, Sensory assessment of food quality, Methods
Introduction to proximate analysis of Food constituents, Rheological aspects of food

Module VI: Emulsions & Colloids
Theory of emulsification & Colloids, Types of emulsions, Emulsifying agents, Role of emulsifying agents & Colloids in food preparation

Module VII: Flavour
Definition, Description of food flavours (tea, coffee, wine, meat, fish spices)

Module VIII: Energy
Definition of Energy and Units of its measurement (Kcal), Energy contribution from macronutrients (Carbohydrates, Proteins and Fat), Factors affecting energy requirements, Concept of BMR, SDA, Thermodynamic action of food, Dietary sources of energy, Concept of energy balance and the health hazards associated with Underweight, Overweight

Module IX: Balanced Diet
Definition, Importance of balanced diet, RDA for various nutrients – age, gender, physiological state

Module X: Menu Planning

Planning of nutritionally balanced meals based upon the three food group system, Factors affecting meal planning, Critical evaluation of few meals served at the Institutes/Hotels based on the principle of meal planning, Calculation of nutritive value of dishes/meals

Examination Scheme:

Components	**V**	**A**	**CT**	**EE**
Weightage (%)	10	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Human Nutrition by Guthrice HA & Picciano MF 1995, Mosby Pub.Co.Toronto
- Perspectives in Nutrition by Wardlaw MW & Insel PM 1993 Mosby Pub Co. Toronto
- Food facts & Principles by Manay & Shalakshara Swamy New Age Int. 2001
- Fundamentals of Food & Nutrition 4th edition 2001by Mudambi & Rajgopal
- Nutritive Value of Indian Foods- Indian Council of Medical Research

References:

- Food Science by Potter & Hotchkiss
- Principles of Food Science by Borgstrom and Macmillion
- Food Chemistry by Fennima
- Sensory Evaluation by Amerine (Academic Press)
- Handbook of Analysis and Quality Control for fruits & Vegetables by Rangana S (Tata McGraw Hill)
- Principles of Food Technology by P.J Fellows.

FUNDAMENTALS OF ACCOUNTING-I

Course Code: HMC2206 **Credit Units: 02**

Course Objective:
At the end of the semester the students will be able to-
- Understand basic concept of hospitality accounting system
- The meaning and need for accounting
- Distinguish between book keeping and accounting
- Record the transactions using rules of debit and credit
- Ascertain the correct bank balances
- To check the accuracy of accounting records.

Course Contents:

Module I: Introduction to Accounting

Meaning & Definition, Types and Classification, Principles of Accounting, Systems of Accounting, Generally Accepted Accounting, Principles

Module II: Primary Books (Journal)

Meaning and Definition, Format of Journal, Rules of Debit and Credit, Opening entry, simple and compound entries, Practical

Module III: Subsidiary Books (Ledger)

Meaning and Uses, Formats, Posting, Practical

Module IV: Subsidiary Books

Need and Use
Classification
- Purchase book
- Sales book
- Purchase returns
- Sales return
- Journal proper
- Practical

Module V: Trial Balance

Meaning, Methods, Advantages, Limitations, Practical

Examination Scheme:

Components	**H**	**P**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination; P-project

Text & References:

Text:

- Element of Hotel Accounting by Dr. JM Negi & G.S. Rawat, HKS International (now Aman Publication, New Delhi)
- Hotel Management Accounting & Control by Dr. JM Negi, Himalaya Publication, New Delhi
- Management Accounting by Dr. Hingorani & Prof. Ramanathan, Sultan Chand & Sons

References:

- Management Accounting & Financial Control by Dr. SN Maheshwari, Sultan Chand & Sons
- Understanding Hospitality Accounting by Raymond Cote, EI-AH&LA USA
- Financial Accounting by GC Maheshwari, NCERT, N. Delhi
- Fundamentals of Hotel Accounting by G.S. Rawat & Dr. JM Negi, Aman Publications, New Delhi

FOOD PRODUCTION FOUNDATION LAB-II

Course Code: HMC2207 **Credit Units: 03**

Cookery

- Preparing & Cooking Fish & Shellfish
- Preparing & Cooking Poultry
- Preparing & Cooking Meat
- Preparing 3 to 5 course Continental Menu

Patisserie

- Different methods & Types Cookie making
- Different Types of Pastries & their applications

Examination Scheme:

Internal: 30 Marks

Components	JE	LE	VV	A
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	JE	VV	INDENT	LE
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora, Frank Bros &Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan

FOOD & BEVERAGE SERVICE FOUNDATION LAB-II

Course Code: HMC2208 **Credit Units: 01**

- Room service tray and trolley lay-up and service
- Room service amenities, Set-up in rooms
- Functional and floor layouts for room service
- Conducting briefing and de-briefing for F&B Outlets
- Beverage order-taking
- Service of hot and cold non- alcoholic beverages
- Table set-up with wines on the menu
- Service of Beer, Sake, and Other fermented and brewed beverages
- Service of sparkling, aromatized, fortified, still wines.
- Glassware used for different spirits,
- Non alcoholic drinks offered with different Spirits - service procedure.
- Order taking –writing a BOT

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE OPERATION LAB-I

Course Code: HMC2209 **Credit Units: 01**

- Identification of equipment, Work Structure & Stationery
- Procedure of taking Reservations – in Person & over Telephone
- Converting enquiry into valid reservation
- Suggestive Selling

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSEKEEPING OPERATION LAB-I

Course Code: HMC2210 **Credit Units: 01**

- Identifying Guest Supplies
- Bed Making
- Bed Making (Variations)

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	5	15	5	5

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

FIELD WORK PROJECT-II

Course Code: HMC2211 **Credit Units: 03**

Course Objective:
Students of hospitality need to go through the basics of practical service exposure in different hospitality outlets. To maximize this exposure students will be send for different hospitality services in all the major & minor areas of operation & management within & outside the campus.

Methodology:
Students should be send for various learning opportunity outside the class room. They should submit the journal after the event is over to assigned faculty from the committee in following format.

- Name of the event
- Location
- Time
- Faculty Responsible
- Task Assigned
- Learning Outcome
- Suggestions

All the assignments should be duly authorized by the faculty responsible for the event.

Student services will be monitored & evaluated by the committee comprising of Program leader & faculty (as approved by HOI) and the marks will be allotted based on the performance, attitude, learning and utilization of knowledge in practical field.

C-20
S-20
V-20
P-20
JE-20

Syllabus - Third Semester

FOOD PRODUCTION OPERATIONS-I

Course Code: HMC2301 **Credit Units: 02**

Course Objective:
After completion of this course the students will have the basic concepts of –
- Standard Recipe, Menu planning
- Classification & cooking of Egg, Meat, Poultry / Game, Fish
- Indian Gravies & Masalas
- Accompaniments & Garnish
- Production of Cakes, role of different ingredients used

Module I:Standard Recipe
- Introduction & Types of standard Recipes
- Method of writing & Uses

Module II :Menu planning
- Introduction
- Types of menus
- Factor effecting menu planning

Module III:Egg Cookery
- Structure, Composition, Varieties, Storage
- Nutritional Aspects
- Preparation

Module IV :Meat Cookery
- Composition, Selection, Grading of Mutton, Lamb, Pork, Beef, Veal
- Cuts of Different Meats, Cooking Times, & Handling
- Nutritional and Storage Points

Module V :Poultry / Game Cookery
- Types/Classification
- Food Value, Storage & Nutritional Value

Module VI:Fish Cookery
- Classification, Source
- Storage, Food Value Preservation

Module VII:Basic Gravies
- Basic ingredients used in gravies
- Types of gravies
- Uses with examples

Module VIII:Masalas
- Blending of spices
- Different Masalas used in Indian cookery

- Wet Masala
- Dry Masala
- Composition of different Masalas
- Verities of Masalasavailable in regional areas
- Special Masala blends

Module IX : Accompaniments&Garnish

Module X :Cakes (Bakery & Patisserie)

- Ingredients Used in Cake-Making & Their Functions
- Type of Methods
- Cake Balancing Formulas, Faults & Remedies
- High Ratio Cakes, Pound Cakes - Definitions, Formulas
- Cake Decorations , Icings, Types of Icing, Other Decorative Items

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

FOOD & BEVERAGE SERVICE OPERATIONS-I

Course Code: HMC2302 **Credit Units: 02**

Course Objective:
After completion of this course the students will have the clear concepts of –
- Spirits & their production methods
- Calculation of strength of Spirit
- Types of Spirits
- Liqueurs & Bitters
- Cigars & Cigarettes

Module I :Spirits
1.1 Introduction & Types
1.2 Measuring Strength of Spirit
1.3 Styles of Production
1.4 Whisky
1.5 Brandy
1.6 Rum
1.7 Gin
1.8 Vodka
1.9 Tequila
1.10 Other Spirits (Pernod, Marc, Grappa Etc.)

Module II :Liqueurs & Bitters
2.1 Types
2.2 Production
2.3 Bases & Brands

Module III :Cigars & Cigarettes
3.1 Manufacturing
3.2 Care & Storing
3.3 Types, Brands

Examination Scheme:

Components	**V**	**H**	**CT1**	**A**	**EE1**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:
Text:
- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Phullar
- Professional Table Service by Dennis Lillicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE OPERATION-II

Course Code: HMC2303 **Credit Units: 02**

Course Objective:
After completion of this course the students will have clear concept on –
- Front office Communication
- Bell Desk Service
- Guest Services

Module I : Bell Desk Service
1.1 Bell Desk Layout, Equipment
1.2 Staff Organisation, Duty Rotas & Work Schedule
1.3 Luggage Handling Procedures
1.4 Left Luggage Procedures
1.5 Other Functions of Bell Desk

Module II :Front office Communication
2.1 Importance of inter-Departmental Communication
2.2 Types & Methods of Communication

Module III :Guest Services
3.1 Handling Guest Requests
3.2 Handling Guest Complaints
3.3 Mail Handling Procedures
3.3.1 Importance of Handling Mail without Delay, Sorting of Mail
3.3.2 Categories of Guest Mail :- Resident Guest, Departed Guest & Guest Still to Arrive

3.3.3 Special Handling of Registered Mail and Parcels
3.4 Message Handling Procedure
3.4.1 Importance, Procedure, Method of Receiving and Transmitting Messages for Guest, Location Form, Paging Procedure

Examination Scheme:

Components	**A**	**JE**	**P**	**CT**	**EE**
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project: JE-Journal Evaluation

Text & References:

Text:
- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSE KEEPING OPERATION-II

Course Code: HMC2304 **Credit Units: 02**

Course Objective:
At the end of the semester the students will have a thorough knowledge of-
- Fibres & Fabrics, Methods of Weaving, Linen
- Linen Room
- Uniforms & Uniform Room
- Sewing Room.

Module I : Fibres & Fabrics

Definition of Fibre
Classification of Fibre - The Origin, Characteristics & Usage in the Hotel

Module II :Weaving

Stages
Terms Used - Weft, Warp, Selvedge, Thread Count
Classification of Weaves - Plain -Basket, Twill, Damask, Satin, Figured, Bird Eye, Herring Bone, Dobby, Jacquard, Pile (Cut & Uncut)
Fabric Commonly Used - Flannel, Parcale, Calico, Cambrioc, Candlewick, Denim, Rayon, Velvet,
Finishes -Sizing, Degumming, Weighting, Boiling off, Scouring, Singeing, Calendering, Decatizing, Shearing, Brushing, Floacking, Sanforisation, Mercerization, Pleating / Fluting, Napping, Bleaching, Dyeing, Printing (Roller & Screen)

Module III :Linen

Classification of Linen
Items Classified As Bed and Bath Linen, Their Sizes
Items Classified As Table Linen, Their Sizes
Materials Used For Making Fabric & Their Classification
Selection Criteria for the Linen Items (Bed Sheets Pillowcases, Towels and Bath Mats, Table Cloths, Serviettes)
Selection Criteria & Calculating Material Required for Soft Furnishings (Curtains, Bedspreads, Upholstery & Cushions)

Module IV :Linen Room

Activities of Linen Room
Location, Equipment & Layout of a Linen Room (Basic Rules)
Purchase of Linen / Linen Hire / Quality & Quantity
Storage & inspection
Issuing of Linen to Floors & Departments (Procedure & Records)
Dispatch & Delivery from Laundry (Procedure & Records)
Stock Taking - Procedure & Records
Condemned Linen & Cut-Down-Procedure and Records
Marking & Monogramming

Module V :Uniforms & Uniform Room

Purpose of Uniforms
Number of Sets, Issuing Procedure & Exchange of Uniforms

Designing A Uniform - Functional Aesthetic Considerations
Layout & Planning of the Uniform Room (Basic Considerations)

Module VI :Sewing Room

Equipments in a sewing room
Functions carried out in a sewing room

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

FOOD SAFETY & HYGIENE

Course Code: HMC2305 **Credit Units: 01**

Course Objective:
At the end of the semester the students will be able to –

Explain the Significance of safety, hygiene & sanitation in the catering industry
Classify Microbes, their action on food
Control of Microbes & their Contamination
Methods of Food storage, Cleaning procedures&Waste disposal
Role of Management in Food Safety & Hygiene

Module I :Introduction

1.1 Significance of safety, hygiene & sanitation in the catering industry

Module II :Classification of microbes

2.1 Bacteria- classification, growth & multiplication of
2.2 Microbes

Module III :Food contamination & spoilage

3.1 Food spoilage, infection & poisoning
3.2 Source, means of spread & control measures of various food poisoning bacteria
3.3 Naturally occurring toxicants, toxic metals & chemicals

Module IV :Hygiene system & sanitary procedures in hospitality industry

4.1 Importance of sanitary procedures
4.2 Commodity hygiene
4.3 Work area hygiene
4.4 Equipment hygiene
4.5 Personal hygiene
4.6 Basic rules to be observed during preparation cooking & holding food

Module V :Food storage

5.1 General guidelines for food storage
5.2 Storage for specific food- meat, poultry, egg, seafood, dairy products & vegetables

Module VI :Cleaning procedures

6.1 Necessity for an efficient cleaning programme
6.2 Types of cleaning agent, their functions, advantages & disadvantages
6.3 Sanitising- good sanitizer & its properties
6.4 Disinfectants, antiseptic
6.5 Methods of cleaning & sanitising- 3 bucket method, sink method, dishwashing machine method

Module VII :Waste disposal

7.1 Difference between garbage & refuse
7.2 Methods of disposal of solid & liquid waste

Module VIII :Management & sanitation

8.1 Reasons for training programme
8.2 Advantages of the programme
8.3 HACCP – use in catering industry

Module IX :Safety &Sanitation Regulation & Standards

9.1 COSHH
9.2 Health & safety at work regulations
9.3 Food hygiene regulation (amendments) 1990/1991

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Food & Beverage Laws : Food Safety & Hygiene by J. Negi
- Food Safety Fundamentals: Essentials of Food Safety and Sanitation by McSwane
- Food Hygiene - Raday

References:

- Personal Hygiene in Food Service by Resolutions Multimedia Group Incorporated

FUNDAMENTALS OF ACCOUNTING-II

Course Code: HMC2306 **Credit Units: 02**

Course Objective:
At the end of the semester students will be able to
- The concept of double entry book keeping system
- Reconcile the bank statement
- Check the accuracy of accounts
- Prepare trial balance / P&L A/c and balance sheet concept
- The hospitality revenue and non revenue producing departmental accounting system
- The for casting of expense and revenue
- The concept of budgeting
- The hotel departmental accounting system.

Course Contents:

Module I
Cash Book, Meaning, Advantages, Simple, Double and Three Column Petty Cash book with imprest system (simple and tabular forms) , Practical

Module II: Final Accounts
Meaning, Procedure for preparation of final accounts , Difference between Trading Accounts, Profit & Loss Accounts & Balance Sheet

Module III: Adjustments
Closing Stock, Prepaid expenses, Outstanding expenses, Depreciation

Module IV: Capital and Revenue Expenditure
Meaning, Definition of Capital and Revenue Expenditure,

Module V: Depreciation
Meaning of Depreciation, Need and Causes, Straight line method, Diminishing Balance method, Practical

Module VI: Ratio Analysis
Importance of Ratios
- Liquidity Ratios, Current ratio, Quick ratio, **Solvency Ratios,** Debt equity ratio, Interest coverage ratio

Activity Ratio, Capital turnover ratio, Stock turnover ratio, Debtors turnover ratio, **Profitability Ratios**
- Gross profit ratio, Net profit ratio.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Element of Hotel Accounting by Dr. J.M Negi, HKS International
- Finance & Cost Control- Techniques in the Hotel & Catering Industry by Dr. J.M Negi, Metropolita Publication, New Delhi
- Management Accounting by Dr. Hingorani & Prof. Ramanathan, Sultan Chand & Sons
- Hotel Management – Accounting & Control by Jagmohan Negi, Himnalayan Publishing House, New Delhi.

References:

- Management Accounting & Financial Control by Dr. S.N Maheshwari, Sultan Chand & Sons
- Understanding Hospitality Accounting by Raymond Cote, EI-AH&LA USA
- Financial Accounting by G.C Maheshwari, NCERT, N. Delhi
- Fundamentals of Hotel Accounting by G.S. Rawat & Dr. J.M Negi.

HOTEL ENGINEERING

Course Code: HMC2307 **Credit Units: 01**

Course Objective:
At the end of the semester students will be able to understand and explain-
- Importance of maintenance & engineering in Hospitality Industry.
- The effective management of energy in the hospitality sector.
- Duties and responsibilities of a chief engineer.
- Organization of maintenance & engineering department in a hotel.
- The safety, security & hygiene procedure in the hospitality industry.
- Maintenance procedure in the hotel

Course Contents:

Module I: Maintenance
1.1 Introduction& Scope in Hotels
1.2 Roll & Importance of maintenance department in the hotel industry with emphasis on its relation with other departments of the hotel.
1.3 Organization Structure of maintenance department, duties and responsibilities of maintenance department staffs
1.4 Classification and Types Preventive and Breakdown Maintenance - comparisons Maintenance Programmes

Module II:Fuels Used in Catering Industry
2.1 Types of fuel used in catering industry,Calorific Value, comparative study of different fuels
2.2 Calculation of amount of fuel required and cost.
2.3 Heat terms and units, method of transfer
2.4 Precautions while using them

Module III:Gas
3.1 LPG and its properties, principles of Bunsen and burner, precautions to be taken while handling gas, low and high-pressure burners, corresponding heat output.
3.2 Gas bank, location, different types of manifolds

Module VI:Electricity
4.1 Fundamentals of electricity,
4.2 Conductors, Insulators – properties and application
4.3 Current, Potential Difference Resistance, Power, Energy Concepts – definitions, their units and relationships, simple conversation.
4.4 AC and DC - their differences, advantages and disadvantages
4.5 Single Phase and Three Phase,
4.6 Electric Circuits, Open Circuits and Close Circuits, Symbols of Circuit Elements, Series and Parallel Connections, Short Circuit, Fuses; MCB,
4.7 Earthing (Grounding) – importance
4.8 Electric Wires and types of wiring system – fittingsand accessories
4.9 Lighting – Different types of Lighting Devices, External Lighting
4.10 Use of Thermostat in electrical equipments.
4.11 Calculation of Power Requirements, Meter Reading and Bill Calculations.

4.12 Safety Precaution to be observed while using electric appliances – reason for placing switches on live wire side. Maintenance of electrical equipment.

Module V:Water Systems Management

5.1 Sources of Water and its quality
5.2 Hardness of Water, Water Softening, Base Exchange Method
5.3 Water distribution system in a hotel, calculations of water requirements and capacity of storage, systems.Water control Taps, Bibcock and Stopcock.
5.4 Flushing system, Construction and working of various types of flushing cisterns
5.5 Swimming Pools
5.6 Hot Water Supply System in Hotels
5.7 Traps,Function of Waste Pipe and Anti-Siphon Pipe. Closets& Bidets
5.8 Inspection Chambers, Sewer Blockings, Leakages and their remedies.

Module VI: Waste Disposal and Pollution Control

6.1 Solid and Liquid Waste, Sullage and Sewage, Disposal of Solid Waste
6.2 Sewage Treatment
6.3 Pollution related to hotel industry
6.4 Water Pollution, Sewage pollution
6.5 Air Pollution, Noise Pollution, Thermal Pollution
6.6 Legal requirements

Module VII: Refrigeration & Air-Conditioning:

7.1 Basic principles, Latent Heat, Boiling Point and its Dependence on pressure, Vapour Compressor, System of refrigeration and refrigerants.
7.2 Conditions for comfort, relatives humidity, humidification, de-humidifying, due point control, unit of air Conditioning
7.3 Window type air conditioner, central air conditioning, preventive maintenance
7.4 Layout of AC Plant.

Module VIII: Safety & Security

8.1 Factors involved in Safety & Security
8.2 Accident prevention
8.3 Security Devices

Module IX: Fire Prevention and Fire Fighting System

9.1 Classes of fire, methods of extinguishing fires
9.2 fire extinguishes, portable and stationery
9.3 Fire detectors and alarm
9.4 Rules to be followed in case of Fire hazards.

Module X:Audio Visual Equipments & Communication Devices

10.1Various audio visual equipment used in hotel & their working principles - public address system, Telephone & Intercom system, Music system, Television system

Module XI: Equipments used in Hospitality Industry

11.1 Food Production Equipment
11.2 Food Service Equipment
11.3 Housekeeping Equipment
11.4 Selection &Economic factors
11.5 Care & Cleaning
11.6 Preventive Maintenance, Electrical & Plumbing considerations

Module XII: Equipment Replacement Policy

12.1 Circumstances under which equipment are replaced
12.2 Replacement policy of items which gradually deteriorates
12.3 Replacement when the average annual cost is minimum
12.4 Replacement when the present cost is minimum
12.5 Economic replacement cycle for suddenly failing equipment

Module XIII: Contract Maintenance

13.1 Necessity of contract maintenance advantages and disadvantages of Contract maintenance
13.2 Essential requirements of a contract, types of contract their comparative Advantages and disadvantages
13.3 Procedure for inviting and processing tenders, negotiating and finalizing

Examination Scheme:

Components	**V**	**HA**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Energy Management by Robert E. Aulbach, Ei-AH&LA, USA.
- Maintenance & Engineering for Lodging & Food Service by Frank D. Borsenik Ei-AH&LA, USA

References:

- Industrial Safety Management by Tarafadar Dhanpat Rai & Company, Delhi
- Hotel Quality Maintenance by Robert Aridel
- Hospitality Facilities Management and Design - David M. Stipanuk & Harold Roffman
- Hotel Maintenance and Building Services - N. C. Goyal
- Hotel Maintenance Manual - Management of Maintenance and Engineering Systems in The Hospitality Industry - Frank D. Borsenik, Alan T. Stutts
- Text Book of Hotel Maintenance - Goyal

FOOD PRODUCTION OPERATIONS LAB-I

Course Code: HMC2308 **Credit Units: 03**

Cookery

- Preparing Indian Masalas & Gravies
- Preparing & Cooking Indian Vegetables
- Preparing Rice, Dal, Breads
- Preparing Indian& continental Menus
- Preparing for Indian & Continental Desserts

Patisserie

- Different methods & Types Cake making
- Icing – Types & Applications

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	**JE**	**VV**	**INDENT**	**LE**
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published, Frank Bros &Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan

FOOD & BEVERAGE SERVICE OPERATIONS LAB-I

Course Code: HMC2309 **Credit Units: 02**

- Service of spirits and liqueurs
- Bar setup and operations
- Cocktail and Mocktail preparations, presentation and service
- Service of Cigars and cigarettes
- Service of Afternoon and High Teas
- Cocktail Parties

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE OPERATION LAB-II

Course Code: HMC2310 **Credit Units: 01**

- Handling Telephones
- Taking Reservations
- Processing Reservations
- Role Play – Check-in / Walk-in / FIT / GIT / VIP / CIP / HG etc.
- Mock Situations – Role – Plays
- Filling up of C – Forms
- Preparation & Filling up of Guest Registration Card

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSEKEEPING OPERATION LAB-II

Course Code: HMC2311 **Credit Units: 01**

- Identification of Fibre & Fabrics
- Test of Fibre & Fabrics
- Sewing & Stitching

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

Syllabus - Fourth Semester

FOOD PRODUCTION OPERATIONS-II

Course Code: HMC2401 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Quantity Food Production
- Menu Planning
- Regional Indian Cuisine
- Frozen Desserts
- Sugar Cookery
- Chocolate Confectionary

Module I: Quantity Food Production- Equipment

Equipment required for mass/volume feeding
Heat and cold generating equipment
Care and maintenance of these equipments
Modern development in equipment manufacture

Module II: Menu Planning

Basic principles of menu planning – recapitulation
Points to consider in menu planning for various volume feeding outlets such as Industrial, Institutional, Mobile Catering Units
Planning menus for;

1. School/college students
2. Industrial workers
3. Hospitals
4. Outdoor parties
5. Theme dinners
6. Transport facilities, cruise lines, airlines, railway

Nutrition factors for the above

Module III: Indenting

Principles of indenting for volume feeding
Portion sizes of various items for different types of volume feeding
Modifying recipes for indenting for large scale catering
Practical difficulties while indenting for volume feeding

Module IV: Planning

Principles of planning for quantity food production with regard to

- Space allocation
- Equipment selection
- Staffing

Module V: Volume Feeding

Institutional and Industrial Catering

- Types of Institutional & Industrial Catering
- Problems associated with this type of catering

- Scope of development and growth

Hospital Catering

- Highlights of hospital catering for patients, staff, visitors
- Diet menus and nutritional requirements

Off Premises Catering

- Reasons for growth and development
- Menu planning and theme parties
- Concept of a Central Production Unit
- Problems associated with off-premises catering

Mobile Catering

- Characteristics of Rail, Airline (Flight Kitchen) and Sea Catering.
- Branches of Mobile Catering

Quantity Purchase & Storage

- Introduction of purchasing
- Purchasing system
- Purchasing specifications
- Purchasing techniques
- Storage

Module VI: Regional Indian Cuisine

Introduction to Regional Indian Cuisine
Heritage of Indian Cuisine
Cuisine and its highlights of different states/region/ communities to be discussed under:

- Geographic location
- Seasonal availability
- Special equipment
- Staple diets
- Specialty cuisine for festivals and special occasions

States - Andhra Pradesh, Bengal, Goa, Gujarat, Karnataka, Kashmir, Kerala, Madhya Pradesh, Maharashtra, North-Eastern States, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh/Uttranchal

Communities- Parsee, Chettinad, Hyderabadi, Lucknowi (Avadhi), Malabari / Syrian, Christian and Bohri

Discussions- Indian Breads, Indian Sweets, Indian Snacks.

Patisserie

Module VII : Frozen Desserts : ingredients; Types

Sherbets,
Ice-creams

Module VIII :Sugar Cookery

Manufacturing, Syrups, Types, Stages of Cooking With Temperatures

Module IX :Chocolate Confectionary

Origin of Chocolate, Manufacturing, Tempering, Types, Usage

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

FOOD & BEVERAGE SERVICE OPERATIONS-II

Course Code: HMC2402 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Guéridon Service
- Banquets
- Bar Operations

Module I:Guéridon Service
- Types of Trolleys
- Sequence of Service

Module II:Banquets
- History of Banquets
- Types of Banquets
- Organization of Banquet Section
- Banquet Procedures
- Buffets
- Banquet Protocols
- Conferences

Module III :Bar Operations
- Bar Set Up
- Equipment
- Bar Control
- Cocktails

Examination Scheme:

Components	**V**	**H**	**CT1**	**A**	**EE1**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:
- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Phullar
- Professional Table Service by Dennis Lillicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE MANAGEMENT-I

Course Code: HMC2403 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Checkout & Settlement
- Front office Accounting Systems
- Night Audit
- Hotel / Front office Security System
- Property Management Systems

Module I :Checkout & Settlement
- Procedures at Reception, Cash Section, Bell Desk
- Express Check-Out & Self Check-Out
- Reduction of Late Charges
- Effective Billing & Collection

Module II: Front office Accounting Systems
- Accounting Fundamentals
- Creation & Maintenance of Accounts
- Audits & internal Control
- Settlement of Accounts
- Cash Control
- Credit Control

Module III: Night Audit
- Night Audit Process
- Function of Night Auditor
- Night Audit Reports

Module IV: Hotel / Front office Security System
- Methods
- Equipment Used
- Card Key Control
- Emergency Procedures
- Management's Role in Security

Module V:Property Management Systems
- Reservation Management Software
- Room Management Software
- Guest Account Management Software
- General Management Software

Examination Scheme:

Components	A	JE	P	CT	EE
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project: JE-Journal Evaluation

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSEKEEPING MANAGEMENT-I

Course Code: HMC2404 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Laundry Operation
- Contract Cleaning
- Flower Arrangement

Module I : Laundry Operation
- Duties & Responsibilities of Laundry Staff (Laundry Manager and Shift-In-Leader, Dry Cleaning, Supervisor, Spotter cum Presser, Laundry Clerk, Attendants Valet Runner, Laundry)
- Importance and Principles of Laundry Operations
- Flow Process of industrial Laundering [Collection, Transportation Arrivals, Sorting, Weighing, Loading, Washing, Rinsing, Starching, Hydro-Extraction, Drying, Unloading, Tumbling, Finishing (Calender / Steam Press) Folding, & Storing Transfer & Use]
- Stages in Wash Cycle (Flush-Suds-Bleach Rinse-Sour & Soft-Extract, Break & Soaking)
- Equipment, Layout & Planning & Laundry (Basic Rules)
- Role of Laundry Agents
- Classification of Laundry Agents (Synthetic, Detergent, Built Soap Detergents, Enzyme Action-Detergents, Explain Briefly)
- Stain Removal

Module II :Contract Cleaning
- Types of Contract Cleaning
- Methods of Pricing of Contract Cleaning
- Advantages and Disadvantages of Contract Cleaning
- Eco-Friendly Process

Module III :Flower Arrangement
- Purpose of Flower Arrangement, Placement & Level of Placement
- With Relevant Examples
- Equipment & Materials Required
- Conditioning of Plant Material
- Styles of Flower Arrangement (Western, Japanese, Free-Style & Abstract)
- Principle of Flower Arrangement (Design, Scale, Balance, Focal Point, Rhythm, Texture, Repetition, Unity & Harmony)

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

HOTEL INFORMATION SYSTEM

Course Code: HMC2405 **Credit Units: 01**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Management Information System (MIS)
- Role of Hotel Information System
- Various interfaces used in Hospitality Industry

Module I :Management Information System (MIS)
- Concepts, evaluation & meaning
- MIS Designs and functions
- Managing multi processor environments.
- MIS Security issues
- MIS performance evaluation

Module II : Hotel Information System
- The HIS Concept
- Software Modules
  - Reservation
  - Guest Accounting
  - Room Management
  - Point of Sales
  - General Management

Module III : Computer Based Reservation System
- Global Distribution System
- Inter sell agencies
- Central Reservation Systems(CRS)
- Affiliate and Non Affiliate Systems
- Property Level Reservation Systems
  - Reservation Inquiry
  - Determination of Availability
  - Creation of Reservation Record
  - Maintenance of Reservation Records
- Generation of reports.
- New Developments Reservation through the Internet

Module IV : Rooms Management Applications
- Rooms Management Module
  - Room Status
  - Room and Rate Assignment
  - In House guest Information Functions
  - Housekeeping Functions
- Generation of Reports

Module V : Guest Accounting Module

- Types of Accounts
- Posting entries to Accounts
- Night audit routine
- Account settlement
- Generation of reports

Module VI : Property Management System Interfaces

- Point of sale Systems (POS)
- Cash Accounting Systems (CAS)
- CAS / PMS Advantages and concerns.
- Electronic Locking Systems.
- Energy Management Systems.
- Auxiliary Guest Services
- Guest Operated Devices in room Vending Systems
- Guest Information Systems

Module VII : Food & Beverage Applications

- POS order - Entry units
- Key Boards and Monitors
- Touch Screen Terminals
- Immediate Character Recognition (ICR) Terminal.
- Wireless Terminals
- POSD Printers.
- Guest check Printers
- Receipt Printers
- Workstation Printers
- Consolidated reports

Module VIII : Food & Beverage Management Applications

- Recipe Management
- Sales Analysis.
- Menu Management Integrated Food Service Software
- Management Reports from Automated Beverage Systems

Module IX : Accounting Applications

- Account Receivable Module
- Account Payable Module
- Payroll Module
- Inventory Module
- Purchasing Module
- Financial Reporting Module

Module X : Selecting And Implementing Computer Systems

- Analyzing Current Information Needs
- Collection Information of Computer Systems
- Establishing System Requirements
- Proposals from Vendors

- Contract Negotiations
- Installation Factors

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Management Information System James A O' Brien
- Management Information System 2nd Ed Gordon B Davis

PRINCIPLES OF MANAGEMENT

Course Code: HMC2406 **Credit Units: 01**

Course Objective: To make students understand management concepts and their application in the field of tourism industry.

Course Contents:

Module1: Introduction to Management

- Concept, Nature, Functions, Process, Traits of a Successful Manager and Managerial Role.
- Management and Society: Business Ethics and Social Responsibilities

Module 2: Planning

- Nature, Purpose, Types and Process of Planning.

Module 3: Organizing

- Concept of Organizing and Organization. Line & Staff, Span of Control.
- Delegation, Decentralization Organization Structure.

Module 4: Directing

- Communication-Process and Types of Communication, Barriers and Principles of Effective Communication
- Motivation: Meaning, Theories, Maslow and Herzberg, Leadership
- Co-Ordination: Meaning, Definition, Principles of Co-Ordination, Techniques of Effective Co-Ordination.

Module 5: Leadership

- Concept, Qualities of a Successful Leader: Factors Influencing Performance of Leaders. Styles of Leadership, Management Grid.
- Controlling: Process. Methods and Techniques

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

- Stoner. Jeen (2005), Management. Prentice Hall, New Delhi
- R.K. Singla,(2007) Business Management, V.K. publication, new Delhi.
- D.K.Goyal,(2008), Business Management, Arya publication
- Prasad. L.M.(2007), Principles and Practice of Management, Sultan Chand and Sons, New Delhi
- Banerjee, S. (2006), Principles and Practice of Management, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi

ECONOMICS OF HOSPITALITY

Course Code: HMC2407 **Credit Units: 01**

Course Objective:
At the end of the semester students would be able to:-
It intends to help the students in understanding the nature of Indian Economy in general & economic planning for tourism & hospitality in general.
It will further help them to understand the basic mechanism of pricing of products in different sector of economy with a special focus on product formulation, packaging & pricing of tourist & hospitality product.

Course Contents:

Module I
- Meaning of Economics

Module II
- Relevance of Economics in Hospitality and Tourism Industry

Module III
- Meaning of Demand

Module IV
- Demand Curve Analysis

Module V
- Factors Affecting Demand

Module VI
- Concept of inflation and types of inflation

Module VII
- Demand and methods of Forecasting

Module VIII
- GDP (Gross Domestic Product) & GNP (Gross National Product)

Module IX
- Fiscal Policy and its Feature and Mechanism

Module X
- Monetary Policy and its functions

Module XI
- Economic Growth and Economic Development, Growth Patterns of Indian Economy

Module XII
- Market Structure and Hospitality and Tourism Industry

Module XIII

- A small capsule on WTO and its implications on Hospitality and Tourism Industry has also been included.

Examination Scheme:

Components	**C**	**HA**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Tourism Economics by Mathieson Alistor & Wall Gerllliej, Physical & Social Impacts.
- The Economics, Travel & Tourism by Anil Andirous, Lengman Cheshues, Melbourne.
- International Travel & Tourism- Principles & Concepts by Dr. JM Negi, S. Chand & Co, New Delhi

References:

- Managerial Economics by Mote Lal & Gupta, Tata McGraw Hill, New Delhi
- Fundamentals of Economic Balances
- Indian Economy by AN Aggarwal
- Indian Economy by Dutta & Sundram
- Indian Economy by Saradesai.

FOOD PRODUCTION OPERATIONS LAB-II

Course Code: HMC2408 **Credit Units: 04**

Cookery

- To formulate different sets of menus from the following regions and to include more dishes from the respective regions. The practical class will be conducted preferably by demonstrative method.
    - Awadh
    - Bengal
    - Goa
    - Gujarat
    - Hyderabad
    - Kashmiri
    - Maharashtra
    - Punjabi
    - Rajasthan
    - South India (Tamil Nadu, Karnataka, Kerala).

Patisserie

- Preparation & Application of Cream, Filling & Custards & Their uses
- Sugar Products
- Chocolate Confectionery

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	**JE**	**VV**	**INDENT**	**LE**
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published, Frank Bros &Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan

FOOD & BEVERAGE SERVICE OPERATIONS LAB-II

Course Code: HMC2409 **Credit Units: 02**

- Buffet Lay-ups, theme Buffet setups
- Restaurant setups of different types
- Service of Cheese
- Preparation of Flambé dishes

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE MANAGEMENT LAB

Course Code: HMC2410 **Credit Units: 01**

- Preparation & Study of Countries – Capitals & Currency, Airlines, Flag Charts, Credit Cards, Travel Agency etc.
- Telecommunication Skills
- Preparation of Guest Folio
- Guest Complaint Handling
- Preparation of Guest History Cards

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSEKEEPING MANAGEMENT LAB

Course Code: HMC2411 **Credit Units: 01**

- Laundry Operations
- Washing & Finishing of various Fibres & Fabrics
- Stain Removal

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
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- Housekeeping Management by Keppa Margret M
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Syllabus - Fifth Semester

FOOD PRODUCTION TRAINING REPORT

Course Code: HMC2501 **Credit Units: 05**

Course Objective:

At the end of the industrial training the student would be able to;
(i) Explain the organizational structure of the department
(ii) Describe job description of various job titles, work schedules, opening & closing duties.
(iii) Explain various sections and their functions
(iv) Observe personal hygiene, kitchen hygiene and sanitation
(v) Identify forms/formats, records and registers maintained
(vi) Help in preparation of various dishes, garnish and service
(vii) Observe food production standards of finished products

On completion of the project the student will be required to submit the following:

Project File or Industrial workflow log book - The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include:
- A short account of the activities that were undertaken as part of the training;
- A statement about the extent to which the training has achieved its stated goals.
- A statement about the outcomes of the learning, evaluation and dissemination processes engaged in as part of the training;
- Any activities planned but not yet completed as part of the training, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Training Report
The report should be submitted in duplicate (2 copies) spiral bound and a CD and should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Department Name; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements**

Acknowledgment to any advisory received in the course of work may be given.

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Suggestions**

In writing these section, emphasis should be given on what has been performed and achieved in the course of the work and any ideas/suggestions they feel will can be implemented, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Appendices**

The Appendix contains material which is of interest to the reader ,and may include any forms, formats and any problem that have arisen that may be useful to document for future reference.

- **Performance Appraisal & Completion Certificate** duly signed and stamped

Examination Scheme:

Project Report:	50
Log book + Attendance + Appraisal	20
Presentation & Viva Voce:	30
Total:	**100**

FOOD & BEVERAGE SERVICE TRAINING REPORT

Course Code: HMC2502 **Credit Units: 05**

Course Objective:
At the end of the industrial training the student would be able to:
(i) explain staff organization
(ii) do layout
(iii) list all equipments used (including crockery, cutlery, glassware etc) and use of these equipment
(iv) describe and explain the menu and bar card
(v) perform task for table reservation & receiving the guest
(vi) lay the table, placing the order and pick-up, service and clearance procedure
(vii) list all bar equipments
(viii) take and serve orders of different beverages, cigars and cigarettes.

On completion of the project the student will be required to submit the following:

Project File or Industrial workflow log book - The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include:
- A short account of the activities that were undertaken as part of the training;
- A statement about the extent to which the training has achieved its stated goals.
- A statement about the outcomes of the learning, evaluation and dissemination processes engaged in as part of the training;
- Any activities planned but not yet completed as part of the training, or as a future initiative directly resulting from the project;
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This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Suggestions**

In writing these section, emphasis should be given on what has been performed and achieved in the course of the work and any ideas/suggestions they feel will can be implemented, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Appendices**

The Appendix contains material which is of interest to the reader ,and may include any forms, formats and any problem that have arisen that may be useful to document for future reference.

- **Performance Appraisal & Completion Certificate** duly signed and stamped

Examination Scheme:

Project Report:	50
Log book + Attendance + Appraisal	20
Presentation & Viva Voce:	30
Total:	**100**

FRONT OFFICE MANAGEMENT TRAINING REPORT

Course Code: HMC2503 **Credit Units: 05**

Course Objective:
At the end of the industrial training the student would be able to:
(i) understand and explain the organization structure
(ii) prepare job descriptions of various job titles at front office
(iii) understand various procedures & functions followed for:-
1. reservations
2. reception & information
3. bell desk
4. bills and cash
5. guest relations
6. night auditing

(iv) maintain various records & registers and understand their uses.

On completion of the project the student will be required to submit the following:

Project File or Industrial workflow log book - The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include:
- A short account of the activities that were undertaken as part of the training;
- A statement about the extent to which the training has achieved its stated goals.
- A statement about the outcomes of the learning, evaluation and dissemination processes engaged in as part of the training;
- Any activities planned but not yet completed as part of the training, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Training Report
The report should be submitted in duplicate (2 copies) spiral bound and a CD and should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Department Name; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements**

Acknowledgment to any advisory received in the course of work may be given.

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Suggestions**

In writing these section, emphasis should be given on what has been performed and achieved in the course of the work and any ideas/suggestions they feel will can be implemented, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis.

- **Conclusion**

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- **Appendices**

The Appendix contains material which is of interest to the reader ,and may include any forms, formats and any problem that have arisen that may be useful to document for future reference.

- **Performance Appraisal & Completion Certificate** duly signed and stamped

Examination Scheme:

Project Report:	50
Log book + Attendance + Appraisal	20
Presentation & Viva Voce:	30
Total:	**100**

HOUSEKEEPING MANAGEMENT TRAINING REPORT

Course Code: HMC2504 **Credit Units: 05**

Course Objective:
At the end of the industrial training the student would be able to:
i) understand and explain the organization structure and various sections of the department
ii) perform duties and responsibilities of the executives and non-executives of the department
iii) describe the functions of various sections
iv) explain the duties of room attendant and houseman in different shifts
v) maintain various records and registers
vi) demonstrate and follow procedures for:
   a) cleaning of room and bathroom
   b) lost and found items
   c) exchange of linen
   d) cleaning of various surfaces
   e) pest control
   f) flower arrangement procedures

On completion of the project the student will be required to submit the following:

Project File or Industrial workflow log book - The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include:
- A short account of the activities that were undertaken as part of the training;
- A statement about the extent to which the training has achieved its stated goals.
- A statement about the outcomes of the learning, evaluation and dissemination processes engaged in as part of the training;
- Any activities planned but not yet completed as part of the training, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Training Report
The report should be submitted in duplicate (2 copies) spiral bound and a CD and should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Department Name; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements**

Acknowledgment to any advisory received in the course of work may be given.

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Suggestions**

In writing these section, emphasis should be given on what has been performed and achieved in the course of the work and any ideas/suggestions they feel will can be implemented, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Appendices**

The Appendix contains material which is of interest to the reader ,and may include any forms, formats and any problem that have arisen that may be useful to document for future reference.

- **Performance Appraisal & Completion Certificate** duly signed and stamped

Examination Scheme:

Project Report:	50
Log book + Attendance + Appraisal	20
Presentation & Viva Voce:	30
Total:	**100**

Syllabus - Sixth Semester

ADVANCED FOOD PRODUCTION OPERATIONS-I

Course Code: HMC2601 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Larder and its activities
- Chaud Froid, Aspic & Jelly
- Charcuterie, Ham, Bacon & Gammon, Forcemeats, Galantines, Pates, Terrine, Mouse & Mousseline, Quenelles, Parfaits, Roulades, Brines, Cures & Marinades
- Non edible Displays

Module I: Larder

Layout & Equipment
- Introduction of Larder Work
- Definition
- Equipment found in the larder
- Layout of typical larder with equipment and various sections

Terms & Larder Control
- Common terms used in the Larder and Larder Control
- Essentials of Larder Control
- Importance of larder Control
- Devising Larder Control Systems
- Liasoning with Other Departments
- Yield Testing

Duties & Responsibilities of the Larder Chef
- Functions of the Larder
- Hierarchy of larder Staff
- Sections of the Larder
- Duties and responsibilities of larder Chef.

Module II: Charcuterie
- Introduction to charcuterie
- Sausage – Types & Varieties
- Casings – Types & Varieties
- Fillings – Types & Varieties
- Additives & Preservatives

Module III :Forcemeats
- Types of forcemeats
- Preparation of forcemeats
- Uses of forcemeats

Module IV :Brines, Cures & Marinades

- Types of Brines
- Preparation of Brines
- Methods of Curing
- Types of marinades
- Uses of Marinades
- Difference between Brines, Cures & Marinades

Module V :Ham, Bacon & Gammon

- Cuts of Ham, Bacon & Gammon
- Differences between Ham, Bacon & Gammon
- Processing of Ham & Bacon
- Green Bacon
- Uses of the different cuts

Module VI :Galantines

- Making of Galantines
- Types of Galantine
- Ballotines

Module VII: Pate& Terrine

- Types of Pate
- Pate de foie gras
- Making of Pate
- Commercial pate and Pate Maison
- Truffle – sources, cultivation and uses of types of truffle

Module VIII: Mouse & Mousseline

- Types of mousse
- Preparation of mousse
- Preparation of mousseline
- Difference between mousse and mousseline

Module IX : Chaud Froid

- Meaning of chaud froid
- Making of chaud froid & precautions
- Types of chaud froid
- Uses of chaud froid

Module X :Aspic & Jelly

- Definition of aspic and jelly
- Difference between the two
- Making of aspic and Jelly
- Uses of aspic and Jelly

Module XI:Quenelles, Parfaits, Roulades

- Preparation of Quenelles, Parfaits and roulades

Module XII :Non edible Displays

- Ice carvings
- Tallow sculpture
- Fruit & vegetable displays
- Salt dough
- Pastillage
- Jelly Logo
- Thermocol work.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

ADVANCED FOOD & BEVERAGE SERVICE OPERATIONS-I

Course Code: HMC2602 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Restaurant Planning & Layout
- Menu Planning
- Manpower Planning

Module I :Restaurant Planning & Layout
- Choosing of Location
- Layout Planning
- Décor
- Furnishing, Fixtures & Fittings
- Equipment Selection

Module II :Menu Planning
- Objectives & Procedures
- Menu Planning Considerations &Constrains
- Menu Designing
- Menu Merchandising

Module III :Manpower Planning
- Job Description
- Job Specification
- Recruitment
- Induction & Training

Examination Scheme:

Components	**V**	**H**	**CT1**	**A**	**EE1**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:
- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Phullar
- Professional Table Service by Dennis Lillicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE MANAGEMENT-II

Course Code: HMC2603 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Establishing Room Rates
- Forecasting Room Availability
- Budgeting for Operations
- Evaluating Front office Operations

Module I :Establishing Room Rates
- Market Condition Approach
- Rule-of-Thumb Approach
- Hubbart Formula

Module II :Forecasting Room Availability
- Forecasting Data
- Percentage of No-Shows
- Percentage of Walk-Ins
- Percentage of Over-stays
- Percentage of Under-stays
- ARR (Average Room Rate)
- RevPAR (Revenue Per Available Room)
- Forecast Formula
- Room Count Considerations

Module III :Budgeting for Operations
- Forecasting Rooms Revenue
- Estimating Expenses

Module IV :Evaluating Front office Operations
- Daily Operations Report
- Occupancy Ratios
- Rooms Revenue Analysis
- Operating Ratios
- Rooms Division income Statement & Budget Reports

Examination Scheme:

Components	**A**	**JE**	**P**	**CT**	**EE**
Weightage (%)	05	05	05	15	70

CT-class test; A-attendance; EE-end semester examination; P-project: JE-Journal Evaluation

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSEKEEPING MANAGEMENT-II

Course Code: HMC2604 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Interior Designing
- Interior Decoration
- Safety and Security

Module I :Interior Designing
- Objectives
- Elements
- Principles
- Planning Trends in Hotels

Module II :Interior Decoration
- Colours
- Lighting
- Furniture
- Floor Finishes
- Carpets
- Wall Coverings
- Windows
- Guestroom Accessories

Module III :Safety and Security
- Fire Prevention
- Accident Prevention
- First Aid
- Crime Prevention
- Dealing With Emergencies

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:
- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

INTRODUCTION TO TOURISM

Course Code: HMC2605 **Credit Units: 01**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Tourism Activities
- Marketing of Tourism Products
- Present scenario in our country
- Planning & Development activities
- Growth of Tourism in our country

Module I :Introduction to Tourism
- Origin, Growth & Development of Tourism
- Early History
- Development of Tourism
- Forms & Types of Tourism
- Classification of Tourism Accommodation & Consumer Groups
- Geographical Resources for Tourism
- Tourism Potential
- Various Tourist Attractions of India

Module II :Travel & Tourism Statistics
- Measurement of Tourism
- Categories of Tourist Statistics
- Methods of Measurement; Problems

Module III :The Organization of Tourism
- Need for Organization
- Factors Influencing Type of Organization
- Tourism Organization in India
- Travel Agency & Tour Operations

Module IV :Tourism Planning & Development
- Planning for Tourism; Coordination
- Tourist Demand & Supply
- Environmental Planning
- Carrying Capacity

Module V :Marketing Concepts And Strategies in Tourism
- Marketing in Travel & Tourism ; Special Features
- The Tourist Product
- Market Research
- Market Segmentation
- Tourist Marketing Mix
- Tourist Publicity - Methods; Brand Concept; Media

Module VI :Information Technology in Tourism
- Modern Media Techniques

- Networking
- Internet & Tourism Industry
- Computers in Air Cargo, Airlines, Hotels, Railways & Crs

Module VII: International Tourism Organizations

- WTO; PATA; IATA; ICAO; OECD; IOTO

Module VIII :Tourist Transport & Their Role in Growth of Tourism

- Modes of Transport - Road, Air, Rail, Sea
- Technological Advances

Module IX :Economic Dimensions of Tourism

- Economic Benefits
- Tourism Multiplier
- Infrastructural & Regional Development
- Employment Generation & Employment Multiplier
- International Understanding & Manila Declaration
- Socio - Economic Significance of Tourism

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	06	04	15	5	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry ii1 India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies,
- Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

HOSPITALITY MARKETING

Course Code: HMC2606 **Credit Units: 01**

Course Objective:
At the end of the semester the students will be able to understand the concept of –
- Marketing Hospitality Tourism Products
- Various tools of marketing
- Service Marketing Mix

Module I :Introduction to Marketing
- Marketing Concepts
- Functions of Marketing
- Importance of Marketing
- Difference between Marketing and Selling
- Related Application of Concept in Hotel Service Industry

Module II :Marketing Mix – 7P's of Marketing
- Product – Product Management, Development, Product Lifecycle and Branding
- Pricing – Factors Influencing Pricing, Methods of Price Fixation and Strategies
- Promotion – Promotion Mix and Tools,
- People – Encounters, Managing Tourism Experience Through People and Important
- Practices to Manage People
- Process – Elements, Managing Process, Developments in Service Processes in Tourism,
- Physical Evidence – Concept, Role & Components

Module III :Market Segmentation and Targeting
- Concept of Market Segmentation
- Procedure and Importance of Market Segmentation
- Market Targeting Process
- Product Positioning

Module IV :Marketing of Tourism & Hospitality Products
- The Tourism Destination
- Marketing Hotels
- Investment in Tourist Attractions
- Identifying Target Markets
- Classification of Visitor Segments
- Monitoring the Tourist Markets
- Organizing and Managing Tourism Marketing
- Marketing to Business and Leisure Travellers
- Marketing to of Hotels to Travel Agents

Module V :Destination Marketing
- Country, Regions, Cities
- Events and Activities
- Leisure Activities
- Accommodation Marketing
- Marketing Local Foods

Module VI :Designing of Marketing Mix for Specific situations

- Familiarization Tours
- Tourism Fairs
- During Off Season / On Season – For Hotels

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Case studies in marketing :the Indian Context - R. Srinivason
- Event Marketing & Management - Sanjaya Singh Gaur, Sanjay V Saggere,
- Hospitality Marketing - Phillip Kotler
- Marketing Hospitality: Sales & Marketing for Hotels Motels & Resorts - Dennis L. Foster TATA McGrawhill

References:

- Customer Service: Career Success Through Customer Loyalty, 5/e - Timm
- Hospitality Marketing in E-Commerce Age - Wearne
- Hospitality Marketing Management, 5th Ed - Robert D. Reid, David e Bojanic
- Hotel & Food Service Marketing - Francis ButtleCassell education ltd.
- Hotel Sales & Operation - Ahmed IsmailDelmar pub.
- Marketing for Tourism, 4/e - Holloway
- Marketing Hotel & Restaurant Into The 90's - Melvyn Grefne
- Marketing in Hospitality & Tourism - Richard Teare...[et al.] Cassell education ltd.

MANAGERIAL ACCOUNTING

Course Code: HMC2607 **Credit Units: 01**

Course Objective:
At the end of the semester the students would be able to-
- Understand the concept of managerial accounting
- Explain contents of income statement, balance sheet and departmental income statements and expense statement and solve practical problem
- Understand objectives, characteristics and implementations of internal control
- Distinguish between internal and statutory audit and views of internal audit

Course Contents:

Module I: Managerial Accounting
- Meaning of managerial accounting
- Functions of managerial accounting
- Utility of managerial accounting

Module II: Uniform System of Accounts for Hotels
- Introduction to Uniform system of accounts
- Contents of the Income Statement
- Practical Problems
- Contents of the Balance Sheet (under uniform system)
- Practical Problem
- Departmental Income Statements and Expense Statement (Schedules 1 to 16)
- Practical Problem

Module III: Internal Control
- Definition and objectives of Internal Control
- Characteristics of Internal Control
- Implementation and Review of Internal Control

Module IV: Internal Audit and Statutory Audit
- An introduction to Internal and Statutory Audit
- Distinction between Internal Audit and Statutory Audit
- Implementation and Review of Internal Audit

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Financial & Cost Control Techniques in Hotel & Catering Industry by JM Negi, Metropolitan, New Delhi
- Elements of Hotel Accountancy by Dr. JM Negi, Aman Publications New Delhi
- Hotel Management – Accounting & Control by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi

References:

- Basic Financial Accounting by Raymond Schmidgall
- Accounting for Hospitality Management by Andrew N Valdamir
- Fundamentals of Accounting by Raymond S Kolt
- An introduction to Accountancy by S N Maheshwari

ADVANCED FOOD PRODUCTION OPERATIONS LAB-I

Course Code: HMC2608 **Credit Units: 04**

Course Objective:
At the end of the semester students would be able to-
- learn about the technique of advance skill in food production
- develop concept of International cuisine

Course Contents:

Module I: Three course menus to be formulated featuring International Cuisines
- French.
- Oriental (Chinese and Thai)
- Italian
- Scandinavian
- British
- Spanish
- Demonstration
  - German Greece, Mexican, Mediterranean and Lebanese.

Module II: Demonstration of- Charcuterie
- Galantines
- Pate
- Terrines
- Mousselines

Module III: Bakery & Patisserie Practical-
- Decorated Cakes
- Gateaux
- International Breads
- Sorbets, Parfaits
- Hot / Cold Desserts

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	**JE**	**VV**	**INDENT**	**LE**
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce

Text & References:

Text:

- Theory of Catering by Kinton Cesroni, Hodder & Stoughton
- Practical Cookery by Kinton Cesroni, Hodder & Stoughton
- Theory of Cookery by K Arora, Frank Bros &Co. New Delhi

References:

- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement, Joana Lorrenz
- Essential of Cooking by James Peterson, Artisan

ADVANCED FOOD & BEVERAGE SERVICE OPERATIONS LAB-I

Course Code: HMC2609 **Credit Units: 02**

Course Objective:
At the end of the semester students will be able to-
- Prepare and give presentation on case studies on planning of F&B outlets
- Plan and supervise service of banquet, buffet, cocktails, gueridon service and setup bar for parties.

Course Contents:
Module I: Case Study on planning of
- Special Restaurant
- Room Service
- Coffee Shop
- Presentation.

Module II
- Case Study on Planning of Manpower of F&B department:-
- Presentation.

Module III
- Supervision of F&B Service in Training Restaurant.

Module IV
- Case Study of Planning Formal & Informal Banquet function including space requirement, Menu Planning.

Module V
- Setting up of various types of Buffet (Design, Layout).

Module VI
- Demonstration and Practice of Guerdon Service.

Module VII
- Case Study on setting up of Bar for parties.

Module VIII
- Demonstration and Practice of Making Cocktails.

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

FRONT OFFICE MANAGEMENT LAB-II

Course Code: HMC2610 **Credit Units: 02**

- Role Play – Lobby Manager, GRE, Concierge, Bell Boy, Bell Captain etc.
- Accommodation Management Related Calculations

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

HOUSEKEEPING MANAGEMENT LAB-II

Course Code: HMC2611 **Credit Units: 02**

- Flower Arrangement
- Theme Decoration

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality A: Attendance

Text & References:

Text:

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

Syllabus - Seventh Semester

ADVANCED FOOD PRODUCTION-II

Course Code: HMC2701 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop clear concept on -

- Modern Trend in Food Production
- Rechauffé Cookery
- Kitchen Planning, Layout and Design
- Quality Control & Standardization of Recipes
- Freezing Techniques
- Food Cost

Module – I :Modern Trend in Food Production Concept

- Frozen Foods
- Types
- Advantages & Disadvantages
- Handling Frozen Foods
- Defrosting Techniques

Module – II : Rechauffé Cookery

- Changes in Food Items
- Optimum Utilization

Module – III :Kitchen Planning, Layout and Design

- Principles of kitchen layout and design,
- Areas of various kitchens with recommended dimension,
- Factors that affect kitchen design,
- Placement of equipments,Flow of work,
- Space allocation,
- Layout of commercial kitchen (types, drawing a layout of a Commercial kitchen),
- Central Kitchen, Satellite Kitchen
- Planning of various supporting services (pot wash, wet grinding, chef room, larder, store and other staff facilities)

Module – IV :Quality Control & Standardization of Recipes

- Raw Materials
- Finished Goods
- Structure of Recipe

Module – V :Indenting

- Concept of indenting\
- Problems Related to indenting
- Storage System

Module – VI :Purchasing

- Receiving
- Ordering
- Movements of Goods
- Purchasing Techniques

Module – VII :Freezing Techniques

- Dry Storage
- Cold Rooms

Module – VIII :Food Cost

- Food Cost
- Food Cost Percentage
- Control Cycle
- Various Reports

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	06	04	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

ADVANCED FOOD & BEVERAGE SERVICE-II

Course Code: HMC2702 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop clear concept on -
- Cycles of Control
- Food Cost Control
- Budgets & Budgetary Control
- Liquor Control

Module – I :Cycles of Control
3.1 Purchasing
3.2 Receiving
3.3 Storing
3.4 Issuing
3.5 Preparation
3.6 Costing & Selling
3.7 Control

Module – II :Food Cost Control
4.1 Food Costing
4.2 Checks & Checking System
4.3 Standard Costing
4.4 Variance Analysis

Module – III :Budgets & Budgetary Control
5.1 Definition, Different Types of Budgeting
5.2 Different Steps of Preparing Different Budgets
5.3 Budgetary Control
5.4 Formats for Budgeting

Module – IV :Liquor Control
6.1 Purchase Procedures
6.2 Assessment of Quality
6.3 Stock Control
6.4 Beverage Sales Control

Examination Scheme:

Components	**V**	**H**	**CT1**	**A**	**EE1**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lillicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Phullar
- Professional Table Service by Dennis Lillicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

ADVANCED FRONT OFFICE MANAGEMENT

Course Code: HMC2703 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop clear concept on -
- Yield Management
- Human Relations Management

Module – I :Yield Management
- Concept of Yield Management
- Capacity Management
- Discount Allocation

Module – II :Measuring Yield
- Potential Average SGL / DBL Rate
- Multiple Occupancy Percentage
- Rate Spread
- Potential Average Rate
- Room Rate Achievement Factor
- Yield Statistic
- Equivalent Occupancy
- Required Non-Room Revenue Per Guest

Module – III :Elements of Yield Management
- Group Room Sales
- Transient Room Sales
- Food & Beverage Activity
- Special Events
- Using Yield Management

Module – IV :Human Relations Management

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:
- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill
- Front Office Training manual – Sudhir Andrews.
- Managing Front Office Operations – Kasavana & Brooks
- Front Office – operations and management – Ahmed Ismail (Thomson Delmar).
- Managing Computers in Hospitality Industry – Michael Kasavana & Cahell.
- Front Office Operations – Colin Dix & Chris Baird.
- Front Office Operations & Management – S. Bhatnagar

ACCOMMODATION MANAGEMENT

Course Code: HMC2704 **Credit Units: 02**

Course Objective:
At the end of the semester the students will develop clear concept on -
- Budgeting, Purchasing, Controls in Housekeeping Department
- Recruitment of Staff, Induction & Training of Hotel Housekeeping Staff
- Working Methods

Module – I :Budgeting
- Definition
- Capital & Operational Budget
- Advantages
- Preparation of a Budget
- Budgetary Control

Module – II :Purchasing
- Department Requirements
- Methods of Purchasing

Module – III :Controls in Housekeeping Department
- Purpose
- Expenses
- Functioning
- Forms

Module – IV :Recruitment of Staff
- Job Specifications & Job Descriptions
- Duty Rotas,
- Manual for Standard Housekeeping Procedures of Commercial Establishments

Module – V :Induction & Training of Hotel Housekeeping Staff

Module – VI :Working Methods
- Optimum Time Requirement
- Planning of Work Methods

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:
- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox

- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

References:

- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

FACILITY MANAGEMENT, PLANNING & DESIGN

Course Code: HMC2705 **Credit Units: 01**

Course Objective:
At the end of the semester the students will be able to-
- Explain & understand hotel design,project management, architectural aspects aspects of facility planning,kitchen stewarding layout &design and methods of energy conservation.,.

Course Contents:

Module I: Hotel Design
Design Consideration, Attractive Appearance, Efficient Plan, Good Location, Suitable Material, Good Workmanship, Sound financing, Competent Management

Module II : Project Management
Introduction of Network analysis, Basic rules and procedures for Network analysis, C.P.M. and PERT, Comparison of CPM and PERT, Classroom exercises, Network crashing determining crash cost, normal cost.

Module III : Facilities Planning
The Systematic Layout Planning Pattern (SLP) for hotel,Planning Consideration,Flow Process and Flow Diagram Procedure for determining space considering ,the guiding factors for the guest room / public facilities, support facilities and services, hotel administration,

Module IV : Architectural Consideration
Difference between carpet area, plinth area and super built area, their relationships, reading of blueprint (plumbing, electrical, AC, ventilation, FSI, FAR, public areas),Approximate cost of construction estimation Approximate operating areas in budget type / 5 star type hotel / guest room,Approximate requirement and estimation of water / electrical load gas, ventilation.

Module V : Kitchen Stewarding Layout and Design
Importance of kitchen stewarding, Kitchen stewarding department layout and design, Equipment found in kitchen stewarding department

Module VI: Stores – Layout and Design
Stores layout and planning (dry, cold and bar), Various equipment of the stores work flow in stores

Module VII : Car Parking
Calculation of car park area for different types of hotels

Module VIII : Energy Conservation
Necessity for energy conservation, Methods of conserving energy in different area of operation of a hotel, Developing and implementing energy conservation program for a hotel

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Systematic Layout Planning by Richard Muther, Cahners Books Division of Sahners Publishing Company Inc. 9 Franklin Street, USA
- Food Service Planning- Layout Equipment by Lendal H Kotschevar & Margrat E Terrell

References:

- Management Operations & Research by N. Satyanarayan & Latika Raman, Himalaya Publishing House.
- Hospitality Facilities Management and Design by David M Stipanuk

HOSPITALITY LAW

Course Code: HMC2706 **Credit Units: 01**

Course Objective:
At the end of the semester the students will develop the idea about various laws related to Hospitality Industry.

Module – I :Introduction to Hotel Law
- Laws applicable to hotel and catering industry.
- Procurement of licenses and permits required to operate hotel restaurant and other catering establishments.
- Criterion of fixation of taxes for various tariff structures applicable to hotels – luxury expenditure sales surcharge service tax etc.

Module – II :Labour laws
- Definition and importance with various provisions.
- Factories Act 1944 – working environment welfare health and safety measures
- Jurisdiction of inspectors.

Module – III :Hotel – Guest Relationship
- Right to receive or refuse accommodation to a guest.
- Guests' right to privacy.
- Tenancy laws.
- Duty to protect guest.
- Employees and third party threats in restrooms and parking lots.

Module – IV :Laws governing lost and found property
- Hotel's liability regarding guest property unclaimed property loss of property.
- Hotel defenses to liability claims.
- Statutory limits on hotel's liability.

Module – V :Food Legislation
- Central State and local food laws.
- Warranty.
- Truth in menu and labeling laws.
- Food adulteration.
- Powers and duties of a Food Inspector.

Module – VI :Liquor licenses
- Independent bar Operation.
- Dispense Bar.
- Satellite Bar.
- Compound license.
- Beer bars.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading:

- Food & Hotel Legislations and Policies – E. Dharmaraj
- Hotel & Tourism Laws – Jogmohan Negi
- Principles of Hospitality Law – Michael Boella
- Hotel Law – J. Negi, Frank Brothers

HUMAN RESOURCE MANAGEMENT

Course Code: HMC2707 **Credit Units: 01**

Course Objective:
Human Resource Management has acquired significance in the process and problems of developments both in the case of developed & developing nations of the world. It has acquired importance in the case of tourism & hospitality management in creating permanent & better images in the minds of tourists coming with specific perception & motivations. Further it is a complex phenomenon with many equally important components; each requires special skills & talents. The present course intents to place focus on various segments of the hospitality with regards to management of human resources.

Course Contents:

Module I: Introduction to Management
Definition, Nature, Scope and Functions of Management, Levels of Management and Management Theories - Classical and Neo - Classical Theories, Systems Approach to organization, Modern Organization Theory.

Module II: Different Function of Management
Planning,Organizing,Staffing,Directing,Management Control

Module III: Human Resource Management
Role, importance, & Applications in hotel Industry

Module IV: Human Resource Planning
Importance and Relevance of HRP, Job Analysis, Job Description, Job Specification & Job Evaluation Method

Module V: Recruitment and Selection
Sources of Recruitment, Selection Process, Induction & Orientation.

Module VI: Training and Development
Training Methods and Evaluation

Module VII: Other Human resource related Functions
Motivation and Productivity ,Job Enrichment ,Career planning employee counseling
Employee Benefits and Welfare Scheme

Module VIII: Disciplinary Issues
Employee Grievance handling process

Module IX: Case Study
Live case study on HR from Hospitality industry, solving problems & implementation.

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- HR Development- Quarterly Journal of Administration (ILE), Vol. II, by Briggs B.
- Human Resource Development in Tourism & Hospitality by Dr. JM Negi, Frank Bros, New Delhi.
- Personnel Management by Devans R.S., Vikas Publishing House, New Delhi.

References:

- The Personnel Management Process: Human Resource development by French, Wendell, Houghton Mifflin Company, Bombay
- Personnel Management by Monappa, A.S., Mirza, S, Tata McGraw Hill, Bombay.

ENTREPRENEURSHIP DEVELOPMENT

Course Code: HMC2708 **Credit Units: 01**

Course Objective:
At the end of semester students will be able to-
- Acquire be self-employed and inculcate a habit of self-earning and maintain a dignified life
- Plan a path for hospitality students to make them successful entrepreneurs in their life and contribute to society
- To understand basic knowledge in the field of entrepreneurship development and give them basic exposure of Govt. policies and assistance
- Describes the roles that new venture creation plays in the economy, defines entrepreneurship and show how three factors – individuals, environments and organizations comes through to create the entrepreneurship event
- Impart the knowledge of the resource based framework i.e. Financial, physical, technological, human and organizational
- Exposed get with franchising opportunity and discuss what elements make a business concepts a legitimate franchise opportunity
- Acquire an effective leadership, quality and effective decision-making.

Course Contents:

Module I: Entrepreneurship Skills

Personality attribute of an entrepreneurs
- Self control-value attitude, Socio-culture factors

Unique characters of the hospitality industry
- Human psychology, Inter-personal relationship, Team building, Customer orientation

Positive entrepreneurship behaviour
- Overcoming external constrains, Solving internal problems

Module II: Identification of business opportunities in the hospitality industry

Demand / Market Analysis, Present and future competition, Government policy regarding small Enterprises

Module III: Organization of small enterprises - Form of organization

Sole ownership, Partnership, Private Ltd. Company, Public Ltd. Company, Manpower requirement

Module IV: Incentives and Assistance-

From central government, From State Government, From Financial Institutions

Module V: Small Enterprises Risk Analysis

Motivational factors, Developing Achievement Orientation, Strength and weakness of Independent Business, Feasibility and viability

Module VI: Establishment of an Enterprise

Registration of business, Licenses and Permits, Financial resources ,Organizing material, human and technical resource, Launching the enterprises, Formulating and implanting business strategies

Examination Scheme

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Text & References:

Text:

- Small Scale Industries and Entrepreneurship, by Desai Vasant; Bombay, Himalaya
- Small Scale Industries in the Developing Countries, by Staley E. & Morsey R. McGraw Hill.
- Management of Small Scale Industries, by Malhotra I. S. & Gupta S. L,
- Innovation and Entrepreneurship, by Drucker, Peter F; East-West Press (P) Ltd.

References:

- Entrepreneurial Development in India, by Gupta CB & Srinivasan; Sultan Chand
- Entrepreneur Development– New Ventures Creation, by Taneja S & Gupta SL
- Entrepreneurship Management by Dr. Aruna Kaulgud, Vikas Publishing House.

EVENT MANAGEMENT

Course Code: HMC2709 **Credit Units: 01**

Course Objective:
At the end of the semester the students will be able to Explain & understand the concept of Event Management, its Design & Feasibility, Marketing of Event, Financial Management, Risk Management, Planning, Operations & Logistics, Control& Evaluation

Module I :Introduction to Event Management
- Size of Events
- Types of Events
- The Event Team
- Code of Ethics

Module II :Concept and Design
- Developing The Concept
- Analysing The Concept
- Designing The Event
- Logistics of The Concept

Module III :Feasibility
- Keys to Success
- The SWOT Analysis

Module IV :Legal Compliance
- Relevant Legislation
- Official Bodies Involved
- Contracts

Module V :Marketing of Event
- Nature of Event Marketing
- Process of Event Marketing
- The Marketing Mix
- Sponsorship

Module VI :Promotion
- Image / Branding
- Advertising
- Publicity
- Public Relations

Module VII :Financial Management
- The Budget
- Break-Even Point & Cash Flow Analysis
- Profit & Loss Statement
- Balance Sheet
- Financial Control Systems

Module VIII :Risk Management

- Process of Risk Management
- Incident Reporting
- Emergency Response Plans
- Standards for Risk Management

Module IX :Planning

- Establish The Aims of The Event & Objectives
- Prepare an Event Proposal
- Planning Tools

Module X :Protocol

- Order of Precedence; Titles; Styles of Address; Dress Codes
- Protocol for Speakers
- Seating Plans
- Religious & Cultural Protocol
- Rules of Flag Flying

Module XI :Staging The Event

- Choosing The Event Site
- Developing The Theme
- Providing Services
- Managing The Environment

Module XII :Staffing

- Recruitment & Selection; Rosters
- Training; Briefing Staff
- Managing Volunteers

Module XIII :Operations & Logistics

- Logistics
- Policies
- Procedures
- Performance Standards
- Functional Areas

Module XIV :Crowd Management & Evacuation

- The Crowd Management Plan
- Emergency Planning
- Implementing Emergency Procedures

Module XV :Control & Evaluation

- Monitoring & Control Systems
- Operational Monitoring & Control
- Evaluation

ADVANCED FOOD PRODUCTION OPERATIONS LAB-II

Course Code: HMC2710 **Credit Units: 04**

Preparation & Presentation of International Cuisine

- France
- Italian
- Spanish
- Chinese
- Thai
- Mexican

Basket Cooking

- Planning & Practicing for 3 to 5 course including Patisserie Products

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	5	5

End-Term: 70 Marks

Components	**JE**	**VV**	**INDENT**	**LE**
Weightage (%)	05	05	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Theory of Catering by Kinton Cesserani, Published by Hodder & Stoughton
- Practical Cookery by Kinton Cesserani, Published by Hodder & Stoughton

References:

- Theory of Cookery by K Arora published, Frank Bros &Co. New Delhi
- Professional Chef by John Wiley
- Ultimate Cooking Course by Carole Clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan

ADVANCED FOOD & BEVERAGE SERVICE LAB-II

Course Code: HMC2711 **Credit Units: 01**

Course Objective:
At the end of the semester the students will be able to-
- Prepare budget of a F&B outlet
- Calculate breakeven point & display on graphs
- Take & record inventories
- Demonstrate & perform supervisory skills in a F&B service outlet.

Course Contents:

Module I
Preparation of Budget of an Event / Outlet**.**

Module II
Calculate breakeven for an F&B outlet and prepare graphs for the above.

Module III
Case Study & Presentation on calculating cost and cost %.

Module IV
Taking and Recording of Inventory.

Module V
Preparation of Bar Inventory procedure and taking Bar Inventory.

Module VI
Case Study and Presentation of Menu Engineering.

Module VII
Preparation of MIS of F&B Outlet of a month with Graphs.

Module VIII
Supervision - F&B Service in Training Restaurant.
Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Text & References:

Text:

- Food & Beverage Services by SN Bagchi & Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP

References:

- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

Syllabus - Eighth Semester

BASICS OF REVENUE MANAGEMENT

Course Code: HMC2801 **Credit Units: 02**

Course Objective:

At the end of the semester the students will be able to Explain & understand the concept of Revenue Management, necessity of its implementation in Hospitality Industry

1. Concept of Revenue Management

2. Basic Terms

3. Core Concepts of Revenue Management

4. Strategic Planning
   - 4.1 Supply & Demand Ratio
   - 4.2 Cost & Pricing
   - 4.3 Value Pricing
   - 4.4 Differential Pricing

5. Revenue Maximization vs. Optimization

6. Forecasting Demand

7. Inventory and Price Management

8. Overbooking as a Strategy

9. Managing Distribution Channels

10. Ethical aspects of Revenue Management

Examination Scheme:

Components	**V**	**A**	**S**	**CT**	**EE**
Weightage (%)	05	05	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination; S-seminar

Suggested Reading :

- An Introduction to Revenue Management for the Hospitality Industry: Principles and Practices for the Real World,by Tranter

INDIAN HERITAGE

Course Code: HMC2802 **Credit Units: 02**

Course Objective:

At the end of the semester the students will be develop a brief idea about Indian culture & Heritage

Module - 1 Culture

1. Culture: An Introduction
2. Indian Culture

Module 2: History and Culture through the Ages

3. Ancient India
4. Medieval India
5. Modern India

Module 3: Languages and Literature

6. Indian Languages and Literature-I
7. Indian Languages and Literature-II

Module 4: Religion and Philosophy

8. Religion and Philosophy in ancient India
9. Religion and Philosophy in Medieval India
10. Religious Reform Movements in Modern India

Module 5: Painting, Performing Arts and Architecture

11. Indian Painting
12. Performing Arts: Music, Dance and Drama
13. Indian Architecture

Module 6: Science and Technology

14. Science and Technology in India
15. Scientists of Ancient India
16. Science and Scientists of Medieval India
17. Scientists of Modern India

Module 7: Education

18. Education in India

Module 8: Social Structure

19. Indian Social Structure
20. Socio-Cultural Issues in Contemporary India
21. Spread of Indian Culture Abroad

Examination Scheme:

Components	**V**	**A**	**S**	**CT**	**EE**
Weightage (%)	05	05	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination; S-seminar

Suggested Reading :

Cultural Heritage of India - M. P Mchcha Shiksha, Anudan Ayog
Heritage Tourism - Praveen Sethi

RESEARCH METHODOLOGY

Course Code: HMC2803 **Credit Units: 02**

Course Objective:
Research methodology will be taught in the theory class to prepare students how to approach the subject of research project in the semester. To deal with surging information data regarding the various aspects of tourism industry, one should have a working efficiency with research and statistical techniques. The techniques may be applied in collecting, organizing, analyzing and interpreting data for decision-making. These may also be applied for formulating and testing research hypothesis. The course has been designed to equip the students with latest and necessary field techniques and to build a necessary statistical acumen among them. Students will master the skill for-

- Writing different types of research proposals
- Constructing the relevant tools of research
- Conduct a research project using appropriate qualitative and quantitative techniques
- Write a research report
- Evaluate a research report
- Give presentation of report supported by latest aids.

Course Contents:

Module I: Research Methodology
Meaning of research,Need and importance of research,Types of research,Criteria of good research

Module III: Data collection, analysis and interpretation (Sample designing)
Types & Sources of Data,Techniques of data collection; Correlation and regression analysis of two variables only.Hypothesis testingTest of significance,Chi-square analysis,Reports

Module IV: Preparation of research proposals-
Selection and formulation of research problem,Operationalization of concepts and constructs,Review of related literature,Aims and objectives,Hypothesis, method, sample and tools.

Module V: Evaluation of research report
Research Report Format,Presentation of Report

Examination Scheme:

Components	**V**	**A**	**S**	**CT**	**EE**
Weightage (%)	05	05	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination; S-seminar

Text & References:

Text:

- Applied General Statistics by Crovton and Crowder
- Behavioural Process in Organizations by Pareek, U.Rao. T.V. & Pestonjee D.M
- Professional Hotel Management by J.M. Negi, S Chand & Co, New Delhi

References:

- Towards Appropriate Tourism– The case of Developing Countries by Peter long Frankfurt
- Method of Social Research – New York; The Free Press
- How to Complete Your Research Work Successfully by Judith Bell; UBS Publisher, Delhi
- How to Research and Write a Thesis in Hospitality & Tourism by James M. Paynter, John Wiley & Sons, New York, USA
- Strategic Management by John A Pearce II & Richard B Robinson Jr.
- Strategic Management by Samual C Cerco
- Quantitative Techniques in Management by Vokra
- Quantitative Approaches to Management by Levin I Richerd

SPECIALIZATION COURSE (LAB)

Course Code: HMC2804 **Credit Units: 04**

Course Objective:

At the end of the semester the students will be develop competency in specialized area selected by him/her.

FOOD PRODUCTION

- **Module I**
  Theme Cuisine

- **Module II**
  Planning and implementing strategies for Quantity Food Production

- **Module III**
  Fusion Cooking

- **Module IV**
  Display Cuisine

- **Module V**
  Designing & setting up Commercial Kitchen Area

F&B SERVICE

- **Module I: Case Study on planning of**
  Special Restaurant
  Room Service
  Coffee Shop
  Presentation.

- **Module II**
  Case Study on Planning of Manpower of F&B department:-
  Presentation.

- **Module III**
  Supervision of F&B Service in Training Restaurant.

- **Module IV**
  Case Study of Planning Formal & Informal Banquet function including space requirement, Menu Planning.

- **Module V**
  Setting up of various types of Buffet (Design, Layout).

- **Module VI**
  Demonstration and Practice of Guerdon Service.

- **Module VII**

Case Study on setting up of Bar for parties.

- **Module VIII**
  Demonstration and Practice of Making Cocktails.

FRONT OFFICE

- **Module I**
  Role Play

- **Module II**
  Situation Handling

- **Module III**
  Work – Time Management

- **Module IV**
  Work Schedule Designing

HOUSEKEEPING

- **Module I:**
  First Aid
  First aid kit
  Dealing with emergency situation

- **Module II**
  Special Decorations

- **Module III**
  Layout of a guest room (Refurbishing & Redecoration)

- **Module IV**
  Team cleaning Management

- **Module V**
  Devising Training modules/standard operating procedure/Inspection check lists

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	5

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

GDPI SESSIONS

Course Code: HMC2805 **Credit Units: 03**

Course Objective:

These sessions would help the students to perform well in the campus interview at the final year stage.

1. **Pre-Preparation before GD/PI**
   - 1.1 Previous day
   - 1.2 Previous night
   - 1.3 Type of food
   - 1.4 Rest & sleep
   - 1.5 On GD/PI day
   - 1.6 Personal Hygiene
   - 1.7 Grooming
   - 1.8 Curriculum Vitae &Testimonials
   - 1.9 Sense of Time

2. Process of Evaluation during Group Discussion
   - 2.1 Skills assessed in a Group Discussion Session
     - 2.1.1 Leadership skills
     - 2.1.2 Communication skills
     - 2.1.3 Interpersonal skills
     - 2.1.4 Persuasive skills
     - 2.1.5 Problem solving skills
     - 2.1.6 Conceptualizing skills
   - 2.2 Rules to follow during the Group Discussion
   - 2.3 Points to remember during Group Discussion
   - 2.4 What to avoid during Group Discussion - Common Mistakes
   - 2.5 Preparations to be taken before appearing in a Group Discussion
     - 2.5.1 Get noticed - But for the right reasons
     - 2.5.2 Egotism Showing off
     - 2.5.3 Quality Vs Quantity

3. Types of Group Discussion GD topics
   - 3.1 Factual
   - 3.2 Abstract
   - 3.3 Argumentative/ Controversial topics
   - 3.4 Opinion based
   - 3.5 Current topics
   - 3.6 Case based topics

4. Steps on how to prepare for an interview?

5. What is an interview?

6. What's the purpose of an interview

7. What to do Before an Interview

8. What to do During the Interview
   8.1 Make Your Entrance
   8.2 Getting Started
   8.3 Attitude Counts

9. What to do after the Interview is over

10. Interview Do's and Don'ts

Examination Scheme:

Components	**V**	**A**	**S**	**CT**	**EE**
Weightage (%)	05	05	05	15	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination; S-seminar

Suggested Reading :

- Body Language – Your Success Mantra Dr. Shalini Verma S. Chand
- The Pocket Guide to Manwatching; Desmond Morris Triad Grafton Books

RESEARCH PROJECT

Course Code: HMC2837 **Credit Units: 12**

Course Objective:
The purpose of research (Hospitality and Tourism based) is to seek answers to problems through the application of scientific methodology, which guarantees that the information is reliable and unbiased. This information is utilized to make conclusions and recommend solution. Some elementary factors need to be kept in mind while preparing a research and deciding the topic, these could be based on its relevance, feasibility, coverage, accuracy and research, objectivity and ethics.
To deal with surging information data regarding the various aspects of tourism industry, one should have a working efficiency with research and statistical techniques. The techniques may be applied in collecting, organizing, analyzing and interpreting data for decision-making. These may also be applied for formulating and testing research hypothesis. The course has been designed to equip the students with latest and necessary field techniques and to build a necessary statistical acumen among them. Students will master the skill for-

- Writing different types of research proposals and reports
- Constructing the relevant tools of research
- Conduct a research project using appropriate qualitative and quantitative techniques
- Do presentation with the help of tutorial aid
- Evaluate a research report.

The research topic should be assigned by the deputed subject faculty in the beginning of semester & should be approved by PL & HOI. Continuous monitoring and guidance should be provided to student at all the steps.
At the term end, the research project will be presented before a panel and evaluated by examiners (As nominated by HOI). The evaluation should be based on presentation, viva, report content & format & conclusion.

Examination Scheme:

Internal Assessment:

Abstract:	10
Draft:	15
Research Orientation:	10
Reading:	05

External Evaluation:

Objective:	05
Issue Profile:	10
Comprehensiveness	10
Relevance:	10
Presentation:	15
Viva:	10

Text & References:

Text:

- Applied General Statistics by Crovton and Crowder
- Behavioural Process in Organizations by Pareek, U.Rao. T.V. Pestonjee D.M
- Professional Hotel Management by J.M. Negi, S Chand & Co, New Delhi

References:

- Towards Appropriate Tourism– The case of Developing Countries by Peter long Frankfurt
- Method of Social Research – New York; The Free Press
- How to Complete Your Research Work Successfully by Judith Bell; UBS Publisher, Delhi
- How to Research and Write a Thesis in Hospitality & Tourism by James M. Paynter, John Wiley & Sons, New York, USA.
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Methodology & Techniques of Social Research by Wilkinson & Bhandarkar
- Methods in Social Research by Gode WJ & Hatt PK
- Scientific Social Surveys & Research by Pouline Young & CF Schmid
- Evaluation Information: A Guide for users of Social Scienec by Lescard, Kartzer Jeffery
- Understanding & Conducting Research Application Education & Behavioural Sciences- 2nd Edition.

Amity School of Hospitality

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Tourism & Travel Management

Syllabus - First Semester

BASICS OF TOURISM MANAGEMENT

Course Code: TRM2101 **Credit Units : 03**

Course Objective: The primary purpose of the paper is to acquaint the students about the basic and preliminary knowledge of the terms, concepts, systems and trends in tourism. It will form the first step to move forward to interact with the advanced knowledge pertaining to travel and tourism.

Course Contents:

Module – I : Conceptual Framework

- Tourism: Definition, Meaning, Nature and Scope.
- Tourist, Travelers, Visitor, Transit Visitor and Excursionist - Definition and Differentiation
- Meaning and Relationship between Leisure, Recreation and Tourism.
- Components and Elements of Tourism
- Types and Typologies (International, Inbound, Outbound, Inter regional, Intra Regional, Domestic, International, National and other Forms, Social Tourism.) of Tourism.

Module – II : Historical Dimensions of Tourism

- Travel and Tourism through the Ages: Early Travels, 'Renaissance' and 'Age of Grand Tours'; Emergence of Modern Tourism, Concept of "Paid Holiday", Silk Route.
- Thomas Cook and the Development of Tourism, & Present Scenario of the Tourism Industry.

Module – III : Motivation and Significance of Travel and Tourism

- **Motivations**
  - Physical Motivations: Travel for Sports and Adventure, Rest and Relaxation, Health and Medical Reasons etc.
  - Cultural Motivations: Pilgrimage Tourism, Cultural Curiosity, Religious etc.
  - Interpersonal Motivation: Meeting New People, VFR, etc
  - Status and Prestige Motivation
  - Business Motivation
- **Significances**
  - The Economic, Social and Cultural Significance of Tourism

Module – IV : Factors that have led to the Growth of Tourism

- **Growth factors**
  - Technology and Destination Development
  - Changing Social Patterns
  - Changing Living Standards
- **Barriers to the Growth of Tourism**
  - Factors Existing at the Destination: Terrorism, & Political and Social Environment
  - Factors Barring a Potential Tourist from Traveling: Time, Cost, and Social Barriers.

Module – V : Studying Tourism

- Tourism Education and its Significance for Tourism Business Growth
- Professionalism – Key to Tourism Growth

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry ii1 India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies,
- Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

INDIAN GEOGRAPHY OF TOURISM

Course Code: TRM2102 **Credit Units : 03**

Course Objective: Geography of Tourism includes the phenomena of tourism over the global space with 'spatial' attention on the place of origin, place of destination & routes through which the travel & tourism takes place. This course has been simplified with very few case studies & broad information about the continents, so the students can have knowledge of India.

Course Contents:

Module – I : India

- General Introduction, States & Capitals
- Physiographic Units
- Seasons and Climatic Regions & their Impacts on Tourism.
- Natural Vegetation & Wild Animals of India
- India: A Destination for all Reasons & Seasons.

Module – II : The Northern Mountains

- General Introduction of the Himalayas & other Ranges
- Importance of the Himalayas & other Ranges for Religious Tourism
- Importance of the Himalayas & other Ranges for Hill Station & Adventure Tourism.

➢ **Case studies**

- Sri Nagar, Shimla, Nainital, Darjeeling & Gangtok.

Module – III : The Deserts & Central Plains

- General Introduction of Deserts & Central Plains.
- Their Importance for Cultural, Religious & Adventure Tourism.

➢ **Case studies**

- Amritsar, Jaipur, Delhi, Lucknow, Kolkata.

Module – IV : The Peninsula

- General Features of Indian Peninsula with their Tourism Significance.

➢ **Case studies**

- Bhopal, Khajuraho, Hyderabad, Banglore, Ooty

Module – V : The Coastal Plains and Islands

- General Features of Coastal Regions, their Importance for Religious, Cultural & Beach Tourism.

➢ **Case Studies**

- Mumbai, Goa, Cochin, Chennai, Andaman & Nicobar Islands.

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Ahmad, Aizaz: General Geography of India, NCERT, New Delhi
- Goh Cheong Long: An Economics Atlas of India, Oxford University.
- National Atlas of India, Govt. of India Publication, Calcutta 1997.
- Atlas of World Oxford Press, New Delhi.
- Singh, R.L.(ed) India: A Regional Geography National Geographical Society of India, Varanasi, 1989.
- Manorama Year Book
- India Year Book 2009, Publication Division. Govt. of India, New Delhi
- Tourism Planner
- Tour Brochures etc.
- Lonely Planet – India
- Kumar, Ravi Bhushan: Coastal Tourism & Environment, AOH Publishing Corporation, New Delhi
- Pilgrimage in India, R.N.Pillai
- Kohli, M.S.: Mountaineering in India, Vikas Publishing House, and New Delhi

CULTURAL TOURISM OF INDIA

Course Code: TRM2103 **Credit Units : 03**

Course Objective: Cultural tourism is the subset of tourism concerned with a country or region's culture, specifically the lifestyle of the people in those geographical areas, the history of those people, their art, architecture, religion(s), and other elements. Through this subject students will come to about to relate culture with tourism and how to combine these together.

Course Contents:

Module – I : Introduction to Culture

- Culture: Concept and its Essential Characteristics
- Indian Culture: Fundamentals of Indian Culture; Indian Culture through the Ages
- Culture and Tourism Relationship with Special Reference to India

Module – II : Indian Architecture

- Buddhist Architecture: Ajanta, Ellora and Sanchi
- Hindu Architecture: Khajuraho Temples, Sun Temple of Konark, Shore Temple of Mamallpuram and Brihadisvara Temple at Thanjavur
- Medieval Architecture: TajMahal, Red Fort of Delhi, FatehpurSikri and QutubMinar

Module – III : Dances, Music and Handicrafts of India

- Classical Dances of India
- Classical Music of India
- Handicrafts and Handlooms

Module – IV : Fairs and Festivals

- Major Fairs and Festivals of India and their Significance for Tourism
- Holi, Dussehra, Diwali, Baisakhi, Pongal, Bihu, Desert Festival (Jaisalmer), Surajkund Craft Fair, International Trade Fair (New Delhi),

Module – V : Cultural Impact

- Positive Impact of Tourism on Cultural & Vice-Versa
- Negative Impact of Tourism on Cultural & Vice-Versa

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Cultural Tourism & Heritage Management - by Shalini Sign, Rawat Publication, Jaipur.
- Hill Stations of India - Gillan Wright, Penguin Books, New Delhi - 19.
- Tourism in India - K.K. Sharma, Classic Publishing House, Jaipur.
- Invitation to Indian Dances by SusheelaMisra Arnold Publishers, New Delhi - 29.

- Acharya, R. (1986): Tourism & Cultural Heritage of India, ROSA Publication, Jaipur
- Harle, J.C. ( ): The Art and Architecture of Indian Sub Continent
- Hussain,A.A.(1987) :The national culture of India, National Book Trust, New Delhi
- Jacob, R., Joseph, S., Philip, A. (2007): Indian Tourism Practices, Abhijit Publications
- Percy, B. ( ): Indian Architecture – Hindu and Buddhist Period
- Mukerjee, R.K. : The Culture and Art of India: George
- Raina, A.K, Raina, C. L, (2005) Fundamentals of Tourism and Indian Religion, Principles and Practices, Kanishka Publishers, Distributors, New Delhi-02

NATURAL TOURISM PRODUCTS OF INDIA

Course Code: TRM2104 **Credit Units : 03**

Course Objective: Tourism begins with the motivation to visit attractions at destinations. The attractions may be natural or man-made (cultural). This course will help the students to give an insight about the rich natural tourist products of India.

Course Contents:

Module – I : Natural and Wild life Tourism

- Meaning, Concept and Scope
- The Importance of Nature in Tourism

Module - II: Natural Attractions

- Brief Study of National Parks and Wildlife Sanctuaries, Bird Sanctuaries, Tiger ,Crocodile and Elephant Project Sites of India.
- Major Hill Stations, Islands, River and River Islands of India

Module - III: Beaches of India

- Important of Sea Beaches of India- Mumbai, Puri, Goa, Chennai, Trivandrum and Kerela.

Module - IV: Adventure Sports

- Existing Trends and Places of Importance for Land Based, Water Based and Aero Based Adventure Sports of India.

Module - V: Hill Stations

- Manali, Mussoorie, Almora, Chamba, Gulmarg, Darjeeling.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Rai. H. C. Hill Tourism Planning & Development
- Ahmad, Aizaz: General Geography of India, NCERT, New Delhi
- Goh Cheong Long: An Economics Atlas of India, Oxford University.
- National Atlas of India, Govt. of India Publication, Calcutta 1997.
- Atlas of World Oxford Press, New Delhi.
- Singh, R.L.(ed) India: A Regional Geography National Geographical Society of India, Varanasi, 1989.
- Manorama Year Book
- India Year Book 2009, Publication Division. Govt. of India, New Delhi
- Tourism Planner, Tour Brochures etc.
- Lonely Planet – India
- Kumar, Ravi Bhushan: Coastal Tourism & Environment, AOH Publishing Corporation, New Delhi
- Pilgrimage in India, R.N.Pillai
- Kohli, M.S.: Mountaineering in India, Vikas Publishing House, and New Delhi

RELIGIOUS TOURISM-I

Course Code: TRM2105 **Credit Units : 02**

Course Objective: The paper focuses on the religions in India which constitute the major motivation for tourists particularly the domestic tourists. The paper gives an exhaustive and selective view of the major religions in India and familiarizes the student with various popular religious destinations associated with different religions.

Course Contents:

Module – I : Hinduism

- Hinduism (Vedic, Bhagvatism and Shaivism Streams): Basic Features; Growth Over the Years

Module – II : Sikhism

- Sikhism: Basic Features and Growth Over the Year

Module – III : Islam and Christianity

- Islam and Christianity in India: Basic Features and Geographical Extent

Module – IV : Buddhism and Jainism

- Buddhism and Jainism: Their Teachings and Philosophy and Growth Over the Year

Module – V : Religious Tourism: An Overview

- Religious Tourism: Concept, Definition and Significance
- Trends and Pattern in Religious Tourism in India
- Problems and Prospects of Religious Tourism in India

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- AbidHussain, S. 2003 (reprint) The National Culture of India, National Book Trust, New Delhi.
- Basham, A.L., 1985 (reprint) The Wonder That Was India, Rupa % Co,. New Delhi
- Hay, Stephen, (Ed.) 1992, Sources of Indian Tradition, 2 vols., Penguin Books, Delhi
- Nadakarni, M.V. 2006, Hinduism: The Gandhian Perspective, Ane Books India, New Delhi
- Radhakrishanan, S. 1999 (Oxford India paperback) Indian Philosophy, 2 vols., Oxford University Press, New Delhi
- Raju, P.T. 1985, Structural Depths of Indian Thought, South Asian Publishers, New Delhi.
- M. Hiriyanna,2009 Outlines of Indian Philosophy, Eastern Book Corporation, Calcutta

APPLICATION OF COMPUTERS

Course Code: TRM2106 **Credit Units: 01**

Course Objective:
The basic objective of the course is to introduce the students to the world of computers and computer technology. The students will be introducedto the basic concept of operating system, word processing, database, presentation.

Course Contents:
Module - I: Computer Fundamentals
Elements of a Computer system
Characteristic of Computers
Classification of Computers
Limitations
Hardware features and uses
Generations of Computer
Primary and Secondary Storage Concepts
Data Entry Devices
Data Output Devices
Software Concepts
System Software
Application Software
Language Classification
Compilers and Interpreters

Module - II: Operating Systems/Environment
Introduction to Windows
GUI/Features
What are Window & Window 95 and above
Part of a Typical Window and their functions

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading ::

Text:
- Basic Computers by IBM
- DOEAC 'O' Level *Information Technology by V.K. Jain BPB Publications*

References:
- Insider Internet Marketing by Jim Deniels
- The Birth of Internet Marketing & Communication by Don Stan Boch

APPLICATION OF COMPUTERS LAB

Course Code: TRM2107 **Credit Units: 01**

Course Objective:
At the end of the semester the students would be able to-
- Create folders
- Shortcuts copy files & folders
- Deleting files and exploring windows etc.

Course Contents:

Module - I: Window Operations
Creating Folders, Creating Shortcuts, C
opying Files/Folders, Renaming Files/Folders, Deleting Files
Exploring Windows
Quick Menu

Module - II: MS Word
Creating a Document, Formatting Documents, Special Effects
Cut, Copy, Paste.
Table, Graphics.
Print Options.

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	10	10	10	40

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Suggested Reading :

Text:
- Microsoft Work 2000 by Heidi Steele Techmedia Publications
- Basic Computers by IBM

References:
- Insider Internet Marketing by Jim Deniels
- The Birth of Internet Marketing & Communication by Don Stan Boch
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi

FIELD WORK PROJECT-I

Course Code: TRM2108 **Credit Units: 03**

Course Objective: Students of Tourism need to go through the basics of practical service exposure in different Tourism & Hospitality outlets. To maximize this exposure students will be send for different Tourism services in all the major & minor areas of operation & management within & outside the campus.

Methodology:
Students should be sending for various learning opportunity outside the class room. They should submit the journal after the event is over to assigned faculty from the committee in following format.

- Name of the Event
- Location
- Time
- Faculty Responsible
- Task Assigned
- Learning Outcome
- Suggestions

All the assignments should be duly authorized by the faculty responsible for the event.

Student services will be monitored & evaluated by the committee comprising of Program leader & faculty (as approved by HOI) and the marks will be allotted based on the performance, attitude, learning and utilization of knowledge in practical field.

C-20
S-20
V-20
P-20
JE-20

Syllabus – Second Semester

TRAVEL AGENCY AND TOUR OPERATOR

Course Code: TRM2201 **Credit Units : 03**

Course Objective: To understand various skills necessary for travel agency and tour operation business.

Course Contents:

Module – I : Travel Agency Business

- Travel Agent: Definition, Types of Travel Agencies
- History, Departments of Travel Agencies
- Major Activities, Functions of Travel Agencies
- Income Sources, Linkages and Integration of Travel Agencies,

Module – II : Tour Operation Business

- Evolution of Tour Operation Business: Definition, Tour Operation, Types of Tour, FIT, GIT, Inbound, Outbound, Escorted, Guided etc.
- Role and Relevance of Tour Operation Business in Modern Scenario.

Module – III : Setting up of Travel Agency and Tour Operating Enterprises

- Entrepreneurship and Tourism
- Procedure for Setting up of Travel Agency and Tour Operating Enterprises; Their Role in Development of Tourism Industry
- Approval from Department of Tourism (DOT), International Air Transport Association (IATA)

Module – IV : The Tour Guide & Escort

- Meaning and Classification, Qualities of an Ideal Tour Guide,
- Various Role of Tour Guide, The Business of Guiding, Organizing a Guiding Business
- Difference Between Guide & Escort

Module – V : Case Studies

- Kuoni, Cox & Kings, Thomas Cook, Carlson Major Tour Operation Companies and Packages (Areas of Operation, Packages, Rates, Itineraries, Marketing Strategies). Role and Relevance of Tour Operation Business in Modern Scenario.

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading:

- Stoner. Jeen (2005), Management. Prentice Hall, New Delhi
- R.K. Singla,(2007) Business Management, V.K. publication, new Delhi.
- D.K.Goyal,(2008), Business Management, Arya publication
- Prasad. L.M.(2007), Principles and Practice of Management, Sultan Chand and Sons, New Delhi
- Banerjee, S. (2006), Principles and Practice of Management, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi

WORLD GEOGRAPHY OF TOURISM

Course Code: TRM2202 **Credit Units : 03**

Course Objective: This course has been simplified with very few case studies & broad information about the continents. It provides a thorough knowledge about the characteristics of tourist markets, attractions of destinations &the accessibility of the world with a focus on a few selected countries of world.

Course Contents:

Module - I: Introduction to World Geography

- Brief Introduction of Continents & Oceans.
- Map Reading.
- Greenwich Mean Time. International Date Line.
- Elements of Weather & Climate. Climatic Zones of the World.
- Natural Vegetation of the World.
- Main Tourist Activities in Different Climatic Zones.

Module - II: Asia

- General Geographical Features: Physiographic Units, Climate, Vegetation Main Countries, Capitals &their Tourist Attractions.
- A Case Study of Japan, Singapore, Sri Lanka, Saudi Arabia.

Module - III: Europe

- General Geographical Features; Physiography, Climate, Vegetation. Main Countries, Capitals &Their Tourist Attractions.
- A Case Study of France, United Kingdom, Switzerland, Netherlands

Module - IV: America

- General Geographical Features of North & South Americas; Physiographic, Climate, Vegetation, Main Countries, Capitals & Their Tourist Attractions.
- A Case Study of The U.S.A. (Only 5 Destinations), Canada, Brazil, Cuba.

Module - V: Other Countries

- General Geographical Features of Given Countries with Information about Physiographic, Climate, Vegetation & Tourist Attractions of South Africa, Egypt, Australia, New Zeeland.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Badawi, Cherine: Footprint Egypt, Footprint Travel Guides, 2004.
- Bickersteth, Jane & Eliot, Joshua: Singapore handbook: the travel guide, Footprint Travel Guides, 2001.
- Blore, Shawn; Davidson, Hilary; Karr, Paul; Livesey, Herbert Bailey & McRae, Bill: Frommer's Canada, John Wiley and Sons, 2004.
- Campbell , Jeff ; Chilcoat, Loretta; Derby, Susan ; Greenfield, Beth; Heller, Carolyn B. ; Martin, Sam ; Miller, Debra ; Morris, Bob; Peevers , Andrea Schultze ; Wolff, Kurt & Zimmerman, Karla : USA , Lonely Planet, 2004 .

- Williams, Stephen: Tourism geography, Routledge, 1998.
- Taylor, Chris; Rowthorn, Chris; Ashburne, John; Benson, Sara & Florence, Mason: Japan, Lonely Planet, University of California, 2000.
- Mente, Boye De: Passport's Japan Almanac, Passport Books, University of Michigan,1987.
- Ellis, Royston: Sri Lanka: TheBradt Travel Guide, Bradt Travel Guides, 2005.
- Plunkett, Richard; Ellemor, Brigitte & Campbell, Verity: Sri Lanka, Lonely Planet, 2003.
- Else, David: England, Lonely Planet, 2007.
- Europe on a Shoestring, Lonely Planet, 2003.
- Prosser, Robert: France, Evans Brothers, 2005.
- Williams, Nicola; Berry, Oliver; Fallon, Steve &Nevez, Catherine Le: France, Lonely Planet, 2007.
- Simonis, Damien; Johnstone, Sarah & Williams, Nicola: Switzerland, Lonely Planet, 2006.
- Steves, Rick: Rick Steves' Switzerland, Avalon Travel Publishing, 2006.
- Louis, Regis St.; Chandler, Gary Prado &Draffen, Andrew: Brazil, Lonely Planet, 2005.
- Peevers, Andrea Schulte & Burgess, Kerryn: Canada, Lonely Planet, 2005.
- Lonely Planet Staff: USA and Canada on a Shoestring 2, Lonely Planet, 1900.
- Fitzpatrick, Mary; Blond, Becca; Pitcher, Gemma; Richmond, Simon; & Warren, Matt: South Africa, Lesotho & Swaziland, Lonely Planet, 2004.
- O’Hagan, Tim: Travel South Africa, Southern Book Publishers, 2000.
- Firestone, Matthew D.; O'Neill, Zora; Sattin, Anthony &Wlodarski, Rafael: Egypt, Lonely Planet, 2008.
- McPhee, Margaret: Australia's Top Tourist Destinations, Universal Publishers, 2003.
- Smitz, Paul; Bain, Carolyn; Bao, Sandra &Farfor, Susannah: Australia, Lonely Planet, 2005

RELIGIOUS TOURISM-II

Course Code: TRM2203 **Credit Units : 02**

Course Objective: The paper focuses on the religions in India which constitute the major motivation for tourists particularly the domestic tourists. The paper gives an exhaustive and selective view of the major religions in India and familiarizes the student with various popular religious destinations associated with different religions

Course Contents:

Module – I : Religious Destinations of Hinduism

- Hinduism: Four Dhams i.e. Badrinath, Rameshwaram, Puri and Dwarka; Varanasi, Mathura, Vrindavan, Haridwar, Vaishno Devi, Allahabad and Tirupati

Module – II : Religious Destinations of Buddhist

- Buddhist:Lumbini, Bodhgaya, Sarnath, Kushinagar, Sharavasti, Sankisa, Vaishali, Rajgriha, Kapilvastu, Nalanda, Sanchi, Ajanta.

Module – III : Religious Destinations of Jain:

- Jain:Kashi, Pavapuri, Shatrunjaya, Girnar, Mt. Abu, Sharavanbelgola, Palitana

Module – IV : Religious Destinations of Muslim

- Muslim: Ajmer Sharif, Nizamuddin (Delhi), FatehpurSikri, and Some Important Mazars.

Module – V : Religious Destinations of Sikh

- Sikh : Patna, Nanded, Guru-ka-Tal (Agra), Amritsar, Manikaran

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Gupta, SP, Lal, K, Bhattacharya, M. Cultural Tourism in India (DK Print 2002)
- Dixit, M and Sheela, C. Tourism Products (New Royal Book, 2001)
- Michell, George, Monuments of India, Vol. 1. London.
- Davies, Philip, Monuments of India, Vol. II.,London.
- Brown Percy, Indian Architecture (Buddhist and Hindu),Bombay.
- Brown Percy, Indian Architecture (Islamic period), Bombay.
- Hawkins. R.E., Encyclopaedia of Indian Natural History.

INTERNATIONAL TOURISM BUSINESS

Course Code: TRM2204 **Credit Units : 03**

Course Objective: To make students aware about the international tourism trends and patterns.

Course Contents:

Module – I : Trends in Tourism

- Trends and Patterns in International Tourism

Module – II : Responsible Factors

- Factors Responsible for Growth and Development of International Tourism
- Motivations in Tourism

Module – III : Marketing

- Overseas Travel Agencies Marketing Planning and Strategies

Module – IV : International Time

- Time Calculation, Flying Time Calculation, Time Zones, Day Light Saving Time,
- International Date Line, Marking of Cities on Outlines Maps.

Module – V : Case Studies

- Main 3 International Cultural and Historical Tour Packages.
- Main 3 International Natural Tour Packages.
- Overseas MICE Tourism

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Anand, M.M., **Tourism and hotel Industry in India,** Prentice Hall, New Delhi, 1976
- Bhatia, A. K., **International Tourism**, Sterling Publishers, New Delhi
- Bhatia, A. K., **Tourism development: Principles, Practices and Philosophies**, Sterling Publishers, New Delhi
- Burkart A. &Medlik S., Tourism: Past, Present and Future, Heinemann Professional Publishing
- www.unwto.org
- Kaul, R.N., Dynamics of Tourism: A Trilogy, Sterling Publishers, New Delhi
- Peters, M., International Tourism, Hutchinson, London

TOURISM ORGANIZATIONS

Course Code: TRM2205 **Credit Units : 03**

Course Objective: These are the organizations to support tourism and travel practices all over the world. This subject will provide with the understanding of these organizations working for tourism

Course Contents:

Module – I : Indian Organization of Tourism and Hospitality

- The Role of the State in Tourism
- National Tourism Organization
- Department of Tourism, India
- ITDC
- DGCA
- AAI
- FHRAI

Module – II : International Tourism Organizations

- UFTAA
- WATA
- ASTA
- WTO
- PATA & PATA Chapters
- IATA
- ICAO
- IHA

Module – III : Travel Industry Fairs

- Participation Advantages
- ITB
- WTM
- PATA Travel Mart
- ICCA

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Websites of all Organizations.

HISTORICAL TOURISM PRODUCTS OF INDIA

Course Code: TRM2206 **Credit Units : 03**

Module – I : Importance of History on Indian Tourism

- Sources of Indian History
- Historical impact on Indian Tourism

Module – II : Various periods in Indian History

- Pre and Protohistory, Vedic Period, Mahajanapada, Maurya, Foreign Invesions
- History up to 650 A.D., Western Kshatrapas, Guptas, Vakatakas, Harshavardhana.
- History up to 1300 A.D., Chalukyas, Cholas, Yadavas, Palas, Pratiharas, Paramaras.
- History up to 1707 A.D., Sultanas, Mughala, Rajputs

Module – III :Historical Tourism Products:

- Definition, Concept and classification.
- Meaning and types of Heritage Tourism,
- Heritage Management Organisations- UNESCO, ASI, ICOMOS, INTACH.

Module – IV :Architectural Heritage of India

- Glimpses on the prominent architecture style flourished in different period. Different style of architecture in India - Hindu, Buddhist and Islamic. Selected case studies of World Heritage Sites in India

Module – V :Historical / Monumental / Architectural destinations

- Delhi, Agra, Jaipur, Khajuraho, Nalanda, Ajanta, Ellora, Hampi- Halebid, Lucknow.Hyderabad, Badami, Aihole, Pattadakkal, Belur, Halebid-, Sravanabelagola, Bijapur, Madurai, Tanjavur, Thiruvananthapuram

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

Books Recommended :

1. Basham, A.L., The Wonder That was India
2. Chopra,S.K., B.N.Puri, and M.N.Das, A Socio-Cultural and Economic History of India
3. Majumdar,R.C., H.C.Raychoudhari and K.K.Datta, An Advanced History of India
4. NeelakanthaSastry, K.A., An Advanced History of India
5. ThaparRomila, A History of India

FUNDAMENTALS OF ACCOUNTING-I

Course Code: TRM2207 **Credit Units : 02**

Course Objective:
At the end of the semester the students will be able to-
- Understand basic concept of hospitality accounting system
- The meaning and need for accounting
- Distinguish between book keeping and accounting
- Record the transactions using rules of debit and credit
- Ascertain the correct bank balances
- To check the accuracy of accounting records.

Course Contents:

Module – I : Introduction to Accounting
Meaning & Definition, Types and Classification, Principles of Accounting, Systems of Accounting, Generally Accepted Accounting, Principles

Module – II : Primary Books (Journal)
Meaning and Definition, Format of Journal, Rules of Debit and Credit, Opening entry, simple and compound entries, Practical

Module – III : Subsidiary Books (Ledger)
Meaning and Uses, Formats, Posting, Practical

Module - IV: Subsidiary Books
Need and Use
Classification
- Purchase book
- Sales book
- Purchase returns
- Sales return
- Journal proper
- Practical

Module – V : Trial Balance
Meaning, Methods, Advantages, Limitations, Practical

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Element of Hotel Accounting by Dr. JM Negi& G.S. Rawat, HKS International (now Aman Publication, New Delhi)
- Hotel Management Accounting & Control by Dr. JM Negi, Himalaya Publication, New Delhi
- Management Accounting by Dr. Hingorani& Prof. Ramanathan, Sultan Chand & Sons
- Management Accounting & Financial Control by Dr. SN Maheshwari, Sultan Chand & Sons
- Understanding Hospitality Accounting by Raymond Cote, EI-AH&LA USA
- Financial Accounting by GC Maheshwari, NCERT, N. Delhi
- Fundamentals of Hotel Accounting by G.S. Rawat& Dr. JM Negi, Aman Publications, New Delhi

FIELD WORK PROJECT - II

Course Code: TRM2208 **Credit Units : 03**

Course Objective: Students of Tourism & Hospitality need to go through the basics of practical service exposure in different Tourism & Hospitality outlets. To maximize this exposure students will be send for different Tourism & Hospitality services in all the major & minor areas of operation & management within & outside the campus.

Methodology:
Students should be sending for various learning opportunity outside the class room. They should submit the journal after the event is over to assigned faculty from the committee in following format.

- Name of the event
- Location
- Time
- Faculty Responsible
- Task Assigned
- Learning Outcome
- Suggestions

All the assignments should be duly authorized by the faculty responsible for the event.

Student services will be monitored & evaluated by the committee comprising of Program leader & faculty (as approved by HOI) and the marks will be allotted based on the performance, attitude, learning and utilization of knowledge in practical field.

C-20
S-20
V-20
P-20
JE-20

Syllabus – Third Semester

TOURISM TRENDS IN INDIA

Course Code: TRM2301 **Credit Units : 03**

Course Objective: To make student aware about new emerging trends of tourism in India.

Course Contents:

Module – I : Trends in Tourism

- Domestic and International Trends and Patterns in Indian Tourism Travel.
- Factors responsible for growth and development of Indian tourism
- Motivations in tourism in India.

Module – II : Tourism in Indian States

- Overview, Trends and Pattern, State Tourism Organization
  - Andhra Pradesh
  - Tamil Nadu
  - Uttar Pradesh
  - Karnataka Madhya Pradesh
  - Delhi

Module – III : Rural Tourism in India

- Meaning, Definition, Concept and Scope of Rural Tourism in India.
- Planning and Management of Rural Tourism
- Sustainable Practices in Rural Tourism
- Benefits of Rural Tourism Development
- Socio-Cultural Impact of Tourism

Module – IV : Reason for Travel in India

- Main Reason and Trends of travelling in India.
- Tourist Arrivals by Mode of Transport: Air, Land, Sea.
- Foreign Tourist Arrivals by Port of Entry.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Indian Tourism Statistics
- Website of Different States of India

TRANSPORT MANAGEMENT

Course Code: TRM2302 **Credit Units : 03**

Course Objective: The purpose of this course is to acquire an in-depth knowledge about the transport management and to become familiar with the techniques and approaches for successful management of tourist transport business.

Course Contents:

Module – I : Introduction to Transport in Tourism

- Evolution of Tourist Transport System
- Importance and Significances of Transport in Tourism.

Module – II : Roadways Industry

- History and Evaluation
- National and State Highways, Express Highways, Golden Quadrilateral.
- Significances of Roadways Transport in Tourism

Module – III : Railways Industry

- History and Evaluation
- Various Tourist Trains: Palace on Wheels, Deccan Odyssey, Fairy Queen**,** 5 Toy Trains
- Significances of Railway Transport in Tourism**.**

Module – IV : Aviation Industry

- History and Evaluation
- Domestic and International Airlines
- Significances of Domestic and International Airlines Transport in Tourism

Module – V : Water Transport

- History and Evaluation
- National and International Cruises
- Significances of WaterTransport in Tourism

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry in India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies, Sterling Publishers, New Delhi

HOSPITALITY MANAGEMENT IN TOURISM

Course Code: TRM2303 **Credit Units : 03**

Course Objective: To provide an overview to the students about the hospitality industry and its importance in tourism.

Course Contents:

Module – I : Introduction to Hospitality

- Hospitality & Hotel: Meaning/Definition, Evolution & History, Classification and Categorization of Hotels, Star Rating of Hotels.

Module – II : Introduction to Hotels

- Organization Structure of a Small, Medium and a Large Hotel, Importance of Grooming and Personality Development, Latest Trends in Hotels

Module – III : Hotel Departments

- Major Departments – Hierarchy, Duties and Responsibilities,
  - Front Office Operations
  - Accommodation Operations
  - F&B Service
  - Food Production

Module – IV : Co-Ordination

- Inter Departmental Co-Ordination
- Support Areas in a Hotel – Duties and Responsibilities
  - Human Resource
  - Accounts
  - Sales and Marketing
  - Purchase Department
  - Security
  - Stores
  - Maintenance

Module – V : Case Study

- A Case Study to be Done on any One of TheFollowing Hotel Chains in India – Taj, Oberoi, Marriot, ITC, Lalit, Hilton, Sheraton, Hyatt, Radisson, TheLeela, etc

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Hotel Management & Operations by Fallon & Rutherford (John Wiley & Sons)
- Introduction to Tourism & Hospitality by Sudhir Andrews (McGraw-Hill Company)
- Introduction to the Hospitality Industry by Tom Powers (John Wiley & Sons)
- Marketing For Hospitality And Tourism 5/e 5th Edition by Philip Kotler (Pearson Education)
- The Origins of Hospitality and Tourism by Kevin D. O'Gorman (Goodfellow Publishers Limited)

TRAVEL DOCUMENTATION

Course Code: TRM2304 **Credit Units : 03**

Course Objective: To make students understand about the documentation process of travelling.

Course Contents:

Module - I: Passport

- Passport, Requirements, Checklists, Types, Changes, Procedure, Tatkal Scheme and Fees, Passport Act and Penalties under Section 12 (1) B

Module - II: Visas

- Documents for obtaining Visa of Major Tourist Destinations of World including Health Check Documents, Types of Visa, Visa Fees, , Refused or Pending Visas, Destination Departure Records.
- Difference between Visa and Passport.

Module - III: Travel out of India

- Rules and Regulations about Eligibility, Quantum and Documentation Required for Foreign Exchange Management Act, Basic Travel Quota, Foreign Exchange for Business, TC, Emigration Requirements, ECNR

Module - IV: Passenger Ticket

- Different Coupons, Ticketing Instruction and Conjunction Tickets, Open Tickets, E-Tickets and its Advantages, Miscellaneous Charges Order (MCO) and Prepaid Ticket Advice (PTA), The Rounding off of Currencies, Referring to Airline Time Table, TIM, OAG, PAT.

Module - V: Destinations

- Tourist Visa for New Zealand and Australia Tourist Visa for Europe Tourist Visa of USA & Canada

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings

- Websites of UK, USA, Canada and Australia
- Websites of Indian ministries and offices related to foreign exchange

TOUR PACKAGING MANAGEMENT

Course Code: TRM2305 **Credit Units : 03**

Course Objective: To provide students with the ability to initiate and carry out advanced analysis and research in the field of destination development.

Course Contents:

Module – I : Tour Package

- Meaning, Type of Tour Package & its Components

Module – II : Planning of Tour Package

- Designing and Process of Tour Package
- Factor Affecting Tour Package

Module – III : Designing of Different Tour Packages

- Cultural Tourism Product: Designing, Development, Issues and Considerations
- Heritage Tourism Product: Designing, Development, Issues and Considerations

Module – IV : Designing of Different Tour Packages

- Religious Tourism Product: Designing, Development, Issues and Considerations
- Medical Tourism Product: Designing, Development, Issues and Considerations

Module – V : Destination Management Handling Company

- Meaning, Factor of Consideration to chose Destination Management Handling Company

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry ii1 India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies, Sterling Publishers, New Delhi
- Chand Mohinder, Travel Agency Management: An Introductory Text, Anmol Publisher; 2nd Revised edition edition (1 November 2007)

AUTOMATION IN TRAVEL AND TOURISM

Course Code: TRM2306 **Credit Units : 02**

Course Objective: Tomake students familiar with the different CRS/GDS systems.

Course Contents:

Module – I : Automation in the Tourism Industry

- An Introduction of CRS/GDS
- Importance of Information Technology in Tourism
- Automation in theHotel, Airlines and Travel Business

Module – II : CRS/GDS

- Use and Practices of Galileo / Amadeus

Examination Scheme:

Internal: 30 Marks

Components	**JE**	**LE**	**VV**	**A**
Weightage (%)	05	15	05	05

End-Term: 70 Marks

Components	**JE**	**VV**	**GP**	**LE**
Weightage (%)	05	5	10	50

Abbreviation: JE= Journal Evaluation; LE= Lab Evaluation; VV= Viva-Voce; GP= Grooming & Punctuality

Suggested Readings:

- Lucas Jr., H. C. (2005) Information Technology For Management McGraw Hill.
- Burch, J. and Grudnitski G. (1989). Information Systems:
- Theory and Practice. 5th ed., John Wiley, New York.
- David, V. (1992). Foundations of Business Systems, Dryden Press, Fort Worth.

FUNDAMENTALS OF ACCOUNTING-II

Course Code: TRM2307 **Credit Units : 02**

Course Objective:
At the end of the semester students will be able to
- The concept of double entry book keeping system
- Reconcile the bank statement
- Check the accuracy of accounts
- Prepare trial balance / P&L A/c and balance sheet concept
- The hospitality revenue and non revenue producing departmental accounting system
- The for casting of expense and revenue
- The concept of budgeting
- The hotel departmental accounting system.

Course Contents:

Module - I
Cash Book, Meaning, Advantages, Simple, Double and Three Column Petty Cash book with imprest system (simple and tabular forms), Practical

Module - II: Final Accounts
Meaning, Procedure for preparation of final accounts , Difference between Trading Accounts, Profit & Loss Accounts & Balance Sheet

Module - III: Adjustments
Closing Stock, Prepaid expenses, Outstanding expenses, Depreciation

Module - IV: Capital and Revenue Expenditure
Meaning, Definition of Capital and Revenue Expenditure,

Module V: Depreciation
Meaning of Depreciation, Need and Causes, Straight line method, Diminishing Balance method, Practical

Module VI: Ratio Analysis
Importance of Ratios
- Liquidity Ratios, Current ratio, Quick ratio, **Solvency Ratios,** Debt equity ratio, Interest coverage ratio

Activity Ratio, Capital turnover ratio, Stock turnover ratio, Debtors turnover ratio, **Profitability Ratios**
- Gross profit ratio, Net profit ratio.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Element of Hotel Accounting by Dr. J.M Negi, HKS International
- Finance & Cost Control- Techniques in the Hotel & Catering Industry by Dr. J.M Negi, Metropolita Publication, New Delhi
- Management Accounting by Dr. Hingorani& Prof. Ramanathan, Sultan Chand & Sons
- Hotel Management – Accounting & Control by JagmohanNegi, Himnalayan Publishing House, New Delhi.
- Management Accounting & Financial Control by Dr. S.N Maheshwari, Sultan Chand & Sons
- Understanding Hospitality Accounting by Raymond Cote, EI-AH&LA USA
- Financial Accounting by G.C Maheshwari, NCERT, N. Delhi
- Fundamentals of Hotel Accounting by G.S. Rawat& Dr. J.M Negi.

Syllabus – Fourth Semester

TOURISM PLANNING AND POLICY

Course Code: TRM2401 **Credit Units : 03**

Course Objective: To develop an understanding of the basic concepts of tourism planning for public and private sector community and regional tourism development

Course Contents:

Module – I : Introduction to Tourism Planning

- Evolution of Tourism planning, Importance, Planning Process, Planning Approaches, Tourism Planning.

Module – II : Stakeholder Participation

- Concept, Need, Objective, Institutional Framework of Public Tourism Policy.
- The Role of Government, Public and Private Sector in Formulation of Tourism Policy.
- Policy Making Bodies and its Process at National Levels.

Module – III : Outline of Tourism Policy

- L.K. Jha Committee - 1963, National Tourism Policy - 1982,
- National Committee Report - 2002, National Action Plan on Tourism – 1992.
- The Latest Policy Document on Tourism.

Module – IV : Type of Tourism Planning

- International, National, Regional, State and Local Level.
- Agents and Typologies of Tourism Development.

Module – V : International Agreements

- Chicago Convention, Warsaw Convention, Open Sky Policy, Bermuda Convention, Euro Agreement, Schengen Agreement

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Indian Tourism Beyond the Millennium - Bezbaruah M.P. (New Delhi)
- Tourism: Past Present & Future : Burkart A.J. and Medlik (London, Heinemann)
- Essays on Tourism : Chib, SomNath (New Delhi, Cross Section Publication)
- Travel Industry : Gee, Chunk Y., James C. & Dexter J.L. Choy (New York, Van Nostrand Reinhold)
- Tourism Planning : Gunn. Clare A. (New York, Taylor & Francis)
- Tourism Dimensions : S.P. Tiwari (New Delhi)
- Tourism : A Community Approach - Murphy, Peter E. (New York, Methuen)
- Tourism Planning : An integrated and Sustainable Approach - Inskeep E.
- National &Reginal Tourism Planning : Inskeep E. (Londown, Routledge)
- Ecotourism: A case guide for planners and managers - Ecotourism Society
- Report of Adhoc Committee on Tourism - 1963
- National Tourism Policy - 1982
- National Committee Report - 2002
- National Action - 1992

- Draft of Tourism Policy – 1997
- Young G. Tourism: Blessing or Blight Pengain Book 1973.
- Cheechi and Co. The Future of Tourism in far East 1961.
- Copen Evic. 'Towards a Sociology of International Tourism, Social Research 39.1 91972) 164-82.
- Cleverdon Robert: The Economic and Social Impact of International Tourism in Developing Countries (London: The Economic Intelligence Unit Ltd. 1979)

CARGO MANAGEMENT

Course Code: TRM2402 **Credit Units : 03**

Course Objective: The objective of this subject is to provide the participants with a good knowledge of airfreight operations, services and management that can support them in various business functions and roles such as operations, customer service, account management and sales

Course Contents:

Module – I : Introduction to Air Cargo

- Aviation and Airline Terminology, IATA Areas, Country Currency, Airlines /Aircraft Layout , Different Types of Aircraft

Module – II : Aircraft Manufacturers

- Aircraft Manufacturers, ULD, International Air Routes, Airports Codes, Consortium, Hub & Spoke Process Flow

Module – III : General Process

- Advices, Booking , SLI, Labeling , Volume/ Weight Ratio, Shipment Planning , TACT, Air Cargo Rates and Charges, Cargo Operations, Cargo Operations Process, Customs Clearance

Module – IV : Air Freight

- Air Freight Forwarding: Air freight Exports and Imports, Special Cargoes , Consolidation

Module – V : Documentation

- Air Way Bill (AWB), Communication, Handling COD Shipments, POD, Conditions of Contract, Dangerous (DGR) or Hazardous Goods

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Air transport logistics by Simon Taylor (Hampton)
- Air cargo distributions: a management analysis of its economic and marketing benefits / [by] Paul ackson and William Brackenridge (Gower Press)
- Air freight: operations, marketing and economics / (by) Peter S. Smith (Faber)
- 4th Party Cyber Logistics for Air Cargo by Sung Chi-Chu (Boston : Kluwer Academic Publishers)
- Accelerated Logistics by Mark Wang (Santa Monica CA)
- Airports; some elements of designs and future development-John Walter wood
- Fundamental of air transport management by P.S.Senguttavan.
- Oxford ATLAS-OXFORD PUBLISHING
- Aviation century: wings of change- A global survey-Ratandeepsingh-jain book

ITINERARY DESIGNING MANAGEMENT

Course Code: TRM2403 **Credit Units : 03**

Course Objective: To make students understand about different tour packages and itinerary.

Course Contents:

Module – I : Itinerary Planning

- Itinerary and its Importance
- Types of Itineraries and Component of Itinerary
- Factors to keep in Mind while Designing an Itinerary
- Type of Journey

Module – II : Itinerary for Inbound Tourist

- Itinerary on Buddhist Circuit, Itinerary on Puri-Bhubaneswar-Konark

Module – III : Itinerary for Inbound Tourist

- Itineraries for Inbound and Domestic Tourists:- Golden Triangle, Rajasthan Tour, Kerala Tour

Module – IV : Itinerary for Outbound Tourist

- Popular Outbound Itineraries of Singapore, Malaysia, Thailand , Europe Tour, Australia Tour

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Travel Agency and Tour Operation, Concepts and Principls - J.M.S. Negi
- Professional Travel Agency Management - Chunk, James, Dexter &Boberg
- The Business of Travel Agency Operations and Management - D.L. Foster
- Travel Agency Management-An Introductory Text, Anmol Publication New Delhi.
- Tourist Guide and Tour Operations, Kanishka Publication, New Delhi.

AIRLINE OPERATION MANAGEMENT

Course Code: TRM2404 **Credit Units : 03**

Course Objective: To make students familiarize with the travel modes and documents.

Course Contents:

Module – I : Management of Airport

- Airport Codes, Airline Codes, Phonetic Alphabet, Airport Lounges, How airports Work?, Baggage Handling, Airport Security

Module – II : Introduction to Journey and Tickets

- Types of Journeys (OW, CT, RT, OJ, RTW).
- Passenger Ticket: Different Coupons, Ticketing Instruction and Conjunction Tickets, Open Tickets, E-Tickets and Its Advantages
- Miscellaneous Charges Order (MCO) and Prepaid Ticket Advice (PTA),The Rounding off of Currencies
- Referring to Airline Time Table, TIM, OAG, PAT.

Module – III : Management of Airlines

- Types of Airlines, Airlines Personnel and Revenue Earning, Airport Management, Study of Aircraft Parts, The Aircraft Turnaround, The Control Tower, Airport Facilities and Special Passengers, Airport Access.

Module – IV : Airport Formalities

- Check in Facilities, Landing Facilities for Departing Passengers, In-Flight Services, Cabin Component, Audio and Video Projection Equipment, Emergency Equipment for Disembarkation, In-Flight Entertainment, Classes of Service with more Comfort.

Module – V : Case Study Discussions

- Jet Airways, Kingfisher, Indian Airlines
- British Airways, Fly Emirates, Singapore Airlines

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings*:*

- JagmohanNegi: Travel Agency & Tour Operation – Concepts and Principles. (Kanishka Pub, New Delhi)
- JagmohanNegi: Air Travel and Fare Construction. - Kanishka Pub, New Delhi 2004
- Dennis. L. Foster: The Business of Travel Agency Operations and Administration (Mc. Graw Hill)
- Study Kit for IATA/UFTAA - Foundation Course: -
    - Module – I – Introduction to tourism
    - Module – II – Travel Geography
    - Module – III – Air Transport
    - Module – IV – Air Fares &Ticketing

MANAGEMENT INFORMATION SYSTEM

Course Code: TRM2405 **Credit Units : 01**

Course Objective:
At the end of the semester the students will develop a clear concept on –
- Management Information System (MIS)
- Role of Hotel Information System
- Various interfaces used in Hospitality Industry

Module – I : Management Information System (MIS)
- Concepts, evaluation & meaning
- MIS Designs and functions
- Managing multi processor environments.
- MIS Security issues
- MIS performance evaluation

Module – II : Hotel Information System
- The Concept
- Software Modules
  - Reservation
  - Guest Accounting
  - Room Management
  - Point of Sales
  - General Management

Module – III : Computer Based Reservation System
- Global Distribution System
- Inter sell agencies
- Central Reservation Systems(CRS)
- Affiliate and Non Affiliate Systems
- Property Level Reservation Systems
  - Reservation Inquiry
  - Determination of Availability
  - Creation of Reservation Record
  - Maintenance of Reservation Records
- Generation of reports.
- New Developments Reservation through the Internet

Module – IV : Guest Accounting Module
- Types of Accounts
- Posting entries to Accounts
- Night audit routine
- Account settlement
- Generation of reports

Module – V : Property Management System Interfaces
- Point of sale Systems (POS)
- Cash Accounting Systems (CAS)
- CAS / PMS Advantages and concerns.
- Electronic Locking Systems.
- Energy Management Systems.
- Auxiliary Guest Services

- Guest Operated Devices in room Vending Systems
- Guest Information Systems

Module – VI : Point of Sale - Applications

- POS order - Entry units
- Key Boards and Monitors
- Touch Screen Terminals
- Immediate Character Recognition (ICR) Terminal.
- Wireless Terminals
- POSD Printers.
- Guest check Printers
- Receipt Printers
- Workstation Printers
- Consolidated reports

Module – VII : Accounting Applications

- Account Receivable Module
- Account Payable Module
- Payroll Module
- Inventory Module
- Purchasing Module
- Financial Reporting Module

Module – VIII : Selecting and Implementing Computer Systems

- Analyzing Current Information Needs
- Collection Information of Computer Systems
- Establishing System Requirements
- Proposals from Vendors
- Contract Negotiations
- Installation Factors

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Management Information System James A O' Brien
- Management Information System 2nd Ed Gordon B Davis

PRINCIPLES OF MANAGEMENT

Course Code: TRM2406 **Credit Units : 01**

Course Objective: To make students understand management concepts and their application in the field of tourism industry.

Course Contents:

Module – I : Introduction to Management

- Concept, Nature, Functions, Process, Traits of a Successful Manager and Managerial Role.
- Management and Society: Business Ethics and Social Responsibilities

Module – II : Planning

- Nature, Purpose, Types and Process of Planning.

Module – III : Organizing

- Concept of Organizing and Organization. Line & Staff, Span of Control.
- Delegation, Decentralization Organization Structure.

Module – IV : Directing

- Communication-Process and Types of Communication, Barriers and Principles of Effective Communication
- Motivation: Meaning, Theories, Maslow and Herzberg, Leadership
- Co-Ordination: Meaning, Definition, Principles of Co-Ordination, Techniques of Effective Co-Ordination.

Module – V : Leadership

- Concept, Qualities of a Successful Leader: Factors Influencing Performance of Leaders. Styles of Leadership, Management Grid.
- Controlling: Process. Methods and Techniques

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Stoner. Jeen (2005), Management. Prentice Hall, New Delhi
- R.K. Singla,(2007) Business Management, V.K. publication, new Delhi.
- D.K.Goyal,(2008), Business Management, Arya publication
- Prasad. L.M.(2007), Principles and Practice of Management, Sultan Chand and Sons, New Delhi
- Banerjee, S. (2006), Principles and Practice of Management, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi

ECONOMICS OF TOURISM

Course Code: TRM2407 **Credit Units : 01**

Course Objective:
At the end of the semester students would be able to:-
It intends to help the students in understanding the nature of Indian Economy in general & economic planning for tourism & hospitality in general.
It will further help them to understand the basic mechanism of pricing of products in different sector of economy with a special focus on product formulation, packaging & pricing of tourist & hospitality product.

Course Contents:

Module - I
- Meaning of Economics

Module - II
- Relevance of Economics in Hospitality and Tourism Industry

Module - III
- Meaning of Demand

Module - IV
- Demand Curve Analysis

Module V
- Factors Affecting Demand

Module VI
- Concept of inflation and types of inflation

Module VII
- Demand and methods of Forecasting

Module VIII
- GDP (Gross Domestic Product) & GNP (Gross National Product)

Module - IX
- Fiscal Policy and its Feature and Mechanism

Module X
- Monetary Policy and its functions

Module XI
- Economic Growth and Economic Development, Growth Patterns of Indian Economy

Module XII
- Market Structure and Hospitality and Tourism Industry

Module XIII
- A small capsule on WTO and its implications on Hospitality and Tourism Industry has also been included.

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

Text:

- Tourism Economics by Mathieson Alistor& Wall Gerllliej, Physical & Social Impacts.
- The Economics, Travel & Tourism by Anil Andirous, LengmanCheshues, Melbourne.
- International Travel & Tourism- Principles & Concepts by Dr. JM Negi, S. Chand & Co, New Delhi

References:

- Managerial Economics by Mote Lal& Gupta, Tata McGraw Hill, New Delhi
- Fundamentals of Economic Balances
- Indian Economy by AN Aggarwal
- Indian Economy by Dutta&Sundram
- Indian Economy by Saradesai.

Syllabus - Fifth Semester

INDUSTRIAL TRAINING PROJECT & PRACTICUM

Course Code: TRM2535 **Credit Units: 20**

Course Objective:
At the end of the industrial training the student would be able to:
(i) understand and explain the organization structure of a Travel Agency / Tour Operator
(ii) prepare job descriptions of various job titles in the organisation
(iii) understand various procedures & functions followed for:-
1. Reservations
2. Information
3. Booking
4. Ticketing
5. Bills and Cash
6. Guest Relations
7. Auditing

(iv) maintain various records & registers and understand their uses.

On completion of the project the student will be required to submit the following:
Project File or Industrial workflow log book - The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.
In general, the File should be comprehensive and include:
- A short account of the activities that were undertaken as part of the training;
- A statement about the extent to which the training has achieved its stated goals.
- A statement about the outcomes of the learning, evaluation and dissemination processes engaged in as part of the training;
- Any activities planned but not yet completed as part of the training, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Training Report
The report should be submitted in duplicate (2 copies) spiral bound and a CD and should contain the following components:
- **Title or Cover Page**

The title page should contain the following information: Department Name; Student's Name; Course; Year; Supervisor's Name.
- **Acknowledgements**

Acknowledgment to any advisory received in the course of work may be given.

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Suggestions**

In writing these section, emphasis should be given on what has been performed and achieved in the course of the work and any ideas/suggestions they feel will can be implemented, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Appendices**

The Appendix contains material which is of interest to the reader ,and may include any forms, formats and any problem that have arisen that may be useful to document for future reference.

- **Performance Appraisal & Completion Certificate** duly signed and stamped

Examination Scheme:

Appraisal Report:	50
Log book + Attendance + Appraisal	20
Presentation & Viva Voce:	30
Total:	**100**

Syllabus – Sixth Semester

ECO-TOURISM AND SUSTAINABLE TOURISM

Course Code: TRM2601 **Credit Units : 03**

Course Objective: To explore the interrelationships between the environment & its resource for sustainable tourism planning and development.

Course Contents:

Module – I : Eco Tourism

- Eco Tourism and Development: Community Awareness and Participation Contribution of Eco-Tourism to Environmental Conservation: Socio-Cultural Conservation

Module – II : Benefits and Impacts

- Mass and Alternative Tourism, Potential Benefits from Ecotourism.
- Environmental Impacts of Tourism
- Difference Between Mass and Green Tourism

Module – III : Eco-Tourism Planning and development strategies

- Eco-Tourism Strategies with Special Reference to Environmental Protection (Environmental Impact Analysis)

Module – IV : Sustainable Tourism

- Definition of, Benefits and Importance of Sustainable Tourism, Agenda 21, Definition and Bodies Promoting Sustainable Tourism, Principles of Sustainable Tourism, Process to set up Sustainable Development at Tourist Destination.

Module – V : Carrying Capacity

- Types of Carrying Capacity: Physical, Biological, Social Carrying Capacity, Importance of Carrying Capacity, Effect of Guest Population on the Carrying Capacity.

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Uma Pillai, 2004, Ecotourism and Environmental Handbook
- Harish Bhatt and B.S. Badan, 2006, Ecotourism
- Baldvin J.H. (1985) Environmental Planning and Management. I.B.D. Dehradun
- Singh Ratandeep : Handbook of Environmental Guidelines for Indian Tourism, Kanishka Publishers, New Delhi.
- RomilaChawla : Wildlife Tourism and Development; Sonali Publications, New Delhi.
- Dash M.C. (1993) fundamentals of Ecology (New Delhi), Tata McGraw Hill Co.Ltd., Publishing Co.Ltd.)
- Eagles P.F.J. 1987. The Planning and Management of Environmentally sensitive areas. (U.S., A.Lengman).
- Khoshov T.N. 1987. The Planning and Management of Environmentally sensitive areas. (U.S., A.Lengman).
- Kormandy E.J. (1989) Environmental issues Concerns and Strategies (New Delhi) Ashish
- Mcnealy J. (1989), Economics and Biological Diversity I.U.C.N. (Switzerland)

- Mridula& N. Dutt (1991) Ecology and Tourism (New Delhi, Universal Publishers)
- Negi. J (1990) Tourism development and Resource conservation (New Delhi Metropolitan)
- Sapru R.K. (1987) Environment Management in India (New Delhi) Ashish.
- Singh T.V., J. Kaur and D.P. Singh (1982) Studies in Tourism Wildlife parts conservation (New Delhi Metropolitan)
- Singh S.C. (Ed.) 1989) Impact of tourism on mountain Environment (Meerat Research India Publications)
- Verma P.S. and V.R. Agarwal; 1996 Principles of Ecology (New Delhi S. Chand)
- Kandari O. P., Chandra Ashish : Tourism Biodiversity & Sustainable Development, Isha Books, Delhi.

TOURIST BEHAVIOUR

Course Code: TRM2602 **Credit Units : 03**

Module – I : Understanding Travel & Tourism Behavior

- Characteristics affecting consumer behavior - cultural Factors, Social Factors, Personal Factors, Psychological Factors, Group Factors
- Models of consumer behavior - Economic Man, Passive Men, Cognitive Man, Emotional Man,
- Black Box Model
- High Commitment & Low Commitment Consumer Behavior.

Module – II : Examination of tourist forms & types & there characteristics

- Activities, Interests & Opinions of Tourism Market Segments & Their Buying Decision Behavior.
- Buyer Decision Process - Need Recognition, Information Search, Evaluation of Alternatives, Purchase Decision
- Post Purchase Behaviour.

Module – III : Tourist as an individual

- Tourist Behaviour, Tourist Perception, Learning and Attitudes Concepts, Process, Important Theories and Application of The Concepts to Tourist Behaviour.

Module – IV : Impact of Tourism in Society

- Specific consideration of Host Guest-Interaction & Their Impact On Physical, Social &Cultural Environments, Cross-Cultural Impacts.
- Management Implication- Consideration of the Implications for Tourism Managements, Communication, Promotion, Tourist Guide Interactions.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Case Studies In Tourism and Hospitality Marketing, Harris
- Cases in Hospitality & Tourism Management, O' Halloram / Amy Allen
- Ecotourism & Sustainable Development, Ravishankar Kumar Singh
- Encyclopedia of Ecotourism, Eco-Tourism Edited By P.C. Sinha
- Environment Security & Tourism Development in South Asia (3 Vol. Set), Pandey, Isha
- Environmental Consciousness : Urban Planning--Tracts for The Times, M.N.Buch,Orient Longman
- Environmental management, S. N. Chary, Vyasulu Vinod, Macmillan Press Ltd
- Environmental Management in The Hospitality Industry: A Guide for Students & Managers, Kathryn Webster Cassell education ltd.
- Hospitality and travel marketing, Alastair M. Morrison Delmar pub.
- International Tourism An Economic Perspective, Francois Vellas, Lionel Becherel Macmillan Press Ltd
- National Eco-Tourism & Wildlife Tourism : Policies & Guidelines, Singh
- Natural Area Tourism, Newsome
- Nature - Based Tourism in Peripheral Areas, Hall
- Tourism & hoteliering, J. M. S. Negi Pitman Pub.

TOURISM & HOSPITALITY IMPACTS

Course Code: TRM2603 **Credit Units : 03**

Module – I : Hospitality Industry and Tourism
Relation of Hospitality Industry with Tourism, Definition, size and scope of Hotel Industry,
Principles and concepts of Hotel and its objectives, organization, departments and classification of Hotels, star categorization, Types of rooms and Types of plan- License, permits and regulatory condition and guidelines for hotel

Module – II : Hospitality Industry
Operational Organisation structure of a Hotel, Various departments and their main activities, Importance of each from tour operations point of view

Module – III : Handling Tourists at Front Office
Front Office Techniques- Front office lay out and activities, guest activities in hotel reservation, role of reception - Forecasting room availability, registration procedure, handling guests on arrival, , Billing and departure activities, Group Handling, Role of Front Office Manager and Personnel, Housekeeping Activities.

Module – IV :Handling Tourists at F&B Division
Food and Beverages activities, Banquet Function, Convention Halls, Meeting room- Arrangement for general and business meetings, organizations and procedure for arrangement of conferences and exhibitions and outdoor catering.

Module – V : Resort Management
Historical perspective, Indian scenario, basic characteristics, phases of resort planning and development, trends and factors in development, Trends and factors in developed tourist markets leading to growth to resort concept, basic element of a resort complex- Loading facilities, land escaping, Dining and Drinking facilities, Family oriented services, shops and entertainment services

Module – VI : Impacts
Impact of Tourism on Hotel Industry and vice versa – Business, Facilityfor tourist, marketing Job opportunity, Govt. revenue earning etc.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Case Studies In Tourism and Hospitality Marketing, Harris
- Cases in Hospitality & Tourism Management, O' Halloram / Amy Allen
- Ecotourism, Page
- Ecotourism & Sustainable Development, Ravishankar Kumar Singh
- Encyclopedia of Ecotourism, Edited By P.C. Sinha
- Endangered Animals of India, S. M. Nair National book Trust
- Environment Security & Tourism Development in South Asia (3 Vol. Set), Pandey Isha
- Environmental Consciousness : Urban Planning--Tracts for The Times, M.N.Buch Orient Longman
- Environmental management, S. N. Chary, Vyasulu Vinod, Macmillan Press Ltd
- Environmental Management in The Hospitality Industry: A Guide for Students & Managers, Kathryn Webster, Cassell education ltd.

- eTourism: Information technology for strategic tourism management, Buhalis
- A Guide to India's Wildlife; TT Maps & Pub. Ltd.
- National Eco-Tourism & Wildlife Tourism : Policies & Guidelines, Singh
- Natural Area Tourism, Newsome
- Nature - Based Tourism in Peripheral Areas, Hall
- Understanding The Hospitality Consumer, Alistair Williams, Butterworth Heineman
- World Travel & Tourism Development, David Boothroyd...[et al.] THM International Pub.
- World Travel & Tourism Development, THG International Pub.
- World Wide Destinations : Geography of Travel & Tourism, Boniface

SOCIOLOGY OF TOURISM

Course Code: TRM2604 **Credit Units : 03**

Course Objective: The paper looks into the sociological concepts like society, culture, social change etc. so that the student can easily grasp the social impacts of tourism. Similar other issues of concern form the basis of this paper.

Course Contents:

Module – I : Understanding Sociology

- Sociology: Definition, Nature and Scope
- Society: Definition and Different Types of Societies

Module – II : Sociological Approach to Tourism

- Sociological Factor in Tourist Motivation, Attitude and Perception
- Social Dimension of Host and Tourist Relationship
- Socio-Cultural Impacts of Tourism

Module – III : Tourism System and the Individual

- Socialization through Interaction and Exchange of Values, Norms, Social Laws and Usages
- Factors Influencing Individual's Role, Behavior, Attitudes and Experiences at the Destination

Module – IV : Tourism and Social Institutions

- Social Institutions and their Roles
- Factors Influencing the Roles and Status of Social Institutions
- Influence of Tourism on Social Institutions

Module – V : Tourism and Social Change

- Social Change: Definition and Theories of Social Change
- Factors Affecting Social Change
- Tourism as an Instrument of Social Change

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Apostolopoulos, y., Leivadi, S &Yiannakis, A., (eds.) 2000, The Sociology of Tourism: Theoretical and Empirical Investigations, Routledge, London and New York
- VidyaBhushan and Sachdeva,D.R., 1992. An Introduction to Sociology, KitabMahal, Allahabad
- Srinivas, M.N. 1987. Social Change in Modern India, Orient Longman, New Delhi
- Veena das (Ed.), 2006. Handbook of Indian Sociology, Oxford University Press, New Delhi

MANAGERIAL ACCOUNTING

Course Code: TRM2605 **Credit Units : 01**

Course Objective:
At the end of the semester the students would be able to-
- Understand the concept of managerial accounting
- Explain contents of income statement, balance sheet and departmental income statements and expense statement and solve practical problem
- Understand objectives, characteristics and implementations of internal control
- Distinguish between internal and statutory audit and views of internal audit

Course Contents:

Module – I : Managerial Accounting
- Meaning of managerial accounting
- Functions of managerial accounting
- Utility of managerial accounting

Module – II : Uniform System of Accounts for Hotels
- Introduction to Uniform system of accounts
- Contents of the Income Statement
- Practical Problems
- Contents of the Balance Sheet (under uniform system)
- Practical Problem
- Departmental Income Statements and Expense Statement (Schedules 1 to 16)
- Practical Problem

Module – III : Internal Control
- Definition and objectives of Internal Control
- Characteristics of Internal Control
- Implementation and Review of Internal Control

Module – IV : Internal Audit and Statutory Audit
- An introduction to Internal and Statutory Audit
- Distinction between Internal Audit and Statutory Audit
- Implementation and Review of Internal Audit

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Financial & Cost Control Techniques in Hotel & Catering Industry by JM Negi, Metropolitan, New Delhi
- Elements of Hotel Accountancy by Dr. JM Negi, Aman Publications New Delhi
- Hotel Management – Accounting & Control by Dr. JagmohanNegi, Himalaya Publishing House, New Delhi
- Basic Financial Accounting by Raymond Schmidgall
- Accounting for Hospitality Management by Andrew N Valdamir
- Fundamentals of Accounting by Raymond S Kolt
- An introduction to Accountancy by S N Maheshwari

HOSPITALITY & TOURISM MARKETING

Course Code: TRM2606 **Credit Units : 01**

Course Objective:
At the end of the semester the students will be able to understand the concept of –
- Marketing Hospitality Tourism Products
- Various tools of marketing
- Service Marketing Mix

Module – I : Introduction to Marketing
- Marketing Concepts
- Functions of Marketing
- Importance of Marketing
- Difference between Marketing and Selling
- Related Application of Concept in Hotel Service Industry

Module – II : Marketing Mix – 7P's of Marketing
- Product – Product Management, Development, Product Lifecycle and Branding
- Pricing – Factors Influencing Pricing, Methods of Price Fixation and Strategies
- Promotion – Promotion Mix and Tools,
- People – Encounters, Managing Tourism Experience Through People and Important
- Practices to Manage People
- Process – Elements, Managing Process, Developments in Service Processes in Tourism,
- Physical Evidence – Concept, Role & Components

Module – III : Market Segmentation and Targeting
- Concept of Market Segmentation
- Procedure and Importance of Market Segmentation
- Market Targeting Process
- Product Positioning

Module – IV : Marketing of Tourism & Hospitality Products
- The Tourism Destination
- Marketing Hotels
- Investment in Tourist Attractions
- Identifying Target Markets
- Classification of Visitor Segments
- Monitoring the Tourist Markets
- Organizing and Managing Tourism Marketing
- Marketing to Business and Leisure Travellers
- Marketing to of Hotels to Travel Agents

Module – V : Destination Marketing
- Country, Regions, Cities
- Events and Activities
- Leisure Activities
- Accommodation Marketing
- Marketing Local Foods

Module – VI : Designing of Marketing Mix for Specific situations

- Familiarization Tours
- Tourism Fairs
- During Off Season / On Season – For Hotels

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:

- Case studies in marketing :the Indian Context - R. Srinivason
- Event Marketing & Management - Sanjaya Singh Gaur, Sanjay V Saggere,
- Hospitality Marketing - Phillip Kotler
- Marketing Hospitality: Sales & Marketing for Hotels Motels & Resorts - Dennis L. Foster TATA McGrawhill
- Customer Service: Career Success Through Customer Loyalty, 5/e - Timm
- Hospitality Marketing in E-Commerce Age - Wearne
- Hospitality Marketing Management, 5th Ed - Robert D. Reid, David e Bojanic
- Hotel & Food Service Marketing - Francis ButtleCassell education ltd.
- Hotel Sales & Operation - Ahmed IsmailDelmar pub.
- Marketing for Tourism, 4/e - Holloway
- Marketing Hotel & Restaurant Into The 90's - Melvyn Grefne
- Marketing in Hospitality & Tourism - Richard Teare...[et al.] Cassell education ltd.

DMC INTEGRATED PROJECT

Course Code: TRM2632 **Credit Units: 12**

Course Objective:
To plan a Tourism Destination with varied facilities and attractions

Modus Operandi:

- **Formation of Team of 5 members**
  Team Designates are the following:
  - Project Head
  - Finance Head
  - HR Head
  - Marketing Head
  - Operations Head

  The planning process is shared by the team members according to their respective portfolio.

- **Presentation & Dissertation**
  The Team should present the Project Plan before the selected Board. Dissertation led by the Team Leader and supported by the rest of the team members.

- **Open to Question-Answer Session**
  The Team will be asked Questions on the Project planned by the Board which should be justified by relevant answers.

- **On completion of the project the student will be required to submit the following:**
  - Project Report
  - Presentation

Examination Scheme:

Project Plan:	50
Presentation	20
Viva Voce:	30
Total:	**100**

Syllabus – Seventh Semester

FACILITY MANAGEMENT PLANNING & DESIGN

Course Code: TRM2701 **Credit Units : 01**

Course Objective:
At the end of the semester the students will be able to-
- Explain the Procedures for Planning, Designing & Managing of Hospitality project, its architectural aspects of facility planning, layout &design, and also develop concepts &methods of energy conservation.,.

Course Contents:
Module – I : Design Hospitality Unit
Design Consideration, Attractive Appearance, Efficient Plan, Good Location, Suitable Material, Good Workmanship, Sound financing, Competent Management

Module – II : Project Management
Introduction of Network analysis, Basic rules and procedures for Network analysis, C.P.M. and PERT, Comparison of CPM and PERT, Classroom exercises, Network crashing determining crash cost, normal cost.

Module – III : Facilities Planning
The Systematic Layout Planning Pattern (SLP) for hotel, Planning Consideration, Flow Process and Flow Diagram Procedure for determining space considering ,the guiding factors for the guest room / public facilities, support facilities and services, administration,

Module – IV : Architectural Consideration
Difference between carpet area, plinth area and super built area, their relationships, reading of blueprint (plumbing, electrical, AC, ventilation, FSI, FAR, public areas), Approximate cost of construction estimation Approximate operating areas in various types budget wise, Approximate requirement and estimation of water / electrical load gas, ventilation.

Module – V : Operational Area requirements
Layout and design, Furniture, Equipment, Installation &functioning

Module – VII : Car Parking
Calculation of car park area for different types of hotels

Module – VIII : Energy Conservation
Necessity for energy conservation, Methods of conserving energy in different area of operation of a hotel, Developing and implementing energy conservation program for a hotel

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Readings:
- Systematic Layout Planning by Richard Muther, Cahners Books Division of Sahners Publishing Company Inc. 9 Franklin Street, USA
- Food Service Planning- Layout Equipment by Lendal H Kotschevar&Margrat E Terrell
- Management Operations & Research by N. Satyanarayan&Latika Raman, Himalaya Publishing House.
- Hospitality Facilities Management and Design by David M Stipanuk

TOURISM & ENVIRONMENTAL LAW

Course Code: TRM2702 **Credit Units : 03**

Module – I : Understanding Law in Tourism Industry

Company - meaning, definition, types, formation and incorporation under companies act, 1956.
Contract act - meaning and essentials of a valid contract, breach and termination of contract.

Module – II : Hotel & Accommodation

Laws relating to Accommodation

Module – III : Travel Agents & Tour Operators

Tourism Packages & Legal Issues
Consumer Protection Act - meaning and its relevance in travel and tourism business.
MRTPC - applicability and significance in tourism and travel related business.
Travel Insurance and consumer protection act, International consumer protection acts in tourism

Module – IV : Common Carriers – Air, Land & Sea

Air Law- Law and regulations related to airlines and airways, Laws relating to passenger safety, convenience and compensation during air travel, Baggage concessions for tourist, Compensation for lost and damaged baggage. Insurance for tourists and their baggage. DGCA formalities for business and recreational flying in India
Laws related to surface transport.
Law of Sea - concept, bill of lading and foreign travels

Module – V : Tourist Documents

Laws and legislation relating to tourist entry, stay and departure.
Passport Act & Visa Extension.
Procedure and requirement for procuring various travel documents (passport, visa, Health Certificates & Insurance) with relation to inbound and outbound tourists.
Laws relating to currency exchange, FEMA.

Module – VI : Foreigners Act

Foreigners Act 1946. Special permits to restricted areas for foreign tourist in India, restricted area in India for foreign tourists and related authorities at these places to obtain permits, permits related to various monasteries and wild life areas and their procedure.

Module – VII : Adventure Tour Operation

Law designed for Adventure Tour operation, special permits for Rafting, Paragliding, Heli-Skiing & Angling. Peak booking formalities, IMF rules for mountain expeditions, cancellation of permits and bookings.

Module – VIII : Wild Life, Heritage and Environment

Wild Life Protection Act - Laws related to Environment and Wild Life.
Antiquities & Art Treasures Act – Laws related to Antiquities & Art Treasures
The Ancient Monument & Archaeological Sites & Remains Act
Laws relating to protection, presentation and conservation of heritage and environment.
Environment Protection Act. Air, Water & Noise Pollution Act.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Sachindra Shekhar Bishwas - Protecting The Cultural Heritage
- Sinha P. C - International Encyclopedia of Tourism Management
- Malik S - Ethical & Legal & Regulatory Aspects Tourism Business
- Tourism Guide Lines Published by Govt. of India, Ministry of Tourism.
- Tourism Guidelines Issued By Department of Tourism for Hotel and Restaurant Operation.
- Sajnanimanohar (1999) Indian Tourism Business : A Legal Perspective, New Delhi.
- R. K. Malhotra (2005) Socio – Environmental and Legal Issues In Tourism, New Delhi.
- Gupta S.K. (1989) Foreign Exchange Laws and Practice, Taxman Publications Delhi.
- Sheshadre, B., India's Wild Life and Tribal Life
- Tajvir Singh, Jagdish, Studies in Tourism, Wild Life Parks and Conservation
- A.S.I., Archaeological Remains, Monuments and Museums
- Acharya, Ram, Tourism & Cultural Heritage of India

MICE MANAGEMENT

Course Code: TRM2703 **Credit Units : 02**

Course Objective:
At the end of the semester the students will be able to Explain & understand the concept of Event Management, its Design & Feasibility, Marketing of Event, Financial Management, Risk Management, Planning, Operations & Logistics, Control& Evaluation

Module - I : Introduction to Concept of MICE
- Types of Events- meetings, incentives, conference/conventions, and exhibitions
- Size of Events
- The Event Team
- Code of Ethics
- The impact of conventions on local and national communities.

Module - II : Concept and Design
- Developing The Concept
- Analysing The Concept
- Designing The Event
- Logistics of The Concept

Module – III : Feasibility
- Keys to Success
- The SWOT Analysis

Module - IV : Legal Compliance
- Relevant Legislation
- Official Bodies Involved
- Contracts

Module – V : Marketing of Event
- Nature of Event Marketing
- Process of Event Marketing
- The Marketing Mix
- Sponsorship

Module – VI : Promotion
- Image / Branding
- Advertising
- Publicity
- Public Relations

Module – VII : Financial Management
- The Budget
- Break-Even Point & Cash Flow Analysis
- Profit & Loss Statement
- Balance Sheet
- Financial Control Systems

Module – VIII : Risk Management
- Process of Risk Management
- Incident Reporting

- Emergency Response Plans
- Standards for Risk Management

Module – IX : Planning

- Establish The Aims of The Event & Objectives
- Prepare an Event Proposal
- Planning Tools

Module – X : Protocol

- Order of Precedence; Titles; Styles of Address; Dress Codes
- Protocol for Speakers
- Seating Plans
- Religious & Cultural Protocol
- Rules of Flag Flying

Module – XI : Staging The Event

- Choosing The Event Site
- Developing The Theme
- Providing Services
- Managing The Environment

Module – XII : Staffing

- Recruitment & Selection; Rosters
- Training; Briefing Staff
- Managing Volunteers

Module – XIII : Operations & Logistics

- Logistics
- Policies
- Procedures
- Performance Standards
- Functional Areas

Module – XIV : Crowd Management & Evacuation

- The Crowd Management Plan
- Emergency Planning
- Implementing Emergency Procedures

Module – XV : Control & Evaluation

- Monitoring & Control Systems
- Operational Monitoring & Control
- Evaluation

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Behind The Scenes at Special Events - by Lena Malouf
- Global Meetings & Exhibitions, - by Krugman, John Wiley & Sons
- How to Plan Exhibitions & Conferences From A to Z, Sam Black
- Special Events : Event Leadership for a New World, Goldblatt

DESTINATION MANAGEMENT

Course Code: TRM2704 **Credit Units : 03**

Module – I : Understanding Destination Management
Destination Planning, Development and Management. Nature, Scope and Significance, Destination Development and its Components. Process of Tourism Planning, Necessity of Tourism Plans. Planning of Tourism for the Development of Economy.

Module – II : Significance
Significance of Effective Publicity, Promotion/ Information System/ Tourism Education and Human Resource Development. Major Considerations in Destination Planning, Types, steps and Stages in Destination Planning.

Module – III : Fund flow in Destination Management
Role of Private and public Sector in Destination and Planning Development. In affluent and Developing Economics, Role and Input of Multinationals. Tourism Carrying Capacity Assessment.

Module – III : Planning in India
Approaches to Destination Resort Planning, Levels, Relevance of Planning in National Regional and Local Context. Major Committees and Their Prospective of Tourism Planning. L.K. Jha Committee (1982), National Committee on Tourism Report (1988), National Action Plan (1992), National Tourism Policy(2000), Important Features of Five Year Tourism plans in India.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :
1. Baud, Bovy Munuel and Lawson(1976) Tourism and Recreation Development C.B.I. Pub.6.
2. Likorish Leonard J, 1991 Development Tourism Destination Policies and Perspectives.
3. Seth P.N(1987) Successful Tourism Planning Management, Cross publication.
4. Murphy Peter E.(1987) Tourism- A Community Approach New York.
5. Kaul R.N. 1985 Dynamic of Tourism- A Trilogy Sterling Publishers, New Delhi.

TOURISM TECHNOLOGY & MEDIA

Course Code: TRM2705 **Credit Units : 03**

Module – I : The application of technology in tourism

Introduction – Concept – Development – Benefit to Service Providers & Tourists – Future Prospect

Module – II : Tourism Related Software & Internet links

- Brief idea about Software related to booking of Hotel, Ticket for Airlines, Train, Road Transport, Ocean liners
- Tourism related IT innovations such as Virtual Globetrotting, Virtual Adventure Sports, tourism related Apps, Digital Guide, Digital Map etc.
- Digital Marketing and Travel Distribution Emerging Trends
- Creative on-line Destination and Business Approaches and Successes
- On-line Consumer Reviews and the Impact on Operators and Destinations
- On-line data sources to enhance business success like PATAmPOWER [http://mpower.pata.org/]

Module – III : Digital gadgets - replace the need for human tour guides

- Mobile Phone
- Digital Audio Guide
- New Innovations

Module – IV : Role of media in tourism

Awareness generation through powerful effects of media communications in line of -

- Social Interaction and cultural and educational aspects of our life
- peace, security and sustainable development
- social, cultural, economic, political and environmental benefits
- developing eco tourism

Module – V : Dependency of Tourism on media reporting

Module – VI : Social Media and Simple Acts of Kindness

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Air Travel Ticketing & Fare Construction, Jagmohan Negi
- All You Wanted to Know About Airline Function, Kaykay Sikdar Wheeler pub.
- Case Studies In Tourism and Hospitality Marketing, Harris
- Cases in Hospitality & Tourism Management, O' Halloram / Amy Allen
- eTourism: Information technology for strategic tourism management, Buhalis
- Progressing Tourism Research, Faulkner

HUMAN RESOURCE MANAGEMENT

Course Code: TRM2706 **Credit Units : 01**

Course Objective:
Human Resource Management has acquired significance in the process and problems of developments both in the case of developed & developing nations of the world. It has acquired importance in the case of tourism & hospitality management in creating permanent & better images in the minds of tourists coming with specific perception & motivations. Further it is a complex phenomenon with many equally important components; each requires special skills & talents. The present course intents to place focus on various segments of the hospitality with regards to management of human resources.

Course Contents:

Module - I: Introduction to Management
Definition, Nature, Scope and Functions of Management, Levels of Management and Management Theories - Classical and Neo - Classical Theories, Systems Approach to organization, Modern Organization Theory.

Module - II: Different Function of Management
Planning,Organizing,Staffing,Directing,Management Control

Module - III: Human Resource Management
Role, importance, & Applications in hotel Industry

Module - IV: Human Resource Planning
Importance and Relevance of HRP, Job Analysis, Job Description, Job Specification & Job Evaluation Method

Module V: Recruitment and Selection
Sources of Recruitment, Selection Process, Induction & Orientation.

Module VI: Training and Development
Training Methods and Evaluation

Module VII: Other Human resource related Functions
Motivation and Productivity ,Job Enrichment ,Career planning employee counseling Employee Benefits and Welfare Scheme

Module VIII: Disciplinary Issues
Employee Grievance handling process

Module - IX: Case Study
Live case study on HR from Hospitality industry, solving problems & implementation.

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- HR Development- Quarterly Journal of Administration (ILE), Vol. II, by Briggs B.
- Human Resource Development in Tourism & Hospitality by Dr. JM Negi, Frank Bros, New Delhi.
- Personnel Management by Devans R.S., Vikas Publishing House, New Delhi.
- The Personnel Management Process: Human Resource development by French, Wendell, Houghton Mifflin Company, Bombay
- Personnel Management by Monappa, A.S., Mirza, S, Tata McGraw Hill, Bombay.

ENTREPRENEURSHIP DEVELOPMENT

Course Code: TRM2707 **Credit Units : 01**

Course Objective:
At the end of semester students will be able to-
- Acquire be self-employed and inculcate a habit of self-earning and maintain a dignified life
- Plan a path for hospitality students to make them successful entrepreneurs in their life and contribute to society
- To understand basic knowledge in the field of entrepreneurship development and give them basic exposure of Govt. policies and assistance
- Describes the roles that new venture creation plays in the economy, defines entrepreneurship and show how three factors – individuals, environments and organizations comes through to create the entrepreneurship event
- Impart the knowledge of the resource based framework i.e. Financial, physical, technological, human and organizational
- Exposed get with franchising opportunity and discuss what elements make a business concepts a legitimate franchise opportunity
- Acquire an effective leadership, quality and effective decision-making.

Course Contents:

Module - I: Entrepreneurship Skills

Personality attribute of an entrepreneurs
- Self control-value attitude,Socio-culture factors

Unique characters of the hospitality industry
- Human psychology,Inter-personal relationship,Team building,Customer orientation

Positive entrepreneurship behaviour
- Overcoming external constrains,Solving internal problems

Module - II: Identification of business opportunities in the hospitality industry

Demand / Market Analysis,Present and future competition,Government policy regarding small Enterprises

Module - III: Organization of small enterprises - Form of organization

Sole ownership,Partnership,Private Ltd. Company,Public Ltd. Company,Manpower requirement

Module - IV: Incentives and Assistance-

From central government,From State Government,From Financial Institutions

Module V: Small Enterprises Risk Analysis

Motivational factors,Developing Achievement Orientation,Strength and weakness of Independent Business, Feasibility and viability

Module VI: Establishment of an Enterprise

Registration of business,Licenses and Permits,Financial resources,Organizing material, human and technical resource,Launching the enterprises,Formulating and implanting business strategies

Examination Scheme:

Components	V	H	CT	A	EE
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Small Scale Industries and Entrepreneurship, by Desai Vasant; Bombay, Himalaya
- Small Scale Industries in the Developing Countries, by Staley E. &Morsey R. McGraw Hill.
- Management of Small Scale Industries, by Malhotra I. S. & Gupta S. L,
- Innovation and Entrepreneurship, by Drucker, Peter F; East-West Press (P) Ltd.
- Entrepreneurial Development in India, by Gupta CB &Srinivasan; Sultan Chand
- Entrepreneur Development– New Ventures Creation, by Taneja S & Gupta SL
- Entrepreneurship Management by Dr. ArunaKaulgud, Vikas Publishing House.

Syllabus – Eighth Semester

BASICS OF REVENUE MANAGEMENT

Course Code: TRM2801 **Credit Units : 02**

Course Objective:

At the end of the semester the students will be able to Explain & understand the concept of Revenue Management, necessity of its implementation in Hospitality Industry

1. Concept of Revenue Management

2. Basic Terms

3. Core Concepts of Revenue Management

4. Strategic Planning
   - 4.1 Supply & Demand Ratio
   - 4.2 Cost & Pricing
   - 4.3 Value Pricing
   - 4.4 Differential Pricing

5. Revenue Maximization vs. Optimization

6. Forecasting Demand

7. Inventory and Price Management

8. Overbooking as a Strategy

9. Managing Distribution Channels

10. Ethical aspects of Revenue Management

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

An Introduction to Revenue Management for the Hospitality Industry: Principles and Practices for the Real World,by Tranter

RESEARCH METHODOLOGY

Course Code: TRM2802 **Credit Units : 02**

Course Objective:
Research methodology will be taught in the theory class to prepare students how to approach the subject of research project in the semester. To deal with surging information data regarding the various aspects of tourism industry, one should have a working efficiency with research and statistical techniques. The techniques may be applied in collecting, organizing, analyzing and interpreting data for decision-making. These may also be applied for formulating and testing research hypothesis. The course has been designed to equip the students with latest and necessary field techniques and to build a necessary statistical acumen among them. Students will master the skill for-

- Writing different types of research proposals
- Constructing the relevant tools of research
- Conduct a research project using appropriate qualitative and quantitative techniques
- Write a research report
- Evaluate a research report
- Give presentation of report supported by latest aids.

Course Contents:

Module - I: Research Methodology
Meaning of research, Need and importance of research, Types of research, Criteria of good research

Module - III: Data collection, analysis and interpretation (Sample designing)
Types & Sources of Data, Techniques of data collection; Correlation and regression analysis of two variables only. Hypothesis testing Test of significance, Chi-square analysis, Reports

Module - IV: Preparation of research proposals-
Selection and formulation of research problem, Operationalization of concepts and constructs, Review of related literature, Aims and objectives, Hypothesis, method, sample and tools.

Module V: Evaluation of research report
Research Report Format, Presentation of Report

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Applied General Statistics by Crovton and Crowder
- Behavioural Process in Organizations by Pareek, U.Rao. T.V. &Pestonjee D.M
- Professional Hotel Management by J.M. Negi, S Chand & Co, New Delhi
- Towards Appropriate Tourism– The case of Developing Countries by Peter long Frankfurt
- Method of Social Research – New York; The Free Press
- How to Complete Your Research Work Successfully by Judith Bell; UBS Publisher, Delhi
- How to Research and Write a Thesis in Hospitality & Tourism by James M. Paynter, John Wiley & Sons, New York, USA
- Strategic Management by John A Pearce II & Richard B Robinson Jr.

- Strategic Management by Samual C Cerco
- Quantitative Techniques in Management by Vokra
- Quantitative Approaches to Management by Levin I Richerd

ETHICS IN HOSPITALITY & TOURISM

Course Code: TRM2803 **Credit Units: 03**

Module – I : Ethics and its Significance

Defining ethics and its significance in tourism, Principles and Practices in Business Ethics - its relevance and applicability in Travel & Tourism Industry, Business Compulsions, Motivation and Ethical parameters.

Module – II : Safety & Security

Safety & Security of tourist, Tourist Police, place of Tourism in the constitution, need of tourism legislation

Module – III : Attitude & Behaviour

Attitude & Behaviour of the Tourists, Respect for Local Culture, Respect for Other Religions, Knowledge of Local Laws & Regulations

Module –IV : Impact on Host

Sense of Conservation towards Natural Resources, Concept of Carrying Capacity & Sustainable consumption, Socio-Cultural Impact of Tourism in the host area, Impact of Personal Grooming and Dress Code among the conservative area

Module –V : Communication – Micro level & Macro Level

Communication through Verbal Language & Body Language, Role of Travel Agents, Tour Operator, Guides & Escorts, Role of Media

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- R. K. Malhotra (2005) Socio – Environmental and Legal Issues In Tourism, New Delhi.
- Tourism Guidelines Issued By Department of Tourism for Hotel and Restaurant Operation.
- Tourism Guide Lines Published by Govt. of India, Ministry of Tourism.
- Malik S - Ethical & Legal & Regulatory Aspects Tourism Business
- Sinha P. C - International Encyclopedia of Tourism Management
- Sinha P. C - Tourism Impact Assessment

GDPI SESSIONS

Course Code: TRM2804 **Credit Units : 03**

Course Objective:

These sessions would help the students to perform well in the campus interview at the final year stage.

1. **Pre-Preparation before GD/PI**
   - 1.1 Previous day
   - 1.2 Previous night
   - 1.3 Type of food
   - 1.4 Rest & sleep
   - 1.5 On GD/PI day
   - 1.6 Personal Hygiene
   - 1.7 Grooming
   - 1.8 Curriculum Vitae &Testimonials
   - 1.9 Sense of Time

2. Process of Evaluation during Group Discussion
   - 2.1 Skills assessed in a Group Discussion Session
     - 2.1.1 Leadership skills
     - 2.1.2 Communication skills
     - 2.1.3 Interpersonal skills
     - 2.1.4 Persuasive skills
     - 2.1.5 Problem solving skills
     - 2.1.6 Conceptualizing skills
   - 2.2 Rules to follow during the Group Discussion
   - 2.3 Points to remember during Group Discussion
   - 2.4 What to avoid during Group Discussion - Common Mistakes
   - 2.5 Preparations to be taken before appearing in a Group Discussion
     - 2.5.1 Get noticed - But for the right reasons
     - 2.5.2 Egotism Showing off
     - 2.5.3 Quality Vs Quantity

3. Types of Group Discussion GD topics
   - 3.1 Factual
   - 3.2 Abstract
   - 3.3 Argumentative/ Controversial topics
   - 3.4 Opinion based
   - 3.5 Current topics
   - 3.6 Case based topics

4. Steps on how to prepare for an interview?

5. What is an interview?

6. What's the purpose of an interview

7. What to do Before an Interview

8. What to do During the Interview
   8.1 Make Your Entrance
   8.2 Getting Started
   8.3 Attitude Counts

9. What to do after the Interview is over

10. Interview Do's and Don'ts

Examination Scheme:

Components	**V**	**H**	**CT**	**A**	**EE**
Weightage (%)	05	05	15	5	70

V-viva; H-home assignment; CT-class test; A-attendance; EE-end semester examination

Suggested Reading :

- Body Language – Your Success Mantra Dr. ShaliniVerma S. Chand
- The Pocket Guide to Man watching; Desmond Morris Triad Grafton Books

RESEARCH PROJECT

Course Code: TRM2837 **Credit Units: 15**

Course Objective:
The purpose of research (Hospitality and Tourism based) is to seek answers to problems through the application of scientific methodology, which guarantees that the information is reliable and unbiased. This information is utilized to make conclusions and recommend solution. Some elementary factors need to be kept in mind while preparing a research and deciding the topic, these could be based on its relevance, feasibility, coverage, accuracy and research, objectivity and ethics.
To deal with surging information data regarding the various aspects of tourism industry, one should have a working efficiency with research and statistical techniques. The techniques may be applied in collecting, organizing, analyzing and interpreting data for decision-making. These may also be applied for formulating and testing research hypothesis. The course has been designed to equip the students with latest and necessary field techniques and to build a necessary statistical acumen among them. Students will master the skill for-

- Writing different types of research proposals and reports
- Constructing the relevant tools of research
- Conduct a research project using appropriate qualitative and quantitative techniques
- Do presentation with the help of tutorial aid
- Evaluate a research report.

The research topic should be assigned by the deputed subject faculty in the beginning of semester & should be approved by PL & HOI. Continuous monitoring and guidance should be provided to student at all the steps.
At the term end, the research project will be presented before a panel and evaluated by examiners (As nominated by HOI). The evaluation should be based on presentation, viva, report content & format & conclusion.

Examination Scheme:

Internal Assessment:

Abstract:	10
Draft:	15
Research Orientation:	10
Reading:	05

External Evaluation:

Objective:	05
Issue Profile:	10
Comprehensiveness	10
Relevance:	10
Presentation:	15
Viva:	10

Suggested Reading :

- Applied General Statistics by Crovton and Crowder
- Behavioural Process in Organizations by Pareek, U.Rao. T.V. Pestonjee D.M
- Professional Hotel Management by J.M. Negi, S Chand & Co, New Delhi

- Towards Appropriate Tourism– The case of Developing Countries by Peter long Frankfurt
- Method of Social Research – New York; The Free Press
- How to Complete Your Research Work Successfully by Judith Bell; UBS Publisher, Delhi
- How to Research and Write a Thesis in Hospitality & Tourism by James M. Paynter, John Wiley & Sons, New York, USA.
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Methodology & Techniques of Social Research by Wilkinson &Bhandarkar
- Methods in Social Research by Gode WJ &Hatt PK
- Scientific Social Surveys & Research by Pouline Young & CF Schmid
- Evaluation Information: A Guide for users of Social Scienec by Lescard, Kartzer Jeffery
- Understanding & Conducting Research Application Education &Behavioural Sciences- 2nd Edition.

FOOD & BEVERAGE SERVICE
(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VHM2152	Basics of Food Service	1	-	4	3
VHM2252	Advanced Food Service	1	-	4	3
VHM2352	Beverage Studies-Basic	1	-	4	3
VHM2452	Beverage Studies-Advanced	1	-	4	3
VHM2552	F&B Service Supervisory Skills	1	-	4	3
VHM2652	F&B Management Skills	3	-	-	3
	TOTAL				**18**

FOOD & BEVERAGE SERVICE

Syllabus - Semester First

BASICS OF FOOD SERVICE

Course Code: VHM2152 **Credit Units: 03**

Prerequisites : 10+2

Course Objective:
At the end of the semester the students will be able to –

- Explain the growth and role of hotel industry and catering establishment
- Understand the various types of hotels and their features
- List and explain various catering establishment with their features
- Explain staff organization structure of food and beverage department
- Describe and understand job description of each personnel working in each F&B outlet
- List various F&B service equipment with its use and care.

Course Contents:
Module –I
1.0 Growth of Hotel Industry
  1.1 Sections of The Industry
2.0 Catering Establishments
  2.1 Different Types

Module –II
3.0 Personnel
  3.1 Staff Organisation in F&B Department
  3.2 Attributes of a Waiter

Module –III
4.0 Furniture & Equipment in a Restaurant

Module –IV
5.0 Plan for serving food and beverages
6.0 Greet customer, take orders and serve
7.0 Clean tables and counters

Module –V
8.0 Communicate with customer and colleagues
9.0 Maintain customer-centric service orientation
10.0 Maintain standard of etiquette and hospitable conduct

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Food & Beverage Services by SN Bagchi& Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

Syllabus - Semester Second

ADVANCED FOOD SERVICE

Course Code: VHM2252 **Credit Units: 03**

Prerequisites : Basics of Food Service (VHM2152)

Course Objective:

At the end of the semester the students will be able to –

- Explain the various types of Meals
- Define & explain the concept of Menu
- Classify various methods of Service
- Calculate bill for meals & Handle payment made by the guests
- Deal with different types of guests in different situations
- Maintain hygiene and safety at workplace

Course Contents:

Module – I

1.0 Meals & Menu
- 1.1 Types of Meals
- 1.2 Introduction to Menu
- 1.3 Courses of Menu
- 1.4 Classification of Menu
- 1.5 Types of Service

Module – II

2.0 Deal with customer payment
3.0 Resolve customer service issues
4.0 Follow gender and age sensitive service practices

Module – III

5.0 Maintain IPR of organisation and customers

Module – IV

6.0 Maintain health and hygiene
7.0 Maintain safety at workplace

Module – V

8.0 Service Terminology

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Food & Beverage Services by SN Bagchi& Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

After successful completion of study of the above Courses (VHM2152***&***VHM2252***), the student becomes eligible to appear for "Qualification Pack: Food & Beverage Service – Steward" (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Third

BEVERAGE STUDIES - BASIC

Course Code: VHM2352 **Credit Units: 03**

Prerequisites : Advanced Food Service (VHM2252)

Course Objective:
At the end of the semester the students will be able to –

- Define & Classify Beverage
- State the various types of Non-Alcoholic & Alcoholic Beverages
- Understand & Explain the Classification, Production& service of Beer & Wine
- Manage inventory

Course Contents:
Module – I
1.0 Classification of Beverage
2.0 Non-Alcoholic Beverages

Module – II
3.0 Alcoholic Beverages : Classification
4.0 Beer : Manufacture, Service, Brands

Module – III
5.0 Wine :Classification, Still Wine, Fortified Wine, Sparkling Wine, Production, Wine producing countries, Wine & Food Harmony

Module – IV
6.0 Supervise food and beverage service
7.0 Manage customer service

Module – V
8.0 Manage inventory and staff

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Food & Beverage Services by SN Bagchi& Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

Syllabus - Semester Fourth

BEVERAGE STUDIES - ADVANCED

Course Code: VHM2452 **Credit Units: 03**

Prerequisites : Beverage Studies – Basic (VHM2352)

Course Objective:

At the end of the semester the students will be able to –

- Define & Explain Distillation process
- Classify Spirits
- State the various types of Non-Alcoholic & Alcoholic Beverages
- Understand & Explain the Production & service of various Spirits
- Prepare Cocktails

Course Contents:

Module – I

1.0 Distillation & Spirits

Module – II

2.0 Whisky : Manufacture, Service, Brands
3.0 Rum : Manufacture, Service, Brands
4.0 Gin : Manufacture, Service, Brands
5.0 Vodka : Manufacture, Service, Brands
6.0 Brandy : Manufacture, Service, Brands

Module – III

7.0 Other Spirits – Country of origin, Manufacture, Service, Brands

Module – IV

8.0 Liqueurs : Manufacture, Service, Brands

Module – V

9.0 Cocktails

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Food & Beverage Services by SN Bagchi& Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

After successful completion of study of the above Courses (VHM2552***&***VHM2452***), the student becomes eligible to appear for "Qualification Pack: Captain" (NSQF level - 6) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Fifth

F&B SERVICE SUPERVISORY SKILLS

Course Code: VHM2552 **Credit Units: 03**

Prerequisites : Beverage Studies – Advanced (VHM2452)

Course Objective:
At the end of the semester the students will be able to –

- Develop Supervisory Skills
- Train Staffs
- Manage Inventory & Budget

Course Contents:

Module – I
1.0 Restaurant Planning & Layout
- 1.1 Choosing of Location
- 1.2 Layout Planning
- 1.3 Décor
- 1.4 Furnishing, Fixtures & Fittings
- 1.5 Equipment Selection

Module – II
2.0 Arranging Equipment
3.0 Manage stock

Module – III
4.0 Supervisory Skills

Module – IV
5.0 Training Staffs
Manage human resource and quality

Module – V
6.0 Manage finances of the facility

Examination Scheme:

Components	**Internal Assessment**			**EE**	
	V	**LP**	**A**	**Th**	**Pr**
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Food & Beverage Services by SN Bagchi& Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

Syllabus - Semester Sixth

F&B MANAGEMENT SKILLS

Course Code: VHM2652 **Credit Units: 03**

Prerequisites : Service Supervisory Skills (VHM2552)

Course Objective:
At the end of the semester the students will be able to –

- Understand & Explain F&B Control
- Implement Menu Engineering

Course Contents:

Module – I

1.0 Cycles of Control
- 1.1 Purchasing
- 1.2 Receiving
- 1.3 Storing
- 1.4 Issuing
- 1.5 Preparation
- 1.6 Costing & Selling
- 1.7 Control

Module – II

2.0 Food Cost Control
- 2.1 Food Costing
- 2.2 Checks & Checking System
- 2.3 Standard Costing
- 2.4 Variance Analysis

Module – III

3.0 Budgets & Budgetary Control
- 3.1 Definition, Different Types of Budgeting
- 3.2 Different Steps of Preparing Different Budgets
- 3.3 Budgetary Control
- 3.4 Formats for Budgeting

Module – IV

4.0 Liquor Control
- 4.1 Purchase Procedures
- 4.2 Assessment of Quality
- 4.3 Stock Control
- 4.4 Beverage Sales Control

Module – V

5.0 Menu Engineering

Examination Scheme:

Components	Internal Assessment				EE
	V	**H**	**CT**	**A**	**Th**
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Food & Beverage Services by SN Bagchi& Anita Sharma, Aman Publications, New Delhi
- Food & Beverage Service by Lilicrap
- Food & Beverage Service by R. Singaravelavan, OUP
- F & B Service Manual by Sudhir Andrews, Tata McGraw Hill
- The Waiter by John Fullar
- Professional Table Service by Dennis Lilicrap.
- Food & Beverage Management & Control by Dr. JM Negi, Kanishka Publications, New Delhi

After successful completion of study of the above Courses (VHM2552**&**VHM2652***), the student becomes eligible to appear for "Qualification Pack: Assistant Catering Manager" (NSQF level - 6) examination under THSC & NSDC by paying fees as applicable.***

FOOD PRODUCTION TECHNIQUES
(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VHM2151	Basics of Food Production	1	-	4	3
VHM2251	Food Production Skills	1	-	4	3
VHM2351	Food Production Operations	1	-	4	3
VHM2451	Advanced Food Production	1	-	4	3
VHM2551	Food Production Supervisory Skills	1	-	4	3
VHM2651	Food Production Management	1	-	4	3
	TOTAL				**18**

FOOD PRODUCTION TECHNIQUES

Syllabus - Semester First

BASICS OF FOOD PRODUCTION

Course Code: VHM2151 **Credit Units: 03**

Course Objective:
At the end of the semester the students will be able to –

- Explain the structure of Kitchenin hotel industry
- Understand the use of various resources used in kitchen
- Handle Commodities used in Food Production
- State the methods of cooking & apply the on various ingredients
- Define & prepare Stocks, Sauces & Gravies
- Understand Vegetable Cookery
- Set up and close kitchen
- Meet the need of the customers

Course Contents:
Module –I
1. Organising Kitchen
   1.1. Kitchen Brigade
   1.2. Kitchen Equipment
   1.3. Commodities

Module – II
2. Fundamentals of Cookery
   2.1. Preparation of Ingredients
   2.2. Methods of Cooking
   2.3. Stocks – Definition, Types & Methods
   2.4. Sauce – Definition, Types & Methods
   2.5. Gravy – Definition, Types & Methods

Module – III
3. Soups – Definition, Types & Methods
4. Vegetable Cookery - Basic Knowledge, Identification, Various Cuts, Preparation

Module – IV
5. Assist in food preparation
6. Set up and close kitchen

Module – V
7. Communicate with customer and colleagues
8. Maintain customer-centric service orientation
9. Maintain standard of etiquette and hospitable conduct

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Theory of Catering by KintonCesserani, Published by Hodder & Stoughton
- Practical Cookery by KintonCesserani, Published by Hodder & Stoughton
- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

Syllabus - Semester Second

FOOD PRODUCTION SKILLS

Course Code: VHM2251 **Credit Units: 03**

Prerequisites : Basics of Food Production (VHM2151)

Course Objective:
At the end of the semester the students will be able to –

- Understand concept of Egg cookery
- Classify Fish and prepare various preparations
- Understand types, Cuts & preparation of Poultry / Game
- Explain the various types of Meals
- Define & explain the concept of Menu
- Classify various methods of Service
- Calculate bill for meals & Handle payment made by the guests
- Deal with different types of guests in different situations
- Maintain hygiene and safety at workplace

Course Contents:
Module – I
1. Egg Cookery - Structure, Composition, Varieties, Preparation

Module – II
2. Fish Cookery - Classification, Various Cuts, Preparation

Module – III
3. Poultry / Game Cookery - Classification, Various Cuts, Preparation

Module – IV
4. Meat Cookery
   4.1. Types - Mutton, Lamb, Pork, Beef, Veal
   4.2. Different Cuts & Preparation

Module – V
5. Monitor stock movement

Module – VI
6. Follow gender and age sensitive service practices
7. Maintain IPR of organization and customers
8. Maintain health and hygiene
9. Maintain safety at workplace

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Theory of Catering by KintonCesserani, Published by Hodder & Stoughton
- Practical Cookery by KintonCesserani, Published by Hodder & Stoughton
- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

After successful completion of study of the above Courses (VHM2151***&***VHM2251***), the student becomes eligible to appear for "Qualification Pack: Commis Chef" (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Third

FOOD PRODUCTION OPERATIONS

Course Code: VHM2351 **Credit Units: 03**

Prerequisites : Food Production Skills (VHM2251)

Course Objective:
At the end of the semester the students will be able to –

- Understand importance of Mise-en-place &Mise-en-scene
- Design & Prepare Menu as par Indian Regional Cuisine
- Plan Indian Breakfast Menu & prepare
- Plan Western Breakfast Menu & prepare

Course Contents:
Module –I
1. Indian Regional Cuisine
   1.1. Study of Main Regions: North, South, East & West
   1.2. Main Meals & Snacks

Module –II
2. Indian Regional Cuisine
   2.1. Ethnic Eating Traditional Indian Bread & Sweet Meats

Module –III
3. Indian Regional Cuisine
   3.1. Indian Masalas& their characteristics

Module – IV
4. Breakfast Cookery
   4.1. Indian – region wise
   4.2. Western

Module – V
5. Prepare for food and kitchen activities

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Theory of Catering by KintonCesserani, Published by Hodder & Stoughton
- Practical Cookery by KintonCesserani, Published by Hodder & Stoughton
- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

Syllabus - Semester Fourth

ADVANCED FOOD PRODUCTION

Course Code: VHM2451 **Credit Units: 03**

Prerequisites : Food Production Operations (VHM2351)

Course Objective:

At the end of the semester the students will be able to –

- Design & Prepare Menu as par Occidental & Oriental Cuisines
- Understand concept of Bakery & Confectionery
- Prepare Cookies & Cakes

Course Contents:

Module – I

1. International Cuisine
   - 1.1. English
   - 1.2. Spanish
   - 1.3. French
   - 1.4. Mexican
   - 1.5. Oriental
   - 1.6. Italian
   - 1.7. Pasta Cookery

Module – II

2. Fundamentals of Bakery
   - 2.1. Various Ingredients & their use

Module – III

3. Cookies – types, methods

Module – IV

4. Cakes – types, methods, decoration, faults

Module – V

5. Perform food preparation as per standards
6. Assist the commi and senior chefs

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Theory of Catering by KintonCesserani, Published by Hodder & Stoughton
- Practical Cookery by KintonCesserani, Published by Hodder & Stoughton
- Theory of Cookery by K Arora published by Frank Bros &Co., New Delhi
- Professional chef by John Wiley
- Basic Baking – S. C Dubey

- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

After successful completion of study of the above Courses (VHM2351**&**VHM2451***), the student becomes eligible to appear for "Qualification Pack: Commi 1" (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Fifth

FOOD PRODUCTION SUPERVISORY SKILLS

Course Code: VHM2551 **Credit Units: 03**

Prerequisites : Advanced Food Production (VHM2451)

Course Objective:

- At the end of the semester the students will be able to –
- Prepare Various types of Salads & Sandwiches
- Decorate & Present with appropriate garnish
- Prepare various types of Cold Desserts
- Design Menu for different Catering outlets & understand the importance of Standard Recipe

Course Contents:

Module –I

1. Salads & Sandwiches - Definition, Classification, Preparation Use & Function

Module – II

2. Food Presentation & Garnish
   2.1. Various Aspects of Presentation; Materials Used

Module – III

3. Cold Desserts – Bakery & Confectionery

Module – IV

4. Menu Planning
5. Standardization of Recipe

Module – IV

6. Assist in creating new recipes and writing menus
7. Manage food resources in the kitchen

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Theory of Catering by KintonCesserani, Published by Hodder & Stoughton
- Practical Cookery by KintonCesserani, Published by Hodder & Stoughton
- Theory of Cookery by K Arora published by Frank Bros & Co., New Delhi
- Basic Baking – S. C Dubey
- Professional chef by John Wiley
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

Syllabus - Semester Sixth

FOOD PRODUCTION MANAGEMENT

Course Code: VHM2651 **Credit Units: 03**

Prerequisites : Supervisory Skills (VHM2551)

Course Objective:
At the end of the semester the students will be able to –

- Understand concept & methods of Quantity Food Production
- Prepare various types of Pastries
- Define & explain the concept of Menu
- Classify various methods of Service
- Calculate bill for meals & Handle payment made by the guests
- Deal with different types of guests in different situations
- Maintain hygiene and safety at workplace

Course Contents:

Module – I
1.0 Quantity Food Production

Module – II
2.0 Pastries
- 2.1 Definition
- *2.2* Ingredients Used,
- *2.3* Classification, Methods, Usage, Faults

Module – III
3.0 Modern Trend in Food Production Concept
- 3.1 Frozen Foods
- 3.2 Types
- 3.3 Advantages & Disadvantages
- 3.4 Handling Frozen Foods
- 3.5 Defrosting Techniques

Module – IV
4.0 Kitchen Management
- 4.1 Manage kitchen operations
- 4.2 Perform administrative work

Module – V
5.0 Food Cost
- 5.1 Food Cost Concept
- 5.2 Food Cost Percentage
- 5.3 Control Cycle
- 5.4 Various Reports

Examination Scheme:

Components	Internal Assessment			EE	
	V	**LP**	**A**	**Th**	**Pr**
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Theory of Catering by KintonCesserani, Published by Hodder & Stoughton
- Practical Cookery by KintonCesserani, Published by Hodder & Stoughton
- Theory of Cookery by K Arora published by Frank Bros & Co., New Delhi
- Professional chef by John Wiley
- Basic Baking – S. C Dubey
- Ultimate Cooking Course by Carole clement publish by Joana Lorrenz
- Essential of Cooking by James Peterson published by Artisan
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi.

After successful completion of study of the above Courses (VHM2551**&**VHM2651***), the student becomes eligible to appear for "Qualification Pack: Sous Chef" (NSQF level - 7) examination under THSC & NSDC by paying fees as applicable***

FRONT OFFICE OPERATIONS
(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VHM2153	Fundamentals of Front Office Operations	1	-	4	3
VHM2253	Handling Reception	1	-	4	3
VHM2353	Check-in & Check-out Process	1	-	4	3
VHM2453	Front Office Supervisory Skills	1	-	4	3
VHM2553	Front Office Yield Management	3	-	-	3
VHM2653	Managing Front Office	3	-	-	3
	TOTAL				**18**

FRONT OFFICE OPERATIONS

Syllabus - Semester First

FUNDAMENTALS OF FRONT OFFICE OPERATIONS

Course Code: VHM2153 **Credit Units: 03**

Prerequisites : 10+2

Course Objective:

At the end of the semester the students will be able to –

Understand the various types of hotels and their features
Explain the structure of Front Office Department
Develop clear concept about Accommodation facilities
Handle Reservation activities
Deal effectively with Guests &Colleagues
Maintain Personal Care & Safety

Course Contents:

Module – I

1.0 Structure of Front Office Department
- 1.1 Functional Organisation of Front office
- 1.2 Front Desk Layout and Equipment

Module – II

2.0 Accommodation Concept
- 2.1 Size and Types of Hotel
- 2.2 Types of Rooms
- 2.3 Rate Categories
- 2.4 Food Plans
- 2.5 Basis of Charging Room Rates
- 2.6 Tariff Card

Module – III

3.0 Reservation Activities
- 3.1 Processing of reservation request
- 3.2 Systems & Tools used

Module – IV

4.0 Communicate with customer and colleagues
- 4.1 Maintain standard of etiquette and hospitable conduct
- 4.2 Maintain customer-centric service orientation
- 4.3 Follow gender and age sensitive service practices

Module – V

5.0 Personal Care &Safety
- 5.1 Maintain health and hygiene
- **5.2** Maintain safety at work place

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

Syllabus - Semester Second

HANDLING RECEPTION

Course Code: VHM2253 **Credit Units: 03**

Prerequisites : Fundamentals of Front Office Operations(VHM2153)

Course Objective:
At the end of the semester the students will be able to –

Handle 'On-Arrival' Procedures of a Guest
Understand & Explain various terminologies used in Hotel reception
Handle Guest's Queries, Complaints & Requests
Prepare Guest Bill & Complete the transaction

Course Contents:

Module – I
1.0 On-Arrival Procedures
- 1.1 Receiving, Greeting, Welcoming A Guest
- 1.2 Assessing The Guest Requirements
- 1.3 Registration & Rooming Procedure
- 1.4 Room Change

Module – II
2.0 Concept of - Over Booking, Scanty Baggage, Room Position, Cancellation, Amendment, Walk-in Guest, walking a Guest, Black listed Guest

Module – III
3.0 Attend to guest queries
- 3.1 Handling Guest Requests
- 3.2 Mail Handling Procedures
- 3.3 Message Handling Procedure - Importance, Procedure, Method of Receiving and Transmitting Messages for Guest, Location Form, Paging Procedure

Module – IV
4.0 Checkout & Settlement
- 4.1 Procedures at Reception, Cash Section, Bell Desk
- 4.2 Reduction of Late Charges
- 4.3 Effective Billing & Collection

Module – V
5.0 Maintain IPR of organisation and customers

Examination Scheme:

Components	Internal Assessment			EE	
	V	**LP**	**A**	**Th**	**Pr**
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

After successful completion of study of the above Courses (VHM2153***&***VHM2253***), the student becomes eligible to appear for "Qualification Pack: Front Office Associate" (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Third

CHECK-IN & CHECK-OUT PROCESS

Course Code: VHM2353 **Credit Units: 03**

Prerequisites : Handling Reception (VHM2253)

Course Objective:
At the end of the semester the students will be able to –
Understand the importance of Communication
Deal with special situations that may arise during Front Office operations
Handle Guest complaints
Guide staffs in handling situations
Prepare Duty Rota

Course Contents:
Module –I
1.0 Front office Communication
2.1 Importance of inter-Departmental Communication
2.2 Types & Methods of Communication

Module – II
2.0 Handling of Special Situations Like
2.1 DNS, DNA, RNA, NI (No information)
2.2 Scanty Baggage Guest
2.3 Refusing Accommodation
2.3.1 Black Listed Guest
2.3.2 Walking A Guest

Module – III
3.0 Assist guest in check-in and checkout process –'Express Check-Out'&'Self Check-Out'

Module – IV
4.0 Handling guest complaints and guide front office staff – Staff Organisation, Duty Rotas& Work Schedule

Module – V
5.0 Front Office related terms

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

After successful completion of study of the above Course (VHM2353***), the student becomes eligible to appear for "Qualification Pack: Front Office Executive" (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Fourth

FRONT OFFICE SUPERVISORY SKILLS

Course Code: VHM2453 **Credit Units: 03**

Prerequisites : Check-in & Check-out Process (VHM2353)
Course Objective:
At the end of the semester the students will be able to –

Understand need of Guests
Handle Guests Requests, Complaints, Messages, Mails
Understand Hotel's Security System
Perform as par the operating System of the department
Guide Staffs in dealing with guests

Course Contents:
Module – I
1.0 Communicating with Guests
- 1.1 Handling Guest Requests & Guest Complaints
- 1.2 Message Handling Procedure – Importance, Procedure, Method of Receiving and Transmitting Messages for Guests, Location Form, Paging Procedure
- 1.3 Importance of Handling Mail without Delay, Sorting of Mail

Module – II
2.0 Facilitate a smooth stay for the guests at the hotel
- 2.1 Manual Key Control Procedure
- 2.2 Left Luggage Procedures
- 2.3 Handling of Special Situations Like – VIP / Spat / DG Guests

Module – III
3.0 Hotel / Front office Security System
- 3.1 Methods
- 3.2 Equipment Used
- 3.3 Card Key Control
- 3.4 Emergency Procedures
- 3.5 Management's Role in Security

Module – IV
4.0 Front office Systems
- 4.1 Non-Automated
- 4.2 Semi- Automated
- 4.3 Fully- Automated

Module – V
5.0 Train and supervise front office staffs for –
- 5.1 Receiving, Greeting, Welcoming A Guest
- 5.2 Assessing The Guest Requirements in cases like – FIT, VIP, Group, Foreigner

Examination Scheme:

Components	Internal Assessment			EE	
	V	**LP**	**A**	**Th**	**Pr**
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

After successful completion of study of the above Course (VHM2453***), the student becomes eligible to appear for "Qualification Pack: Guest Relations Manager" (NSQF level - 6) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Fifth

FRONT OFFICE YIELD MANAGEMENT

Course Code: VHM2553 **Credit Units: 03**

Prerequisites : Front Office Supervisory Skills (VHM2453)

Course Objective:

At the end of the semester the students will be able to –

Explain the concept of Yield Management
Take measures to maximize yield of the department
Deal with Staff needs
Analyze Training needs and arrange Training

Course Contents:

Module –I

1.0 Yield Management
- 1.1 Concept of Yield Management
- 1.2 Capacity Management
- 1.3 Discount Allocation

Module – II

2.0 Measuring Yield
- 2.1 Potential Average SGL / DBL Rate
- 2.2 Multiple Occupancy Percentage
- 2.3 Rate Spread
- 2.4 Potential Average Rate
- 2.5 Room Rate Achievement Factor
- 2.6 Yield Statistic
- 2.7 Equivalent Occupancy
- 2.8 Required Non-Room Revenue Per Guest

Module – III

3.0 Elements of Yield Management
- 3.1 Group Room Sales
- 3.2 Transient Room Sales
- 3.3 Food & Beverage Activity
- 3.4 Special Events

Module – IV

4.0 Application of Yield Management Concepts

Module – V

5.0 Human Relations Management

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

Syllabus - Semester Sixth

MANAGING FRONT OFFICE

Course Code: VHM2653 **Credit Units: 03**

Prerequisites : Front Office Yield Management (VHM2553)

Course Objective:
At the end of the semester the students will be able to –

Explain the various types of Meals
Define & explain the concept of Menu
Classify various methods of Service
Calculate bill for meals & Handle payment made by the guests
Deal with different types of guests in different situations
Maintain hygiene and safety at workplace

Course Contents:

Module – I

1.0 Planning & Operations
- 1.1 Plan and control day to day front office activities
- 1.2 Assist in managing the front office operation
- 1.3 Manage the front office staffing process

Module – II

2.0 Establishing Room Rates
- 2.1 Market Condition Approach
- 2.2 Rule-of-Thumb Approach
- 2.3 Hubbart Formula

Module – III

3.0 Forecasting Room Availability
- 3.1 Forecasting Data
- 3.2 Percentage of No-Shows
- 3.3 Percentage of Walk-Ins
- 3.4 Percentage of Over-stays
- 3.5 Percentage of Under-stays
- 3.6 ARR (Average Room Rate)
- 3.7 RevPAR (Revenue Per Available Room)
- 3.8 Forecast Formula
- 3.9 Room Count Considerations

Module – IV

4.0 Budgeting for Operations
- 4.1 Forecasting Rooms Revenue
- 4.2 Estimating Expenses

Module – V

5.0 Evaluating Front Office Operations

- 5.1 Daily Operations Report
- 5.2 Occupancy Ratios
- 5.3 Rooms Revenue Analysis
- 5.4 Operating Ratios
- 5.5 Rooms Division Income Statement & Budget Reports

Examination Scheme:

Components	**Internal Assessment**				**EE**
	V	**H**	**CT**	**A**	**Th**
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Front Office Management by Bardi, John Willy and Sons
- Front Office Management by Mr. Sbhal Nagar
- Professional Hotel Front Office Management – Anutosh Bhakta
- Hotel Management by Dr. Jagmohan Negi, Himalaya Publishing House, New Delhi.
- Professional Hotel Management by Dr. JM Negi, S. Chand & Co, New Delhi
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Front Office by Abbott, Butter Worth Hiemann.
- Front Office Manual by Sudhir Andrews, Tata McGraw Hill

After successful completion of study of the above Courses (VHM2553***&***VHM2653***), the student becomes eligible to appear for "Qualification Pack: Duty Manager" (NSQF level - 7) examination under THSC & NSDC by paying fees as applicable.***

HOUSEKEEPING FUNCTIONS
(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VHM2154	Basics of Housekeeping	1	-	4	3
VHM2254	Rules for Cleaning	1	-	4	3
VHM2354	Laundry Operations	1	-	4	3
VHM2454	Maintaining Guest Room	1	-	4	3
VHM2554	Housekeeping Supervisory Skills	1	-	4	3
VHM2654	Housekeeping Management Skills	3	-	-	3
	TOTAL				**18**

HOUSEKEEPING FUNCTIONS

Syllabus - Semester First

BASICS OF HOUSEKEEPING

Course Code: VHM2154 **Credit Units: 03**

Prerequisites : 10+2

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
Organization of Housekeeping department and its basic functioning
All agents and equipment used for cleaning of all possible surfaces

Course Contents:
Module –I
1.0 Housekeeping Department in Hospitality Industry
- 1.1 Role of Housekeeping in Guest satisfaction and repeat Business
- 1.2 Organizational Structure of Housekeeping Department for: Small Hotel, Medium Hotel, Large Hotel
- 1.3 Layout of the Housekeeping Department

Module –II
2.0 Cleaning Equipment
- 2.1 General Consideration for Selection
- 2.2 Classification & Types of Equipments
- 2.3 Method of Use and Mechanism for Each Type
- 2.4 Care and Maintenance

Module – III
3.0 Cleaning Agents
- 3.1 Classification
- 3.2 General Criteria for Selection
- 3.3 Use, Care & Storage
- 3.4 Distribution & Control

Module – IV
4.0 Care and Cleaning of Different Surface
- 4.1 Metals, Glass, Ceramics, Wood, Wall finishes, Floor finishes, Floor Coverings

Module – V
5.0 Communicate with customer and colleagues
6.0 Maintain safety at workplace

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

Syllabus - Semester Second

RULES FOR CLEANING

Course Code: VHM2254 **Credit Units: 03**

Prerequisites : Basics of Housekeeping (VHM2154)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
- Cleaning Methods & Schedules
- Pests & their control
- Customer-Centric Service
- Maintaining Etiquette & Hygiene

Course Contents:

Module – I
1.0 Introduction to Cleaning
- 1.1 Rules & methods of cleaning
- 1.2 Organizing cleaning schedules
- 1.3 Frequency of cleaning daily, periodic, special

Module – II
2.0 Pests found in the hotel and their control.

Module – III
3.0 Maintain customer-centric service orientation
4.0 Follow gender and age sensitive service practices (FM)

Module – IV
5.0 Maintain standard of etiquette and hospitable conduct
6.0 Maintain health and hygiene

Module – V
7.0 Maintain IPR of organisation and customer

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :
- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M

- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Courses (VHM2154**&**VHM2254***), the student becomes eligible to appear for "Qualification Pack: Cleaner – Carpet and Chair / Surface Polisher" (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Third

LAUNDRY OPERATIONS

Course Code: VHM2354 **Credit Units: 03**

Prerequisites : Rules for Cleaning (VHM2254)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
- Fibre & Fabrics
- Laundry Operations
- Stain Removal

Course Contents:

Module – I
1.0 Fibres& Fabrics
- 1.1 Definition of Fibre
- 1.1 Classification of Fibre - The Origin, Characteristics & Usage in the Hotel, Care & Cleaning

Module – II
2.0 Laundry in Hotel
- 2.1 Duties & Responsibilities of Laundry Staff (Laundry Manager and Shift-In-Leader, Dry Cleaning, Supervisor, Spotter cum Presser, Laundry Clerk, Attendants Valet Runner, Laundry)
- 2.2 Importance and Principles of Laundry Operations
- 2.3 Equipment, Layout & Planning & Laundry (Basic Rules)

Module – III
3.0 Laundry Work Flow
- 3.1 Flow Process of industrial Laundering [Collection, Transportation Arrivals, Sorting, Weighing, Loading, Washing, Rinsing, Starching, Hydro-Extraction, Drying, Unloading, Tumbling, Finishing (Calender / Steam Press) Folding, & Storing Transfer & Use]
- 3.2 Stages in Wash Cycle (Flush-Suds-Bleach Rinse-Sour & Soft-Extract, Break & Soaking)

Module – IV
4.0 Laundry Cleaning Agents
- 4.1 Role of Laundry Agents
- 4.2 Classification of Laundry Agents (Synthetic, Detergent, Built Soap Detergents, Enzyme Action- Detergents, Explain Briefly)

Module – V
5.0 Stain Removal
- 5.1 Special Equipment & Agents
- 5.2 Process of Stain Removal

Examination Scheme:

Components	Internal Assessment			EE	
	V	**LP**	**A**	**Th**	**Pr**
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Course (VHM2354***), the student becomes eligible to appear for "Qualification Pack: Laundry Machine Operator" (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Fourth

MAINTAINING GUEST ROOM

Course Code: VHM2454 **Credit Units: 03**

Prerequisites : Laundry Operations (VHM2354)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:

Guest Room of a Hotel
Cleaning of Guest Room
Bed Making
Use of Guest Room Supplies
Waste Disposal
Room inspection & Report documentation

Course Contents:

Module – I

1.0 Guest Room
- 1.1 Types of Rooms
- 1.2 Room layouts and what are constitutes in a guest room

Module – II

2.0 Guestroom Cleaning
- 2.1 Stacking of Chambers Maid Trolley
- 2.2 Pre – Preparation
- 2.3 Entering the guestroom
- 2.4 Bed Making
- 2.5 Bathroom Cleaning
- 2.6 Second Service
- 2.7 Turndown Service

Module – III

3.0 Identifying Guest Supplies

Module – IV

4.0 Conduct periodic deep cleaning
5.0 Collect and dispose waste properly

Module – V

6.0 Guest Room inspection
7.0 Report, record and prepare documentation

Examination Scheme:

Components	Internal Assessment			EE	
	V	**LP**	**A**	**Th**	**Pr**
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Course (VHM2454***), the student becomes eligible to appear for "Qualification Pack: Room Attendant" (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Fifth

HOUSEKEEPING SUPERVISORY SKILLS

Course Code: VHM2554 **Credit Units: 03**

Prerequisites : Maintaining Guest Room (VHM2454)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
- Safety & Security measures in the organization
- Planning & Supervising Housekeeping work schedule
- Monitoring performance & designing training needs
- Prepare documented record & reports

Course Contents:

Module – I
1.0 Safety and Security
- 1.1 Fire Prevention
- 1.2 Accident Prevention
- 1.3 First Aid
- 1.4 Crime Prevention
- 1.5 Dealing with Emergencies

Module – I
2.0 Plan and prepare for housekeeping services
- 2.1 Periodical Cleaning schedule
- 2.2 Special Cleaning schedule

Module – II
3.0 Supervise and monitor housekeeping services
- 3.1 Inspection & Checking

Module – III
4.0 Support individual and team performance
- 4.1 Analysis performance & Arrange Training if required

Module – IV
5.0 Record and prepare documentation
6.0 Report submission

Examination Scheme:

Components	Internal Assessment			EE	
	V	LP	A	Th	Pr
Weightage (%)	05	20	05	40	30

V-Viva; LP-Lab Performance; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Courses (VHM2554***), the student becomes eligible to appear for "Qualification Pack: Housekeeping Supervisor" (NSQF level - 6) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Sixth

HOUSEKEEPING MANAGEMENT SKILLS

Course Code: VHM2654 **Credit Units: 03**

Prerequisites : Housekeeping Supervisory Skills (VHM2554)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
- Housekeeping Contract Cleaning
- Interior Decoration
- Planning & use of Resources in Housekeeping department
- Overall control of the department

Course Contents:

Module – I
1.0 Contract Cleaning
- 1.1 Types of Contract Cleaning
- 1.2 Methods of Pricing of Contract Cleaning
- 1.3 Advantages and Disadvantages of Contract Cleaning
- 1.4 Eco-Friendly Process

Module – II
2.0 Interior Decoration
- 2.1 Colours
- 2.2 Lighting
- 2.3 Furniture
- 2.4 Floor Finishes
- 2.5 Carpets
- 2.6 Wall Coverings
- 2.7 Windows
- 2.8 Guestroom Accessories

Module – III
3.0 Plan effectively the activities of housekeeping department

Module – IV
4.0 Perform staffing and organizing of housekeeping department

Module – V
5.0 Control the activities of housekeeping department

Examination Scheme:

Components	Internal Assessment				EE
	V	**H**	**CT**	**A**	**Th**
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings :

- Professional Management of Housekeeping Operation by Robert J. Martin
- Hotel, Hostel & Hospital Housekeeping by John C. Branson & Margaret Lennox
- Housekeeping Management by Keppa Margret M
- Hospitality Management: Current Trends & Practices by Dr. JM Negi, Amity University Press, New Delhi
- Accommodation Management by Roy C
- Hotel Housekeeping Training Manual by Sudhir Andrew
- Professional House Keeping by Madlin Tucker

After successful completion of study of the above Courses (VHM2654***), the student becomes eligible to appear for "Qualification Pack: Housekeeping Manager" (NSQF level - 7) examination under THSC & NSDC by paying fees as applicable.***

TOURISM OPERATIONS
(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VTM2151	Fundamentals of Tourism	2	1	-	3
VTM2251	Tour Operations & Tourist Guidance	2	1	-	3
VTM2351	Handling Travel Agency	2	1	-	3
VTM2451	Coordinating Tour Transportations	2	1	-	3
VTM2551	Tourism Management	2	1	-	3
VTM2651	Event Planning	2	1	-	3
	TOTAL				**18**

TOURISM OPERATIONS

Syllabus - Semester First

FUNDAMENTALS OF TOURISM

Course Code: VTM2151 **Credit Units: 03**

Prerequisites : 10+2

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
History of Tourism
Forms & Types of Tourism
Tourist Attractions & facilities

Course Contents:
Module –I
1.0 Introduction to Tourism
1.1 Origin, Growth & Development of Tourism
1.2 Early History
1.3 Development of Tourism
1.4 Forms & Types of Tourism

Module –II
2.0 Tourist Attractions & facilities
2.1 Tourism Accommodation& Accessibility
2.2 Geographical Resources for Tourism
2.3 Tourism Potential
2.4 Various Tourist Attractions of India

Module –III
3.0 Coordinate with travel partners
4.0 Engage with tourists
5.0 Communicate with customer and colleagues

Module –IV
6.0 Guide the tourists at heritage sites
7.0 Maintain customer-centric service orientation

Module – V
8.0 Maintain standard of etiquette and hospitable conduct
9.0 Follow gender and age sensitive service practices
10.0 Maintain health and hygiene

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry ii1 India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies,
- Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

After successful completion of study of the above Course (VTM2151***), the student becomes eligible to appear for "Qualification Pack: Heritage Tour Guide" (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Second

TOUR OPERATIONS & TOURIST GUIDANCE

Course Code: VTM2251 **Credit Units: 03**

Prerequisites : Fundamentals of Tourism (VTM2151)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
Various forms of Tourism
Effective communication with Tourists
Guiding Tourists

Course Contents:
Module – I
1.0 Guide tourists at religious destinations
2.0 Guide tourists during culture tours

Module – II
3.0 Guide tourists at nature/eco/rural spots
4.0 Guide tourists during gastronomy tours

Module – III
5.0 Guide tourists in leisure and recreation tours
6.0 Guide tourists in cruise

Module – IV
7.0 Guide tourists for sporting events
8.0 Guide tourist on desert tours

Module – V
9.0 Guide tourist on wellness and medical tours

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry ii1 India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies,
- Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)

- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

After successful completion of study of the above Courses (VTM2251***), the student becomes eligible to appear for "Qualification Pack: Tour Guide" (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Third

HANDLING TRAVEL AGENCY

Course Code: VTM2351 **Credit Units: 03**

Prerequisites : Tour Operations & Tourist Guidance (VTM2251)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
Tour Package
Planning of Tour Package
Designing Tour Packages

Course Contents:
Module –I
1.0 Tour Package - Meaning, Type of Tour Package & its Components

Module – II
2.0 Planning of Tour Package
2.1 Designing and Process of Tour Package
2.2 Engage with customer to understand their tour packaging requirements
2.3 Plan travel itinerary as per customer's requirement
2.4 Factor Affecting Tour Package
2.5 Arrange tour package in coordination with service providers and partners

Module – III
3.0 Designing Tour Packages
3.1 Cultural Tourism Product: Designing, Development, Issues and Considerations
3.2 Heritage Tourism Product: Designing, Development, Issues and Considerations
3.3 Religious Tourism Product: Designing, Development, Issues and Considerations

Module – IV
4.0 Designing Tour Packages
4.1 Adventure Tourism Product: Designing, Development, Issues and Considerations
4.2 Medical Tourism Product: Designing, Development, Issues and Considerations

Module – V
5.0 Destination Management
5.1 Meaning, Factor of Consideration to choose Destination Management Handling Company
5.2 Monitor the tour progress
5.3 Maintain IPR of organisation and customer

Examination Scheme:

Components	**Internal Assessment**				**EE**
	V	**H**	**CT**	**A**	**Th**
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry ii1 India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies,
- Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

After successful completion of study of the above Course (VTM2351***), the student becomes eligible to appear for "Qualification Pack: Travel Consultant" (NSQF level - 4) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Fourth

COORDINATING TOUR TRANSPORTATIONS

Course Code: VTM2451 **Credit Units: 03**

Prerequisites : Handling Travel Agency (VTM2351)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
Transport System
Transport Schedule& Arrangement for tourists

Course Contents:
Module – I
1.0 Modes of Transport
1.1 Road ways
1.2 Railways
1.3 Air ways
1.4 Water ways

Module – II
2.0 Types of transport operator
2.1 Public & Private
2.2 Domestic & International

Module – III
3.0 Transport Schedule
3.1 Travel Time
3.2 Preparation of itinerary

Module – IV
4.0 Interact with the customers or tourists
5.0 Arrange for the travel

Module – V
6.0 Follow up with customer or tourist

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry ii1 India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies,
- Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

After successful completion of study of the above Course (VTM2451***), the student becomes eligible to appear for "Qualification Pack: Transport Coordinator" (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.***

Syllabus - Semester Fifth

TOURISM MANAGEMENT

Course Code: VTM2551 **Credit Units: 03**

Prerequisites : Coordinating Tour Transportations (VTM2451)

Course Objective:
At the end of the semester the students would have a thorough knowledge of:
- Motivation of Travel and Tourism
- Significance of Travel and Tourism
- Growth factors of Tourism& its barriers
- Eco-Tourism

Course Contents:

Module –I

1.0 Motivation of Travel and Tourism
- 1.1 Physical Motivations: Travel for Sports and Adventure, Rest and Relaxation, Health and Medical Reasons etc.
- 1.2 Cultural Motivations: Pilgrimage Tourism, Cultural Curiosity, Religious etc.
- 1.3 Interpersonal Motivation: Meeting New People, VFR, etc
- 1.4 Status and Prestige Motivation
- 1.5 Business Motivation

Module – II

2.0 Significance of Travel and Tourism
- 2.1 The Economic, Social and Cultural Significance of Tourism

Module – III

3.0 Growthfactors of Tourism
- 3.1 Technology and Destination Development
- 3.2 Changing Social Patterns
- 3.3 Changing Living Standards

Module –IV

4.0 Barriers to the Growth of Tourism
- 4.1 Factors Existing at the Destination: Terrorism, & Political and Social Environment
- 4.2 Factors Barring a Potential Tourist from Traveling: Time, Cost, and Social Barriers.

Module – V

5.0 Eco-Tourism Planning and development strategies
- 5.1 Eco-Tourism Strategies with Special Reference to Environmental Protection (Environmental Impact Analysis)

Examination Scheme:

Components	Internal Assessment				EE
	V	H	CT	A	Th
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Readings:

- Pran Seth: Successful tourism Management (Vol. 1 & 2)
- Anand, M.M., Tourism and hotel Industry ii1 India, Prentice Hall, New Delhi, 1976
- Bhatia, A. K., International Tourism, Sterling Publishers, New Delhi
- Bhatia, A. K., Tourism development: Principles, Practices and Philosophies,
- Sterling Publishers, New Delhi
- McIntosh, Robert, W. Goldner, Charles, Tourism: Principles, Practices and Philosophies, John Wiley and Sons Inc. New York, 1990 (9th edition)
- Mill, Robert Christie and Alastair M. Morrison, The Tourism System, Englewood Cliffs, N.J., Prentice Hall, 1985
- Negi, J.M.S., Tourism and Travel- Concepts and principles, Gitanjali Publishing House, New Delhi, 1990
- Robinson, H.A., Geography of Tourism, Me Donald and Evans, London, 1976

Syllabus - Semester Sixth

EVENT PLANNING

Course Code: VTM2651 **Credit Units: 03**

Prerequisites : Tourism Management (VTM2551)
Course Objective:
At the end of the semester the students would have a thorough knowledge of:

Concept of MICE
Marketing MICE
Planning MICE
Staging MICE

Course Contents:
Module – I
1.0 Introduction to Concept of MICE

1.1 Types of Events- meetings, incentives, conference/conventions, and exhibitions
1.2 Size of Events
1.3 The Event Team
1.4 Code of Ethics
1.5 The impact of conventions on local and national communities.

Module – II
2.0 Map the customer requirement

2.1 Visualise the need
2.2 Guide the customer
2.3 Estimate the budget

Module – III
3.0 Concept and Design

3.1 Developing The Concept
3.2 Analysing The Concept
3.3 Designing The Event
3.4 Logistics of The Concept

Module – IV
4.0 Marketing of Event

4.1 Nature of Event Marketing
4.2 Process of Event Marketing
4.3 The Marketing Mix
4.4 Sponsorship

Module – V
5.0 Staging The Event

5.1 Choosing The Event Site
5.2 Developing The Theme
5.3 Providing Services
5.4 Managing The Environment

Examination Scheme:

Components	Internal Assessment				EE
	V	**H**	**CT**	**A**	**Th**
Weightage (%)	05	05	15	05	70

V-Viva; H-Home Assignment; CT-Class Test; A-Attendance; EE-End Semester Examination

Suggested Reading :

- Behind The Scenes at Special Events - by Lena Malouf
- Global Meetings & Exhibitions, - by Krugman, John Wiley & Sons
- How to Plan Exhibitions & Conferences From A to Z, Sam Black
- Special Events : Event Leadership for a New World, Goldblatt

After successful completion of study of the above Courses (VTM2551**&**VTM2651***), the student becomes eligible to appear for "Qualification Pack: Meeting, Conference and Event Planner" (NSQF level - 5) examination under THSC & NSDC by paying fees as applicable.***

AEROSPACE ENGINEERING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per	Tutorial (T) Hours Per Week	Practical (P) Hours Per	Total Credits
ASE2351	Elements of Aerospace Engineering	3	-	-	3
ASE2451	Elements of Space Engineering	3	-	-	3
ASE2551	Aircraft System	3	-	-	3
ASE2651	Aircraft Stability & Control	3	-	-	3
ASE2751	Aircraft Performance	3	-	-	3
ASE2851	Introduction to Automatic Flight Control	3	-	-	3
	TOTAL				**18**

AEROSPACE ENGINEERING

Syllabus

ELEMENTS OF AEROSPACE ENGINEERING

Course Code: ASE2351 **Credit Units: 03**

Course Objective:
Being a foundation course for aerospace students, its objective is to provide introductory knowledge about some of the topics of aerospace engineering, such as, flight vehicles, principles of flight mechanics, propulsion systems, aerospace structures, aircraft systems, passenger comfort systems, power-actuated systems, etc.

Course Contents:
Module I: Introduction to Aerospace Systems
Development of Flying Machines. Classification of flight vehicles. Introduction to prominent features of design; Airplanes, helicopter and other flying machines along with examples.

Module II: Aircraft Systems
Lifting and non-lifting surfaces. Lift and drag of airfoils, stalling, finite span wing, induced drag. Wing plan-form variations, forward and aft swept wings, high lift devices, use of control surfaces, elementary ideas about stability and control of airplanes.

Module III: Principles of Aerospace Propulsion
Classification of propulsive units and their features; Fixed and variable pitch air screws, piston prop engine, turbo prop engine, turbo jet engines and its variations, ramjet, pulse jet, rockets engines; Solid and liquid propellant engine, the concept of staging of rockets, structural features in each case, Engine starting-systems.

Module IV: Aerospace Vehicle Structure
Importance of strength/weight ratio, introduction to loads on different parts of the vehicle, detailed description of the fuselage, wing and tail surfaces, wing surfaces, wing fuselage jointing methods, different types of under carriages,

Module V: Power Actuated Systems
Hydraulic system: details and various components, selector and sequence, switches, electro-hydro-mechanical system, pneumatic system, fuel systems, etc.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Kermode A.C., “Mechanics of Flight”, Pitman Publication, UK, 1984.
- Kermode A.C., “Aeroplane Structures”, Pitman Publication, UK, 1986.
- Michael J. Kroes and JR Rardon, “Aircraft Basic Science” Tata McGraw-Hill.
- Michael J. Kroes and Thomas W. Wild, “Aircraft Power Plants”.
- John Anderson Jr., “Fundamentals of Aerodynamics”.
- Irewin E. Treager, “Aircraft Gas Turbine Engine Technology”.
- Haughten E.L. and Carpentar P.W., “Aerodynamics for Engineering Students”.

ELEMENTS OF SPACE ENGINEERING

Course Code: ASE2451 **Credit Units: 03**

Course Objective:
The knowledge of concepts of Space Systems is important for understanding the essentials of Aerospace discipline, particularly subsystems such as Rockets and Missiles; Satellite Launch Vehicles; Satellite Systems; Tracking, Telemetry and Tele-command; Control, Guidance and Navigation; Flight and Orbital Mechanics.

Course Contents:
Module I: Introduction to Space Systems
Evolution of Rocketry, Planet/Solar Systems, Space Exploration, Space Applications, Future Trends.

Module II: Elements of Rockets and Satellites
Satellite Launch Vehicles, Missiles, Communication Satellites, Remote Sensing.

Module III: Orbital Mechanics and Mission Design
Motion in Gravitational Field. Orbits, Orbital Elements, Hohmann Transfer. Delta-V Requirements. Orbit Perturbations.

Module IV: Ground Systems
Ground Stations, Link Calculations, Station Keeping, Deep Space Network (DSN), VSATs, GPS, ILS, Auto Pilot and Navigation Systems.

Module V: Space Craft Systems
Space Craft Types, Attitude Determination and Control, Power Systems, Thermal Control, Space Craft Propulsion, Communication Satellites, Remote Sensing Satellites.

Module VI: Launch Vehicles and Missiles
PSLV, GSLV, Re-useable Vehicles, Propellant & Propulsion Systems, Thermal Protection, Control Systems, SAM, IRBM, ICBM.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Satellite Technology, Principles and Applications, Maini, AK
- Guided Weapons Systems Design, Balakrishnan, R
- Space Systems Engineering, Fortesque, PW
- Getting Started With Amateur Satellites, Gould Smith, G

References:
- Wings of Fire, Abdul Kalam, APJ
- Satellite Communication Systems, Evans
- Space Today, Mohan Sundara Rajan
- Handbook of Satellite Communications, ITU

AIRCRAFT SYSTEMS

Course Code: ASE2551 **Credit Units: 03**

Module I: Flight Control Systems
Primary and secondary flight control,flight control linkage systems,push-pull control rod system,cable and pulley systems,high lift control systems, flight control actuation,linear actuator,mechanical actuator,mechanical screw jack actuator,direct drive actuation,fly-by-wire actuator, electro-hydrostatic actuator, electro-mechanical actuator

Module II: Engine Control Systems
Engine starting, engine indications, engine oil system, fuel flow control, ignition control, air flow control, engine offtakes, control system parameters, input signals, output signals, Reverse Thrust on modern civil aircraft, throttle levers, starting sequence

Module III: Hydraulic and Pneumatic Systems
Hydraulic circuit design, Hydraulic actuation, Hydraulic Fluid, Fluid pressure, Fluid flow rate, Hydraulic piping, Hydraulic Pumps, Hydraulic reservoir, emergency power source, Use of bleed air, Engine bleed air control, Bleed air system indications

Module IV: Environment Control Systems
Need for controlled environment, heat sources, ram air cooling, fuel cooling,engine bleed,bleed flow and temperature control,air cycle refrigeration,humidity control,hypoxia,tolerance

Module V: Gyroscopic Systems
Gyroscope and its properties,gyro horizon,turn and bank indicator, turn coordinator, direct reading magnetic compass,and directional gyroscope.

Module VI: Emergency Systems
Warning systems, Fire detection & suppression,emergency power source, Emergency landing,emergency system testing

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References:
1. Aircraft systems -Ian Moir and Allan Seabridge
2. Aircraft Systems - David A. Lombardo -

AIRCRAFT STABILITY AND CONTROL

Course Code: ASE2651 **Credit Units: 03**

Course Objective:
This objective of this course is to make the students understand various aspects of stability of an aircraft in flight, both stick fixed and stick free, and how geometric features of control surfaces and their proper angular movements achieve it. Students are also given an analytical understanding of longitudinal, lateral and directional stability and measures that can be taken to control the same.

Course Contents:

Module I: Stick Fixed Static Longitudinal Stability
Introduction to stability of airplane, stick fixed longitudinal stability, effect of power, Neutral point, Centre of gravity limits. In flight measurement of stick fixed neutral point.

Module II: Control Surfaces and Aerodynamic Balancing
Control surface hinge moments, floating and restoring tendencies, different types of tabs used on airplanes. Frise Aileron, Spoiler Controls.

Module III: Stick Free Static Longitudinal Stability
Effect of free elevator on airplane stability, Elevator Control force, stick force gradients, Neutral point, Controls free center of gravity limit. In-flight measurement of stick free neutral point.

Module IV: Maneuvering Flight
Effect of acceleration on airplane balancing, Elevator angle per g, and stick force per g, Maneuver margins.

Module V: Directional Stability and Control
Asymmetric flight, Feather cock stability, contribution of different parts of Airplane, Rudder Fixed and Rudder free static directional stability, rudder lock.

Module VI: Lateral Stability and Control
Dihedral Effect. Contribution of different parts of airplane controls in roll, aileron control power, cross coupling of lateral and directional effects.

Module VI: Dynamic Stability
(a) Longitudinal Dynamic Stability: Simple analysis of short period and phugoid modes, stick-fixed and stick-free.
(b) Lateral and Directional Dynamic Stability: Simple analysis of roll subsidence spiral mode and Dutch roll.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Perkins and Hage, “Airplane Performance Stability and Control”.
- Etkin, “Dynamics of flight”
- Dickinson, “Aircraft Stability and control for Pilots and Engineers”.
- Babister, “Aircraft Stability and Control”.
- Dommasch Serby and Connoly, “Airplane Aerodynamics”.

AIRCRAFT PERFORMANCE

Course Code: ASE2751 **Credit Units: 03**

Course Objective:
In this course, aerospace students will learn the concepts and basic structural analysis of 2-D members in Cartesian and Polar coordinates using various methods. Students will also understand the analysis of torsional loads on bars, shells and walled tubes as well as the analysis of statically indeterminate structures.

Course Contents:
Module I: Introduction to Aerospace Structure
Importance of strength/weight ratio, introduction to loads on different parts of the vehicle, detailed description of the fuselage, wing and tail surfaces, wing surfaces, wing fuselage jointing methods, different types of under carriages,

Module II: Imposed Loads
General considerations, basic flight loading conditions, Aerodynamic loads, inertia loads, Load factors for translational acceleration, load factor diagram.

Module III: Evaluation of Vehicle Material
Mechanical properties, stress- strain curve, fatigue, strength-weight comparison of materials, sandwich construction and composite materials.

Module IV: Structural Analysis Method

Energy Method, strain energy, complimentary energy.The two Castinglino's theorems and application to statically indeterminate system.Unit load method, principle of virtual work and virtual displacement, principle of superposition, reciprocal theorem.

Module V: Structural Analysis of Wing and Fuselage
Analysis of typical semi-monocoque structures, distribution of concentrated loads in webs, loads on fuselage bulkhead, analysis of wing ribs. Shear flow in tapered webs.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S. Timoshanko and J.N., "Theory of Elasticity".
- David J. Perry, "Aircraft Structures", McGraw Hill Book Co. 1949.
- T.H.G. Megson, "Aircraft Structures for Engineering Students", Edward Arnold and Co., 2nd Ed, 1990.
- Richard S. Shevell, "Fundamentals of Flight".
- Darrol stinton, "The anatomy of the Aeroplane
- Pilot's Handbook of Aeronautical Knowledge

INTRODUCTION TO AUTOMATIC FLIGHT CONTROL

Course Code: ASE2851 **Credit Units: 03**

Course Objective:
This course is designed to provide adequate knowledge to analyse one-degree and multi-degree of freedom systems of vibrations using different methods to find out their natural frequencies and frequency / amplitude responses.

Course Contents:

Module I: Introduction
Open Loop and Closed Loop (Feed Back) control systems. Types of feedback control systems. Laplace's transform.

Module II: Feedback Control Systems
Transfer function of linear systems. Impulse response of linear systems, Block diagrams of feed back control systems, Multivariable systems. Block diagram algebra.

Module III: Analysis of Feedback Control Systems
Typical test input signals, Time domain performance characteristics of feedback control systems. Effects of derivative and integral control. Steady State response of feedback control system-steady State error, Frequency response.

Module IV: System Stability
Routh-Hurwitz Criterion, the Root Locus Method.

Module V: Auto-pilots
Longitudinal Auto Pilots: Brief description through Block diagrams and Root Locus of Displacement Auto Pilot. Pitch Orientational Control System. Acceleration control system.

Module VI: Miscellaneous
Fly-By-Wire control system, Instrument Landing System.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- John H. Blackelock, “Automatic Control of aircraft and Missiles”, John Wiley and Sons, 2nd Ed.1990
- Perkins C.D. and Hage R.E., “Airplane Performance Stability and Control”, John Wiley and Sons.
- Bernard Etkins, “Dynamics of Flight Stability and Control”, John Wiley & Sons, 2/Ed 1989
- Robert C. Nelson, ‘Flight Stability and Automatic Control”, McGraw Hill Co, 1989.
- Pallet H.J., “Automatic Flight Control”, B.S. Professionals Books, Oxford, 3rd Ed, 1987.
- Benjamin C. Kuo, “Automatic Control Systems,” Prentice Hall of India, 1992

ARTIFICIAL INTELLIGENCE

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
CSE2351	Basics of Artificial Intelligence	3	-	-	3
CSE2451	Artificial Neural Networks	3	-	-	3
CSE 2551	Fuzzy Logic	3	-	-	3
CSE2651	Introduction to Genetic Algorithm	3	-	-	3
CSE2751	Soft Computing	3	-	-	3
CSE2851	Project (Artificial Intelligence)	3	-	-	3
	TOTAL				**18**

ARTIFICIAL INTELLIGENCE

Syllabus

BASICS OF ARTIFICIAL INTELLIGENCE

Course Code: CSE2351 **Credit Units: 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

MODULE- I
AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

MODULE-II
Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions**.**

MODULE-III
Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempstershafer theory.

MODULE- IV
First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning,Decisiontrees,Explanationbasedlearning,Statistical Learning methods ,Reinforcement Learning.

MODULE- V
Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Reference Books:-

1. S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, SecondEdition, Pearson Education
2. David Poole, Alan Mackworth, Randy Goebel, ”Computational Intelligence : a logical approach”, Oxford University Press.
3. G. Luger, “Artificial Intelligence: Structures and Strategies for complex problemsolving”, Fourth Edition, Pearson Education.
4. J. Nilsson, “Artificial Intelligence: A new Synthesis”, Elsevier Publishers.

ARTIFICIAL NEURAL NETWORKS

Course Code: CSE2451 **Credit Units: 03**

Module-I

Artificial Neural Networks (ANN) and their biological roots and motivations. ANNs as numerical data/signal/image processing devices.a summing dendrite, synapses and their weights, pre- and post-synaptic signals, activation potential and activation function. Excitatory and inhibitory synapses. The biasing input. Types of activating functions.Encoding (training phase) and decoding (active phase). Taxonomy of neural networks:-feedforward and recurrent networks with supervised and unsupervised learning laws, static &dynamic processing systems, basic data structures: mapping of vector spaces, clusters, principal components.

Module-II

Linear Networks:-Adaline - the adaptive linear element, Linear regression. The Wiener-Hopf equation.The Least-Mean-Square (Widrow-Hoff) learning algorithm.Method of steepest descent.Adaline as a linear adaptive filter.A sequential regression algorithm.

Multi-Layer Feedforward Neural Networks:- Multi-Layer Perceptrons. Supervised Learning.Approximation and interpolation of functions.Back-Propagation Learning law. Fast training algorithms. Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nettalk.

Module-III

Self-Organising Systems:-Unsupervised Learning,Pattern clustering , Topological mapping , Kohonen's self-organizing map , Local learning laws-GeneralisedHebbian Algorithm. The Oja's and Sanger's rules. Principal component analysis - Karhunen-Loeve transform.

Module-IV

Feedback neural networks:- Pattern storage and retrieval, Hopfield model, Boltzmann machine, Recurrent neural networks.

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Module-V

Radial basis function networks:- Regularization theory, RBF networks for function approximation, RBF networks for pattern classification.

Kernel methods for pattern analysis:- Statistical learning theory, Support vector machines for pattern classification, Support vector regression for function approximation, Relevance vector machines for classification and regression.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Reference Books:-

1. B.Yegnanarayana, Artificial Neural Networks, Prentice Hall of India.
2. Satish Kumar, Neural Networks – A Classroom Approach, Tata McGraw-Hill.
3. S.Haykin, Neural Networks – A Comprehensive Foundation, Prentice Hall.

FUZZY LOGIC

Course Code: CSE2551 **Credit Units: 03**

MODULE- I

Introduction: Background, Uncertainty and imprecision, Statistics and random processes, Uncertainty in information, Fuzzy sets and membership, Chance versus ambiguity, Classical sets - operations on classical sets to functions, Fuzzy sets-fuzzy set operations, Properties of fuzzy sets, sets as points in hypercube.

MODULE-II

Classical Relations And Fuzzy Relations: Cartesian product, Crisp relations-cardinality of crisp relations, Operations on crisp relations, Properties of crisp relations, Compositions, Fuzzy relations-cardinality of fuzzy relations, Operations on fuzzy relations, Properties of fuzzy relations, Fuzzy Cartesian product and composition, Non interactive fuzzy sets, Tolerance and equivalence relations-crisp equivalence relation, Crisp tolerance relation, Fuzzy tolerance, Max-min Method, other similarity methods.

MODULE-III

Membership Functions: Features of the membership function, Standards forms and boundaries, fuzzification, Membership value assignments-intuition, Inference, Rank ordering, Angular fuzzy sets.

MODULE- IV

Fuzzy-To-Crisp Conversions And Fuzzy Arithmetic: Lambda-cuts for fuzzy sets, Lambda-cuts for fuzzy relations, Defuzzification methods. Extension principle-crisp functions, Mapping and relations, Functions of fuzzy sets-extension principle, Fuzzy transform (Mapping), Fuzzy numbers Interval analysis in Arithmetic.

MODULE- V

Fuzzy Logic &Fuzzy Rule-Based Systems: Fuzzy logic, approximate reasoning, Fuzzy tautologies, Contradictions, Equivalence and logical proofs. Natural language, Linguistic hedges, Rule-based system-canonical rule forms, Decomposition of compound rules, Likelihood and truth qualification, Aggregation of fuzzy rules.

MODULE- VI

Fuzzy Decision Making, Classification & Hybrid formation: Fuzzy synthetic evaluation, Fuzzy ordering, Preference and consensus, Multiobjective decision making under fuzzy states and fuzzy actions. Classification by equivalence relations-crisp relations, Fuzzy relations cluster analysis, neuro fuzzy and fuzzy genetic system, applications to engineering problems.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Reference Books:-

- Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.
- Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan andRai – PHI Publication.
- Fuzzy Sets, Fuzzy Logic, and Fuzzy Systems by Lotfi A. Zadeh
- Fuzzy logic with engineering application by Timothy J. Ross-wiley

INTRODUCTION TO GENETIC ALGORITHM

Course Code: CSE2651 **Credit Units: 03**

Module-I
Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithmgenetic modeling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.

Module-II
Genetic technology:- steady state algorithm, fitness scaling, inversion.Geneticprogramming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm.Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.

Module-III
Genetic Algorithm in engineering and optimization-natural evolution –Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations.

Module-IV
Introduction to genetics - based machine learning: Classifier system, Rule and Message system, Apportionment of credit, Knowledge based Techniques, Genetic Algorithms and parallel. processors.

Module-V
Applications of Genetic based machine learning-Genetic Algorithm and parallel processors- composite laminates- constraint optimization- multilevel optimization- real life problem.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Book:-
David E.Goldberg, "Genetic Algorithms in search , Optimization & Machine Learning"

Reference Books:-
1. William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"
2. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems "
3. David A. Coley, "An Introduction to Genetic Algorithms for Scientists and Engineers ".
4. Melanie Mitchell- 'An introduction to Genetic Algorithm'- Prentice-Hall of India

SOFT COMPUTING

Course Code: CSE2751 **Credit Units: 03**

Module-I

Introduction of soft computing, soft computing vs. hard computing,various types of soft computing techniques,applications of soft computing. Artificial Intelligence: Introduction,Various types of production systems, characteristics of production systems,breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning,forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

Module-II

Structure and Function of a single neuron:Biological neuron,artificial neuron, definition of ANN,Taxonomy of neural net,Difference b/w ANN and human brain,characteristic and applications of ANN, single layer network, Perceptron training algorithm,Linear separability, Delta rule.Introduction of MLP,different activation functions,Error back propagation algorithm,derivation of BBPA, momentum, limitation, characteristics and application of EBPA.

Module-III

Counter propagation network:-Architecture,functioning & characteristics of counter Propagation network,Hop field/ Recurrent network,configuration, stability constraints, associative memory, and characteristics,limitations and applications.

Module-IV

Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations,Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions,Fuzzy rule base system : fuzzy propositions, formation,decomposition & aggregation of fuzzy Rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making.

Module-V

Genetic algorithm:Fundamental,basic concepts,working, principle,encoding, fitnessfunction, reproduction,Genetic modeling:Inheritance operator,cross over,inversion & deletion,mutation operator,Bitwise operator,Generational Cycle,Convergence of GA, Applications & advances in GA,Differences & similarities between GA & other traditional methods.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Reference Books :

- S, Rajasekaran & G.A. VijayalakshmiPai, Neural Networks, Fuzzy Logic & GeneticAlgorithms, Synthesis & applications, PHI Publication.
- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.&Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication

PROJECT (ARTIFICIAL INTELLIGENCE)

Course Code: CSE2851 **Credit Units: 03**

Methodology

Topics of project are to be based on the latest trends in Artificial Intelligence, verifying engineering concepts in Artificial Intelligence /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the project, the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	**100**

Amity School of Engg. & Technology

Bachelor of Technology - Aerospace Engineering

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

ENGINEERING MATHEMATICS - I

Course Code: ASE2113
L-T-P : 3-1-0 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Differential Calculus by Shanti Narain

- Integral Calculus by Shanti Narain

References:

- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING CHEMISTRY

Course Code: **ASE2115**
L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention,
Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning &calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels

Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter,Solid fuels - Proximate and ultimate analysis, Octane &Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module III: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module VI: Corrosion
Introduction, Mechanism of dry and wet corrosion,

Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ASE2120	ELEMENTS OF MECHANICAL ENGINEERING	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

In this course the concepts of various prime movers like I C Engine, Gas Turbine, Steam Turbine, and Hydraulic Turbine are discussed in detail. Concept of power absorbing devices and power transmission devices are discussed in detail. Elementary concept of mechanics of material and machine tool also discussed in detail. The aim of this course is to make the students familiar with the basic mechanical engineering.

Course Objectives

The objective of this course is to

1. Equip the students with concept of heat engine, steam, boiler, steam turbine, hydraulic turbine, hydraulic pumps, stress and strain, power transmission.

2. Provide an overview of machine tool and manufacturing system.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain working of I C engine, Gas turbine, Air standard efficiency of Otto Cycle &Diesel Cycle and Boilers.

CO2: Explain working of Steam Turbine, Hydraulic Turbine and Hydraulic Pumps.

CO3: Describe the stress strain diagram, Elastics constants and Transmission system.

CO4: Discuss the metal cutting and working of machine tool with manufacturing system.

Modules	Blooms level*	Number of hours
MODULE 1: Prime Mover (I. C. Engine) Internal Combustion Engine: Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle. Working principle of gas turbine, Constant pressure gas turbine cycle.	L1, L2 and L3	7
MODULE 2: Prime Mover (Turbine) Steam Turbine: Classification of boilers, Classification of steam turbines, Working principle of impulse and reaction. Hydraulic Turbine: Classification of hydraulic turbine, Construction details and working of Pelton, Francis and Kaplan turbines.	L1, L2 and L3	8
MODULE 3: Power Absorbing machine Power absorbing devices: Hydraulic Pumps: Classification of hydraulic pumps, Working of Reciprocating and centrifugal pumps. Power transmission devices: Introduction to Power transmission, Belt drive, Rope drive, Chain drive, Gear drive, Gear train.		7
MODULE 4: Mechanics of Material Stress & Strain: Introduction, Concept & types of Stresses and strains, Poison's ratio, Stress-strain diagrams, Hooks law, Elastic constants & their relationships, Stresses and strains in simple and compound bars under axial loading, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc.	L1, L2 and L3	6
MODULE 5: Machine Tool Machine Tool: Introduction to Metal Cutting, Classification of machine tool, working and operations of Lathe, Shaper, Milling, Drilling machines. Manufacturing system: Component of Manufacturing Systems, Fundamentals of Numerical Control (NC), Advantage of NC systems, Classifications of NC, Computer Numerical control, Comparison of NC and CNC. Comparison between conventional and NC machines.	L1, L2 and L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Rajput, R.K. (2013). *Elements of Mechanical Engineering*, Delhi: Lakmi Publication.
- Jain, V. (2011). *Basics of Mechanical Engineering*, Delhi :Dhanpat Rai Publication.
- Kumar, D.S. (2013). *Elements of Mechanical Engineering*, , Delhi : S.K. Kataria and Sons Publications.

Reference Books

- Ganesan, V. (2017). *Internal Combustion Engine*, New-Delhi: Tata McGraw Hill.
- Nag, P.K. (2013). *Engineering thermodynamics*, New-Delhi: Tata McGraw Hill.
- Kumar, D.S. (2013).*Thermal Engineering*, New-Delhi: S.K. Kataria and Sons Publications.
- Hazra, S.K. and Chaudhary, A.K. (2012). *Workshop Technology Vol. II* . New Delhi: Asian Book Comp.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

ASE2105	Introduction to Computers and Programming in C	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

CO 1:Define the purpose and structure of C Program for programming; identify and distinguish various data types and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.

CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs

CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language

CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.

CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7
Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.Strings and C string library.Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. YashwantKanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, “The C Programming Language”, 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, “Programming with C”, Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, “Computer Concepts & Programming in C”, Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	**2**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO2	**1**	**1**	**2**	**2**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO3	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO4	**1**	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	**1**	--	**1**	--
CO5	**1**	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	**1**	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

ASE2118	Basic of Electrical and Electronics Engineering	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of electricity and electrical circuits are discussed in detail. Theorems related to electrical circuits, law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network will be introduced.

Course Objectives

The objective of this course is to:

1. Provide the overview of concept of flow of current/voltage of electrical circuits.
2. Provide the basic knowledge about the concepts of electrical circuits.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Explain the fundamental theorems and laws related to the electrical circuits.

CO2. Derive equations and solve problems related to network theorems.

CO3. Draw phasor diagrams for different alternating current waveforms and Explain the working principle and estimate the performance of single phase transformers.

CO4. Explain the operation, characteristic and application of PN Junction Diode, Rectifiers, Zener Diode and Bipolar Junction Transistor.

Modules	Blooms level*	Number of hours
Module I: **Direct Current Circuits:** Ohm'sLaw,Kirchoff'sCurrent Law, Kirchoff's Voltage Law Network Reduction: Star-Delta Transformation, Source Transformation, Nodal Analysis, Mesh analysis, Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem, Maximum Power transfer theorem.	L1 and L2	9
Module II: **Alternating Current Circuits:** Peak, Average and RMS values for	L1, L2 and L3	8

alternating currents, Power calculation: reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.		
Module III: **Transformer:** Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.	L1, L2 and L3	6
Module IV: **Rotating Electrical Machines:** D.C. machines (motors and generators), Induction motor, Synchronous machines (motors and generators): construction, working principle, classification and applications.	L1, L2 and L3	6
Module V: **Semiconductor Devices:** Principle of operation characteristic and application of PN Junction Diode, Rectifiers, Zener Diode, Principle of operation, characteristic and application of Bipolar Junction Transistor, Regulated Power Supply.	L1, L2 and L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. V K Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd edition, S. Chand Publications, 2014, New Delhi
2. D. P. Kothari and I. J. Nagrath, Theory and Problem of Basic Electrical Engineering, PHI Learning Pvt. Ltd., 2015, New Delhi.
3. J B Gupta, Electrical Science, S K Kataria and Sons, 2015, New Delhi.

Reference Books

1. R J Smith and R C Dorf, Circuits Devices and Systems, 5th Edition, John Wiley
2. B.L. Thareja, Basic Electronics, 5th edition, S. Chand Publishing, 2011, New Delhi
3. V. Del Toro, Electrical Engineering fundamentals, PHI, 2016
4. Mahmood Nahvi, Joseph Edminister, Electric Circuits, 7th edition, McGraw-Hill Education, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO2	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO3	**1**	**1**	**3**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

ENGINEERING CHEMISTRY LAB

Course Code: **ASE2117**
L-T-P :0-0-2 **Credit Units: 01**

Course Contents:

List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ASE2110	Programming in C Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

3. Equip the students with concepts of Programming through C Language
4. Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement.	L3	5
LABORATORY SESSSION 2 LOOPING 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D	L3	6
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read nnum of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and de-allocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING 1. WAP program to display student information by initializing structures.	L3	4

2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
- YashwantKanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--

CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO3	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO4	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ASE2121	**ELEMENTS OF MECHANICAL ENGINEERING LAB**	L	T	P	C
Version 2019.1	Date of Approval: July 14, 2019	0	0	2	1

Pre-requisites/Exposure	
Co-requisites	

Pre –Requisite: Elements ofMechanical Engineering
Catalog Description

In this course the concepts of various prime movers like I C Engine, Gas Turbine, Steam Turbine, and Hydraulic Turbine are discussed in detail. Concept of power absorbing devices and power transmission devices are discussed in detail. Elementary concept of mechanics of material and machine tool also discussed in detail. The aim of this course is to make the students familiar with the basic mechanical engineering.

Course Objectives:

The objective of this course is to

1. Equip the students with practical concepts of Boiler, Turbine, IC Engine and Machine tools.
2. Understand the elements of mechanical engineering by working models and experiments.

Course Outcomes (COs): After studying this course the students will be able to:

CO 1- Define the basics of working of boilers, Steam turbines.

CO 2- Explain the principle and working of two strokes and four strokes internal combustion engines.

CO 3- Explain the working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.

CO 4 - Describe the tensile test and power transmission derives.

CO 5- Identify and demonstrate the machine tools and lathe operation.

List of Experiments	Blooms level*	Number of hours
1. To Study the Cochran and Babcock & Wilcox boilers.	L1, L2 and L3	2
2. To study the working of impulse and reaction steam turbines	L1, L2 and L3	2
3. To study Two-Stroke & Four-Stroke Diesel Engines.	L1, L2	2

	and L3	
4. To Study Two-Stroke & Four-Stroke Petrol Engines.	L1, L2 and L3	2
5. To study the constructional features and working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.	L1, L2 and L3	2
6. To perform tensile test, plot the stress-strain diagram and evaluate the tensile properties of a given metallic specimen.	L1, L2 and L3	2
7. To Study the different power transmission drives.	L1, L2 and L3	2
8. To Study different types of machine tools (lathe, milling, drilling & shaper).	L1, L2 and L3	2
9. To perform the metal cutting operation on Lathe machine.	L1, L2 and L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rajput, R.K. Elements of Mechanical Engineering, Lakmi Publication, Delhi, 2013. .
- Jain, V. Basics of Mechanical Engineering, Dhanpat Rai Publication, Delhi , 2011.
- Kumar, D.S. Elements of Mechanical Engineering, S.K.Kataria and Sons Publications, Delhi 2013.

Reference Books

- Ganesan, V. Internal Combustion Engine , New-Delhi : Tata McGraw Hill, New delhi, 2017.
- Heine, R.W. Loper and P.C. Rosenthal, Principles of metal casting, McGraw Hill, New-Delhi, 2001
- Nag, P.K. Engineering thermodynamics,: Tata McGraw Hill, New-Delhi, 2013.
- Kumar, D.S.Thermal Engineering, S.K. Kataria and Sons Publications, New-Delhi, 2013.

Hazra, S.K. and Chaudhary, A.K. Workshop Technology Vol. II . Asian Book Comp, New-Delhi, 2012.

ASE2119	Basic Electrical and Electronics Engineering Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course, students will become familiar with basic electrical circuits. The students will learn practical aspects and implementation of theorems related to electrical circuits, law's related to flow of current, voltages, transformer and transistors.

Course Objectives

The objective of this course is to:

1. Provide the overview of concept of flow of current/voltage of electrical circuits.
2. Provide the basic knowledge about the concepts of electrical circuits and BJTs.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Explain the fundamental theorems and laws related to the electrical circuits and experimentally verify the basic circuit theorems

CO2. Explain the working principle and estimate the performance of single phase transformers.

CO3. Understand 3 phase balanced and unbalanced, star and delta connected supply and load and to measure power in 3 phase circuits

CO4. Able to design circuit with Bipolar Junction Transistor in CB, CE & CC configurations

Modules	Blooms level*	Number of hours
Lab Session 1: Network Analysis Techniques & Theorems 1. To verify KVL & KCL in the given network. 2. To verify Superposition Theorem. 3. To verify Maximum Power Transfer Theorem. 4. To verify Reciprocity Theorem. 5. To determine and verify R_{Th}, V_{Th}, R_N, I_N in a given network.	L1 , L2 and L3	6
Lab session II: Transformers and transistors	L1, L2 and	3

1. To perform open circuit & short circuit test on a single-phase transformer. 2. To perform regulation, ratio & polarity test on a single-phase transformer. 3. To obtain the characteristics of a transistor under common base (CB) and common emitter (CE) configuration.	L3	
Lab session III: Alternating Current Circuits 1. To study transient response of a given RLC Circuit. 2. To measure power & power factor in a three phase circuit by two wattmeter method. 3. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.	L1, L2 and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. V K Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd edition, S. Chand Publications, 2014, New Delhi
2. D. P. Kothari and I. J. Nagrath, Theory and Problem of Basic Electrical Engineering, PHI Learning Pvt. Ltd., 2015, New Delhi.
3. J B Gupta, Electrical Science, S K Kataria and Sons, 2015, New Delhi.

Reference Books

(a) R J Smith and R C Dorf, Circuits Devices and Systems, 5th Edition, John Wiley

(b) B.L. Thareja, Basic Electronics, 5th edition, S. Chand Publishing, 2011, New Delhi

(c) V. Del Toro, Electrical Engineering fundamentals, PHI, 2016

(d) Mahmood Nahvi, Joseph Edminister, Electric Circuits, 7th edition, McGraw-Hill Education, 2017

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-
CO 2	1	1	2	3	--	--	--	--	--	--	--	--	1	-	-
CO 3	1	1	3	3	-	--	--	--	--	--	--	--	1	-	-
CO 4	1	1	2	--	--	--	--	--	--	--	--	--	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ENGLISH – I

Cource Code: CSS2152

L-T-P : 1-0-0 **CreditUnits: 01**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	**H.W. Longfellow**

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	05	15	10	70

Text & References:

- MadhulikaJha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, MalraTreece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

*** 30 hrs Programme to be continued for Full year**

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH 2151

L-T-P : 1-0-0 **CreditUnits: 01**

Course Objective:

This course aims at imparting:
Understanding self & process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and its effective on personality
Building Emotional Competence

Course Contents:

Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept, Self confidence, Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance, Components of self esteem, High and low self esteem, Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann&Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - I

Course Code: LAN2151

L-T-P : 3-0-0 **CreditUnits: 03**

Course Objective:

To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

Course Contents:

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Object if 1, 2
Only grammar of Unité 3: object if 3, 4 and 5

Contenu lexical :Unité 1 : Découvrir la langue française : (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3:Organiser son temps

1. dire la date et l'heure

Contenu grammatical :

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futurproche

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN - I

Course Code: LAN2152

L-T-P : 3-0-0 **CreditUnits: 03**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Introduction
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics
Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions
To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wievielkostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch

- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – I

Course Code: LAN2153

L-T-P : 3-0-0 **CreditUnits: 03**

Course Objective:

To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

Course Contents:

Module I

A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II

Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse*and practice of it.

Module III

Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV

Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V

Time, demonstrativepronoun (Este/esta, Aquel/aquellaetc)

Module VI

Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, EnDirecto I A
- Español Sin Fronteras

RUSSIAN – I

Course Code: LAN2154

L-T-P : 3-0-0 **CreditUnits: 03**

CHINESE – I

Course Code: LAN2155

L-T-P : 3-0-0 **CreditUnits: 03**

Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects

of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

PORTUGUESE - I

Course Code: LAN2156

L-T-P : 3-0-0 **CreditUnits: 03**

ENGINEERING MATHEMATICS - II

Course Code: ASE2209
L-T-P : 3-1-0 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

Module IV: Statistics and Probability
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.

- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ASE2216	Engineering Mechanics	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Basics of Mathematics, Mathematical Equations, Force systems				
Co-requisites	-				

Catalog Description

Engineers are the ultimate problem solvers. This course introduces the principles required to solve engineering mechanics problems. It addresses the modelling and analysis of static equilibrium problems with an emphasis on real-world engineering applications and problem solving. To master this course, students should have a background in basic mathematical calculus and physics covering classical mechanics. These basic concepts of physics and mathematics will be applied to formulate problems on force systems, trusses, friction, centroid, simple lifting machines, power transmission devices and law of conservation of energy.

Course Objectives

The objective of this course is to

5. Equip the students with concepts of free body diagram, friction, centroid or center of gravity, trusses, energy, force system and its effect on the behavior of the bodies
6. Provide an overview of estimation of performance of belts and simple lifting machines under various operating conditions.

Course Outcomes

After completing the course, the students will be able to

CO1. Explain the concept of free body diagram, classify various force system sand apply equilibrium equations to solve different truss problems.

CO2. Define and compute various terms associated with the friction, determine the efficiency of simple lifting machines and power transmission devices.

CO3. Describe various theorems and apply them to determine centroid, centre of gravity, moment of inertia, mass moment of inertia of various bodies.

CO4. Analyse and setting up the problems involving the concept of work, energy, impulse and momentum.

Modules	Blooms level*	Number of hours
Module I: **<u>Force system</u>**	L1, L2	10

Types of forces, Parallelogram law of forces, Triangle law of forces, Polygon law of forces, Free body diagram, Equilibrium equations and applications. Lami's theorem and its applications. Moment and its applications,	and L3	
Module II: **<u>Determinate Structures</u>** Plane truss, perfect and imperfect truss, assumption in solving the truss problems, method of joints, method of section.	L1, L2,and L3	8
Module III: **<u>Friction</u>** Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, ladder friction, Screw jack & determination of its efficiency	L2 and L3	10
Module IV: **<u>Distributed Force</u>** Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, perpendicular axis theorem, parallel axis theorem, and its application, polar moment of inertia.	L2, L3 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- **S. Timoshenko, D. H. Young**, Engineering Mechanics, 5th Ed, McGraw Hill, 2008, New-Delhi
- **<u>S. S. Bhavikatti</u>, <u>K. G. Rajashekarappa</u>**, Engineering Mechanics, New Age International Ltd, 1998, New Delhi
- **D.S. Kumar**, Engineering Mechanics, S. Chand Publication, 2013, New-Delhi

Reference Books

- **I. H. Shames & G. K. M. Rao**, Engineering Mechanics: Statics and dynamics, 4th Ed, PHI, 2002.
- **<u>Beer Ferdinand P</u>, <u>Russel Johnston Jr.</u>, <u>David F Mazure</u>**, Vector Mechanics for Engineers: Statics and Dynamics (SIE), 5th Ed, McGraw Hill, 2008, New-Delhi
- **J. L. Meriam and L. G. Kraige**, Engineering Mechanics, Vol I – Statics, Vol II – Dynamics, 6th Ed, John Wiley, 2008.

- **R. C. Hibbler**, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press, 2006.
- **Andy Ruina and RudraPratap**, Introduction to Statics and Dynamics, Oxford University Press, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO 2	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO 3	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**
CO 4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ENGINEERING PHYSICS

Course Code: **ASE2110**
L-T-P : 2-1-0 **CreditUnits: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnelsbiprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .
Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

ENGINEERING PHYSICS LAB

Course Code: **ASE2114**
L-T-P : 0-0-2 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender&Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ASE2212	ENGINEERING GRAPHICS LAB	L	T	P	C
Version 2019.1	Date of Approval: July 14, 2019	0	0	4	2
Pre-requisites/Exposure	Concepts Mathematics (especially Trigonometry and Geometry)				
Co-requisites	Machine Drawing & CAD				

Catalog Description:

A freshman level course which provides the undergraduate engineering students with a background in descriptive geometry, orthographic projection, engineering drawing standards and annotation,computer-aided engineering graphics. The concepts ofpoint, line and plane relationships in projection, multi-view engineering drawings, auxiliary and section views, basic dimensioning and annotation, engineering applications of drawings are also discussed.

Course Objective:

The objective of this course is to

1. Equip the students with the in-depth knowledge of drawings of points, straight line, planes, cylinders, prisms, pyramids, parabola, ellipse etc.

2. Draw different figures manually and will be capable of using various instruments involved in drawings.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO 1 - Define and explain basic principles of projections of points and lines.

CO 2 - Define, describe and construct the different orientations and projections of planes.

CO 3 – Explain and construct the projections of solids and sectioning of solids in different orientations.

CO 4 - State and draw the concepts of development of surfaces and introduction to auto CAD.

CO 5 – Define and construct orthographic and isometric view of an object.

Modules	Blooms level*	Number of hours
Module I: Introduction Importance, significance and scope of engineering drawing, drawing instruments and their use, lettering, dimensioning, scales, sense of proportioning, different types of projections, B.I.S. Specifications.	L1 and L2	8

Module II: Projection of points, lines and plane surface Principal planes, principles of orthographic projections, Projection of points in all quadrants, Projection methods - First angle & third angle projection, Projections of straight lines (first angle projection) inclined to both the planes, true lengths and traces, projection of planes, projection of planes in simple position and inclined to both the principal planes, auxiliary planes and views	L1, L2 and L3	12
Module III: Projection of solids & section of solids Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both of the principal planes, Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other, obtaining true shape of section	L1, L2 and L3	12
Module IV: Development of surfaces & Isometric projections Development of surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones, Principles of isometric projection, isometric scale, Isometric projections of simple solids and truncated solids, Prisms, pyramids, cylinders, cones, Conversion of Orthographic Views to Isometric Views and Vice-versa.	L1, L2 and L3	8
Module V: Introduction to CAD Introduction to CAD and use of its commands, practice of some 2D figures using CAD.	L1, L2 and L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	50	20

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- PS Gill, 2013, Engineering Drawing, Kataria Publication.
- ND Bhatt, 2014, Engineering Drawing, Charotar publications.

References Books:

- N Sidheshwar, 2014 Machine Drawing Drawing, Tata McGraw Hill
- M.B. Shah & B.C. Rana, 2007, Engineering Drawing, Pearson Education.
- CADFolks, AutoCAD 2018 For Beginners, CreateSpace Independent *Publishing* Platform; 6 edition.

CO, PO and PSO mapping

	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**	**PSO**

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO2	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO3	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO5	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ENGLISH-II

Course Code: CSS2252

L-T-P : 1-0-0 **CreditUnits: 01**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	**H.W. Longfellow**

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	05	15	10	70

Text & References:

- MadhulikaJha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, MalraTreece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH 2251

L-T-P : 1-0-0 **CreditUnits: 01**

Course Objective:

To enable the students:
Understand the process of problem solving and creative thinking.
Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
Making Predictions and Reasoning
Memory and Critical Thinking
Emotions and Critical Thinking
Thinking skills

Module II: Hindrances to Problem Solving Process
Perception
Expression
Emotion
Intellect
Work environment

Module III: Problem Solving
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
Perception
Expression
Emotion
Intellect
Work environment

Module IV: Plan of Action
Construction of POA
Monitoring
Reviewing and analyzing the outcome

Module V: Creative Thinking
Definition and meaning of creativity
The nature of creative thinking
Convergent and Divergent thinking
Idea generation and evaluation (Brain Storming)
Image generation and evaluation
Debating
The six-phase model of Creative Thinking: ICEDIP model

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

ENVIRONMENTAL STUDIES

Course Code: **ENV 2252**
L-T-P : 4-0-0 **CreditUnits: 04**

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness

Module II: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution
Definition
Causes, effects and control measures of:

a. Air pollution
b. Water pollution

FRENCH - II

Course Code: LAN2251

L-T-P : 3-0-0 **CreditUnits: 03**

Course Objective:

To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.
To make them learn the basic rules of French Grammar.

Course Contents:

Module A : pp.38 – 47 : Unité 3: Objectif 3, 4, 5, 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3 : Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

Unité 4: **Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5: s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical:

1. Adjectifsdémonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de :
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

ExaminationScheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN – II

Course Code: LAN2252

L-T-P : 3-0-0 **CreditUnits: 03**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Grammar to consolidate the language base learnt in Semester I

Course Contents:

Module I: Everything about Time and Time periods

Time and times of the day.

Weekdays, months, seasons.

Adverbs of time and time related prepositions

Module II: Irregular verbs

Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs

To comprehend the change in meaning that the verbs undergo when used as such

Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension

Reading and deciphering railway schedules/school time table

Usage of separable verbs in the above context

Module V: Accusative case

Accusative case with the relevant articles

Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns

Nominative and accusative in comparison

Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions

Accusative propositions with their use

Both theoretical and figurative use

Module VIII: Dialogues

Dialogue reading: 'In the market place'

'At the Hotel'

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3

- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – II

Course Code: LAN2253

L-T-P : 3-0-0 **CreditUnits: 03**

Course Objective:

To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Possessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, EnDirecto I A
- Español Sin Fronteras

RUSSIAN – II

Course Code: LAN2254

L-T-P : 3-0-0 **CreditUnits: 03**

CHINESE – II

Course Code: CSE2255

L-T-P : 3-0-0 **CreditUnits: 03**

Course Objective:

Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II
Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room..eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV
Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V
The verb "qu"
- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets
- Going to the post office, buying stamps
- Going to the market to buy things..etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.
Comprehension and answer questions based on it.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

PORTUGUESE - II

Course Code: LAN2256

L-T-P : 3-0-0 **CreditUnits: 03**

Third Semester

ASE2313	Engineering Mathematics - III	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	1	0	4
Pre-requisites/ Exposure	Basic Mathematics				
Co-requisites					

Course Catalog

The course is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Objectives

The objective of this course is to

1. Equip the students with basic concepts of mathematics so as to explore the usage of mathematics in differential equations and its classification integral calculus.
2. Disseminate knowledge on performing mathematical functions that can be applied to solve the vector and integral problem and gaining deeper knowledge in a subject specific area through practicing different problems in solving and analyzing the problem

Course Outcomes

On successful completion of this course, students will be able to

CO1. Identify, estimate, and apply the fundamental concept of mathematics such as Partial Differential Equations and its classifications, vector differentiation and integral calculus.

CO2. Utilize the Fourier series and Laplace transformation to analyze the problems in various domains of engineering.

CO3. Describe any model with multi variable using linear programming by numerous methods.

CO4. Identify, estimate and apply different mathematical functions to attain a solution of problem

CO5. Demonstrate problem-solving and critical thinking skills by practicing problem in mathematics.

Course Content

Modules	Blooms level*	Number of hours
Module I: Partial Differential Equations Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method, Homogeneous linear equations with constant coefficients, Non homogeneous linear equations.	L1, L2, L3	14
Module II: Fourier Series Periodic Functions, Fourier Series, Functions having points of discontinuity, Even or Odd Functions, Change of Interval, Half-range series, , Parseval's Formula, Complex form of Fourier series, Practical Harmonic Analysis, Fourier Transforms, Sine and Cosine Transforms.	L1, L2, L3, L4	10
Module III: Laplace Transformation Definition, Transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Evaluation of	L1, L2, L3	12

integrals by Laplace transform, Inverse transforms, Other methods of finding inverse transforms, Convolution theorem, Application to differential equations, Simultaneous linear equations with constant coefficients, Unit step functions, Periodic functions.		
Module IV: Linear Programming Formulation of the problem, Graphical method, Canonical and Standard forms of L.P.P. Simplex Method, Artificial variable Techniques-M-method, Two phase method, Degeneracy, Dual simplex method.	L1, L2, L3	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. Kreyzig, E., "Advanced Engineering Mathematics", 9th Edition, John Willey & Sons, 2011.

Reference:

1. Jain, M.K. and Iyenger, S.R.K., "Advanced Engineering Mathematics", 5th Edition, NarosaPublications, 2016.
2. Thomas, B.G., and Finley, R.L., "Calculus and Analytical Geometry", 9th Edition, Pearson Education Asia, Addison Wesley, 1995.
3. Simmons, G.F., "Differential Equations with applications", Tata McGraw Hill, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2314	Engineering Thermodynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Physics, Chemistry				
Co-requisites					

Course Catalog

This course provides basic understanding and knowledge of the scientific principles of thermodynamics, and heat transfer. This course helps the students to understand the application of basic fluid mechanics, thermodynamic, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering. It will also help in designing any device which involves the interchange between heat and work.

Course Objectives

The objective of this course is to

1. Equip the students with basic knowledge and governing principles of heat and work.
2. Enable students with problem solving skills related to gases, gas mixtures, gas power cycles, and vapor power cycles.

Course Outcomes

On successful completion of this course, students will be able to

CO1. Identify and explain the basic science and principles of thermodynamics and apply them to thermodynamic systems.

CO2. Identify, and explain the basic principles of first law of thermodynamics and apply the knowledge to solve relevant engineering problems.

CO3. Identify, and explain the basic principles of second law of thermodynamics and apply the knowledge to solve relevant engineering problems.

CO4. List, explain and compare amongst the various properties of gases and gas mixtures and solve relevant engineering problems.

CO5. List, explain and compare amongst the various kinds of gas and vapor power cycles and solve relevant engineering problems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Basic Concepts Macroscopic and microscopic approaches, thermodynamic system and control volume. Thermodynamic properties, processes and cycles. Homogeneous and heterogeneous systems, Quasi-static process, Thermodynamic equilibrium, Pure substance. Zeroth Law of Thermodynamics and temperature, Measurement of	L1, L2	7

temperature and its scales, thermocouples, Ideal gas.		
Module 2: First Law of Thermodynamics Work and heat transfer, sign conventions. Joule's experiment, equivalence of heat and work, First law of thermodynamics, specific heats, internal energy, enthalpy, applications and limitations of first law. First law applied to flow processes; control volume, Steady flow processes, mass and energy balance.	L1, L2, L3	7
Module 3: Second Law of Thermodynamics and Entropy Qualitative difference between heat and work, Energy reservoir, Heat Engine, heat pump and refrigerator, Kelvin Planck's and Clausius's statements of Second Law and their equivalence, Perpetual motion machine, Reversibility and irreversibility, Carnot Cycle, Carnot's theorem and it's corollary, Absolute temperature scale, Clausius's inequality, property of entropy, principle of entropy increase, concepts of availability.	L1, L2, L3	8
Module 4: Properties of Gas and Gas Mixtures Avogadro's law, ideal and real gas, equations of state, Dalton's law, Properties of mixture of gases; internal energy, enthalpy, specific heat and entropy, Gibb's function. Steam, saturated and superheated steam,wet steam, Use of steam tables.	L1, L2, L3, L4	7
Module 5: Gas and Vapour Power Cycles Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, Brayton cycle, Reversed Carnot cycle, PV and TS Diagrams, Comparisons, Calculations of efficiency. Simple steam power cycle, Rankine cycle, Comparison of Rankine and Carnot cycle.	L1, L2, L3, L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. P. K. Nag, "Engineering Thermodynamics", 6th Edition, Tata McGraw Hill, 2017.
2. Rahul Gupta, "Engineering Thermodynamics", Asian Books Pvt. Ltd., 2008.

Reference:

1. S. K. Kulshretha, "Textbook of Applied Thermodynamics, Steam and Thermal Engineering", Vikas Publications House Pvt. Ltd., 1984.
2. Y. A. Cengel, M. A. Boles, "Thermodynamics: An Engineering Approach**",** 8th Edition,McGraw Hill, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4

CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	-	1	-	-
CO5	1	1	3	-	-	-	-	-	-	-	-	-	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2315	Strength of Materials	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Physics, Engineering Mechanics				
Co-requisites					

Course Catalog

The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure and stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

Course Objectives

The objective of this course is to

1. Equip the students with concept of stress and strain induced in material under various loading conditions.
2. Provide an overview of stresses induced in beam, shaft, column and deflection of beam under various loading conditions.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify, explain, and apply the principles of stress and strain and relationship between elastic constant to solve complex engineering problems.

CO2. Identify, explain, and apply the principles of shear force and bending moment under various loads to solve complex engineering problems.

CO3. Identify, explain, and apply the principles of torsion and torsional stresses to solve complex engineering problems.

CO4. Identify, explain, and apply the methods to solve complex engineering problems related to columns and struts.

CO5. Identify, explain, and apply the methods to solve complex engineering problems related to slope and deflection of different bodies.

Course Content

Modules	Blooms level*	Number of hours
Module I: Simple Stresses and Strains Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Mohr Circle, problems.	L1, L2, L3	6
Module II: Shear Force and Bending Moment Definitions, Types of loads, Types of beams, Shear force and bending moment diagrams for cantilevers, simply supported beams, calculation of maximum	L1, L2, L3	8

bending moment & shear force. Bending Stress, assumptions in the simple bending theory, derivation of formula and its application to beams of rectangular, circular and channel sections, problems.		
Module III: Torsion Derivation of torsion equation and its assumptions. Applications of the equation for the hollow and solid circular shafts, torsional rigidity, combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion, problems.	L1, L2, L3	7
Module IV: Columns and Struts Columns and Struts and their failure mechanism, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications, problems.	L1, L2, L3	7
Module IV: Slope and Deflection Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following: a) Cantilevers b) Simply supported beams with or without overhang c) Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads, problems.	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. Ramamurtham, S., "Strength of Materials", 16th Edition, Dhanpat Rai Publishing Company, 2011.
2. Peery, D. J., "Aircraft Structures", Dover Publications, 2011.
3. Megson, T. H. G., "Aircraft Structures for Engineering Students", Elsevier India, 2005.
4. Sun, C. T., "Mechanics of Aircraft Structures", 2nd Edition, Wiley-India Pvt. Ltd., 2006.

Reference:

1. Timoshanko, S. P. and Goodier, J. N., "Theory of Elastic Stability", 2nd Edition, Dover Publications Inc., New York, 2009.
2. Sinha, N. C., "Elements of Structural Analysis", New Central Book Agency, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4

CO1	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2317	Strength of Materials Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Physics, Engineering Mechanics				
Co-requisites	Strength of Materials				

Course Catalog

The objective of the Strength of Materials lab is to demonstrate the basic principles in the area of strength and mechanics of materials and structural analysis to the undergraduate students through a series of experiments. In this lab, the experiments are performed to measure the properties of the materials such as impact strength, tensile strength, compressive strength, hardness, ductility etc.

Course Outcomes

At the end of the course, the student shall be able to:

CO1. Identify, explain, and demonstrate the procedure to conduct hardness tests using differenttesting techniques.

CO2. Identify, explain, and demonstrate the procedure to conduct compression and stiffness testsusing different testing techniques.

CO3. Identify, explain, and demonstrate the procedure to conduct impact and tensile tests usingdifferent testing techniques.

CO4. Identify, explain, and demonstrate the procedure to conduct torsion tests and draw shearforce and bending moment diagrams for bodies under different loading conditions.

Modules	Blooms level*	Number of hours
1. To study the Brinell hardness testing machine & perform the Brinell hardness test.	L1, L2, L3	2
2. To study the Rockwell hardness testing machine & perform the Rockwell hardness test.	L1, L2, L3	2
3. To study the Spring Compression Testing machine and perform the Spring Stiffness test.	L1, L2, L3	2
4. To study the Impact testing machine and perform the Impact tests (Izod&Charpy Test)	L1, L2, L3	2
5. To study the Universal Testing Machine and perform the tensile test on Universal Testing Machine.	L1, L2, L3	2
6. To perform compression & bending tests on UTM.	L1, L2, L3	2
7. To study the torsion testing machine and perform the torsion test.	L1, L2, L3	2
8. To draw shear Force, Bending Moment Diagrams for a simply Supported Beam under Point and Distributed Loads.	L1, L2, L3	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

12. G. H. Ryder, “Strength of Materials”, India: Macmillan, 1969.

13. R. K. Bansal, “A Textbook of Strength of Materials”, Laxmi Publications, 2010.

14. V. Jain, “Strength of Material –I”. Dhanpat Rai Publications, 2012.

Reference:

- S. Singh, “Strength of Material”, Khanna Publisher, 2010.
- R. K. Rajput, “Strength of Materials”, S. Chand Publications, 2006.

Examination Scheme

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO2	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO3	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO4	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3

1: strongly related, 2: moderately related and 3: weakly related

ASE2321	Introduction of Aerospace Engineering	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Physics, Engineering Mechanics, Chemistry				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of flight vehicles and their classifications based on various aspects. Knowledge of basic physics is crucial to comprehend the contents of this course. This course also provides introductory knowledge to the students about various components and systems of flight vehicles which serve as a foundation for better understanding of advanced course.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the basic science and principles as applicable to various flight vehicles and their structure.
2. Provide education to the students about the aerodynamics, propulsion, and systems of different types of flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain, and categorize amongst various kinds of flight vehicles and their design.

CO2. List, explain, and compare amongst various structural components of flight vehicles and loads acting on them.

CO3. List, explain, categorize, and apply the basic concepts of flight and properties of atmosphere.

CO4. List, explain, categorize, and apply the basic concepts of propulsion and propulsion systems.

CO5. List, explain, categorize, and apply the basic concepts of various types of aerospace systems and instrumentations.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Flight Vehicles History and development of flying machines. Classification of flight vehicles. V/STOL Machines, Introduction to prominent design features of; Airplanes, helicopter and other flying machines. Advancements in Aerospace.	L1, L2, L4	7
Module 2: Aerospace Structure Importance of strength/weight ratio of materials. Monocoque, semi-monocoque and truss type construction. Detailed description of the fuselage, wing and tail structures. Loads on different parts of the aerospace vehicles. Types of undercarriages. Aerospace Materials.	L1, L2, L4	7

Module 3: Principles of Flight International Standard Atmosphere, Relationship between temperature, pressure and altitude. Bernoulli's principle, Propagation of sound, Mach Number, Aerodynamic forces and moments on airfoil; Lift and drag, Roll, Pitch and yaw, Wing Planform, Control surfaces.	L1, L2, L4	7
Module 4: Principles of Propulsion Newton's third law of motion and its application in propulsion, Propulsive force, Air-breathing Propulsion, Types of air-breathing engines, Rocket Propulsion, Thrust Equation, Propulsive Efficiency, Propulsion system design criteria, Advancements in Aerospace Propulsion.	L1, L2, L4	8
Module 5: Aerospace Systems and Instrumentation Introduction to mechanical, electrical and avionics systems, conventional control, powered control, basic instruments of flying, T-arrangement, Actuation systems, Environmental control systems, Air data systems, communication systems.	L1, L2, L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. A. C. Kermode, "Mechanics of Flight", 11th Edition, Prentice Hall, 2006.
2. A. C. Kermode, "Aeroplane Structures", 2nd Edition, Pitman Publications, UK, 1986.
3. M. J. Kroes, J. Rardon, M. Nolan, "Aircraft Basic Science", 8th Edition,McGraw-Hill Education, 2013.
4. J. D. Anderson Jr., "Fundamentals of Aerodynamics", 5th Edition, McGraw Hill Education, 2010.
5. E. L. Houghten, P. W. Carpenter, "Aerodynamics for Engineering Students", 5th Edition, Butterworth-Heinemann, 2003.

Reference:

1. M. J. Kroes, T. W. Wild, "Aircraft Power Plants", 7th Edition, McGraw Hill Education, 1994.
2. I. E. Treager, "Aircraft Gas Turbine Engine Technology", 3rd Edition, McGraw Hill Education, 2017.
3. J. G. Bertin, R. M. Cummings, "Aerodynamics for Engineers", 6th Edition, Pearson Education, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO	PSO

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	1	3	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	3	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	3	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-
CO5	1	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2322	Fluid Mechanics and Dynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basic Physics				
Co-requisites					

Course Catalog

This course provides the basic knowledge and understanding of the properties, types, motion and forces of fluid. A student is supposed to have a basic knowledge of physics to comprehend the contents of this course. The subject will further enhance the knowledge regarding different types of flows and their practical applications in the field of aerospace. The course also includes different fluid equations like Euler's, Bernoulli's etc. and their practical applications.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students about different properties of fluids and equip the students with the knowledge of basic principles and laws governing the motion of fluid.
2. Equip the students with knowledge and understanding of the different behaviors of flow past submerged bodies of different shapes and cross-sections.

Course Outcomes

On successful completion of this course, students will be able to

CO1. Identify, describe, and distinguish amongst the various types and properties of fluids, hydrostatic forces and their measurement techniques.

CO2. Identify, describe, and distinguish amongst the various properties of Kinematics of fluid motion and solve relevant engineering problems.

CO3. Identify, describe, and distinguish amongst the various properties of Dynamics of fluid motion and solve relevant engineering problems using various techniques of dimensional analysis.

CO4. Define, and explain various forces and moments acting on fully submerged bodies and apply the basic principles to solve relevant engineering problems.

CO5. Identify, describe, and distinguish between various properties of internal and external laminar and turbulent flows and solve relevant engineering problems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Fluid Properties and Fluid Static Physical properties of fluids, Newtonian and Non-Newtonian Fluids, Incompressible and compressible fluids. Pascal's Law, Hydrostatic law, concept of pressure and its measurement, forces on plane and curved surfaces. Buoyancy, stability of floating bodies.	L1, L2	7

Module 2: Fluid Kinematics Description of fluid flow; Lagrangian and Eulerian approach, Types of fluid flows, streamline, pathline and streakline, velocity potential and stream function. Source, sink, doublet, superimposed flow, vorticity and circulation, vortex flow, free and forced vortex.	L1, L2	8
Module 3: Fluid Dynamics and Dimensional Analysis Conservation equations, Euler's equation, Bernoulli's equation, Introduction to Navier-stokes equation, Pilot tube, Venturimeter, orificemeter, notches. Buckingham π-Theorem, Rayleigh Theorem, Types of similarity, Dimensionless numbers and their significance.	L1, L2, L3	7
Module 4: Flow past Submerged Bodies Drag and Lift, Types of drag force, Drag on various bodies, circulation and lift on cylinder and airfoil, Magnus Effect, Introduction to boundary layer, Boundary layer thickness, boundary layer separation.	L1, L2, L3	7
Module 5: Laminar and Turbulent Flow Reynolds' experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates, Transition from laminar to turbulent flow, velocity distribution law near a solid boundary. Flow through pipes, Energy losses, minor losses in pipe lines.	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. R. K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications Pvt. Ltd., 2002.
2. D. S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S. K. Kataria& Sons, 2000.

References:

1. G. S. Sawhney, "Fundamentals of Fluid Mechanics", I K International Publishing House, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO2	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-
CO5	1	1	3	-	-	-	-	-	-	-	-	-	1	3	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2323	Fluid Mechanics and Dynamics Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Basic Physics				
Co-requisites	Fluid Mechanics and Dynamics				

Course Catalog

The objective of the Fluid Mechanics and Dynamics lab is to familiarize the students with application of basic physics of fluids, its viscosity, and its laws of conservation of energy. It provides the students with the knowledge of laboratory methods and interpretation of results with regard to fluid engineering applications such as design and operation of water, losses it goes through while energy is being transferred.

Course Objectives

1. Equip the students with concepts of properties of fluid flow and fluids; energy losses calculations and its measurement through different geometric cross sections.
2. Provide an outline of calculations of coefficient of discharge velocity and contraction through various flow measuring devices.

Course Outcomes

At the end of the course, the student shall be able to:

CO1. Describe the working, interpret, calculate, and validate the Bernoulli's experiment.

CO2. Describe the working of Venturimeter and Orificemeter, determine the coefficient of discharge.

CO3. Describe, categorize, differentiate the various major and minor losses, and calculate the losses in the pipeline structure.

CO4. Describe the Reynolds's experiment and metacenter. Determine the type of the flow and interpret the conditions for a body to float.

CO5. State the pressure measuring devices, their working and determine the viscosity of fluid with change in the temperature.

Modules	Blooms level*	Number of hours
1. Verification of Bernoulli's Theorem	L2, L4	1
2. To determine the coefficient of discharge of Venturimeter	L2, L3	2
3. To determination of coefficient of Discharge C_d, coefficient of contraction C_c and coefficient of velocity C_v of an Orificemeter	L2, L3	1
4. To find major head losses in a pipe line	L2, L3 and L4	1
5. To find minor head losses in a pipe line (sudden expansion/contraction/bend)	L2, L3 and L4	1

6. To find critical Reynold's number for a pipe flow	L2, L3	1
7. To determine the metacentric height of a floating body	L2, L3	1
8. To study pressure measuring devices	L1, L2	1
9. To determine the viscosity of the fluid with the change in the temperature	L1, L2	1
10. To determine the coefficient of discharge by falling head method	L2, L3	1

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. R. K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications Pvt. Ltd., 2002.
2. D. S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S. K. Kataria& Sons, 2000.

References:

1. G. S. Sawhney, "Fundamentals of Fluid Mechanics", I K International Publishing House, 2011.

Examination Scheme

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO2	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO3	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3
CO4	1	3	-	1	-	-	-	-	2	2	3	3	1	-	-	3

1: strongly related, 2: moderately related and 3: weakly related

ASE2324	Aircraft Manufacturing Processes	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Basic Physics, Chemistry, Engineering Mechanics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various tools, techniques, processes, and practices utilized in manufacturing and maintenance workshops. This course also deals with various specific processes utilized in manufacturing of aircraft structure and components. Basic understanding of engineering physics and elements of mechanical engineering is prerequisite to comprehend the contents of this course.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the basic manufacturing processes, and heat treatment techniques.
2. Equip the students with knowledge of various tools, processes, and techniques used in manufacturing of aircraft and its components.

Course Outcomes

On successful completion of this course, students will be able to

CO1. Identify, describe and distinguish amongst the basic tools and processes used in sheet metal and wood working.

CO2. Identify, describe, and distinguish between various heat treatment processes and their impacts on material properties.

CO3. Identify, describe, and distinguish between various types of machining tool used in manufacturing and fabrication of components.

CO4. Identify, describe, and distinguish between various types of jigs and fixtures used in manufacturing and fabrication of aircraft components.

CO5. Identify, describe, and distinguish between various processes and techniques used in manufacturing and fabrication of aircraft structure and components.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Selection of materials. Importance of material processes. Manufacturing Processes. Sheet Metal working. Wood Working.	L1, L2	4
Module 2: Heat Treatment of Steels Relation between heat treatment and physical properties of steels. Critical temperatures, annealing, normalizing, tempering, case carburizing, hardening,	L1, L2	6

nitriding and other surface hardening methods. Quenching. Hardness numbers, hardness testing machines.		
Module 3: Machining Tools Types of lathe, lathe operations – facing, turning, threading, shapers. Types of shapers, general applications. Milling machines, types of milling machines. Work holding devices, cutter holding devices. Abrasives, bonds, grinding wheels.	L1, L2	5
Module 4: Jigs and Fixtures General design. Method of location of cylindrical and flat surfaces. Design principles of Wing Jig, Fuselage jig and other components.	L1, L2	4
Module 5: Aircraft Manufacturing Processes Profiling, hydroforming, spar milling, spark erosion, high energy rate forming. Manufacturing of honeycomb structures. General methods of construction of aircraft and engine parts.	L1, L2	5

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. W. A. J. Chapman, "Workshop Technology-Vol. I, II, III", 5th Edition, Butterworth-Heinemann, 1972.
2. G. F. Titterton, "Aircraft Materials and Processes", Sterling Book House, 2007.
3. G. B. Ashmead, "Aircraft Production Methods" 1st Edition, Chilton Company, 1956.

References:

1. L. Gupta, "Advanced Composite Materials", Himalayan Books, New Delhi, 1998.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-
CO2	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-
CO3	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-
CO4	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-
CO5	1	-	1	-	2	-	-	-	-	-	-	-	3	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2325	Measurement Techniques	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Basic Physics				
Co-requisites					

Course Catalog

The course is designed to equip the students with knowledge and understanding of variousmeasurements systems generally utilized in different aerospace applications. This course enables thestudents to identify and utilize a particular measuring system to achieve solutions of variousengineering applications.

Course Objectives

The objective of this course is to

1. Equip the student with a basic understanding about the need and necessity of specificmeasurements techniques systems for aerospace applications.
2. Provide detailed knowledge to the students about the construction and operation of variousmeasurements systems and instruments.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, identify, and explain the need, necessity, and fundamentals of measuring principles,techniques, and systems.

CO2. List, identify, and explain the construction, components, and working of motion, force andtorque measurement systems.

CO3. List, identify, and explain the construction, components, and working of pressure and flowmeasurement systems.

CO4. List, identify, and explain the construction, components, and working of temperature andhumidity measurement systems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Measurement Systems Introduction, Typical Applications of measurement Systems, Functional Elements of a Measurement System, Classification of Instruments, Standards and Calibration.	L1, L2	5
Module 2: Motion, Force and Torque Measurement Introduction, Relative motion Measuring Devices, Electromechanical, Optical, Photoelectric, Absolute Motion Devices, Spring Mass & Force Balance Type, Hydraulic Load Cell, Pneumatic Load Cell, Elastic Force Devices, Separation of Force Components, Electro-mechanical Methods, Strain Gauge, Torque	L1, L2	7

Transducer, Torque Meter.		
Module 3: Pressure and Flow Measurement Introduction, Moderate Pressure Measurement, Monometers, Elastic Transducer, High Pressure Transducer, Low Pressure Measurement, Quantity Meters, Positive Displacement Meters, Flow Rate Meters, Variable Head Meters, Variable Area Meters, Rotameters, Pitot-Static Tube Meter, Drag Force Flow Meter, Hot-Wire Anemometer	L1, L2	6
Module 4: Temperature and Humidity Measurement Introduction, Measurement of Temperature, Non Electrical Methods – Solid Rod Thermometer, Bimetallic Thermometer, Liquid-in-Glass thermometer, Pressure Thermometer, Electrical Methods – Electrical Resistance Thermometers, Semiconductor Resistance Sensors (Thermistors), Thermo–electric Sensors, Thermocouple Materials, Radiation Methods (Pyrometry), Total Radiation Pyrometer, Selective Radiation Pyrometer, humidity measurements	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. E. O. Doebelin, "Measurement systems Application and Design", 4th Edition, Tata McGraw Hill, 1997.
2. N. A. Anderson, "Instrumentation for Process Measurement and Control", 3rd Edition, CRC Press, 1997.
3. N. Chaudhary, "Instrumentation, Measurement and Analysis", 4th Edition, Tata McGraw Hill, 2016.

Reference:

1. A. S. Morris, "Principles of Measurement and Instrumentation", Prentice Hall of India, 1899.
2. T. G. Beckwith, W. L. Buck, R. D. Marangoni, A. Wesley, "Mechanical Measurements", 6th Edition, Pearson Education India, 2013.
3. D. S. Kumar, "Mechanical Measurements", 5th edition, S. Kataria& Sons, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	1	-	-	-	-	-	-	-	-	-	3	3	1	-

CO2	1	-	1	-	-	-	-	-	-	-	-	-	3	3	1	-
CO3	1	-	1	-	-	-	-	-	-	-	-	-	3	3	1	-
CO4	1	-	1	-	-	-	-	-	-	-	-	-	3	3	1	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2326	Introduction to Heat Transfer	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Basic Physics, Chemistry				
Co-requisites					

Course Catalog

The main objective of this course is to provide an understanding of the behavior of thermal systems. This course aims to provide the students essential knowledge on various modes of heat transfer and its application in solving problems related to aero-thermodynamics of rockets and launch vehicles. Specifically, this course would deal with aero-thermal design and analysis of various systems of flight vehicles.

Course Objectives

The objective of this course is to

1. Provide a basic understanding and knowledge to the students about the various mechanism of heat transfer.
2. Equip the students with knowledge to apply and solve heat transfer related problems of the aerospace domain.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, and describe various principles and characteristics of conductive heat transfer for different bodies and solve relevant problems.

CO2. List, and describe various principles and characteristics of convective heat transfer for different bodies and solve relevant problems.

CO3. List, and describe various principles and characteristics of radiative heat transfer for different bodies and solve relevant problems.

CO4. Identify, explain and apply the various principles of heat transfer to solve problems relevant to heat transfer through various components and systems of flight vehicles.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Conductive Heat Transfer Basic modes of heat transfer, Fourier's Law of heat conduction, thermal conductivity of materials, heat capacity, 1D steady state heat conduction with and without heat generation, for plates, cylinders and spheres, critical thickness, unsteady state.	LI, L2	6
Module 2: Convective Heat Transfer Introduction, Newton's law of cooling, advection, free convection in atmosphere, free convection on vertical plate. Forced convection, laminar and	LI, L2	6

turbulent convective heat transfer analysis between parallel plates, over a flat plate and in circular pipes.		
Module 3: Radiative Heat Transfer Introduction to physical mechanism, radiation properties, Stefan-Boltzmann's Law, radiation shape factors, Black and grey body radiation, radiation shields.	LI, L2	6
Module 4: Heat Transfer Problems in Aerospace High speed flow heat transfer, Heat transfer problems in gas turbine combustion chamber, rocket thrust chamber, aerodynamic heating and ablative heat transfer, cooling techniques. Heat Exchangers, overall heat transfer coefficient, NTU method of analysis.	L1, L2, L3, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. J. P. Holman, "Heat Transfer", 8th Edition, McGraw Hill, 1997.
2. A. Bejan, "Convection Heat Transfer", John Wiley, 1993.

Reference Books

1. Y. A. Cengel, "Heat Transfer: A Practical Approach", 2nd Edition, McGraw Hill, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO4	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

Fourth Semester

ASE2412	Numerical Analysis and Programming	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Basic Mathematics				
Co-requisites					

Course Catalog

This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. The given techniques can be used in design of engineering and scientific problems. This course provides the basic knowledge and fundamentals related to the concepts of engineering mathematics, errors and approximation theory, interpolation, graph fitting and statistical computation.

Course Objectives

The objective of this course is to

1. Provide an understanding to the students about the various numerical tools to solve problems related to formulation of algebraic equations and data interpolation.
2. Equip the students with knowledge to use various numerical tools to solve problems related to calculus, differential equations, and statistics.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify, distinguish and apply the concept of errors, data interpretation and approximation theory to solve relevant problems.

CO2. Identify, distinguish the various methods of Interpolation, and apply the concept to solve realistic problems.

CO3. Distinguish and apply the various methods of numerical integration and differentiationto solve complex engineering problems.

CO4. Interpret and construct differential equations various different methods to solve complex engineering problems.

CO5. Identify, distinguish and apply various technical tools of curve fitting and their utilisation in engineering.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Solution of Algebraic and Transcendental Equation Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method. Solutions of Simultaneous equation: Gauss elimination method, Jacobi iteration method, Gauss Seidal method.	L1, L2, L3	10
Module 2: Interpolation Finite Differences, Difference tables, Polynomial Interpolation**:** Newton's forward and backward formula, Central Difference Formulae: Gauss forward	L1, L2, L3	10

and backward formula. Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula.		
Module 3: Numerical Integration and Differentiation Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.	L2, L3	5
Module 4: Solution of Differential Equations Euler's Method, Runga-Kutta Methods	L2, L3, L4	3
Module 5: Statistical Computation Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc., Data fitting with Cubic splines.	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

15. Eyengar, S. R. K., Jain, S. K. and Jain, R. K., "Numerical Methods for Scientific and Engineering Computations", New Age International Publishers, 2007.

16. Sastry, S. S., "Introductory Methods of Numerical Analysis", 5th Edition, Pearson, 2012.

Reference Books

1. Gerald, "Applied Numerical Analysis", 7th Edition, Pearson, 2007.

2. Gupta, C. B., "Introduction to statistical Methods", 23rd Edition, Vikas Publishing House Pvt. Ltd., 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-
CO2	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-
CO3	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-
CO4	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-
CO5	1	1	2	-	3	-	-	-	-	-	-	-	1	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2415	Low Speed Aerodynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Basic Physics, Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of flow over airfoils and wings. This course focuses on educating the students about various physical laws and mathematical theories that define the flow behavior over lifting and non-lifting surfaces at low Mach number. Knowledge of basic physics and fluid mechanics is crucial to comprehend the contents of this course. This course serves as a prerequisite for better understanding of advanced aerodynamic courses.

Course Objectives

The objective of this course is to

3. Provide knowledge about the basic principles and parameters of flow motion and their measurement.

4. Educate the students about the theories and laws governing the aerodynamic behavior over airfoils and wings.

Course Outcomes

On completion of this course, the students will be able to

CO6. List and explain parameters of fluid motion and derive relevant governing equations.

CO7. Describe and determine various aerodynamic and design parameters of different types of airfoils.

CO8. Explain, derive, and apply various governing equations and theories of incompressible flow over infinite wings.

CO9. Explain, derive, and apply various governing equations and theories of incompressible flow over finite wings.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Introduction to incompressible flow. Continuity, momentum and energy Equation and their control volume approach. Streamline, Pathline, Streakline, Vorticity and circulation. Pitot-static tube, measurement of air-speed, pressure coefficient.	L1, L2, L3	6
Module 2: Airfoil Characteristics Airfoil nomenclature and characteristics. Aerodynamic force and moments, Calculations for airfoil lift and drag. Center of pressure, Aerodynamic center.	L2, L3	6

Characteristics of low speed airfoils. Finite and Infinite wings.		
Module 3: Incompressible Flow over Airfoils Non-lifting and lifting flow over circular cylinder. Vortex sheet Kutta sheet, Kutta-Jaukowski theorem. Generation of lift. D'alembert's principle. Classical thin airfoil theory for symmetric and cambered airfoil. Kelvin Circulation theorem.	L2, L3, L4	6
Module 4: Incompressible Flow over Finite Wings Biot-Savart's Law. Helmholtz's theorem. Vortex filament, finite and infinite. Prandtl classical lifting line theory. Downwash and induced drag. Elliptical lift distribution. Vortex lattice method for wings. Delta wing.	L2, L3, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

6. Anderson, J. D., Jr., "Fundamentals of Aerodynamics", 2nd Edition, McGraw Hill, 1990.
7. Houghton, E. L. and Carpenter, P. W., "Aerodynamics of Engineering Students", 4th Edition, CBS Publishers & Distributors, 2005.
8. White, F. M., "Fluid Mechanics", 2nd Edition, McGraw Hill, 1986.

Reference:

4. Bertin, J. G. and Cummings, R. M., "Aerodynamics for Engineers", 6th Edition, Pearson, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2416	Aircraft Propulsion	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basic Physics, Introduction to Aerospace Engineering, Engineering Thermodynamics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of aerospace propulsive devices as systems, with functional requirements and environmental considerations. This course provides intermediate knowledge to the students about the design, construction, and working of different types of propulsion systems and of their components and sub-systems. Knowledge of basic physics, thermodynamics, and components of flight vehicle's power plant is crucial to comprehend the contents of this course. This course serves as a prerequisite for better understanding of advanced courses related to propulsion of flight vehicles.

Course Objectives

The objective of this course is to

1. Equip the students with basic knowledge and governing principles of jet propulsion, propulsion systems, and their components.
2. Enable students with problem solving skills related to design, construction, and performance of aircraft powerplants, their systems, and subsystems.

Course Outcomes

On successful completion of this course, students will be able to

CO1. Identify and explain the basic science and principles of jet propulsion and relevant performance parameters.

CO2. Identify, describe and compare amongst the various types of propellers and explain the mathematical theories behind the operation of propellers.

CO3. List, summarize and compare amongst the construction, components, and operation of various types of air-breathing engines, their systems, and subsystems and solve relevant problems.

CO4. List, summarize, and compare amongst the construction, components, and operation of various types of aircraft piston engines, their systems and subsystems.

CO5. Outline and describe different types of fuels, their characteristics, and environmental consideration associated with their use.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction	L1, L2	7

Basics of Jet propulsion. Classification of powerplants. Propulsive efficiency, Specific fuel consumption, Thrust and power. Factors affecting thrust and power.		
Module 2: Propeller Blade Theory Ideal momentum theory and blade element theory. Selection of propellers, Types of propellers, Prop-fan, Shrouded propellers. Propeller power losses, Propeller performance parameters. Windmilling Effect.	L1, L2, L4	7
Module 3: Air-breathing Engines Gas turbinecycle. Compressor and turbine efficiencies. Compressor work and turbine work. Centrifugal and axial type of compressor and their comparative action. Combustion chambers, various arrangements and performance. Nozzles and their operation, afterburners.	L1, L2, L3, L4	6
Module 4: Aircraft Piston Engines S.I. and C.I. engines, 4-stroke and 2-stroke engines. Various type of arrangements, multi-cylinder engines, their merits and operational efficiencies. Intake and exhaust manifolds. Cooling and lubrication systems. Valve timing and arrangements. Combustion knock, knock rating. Carburetion and fuel injection. Ignition of the charge, ignition system. I.H.P., B.H.P and F.H.P, engine performance, effect of altitude, power required and power available. Supercharging and turbocharging	L1, L2, L4	10
Module 5: Aviation Fuel and Environmental Considerations Liquid fuels, hydrocarbons, gasoline, aviation turbine fuels. Fuel characteristics, vapor lock. Aircraft emission standards, environmental implications.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. Hill, P. and Peterson, C., "Mechanics and Thermodynamics of Propulsion", 2nd Edition, Pearson, 1991.
2. Mattingly, J. D., "Elements of Gas Turbine Propulsion", 1st Edition, McGraw Hill, 1997.
3. Heywood, J. B., "Internal-Combustion Engine Fundamentals", 1st Edition, McGraw Hill, 2017.

Reference:

1. Treager, I., "Aircraft Gas Turbine Engine Technology", 3rd Edition, McGraw Hill, 2017.
2. Sarvanmattoo, H. I. H., Rogers, G. F. C., Cohen, H. and Straznicky, P., "Gas Turbine Theory", 6th Edition, Pearson Education, 2008.
3. Mukunda, H. S., "Understanding Aerospace Chemical Propulsion", I K International Publishing House Pvt. Ltd., 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	1	2	3	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	1	2	3	-	3	-	-	-	-	-	-	-	-	1	3	-
CO5	1	3	-	-	-	-	1	-	-	-	-	-	-	1	1	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2417	**Aerospace Structures-I**	**L**	**T**	**P**	**C**
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Engineering Mechanics, Strength of Materials				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of loads acting on aircraft structural members and their importance. This course provides knowledge and understanding to the students about the analysis of stress, strain, deflection, and torsion of a structure under varying loads using numerous methods. Knowledge of engineering mechanics and strength of materials is crucial to comprehend the contents of this course. This course serves as a prerequisite for better understanding of advanced courses related to structure of flight vehicles.

Course Objectives

The objective of this course is to

3. Provide an overview of structural problems of beams and trusses which serves as benchmarks in analysis of structural members of flight vehicles.

4. Enable the students to understand and utilized different theorems and principles governing the structural designing of flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

CO6. Identify, describe, and analyze structural problems of stress and strain in Cartesian and Polar coordinates using governing equations.

CO7. Describe and determine the deflection and rotation of beams under different loads using various theorems.

CO8. Identify, describe, and determine the forces acting on statically indeterminate structures under different loads using various theorems.

CO9. Describe and apply the fundamental knowledge of torsion to solve relevant problems about solid bars, shells, and tubes.

CO10. Identify, describe and compare amongst various loads acting on structure members of an aircraft.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Analysis of 2D Problems Plane Stress and Plane Strain. Equilibrium equations, compatibility conditions, governing equations and boundary conditions. Analysis of 2D problems, Theory of Elasticity.	L1, L2, L4	6
Module 2: Structural Analysis Method Energy method, strain energy due to axial, bending and torsional loads, complimentary energy. Castigliano's theorems, Maxwell's reciprocal theorem. Unit load method. Principle of virtual work and virtual displacement. Principle of superposition.	L2, L3	6
Module 3: Statically Indeterminate Structures Statically determinate and indeterminate structures. Analysis of plane truss: Moment distribution method, Stiffness method, Flexibility method. Analysis of frames and rings.	L1, L2, L3, L4	6
Module 4: Torsion Torsion of non-circular solid bars, warping, axially constrained stresses. Torsional deflection of non-circular shell. Analysis of thin and thick walled tubes. Multi-cell sections.	L2, L3	6
Module 5: Structural Loads Loads on flight vehicles, Aerodynamic loads, Maneuvering loads, Inertia loads, Gust loads. Velocity-load factor diagram. Factor of safety.	L1, L2, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

5. Ramamurtham, S., "Strength of Materials", 16th Edition, Dhanpat Rai Publishing Company, 2011.
6. Peery, D. J., "Aircraft Structures", Dover Publications, 2011.
7. Megson, T. H. G., "Aircraft Structures for Engineering Students", Elsevier India, 2005.
8. Sun, C. T., "Mechanics of Aircraft Structures", 2nd Edition, Wiley-India Pvt. Ltd., 2006.

Reference:

3. Timoshanko, S. P. and Goodier, J. N., "Theory of Elastic Stability", 2nd Edition, Dover Publications Inc., New York, 2009.
4. Sinha, N. C., "Elements of Structural Analysis", New Central Book Agency, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2418	Introduction to Space Sciences	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. The given techniques can be used in design of engineering and scientific problems. This course provides the basic knowledge and fundamentals related to the concepts of engineering mathematics, errors and approximation theory, interpolation, graph fitting and statistical computation.

Course Objectives

The objective of this course is to

1. Provide an understanding to the students about the space, celestial bodies, trajectories,orbits, and orbital mechanics.
2. Equip the students with knowledge about various types of rockets, satellites and spacecraft,their crucial systems and subsystems.

Course Outcomes

On completion of this course, the students will be able to

CO1. List and explain the various peculiarities and properties of space, celestial bodies, mannedand unmanned spaceflight.

CO2. State and explain elements, principles and laws associated with the motion of orbitingbodies.

CO3. Define, explain and compare amongst the various elements and properties related tomaneuvering of artificial satellites in orbits.

CO4. List, explain, distinguish and compare amongst the different types of rockets and satellites,their design and operation.

CO5. List, explain, distinguish and compare amongst the different systems and subsystems ofspacecraft.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Planet/Solar Systems, Use of space. History of spaceflight, Spaceenvironment, Planetary exploration. Peculiarities of space environment, effect of space environment on materials of spacecraft structure and astronauts, manned space missions.	L1, L2	7
Module 2: Orbital Principles	L1, L2	7

Motion of planets and satellites, history of various models. Trajectory andOrbits. Circular and elliptical orbits. Orbital elements and properties.Kepler's laws of planetary motion and proof of the laws. Newton's universallaw of gravitation. Total energy of an orbiting body. Orbital Velocity.		
Module 3: Orbital Maneuvers Orbit Establishment. Orbital perturbations and corrections. Orbital Maneuvers. Single-impulse maneuvers, delta-V and delta-V requirements.Hohmann transfer. Simple plane changes.	L1, L2, L4	7
Module 4: Rockets and Satellites Rockets, Missiles, Satellite launch vehicles. PSLV, GSLV. Propellant & rocketpropulsion systems. Thermal protection. Natural and artificial satellites, Differenttypes of satellites. Communication satellites, radio wave propagation,modulation and demodulation. Remote sensing satellites.	L1, L2, L4	7
Module 5: Spacecraft Systems Spacecraft launch, launch vehicle and site selection. Attitude reference andcontrol subsystem. Power subsystem. Thermal subsystem. Orbitalmaintenance subsystem. Propulsion subsystem. Onboard computersubsystem.	L1, L2, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. A. K. Maini, V. Agrawal, "Satellite Technology, Principles and Applications", 3rd Edition,Wiley, 2014.
2. P. Fortescue, G. Swinerd, J. Stark, "Space Systems Engineering", Wiley, 2011.
3. S. G. Gould, "Getting Started with Amateur Satellites", 2003.

Reference Books

1. B. G. Evans, "Satellite Communication Systems", 3rd Edition, The Institution of Engineeringand Technology, 1999.
2. B. A. Campbell, S. W. McCandless, "Introduction to Space Sciences and SpacecraftApplications", Gulf publishing, 1996.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-

CO3	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO4	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2419	Low Speed Aerodynamics Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Fluid Mechanics and Dynamics				
Co-requisites	Low Speed Aerodynamics				

Course Catalog

The objective of this course is to provide practical knowledge and understanding to the students aboutthe aerodynamics over bodies of different cross-sections and shapes. Knowledge of fluid mechanicsand basic aerodynamics is necessary to comprehend the contents of this course. This course equip thestudents with necessary knowledge to design and carry out experiments, gather results and interpretthem in order to observe the aerodynamic behavior of bodies.

Course Objectives

The objective of this course is to

1. Equip the students with necessary practical understanding and skill to carry out experimentsto visualize and observe the flow behavior over different bodies.
2. Provide practical skill and knowledge to carry out experiments using wind tunnel to gatherresults as per designed experiment.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain and demonstrate the construction and procedure of operating a wind tunnel and measurement of pressure gradient along a wind tunnel.

CO2. Explain and demonstrate the procedure of utilizing Pitot - static tube and anemometer forflow velocity calculations.

CO3. Explain and demonstrate the procedure of determining pressure distribution over bodies ofdifferent cross-sections.

CO4. Explain and demonstrate the procedure of utilizing Hele-shaw apparatus for flowvisualization over bodies of different cross-sections.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: Wind tunnel as a tool, their classification, uses and applications.	L1, L2	2
Experiment 2: Measurement of pressure gradient along a wind tunnel	L1, L2	2
Experiment 3: Use of Pitot - static tube and Anemometer for measuring velocity	L1, L2	2

Experiment 4: Pressure distribution over a 2D cylinder	L1, L2	2
Experiment 5: Pressure distribution over an airfoil	L1, L2	2
Experiment 6: Flow visualization over flat plate	L1, L2	2
Experiment 6: Flow visualization over cylinder	L1, L2	2
Experiment 7: Flow visualization over an airfoil	L1, L2	2
Experiment 8: Experiments on potential flow Analogy (Hele-Shaw flow).	L1, L2	2
Experiment 9: Setting up of liquid paraffin smoke wire for flow visualization.	L1, L2	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. J. D. Anderson, Jr., "Fundamentals of Aerodynamics", 2nd Edition, McGraw Hill, 1990.
2. E. L. Houghton, P. W. Carpenter, "Aerodynamics of Engineering Students", 4th Edition, CBSPublishers & Distributors, 2005.
3. F. M. White, "Fluid Mechanics", 2nd Edition, McGraw Hill, 1986.

Reference Books

1. J. G. Bertin, R. M. Cummings, "Aerodynamics for Engineers", 6th Edition, Pearson, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	**5**	**35**	**35**

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	-	-	-	-	-	-	2	2	3	3	1	1	-	3
CO2	1	3	-	-	-	-	-	-	2	2	3	3	1	1	-	3
CO3	1	3	-	-	-	-	-	-	2	2	3	3	1	1	-	3
CO4	1	3	-	-	-	-	-	-	2	2	3	3	1	1	-	3

1: strongly related, 2: moderately related and 3: weakly related

ASE2420	Aircraft Propulsion Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites	Aircraft Propulsion				

Course Description

The objective of this course is to provide practical knowledge and understanding to the students about the various propulsion systems and subsystems used in aerospace applications. Knowledge of fluid mechanics, thermodynamics, and heat transfer is necessary to comprehend the contents of this course. This course equips the students with necessary knowledge to understand the construction and operation of propulsion systems.

Course Objectives

The objective of this course is to

1. Provide practical knowledge to the students about the various types of piston engine, their construction, and operation.
2. Provide practical knowledge to the students about the various subsystems of SI and CI engines, their construction, and operation.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain, and differentiate amongst the various types of piston engines based on their construction and operation.

CO2. Explain and demonstrate the construction and operation of various subsystems of piston engines.

CO3. Explain and demonstrate the knowledge of determining different kinds of powers in a piston engine.

CO4. Determine and analyze the performance of nozzle and duct burner.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: To study the construction and working of CI and SI engines having various arrangements of cylinders.	L2, L3	1
Experiment 2: To study the construction and working of two-stroke and four-stroke piston engines.	L2, L3	1
Experiment 3: To study the construction and working of a carburettor.	L2, L3	1
Experiment 4: To study the components and working of the fuel system of petrol and diesel engine.	L2, L3	1
Experiment 5: To study the components and working of the ignition system of the petrol engine.	L2, L3	1

Experiment 6: To determine the valve timings for a given piston-cylinder arrangement.	L2, L3	1
Experiment 7: To determine the IHP, BHP, and FHP of a four-stroke petrol engine.	L2, L3, L4	2
Experiment 8: To determine the performance of a nozzle.	L2, L3, L4	2
Experiment 9: To determine the performance of a duct burner.	L2, L3, L4	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. P. Hill, C. Peterson, "Mechanics and Thermodynamics of Propulsion", 2nd Edition, Pearson, 1991.
2. J. D.Mattingly, "Elements of Gas Turbine Propulsion", 1st Edition, McGraw Hill, 1997.
3. J. B.Heywood, "Internal-Combustion Engine Fundamentals", 1st Edition, McGraw Hill, 2017.

Reference:

1. I.Treager, "Aircraft Gas Turbine Engine Technology", 3rd Edition, McGraw Hill, 2017.
2. H. I. H.Sarvanmattoo, G. F. C.Rogers, H.Cohen, P.Straznicky, "Gas Turbine Theory", 6th Edition, Pearson Education, 2008.
3. H. S. Mukunda, "Understanding Aerospace Chemical Propulsion", I K International Publishing House Pvt. Ltd., 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	**5**	**35**	**35**

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	-	-	-	-	-	-	2	2	3	3	-	1	-	3
CO2	1	3	-	-	-	-	-	-	2	2	3	3	-	1	-	3
CO3	1	3	-	-	-	-	-	-	2	2	3	3	-	1	-	3
CO4	1	3	-	-	-	-	-	-	2	2	3	3	-	1	-	3

1: strongly related, 2: moderately related and 3: weakly related

ASE2422	Fuels and Combustion	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Chemistry				
Co-requisites	Aircraft Propulsion				

Course Description

This course provides basic understanding to the students about various types of fuels used in aviation application along with an insight to their physical and chemical parameters. This course also deals with various combustion mechanisms of fuels and enable the students in understanding the need and techniques of flame stability and fuel treatment. Basic knowledge of engineering chemistry and thermodynamics is a prerequisite to comprehend the contents of this course.

Course Objectives

The objective of this course is to

3. Provide a basic understanding to the students about the various aviation fuels and their properties.

4. Equip the students with knowledge about combustion fundamentals and performance.

Course Outcomes

On completion of this course, the students will be able to

CO5. Identify, explain, and compare amongst the various properties of fuels.

CO6. Identify, explain, and compare amongst the various types of alternative fuels used in aviation applications.

CO7. Explain, describe, and compare amongst the various fundamentals of combustion and flames.

CO8. Identify, explain and compare amongst the various fundamentals and techniques related to flame stabilization.

CO9. List, explain, and compare amongst the various methods and processes of fuel treatments.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Fuel and its Properties. Fuels, types of fuels, relative density, molecular mass, vapor pressure, flash point, volatility point, viscosity, surface tension, freezing point, specific heat, latent heat, thermal conductivity. Combustion properties of fuels. Calorific value, enthalpy, spontaneous-ignition temperature, limits of flammability, smoke point. Pressure and temperature effects.	L1, L2	7
Module 2: Alternative Fuels for Aerospace Applications Alternative fuels, synthetic fuels, biofuels, biodiesels, alternative fuel properties. Combustion and emissions performance. Fuel preparation, fuel atomization.	L1, L2	7
Module 3: Fundamentals of Combustion Deflagration, detonation, classification of flames, physics of combustion chemistry. Flammability limits, weak mixtures, rich mixtures. Laminar and	L2, L4	8

turbulent flames, Premixed and diffusion flames, flame burning velocity. Factors influencing flame propagation speed. Stoichiometric ratio, equivalence ratio. Flame propagation in heterogeneous mixtures of fuel drops, fuel vapor, and air.		
Module 4: Flame Stabilization Flame stability, definition of stability performance, measurement of stability performance. Bluff-body flame holders, stabilization. Mechanisms of flame stabilization, flame stabilization in combustion chambers.	L1, L2	7
Module 5: Fuel Treatment Introduction to fuel treatment, removal of sulfur compounds, contaminants, asphaltenes, gum, sediment, ash, water, sodium, vanadium, additives, gum prevention, corrosion inhibition/lubricity improvers, anti-icing, antismoke. Environmental considerations.	L1, L2	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

3. S. Sarkar, "Fuels & Combustion", 3rd Edition, CRC Press, 2010.
4. R. L. Bechtold, "Alternative Fuels Guidebook", SAE International, 1997.
5. K. K. Kuo, "Principles of Combustion", 2nd Edition, Wiley India Pvt. Ltd., 2012.

Reference:

2. J. Hancsok, S. P. Srivastava, "Fuels and Fuel Additives", 1st Edition, Wiley, 2014.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO5	1	-	3	-	-	-	1	-	-	-	-	-	-	1	1	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2423	Control Systems	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basics of Electrical and Electronics Engineering				
Co-requisites					

Course Description

This course provides basic understanding and knowledge to the students about various control systems and their utilization in aerospace applications. Basic knowledge of electronics is a prerequisite to comprehend the contents of this course. This course also deals with analysis and design of control systems and enables the students in understanding the application of control systems in automatic flying control of flight vehicles.

Course Objectives

The objective of this course is to

1. Provide a basic understanding to the students about the control systems and their applications.
2. Equip the students with knowledge about operation, design, and analysis of control systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify, explain, and categorize amongst the various types of control systems used in flight vehicle operation and control.

CO2. Explain, describe, and compare amongst the various types of open and closed loop control systems, illustrate block diagrams and signal flow graphs.

CO3. Explain and analyze the operation of transient and steady-state response control systems.

CO4. List, explain, design, and analyze different types of controllers using various approaches.

CO5. Describe, distinguish, and compare amongst the different types of control systems utilized in Automatic flying control systems of aircrafts.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Control Systems History of Automatic Control. Control Engineering Practice. Simple pneumatic, hydraulic, and thermal systems. Parallel and series systems. Analogies-mechanical and electrical components. Development of flight control systems.	L1, L2, L4	7
Module 2: Open and Closed Loop Systems Concept of controls. Open-loop and closed-loop systems with examples. Concepts of feedback and basic structure of feedback control system. Laplace's transform. Block diagram, representation of block diagram, reduction block diagram. Output to input ratios, signal flow graph. Requirements of an ideal control system.	L2, L3, L4	7
Module 3: Transient and Steady-State Response Analysis Introduction. Type and order of systems, time response specifications. Transient,	L2, L4	8

and steady state response. Input signals. First order system with unit step response, Second order system with unit step response for un-damped, critical damped, overdamped, and underdamped cases. Higher order system. Routh's – Hurwitz Criterion. Steady and transient state errors in unit feedback control systems.		
Module 4: Control Systems Analysis and Design Introduction. Types of controllers. Root locus plot, lead and lag compensation techniques. Bode plot: concepts and construction. Lead and lag compensation technique based on the frequency-response approach.	L1, L2, L3, L4	7
Module 5: Automatic Flight Control Introduction to Automatic flight control, automatic flight control system components. Autopilot, longitudinal autopilots. Brief description through block diagrams and Root locus of displacement auto pilot. Pitch orientation control system. Acceleration control system.	L2, L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. K. Ogata, "Modern Control Engineering", 5th Edition, Prentice Hall of India, 2010.
2. R. C. Drof, R. H. Bishop, "Modern Control System", 13th Edition, Pearson, 2017.
3. B. C. Kuo, F. Golnaraghi, "Automatic Control Systems", 9th Edition, John Wiley & Sons, 2014.

Reference:

1. I. J. Nagrath, M. Gopal, "Control Systems Engineering" New Age Publication, 2001.
2. J. J. Distefano, "Feedback and Control Systems", 2nd Edition, Tata McGraw hill, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	1	3	1	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	1	3	1	-	-	-	-	-	-	-	-	-	-	1	3	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2424	Mechatronics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basics of Electrical and Electronics Engineering				
Co-requisites					

Course Description

This course represents the design of computer-controlled electromechanical system. Basic knowledge of electronics and measurements systems is a prerequisite to comprehend the contents of this course. This course enables the student to design and operate a mechatronics system after integrating the principles of mechanical, computer, electrical, and controls engineering.

Course Objectives

The objective of this course is to

1. Provide brief introduction of various components of mechatronics systems comprising electrical, mechanical and control systems along with basic knowledge of mathematical models and theories.

2. Equip the students with knowledge about different types of sensors, actuation systems and microprocessors and their applications.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain, and describe different types of mechatronics systems, their components and working.

CO2. Describe and represent mathematical models and blocks of mechatronic systems with various system theories.

CO3. Identify, describe and select appropriate sensors and transducers and design an instrumentation system for collecting information about processes.

CO4. Describe and distinguish between Pneumatic and hydraulic actuation systems, their design and operation.

CO5. Identify, describe, and design the architecture and the instruction set for a microprocessor and its language programming with various types of digital and analog interfaces.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Introduction to mechatronics systems. Mechatronics in manufacturing, products, and design. Mechatronics system components. Measurement systems, control systems, electrical systems, mechanical systems.	L1, L2	6
Module 2: System Models Mathematical models. Mechanical system building blocks. Modeling dynamic systems. First order systems, second order systems.	L2, L4	6
Module 3: Transducers and Sensors	L1, L2,	8

Definition and classification of transducers and sensors. Principle of working and applications of light sensors, proximity sensors and Hall effect sensors. Signal conditioning, introduction to signal conditioning. Operational amplifier, protection, filtering, Wheatstone bridge. Digital signals multiplexers. Data acquisition.	L3	
Module 4: Actuation Systems Introduction. Need and necessity of actuation systems. Pneumatic and hydraulic actuation systems, system components, graphic representations, symbols. Directional control valves, pressure control valves, process control valves. Hydraulic power packs, pumps. Design of hydraulic circuits.	L2, L3	8
Module 5: Introduction to Microprocessors Evolution of Microprocessor. Organization of Microprocessors (Preliminary concepts). Basic concepts of programming of microprocessors. Review of concepts - Boolean algebra, logic gates and gate networks, binary & decimal number systems, memory representation. Conversion of real, numbers, floating point notation, representation of floating point numbers, accuracy and range, overflow and underflow, addition of floating point numbers, character representation.	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. N. Mahalik, "Mechatronics - Principles, Concepts and Applications", Tata McGraw Hill Education, 2017.
2. R. K. Rajput, "A Textbook of Mechatronics", S. Chand & Company, 2007.
3. W. Bolton, "Mechatronics", 4th Edition, Pearson Education, 2010.
4. M. A. Mazidi, J. G. Mazidi, "The 8051 Microcontroller", Pearson, 2004.

Reference:

- D. Alciatore, "Introduction to Mechatronics and Measurement Systems, 4th Edition, Tata McGraw Hill Education, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-

CO3	1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	2	2	-	-

1: strongly related, 2: moderately related and 3: weakly related

FIFTH SEMESTER

ASE2510	Turbomachinery	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Engineering Thermodynamics, Aircraft Propulsion				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of shaft power and aircraft engines components such as inlet compressor, combustion chamber and nozzles. This course focuses on educating the students about various physical laws and mathematical theories that define the flow behavior, efficiencies and losses, i.e., performance characteristics of the components based on thermodynamics and aerodynamics. Knowledge of basic physics and fluid mechanics is crucial to comprehend the contents of this course. This course serves as a prerequisite for designing of engine components.

Course Objectives

The objective of this course is to

5. Provide knowledge about the basic principles and parameters of gas turbine/Turbomachinery.

6. Educate the students about the theories and laws governing the aerodynamic and thermodynamics analysis of turbomachinery.

Course Outcomes

On completion of this course, the students will be able to

CO6. Identify and explain various configurations of shaft power and aircraft engines.

CO7. Describe and analyze various components of centrifugal compressor and also describe its performance characteristics.

CO8. Describe and analyze various components of axial flow compressor and also describe its performance characteristics.

CO9. Describe and analyze various components of axial flow turbines and also describe its performance characteristics.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Open-cycle single shaft and twin shaft arrangements, Multi spool arrangements, Closed cycles, Aircraft propulsion, Industrial applications, Marine and land transportation	L1, L2	6
Module 2: Shaft power cycles Ideal cycles, Methods of accounting components losses, Design point performance calculations, Comparative performance of practical cycles, Combined cycles and cogeneration schemes, Closed cycle gas turbines	L1, L2	8
Module 3: Centrifugal compressor Principle of operation, Work done and pressure rise, The diffuser, Non dimensional quantities for plotting compressor characteristics, compressor	L2, L4	6

characteristics.		
Module 4: Axial flow compressor Basic operation, Elementary theory, Factor affecting stage pressure ratio. Blockage in compressor annulus, Degree of reaction, Three dimensional Flow, Design process, Blade design, Calculations of stage performance, compressibility effects, Off design Performance, Axial compressor characteristics.	L2, L4	8
Module 5: Axial Flow turbines Elementary theory of axial flow turbine, vortex theory, choice of blade profile, pitch and chord, Estimation of stage performance, overall turbine performance, The cooled turbine	L2, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

9. H. I. H. Saravanamuttoo, H. Cohen, G. F. C. Rogers, "Gas Turbine Theory", 2001.

10. S. M. Yahya, "Turbine, Compressors and Fans", Tata McGraw- Hill Publishing Company Ltd., New Delhi,

Reference:

1. N. Cumpsty, Compressor Aerodynamics, Kreiger Publications, USA, 2004.

2. I. A. Johnson, R. O. Bullock, "NASA-SP-36: Axial Flow Compressors", NTIS (re-release), 2002.

3. M. M. El-Wakil, "Powerplant Technology", McGraw-Hill Pub, 1984.

4. NASA-SP-290, "Axial Flow turbines", NTIS, USA, 2002 (re-release).

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2511	High Speed Aerodynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Low Speed Aerodynamics				
Co-requisites					

Course Catalog

Course contains the basic material essential for a foundation of compressible flow aerodynamics. The course introduces the fundamental concepts and principles of compressible flow and intends to provide the necessary background for advanced studies on the subject. The course covers the general principles and essentials of compressible flow, the flow equations, one-dimensional gas dynamics, wave motion and waves in supersonic flow, flow in ducts, small-perturbation theory. The exercises included in the course are intended to demonstrate the use of the course material and to outline additional equations and results.

Course Objectives

The objective of this course is to

1. Provide knowledge to the students about compressible flow and its applications.
2. Enable students to know about shock waves in supersonic flow and different related techniques to solve problems

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and explain fundamental principles of compressible flow.

CO2. Describe and derive wave motion and waves in supersonic flow.

CO3. Explain, derive, and apply various governing equations and theories of compressible flow in ducts.

CO4. Explain, derive, and apply governing small perturbation theory.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Compressible Aerodynamics Basic concepts of compressible flow continuity, energy and momentum equations. One dimensional inviscid flow; Stagnation quantities; Isentropic conditions. Speed of sound and Mach number; Isentropic relations; Area-velocity relation. Flow through constant area duct; Normal shock; Propagating Normal Shock. One dimensional linear and nonlinear wave motion.	L1, L2	9
Module 2: Oblique shocks and compressible Flows through ducts Oblique shock and supersonic compression by turning. Weak shocks and Mach waves; Supersonic expansion by turning. Prandtl-Meyer expansion fan; Reflection and intersection of shocks. Shock detachment and bow shock; Shock Expansion theory with application to thin airfoils. Governing equations for quasi One Dimensional Flow through converging and diverging ducts. Diffusers and supersonic Wind Tunnels.	L2, L3	9

Module 3: Subsonic compressible Flow over Airfoils, Linear Theory The derivation of velocity potential equation, Linearized velocity potential equation, Prandtl-Glauert compressibility correction, Critical Mach number, Whitcomb's area rule, Super critical airfoil.	L1, L2, L3	9
Module 4: Linearized Supersonic Flow Introduction, Derivation of Linearized supersonic Pressure Coefficient Formula, Application to supersonic Airfoils Viscous Flow Supersonic Airfoil Drag	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. J. D. Anderson, Jr., "Fundamentals of Aerodynamics", 2nd Edition, McGraw Hill, 1990.
2. E. L. Houghton, and P. W. Carpenter, "Aerodynamics of Engineering Students", 4th Edition, CBS Publishers & Distributors, 2005.
3. F. M. White, "Fluid Mechanics", 2nd Edition, McGraw Hill, 1986.

Reference:

1. A. H. Shapiro, "Dynamics and Thermodynamics of Compressible Fluid Flow - Volume I& II", Ronald Press, 2002.
2. H. W. Liepmann, and A. Roshko, "Elements of Gas Dynamics", John Wiley & Sons, 1999.
3. J. G. Bertin and R. M. Cummings, "Aerodynamics for Engineers", 6th Edition, Pearson, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2512	Aerospace Structures - II	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Mechanics of Solids, Aerospace Structures-I				
Co-requisites					

Course Catalog

Knowledge of basic mechanics and structures-I is crucial to comprehend the contents of this course. This course provides exhaustive knowledge to the students about the buckling and post buckling behavior of columns, plates and beams, which serve as a foundation for solving critical aerospace problems.

Course Objectives

The objective of this course is to

3. Equip the students to understand the analytical study of the buckling behavior of columns and plates.
4. Provide the knowledge to the students about the post buckling behavior of plates and field beams under tension.

Course Outcomes

On successful completion of this course, the students will be able to

CO1. Identify, explain, apply and analyze the fundamentals of buckling of columns and plates.

CO2. Identify, describe and determine the buckling of open sections.

CO3. Identify, explain and analyze the post buckling behavior of plates.

CO4. Identify, explain, apply and analyze the fundamentals of buckling of columns.

CO5. List and explain the different types of stress & strain measurement techniques.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Elastic Buckling of Columns Stability criteria: equilibrium approach, energy approach, imperfection approach, dynamic approach; Higher order governing equation; Large deflection of columns; Buckling of laminated composite columns; Approximate Techniques: Timoshenko's method, Rayleigh-Ritz method, Galerkin's technique; Effect of shear on buckling load; Problems.	L1, L2, L3, L4	8
Module 2: Buckling of Open Sections Torsional load –deformation characteristics; Equilibrium approach in Torsional Buckling & Torsional-Flexural Buckling; Energy Approach: Rayleigh-Ritz Method; Problems.	L1, L2	8
Module 3: Elastic Buckling of Thin Plates Introduction; Equilibrium approach; Energy Approach; Approximate Techniques: Rayleigh-Ritz method, Galerkin's Technique; Buckling of Stiffened Plates, Circular Plates & Thick Rectangular Plates; Problems.	L1, L2, L4	8

Module 4: Post-Buckling Behavior of Plates Introduction; Governing Equation; Energy Approach; Complete Tension Field Beams; Semi-Tension Field Beam; Angle of Diagonal Tension.	L1, L2, L3, L4	5
Module 5: Inelastic Buckling of Columns Double Modulus Theory; Tangent Modulus Theory; Eccentrically Loaded Columns; Empirical Relations for Short Columns.	L1, L2, L3, L4	4
Module 6: Measurement of Stress & Strain Measurement of Strain and Stress; Techniques & principles of measurement; Strain Gauges; Photoelasticity: principle, working, applications.	L1, L2	3

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books

Text:

1. N. G. R. Iyengar, "Structural stability of Columns and Plates", 1st Edition, affiliated East-West Press (Pvt.) Ltd., New Delhi, 1986.
2. D. J. Perry, "Aircraft Structures", Dover Publications, 2011.
3. T. H. G. Megson, "Aircraft Structures for Engineering Students", Elsevier India, 2005.

Reference:

5. S. P. Timoshanko, and J. N. Goodier, "Theory of Elastic Stability", 2nd Edition, Dover Publications Inc., New York, 2009.
6. N. C. Sinha, "Elements of Structural Analysis", New Central Book Agency, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	-	2	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2513	Flight Mechanics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Low Speed Aerodynamics				
Co-requisites					

Course Catalog

This course contains Fundamental characteristics of standard atmosphere which are crucial for aerodynamic characteristics of airfoil and airplane. The course is designed to make students to understand aerodynamic forces and moments in steady, accelerated flight and in maneuvers for different flight modes and conditions.

Course Objectives

The objective of this course is to

1. Provide an insight to students about the characteristics of atmosphere.
2. Equip students about different forces on airfoil and wing due to immersion in free stream of air in flight.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and explain parameters of International Standard Atmosphere.

CO2. State, explain and apply the physical principle in estimation of aerodynamic drag over flight vehicles.

CO3. Describe, apply and analyze the aerodynamic characteristics over airfoils and wings of flight vehicles.

CO4. Explain and apply the basic equations and principles to analyze the airplane mechanics in steady flight.

CO5. Explain and apply the basic equations and principles to analyze the airplane performance in accelerated flight and maneuvers.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Standard Atmosphere Standard atmosphere, relation between Geopotential and Geometric altitudes, pressure, temperature and density altitudes, Relation for stratosphere and troposphere, Stability of atmosphere, aero-thermodynamics, Measurement of air-speed: true airspeed, indicated airspeed and equivalent airspeed, Airspeed indicator	L1, L2	7

Module 2: Aerodynamic Drag Drag and its effects, Types of drag and affecting factors, Drag polar, Compressibility drag, Design for minimum drag, Estimation of drag of complete airplane, Terminal velocity	L1, L2, L3	7
Module 3: Aerodynamic Characteristics Force and Moments coefficients dimensional analysis, Pressure distribution over 2D airfoil, Variation with angle of attack, Center of pressure, Aerodynamic center and connected problems, Lift, Drag and moment coefficients; Relations between lift and drag, Estimation of these characteristics from measured pressure distributions, Variation of aerodynamic coefficients with Reynolds Number and Mach Number, Effect of span, Aspect ratio, plan form, sweep, taper and twist on aerodynamic characteristics of a lifting surface, Delta wing aerodynamics	L2, L3, L4	7
Module 4: Airplane Mechanics in Steady Flight Straight and Level flight, stalling speed; Variation of drag with flight, Speed conditions for minimum drag, minimum power conditions; Power at other speeds, Gliding flight, Shallow and steep angles of glide; Sinking speed, Minimum sinking speed, Time of descent, Climbing flight at shallow angles, Correction for steep angles, Time to flight, Maximum rate of climb	L2, L3, L4	7
Module 5: Airplane Performance in Accelerated Flight and Maneuvers Take-off and landing, Calculations of take-off ground run, Take-off distances, Minimum ground run, assisted take-off, Calculation of landing ground run, Range and endurance and problems connected with them. Introductory comments on spins and stalls; turning flight, Maneuvers in 3D space	L2, L3, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. D. O. Dommasch, S. S. Sherby & T. F. Connolly, "Airplane Aerodynamics", 4th Ed. Pitman Publishing Group, 1998.
2. E. L. Houghton and A. E. Brock, "Aerodynamics for Engineering Students", Edward Arnolds, 1986.
3. R. S. Shevell, "Fundamentals of Flight", 3rd Ed. Prentice Hall, 1999.
4. John D. Anderson, "Introduction to Flight", McGraw Hill, 3rd Ed, 2004.

References:

1. J. J. Bertin and M. L. Smith, "Aerodynamics for Engineers", 2nd Ed., Prentice Hall.
2. C. D. Perkins and R. E Hage, "Airplane Performance, Stability and Control", John Wiley, 1949.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2514	Computer Aided Drafting Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Engineering Graphics				
Co-requisites					

Course Catalog

In this course the concept of design, drafting and modeling are discussed in details using AutoCAD software. The course contents include the basic commands, 2D and 3D modeling of machine components using AutoCAD. To master this course, students should have a background in basic knowledge of Engineering graphics and design.

Course Objectives

The objective of this course is to

3. Equip the students with the concept of basic commands and features used in AutoCAD.
4. Provide an overview to learn and apply the use of basic commands in generating the 2D sketches and 3D models of machine components.

Course Outcomes

On completion of this course, the students will be able to

CO1: Construct, edit and plot drawings using basic AutoCAD commands and features.

CO2: Construct and edit the model of machine components such as Piston, Connecting rod.

CO3: Construct and edit 2D sketches of pentagon, hexagon and any 2D drawing.

CO4: Construct and edit 3D model of nut, bolt and gear.

CO5: Construct and edit the geometry of hollow cylinder containing sphere and triangle.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: Basics of AutoCAD	L2, L3	2
Experiment 2: Modeling of machine Components such as Connecting, Rod, piston etc.	L2, L3	2
Experiment 3: 2D modeling for different Geometrics such as Hexagon, Pentagon etc	L2, L3	2
Experiment 4: 3D modeling of nut and Bolt.	L2, L3	2
Experiment 5: Modeling of Gear.	L2, L3	2
Experiment 6: Modeling of Compound Geometrics such as Hollow Cylinder containing Sphere, Triangle etc.	L2, L3	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

4. P. S. Gill, “Engineering Drawing”, S. K. Kataria & Sons, New Delhi, 2009.
5. N. D. Bhat, “Engineering Drawing: Plane and Solid Geometry”, Charotar Publishing House Pvt. Limited, New Delhi, 2010.

Reference:

4. J. M. Kirkpatrick, “The AutoCAD Book: Drawing, Modeling, and Applications”, Prentice Hall, 1996
5. P. Karaiskos, N. Fulton, “AutoCAD for Mechanical Engineers and Designer”, Wiley, 1995

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	**5**	**35**	**35**

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO2	1	2	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO3	1	2	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO4	1	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2515	Structural Analysis Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Aerospace Structures-I, Aerospace Structures-II				
Co-requisites					

Course Catalog

Knowledge of basic structures and modeling is crucial to comprehend the contents of this course. This course provides extensive knowledge to the students about various modeling and analysis tools for the designing of aircraft structures and testing them practically, leading to the development and fabrication that serve as a foundation for better and safe futuristic designs.

Course Objectives

The objective of this course is to

1. Equip the students with the practical knowledge and applications of different types of beams and columns.
2. Provide an overview to learn and apply the FEM based tool for detailed structural analysis

Course Outcomes

On completion of this course, the students will be able to

CO1: List, explain and apply the basics of FEM and structures lab.

CO2: Explain and apply the different theorems in finding loads and shear center over the given types of beams and sections.

CO3: Describe and apply the concepts of photoelasticity for visualizing the stress distribution.

CO4: Describe, apply and analyze the stress distribution using FEM based designing tool.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: Introduction to FEM & Aircraft Structures Lab	L1, L2, L3	2
Experiment 2: To Verify the following theorems for the given beams a. Maxwell's Reciprocal Theorem b. Principle of Superposition c. Castigliano's Theorem	L2, L3	2
Experiment 3: To determine the shear center for Open & Closed sections	L2, L3	2
Experiment 4: To study the Photoelasticity apparatus and visualize the stress distribution over different sample shapes.	L2, L3	2
Experiment 5: To determine the stress distribution over a circular cylinder under axial compressive and tensile load using ANSYS structural workbench.	L2, L3, L4	2
Experiment 6: To determine the stress distribution over a rectangular plate under	L2, L3, L4	2

compressive and tensile load using ANSYS structural workbench.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. B. C. Nakra and K. K. Chaudhary, "Instrumentation Measurement and Analysis", Tata McGraw Hill, 2nd Ed, 1993.
2. N. G. R. Iyengar, "Structural stability of Columns and Plates", 1st Edition, affiliated East-West Press (Pvt.) Ltd., New Delhi, 1986.
3. D. J. Perry, "Aircraft Structures", Dover Publications, 2011.

Reference:

1. S. P. Timoshanko, and J. N. Goodier, "Theory of Elastic Stability", 2nd Edition, Dover Publications Inc., New York, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	**5**	**35**	**35**

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO2	1	2	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO3	1	2	-	-	-	-	-	-	2	2	3	3	1	-	-	-
CO4	1	3	-	-	-	-	-	-	2	2	3	3	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2535	Summer Internship Evaluation-I	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The internship experience provides the student with an opportunity to explore career interests while applying knowledge and skills learned in the classroom in a work setting. The training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. The experience also helps students gain a clearer sense of what they still need to learn and provides an opportunity to build professional networks. The intern develops a greater understanding about career options while more clearly defining personal career goals. Hence, the training will be useful for their future employment in industry. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university.

Course Objectives

The objective of this course is to

1. Provide practical training on some demo or live projects that will increase the capability of the students to work in a team on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

CO10. Relate and apply the acquired classroom knowledge with technical, real-time industry environment.

CO11. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.

CO12. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.

CO13. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.

- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

- **Title Page -** Format will be given by coordinator/supervisor.
- **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate-**This is page number (ii). It is given by the Institute.The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate -**This is a certificate, which the company gives to the students.
- **Contents-**This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement-**This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.

- **Abstract and Keywords-**This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
- The keywords (maximum 6) are a hint that what is contained in the report.
- **Company Profile -**A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
- **Chapters-**Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography-**This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Components	V	IF	R	PR	FP
Weightage (%)	20	20	20	20	20

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR–Progress Report

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related

ASE2516	Satellite Communication	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Introduction to Space Sciences				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of the fundamentals of satellite communication. This course provides the students with a sound understanding of how a satellite communication system successfully transfers information from one earth station to another. It exposes them to examples of applications and tradeoffs that typically occur in engineering system design, and encourages them to apply the knowledge in satellite communication design problems.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the basics of satellite communication and its segments.
2. Provide education to the students about the components and operation of various satellite communication systems and sub-systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe, summarize, and categorize the components and operation of satellite communication system.

CO2. Describe and apply the principles of radio wave propagation and polarization in satellite communication.

CO3. Describe, summarize, and categorize the components and operation of the space and earth segment of satellite communication.

CO4. Describe and apply the principles of satellite communication links, budgets and planning in satellite communication.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Satellite Communication Historical background, Basic concepts of Satellite Communications, Communication Networks and Services, Comparison of Network Transmission technologies, Orbital and Spacecraft problems, Growth of Satellite communications	L2, L4	6
Module 2: Radio Wave Propagation and Polarization Introduction, Atmospheric Losses, Ionospheric Effects, Rain Attenuation, Other Propagation Impairments, Antenna Polarization, Polarization of Satellite Signals, Cross Polarization, Discrimination, Ionospheric Depolarization, Rain	L2, L3	5

Depolarization, Ice Depolarization		
Module 3: The Space Segment Introduction, The Power Supply, Attitude Control, Spinning satellite stabilization, Momentum wheel stabilization, Station Keeping, Thermal Control, TT&C Subsystem, Transponders, The wideband receiver, The input DE multiplexer, The power amplifier, The Antenna Subsystem	L2, L4	5
Module 4: The Earth Segment Introduction, Receive-Only Home TV Systems, The outdoor unit, The indoor unit for analog (FM) TV, Master Antenna TV System, Community Antenna TV System, Transmit-Receive Earth Stations	L2, L4	6
Module 4: The space link Introduction, equivalent isotropic radiated power, transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, inter-satellite links, Interference between satellite circuits	L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

5. D. Roddy, "Satellite Communications", 4th Edition, McGraw Hill, 2006.
6. W. L. Pritchard, H. G. Suyderhoud, R. A. Nelson, "Satellite Communication Systems Engineering", 2nd Edition, Pearson, 2007.
7. T. Pratt, C.Bostian, J.Allnutt, "Satellite Communication", 2ndEdition, John Wiley & Sons, Inc., 2003.
8. A. K. Maini, V. Agarwal, "Satellite Technology, Principles and Applications", 2ndEdition, John Wiley & Sons, Inc., 2014.

Reference:

1. N. Agarwal, "Design of Geosynchronous Space Craft", Prentice Hall, 1986.
2. B. R. Elbert, "The Satellite Communication Applications", Hand Book, Artech House, 1997.
3. T. T. Ha, "Digital Satellite Communication", 2nd Edition, McGraw Hill, 1990.
4. E. Fthenakis, "Manual of Satellite Communications", McGraw Hill Book, 1984.
5. R. G. Winch, "Telecommunication Trans Mission Systems", McGraw-Hill Book, 1983.
6. B. Ackroyd, "World Satellite Communication and earth station Design", BSP professional Books, 1990.
7. G. B. Bleazard, "Introducing Satellite communications", NCC Publication, 1985.
8. M. Richharia, "Satellite Communication Systems-Design Principles", Macmillan, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	2	-	-	-	-	-	-	-	-	-	-	2	1	-
CO2	1	-	2	-	-	-	-	-	-	-	-	-	-	2	1	-
CO3	1	-	2	-	-	-	-	-	-	-	-	-	-	2	1	-
CO4	1	-	2	-	-	-	-	-	-	-	-	-	-	2	1	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2517	Aircraft Systems and Instrumentation	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of aircraft systems and their importance based on various aspects. Knowledge of basic physics is crucial to comprehend the contents of this course. Studying this course the students will learn about various components, systems and instruments of aircrafts that serve as a foundation for better understanding of advanced course.

Course Objectives

The objective of this course is to

1. Provide knowledge of different types of control systems used in the aircraft and their associated instruments.
2. Provide knowledge about the applications and real time problems associated with those systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain and compare various types of flight control systems.

CO2. Identify and describe the engine control system with applications.

CO3. List and explain the hydraulic and environment control system.

CO4. Outline and describe about the gyroscopic systems used in aircrafts.

CO5. List and explain about the different types of navigational and pitot static instruments.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Flight Control Systems Primary and secondary flight control, Flight control linkage systems, push-pull	L1, L2, L4	6

control rod system, cable and pulley systems, High lift control surfaces, Flight control actuation, linear actuator, mechanical actuator, mechanical screw jack actuator, Direct drive actuation, fly-by-wire actuator, electro-hydrostatic actuator, electro-mechanical actuator		
Module 2: Engine Control Systems Engine technology and principle of operation, fuel flow control, air flow control, control systems, control system parameters, input signals, output signals, example systems, engine starting, fuel control, ignition control, engine rotation, throttle levers, starting sequence, engine oil systems.	L1, L2	6
Module 3: Hydraulic and Environment Control Systems Hydraulic circuit design, hydraulic actuation, hydraulic fluid, fluid pressure and temperature, fluid flow rate, hydraulic piping and pumps, need for controlled environment, heat sources, ram air cooling, fuel cooling, engine bleed, bleed flow and temperature control, air cycle refrigeration, humidity control, hypoxia, g tolerance.	L1, L2	6
Module 4: Gyroscopic Systems Gyroscope and its properties, Gyro horizon, Turn and bank indicator, turn coordinator, Direct reading magnetic compass, Directional gyros.	L1, L2	6
Module 5: Navigational Instruments Very high and ultra-high frequency radio aids, VOR, TACAN, VORTAC, VHF direction finding, instrument landing system, microwave landing system.	L1, L2	6
Module 6: Pitot Static Instruments Pitot static system, air speed indicator, altimeter, Mach meter, Mach /airspeed indicator, vertical speed indicator.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & References Books:

Text:

9. I. Moir, and A. Seabridge, "Aircraft Systems: Mechanical, electrical, and avionics subsystems integration", John Wiley & Sons, 2011.
10. E. H. Pallett, "Aircraft instruments: principles and applications", London: Pitman, 1981.

Reference:

1. D. A. Lombardo, "Aircraft Systems", 2nd edition, Tata McGraw Hill, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	2	-	-	-	-	-	-	-	-	-	1	2	1	-
CO2	1	-	2	-	-	-	-	-	-	-	-	-	1	2	1	-
CO3	1	-	2	-	-	-	-	-	-	-	-	-	1	2	1	-
CO4	1	-	2	-	-	-	-	-	-	-	-	-	1	2	1	-
CO5	1	3	2	-	-	-	-	-	-	-	-	-	1	2	1	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2518	Introduction of UAVs	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Fluid Mechanics and Dynamics, Low Speed Aerodynamics, Aircraft Propulsion				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding about all fundamental aspects of UAVs, from design to logistics and ethical issues. It provides a comprehensive introduction to all of the elements of a complete unmanned aircraft vehicle system. It addresses the air vehicle, mission planning and control, several types of mission payloads and payload control along with safety concerns regarding the operation of UAVs.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the overview of all elements of UAVs and of how they interact along with underlying concepts of key subsystems.
2. Provide education to the students about the construction, design, control and safe operation of unmanned flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain, and compare amongst various types and classes of UAVs.

CO2. List, describe, and contrast amongst the construction, controlling and piloting techniques of UAVs.

CO3. Describe, and distinguish amongst the various types of UAV payloads and their controlling mechanisms.

CO4. Outline, describe, and categorize the basic risks and safety regulations and guidelines associated with the operation of UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to UAVs Overview of UAV Systems; Examples of UAV Systems; Very Small UAVs; Small UAVs; Medium UAVs; Large UAVs; Expendable UAVs; Classes of UAV Systems; Classification by Range and Endurance.	L1, L2, L4	6
Module 2: UAV Construction and Control Basic Structure and Loads; Construction Materials; Propulsion Systems for UAVs; Modes of Control; UAV Piloting; Remote Piloting; Autopilot-Assisted Control; Complete Automation.	L1, L2, L4	6
Module 3: Payloads and Payload Control Types of Payloads; Imaging Sensors; Target Detection, Recognition, and	L2, L4	6

Identification; Atmospheric, Radiological, and Environmental Monitoring; Armed Utility UAVs, Payload Capacity; Controlling Payloads; Signal Relay Payloads.		
Module 4: Safe UAV Operation Regulating Authority; General Safety Regulations and Guidelines; Restricted Airspace; Risk Assessment; Severity Classifications; Risk Mitigation; Do's and Don'ts of UAV Flying.	L1, L2, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. P. Fahlstorm, T. Gleason, "Introduction to UAV Systems", 4th Edition, John Wiley & Sons, Inc., 2012.
2. "DGCA RPAS Guidance Manual", Director General of Civil Aviation, Revision-1, 2019.

Reference:

1. K. P. Valavanis, G. J. Vachtsevanos, "Handbook of Unmanned Aerial Vehicles", 1st Edition, Springer, 2015.
2. R. E. Weibel, R. J. Hansman, "Safety Considerations for Operation of Unmanned Aerial Vehicles in the National Airspace System", Report No. ICAT-2005-1, MIT International Center for Air Transportation, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	1	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-
CO3	1	-	1	-	-	-	-	-	-	-	-	-	1	1	-	-
CO4	-	-	-	-	-	1	-	1	-	-	-	-	-	-	1	-

1: strongly related, 2: moderately related and 3: weakly related

SIXTH SEMESTER

ASE2609	Aircraft Maintenance & Quality Assurance	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of aircraft maintenances and their importance based on various aspects. This course provides introductory knowledge to the students about testing of various components as well as the fabrication of FRPs that serve as a foundation for better understanding of advanced course.

Course Objectives

The objective of this course is to

5. Provide knowledge of various types of preventive maintenance: repairs, overhauls, and calibration, rigging and testing of aircraft and its instruments and components/systems.
6. Provide knowledge about the layout of aircraft structure, corrosion of aircraft components and its prevention.

Course Outcomes

On completion of this course, the students will be able to

CO14. Identify and explain the importance of aircraft maintenance and quality assurance.

CO15. List and explain various types of testings for aircraft materials using DTs and NDTs and the corrosion prevention methods.

CO16. Illustrate the fabrication and repair of FRP components and explain the quality assurance practices.

CO17. Explain and demonstrate the layout of an aircraft along with the assembly and rigging.

CO18. Explain and demonstrate their course knowledge to disciplinary as well as interdisciplinary audience.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Maintenance Requirement of maintenance of aircraft, its components, systems, subsystems. Types of maintenance scheduling, Inspection of aircraft components. Types of Inspections, Repair, Modifications, and Reconditioning. Role of airworthiness, Issue of C of A.	L1, L2	6
Module 2: Testing of Aircraft Materials and Components Testing techniques for Tension, Hardness, Bending, Impact, Crushing, Torsion, Fatigue, Hydrostatic tests. NDT Techniques: X-ray, Gamma Ray, Ultra-sonic; Magna-flux.	L1, L2	6

Module 3: Layout of Aircraft Structure Principle and important sub-groups, Aircraft Station numbering sub-assemblies in airframe, landing gear, Power plant and its attachment, Rotorcraft Structure.	L1, L2	6
Module 4:Aircraft Assembly and Rigging Aircraft Assembly, Rigging, Alignment of fixed surfaces and flight controls and systems in details, balancing, Inspection and Maintenance. Flight control system of Helicopter.	L1, L2	6
Module 5: Fabrication and Repair of FRP Components Development of metal bonding and composite materials, Bonding Structures, Composites: Characteristics, types, Fabrication and repair.	L1, L2	6
Module 6: Quality Assurance Meaning of Quality and quality improvement, need of Quality, Statistical methods for quality control, Process capability. Need of Quality Assurance, Quality Audit, Concept of Zero defect, ISO 9000 quality systems, TQM.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

11. M. J. Kroes, W. A. Watkins, F. Delp, and R. Sterkenburg, "Aircraft Maintenance and Repair", 7th edition, McGraw-Hill Education, 2013.

12. G. F. Titterton, "Aircraft Materials and Processes", 3rd edition, Himalayan Books, New Delhi, 1998.

13. A. Mitra, "Fundamentals of Quality Control", Wiley-Blackwell; 4th edition, 2016.

References:

1. A. V. Feigenbaum, "Total Quality Control", 40th anniversary edition, 1983.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	-	3	-	-	-	-	-	-	-	-	-	2	1	-	-
CO2	1	2	3	-	-	-	-	-	-	-	-	-	2	1	-	-
CO3	1	2	1	3	-	-	-	-	-	-	-	-	2	1	-	-
CO4	-	-	2	-	1	-	-	-	-	-	-	-	2	1	-	-

CO5	-	3	-	3	-	-	-	-	-	1	-	-	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2613	Computational Fluid Dynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Fluid Mechanics and Dynamics, Flight Dynamics				
Co-requisites					

Course Catalog

This course introduces the beginning graduate and advanced undergraduate students to finite difference methods as a means of solving different type of differential equations that arise in fluid dynamics. Fundamentals of numerical analysis, ordinary differential equations and partial differential equations related to fluid mechanics and heat transfer will be reviewed. Error control and stability considerations are discussed and demonstrated. The Navier-Stokes equations will be solved using a commercial software.

Course Objectives

The objective of this course is to

7. Provide introductory knowledge to the students about a variety of computational techniques that can be used for solving engineering problems.
8. Provide education to the students about utilizing the computational software for result presentations and data visualization of engineering problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe, and apply the various governing equations to solve engineering problems.

CO2. Describe, and apply various mathematical approaches to solve partial differential equations.

CO3. Describe, and apply the fundamental knowledge and various techniques to create computational grids.

CO4. Describe, and apply the fundamental knowledge and various techniques to discretize computational grids.

CO5. Describe, and apply the knowledge and technique of finite volume method to achieve numerical solution of problems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Governing Equations of Fluid Dynamics: Continuity, Momentum and Energy Equations; Derivation in Various Forms; Integral Versus Differential Form of Equations; Models of Flows; Substantial Derivative; Divergence of Velocity; Physical Boundary Conditions.	L2, L3	6
Module 2: Mathematical Behaviour of Partial Differential Equations Classification of Partial Differential Equations; Cramer Rule and Eigen Value Methods for Classification; Hyperbolic, Parabolic, and Elliptic Forms of Equations.	L2, L3	5
Module 3: Grid Generation and Techniques	L2, L3,	5

Need for Grid Generation; General Transformation of The Equations; Metrics and Jacobians; Structured Grids-Essential Features; Structured Grid Generation Techniques - Algebraic and Numerical Methods; Unstructured Grids-Essential Features; Unstructured Grid Generation Techniques- Delaunay-Voronoi Diagram; Advancing Front Method.	L5	
Module 4: Discretization Finite Differences Methods and Difference Equations; Explicit and Implicit Approaches; Unsteady Problem - Explicit Versus Implicit Scheme; Errors and Stability Analysis; Time Marching and Space Marching; Reflection Boundary Condition; Relaxation Techniques; Alternating Direction Implicit Method; Successive over Relaxation/Under Relaxation.	L2, L3, L5	6
Module 5: Finite Volume Technique and Some Applications Spatial Discretization - Cell Centered and Cell Vertex Techniques (Overlapping Control Volume, Duel Control Volume); Temporal Discretization - Explicit Time Stepping and Implicit Time Stepping; Time Step Calculation; Upwind Scheme and High Resolution Scheme; Unsteady Flows and Heat Conduction Problems.	L2, L3, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

9. C. A. J. Fletcher, "Computational Techniques for Fluid Dynamics", 2nd Edition, Springer, 2002.
10. J. D. Anderson, "Computational Fluid Dynamics", McGraw Hill, 2013.

Reference:

1. J. F. Wendt, "Computational Fluid Dynamics - An Introduction", 3rd Edition, Springer, 2013.
2. C. Hirsch, "Numerical Computation of Internal and External Flows", 1st Edition, Elsevier, 2007.
3. K. A Hoffmann, S. T. Chiang, "Computational Fluid Dynamics for Engineers", Vols. I & II, Engineering Education System, 1993.
4. T. K. Sengupta, "Fundamentals of CFD", Universities Press, 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-
CO2	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-
CO3	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-
CO4	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-

CO5	1	2	-	3	-	-	-	-	-	-	-	-	1	1	3	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2614	Aerospace Materials	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Aerospace Structures-I				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various types of materials, their properties and their applications in aerospace. This course serves as a foundation for better understanding of advanced courses relevant to aircraft manufacturing, aircraft design, construction and fabrication.

Course Objectives

The objective of this course is to

1. Provide strong knowledge base to students in respect of various important aerospace materials used in the manufacture of aircraft.
2. Provide introductory knowledge base to students regarding different types of alloys, their heat treatment processes and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and explain the fundamental of materials and their importance on flight vehicle.

CO2. Identify, explain and compare the properties of various aluminum and magnesium alloys and steel compositions. Also their application to aerospace vehicle vehicles.

CO3. Identify, describe and compare the properties of high strength and high resistance alloys along with their application to aerospace vehicle vehicles.

CO4. Identify and explain the corrosion and its different prevention methods for preventing aircraft components.

CO5. Identify and explain about the composite materials, their applications and different types.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction To Materials Properties of flight vehicle materials, Importance of strength/weight ratio of materials for Aerospace Vehicles, Importance of temperature variations, factors affecting choice of material for different parts of airplane.	L1, L2	6
Module 2: Aluminum & Magnesium Alloys Aluminum alloys, Heat treatment, High strength and high corrosion resistant alloys, Magnesium alloys and their properties, Heat treatment. Application to Aerospace Vehicle of these alloys.	L1, L2, L4	6

Module 3: Aircraft Steels Classification of alloy steels, Effect of alloying elements, Carbon steels v/s Alloys steels, corrosion resistant steels, Heat treatment, Corrosion prevention methods, Selection and application of steel alloys to aircraft manufacture.	L1, L2, L4	6
Module 4: High Strength And Heat Resistant Alloys Classification of heat resistant materials and iron, Nickel and cobalt base alloys, Refractory materials: Ceramics, Titanium and its alloys, properties of Inconel, Monal and K-Monal, Nimonic and super alloys: Application to Aerospace vehicles.	L1, L2	6
Module 5: Corrosion And Its Prevention Corrosion of dissimilar metals, protection, Cleaning, Plating anodic, Oxidation, Paints. Problems of corrosion to aircraft near sea, Protective/Preventive measures.	L1, L2	6
Module 5: Composite Materials Classification and characteristics of Composite materials, Types of Composite materials, Matrix phase, Dispersion phase, Advantages of composite materials, FRP, MMC, PMC, CMC, and Applications of Composites in Aircrafts.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

4. W. A. J. Chapman, "Workshop Technology-Vol. I-III", 5th Edition, Butterworth-Heinemann, 1972.
5. G. F. Titterton, "Aircraft Materials and Processes", Sterling Book House, 2007.
6. L. Gupta, "Advanced Composite Materials", Himalayan Books, New Delhi, 1998.

References:

1. G. B. Ashmead, "Aircraft Production Methods", 1st Edition, Chilton Company, 1956.
2. R. F. Gibson, "Principles of composite Materials Mechanics", 2nd Edition, McGraw Hill, CRC Press, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	-	2	-	-	-	-	-	-	-	-	-	3	1	-	-
CO2	1	-	2	-	-	-	-	-	-	-	-	-	3	1	-	-
CO3	-	-	1	-	2	-	-	-	-	-	-	-	3	1	-	-

CO4	1	2	1	3	-	-	-	-	-	-	-	-	3	1	-	-
CO5	-	-	1	2	2	-	-	-	-	-	-	-	3	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2651	Aircraft Stability and Control	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Low Speed Aerodynamics, Flight Mechanics				
Co-requisites					

Course Catalog

This course provides the fundamental knowledge of stability and control of an aircraft. Students will understand the importance of different components of an aircraft in providing stability and giving control to aircraft motion. This course also provides understanding of mathematics behind the designing of aircraft and its components. The content of this course serves as a foundation for advance course of aircraft designing.

Course Objectives

The objective of this course is to

1. Provide understanding of various aspects of stability of an aircraft in flight and how geometric features of control surfaces and their proper angular movements achieve it.
2. Provide an analytical understanding of longitudinal, lateral and directional stability and measures that can be taken to control the same.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define, explain, apply and compare the various fundamentals and aspects of stick fixed static longitudinal stability.

CO2. Define, explain, apply and compare the various fundamentals and aspects of stick free static longitudinal stability.

CO3. Define, explain, apply and compare the various fundamentals and aspects of directional stability and control of flight vehicles.

CO4. Define, explain, apply and compare the various fundamentals and aspects of lateral stability and control of flight vehicles.

CO5. Define, explain, apply and compare the various fundamentals and aspects of dynamic stability of flight vehicles.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Stick Fixed Static Longitudinal Stability Introduction to stability of airplane, stick fixed longitudinal stability, Neutral point, Centre of gravity limits, In flight measurement of stick fixed neutral point	L1, L2, L3, L4	8
Module 2: Stick Free Static Longitudinal Stability Control surface hinge moments, floating and restoring tendencies, the tab, Effect of free elevator on airplane stability, Elevator Control force, stick force	L1, L2, L3, L4	7

gradients, Neutral point, Controls free center of gravity limit, In-flight measurement of stick free neutral point		
Module 3: Directional Stability and Control Asymmetric flight, Feather cock stability, contribution of different parts of Airplane, Rudder Fixed and Rudder free static directional stability, rudder lock	L1, L2, L3, L4	7
Module 4: Lateral Stability and Control Dihedral Effect, Contribution of different parts of airplane controls in roll, aileron control power, cross coupling of lateral and directional effects	L1, L2, L3, L4	7
Module 5: Dynamic Stability (a) Longitudinal Dynamic Stability: Simple analysis of short period and phugoid modes, stick-fixed and stick-free (b) Lateral and Directional Dynamic Stability: Simple analysis of roll subsidence spiral mode and Dutch roll	L1, L2, L3, L4	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. C. D. Perkins, R. E. Hage, "Airplane Performance Stability and Control", John Wiley & Sons, 1949.
2. B. Dickinson, "Aircraft Stability and control for Pilots and Engineers", Pitman, 1968.
3. B. N. Pamadi, "Performance, Stability, Dynamics and Control of Airplanes", 2nd Edition, American Institute of Aeronautics & Astronautics, 2004.
4. R. Nelson, "Flight Stability and Automatic Control", McGraw Hill Education, 2017.

Reference:

1. M. V. Cook, "Flight Dynamics Principles: A Linear Systems Approach to Aircraft Stability and Control", Wiley, 1997.
2. J. Roskam, "Airplane Flight Dynamics and Automatic Flight Controls", Roskam Aviation and Engineering Corporation, 2001.
3. B. Etkin, L. D. Reid, "Dynamics of Flight: Stability and Control", 3rd Edition, Wiley, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO5	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2612	Computational Fluid Dynamics Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Fluid Mechanics and Dynamics, Low Speed Aerodynamics, CAD				
Co-requisites	Computational Fluid Dynamics				

Course Description

The objective of this course is to provide knowledge and understanding to the students about the modeling, meshing and simulation of flow over aircraft and its components. Knowledge of Fluid Mechanics and Dynamics, Low Speed Aerodynamics, Computer Aided drafting is necessary to comprehend the contents of this course. This course equips the students with various approaches and tools of modeling and grid generations, also a brief knowledge is provided to the students about the numerical methods to solve numerous problems related to aerospace and mechanical systems.

Course Objectives

The objective of this course is to

1. Provide experience in computing aerodynamic problems and understanding flow physics over flat plate, pipe, cylinder, over a wedge and flow over an airfoil.
2. Provide knowledge to estimate flow characteristics with different Mach numbers to determining the pressure coefficients over different structural objects.

Course Outcomes

On completion of this course, the students will be able to

CO5. Describe and apply the engineering fundamentals and principles to model flat plate, pipe, cylinder, wedge, Nozzle, airfoil and wing in ANSYS Workbench/ AutoCAD.

CO6. Describe and apply the engineering fundamentals and principles to generate different types of grids with varying qualities, arrangement of nodes and topology.

CO7. Describe and apply the engineering fundamentals and principles to simulate the flow with varying parameters over the object with different numerical methods.

CO8. Compare and analyze the results of flow simulation to achieve an optimum design of the structure.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: Introduction to ANSYS	L1, L2,	1
Experiment 2: To simulate and analyze the flow over a flat plate	L1, L2, L3, L4	1
Experiment 3: To simulate and analyze the flow through a pipe	L1, L2, L3, L4	1
Experiment 4: To simulate and analyze the flow over a circular cylinder	L1, L2, L3, L4	1
Experiment 5: To simulate and analyze the flow over a wedge	L1, L2,	1

	L3, L4	
Experiment 6: To simulate and analyze the subsonic flow through a nozzle	L1, L2, L3, L4	1
Experiment 7: To simulate and analyze the supersonic flow through a nozzle	L1, L2, L3, L4	1
Experiment 8: To simulate and analyze the flow over a symmetric aerofoil	L1, L2, L3, L4	1
Experiment 9: To simulate and analyze the flow over a cambered aerofoil	L1, L2, L3, L4	2
Experiment 10: To simulate and analyze the flow over a wing structure	L1, L2, L3, L4	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

6. C. A. Fletcher, "Computational Techniques for Fluid Dynamics", 2nd Edition, Springer, 2002.
7. J. D. Anderson, "Computational Fluid Dynamics", McGraw Hill, 2013.
8. ANSYS, Inc., ANSYS Fluent Tutorial Guide, 2018.
9. ANSYS, Inc., ANSYS Theory Reference, 11th Edition, 1999.
10. ANSYS, Inc., ANSYS Workbench, 2005.

Reference:

1. C. Hirsch, "Numerical Computation of Internal and External Flows", 1st Edition, Elsevier, 2007.
2. T. K. Sengupta, "Fundamentals of CFD", Universities Press, 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	**5**	**35**	**35**

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	2	2	-	-	-	-	-	3	2	-	3	1	1	2	3
CO2	1	2	2	-	-	-	-	-	3	2	-	3	1	1	2	3
CO3	1	2	2	-	-	-	-	-	3	2	-	3	1	1	2	3
CO4	1	2	2	-	-	-	-	-	3	2	-	3	1	1	2	3

1: strongly related, 2: moderately related and 3: weakly related

ASE2615	Aeromodelling Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Low Speed Aerodynamics, Aircraft Propulsion				
Co-requisites					

Course Description

The objective of this course is to provide practical knowledge and understanding to the students about the design and fabrication of models and prototypes of aircraft. Knowledge of Introduction to Aerospace Engineering, Low Speed Aerodynamics, Aircraft Propulsion, and Aircraft Structures is necessary to comprehend the contents of this course. This course equips the students with necessary knowledge to understand the construction and operation of model and prototype flight vehicles.

Course Objectives

The objective of this course is to

5. Provide practical knowledge to the students about the design of model and prototypes of flight vehicles.
6. Provide practical knowledge to the students about the fabrication and operation of model and prototypes of flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain and apply the engineering fundamentals and principles to design and create various types airfoils and wing planforms using basic construction materials.

CO2. Explain and apply the engineering fundamentals and principles to design and create unpowered and powered gliders using basic construction materials.

CO3. Explain and apply the engineering fundamentals and principles to design and create radio-controlled flight vehicles.

Course Content

Modules	Blooms level*	Number of hours
Experiment 1: To design and fabricate various types of airfoils using basic raw materials (Thermocol, Balsa wood, Cardboard, etc.).	L2, L3, L5	2
Experiment 2: To design and fabricate various types of wing planforms using basic raw materials (Thermocol, Balsa wood, Cardboard, etc.).	L2, L3, L5	2
Experiment 3: To perform design calculations and fabrication of an unpowered glider aircraft.	L2, L3, L5	2
Experiment 4: To perform design calculations and fabrication of a powered glider aircraft.	L2, L3, L5	2
Experiment 5: To perform design calculations of a small-scale, radio-controlled, fixed-	L2, L3, L5	2

wing flight vehicle.		
Experiment 6: To fabricate and test a small-scale, radio-controlled, fixed-wing flight vehicle.	L2, L3, L5	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

6. J. D. Anderson, "Fundamentals of Flight", McGraw Hill, 2000.
7. V. Smeed, "The Basics of Aeromodelling", Nexus Special Interests, 1995.
8. R. H. Warring, "Basic Aeromodelling", Special Interest Model Books, 1976.

Reference:

1. R. Randolph, "R/C Airplane Building Techniques", Air Age Publications, 1991.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	**5**	**35**	**35**

IA: Internal Assessment, EE: External Exam, PR: Performance, LR: Lab Record, V: Viva.

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	2	2	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	2	2	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	2	2	-	-	-	-	-	2	2	3	3	1	1	1	2

1: strongly related, 2: moderately related and 3: weakly related

ASE2637	Minor Project	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The minor project provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The minor project is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out minor project build a foundation and aptitude in students to conduct meaningful research towards a practical outcome. The minor project aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

1. Provide practical training on small-scale projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

CO1. Relate and apply the acquired classroom knowledge with technical and real-time environment.

CO2. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.

CO3. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.

CO4. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities

completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

- **Title Page -** Format will be given by coordinator/supervisor.
- **Declaration by the Students -** This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate -** This is page number (ii). It is given by the Institute.The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate -** This is a certificate, which the company gives to the students.
- **Contents -** This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement -** This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
- **Abstract and Keywords -** This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
- The keywords (maximum 6) are a hint that what is contained in the report.

- **Company Profile -** A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
- **Chapters -** Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography -** This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Internal and Final Assessment (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

ASE2616	Introduction of Avionics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Aircraft Systems and Instrumentation				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of the role and architecture of avionics systems of the aircraft. It provides basic understanding of the avionic systems are an essential and key component of modern aircraft that control all vital functions, including navigation, flight control, data display and communications.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the basic avionics systems, their need and necessity, their role and architecture.
2. Provide education to the students about the components and operation of various avionics systems and sub-systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define, explain, and summarize the role, architecture and working of various avionics systems and components.

CO2. List, define, explain, and categorize the various avionics systems facilitating man-machine interaction.

CO3. Define, describe, and apply the basic concepts of air data systems and inertial sensors.

CO4. Describe, and categorize the different Fly-by-wire flight control systems used in modern aircrafts.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Avionics Technology Introduction; Technology Evolution; Avionics Computing; Digital Systems Input and Output; Analogue to Digital Process; Digital to Analogue Process; Micro-electronic Devices; Digital Data Buses; Fibre-optic Buses; Avionics Packaging	L1, L2	6
Module 2: Man-Machine Interaction Flight Deck Displays; Head-Up Display Visual Guidance System (HVGS); Helmet Mounted Displays; Head Down Displays; HUDs versus HMDs	L1, L2, L4	6
Module 3: Air Data Systems and Inertial Sensors Air Data Computer; Air Data Measurement; Use of pitot static probe, static probe to derive air data indications; Derivation of Air Data Laws and Relationships; Air Data Sensors and Computing; Position Gyros, Rate Gyros and	L1, L2, L3	6

Accelerometers.		
Module 4: Fly-by-Wire Flight Control Systems Basic Concepts and Features; Advantages of FBW Control; Control Laws; Redundancy and Failure Survival; Fly-by-Light Flight Control systems; Longitudinal, Lateral & Direction Autopilot.	L1, L2, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

11. R. P. G. Collinson, "Introduction to Avionics Systems", 3rd Edition, Springer, 2011.

12. I. Moir, A. Seabridge, M. Jukes, "Civil Avionics Systems", 2nd Edition, John Wiley & Sons, Ltd., 2013.

Reference:

1. I. Moir, A. Seabridge, "Aircraft Systems", Professional Engineering Publishing Limited, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	2	1	-	-	-	-	-	-	-	-	-	-	1	3	-
CO2	-	2	1	-	-	-	-	-	-	-	-	-	-	1	3	-
CO3	-	2	1	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	-	2	1	-	-	-	-	-	-	-	-	-	-	1	3	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2617	Propellant Technology	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Engineering Thermodynamics, Aircraft Propulsion				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of the propellants used in rockets and missiles. This course aims to familiarize the students with the fundamental information about type, composition, application and performance of the propellants for rockets and missiles.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the types and application criteria of different propellants in rockets and missiles.
2. Provide education to the students about the chemistry and thermodynamics of propellant gains and systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, describe, and categorize amongst various kinds of solid propellants used in aerospace propulsion and discuss their performance.

CO2. List, summarize, and compare amongst various kinds of liquid propellants used in aerospace propulsion and discuss their performance.

CO3. List, explain and compare amongst various kinds of hybrid and cryogenic propellants used in aerospace propulsion and discuss their performance.

CO4. Identify, distinguish and contrast amongst various kinds of green propellants used in aerospace propulsion and discuss their performance.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Solid Propellants Introduction; Properties and Design of Solid Motors; Propellant Composition; Propellant Burning Rate; Basic Performance Relations; Propellant Grain and Grain Configuration.	L1, L2, L4	6
Module 2: Liquid Propellants Basic Configuration of Liquid Propellant Engine; Types of Liquid Propellants; Combustion Chamber and Nozzle; Propellant Feed System; Safety and Environmental Concerns	L1, L2, L4	6
Module 3: Hybrid and Cryogenic Propellants Applications and Propellants; Performance Analysis and Grain Configuration; Combustion Instability; Cryogenics; Components and Combustion Cycles;	L1, L2, L4	6

Advantages and Limitations of Cryogenic Propellants;		
Module 4: Green Propellants Rocket Emissions; Environmental Concerns; Manufacturing and handling Risks; Alternative Green Propellants; Green Solid Propellants; Green Liquid Propellants; Advantages and Challenges.	L1, L2, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. G. P. Sutton, O. Biblarz, "Rocket Propulsion Elements", 7th Edition, John Wiley & Sons, Inc., 2001.
2. M. J. L. Turner, "Rocket and Spacecraft Propulsion", 3rd Edition, Praxis Publishing, Springer, 2009.

Reference:

1. A. K. Gupta, D. G. Lilley, "Advances in Chemical Propulsion", CRC Press, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO2	1	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	1	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO4	1	-	2	-	-	2	1	-	-	-	-	-	-	2	1	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2618	Finite Element Method	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Engineering Thermodynamics, Aircraft Propulsion				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of aircraft maintenances and their importance based on various aspects. This course provides introductory knowledge to the students about testing of various components as well as the fabrication of FRPs that serve as a foundation for better understanding of advanced course.

Course Objectives

The objective of this course is to

1. Provide knowledge of various concepts of Mathematical Modeling of Engineering Problems.
2. Provide knowledge about the basics of the Finite Element Technique, a numerical tool for the solution of different classes of problems in solid mechanics.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and explain the basics of finite elements analysis.

CO2. Summarize and explain various types of techniques used in the formulation of finite elements methods.

CO3. List, identify and describe the different elemental properties along with their applications in the FEM of plates and shells.

CO4. List, explain and apply the gained knowledge in related FEM domains.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Finite Element Analysis Introduction; Basic Concepts of Finite Element Analysis; Introduction to Elasticity; Steps in Finite Element Analysis	L1, L2	4
Module 2: Finite Element Formulation Techniques Virtual Work and Variational Principle; Galerkin Method; Finite Element Method: Displacement Approach; Stiffness Matrix and Boundary Conditions	L1, L2	4
Module 3: Element Properties Natural Coordinates; Triangular Elements; Rectangular Elements; Lagrange and Serendipity Elements; Solid Elements; Isoparametric Formulation;	L1, L2	6
Module 4: FEM for Plates and Shells Introduction to Plate Bending Problems; Finite Element Analysis of Thin Plate ;	L1, L2	6

Finite Element Analysis of Thick Plate; Finite Element Analysis of Skew Plate ;		
Module 5: Additional Applications of FEM Finite Elements for Elastic Stability; Finite Elements in Fluid Mechanics; Dynamic Analysis	L1, L2, L3	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. J. N. Reddy, "An Introduction to the Finite Element Method", 3rd Edition, Tata McGraw-Hill, 2005.
2. P. Seshu, "Text Book of Finite Element Analysis", Prentice-Hall of India Pvt. Ltd., New Delhi, 2007.

References:

1. C. S. Krishnamoorthy, "Finite element analysis: theory and programming", Tata McGraw-Hill Education, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance; CT: Class Test; S/V/Q: Seminar/Viva/Quiz; HA: Home Assignment; EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	1	2	-	-
CO3	1	2	-	3	-	-	-	-	-	-	-	-	1	2	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-

1: strongly related, 2: moderately related and 3: weakly related

SEVENTH SEMESTER

ASE2702	Flight Dynamics	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basic Mathematics, Low Speed Aerodynamics, Flight Mechanics,				
Co-requisites					

Course Catalog

This course contains Fundamental mathematical and dynamic principles for flight dynamics. The course also provides basic knowledge and understanding of use of general equations for unsteady motion of airplane, such as force equations, momentum equations and principle of rotation. It also provides basic knowledge of small disturbance theory for aircraft stability and control.

Course Objectives

The objective of this course is to

9. Equip students to understand the complexities of airplane and rocket dynamics

10. Equip the students about the degrees of freedom of flight trajectory and analysis of stability and control based on small disturbance theory and stability derivatives for airplane and rockets.

Course Outcomes

On completion of this course, the students will be able to

CO10. Define and explain particle and rigid body kinematics for different system of frames and use of co-ordinate transformation.

CO11. Define, explain and apply the equations of motion of aircraft and flight simulation of powered and unpowered flight.

CO12. Describe, apply and analyze small disturbance theory for stability and control.

CO13. Describe, apply and analyze Physical significance of stability derivatives and their use.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Overview; Fundamental of Vectors; Fixed and Inertial frame of reference, Earth as a flat surface, Coriolis Effect, Longitudinal, Directional and Lateral forces and moments; Longitudinal, Directional and Lateral Stability.	L1, L2	6
Module 2: Transformation Coordinate Systems; Transformation from Cartesian to Cylindrical and Cylindrical to Spherical Coordinate Systems; Transformation Matrix about X, Y And Z Axis; Rotation Matrix about X, Y And Z Axis; Earth, Body, Wind and Stability Axis Systems and their Transformation.	L1, L2	6
Module 3: Aircraft Equations of Motion Force equations in moving frame, Moment equations in moving frame, Orientation and	L1, L2, L3	8

position of the airplane: Principle Rotation, Euler angles, Euler rates, Transformation matrix, External forces, Angular velocities equations in moving frame		
Module 4: Small Disturbance Theory Introduction; Assumptions, Linearized equations of aircraft motion: Control fixed longitudinal directional equations, control fixed lateral directional equations, Stability analysis of linearized equations of motion	L1, L3, L4	8
Module 5: Stability Derivatives Introduction, Expressions for $Cx, and\ Cz$. The α Derivatives: $Cx_\alpha, Cz_\alpha, Cm_\alpha$. The u Derivatives: Cx_u, Cz_u, Cm_u. The q Derivatives: Cz_q, Cm_q. The $\dot{\alpha}$ Derivatives: $C_{L\dot{\alpha}}, C_{m\dot{\alpha}}$. The β Derivatives: $C_{y\beta}, C_{l\beta}, C_{n\beta}$. The p Derivatives: C_{yp}, C_{lp}, C_{np}. The r Derivatives: C_{yp}, C_{lp}, C_{np}	L1, L3, L4	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. B. Etkin, "Dynamics of Flight" 3rd Edition, John Wiley & Sons, Inc., 2007.
2. J. L. Meriam, "Dynamics" John Wiley & Sons, Inc., 1987.
3. R. C. Nelson, "Flight Stability and Automatic Control", McGraw-Hill, 2002.

References:

1. A. E. Roy, "Foundation of Astrodynamics", Macmillan, US, 1997.
2. M. H. Kaplan, "Spacecraft Dynamics and Control", John Wiley & Sons, Inc., 2004.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2709	Aircraft Design	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Basic Mathematics, Low Speed Aerodynamics, Flight Mechanics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various aspects and processes of aircraft design. This course provides in-depth knowledge to the students about flow process of carrying out the designing of aircraft, its associated loads and the safety requirements. Based on this course, students will be able to investigate new and emerging design aspects

Course Objectives

The objective of this course is to

7. Provide introductory knowledge to the students regarding the fundamentals of aircraft designing and its structural analysis
8. Provide education to the students about the concepts of different structural members and various associated loads

Course Outcomes

On successful completion of this course, the students will be able to

CO1. List and describe the basics of aircraft system design and aircraft structures

CO2. Identify, explain and analyze the applicability of design aspects and different aircraft loads.

CO3. Identify and explain the design considerations of wings and high lift devices.

CO4. Identify, correlate and apply the numerical and theoretical knowledge to investigate new and emerging design aspects

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Aircraft design, requirements and specifications, Different design phases, Importance of each phase. Weight, its importance. Aerodynamic and structural design considerations. Classifications of airplane.	L1, L2	8
Module 2: Air Loads during Flight Ground Loads, Airframe loads, maneuvering loads in flight, Load factor, V-n diagram, gust loads, and estimation of gust loads.	L1, L2	6
Module 3: Wing Design Consideration Selection of airfoil and planform. Span wise air loads variation, BMD and SFD. Weight distribution.	L1, L2, L4	8
Module 4: High Lift Systems Airfoil's maximum lift coefficient, leading and trailing edge devices, effect of	L1, L2	7

sweep back. Stall and the deep stall. Effect of Re, V/STOL configurations.		
Module 5: Conceptual Design of Airplane & Layout Preparation of 3-views and layout. Estimation of take-off, landing, climbing and cruise performance. Flight envelope.	L1, L2, L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. D. P. Raymer, "Airplane Design-A Conceptual Approach", 3rd Edition, AIAA Education Series, 1999.
2. D. Stinton, "The Design of Airplane", 1st edition, Granada, UK, 2000.

References:

1. L. M. Nikolai, "Fundamentals of Aircraft Design", 2nd edition, Univ. of Dayton Ohio, 1975.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination;

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	-	1	-	2	-	-	-	-	-	-	-	3	1	-	-
CO2	1	-	1	-	2	-	-	-	-	-	-	-	3	1	-	-
CO3	1	-	2	-	2	-	-	-	-	-	-	-	3	1	-	-
CO4	1	2	2	-	2	-	-	-	-	-	-	-	3	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2712	Principles of Helicopter Engineering	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Low Speed Aerodynamics				
Co-requisites					

Course Catalog

The course provides the fundamental knowledge of helicopters, its various structural members and rotor controls. Students will understand the aerodynamics of rotor blades during hovering and in directional flight with various performance parameters. This course also provides the understanding of rotor designing considerations and its stress analysis. Stability and vibration concepts are also included which are essential in the designing of helicopter.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students about the helicopter and its main components, aerodynamics of rotor blades, stability and control, engine power and rotor vibration.
2. Provide education to the students about design considerations for the rotor parts and calculate the performance in real engineering applications.

Course Outcomes

On completion of this course, the students will be able to

CO19. Define, explain, and categorize amongst the various components, systems and subsystems of helicopters.

CO20. Explain and compare amongst the various aspects of flight controls of helicopters.

CO21. Describe, apply and analyze the fundamental concepts and principles of aerodynamics of rotor blades.

CO22. Describe and apply the fundamental knowledge and principles to evaluate the performance of helicopters.

CO23. Apply and compare the fundamental concepts and principles for rotor blade design of helicopters.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Basic features, Layout, The Main Rotor System: Geometry of the rotor, Fully Articulated Rotor System, Semi rigid Rotor System, Rigid Rotor System, Tail Rotor, drive to main tail rotor, Rotor controls, Tandem helicopter, Coaxial helicopter, intermeshing helicopter	L1, L2, L4	6
Module 2: Helicopter Flight Controls Collective Pitch Control, Throttle Control, Collective Pitch / Throttle Coordination, Correlator / Governor, Cyclic Pitch Control, Anti-torque Pedals	L2, L4	5

Module 3: Aerodynamics of Rotor Blades Feathering and flapping, Profile Drag, Induced Drag, Parasite Drag, Rotor Blade Angles, Ground effect, Hovering Flight: Translating Tendency, Pendular Action, Coning, Coriolis Effect. Vertical Flight, Forward Flight: Advancing Blade, Retreating Blade, Dissymmetry of Lift. Translational Lift, Sideward Flight, Sideward Flight, Rearward Flight, Autorotation, state vortex ring, Blade stall, high speed limitations	L2, L3, L4	5
Module 4: Flight Performance Factors Affecting Performance, Momentum theory, Disk loading, power leading, Rotor efficiency, Effects of solidity, Piston engines, Gas turbines, and Gross weight of a jet helicopter, Required Power, Range and Endurance, Rate of climb, Ceiling in vertical climb	L2, L3	6
Module 5: Rotor Blade Design Design requirement, Design considerations: Aerofoil selection, rotor diameter, tip speed, rotor solidity, number of blades blade planform, blade twist, Tip shape, cut-out section. Design of tail rotor, Material selection	L3, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

11. J. G. Leishman, "Principles of Helicopter Aerodynamics", 2nd edition, Cambridge Aerospace Series, 2008.

12. J. M. Seddon, S. Newman, "Basic Helicopter Aerodynamics", 3rd Edition, Aerospace Series, Wiley, 2011.

13. Rotorcraft Flying Handbook, U. S. Department of Transportation, Federal Aviation Administration, 2000.

14. W. J. Wagtendonk, "Principles of Helicopter Flight", 2nd Edition, Aviation Supplies & Academics, Inc., 2015.

Reference:

1. W. Johnson, "Helicopter Theory", 6th Edition, Dover Publications, Inc., 1994.

2. J. Watkinson, "The Art of the Helicopter" 1st Edition, Elsevier, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	-	-	-	-	-	-	-	-	-	1	-	3	-

CO2	1	2	3	-	-	-	-	-	-	-	-	-	1	-	3	-
CO3	1	2	3	-	-	-	-	-	-	-	-	-	1	-	3	-
CO4	1	2	3	-	-	-	-	-	-	-	-	-	1	-	3	-
CO5	1	2	3	-	-	-	-	-	-	-	-	-	1	-	3	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2713	Vibration Engineering	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Engineering Mechanics				
Co-requisites					

Course Catalog

This subject will cover the fundamental concepts on the vibration of mechanical systems of one degree freedom, Lagrange's equations of motion and multiple degree of freedom systems. This course includes introduction to matrix methods, influence coefficient, forced vibration, principle mode of vibration, Rayleigh method, measuring instruments, isolation, torsional systems and balancing of machine.

Course Objectives

The objective of this course is to

1. Provide adequate knowledge to analyse one-degree and multi-degree of freedom systems of vibrations using different methods.
2. Find out natural frequencies and amplitude responses of different systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, determine and apply the equation of motions for free vibration under damped and undamped condition for one degree freedom system.

CO2: Explain, determine and apply the equation of motion for forced vibration due to excitation of support.

CO3: Determine and apply the equation of motion in reciprocating and rotary balancing of machine and explain the vibration isolation.

CO4: Explain, determine and apply the equation of motion for two degree of freedom system and explain vibration absorber

CO5: Derive and apply the principle mode of vibration by matrix iteration, influence coefficient and solve the problem free and forced vibration having multi degree of freedom systems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Scope of Vibration Important terminology and classification, Degrees of freedom, Harmonic motion, vectorial representation, complex number representation, addition, Derivation of equation of motion for one dimensional longitudinal, transverse and torsional vibrations without damping using Newton's second law, D' Alembert's principle and Principle of conservation of energy, Compound pendulum and centre of percussion, Damped vibrations of single degree of	L1, L2, L3	6

freedom systems, Viscous damping, underdamped, critically damped and overdamped systems, Logarithmic decrement, Vibration characteristics of Coulomb damped and Hysteretic damped systems.		
Module 2: Forced Vibrations of Single Degree of Freedom Systems Forced vibration with constant harmonic excitation, Steady state and transient parts, Frequency response curves and phase angle plot, Forced vibration due to excitation of support.	L1, L2, L3	8
Module 3: Vibration Isolation and Transmissibility Force transmissibility, Motion transmissibility, Forced vibration with rotating and reciprocating unbalance, Materials used in vibration isolation.	L1, L2, L3	6
Module 4: System with Two Degrees of Freedom principle mode of vibration, Mode shapes, Undamped forced vibrations of two degrees of freedom system with harmonic excitation, Vibration Absorber, Undamped dynamic vibration absorber and centrifugal pendulum absorber	L1, L2, L3	8
Module 5: Multi-degree of Freedom Systems Undamped free vibrations, principal modes, and normal co-ordinates. Orthogonality of principal modes of vibrations. Semi-definitive systems. Systems with equal frequencies, influence coefficients, natural frequencies and principal modes by matrix iteration, damped free vibrations, forced vibrations, Rayleigh's, Dunkerley's, Stodola's and Holzer's methods. Vibrations of continuous systems, Transverse vibration of a string, longitudinal vibration of a bar, Torsional vibration of a shaft.	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text & Reference Books

Text:

1. S. T. Francis, I. E. Morse, "Mechanical Vibrations", Prentice Hall of India, 1994.
2. H. A. Church, "Mechanical Vibrations", John Wiley and Sons, Reprint 199.
3. S. Timoshenko, "Vibration Problems in Engineering", Van Nostrand, 1961.

Reference:

1. S. G. Kelly, "Mechanical Vibrations", McGraw-Hill, New Delhi, 1960.
2. G. K. Grover, "Mechanical Vibrations", Nem Chand, New Delhi, 1977.
3. V. P. Singh, "Mechanical Vibrations", Dhanpat Rai Publications, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

PSO 3	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
CO 2	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
CO 3	**1**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
CO 4	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**
CO 5	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	

1: strongly related, 2: moderately related and 3: weakly related

ASE2714	Vibration Engineering Lab	L	T	P	C
Version 2019-1	Date of Approval: May 2019	0	0	2	1
Pre-requisites/ Exposure	Engineering Mechanics				
Co-requisites	Vibrations Engineering				

Course Catalog

The vibration engineering lab will cover the fundamental concepts on the vibration of mechanical systems of free vibration of simple and compound pendulum and Torsional vibration of rotor. An Interpretation of results is to find out the natural frequency of different mechanical systems.

Course Objectives

The objective of this course is to

1. Provide adequate knowledge to analyses one-degree and multi-degree of freedom systems of vibrations using different methods.
2. Find out natural frequencies and amplitude responses of different systems.

Course outcomes

On completion of this course, the students will be able to

CO1: Explain and apply the natural frequency of simple pendulum, compound pendulum and bifilar suspension.

CO2: Explain and apply the equation of motion of torsional vibration and determine the damping coefficient of free vibration.

CO3: Explain and apply the equation of motion of longitudinal vibration and determine the natural frequency of spring mass system.

CO4: Explain and apply the Dunkerley's rule and determine the natural frequency of beam.

CO5: Determine and apply the principle mode of vibration of shaft with different end conditions.

Course Content

Experiment	Blooms level*	Number of hours
1. To verify the relation $T = 2\pi\sqrt{\frac{L}{g}}$ for a simple pendulum.	L2, L3	1
2. To determine the radius of gyration 'k' of compound pendulum and verify the relation $T = 2\pi\sqrt{\frac{k^2+og^2}{g(og)}}$	L2, L3	1
3. To determine the radius of gyration of bar using Bi-filar suspension.	L2, L3	1
4. To study the torsional vibration (undamped) of single rotor shaft system	L2, L3	1
5. To study the damped torsional oscillations and determine the damping coefficient	L2, L3	1
6. To study the longitudinal vibration of spring and to determine the frequency theoretically and actually by experiment	L2, L3	1

7.	To study the undamped free vibration of equivalent spring mass system.	L2, L3	1
8.	To verify the Dunkerley's rule on simply supported beam and compare it with actually by experiment.	L2, L3	1
9.	To study the forced lateral vibration of the beam for different damping	L2, L3	1
10.	To determine experimentally the whirling speed of shaft for a given system.	L2, L3	1
11.	Harmonic excitation of cantilever beam using electrodynamics shaker and determination of resonant frequencies	L2, L3	2

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & Reference Books

Text:

1. S. T. Francis, I. E. Morse, "Mechanical Vibrations", Prentice Hall of India, 1994.
2. H. A. Church, "Mechanical Vibrations", John Wiley and Sons, Reprint 199.
3. S. Timoshenko, "Vibration Problems in Engineering", Van Nostrand, 1961.

Reference:

1. S. G. Kelly, "Mechanical Vibrations", McGraw-Hill, New Delhi, 1960.
2. G. K. Grover, "Mechanical Vibrations", Nem Chand, New Delhi, 1977.
3. V. P. Singh, "Mechanical Vibrations", DhanpatRai Publications, 2002.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

4. Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**1**	**1**	**1**	**3**	**1**
CO2	**1**	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**1**	**1**	**1**	**3**	**1**
CO3	**1**	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**1**	**1**	**1**	**3**	**1**
CO4	**1**	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**1**	**1**	**1**	**3**	**1**
CO5	**1**	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**1**	**1**	**1**	**3**	**1**

1: strongly related, 2: moderately related and 3: weakly related

ASE2735	Summer Internship Evaluation-II	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The internship experience provides the student with an opportunity to explore career interests while applying knowledge and skills learned in the classroom in a work setting. The training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. The experience also helps students gain a clearer sense of what they still need to learn and provides an opportunity to build professional networks. The intern develops a greater understanding about career options while more clearly defining personal career goals. Hence, the training will be useful for their future employment in industry. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university.

Course Objectives

The objective of this course is to

1. Provide practical training on some demo or live projects that will increase the capability of the students to work in a team on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

CO1. Relate and apply the acquired classroom knowledge with technical, real-time industry environment.

CO2. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.

CO3. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.

CO4. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.

- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

- **Title Page -** Format will be given by coordinator/supervisor.
- **Declaration by the Students -** This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate -** This is page number (ii). It is given by the Institute.The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate -** This is a certificate, which the company gives to the students.
- **Contents -** This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement -** This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.

- **Abstract and Keywords -** This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
- The keywords (maximum 6) are a hint that what is contained in the report.
- **Company Profile -** A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
- **Chapters -** Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography -** This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Components	V	IF	R	PR	FP
Weightage (%)	20	20	20	20	20

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR – Progress Report

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

ASE2737	Major Project	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The major project provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The major project is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out major project build a foundation and aptitude in students to conduct meaningful research towards achieving practical and technological outcomes for a given engineering problem. The major project aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

1. Provide practical training on projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

CO1. Relate and apply the acquired classroom knowledge with technical and real-time environment.

CO2. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.

CO3. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.

CO4. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be

used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made

using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

- **Title Page -** Format will be given by coordinator/supervisor.
- **Declaration by the Students -** This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate -** This is page number (ii). It is given by the Institute.The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate -** This is a certificate, which the company gives to the students.
- **Contents -** This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement -** This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
- **Abstract and Keywords -** This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

- The keywords (maximum 6) are a hint that what is contained in the report.
- **Company Profile -** A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
- **Chapters -** Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography -** This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Internal Examiner (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

External Examiner (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

EIGHTH SEMESTER

ASE2811	Spacecraft Propulsion	L	T	P	C
Version 2019-1	Date of Approval: May 2019	3	0	0	3
Pre-requisites/ Exposure	Introduction to Aerospace Engineering, Aircraft Propulsion				
Co-requisites					

Course Catalog

This course covers the fundamentals of spacecraft propulsion and discusses advanced concepts in space propulsion ranging from chemical to electrical engines. Topics include conventional and advanced propulsion systems, physics and engineering of spacecraft propulsion, and various schemes for accelerating propellants.

Course Objectives

The objective of this course is to

11. Provide introductory knowledge to the students regarding the basic science and principles as applicable to various flight vehicles and their structure.

12. Provide education to the students about the aerodynamics, propulsion, and systems of different types of flight vehicles.

Course Outcomes

On completion of this course, the students will be able to

CO24. Define, explain, and apply the different theoretical aspects and associated mathematical principles to spacecraft propulsion.

CO25. List, explain, and compare amongst various types, systems and subsystems of chemical propulsion.

CO26. Outline, describe, and contrast amongst various types, systems and subsystems of electric propulsion.

CO27. Identify, explain, and compare amongst various types, systems and subsystems of nuclear propulsion.

CO28. List, summarize and contrast amongst the different advanced propulsion concepts for interstellar travels.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Spacecraft Propulsion Overview of Spacecraft Propulsion; Basic Theory of Thermal Jet/Rocket Engines; Launch Vehicle Selection; Newton's Third Law and Rocket Equation; Tsiolkovsky's Rocket Equation.	L1, L2, L3	6
Module 2: Chemical Propulsion Basic Configuration of -Liquid Propellant Engines, Solid Propellant Rockets, Hybrid Rocket Motors, Cryogenic Engines; Specific Impulse; Propulsive Efficiency; Combustion Stability; Thrust stability.	L1, L2, L4	6

Module 3: Electric Propulsion Overview of Electric Propulsion; Basics and Classification; Principles of Electric Propulsion; Electrothermal Thrusters; Electrostatic Thrusters; Electromagnetic Thrusters; Electrical Power Generation; Applications of Electric Propulsion.	L1, L2, L4	9
Module 4: Nuclear Propulsion Nuclear Propulsion Basics; Nuclear Fission Concept; Principle of Nuclear Thermal Propulsion; Fuel Elements; Exhaust Velocity of Nuclear Thermal Rocket; Radiation and its Management; Start-up and Shut-down; Potential Applications; Operational Issues.	L1, L2, L4	9
Module 5: Advanced Concepts Interstellar Distances; Energy Requirements; Propulsion Systems requirements; Improving Efficiency; Single Stage to Orbit; Air-breathing Engines.	L1, L2, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

13. G. P. Sutton, O. Biblarz, "Rocket Propulsion Elements", 7th Edition, John Wiley & Sons, Inc., 2001.

14. M. J. L. Turner, "Rocket and Spacecraft Propulsion", 3rd Edition, Praxis Publishing, Springer, 2009.

Reference:

15. A. K. Gupta, D. G. Lilley, "Advances in Chemical Propulsion", CRC Press, 2001.

16. G. C. Oates, "Aerothermodynamics of Gas Turbine and Rocket Propulsion", 3rd Edition, American Institute of Aeronautics and Astronautics, Inc., 1997.

17. M. Tajmar, "Advanced Space Propulsion Systems", Springer Science & Business Media, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO2	1	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO3	1	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO4	1	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-
CO5	1	-	2	-	-	-	-	-	-	-	-	-	-	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2812	Aerospace Navigation, Guidance & Control	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Introduction to Avionics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of science and principles governing the navigation and communication of aerospace vehicles. Knowledge of basic physics, natural laws, interplanetary flight and flight vehicles is crucial to comprehend the contents of this course. This course provides introductory knowledge to the students about the construction, components and operation of various systems and sub-systems used for navigation, guidance and communication of interplanetary flight vehicles.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the basic science and principles as applicable to navigation of interplanetary flight vehicles in atmosphere, space and around planetary bodies.
2. Provide education to the students about the various navigation, guidance and communication systems and subsystems of different types of spacecraft.

Course Outcomes

On completion of this course, the students will be able to

CO1. State, explain, and summarize the basic science and principles behind the operation of Radar.

CO2. State and explain the physical and natural laws as applicable to the navigation of flight vehicles in atmosphere and space.

CO3. List, explain, and categorize various systems and sub-systems used for navigation, guidance and control of interplanetary flight vehicles.

CO4. List, explain, and summarize the different Fly-by-wire avionics systems used in modern aircrafts.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Concepts of Navigation, Guidance and Control, Introduction to Basic Principles, Air Data Information, Principle of Working of Radar, MTI and Pulsed Doppler Radar, Moving Target Detector, Limitation of MTI Performance.	L1, L2	6
Module 2: Navigation on Earth's Surface Basic Principle of Navigation; Position Fixing; Global Positioning System; Geodetics and Basic Reference Frames; Simplified Aerospace Vehicle Equation; Fundamental of Navigation Equation; International Satellite navigation system.	L1, L2	6
Module 3: Guidance of Aerospace Vehicles	L1, L2	6

Introduction; Classification; Description; Guidance Phases During Flight; Categories of Homing and Command Guidance, Kinematic Equations, Missile Guidance Laws; Classification of Guidance Laws; Classical Guidance Laws; Modern Guidance Laws		
Module 4: Control Systems Basic Definitions; Open Loop and Closed Loop Systems; Input-Output Description; Performance Criteria; Feedback Control; Root Locus; Evan's Form; Steps to Obtain Root Locus; Root Locus Example.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. P. T. Kabamba, A. R. Girard, "Fundamentals of Aerospace Navigation and Guidance", Cambridge Aerospace Series, 2014
2. J. H. Blakelock, "Automatic control of Aircraft & Missiles", 2nd Edition, Wiley Interscience Publication, 1990.

Reference:

1. R. B. Underdown, Tony Palmer, "Navigation", Black Well Publishing, 2001.
2. M. I. Skolnik, "Introduction to Radar Systems", 3rd Edition, Tata McGraw Hill, 2001.
3. G. M. Siouris, "Missile Guidance and Control Systems", Springer, 2004.
4. M. Kayton, W. Fried, "Avionics Navigation System", Wiley Interscience Publication, 1997.
5. P. Zarchan, "Tactical and Strategic Missile Guidance", AIAA, 2007.
6. N. S. Nise, "Control Systems Engineering", Wiley-India, 2004.
7. B. Friedland, "Control System Design", Dover Publication, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	1	3	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2837	Project-Dissertation	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The project-dissertation provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The project-dissertation is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out project-dissertation build a foundation and aptitude in students to conduct meaningful research towards achieving practical and technological outcomes for a given engineering problem. The project-dissertation aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

1. Provide practical training on projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
2. Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

CO1. Relate and apply the acquired classroom knowledge with technical and real-time environment.

CO2. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.

CO3. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.

CO4. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be

used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made

using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

- **Title Page -** Format will be given by coordinator/supervisor.
- **Declaration by the Students -** This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
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- **Abstract and Keywords -** This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

- The keywords (maximum 6) are a hint that what is contained in the report.
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- **Chapters -** Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography -** This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Internal Examiner (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

External Examiner (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

CO, PO, PSO Mapping

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CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

ASE2813	Aeroelasticity	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	High Speed Aerodynamics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of aeroelastic phenomenon. The courses on educating students about different aeroelastic phenomenon related to aircraft and their effect on aircraft performance. This also provides mathematical strategies to solve aeroelastic problems. Knowledge of basic strength of materials and aerodynamics is crucial to comprehend the content this course. This course serves as a prerequisite for designing of engine components.

Course Objectives

The objective of this course is to

1. Provide students knowledge about the Elastic behavior of the different parts of aircraft under loads.
2. Educate the students about the theories and laws governing the aero elasticity.
3. Provide solution of elastic phenomenon for arbitrary shaped oscillatory objects.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define, explain and apply about the elastic behavior of the different parts of aircraft under loads

CO2. Define, explain, apply and distinguishes between static and dynamic aero elastic phenomenon.

CO3. Define, explain, and apply phenomena of divergence of 2D wing sections and cantilever wind and their solutions in generalized co-ordinates.

CO4. Define and explain reversal of aileron and its consequences on longitudinal stability.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Definition and historical background, Static and dynamic aeroelasticity phenomenon, integration of aerodynamic, elastic and inertia forces, Influence of aeroelasticity phenomenon on aircraft design	L1, L2, L3	5
Module 2: Divergence of Lifting Surface Phenomenon of divergence, Divergence of 2-D wing section, Divergence of an idealized cantilever wing, Solution to generalized co-ordinates, Method of successive approximation	L1, L2, L3	5
Module 3: Steady State Aeroelasticity Problems in General Loss and reversal of aileron control: 2D case, Aileron reversal general case, Lift distribution on a rigid and elastic wing, Effect on static longitudinal stability of aircraft	L1, L2, L3	4

Module 4: Introduction to Flutter and Buffeting Phenomenon of flutter, Flutter of a cantilever wing, Approximate determination of critical speed by Galerkin's Method, Buffeting and stall flutter	L1, L2, L3	5
Module 5: Non - Aeroelastic Problems Flow around an oscillating circular cylinder, Applications to H-shaped sections, Prevention of aero-elastic instabilities	L1, L2	5

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. Y. C. Fung, "An Introduction to Theory of Aeroelasticity", Dover Publication, 1st Ed.,1967.
2. R. L. Bisplinghoff, H. Ashley and R. L. Halfman, "Aeroelasticity", Addison-Wesley Publishing Company, Reading Mass,1st Ed 1963.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	1	1	3	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

ASE2814	Aerospace Industrial Management	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of the management practices of airlines, airports and businesses related to the aerospace industry. This course is aimed to equip the students with necessary information and knowledge about the various aspects related to the design, maintenance, and production management practices of aerospace industries.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students regarding the management practices of aerospace industries for the maintenance and design of flight vehicles.
2. Provide education to the students about the production, safety and quality management practices followed in aerospace industries.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify, describe, and compare amongst the various management practices and principles followed by aerospace industries for maintenance of flight vehicles.

CO2. Identify, describe, and compare amongst the various management practices and principles followed by aerospace industries for product design.

CO3. Identify, describe, and compare amongst the various management practices and principles followed by aerospace industries for preferred production processes.

CO4. Identify, describe, and compare amongst the various management practices and principles followed by aerospace industries regarding the safety and outcome quality of carried out processes.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Maintenance Management Maintenance Programme – Necessity, Structure, Content, Life Cycle Monitoring, Status Reporting; Reliability Managements; Aircraft Maintenance – Scheduled, Unscheduled, Line and Base Maintenance; Setup of Maintenance Organization; Planning and Controlling; Engine and Propeller Maintenance.	L1, L2, L4	6
Module 2: Design Management Basic Design Organization Requirements; Essential Design Organizational Structure; Specifications of Design Project; Design Classifications; Management Basics of Major Design Projects; Minor Design Changes; Component Development.	L1, L2, L4	6

Module 3: Production Management Production and Maintenance Planning; Technical, Organizational and Personnel Requirements; Infrastructure, Work Environment and Equipment; Selection and Monitoring of Supplies; Material Control and Handling	L1, L2, L4	6
Module 4: Quality and Safety Management Quality Management Systems – Basics, Purpose, Objectives and Documentation; Safety/ Risk Management Systems – Basics, Organizational Framework, Safety/ Risk Monitoring, Promoting Safety Expertise and Culture; Auditing – Internal and External.	L1, L2, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

Text:

1. M. Hinsch, "Industrial Aviation Management" Springer, 2018.
2. P. Malaval, C. Bénaroya, J.Aflalo, "Aerospace Marketing Management: A Handbook for the Entire Value Chain (Management for Professionals)", Springer, 2016.

Reference:

1. H. Geraint, "Management in the Airline Industry", Routledge, 2007.
2. S. Eriksson, H. Steenhuis, "The Global Commercial Aviation Industry", Routledge, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	-	-	-	3	2	-	-	-	-	1	-	-	-	1	3
CO2	-	-	-	-	3	2	-	-	-	-	1	-	-	-	1	3
CO3	-	-	-	-	3	2	-	-	-	-	1	-	-	-	1	3
CO4	-	-	-	-	3	1	-	-	-	-	1	-	-	-	1	3

1: strongly related, 2: moderately related and 3: weakly related

ASE2815	Civil Aviation Requirements (CAR)	L	T	P	C
Version 2019-1	Date of Approval: May 2019	2	0	0	2
Pre-requisites/ Exposure	Introduction to Aerospace Engineering				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various guidelines and regulations laid down by the regulating authority of India i.e. DGCA for the safe and legal operation of flight vehicles.

Course Objectives

The objective of this course is to

1. Provide introductory knowledge to the students about the guidelines and regulations about the airworthiness of flight vehicle and its systems and equipment.
2. Provide education to the students about the licensing procedure for aircraft maintenance engineer and about the various requirements for safe operation of flight vehicles in India.

Course Outcomes

On completion of this course, the students will be able to

CO1. State, and explain the guidelines and regulations associated with the airworthiness of different flight vehicles.

CO2. State, and explain the guidelines and regulations associated with the installation and operation of crucial aircraft instrument, equipment and accessories.

CO3. State, and explain the guidelines and regulations associated with the Licensing procedure and requirements of aircraft maintenance engineer.

CO4. State, and explain the guidelines and regulations associated with other important aspects of safe operation of flight vehicles.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Airworthiness of Flight Vehicles Registration/ Deregistration of Aircraft; Issue/Validation and Suspension of Certificate of Airworthiness; Special Flight Permits; Design, Manufacture, Registration and Operation of Micro Light Aircraft; Requirements for Manufacture, Registration and Airworthiness Control of Hot Air Balloons; Age of Aircraft to be Imported for Scheduled/Non-scheduled Including Charter; Issue/ Renewal and Suspension of Special Certificate of Airworthiness.	L1, L2	6
Module 2: Aircraft Instrument, Equipment and Accessories Approval of Cockpit Check List; Minimum Equipment List; Configuration Deviation List; Defect Recording, Monitoring, Investigation and Reporting; Flight Data Recorders; Cockpit Voice Recorders; Ground Proximity Warning Systems (GPWS);Installation of Airborne Collision Avoidance System; Installation of Communication, Navigation and Radar Equipment.	L1, L2	6
Module 3: Aircraft Maintenance Engineer Licensing	L1, L2	6

Licensing of Aircraft Maintenance Engineers; Issue of Authorization to Aircraft Maintenance Engineers; Approval of Flight Engineer Examiners and Check Flight Engineers; Procedure for Issue/ Renewal/ Extension of Student Flight Engineer/ Flight Engineer's License; Validation of Foreign Licenses of Aircraft Maintenance Engineers.		
Module 4: Miscellaneous Requirements Weight and Balance Control of an Aircraft; Provision of Medical Supplies in Aircraft; Flammability Requirements for Furnishing Materials to be Used in Aircraft; Aircraft Log Books; Document to be Carried on Board by Indian Registered Aircraft; Requirements for Issue of Taxy Permit.	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text & Reference Books:

1. Civil Aviation Requirements (CAR) Section 1, Directorate General of Civil Aviation, India.
2. Civil Aviation Requirements (CAR) Section 2, Directorate General of Civil Aviation, India.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	-	-	-	-	1	-	1	-	-	-	3	-	-	1	3
CO2	-	-	-	-	-	1	-	1	-	-	-	3	-	-	1	3
CO3	-	-	-	-	-	1	-	1	-	-	-	3	-	-	1	3
CO4	-	-	-	-	-	1	-	1	-	-	-	3	-	-	1	3

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engg. & Technology

Bachelor of Technology - Civil Engineering

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

ENGINEERING MATHEMATICS-I

Course Code: CIV2113 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING CHEMISTRY

Course Code: CIV2114 **Credit Units: 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels
Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter,Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module IV: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module V: Corrosion
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ELEMENTS OF MECHANICAL ENGINEERING

Course Code: CIV2104 **Credit Units: 02**

Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

Course Contents:

Module I: Fundamental Concepts
Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

Module II: Stress And Strain Analysis
Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

Module III:Casting& Forging
Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

Module IV: Welding& Sheet metal working:
Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. *Internal Combustion Engine*, Tata McGraw-Hill.

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: CIV2105 **Credit Units: 03**

Course Objective:
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.
Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References:

- ***Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.***
- ***J. B Dixit, "Fundamentals of Computers and Programming in 'C'.***
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

ELECTRICAL SCIENCE

Course Code: CIV2106 **Credit Units: 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

ELEMENTS OF MECHANICAL ENGINEERING LAB

Course Code: CIV2109 **Credit Units: 01**

Course Contents:

1. Welding

(a) Arc Welding
- Butt Joint
- Lap Joint
- T Joint

(b) Gas Welding
- Butt Joint
- Lap Joint
- Brazing of Broken pieces

2. Foundry
- Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal
- Dust Bin
- Mug
- Funnel
- Cylindrical Mug with handle-Rectangular

4. Fitting Shop
- Male – Female Joint
- Rectangular piece Filing the job

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PROGRAMMING IN C LAB

Course Code: CIV2110 **Credit Units: 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELECTRICAL SCIENCE LAB

Course Code: CIV2111 **Credit Units: 01**

List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify RTh, VTh, RN, IN in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING GRAPHICS LAB

Course Code: CIV2112 **Credit Units: 01**

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface
Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

ENGINEERING CHEMISTRY LAB

Course Code: CIV2115 **Credit Units: 01**

Course Contents:

List of Experiments:
(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

ENGINEERING MATHEMATICS-II

Course Code: CIV2208 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

Module IV: **Statistics and Probability**
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ENGINEERING PHYSICS

Course Code: CIV2209 **Credit Units: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .
Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

OBJECT ORIENTED PROGRAMMING IN C++

Course Code: CIV2203 **Credit Units: 02**

Course Objective:
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:
Module I: Introduction
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

ENGINEERING MECHANICS

Course Code: CIV2204 **Credit Units: 03**

Course Objective:
Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

Course Contents:

Module I: Force system & Structure
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Module II:Friction
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

Module III: Distributed Force
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

Module IV: Work -Energy
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

OBJECT ORIENTED PROGRAMMING IN C++ LAB

Course Code: CIV2206 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab

ENGINEERING MECHANICS LAB

Course Code: CIV2207 **Credit Units: 01**

Engineering Mechanics:

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like
4. Leather, Wood, Aluminum) on an inclined plane.
5. To find the forces in the members of Jib Crane.
6. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
7. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
8. Wheel and Axle
9. To determine the MA, VR, η of Worm Wheel (2-start)
10. Verification of force transmitted by members of given truss.
11. To verify the law of moments using Bell crank lever
12. To find CG and moment of Inertia of an irregular body using Computation method

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING PHYSICS LAB

Course Code: CIV2210 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Third Semester

BUILDING TECHNOLOGY

Course Code: CIV2304 **Credit Units: 02**

Course Objective:
The course covers building materials and their testing, cement and its applications foundation and structural members of building. Different areas and utilities of building like floors, doors etc.

Course Contents:
Module I
Building stones - Classification of rocks - Quarrying - Dressing - Properties and uses of common type of stones; Timber - Defects - Seasoning - Decay - Preservation - Plywood, fibre board, particle board; Clay products - Bricks - Manufacture - IS classifications - Properties and testing - Types of bricks - Tiles - Manufacture, properties and uses - Types of tiles; Ceramic products - Lime - Classification - Manufacture, properties and uses.

Module II
Cement - Ingredients - Manufacture - Types of cement - Properties and testing - Uses; Mortar - Sand - Properties - Types of mortar and uses; Concrete - Properties of fresh concrete and tests - Proportioning of concrete mixes - Properties of hardened concrete and tests – Recent developments in concrete; Iron and steel - Structural sections - Properties and uses of structural steel - Recent developments; Miscellaneous materials - Glass - Plastics -A.C.sheets – Thermocole.

Module III
Foundation - Timbering of foundation trenches - Bearing capacity of soils - Improvement of bearing capacity - Settlement of foundation - Description of spread, grillage, raft and pile foundations; Brick and stone masonry - Bonds in brick work - Types of stone masonry -Cavity walls - Lintels and arches; concrete construction - Batching, mixing, placing, compacting and curing of concrete - form work - Precast concrete - Prestressed concrete - Recent developments in concreting; Partition walls - Types and features.

Module IV
Floors and flooring – Different types and applications; Doors, windows and ventilators - Different types; Finishing works; Building Failures - Concrete failure - Steel failure -Foundation failure - Other types of failures – Causes and Remedial measures – Building repairs - Shoring - Underpinning – Scaffolding; Tall buildings - Framed structures - Steel and concrete frames – Joints in steel and concrete frames - Introduction to prefabrication – Slip form and lift slab constructions; Fire proof construction - Fire load - Fire resisting properties of building materials – Fire extinguishing methods – Fire proof construction methods.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Punmia B. C, Ashok Kr. Jain, Arun Kr. Jain, Building Construction, Laxmi Publications, New Delhi. (2008).
- Shetty M. S, Concrete Technology, S. Chand & Co., New Delhi (2008).

SURVEYING-I

Course Code: CIV2305 **Credit Units: 02**

Course Objective:
Surveying is the basic element of mapping areas for civil engineering construction. Methods of surveying including leveling, and leveling methods, contours, estimation of volumes etc are covered.

Course Contents:

Module I
Introduction - classification of surveys - plane surveying - geodetic surveying – topographic surveying - reconnaissance - principle of working from whole to part - provision of control -conventional signs - chain survey - instruments - principles of chain survey - field book - plotting - tie line and check line - chaining and ranging - obstacles - chaining on sloping ground - errors in chain survey - uses of cross staff and optical square

Module II
Compass survey - prismatic compass - surveyor's compass - whole circle and reduced bearing- true and magnetic bearing - dip and declination - local attraction - traversing - plotting - error of closure - graphical and analytical adjustments - plane table survey - instruments and accessories - different methods - orientation - advantages and disadvantages of plane tabling -two point problem - three point problem - errors in plane tabling - minor instruments – hand levels - clinometer - Ceylon ghat tracer - hypsometer - pantagraph -ediograph - box sextant -telescopic alidade

Module III
Levelling - definition of level surfaces - mean sea level - reduced level - bench marks - levelling instruments - temporary and permanent adjustments - fly leveling - booking - reduction of levels - corrections for refraction and curvature - reciprocal leveling - longitudinal levelling and cross sectioning - contour survey - definition - characteristics of contour - uses of contour - methods of contouring - direct and indirect interpolation – plotting - areas and volumes - trapezoidal rule - Simpson's rule - area from latitude and departure - uses of planimeter - volumes - trapezoidal and prismoidal formula

Module IV
Total Station – introduction – EDM- measurement of horizontal & vertical angles – traversing – trigonometric leveling. Theodolite surveying - study of theodolite - temporary and permanent adjustments -measurement of horizontal angles - method of repetition and reiteration - measurement of vertical angles - theodolite traverse - calculation of co ordinates - corrections - traverse table - omitted measurements - tacheometric surveying - stadia system - fixed and movable hair methods - staff held vertical and normal - instrument constants - analytic lens – tangential system - direct reading tacheometer - subtense bar – trigonometric leveling

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S.K Duggal, Surveying Vol 1 and II, 2nd ed., Tata - McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol I &II, Standard Book House, New Delhi (2008)
- Punmia, B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol I & II, Laxmi Publications, New Delhi (2008).

STRENGTH OF MATERIALS

Course Code: CIV2312 **Credit Units: 04**

Course Objective:
The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

Course Contents:
Module I: Simple stresses and strains
Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls.

Module II: Compound stress and strains
The two dimensional system; stress at a point on a plane, principal stresses and principal planes; Mohr's circle of stress. Graphical and Analytical methods for stresses on oblique section of body. Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.

Module III: Bending Stress
Theory of bending stresses in beams due to bending, assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite / flitched beams, bending and shear stresses in composite beams.

Module IV: Torsion
Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, combined torsion and bending of circular shafts principal stress and maximum shear stresses under combined loading of bending and torsion, analysis of close-coiled-helical springs.

Module V: Thin cylinders and spheres
Derivation of formulae and calculation of hoop stress, longitudinal stress in a cylinder and sphere subjected to internal pressure.

Module VI: Columns and struts
Columns and failure of columns, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications**.**

Module VII: Slope and deflection
Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following:
a) Cantilevers
b) Simply supported beams with or without overhang
c) Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.

References:

- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.
- Popov Eger P., "Engg. Mechanics of solids", Prentice Hall, New Delhi, 1998.
- Fenner, Roger. T, "Mechanics of Solids", U.K. B.C. Publication, New Delhi, 1990.
- Srinath L.S. et.al., "Strength of Materials", McMillan, New Delhi,2001

CONCRETE TECHNOLOGY

Course Code: CIV2313 **Credit Units: 03**

Course Objective: The students will be able to learn about the concrete making material materials, their significance and use. This will also enable the students to understand the manufacturing process of concrete and the precautions, various properties of concrete and different types of concrete and their application.

Course Contents:

Module I: Materials

Materials: cement - different types - chemical composition and physical properties - tests on cement - I.S. specifications - aggregates - classification - mechanical properties and tests as per I.S. - alkali aggregate reaction - grading requirements - heavy weight - light weight - normal weight - aggregate - sampling of aggregate - water - quality of water - permissible impurities as per I.S - admixtures - accelerators - retarders - water reducing agents – super plasticizers- use of silica fumes.

Module II: Manufacture

Manufacture of concrete - measurement of materials - storage and handling - batching plant and equipment - mixing - types of mixers - transportation of concrete - pumping of concrete - placing of concrete - under water concreting - compaction of concrete - curing of concrete - ready mixed concrete - mix design - nominal mixes - design mixes - factors influencing mix design - A.C.I method - I.S method - design for high strength mixes.

Module III: Properties of Concrete

Properties of concrete - fresh concrete - workability - factors affecting workability - tests for workability - segregation and bleeding - hardened concrete - factors affecting strength of concrete - strength of concrete in compression, tension and flexure - stress- strain characteristics and elastic properties - shrinkage and creep - durability of concrete - permeability - chemical attack - sulphate attack - resistance to abrasion and cavitaion - resistance to freezing and thawing - resistance to fire - marine atmosphere - quality control - frequency of sampling - test specimens - statistical analysis of test results - standard deviation - acceptance criteria

Module IV: Special Concretes

Special concrete - light weight concrete - high density concrete - vacuum concrete - shotcrete - Fibre reinforced concrete-polymer concrete - ferrocement - high performance concrete - self compacting concrete - types of failure - diagnosis of distress in concrete - crack control - leak proofing - guniting and jacketing techniques.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Neville A.M., Properties of Concrete, Pitman
- Shetty M.S., Concrete Technology, S I Chand & Company, 1993.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, 1995.
- Krishna Raju N., Design of Concrete Mixes, CBS publishers, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co. 1988.
- Murdock L.J., Concrete: Materials & Practice, Edward Arnold, 1968.

ENGINEERING MATHEMATICS-III

Course Code: CIV2311 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Partial Differential Equations
Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method, Homogeneous linear equations with constant coefficients, Non homogeneous linear equation

Module II: Fourier Series
Periodic Functions, Fourier Series, Functions having points of discontinuity, Even or Odd Functions, Change of Interval, Half-range series, Parseval's Formula, Complex form of Fourier series, Practical Harmonic Analysis, Fourier Transforms, Sine and Cosine Transforms

Module III: Laplace Transformation
Definition, Transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Evaluation of integrals by Laplace transform, Inverse transforms, Other methods of finding inverse transforms, Convolution theorem, Application to differential equations, Simultaneous linear equations with constant coefficients, Unit step functions, Periodic functions

Module IV: Linear Programming
Formulation of the problem, Graphical method, Canonical and Standard forms of L.P.P. Simplex Method, Artificial variable Techniques-M-method, Two phase method, Degeneracy, Dual simplex method

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att.: Attendance

Text & References:
- Shanti Narain., "Differential Calculus"
- Shanti Narain., "Integral Calculus"
- B.S. Grewal., "Higher Engineering Mathematics'
- A.R. Forsyth., "Differential Equations"
- H.K. Dass., "Higher Engineering Mathematics"
- I.N. Snedon., "Partial Differential Equations"

CIVIL ENGINEERING DRAWING LAB & CAD LAB

Course Code: CIV2307 **Credit Units: 01**

Course Contents:

1. Paneled doors, glazed windows and ventilators in wood.
2. Steel and aluminum windows.
3. Steel roof trusses.
4. Reinforced concrete staircase.
5. Residential buildings with flat and pitched roof – RC and tiled.
6. Public buildings like office, dispensary, post office, bank etc.
7. Industrial buildings.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill
- Chiara, Joseph De, Time Saver Standards for Site Planning, McGraw Hill
- Ching, Francis D K, Architectural Graphics. .John Wiley

STRENGTH OF MATERIALS LAB

Course Code: CIV2314 **Credit Units: 01**

List of Experiments:

1. Universal Testing Machine
2. Tensile Test (MS)
3. Double Shear Test (MS)
4. Compression Test (CI)
5. Brinell Hardness No.
6. Izod Impact
7. Testing Machine
8. Rockwell Hardness Tester
9. Spring Stiffness (Spring Compression Testing machine)
10. Torsion testing machine

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BASICS OF NATURAL RESOURCES MANAGEMENT

Course Code: CIV2315 **Credit Units: 03**

Course Objectives: students shall have a basic understanding of development problems associated with natural resource management, be able to explain and use basic concepts, such as water and nutrient balances, and to use GIS methods to visualise and analyse spatial data related to natural resource management.

Course Contents:

Module I
Introduction to Natural Resource Bases: Concept of resource, classification of natural resources. Factors influencing resource availability, distribution and uses. Interrelationships among different types of natural resources. Concern on Productivity issues. Ecological, social and economic dimension of resource management.

Module II
Forest resources: forest vegetation, status and distribution, major forest types and their characteristics. Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people, forest management. Developing and developed world strategies for forestry. Land resources: Land as a resource. Dry land, land use classification, land degradation, man induced landslides, soil erosion and desertification. Landscape impact analysis, wetland ecology & management. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Water ecology and management. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case-studies. Fish and other marine resources: Production, status, dependence on fish resource, unsustainable harvesting, issues and challenges for resource supply, new prospects.

Module III
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Resource Management Paradigms: Resource management the evolution and history of resource management paradigms. Resource conflicts: Resource extraction, access and control system. Approaches in Resource Management: Ecological approach; economic approach; ethnological approach; implications of the approaches; integrated resource management strategies. Poverty and implications in Resource Management in developing countries – Poverty in developing countries, causes and link with resources scarcity and poverty.

Module IV
Management of Common International Resources: Ocean, climate, International fisheries and management commissions; Antarctica: the evolution of an international resource management regime.
Case Studies: 8
1. Resource management in mountain ecosystem
2. Dry-land ecosystem
3. The management of marine and coastal resources
4. Case study of shifting cultivation
5. Mangrove ecosystem and their management

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- Coastal Ecology & Management, Mann, K.H. 2000. Ecology of Coastal Waters with Implications for Management (2nd Edition).Chap. 2-5, pp.18-78 & Chap. 16, pp.280-303.
- Global Change and Natural Resource Management, Vitousek, P.M. 1994. Beyond global warming: Ecology and global change. Ecology 75, 1861-1876.
- Agarwal, K.C., 2001. Environmental Biology, Nidhi Publication Ltd. Bikaner.
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publishing House.
- Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment.Cambridge Univ. Press.
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Townsend C., Harper J, and Michael Begon. Essentials of Ecology, Blackwell Science

DISASTER MANAGEMENT & MITIGATION

Course Code: CIV2316 **Credit Units: 03**

Course Contents:

Module I:
Understanding Disasters: Meaning, nature, characteristics and types of Disasters, Causes and effects, Disaster: A Global View

Module II:
Introduction to disaster Preparedness, Disaster Management: Prevention, Preparedness and Mitigation, Disaster Preparedness: Concept & Nature, Disaster Preparedness Plan, Disaster Preparedness for People and Infrastructure, Community based Disaster Preparedness Plan.

Module III:
Disaster Mitigation, Disaster Mitigation: meaning and concept, Disaster Mitigation Strategies, Emerging Trends in Disaster Mitigation, Mitigation management, Role of Team and Coordination.

Module IV:
Technologies for Disaster Management, Role of IT in Disaster Preparedness, Remote Sensing, GIS and GPS, Use and Application of Emerging Technologies, Application of Modern Technologies for the Emergency communication, Application and use of ICST for different disasters.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Sharma, R.K. & Sharma, G. (2005) (ed) Natural Disaster, APH Publishing Corporation, New Delhi.
- Carter, W. Nick, 1991: Disaster Management, Asian Development Bank, Manila
- Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
- Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.

ENGINEERING ECONOMICS AND MANAGEMENT

Course Code: CIV2317 **Credit Units: 03**

Course Objective: This course will enable the students to understand the basics concepts of organizations' economic environment, macroeconomics, financial and inventory management.

Course Contents:

Module I: Organizations and their Economic Environment
Definition of Economics and Managerial Economics – Nature and Scope – Definition and Concept of Good, Want, Value, Wealth, Utility – Utility and Demand – Law of Diminishing Marginal Utility – Assumptions and Importance. Demand and Supply – Law of Demand and Law of Supply. Market price and natural price. Standard market forms- Monopoly, Perfect competition. Organisational forms- Proprietorship, partnership, Joint Stock Company – Cooperative organisation.

Module II: Macroeconomics
Money- nature and functions – Inflation and Deflation – Kinds of Banking – commercial banks – Central banking – Credit instrument - Monetary Policy – International trade – Balance of trade and Balance of Payments – taxation – Direct and Indirect taxes – GST- Impact and Incidence of tax- Concept of National Income – Features with reference to developing countries.

Module III: Introduction to Management
Management Theory- Characteristics of management – Systems Approach to management – Concepts of goal, objective, strategies, programmes. Decision making under certainty, uncertainty and risk – Introduction to functional areas of management – Operations management, Human resources management, marketing management.

Module IV: Financial and Inventory Management
Need for Financial Management – Types of financing (Short term and long term) - Borrowing – Equity financing – Analysis of Financial Statement – balance sheet – Profit and Loss account – Fund flow statement – Ratio Analysis . Functions and objectives of Inventory management – Decision models – Economic Order Quantity (EOQ) model – sensitivity analysis of EOQ model - inventory model with planned shortages – Periodic order quantity – single period Inventory models

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Konni, Donnel C.O. and Weighnrich. H., Management, Eight Edition, McGraw Hill International Book Company, 1997.
- Philip Kotler, Marketing Management, Prentice-Hall of India, Edition 1998.
- G.W. Plossl, Production and inventory control by, Prentice Hall.
- Paul A Samuelson and William D Nardhaus, Economics, McGraw Hill International Edition.
- Barthwal R R, Industrial Economics – An Introductory Text Book, New Age International Pvt Ltd, 2000.
- Aninnya Sen, Microeconomics – Theory and Applications, OUP.
- Sharma J.L., Construction management and accounts, Sathya Prakashan, New Delhi, 1994.
- Srinath,L.S. An Introduction to Project Management, Tata McGraw Hill publications, 1995.

NUMERICAL ANALYSIS AND PROGRAMMING

Course Code: CIV2401 **Credit Units: 03**

Course Objective:
This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. Emphasis is given on computer programming also so that the given techniques can be used in design of engineering and scientific problems.

Course Contents:
Module I
Solution of Algebraic and Transcendental Equation
Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method
Solutions of Simultaneous equation
Gauss elimination method, Jacobi iteration method, Gauss Seidal method

Module II: Interpolation
Finite Differences, Difference tables
Polynomial Interpolation**:** Newton's forward and backward formula
Central Difference Formulae: Gauss forward and backward formula.
Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

Module III: Numerical Integration and Differentiation
Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

Module IV: Solution of differential Equations
Euler's Method, Runga-Kutta Methods.

Module V: Statistical Computation
Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- Gerald & Whealey, "Applied Numerical Analyses", AW
- Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi

References:

- T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH
- Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
- Francis Scheld," Numerical Analysis", TMH
- Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.
- Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing.
- Goyal, M, "Computer Based Numerical and Statistical Techniques", Firewall Media, New Delhi.

STRUCTURAL ANALYSIS-I

Course Code: CIV2402 **Credit Units: 04**

Course Objective:
Structural Analysis, being the critical part in designing building and other structures, is important. Elastic theorems fixed and continuous beams, circular beams over simple support and theory of columns are covered in this course.

Course Contents:

Module I: Deflection of beams
Differential equation of the elastic curve - slope and deflection of beams by method of successive integration - Macaulay's method - Moment area method - Conjugate beam method - Deflection due to shear.

Module II: Elastic theorems and energy principles
Strain energy and complementary energy - review of strain energy due to axial load - bending, shear and torsion - principle of superposition - principle of virtual work - Castigliano's theorem for deflection - theorem of complementary energy - Betti's theorem - Maxwell's law of reciprocal deflections - principle of least work - application of method of virtual work (unit load method) and strain energy method for determination of deflections of statically determinate beams - pin-joined trusses and rigid frames - temperature effects.

Module III: Fixed and continuous beams
Statically indeterminate structures - degree of static and kinematic indeterminacies – brief introduction to force and displacement methods - fixed and continuous beams - force method - analysis by consistent deformation method - application of moment area and conjugate beam methods for fixed beams - theorem of three moments for continuous beams - shear force and bending moment diagrams - deflection and support settlement.

Module IV: Beams curved in plan
Analysis of cantilever beam curved in plan - analysis of circular beams over simple supports
Theory of columns
Axial loading of short strut - long columns - Euler's Formula - Rankine Formula – Secant Formula - eccentric loading - direct and bending stresses – Buckling Load as an eigen value problem.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts & References:

- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2nd ed., Tata McGraw Hill, New Delhi (2004).
- S Ramamrutham, R Narayan, Theory of Structures

TRANSPORTATION ENGINEERING-I

Course Code: CIV2404 **Credit Units: 03**

Course Objective:
Modern road design and construction are covered in the syllabus.

Course Contents:

Module I: Highway Classification, Alignment and Geometrical Design
Introduction – Highway development in India - Classification of roads - Typical cross sections of roads in urban and rural area - Requirements and factors controlling alignment of roads - Engineering surveys for highway location - Pavement surface characteristics - Camber and width requirements – Sight distances - stopping and overtaking sight distances, overtaking zone requirements - Design of horizontal alignment - speed, radius, super elevation, methods of providing super elevation, extra widening of pavements, transition curves - Design of vertical alignment - gradient, grade compensation, summit curves and valley curves - worked out problems on all the above topics.

Module II: Traffic engineering
Introduction - Road user, vehicle and traffic characteristics - Speed and volume studies - Simple worked out problems - Principles of design of at-grade intersections -Simple layouts - Objectives, classification and uses of traffic signs and markings - Design of isolated signals by Webster's method.

Module III: Pavement Materials and Design
Desirable properties and testing of highway materials: road aggregates, bituminous materials and subgrade soil - Factors influencing the design of pavements - CBR method and IRC guidelines of flexible pavements design - Design of rigid pavements using IRC charts - worked out problems.

Module IV: Pavement Construction and Maintenance
Historical development of road construction -Construction of earth roads, WBM roads, stabilized roads, bituminous pavements, cement concrete roads and joints in cement concrete roads - Types and causes of failures in flexible & rigid pavements.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Papacostas, C.S., Transportation Engineering and Planning, 3rd ed., Pearson Education, New Delhi (2008)
- O' Flaherty Coleman. A., Transport Planning and Traffic Engineering, Elsevier, New Delhi (2008).
- Slinn, Mike, Traffic Engineering Design (Principles and Practice), Elsevier, New Delhi (2008), O'Flaherty, Coleman A., Highways (The Location, Design, Construction and Maintenance of Pavement) 4th ed, Elsevier, New Delhi (2008).

SURVEYING-II

Course Code: CIV2411 **Credit Units: 02**

Course Objective:
Geoinformatics is an important data system for all civil engineering activities including construction of structures, dams, water systems etc. Correct and reliable information and geographical data are a requirement today. The course thus addresses this issue.

Course Contents:

Module I
Triangulation - principle - reconnaissance - selection of site for base line - selection of stations - orders of triangulation - triangulation figures - scaffolds and signals - marking of stations - intervisibility and heights of stations - satellite stations - base line measurement - equipment and corrections - adjustment of observations.

Module II
Survey adjustments and theory of errors – introduction – laws of accidental errors –probability curve – principle of least squares – laws of weights – probable error – normal equation – most probable value – method of correlates – angle adjustment – station adjustment – figure adjustment – adjustment of triangles.

Module III
Curves - types of curves - elements of a curve - simple curves - different methods of setting out – introduction to compound curves - reverse curves, transition curves, vertical curves.

Module IV
Photogrammetry – terrestrial and aerial photogrammetry – heights and distances from Photographs – flight planning — photo mosaic – photo interpretation – applications of photogrammetry. GNSS – GPS – differential GPS.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts & References:

- S.K Duggal, Sruveying Vol. I and II, 2nd ed., Tata McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol. I & II, Standard Book House, New Delhi (2008)
- Punmia B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol. I &II, Laxmi Pub, New Delhi (2004)

FLUID MECHANICS

Course Code: CIV2412 **Credit Units: 04**

Course Objective:
The objective of Fluid Mechanics subject is that students should understand the, properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behaviour of fluids, dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

Course Contents:
Module I: Fluid Properties and Fluid Statics
Newtonian and Non-Newtonian Fluids; Viscosity; Incompressible and compressible fluids, compressibility. Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentre height.

Module II: Kinematics of Fluid Motion
Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

Module III: Dynamics of Fluid Flow
Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – Pilot tube, Venturi meter; steady flow momentum equation, force exerted on a pipe bend.

Module IV: Dimensional Analysis and Principles of Similarity
Buckingham π-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

Module V: Laminar and Turbulent Flow
Reynold's experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates. Transition from laminar to turbulent flow, courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

Module VI: Analysis of Pipe Flow
Energy losses, minor losses in pipe lines, concept of equivalent length, flow between two reservoirs, and multiple pipe systems – in series and parallel, siphon.

Module VII: Flow Measurements
Measurement of flow using Venturi meter, orifice meter, Pitot tube, measurement of flow in open channels – rectangular, triangular, trapezoidal weir, Cipoeletti weir.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons, 2000.

References:

- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- V.L. Streeter and E.B. Wylie, "Fluid Mechanics", Tata McGraw Hill
- Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

NUMERICAL ANALYSIS AND PROGRAMMING LAB

Course Code: CIV2405 **Credit Units: 01**

Course Contents:

Assignments will be provided for the following:

- Analysis of various numerical and statistical techniques

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SURVEYING PRACTICAL

Course Code: CIV2407 **Credit Units: 01**

Course Contents:

List of Exercises:

1. Introduction to Total Station including the settings etc.
2. Measurement of horizontal distance using Total Station.
3. Introduction to Measurement of Horizontal and Vertical angles by the use of Total Station.
4. Traversing by use of Total Station.
5. Setting out of Simple Curves – Linear Method.
6. Setting out of Simple Curves – Angular Method.
7. Setting out of Transition Curve.
8. Layout of a building.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

FLUID MECHANICS LAB

Course Code: CIV2413 **Credit Units: 01**

Course Contents:

1.Verification of Bernoulli's Theorem

2.Experiment using Venturimeter

3.Determination of coefficient of Discharge C_d, C_c, $C_!$ Using

4.Circular/triangular/rectangular orifice

5.To find major head losses in a pipe line

6.To find minor head losses in a pipe line (sudden expansion/contraction/bend)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

FLUID MACHINERY

Course Code: CIV2414 **Credit Units: 03**

Course Objective:
Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

Course Contents:

Module I:Introduction
Euler's equations for turbo machines; impulse and reaction forces due to fluid systems on stationery and moving system of vanes; jet propulsion.

Module II: WaterTurbines
Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

Module III: Pumps
Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

Module IV: Performance of Fluid Machines
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

Module V: HydraulicPower Transmission
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.

Module VI: PowerHydraulics
Positive pumps: gear, vane, screw, pump, variable delivery valves: flow control, pressure control, direction control, solenoid operated valve, hydraulic circuits, fluid coupling and torque converter.
Pneumatic Power: Basic principles, comparison of pneumatic and hydraulic Systems.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.

References:

- Dr. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", S.K. Kataria& Sons,2001
- D.R. Malhotra & N.K. Malhotra, "The Fluid Mech. & Hydraulics", Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, "Fluid Mechanics, Fluid Mechanics & Hydraulics", CBS Publishers; 1999.

HYDROLOGY AND FLOOD CONTROL

Course Code: CIV2415 **Credit Units: 03**

Course Objective:
This course deals with advanced concept of hydrology.

Course Contents:

Module I
Introduction hydrologic cycle, water budget equations, world water balance, application in engineering. Precipitation: Forms of precipitation, measurement, depth-area-duration & intensity-duration- frequency relationships, probable maximum precipitation.

Module II
Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration-
measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration- process, capacities, indices, measurement & estimation

Module III: Runoff and Hydrographs
Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

Module IV: Flood
Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- ‘Hydrology for Engineers’ by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
- ‘Engineering Hydrology’ by K. Subramanya
- ‘Hydrology: Principles. Analysis. Design’ by Raghunath H. M.
- ‘Handbook of Applied Hydrology’ by Chow V. T.
- ‘Irrigation: Theory & Practice’ by Michael A. M.

REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS

Course Code: CIV2416 **Credit Units: 03**

Course Objective:
This course deals with remote sensing and geographic information systems.

Course Contents:
Module I
Concepts and foundations of remote sensing- electromagnetic spectrum, energy sources and radiation principles, energy interactions in the atmosphere and with earth surface features, data acquisition and interpretation, reference data, ideal remote sensing systems, characteristics of real remote sensing systems. Classification of maps, map scale, spatial reference system, map projections, grid systems, linkage of GIS to remote sensing. Radar principle- Factors affecting microwave measurements, radar wavebands, SLAR systems, interaction between microwaves and earth's surface. Basic principles of photogrammetry – geometrical characteristics of aerial photographs, photographic scale, ground coverage, area measurement, relief displacement of vertical features, image parallax, ground control, mapping.

Module II
Remote sensing platforms and sensors - Satellite system parameters, sensor parameters, imaging sensor systems, earth resources and meteorological satellites with microwave sensors, scanners, radiometers. The Indian Remote Sensing Program. Data types and format, scale and legend.
Visual Image Interpretation - Digital Image Processing - Basic character of a digital image, image rectification & restoration, preprocessing, registration, enhancement, contrast, spatial feature and multi image manipulation, spatial filtering, image transformations, image classification, performance analysis, data merging and GIS integration.

Module III
GIS overview – what is GIS, components, definitions & terminology, uses, GIS queries & architecture, theoretical models & framework, GIS technology trends, data sources, collection, and entry, data formats & standards, types of analysis, spatial data modeling, GIS data management, database models, storage of data, object based GIS models, data input & editing, data quality issues. Data analysis & modeling – Integration of remote sensing & GIS.

Module IV
Application of Remote Sensing& GIS in natural resources management with specific reference to impact of mining activities on environment, biodiversity, coastal zone protection, flood management, forest protection, monitoring urban growth, managing watersheds & water resources, hydrologic modeling, preventing natural disasters etc.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Thomas. M. Lillesand and Ralph. W. Kiefer, Remote Sensing and Image Interpretation:, John Wiley and Sons, Inc., 2002
- M. Anji Reddy, Text Book of Remote Sensing and Geographical Information Systems:, B.S. Publications, 2001
- Ian Heywood, Sarah Cornelius, and Steve Carver, An Introduction to Geographical Information Systems, Pearson Education Asia, 2001
- George. B. Korte, The GIS Book:, Onward Press, Thomson Learning, 2001
- D. P. Rao, Association of Exploration Geophysicists, 1995, Remote Sensing for Earth Resources.

Syllabus - Fifth Semester

STRUCTURAL ANALYSIS-II

Course Code: CIV2501 **Credit Units: 03**

Course Objective:
The course builds upon the earlier course of Structural Analysis I and deals with more advanced methods.

Course Contents:

Module I: Force method of analysis of indeterminate structures Analysis of rigid frames of different geometry by consistent deformation method – settlement effects - analysis of pin-jointed trusses by consistent deformation method - externally and internally redundant trusses - effects of settlement and prestrains.

Module II: Displacement method of analysis of indeterminate structures Slope deflection method - analysis of continuous beams - beams with overhang - analysis of rigid frames - frames with sloping legs - gabled frames - frames without sway and with sway - settlement effects - moment distribution method as successive approximation of slope deflection equations - analysis of beams and frames - non-sway and sway analyses - Kani's method as iterative method of analysis of frames (outline only)

Module III: Moving Loads & Influence Lines
Introduction to moving loads - concept of influence lines - influence lines for reaction, shear force and bending moment in simply supported beams - influence lines for forces in trusses – analysis for different types of moving loads - single concentrated load - several concentrated loads - uniformly distributed load shorter and longer than the span.

Module IV: Cables, suspension bridges and arches
Analysis of forces in cables - suspension bridges with three-hinged and two-hinged stiffening girders - theory of arches - Eddy's theorem - analysis of three-hinged and two-hinged arches - settlement and temperature effects.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Wang C.K., Statically Indeterminate Structures, McGraw Hill, New York, 1983.
- Wilbur J.B. & Norris C.H., Elementary Structural Analysis, McGraw Hill, 1960.
- Wang C.K., Intermediate Structural Analysis, McGraw Hill, 1983.
- Timoshenko S.P. & Young D.H., Theory of Structures, McGraw Hill, 1965.
- Kinney S.J., Indeterminate Structural Analysis, Oxford & IBH, 1985.
- Matheson J.A.L., Hyperstatic Structures, John Wiley and Sons, 1996.
- Reddy C.S., Basic Structural Analysis, Tata McGraw Hill
- Negi L.S. & Jangid R.S, Structural Analysis, Tata McGraw Hill
- Rajasekaran S. & Sankarasubramanian G., Computational Structural Mechanics, PHI

PRINCIPLES OF STRUCTURAL DESIGN

Course Code: CIV2502 **Credit Units: 03**

Course Objective:
Based on the course Structural Analysis the student should be able to start design of structures using various types of materials.

Course Contents:

Module I: Design Philosophy
Introduction –Structures and structural systems– Introduction – materials – mix design by IS method – basic properties of concrete and reinforcement, testing of concrete , Introduction to Various Design Philosophies– design considerations – loading standards – working stress method(WSM) – ultimate load method – probabilistic analysis and design – uncertainties in design –limit state method(LSM) – limit states – multiple safety factor formats – load and resistance factor design format – partial safety factor format.

Module II: Design of RC Beams
Basic design concepts of working stress method (WSM) – analysis of sections by WSM – Design of Rectangular Singly and Doubly Reinforced Sections by Working Stress Method. Assumptions in Limit State Design Method, Design of Rectangular Singly and Doubly Reinforced beams, T-beams, L-beams by Limit State Design Method.

Module III: Shear and Torsion
Behaviour of RC beam in Shear, Shear Strength of beams with and without shear reinforcement, Minimum and Maximum shear reinforcement, design of beam in shear, Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples by Limit State Design Method), Failure of beam under shear, Concept of Equivalent Shear and Moments.

Module IV: Design of Slabs
Design of one way and two way solid slabs by Limit State Design Method, Serviceability Limit States, Control of deflection, cracking and vibrations.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Pillai S.U. & Menon D, Reinforced Concrete Design Tata McGraw Hill, 2003.
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003.
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982.
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998.
- Shetty M.S., Concrete Technology, S. Chand, 1988.
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House, 2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000.
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005.
- Ram Chandra, Design of Steel Structures Vol. I, Standard Book House, 2005.
- Negi L.S., Design of Steel Structures Vol. I, Tata McGraw Hill, 2005.
- BIS Codes (IS 875, IS 10262, SP 23, IS 456, IS 800, SP 6, IS 883, IS 2750).

TRANSPORTATION ENGINEERING-II

Course Code: CIV2503 **Credit Units: 03**

Course Objective:
This course deals with the design concept of railways, airport and tunnel.

Course Contents:

Module I: Components & Geometric Design of Railways
Introduction. Typical cross-sections. Various gauges. Coning of wheels and tilting of rails. Functions and requirements of component parts of a railway track. Creep of rails. Geometrical design of railway track. Horizontal curves, radius, superelevation, cant deficiency, transition curves, safe speed on curves, different types of gradients, grade compensation. Worked out problems.

Module II: Railway Operation and Control
Points and crossings and their design. Track junctions and simple track layouts. Details of different types of stations and yards. Signaling and interlocking. Control of train movements. Absolute block . Automatic block system and CTC system. Railway Construction and Maintenance: Construction of railway track: earthwork, plate laying and packing. Maintenance of track-alignment, gauge, renewal of component parts and drainage, modern methods of track maintenance.

Module III: Tunneling
Tunnel alignment and grade. Size and shape of a tunnel. Methods of tunneling in hard rocks. Full face method, heading and bench method, drift method. Methods of tunneling in soft soils. Compressed air and shield tunneling Shafts in tunnels. Ventilation of tunnel and various methods. Lining of tunnels. Drainage and lighting of . Micro Tunneling. Trenchless technology.

Module IV: Airport planning and Design
Introduction. Aircraft characteristics and their influence on planning of airports. Airport obstructions and zoning. Component parts of airport and site selection. Runway design. Orientation, basic runway length, corrections and geometric. Design of taxiways and aprons - Terminal area planning. Facilities in terminal area and their planning concepts, aircraft parking configurations. Airport drainage system. Surface and subsurface drainage systems and their design.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Antia K.F, Railway Track, New Book Company Pvt. Ltd, 1960.
- Agarwal M.M., Railway Engineering, Prabha and Co
- Khanna S.K & Arora M.G., Airport Planning and Design, Nemchand & Bros.
- Horonjeff R., Planning and Design of Airports, Mc Graw Hill
- Mundrey J.S, Railway Track Engineering, TMGS, 1988.

GEOTECHNICAL ENGINEERING-I

Course Code: CIV2551 **Credit Units: 03**

Course Objective:
Soil mechanics and related topics are important areas in Civil Engineering and the first part of Geotechnical Engineering deals with soils and their characteristics.

Course Contents:
Module I: Nature of soil and functional relationships
Soil type -Concepts of single grained, honey combed and flocculent structure and their effects on the basic soil properties - 3 phase system - void ratio - specific gravity - dry density - porosity - water content - saturated unit weight - submerged unit weight - degree of saturation. Laboratory and field identification of soils: Determination of water content by oven drying -Specific gravity using pycnometer and specific gravity bottle - Grain size analysis by sieve analysis, hydrometer analysis and pipette analysis - Atterberg limits and indices – Visual identification by simple field tests - Field density by core cutter, sand replacement and wax coating methods. Classification of soils: Necessity - Principles of classification - I.S. classification – Plasticity charts - Group index.

Module II: Soil Water, Permeability and Stress Distribution
Soil water: Types - Effective stress - Total stress - Pore pressure - Pressure diagrams. Permeability: Definition - Darcy's law - Factors affecting permeability – Laboratory determination - Stratified soils: average permeability. Stress distribution: Boussinesq's equations for vertical pressure due to point loads- Assumptions and limitations - pressure bulb – Influence diagram - Vertical pressure due to uniformly distributed loads, line loads and strip loads - Newmark charts and their use - Westergaard's solution.

Module III: Consolidation and Compa tion
Consolidation: Definition - Concepts of coefficient of compressibility - Coefficient of volume change and compression index - e-log p curves - Terzaghi's theory of one dimensional consolidation – Determination of coefficient of consolidation- pre-consolidation pressure difference between consolidation and compaction. Compaction: Definition and objectives of compaction - Proctor test and modified proctor test - Concept of OMC and maximum dry density - Zero air voids line -Factors influencing compaction.- Effect of compaction on soil properties - Field compaction methods - Proctor needle for field control.

Module IV: Shear Strength and Stability of Slopes
Shear Strength: Definition - Mohr's strength and stress circles - origin of planes - Mohr's envelope - Mohr-Coulomb strength theory -Direct, triaxial and UCC tests - Drainage conditions - Measurement of pore pressure - Vane shear tests -Total and effective stress -strength parameters – Stress path, Liquefaction of sand - Choice of test conditions for field problems. Stability of slopes: Slope failure, base failure and toe failure - Swedish circle method - φ=0 analysis and c=0 analysis - Friction circle method - Taylor's stability number -Stability charts - Sliding block analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Terzaghi K. & Peck R.B., Soil Mechanics in Engineering Practice, John Wiley Sons, 1967.
- Alam Singh, Soil Engineering-Theory and Practice, Asia Pub, 1967.
- Punmia B.C., Soil Mechanics and Foundations, Saurabh,1992.
- Murthy V.N.S., Soil Mechanics and Foundation Engineering, Dhanpat Rai, 1984
- Khan I.H., Text Book of Geotechnical Engineering, Prentice Hall of India

MATERIAL TESTING LAB

Course Code: CIV2504 **Credit Units: 01**

List of Exercises

1. Concrete:
   (a) Slump Test of Concrete (b) Compaction Factor Test of Concrete (c) Vee-Bee Test of Concrete (d) Compressive Strength.

2. Fine Aggregate:
   (a) Fineness Modulas (b) % of material less than 75 micron (c) Silt Content.

3. Flakiness Index.

4. Elongation Index.

5. Rebound Hammer Test.

6. Ultrasonic Pulse Velocity Meter

7. Bending test on steel beams.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

TRANSPORTATION ENGINEERING LABORATORY

Course Code: CIV2509 **Credit Units: 01**

LIST OF EXPERIMENTS

Course objective: The students will learn different tests on aggregates and bitumen. They will also learn about the significance of these tests.

1. Impact test and Abrasion test of aggregate
2. Elongation and Flakiness index of aggregate
3. Water absorption test of aggregate
4. CBR test for subgrade
5. Determination of Flash and Fire test of bitumen
6. Determine the specific gravity of bitumen
7. Determination of penetration value of bitumen.
8. Determination of softening point test.
9. Determination of ductility of bitumen.
10. Determination of viscosity.
11. Determination of bitumen by centrifuge extractor.
12. Pavement evaluation and maintenance test.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text book & Reference:

- Khanna, S.K., Justo, C.E.G., and Veeraragavan, A., Highway Materials laboratory testing, Nem Chand & Brothers
- Relevant IRC and AASHTO codes

SUMMER INTERNSHIP EVALUATION-I

Course Code: CIV2535 **Credit Units: 03**

Methodology:
Practical training is based on the theoretical subjects studied by students. An industry visit will be planned for each student and on-site practical training will be imparted with the help of the industry guide. The students are to learn various industrial, technical and administrative processes followed in the industry. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25

SUSTAINABLE DEVELOPMENT IN CIVIL ENGINEERING

Course Code: CIV2510 **Credit Units: 03**

Course Objectives: Learn about the principles, indicators and general concept of sustainability. Apprehend the local, regional and global impacts of unsustainable designs, products and processes. Student shall be able to apply the sustainability concepts in engineering. Know built environment frameworks and their use. Understand how building and design is judged and valued by clients and stakeholders and how to implement sustainability.

Course Contents:

Module-I

Introduction: Sustainability - Introduction, Need and concept of sustainability, Social-environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act.

Module-II

Global Environmental Issue: Resource degradation, Climate change, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print Carbon sequestration – Carbon capture and storage (CCS). Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking

Module-III

Sustainable Design: Basic concepts of sustainable habitat, Green buildings, green materials for building construction, material selection for sustainable design, green building certification- GRIHA & IGBC Certification for buildings, Energy efficient building design- Passive solar design technique, Thermal storage, Cooling strategies, high performance insulation. Sustainable cities, Sustainable transport.

Module-IV

Clean Technology and Energy: Energy sources: Basic concepts-Conventional and non-conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy. Rainwater harvesting

Module-V

Green Engineering: Green Engineering concepts, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Reference Books:

- Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication
- ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System
- Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-Hill Professional.
- Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Language Book Society (ELBS).
- Malcolm Dowden, Climate Change and Sustainable Development: Law, Policy and Practice
- Daniel A. Vallero and Chris Brasier, " Sustainable Design: The Science of Sustainability and Green Engineering", WileyBlackwell
- Sustainable Engineering Practice: An Introduction, Committee on Sustainability, American Society of Civil Engineers.

AIR AND WATER POLLUTION CONTROL ENGINEERING

Course Code: CIV2511 **Credit Units: 03**

Course Objectives:

- To impart knowledge on the principles and design of control of indoor/ particulate / gaseous air pollutant and its emerging trends.
- To introduce the fundamentals of mathematical models for water quality and the importance of model building.

Course Contents:

MODULE-I: INTRODUCTION TO AIR POLLUTION

Structure and composition of Atmosphere – Sources and classification of air pollutants - Effects of air pollutants on human health, vegetation & animals, Materials & Structures – Effects of air Pollutants on the atmosphere, Soil & Water bodies – Long- term effects on the planet – Global Climate Change, Ozone Holes – Ambient Air Quality and Emission Standards – Air Pollution Indices – Emission Inventories.

MODULE-II: AIR QUALITY MONITORING AND MODELLING

Ambient and Stack Sampling and Analysis of Particulate and Gaseous Pollutants -Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Transport & Dispersion of Air Pollutants - Introduction to Air Quality Modeling. Necessity, application and limitation of air quality modelling. Introduction to Dispersion Modeling, Photochemical Modeling and Receptor Modeling. Different air quality Dispersion models and their limitations.

MODULE-III: CONTROL OF AIR POLLUTANTS

Primary considerations in designing effective control strategy: Environmental, Engineering and Economic Factor - Factors to be considered while selecting control equipments - Various mechanisms to control gaseous pollutants and particulate matter. Control Equipment design for particulate matter: Gravity chamber, Cyclone separator, Electrostatic precipitator, fabric filter, bag filter, Wet scrubber, Venturi scrubber and absorption towers.Control Equipment design for gaseous pollutants: Absorption, Adsorption, Condensation and Incineration.

MODULE-IV: SURFACE AND SUB-SURFACE WATER QUALITY MODELLING

Water quality modeling of Streams, Lakes and impoundments and Estuaries – Water quality– model sensitivity – assessing model performance; Models for dissolved oxygen, pathogens and BOD-Streeter Phelps model for point and distributed sources - Modified Streeter Phelps equations -Toxicant modeling in flowing water - Groundwater flow and mass transport of solutes, Degradation of organic compounds, application of concepts to predict groundwater contaminant movement, seawater intrusion – basic concepts and modeling.

MODULE-V: AIR AND WATER QUALITY MODELLING SOFTWARES

Exposure to computer models for surface water quality, groundwater quality and air quality - Introduction to commonly used air quality models such as AERMOD, CALPUFF, ISCST3 and CALINE4 etc.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books/References:

- Steven C. Chapra, “Surface Water Quality Modeling”, Tata McGraw-Hill Companies,Inc., New Delhi, 2008.
- “Water Quality Modelling for Rivers and Streams” Authors: Benedini, Marcello, Tsakiris, George, Springer Netherlands 2013.
- **“**Hydrodynamics and Water Quality**:** Modeling Rivers, Lakes, and Estuaries”, Zhen-Gang Ji, John Wiley & Sons, 2008.
- “Modeling Groundwater Flow and Contaminant Transport By Jacob Bear, A. H.-D. Cheng, Springer Science & Business Media, 2010.
- “Mathematical Modeling of Groundwater Pollution” Ne-Zheng Sun, Alexander Sun, Springer New York, 2012
- Lawrence K. Wang, Norman C. Parelra, Yung Tse Hung, "Air Pollution Control Engineering", Tokyo, 2004.
- Noel de Nevers, "Air Pollution Control Engg"., Mc Graw Hill, New York, 1995.
- David H.F. Liu, Bela G. Liptak „Air Pollution‟, Lweis Publishers, 2000.
- Anjaneyulu. Y, “Air Pollution & Control Technologies” Allied Publishers (P) Ltd.,India, 2002. Arthur C.Stern, „Air Pollution (Vol.I – Vol.VIII)‟, Academic Press, 2006.
- Wayne T.Davis, „Air Pollution Engineering Manual‟, John Wiley &Sons, Inc., 2000.
- Daniel Vallero “ Fundamentals of Air Pollution”, Fourth Edition,2008.

COMPUTER APPLICATION IN HYDRO ENGINEERING

Course Code: CIV2512 **Credit Units: 03**

Course Objective:
This course deals with computer application in hydro engineering.

Course Contents:

Module I
Review of Basic Hydraulic Principles – General flow characteristics, Energy and momentum principles and Equations, Pressure and free surface flows, HGL and TEL, Major and minor losses, Computer applications to simple flow problems, Introduction to SAP.
Storm Sewer Design and Gravity Piping Systems – Review of basic hydrologic principles, Gradually varied flow, Mixed flow profiles, Storm Sewer Applications.

Module II
Drainage Inlet Design, Culvert Hydraulics and Design.
Pressure Piping Systems & Water Quality Analysis – Analysis and design of water distribution systems
Introduction to Some Packages such as Flow Master, Storm CAD, Culvert Master, Water CAD, and Sewer CAD and EPANET.

Module III
Flow Routing - Hydrologic and hydraulic methods of routing, Sanitary sewer design including extended period simulation and routing.
Watershed modeling – Basic principles – Introduction to SWMM

Module IV
Water quality modeling in streams- Basic models, Introduction to software packages.
Ground water quality modeling
Introduction to remote sensing and GIS applications and web based applications

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Michael. M. Meadows & Thomas M Walski, Computer Applications in Hydraulic Engineering, Haestad Press, 2001.
- QIP short term course notes advanced IT applications in Civil Engineering: IIT, Kharagpur, 2001.
- L.W. Mays, Water Resources Engineering, John Wiley and Sons, 2001.
- S.C. Chapra, Surface Water Quality Modeling, McGraw Hill, Inc., 1997.

Syllabus - Sixth Semester

ENVIRONMENTAL ENGINERING-I

Course Code: CIV2601 **Credit Units: 03**

Course Objective:
Based on course Environmental studies, the water resources and their management for environmental suitability are studied in this course.

Course Contents:

Module I: Scope of Environmental Engineering
Water Supply Engineering. Quantity of water. Types of water demand. Fluctuation in demand. Factors affecting consumption. Forecasting population. Design period.

Module II: Sources of water
Surface water sources. Intakes. Ground water Sources. Estimation of yield from various ground water sources. Quality of water. Drinking water standards – Water quality parameters- effects on human health- Methods of Physical, Chemical and Bacteriological analysis of water.

Module III: Treatment of water
Process details and design considerations. Aeration. Coagulation. Flocculation. Sedimentation. Filtration. Disinfection. Miscellaneous and advanced treatments. Iron and manganese removal. Fluoridation and defluoridation. Water Softening. Arsenic removal. Desalination. Membrane filtration.

Module IV: Water supply schemes
Gravitational, pumping and combined schemes. Pumps. Pumping stations. Transmission of water. Materials of water supply pipes. Design of gravity and pumping main. Distribution systems. Different layout of pipe networks.House connection from mains. Different valves, meters and hydrants. Storage reservoirs. Balancing reservoir. Detection and prevention of leaks in the distribution systems. Maintenance of distribution systems.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Garg S. K, Environmental Engineering, Vol. I, Khanna Publications, 2001, New Delhi.
- Birdie G.S & Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons, 1998, New Delhi.
- Duggal, K.N., Elements of Environmental Engineering, S Chand & Co. Ltd., 2000, New Delhi.
- Mark J. Hammer & Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd., 1998, New Delhi.
- Fair, Geyer & Okun, Water & Waste Water Engineering, John Wiley, 1966, New York.
- Ernest W. Steel & Terence J. Mc Ghee, Water Supply & Sewage, McGraw Hill, 1990, New York.
- Relevant BIS Codes.

STRUCTURAL CONCRETE DESIGN

Course Code: CIV2602 **Credit Units: 03**

Course Objective:
This course deals with the design concept of designing concrete structure. As a prerequisite the students should have knowledge of principal of structural design.

Course Contents:
Module I: Design of Columns
Design of Columns by Limit State Design Method- Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression, requirements for reinforcement, Column with helical reinforcement, Short column under axial load and uni-axial bending, Design of columns under bi-axial loading by Design Charts
Note: All designs shall be conforming to IS : 456 – 2000

Module II: Design of Footing
Analysis and design of beam curved in plan. 2 Structural behavior of footings, design of footing for a wall and a single column, combined rectangular and trapezoidal footings, Design of strap footing.

Module III: Design of Tank
Design criteria, material specifications and permissible stresses for tanks, design concept of circular and rectangular tanks situated on the ground / underground, design of overhead tanks.

Module IV: Design of Retaining Wall
Structural behavior of retaining wall, stability of retaining wall against overturning and sliding, Design of T-shaped retaining wall, Concept of Counter fort retaining wall. Loads, forces and I.R.C. bridge loadings, Design of R.C. slab culvert.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Pillai S.U. & Menon D., Reinforced Concrete Design Tata McGraw Hill, 2003
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House,2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005
- BIS codes (IS 456, SP 16, SP 24, SP 34)

WATER RESOURCE ENGINEERING-I

Course Code: CIV2610 **Credit Units: 03**

Course Objective:
This course deals with various concepts of water resources engineering. The course introduces the concept of hydrology, ground water and then deals with irrigation engineering. It also deals with design of dam.

Course Contents:

Module I: Hydrology
Hydrologic cycle- Precipitation, rainfall variations, measurement, presentation of RF data, Mean precipitation, Abstractions from precipitation- Runoff-Long term runoff, empirical formulae, short term runoff- hydrograph analysis. Flood-Rational and Empirical methods for prediction - Design floods. Ground water- Aquifer types-flow of ground water – Well hydraulics-Types of wells-Other sources of ground water.

Module II: Irrigation
Necessity of irrigation and type of irrigation systems.-Total planning concept-Water requirements of crops-Command area-duty-delta. Consumptive use of water –Irrigation efficiency-Irrigation requirement of crops-Reservoir planning-Site investigation-Zones of storage-Reservoir yield-Reservoir losses and Control-Life of reservoir

Module III
Diversion head works-Location – Essential components of Weir and Barrage-Weirs on permeable foundations-Blighs and khoslas seepage theories - Design procedure.
Dams - Types of dams and their selection-Gravity dam-Analysis and design.
Spillways-Different types and suitability.

Module IV
Regulation and control of canal system-Purpose, Types of canal regulation works and their functional aspects. Irrigation Outlets-Requirements, types, non-modular, semi-module and rigid module, selection criterion. River Training - Objective and need, classification of rivers, and river training works, meandering, stages, methods of river training, bank protection, Methods for measurement of discharge.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Irrigation Engg. and Hydraulic Structures by S.K. Garg, Khanna Publishers.
- Irrigation, Water Resources, and Water power Engineering By Dr P.N.Modi, Standard Book House 1990
- Engineering Hydrology by K. Subramanya, TMH.
- Irrigation Water Power and Water Resource Engg. by K.R. Arrora.
- Water Resources Engg. By Larry W. Mays, John Wiley India
- Water resources Engg. By Wurbs and James, John wiley India
- Water Resources Engg. By R. K. Linsley, McGraw Hill
- Irrigation and water Resources Engg. By G L Asawa, New age International Publishers
- Irrigation Theory and practices by A.M. Michel.
- Irrigation and water Power engineering by B.C. Punmia, Laxmi Publications.

GEOTECHNICAL ENGINEERING-II

Course Code: CIV2651 **Credit Units: 03**

Course Objective:
Advanced topics of soil mechanics and the design of foundations are covered in this course.

Course Contents:

Module I: Earth pressure
Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils. Coulomb's and Rankine's theories. Point of application of earth pressure for cases of with and without surcharge in cohesionless and cohesive soils. Culmann's and Rebhan's graphical construction for active earth pressure. Friction circle method for active earth pressure. **Site investigation and soil exploration:** Objectives. Planning. Reconnaissance. Depth of exploration. Methods of subsurface exploration. Test pits. Auger borings. Wash boring. Rotary drilling. Percussion drilling. Core drilling. Sampling. Types of soil samples. Splitspoon sampler. Thin walled sampler. Piston sampler. Denison sampler. Hand cut samples. Location of water table. S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.

Module II: Bearing capacity
Ultimate and allowable bearing capacity. Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts. Effect of water table on bearing capacity. Meyerhoff's bearing capacity heory. Skempton's formulae. Bearing capacity from field tests. Bearing capacity from building codes. Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.
Settlement analysis: Distribution of contact pressure. Immediate and consolidation settlement. Estimation of initial and final settlement under building loads. Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement.

Module III: Foundations
General considerations: Functions of foundations. Requisites of satisfactory foundations. Different types of foundations. Definition of shallow and deep foundation. Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations . Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements.
Open excavation: Open foundation excavations with unsupported slopes. Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations. Stability of bottom of excavations. **Raft foundations**: Bearing capacity equations. Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations.

Module IV: Pile foundations
Uses of piles. Classification of piles based on purpose and material. Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile. Static and dynamic formulae. Determination of bearing capacity by penetration tests and pile load tests (IS methods). Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method. **Caissons and piers:** Open (well) caissons. Box (floating) caissons. Pneumatic caissons. Construction details and design considerations of well foundations. Drilled piers and their construction details.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Joseph E. & Bowles, *Foundation Analysis & Design*, McGraw Hill
- Leonards G.A., *Foundation Engineering*, McGraw Hill
- Teng W.C., Foundation Design, PHI, 1984
- Tomlinson M.J., Foundation Design & Construction, Pitman, 1963.
- Terzaghi & Peck, Soil Mechanics in Engineering Practice, Asia Publishing
- Arora K.R., *Soil Mechanics & Foundation Engg.*, Standard Publications, 1987.
- Murthy V.N.S., Soil Mechanics & Foundations.
- Punmia B.C., Soil Mechanics & Foundations, Laxmi, 1988.

GEOTECHNICAL ENGINEERING LAB

Course Code: CIV2605 **Credit Units: 01**

Course Contents:

1. Specific gravity of coarse and fine grained soils.
2. Grain size analysis (a) Sieve analysis (b) Pipette analysis
3. Atterberg's limits and indices
4. Determination of field density (a) sand replacement method (b) core cutter method
5. Determination of coefficient of permeability by
   (a) Constant head method (b) Variable head method
6. Consolidation test
7. Compaction test (a) IS light compaction test (b) IS heavy compaction test
8. California Bearing Ratio test
9. Direct shear test
10. Triaxial shear test
11. Unconfined compressive strength test
12. Laboratory vane shear test

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PRESTRESSED CONCRETE

Course Code: CIV2607 **Credit Units: 03**

Course Objective:
This course deals with advanced concept of structural concrete design.

Course Contents:

Module I: Materials for prestressed concrete and prestressing systems
High strength concrete and high tensile steel – tensioning devices – pretensioning systems – post tensioning systems.

Module II: Analysis of prestress and bending stresses
Analysis of prestress – resultant stresses at a sector – pressure line or thrust line and internal resisting couple – concept of load balancing – losses of prestress – deflection of beams.

Module III: Strength of prestressed concrete sections in flexure, shear and torsion
Types of flexural failure – strain compatibility method – IS code procedure – design for limit state of shear and torsion.

Module IV: Design of prestressed concrete beams and slabs
Transfer of prestress in pre tensioned and post tensioned members – design of anchorage zone reinforcement – design of simple beams – cable profiles – design of slabs.
A design project for the design and detailing of a large span beam is envisaged at this stage.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- N. Krishna Raju, Prestressed concrete, Tata McGraw Hill, 2000
- T.Y. Lin, Ned H. Burns, Design of Prestressed Concrete Structures, John Wiley & Sons, 2004.
- P. Dayaratnam, Prestressed Concrete, Oxford & IBH,1982
- R. Rajagopalan, Prestressed Concrete, Narosa publishers, 2004.
- BIS codes (IS 1343)

TRAFFIC ENGINEERING AND MANAGEMENT

Course Code: CIV2608 **Credit Units: 03**

Course Objective:
The students acquire comprehensive knowledge of traffic surveys and studies such as 'Volume Count', 'Speed and delay', 'Origin and destination', 'Parking', 'Pedestrian' and 'Accident surveys'. They achieve knowledge on design of 'at grade' and 'grade separated' intersections. They also become familiar with various traffic control and trafficmanagement measures.

Course Contents:

Module I: Introduction
Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

Module II: Traffic Surveys and Analysis
Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

Module III: Traffic Control
Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

Module IV: Geometric Design of Intersections
Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections - Principles of Intersection Design, Elements of Intersection Design, Rotary design, Grade Separation and interchanges - Design principles.

Module V: Traffic Management
Traffic Management- Transportation System Management (TSM) - Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, Oneway Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.
- Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
- Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
- Guidelines of Ministry of Road Transport and Highways, Government of India.
- Subhash C. Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications, New Delhi, 1989.
- Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall of India Pvt Ltd, 2006.

BASICS OF OPTIMIZATION TECHNIQUES AND MATHEMATICAL MODELING

Course Code: CIV2611 **Credit Units: 03**

Course Objectives: Optimization is the process of obtaining the best result under given circumstances. In design, construction and maintenance of any engineering system, engineers have to take many technological and managerial decisions at several stages. The ultimate goal of all such decisions is either to minimize the effort required or to maximize the desired benefit. A number of optimization methods have been developed for solving different types of optimization problems. In this course, after discussing about the optimization problem formulation, Linear Programming, Non Linear Programming, Dynamic Programming techniques are explained in detail along with number of applications in civil engineering.

Course Contents:

MODULE-I

Introduction and Basic Concepts: Historical Development; Engineering applications of Optimization; Art of Modeling Objective function; Constraints and Constraint surface; Formulation of design problems as mathematical programming problems Classification of optimization problems Optimization techniques – classical and advanced techniques.

MODULE-II

Optimization using Calculus: Stationary points; Functions of single and two variables; Global Optimum Convexity and concavity of functions of one and two variables Optimization of function of one variable and multiple variables; Gradient vectors; Examples Optimization of function of multiple variables subject to equality constraints; Lagrangian function Optimization of function of multiple variables subject to equality constraints; Hessian matrix formulation; Eigen values Kuhn-Tucker Conditions; Examples.

MODULE-III

Linear Programming: Standard form of linear programming (LP) problem; Canonical form of LP problem; Assumptions in LP Models; Elementary operations Graphical method for two variable optimization problem; Examples Motivation of simplex method, Simplex algorithm and construction of simplex tableau; Simplex criterion; Minimization versus maximization problems Revised simplex method; Duality in LP;Primaldual relations; Dual Simplex method; Sensitivity or post optimality analysis Other algorithms for solving LP problems – Karmarkar's projective scaling method

MODULE-IV

Linear Programming Applications: Use of software for solving linear optimization problems using graphical and simplex methods Examples for transportation, assignment, water resources, structural and other optimization problems. Dynamic Programming, Dynamic Programming Applications Advanced Topics in Optimization

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOK:

- S.S. Rao,"Engineering Optimization: Theory and Practice", New Age International P)Ltd., New Delhi, 2000.
- G. Hadley,"Linear programming", Narosa Publishing House, New Delhi, 1990.
- H.A. Taha,"Operations Research:An Introduction", 5th Edition, Macmillan, New York, 1992.
- K. Deb,"Optimization for Engineering DesignAlgorithms and Examples",Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.
- K.Srinivasa Raju and D. Nagesh Kumar, "Multicriterion Analysis in Engineering and Management",PHI Learning Pvt. Ltd., New Delhi, India, ISBN 978-81-203-3976-7, pp.288, 2 0 1 0.

Syllabus - Seventh Semester

STRUCTURAL STEEL DESIGN

Course Code: CIV2701 **Credit Units: 03**

Course Objective:
This course deals with design of various steel structures. The prerequisite of this course is that the students should have good understanding of principles of structural design.

Course Contents:

Module-I: General Considerations
Introduction, Advantages of Steel as a Structural. Material, Disadvantages of Steel as a Structural Material, Structural Steel, Stress Strain Curve for Mild Steel, Rolled Steel Sections, Convention for Member Axes, Loads, Dead Load, Live Loads, Environmental Loads, Seism ic Forces, Snow and Rain Loads, Erection Loads, Basis for Design, Design Philosophies, Local Buckl ing of Plate Elements. Introduction to Limit State Design Introduction, Limit States for Steel Design, Limit States of Strength, Limit States of Serviceability, Actios (Loads), Probabilistic Basis for Design, Design Criteria

Module-II: Simple Connections
Riveted, Bolted and Pinned Connections Introduction, Riveted Connections, Patterns of Riveted Joint s, Bolted Connections, Types of Bolts, Types of Bolted Joints, Load Transfer Mechanism, Failure of Bolted Joints, Specification for Bolted Joints, Bearing- Type Connections, Prying Action, Tensile Strength of plate, Efficiency of the Joint, Combined Shear and Tension, Slip- Critical Connections, C ombined Shear and Tension for Slip- Critical Connections, Working Load Design, Pin Connections
Simple Welded Connections
Introduction, Types, Symbols, Welding Process, Weld Defects, Inspection of Welds, Assumptions in t he Analysis of Welded Joints, Design of Groove Welds, Design of Fillet Welds, Fillet Weld Applied t o the Edge of A Plate or Section, Fillet Weld for Truss Members, Design of Intermittent Fillet Welds, Plug and Slot Welds, Stresses Due To Individual Forces, Combination of Stresses, Failure of Welds, Distortion of Welded Parts, Fillet Weld Vs Butt Weld, Welded Jointed Vs Bolted and Riveted Joints, Section of Fasteners, Working Load Design

Module-III: Tension Members
Introduction, Types of Tension Members, Net Sectional Area, Effective Net Area, Types of Failure, Design Strength of Tension Members, Slenderness Ratio (λ), Displacement, Design of Ten sion Member, Lug Angles, Splices, Gusset Plate, Working Load Design

Module-IV: Compression Members
Introduction, Effective Length, Slenderness Ratio (λ), Types of Sections, Types of Buckling, Classific ation of cross Sections, Column Formula, Design Strength, Design of Axially Loaded Compression M embers, Built Up Columns (Latticed Columns), Lacing, Batten, Compression Member Composed ofTwo Components Back to Back, Encased Column, Splices, Design of Column Bases

Module-V: Beams
Introduction, Types of Sections, Behaviour of Beam in Flexure, Section Classification, Lateral Stabilit y of Beams, Lateral Torsional Buckling, Bending Strength of Beams, Laterally Supported Beams, Laterally Unsupported Beams, Shear Strength of Beams, Web Buckling, Bearing Strength, Web Crippling, Deflection, Design Procedure of Rolled Beams, BuiltUp Beams (Plated Beams), Linte ls, Purlins, Beam Bearing Plates, Castellated Beam, Effect of Holes in Beam, Introduction to Plate Gir der , Introduction to Gantry Girder.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Ramchandra, Design of Steel Structures Vol I and II, Standard book house, 1991
- P. Dayaratnam, Design of Steel Structures, (Wheeler), 1998
- M. Raghupathi, Design of Steel Structures, Tata McGraw Hill, 1985
- Lin & Breslar, Design of Steel Structures, John Wiley & Sons, 1963
- BIS codes (IS 800, SP: 6 – Part 1 to 6).

ENVIRONMENTAL ENGINEERING-II

Course Code: CIV2702 **Credit Units: 03**

Course Objective:
This course deals with advanced environmental engineering concepts. It explains the design of various plumbing, treatment plant and solid waste management.

Course Contents:

Module I
Sanitary plumbing – sanitary fixtures – systems of piping – house drainage– connection of house drains and street sewers. Systems of sewerage– Dry weather flow and wet weather flow– sewers and sewer appurtenances – sewage pumping – maintenance of sewers.

Module II
Waste water- Characteristics– sampling – population equivalent — preliminary treatment of waste water – screens – grit chamber – detritus tank – Sedimentation tank.
Biological treatment (process details and design considerations) - Aerobic- Activated Sludge Process- Trickling Filter- Oxidation Ponds

Module III
Anaerobic treatment- Anaerobic digesters- Septic Tanks- Soak pits
Waste water disposal – disposal into stream –fundamentals of stream sanitation- disposal by irrigation – sludge treatment and disposal

Module IV
Solid waste management: Generation- on site handling and storage- transfer and transportprocessing- resource recovery- treatment and disposal.
Air pollution and control – sources –pollutants and their health effects– particulate and gaseous pollution control devices (fundamentals)-Settling chambers- Electrostatic precipitators- Cyclones- Wet Collectors-Gas absorption by tray and packed towers

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Birdie G. S and Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai and Sons (1998), New Delhi
- Duggal K.N., Elements of Environmental Engineering, S. Chand and Co. Ltd. (2000), New Delhi
- Garg S.K, Environmental Engineering Vol. II¸ Khanna Publications (2001) New Delhi
- Ehlers VM & Steel EW, Municipal & Rural Sanitation, 6th Edn.(1965)McGraw Hill.
- Sawyer and McCarte, Chemistry for Environmental Engineering, Tata McGraw-Hill, (2003) New Delhi,.
- Fair, Geyer & Okun, Water and Waste water Engineering, John Wiley & sons, Inc (1966)
- Metcalf & Eddy, Waste Water Engineering Treatment, Disposal & Reuse, Tata McGraw Hill (1979)

WATER RESOURCE ENGINEERING-II

Course Code: CIV2711 **Credit Units: 03**

Course Objectives: To study the different aspects of design of hydraulic structures. To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works

Course Contents:

MODULE-I:
Head Works:Types of head works, Functions and investigations of a diversion head work: component parts of a diversion head work and their design considerations, silt control devices.
Theories of Seepage: Seepage force and exit gradient, assumptions and salient features of Bligh's Creep theory, Limitations of Bligh's Creep theory, salient features of Lane's weighted Creep theory and Khosla's theory, Comparison of Bligh's Creep theory and Khosla's theory, Determination of uplift pressures and floor thickness.

MODULE-II:
Design of Weirs: Weirs versus barrage, types of weirs, main components of weir, causes of failure of weir and design considerations with respect to surface flow, hydraulic jump and seepage flow. Design of barrage or weir. Energy Dissipation Devices: Use of hydraulic jump in energy dissipation, Factors affecting design, Types of energy dissipators and their hydraulic design.

MODULE-III:
Canal Regulators: Offtake alignment, cross-regulators – their functions and design, Distributory head regulators, their design, canal escape. Canal Falls: Necessity and location, types of falls and their description, selection of type of falls, Principles of design, Design of Sarda type, straight glacis and Inglis or baffle wall falls. Canal Out-lets : Essential requirements, classifications, criteria for outlet behaviours, flexibility, proportionality, sensitivity, sensitiveness, etc. Details and design of nonmodular, semi-modular and modular outlets.

MODULE-IV:
Cross-Drainage works : Definitions, choice of type, Hydraulic design consideration, Aqueducts their types and design, siphon aqueducts – their types and design considerations, super passages, canal siphons and level crossing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Irrigation Engg. & Hydraulic Structure by Santosh Kumar Garg, Khanna Publishers
- Design of Irrigation Structures by R.K. Sharma, Oxford IBH Pub
- Irrigation Engg. and Hydraulics Structures by S.R. Sahasrabudhe, . Katson Publishing
- Irrigation Practice and Design Vol. I to VII by K.B. Khushlani. Oxford IBH Pub
- P.N. Modi; Irrigation with Resources and with Power Engineering, Standard Book House
- Irrigation Engg. Vol. I & II by Ivan E. Houk, John Wiley and sons

ENVIRONMENTAL ENGINEERING LAB

Course Code: CIV2704 **Credit Units: 01**

Course Contents:

1. Determination of solids (total, dissolved, organic, inorganic and settleable) in water
2. Determination of turbidity and the optimum coagulant dose
3. Determination of alkalinity and pH of water
4. Determination of hardness and chlorides in water
5. Determination of iron and manganese in water
6. Determination of sulphates and sulphides in water
7. Determination of D.O and B.O.D of waste water
8. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample
9. Determination of coliforms in water
10. Demonstration of Instrumental methods of pollutant analysis

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- Standard method for the examination of water and waste water, 2005, APHA, AWWA, WPCF Publication

SUMMER INTERNSHIP EVALUATION-II

Course Code: CIV2735 **Credit Units: 03**

Objective:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

Guidelines
In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.
Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components
Front Page
Declaration
Student Certificate (University)
Certificate (Company)
Acknowledgement
Abstract
Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters
Appendices(optional)
References / Bibliography

The above components are described below:
1. **The Title Page**-- Format will be given by coordinator/supervisor.
2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Company Certificate: This is a certificate, which the company gives to the students.
5. Contents-This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.
6. Acknowledgement-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
7. Abstract and **Keywords-**This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

The keywords (maximum 6) are a hint that what is contained in the report.
8. Company Profile: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
9. **Chapters**—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment consists of topic relevance, progress report and industry feedback on company letterhead. Final Assessment includes viva, presentation, execution and report marks.

Examination Scheme:

Components	**IF**	**PR**	**R**	**E**	**V**	**FP**
Weightage (%)	20	20	15	15	15	15

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR-Progress Report, E-Execution

INDEPENDENT STUDY

Course Code: CIV2712 **Credit Units: 02**

This is an elective, self-directed course to investigate aemerging areasof IT and Computer Science like Mobile Operating System, Cloud Computing, or from Current Research Areas etc. The primary goal of the course is to provide students with research exploration of a specific topic of interest to the individual student under the advisement of an instructor who will monitor and critique the student's progress.

Independent study provides students with the opportunity to work one-on-one with a Faculty on a particular topic. The student and faculty should discuss the aims and content of the study and present the proposal to Head of Department. The independent study proposal should include the study's title, theme, readings, work to be submitted, and syllabus. Faculty and student should meet for a minimum number of 2 hours per week. Student will give a seminar after completion of study.

TERM PAPER

Course Code: CIV2731 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

Guidelines for Term Paper

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of Materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the Notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the Paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the First Draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing &Preparing the Final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.

f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion&Conclusion
6) Bibliography
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

Bibliography

From the very beginning of a research project, you should be careful to note all details of articles gathered. The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography. The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical Conventions:

Monographs

Crystal, D. (2001), Language and the internet, Cambridge: Cambridge University Press

Edited Volumes

Gass, S/Neu, J. (eds.) (1996), Speech acts across cultures, Challenges to communication in a second language, Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language, Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved on [5.10.01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document], German as a Foreign Language Journal [online] 1, Retrieved [12.09.00] from the World Wide Web, http://www.gfl-journal.com/

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document], Retrieved on [13.10.01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu

Unpublished Thesis/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, etc.) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Examination Scheme:

Dissertation:	75
Viva voce	25
Total:	**100**

PROJECT

Course Code: CIV2732 **Credit Units: 02**

Methodology

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Guidelines for Project File

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

Project File

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period where the researcher is not working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The project file is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the file should be comprehensive and includes:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

Layout Guidelines for the Project File

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment of the Project File

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following assessment objectives:

- Range of research methods used to gain information
- Execution of research
- Data analysis (Analyse Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:
Continuous Evaluation:
40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:
60% (Based on the documentation in the file, final report layout, analysis and results, achievement of objectives, presentation/ viva)

Syllabus - Eighth Semester

CONSTRUCTION MANAGEMENT AND QUANTITY SURVEYING

Course Code: CIV2801 **Credit Units: 03**

Course Objective:
The main objective of this course is to train the student construction management and quantity surveying

Course Contents:

Module I
Construction Management – Network techniques – introduction – Bar charts – use of CPM and PERT for planning – time estimates – critical path – updating – crashing – resource smoothing – resource leveling – computer applications
Construction planning: Preparation of job layout – labour schedule – material schedule – equipment schedule

Module II:
Project Implementation **–** Tender – earnest money deposit – security deposit – contract – contract documents – measurements – completion certificate – inspection and quality control – standardization – organisations at national and international level (BIS & ISO) – role of certification

Module III
Quantity surveying - preparation of detailed estimates for: buildings - reinforced concrete structures - sanitary and water supply works

Module IV
Preparation of specification for common materials of construction and items of work as per IS - analysis of rates and preparation of abstract of estimate
Introduction to valuation of real properties: Depreciation – Sinking fund – methods of valuation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Vazirani V.N. & Chandola S.P., Heavy Construction, 1978.
- Jha J. & Sinha S.K., Construction & Foundation Engineering, Khanna Publications
- Verma L.C., Standardisation - A New Discipline
- Rangwala, Valuation of Real Properties, Charotar, 1978.
- Peurifoy R.L., & Ledbetter W.B., Construction Planning Equipment & Methods,
- McGraw Hill, 1956.
- Dutta B.N., Estimation & Costing in Civil Engg, UBSPD, 1992.
- Chakrabarthi, Estimation, Costing, Specification in Civil Engg,
- Shah N.A., Quantity Surveying & Specification in Civil Engg**.,**
- I.S 1200 (1968), Methods of Measurement of Building & Civil Engg. Works Mahajan S.P., Civil Estimating & Costing, Sathyaprakasham, 1988

DISSERTATION

Course Code: CIV2837 **Credit Units: 08**

Methodology

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Guidelines for Project File and Project Report

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

Project File

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period where the researcher is not working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

Project Report

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page**
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgement(s)**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract**
  A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.
  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.
  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.
  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.
- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly.
  Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?
- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.
  Examples
  For research article
  Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli* O157: H7. *ClinMicrobiol Infect*, **8** (suppl 1): 116–117.
  For book
  Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

Layout Guidelines for the Project File & Project Report

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment of the Project File and the Project Report

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following assessment objectives:

- Range of Research Methods used to oASEin information
- Execution of Research
- Data Analyses (Analyse Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology,refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis andresults, achievement of objectives, presentation/ viva)

INDUSTRIAL WASTE ENGINEERING

Course Code: CIV2803 **Credit Units: 03**

Course Objective:
To provide the knowledge on the wastewater characteristics from industry, Define the Principles of pollution prevention and mechanism of industrial processes, andSuggest the suitable technologies for the treatment of wastewater.

Course Contents:

Module I
Industrial waste types and characteristics; levels of environmental pollution due to industrial wastes; health issues due to industrial wastes; ecological and human health risk assessment due to industrial wastes; waste characterization methods; treatment methods-conventional and recent trends. Industrial scenario in India– Industrial activity and Environment - Uses of Water by industry – Sources and types of industrial wastewater – Nature and Origin of Pollutants – Industrial wastewater and environmental impacts – Regulatory requirements for treatment of industrial wastewater – Industrial waste survey – Industrial wastewater monitoring and sampling - generation rates, characterization and variables –Toxicity of industrial effluents and Bioassay tests – Major issues on water quality management.

Module II
Waste management Hierarchy - Source reduction techniques – Periodic Waste Minimisation Assessments – Evaluation of Pollution Prevention Options – Cost benefit analysis – Pay-back period – Implementing & Promoting Pollution Prevention Programs in Industries.

Module III
Flow and Load Equalisation – Solids Separation – Removal of Fats, Oil & Grease- Neutralisation – Removal of Inorganic Constituents – Precipitation, Heavy metal removal, Nitrogen & Phosphorous removal, Ion exchange, Adsorption, Membrane Filtration, Eletrodialysis & Evaporation – Removal of Organic Constituents – Biological treatment Processes, Chemical Oxidation Processes, Advanced Oxidation processes – Treatability Studies.

Module IV
Individual and Common Effluent Treatment Plants – Joint treatment of industrial and domestic wastewater - Zero effluent discharge systems - Quality requirements for Wastewater reuse – Industrial reuse , Present status and issues - Disposal on water and land – Residuals of industrial wastewater treatment – Quantification and characteristics of Sludge – Thickening, digestion, conditioning, dewatering and disposal of sludge – Management of RO rejects.

Module V
Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for Textiles – Tanneries – Pulp and paper – metal finishing – Oil Refining–Pharmaceuticals–Sugar and Distilleries.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References:

- "Industrial wastewater management, treatment & disposal, Water Environment" Federation Alexandria Virginia, Third Edition, 2008.
- Lawrance K.Wang, Yung Tse Hung, Howard H.Lo and Constantine Yapijakis “handlook of Industrial and Hazardous waste Treatment”, Second Edition, 2004.
- Metcalf & Eddy/ AECOM, "water reuse Issues, Technologies and Applications", The Mc Graw- Hill companies, 2007.

- Nelson Leonard Nemerow, “Industrial waste Treatment”, Elsevier, 2007.
- Wesley Eckenfelder W., “Industrial Water Pollution Control”, Second Edition, Mc Graw Hill, 1989.
- Paul L. Bishop, „Pollution Prevention: - Fundamentals and Practice“, Mc-Graw Hill International, Boston, 2000.
- Waste water Treatment for pollution control and reuse by Soli. J. Arceivala, Shyam. R. Asolekar, Tata Mcgraw Hill, 2007.

SOLID WASTE MANAGEMENT AND RECYCLING

Course Code: CIV2808 **Credit Units: 03**

Course objective: To provide information regarding different elements of Environmental pollution, their origin, characteristics and treatment.

Course Contents:

MODULE-I
Definition of solid waste-waste generation in a technological society- major legislation, monitoring responsibilities, sources and types of solid waste- sampling and characterization- Determination of composition of MSW- storage and handling of solid waste- Future changes in waste composition.

MODULE-II
Collection and transport of solid waste: Collection of Solid waste: type of waste collection systems, analysis of collection system- alternative techniques for collection system. Separation and Processing and Transformation of Solid Waste: unit operations used for separation and processing, Materials Recovery facilities, Waste transformation through combustion and anaerobic composting, anaerobic methods for materials recovery and treatment.

MODULE-III
Recycling of plastic materials and metals. Energy recovery – Incinerators. Transfer and Transport: need for transfer operation, transport means and methods, transfer station types and design requirements. Landfills: Site selection, design and operation, drainage and leachate collection systems – requirements and technical solutions, designated waste landfill remediation – Integrated waste management facilities.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books/References:

- John Pichtel-Waste Management Practices, CRC Press, Taylor & Francis Group.
- Technobanoglous et al –Integrated Solid Waste Management, McGraw- Hill
- Charles A. Wentz – Hazardous Waste Management, McGraw- Hill

BASICS OF FINITE ELEMENT METHOD

Course Code: CIV2809 **Credit Units: 03**

Course Objective: This will enable the student to have a basic knowledge of finite element method and shall be able to appreciate and analyze linear elastic structures using finite element method.

Course Contents:

Module I: Introduction to FEM. Basic idea of FEM. Applications and importance of FEM. Differential equilibrium equations - strain displacement relation - linear constitutive relation - special cases- Principle of stationary potential energy - application to finite element methods. Some numerical techniques in finite element Analysis

Module II:
Displacement models - convergence requirements. Natural coordinate systems – Shape function. Interpolation function- Linear and quadratic elements - Lagrange & Serendipity elements- Strain displacement matrix - element stiffness matrix and nodal load vector. Coordinate Transformation: Transformation of vectors and tensors, transformation of stiffness matrices, degree of freedom within elements, condensation, condensation and recovery algorithm, substructuring, structural symmetry.

Module III:
Two dimensional isoparametric elements - Four noded quadrilateral elements – triangular elements- Computation of stiffness matrix for isoparametric elements - numerical integration, (Gauss quadrature) -Convergence criteria for isoparametric elements.

Module IV:
Assemblage of elements – Direct stiffness method- Special characteristics of stiffness matrix - Boundary condition & reaction - Gauss elimination and LDLT decomposition- Basic steps in finite element anlaysis, Introduction to Softwares based on FEM analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Cook, R.D., Malkus, D.S., Plesha, M.E., and Witt, R.J., Concepts and Applications of Finite Element Analysis, John Wiley & Sons, 2003.
- Zienkiewicz, O.C., and Morgan, K., Finite Element Approximation, John Wiley & Sons, 1983.
- C.S.Krishnamoorthy, Finite element analysis, theory and programming, Tata McGraw Hill, 2009.
- Finite element analysis, theory and progarmming by GS Krishna Murthy.
- Zienkiewicz, O.C., and Taylor, R.L., The Finite Element Method, Vols I to III, McGraw Hill, 1999.
- Reddy, J.N., An Introduction to the Finite Element Method, McGraw Hill, 2006.

Amity School of Engg. & Technology

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

ENGINEERING MATHEMATICS-I

Course Code: CSE2110 **Credit Units : 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING PHYSICS

Course Code: CSE2111 **Credit Units : 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .
Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

ENGINEERING MECHANICS

Course Code: CSE2103 **Credit Units : 03**

Course Objective:
Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

Course Contents:

Module I: Force system & Structure
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Module II:Friction
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

Module III: Distributed Force
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

Module IV: Work -Energy
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: CSE2104 **Credit Units : 03**

Course Objective:
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:
Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.
Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

***References*:**

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers and Programming in 'C'.
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

PROGRAMMING IN C LAB

Course Code: CSE2107 **Credit Units : 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING MECHANICS LAB

Course Code: CSE2109 **Credit Units : 01**

Engineering Mechanics:

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like
4. Leather, Wood, Aluminum) on an inclined plane.
5. To find the forces in the members of Jib Crane.
6. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
7. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
8. Wheel and Axle
9. To determine the MA, VR, η of Worm Wheel (2-start)
10. Verification of force transmitted by members of given truss.
11. To verify the law of moments using Bell crank lever
12. To find CG and moment of Inertia of an irregular body using Computation method

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING PHYSICS LAB

Course Code: CSE2112 **Credit Units : 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING GRAPHICS LAB

Course Code: CSE2113 **Credit Units : 01**

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI:Development of Surface
Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

Syllabus - Second Semester

ENGINEERING MATHEMATICS-II

Course Code: CSE2211 **Credit Units : 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: **Complex Analysis**
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

Module IV: **Statistics and Probability**
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ENGINEERING CHEMISTRY

Course Code: CSE2212 **Credit Units : 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:
Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels
Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter,Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module IV: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module V: Corrosion
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ELECTRICAL SCIENCE

Course Code: CSE2213 **Credit Units : 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: CSE2204 **Credit Units: 03**

Course Objective:
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:
Module I: Introduction
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

ELEMENTS OF MECHANICAL ENGINEERING

Course Code: CSE2205 **Credit Units: 02**

Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

Course Contents:

Module I: Fundamental Concepts
Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

Module II: Stress And Strain Analysis
Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

Module III:Casting& Forging
Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

Module IV: Welding& Sheet metal working:
Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. *Internal Combustion Engine*, Tata McGraw-Hill.

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: CSE2208 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab

ELEMENTS OF MECHANICAL ENGINEERING LAB

Course Code: CSE2209 **Credit Units: 01**

Course Contents:

1. Welding

   (a) Arc Welding
   - Butt Joint
   - Lap Joint
   - T Joint

   (b) Gas Welding
   - Butt Joint
   - Lap Joint
   - Brazing of Broken pieces

2. Foundry
   - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal
   - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop
   - Male – Female Joint
   - Rectangular piece Filing the job

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELECTRICAL SCIENCE LAB

Course Code: CSE2214 **Credit Units: 01**

List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify RTh, VTh, RN, IN in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING CHEMISTRY LAB

Course Code: CSE2215 **Credit Units: 01**

Course Contents:

List of Experiments:
(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Third Semester

DATA COMMUNICATION AND COMPUTER NETWORKS

Course Code: CSE2301 **Credit Units: 03**

Course Objective:
The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP.

Course Contents:

Module I: Introduction
Introduction to computer networks, evolution of computer networks and its uses, reference models, example networks
The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system

Module II: The data link layer
Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, example of data link protocols- HDLC, PPP Access

Module III: Medium access layer
Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, CSMA/CA, IEEE Standard 802 for LAN and MAN, Bridges, Wireless LANs. Introduction to wireless WANs: Cellular Telephone and Satellite Networks, SONETISDH, Virtual-Circuit Networks: Frame Relay and ATM.

Module IV: The network layer
Network layer concepts, design issues, static and dynamic routing algorithms, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion controland quality of service, internetworking, Ipv4

Module V: The transport layer
The transport services, elements of transport protocols, TCP and UDP
The application layer: Brief introduction to presentation and session layer, DNS,E-mail**,** WWW

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & neworking: Forouzan, B. A.

References:
- Computer network protocol standard and interface: Uyless, Black
- Data and Computer Communications, Seventh Edition (7th.) William Stallings Publisher: Prentice Hall
- Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose

DATABASE MANAGEMENT SYSTEMS

Course Code: CSE2302 **Credit Units: 04**

Course Objective:
The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

Course Contents:

Module I: Introduction
Concept and goals of DBMS, DBMS Architecture, Database Languages, Database Users, Database Abstraction.
Basic Concepts of ER Model:Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constarint, Keys, Mapping, Design of ER Model

Module II: Hierarchical model &Network Model
Concepts, Data definition, Data manipulation and implementation.
Network Data Model, DBTG Set Constructs, and Implementation

Module III: Relational Model
Relational database, Relational Algebra, Relational Calculus, Tuple Calculus.

Module IV: Relational Database Design and Query Language
SQL, QUEL, QBE, Normalization using Functional Dependency, 1NF, 2NF, 3NF, BCNF, Multivalued dependency and Join dependency.

Module V: Concurrency Control and New Applications
Transaction basics: ACID property, Lifecycle of Transcation, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH, 2000.
- Steve Bobrowski, "Oracle & Architecture", TMH, 2000

References:

- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

OPERATING SYSTEMS

Course Code: CSE2303 **Credit Units: 03**

Course Objective:
Operating Systems serve as one of the most important courses for undergraduate students, since it provides the students with a new sight to envision every computerized systems especially general purpose computers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand, analyze and overcome the challenges they face with in the other courses and the real world.

Course Contents:

Module I: Introduction to operating system
Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls.

Module II: Process Management
Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads
Interprocess Communication and Synchronization:
Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.
CPU Scheduling:
Job scheduling functions, Process scheduling, Scheduling Algorithms, Non Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.
Deadlock:
System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach.

Module III: Memory Management
Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays

Module IV: Device management
Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling,
Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage.

Module V: File System and Protection and security
File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management.
Policy Mechanism, Authentication, Internal excess Authorization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Milenekovic, “Operating System Concepts”, McGraw Hill
- A. Silberschatz, P.B. Galvin “Operating System Concepts”, John Willey & son

References:

- Dietel, “An introduction to operating system”, Addision Wesley
- Tannenbaum, “Operating system design and implementation”, PHI
- Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI.
- Willam Stalling “ Operating system” Pearson Education
- B. W. Kernighan & R. Pike, “The UNIX Programming Environment” Prentice Hall of India, 2000
- Sumitabha Das “ Your UNIX The ultimate guide” Tata Mcgraw Hill
- “Design of UNIX Operating System “ The Bach Prentice – Hall of India

DATA STRUCTURES USING C

Course Code: CSE2304 **Credit Units: 04**

Course Objective:
Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

Course Contents:
Module I: Introduction to Data structures
Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Trade offs. Use of pointers in data structures.
Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

Module II: Introduction to Stacks and queue
Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.
Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

Module III: Dynamic Data Structure
Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation.
Stack and queue implementation using linked list.

Module IV: Trees and Graphs
Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.
Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

Module V: Sorting and Searching and file structures
Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.
Searching: Linear search, Binary search
File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Horowitz and Sahani, “Fundamentals of Data structures”, Galgotia publications
- Tannenbaum, “Data Structures”, PHI
- R.L. Kruse, B.P. Leary, C.L. Tondo, “Data structure and program design in C” PHI
- “Data structures and algorithms” – Schaum Series.

DATA STRUCTURES USING C LAB

Course Code: CSE2305 **Credit Units: 01**

Software Required: Turbo C++

Assignment will be provided for following:

- Practical application of sorting and searching algorithm.
- Practical application of various data structure like linked list, queue, stack, tree

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA COMMUNICATION AND COMPUTER NETWORKS LAB

Course Code: CSE2306 **Credit Units: 01**

Equipments Required:
Switch Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors etc. Platforms required: Linux Server

Course Contents:

- Introduction and Installation of Linux
- Administrating Linux
- Setting up a Local Area Network
- Connecting to the Internet
- Setting up Print Server
- Setting up File Server
- Setting up Mail Server
- Setting up FTP Server
- Setting up Web Server
- Setting up MySQL Database Server

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATABASE MANAGEMENT SYSTEMS LAB

Course Code: CSE2307 **Credit Units: 01**

Software Required: Oracle 9i

Topics covered in lab will include:

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

UNIX PROGRAMMING LAB

Course Code: CSE2308 **Credit Units: 01**

Software Required:UNIX SCO

Assignments will be provided for the following

- Introduction to UNIX Commands
- Introduction to vi editor
- Programming in shell script
- Introduction to programming in C Shell

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India
- "Unix –Shell Programming" Kochar
- " Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

ELECTRONIC DEVICES & CIRCUITS

Course Code: CSE2310 **Credit Units: 02**

Course Objective:
This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:

Module I: Semeconductor physics: Mobility & conductivity, Charge densities in a semiconductor, Fermi dirac distribution, carrier concentration and Fermi levels in semiconductor, generation and recombination of charges, diffuse and continuity equations, Hall effect.

Module II: Semiconductor Diode and Diode Circuits
Junction diode, Diode as circuit element,Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module III: Bipolar Junction Transistor
Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in $I_{co,}$ V_{BE} &β, Stabilization factors, thermal stability.

Module IV: Small signal Analysis of transistor and Multistage Amplifier
Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

Module V: Field Effect Transistors
Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module VI: Feedback Amplifiers
Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VII: Power Amplifiers
Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, ClassAB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

ELECTRONIC DEVICES & CIRCUITS LAB

Course Code: CSE2311 **Credit Units: 01**

Course Contents:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode as a voltage regulator.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations.
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

E-COMMERCE AND ERP

Course Code: CSE2312 **Credit Units: 03**

Course Objective:
This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Contents:
Module I: Introduction E-commerce and ERP
E-commerce and its types, EDI and its basics, Digital payment systems, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies-Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT &Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.

Module II: ERP Modules
Business Modules in an ERP Packag- Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

Module III: Benefits of ERP
Time Reduction, On time shipment, Improved Resource Utilization, Performance, Customer Satisfaction, Flexibility, information accuracy and decision making capability, reduction in quality costs, Accuracy.

Module IV: ERP Implementation
ERP Implementation Lifecycle, Implementation Methodology, In-house implementation-Pros and cons, Vendors, Consultants and Users and their roles, Project Management and Monitoring after ERP Implementation.

Module V: The ERP Market and Future Directions
ERP Market Place- SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA).Future directions in ERP.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Alexis Leon, "Enterprise Resource Planning", Tata McGraw Hill 2001
- Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company

References:
- Loshin, Pete and Murphy, Paul, *Electronic Commerce*, Second edition, 1990, Jaico Publishing House, Mumbai.
- S. Sadagopan, "Enterprise Resource Planning", Tata McGraw Hill 2000

INTRODUCTION TO IOT

Course Code: CSE2313 **Credit Units: 03**

Course Objective:
The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the workingof Internet of Things. To understand the concepts of Web of Things.

Course Contents:
Module I: IOT - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.

Module II: IOT PROTOCOLS - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security

Module III: IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction, IoT and Big Data.

Module IV: WEB OF THINGS - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardizationfor WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals andBusiness Intelligence.

Module V: IOT APPLICATIONS - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc., Introduction to Fog Computing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet ofThings", Springer, 2011.
- David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.
- Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applicationsand Protocols", Wiley, 2012.

References:

- Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014
- Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013
- CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

Syllabus - Fourth Semester

THEORY OF AUTOMATA AND COMPUTATION

Course Code: CSE2401 **Credit Units: 04**

Course Objective:
The course begins with the basic mathematical preliminaries and goes on to discuss the general theory of automata, properties of regular sets and regular expressions, and the basics of formal languages. Besides, sufficient attention is devoted to such topics as pushdown automata and it's relation with context free languages, Turing machines and linear bounded automata, the basic concepts of computability such as primitive recursive functions and partial recursive functions.

Course Contents:
Module I:Introduction to Languages and Automata
Formal Grammars and Chomsky Hierarchy, Regular Expression Deterministic and Nondeterministic Finite Automata, Regular Expression, Two way Finite Automata, Finite Automata with output, Properties of regular sets, pumping lemma for regular sets, My-Hill-Nerode Theorem.

Module II: Context Free Grammars and Pushdown Automata
CFG: Formal Definition, Derivation and Syntax trees, E-removal, Ambiguous Grammar, Properties of CFL, Normal Forms (CNF and GNF)
Pushdown Automata:Definitions, Relationship between PDA and context free language, Decision Algorithms

Module III: Turing Machine
The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Universal TM, Church's Machine.
Recursive and recursively enumerable language, unrestricted grammars, Context Sensitive Language, Linear Bounded Automata (LBA).

Module IV: Undecidability
Turing machine halting Problem, undecidable problems for recursive enumerable language, Post correspondence problems (PCP) and Modified Post correspondence problems, Undecidable problems for CFL.

Module V: Computability
Partial and Total Functions, Primitive Recursive functions, Recursive functions.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Hopcroft and Ullman, "Introduction to Automata Theory, languages and computation", Addision Wesley.
- "An introduction to formal languages and Automata (2nd ed)" by Peter Linz, D. C. Health and Company.

References:
- "Introduction to theory of computation (2nd Ed)" by Michael sipser.
- Mishra & Chandrashekharan, "Theory of Computer Sciences", PHI.
- Zavi Kohavi, "Switching and finite Automata Theory "
- Kohan, "Theory of Computer Sciences".
- Korral, "Theory of Computer Sciences".

DIGITAL ELECTRONICS

Course Code: CSE2402 **Credit Units: 02**

Course Objective:
This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

Course Contents:

Module I: Boolean Functions
Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

Module II: Combinational Circuits
Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer,.

Module III: Sequential Circuits
Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.

Module IV: Logic families
Logic families: RTL, DTL, TTL, ECL

Module V: Data Converters
Data converters: ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Moris Mano: Digital Circuits Systems
- R. P. Jain: Digital Logic & Circuits
- Thomas L. Floyd: Digital Fundamentals
- Malvino and Leech: Digital Principles & Applications

DISCRETE MATHEMATICS

Course Code: CSE2403 **Credit Units: 04**

Course Objective:
This subject provides students with an in-depth education in the conceptual foundations of computer science and in engineering complex software and hardware systems. It allows them to explore the connections between computer science and a variety of other disciplines in engineering and outside. Combined with a strong education in mathematics, sciences, and the liberal arts it prepares students to be leaders in computer science practice, applications to other disciplines, and research.

Course Contents:
Module I: Formal Logic
Statement, Symbolic Representation and Tautologies, Quantifiers, Predicator and validity, Normal form. Propositional Logic, Predicate Logic, First Order Logic.

Module II: Proof & Relation
Techniques for theorem proving: Direct Proof, Proof by Contra position, Proof by exhausting cares and proof by contradiction, principle of mathematical induction, principle of complete induction. Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients.

Module III: Sets and Combinations
Sets, Subtracts, power sets, binary and unary operations on a set, set operations/set identities, fundamental country principles, principle of inclusion, exclusion and pigeonhole principle, permutation and combination, Pascal's triangles, Comparing rates of growth: big theta, little oh, big oh and big omega.

Module IV: Relation/function and matrices
Relation/function and matrices: Relation, properties of binary relation, operation on binary relation, closures, partial ordering, equivalence relation, Function, properties of function, composition of function, inverse, binary and n-ary operations,
characteristic function, Permutation function, composition of cycles, Boolean matrices, Boolean matrices multiplication.

Module V: Lattices & Boolean Algebra
Lattices: definition, sub lattices, direct product, homomorphism Boolean algebra: definition, properties, isomorphic structures (in particulars, structures with binary operations) sub algebra, direct product and homo-morphism, Boolean function, Boolean expression, representation & minimization of Boolean function.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- J.P. Tremblay & R. Mamohan, "Discrete Mathematical Structure with Application to Computer Science," TMH, New Delhi (2000).
- Kolman, Busby & Ross "Discrete Mathematical Structures", PHI.
- Iyengar, Chandrasekaran and Venkatesh, "Discrete Mathematics", Vikas Publication.
- Peter Linz, "An Introduction to Formal Languages and Automata", Narosa Publishing House.

References:

- J. Truss, "Discrete Mathematics", Addison Wesley.
- C.L. Liu, "Elements of Discrete Mathematics", McGraw Hill Book Company.
- M. Lipson & Lipshutz, "Discrete Mathematics", Schaum's Outline series.
- J. E. Hopcroft & J. D. Ullman, "Introduction to Automata Theory, Languages and Computation", Addison Weliy.

ARTIFICIAL INTELLIGENCE

Course Code: CSE2412 **Credit Units: 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Contents:

Module I: Problem solving and Scope of AI
Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction.
Problem Solving
State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.

Module II: Knowledge Representation
Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

Module III: Understanding Natural Languages
Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts ,Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation..

Module IV
Expert System: Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN,R1
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. **Programming Language:** Introduction to programming Language, LISP and PROLOG.
Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

Module V: Introduction to Robotics
Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992.
- N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 1990.
- John J. Craig, “Introduction to Robotics”, Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication
- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication

References:

- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.

DIGITAL ELECTRONICS LAB

Course Code: CSE2405 **Credit Units: 01**

List of Experiments:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip- flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement control circuit using multiplexer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ARTIFICIAL INTELLIGENCE LAB

Course Code: CSE2413 **Credit Units: 01**

Course Contents:

Assignments will be provided for the following:

- Programming in Prolog
- Programming for Robotics

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMMUNICATION SYSTEMS

Course Code: CSE2414 **Credit Units: 02**

Course Objective:
The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

Course Contents:

Module I: Introduction
Communication Process, Source of Information, Communication channels, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, primary communication resources, analog versus digital communications

Module II: Amplitude modulation
Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

Module III: Angle Modulation
Narrow and wide band FM, BW calculations using Carlson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

Module IV: Pulse Modulation
Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems,
Basics of digital communications: ASK, PSK, FSK, QPSK basics & wavform with brief mathematical introduction

Module V: Noise
Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

Module VI: Introduction to Information Theory
Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition

References:
- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH

COMMUNICATION SYSTEMS LAB

Course Code: CSE2415 **Credit Units: 01**

List of Experiments:

1. To study the sampling and reconstruction of a given signal.
2. To study amplitude modulation and demodulation.
3. To study frequency modulation and demodulation.
4. To study time division multiplexing.
5. To study pulse amplitude modulation.
6. To study delta and adaptive delta modulation and demodulation.
7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying.
9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
10. To study quadrature phase shift keying & quadrature amplitude modulation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES
(PHP and MySql)

Course Code: CSE2416 **Credit Units: 02**

Course Objective:
This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc.

Course Contents:
Module I: Introduction to Open Source and PHP programming
Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.

Module II: Operator, Loops, Array, Exception and Error Handling
Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array.
Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.

Module III: Classes, File system, Passing Information between pages
Object orientedprogrammingwithPhp, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server.
HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.

Module IV: Workingwithdatabase
HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input usingJavascript.
MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL APIBuilding Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.

Module V: WorkingwithFrameworks
Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Woprking with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:
Text:
- Beginning PHP, Apache, MySQL Web Development, Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, published by Wiley, wrox
- PHP, MySQL and Apache Julie C Meloni Pearson Education ISBN : 81-297-0443-9

References:
- The Complete Reference PHP, by Steven Holzner, Tata McGraw-Hill Publication
- Beginning PHP and MYSQL, by W. Jason Gilmore, Apress Publication

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP and MySql) LAB

Course Code: CSE2417 **Credit Units: 01**

Course Contents:

1. Write the process of installation of web server.
2. Write programs to print all details of your php server. Use phpinfo().
3. Write a program to give demo of ECHO and PRINT command.
4. Write a program to implement the string functions.
5. Write a program to print Fibonacci series upto a given number using recursion.
6. Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice.
7. Write a program sort ten number by using array.
8. Write a program to demonstrate the concept of associative array.
9. Write a program to demonstrate the concept of multidimensional array.
10. Write a program to demonstrate the concept of Classes & objects.
11. Create a login form with two text fields called “login” and “password”. When user enters “Amity”as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry.HTML in case of wrong username/password.
12. How to work with sessions in PHP?
13. Introduction to Mysql creating databases, tables, using command line and gui interface, phpmyadmin
14. How to connect to MySQL using PHP ? Write programs for insertion, deletion updates and other sql queries. Design front end using html, css and write php scripts for processing of data. Try all different methods of connecting from php to MySQL
15. Make a small project with mysql and php to perform CRUD operations. Use Session also.
16. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”.
17. Write a program to design login form in which find the greatest number amongst three numbers.
18. WAP for Marksheet generation.
19. Design a webpage for entering the student details with all the validations applied on it.
20. Write a php script to print current date and time.
21. Write a pp script to use include and require functions.
22. Write a php script including all the file handling functions.
23. Design a website using Wordpress /Joomla/Drupal
24. Introduction to Laravel frame work and one simple project.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ARTIFICIAL NEURAL NETWORKS

Course Code: CSE2410 **Credit Units: 02**

Course Objective:
Aim of this course is to introduce the students fundamentals concepts of Nural network and its various application in computer science.

Course Contents:
Module I:-
Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications.

Module II:-
Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms,
Learning rule:-
Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule.

Module III:-
Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.

Module IV:-
Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.

Module V:-
Associative memory, auto-associative memory, bi-directional associative memory.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Book:

- Kenji Suzuki (ed.) - InTech **,** 2013
- Todd Troyer - University of Texas at San Antonio **,** 2005

ARTIFICIAL NEURAL NETWORKS LAB

Course Code: CSE2411 **Credit Units: 01**

Course Objective
The aim of this lab to gain the practical knowledge of basic neuron models and learning algorithms.

Lab Assignment
To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox

Examination Scheme

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Fifth Semester

SOFTWARE ENGINEERING

Course Code: CSE2501 **Credit Units: 03**

Course Objective:
The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software. The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly be based on the classical analysis-design-implementation framework.

Course Contents:

Module I: Introduction
Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

Module II: Software Metrics and Project Planning
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Module III: Software Requirement Analysis, design and coding
Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding,

Module IV: Software Reliability, Testing and Maintenance
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing,Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards.Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

Module V: UML
Introduction to UML,Use Case Diagrams, Class Diagram: State Diagram in UMLActivity Diagram in UMLSequence Diagram in UMLCollaboration Diagram in UML, Domain,Component Diagram and Deployement Diagram

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

References:

- R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
- P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
- Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
- James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons.
- Sommerville, “Software Engineering”, Addison Wesley, 1999.

COMPUTER ARCHITECTURE

Course Code: CSE2502 **Credit Units: 04**

Course Objective:
This course deals with computer architecture as well as computer organization and design. Computer architecture is concerned with the structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. Computer organization is concerned with the way the hardware components are connected together to form a computer system. Computer design is concerned with the development of the hardware for the computer taking into consideration a given set of specifications.

Course Contents:

Module I: Register Transfer Language
Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.

Module II: Basic Computer Organizations and Design
Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit

Module III: Central Processing Unit
Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC
Computer Arithmetic: Introduction, Addition and Subtraction Algorithm,Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations

Module IV: Memory and Intrasystem Communication and Input output organisation
Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniues, Virtual Memory, Memory Management Hardware
Intrasystem communication and I/O: Peripheral Devices, Input-Output
Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer,Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication

Module V: Introduction to Pipelining and MultiProcessor
Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline
Multiprocessors: Characteristics of Multiprocessors

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
- Harry &Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References:

- WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
- Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
- Kai Hwang & Faye a Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, "Computer Organization," McGraw hill.
- Tennenbaum," Structured Computer Organization," PHI
- B. Ram, "Computer Fundamentals architecture and organization," New age international Gear C. w., "Computer Organization and Programming, McGraw hill

JAVA PROGRAMMING

Course Code: CSE2503 **Credit Units: 03**

Course Objective:
The objective is to impart programming skills used in this object oriented language java.
The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

Course Contents:

Module I: Java Basics
Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.

Module II: Java Object Oriented
Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.

Module III: Exception Handling and Threading
Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception.
Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.

Module IV : Event Handling And AWT
Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces
AWT: Working with Windows, AWT Controls, Layout Managers

Module V: Java Advanced
AppletClass, Architecture, Skeleton, Display Methods.
Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes.
Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

References:
- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999

ANALYSIS AND DESIGN OF ALGORITHM

Course Code: CSE2511 **Credit Units: 03**

Course Objective:
The designing of algorithm isan important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program

Course Contents:

Module I: Introduction
Algorithm Design paradigms - motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations. Recurrences- substitution method, recursion tree method, master method

Module II: Divide and conquer
Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort**,** Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.
Greedy Method
Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman

Module III: Dynamic programming
Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem

Module IV: Graph searching and Traversal
Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search)
Back tracking
Overview, 8-queen problem, and Knapsack problem
Brach and bound
LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

Module V: Computational Complexity
Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication
- T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm,"

References:
- Sara Basse, A. V. Gelder, "Computer Algorithms," Addison W
- J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"
- D. E. Knuth, " The art of Computer Program

SOFTWARE ENGINEERING LAB

Course Code: CSE2504 **Credit Units: 01**

Software Required: Rational Rose

Assignments will be provided for the following:

- Use of Rational Rose for visual modeling.
- Creating various UML diagrams such as use case, sequence, collaboration, activity, state diagram, and class diagrams.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

JAVA PROGRAMMING LAB

Course Code: CSE2505 **Credit Units: 01**

Software Required: JDK1.3

Assignments will be provided for the following:

- Java programs using classes & objects and various control constructs such as loops etc, and data structures such as arrays, structures and functions
- Java programs for creating Applets for display of images and texts.
- Programs related to Interfaces & Packages.
- Input/Output and random files programs in Java.
- Java programs using Event driven concept.
- Programs related to network programming.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ANALYSIS AND DESIGN OF ALGORITHM LAB

Course Code: CSE2512 **Credit Units: 01**

Lab assignment will be based on the following:

Programs for binary search and Quick sort by using divide and conquer techniques.
Programs on algorithm based on greedy method.
Programs on algorithm based on Dynamic programming.
Programs on Depth First and Breadth Search traversals of graphs.
Programs on algorithm based on backtracking.
Programs on algorithm based on Brach and Bound.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION-I

Course Code: CSE2535 **Credit Units: 03**

Course Objective:
The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

VHDL PROGRAMMING

Course Code: CSE2506 **Credit Units: 02**

Course Objective:
VHDL is commonly used as a design-entry language for field-programmable gate arrays and application-specific integrated circuits in electronic design automation of digital circuits. The course aims to discuss the syntax of the language to model a digital system.

Course Contents:

Module I
Fundamental VHDL Units, LIBRARY Declarations, ENTITY, ARCHITECTURE, Introductory Examples, Specification of combinational systems using VHDL, Introduction to VHDL, Basic language element of VHDL, Behavioural Modeling, Data flow modeling, Structural modeling, Subprograms and overloading, VHDL description of gates.

Module II
Data Types; Pre-Defined Data Types, User-Defined Data Types, Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data Types, Data Conversion

Module III: Sequential codes
PROCESS: Signals and Variables, IF, WAIT, CASE, LOOP, CASE versus IF, CASE versus WHEN, Bad Clocking, Using Sequential Code to Design Combinational Circuits
Description and design of sequential circuits using VHDL,

Module IV
Standard combinational modules, Design of a Serial Adder with Accumulator, State Graph for Control Network, design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of a Binary Divider.

Module V
Micro programmed Controller, Structure of a micro programmed controller, Basic component of a micro system, memory subsystem. Overview of PAL, PLA, FPGA, CPLD.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- J. Bhaskar, “A VHDL Primer”, Addison Wesley, 1999.
- Volnei A. Padroni, “Circuit Design with VHDL.”
- M. Ercegovac, T. Lang and L.J. Moreno, ”Introduction to Digital Systems”, Wiley,2000
- C. H. Roth, “Digital System Design using VHDL”, Jaico Publishing, 2001

References:

- VHDL Programming by Examples by Douglas L. Perry, TMH, 2000
- Hardware Description Languages by Sumit Ghose, PHI, 2000
- The Designer Guide to VHDL by P.J. Ashendern; Morgan Kaufmann Pub. 2000
- Digital System Design with VHDL by Mark Zwolinski; Prentice Hall Pub. 1999
- Designing with FPGA & CPLDs by Zeidman; CMP Pub. 1999
- HDL Chip Design by Douglas J. Smith; Doone Pub. 2001

VHDL PROGRAMMING LAB

Course Code: CSE2507 **Credit Units: 01**

Software Required: Mentor Graphics

Topics covered in lab will include:

- Designing Basic Gates.
- Designing Combinational circuits like adder, multiplexer, PLA
- Designing Sequent ional Circuits like flip-flops, counters, registers.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DISTRIBUTED OPERATING SYSTEM

Course Code: CSE2513 **Credit Units: 03**

Course Objective:
This Subject provides students with an in-depth knowledge about the operating system. The former treats the standard principles of single processor system, including processes, synchronization, I/O, deadlocks, mutual exclusion, fault tolerance , Memory Management, File Management systems, security and so on. This subject covers distributed operating system in detail, including communication process, file system and memory management synchronization and so on but this time in the context of distributed systems

Course Contents:

Module I: Introduction
Functions of an Operating System, Design Approaches, Review of Network Operating System and Distributed Operating System, Issue in the design of Distributed Operating System, Overview of Computer Networks, Modes of communication, System Process, Interrupt Handling, Handling Systems calls, Protection of resources, Micro-Kernel Operating System, client server architecture.

Module II: Distributed Mutual Exclusion
Lamppost's Algorithm, The Critical Section Problem, Other Synchronization Problems, Language Mechanisms for Synchronization, Axiomatic Verification of Parallel Programs, Inter process communication (Linux IPC Mechanism), Remote Procedure calls, RPC exception handling, security issues, RPC in Heterogeneous Environment, Case studies.

Module III: Synchronization in Distributed System
Deadlocks in Distributed Systems, Centralized Deadlock- Detection Algorithms, Distributed Deadlock Detection Algorithm' Path Pushing Algorithm, Edge Chasing Algorithm, Diffusion Computation Based Algorithm.
Clock Synchronization: Logical clocks, Physical clocks, Vector Clock, clock synchronization algorithms, Mutual Exclusion, Non-Token Based Algorithms – Lamport's Algorithm, Token-Based Algorithms, Suzuki-Kasami's Broadcast Algorithm, Election Algorithms,

Module IV: Distributed Shared Memory
Introduction, Architecture & Motivation Algorithms for Implementing DSM: The Central – Server Algorithms, The Migration Algorithms, The Read – Replication Algorithms, The Full- Replication Algorithms. Memory Coherence, Coherence Protocols: Write Invalidate Protocol, Write Update Protocol, Design Issues: Granularity , Page Replacement

Module V: Concurrency Control Algorithms
Basic Synchronization Primitives, Two –Phase Locking Protocol, Timestamp Based Algorithms, Two –Phase Commit Protocol. Voting Protocols: Static Voting, Majority Based Dynamic Voting Protocol.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- A. S. Tanenbaum, Distributed Operating Systems, Prentice-Hall, ISBN 0-13-219908-4.
- SinghalShivratri Advanced Concepts in Operating Systems TMH 1994.
- M. Beck et al Linux Kernal, Internal Addition Wesley, 1997.
- B. W. Kernighan and R Pide, The Unix Programming Environment Prentice Hall of India - 2000.
- A. Silberschatz P.B Galvin Operating System Concept, John Wiley & Sons (Asia) 2000.
- Cox K, "Red Hat Linux Administrator's Guide". PHI (200).

FUZZY LOGIC& GENETIC ALGORITHM

Course Code: CSE2514 **Credit Units: 03**

Course Objective:
This course is intended to mathematical introduction to the analysis, synthesis, and design of control systems using fuzzy logic and Genetic Algorithm. A study of the fundamentals of fuzzy sets, operations on these sets, and their geometrical interpretations. Methodologies to design fuzzy models and feedback controllers for dynamical systems,Various applications and case studies.
fuzzy inference systems, fuzzy logic control,parallelprocessors,multilevel optimization- reallife problem and other machine intelligence applications of fuzzy logic and Genetic Algorithm.

Course Contents:
Module I: Introduction
Crisp sets: Overview, Fuzzy sets : Basic types and concepts,Characterstics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets

Module II: Fuzzy operations and Fuzzy arithmetic
Types of operations, Fuzzy complements, Fuzzy intersection:t-norms, Fuzzy union:t-conorms,Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables,Airthmetic operations on intervals, Airthmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.

Module III: Fuzzy systems And Applications
General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata.Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics

Module- IV: Introduction to Genetic Algorithm
Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithmgenetic modeling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.

Module-V: Genetic Technology
Genetic technology:- steady state algorithm, fitness scaling, inversion.Geneticprogramming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm.Advanced operators and techniques in genetic search:- Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.

Module- VI: Applications **5 lecture hours**
Genetic Algorithm in engineering and optimization-natural evolution –Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning-Genetic Algorithm and parallelprocessors- composite laminates- constraint optimization- multilevel optimization- reallife problem.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Fuzzy sets and fuzzy logic theory and application by George. j. klir , Bo Yuan
- David E. Goldberg, "Genetic Algorithms in search, Optimization & Machine Learning"

References:

- A First Course in Fuzzy and Neural Control by Nguyen, Prasad, Walker, and Walker. CRC 2003
- Artificial Intelligence by Negnevisky. Addison-Wesley
- Automatic Control Systems by Colnaraghi and Kuo. 9th edition. Wiley Publisher. 2010
- William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"
- 2. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems “

Syllabus - Sixth Semester

MICROPROCESSOR

Course Code: CSE2601 **Credit Units: 03**

Course Objective:
This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Introduction to Microcomputer Systems
Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations,interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams
Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing
Interfacing with 8085.Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.

Module IV: Architecture of 16-Bit Microprocessor
Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors
Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.]
- Douglas V Hall.

References:
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.

SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION

Course Code: CSE2602 **Credit Units: 03**

Course Objective:
The objective is to make aware students the concepts of compiler designing. It is expected students have should knowledge on automata theory. This course includes various Lexical Analysis, parsing techniques and syntax directed translation.

Course Contents:
Module I: Introduction
Phases , FSM & RE's and their application to Lexical Analysis, Implementation of Lexical Analyzers, The Syntactic specification of Languages: CFG, Derivation and Parse Trees, Capabilities of CFG.

Module II : System Programming
Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor , First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation, Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes.Booting techniques and sub-routines.

Module III: Basic Parsing Techniques
Parsers, Shift Reduce Parsing, Operator precedence parsing, topdown Parsing, Predictive Parsers.

Module IV: Automatic Construction of efficient Parsers
LR Parsers, the canonical collection of LR(0) items, constructing SLR Parsing Tables, Constructing canonical LR Parsing tables and LALR parsing tables, An Automatic Parser Generator, Implementation of LR parsingTables, Constructing LALR sets of items.

Module V: Syntax Directed Translation
Syntax directed Translation Schemes, Implementation of Syntax directed translators, Intermediate Code, Postfix notation, Parse Trees and Syntax Trees, Three address Code, Quadruple & Triples, Translation of Assignment Statements, Postfix Translation.

Module VI: Error detection and Recovery
Lexical phase errors, syntax phase errors, semantic errors Code Optimization: Loop optimization, the DAG representation of basic blocks, value numbers and Algebraic Laws, Global Data – Flow Analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Alfread V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
- Ullman, Principles of Compiler Design, Narosa publications.
- Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.
- Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.
- D.M. Dhamdhere, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
- Holub, "Compiler Design in C", PHI.
- Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill
- Waite W.N. and Goos G., "Compiler Construction" Springer Verlag.

ADVANCED JAVA PROGRAMMING

Course Code: CSE2604 **Credit Units: 03**

Course Objective:
The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Contents:

Module I : Distributed Computing
Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.

Module II : Database Connectivity
ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql.

Module III : Servlet Programming
Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.

Module IV: JSP Programming
JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.

Module V: JEE Web Appliaction
The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application;Introduction to EJB.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
- Professional Java Server Programming (a Press), Allamaraju
- Developing Java Servlets (Techmedia – SAMS), James Goodwill sing Java 1.2 Special Edition (PHI), Webber

References:
- David Flanagan,Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell - A desktop Quick reference - O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, “JAVA 2” PEARSON publication

MICROPROCESSOR LAB

Course Code: CSE2605 **Credit Units: 01**

Course Contents:

1. To load the numbers 49H and 53H in the memory location 9510 and 9511
2. respectively and add the contents of memory location 9601
3. To write assembly language programming for 8 bit addition with and without carry.
4. To write assembly language programming for 8 bit subtraction with and without borrow.
5. To write assembly language programming for 8 bit multiplication and division.
6. To write assembly language programming for sorting an array of numbers in ascending and descending order.
7. To write assembly language programming with additional instructions.
8. To write and execute a program using stacks.
9. To study and program the programmable peripheral interface (8255) board.
10. To study and program the programmable interval timer (8253) board.
11. To study and program the programmable DMA controller (8257) board.
12. To study and program the programmable interrupt controller (8259) board.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SYSTEM PROGRAMMING & COMPILER CONSTRUCTION LAB

Course Code: CSE2606 **Credit Units: 01**

Software Required: Turbo C++

Assignment will be provided for following:

List of Programs:

1. WAP to check whether string is accepted or not for entered grammar.
2. WAP to convert Infix to Postfix notation.
3. WAP to convert Infix to Prefix notation.
4. WAP to find no of Tokens in an expression.
5. WAP to convert Regular Expression to NFA.
6. WAP to convert NFA to DFA.
7. Write a program to implement Text Editor.
8. WAP calculate FIRST and FOLLOW of a grammar.
9. WAP to implement shift reduce parser.
10. WAP to implement symbol table .

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED JAVA PROGRAMMING LAB

Course Code: CSE2608 **Credit Units: 01**

Programming Language: Java

1. WAP to display label on a frame with the help of JFrame
2. WAP to display six buttons on a panel using JFrame.
3. WAP. To display an image and a string in a label on the JFrame.
4. WAP that implement a JApplet that display a simple label
5. WAP that implement a JApplet and display the following frame
   a. Customer name
   b. Customer number
   c. Age
   d. Address
6. WAP to access a table Product Master from MS-Access using Java code.
7. WAP that implement a simple servlet program.
8. WAP for authentication, which validate the login-id and password by the servlet code.
9. WAP to connecting a database using user-id and password.
10. WAP to insert data into the database using the prepared statement.
11. WAP to read data from the database using the Resulset.
12. WAP to read data send by the client (HTML page) using servlet.
13. WAP to include a HTML page into a JSP page.
14. WAP to handle the JSPException.
15. WAP to read data send by a client (HTML page) using JSP.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CRYPTOGRAPHY AND NETWORK SECURITY

Course Code: CSE2603 **Credit Units: 03**

Course Objective:
Network Security was always important, but has gained significance with the increase of application of Internet associated e-commerce. Threat and compromise /Breach potentially increased with the introduction of the end user involment,communication and networking .Thus the course is introduced to make the student acquainted with the concepts and practices to make the network environment secure.

Course Contents:

Module I
Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Module II
Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relativeprime numbers, Extended Euclidean Algorithm,Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, DiscreteLogarithmic Problem,Principals of public key crypto systems, RSA algorithm, security of RSA.

Module III
Message Authentication Codes: Authentication requirements, authentication functions, messageauthentication code, hash functions, birthday attacks, security of hash functions, Secure hashalgorithm (SHA)Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signaturestandards (DSS).

Module IV
Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange,Public key distribution, X.509 Certificates, Public key Infrastructure.Authentication Applications: Kerberos

Module V
IP Security: Architecture, Authentication header, Encapsulating security payloads, combiningsecurity associations, key management.Introduction to Secure Socket Layer, Secure electronic transaction (SET). Viruses and related threats,Firewalls.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- William Stallings" Cryptography and Network Security: Principles and Practices" PHI
- "Applied Cryptography", Bruce Schiener.
- Bernard Menezes," Network Security and Cryptography", Cengage Learning.
- Atul Kahate, "Cryptography and Network Security", TMH.

SOFTWARE TESTING AND QUALITY ASSURANCE

Course Code: CSE2612 **Credit Units: 03**

Course Objective:
To apply all the testing skills of software testing in such a way that it can provide and improve the software development methodology. Basic objective of Software Testing is to develop methods and procedures at can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle for the development.

Course Contents:

Module I
Software Testing Fundamentals - Software Testing Definition, Importance, objectives, why is it too hard? Errors, faults and failure. Testing process, STLC, QA and QC, Verification and Validation, Inspections and walkthroughs, Test Plan, test cases, drivers, stubs, Validation checks.

Module II
Black box testing - Definition, Equivalence Class, Boundary Value Analysis, Documentation testing,state based testing, White box testing – Definition, Difference between black box testing and white box testing, Path testing, Cyclomatic complexity, graph metrics, mutation testing.

Module III
Levels of testing- Low level testing- Unit testing and Integration testing. High level testing- System testing, performance testing, stress testing, load testing, volume testing, smoke and sanity testing, Installation testing, usability testing, website testing, security testing, recovery testing, Domain testing, Static testing and dynamic testing,

Module IV
Test cases– Designing, Execution. Reducing number of test cases- Prioritization guidelines, priority category, scheme, risk analysis, regression testing. Designing scripts, RTM, TRS.

Module V
Cohesion and coupling in class testing, GUI testing, integration and system testing, Automated Testing tools - Manual vs. Automated testing, Static and Dynamic Testing tools, Characteristics: Rational tools, Quality Standards- CMM, ISO, Six sigma, McCall's Quality Factors and Criteria, Quality Metrics

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Software Testing, Srinivasan Desikan, Pearson Education
- Software Testing, R.B.Chopra
- Software Engineering: A Practitioner's Approach, Roger S. Pressman

References:
- Software Testing tools, K.V.K.K Prasad, Dreamtech
- Foundations of software Testing, ISTQB Certification, Dorothy Graham
- Software Test Engineer's Handbook, Graham Bahms

VLSI DESIGN

Course Code: CSE2610 **Credit Units: 02**

Course Objective:
In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

Course Contents:

Module I: Devices and the wire
Diode, dynamic and transient behaviour-diffusion capacitance, SPICE diode model.
MOSFET STATIC BEHAVIOUR: Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS, depletion and enhancement device
DYNAMIC BEHAVIOUR: Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE MODELS for MOS transistors
The Wire: Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

Module II: CMOS Inverter
VTC of an ideal inverter, Switching Model of the CMOS inverter: nMOS /pMOS discharge and charge, VTC of CMOS inverter: PMOS AND NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer
Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tristate inverter, Resistive load inverter.
Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages
Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

Module III: Combinational circuits
CMOS LOGIC: Good 0 and poor 0, Goo1 and poor 1, series and parallel N and P switches, 2 and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay,
Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates
Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay. Pass-transistor logic, pass gate configurations for nmos and pmos, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain
Dynamic CMOS design: Precharge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic

Module IV: Sequential Logic circuits
Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

Module V: Layout Design Rules
Introduction to CMOS Process technology, Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design

VLSI DESIGN LAB

Course Code: CSE2611 **Credit Units: 01**

Course Contents:

1. Using Design architect and simulate V vs time for CMOS inverter using same W/L ratio for PMOS and NMOS.
2. Design and simulate again by Sizing PMOS to NMOS appropriately and repeat experiment 1
3. Design and simulate V vs t for 2 input NAND and Nor gates.
4. Design and Simulation for general CMOS functions
5. One bit full adder simulation
6. 2:1 MUX using pass transistor logic
7. Other functions using pass transistor logic
8. Layout of CMOS inverter
9. Layout of NAND and NOR gates
10. Design and Simulation SR latch using NAND and NOR representations
11. Design and simulate D flip flop

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Seventh Semester

DATAWAREHOUSING & DATA MINING

Course Code: CSE2701 **Credit Units: 03**

Course Objective:
The objective of this course is to introduce students to Data Warehousing & Data mining technologies that will help to Inspect, Control and Secure Information through Databases.

Course Contents:
Module I: Introduction to Data Warehousing
Data Warehouse definition & Characteristics, The need for data ware housing, Operational and Informational Data Stores, Difference between Data warehouse and DBMS, Benefits of Data warehousing, Data mart, Meta Data, Conceptual Modeling of Data Warehouses: star schemas, Snowflake, Fact Constellations with example each.

Module II: Data Warehousing Components & Architecture
Data Warehouse Architecture, Components of Data Warehouse Architecture, Data Warehousing Topologies, Meta Data, Components of Meta data, Mapping Meta Data. Challenges with Data Warehousing.

Module III: On Line Analytical Processing (OLAP)
Definition: OLAP, Difference between OLTP and OLAP, OLAP Server Architecture, OLAP Operations, Multi Relational & Multi Dimensional: MOLAP, ROLAP, OLAP Tools, Metadata Repository, Data Warehouse Back-End Tools and Utilities.

Module IV: Data Mining
Introduction to Data Mining, Applications, Limitations, Techniques, Association Rules: Priori Algorithm, Direct Hashing and Pruning (DHP), Classification: Decision Tree, Split Algorithm based on Information Theory, Bayes Method.

Module V: Cluster Analysis: Concepts and Methods
Cluster Analysis: Features, Types of Cluster Analysis Methods: Partitional, Hierarchical, Density Based, Grid based Methods, , Web Data Mining, Search Engine, Case Study, Limitations.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.
- (Berry, Michael)Data Mining Techniques.
- (Sharma, Gajendra)Data Mining, Data Warehousing and OLAP.
- (Gupta, GK) Data Mining with Case Studies.
- (Han & Kamber)Data Mining: Concepts and Techniques.
- (Paulraj Ponniah) Datawarehousing Fundamentals.

COMPUTER GRAPHICS

Course Code: CSE2710 **Credit Units: 03**

Course Objective:
The objective of the course is to provide the understanding of the fundamental graphical operations and the implementation on computer, the mathematics behind computer graphics, including the use of spline curves and surfaces. It gives the glimpse of recent advances in computer graphics, user interface issues that make the computer easy, for the novice to use.

Course Contents:

Module I: Introduction to Graphics and Graphics Hardware System
Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.

Module II: Output Primitives and Clipping operations
Algorithms for drawing 2D Primitives lines (DDA and Bresenham‘s line algorithm), circles (Bresenham‘s and midpoint circle algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.

Module III: 2D Geometric transformation
2D Transformation: Basic transformat ion, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.

Module IV:3D Geometric transformation
3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation

Module V: object modeling and Visible Surface detection
fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter‘s algorithm), Binary search partition method, Scan line method,

Module VI: Introduction to multimedia
Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References*:*
Text:

- Foley et. al., “Computer Graphics Principles & practice”, 2nd ed. AWL, 2000.
- D. Hearn and P. Baker, “Computer Graphics”, Prentice Hall, 1986.
- R. Plastock and G. Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, McGraw Hill, 1986

References:

- R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
- C.E. Leiserson, T.H. Cormen and R.L. Rivest, “Introduction to Algorithms”, McGraw-Hill Book Company, 1990.
- W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
- F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
- D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989
- David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
- Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 1992

ADVANCED COMPUTER ARCHITECTURE

Course Code: CSE2711 **Credit Units: 03**

Course Objective:
With increase in availability of system resources, concept of parallel architecture has obtained immense popularity. This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources. In this course we have discussed the theory, technology, architecture (hardware) and software aspects of parallel computer and Vector computers.

Course Contents:
Module I: Parallel computer models
The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks
Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Module II: System Interconnect Architectures
Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Module III: Processors and Memory Hierarchy
Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors
Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

Module IV: Backplane Bus System
Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design,Computer airthmetic principles.

Module V: Vector Processing Principles
Vector instruction types, Vector-access memory schemes.
Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Kai Hwang, “Advanced computer architecture”; TMH, 2000.

References:

- J.P. Hayes, “computer Architecture and organization”, MGH, 1998.
- M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”, Narosa Publishing, 1998.
- D.A. Patterson, J.L. Hennessy, “Computer Architecture: A quantitative approach”, Morgan Kauffmann, 2002.
- Hwang and Briggs, “Computer Architecture and Parallel Processing”; MGH,

DATAWARE HOUSING & DATA MINING LAB

Course Code: CSE2704 **Credit Units: 01**

Course Contents:

Programming Language: Weka 3.6

List of Experiments/Programs:

1. Defining Weather relation for different attributes
2. Defining employee relation for different attributes
3. Defining labor relation for different attributes
4. Defining student relation for different attributes
5. Exploring weather relation using experimenter and obtaining results in various schemes
6. Exploring employee relation using experimenter
7. Exploring labor relation using experimenter
8. Exploring student relation using experimenter
9. Setting up a flow to load an arff file (batch mode) and perform a cross validation using J48
10. Design a knowledge flow layout, to load attribute selection normalize the attributes and to store the result in a csv saver.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMPUTER GRAPHICS LAB

Course Code: CSE2712 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

Assignments will be provided for the following:

- Geometrical shapes based on graphics algorithms
- 2D Geometric transformation translation, rotation, scaling, reflection.
- Clipping
- Animation

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION-II

Course Code: CSE2735 **Credit Units: 03**

Guidelines:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:
A4 size paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top & bottom margins: 1 inch/ 2.5 cm
Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the delaines.

STUDENT ASSESSMENT RECORD (SAR)

1. **Range of Research Methods used to obtain information**

2. **Execution of Research**

3. **Data Analysis**
    - Analyse Quantitative/ Qualitative information
    - Control Quality

4. **Draw Conclusions**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

SOFT COMPUTING

Course Code: CSE2751 **Credit Units: 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organise, process, share and use the knowledge embedded in multimedia content. Research will aim to maximise automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services.

Course Contents:

Module I: Soft Computing
Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Module II: Neural Network
Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA

Module III
Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.

Module IV: Fuzzy Logic
Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

Module V: Genetic algorithm
Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

Examination Scheme:

Components	CT	H	V/S/O	AT	EE
Weightage (%)	10	8	7	5	70

Text & References:

- S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication
- Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
- Hagen, Neural Network Design, Cengage Learning

MOBILE COMPUTING

Course Code: CSE2707 **Credit Units: 03**

Course Objective:
The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Contents:

Module I: Introduction to Personal Communications Services (PCS)
PCS Architecture, Mobility management, Networks signaling.
Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP)
GPRS Architecture, GPRS Network Nodes.
Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Module III:Third Generation (3G) Mobile Services
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module IV: Global Mobile Satellite Systems
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

Module V:Enterprise Networks
Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

References:

- "Guide to Designing and Implementing wireless LANs", by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
- "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
- "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

GRID COMPUTING

Course Code: CSE2709 **Credit Units: 03**

Course Objective:
Grid computing (or the use of a *computational grid*) is applying the resources of many computers in a network to a single problem at the same time - usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data. The major objective of this course is to provide a sound foundation to the students on the concepts, percepts and practices in a field that is of immense concern to the industry and business.

Course Contents:

Module I: Introduction-Cluster to grid computing
Cluster computing models, Grid models, Mobile grid models, Applications.
Parset: System independent parallel programming on distributed systems: Motivation and introduction, Semantics of the parset construct, Expressing parallelism through parsets, Implementing parsets on a loosely coupled distributed system.
Anonymous remote computing model: Introduction, Issues in parallel computing on interconnected workstations, Existing distributed programming approaches, The arc model of computation, The two tired arc language constructs, Implementation

Module II: Integrating task parallelism with data parallelism
Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work
Anonymous remote computing and communication model: Introduction, Location in dependent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes, Case study, and Performance analysis.

Module III: Parallel programming model on CORBA
Introduction, Existing works, notion of concurrency, system support implementation performance, sitability of CORBA: introspection.
Grid computing model: Introduction, a parallel computing model over grids, Design and implementation of the model, Performance studies, Related work.

Module IV: Introducing mobility into anonymous remote computing and communication model
Introduction, issues in mobile clusters and parallel computing on mobile clusters, moset overview, moset computation model, implementation, performance.

Module V: Parallel Simulated Annealing algorithms
Introduction, Simulated annealing (SA) Technique, Clustering algorithm for simulated annealing (SA), Combination of genetic algorithm and simulated annealing (SA) algorithm

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- "Grid Computing a Research Monograph" by D. Janakiram, Tata McGraw hill publications, 2005

References:

- "Grid Computing: A Practical Guide to technology and Applications" by Ahmar Abbas, Charles River media – 2003.
- "Grid Computing" Joshy Joseph & Craig Fellenstein, Pearson Education

TERM PAPER

Course Code: CSE2731 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER
The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of Materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the Notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing & Preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.

d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
(i) Show evidence of what an author has said.
(ii) Avoid misrepresentation through restatement.
(iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
1) Title page
2) Table of contentsIntroduction
3) Review
4) Discussion&Conclusion
5) References
6) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

Reference
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World

Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: CSE2732 **Credit Units: 02**

Course Objective:
The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

STUDENT ASSESSMENT RECORD (SAR)

Record to be maintained by project guide.

1. **Project Tools (Hardware/ Software) used fot implementation.**

2. **Project Evaluation& Execution.**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

WORKSHOP/ INDEPENDENT STUDY

Course Code: CSE2733 **Credit Units: 02**

This is an elective, self-directed course to investigate aemerging areasof IT and Computer Science like Mobile Operating System, Cloud Computing, or from Current Research Areas etc. The primary goal of the course is to provide students with research exploration of a specific topic of interest to the individual student under the advisement of an instructor who will monitor and critique the student's progress.

Independent study provides students with the opportunity to work one-on-one with a Faculty on a particular topic. The student and faculty should discuss the aims and content of the study and present the proposal to Head of Department. The independent study proposal should include the study's title, theme, readings, work to be submitted, and syllabus. Faculty and student should meet for a minimum number of 2 hours per week. Student will give a seminar after completion of study.

Syllabus - Eighth Semester

PROJECT-DISSERTATION

Course Code: CSE2837 **Credit Units: 08**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements**(optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

DIGITAL IMAGE PROCESSING

Course Code: CSE2803 **Credit Units: 02**

Course Objective:
Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. *Digital Image Processing* is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematica.

Course Contents:
Module I: Introduction and Digital Image Fundamentals
The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Module II: Image Enhancement in the Spatial Domain
Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Module III: Image Enhancement in the Frequency Domain:
Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.
Image Restoration
A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

Module IV: Image Compression
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.
Image Segmentation
Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.

Module V: Representation and Description
Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms.
Object Recognition
Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Rafael C. Conzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:
- Rosefield Kak, "Digital Picture Processing",
- W.K. Pratt, "Digital Image Processing",

DIGITAL IMAGE PROCESSING LAB

Course Code: CSE2805 **Credit Units: 01**

Software Required: Java

List of Assignements:

Experiments will be based on Image Representation, Image transformation, Image Enhancements, Edge Detection, Morphological Image processing and Segmentation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DOT NET PROGRAMMING

Course Code: CSE2804 **Credit Units: 02**

Course Objective:
To create web based applications using ASP.NET.

Course Contents:

Module I: Introduction to .NET technologies
Features of .NET, .NET Framework, CLR, What is ASP.NET? Difference between ASP and ASP.NET.
Design View, HTML View, Default Files used in ASP.NET. Concept of Master pages, Intrinsic Objects of ASP.Net, Structure of ASP.NET page, Cascading Style Sheet: Embeded, Inline, External.

Module II: Controls in ASP.NET
Overview of Dynamic Web page, Understanding ASP.NET Controls, Applications, Web servers, Installation of IIS. Web forms, web form controls -server controls, client controls. Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box. Adding controls at runtime. Running a web Application, creating a multiform web project. Form Validation: Client side validation, server Side validation, validation Controls: Required Field Comparison Range. Calendarcontrol, Ad rotator Control, Internet Explorer Control.

Module III: Overview of ADO.NET and XML
What is ADO.NET, from ADO to ADO.NET. ADO.NET architecture, Accessing Data using Data Adapters and Datasets, using Command & Data Reader, binding data to data bind Controls, displaying data in data grid, XML basics, attributes, fundamental XML classes: Document, text writer, text reader. XML validations, XML in ADO.NET, The XML Data Document, Data Binding and its yypes.

Module IV: ASP.NET Applications
Creating, tracking, caching, error handling, Securing ASP.NET applications- form based applications, window based application.

Module V: Web services
Introduction, State management- View state, Session state, Application state, Building ASP.NET web services, working with ASP.NET applications, creating custom controls, Invoking COM/COM+, Activ X Components

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- ASP.NET Unleashed by Stephen Walther, SAMS publications

References:
- ASP.NET, Wrox Publications
- ASP.NET and VB.NET, Wrox Publication
- ASP.NET and C#.NET, Wrox publication.

DOT NET PROGRAMMING LAB

Course Code: CSE2806 **Credit Units: 01**

Course Contents:

- Use of Controls in creating web pages
- Creating sessions
- Creating Custom controls
- Implementing security

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SIMULATION & MODELING

Course Code: CSE2807 **Credit Units: 02**

Course Objective:
The goal is to introduce students to basic simulation methods and tools for modelling and simulation of continuous, discrete and combined systems. The objective is to impart knowledge of simulation principles. The ability to create simulation models of various types.

Course Contents:

Module I: Linear Programming
Linear Programming: Formulation, Graphical solution, standard and matrix form of linear programming problems, Simplex method and its Algorithm, Two-phase Simplex method.

Module II: Integer Programming
Integer Programming: Importance, Need and importance of Integer Programming, Gomory's All Integer Programming Problem technique and its algorithm.

Module III:Modeling & Simulation Concepts and Random Numbers
Modeling & Simulation Concepts:System Concepts**,** What is a Model?,Type of Models, Modeling & Simulation, Continuous vs. Discrete System Simulation, Numerical Integration vs. Continuous Simulation, Analog vs. Digital Simulation, Simulation vs. Monte- Carlo Simulation, Nature of Computer Modeling and Simulation, When to Use Simulation?, Limitations of Simulation, Validation**,** andSimulation Languages.
Random Numbers**:** Pseudo-random generators, Testing of Pseudo-random number generators, Generation of non-uniformly distributed random numbers.

Module IV:Simulation Experiments and Design of Application Simulators
Simulation Experiments:Run length of Static and Dynamic Stochastic Simulation Experiments, Minimizing variability in simulators without increasing Number of simulation Runs.

Module V:Design of Application Simulators Design of Application Simulators – for Multi-server Queuing System, PERT, Optimizing Inventory Policy and Cost in Business environment.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Sharma, S.D., Operations Research, Kedar Nath and Ram Nath, Meerut.
- Nar Singh Deo, "System Simulation with Digital computer", PHI, New Delhi.
- Taha, H.A., Operation Research – An Introduction, McMillan Publishing Co, New York.
- Gupta P.K., Hira and D.S., Operation Research, Sultan Chand & Sons, New Delhi.
- Kanti Swarup, Gupta P.K. & Man Mohan, Operation Research, Sultan Chand & sons, New Delhi.
- Rao S.S., Optimization Theory and Applications, Wiley Eastern Ltd. New Delhi.
- Gordon G., "System Simulation", PHI, New Delhi.
- Payne James A. , " Introduction to Simulation : Programming Techniques and Methods of Analysis, McGraw Hill International Editions, Computer Science services, New York.
- Jerry Banks, John S Carson II, Barry L Nelson and David M Nicol, Discrete Event Simulation, Pearson Education Asia, New Delhi.
- Francis Neelamkavil, "Computer Modeling and Simulation", John Wiley & Sons, New York.

SIMULATION AND MODELLING LAB

Course Code: CSE2811 **Credit Units: 01**

1. Basic Concepts of Simulation and Modeling and SIGMA (An Introduction).
2. Exploring the Car Wash Model. (Single queue single server)
3. The Car Wash Model (Single Queue two Servers)
4. Implementation of Buffered Queue Model
5. To Design Airport Model. (One queue multiple servers)
6. To Design a superstore model (Two queue and two servers)
7. To Design a Billing System (Two queues one Server)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

Amity School of Engg. & Technology

Bachelor of Technology - Electrical & Electronics Engineering

FLEXILEARN

-Freedom to design your degree

Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Technology - Electrical & Electronics Engineering

Syllabus - First Semester

ENGINEERING MATHEMATICS-I

Course Code: EEE2112 **Credit Units : 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING PHYSICS

Course Code: EEE2113 **Credit Units : 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .
Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

ENGINEERING CHEMISTRY

Course Code: EEE2114 **Credit Units : 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:
Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels
Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter,Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module IV: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module V: Corrosion
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ELEMENTS OF MECHANICAL ENGINEERING

Course Code: EEE2104 **Credit Units : 02**

Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

Course Contents:

Module I: Fundamental Concepts
Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

Module II: Stress And Strain Analysis
Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

Module III:Casting& Forging
Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

Module IV: Welding& Sheet metal working:
Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. *Internal Combustion Engine*, Tata McGraw-Hill.

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: EEE2105 **Credit Units : 03**

Course Objective:
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.
Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References:

- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers and Programming in 'C'.
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

ELECTRICAL SCIENCE

Course Code: EEE2106 **Credit Units : 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

ENGINEERING PHYSICS LAB

Course Code: EEE2115 **Credit Units : 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING CHEMISTRY LAB

Course Code: EEE2116 **Credit Units : 01**

Course Contents:

List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELEMENTS OF MECHANICAL ENGINEERING LAB

Course Code: EEE2108 **Credit Units : 01**

Course Contents:

1. Welding

(a)	Arc Welding	-	Butt Joint
		-	Lap Joint
		-	T Joint
(b)	Gas Welding	-	Butt Joint
		-	Lap Joint
		-	Brazing of Broken pieces

2. Foundry - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal
   - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop
   - Male – Female Joint
   - Rectangular piece Filing the job

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PROGRAMMING IN C LAB

Course Code: EEE2110 **Credit Units : 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELECTRICAL SCIENCE LAB

Course Code: EEE2111 **Credit Units : 01**

List of Experiments:

- To verify KVL & KCL in the given network.
- To verify Superposition Theorem.
- To verify Maximum Power Transfer Theorem.
- To verify Reciprocity Theorem.
- To determine and verify RTh, VTh, RN, IN in a given network.
- To perform open circuit & short circuit test on a single-phase transformer.
- To study transient response of a given RLC Circuit.
- To perform regulation, ratio & polarity test on a single-phase transformer.
- To measure power & power factor in a three phase circuit by two wattmeter method.
- To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

ENGINEERING MATHEMATICS-II

Course Code: EEE2209 **Credit Units : 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

Module IV: **Statistics and Probability**
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: EEE2203 **Credit Units : 03**

Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

Module I: Introduction

Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects

Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance

Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism

Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling

Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:

Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

ENGINEERING MECHANICS

Course Code: EEE2204 **Credit Units : 03**

Course Objective:
Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

Course Contents:

Module I: Force system & Structure
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Module II: Friction
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

Module III: Distributed Force
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

Module IV: Work -Energy
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: EEE2206 **Credit Units : 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab

ENGINEERING MECHANICS LAB

Course Code: EEE2207 **Credit Units : 01**

Engineering Mechanics:

- To verify the law of Force Polygon
- To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
- To determine the co-efficient of friction between wood and various surface (like
- Leather, Wood, Aluminum) on an inclined plane.
- To find the forces in the members of Jib Crane.
- To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
- To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
- Wheel and Axle
- To determine the MA, VR, η of Worm Wheel (2-start)
- Verification of force transmitted by members of given truss.
- To verify the law of moments using Bell crank lever
- To find CG and moment of Inertia of an irregular body using Computation method

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING GRAPHICS LAB

Course Code: EEE2208 **Credit Units : 01**

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface
Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

Syllabus - Third Semester

ENGINEERING MATHEMATICS-III

Course Code: EEE2308 **Credit Units : 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Partial Differential Equations
Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method, Homogeneous linear equations with constant coefficients, Non homogeneous linear equations.

Module II: Fourier Series
Periodic Functions, Fourier Series, Functions having points of discontinuity, Even or Odd Functions, Change of Interval, Half-range series, , Parseval's Formula, Complex form of Fourier series, Practical Harmonic Analysis, Fourier Transforms, Sine and Cosine Transforms.

Module III: Laplace Transformation
Definition, Transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Evaluation of integrals by Laplace transform, Inverse transforms, Other methods of finding inverse transforms, Convolution theorem, Application to differential equations, Simultaneous linear equations with constant coefficients, Unit step functions, Periodic functions.

Module IV: Linear Programming
Formulation of the problem, Graphical method, Canonical and Standard forms of L.P.P. Simplex Method, Artificial variable Techniques-M-method, Two phase method, Degeneracy, Dual simplex method.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain
- Higher Engineering Mathematics by B.S. Grewal

References:
- Differential Equations by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass
- Partial Differential Equations by I.N. Snedon

ANALOG ELECTRONICS-I

Course Code: EEE2302 **Credit Units : 03**

Course Objective:
This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:

Module I: Semiconductor Diode and Diode Circuits
Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module II: Bipolar Junction Transistor
Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in $I_{co,}$ V_{BE} & β, Stabilization factors, thermal stability.

Module III: Small signal Analysis of transistor and Multistage Amplifier
Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

Module IV: Field Effect Transistors
Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module V: Feedback Amplifiers
Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VI: Power amplifiers
Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

CIRCUITS & SYSTEMS

Course Code: EEE2303 **Credit Units : 03**

Course Objective:
The course intends to make the students proficient in analyzing circuits. At the completion of the course, the student should be able to construct and interpret block diagrams and signal flow graphs of control systems and to use basic methods of determining their stability.

Course Contents:

Module I: Graph Theory and Network equations
Graph of a network, Trees, Co-trees and loops, Cut set matrix, Tie set matrix, number of possible trees of a graph, duality, Loop Analysis and Node Analysis.

Module II: Analysis of circuits using classical Method
Time and Frequency domain analysis of RL, RC and RLC circuits, Linear constant coefficient differential equation.

Module III: Signals and Laplace Transforms
Unit step signal, Ramp signal, impulse signal, Laplace transformations and its properties, Gate function, Inverse Laplace transformations, Application of Laplace Transforms in circuit analysis.

Module IV: Network Theorems
Reciprocity theorem, Superposition theorem, Thevenin's and Norton's theorems, Millman's theorem, Maximum power transfer theorem, Compensation theorem, Tellegan's theorem.

Module V: Two port Network & Network Functions
Introduction, two port z-, y-, T-, h-parameters, Inter-relations among parameters, Condition for reciprocity and symmetry, Interconnections of two port networks, Driving point and transfer functions, Poles, Zeros and necessary condition for driving point and transfer function,.

Module VI: Network Synthesis
Hurwitz polynomial, Positive real functions, synthesis of LC, RC, RL immittance functions.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- M.E. Valkenburg, "Network analysis", PHI.
- D. R. Choudhary, "Networks and Systems", New Age International.
- K.M. Soni, 2009, "Circuits and Systems", VIII Edition, S.K. Kataria & Sons Delhi.

References:

- Bhise, Chadda, Kulshreshtha, "Engineering network analysis and filter design", Umesh Publication.
- F.F. Kuo, "Network Analysis and Synthesis", Wiley India Pvt. Ltd.

SIGNALS AND SYSTEMS

Course Code: EEE2304 **Credit Units : 03**

Course Objective:
The objective of the course is to provide knowledge of Signals and Systems to students of ECE. This Course includes good insight of types of signals and types of systems, various operations performed on them through the use of Fourier series, Fourier transform, z transform.

Course Contents:

Module I: Signals and Systems
Introduction of signals and systems; classification of signal, continuous time and discrete time signals, operations performed on them, even and odd signals, periodic and non periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.

Module II: LTI system
Response of LTI system for continuous and discrete time systems, Impulse response, Step response, properties of continuous LTI and discrete LTI systems, LTI systems described by differential and difference equation, analysis of LTI Systems, interconnection of systems.

Module III: Fourier series
Representation of continuous time periodic signal, properties of continuous time Fourier series, representation of discrete time periodic signals, convergence of the Fourier series, properties of discrete time Fourier series, Fourier series and LTI systems.

Module IV: Fourier Transform
Continuous time Fourier transform, properties of continuous time Fourier transform, discrete time Fourier transform, properties of discrete time Fourier transform; applications; Bandwidth determination of signals and systems.

Module V: z-Transform
Definition of z-transform, region of convergence, properties of z-transform, first order system, second order system, inverse z-transform, analysis of LTI system using z-transform.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References
Text:
- Alan.V Oppenheim, Signals and Systems, 4th Edition 2007, Pearson Prentice Hall Publication.
- K.M. Soni, Signals and Systems; 3rd Edition, S.K. Kataria & Sons Publication.
- P.Ramesh Babu, Signal and Systems, 3rd Edition, Scitech Publications (INDIA) Pvt. Ltd.

References:
- Simon Haykin, Signals and Systems, 2nd Edition, Willy Publications.
- B.P.Lathi, Linear Systems & Signals, 2nd Edition, Oxford Publication.
- Roberts, Fundamentals of Signals and Systems, TMH Publication.

ANALOG ELECTRONICS-I LAB

Course Code: EEE2305 **Credit Units : 01**

Course Contents:

- To study and plot the characteristics of a junction diode.
- To study Zener diode I-V characteristics.
- To study diode based clipping and clamping circuits.
- To study half wave, full wave and bridge rectifier with filters.
- To study the input and output characteristics of a transistor in its various configurations (CE and CB).
- To study and plot the characteristics of a JFET in its various configurations.
- To study and plot the characteristics of a MOSFET in its various configurations.
- To study various types of Bias Stabilization for a transistor.
- To study the gain and plot the frequency response of a single stage transistor amplifier.
- To measure gain and plot the frequency response of double stage RC coupled amplifier.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CIRCUITS & SYSTEMS LAB

Course Code: EEE2306 **Credit Units : 01**

List of Experiments:

1. To verify Thevenin's theorem in a given network.
2. To verify reciprocity theorem in a given network.
3. To verify maximum power transfer theorem in a given network.
4. To verify Tellegen's theorem in a given network.
5. To determine the Z- and Y- parameters of a resistive two-port network.
6. To determine the T- (ABCD) parameters of a resistive two-port network.
7. To determine the h- parameters of a resistive two-port network.
8. To design series-series connection of 2 two-port networks and determine its Z- parameters.
9. To design parallel-parallel connection of 2 two-port networks and determine its Y- parameters.
10. To design a cascade connection of 2 two-port networks and determine its T- (ABCD) parameters.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA STRUCTURE USING C

Course Code: EEE2309 **Credit Units : 02**

Course Objective:
Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

Course Contents:

Module I: Introduction to Data structures
Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Trade offs. Use of pointers in data structures.
Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

Module II: Introduction to Stacks and queue
Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.
Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

Module III: Dynamic Data Structure
Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation.
Stack and queue implementation using linked list.

Module IV: Trees and Graphs
Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.
Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

Module V: Sorting and Searching and file structures
Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.
Searching: Linear search, Binary search

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Horowitz and Sahani, “Fundamentals of Data structures”, Galgotia publications
- Tannenbaum, “Data Structures”, PHI
- R.L. Kruse, B.P. Leary, C.L. Tondo, “Data structure and program design in C” PHI
- “Data structures and algorithms” – Schaum Series.

DATA STRUCTURE USING C LAB

Course Code: EEE2310 **Credit Units : 01**

Software Required: Turbo C++

Assignment will be provided for following:

- Practical application of sorting and searching algorithm.
- Practical application of various data structure like linked list, queue, stack, tree

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

VIRTUAL INSTRUMENTATION

Course Code: EEE2311 **Credit Units : 02**

Course Objective:
The purpose of this course is to provide a thorough introduction to virtual instrumentation with an in depth study of virtual instrument, software, hardware and its applications.

Course Contents:

Module I: Introduction to Virtual Instrumentation: Introduction, Historical perspective, advantages, block diagram and architecture of a virtual instrument, conventional vs. virtual instrumentation.

Module II: Introduction to Software : Introduction to Lab VIEW, Front panel, back panel representations, Block diagram, Menus, Palettes, VI and Sub VI, Editing and Debugging VI, Structures, Arrays, Clusters, Charts and Graphs, Data acquisition, Instrument Control, Signal Generation and Signal Processing Examples.

Module III: Introduction to systems hardware: ADC, DAC, D/O, counters and timer, PC hardware structure, timing, interrupts, DMA, software and hardware installation, Configuring data acquisition hardware using the drives in application software, use of DAQ library functions for different analog and digital input/output operations. Input/output devices & functions like data gloves, joysticks, CRT etc.

Module IV: Application of Virtual Instrumentation in various fields: Aviation, Automotive, High Voltage, Defense, Chemical, Industrial, Marine, Medical, Mining, Nuclear Energy, Virtual landscapes.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

LABORATORY / FIELD EXPERIENCES

- **.** Geographical programming using Lab VIEW
- . Applications of Lab VIEW

Text & references:

- . Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.
- . LabVIEW Basic 1 Course Manual, National Instruments
- Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.
- LabVIEW for everyone - Wells Lisa K and Travis Jeffrey, Prentice Hall.

VIRTUAL INSTRUMENTATION LAB

Course Code: EEE2312 **Credit Units : 01**

List of Experiments:

- To open, and explore the components of LabView.
- To build a simple VI that converts a Celsius temperature reading to Fahrenheit.
- (a) To create an icon and a connector pane so you can use a VI as a subVI.
  (b) To build a VI and create its icon and connector pane so you can use it as a subVI.
- To build a VI to generate 4*5 two dimensional array of random numbers (between1 to 2).
- To Build a VI that generate Fibonacci series starting from ‘0’.
- To build a VI which finds roots of quadratic equation using formula node.
- To build a VI that reverses the contents of an array.
- To build a VI that can be used for sorting of numeric array i.e. in ascending or descending order.
- To build a VI for 4*1 multiplexer operation.
- To build a VI for 3*8 Decoder operation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Fourth Semester

ELECTRIC MACHINE-I

Course Code: EEE2402 **Credit Units : 03**

Course Objective:
The purpose of this course is to introduce the student to the various types of basic machines used in the industry and its application.

Course Contents:

Module I: Principles of EMEC
Introduction, Energy in Electro-Magnetic System, Flow of Energy in Electro-Mechanical Devices, Energy in Magnetic field and co-energy, Dynamics of Electromechanical Systems, Singly excited systems. Torque and EMF equations.

Module II: D. C. Machines
EMF and Torque equations, Armature windings, Armature Reaction, Demagnetizing and Cross-magnetizing armature MMF, Inter pole and compensating windings, commutation. Characteristics of D.C.generators.
D.C. motors and their characteristics
Starting of D.C.motors. Starter step calculation for a D.C. shunt and series motor. Speed control of D.C. motors. Ward Leonard control. Braking of d.c.motors. Efficiency and testing of d.c. machines, Hopkinson test.

Module III: 1- Ø Transformers
Transformer construction and practical considerations. Equivalent circuit, Exact and approximate, per unit values, Phasor diagram, Transformer testing: open circuit test, Short Circuit test, Sumpner's test, Efficiency and voltage regulation, All day efficiency, Auto-transformer.

Module IV: 3 – Ø Transformer
Three-phase Bank of Single-phase Transformers, Parallel operations of 1 and 3 phase transformers, 3 to 2 and 6 phase conversion. Load division between transformers in parallel. Three winding transformers, Tertiary winding, Tap Changing, Transformers for special purpose, Welding, Traction, Instruments and pulse Transformers.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Electrical Machines: I. J. Nagrath and D. P. Kothari (Tata McGraw Hill)
- Electrical Machniery: Fitzerald, Kingsley (McGraw Hill)
- Electrical Machnies: P. C. Sen

References:
- Electrical Machines and their Applications: J. Hindmarsh
- Electrical Machines: P. K. Mukherjee & S. Chakravoti (Dhanpat Rai Publications)
- Electric Machines: Ashfaq Hussain (Dhanpat Rai Publications)

ELECTROMAGNETIC FIELD THEORY

Course Code: ECE2403 **Credit Units: 03**

Course Objective:
This course provides a general introduction to the important physical concepts and mathematical methods used in treating all types of wave phenomena, but stresses electromagnetic signal propagation and issues of central importance in electrical engineering. As a core course in the Electrical Computer and Systems Engineering option of the Engineering Sciences concentration, it provides essential background and basic preparation for more advanced work in device physics, microwave and ultra-fast circuitry, antenna design, optics, optical communication and optoelectronics.

Course Contents:

Module I: Mathematical Basics and Electrostatics
Coordinate Systems: Spherical and Cylindrical coordinates, Dirac delta function, Coulomb's law, Gauss's law, Poisson's Equation, Laplace's Equation, Electrostatic Boundary conditions, Work and Energy in Electrostatics, Conductors, Surface charge and force on conductors

Module II: Magnetostatics and Magnetic Fields in matter
Magnetic induction and Faraday's law, Magnetic Flux density, Magnetic Field Intensity, Biot Savart Law, steady currents, Ampere's law, Magnetostatic Boundary conditions, magnetic field inside matter, magnetic susceptibility and permeability, ferromagnetism, energy stored in a Magnetic field, Magnetic Vector Potential

Module III: Electrodynamics
Faraday's laws, Maxwell's equations, Maxwell's modification of Ampere's law, continuity equation and Poynting theorem.

Module IV: Electrodynamic Waves
Wave propagation in unbounded media, Boundary conditions, reflection and transmission, polarization, E.M. waves in vacuum, E. M. waves in matter: reflection and transmission of plane waves.

Module V: Introduction to Transmission Lines
Transmission Line, Line Parameters, Characteristic Impedance, Image Impedance, HVDC and HVAC Common faults in transmission lines. Skin Effect, Ferranti Effect and Corona.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Griffiths: Introduction to Electrodynamics
- Fawwaz T. Ulaby: Fundamentals of Applied Electromagnetics
- Hayt, William H., Buck, John A. Hayt, William H., Buck, John A., Engineering Electromagnetics

ANALOG ELECTRONICS-II

Course Code: EEE2408 **Credit Units: 03**

Course Objective:
The purpose of this course is to introduce the student to the application of semiconductor devices in linear analog circuits. To insure the usefulness of the course material to both computer engineers and electrical engineers, the course stresses circuit designs using the operational amplifier.

Course Contents:

Module I: Building Blocks of Analog ICs
Differential amplifier, Op-amp Model, op-amp DC & AC parameters, virtual ground, Current mirrors, Active loads, Level shifters and output stages.

Module II: Operational amplifiers
Introduction, open loop and closed loop configuration, op-amp parameters (input offset current, output offset current, i/p bias current, CMRR, PSRR, null adjustment range, etc,) Inverting and non-inverting configuration, voltage gain of inverting and non inverting configurations.

Module III: Linear & Non Linear Wave shaping
Adders, Voltage to current, current to voltage Converter, Integrators, Differentiators**,** Voltage follower (voltage buffer), summer, subtractor, Comparators, log/antilog circuits using Op-amps, precision rectifiers

Module IV: Waveform Generations
Damped and undamped oscillations, Barkhausen criterion for sustained oscillation. Tank circuit generator Astable multi Vibrators, OTA-C Oscillators, Crystal oscillator**.** Types of oscillators: LC-Hartley and Colpitts, RC-RC phase shift and Wien bridge oscillator, Basics of tuned Amplifiers, Voltage Controlled Oscillator.

Module V: Active RC Filters & Applications of Linear Circuits
Idealistic & Realistic response of filters (LP, BP, and HP), Butter worth & Chebyshev approximation filter functions, LP,BP,HP and All pass, Notch Filter, Operational transconductance amplifier (OTA)-C filters.

Module VI: Applications of IC Analog Multiplier & Timer
IC phase locked loops, 555 Timer, IC voltage regulators-(fixed, variable) 78xx, 79xx series and adjustable.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Richard C. Jaeger: Microelectronic Circuit Design
- Adel S. Sedra and K. C. Smith: Microelectronic Circuits
- Ramakant Gaekwad: Operational Amplifiers
- Rolf Schaumann and Mac E. Van Valkenburg: Design of Analog Filters
- D. Roy Choudhury and Shail B. Jain: Linear Integrated Circuits

DIGITAL ELECTRONICS

Course Code: EEE2412 **Credit Units: 02**

Course Objective:
This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

Course Contents:

Module I: Boolean Functions
Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1`s complement and 2`s complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

Module II: Combinational Circuits
Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.

Module III: Sequential Circuits
Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.

Module IV: Logic families & data converters
Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Moris Mano : Digital Design, Pearson Education.
- R. P. Jain: Digital Electronics, Tata McGraw Hill.
- Thomas L. Floyd: Digital Fundamentals, Pearson Education.
- Malvino and Leech: Digital Principles & Applications, Tata McGraw Hill.

ELECTRIC MACHINE LAB-I

Course Code: EEE2406 **Credit Units: 01**

List of Experiments:

- Load test on a single phase transformer.
- To perform Open circuit and short circuit tests on a single phase transformer and hence find equivalent circuit, voltage regulation and efficiency.
- To find the efficiency and voltage regulation of single phase transformer under different loading conditions.
- To perform parallel operation of two single phase transformers.
- To study the various connections of three phase transformer.
- To study the constructional details of D.C. machine and to draw sketches of different components.
- To measure armature and field resistance of d.c. shunt generator and to obtain its open circuit characteristics.
- To obtain load characteristics of d.c. shunt/series /compound generator.
- To draw speed-torque characteristics of d.c. shunt/series /compound generator.
- To study d.c. motor starters.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ANALOG ELECTRONICS LAB-II

Course Code: EEE2409 **Credit Units: 01**

List of Experiments:

1. To study the op amp as an inverting and non inverting amplifier.

2. To use the op amp as an adder, subtractor, integrator and differentiator.

3. To design a ramp and a square wave generator.

4. To study the IC-555 timer as stable and bistable multivibrator.

5. To design low pass, high pass and band pass filters using op- amp. and plot their frequency response.

6. To design and study class a power amplifier.

7. To design and study a class B push pull amplifier.

8. To study various feedbacks such as voltage series feedback.

9. To design RC phase shift and Wein bridge oscillators using op amplifier.

10. To design and study Colpitt and Hartley oscillators.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DIGITAL ELECTRONICS LAB

Course Code: EEE2413 **Credit Units: 01**

List of Experiments:

- To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.
- To obtain half adder, full adder using gates and verify their truth tables.
- To obtain half subtractor, full subtractor using gates and verify their truth tables.
- To implement control circuit using multiplexer.
- To convert BCD code into excess 3 code and verify the truth table.
- To verify the truth tables of RS, D, JK and T flip- flops.
- To implement and verify 3-bit bi-directional shift register.
- To design and study asynchronous/ripple counter.
- To design and study synchronous counter.
- To design and study a sequence detector.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

POWER PLANT PRACTICES

Course Code: EEE2411 **Credit Units: 03**

Course Objective:
The objective of this course is that the students come to know different ways of producing energy such as thermal energy from gas and steam, hydraulic energy nuclear energy, non conventional source of energy from wind, solar and tidal. And their different uses in productive works.

Course Contents:

Module I: Steam Generator Plant
Fuel handling systems, Indian coals, combustion of coal in furnaces; fluidized bed combustion; High pressure heavy duty boilers, Super critical and once through boilers influence of operating conditions on layout of evaporator, superheated, reheated and economizer; dust collectors; ash disposal, fans and draft systems.

Module II: Turbine Plane
Layout of turbine plant room, corrosion in condensers and boilers, feed water treatment; feed heating and de aeration system; cooling water systems and cooling towers.

Module III: Control
Important instruments on steam generator and turbine; drum water level control, combustion control and super heat temperature control; testing of power plants and heat balance.

Module IV: Other Power Plant
General layout of I.C. Engines and turbine power plants, types, gas turbine plants, fields of application, Nuclear power plants, power reactors and nuclear steam turbines; handling of nuclear waste and safety measures, peak load power generation methods.

Module V: Economics
Planning for power generation in India, super thermal power plants, estimation of cost of power generation; choice of plant site.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Arora & Domkundwar, "A course in Power Plant Engineering", Dhanpat Rai & Sons

References:
- Black Veatch, "Power Plant Engineering", CBS Publisher

DATABASE MANAGEMENT SYSTEMS

Course Code: EEE2414 **Credit Units: 02**

Course Objective:
The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

Course Contents:
Module I: Introduction
Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model

Module II: Hierarchical model & Network Model
Concepts, Data definition, Data manipulation and implementation. Network Data Model, DBTG Set Constructs, and Implementation

Module III: Relational Model
Relational database, Relational Algebra, Relational & Tuple Calculus.

Module IV: Relational Database Design and Query Language
SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.

Module V: Concurrency Control and New Applications
Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH, 2000.
- Steve Bobrowski, "Oracle & Architecture", TMH, 2000

References:
- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

DATABASE MANAGEMENT SYSTEMS LAB

Course Code:EEE2415 **Credit Units: 01**

Software Required: Oracle 9i

Topics covered in lab will include:

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Fifth Semester

DIGITAL CIRCUITS AND SYSTEMS

Course Code: EEE2501 **Credit Units: 03**

Course Objective:
This course builds on the course Digital Circuits and Systems - Hardware development language VHDL is introduced; the usage of the same to implement the systems is dealt in detail.

Course Contents:

Module I: Design of Sequential circuits
SR, JK, T and D flip flops and their timing diagrams with delay, characteristic table, characteristic equation and excitation tables. Design of Finite State Machines: Mealy and Moore type using next state tables, state diagrams, state minimization, state encoding: minimum bit change and hot one encodings. Comparative cost and delays of different implementations and their optimization and timing diagrams, Asynchronous and synchronous sequential circuits Static Timing Analysis –setup, hold time, clock skew, clock period
Data paths, FSMs with datapaths, ASM charts

Module II: Basics of VHDL
Introduction and Basic Design Units of VHDL, Writing Entities for Digital circuits like decoders, registers etc, Scalar Data types and Operations: Object types: constants, variables, signal and files. Data Types: scalar, integer, floating, physical, enumeration, type declarations, subtypes, expressions and operators for various types.
Sequential statements: If, case, Null, Loop, Exit, Next statements, while loops, For loops, Assertion and report statements
Composite Arrays: arrays, Array aggregates, unconstrained array types, strings, Bit vectors, Standard Logic Arrays, array operations and records

Module III: VHDL Programming
Behavioral Modeling: process statements, variable and signal assignments, inertial and transport delay models, signal drivers, multiple and postponed processes
Dataflow Modeling: Concurrent signal assignment, multiple drivers, block statement
Structural Modeling: component declaration, component instantiation, resolving signal values, and configuration: basic configuration, configuration for structural modeling, mapping library entities.
Generics, generic (AND, NAND, OR, NOR, XOR and XNOR) gates, functions and subprograms, packages and libraries

Module IV: Synthesis: mapping statements to gates
Writing a test bench, converting real and integers to time, dumping and reading from text file
Vhdl modeling of basic gates, half and full adder AOI, IOA, OAI, multiplexes, decoders (dataflow, behavioral and structural modeling), three state driver, parity checker, D, T, JK and SR flip flops, flip flops with preset and clear, modeling for multiplexer, priority encoder, ALU etc, modeling regular structures, delays, conditional operations, synchronous logic, state machine modeling, Moore and Mealy machines, generic priority encoder, clock divider, shift registers, pulse counter etc

Module V: Overview of the following
PLD devices, PROM, PAL, PLA, CPLD, EPLD GAL, FPGA, DRAM etc and their applications, FPGA programming, Design exercises ASIC design using CAD tools

Examination Scheme:

Components	HA	V/S/Q	CT	AT	ESE
Weightage (%)	7	8	10	5	70

Text & References:

- Daniel Gajski: Principles of Digital Design
- Bhasker: A VHDL Primer 3/e
- Pedroni: Circuit Design with VHDL
- Perry: VHDL: Programming by examples K. Skahill, VHDL for programmable Logic

MICROPROCESSOR SYSTEMS

Course Code: EEE2502 **Credit Units: 03**

Course Objective:
This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Introduction to Microcomputer Systems
Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations, interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams
Introduction to 8085 instruction set, advance 8085 programming , Addressing modes, Counters and time Delays, , Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing
Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

Module IV: Architecture of 16-Bit Microprocessor
Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors
.Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.]
- Douglas V Hall.
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.

POWER SYSTEM-I

Course Code: EEE2503 **Credit Units: 03**

Course Objective:
This course deals with the analysis of faults and method of protection.

Course Contents:
Module I: Representation of Power Systems
Introduction, types of short circuits, sources of fault current, Percentage resistance and reactance, Base KVA, Short circuit KVA, Fault level, The one line diagram, Impedance and reactance diagram, Points to be noted for drawing Impedance diagram, procedure for short circuit calculation, Per Unit method and quantities, Selection and Changing the base of per unit quantities, per unit impedance of three winding transformers, Advantage of per unit computation, Wave form of short circuit current- sub transient, transient and steady state, Current limiting reactors- air insulated, oil immersed, Reactor location- generator, feeder, bus-bar

Module II: Symmetrical Components and Analysis of Faults
Introduction, Meaning of sequence, Definition of Sequence systems, Operator 'h', Determination of sequence components, per unit and percent quantities, Three phase short circuit, Line to ground fault, Maximum and minimum fault currents, Meaning of sequence impedances and sequence networks, independence of sequence components.

Module III: Short Circuit Currents
Introduction, causes and sources of short circuits, Stability, Symmetrical and asymmetrical short circuits, Analysis of asymmetrical currents, DC components of asymmetrical short circuits, Initial magnitude of DC Component, Sub transient reactance, Negative sequence reactance, Zero sequence reactance.

Module IV: Fuses
Introduction, Definition and types, Construction, HRC Fuse link, Action of HRC fuse, Shapes of fuse element, Specifications of a fuse link, Characteristic of a fuse, Cut off, Classification and categories P-Q-R, Selection of a fuse link, Silver as fuse elements, purpose of filler, Guide lines for some applications, protection of motor, discrimination, protection of radial lines, coordination of fuse and circuit breakers, protection of meshed feeders with steady load, tests on fuse

Circuit Breakers Introduction, Requirement of circuit breakers, Basic operation, establishment and properties of arc, Principles of arc interruption, DC Circuit breaking and AC circuit breaking, Recovery and re-striking voltage, Methods of arc extinction, Mathematical expression for re-striking voltage, Active recovery voltage, Switching, magnetizing and capacitive currents, Current chopping, Resistance switching, Operating mechanisms and types, Contacts- types and materials, Types of Circuit breakers- oil circuit breakers, Air circuit breakers, Vacuum Circuit breakers, SF6 circuit breakers, Rating of Circuit breakers- Braking capacity, Making capacity, Short time rating, Normal current rating, Maintenance, Auto re-closure, Selection of circuit breakers.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Electric Power System: By – C.L.Wadhwa
- Electric Power System: By - Asfaq Husain
- Elements of Power System Analysis: By – William D.Stevenson
- Power System Analysis & Design: By – B.R.Gupta
- HVDC Transmission: By K.R. Padiyar
- Electric power by Soni, Gupta and Bhatnagar

CONTROL SYSTEM

Course Code: EEE2509 **Credit Units: 03**

Course Objective:
The basic objective of this course is to provide the students the core knowledge of control systems, in which time & frequency domain analysis, concept of stability.

Course Contents:

Module I: Input / Output Relationship
Introduction of open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical Mechanical and Thermal), derivation of transfer function for different types of systems, block diagram & signal flow graph, Reduction Technique, Mason's Gain Formula.

Module II: Time – Domain Analysis
Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID Controllers.

Module III: Frequency Domain Analysis
Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots),gain and phase margins, relative stability, Correlation with time domain, constant close loop frequency responses, from open loop response, Nyquist Plot.

Module IV: Concept of Stability
Asymptotic stability and conditional stability, Routh – Hurwitz criterion, Root Locus plots and their applications. Compensation Techniques: Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques. P, PI, PID controllers.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Dr. N.K Jain, 2005,"Automatic Control System Engineering", Dhanpat Rai Publication.
- J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.

References:
- M, K. Ogata, 2002, "Modern Control Engineering, PHI.
- B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.

DIGITAL CIRCUITS AND SYSTEMS LAB

Course Code: EEE2505 **Credit Units: 01**

List of Experiments

To implement VHDL code for
1. 2, 3, 4 inputs AND, OR, XOR and XNOR gates and testing their simulation with signals.
2. Half adder, full adder and full subtractor. Also trying out other simple combinatorial circuits like AOI, IOA, OAI.
3. D and T, flip-flops.
4. JK and SR flip-flops.
5. 2 to 4 and 3 to 8 decoders.
6. 2 to 1, 4 to 1 and 8 to 1 multiplexers.
7. a register.
8. 2 to 1, 4 to 2 and 8 to 3 priority encoders.
9. 8 bit tri state drivers.
10. 9 input parity checker.
11. 1 bit, 4 bit 8 bit comparators.
12. Adding and subtracting 8 bit integers of various types.
13. Clock divider
14. shift register
15. Pulse counters.
16. VHDL Design examples of Moore machine, Mealy machine, generic gate inputs and delays.
17. VHDL code examples of structural modeling showing binding.

Experiments based Field Programmable Gate Array (FPGA) Programming

18. Implementation of all the above VHDL experiments using FPGA.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MICROPROCESSOR SYSTEMS LAB

Course Code:EEE2506 **Credit Units: 01**

List of experiments:

1) Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated.

2) Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated.

3) Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD.

4) Write assembly language program for 8 bit multiplication and division.

5) To study, understand, interface and two peripheral devices with 8085.

6) Any three programs using 8085 based on block of data.

7) Using 8086 write an ALP to add list of 10 given numbers.

8) Using 8086 write an ALP to sum the numbers from 1-100.

9) Using 8086 write an ALP to count negative numbers from a given list of 10 numbers.

10) Using 8086 write an ALP to check number of vowels in a given string.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CONTROL SYSTEM LAB

Course Code:EEE2510 **Credit Units: 01**

Course Contents:

1. Study and draw

a) Step response of open Loop system (linear 1st order, 2nd order

b) Step response of closed loop systems (1st order)

2. Study and draw temperature control system the open loop response and closed loop response with different values of gains
3. Study of operations and characteristics of a stepper motor
4. To Study a D.C. motor speed control system.
5. Performance evaluation and design of PID controller.
6. Study of microprocessor control of a simulated linear system.
7. To design a suitable cascade compensator for the given system and verify the resulting improvement.
8. Note: three experiments in MATLAB have to be performed in the slot of MATLAB.

Using MATLAB obtain the unit-step response and unit impulse response of the following system:

$$\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$$

9. For a 2nd order transfer function using MATLAB

a) Bode Plot

b)Root locus plot

c)Nyquist plot.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

SUMMER INTERNSHIP EVALUATION-I

Course Code: EEE2535 **Credit Units: 03**

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

BIOMEDICAL INSTRUMENTATION

Course Code: EEE2507 **Credit Units: 03**

Course Objective:
This course aims to give an understanding of instruments used in biomedical applications.

Course Content:

Module-I: Sensors and Transducers for biological applications
Types, properties, characteristics and selection of transducers for biological instrumentation.

Module-II: Measurement of electrical parameters
Leads and electrodes, electrocardiography, electrical activity of the heart, equivalent cardiac generator. Einthoven lead system, standardization of recording and display of ECT (Electrocardiogram), EEG (Electroencephalogram), EMG (Electromyogram), EOG (Electroocculogram), ERG (Electroretinogram), EGG (Electrogastogram).

Module-III: Measurement of non-electrical parameters
Blood flow, drop recorder, electromagnetic flow meter, measurement of systolic and diastolic pressures, blood pressure instruments, intraocular pressure, lung air pressure, Audiometers. Measurement of body temperature, thermography. Cardiac tachometer, respiration rate phonocardiogram, heart sounds electrical stethoscope pulmonary function analysers. CO2 - O2 - Concentration in exhaled air, blood and lungs, pH value of blood, impedance pletnysmography blood gas analysers, blood cell counters.

Module-IV: Medical Imaging Systems
Medical display systems, medical thermography X-Ray, diathermy equipment. Ultrasonics in biomedical application for diagnostic and therapeutic, CAT, MRI, Laser applications in biomedical field.

Module-V: Patient safety
Electrical Safety of Medical Equipments, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Test Instruments for checking Safety parameters of biomedical equipments.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

BOOKS RECOMMENDED

- Biomedical Instrumentation and Measurements; L.C. Cronwell F.J. Weibell. E.A. Pfeiffer, PHI.
- Principles of applied instrumentation: Gaddes and Baker, John Wiley & Sons.
- Handbook of Bio-medical Instrumentation; R.S. Khandpur, Mc Graw Hill
- Medical Instrumentation – Application & Design, John G. Webster, Editor, John Wiley & Sons.

FUZZY LOGIC AND NEURAL NETWORKS

Course Code: EEE2508 **Credit Units: 02**

Course Objective

Course has been divided in to two parts: Neural Networks and Fuzzy Logic. Neural networks part aims at introducing the fundamental theory and concepts of biological and artificial neural network and their applications in the area of machine intelligence. This part also offers knowledge of learning rules and architecture of various neural nets. The second part covers fuzzy logic: Fuzzy logic is a tool that can be applied to ambiguous problems, which cannot easily solved by classical techniques. Course discusses the fundamental of fuzzy set theory and fuzzy logic. In addition, this course also introduces applications of fuzzy logic in several areas such as fuzzy control and fuzzy decision making.

Course Contents :

Module I: Introduction

Biological neurons & memory: structure & function of simple neuron; Artificial Neural Networks (ANN); Typical applications of ANN: Classification, pattern recognition, control, optimization; Basic approach of working on ANN – Training, learning and generalization.

Module II:

Back propagation –architecture –algorithm-derivation of learning rules –number of hidden layers-learningfactors-Hopfield neural net : architecture – algorithm –applications.

Module III:

Neural network based on competition: fixed- weight competitive nets- kohonen self organizing maps andapplications. Adaptive Renonace theory: Basic architecture and operation. Neural controller for a temperature
process.

Module IV:

Basic concepts of fuzzy sets – Relational equation – fuzzy logic control – fuzzification – defuzzification –knowledge base – Decision making logic –membership functions – rule base.

Module V:

Fuzzy logic controller: functional diagram, membership functions: triangular, trapezoidal- scale factors.Fuzzificatoin: membership value assignments using intuition –knowledge base. Defuzzification : maxmembershipprinciple – centeroid method – weighted average method –rule. Choice of variables-derivation ofrules- case study: fuzzy logic controller design for a temperature process

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Timothy J.Ross, Fuzzy logic with Engineering Applications, McGraw Hill, New york, 1996.
- Kosko.B, Neural Network and fuzzy systems- o\prentice Hall of India Pvt. Ltd., New Delhi, 1992.
- Zurada Jacek M, Introduction to Artificial Neural Systems, West, 1992. (QA76.87.Z96)
- S.N.Shivanandam, S.N.Deepa, Principles of Soft Computing, Wiley 2008

Reference Books

- Neural Networks by Rolf Pfeifer, Dana Damian, Rudolf Fuchslin - University of Zurich.
- Jang Jyh-Shing Roger, Sun Chuen-Tsai and Mizutani Eiji, NeuroFuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, Prentice-Hall, 1997.

FUZZY LOGIC AND NEURAL NETWORKS LAB

Course code: EEE2511 **Credit Units: 01**

List of Experiments

- To study about Matlab and learn basic matrix operations.
- Write program to draw straight line, circle and sine functions.
- Study of Biological Neural Network & Artificial Neural Network
- How the weight and bias value effect the output of neuron.
- How weight and bias values are able to represent a decision boundary in feature space.
- Implementation of logic gate (AND,OR,NOT,NAND,NOR) using McCulloh-pitts model.
- How the choice of activation function effects the output of neuron. Experiment with following function: binary threshold and sigmoid function.
- Write a program to implement single layer perception algorithm..
- To Study Fuzzy Logic
- To study and analysis of Fuzzy vs Crisp logic.
- Write the program to implement various Fuzzy set operations (complement , union, intersection etc.)
- Implementation of fuzzy relations (Max-Min Composition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

POWER SYSTEM-II

Course Code: EEE2601 **Credit Units: 04**

Course Objective:
The basic objective of the course is to impart knowledge to the students on power system protection

Course Contents:

Module I: Metal Enclosed Switchgear
Introduction, Types of switchgear, High voltage indoor metal enclosed switchgear- general features, draw out type metal enclosed switchgear, sheet steel switch boards, switchgear with vacuum interrupters, Low voltage metal clad switchgear and low voltage circuit breakers- unit type, classification, rated quantities, tests on low voltage circuit breakers, Explosion proof switchgear, Low voltage control gear and contactor- terms and definition, rated characteristics, tests, Control panels

Module II: Neutral Earthing
Introduction, Terms and definition, Disadvantages of ungrounded Systems, Advantages of neutral grounding, Types of grounding, Ungrounded system, Connection of arc suppression coil, Neutral point earthing of transformer LV circuits, Neutral grounding practice, Earthing transformer, Station earthing system, Resonant grounding - Methods of neutral grounding.

Module III: Protective Relaying
Introduction, Importance, Protective zones, primary and backup protection, desirable quantities of protective relaying, Some terms in protective relaying, Basic operation of relay, Classification of relays, Buchholz's relay, Induction relays, Directional relays, Distance relays- impedance relay, admittance relay, classification of distance relays and distance protection, Differential relays

Module IV: Static Relays
Introduction, Static relay techniques using semi conductors,: Phase and amplitude comparators, Duality between phase and amplitude comparators, general equation for comparators, Basic elements of a static relay, over-current relays, differential protection, static distance protection.

Module V: Apparatus Protection
Alternator protection- types of faults, Stator protection, differential protection, rotor protection, over load protection, loss of excitation protection, un balanced loading protection, prime mover protection, over speed protection, over voltage protection, Transformer protection-, nature, faults in auxiliary equipment, winding faults, over load and external short circuits, differential protection of transformers, over current and earth fault protection, tank leakage protection, restricted earth fault protection, gas relays, transformer feeder protection, Induction Motor Protection: Abnormal operating conditions, Contactors and circuit breakers for motors, Under voltage protection, phase and Earth fault protection, Overload protection, Unbalanced voltage protection, Single phasing preventer, Phase reversal protection.

Module VI: Computer aided relaying
Introduction to microcomputer based relays, general functional diagram of micro computer based relays. Advantages over conventional relaying techniques. Relay testing: Relay test benches

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- S. S. Rao - Switchgear and Protection - Khanna Publishers, N.Delhi, 1990.
- T.S.Madhava Rao - Power System Protection - TMH, 1979
- I. J. Nagrath and D. P. Kothari - Power System Engineering, TMH, 1994

References:

- Badriram and D. Vishwakarma - Power System Protection and Switchgear - TMH, 1995
- Ravindranath B. and Chander. M - Power System Protection and Switchgear - Wiley Eastern, 1994.
- Arun G.Phadke and S. H. Horowitz - Power System Relaying (Ed.2) - John Wiley, 1995.
- C. L. Wadhwa - Electrical Power Systems (Ed. 2) – Wiley Eastern, 1993
- Ravindranath and Chander - Power System Protection and Switchgear - Wiley Eastern, 1994

ELECTRIC MACHINE-II

Course Code: EEE2602 **Credit Units: 04**

Course Objective:
This course deals with the systematic study and application of the AC machines which are widely used in the Industry

Course Contents:

Module I: Poly phase Induction Machines – I
Construction features, production of rotating magnetic field, phasor diagram, equivalent circuit, torque and power equations, torque-slip characteristics, no load and blocked rotor tests' efficiency. Induction generator.

Poly phase Induction Machines – II
Starting and speed control (with and without e.m.f. injection in the rotor circuit), deep bar and double cage induction motors, cogging and crawling.

Module II: Single- Phase Induction Motor
Double revolving field theory, equivalent circuit, no load and blocked rotor tests, starting methods, repulsion motor.
A.C. Commutator Motor:
E.M.F. induced in commutator windings, single phase a.c. series motor, Universal motor

Module III: Synchronous Machines - I
Constructional features, armature windings, E.M.F. equation, winding coefficients, harmonics in the induced E.M.F., armature reaction, O.C. and S.C. tests, voltage regulation-Synchronous impedance method, MMF Method, Potier's triangle method and parallel operation, operation on infinite bus, cooling.

Module IV: Synchronous Machines - II
Two reaction theory, power expressions for cylindrical and salient pole machines, performance characteristics.
Synchronous Motor
Principle of operation, starting methods, phasor diagram torque-angle characteristics, V-curves hunting and dampling, synchronous condenser, reluctance motor.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- M.G.Say, "Alternating Current machines", Pitman & Sons.
- P.S. Bimbhra, "Electric Machinery", Khanna Publishers.

References:
- P.S. Bimbhra, "Generalized Theory of Electrical Machnies", Khanna Publishers.
- I.J. Nagrath and D.P. Kothari, "Electrical Machnies", Tata McGraw Hill.
- B.R. Gupta and V. Singhal, "fundamental of Electrical Machines", New Age International

ELECTRICAL POWER GENERATION, TRANSMISSION AND DISTRIBUTION-I

Course Code: EEE2603 **Credit Units: 04**

Course Objective:
The basic objective of this course is to provide the students the core knowledge of electric power transmission and distribution.

Course Contents:
Module I: General Background
Introduction, Structure of electric power systems, Single and double script notation, Power in single phase AC circuits, Complex power, Direction of power flow, Voltage, current and Power in balanced 3 phase circuits

Module II: Supply Systems
Introduction, Method of transmission and distribution-overhead, underground, comparison between them, Choice of transmission voltage, System voltage and transmission efficiency, Systems of transmission and distribution- DC 2 wire, AC 1 phase two wire, AC 2 phase four wire, AC 2 phase three wire, AC 3 phase three wire, AC 3 phase four wire, influence of voltage on cost and efficiency, comparison of different systems of transmission and distribution based on equal potential difference any conductor and earth and between two conductors, Need for AC for transmission

Module III: Mechanical Design of Overhead Lines
Main items of overhead lines-Conductors, supports, Insulators, metal hardware, Conductor material and properties-copper, aluminum, ACSR, cadmium copper, Supports- main requirements of supports,, types of supports-wooden, RCC, steel tubular, steel towers, Insulators-factors involved in design, types-`pin, suspension and their comparison, Strain and shackle insulators, Insulator failure, Potential difference over a string of suspension insulators, String efficiency and methods used for increasing it, Capacitance grading, Static shielding, Sag tension calculations with supports at same and different levels, Effect of ice and wind

Module IV: Constants of Overhead Lines
Introduction, Resistance, Inductance-single conductor, two wire system, three phase line symmetrically and asymmetrically placed, composite conductor, three phase line with more than one circuit, Capacitance- single phase two wire system, between two lines, 3 phase line symmetrical spacing and effect of transposition in case of unsymmetrical spacing, effect of earth on capacitance of conductor, Skin and proximity effect, Classification of overhead lines based on capacitance- short, medium and long

Module V: Corona
Introduction, Voltage gradient, Corona formation, Factors affecting corona, Critical voltage, Visual critical voltage, Disruptive critical voltage, Power loss due to corona, Advantages and disadvantages, Methods to reduce corona

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Electric Power System: By – C.L. Wadhwa
- Electric Power System: By - Asfaq Husain
- Elements of Power System Analysis: By – William D. Stevenson
- Power System Analysis & Design: By – B.R. Gupta
- HVDC Transmission: By K.R. Padiyar
- Electric power by Soni, Gupta and Bhatnagar

MODERN AND DIGITAL CONTROL ENGINEERING

Course Code: EEE2608 **Credit Units: 03**

Course Objective:
The basic objective of the course is to impart knowledge to the students on modern control theory and design of control systems.

Course Contents:
Module I: Control System Components
Basic components, amplifiers, plants, transducers, error detectors, servo systems and regulator, DC and AC position and speed control systems.
Design of Feedback control systems
Introduction, cascade compensation networks, phase lag and lead design using Bode and Root locus plots

Module II: Modern theory
Introduction- State variables, state differential equations(homogeneous and non-homogeneous), Solution, state transition matrix- properties and computation, Laplace solution of state equations, transfer function matrix, representation of state equations in term of state transition matrix, characteristic equation
Modeling- state variable modeling, state model signal flow graph, state models-physical, phase, Jordan, similarity transformation, other useful transformation- controllability and observability canonical, diagonal canonical, Jordan canonical
Decomposition- direct, cascade, parallel
Controllability and observability – introduction, definition, tests, theorems, rank of a matrix, output controllability, duality theorem, pole- zero cancellation
Design-state feedback, relationship with closed-loop transfer function, pole placement and assignment, design of controller by transformation, Observer design, Ackerman's formula

Module III: Discrete time signals and systems
Introduction, SDC systems, sampling and data reconstruction.
Transform analysis of discrete systems: Introduction, linear difference equations, the pulse T.F. and pulse response, Z-transform equivalence of Zdomain to S-domain, stability analysis.

Module IV: Design of digital controls
Introduction, design of a positional
Servomechanism, digital PID controller, multivariable controllers.

Module V: State space models of discrete time systems: Introduction, discrete time state equation and solution, design examples, concepts of controllability and observability Liapunov stability analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- R C Dorf," Modern Control Systems", Pearson Education
- J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.
- Norman S Nise, "Control system Engineering", Wiley publishers

References:
- M, K. Ogata, 2002, "Modern Control Engineering, PHI.
- B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India

POWER SYSTEM LAB

Course Code: EEE2604 **Credit Units: 01**

List of Experiments:

1. To study the performance of a transmission line. Also compute its ABCD parameters.
2. Study of Characteristics of over current and earth fault protection.
3. To study the operating characteristics of fuse. (HRC or open type)
4. To find the earth resistance using three spikes
5. To study over current static relay.
6. To study the different types of faults on transmission line demonstration panel/model.
7. To study the radial feeder performance when
   (a) Fed at one end.
   (b) Fed at both ends
8. To study the performance of under voltage and over voltage relay.
9. To study the characteristics of bimetal mini circuit breakers.
10. To study the characteristics of Distance Relay.
11. To find the breakdown strength of transformer oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELECTRIC MACHINE-II LAB

Course Code: EEE2605 **Credit Units: 01**

List of Experiments:

1. To Perform load-test on 3 ph. Induction motor & to plot torque V/S speed characteristics.
2. To Perform no-load & blocked –rotor tests on 3 ph. Induction motor to obtain equivalent ckt. Parameters & to draw circle diagram.
3. To study the speed control of 3 ph. Induction motor by Kramer's Concept.
4. To study the speed control of 3 ph. Induction motor by cascading of two induction motors, i.e. by feeding the slip power of one motor into the other motor.
5. To study star- delta starters physically and
   (a) to draw electrical connection diagram
   (b) to start the 3 ph. Induction motor using it.
   (c) To reverse the direction of 3 ph. I.M.
6. To start a 3 phase slip –ring induction motor by inserting different levels of resistance in the rotor ckt. And to plot torque –speed characteristics.
7. To perform no-load & blocked –rotor test on 1 ph. Induction motor & to determine the parameters of equivalent ckt. Drawn on the basis of double revolving field theory.
8. To Perform load –test on 1 ph. Induction motor & plot torque –speed characteristics.
9. To Perform no load & short ckt. Test on 3- phase alternator and draw open ckt. And
10. Short ckt. Characteristics.
11. To find voltage regulation of an alternator by zero power factor (z.p.f.) method.
12. To study effect of variation of field current upon the stator current and power factor
13. With synchronous motor running at no load and draw V & inverted V curves of motor.
14. To measure negative sequence & zero sequence reactance of Syn. Machines.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

UTILIZATION OF ELECTRICAL ENERGY

Course Code: EEE2606 **Credit Units: 03**

Course Objective:
This course intends to impart knowledge on the practical and practice aspects of electrical engineering

Course Contents:

Module I: Heating and Welding
Electrical heating-advantages, methods and application, resistance over general construction, design of heating elements, efficiency and losses control. Induction heating: core type furnaces, core less furnaces and high frequency eddy current heating, dielectric heating: principle and special applications, arc furnaces: direct arc furnaces, Indirect arc furnaces, electrodes, power supply and control. Different methods of electrical welding and electrical equipment for them. Arc furnaces transformer and welding transformers.

Module II: Traction
Advantages and disadvantages, system of electric traction, diesel electric locomotives. Mechanics of train movement: simplified speed time curves, average and schedule speed, tractive effort, specific energy consumption, factors affecting specific energy consumption.

Module III: Traction Motors
DC motors, single phase and three phase motors, starting and control of traction motors, braking of traction motors. Modern 25 KV a.c. single phase traction systems: advantages, equipment and layout of 25 KV, single phase power frequency A.C. traction.

Module IV: Electric Drives
Individual and collective drives- electrical braking, plugging, rheostatic and regenerative braking load equalization use of fly wheel criteria for selection of motors for various
industrial drives.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Utilization of Elect. Energy - E.O. Taylor
- Utilization of Elect. Energy - H. Pratab
- Utilization of Elect. Energy - J.B. Gupta

SUBSTATION ENGINEERING

Course Code: EEE2607 **Credit Units: 03**

Course Objective:
The purpose of this course is to provide a thorough introduction to Substation engineering with an in depth study of various components that make a complete Substation.

Course Contents:

Module I
Introduction Functions of a substation, Classification, Layout, Design and Construction of Bus Bar and earth wire in substation.
Jumpering of conducters, Factors affecting layout of substation, Testing of substation. Reactive power management, Fundamentals of earthing

Module II
Load Management, importance of capacitor banks, power factor improvement, protection and installment of capacitor banks. types of overhead insulators, pollution flashover mechanism in insulators,basics of current transformers and voltage transformers. Economic operation of power system.

Module III
Computer applications, SCADA subsystem, Data acquisition and data processing, supervisory control, voltage control and voltage stability, Protection using circuit breakers,fuse and protection against overvoltage.Bus bar protection.

Module IV
Technical standards for construction of sub stations, Substation automation system. Gas insulated substations,.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Substation Engineering by Er. R.S.Dahiya (KATSON BOOKS)
- EHV AC and DC by S.Rao

ELECTRICAL POWER TRANSMISSION AND DISTRIBUTION-II

Course Code: EEE2701 **Credit Units: 04**

Course Objective:
The basic objective of this course is to provide the students the core knowledge of electric power transmission and distribution

Course Contents:
Module I: Short and Medium Lines
Introduction, Classification of lines, Short single phase line and phasor diagram, Short 3 phase ine, Transmission line as a two port network, Line regulation and efficiency, Line with transformers, Medium lines, Nominal T and pie models, Transmission efficiency and regulation of medium lines

Module II: Long Lines
Introduction, Exact solution of a long line, Physical interpretation of the long line equation, Propagation – constant, wavelength and velocity, Characteristic Impedance, Hyperbolic form of line equation, ABCD constants and evaluation, Ferranti effect, Surge impedance loading

Module III: Cables
Introduction, Classification, cable conductors, Cable requirements and construction, Properties and classification of Insulating materials, metallic sheathing, mechanical protection, Dielectric stress and insulation resistance, Capacitance – single core and three core cable, Grading of cables- Capacitive, inter-sheath, Limitation of inter-sheath grading, Economical diameter, Methods of laying, Cable specifications, Current carrying capacity of cables, LT cables. HT cables, Super tension Cables, Extra high tension cables, Advantages and disadvantages of oil filled cables

Module IV: Distribution
Kelvin's law and modified Kelvin's law for feeder conductor size, limitations of Kelvin's laws, DC distribution, radial and ring main systems, DC three wire systems, Different types of distributors,, DC distributor with concentrated load fed at one end and both ends with ends maintained at equal and unequal voltages, DC distributor with distributed load fed at one end and at both ends, DC ring main distributor, Dc ring main distributor with interconnector, DC three wire distributor fed at one end and at both ends, AC Distribution- method of calculations, AC distributor with concentrared loads, Power factors with respect to respective load points.

Module V
Introduction, comparison of a.c. and d.c. transmission system, Advantages and limitations of HVDC transmission, principal parts, control and applications of HVDC transmission.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Electric Power System: By – C.L.Wadhwa
- Electric Power System: By - Asfaq Husain
- Elements of Power System Analysis: By – William D.Stevenson
- Power System Analysis & Design: By – B.R.Gupta
- HVDC Transmission: By K.R. Padiyar
- Electric power by Soni, Gupta and Bhatnagar

MEASURMENT AND MEASURING INSTRUMENTS

Course Code: EEE2702 **Credit Units: 03**

Course Objective:
The objective of the course is to provide a brief knowledge of measurements and measuring instruments related to engineering. The basic idea of this course is to give the sufficient information of measurements in any kind of industry viz. electrical, electronics, mechanical e t c.

Course Contents:

Module I: Theory of Measurement
Introduction, Unit System, Performance Characteristics: static & dynamic standards, Error analysis: Sources, types and statistical analysis.

Module II: Transducers
Passive transducers, Active transducers: Classification, selection, Measurement of Pressure, Strain, Resistance, Capacitance and inductance. strain gauges, rossettes, LVDT, interfacing resistive transducers to electronic circuits.

Module III: Analog Meters
AC analog meter: Average, Peak and RMS voltmeters, sampling voltmeters. Electronics Analog meters: Electronics analog DC and AC voltmeter and ammeters, ohmmeter and multimeter

Module IV: Data Acquisition System
Introduction to data acquisition systems, Bridges: Wheatstone's bridge, Kelvin double bridge; Megger; Andersons Bridge; Schering Bridge; sources and detectors, shielding of bridges.

Module V: Digital Meters and Oscilloscopes
Display devices: Decimal, BCD and straight binary number, indicating system, numeric & alpha number display using LCD & LED, specification of digital meters: display digit & counts resolution, sensitivity, accuracy, speed & settling time etc.
Types of oscilloscopes, Measurement of Frequency.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.
- Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

References:
- Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.
- Electronics Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.

MEASURMENT AND MEASURING INSTRUMENTS LAB

Course Code: EEE2703 **Credit Units: 01**

Course Contents:

1. Measurement of resolution and sensitivity of thermocouple (study of various thermocouples J, K, T, etc.) (Calibration)

2. Measurement of resolution, sensitivity and non linearity of thermistor (thermistor instability)

3. Measurement of thickness of LVDT.

4. Measurement of resolution of LVDT (and displacement measurement)

5. Study of proportional control and offset Problems.

6. Study of proportional integral control.

7. Study of proportional integral derivative (PID) control.

8. Vibration measurement by stroboscope (natural frequency of a cantilever)

9. Angular frequency (speed of rotating objects) measurement by stroboscope.

10. Pressure transducer study and calibration.

11. Proving ring (force measurement)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION-II

Course Code: EEE2735 **Credit Units: 03**

Methodology:
Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

SOFTWARE ENGINEERING

Course Code: EEE2704 **Credit Units: 02**

Course Objective:
The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software. The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly be based on the classical analysis-design-implementation framework.

Course Contents:

Module I: Introduction
Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

Module II: Software Metrics and Project Planning
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Module III: Software Requirement Analysis, design and coding
Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding,

Module IV: Software Reliability, Testing and Maintenance
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards. Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

Module V: UML
Introduction to UML, Use Case Diagrams, Class Diagram: State Diagram in UML Activity Diagram in UML Sequence Diagram in UML Collaboration Diagram in UML

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:
Text:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

References:

- R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
- P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
- Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
- James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
- Sommerville, "Software Engineering", Addison Wesley, 1999.
- Sommerville, "Software Engineering", Addison Wesley, 1999.

SOFTWARE ENGINEERING LAB

Course Code: EEE2708 **Credit Units: 01**

Software Required: Rational Rose

Assignments will be provided for the following:

- Use of Rational Rose for visual modeling.
- Creating various UML diagrams such as use case, sequence, collaboration, activity, state diagram, and class diagrams.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DIGITAL SIGNAL PROCESSING

Course Code: EEE2705 **Credit Units: 02**

Course Objective:
The objective of the course in Digital signal processing is to provide the student with significant skills in general as well as advanced theories and methods for modification, analysis, detection and classification of analog and digital signals. Furthermore, the objective is to give the student a broad knowledge of central issues regarding design, realisation and test of analog and in particular digital signal processing systems consisting of hardware and/or software components. The specialization in signal processing makes it possible to study practical or theoretic fields, ranging from mathematics/signal theory over algorithmic design to development of instruments based on hardware and/or software for real time signal

Course Contents:

Module I: Discrete time signals and systems in time domain
Classification of signal, signal processing operations, classification of systems, discrete time systems, examples of types of signal, sampling process, time domain characterization of LTI discrete- time systems, state space representation of LTI discrete time systems.

Module II: Discrete time signals in transform domain
DTFT, properties, applications, inverse DTFT, DFT, properties, applications, inverse DFT, Z-transform, properties, applications, inverse Z-transform, frequency response, transfer function, Fast Fourier transform algorithms: DIT algorithm, DIF algorithm.

Module III
Discrete time processing of continuous time signals: sampling, analog filter design, antiliasing filter design.

Module IV: Discrete time processing of discrete- time signals
Digital filters: Digital filter structure: FIR filter structure, IIR filter structure
Digital filter design: Impulse invariance method, bilinear transform method of IIR filter design, FIR filter design.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Prokis, Manolakis: Digital signal processing
- Oppenheim & Schaffer : Digital Signal Processing
- Fafael C. Gonzalez, Richrd E. Woods: Digital Image Processing
- Anil Kumar Jain Fundamentals of Digital Image Processing

DIGITAL SIGNAL PROCESSING LAB

Course Code: EEE2709 **Credit Units: 01**

List of Experiments:

- To generate unit step sequence, exponential sequence and sinusoidal sequence
- To determine convolution of two given sequences.
- To plot the frequency response of an FIR system
- To compute DFT and IDFT of a given sequence
- To determine the circular convolution of two given sequences
- To design various analog filters
- To design FIR filter using Hamming window
- To convert Analog filter into Digital Filter using bilinear transformation
- To determine z and inverse z transform of a given sequence
- To verify 8 points FFT algorithm in decimation in time (DIT) & decimation in frequency (DIF).
- To determine the filter coefficient using Ramez exchange algorithm.
- To design an IIR digital filter and its parallel realization.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ROBOTICS AND MECHATRONICS

Course Code: EEE2706 **Credit Units: 02**

Course Objective:
The course aims to introduce the working of robots their geometric interpretations and planning of trajectories. This course also provides knowledge on mecharonics.

Course Contents:

Module I: Robot Arm Kinematics
Introduction. The Direct Kinematics Problem. Rotation Matrices, Composite Rotation Matrix. Rotation Matrix about an Arbitrary Axis, Rotation Matrics with Euler Angles Representation, Geometric Interpretation of Rotation Matrics, Homogeneous Coordinates and transformation Matrix,

Module II
Geometric Interpretation of Homogeneous Transformation Matrices, Composite Homogeneous Transformation Matrix.
II&III Links, Joints and Their Parameters, The David-Hhartenberg Representation, ½ Kinematics Equation for Manipulators, Other specifications of the Location of the End-Effector, Classification of manipulators, The Inverse Kinematics Problem, Inverse Transform Technique for Euler Angles Solution.

Module III: Planning of Manipulator Trajectories
Introduction, General considerations on Trajectory planning, joint- Interpolated Trajectiries, Calculation of a 4-3-4 joint Trajectory, Cubic Spline Trajectory (five Cubics).

Module IV: Mechatronics
What is Mechatronics, Systems, Measurement systems, Control systems, Microprocessor- based controllers, Response of systems, The Mechatronics Approach.

Module V: Actuators
Pneumatic and Hydraulic Actuation systems; Actuation systems, Pneumatic and Hydraulic systems, Directional control valves, Pressure control valves, Cylinders, Process Control Valves, Rotary Actuators.
Mechanical Actuation Systems: Mechanical systems, Types of motion, Kinematic chains, Cams, Gear trains, Ratchet and pawl, Belt and chain drives, Bearings, Mechanical aspects of motor selection.
Electrical Actuation Systems: Electrical systems, Mechanical switches, Solid state switches, Solenoids, D.C. Motors, A.C. Motors, Stepper Motors.
Programmable Logic Controllers: Introduction, Basic Structure, Input Output Processing, Programming, Mnemonics, Timers, Internal Relays and Counters, Shift Registers, Master and jump controls, Data handling, Analogue input/output, Selection of a PLC.
Mechatronics Systems: Traditional and Mechatronics Designs, Possible
Mechatronics Design Solutions, Case Studies of Mechatronic Systems.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

Text:

- Robotics, Control, Sensing, Vision and Intelligence, K S FU,
- R C GONZALEZ, C S G LEE, McGraw Hill, 1987.
- Mechatronics, W BOLTON, Pearson Education Ltd, 2003.

References:

- Introduction to Robotic Mechanics and Control, JOHN J. CRAIG, Pearson Education Ltd. 2003
- Introduction to Robotics, SYED V NIKU, PHI, Pearson, 2003
- Robotics and Control, R K Mittal, I J Nagrath, TMH, 2003
- Mechatronics, Principles Concepts and Applications – N.P. Mahalik TMH 2005
- Introduction to Mechatronics and Measurement systems – David G.Alciator and Michael B. Histand TMH 2005

ROBOTICS AND MECHATRONICS LAB

Course Code: EEE2710 **Credit Units: 01**

1. To study Robot Arm (Model 1055)
2. To make the sequential operation
   $A^+ B^+ A^- B^-$; A^+, B^+, $B^- A^-$ using Pneumatic trainer
3. For the above write a ladder logic giving time delays
4. Design a Pneumatic Circuit for clamping type & operated by PLC
5. Design a Hydraulic Circuit for clamping type & operated by PLC
6. To make the ladder logic for water level control & reaction vessel to detect different levels of water and switch off the water supply.
7. Starter Control & Star Delta Starter for ¼ HP AC. Motor to demonstrate the use of PLC Motor Starting
8. Design Fan operation using PLC
9. Design n a Lift Control
10. Design Sequential Switching Motors

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

C BASED EMBEDDED SYSTEM DESIGN

Course Code: EEE2707 **Credit Units: 02**

Course Objective:
The syllabus is divided into two parts, the first one deals with 8051 architecture and its interfacing with other devices. Second part of the syllabus deals with the basic embedded system and it's design. A microcontroller is an integrated circuit that is programmable. The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. Real Time Operating System is also explained at length.8051 C programming is also incorporated in the syllabus.

Course Contents:

Module I: Introduction to an embedded systems design & RTOS
Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

Module II: Overview of Microcontroller
Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.

Module III: Communication with 8051
Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).

Module IV: Basics of 8051 C Programming
Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types. Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs.

Module V: 8051 C Programming
Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions, Common control problem examples (Centronics parallel interface, Printer interace, Memory access, Key matrix scanning, Stepper motor control and digital clock).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Raj Kamal, 2004, “Embedded Systems”, TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. “The 8051 microcontroller” Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 “The 8051 Microcontroller and Embedded Systems”, PHI.

References:

- David E. Simon,1999, “An Embedded Software Primer”, Pearson Education
- K.J. Ayala, 1991, “The 8051 Microcontroller”, Penram International.
- Dr. Rajiv Kapadia, “8051 Microcontroller & Embedded Systems”, Jaico Press
- Dr. Prasad, 2004, “Embedded Real Time System”, Wiley Dreamtech.

C BASED EMBEDDED SYSTEM DESIGN LAB

Course Code: EEE2711 **Credit Units: 01**

Course Contents:

1. Write a program to add two 8-bit numbers using microcontroller 8051.
2. Write a program to multiply two 8-bit numbers using microcontroller 8051.
3. Write a program to divide two 8-bit numbers using microcontroller 8051.
4. Write a program to subtract two 8-bit numbers using microcontroller 8051.
5. Write a program to generate a geometric progression using microcontroller 8051.
6. Write a program to generate a square wave using microcontroller 8051.
7. Write a program to generate a delay of 5 ms using microcontroller 8051.
8. Study and implement serial communication by interfacing microcontroller with a computer.
9. Study and implement parallel data communication by interfacing microcontroller with a LCD.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INDEPENDENT STUDY

Course Code: EEE2712 **Credit Units: 02**

This is an elective, self-directed course to investigate a emerging areas of IT and Computer Science like Mobile Operating System, Cloud Computing, or from Current Research Areas etc. The primary goal of the course is to provide students with research exploration of a specific topic of interest to the individual student under the advisement of an instructor who will monitor and critique the student's progress.

Independent study provides students with the opportunity to work one-on-one with a Faculty on a particular topic. The student and faculty should discuss the aims and content of the study and present the proposal to Head of Department. The independent study proposal should include the study's title, theme, readings, work to be submitted, and syllabus. Faculty and student should meet for a minimum number of 2 hours per week. Student will give a seminar after completion of study.

TERM PAPER

Course Code: EEE2731 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER
The procedure for writing a term paper may consist of the following steps:
1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of Materials
a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper
a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion
Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing & Preparing the final Paper
a) Before writing a term paper, you should ensure you have a question which you attempt to

answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

Reference

From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Russian speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

sUnpublished theses/ dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: EEE2732 **Credit Units: 02**

Course Objective:
The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

STUDENT ASSESSMENT RECORD (SAR)

Record to be maintained by project guide.

1. Project Tools (Hardware/ Software) used fot implementation.

2. Project Evaluation & Execution.

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

Syllabus - Eighth Semester

POWER ELECTRONICS

Course Code: EEE2801 **Credit Units: 03**

Course Objective:
The course aims to introduce them to the theory of operation, analytical and circuit models and basic design concepts of Electric Power components and systems.

Course Contents:

Module I: Triggering Devices
Triggering devices, Unijunction Transistor, Characteristics and applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon Controlled Switch, Silicon Unilateral Switch, silicon Silicon bilateral Switch, Shockley diode.

Module II: Thyristor Firing Circuits, Turn on systems
Two transistor model of Thyristor, Method of Triggering a thyristor, Thyristor Types, Requirement for triggering circuits, Thyristor Firing Circuits, Fullwave control of Ac with one thryristor, Light activated SCrs (LASCR), Control Circuit, dv/dt and di/dt protection of Thyristor, Pulse Transformer triggering, Firing SCR by UJT, TRIAC firing circuit, Phase control of SCR by pedestal and Ramp.

Module III: Controlled Rectifiers
Types of Converters, effect of inductive load, Commutating diode or free wheeling diode, controlled rectifiers, Bi phase half wave, single phase full wave phase controlled converter using bridge principle, harmonics.

Module IV: Inverters
Types of Inverters, Bridge Inverters, Voltage Source Inverters, Pulse Width Modulation Inverters, Current source Inverters.

Module V: AC Voltage Controllers
Types of AC voltage Controllers, AC Phase Voltage controllers, single Phase Voltage Controller with RL load, harmonic analysis of single phase full wave controller with RL load.

Module VI: DC to DC Converters
DC choppers, Chopper classification, two quadrant chopper, Four quadrant chopper.

Module VII: Cyclo Converter
Single phase and three phase cycloconverters.

Module VIII: Industrial Applications
One shot Thyristor trigger Circuit, over voltage protection, simple battery charger, battery charging regulator, AC static switches, DC static switch

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- J. Michael: Power Electronics: Principles and Applications
- M. H. Rashid: Power Electronics circuits

References:

- H. C. Rai, “Power Electronics Devices, Circuits, Systems and Application”, Galgotia, 3rd Ed.
- P. S. Bimbhara, “Electrical Machinery, Theory Performance and Applications” Khanna Publications, 7th Ed

PROJECT-DISSERTATION

Course Code: EEE2837 **Credit Units: 08**

Methodology
Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Guidelines for Project File and Project Report
Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.
Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.
Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

Project File
The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period where the researcher is not working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department
The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include
- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

Project Report
The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:
- **Title or Cover Page**
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgement(s)**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract**
  A good"Abstract" should be straight to the point; not too descriptive but fully informative. First

paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.
- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.
  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.
  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.
  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.
- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly.
  Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?
- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.
  Examples
  For research article
  Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli*

O157: H7. *ClinMicrobiol Infect*, **8** (suppl 1): 116–117.
For book
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

Layout Guidelines for the Project File & Project Report

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment of the Project File and the Project Report

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following assessment objectives:

- Range of Research Methods used to oASEin information
- Execution of Research
- Data Analyses (Analyse Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology,refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis andresults, achievement of objectives, presentation/ viva)

Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25

HIGH VOLTAGE ENGINEERING

Course Code: EEE2802 **Credit Units: 03**

Course Objective:
This subject deals with the detailed analysis of Breakdown occur in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition the High voltage testing methods are also discussed.

Course Contents:

Module I: Introduction to High Voltage Technology and Applications
Electric Field Stresses, Gas / Vaccum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

Module II: Break Down in Gaseous and Liquid Dielectrics
Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids.

Module III: Break Down in Solid Dielectrics
Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

Module IV: Generation of High Voltages and Currents
Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

Module V: Measurement of High Voltages and Currents
Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

Module VI: Over Voltage Phenomenon and Insulation Co-Ordination
Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

Module VII: Non-Distructive Testing Of Material and Electrical Apparatus
Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

Module VIII: High Voltage Testing Of Electrical Apparatus
Testing of Insulators and bushings, Testing of Isolators and circuit breakers, testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition
- High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2nd Edition.

References:

- High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
- High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited, 1995.

NUCLEAR POWER ENGINEERING

Course Code: EEE2803 **Credit Units: 03**

Course Objective:
The aim of this course is to make the students learn about the theory and engineering behind establishment Nuclear power stations

Course Contents:

Module I: Introduction to Nuclear Engineering
Introduction, Why Nuclear Power for Developing Countries, Atomic Nuclei, Atomic Number and Mass Number, Isotopes, Atomic Mass Unit, Radioactivity and Radioactive Change Rate of Radioactive Decay, Mass – Energy Equivalence, Binding Energy, Release of Energy by Nuclear Reaction, types of Nuclear Reactions, Initiation of Nuclear Reaction, Nuclear Cross – section, Nuclear Fission, The Fission Chain Reaction, moderation, Fertile Materials and Breeding.

Module II: Nuclear Reactors
Introduction, General Components of Nuclear Reactor, General Problems of Reactor Operation, Different Types of Reactors, Pressurised Water Reactors (PWR), Boiling Water Reactors (BWR), Heavy Water – cooled and Moderated CANDU (Canadian Deuterium Uranium) Type Reactors, Gas-cooled Reactors, Breeder Reactors, Reactor Containment Design, Location of Nuclear Power Plant, Nuclear Power Station in India, India's 3-stage Programme for Nuclear Power Development, Comparison Nuclear Plants with Thermal Plants.

Module III: Nuclear Materials
Introduction, Fuels, Cladding and Structural Materials Coolants, Moderating and Reflecting Materials, Control Rod Materials, Shielding Materials.

Module IV: Nuclear Waste & Its Disposal
Introduction, Unit of Nuclear Radiation, Types of Nuclear Waste, Effects of Nuclear Radiation, Radioactive Waste Disposal System, Gas Disposal System.
Safety Rules: Personal Monitoring, Radiation Protection (Radiation Workers, Non-Radiation Workers, Public at large), Radiation Dose (Early effect, Late effect hereditary effect)

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- P.K. Nag " Power Plant Engineering ", Tata McGraw Hill
- Arora & Domkundwar "Power Plant Engineering ", Dhanpat Rai & Co.
- Combined Power Plants by J.H. Horlock Pergamon Press.
- Soni, Gupta and Bhatnagar- A course in Electric Power-Dhanpat rai and Sons

References:
- Black / Veatch, "Power Plant Engineering", CBS Published & Distributors.
- Gas Turbine Theory –by Sh. H. Cohen, G.F.C. Rogers. H.I.H. Saravanamuttoo.
- Longman Scientific & Technical.

THERMAL POWER ENGINEERING

Course Code: EEE2804 **Credit Units: 03**

Course Objective:
The aim of this course is to make the students learn about the theory and engineering behind establishment Thermal power stations

Course Contents:

Module I
Introduction, Uses, Trends, Selection of site for Thermal Station, Main Parts & Working, Boilers, Economizers, Air Preheater, Super heaters, & Reheaters, Steam Prime Mover, Condensers, Spray pond, Cooling Tower, Fuels, Analysis of coal, Liquid fuels, Gaseous Fuels, Hull Handling, Delivery of coal, Unloading Preparation, Transfer, Outdoor (Dead) Storage, Indoor (Live) Storage, Inplant Handling, Coal Weighing, Combustion & Combustion Equipment, Hand Firing, Stoker Hiring, Pulverized Fuel system, Coal Pulverizing Mills, pulverized Fuel burners, automatic combustion control Ash Disposal & dust collection, Ash Handling System, Dust collection, Draught Systems, Types of different Methods of feed water treatment, Evaporators, feed Water Heaters, Steam turbines, Turbo-alternators, steam Station Layouts, steam Station Control.

Module II: Diesel Electric Stations
Introduction, Uses Selection of Site for a Diesel Stations, Diesel Electric Plant: Main Components, Different Types of Engines Used in Diesel Power and their working, Diesel Plant Etnciency and Heat Balance Choice and characteristics of Diesel engines, Auxiliary equipment for Diesel Power Plant, Plant Layout and Maintenance.

Gas Turbine Plants
Introduction, A Simple Gas Turbine plant, Methods to Improve Thermal Efficiency of Gas Turbine Plant, Open Cycle and closed cycle gas Turbine Plants, Components of a Gas Turbine Plant, Fuels for Gas Turbine Plants, Different Arrangements of Components, Combination Gas Turbine Cycle, Plant Layout, Advantages of Gas Turbine Plants over steam Plants

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Soni, Gupta and Bhatnagar- A course in Electric Power-Dhanpat rai and Sons

HYDRO POWER ENGINEERING

Course Code: EEE2805 **Credit Units: 03**

Course Objective:
The aim of this course is to make the students learn about the theory and engineering behind establishment Hydro power stations

Course Contents:
Module I
Introduction, Potential of hydropower in India- its development and future prospect. Selection of site and investigation, General Hydrology- hydrological cycle, precipitation, run-off and its measurement, hydrography, unit hydrograph, flow duration and mass curve,

Module II
Classification of Hydro-Electric Plant, Pondage and storage, Classification of Hydro-Electric Plants according to Quantity of Water available, Classification of Hydro-electric Plants According to Available Head, Classification of Hydro-electric Plants According to Nature of Load,

Module III
General Arrangement & Operation of a hydro electric Plant Functions of different Components in storage Reservoir Plants, Principle of Working of a Hydro electric Plant,

Module IV
Construction & Operation of a different components, Dams, Spillways, Gates, Intake & Outlet works, Canals & Penstocks, Water Hammer & Surge Tank, Type of Turbine, Characteristic of turbines, Governing of turbines, Draft Tube, Hydro-Electric Generators,

Module V
Power station structure lay out and control, Selection of prime mover, speed and pressure regulation, methods of governing, starting and stopping of water turbines, operation of hydro turbines. Machine loading and frequency control, Maintenance of hydropower plants

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Soni, Gupta and Bhatnagar- A course in Electric Power-Dhanpat rai and Sons
- Jagdish Lal, "Hydraulic Machines", Metropolitan book company(P) ltd. Modi, P.N., & Seth, S.M., Hydraulic & Fluid mechanics including Hydraulic Machines", Standard Book House.
- Guthrie Brown," Hydroelectric Engg. Practice", 2nd ed.(in 3 vols.)
- Vol. I : Civil Engineering
- Vol. II : Mechanical & Electrical Engg.
- Vol III : Economics, Operation, Maintenance
- Hydro Power an Indian Perspective Author-Cum-Editor Dr. B.S.K. Naidu, Director General, NPTI.
- Hydro –Electric and Pump storage Plants – MG Jog, Wiley Eastern Limited.
- Micro Hydroelectric Power Stations – By L.Monition, Power Stations- by Lamination, Mle Nir, J.Roux translated by Joan Mc Mullan, John Wiley & Sons.
- Hydro Power by Professor Dr. Ing. Joachim Raable VDI- Verlag Gmbtt.
- Hydro Power Plant Familarisation, NPTI Publication.

SOLAR ENGINEERING

Course Code: EEE2806 **Credit Units: 03**

Course Objective:
To get in depth knowledge and deep understanding about the manufacturing methods of thin film solar panels and to gain an overview of the whole manufacturing process. To get in depth knowledge and understanding about the manufacturing methods of solar wafer and cells.

Course Contents:

Module I: Introduction
Basics of Solar Panels, Fundamentals of solar cells: types of solar cells, semi conducting materials, band gap theory, Solar cell properties and design; p-n junction photodiodes, Single junction and triple-junction solar panels, metal-semiconductor hetero junctions, and Semiconducting materials for solar cells. Types of solar energy concentrators, Fresnel lenses and Fresnel reflectors, operating solar cells at high incident energy for maximum power output

Module II: Solar cell manufacturing processes
Material resources, chemistry, low cost manufacturing processes. Single crystal, polycrystalline and amorphous silicon solar cells, cadmium telluride thin-film solar cells, conversion efficiency, Current trends in photovoltaic research and applications, solution based processes solar cell production.

Module III: Different Coating Methods
ASi (Amorphos Silicon), ASI/µcSi (Amorphous and micro crystalline Silicon), CIS (Copper Indium Sulfid), CdTe (Cadmium Telluride)
Inline Production: Machine overview, Laser Scribing Systems, Edge Ablation, Cutting of glases

Module IV: Process Methods
Texturizing, Diffusion, PSG_etching, SIN-coating, Metalization.
Inline production: Machine overview, Handling Systems, Testing and Sorting, Laser Edge Isolation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Principles of Solar Engineering, D. Yogi Goswami, Taylor and Francis
- Applied Photovoltaics, Stuart Wenham, Martin Green, and Muriel Watt, Earthscan
- Photovoltaic Engineering Handbook, F. Lasnier and T. G. Ang, IOP Publishing UK (Adam HilgerUSA)
- H.P. Garg and J. Prakash, “Solar Energy fundamental and Applications”, Tata McGraw Hill Pulishing Co. Ltd.
- Magal, “Solar Power Engineering”, Tata McGraw Hill Publishing Co. Ltd

PROCESS AND MACHINE TECHNOLOGY

Course Code: EEE2807 **Credit Units: 03**

Course Objective:
To get a thorough knowledge and understanding of the complete product management and troubleshooting. To be able to maintain the solar machines and to gain the strategic competence to optimize the whole process of maintenance. To get a capacity to optimize the work flow.

Course Contents:

Module I: Troubleshooting
Inspection Procedures, Troubleshooting Methods, Troubleshooting Procedures, Load Problem, Inverter Problem, Array Problem, Troubleshooting Records

Module II: Maintenance
Basics, Maintenance Procedures, Module array cleaning, Electrical check and maintenance, Inverter preventative maintenance, Maintenance instructions

Module III: Asset lifecycle management
Introduction, Upkeep strategy & philosophy, General Product Management, Energy production analysis and reporting.

Module IV: Support guidelines
Optimization process, Controlling of maintenance, Repair and Replacement, User manual.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Bower, W., J. Dunlop and C. Maytrott, “Performance of Battery Charge Controllers: An Interim Test Report,” Proceedings of 21st IEEE Photovoltaic Specialists Conference
- Vinal, George W., Storage Batteries, Fourth Edition, John Wiley and Sons
- Kiehne, H. A., Battery Technology Handbook, Marcel Dekkar, Inc.
- Linden, D., Handbook of Batteries and Fuel Cells, McGraw-Hill
- Lane, C., Dunlop, J., and W. Bower, “Cecil Field Photovoltaic Systems Evaluation,” Sandia National Laboratory
- Hammond, B. and J. Dunlop, “Venice Photovoltaic Systems Evaluation,” Sandia National Laboratory,

Amity School of Engg. & Technology

Bachelor of Technology - Mechanical Engineering

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

ENGINEERING MATHEMATICS-I

Course Code: MAE2112 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING CHEMISTRY

Course Code: MAE2113 **Credit Units: 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels
Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter,Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module IV: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication; Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module V: Corrosion
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ELEMENTS OF MECHANICAL ENGINEERING

Course Code: MAE2104 **Credit Units: 02**

Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

Course Contents:

Module I:Fundamental Concepts
Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

Module II: Stress And Strain Analysis
Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

Module III:Casting& Forging
Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

Module IV: Welding& Sheet metal working:
Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. *Internal Combustion Engine*, Tata McGraw-Hill.

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: MAE2105 **Credit Units: 03**

Course Objective:
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.
Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References:

- ***Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.***
- ***J. B Dixit, "Fundamentals of Computers and Programming in 'C'.***
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

ELECTRICAL SCIENCE

Course Code: MAE2106 **Credit Units: 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

ELEMENTS OF MECHANICAL ENGINEERING LAB

Course Code: MAE2109 **Credit Units: 01**

Course Contents:

1. Welding

(a)	Arc Welding	-	Butt Joint
		-	Lap Joint
		-	T Joint
(b)	Gas Welding	-	Butt Joint
		-	Lap Joint
		-	Brazing of Broken pieces
2. Foundry		-	Sand mould casting by single piece pattern& Split pattern bracket with cores
3. Sheet Metal		-	Dust Bin
		-	Mug
		-	Funnel
		-	Cylindrical Mug with handle-Rectangular
4. Fitting Shop		-	Male – Female Joint
		-	Rectangular piece Filing the job

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PROGRAMMING IN C LAB

Course Code: MAE2110 **Credit Units: 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELECTRICAL SCIENCE LAB

Course Code: MAE2111 **Credit Units: 01**

List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify RTh, VTh, RN, IN in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING CHEMISTRY LAB

Course Code: MAE2114 **Credit Units: 01**

Course Contents:

List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.
2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.
3. To determine the type and extent of alkalinity of given water sample.
4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.
5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.
6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.
7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.
8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.
10 To determine the total residual chlorine in water.
11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.
12 Determination of viscosity of given oil by means of Redwood viscometer I.
13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus
14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

ENGINEERING MATHEMATICS-II

Course Code: MAE2209 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

Module IV: **Statistics and Probability**
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ENGINEERING PHYSICS

Course Code: MAE2210 **Credit Units: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .
Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: MAE2203 **Credit Units: 03**

Course Objective:
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:
Module I: Introduction
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.
Module IV: Polymorphism
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

ENGINEERING MECHANICS

Course Code: MAE2204 **Credit Units: 03**

Course Objective:
Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

Course Contents:

Module I: Force system & Structure
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Module II:Friction
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

Module III: Distributed Force
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

Module IV: Work -Energy
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: MAE2206 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab

ENGINEERING MECHANICS LAB

Course Code: MAE2207 **Credit Units: 01**

Engineering Mechanics:

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like
4. Leather, Wood, Aluminum) on an inclined plane.
5. To find the forces in the members of Jib Crane.
6. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
7. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
8. Wheel and Axle
9. To determine the MA, VR, η of Worm Wheel (2-start)
10. Verification of force transmitted by members of given truss.
11. To verify the law of moments using Bell crank lever
12. To find CG and moment of Inertia of an irregular body using Computation method

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING GRAPHICS LAB

Course Code: MAE2208 **Credit Units: 01**

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI:Development of Surface
Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

ENGINEERING PHYSICS LAB

Course Code: MAE2211 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

KIMEMATICS OF MACHINE

Course Code: MAE2301 **Credit Units: 04**

Course Contents:

Module-I: Introduction
Links-types, Kinematics pairs-classification, Constraints-types, Degrees of freedom of planar mechanism, Grubler's equation, linkage mechanisms, inversions of four bar chain, slider crank chain and double slider crank chain
Velocity in Mechanisms
Velocity of point in mechanism, relative velocity method, Velocities in four bar mechanism, slider crank mechanism and quick return motion mechanism, Rubbing velocity at a pin joint, Instantaneous center method, Types & location of instantaneous centers, Kennedy's theorem, Velocities in four bar mechanism & slider crank mechanism

Module-II: Acceleration in Mechanisms
Acceleration of a point on a link, Acceleration diagram, Coriolis component of acceleration, Crank and slotted lever mechanism, Klein's construction for Slider Crank mechanism and Four Bar mechanism, Analytical method for slider crank mechanism
Mechanisms with Lower Pairs
Pantograph, Exact straight line motion mechanisms-Peaucellier's, Hart and Scott Russell mechanisms, Approximate straight line motion mechanisms–Grass-Hopper, Watt and Tchebicheff mechanisms, Analysis of Hooke's joint, Davis and Ackermann steering gear mechanisms.

Module-III: FRICTION
Laws of friction, Friction on inclined plane, Efficiency on inclined plane, Friction in journal bearing-friction circle, Pivots and collar friction-uniform pressure and uniform wear, Belt and pulley drive, Length of open and cross belt drive, Ratio of driving tensions for flat belt drive, centrifugal tension, condition for maximum power transmission, V belt drive
Brakes & Dynamometers
Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers

Module-IV: CAMS
Cams and Followers - Classification & terminology, Cam profile by graphical methods with knife edge and radial roller follower for uniform velocity, simple harmonic and parabolic motion of followers, Analytical methods of cam design – tangent cam with roller follower and circular cams with flat faced follower

Module-V: Gears & Gear Trains
Classification & terminology, law of gearing, tooth forms & comparisons, Systems of gear teeth, Length of path of contact, contact ratio, interference & under cutting in involute gear teeth, minimum number of teeth on gear and pinion to avoid interference, simple, compound, reverted and planetary gear trains, Sun and planet gear.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Books and References:

- Theory of Machines - Thomas Bevan
- Theory of Machines and Mechanisms- Shigley

- Theory of Machines and Mechanisms-Ghosh & Mallik
- Theory of Machines and Mechanisms- Rao & Dukkipati
- Theory of Machines-S.S. Rattan
- Kinematics of Machines-Dr. Sadhu singh
- Mechanics of Machines – V. Ramamurti
- Theory of Machines – Khurmi & Gupta
- Theory of Machines – R. K. Bansal
- Theory of Machines – V. P. Singh
- Theory of Machines – Malhotra & Gupta

MATERIAL SCIENCE AND METALLURGY

Course Code: MAE2303 **Credit Units: 03**

Course Objective:
Metallurgy and Materials deal with the structure and properties of all materials, which have engineering applications. Metallurgists and Materials Engineers are responsible for designing, producing, examining and testing materials as diverse as metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites. This course will help students understand the properties of different types of materials and their applications.

Course Contents:

Module I
Atomic structure of metals crystal structure, crystal lattice of (i) Body centered cubic (ii) face centered cubic (iii) closed packed hexagonal, crystallographic notation of atomic planes, polymorphism and allotropy, solidification of crystallization (i) nuclear formation (crystal growth) (ii) crystal imperfection Elementary treatment of theories of plastic deformation, phenomenon of slip twinning, dislocation, identification of crystallographic possible slip planes and direction in FCC, BCC, C.P., recovery, re-crystallization, preferred orientation causes and effects on the property of metals.

Module II
Introduction to Engineering materials, their mechanical behaviour, testing and manufacturing properties of materials, physical properties of materials, classification of engineering materials.

Module III
General principles of phase transformation in alloys, phase rule and equilibrium diagrams, Equilibrium diagrams of Binary system in which the components form a mechanical mixture of crystals in the solid state and are completely mutually soluble in both liquid state. Equilibrium diagrams of a systems whose components have complete mutual solubility in the liquid state and limited solubility in the solid state in which the solid state solubility deceases with temperature. Equilibrium diagram of alloys whose components have complete mutual solubility in the liquid state and limited solubility in solid state (Alloy with a peritectic transformation) Equilibrium diagrams of a system whose components are subject to allotropic change. Iron carbon equilibrium diagram. Phase transformation in the iron carbon diagram (i) Formation of Austenite (ii) Transformation of austenite into pearlite (iii) Martensite transformation in steel, time temperature transformation curves.

Module IV
Principles and applications of heat treatment processes viz. annealing, normalizing hardening, tempering; harden ability & its measurement, surface hardening processes. Defects in heat treatment and their remedies; effects produced by alloying elements on the structures and properties of steel. Distribution of alloying elements (Si, Mn. Ni. Cr. Mo. TL. Al) in steel.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- V. Raghavan, “Material Science & Engineering”, Prentice Hall India Ltd., 2001.

- Shackelford, J.F. and Muralidhara, M.K., Introduction to Material Science for Engineers (6/e), Pearson Education, 2007
- S.K. Hazra Chaudhuri, "Material Science & Processes", Indian Book Publishers, Calcutta, 1983.
- R.B. Gupta, "Material Science Processes", Satya Prakashan, New Delhi, 2000.

References:

- Degarmo E. Paul et.al, "Materials & Processes in Manufacture", Prentice Hall India, New Delhi, 2001.
- Raymond A Higgim., "Engineering Metallurgy Part 1", Prentice Hall India, New Delhi, 1998.
- L. Krishna Reddi, "Principles of Engineering Metallurgy", New Age Publication, New Delhi, 2001.
- Buduisky et al, "Engineering Materials & Properties", Prentice Hall India, New Delhi, 2004.
- Peter Haasten, "Physical Metallurgy", Cambridge Univ. Press, 1996.

APPLIED THERMODYNAMICS

Course Code: MAE2311 **Credit Units: 03**

Course Objective:
Objective of this course is to impart in depth understanding of the principles of thermodynamics and heat transfer. This course also helps students understand the application of basic fluid mechanics, thermodynamic, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering.

Course Contents:
Module I: Basic concepts
Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth Law of Thermodynamics, Work and heat, Flow work

Module II: First Law of Thermodynamics
Mechanical equivalent of heat, internal energy, Analysis of non-flow system, flow process and control volume, steady flow, energy equation, flow processes

Module III: Second Law of Thermodynamics and Entropy
Heat Engine, heat pump, Kelvin Planck and Clausius statement of Second Law of Thermodynamics, Perpetual motion machine, Reversible cycle- Carnot Cycle, Clausius inequality, entropy, Principle of entropy increase, concepts of availability, irreversibility.

Module IV: Air-Cycles
Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, Stirling cycle, Erricsson cycle, Brayton cycle; Reversed Carnot cycle.

Module V: Properties of Steam
Use of steam tables, wet steam, superheat steam, different processes of vapour, Mollier Diagram.

Module VI: Reciprocating Air compressors
Single stage compressor, Isothermal efficiency, adiabatic efficiency, clearance volume, volumetric efficiency, and multi-stage compression with intercooling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- P.K. Nag, “Engineering Thermodynamics”, Tata McGraw Hill
- Incropera, “Engineering Thermodynamics”, John Willy

References:
- Engel, T. and Reid, P., Thermodynamics, Statistical Thermodynamics & Kinetics, Pearson Education, 2006
- Cengel & Boles, “Thermodynamics”, Tata McGraw Hill.
- Sonntag/Vanhylene, Fundamentals of Thermodynamics, Wiley
- Rahul Gupta, Engineering Thermodynamics, Asian Books P. Ltd.
- Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications
- Onkar Singh, Applied Thermodynamics, New Age Publications.
- Dhomkundwar Kothandaraman, “A Cou

STRENGTH OF MATERIALS-I

Course Code: MAE2312 **Credit Units: 04**

Course Objective:
The objective of this course is to make the students understand the concept of stress and strain in different types of structure/machine under different loading conditions. The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

Course Contents:

Module I: Simple stresses and strains
Concept of stress and strain; Hooke's law, Young's modulus, Poisson ratio, stress at a point, stress and strains in bars subjected to axial loading. Modulus of elasticity, stress produced in compound bars subject to axial loading. Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls.

Module II: Compound stress and strains
The two dimensional system; stress at a point on a plane, principal stresses and principal planes; Mohr's circle of stress. Graphical and Analytical methods for stresses on oblique section of body. Shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.

Module III: Bending Stress
Theory of bending stresses in beams due to bending, assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite / flitched beams, bending and shear stresses in composite beams.

Module IV: Torsion
Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, combined torsion and bending of circular shafts principal stress and maximum shear stresses under combined loading of bending and torsion, analysis of close-coiled-helical springs.

Module V: Thin cylinders and spheres
Derivation of formulae and calculation of hoop stress, longitudinal stress in a cylinder and sphere subjected to internal pressure.

Module VI: Columns and struts
Columns and failure of columns, Euler's formulas; Rankine-Gordon's formula, Johnson's empirical formula for axially loaded columns and their applications.

Module VII: Slope and deflection
Relationship between moment, slope and deflection, Mohr's theorem; Moment area method; method of integration; Macaulay's method: Use of all these methods to calculate slope and deflection for the following:
a) Cantilevers
b) Simply supported beams with or without overhang
c) Under concentrated loads, uniformly distributed loads or combination of concentrated and uniformly distributed loads

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Jindal U.C., “Strength of Materials”, Galgotia Publication, New Delhi, 1998.
- Ryder G.H., “Strength of Materials”, Macmillan, Delhi, 2003.
- R.K. Bansal, “Strength of Materials”, Laxmi Publication, New Delhi, 2001.

References:

- Sadhu Singh, “Strength of Materials”, Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., “Elements of Strength of Materials”, East-West affiliated, New Delhi, 2000.
- Hibbler R.C., “Mechanics of Materials”, Prentice Hall, New Delhi, 1994.
- Popov Eger P., “Engg. Mechanics of solids”, Prentice Hall, New Delhi, 1998.
- Fenner, Roger. T, “Mechanics of Solids”, U.K. B.C. Publication, New Delhi, 1990.
- Srinath L.S. et.al. “Strength of Materials”, McMillan, New Delhi,2001.

MACHINE DRAWING LAB

Course Code: MAE2306 **Credit Units: 01**

Course Contents:

Free-Hand Sketching & Shaft Scale Drawing
Components like cotter joint, knuckle joint; rivets and riveted joints; couplings; flywheels, pulleys, bush bearings, Engine parts. Isometric views from Orthographic Projections of Machine Components.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- Pohit, G and Gosh, G., Machine Drawing with Auto CAD, Pearson Education, 2007
- PS Gill, Machine Drawing, S. Chand.
- ND Bhatt, Machine Drawing, Charotar publications
- N Sidheshwar, Machine Drawing , Tata McGraw Hill
- CL Tanta, Mechanical Drawing , “Dhanpat Rai”

KINEMATICS OF MACHINE LAB

Course Code: MAE2307 **Credit Units: 01**

1. To study inversion of 3 R-IP Kinematics chain
2. To study inversions of 2R-2P Kinematics Chain
3. To carry out computer implementable kinematics analysis of 4 R mechanisms
4. To carry out computer implementable kinematics analysis of slider bar mechanism
5. To study gear box, clutch and differential gear
6. To find coefficient of friction for clutch plate
7. To determine gear ratio for an epicyclical gear train and verify it by analytical method
8. To study different types of Cam follower systems
9. To determine moment of inertia of the given object using of Trifler suspension.
10. To plot slider displacement, velocity and acceleration against crank rotation for single slider crank mechanism.
11. To find coefficient of friction between belt and pulley.
12. To study various types of gears – Helical, cross helical, worm, bevel gear.
13. To study the different types of brakes and dynamometers.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

STRENGTH OF MATERIALS LAB-I

Course Code: MAE2313 **Credit Units: 01**

List of Experiments:

1. Universal Testing Machine
2. Tensile Test (MS)
3. Double Shear Test (MS)
4. Compression Test (CI)
5. Brinell Hardness No.
6. Izod Impact
7. Testing Machine
8. Rockwell Hardness Tester
9. Spring Stiffness (Spring Compression Testing machine)
10. Torsion testing machine

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

RENEWABLE ENERGY & ENERGY MANAGEMENT

Course Code: MAE2314 **Credit Units: 03**

Course Objective:
Current Energy Scenario, Principles of renewable energy, fundamentals, scientific principles of renewable energy, technical implications, social implications.

Course Contents:

Module-I: Solar Energy
Solar radiation: Extraterrestrial solar radiation, components of radiation, geometry of earth and sun, geometry of collector and solar beam, measurements of solar radiations, Solar water heating system, solar air heaters, solar concentrators

Module-II: Energy from Oceans
Principles of Ocean thermal energy conversion, Principles of Geothermal energy conversion, suitable sites and criteria, Advantages and disadvantages.

Module-III: Energy from Wind
Basic principles of wind energy conversion; design of windmills; wind data and energy estimation site selection considerations.

Module-IV: Energy from Water
Classification of small hydro power (SHP) stations; description of basic civil works design considerations turbines and generators for SHP; advantages and limitations.

Module-V: Energy from Earth
Origin and nature of geothermal energy; classification of geothermal resources: schematic of geothermal power plants

Module-VI: Energy Management
The relevance of energy management profession, general principles of energy management and energy management planning.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References

- ‘Renewable energy resources: John W Tidwell and Anthony D Weir.
- Renewable energy engineering and technology-edited by V. V.N. Kishore
- ‘Non-conventional sources of energy’. G.D. Rai. Khanna Publishers,2000.
- ‘Solar energy utilization’ G.D. Rai Khanna Publishers 2000.
- ‘Renewable and novel energy sources’ S.L.Sah. M.I. Publications, 1995.
- ‘Energy Technology’. S.Rao and B.B. Parulekar. Khanna Publishers, 1999

ERGONOMICS

Course Code: MAE2315 **Credit Units: 03**

Course Objective: To explain the general principles those governthe interaction of humans and their working environment for improving worker performance and safety.

Module-I: INTRODUCTION Brief history of human factors Engineering/Ergonomics, Interdisciplinary nature, Principles of Human factors Engineering, Biostatic and Biodynamic Mechanics,Human Machine Systems – interfaces.

Module-II: HUMAN PERFORMANCE Factors influencing performance, Information receiving and processing, Information theory and its application, Human response and errors, Signal detection theory,Posture and Body Mechanics: Muscle Functioning, Spine, Musculoskeletal problems in Sitting and Standing.

Module-III: PHYSIOLOGICAL ASPECTS OF HUMAN AT WORK Metabolism, Physiological factors involved in muscular activity, Measurement of energy expenditure, Quantitative work load analysis , Physical work capacity and its evaluation , Physiological fatigue, Work and rest schedules, Physical fitness tests.

Module-IV: WORK PLACE DESIGN Problems of body size, Anthropometry measures, Work posture, Work space layout and work station design , Design of displays, controls and VDT work stations, Hand tool design, Illumination.

Module-V: OCCUPATIONAL HEALTH AND SAFETY Industrial accidents, Personnel Protective devices, Safety Management practices, Effect of Environment – heat, cold & noise, NIOSH regulations and Factories Act, Legal and Safety Aspects.

OUTCOMES: The Student should apply ergonomic principles to design workplaces for the improvement of human performance and implement latest occupational health and safety to the work place.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:

- Bridger, R.S., “Introduction to Ergonomics”, McGraw Hill, 1995.
- Martin Helander, “A guide to Ergonomics of Manufacturing”, TMH, 2006.

REFERENCES:

- Mecormik, T.J., “Human Factors Engineering”, TMH, 1990.
- John Grimaldi, “Safety Management”, A.I.B.S., 5th Edition, Hazard Control Technology 2003
- Philips, Chandler A, “Human Factors Engineering”, John Wiley and Sons, Inc. 2000
- M. S. Sanders and Ernest J. McCormick, “Human Factors Engineering and Design”, McGraw-Hill Inc.
- E. Grad jean, “Fitting Task to the Man” Taylor and Francis.
- The Factories Act, 1948.

SOLAR ENERGY

Course Code: MAE2316 **Credit Units: 03**

Course Objectives

The course provides introduction to solar energy based systems.The course also provides the understanding of generation of power from solar insolation and power generation through solar photovoltaics and solar thermal etc. The components of power generation via solar photovoltaics and solar thermal routes and their performance characteristics will also be covered.

Course Contents

Module-I: Introduction

Current Energy Scenario, Principles of renewable energy, fundamentals, scientific principles of renewable energy, technical implications, social implications.

Module-II: Solar Radiations

Solar radiation: Extra-terrestrial solar radiation, components of radiation, geometry of earth and sun, geometry of collector and solar beam, measurements of solar radiations, Solar water heating system, solar air heaters, solar concentrators

Module-III: Solar Energy

Solar thermal power and it's conversion, Solar collectors, Flat plate collector, Performance analysis of flat plate collector,

Module-IV: Solar concentrating collectors,

Types of concentrating collectors, Thermodynamic limits to concentration, Cylindrical collectors, Thermal analysis of solar collectors, Tracking CPC and solar swing.

Module-V: Solar Thermal Energy Storage

Solar thermal energy storage, Different systems, Solar pond. Applications, Water heating, Space heating & cooling, Solar distillation, Solar pumping, Solar cooking, Greenhouses, Solar power plants.

Module-VI: Solar Photovoltaic Systems

Photovoltaic effect, Efficiency of solar cells, Semiconductor materials for solar cells, Solar photovoltaic system, Standards of solar photovoltaic system, Applications of PV system, PV hybrid system.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- ‘Renewable energy resources: John W Tidwell and Anthony D Weir.
- Renewable energy engineering and technology-edited by V. V.N. Kishore
- ‘Non-conventional sources of energy’. G.D. Rai. Khanna Publishers,2000.
- ‘Solar energy utilization’ G.D. Rai Khanna Publishers 2000.
- ‘Renewable and novel energy sources’ S.L.Sah. M.I. Publications, 1995.
- ‘Energy Technology’. S.Rao and B.B. Parulekar. Khanna Publishers, 1999
- Solar Photovoltaics, Chentan Singh Solanki, PHI Publications, 2009

Syllabus - Fourth Semester

DYNAMICS OF MACHINES

Course Code: MAE2401 **Credit Units: 04**

Course Contents:

Module I

Static Force Analysis: Static force analysis of planer mechanisms, Free body diagrams, dynamic force analysis including inertia and frictional forces of planer mechanisms

Inertia forces: D-Alembert's Principle, Velocity and acceleration of piston, Torque exerted on the crank shaft when friction and inertia of moving parts are neglected, Forces on the reciprocating parts of an engine considering friction and inertia of moving parts, Turning moment on crank shaft, Dynamically equivalent system, Torque exerted on the crank shaft, considering the weight of the connecting rod.

Module-II

Balancing of rotating masses: Balancing of single rotating mass, Balancing of several masses rotating in the same plane, Balancing of several masses rotating in different planes.

Balancing of reciprocating masses: Balancing of reciprocating engine, Partial balancing of primary force, Partial balancing of locomotives, Variation of tractive force, swaying couple, hammer blow, coupled locomotive, primary balance of multi-cylinder inline engine, Secondary balance of multi-cylinder in line engines, Method of direct and reverse cranks, V-engines balancing.

Module-III

Governors: Types of Governor, Watt Governor, Porter governor, Proell Governor, Hartnell Governor, Wilson-Hartnell governor, Sensitivity, Stability, Isochronism, Hunting, Governor Effort and Power, controlling force

Module-IV

Gyroscopic effect and Gyroscope: Spinning and precession, gyroscopic couple, Effect of gyroscopic couple on the stability of automotive vehicles: Stability of four wheelers, Stability of two wheelers, Gyroscopic effects on ships and aero planes.

Module-V

Vibration: Vibration analysis of SDOF systems, natural, damped, forced vibrations, base-excited vibrations, transmissibility ratio

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- PL Ballaney, Theory of Machines,
- Hams Crone and Roggers, Theory of Machines
- Shigley, Theory of Machines
- J. Lal, Theory of Machines
- SS Rattan, Theory of Machines
- Ghosh and Mallick, Mechanisms and Machines, EWP publication.
- R.S. Khurmi, Theory of Machine, S. Chand.

THEORY OF METAL FORMING

Course Code: MAE2403 **Credit Units: 03**

Course Objective:
The objective of this course is to introduce the fundamentals of basic manufacturing processes (solidification process, heat treatment, deformation processes, material removal processes, and joining processes). The students are expected to be able to select, analyze and design basic manufacturing processes for product development.

Course Contents:
Module I: Introduction
Review of tensile test, True stress and true strain, Yielding criteria for ductile metals, Yield locus, Plastic stress-strain relations-Levymises equation, prandtl-Reuss equations.

Module II: Plastic deformation
Crystal Geometry, Lattice defects, Deformation by slip, Shear Stress required to cause slip in a perfect Crystal, Deformation by twinning, Fracture, Types of Fracture, Creep Failure.

Module III: Introduction to metal working
Classification of metal working processes-Cold working, Hot working, Effect of variables on metal working processes, Methods of Analysis of metal working processes.

Module IV: Forging
Classification of Forging Processes, Forging equipment, Open die forging, Closed die forging, Load calculation in Plane strain forging, Forging defects.

Module V: Rolling
Rolling Mills, Hot rolling, Cold rolling, Forces and Geometrical Relationships in Rolling, Rolling load & torque, rolling defects.

Module VI: Extrusion
Methods of Extrusion, Hot Extrusion, Cold Extrusion, Analysis of Extrusion processes, Effect of Variables on Extrusion pressure, Extrusion defects.

Module VII: Sheet metal forming
Forming Methods, Forming Operations-Shearing, Blanking, Bending, Stretch Forming, Deep Drawing, Stresses developed in Deep Drawing, Defects in Formed Parts.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Mechanical Metallurgy by George E. Dieter: Mc Graw-Hill Book Company
- Metal working by Surinder Kumar, Dhanpat Rai & Sons

MANUFACTURING PROCESSES

Course Code: MAE2411 **Credit Units: 03**

Course Objective:
This is a new developmental graduate course for students interested in learning how to design, analyze and build specialty manufacturing process machines. It anticipated that this course would become part of the new manufacturing emphasis area in mechanical engineering.

Course Contents:

Module I: Introduction to Machine Tools
Classification of machine tools, kinds of motion in machine tool operations, definition of cutting speed, feed and depth of cut.

Module II: Lathe
Classification and various parts of Lathe, specification, Description of important mechanism viz. apron, tail stock, head stock, work holding, devices and operations, e.g. taper, turning, eccentric turning and screw-cutting, Geometry of a single point cutting tool. Calculation of machining time, Capstan and turret lathe

Module III:Drilling Machine
Geometry and nomenclature of a twist drill, specification and classification of drilling machines, cutting speed, feed, depth of cut and calculation machining time in drilling, tool holding devices, different types of operations performed on a drilling machine.

Module IV:Milling Machine
Classification, up milling and down milling, dividing Head, different types of operations – simple, compound and differential indexing, slab milling, spiral milling, slot milling, T-slot milling and end milling.

Module V:Shaper, Slotter& Planner
Principal part of a shaper, classification, Quick Return mechanism, table feed mechanism of a shaper, Operations, e.g. horizontal, vertical and inclined shaping, difference between a shaper, planer and slotter, cutting speed, feed, and depth of cut and calculation of machining time in shaping.

Module VI:Grinding Machines
Construction and specification of a grinding wheel, wheel turning and dressing, Grinding machines surface, cylindrical and center less grinding.

Module VII:Special Machines
Horizontal and vertical boring machines, Gear Geometry, Gear generation and hobbing; Lapping, honing and super finishing processes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- P.N. Rao, "Manufacturing Technology: Metal Cutting & Machine Tools", Tata McGraw Hill, Delhi, 2004.
- B.S. Raghuwanshi, "Workshop Technology", Vol.2, Dhanpat Rai & Sons, 2003.
- HazraChandhari S.K., "Elements of Workshop Technology", Vol.2, Media Promoters, 2003.

References:

- P.C. Sharma, “A Text Book of Production. Engineering”, S. Chand, New Delhi, 2004.
- Bawa H.S., “Workshop Technology”, Vol.2, Tata McGraw Hill, 2004.
- Juneja&Shekhon, “Fundamental of Metal Cutting”, New Age Publications
- S.F. KrarStevan F. and Check A.F., “Technology of M/C Tools”, McGraw Hill Book Co., 1986.
- Kibbe Richard et al, “M/c Tool practices”, Prentice HallIndia, 2003.
- Bangalore HMT, “Production Technology”, Tata McGraw Hill, 1980.
- R.K. Jain, “Production Technology”, Khanna Publishers
- Gerling Heinrich, “All about Machine Tools”, New Age Publication, 2003.

STRENGTH OF MATERIALS-II

Course Code: MAE2412 **Credit Units: 04**

Course Contents:

Module-I: Energy Methods: Definitions, expressions for strain energy stored in a body whenload is applied (i) gradually, (ii) suddenly and (iii) with impact, strain energy ofbeams in bending, beam deflections, strain energy of shafts in twisting, energymethods in determining spring deflection, Castigliano's& Maxwell's theorems.Numericals.

Module-II: Theories of Elastic Failure: Various theories of elastic failures with derivations and graphical representations, applications to problems of 2- dimensional stress system with (i) Combined direct loading and bending, and (ii) combined torsional and direct loading, Numericals.

Module-III: Springs: Stresses and Deflection of springs by energy method, helical springsunder axial load and under axial twist axial load and twisting moment actingsimultaneously both for open and closed coiled springs, leafsprings.

Module-IV: Thin Pressure Vessels: Hoop & Longitudinal stresses & strains incylindrical & spherical vessels & their derivations under internal pressure.

Module-V: Thick Pressure Vessels: Derivation of Lame's equations, radial & hoop stresses and strains in thick andcompound cylinders shells subjected to internal fluid pressure. Numericals.

Module-VI: Rotating Rings & Discs: Stresses in uniform rotating rings & discs, rotating discsof uniform strength, stresses in rotating cylinders, hollow cylinders & solidscylinders. Numericals.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

1. Strength of Materials – G.H.Ryder, Third Edition in SI Units 1969 Macmillan, India.
2. Mechanics of Materials – (Metric Edition): Ferdinand P. Beer and E. Russel Johnston,Jr.Second Edition, McGraw Hill.
3. Strength of Material- Sadhu Singh- Khanna Publisher.

Reference Books:

1. Book of Solid Mechanics – Kazmi, Tata McGraw Hill
2. Strength of Materials – D.S. Bedi - S. Chand & Co. Ltd.
3. Advanced Mechanics of Solids and Structures – N. Krishan Raju and D.R.Gururaje-Narosa Publishing House.

Web Links:

1. http://nptel.ac.in/courses/112101095/
2. https://www.youtube.com/watch?v=jZRomCtVLHU
3. https://www.youtube.com/watch?v=1Ycn81U72G0

FLUID MECHANICS

Course Code: MAE2413 **Credit Units: 04**

Course Objective:
The objective of Fluid Mechanics subject is that students should understand the, properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behaviour of fluids, dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

Course Contents:

Module I: Fluid Properties and Fluid Statics
Newtonian and Non-Newtonian Fluids; Viscosity; Incompressible and compressible fluids, compressibility. Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentre height.

Module II: Kinematics of Fluid Motion
Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

Module III: Dynamics of Fluid Flow
Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – Pilot tube, Venturi meter; steady flow momentum equation, force exerted on a pipe bend.

Module IV: Dimensional Analysis and Principles of Similarity
Buckingham π-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

Module V: Laminar and Turbulent Flow
Reynold's experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates. Transition from laminar to turbulent flow, courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

Module VI: Analysis of Pipe Flow
Energy losses, minor losses in pipe lines, concept of equivalent length, flow between two reservoirs, and multiple pipe systems – in series and parallel, siphon.

Module VII: Flow Measurements
Measurement of flow using Venturi meter, orifice meter, Pitot tube, measurement of flow in open channels – rectangular, triangular, trapezoidal weir, Cipoeletti weir.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.

References:

- F. M. White, Introduction to Fluid Mechanics, McGraw Hill
- I.H. Shames, “Mechanics of Fluids”, Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- V.L. Streeter and E.B. Wylie, “Fluid Mechanics”, Tata McGraw Hill
- Massey B S, Mechanics of Fluids, Van Nostrand Reinhold Co

DYNAMICS OF MACHINES LAB

Course Code: MAE2405 **Credit Units: 01**

List of Experiments:

1. To study gyroscopic effects through models
2. To determine gyroscopic couple on Motorized Gyroscope.
3. To determine and verify the whirling speed of a shaft-disc system
4. To determine the damping factor for a given horizontal vibration set up
5. To perform experiment on Watt and Porter Governors to prepare performance characteristic Curves, and to find stability & sensitivity.
6. To perform experiment on Proell Governor to prepare performance characteristic curves, and to find stability & sensitivity.
7. To perform experiment on Hartnell Governor to prepare performance characteristic Curves, and to find stability & sensitivity.
8. To perform the experiment for static balancing on static balancing machine.
9. To perform the experiment for dynamic balancing on dynamic balancing machine.
10. To determine mass moment of inertia of a flywheel.
11. To perform wheel balancing
12. To plot pressure distribution curves on a journal bearing

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MANUFACTURING PROCESSES LAB

Course Code: MAE2414 **Credit Units: 01**

Course Contents:

1. Operations on the Lathe Machine.
2. Operations on the Shaper Machine.
3. Operations on the Planner Machine.
4. Operations on the Drilling Machine.
5. Operations on the Grinding Machine.
6. Operations on the Milling Machine.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

FLUID MECHANICS LAB

Course Code: MAE2415 **Credit Units: 01**

FLUID MECHANICS LAB

1.Verification of Bernoulli's Theorem

2.Experiment using Venturimeter

3.Determination of coefficient of Discharge C_d, C_c, $C_!$ Using

4.Circular/triangular/rectangular orifice

5.To find major head losses in a pipe line

6.To find minor head losses in a pipe line (sudden expansion/contraction/bend)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

NUMERICAL ANALYSIS AND PROGRAMMING

Course Code: MAE2408 **Credit Units: 02**

Course Objective:
This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. Emphasis is given on computer programming also so that the given techniques can be used in design of engineering and scientific problems.

Course Contents:

Module I: Solution of Algebraic and Transcendental Equation
Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method
Solutions of Simultaneous equation
Gauss elimination method, Jacobi iteration method, Gauss Seidal method

Module II: Interpolation
Finite Differences, Difference tables
Polynomial Interpolation**:** Newton's forward and backward formula
Central Difference Formulae: Gauss forward and backward formula.
Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

Module III: Numerical Integration and Differentiation
Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

Module IV: Solution of differential Equations
Euler's Method, Runga-Kutta Methods.

Module V: Statistical Computation
Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- Gerald & Whealey, "Applied Numerical Analyses", AW
- Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi

References:
- T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH
- Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
- Francis Scheld, " Numerical Analysis", TMH
- Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.
- Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing.
- Goyal, M, "Computer Based Numerical and Statistical Techniques", Firewall Media, New Delhi.

NUMERICAL ANALYSIS & PROGRAMMING LAB

Course Code: MAE2409 **Credit Units: 01**

Software Required: Turbo C/C++

Course Contents:

Assignments will be provided for the following:

1. Analysis of various numerical and statistical techniques

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

GAS TURBINES

Course Code: MAE2416 **Credit Units: 03**

Course Objective: To explain the theory of a simple ideal gas turbine cycle and the methods which help in the improvement of the efficiency and net work output.

Course Contents:

Module-I: Introduction
Air standard cycles, assumptions of air standard cycles, general aspects of gas turbine, classification of gas turbine, gas turbine vs. reciprocating IC engines, gas turbine vs. steam turbines

Module-II: Types of Gas Turbines
Constant pressure combustion gas turbines, open cycle gas turbine, closed cycle gas turbine, closed cycle gas turbine plant vs. open cycle gas turbine plant, constant volume combustion gas turbines, advantages and disadvantages

Module-III: Simple gas turbine cycles
Theory of a simple ideal gas turbine cycle, efficiency of air standard gas turbine cycle, variation of efficiency with pressure ratio, optimum pressure ratio, maximum pressure ratio, isentropic efficiency of compressor and turbine

Module-IV: Methods improving thermal efficiency of gas turbine plant
Regenerative gas turbine cycle, reheat gas turbine cycle, gas turbine cycle with intercooling, gas turbine cycle with reheat and regeneration,Real gas turbine cycles

Module-V: Pollution from gas turbine emissions
Gas turbine combustion chamber, types of combustion chambers, description of a typical combustion chamber, performance of combustion chamber, pollution aspects, automotive gas turbines

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.
- Gas Turbines - V. Ganesan, Pub. - Tata McGraw Hill.
- Engineering fundamental of the I.C.Engine – Willard W. Pulkrabek Pub.-PHI,India
- Internal combustion Engines – R.K.Rajput, Laxmi Publications

Reference Books:

- Internal Combustion Engines & Air pollution- Obert E.F, Pub.-Hopper & Row Pub., New York
- Internal Combustion Engines Fundamentals- John B. Heywood, Pub.-McGraw Hill, New York
- Fundamentals of Internal Combustion Engines-H.N. Gupta, PHI, New Delhi

ELECTRICAL MACHINE

Course Code: MAE2417 **Credit Units: 02**

Course Objective:
Electrical Machines provides the backbone for successful and uninterrupted smooth functioning of any industry. Knowledge of this subject in any engineering branch is vital in process industry. The course covers the machines e.g. Motors & generators characteristics and classifications related to mechanical & automation as well as recent development engineering applications. Successful completion of this course will be very helpful for the students who wish to join challenging industry.

Course Contents:

Module I
Introduction to Subject, Some important fundamentals, Electrical Power generation, Utilization & distribution facts & figures. Simple Loop Generator, D C Machines, Construction Features, Principle of Operation.

Module II
DC Generator Analysis & DC Motor, Classification & Characteristics & Analysis. Speed Torque Characteristics, Speed control of D C Motor. Application of D C Motor. Starters.

Module III
A C Machines, 3 phase IM, Revolving Magnetic field theory, IM as a transformer, Equivalent Circuit. 3 phase Synchronous Machines, Synchronous Motor, Synchronous Generator, Equivalent Ckt.

Module IV
Single phase Induction Motor, Double Revolving Field theory, Different types of 3 phase IM. Characteristics & typical Applications. Fractional Kilo Watt Hour Motor, Stepper Motor, Hysterisis Motor, A C Series Motors, Universal Motors.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- I J Nagrath & D P Kothari. “Electrical Machines”. TMH
- Irvin Kosow, “Electrical Machines & Transformers”, PHI.

References:
- B L Theraja “Electrical Engineering”.

ELECTRICAL MACHINE LAB

Course Code: MAE2418 **Credit Units: 01**

Course Contents:

S. NO.	NAME OF THE EXPERIMENTS
1.	Speed Control of DC Shunt Motor
2.	To obtain magnetization characteristics of 1) Separately excited DC Generator 2) Shunt Generator
3.	To obtain the load characteristics 1) DC Shunt Motor 2) Cumulative Compound generator
4.	To conduct Swinburne Test on a DC. Shunt Motor and hence obtain its efficiency at full load.
5.	To perform No Load Test and blocked rotor test on a three phase Induction motor and hence determine its equivalent circuit parameters.
6.	To perform load test on a three phase Induction Motor and obtain its various performance characteristics.
7.	Retardation Test on a three phase induction motor and calculate its moment of inertia.
8.	To perform No Load and Blocked Rotor Test on a single phase Induction motor and hence determine its equivalent circuit parameters.
9.	To perform open circuit and short circuit test on a three phase alternator and hence determine its voltage regulation by synchronous Impedance Method.
10.	To obtain V curves of a three phase synchronous motor at no load.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Fifth Semester

MACHINE DESIGN-I

Course Code: MAE2501 **Credit Units: 03**

Course Objective:
The objective of this course is to help students apply concepts learned in the mechanics, structure, material and manufacturing courses. This course offers working knowledge in the use of proper failure theories under steady and variable loading, design of mechanical elements, such as shaft, coupling, power screws, and detachable, permanent and welded connections.

Course Contents:

Module I: Variable stresses in Machine Parts
Fatigue and Endurance Limit, Factor of Safety for Fatigue Loading, Stress concentration, Notch sensitivity, Gerber Method, Goodman Method and Soderberg Method for combination of stresses.

Module II: Power Screws
Types of screw threads, Torque required to raise and lower the load, Efficiency of square threaded screw, overhauling and self locking screw, stresses in power screw, design of screw jeck.

Module III: Cotter and Knuckle Joints
Types of cotter joints, design of socket and spigot joint, design of sleeve and cotter joint, design of jib and cotter joint, Design procedure of Knuckle joint.

Module IV: Riveted and Welded Joint
Types of Riveted joint, Lap joint , Butt Joint, Caulking and Fullering, Failure of Riveted joint, Strength of Riveted joint, Efficiency of Riveted joint. Advantages and Disadvantages of welded joint over Riveted joint, Strength of Fillet joint, strength of Butt joints.

Module V: Keys and Couplings
Types of Keys, Splines, Strength of Sunk Key, types of shaft coupling, Sleeve and muff coupling, Flange coupling, Flexible coupling, Oldham coupling, Universal coupling.

Module VI: Drives
Types of Belt drives, Flat Belt drives, Velocity ratio, Sleep, Creep of Belt, Length of open Belt, length of cross belt, power transmission by belt, Maximum tesion in the belt. Types of V belt and Pulleys, advantages and disadvantages of V belt over Flat Belt, Ratio of Driving tensions for V belt, Rope drives. Chain drives, advantages and disadvantages of Chain drives.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- J.E. Shigley, Mechanical Engineering Design.
- Sadhu Singh, Machine Design
- R.S. Khurmi & J.K. Gupta, Machine design
- D.K. Aggarwal & P.C. Sharma, Machine Design

HEAT & MASS TRANSFER

Course Code: MAE2502 **Credit Units: 04**

Course Objective:
The main objective of the course to understand the behaviour of thermal systems. To illustrate the development of the governing differential, algebraic and finite difference equations associated with thermal systems. To introduce the possible methods of solution to the governing equation. To investigate the influences of boundary and initial conditions and system parameters on the resulting steady or transient response of the system. To provide the basic tools those are used in thermal system design. To expose students to heat transfer applications in industry.

Course Contents:

Module I
One-dimensional steady-state conduction through homogeneous and composite plane walls, cylinders and spheres, critical thickness of insulation; heat transfer from fins of uniform cross section.

Module II
Concept of hydrodynamic and thermal boundary layers, momentum and energy equation for boundary layers on a flat plate application of dimensional analysis to free and force convection; important dimensionless number.

Module III
Thermal radiation; Kirchoff's law; Planck's distribution law, Wien's displacement law; Stefan-Boltzmann's relation, Configuration factors; radiant interchange between black and grey surfaces; radiation shielding solar radiation.

Module IV
Combined heat transfer analysis; overall heat transfer co-efficient; types of heat exchangers; LMTD methods of heat exchanger design; simple heat exchanger calculations.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Incropera, F.P. and DeWitt, D.P. (2002). Fundamentals of Heat and Mass Transfer, John Willy & Sons, New York, NY.
- Nag, P.K. (2002). Heat and Mass Transfer, TMH.
- John R.Howell & Richrd O Buckius, Fundamentals of Engg. Thermodynamics, McGraw Hill International.
- Holman, J.P. (1997). Heat Transfer, 9th edition, McGraw-Hill.
- Mills, A.F. (1999). Basic Heat and Mass Transfer. Prentice-Hall.
- Thirumaleshwar, M. (2006). Fundamentals of Heat and Mass Transfer, Pearson education.
- Ghoshdastidar, P.S. (2004). Heat Transfer. Oxford University Press.
- Arora, Domkundwar, S. and Domkundwar, A. (1988). A Course in Heat & Mass Transfer, Dhanpat Rai & Co.

METROLOGY

Course Code: MAE2551 **Credit Units: 03**

Course Objective:
The main objective of this course is to give the student: a basic understanding of the physical loss governing metrology and tolerance design. Gain and appreciation for the capabilities and applications of metrology through hands own experiences.

Course Contents:

Module I: Principles of measurement
Definition of Metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors.
Length Standards: Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges.
Limits, fits and tolerances: Various definitions, different types of fits and methods to provide these fits. Numerical to calculate the limits, fits and tolerances, ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges.

Module II: Comparators
Principles and working of Mechanical, Electrical, Optical and Pneumatic Comparators.
Angular Measurement: Sine Bar – different types of sine bars, use of sine bars in conjunction with slip gauges, Use of angle gauges, spirit level, errors in use of sine bars. Numericals. Principle and working of autocollimator.

Module III: Straightness and flatness
Definition of Straightness and Flatness error. Numericals based on determination of straightness error of straight edge with the help of spirit level and auto collimator
Screw Thread Measurement: Errors in threads, Measurement of elements of screw threads –major diameter, minor diameter, pitch, flank angle and effective diameter (Two and three wire methods). Effect of errors in pitch and flank angles
Gear Measurement: Measurement of tooth thickness – Gear tooth vernier caliper, Constant chord method, base tangent method and derivation of mathematical formulae for each method. Parkinson Gear Tester.

Module IV
Machine Tool Alignment: Machine tool tests and alignment tests on lathe. Alignment tests on milling machine. Alignment tests on a radial drilling machine, Interferometry.
Surface texture: Introduction, types of irregularities, Elements of surface
Texture, Measurement of surface finish, Examination of surface Roughness.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi
- I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi

References:
- F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition.

MACHINE DESIGN LAB-I

Course Code: MAE2504 **Credit Units: 01**

Course Contents:

Design of:
(i) Cotter Joint
(ii) Knuckle Joint
(iii) Pipe Joint
(iv) Screw Jack
(v) Rigid and Flexible coupling
(vi) Spur Gear Train

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

METROLOGY LAB

Course Code: MAE2505 **Credit Units: 01**

Course Contents:

Name of Experiments:

1 Set up a dimension by slip gauges (example 36.936; 14.727…..) Measure this set up by micrometer (least count 0.01) several times and read dimensions. Find statistical mean and record the expected variation between the actual dimension and dimension measured by micrometer.
2 To check the roundness of a circular bar with the help of dial gauge.
3 Mill a component to dimension (23, 57.6,…). Set up a comparator by slip gauge set to this dimension. Check component deviation by the comparator and record the deviation. Measure several times and obtain the mean value.
4 Check the bore in a component by a bore-indicator. Set the bore indicator by micrometer and measure the deviation in the bore. Measure several times and obtain the mean value at three positions along the length of the bore.
5 Set – up a sine bar for measuring the angle of an inclined surface (of a bracket, milling cutter arbor with 7/24 taper, ….). Measure the angle several times and record the mean value. Use height gauge wherever necessary.
6 Check angular dimension of a dovetail guide way by measuring across rollers.
Check the included angle of a V – block (90º, 60º, …) / or a machined groove by measuring over a roller using height gauge and parallel blocks/slip gauges.
7 Measure the straightness of a surface (surface plate; guide way of machine tool) by using straight edge and dial gauge and dial gauge stand. Set up straight edge on jacks such that dial reading at each end coincide. Move the dial stand along the straight edge. Record readings at 50 mm interval and draw a plot. Obtain maximum deviation which is the straightness.
8 Measure straightness using a spirit level. Place spirit level at an initial position and note level reading. Move the level on a straight line and take readings at 50 mm intervals. Plot the difference from the original reading and obtain the straightness value.
9 Draw a trapezoidal and any other profile in AutoCAD to 1:1 scale. On a steel plate make the profile by fitting and filing. Set up the drawing on profile projector. Check the component and note deviations. Correct the profile and recheck. Make the profile as close to the required one.
10 To machine a given surface and study its roughness characteristics
11 To measure the geometry of a screw using profile projector
12 To study the cutting tool geometry using tool makers microscope

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

HEAT & MASS TRANSFER LAB

Course Code: MAE2507 **Credit Units: 01**

Experiments to be Performed (Minimum 10 Numbers)

1. To Determine Thermal Conductivity of Insulating Powders.
2. To Determine Thermal Conductivity of a Good Conductor of Heat (Metal Rod).
3. To Measure the thermal Conductivity of Liquid.
4. To determine the transfer Rate and Temperature Distribution for a Pin Fin.
5. To Measure the Emissivity of the Test plate Surface.
6. To Determine Stefan Boltzmann Constant of Radiation Heat Transfer.
7. To Determine the Surface Heat Transfer Coefficient For Heated Vertical Cylinder in Natural Convection.
8. Determination of Heat Transfer Coefficient in Drop Wise and Film Wise condensation.
9. To Determine Critical Heat Flux in Saturated Pool Boiling.
10. To Study Performance of Simple Heat Pipes.
11. To Study and Compare LMTD and Effectiveness in Parallel and Counter Flow Heat Exchangers.
12. To Find the Heat transfer Coefficient in Forced Convection in a tube.
13. To determine the total thermal conductivity and thermal resistance of the given compound resistance in series.
14. To find out the thermal conductivity of given slab material.
15. To determine the individual thermal conductivity of different lagging in a lagged pipe.
16. To study the rates of heat transfer for different materials and geometries
17. To understand the importance and validity of engineering assumptions through the lumped heat capacity method.
18. Testing and performance of different heat insulators.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION-I

Course Code: MAE2535 **Credit Units: 03**

Objective:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

Guidelines
In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components
Front Page
Declaration
Student Certificate (University)
Certificate (Company)
Acknowledgement
Abstract
Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters
Appendices(optional)
References / Bibliography

The above components are described below:
1. **The Title Page**-- Format will be given by coordinator/supervisor.
2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Company Certificate: This is a certificate, which the company gives to the students.

5. Contents-This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.
6. Acknowledgement-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
7. Abstract and **Keywords-**This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.
8. Company Profile: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
9. **Chapters**—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment consists of topic relevance, progress report and industry feedback on company letterhead. Final Assessment includes viva, presentation, execution and report marks.

Examination Scheme:

Components	**IF**	**PR**	**R**	**E**	**V**	**FP**
Weightage (%)	20	20	15	15	15	15

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR-Progress Report, E-Execution

OPTIMIZATION TECHNIQUES

Course Code: MAE2508 **Credit Units: 03**

Course Contents:

Introduction& history of optimization, Clasification & application of optimization technique. Classical optimization techniques for unconstrained optimization. Karush-Kuhn-Tucker conditions. Sensitivity analysis for linear programming problems. Non-linear programming. Penalty function methods. Sequential linear programming. Feasible direction methods. Quadratic programming. Geometric programming. Integer programming.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Books:-

- Engineering Optimization: Theory and Practice By Singiresu S. Rao , John Wiley Publication
- Optimization Concepts and Applications in Engineering by Ashok D. Belegundu, Tirupathi R. Chandrupatla, Cambridge University Press, 2011
- Theory and Techniques of Optimization for Practicing Engineers by Raymond L. Zahradnik , Barnes & Noble, 1971

OPERATIONS RESEARCH

Course Code: MAE2511 **Credit Units: 03**

Course Objective:
In a rapidly changing environment an understanding is sought which will facilitate the choice and the implementation of more effective solutions, which, typically, may involve complex interactions among people, materials and money. Organizations may seek a very wide range of operational improvements - for example, greater efficiency, better customer service, higher quality or lower cost. Whatever the business, engineering aim, Operation Research can offer the flexibility and adaptability to provide objective help. This course introduces students to the principles of operational research.

Course Contents:

Module I: Linear Programming
Formulation of problem. Graphical and simplex method for maximization and minimization. Duality theory and sensitivity analysis

Module II:Transportation Models
Stepping stone algorithm, MODI method and Vogel's Approximation Method (VAM) for selfing balanced, unbalanced transportation problems and problems of degeneracy and maximization.

Module III:Assignment Models
Assignment model for maximization and traveling salesman problems, Industrial Problems

Module IV:Queuing Theory
Basic structured, Terminology, classification. Birth and death process. Sequencing: Processing in jobs through machines with the same processing order. Processing of 2 jobs through machines with each having different processing order.

Module V:Network Models
Introduction to PERT and CPM. Fundamental concept of Network models and construction of network diagrams. PERT activity, time estimate. Critical path and project time duration. Probability of completing the project on or before specified time. Float of a activity.

Module VI:Games Theory
Zero Sum two person competitive games, Minimax and maximini principle Arithmetic, algebraic, matrix algebra method,. Solution by dominance, sub game, Graphical and linear programming method.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- HM Wagner, Principles of Operations Research, Prentice Hall
- Heizer, J. & Render B., Operations Management, Pearson Education (8/e), 2006
- PK Gupta and DS Hira, Operations Research, S. Chand & Co.
- Taha, Introduction to Operation Research
- F.S. Hiller and G.I. Libermann, Introduction to Operation Research, Holden Ray.

ADVANCED THERMODYNAMICS

Course Code: MAE2512 **Credit Units: 03**

Course Objective: To familiarize the students to understand the fundamentals of thermodynamics and to perform thermal analysis on their behavior and performance.

Course Contents:

Module-I: Preliminaries and the Zeroth-Law of Thermodynamics
Basic Concepts: Macroscopic and Microscopic Approaches, Thermodynamic Systems, Surrounding and Boundary, Thermodynamic Property – Intensive and Extensive, Thermodynamic Equilibrium, State, Path, Process and Cycle, Quasi-static, Reversible and Irreversible Processes, Working Substance. Concept of Thermodynamic Work and Heat, Equality of Temperature, Zeroth Law of Thermodynamic and its utility, Problems.

Module-II: First-Law of Thermodynamics
First Law of Thermodynamics: Energy and its Forms, Energy and 1st law of Thermodynamics, Internal Energy and Enthalpy, PMMFK, Steady flow energy equation, 1st Law Applied to Non- flow process, Steady Flow Process and Transient Flow Process, Throttling Process and Free Expansion Process. Problems.

Module-III: Second Law of Thermodynamics
Second Law of Thermodynamics: Limitations of First Law, Thermal Reservoir, Heat Source and Heat Sink, Heat Engine, Refrigerator and Heat Pump, Kelvin- Planck and Clausius Statements and their Equivalence, PMMSK. Carnot Cycle, Carnot Heat Engine and Carnot Heat Pump, Carnot Theorem and its Corollaries, Thermodynamic Temperature Scale. Entropy, Clausius Inequality, Principle of Entropy Increase, Temperature Entropy Plot, Entropy Change in Different Processes, Introduction to Third Law of Thermodynamics. Problems.

Module-IV: Availability & Irreversibility
Availability and Irreversibility: High and Low Grade Energy, Availability and Unavailable Energy, Loss of Available Energy Due to Heat Transfer Through a Finite Temperature Difference, Dead state of a system, Availability of a Non-Flow or Closed System, Availability of a Steady Flow System, Helmholtz and Gibb's Functions,Irreversibility

Module-V: Thermodynamic Properties of Pure Substances
Pure Substance: Pure Substance and its Properties, Phase and Phase Transformation, Vaporization, Evaporation and Boiling, Saturated and Superheat Steam, Solid – Liquid – Vapour Equilibrium, T-V, P-V and P-T Plots During Steam Formation, Properties of Dry, Wet and Superheated Steam, Property Changes During Steam Processes, Temperature – Entropy (T-S) and Enthalpy – Entropy (H-S) Diagrams, Throttling and Measurement of Dryness Fraction of Steam. Problems.

Module-VI: Gas Vapor Mixtures
Ideal and Real Gases: Concept of an Ideal Gas, Basic Gas Laws, Characteristic Gas Equation, Avogadro's law and Universal Gas Constant, P-V-T surface of an Ideal Gas. Vander Waal's Equation of state, Mixture of Gases, Mass, Mole and Volume Fraction

Module-VII: Thermodynamic Relations
Thermodynamic Relations: Maxwell Relations, Clapeyron Equation, Relations for changes in Enthalpy and Internal Energy & Entropy, Specific Heat Capacity Relations, Joule Thomson coefficient & inversion curve.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- **Thermodynamics: an Engineering Approach**, Y.A.Cengal and M.A.Boles, McGraw Hill (Fifth edition).
- Engineering Thermodynamics – Jones and Dugan, PHI, New Delhi.
- Fundamentals of Engineering Thermodynamics – E. Radhakrishnan, PHI, NewDelhi.

Reference Books:

- Theory and Problems of Thermodynamics – Y. V.C. Rao, Wiley Eastern Ltd., New Delhi.
- Engineering Thermodynamics – C P Arora, Tata McGraw Hill
- Basics of Mechanical Engineering – Vineet Jain, Dhanpat Rai Publication
- Engineering Thermodynamics – P K Nag, Tata McGraw Hill

Syllabus - Sixth Semester

MACHINE DESIGN-II

Course Code: MAE2602 **Credit Units: 03**

Course Objective:
The course aims at developing concepts as to how to analyze mechanical systems and select proper machine elements (bearing, gears, belts, chains). It prepares the students how to design machine element by specifying their type, geometry, material and how to integrate these elements to build a mechanical systems.

Course Contents:

Module I: Mechanical Drives
Selection of transmission, helical, bevel and worm gears, belt and chain drives.

Module II: Friction Clutches & Brakes
Common friction materials, shoe, band, cone and disc brake their characteristics and design, friction clutches.

Module III: Bearings and Lubrication
Types of sliding bearing, materials, type of lubrication, design of sliding bearing, selection and application of rolling bearing, seals.

Module IV
Design of spring, helical spring, Leaf spring

Module V: Engine parts
Piston, connecting rod and crankshaft.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Maleeve Hartman and O.P. Grover, “Machine Design”, CBS Publication & Publishers.
- V.B Bhandari, “Machine Design”, Tata McGraw Hill.
- P.C. Sharma and D.K Aggarwal., “Machine Design”, S.K. Kataria & Sons.

References:
- Mahadevan, “Design Data Book”, CBS Publication & Publisher

FLUID MACHINES

Course Code: MAE2611 **Credit Units: 03**

Course Objective:
Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

Course Contents:

Module I: Introduction
Euler's equations for turbo machines; impulse and reaction forces due to fluid systems on stationery and moving system of vanes; jet propulsion.

Module II: WaterTurbines
Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

Module III: Pumps
Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

Module IV: Performance of Fluid Machines
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

Module V: HydraulicPower Transmission
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.

Module VI: PowerHydraulics
Positive pumps: gear, vane, screw, pump, variable delivery valves: flow control, pressure control, direction control, solenoid operated valve, hydraulic circuits, fluid coupling and torque converter.
Pneumatic Power: Basic principles, comparison of pneumatic and hydraulic Systems.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.

References:

- Dr. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", S.K. Kataria& Sons,2001
- D.R. Malhotra & N.K. Malhotra, "The Fluid Mech. & Hydraulics", Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, "Fluid Mechanics, Fluid Mechanics & Hydraulics", CBS Publishers; 1999.

INTERNAL COMBUSTION ENGINES

Course Code: MAE2612 **Credit Units: 03**

Course Objective:
This course provides an in-depth knowledge of the functioning of IC Engine & Gas Turbine, and also deals with the combustion techniques used for various fuels. This course finds immense application in automobile industry and gas-operated power plants.

Course Contents:

Module I: Fundamentals
Development of IC engine, Classification, Working Cycles, Indicator diagram, comparison of SI Engine and CI Engine, two stroke and four-stroke engine, Valve timing diagram of SI and CI engine.

Module II: Air Standard Cycle
Assumptions in air standard cycle & fuel-air cycle, fuel-air cycle calculations, factors influencing fuel-air cycle, effects of variable specific heats, dissociation.

Module III: Fuel and Combustion
Combustion of SI engine, ignition limits, normal combustion, abnormal combustion, effect of engine Variable in ignition lag, spark advance and factors affecting ignition timing, pre-ignition, theory, and factors affecting detonation, PN, HUCR. Combustion in CI engine, fundamentals ofcombustion process in Diesel engine, delay period, diesel knock, and cold starting of CI engine. IC engine Fuel, combustion equations, theoretical air and excess air, stoichiometric air fuel ratio, desirable Properties of good IC engine fuels knock rating of SI engine fuel.

Module IV: Performance & Testing
Testing and performance of IC engine, performance parameters, basic measurement, engine Performance curve, fuel consumption, load outputs, engine power, heat balance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
- Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication
- Vladimir Leonidas Maleev. Internal-combustion Engines, Theory and Design. McGraw-Hill.

References:
- Lester Clyde Lichty, Robert Leroy Streeter. Internal Combustion Engines, McGraw-Hill
- Wallace Ludwig Lind. Internal-combustion Engines: Their Principles and Applications to Automobile, Aircraft, Ginn.
- Edward Frederic Obert, Burgess Hill Jennings, Internal Combustion Engines: Analysis and Practice
- Joseph Albert Polson. Internal Combustion Engines, Chapman & Hall, limited
- Rolla Clinton Carpenter, Herman Diederichs. Internal Combustion Engines, Their Theory Construction and Operation. Van Nostrand companies
- John Benjamin Heywood. Internal Combustion Engine Fundamentals. McGraw-Hill

MACHINE DESIGN LAB-II

Course Code: MAE2604 **Credit Units: 01**

Course Contents:
Design and drawing based upon the course Machine Design II such as automotive transmission, brakes, clutches connecting rod, I.C. engine piston, connecting rod, hydraulic rivet, mechanical hoist etc.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

FLUID MACHINES LAB

Course Code: MAE2613 **Credit Units: 01**

Course Contents:

Name of Experiments:

1. To conduct a test on Centrifugal Pump and plot its characteristics
2. To Plot the characteristics of Pelton turbine.
3. To conducts an experiment on Francis turbine.
4. To study the effect of a draft tube on reaction turbines.
5. To find the friction factor for flow through pipes
6. To study the hydraulic controls rig.
7. To conduct an experiment for verifying model laws.
8. To study the cavitations phenomenon in turbines.
9. Study of hydraulic couplings and torque converters.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INTERNAL COMBUSTION ENGINES LAB

Course Code: MAE2614 **Credit Units: 01**

LIST OF EXPERIMENTS

S.No.	Name of the Experiment
1.	To study the constructional details & working principles of two-stroke petrol/ four-stroke petrol Engine.
2.	To study the constructional details & working principles of two-stroke Diesel / four-stroke Diesel Engine.
3.	Analysis of exhausts gases from single-cylinder/ multi- cylinder/ petrol engine by Orsat apparatus.
4.	To prepare heat balance sheet on multi-cylinder diesel engine / petrol engine.
5.	To find the indicated horse power (IHP) on multi-cylinder diesel engine / petrol engine by Morse test.
6.	To prepare variable speed performance test of a multi- cylinder /single-cylinder petrol engine / diesel engine and prepare the curve (i) bhp, ihp, fhp Vs Speed (ii) Volumetric efficiency & indicated specific fuel consumption VsSpeed.
7.	To find fhp of multi cylinder diesel engine / petrol engine by Willian's Line Method & MotoringMethod.
8.	To perform constant speed performance test on a single- cylinder/ multi-cylinder diesel engine & draw curves of (i) bhp Vs fuel rate, air rate and A/F and (ii) bhp Vs mep, mechanical efficiency & s.f.c.
9.	To study and determine the effect of A/F ratio on the performance of the two stroke, single – cylinder petrol engine.
10.	To study and draw the valve timing diagram four stroke, single – cylinder diesel engine.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

VIBRATION ENGINEERING

Course Code: MAE2615 **Credit Units: 02**

Course Contents

Module-I: Scope of Vibration: Important terminology and classification, Degrees of freedom, Harmonic motion, vectorial representation, complex number representation, addition, Derivation of equation of motion for one dimensional longitudinal, transverse and torsional vibrations without damping using Newton's second law, D' Alembert's principle and Principle of conservation of energy, Compound pendulum and centre of percussion, Damped vibrations of single degree of freedom systems, Viscous damping, underdamped, critically damped and overdamped systems, Logarithmic decrement, Vibration characteristics of Coulomb damped and Hysteretic damped systems.

Module-II: Forced Vibrations of Single Degree of Freedom Systems: Forced vibration with constant harmonic excitation, Steady state and transient parts, Frequency response curves and phase angle plot, Forced vibration due to excitation of support.

Module-III: Vibration Isolation and Transmissibility: Force transmissibility, Motion transmissibility, Forced vibration with rotating and reciprocating unbalance, Materials used in vibration isolation.

Module-IV: System with Two Degrees of Freedom: principle mode of vibration, Mode shapes, Undamped forced vibrations of two degrees of freedom system with harmonic excitation, Vibration Absorber, Undamped dynamic vibration absorber and centrifugal pendulum absorber

Module-V: Many Degrees of Freedom Systems: exact analysis.
Many Degrees of Freedom Systems: approximate methods, Rayleigh's, Dunkerley's, Stodola's and Holzer's methods, Vibrations of continuous systems, Transverse vibration of a string, Longitudinal vibration of a bar, Torsional vibration of a shaft.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

List of Recommended Books

- Mechanical Vibrations, Rao S.S., Pearson Education.
- Mechanical Vibrations and Noise Engineering, Ambekar A.G., Prentice Hall India.
- Mechanical Vibrations, Grover G.K., Nem Chand and Brothers.
- Theory of Vibrations with Applicaion, Thomson and Dahleh, Pearson Education.
- Elements of Vibration Analysis, Leonard Meirovitch, Tata McGraw-Hill, New Delhi.
- Principles of Vibration, Benson H.Tongue, Oxford Publcation

VIBRATION ENGINEERING LAB

Course Code: MAE2616 **Credit Units: 01**

List of Experiments

To perform any 8 of the following experiments:

1. To find the viscosity of the given fluid using the concept of vibrations.
2. To determine the co-efficient of friction between two materials using the method vibrations and also draw a graph between the co-efficient of friction and the speed of the rollers.
3. Investigation of the node and anti-node position for the cantilever.
4. Investigation of the node and anti-node position for simply supported beam.
5. Investigation of the node and anti-node position for a fixed end beam.
6. Determine experimentally the load on a beam with different end conditions and compare it with actual load and discuss the results.
7. Test the given structure for its vibrational stability.
8. Determine experimentally the spring stiffness and dampers required structure to a specific degree from the given vibrating body and test it experimentally.
9. To determine experimentally the whirling speed of shaft for a given system.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMPUTER INTEGRATED MANUFACTURING SYSTEM

Course Code: MAE2608 **Credit Units: 02**

Course Contents

Module-I:
Evolving manufacturing environment, New competitive challenges, Evolving Role of Information Technology

Module-II:
CIM Systems: Flexibility, Integration and Automation Opportunities, Automation of information and manufacturing systems, Automation strategies, Towards Flexible Automation,

Module-III:
Islands of automation, Evolution Towards CIM systems, Computer based integration between various functions- manufacturing, sales, design, materials etc

Module-IV:
Flexible Manufacturing Systems (FMS) as mini CIM,Computer Integrated Production Management, ERP, Group technology,

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

COMPUTER INTEGRATED MANUFACTURING SYSTEMS LAB

Course Code: MAE2617 **Credit Units: 01**

Course Objectives

The objective of this course is to
1. To equip the students about the computer integration in manufacturing.
2. To provide sound knowledge of CIMS, FMS, GT and ERP.

List of experiments
1. To study Computer Integrated Manufacturing System(CIMS) and its importance in manufacturing environment.
2. To study a CIM model of any industry.
3. Introduction to CAD software's.
4. Introduction to CAM software's.
5. To study Computer aided process planning (CAPP) with suitable example.
6. To describe Computer aided quality control.
7. To study Flexible manufacturing system (FMS).
8. To study flexibility in FMS and its measurements.
9. To study Group Technology(GT)with suitable example.
10. To study part family forming using different method in GT.
11. Do an exercise of Part Coding onGroup Technology.
12. Study of Enterprise resource planning (ERP) and its applications.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

Text:
- Mikell P. Groover, "Automation, Production Systems and Computer-Integrated Manufacturing", 2nd Edition, Pentice Hall, 2001.
- Rao, Kundra& Tiwari, "Computer aided Manufacturing" Tata McGraw Hill, 2007.
- Numerical Control: by Koren, Khanna Publisher.

References:
- Mikell P. Groover, Emory W. Zimmers, "CAD/CAM", Pearson Education, 2006.
- P.N. Rao, "CAD/CAM Principles and Applications", Tata McGraw Hill, 2006

COMPUTER AIDED DESIGNING

Course Code: MAE2618 **Credit Units: 02**

Course Objective:
The objective of this course is to impart students an in-depth exposure to methods in geometric modeling and its applications in CAD/CAM. This course introduces integrated approach to CAD including: Overview of CAD, numerical techniques for CAD, Computer graphics and design, Principle and management of design data base system, finite element analysis and CAD, Design optimization. Along with the theoretical presentations, commercial CAD software are also introduced and applied to create Engineering components and assemblies.

Course Contents:

Module I
Introduction to CAD. Design process, Introduction to solid modeling and aided design of some elements/ components, hardware requirements, concurrent engineering.

Module II
Elementary Computer Graphics. Transformations, Mappings, Projections – orthographic, isometric, perspective.

Module III
Representation of surfaces. Plane surfaces, Ruled surfaces, Surfaces of revolution, Sweep surfaces, Bezier surface, Bicubic surface patch, Approximation B – spline surface, composite surfaces.

Module IV: Solid Modeling
Set theory, Graph theory, Regularized Boolean operations, B-rep modeling, Sweep representations, Spatial occupancy enumeration.

Module V: Advanced CAD
Mechanical assembly, Geometric property formulation- curve length, surface are calculations, volume calculation, centriod calculation, Tolerances representations, Animation, Simulation, Strategic factors in product design, Robust design for product, Introduction to Finite element modeling and analysis.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Ibrahim Zeid, "CAD/CAM Theory and Practice", Tata McGraw-Hill Publishing Company Limited, 6th Edition 1998.
- David F. Rogers and J. Alan Adams, "Mathematical Elements for Computer GraPrentice Hall Indiacs", Tata McGraw-Hill, 2nd Edition 2002.

References:
- Ibrahim Zeid, "Mastering CAD/CAM", Tata McGraw-Hill Publishing Company Limited,

COMPUTER AIDED DESIGNING LAB

Course Code: MAE2619 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Analysis and design using ANSYS/Pro-E software for:
2. Flange Coupling.
3. Design Shaft.
4. Design for Key.
5. Design for Spur Gear.
6. Design for Helical Gear.
7. Parts of Thin Cylinder Pressure Vessels.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

Syllabus - Seventh Semester

COMPUTER AIDED MANUFACTURING

Course Code: MAE2701 **Credit Units: 03**

Course Objective:
The aim of the course is to impart the students the basic and essential concepts in using Computer Assisted Manufacturing (CAM) and Computer Numerical Control (CNC) machines. Students will learn the basic concepts of manufacturing planning and control. They will be offered hands on experience in using CAM software to design, simulate and write CNC programs.

Course Contents:

Module I
Introduction to Numerical control. Programmed automation. Nomenclature, type and features of NC machines tools. Axes designation. Point to point, straight and continuous control systems.

Module II
Machining centre and Turning centre, Automatic tool changer, Machine Tool beds and automated pallet changers**.**

Module III
Machine Control Unit, Actuation Systems, open and close loop systems, transducers for NC Systems, revolves, encoders and inductosyn.

Module IV
Manual Part Programming: Processes planning, G&M codes. Interpolation Cycles. Tool compensation, Subroutines, Introduction to Computer Aided Part Programming.

Module V
Tooling and tool presetting. Computer Aided inspection - Contact Inspection (Coordinate Measuring Machine) & Non Contact Inspection.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Mikell P. Groover, "Automation, Production Systems and Computer-Integrated Manufacturing", 2nd Edition, Pentice Hall, 2001.
- Rao, Kundra & Tiwari, "Computer aided Manufacturing" Tata McGraw Hill, 2007.
- Numerical Control: by Koren, Khanna Publisher.

References:
- Mikell P. Groover, Emory W. Zimmers, "CAD/CAM", Pearson Education, 2006.
- P.N. Rao, "CAD/CAM Principles and Applications", Tata McGraw Hill, 2006.

AUTOMOTIVE ENGINEERING

Course Code: MAE2707 **Credit Units: 03**

Course Objective:
This course emphasizes on constructional details of automotive vehicles which includes – Basic structure, engine, transmission systems, suspension systems, steering system, braking systems and wheels & tyres..

Course Contents:

Module I
Introduction, Components of an automobile, basic engine terminology, engine cycles, working of an IC engine. Basic engine design considerations, constructional details of C.I. and S.I. engines. crank shafts, connecting rod, piston, values, cams, manifolds, air cleaners, mufflers, radiators, and oil filters.

Module II: Transmission System
Description and working of manually operated gearboxes like sliding mesh, constant mesh, synchromesh and epicycle; hydraulic torque convertor and its construction working and performance, sem-automatic and fully automatic transmission, Hydramatic transmission, analysis of differentials, live axles, construction working and requirements of overdrive.

Module III: Steering System
Introduction, Front axle, wheel alignment, Steering geometry, steering mechanisms, Ackerman steering, center point steering, power steering.

Module IV: Suspension
Objective, requirement, function, types Shock absorbers, Independent suspension, Stabilizer, air suspension, Hydroelastic suspension, Hydragas interconnected suspension.

Module V
Principle, braking requirements, brake efficiency, fading of brakes, types of brakes, bleeding of brakes, brake fluid.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Kirpal Singh, "Automobile Engg.", Vol. I & II, Standard Publishers, 2004
- N.K. Giri, "Automotive Mechanics", Khanna Publishers
- Narang G.B.S., "Automobile Engg.", Khanna Publishers
- Srinivasan, "Automotive Engines", Tata McGraw Hill
- K.K. Jain & R.B. Asthana, "Automobile Engineering", Tata McGraw Hill

References:

- James D. Halderman and Chase D. Mitchell Jr., Automotive Engines- Theory and Servicing, Pearson Education, 2007
- Joseph Haitner, "Automotive Mechanics", C.B.S. Publications

COMPUTER AIDED MANUFACTURING LAB

Course Code: MAE2703 **Credit Units: 01**

Course Contents:

Name of Experiments:

1. Make a sketch of CNC lathe showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional lathe and, if it is considered as a CNC lathe, show the axes with designations.

2. Make a Kinematics diagram of CNC Lathe showing all machine sub-assemblies. Indicate bearing arrangements, ball screw arrangements with sizes, wherever available.

3. Repeat (1) on CNC machining centre and conventional milling machine.

4. Repeat (2) for CNC machining centre.

5. Study the CNC lathe. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function.

6. Repeat (5) on machining centre.

7. Study the work holding and tool holding devices in the CNC lathe and machining centre and draw up their specifications and capacities.

8. Prepare part programs for 2 specified components for CNC lathe by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine.
   Test the program in dry run and by tool path graphic simulation.
   Machine the component.

9. Do the above work for machining centre.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

AUTOMOTIVE ENGINEERING LAB

Course Code: MAE2708 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Drawing Valve Timing Diagram
2. Determination of Firing Order of engine
3. Specification of engine
4. Study of different parts of engine
5. Study of Clutch
6. Study of Hydraulic Brake System
7. Study of Carburetor
8. Study of various parts of Auxiliary systems
9. Study of Wheel
10. Study of emission system
11. Study of steering system

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

SUMMER INTERNSHIP EVALUATION-II

Course Code: MAE2735 **Credit Units: 03**

Objective:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

Guidelines
In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report
1. File should be in the following specification
- A4 size paper
- Spiral Binding
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures

experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page
Declaration
Student Certificate (University)
Certificate (Company)
Acknowledgement
Abstract
Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters
Appendices(optional)
References / Bibliography

The above components are described below:

1. **The Title Page**-- Format will be given by coordinator/supervisor.

2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.

3. Certificate-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).

4. Company Certificate: This is a certificate, which the company gives to the students.

5. Contents-This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.

6. Acknowledgement-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.

7. Abstract and **Keywords-**This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

The keywords (maximum 6) are a hint that what is contained in the report.

8. Company Profile: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.

9. **Chapters**—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.

10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals

preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment consists of topic relevance, progress report and industry feedback on company letterhead. Final Assessment includes viva, presentation, execution and report marks.

Examination Scheme:

Components	**IF**	**PR**	**R**	**E**	**V**	**FP**
Weightage	20	20	15	15	15	15

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR-Progress Report, E-Execution

INDEPENDENT STUDY

Course Code: MAE2712 **Credit Units: 02**

This is an elective, self-directed course to investigate aemerging areasof IT and Computer Science like Mobile Operating System, Cloud Computing, or from Current Research Areas etc. The primary goal of the course is to provide students with research exploration of a specific topic of interest to the individual student under the advisement of an instructor who will monitor and critique the student's progress.

Independent study provides students with the opportunity to work one-on-one with a Faculty on a particular topic. The student and faculty should discuss the aims and content of the study and present the proposal to Head of Department. The independent study proposal should include the study's title, theme, readings, work to be submitted, and syllabus. Faculty and student should meet for a minimum number of 2 hours per week. Student will give a seminar after completion of study.

TERM PAPER

Course Code: MAE2731 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

Guidelines for Term Paper

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of Materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the Notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the Paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the First Draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing &Preparing the Final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion&Conclusion
6) Bibliography
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

Bibliography

From the very beginning of a research project, you should be careful to note all details of articles gathered. The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography. The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical Conventions:

Monographs

Crystal, D. (2001), Language and the internet, Cambridge: Cambridge University Press

Edited Volumes

Gass, S/Neu, J. (eds.) (1996), Speech acts across cultures, Challenges to communication in a second language, Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language, Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved on [5.10.01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document], German as a Foreign Language Journal [online] 1, Retrieved [12.09.00] from the World Wide Web, http://www.gfl-journal.com/

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document], Retrieved on [13.10.01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu

Unpublished Thesis/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, etc.) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Examination Scheme:

Dissertation:	75
Viva voce	25
Total:	**100**

PROJECT

Course Code: MAE2732 **Credit Units: 02**

Methodology

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Guidelines for Project File

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

Project File

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period where the researcher is not working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The project file is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the file should be comprehensive and includes:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

Layout Guidelines for the Project File

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment of the Project File

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following assessment objectives:

- Range of research methods used to gain information
- Execution of research
- Data analysis (Analyse Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation:
40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:
60% (Based on the documentation in the file, final report layout, analysis and results, achievement of objectives, presentation/ viva)

Syllabus - Eighth Semester

REFRIGERATION AND AIR CONDITIONING

Course Code: MAE2801 **Credit Units: 03**

Course Objective:
The aim of this course is to provide the students with the understanding of the basic principles of Refrigeration and Air Conditioning such that they could build simple mathematical models representing the conditioned space and its components used to control environmental conditions. The application of thermodynamics, heat transfer, and fluid mechanics includes an understanding of refrigerants and refrigeration systems, psychometrics, human comfort and air quality, calculation of heating and cooling loads, and heat and mass transfer processes and associated R & AC components and systems.

Course Contents:

Module I: Refrigeration
Air refrigeration systems, air cycle refrigeration of aircraft, various compression refrigeration cycles, basic components of the plant.

Module II
Properties and choice of refrigerants, Eco-friendly refrigerants multiple compression and evaporation system, cascading.

Module III
Vapour absorption cycle, electrolux system steam jet refrigeration, vortex tube, application of refrigeration systems cascading, vapour absorption cycle

Module IV: Air-conditioning
Psychometric processes, applied psychometric, comfort air-conditioning, ventilation requirements, cooling and dehumidification system, estimation of cooling and heating loads, air handling, air distribution, duct design, industrial air conditioning.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- CP Arora, Refrigeration and Conditioning, Tata McGraw Hill
- Manohar Prasad, Refrigeration and Conditioning , Wiley Eastern Limited
- Jordan and Priester, Refrigeration and Conditioning, Prentice Hall of India
- WF Stoecker, Refrigeration and Conditioning, McGraw Hill.

REFRIGERATION AND AIR-CONDITIONING LAB

Course Code: MAE2802 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Study of refrigeration testing.
2. Study of Air-Conditioning testing.
3. To calculate the COP of Refrigerator.
4. Study of effect of superheating.
5. To calculate the efficiency of Compressor.
6. To calculate total Heat Load for Air-Conditioning unit.
7. To calculate the COP of Heat Pump.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PROJECT-DISSERTATION

Course Code: MAE2837 **Credit Units: 08**

Methodology

Topics of project are to be based on the latest trends, verifying engineering concepts /principals and should involve elementary research work. The projects may involve design, fabrications, testing, computer modeling, and analysis of any engineering problem. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Guidelines for Project File and Project Report

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

Project File

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period where the researcher is not working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

Project Report

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page**
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgement(s)**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract**
  A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.
  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.
  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.
  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.
- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly.
  Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?
- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.
  Examples
  For research article
  Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli* O157: H7. *ClinMicrobiol Infect*, **8** (suppl 1): 116–117.
  For book
  Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

Layout Guidelines for the Project File & Project Report

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment of the Project File and the Project Report

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following assessment objectives:

- Range of Research Methods used to oASEin information
- Execution of Research
- Data Analyses (Analyse Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology,refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis andresults, achievement of objectives, presentation/ viva)

ARTIFICIAL INTELLIGENCE AND ROBOTICS

Course Code: MAE2805 **Credit Units: 02**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organise, process, share and use the knowledge embedded in multimedia content. Research will aim to maximise automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Contents:

Module I: Scope of AI
Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.
Problem solving
State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

Module II: Knowledge Representation
Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtracks.
Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.
Expert Systems
Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

Module III: Manipulator kinematics
Kinematics: Introduction, solvability, algebraic solution by reduction to polynomial, standard frames, repeatability and accuracy, computational considerations.

Module IV: Manipulator dynamics
Introduction, acceleration of rigid body, mass distribution, Newton's equation, Euler's equation, Iterative Newton-Euler dynamic formulation, closed dynamic equation, Lagrangian formulation of manipulator dynamics, dynamic simulation, computational consideration.

Module V: Trajectory Generation
Introduction, general considerations in path description and generation, joint space schemes, Cartesian space schemes, Path generation in runtime, Planning path using dynamic model.

Module VI: Linear control of manipulators
Introduction, feedback and closed loop control, second order linear systems, control of second-order systems, Trajectory following control, modeling and control of a single joint, sensor and vision system.
Robot Programming languages & systems: Introduction, the three level of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992.
- N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 1990.
- John J. Craig, “Introduction to Robotics”, Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication
- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication

References:

- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.

ARTIFICIAL INTELLIGENCE AND ROBOTICS LAB

Course Code: MAE2808 **Credit Units: 01**

Course Contents:

Name of Experiments:

1. Robot Arm (Model 1055)

2. Write a prolog program to define a relations knowledge base as follows : Assume the following in the kbase :
   Male (person), female (person), husband (person, person0, wife(person, person), father (person, person), mother (person, person). Define the predicates for
   Parent
   Brother
   Sister
   Grandfather
   Ancestor

3. Write a prolog program to simulate a non deterministic finite automation (NFA)

4. A computer system accepts a user's name and password which are stored as facts in the kbase. Validate this information through a predicate login. If not valid, display a suitable message.

5. Write prolog predicates to perform list manipulation as follows :
   List membership relation
   Length of a list
   Concatenate 2 list to produce a third list
   Reverse a list
   Subset of a list
   Appending an element to a list
   Summing the element of a list

6. Write a prolog program to implement Depth first search algorithm.

7. Write a prolog program to simulate the Towers of Hanoi problem.

8. There is a gold treasure hidden inside a cave. The cave is a maze of galleries connecting different rooms in which there are dangerous beings like monsters and robbers. The gold treasure is all in one room. Determine a route by which a person can get to the treasure and escape with it unhurt. Enclosed is a photocopy of the cave lay out. Write the corresponding prolog program.

9. Write a prolog program to simulate the xor logic circuit. In this program make use of the predicate definitions for AND, NOT and OR gate.

10. A hungry monkey finds himself in a room in which a bunch of bananas is hanging from the ceiling. The monkey cannot reach the bananas. In the room there is a chair and a stick. The ceiling is just the right height so that a monkey standing on a chair could knock the bananas down with the stick. The monkey knows how to move around, carry other things around, reach for the bananas and wave a stick in the air. Write prolog predicate that define the monkey's legal moves, the different legal states and enable the monkey to got to the bananas.

11. In the block world problem, assure a sequence of 3 blocks a, b, c on a table. Write prolog predicates to define valid states in the blocks world domain and also to define valid legal moves in the system.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

COMPUTATIONAL FLUID DYNAMICS

Course Code: MAE2809 **Credit Units: 02**

Course Contents:

Module-I: Introduction
Introduction to CFD, description about CFD, History and early view points on CFD, Fluid Mechanics Preliminaries, Mathematical preliminaries, Reynold's transport theorem, Equations of mass, momentum and energy conservation in integral and difference forms.

Module-II: Discritization methods
Basics of discretization in CFD, Finite difference formulation with introduction to - Consistency, Stability and Order of accuracy. Understanding discretization techniques using Linear Convection Equation.

Module-III: Finite volume method
Finite volume formulation, Finite volume state update formulae in 1D and 2D, Higher order procedures. Spatial Discretization Convective and diffusive fluxes Euler backward/forward time integration Chracteristics and Eigenvalues

Module-IV: Heat conduction problem
Solution of One dimensional heat conduction through a pin fin by F.D.M solution of two dimensional heat conductional in a plate by F.D.M. Control volume formulation of the heat conduction problem and its solution.

Module-V: Turbulence Modeling
Introduction to turbulence, Reynold's averaged Navier-Stokes equations and closure problem, Prandtl's mixing length theory and eddy viscosity , Turbulence models - k-epsilon model, k-omega model.

Module-VI: Fluid flow problem
Practical aspects of CFD, Grid generation: Introduction to structured, unstructured, Cartesian meshes: A case study on CFD technology readiness for an industrial application.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Books recommended;

- Computational fluid dynamics by John.d.Anderson, Jr
- Introduction to Computational fluid dynamics by Anil .W. Date
- Numerical heat transfer and fluid flow by suhas. V. patankar
- An Introduction to Computational Fluid Dynamics by H.K. Versteeg and W. Malalasekera
- Computational Fluid Dynamics by Klaus A. Hoffmann, Steve T. Chiang

COMPUTATIONAL FLUID DYNAMICSLAB

Course Code: MAE2810 **Credit Units: 01**

1. To perform the experiment on Geometry import, Geometry clean up, Building computational domain, Edge meshing,Surface meshing, Quality check for surface mesh, Volume meshing, Quality check for volume mesh, setting boundary conditions, Volume Mesh export.
2. Inviscid unstructured mesh generation for NACA 0012 airfoil
3. 3 Viscous unstructured mesh generation for NACA 0012 airfoil
4. Inviscid unstructured mesh generation for a convergent divergent nozzle
5. Viscous unstructured mesh generation for a convergent divergent nozzle
6. To make and validate a computer programme for the one dimensional pin fin steady state heat conduction.
7. To make and validate a computer programme for the fully developed laminar flow in circular pipe.
8. To make and validate a computer programme for the plate in two dimensions in steady state conduction.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

POWER PLANT PRACTICES

Course Code: MAE2811 **Credit Units: 03**

Course Objective:
The objective of this course is that the students come to know different ways of producing energy such as thermal energy from gas and steam, hydraulic energy nuclear energy, non conventional source of energy from wind, solar and tidal. And their different uses in productive works.

Course Contents:
Module I: Steam Generator Plant
Fuel handling systems, Indian coals, combustion of coal in furnaces; fluidized bed combustion; High pressure heavy duty boilers, Super critical and once through boilers influence of operating conditions on layout of evaporator, superheated, reheated and economizer; dust collectors; ash disposal, fans and draft systems.

Module II: Turbine Plane
Layout of turbine plant room, corrosion in condensers and boilers, feed water treatment; feed heating and de aeration system; cooling water systems and cooling towers.

Module III: Control
Important instruments on steam generator and turbine; drum water level control, combustion control and super heat temperature control; testing of power plants and heat balance.

Module IV: Other Power Plant
General layout of I.C. Engines and turbine power plants, types, gas turbine plants, fields of application, Nuclear power plants, power reactors and nuclear steam turbines; handling of nuclear waste and safety measures, peak load power generation methods.

Module V: Economics
Planning for power generation in India, super thermal power plants, estimation of cost of power generation; choice of plant site.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
•Arora &Domkundwar, “A course in Power Plant Engineering”, Dhanpat Rai & Sons
References:
•Black Veatch, “Power Plant Engineering”, CBS Publisher

Amity School of Engineering & Technology

B.Tech. + M.Tech. - Network & Cyber Security

FLEXILEARN

-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

ENGINEERING MATHEMATICS-I

Course Code: NCE6101 **Credit Units : 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non-homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING PHYSICS

Course Code: NCE6102 **Credit Units : 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

ENGINEERING MECHANICS

Course Code: NCE6103 **Credit Units : 03**

Course Objective:
Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

Course Contents:

Module I: Force system & Structure
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Module II: Friction
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

Module III: Distributed Force
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

Module IV: Work -Energy
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: NCE6104 **Credit Units : 03**

Course Objective:
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:
Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.
Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References*:*
- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, "Fundamentals of Computers and Programming in 'C'.
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

ENGINEERING PHYSICS LAB

Course Code: NCE6105 **Credit Units : 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PROGRAMMING IN C LAB

Course Code: NCE6106 **Credit Units : 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING MECHANICS LAB

Course Code: NCE6107 **Credit Units : 01**

Engineering Mechanics:

- To verify the law of Force Polygon
- To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
- To determine the co-efficient of friction between wood and various surface (like
- Leather, Wood, Aluminum) on an inclined plane.
- To find the forces in the members of Jib Crane.
- To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
- To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
- Wheel and Axle
- To determine the MA, VR, η of Worm Wheel (2-start)
- Verification of force transmitted by members of given truss.
- To verify the law of moments using Bell crank lever
- To find CG and moment of Inertia of an irregular body using Computation method

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING GRAPHICS LAB

Course Code: NCE6108 **Credit Units : 01**

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI:Development of Surface
Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:
- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

Syllabus - Second Semester

ENGINEERING MATHEMATICS-II

Course Code: NCE6201 **Credit Units : 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$
.

Module IV: Statistics and Probability
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ENGINEERING CHEMISTRY

Course Code: NCE6202 **Credit Units : 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels
Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter, Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module IV: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication; Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module V: Corrosion
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ELECTRICAL SCIENCE

Course Code: NCE6203 **Credit Units : 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: NCE6204 **Credit Units : 03**

Course Objective:
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:
Module I: Introduction
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

ELEMENTS OF MECHANICAL ENGINEERING

Course Code: NCE6205 **Credit Units : 02**

Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

Course Contents:

Module I: Fundamental Concepts
Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

Module II: Stress And Strain Analysis
Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

Module III: Casting& Forging
Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

Module IV: Welding & Sheet metal working:
Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. *Internal Combustion Engine*, Tata McGraw-Hill.

ENGINEERING CHEMISTRY LAB

Course Code: NCE6207 **Credit Units : 01**

Course Contents:
List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
(b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
(b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: NCE6208 **Credit Units : 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab

ELEMENTS OF MECHANICAL ENGINEERING LAB

Course Code: NCE6209 **Credit Units : 01**

Course Contents:

1. Welding

   (a) Arc Welding
   - Butt Joint
   - Lap Joint
   - T Joint

   (b) Gas Welding
   - Butt Joint
   - Lap Joint
   - Brazing of Broken pieces

2. Foundry
   - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal
   - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop
   - Male – Female Joint
   - Rectangular piece
   - Filing the job

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Third Semester

DATA COMMUNICATION AND COMPUTER NETWORKS

Course Code: NCE6301 **Credit Units : 03**

Course Objective:
The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP.

Course Contents:

Module I: Introduction
Introduction to computer networks, evolution of computer networks and its uses, reference models, example networks
The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system

Module II: The data link layer
Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, example of data link protocols- HDLC, PPP Access

Module III: Medium access layer
Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, CSMA/CA, IEEE Standard 802 for LAN and MAN, Bridges, Wireless LANs. Introduction to wireless WANs: Cellular Telephone and Satellite Networks, SONETISDH, Virtual-Circuit Networks: Frame Relay and ATM.

Module IV: The network layer
Network layer concepts, design issues, static and dynamic routing algorithms, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion control and quality of service, internetworking, Ipv4

Module V: The transport layer
The transport services, elements of transport protocols, TCP and UDP
The application layer: Brief introduction to presentation and session layer, DNS, E-mail, WWW

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & neworking: Forouzan, B. A.

References:
- Computer network protocol standard and interface: Uyless, Black
- Data and Computer Communications, Seventh Edition (7th.) William Stallings Publisher: Prentice Hall
- Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose

DATABASE MANAGEMENT SYSTEMS

Course Code: NCE6302 **Credit Units : 04**

Course Objective:
The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

Course Contents:

Module I: Introduction
Concept and goals of DBMS, DBMS Architecture, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constarint, Keys, Mapping, Design of ER Model

Module II: Hierarchical model &Network Model
Concepts, Data definition, Data manipulation and implementation.
Network Data Model, DBTG Set Constructs, and Implementation

Module III: Relational Model
Relational database, Relational Algebra, Relational Calculus, Tuple Calculus.

Module IV: Relational Database Design and Query Language
SQL, QUEL, QBE, Normalization using Functional Dependency, 1NF, 2NF, 3NF, BCNF, Multivalued dependency and Join dependency.

Module V: Concurrency Control and New Applications
Transaction basics: ACID property, Lifecycle of Transcation, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH, 2000.
- Steve Bobrowski, "Oracle & Architecture", TMH, 2000

References:

- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

OPERATING SYSTEMS

Course Code: NCE6303 **Credit Units : 03**

Course Objective:
Operating Systems serve as one of the most important courses for undergraduate students, since it provides the students with a new sight to envision every computerized systems especially general purpose computers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand, analyze and overcome the challenges they face with in the other courses and the real world.

Course Contents:

Module I: Introduction to operating system
Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls.

Module II: Process Management
Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads, Inter-process Communication and Synchronization:Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.
CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.
Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach.

Module III: Memory Management
Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays

Module IV: Device management
Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling,
Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage.

Module V: File System and Protection and security
File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management.
Policy Mechanism, Authentication, Internal excess Authorization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Milenekovic, “Operating System Concepts”, McGraw Hill
- A. Silberschatz, P.B. Galvin “Operating System Concepts”, John Willey & son

References:

- Dietel, “An introduction to operating system”, Addision Wesley
- Tannenbaum, “Operating system design and implementation”, PHI
- Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI.
- Willam Stalling “ Operating system” Pearson Education
- B. W. Kernighan & R. Pike, “The UNIX Programming Environment” Prentice Hall of India, 2000
- Sumitabha Das “ Your UNIX The ultimate guide” Tata Mcgraw Hill
- “Design of UNIX Operating System “ The Bach Prentice – Hall of India

DATA STRUCTURES USING C

Course Code: NCE6304 **Credit Units : 04**

Course Objective:
Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

Course Contents:
Module I: Introduction to Data structures
Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Trade- offs. Use of pointers in data structures.Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

Module II: Introduction to Stacks and queue
Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.
Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

Module III: Dynamic Data Structure
Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation.
Stack and queue implementation using linked list.

Module IV: Trees and Graphs
Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.
Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

Module V: Sorting and Searching and file structures
Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.
Searching: Linear search, Binary search, File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Horowitz and Sahani, "Fundamentals of Data structures", Galgotia publications
- Tannenbaum, "Data Structures", PHI
- R.L. Kruse, B.P. Leary, C.L. Tondo, "Data structure and program design in C" PHI
- "Data structures and algorithms" – Schaum Series.

DATA STRUCTURES USING C LAB

Course Code: NCE6305 **Credit Units : 01**

Software Required: Turbo C++

Assignment will be provided for following:

- Practical application of sorting and searching algorithm.
- Practical application of various data structure like linked list, queue, stack, tree

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA COMMUNICATION AND COMPUTER NETWORKS LAB

Course Code: NCE6306 **Credit Units : 01**

Equipments Required:
Switch Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors etc.
Platforms required: Linux Server

Course Contents:
- Introduction and Installation of Linux
- Administrating Linux
- Setting up a Local Area Network
- Connecting to the Internet
- Setting up Print Server
- Setting up File Server
- Setting up Mail Server
- Setting up FTP Server
- Setting up Web Server
- Setting up MySQL Database Server

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATABASE MANAGEMENT SYSTEMS LAB

Course Code: NCE6307 **Credit Units : 01**

Software Required: Oracle 9i

Topics covered in lab will include:

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

UNIX PROGRAMMING LAB

Course Code: NCE6308 **Credit Units : 01**

Software Required: UNIX SCO

Assignments will be provided for the following

- Introduction to UNIX Commands
- Introduction to vi editor
- Programming in shell script
- Introduction to programming in C Shell

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India
- "Unix –Shell Programming" Kochar
- " Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

INTRODUCTION TO IOT

Course Code: NCE6309 **Credit Units : 03**

Course Objective:
The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the workingof Internet of Things. To understand the concepts of Web of Things.

Course Contents:
Module I: IOT - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.

Module II: IOT PROTOCOLS - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security

Module III: IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction, IoT and Big Data.

Module IV: WEB OF THINGS - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardizationfor WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals andBusiness Intelligence.

Module V: IOT APPLICATIONS - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc., Introduction to Fog Computing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet ofThings", Springer, 2011.
- David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.
- Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applicationsand Protocols", Wiley, 2012.

References:

- Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014
- Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013
- CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

E-COMMERCE AND ERP

Course Code: NCE6310 **Credit Units : 03**

Course Objective:
This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Contents:
Module I: Introduction E-commerce and ERP
E-commerce and its types, EDI and its basics, Digital payment systems, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies-Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT &Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.

Module II: ERP Modules
Business Modules in an ERP Packag- Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

Module III: Benefits of ERP
Time Reduction, On time shipment, Improved Resource Utilization, Performance, Customer Satisfaction, Flexibility, information accuracy and decision making capability, reduction in quality costs, Accuracy.

Module IV: ERP Implementation
ERP Implementation Lifecycle, Implementation Methodology, In-house implementation-Pros and cons, Vendors, Consultants and Users and their roles, Project Management and Monitoring after ERP Implementation.

Module V: The ERP Market and Future Directions
ERP Market Place- SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA).Future directions in ERP.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Alexis Leon, "Enterprise Resource Planning", Tata McGraw Hill 2001
- Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company

References:
- Loshin, Pete and Murphy, Paul, *Electronic Commerce*, Second edition, 1990, Jaico Publishing House, Mumbai.
- S. Sadagopan, "Enterprise Resource Planning", Tata McGraw Hill 2000

ELECTRONIC DEVICES & CIRCUITS

Course Code: NCE6311 **Credit Units : 02**

Course Objective:
This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:
Module I: Semeconductor physics: Mobility & conductivity, Charge densities in a semiconductor, Fermi dirac distribution, carrier concentration and Fermi levels in semiconductor, generation and recombination of charges, diffuse and continuity equations, Hall effect.

Module II: Semiconductor Diode and Diode Circuits
Junction diode, Diode as circuit element,Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module III: Bipolar Junction Transistor
Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in $I_{co,}$ V_{BE} &β, Stabilization factors, thermal stability.

Module IV: Small signal Analysis of transistor and Multistage Amplifier
Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

Module V: Field Effect Transistors
Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module VI: Feedback Amplifiers
Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VII: Power Amplifiers
Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, ClassAB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

ELECTRONIC DEVICES & CIRCUITS LAB

Course Code: NCE6312 **Credit Units : 01**

Course Contents:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode as a voltage regulator.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations.
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

THEORY OF AUTOMATA AND COMPUTATION

Course Code: NCE6401 **Credit Units : 04**

Course Objective:
The course begins with the basic mathematical preliminaries and goes on to discuss the general theory of automata, properties of regular sets and regular expressions, and the basics of formal languages. Besides, sufficient attention is devoted to such topics as pushdown automata and it's relation with context free languages, Turing machines and linear bounded automata, the basic concepts of computability such as primitive recursive functions and partial recursive functions.

Course Contents:
Module I:Introduction to Languages and Automata
Formal Grammars and Chomsky Hierarchy, Regular Expression Deterministic and Nondeterministic Finite Automata, Regular Expression, Two way Finite Automata, Finite Automata with output, Properties of regular sets, pumping lemma for regular sets, My-Hill-Nerode Theorem.

Module II: Context Free Grammars and Pushdown Automata
CFG: Formal Definition, Derivation and Syntax trees, E-removal, Ambiguous Grammar, Properties of CFL, Normal Forms (CNF and GNF)
Pushdown Automata:Definitions, Relationship between PDA and context free language, Decision Algorithms

Module III: Turing Machine
The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Universal TM, Church's Machine.
Recursive and recursively enumerable language, unrestricted grammars, Context Sensitive Language, Linear Bounded Automata (LBA).

Module IV: Undecidability
Turing machine halting Problem, undecidable problems for recursive enumerable language, Post correspondence problems (PCP) and Modified Post correspondence problems, Undecidable problems for CFL.

Module V: Computability
Partial and Total Functions, Primitive Recursive functions, Recursive functions.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Hopcroft and Ullman, "Introduction to Automata Theory, languages and computation", Addision Wesley.
- "An introduction to formal languages and Automata (2nd ed)" by Peter Linz, D. C. Health and Company.

References:
- "Introduction to theory of computation (2nd Ed)" by Michael sipser.
- Mishra & Chandrashekharan, "Theory of Computer Sciences", PHI.
- Zavi Kohavi, "Switching and finite Automata Theory "
- Kohan, "Theory of Computer Sciences".
- Korral, "Theory of Computer Sciences".

DIGITAL ELECTRONICS

Course Code: NCE6402 **Credit Units : 02**

Course Objective:
This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

Course Contents:

Module I: Boolean Functions
Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

Module II: Combinational Circuits
Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer,.

Module III: Sequential Circuits
Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.

Module IV: Logic families
Logic families: RTL, DTL, TTL, ECL

Module V: Data Converters
Data converters: ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Moris Mano: Digital Circuits Systems
- R. P. Jain: Digital Logic & Circuits
- Thomas L. Floyd: Digital Fundamentals
- Malvino and Leech: Digital Principles & Applications

DISCRETE MATHEMATICS

Course Code: NCE6403 **Credit Units : 04**

Course Objective:
This subject provides students with an in-depth education in the conceptual foundations of computer science and in engineering complex software and hardware systems. It allows them to explore the connections between computer science and a variety of other disciplines in engineering and outside. Combined with a strong education in mathematics, sciences, and the liberal arts it prepares students to be leaders in computer science practice, applications to other disciplines, and research.

Course Contents:
Module I: Formal Logic
Statement, Symbolic Representation and Tautologies, Quantifiers, Predicator and validity, Normal form. Propositional Logic, Predicate Logic, First Order Logic.

Module II: Proof & Relation
Techniques for theorem proving: Direct Proof, Proof by Contra position, Proof by exhausting cares and proof by contradiction, principle of mathematical induction, principle of complete induction. Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients.

Module III: Sets and Combinations
Sets, Subtracts, power sets, binary and unary operations on a set, set operations/set identities, fundamental country principles, principle of inclusion, exclusion and pigeonhole principle, permutation and combination, Pascal's triangles, Comparing rates of growth: big theta, little oh, big oh and big omega.

Module IV: Relation/function and matrices
Relation/function and matrices: Relation, properties of binary relation, operation on binary relation, closures, partial ordering, equivalence relation, Function, properties of function, composition of function, inverse, binary and n-ary operations,
characteristic function, Permutation function, composition of cycles, Boolean matrices, Boolean matrices multiplication.

Module V: Lattices & Boolean Algebra
Lattices: definition, sub lattices, direct product, homomorphism Boolean algebra: definition, properties, isomorphic structures (in particulars, structures with binary operations) sub algebra, direct product and homo-morphism, Boolean function, Boolean expression, representation & minimization of Boolean function.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- J.P. Tremblay & R. Mamohan, "Discrete Mathematical Structure with Application to Computer Science," TMH, New Delhi (2000).
- Kolman, Busby & Ross "Discrete Mathematical Structures", PHI.
- Iyengar, Chandrasekaran and Venkatesh, "Discrete Mathematics", Vikas Publication.
- Peter Linz, "An Introduction to Formal Languages and Automata", Narosa Publishing House.

References:

- J. Truss, "Discrete Mathematics", Addison Wesley.
- C.L. Liu, "Elements of Discrete Mathematics", McGraw Hill Book Company.
- M. Lipson & Lipshutz, "Discrete Mathematics", Schaum's Outline series.
- J. E. Hopcroft & J. D. Ullman, "Introduction to Automata Theory, Languages and Computation", Addison Weliy.

ARTIFICIAL INTELLIGENCE

Course Code: NCE6404 **Credit Units : 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Contents:

Module I: Problem solving and Scope of AI
Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction.
Problem Solving
State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.

Module II: Knowledge Representation
Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

Module III: Understanding Natural Languages
Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts ,Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation..

Module IV
Expert System: Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN,R1
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. **Programming Language:** Introduction to programming Language, LISP and PROLOG.
Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

Module V: Introduction to Robotics
Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992.
- N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 1990.
- John J. Craig, “Introduction to Robotics”, Addison Wesley publication
- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication

- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication

References:

- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.

DIGITAL ELECTRONICS LAB

Course Code: NCE6405 **Credit Units : 01**

List of Experiments:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip- flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement control circuit using multiplexer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

AMITY UNIVERSITY

ARTIFICIAL INTELLIGENCE LAB

Course Code: NCE6406 **Credit Units : 01**

Course Contents:

Assignments will be provided for the following:

- Programming in Prolog
- Programming for Robotics

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMMUNICATION SYSTEMS

Course Code: NCE6407 **Credit Units : 02**

Course Objective:
The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

Course Contents:

Module I: Introduction
Communication Process, Source of Information, Communication channels, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, primary communication resources, analog versus digital communications

Module II: Amplitude modulation
Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

Module III: Angle Modulation
Narrow and wide band FM, BW calculations using Carlson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

Module IV: Pulse Modulation
Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems,
Basics of digital communications: ASK, PSK, FSK, QPSK basics & wavform with brief mathematical introduction

Module V: Noise
Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

Module VI: Introduction to Information Theory
Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition

References:
- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH

COMMUNICATION SYSTEMS LAB

Course Code: NCE6408 **Credit Units : 01**

List of Experiments:

- To study the sampling and reconstruction of a given signal.
- To study amplitude modulation and demodulation.
- To study frequency modulation and demodulation.
- To study time division multiplexing.
- To study pulse amplitude modulation.
- To study delta and adaptive delta modulation and demodulation.
- To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
- To study carrier modulation techniques using binary phase shift keying and differential shift keying.
- To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
- To study quadrature phase shift keying & quadrature amplitude modulation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES
(PHP and MySql)

Course Code: NCE6409 **Credit Units : 02**

Course Objective:
This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc.

Course Contents:
Module I: Introduction to Open Source and PHP programming
Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.

Module II: Operator, Loops, Array, Exception and Error Handling
Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array.
Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.

Module III: Classes, File system, Passing Information between pages
Object orientedprogrammingwithPhp, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server.
HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.

Module IV: Workingwithdatabase
HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input usingJavascript.
MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL APIBuilding Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.

Module V: WorkingwithFrameworks
Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Woprking with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:
Text:
- Beginning PHP, Apache, MySQL Web Development, Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, published by Wiley, wrox
- PHP, MySQL and Apache Julie C Meloni Pearson Education ISBN : 81-297-0443-9

References:
- The Complete Reference PHP, by Steven Holzner, Tata McGraw-Hill Publication
- Beginning PHP and MYSQL, by W. Jason Gilmore, Apress Publication

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP and MySql) LAB

Course Code: NCE6410 **Credit Units : 01**

Course Contents:

1. Write the process of installation of web server.
2. Write programs to print all details of your php server. Use phpinfo().
3. Write a program to give demo of ECHO and PRINT command.
4. Write a program to implement the string functions.
5. Write a program to print Fibonacci series upto a given number using recursion.
6. Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice.
7. Write a program sort ten number by using array.
8. Write a program to demonstrate the concept of associative array.
9. Write a program to demonstrate the concept of multidimensional array.
10. Write a program to demonstrate the concept of Classes & objects.
11. Create a login form with two text fields called “login” and “password”. When user enters “Amity”as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry.HTML in case of wrong username/password.
12. How to work with sessions in PHP?
13. Introduction to Mysql creating databases, tables, using command line and gui interface, phpmyadmin
14. How to connect to MySQL using PHP ? Write programs for insertion, deletion updates and other sql queries. Design front end using html, css and write php scripts for processing of data. Try all different methods of connecting from php to MySQL
15. Make a small project with mysql and php to perform CRUD operations. Use Session also.
16. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”.
17. Write a program to design login form in which find the greatest number amongst three numbers.
18. WAP for Marksheet generation.
19. Design a webpage for entering the student details with all the validations applied on it.
20. Write a php script to print current date and time.
21. Write a pp script to use include and require functions.
22. Write a php script including all the file handling functions.
23. Design a website using Wordpress /Joomla/Drupal
24. Introduction to Laravel frame work and one simple project.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ARTIFICIAL NEURAL NETWORK

Course Code: NCE6411 **Credit Units : 02**

Course Objective:
Aim of this course is to introduce the students fundamentals concepts of Nural network and its various application in computer science.

Course Contents:
Module I:-
Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications.

Module II:-
Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms,
Learning rule:-
Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule.

Module III:-
Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.

Module IV:-
Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.

Module V:-
Associative memory, auto-associative memory, bi-directional associative memory.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Book:
- Kenji Suzuki (ed.) - InTech , 2013
- Todd Troyer - University of Texas at San Antonio , 2005

ARTIFICIAL NEURAL NETWORK LAB

Course Code: NCE6412 **Credit Units : 01**

Course Objective
The aim of this lab to gain the practical knowledge of basic neuron models and learning algorithms.

Lab Assignment
To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SOFTWARE ENGINEERING

Course Code: NCE6501 **Credit Units : 03**

Course Objective:
The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software.The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly be based on the classical analysis-design-implementation framework.

Course Contents:

Module I: Introduction
Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

Module II: Software Metrics and Project Planning
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Module III: Software Requirement Analysis, design and coding
Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding,

Module IV: Software Reliability, Testing and Maintenance
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing,Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards.Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

Module V: UML
Introduction to UML,Use Case Diagrams, Class Diagram: State Diagram in UMLActivity Diagram in UMLSequence Diagram in UMLCollaboration Diagram in UML, Domain,Component Diagram and Deployement Diagram

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

References:

- R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
- P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
- Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
- James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons.
- Sommerville, “Software Engineering”, Addison Wesley, 1999.

COMPUTER ARCHITECTURE

Course Code: NCE6502 **Credit Units : 04**

Course Objective:
This course deals with computer architecture as well as computer organization and design. Computer architecture is concerned with the structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. Computer organization is concerned with the way the hardware components are connected together to form a computer system. Computer design is concerned with the development of the hardware for the computer taking into consideration a given set of specifications.

Course Contents:

Module I: Register Transfer Language
Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.

Module II: Basic Computer Organizations and Design
Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit

Module III: Central Processing Unit
Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC. Computer Arithmetic: Introduction, Addition and Subtraction Algorithm,Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations

Module IV: Memory and Intrasystem Communication and Input output organisation
Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniues, Virtual Memory, Memory Management Hardware, **Intrasystem communication and I/O:** Peripheral Devices, Input-Output, Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer,Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication

Module V: Introduction to Pipelining and Multi-Processor
Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Multiprocessors: Characteristics of Multiprocessors

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
- Harry &Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References:
- WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.

- Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
- Kai Hwang & Faye a Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, "Computer Organization," McGraw hill.
- Tennenbaum," Structured Computer Organization," PHI
- B. Ram, "Computer Fundamentals architecture and organization," New age international Gear C. w., "Computer Organization and Programming, McGraw hill

JAVA PROGRAMMING

Course Code: NCE6503 **Credit Units : 03**

Course Objective:
The objective is to impart programming skills used in this object oriented language java.The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

Course Contents:
Module I: Java Basics
Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.

Module II: Java Object Oriented
Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.

Module III: Exception Handling and Threading
Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception.
Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.

Module IV : Event Handling And AWT
Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers

Module V: Java Advanced
AppletClass, Architecture, Skeleton, Display Methods., Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes., Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

References:
- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999

ADVANCE DATA STRUCTURE AND ALGORITHM

Course Code: NCE6504 **Credit Units : 03**

Course Objective:
The objective to this course is to equip students with advanced concepts of data structures like Huffman trees, Self organizing trees, different types of heaps and their time complexity. Advanced topics and graphs and graph algorithms, geometric algorithms and parallel algorithms.

Course Contents:

Module-I:
ADVANCED TREES: Definitions Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees, Splay Tree.Augmenting Red-Black Trees to Dynamic Order Statistics and Interval Tree Applications. Operations on Disjoint sets and itsunion-find problem Implementing Sets. Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.

Module-II:
MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees Implementing Binomial Heaps and itsOperations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci HeapImplementing Fibonacci Heap. SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting andmerging network sorter.

Module-III:
GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut-Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs.

Module-IV:
GRAPH THEORY ALGORITHMS: Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph andPlanarity Testing, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and ArticulationPoint. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.

Module-V:
Geometric algorithms: Point location, convex hulls and Voronoi diagrams, Arrangements. Parallelalgorithms: Basic techniques for sorting, searching, merging

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Rivest Cormen, “Introduction to Algorithms”;PHI

References:
- Tammasia, “Algorithm Design”, Willey

ANALYSIS AND DESIGN OF ALGORITHM

Course Code: NCE6505 **Credit Units : 03**

Course Objective:
The designing of algorithm isan important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program

Course Contents:

Module I: Introduction
Algorithm Design paradigms - motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations. Recurrences- substitution method, recursion tree method, master method

Module II: Divide and conquer
Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort**,** Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.
Greedy Method
Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman

Module III: Dynamic programming
Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem

Module IV: Graph searching and Traversal
Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search)
Back tracking
Overview, 8-queen problem, and Knapsack problem
Brach and bound
LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

Module V: Computational Complexity
Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication
- T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm,"

References:
- Sara Basse, A. V. Gelder, "Computer Algorithms," Addison W
- J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"
- D. E. Knuth, " The art of Computer Program

SOFTWARE ENGINEERING LAB

Course Code: NCE6506 **Credit Units : 01**

Software Required: Rational Rose

Assignments will be provided for the following:

- Use of Rational Rose for visual modeling.
- Creating various UML diagrams such as use case, sequence, collaboration, activity, state diagram, and class diagrams.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

JAVA PROGRAMMING LAB

Course Code: NCE6507 **Credit Units : 01**

Software Required: JDK1.3

Assignments will be provided for the following:

- Java programs using classes & objects and various control constructs such as loops etc, and data structures such as arrays, structures and functions
- Java programs for creating Applets for display of images and texts.
- Programs related to Interfaces & Packages.
- Input/Output and random files programs in Java.
- Java programs using Event driven concept.
- Programs related to network programming.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

AMITY UNIVERSITY

ADVANCE DATA STRUCTURES AND ALGORITHM LAB

Course Code: NCE6509 **Credit Units : 01**

Programs based on Implementation of Graphs using Adjacency Matrix, Linked List , implementation of graph algorithms like BFS,DFS, Minimum Spanning Tree, Binary Search Tree, Knapsack Problem using Greedy Algorithm, Dynamic Programming, Shortest Path Algo (Dijkstra's), Implementing B-Tree,AVL Tree ,Red Black Tree. Implementing Sets, Dictionaries, Priority Queue using Heap.

Recommended Software: Java/C++/C/Python

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ANALYSIS AND DESIGN OF ALGORITHM LAB

Course Code: NCE6510 **Credit Units : 01**

Lab assignment will be based on the following:

Programs for binary search and Quick sort by using divide and conquer techniques.
Programs on algorithm based on greedy method.
Programs on algorithm based on Dynamic programming.
Programs on Depth First and Breadth Search traversals of graphs.
Programs on algorithm based on backtracking.
Programs on algorithm based on Brach and Bound.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PYTHON PROGRAMMING LAB

Course Code: NCE6508 **Credit Units : 01**

Course Contents:

- Setting up python on Windows/Linux/Mac
- First program in python
- Programs related to basic input/ouput.
- Programs related to variables,strings,numbers
- Programs related to Lists and Tuples
- Programs related toFunctions
- Programs related to If Statements
- Programs related to While Loops and Input
- Programs related to Basic Terminal Apps
- Programs related to Dictionaries
- Programs related to Classes
- Programs related to Exceptions
- Programs related to GUI programming
- Using Word, Excel, PDF files in python.
- Web programming in python,
- Case study of application areas of python.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION-I

Course Code: NCE6535 **Credit Units : 03**

Course Objective:
The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

FUZZY LOGIC & GENETIC ALGORITHM

Course Code: NCE6511 **Credit Units : 03**

Course Objective:
This course is intended to mathematical introduction to the analysis, synthesis, and design of control systems using fuzzy logic and Genetic Algorithm. A study of the fundamentals of fuzzy sets, operations on these sets, and their geometrical interpretations. Methodologies to design fuzzy models and feedback controllers for dynamical systems,Various applications and case studies.
fuzzy inference systems, fuzzy logic control,parallelprocessors,multilevel optimization- reallife problem and other machine intelligence applications of fuzzy logic and Genetic Algorithm.

Course Contents:
Module I: Introduction
Crisp sets: Overview, Fuzzy sets : Basic types and concepts,Characterstics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets

Module II: Fuzzy operations and Fuzzy arithmetic
Types of operations, Fuzzy complements, Fuzzy intersection:t-norms, Fuzzy union:t-conorms,Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables,Airthmetic operations on intervals, Airthmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.

Module III: Fuzzy systems And Applications
General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata.Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics

Module- IV: Introduction to Genetic Algorithm
Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithmgenetic modeling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.

Module-V: Genetic Technology
Genetic technology:- steady state algorithm, fitness scaling, inversion.Geneticprogramming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm.Advanced operators and techniques in genetic search:- Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.

Module- VI: Applications **5 lecture hours**
Genetic Algorithm in engineering and optimization-natural evolution –Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning-Genetic Algorithm and parallelprocessors- composite laminates- constraint optimization- multilevel optimization- reallife problem.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Fuzzy sets and fuzzy logic theory and application by George. j. klir , Bo Yuan
- David E. Goldberg, "Genetic Algorithms in search, Optimization & Machine Learning"

References:

- A First Course in Fuzzy and Neural Control by Nguyen, Prasad, Walker, and Walker. CRC 2003
- Artificial Intelligence by Negnevisky. Addison-Wesley
- Automatic Control Systems by Colnaraghi and Kuo. 9th edition. Wiley Publisher. 2010
- William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"
- 2. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems "

VHDL PROGRAMMING

Course Code: NCE6512 **Credit Units : 02**

Course Objective:
VHDL is commonly used as a design-entry language for field-programmable gate arrays and application-specific integrated circuits in electronic design automation of digital circuits. The course aims to discuss the syntax of the language to model a digital system.

Course Contents:

Module I
Fundamental VHDL Units, LIBRARY Declarations, ENTITY, ARCHITECTURE, Introductory Examples, Specification of combinational systems using VHDL, Introduction to VHDL, Basic language element of VHDL, Behavioural Modeling, Data flow modeling, Structural modeling, Subprograms and overloading, VHDL description of gates.

Module II
Data Types; Pre-Defined Data Types, User-Defined Data Types, Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data Types, Data Conversion

Module III: Sequential codes
PROCESS: Signals and Variables, IF, WAIT, CASE, LOOP, CASE versus IF, CASE versus WHEN, Bad Clocking, Using Sequential Code to Design Combinational Circuits
Description and design of sequential circuits using VHDL,

Module IV
Standard combinational modules, Design of a Serial Adder with Accumulator, State Graph for Control Network, design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of a Binary Divider.

Module V
Micro programmed Controller, Structure of a micro programmed controller, Basic component of a micro system, memory subsystem. Overview of PAL, PLA, FPGA, CPLD.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- J. Bhaskar, “A VHDL Primer”, Addison Wesley, 1999.
- Volnei A. Padroni, “Circuit Design with VHDL.”
- M. Ercegovac, T. Lang and L.J. Moreno, ”Introduction to Digital Systems”, Wiley,2000
- C. H. Roth, “Digital System Design using VHDL”, Jaico Publishing, 2001

References:
- VHDL Programming by Examples by Douglas L. Perry, TMH, 2000
- Hardware Description Languages by Sumit Ghose, PHI, 2000
- The Designer Guide to VHDL by P.J. Ashendern; Morgan Kaufmann Pub. 2000
- Digital System Design with VHDL by Mark Zwolinski; Prentice Hall Pub. 1999
- Designing with FPGA & CPLDs by Zeidman; CMP Pub. 1999
- HDL Chip Design by Douglas J. Smith; Doone Pub. 2001

VHDL PROGRAMMING LAB

Course Code: NCE6513 **Credit Units : 01**

Software Required: Mentor Graphics

Topics covered in lab will include:

- Designing Basic Gates.
- Designing Combinational circuits like adder, multiplexer, PLA
- Designing Sequent ional Circuits like flip-flops, counters, registers.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DISTRIBUTED OPERATING SYSTEM

Course Code: NCE6514 **Credit Units : 03**

Course Objective:
This Subject provides students with an in-depth knowledge about the operating system. The former treats the standard principles of single processor system, including processes, synchronization, I/O , deadlocks, mutual exclusion, fault tolerance , Memory Management, File Management systems, security and so on. This subject covers distributed operating system in detail, including communication process, file system and memory management synchronization and so on but this time in the context of distributed systems

Course Contents:

Module I: Introduction
Functions of an Operating System, Design Approaches, Review of Network Operating System and Distributed Operating System, Issue in the design of Distributed Operating System, Overview of Computer Networks, Modes of communication, System Process, Interrupt Handling, Handling Systems calls, Protection of resources, Micro-Kernel Operating System, client server architecture.

Module II: Distributed Mutual Exclusion
Lamppost's Algorithm, The Critical Section Problem, Other Synchronization Problems, Language Mechanisms for Synchronization, Axiomatic Verification of Parallel Programs, Inter process communication (Linux IPC Mechanism), Remote Procedure calls, RPC exception handling, security issues, RPC in Heterogeneous Environment, Case studies.

Module III: Synchronization in Distributed System
Deadlocks in Distributed Systems, Centralized Deadlock- Detection Algorithms, Distributed Deadlock Detection Algorithm' Path Pushing Algorithm, Edge Chasing Algorithm, Diffusion Computation Based Algorithm.
Clock Synchronization: Logical clocks, Physical clocks, Vector Clock, clock synchronization algorithms, Mutual Exclusion, Non-Token Based Algorithms – Lamport's Algorithm, Token-Based Algorithms, Suzuki-Kasami's Broadcast Algorithm, Election Algorithms,

Module IV: Distributed Shared Memory
Introduction, Architecture & Motivation Algorithms for Implementing DSM: The Central – Server Algorithms, The Migration Algorithms, The Read – Replication Algorithms, The Full- Replication Algorithms. Memory Coherence, Coherence Protocols: Write Invalidate Protocol, Write Update Protocol, Design Issues: Granularity , Page Replacement

Module V: Concurrency Control Algorithms
Basic Synchronization Primitives, Two –Phase Locking Protocol, Timestamp Based Algorithms, Two –Phase Commit Protocol. Voting Protocols: Static Voting, Majority Based Dynamic Voting Protocol.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- A. S. Tanenbaum, Distributed Operating Systems, Prentice-Hall, ISBN 0-13-219908-4.
- SinghalShivratri Advanced Concepts in Operating Systems TMH 1994.
- M. Beck et al Linux Kernal, Internal Addition Wesley, 1997.
- B. W. Kernighan and R Pide, The Unix Programming Environment Prentice Hall of India - 2000.
- A. Silberschatz P.B Galvin Operating System Concept, John Wiley & Sons (Asia) 2000.
- Cox K, "Red Hat Linux Administrator's Guide". PHI (200).

Syllabus - Sixth Semester

MICROPROCESSOR

Course Code: NCE6601 **Credit Units : 03**

Course Objective:
This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:
Module I: Introduction to Microcomputer Systems
Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations,interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams
Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing
Interfacing with 8085.Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.

Module IV: Architecture of 16-Bit Microprocessor
Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors
Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.]
- Douglas V Hall.

References:

- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.

SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION

Course Code: NCE6602 **Credit Units : 03**

Course Objective:
This course provides knowledge to design various system programs.

Course Contents:

Module I: Introduction
Definition, Evolution, Components**,** Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor. Case study MS-Word, DOS Editor and vi editor.

Module II: Assemblers
First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines.

Module III: Compilers & Macro Processor
Introduction to various translators. Various phases of compiler. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation, case study MASM and ANSI C Macro language.

Module IV: Debuggers, Loaders and Linkers
Introduction to various debugging techniques. Case study:- Debugging in Turbo C++ IDE. Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes.

Module V: Operating System
Booting techniques and sub-routines. Design of kernel and various management for OS. Design of Shell and other utilities, (**Overview of Unix OS, Difference Between Unix and Linux, Commands in Unix.)-changes made**

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.
- Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.

References:

- Aho A.V. and J.D. Ullman Principles of compiler Design Addison Wesley/ Narosa 1985.

ADVANCED JAVA PROGRAMMING

Course Code: NCE6603 **Credit Units : 03**

Course Objective:
The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Contents:

Module I: Distributed Computing
Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.

Module II: Database Connectivity
ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql.

Module III: Servlet Programming
Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.

Module IV: JSP Programming
JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.

Module V: JEE Web Appliaction
The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
- Professional Java Server Programming (a Press), Allamaraju
- Developing Java Servlets (Techmedia – SAMS), James Goodwill sing Java 1.2 Special Edition (PHI), Webber

References:
- David Flanagan,Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell - A desktop Quick reference - O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, “JAVA 2” PEARSON publication

ADVANCE DATABASE MANAGEMENT SYSTEMS

Course Code: NCE6604 **Credit Units : 03**

Course Objective:
The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques

Course Contents:
Module I: Relational Databases
Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Module II: Query Processing and Optimization
Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.
Objected Oriented and Object Relational Databases
Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Module III: Parallel and Distributed Databases
Distributed Data Storage – Fragmentation & Replication, Location and Fragment
Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.
Advanced Transaction Processing
Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

Module IV
Multimedia databases,Databases on the Web and Semi–Structured Data
Case Study: Oracle Xi

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
***Text*:**

- Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
- Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
- R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

***References*:**

- Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
- Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
- Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
- W. Kim, "Modern Database Systems", 1995, ACM Press, Addision – Wesley,
- D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
- Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
- Oracle Xi Reference Manual
- Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

DIGITAL COMPUTER ORGANIZATION

Course Code: NCE6605 **Credit Units : 03**

Course Objective:
The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Contents:

Module I: Representation of Information and Basic Building Blocks
Number Systems, Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean algebra, K-map Simplification, Half adder, Full adder, Decoders, Multiplexes, Binary Counters, Flip/Flops: SR FF, JK FF, Master Slave FF, T and D FF, Registers: Parallel and Serial Registers, Counters (Synchronous & Asynchronous), ALU, Micro-Operation, ALU-chip.

Module II: Basic Organization
Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired and Micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing Modes, Instruction Formats, Data transfer & Manipulation, I/O organization, Bus Architecture, Programming Registers.

Module III: Memory Organization
Memory hierarchy, Main Memory (RAM/ROM chips) with mapping, Auxiliary memory, Associative memory and its mapping, Virtual memory, Cache memory with mapping techniques, Memory management hardware.

Module IV: Input-Output organization
Peripheral devices, I/O interface, Direct memory access, Modes of transfer, Priority Interrupt, I/O Processors, Serial Communication, Asynchronous data transfer, Strobe Control, Handshaking, I/O Controllers, CPU-IOP Communication.

Module V: Processor Organization
Introductory Concept of pipeline, Flynn's Classification, Parallel processing. RISC and CISC characterstics, arithmetic pipeline with example.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Computer System Architecture: M. Mano (PHI Publication)
- William Stalling, "Computer Organization & Architecture", Pearson education Asia.
- B. Ram, "Computer Fundamental Architecture & Organization" New Age.

References:
- Computer Organization: Vrarsie, Zaky & Hamacher (TMH Publication).
- Tannenbaum, "Structured Computer Organization", PHI.

MICROPROCESSOR LAB

Course Code: NCE6606 **Credit Units : 01**

Course Contents:

- To load the numbers 49H and 53H in the memory location 9510 and 9511
- respectively and add the contents of memory location 9601
- To write assembly language programming for 8 bit addition with and without carry.
- To write assembly language programming for 8 bit subtraction with and without borrow.
- To write assembly language programming for 8 bit multiplication and division.
- To write assembly language programming for sorting an array of numbers in ascending and descending order.
- To write assembly language programming with additional instructions.
- To write and execute a program using stacks.
- To study and program the programmable peripheral interface (8255) board.
- To study and program the programmable interval timer (8253) board.
- To study and program the programmable DMA controller (8257) board.
- To study and program the programmable interrupt controller (8259) board.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION LAB

Course Code: NCE6607 **Credit Units : 01**

Software Required: Turbo C++

Assignment will be provided for following:

- WAP to determine the length of the machine instructions.
- WAP to differentiate between symbols, literals and tokens.
- WAP to implement Symbol table.
- WAP to implement base table.
- WAP to find the relative addresses.
- Design a macro to perform add operation.
- On the basis of above program display the values of PC, LC and IR.
- Perform programming on loader based programme.
- Perform programming on linker based programme.
- Perform Programming on editor based programme.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED JAVA PROGRAMMING LAB

Course Code: NCE6608 **Credit Units : 01**

Programming Language: Java

1. WAP to display label on a frame with the help of JFrame
2. WAP to display six buttons on a panel using JFrame.
3. WAP. To display an image and a string in a label on the JFrame.
4. WAP that implement a JApplet that display a simple label
5. WAP that implement a JApplet and display the following frame

a. Customer name
b. Customer number
c. Age
d. Address

6. WAP to access a table Product Master from MS-Access using Java code.
7. WAP that implement a simple servlet program.
8. WAP for authentication, which validate the login-id and password by the servlet code.
9. WAP to connecting a database using user-id and password.
10. WAP to insert data into the database using the prepared statement.
11. WAP to read data from the database using the Resulset.
12. WAP to read data send by the client (HTML page) using servlet.
13. WAP to include a HTML page into a JSP page.
14. WAP to handle the JSPException.
15. WAP to read data send by a client (HTML page) using JSP.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCE DATABASE MANAGEMENT SYSTEM LAB

Course Code: NCE6609 **Credit Units : 01**

Programs should be based on following topics:
Quick Review of Simple SQL Statements, SQL Built-in Functions, Primary Key, Foreign Key,Normalization, Joins View, Union. **Emphasis** on PL/SQL, Cursors 8. Exception handling, Procedure, Functions ,Trigger, concurrency control, transaction processing. Introduction to SQLite. Recommended Software: PostGreSQL, MySQL, Oracle.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CRYPTOGRAPHY AND NETWORK SECURITY

Course Code: NCE6610 **Credit Units : 03**

Course Objective:
The objective here is to acquaint the students with the application of networking. Detail description of the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

Course Contents:

Module I: Advanced TCP/IP
TCP Services, TCP format and connection management, Encapsulation in IP, UDP Services, Format and Encapsulation in IP, IP Services, Header format and addressing, Fragmentation and reassembly, Migration to IPv6, Protocols: BOOTP, DHCP, ICMP, IGMP; Internet Routing Protocols: OSPF, RIP, EIGRP, BGP.

Module II: High Speed Networks
Packet Switching Networks; Frame Relay Networks; Asynchronous Transfer Mode (ATM); ATM protocol Architecture; ATM logical connections; ATM cells; ATM Service categories; ATM Adaptation Layer; QoS in ATM and Frame Relay

Module III: High Speed LANs
LAN Ethernet, fast Ethernet, gigabit Ethernet, FDDI, DSL, ADSL

Module IV: Wireless communication
Wireless networks, wireless channels, channel access, network architecture, IEEE 802.11, Bluetooth, Satellite Networks.

Module V: Network Security and Management
Principles of cryptography, Authentication, integrity, key distribution and certification, Access control andFirewalls, attacks and counter measures, security in manylayers. Infrastructure for network management, The internet standard managementframework, SMI, MIB, SNMP, Security and administration.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- William Stallings, "High-Speed Networks and Internets, Performance and Quality of Service", Pearson Education.
- High performance communication networks by: J. Walrand & Pravin Varaiya, Morgan Kaufman, 1999.
- Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) by Douglas E. Comer
- ATM networks: Concepts, Protocols, Applications by: Handel, Addision Wesseley.
- Cryptography & Networks Security Stallings, William 3rd edition

References:
- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & networking: Forouzan, B. A.
- Computer network protocol standard and interface Uyless, Black

SOFTWARE TESTING AND QUALITY ASSURANCE

Course Code: NCE6611 **Credit Units : 03**

Course Objective:
To apply all the testing skills of software testing in such a way that it can provide and improve the software development methodology. Basic objective of Software Testing is to develop methods and procedures at can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle for the development.

Course Contents:
Module I
Software Testing Fundamentals - Software Testing Definition, Importance, objectives, why is it too hard? Errors, faults and failure. Testing process, STLC, QA and QC, Verification and Validation, Inspections and walkthroughs, Test Plan, test cases, drivers, stubs, Validation checks.

Module II
Black box testing - Definition, Equivalence Class, Boundary Value Analysis, Documentation testing,state based testing, White box testing – Definition, Difference between black box testing and white box testing, Path testing, Cyclomatic complexity, graph metrics, mutation testing.

Module III
Levels of testing- Low level testing- Unit testing and Integration testing. High level testing- System testing, performance testing, stress testing, load testing, volume testing, smoke and sanity testing, Installation testing, usability testing, website testing, security testing, recovery testing, Domain testing, Static testing and dynamic testing,

Module IV
Test cases– Designing, Execution. Reducing number of test cases- Prioritization guidelines, priority category, scheme, risk analysis, regression testing. Designing scripts, RTM, TRS.

Module V
Cohesion and coupling in class testing, GUI testing, integration and system testing, Automated Testing tools - Manual vs. Automated testing, Static and Dynamic Testing tools, Characteristics: Rational tools, Quality Standards- CMM, ISO, Six sigma, McCall's Quality Factors and Criteria, Quality Metrics

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Software Testing, Srinivasan Desikan, Pearson Education
- Software Testing, R.B.Chopra
- Software Engineering: A Practitioner's Approach, Roger S. Pressman

References:
- Software Testing tools, K.V.K.K Prasad, Dreamtech
- Foundations of software Testing, ISTQB Certification, Dorothy Graham
- Software Test Engineer's Handbook, Graham Bahms

VLSI DESIGN

Course Code: NCE6612 **Credit Units : 02**

Course Objective:
In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

Course Contents:

Module I: Devices and the wire
Diode, dynamic and transient behaviour-diffusion capacitance, SPICE diode model.
MOSFET STATIC BEHAVIOUR: Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS, depletion and enhancement device
DYNAMIC BEHAVIOUR: Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE MODELS for MOS transistors
The Wire: Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

Module II: CMOS Inverter
VTC of an ideal inverter, Switching Model of the CMOS inverter: nMOS /pMOS discharge and charge, VTC of CMOS inverter: PMOS AND NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer
Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tristate inverter, Resistive load inverter.
Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages
Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

Module III: Combinational circuits
CMOS LOGIC: Good 0 and poor 0, Goo1 and poor 1, series and parallel N and P switches, 2 and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay,
Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates
Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay. Pass-transistor logic, pass gate configurations for nmos and pmos, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain
Dynamic CMOS design: Precharge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic

Module IV: Sequential Logic circuits

Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

Module V: Layout Design Rules

Introduction to CMOS Process technology, Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design

VLSI DESIGN LAB

Course Code: NCE6613 **Credit Units : 01**

Course Contents:

- Using Design architect and simulate V vs time for CMOS inverter using same W/L ratio for PMOS and NMOS.
- Design and simulate again by Sizing PMOS to NMOS appropriately and repeat experiment 1
- Design and simulate V vs t for 2 input NAND and Nor gates.
- Design and Simulation for general CMOS functions
- One bit full adder simulation
- 2:1 MUX using pass transistor logic
- Other functions using pass transistor logic
- Layout of CMOS inverter
- Layout of NAND and NOR gates
- Design and Simulation SR latch using NAND and NOR representations
- Design and simulate D flip flop

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Seventh Semester

DATA WAREHOUSING AND DATA MINING

Course Code: NCE6701 **Credit Units : 03**

Course Objective:
The objective of this course is to introduce students to Data Warehousing & Data mining technologies that will helpTo Inspect, Control and Secure Information through Databases.

Course Contents:
Module I: Introduction to Data Warehousing
The need for data ware housing, Operational & Informational Data Stores, Data Warehouse definition & Characteristics, Data Warehouse role & Structure, The cost of warehousing data, Foundation & Roots of Data,

Module II: Data Warehousing Components& Architecture:
Stores, warehouses and marts, Data warehouse database, Sourcing, acquisition, clean up & transformation tools, meta data, Access tools, Data ware house administration & management,.
operational & External Database layer, Information access layer, data access layer, metadata layer, process management layer, Application messaging layer, Physical DW layer, Data staging layer.

Module III: Building a Data Warehouse:
Business, Design, Technical & Implementation Considerations, DW project plan.
Overview of Mapping the DW to Multiprocessor Architecture, & DBMS Schemas for Decision Support.

Module IV: Metadata and OLAP:
METADATA: Definition, repository, management & trends.
OLAP: Need, guidelines, Multi Relational & Multi-Dimensional: MOLAP, ROLAP, OLAP Tools.

Module V: Data Mining & Visualization:
Techniques to mine the data, Market Basket analysis, Measuring data mining effectiveness, embedding data mining to business process, current limitations and challenges in DM.
Introduction to EIS, The future of Data Mining, Warehousing & Virtualization, Applications: PowerBuilder, Forte. Technical Exposure to Data Mining

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:
- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

References:
- (Berry, Michael)Data Mining Techniques.
- (Sharma, Gajendra)Data Mining, Data Warehousing and OLAP.
- (Gupta, GK) Data Mining with Case Studies.
- (Han & Kamber)Data Mining: Concepts and Techniques.
- (Paulraj Ponniah) Datawarehousing Fundamentals.

COMPUTER GRAPHICS

Course Code: NCE6702 **Credit Units : 03**

Course Objective:
The objective of the course is to provide the understanding of the fundamental graphical operations and the implementation on computer, the mathematics behind computer graphics, including the use of spline curves and surfaces. It gives the glimpse of recent advances in computer graphics, user interface issues that make the computer easy, for the novice to use.

Course Contents:

Module I: Introduction to Graphics and Graphics Hardware System
Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.

Module II: Output Primitives and Clipping operations
Algorithms for drawing 2D Primitives lines (DDA and Bresenham‘s line algorithm), circles (Bresenham‘s and midpoint circle algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.

Module III: 2D Geometric transformation
2D Transformation: Basic transformat ion, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.

Module IV: 3D Geometric transformation
3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation

Module V: object modeling and Visible Surface detection
fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter‘s algorithm), Binary search partition method, Scan line method,

Module VI: Introduction to multimedia
Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References*:*

Text:

- Foley et. al., “Computer Graphics Principles & practice”, 2nd ed. AWL, 2000.
- D. Hearn and P. Baker, “Computer Graphics”, Prentice Hall, 1986.
- R. Plastock and G. Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, McGraw Hill, 1986

References:

- R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
- C.E. Leiserson, T.H. Cormen and R.L. Rivest, “Introduction to Algorithms”, McGraw-Hill Book Company, 1990.
- W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
- F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
- D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989
- David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
- Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 1992

ADVANCED COMPUTER ARCHITECTURE

Course Code: NCE6703 **Credit Units : 03**

Course Objective:
With increase in availability of system resources, concept of parallel architecture has obtained immense popularity. This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources. In this course we have discussed the theory, technology, architecture (hardware) and software aspects of parallel computer and Vector computers.

Course Contents:

Module I: Parallel computer models
The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks
Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Module II: System Interconnect Architectures
Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Module III: Processors and Memory Hierarchy
Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors
Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

Module IV: Backplane Bus System
Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design,Computer airthmetic principles.

Module V: Vector Processing Principles
Vector instruction types, Vector-access memory schemes.
Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Kai Hwang, "Advanced computer architecture"; TMH, 2000.

References:
- **J.P. Hayes, "computer Architecture and organization", MGH, 1998.**
- M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
- D.A. Patterson, J.L. Hennessy, "Computer Architecture: A quantitative approach", Morgan Kauffmann, 2002.
- Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH,

ADVANCED COMPUTER NETWORKS

Course Code: NCE6704 **Credit Units : 03**

Course Objective:
The objective of the course is to provide thorough understanding & in-depth knowledge of concepts in computer networks Such as Internet protocols and routing, local area networks, wireless communications and networking, performance analysis, congestion control, TCP, network address translation, multimedia over IP, switching and routing, mobile IP, multicasting, IPv6. Peer-to-peer networking, network security, and other current research topics. A focus will be placed on wireless networking, reflecting rapid advances in this area. This course motivates the students to explore current research areas in the same field.

Course Contents:
Module I : Introduction to Networks
Networking introduction, Reference Models, TCP/IP, OSI, Addressing, Protocol Layering, Transmission impairment, performance, Switching, Transmission Media, Introduction to MAC, Channel allocation, MAC protocol classification for LAN's, MAN's, MAC protocols for Adhoc N/ws, MAC Protocol for WLAN's(adhoc and sensor n/ws), Introduction to Ethernet protocol (Fast, Gigabit and standard Ethernet).

Module II: Network Layer
Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet.
IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.

Module III : Mobile IP
Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.

Module IV : Transport Layer and Application Layer
The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues.
The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.

Module V : Network Security
Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues.

Examination Scheme:

Components	A	CT	H	V/S/O	EE
Weightage (%)	5	10	7	8	70

Text & References:
Text:
- Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
- Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

***References*:**
- Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication.
- W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
- W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
- C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices, Addison Wesley, 1997.

DATAWARE HOUSING & DATA MINING LAB

Course Code: NCE6705 **Credit Units : 01**

Course Contents:

Programming Language: Weka 3.6

List of Experiments/Programs:

- Defining Weather relation for different attributes
- Defining employee relation for different attributes
- Defining labor relation for different attributes
- Defining student relation for different attributes
- Exploring weather relation using experimenter and obtaining results in various schemes
- Exploring employee relation using experimenter
- Exploring labor relation using experimenter
- Exploring student relation using experimenter
- Setting up a flow to load an arff file (batch mode) and perform a cross validation using J48
- Design a knowledge flow layout, to load attribute selection normalize the attributes and to store the result in a csv saver.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMPUTER GRAPHICS LAB

Course Code: NCE6706 **Credit Units : 01**

Software Required: Turbo C++

Course Contents:

Assignments will be provided for the following:

- Geometrical shapes based on graphics algorithms
- 2D Geometric transformation translation, rotation, scaling, reflection.
- Clipping
- Animation

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED COMPUTER NETWORKS LAB

Course Code: NCE6707 **Credit Units : 01**

Course Contents:

Various installations and connections of LAN, WAN, ETC

Working on NS2.

Socket Programming using C Language on Linux

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MATLAB

Course Code: NCE6708 **Credit Units : 02**

Understanding The MATLAB Environment, Using the Help System in MATLAB, MATLAB Basics,Linear Algebra; Vectors and Matrices and various operations on them, M files; Scripts and User-defined functions, Plotting, Flow Control and Loops; For and While Loops, If and Case statements, structures, writing basic programs using the above, study of various toolboxes available in matlab and case study of any one tool box.

Recommended Software: MATLAB/Octave

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION-II

Course Code: NCE6735 **Credit Units : 03**

Guidelines:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:
A4 size paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top & bottom margins: 1 inch/ 2.5 cm
Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the delaines.

STUDENT ASSESSMENT RECORD (SAR)

1. **Range of Research Methods used to obtain information**

2. **Execution of Research**

3. **Data Analysis**
   - Analyse Quantitative/ Qualitative information
   - Control Quality

4. **Draw Conclusions**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

SOFT COMPUTING

Course Code: NCE6709 **Credit Units : 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organise, process, share and use the knowledge embedded in multimedia content. Research will aim to maximise automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services.

Course Contents:

Module I: Soft Computing
Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Module II: Neural Network
Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA

Module III
Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.

Module IV: Fuzzy Logic
Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

Module V: Genetic algorithm
Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

Examination Scheme:

Components	CT	H	V/S/O	AT	EE
Weightage (%)	10	8	7	5	70

Text & References:

- S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication
- Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
- Hagen, Neural Network Design, Cengage Learning

MOBILE COMPUTING

Course Code: NCE6710 **Credit Units : 03**

Course Objective:
The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Contents:

Module I: Introduction to Personal Communications Services (PCS)
PCS Architecture, Mobility management, Networks signaling.
Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP)
GPRS Architecture, GPRS Network Nodes.
Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Module III: Third Generation (3G) Mobile Services
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module IV: Global Mobile Satellite Systems
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

Module V:Enterprise Networks
Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

References:

- "Guide to Designing and Implementing wireless LANs", by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
- "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
- "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

GRID COMPUTING

Course Code: NCE6711 **Credit Units : 03**

Course Objective:
Grid computing (or the use of a *computational grid*) is applying the resources of many computers in a network to a single problem at the same time - usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data. The major objective of this course is to provide a sound foundation to the students on the concepts, percepts and practices in a field that is of immense concern to the industry and business.

Course Contents:

Module I: Introduction-Cluster to grid computing
Cluster computing models, Grid models, Mobile grid models, Applications.
Parset: System independent parallel programming on distributed systems: Motivation and introduction, Semantics of the parset construct, Expressing parallelism through parsets, Implementing parsets on a loosely coupled distributed system.
Anonymous remote computing model: Introduction, Issues in parallel computing on interconnected workstations, Existing distributed programming approaches, The arc model of computation, The two tired arc language constructs, Implementation

Module II: Integrating task parallelism with data parallelism
Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work
Anonymous remote computing and communication model: Introduction, Location in dependent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes, Case study, and Performance analysis.

Module III: Parallel programming model on CORBA
Introduction, Existing works, notion of concurrency, system support implementation performance, sitability of CORBA: introspection.
Grid computing model: Introduction, a parallel computing model over grids, Design and implementation of the model, Performance studies, Related work.

Module IV: Introducing mobility into anonymous remote computing and communication model
Introduction, issues in mobile clusters and parallel computing on mobile clusters, moset overview, moset computation model, implementation, performance.

Module V: Parallel Simulated Annealing algorithms
Introduction, Simulated annealing (SA) Technique, Clustering algorithm for simulated annealing (SA), Combination of genetic algorithm and simulated annealing (SA) algorithm

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- "Grid Computing a Research Monograph" by D. Janakiram, Tata McGraw hill publications, 2005

References:
- "Grid Computing: A Practical Guide to technology and Applications" by Ahmar Abbas, Charles River media – 2003.
- "Grid Computing" Joshy Joseph & Craig Fellenstein, Pearson Education

TERM PAPER

Course Code: NCE6731 **Credit Units : 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER
The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of Materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the Notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing & Preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.

d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
(i) Show evidence of what an author has said.
(ii) Avoid misrepresentation through restatement.
(iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
1) Title page
2) Table of contentsIntroduction
3) Review
4) Discussion&Conclusion
5) References
6) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

Reference
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World

Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: 40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation: 60%
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

PROJECT

Course Code: NCE6732 **Credit Units : 02**

Course Objective:
The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

STUDENT ASSESSMENT RECORD (SAR)

Record to be maintained by project guide.

1. **Project Tools (Hardware/ Software) used fot implementation.**

2. **Project Evaluation& Execution.**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

WORKSHOP/ INDEPENDENT STUDY

Course Code: NCE6733 **Credit Units : 02**

This is an elective, self-directed course to investigate aemerging areasof IT and Computer Science like Mobile Operating System, Cloud Computing, or from Current Research Areas etc. The primary goal of the course is to provide students with research exploration of a specific topic of interest to the individual student under the advisement of an instructor who will monitor and critique the student's progress.

Independent study provides students with the opportunity to work one-on-one with a Faculty on a particular topic. The student and faculty should discuss the aims and content of the study and present the proposal to Head of Department. The independent study proposal should include the study's title, theme, readings, work to be submitted, and syllabus. Faculty and student should meet for a minimum number of 2 hours per week. Student will give a seminar after completion of study.

Syllabus - Eighth Semester

MATHEMATICAL FOUNDATION FOR CYBER SECURITY

Course Code: NCE6801 **Credit Units : 03**

Course Contents:

Module-I:
Integer arithmetic, modular arithmetic, matrices, Linear Congruence: Definition – Basic properties of congruence, Divisibility - Greatest common divisor, equivalence classes, residue classes.

Module-II:
Primes, primality testing, factorization, Chinese remainder theorem, quadratic congruence, exponentiation and logarithm.

Module-III:
Algebraic structures: groups, fields, rings, Modulo groups - Primitive roots - Discrete logarithms. Finite fields – GF (p), GF(2^n) – polynomial arithmetic

Module-IV:
SHANNON'S THEORY: Introduction, Elementary Probability Theory, Perfect Secrecy, Entropy, Properties of Entropy, Spurious Keys & Unicity distance, Product Cryptosystems

Module-V:
PSEUDORANDOM NUMBER GENERATION: Introduction and examples Indistinguishability of Probability Distributions - Next Bit Predictors - The Blum-Blum-Shub Generator – Security of the BBS Generator.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- "Cryptography & Network Security", William stallings,PHI,4th Edition.
- "Cryptography & Network Security", Behrouz A. Forouzan, PHI,2nd Edition.
- "Cryptography Theory & Practice", Douglas R. Stinson, Chapman & Hall, 3rd Edition

NETWORK AND WIRELESS SECURITY

Course Code: NCE6802 **Credit Units : 03**

Course Contents:

Module-I: INTRODUCTION
Network concepts – Threats in networks – Network security controls – Importance of security – Threat models – Security concepts – Common mitigation methods
Why is Wireless Different? Introduction ,Protecting the Means Of Communication Protecting Privacy, Promoting Safety ,The Personal and the Public ,Shaking Up the Status Quo ,Understanding Wireless Forecasts ,Reasonable Degrees of Security, Regulatory Environments and Issues ,Security-Related Regulations ,Security Related Market Factors, Guidelines for Security Measures, Cellular Networks and Bearer Technologies ,First-Generation Wireless (1G), Second-Generation Wireless (2G), Spread Spectrum ,Code Division Multiple Access (CDMA) ,Time Division Multiple Sccess (TDMA) ,Global System for Mobile Communications (GSM) ,Third-Generation Wireless (3G) ,Short Message Service (SMS) ,Fourth-Generation Wireless (4G)

Module-II: The Wireless Local Area Network (WLAN)
Wireless Transmission Media ,Infrared Systems ,Narrowband Radio Systems ,Wideband Radio Systems: SpreadSpectrum ,Frequency-Hopping Spread Spectrum (FHSS) ,Direct-Sequence Spread Spectrum (DSSS) ,WLAN Products and Standards—Today's Leaders? ,802.11 Security? ,IEEE 802.11b ,Securing WLANs ,Eavesdropping ,Unauthorized Access ,Interference and Jamming ,Physical Threats ,Countermeasures ,Frequency-Hopping Spread Spectrum (FHSS), Direct-Sequence Spread Spectrum (DSSS) ,Infrared (IR) ,Narrowband ,The Infamous WEP ,Encryption ,Authentication ,Wired Equivalency Protocol Flaws Too Public ,Other Authentication Techniques ,Physical Security.

Module-III: Wireless Application Protocol(WAP)
Comparison of the TCP/IP, OSI, and WAP Models, How WAP Works ,The Security Status of WAP ,Viruses ,Authorization ,Non-repudiation ,Authentication ,Secure Sessions ,Security Products ,Securant Technologies ClearTrust Control ,WAP Security Architecture ,Marginal Security ,Wireless Access to the Internet ,Wireless Middleware

Module-IV: Wireless Transport Layer Security (WTLS)
Secure Socket Layer, Record Protocol, SSL Handshake Protocol ,Transport Layer Security, Advantages and Disadvantages of SSL/TLS ,Netscape ,Microsoft ,Entrust ,EAP-TLS ,Alternatives to SSL/TLS ,
IP Security (IPSec) ,Authentication Header Protocol (AH) ,Encapsulating Security Payload (ESP) ,Transport and Tunnel Modes, Secure Shell (SSH) ,SSH Transport Layer Protocol ,SSH Versus TLS Implementations ,Light Extensible Authentication Protocol (LEAP) ,Wireless Transport Layer Security and WAP ,Understanding Wireless Transport Layer Security ,WTLS Handshake Protocol ,WTLS Alert Protocol ,WTLS Change Cipher Protocol ,Pros and Cons of WTLS ,WTLS Vulnerabilities ,Implementations of WTLS

Module-V: Bluetooth Security
Bluetooth Basic Specifications ,Bluetooth Technology, Bluetooth Specification Development ,Design Decisions ,Piconets ,Bluetooth Security Architecture ,Scatternets ,The Bluetooth stack ,Security Functions at the Baseband Layer ,Security Functions of the Service Discovery Protocol ,Security Functions at the Link Layer ,Frequency-Hopping ,

Channel Establishment ,Security Manager ,Authentication,Authentication with the SAFER1 Block Cipher ,Encryption ,Encryption Modes ,Key Length Negotiation ,Encryption With the E0 Stream Cipher ,Threats to Bluetooth Security ,Jamming ,Bluetooth holes

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Nichols and Lekka, “Wireless Security-Models, Threats and Solutions”, Tata McGraw – Hill, New Delhi, 2006.
- Charles P. Fleeger, "Security in Computing", Prentice Hall, New Delhi, 2009
- Merritt Maxim and David Pollino, ”Wireless Security”, Osborne/McGraw Hill, New Delhi, 2005.

CYBER CRIME AND IT LAW

Course Code: NCE6803 **Credit Units : 03**

Course Contents:

Module-I: Power of Arrest Without Warrant Under the IT Act, 2000: A Critique
Crimes of this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce, Forgetting the Line Between Cognizable and Non-Cognizable Offences, Necessity of Arrest without Warrant from Any Place, Public or Otherwise, Checks and Balances Against Arbitrary Arrests, Arrest for "About to Commit" an Offence Under the IT Act: A Tribute to Draco, Arrest, But No Punishment!

Module-II: Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000
Concept of 'Cyber Crime' and the IT Act, 2000, Hacking, Teenage Web vandals, Cyber Fraud and Cyber cheating, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences, Monetary Penalties, Adjudication and Appeals Under IT Act, 2000, Network Service Providers, Jurisdiction and cyber Crimes, Nature of Cyber Criminality, Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications on Cyber Crime.

Module-III: Jurisdiction in the Cyber World
Questioning the Jurisdiction and Validity of the Present Law of Jurisdiction, Civil Law of Jurisdiction in India, Cause of Action, Jurisdiction and the Information Technology Act,2000, Foreign Judgments in India, Place of Cause of Action in Contractual and IPR Disputes, Exclusion Clauses in Contracts, Abuse of Exclusion Clauses, Objection of Lack of Jurisdiction, Misuse of the Law of Jurisdiction, Legal Principles on Jurisdiction in the United States of America, Jurisdictional Disputes W.R.T. the Internet in the United States of America.

Module-IV: Battling Cyber Squatters and copyright Protection in the Cyber World
Concept of Domain Name and Reply to Cyber Squatters, Meta-Tagging, Legislative and Other Innovative Moves Against Cyber Squatting, The Battle Between Freedom and Control on the Internet, Works in Which Copyright Subsists and Meaning of Copyright, Copyright Ownership and Assignment, Licence of Copyright, Copyright Term and Respect for Foreign Works, Copyright Infringement, Remedies and Offences, Copyright Protection of Content on the Internet; Copyright Notice, Disclaimer and Acknowledgement, Downloading for Viewing Content on the Internet, Hyper-linking and Framing, Liability of ISPs for Copyright violations in the Cyber World: Legal Developments in the US, Napster and its Cousins: A Revolution on the Internet but a Crisis for Copyright Owners, Computer Software Piracy.

Module-V: Protection of Cyber Consumers in India
Are Cyber consumers Covered Under the Consumer Protection Act, Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on Cyber Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a consumer in India.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- "Cyber Law Simplified" , Vivek Sood, TMH, 2001
- "Cyber Security, Cyber Crime and Cyber Forensics: Applications and Perspectives" Raghu Santanam, M. Sethumadhavan, Information Science Reference
- Cyberlaw – The Indian Perspective By Pavan Duggal, Saakshar Law Publications.
- Jonathan Rosenoer,"Cyber Law: The law of the Internet", Springer-Verlag, 1997

CYBER CRIME INVESTIGATON & FORENSICS

Course Code: NCE6804 **Credit Units : 03**

Course Contents:

Module-I: Computer Forensics and Investigations as a Profession, Understanding
Computer Forensics ,Computer Forensics Versus Other Related Disciplines ,A Brief History of Computer Forensics, Understanding Case Law ,Developing Computer Forensics Resources ,Preparing for Computer Investigations, Understanding Law Enforcement Agency Investigations, Following the Legal Processes, Understanding Corporate Investigations, Establishing Company Policies, Displaying Warning Banners ,Designating an Authorized Requester, Conducting Security Investigations, Distinguishing Personal and Company Property ,Maintaining Professional Conduct.

Module-II: Understanding Computer Investigations
Preparing a Computer Investigation, An Overview of a Computer Crime ,An Overview of aCompanyPolicy Violation ,Taking a Systematic Approach ,Assessing the Case ,Planning Your Investigation ,Securing Your Evidence ,Procedures for Corporate High-Tech Investigations, Employee Termination Cases,InternetAbuse Investigations-mail Abuse Investigations, Attorney-Client Privilege Investigations, Media Leak Investigations, Industrial Espionage Investigations, Interviews and Interrogations in High-Tech Investigations ,Understanding Data Recovery Workstations and Software, Setting Up Your Workstation for Computer Forensics ,Conducting an Investigation, Gathering the Evidence ,Understanding Bit-stream Copies ,Acquiring an Image of EvidenceMedia,UsingProDiscoverBasic to Acquire a USB Drive ,Analyzing Your Digital Evidence, Completing the Case, Critiquing the Case

Module-III: Data Acquisition
Understanding Storage Formats for Digital Evidence, Raw Format, Proprietary Formats,
Advanced Forensic Format ,Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions ,Using Acquisition Tools ,Windows XP Write-Protection with USB Devices, Acquiring Data with a Linux Boot CD,Capturing an Image with ProDiscover Basic ,Capturing an Image with Access Data FTK Imager ,Validating Data Acquisitions ,Linux Validation Methods, Windows Validation Methods ,Performing RAID Data Acquisitions ,Understanding RAID ,Acquiring RAID Disks ,Using Remote Network Acquisition Tools ,Remote Acquisition with ProDiscover,Remote Acquisition with EnCase Enterprise , Remote Acquisition with R-Tools R-Studio ,Remote Acquisition with WetStone Livewire, Remote Acquisition with F-Response ,Remote Acquisition with Runtime Software ,Using Other Forensics Acquisition Tools,SnapBack DatArrest ,NTI SafeBack,DIBS USA RAID ,Look Investigator I imager ,ASRData SMART ,Australian Department of Defence PyFlag,

Module-IV: Processing Crime and Incident Scenes
Identifying Digital Evidence, Understanding Rules of Evidence ,Collecting Evidence in Private-Sector Incident Scenes, Processing Law Enforcement Crime Scenes ,Understanding Concepts and Terms Used in Warrants ,Preparing for a Search ,Identifying the Nature of the Case, Identifying the Type of Computing System, Determining Whether You Can Seize a Computer, Obtaining a Detailed Description of theLocation,Determining Who Is in Charge, Using Additional Technical Expertise ,Determining the Tools You Need ,Preparing the Investigation Team, Securing a Computer Incident or Crime Scene ,Seizing Digital Evidence at the Scene ,Preparing to Acquire Digital Evidence, Processing an IncidentorCrime Scene ,Processing Data Centers with RAID Systems ,Using a Technical Advisor, Documenting Evidence in the Lab,Processing and Handling Digital Evidence ,Storing Digital Evidence, Evidence Retention and Media Storage Needs, Documenting Evidence ,Obtaining a Digital Hash,

Reviewing a Case ,Sample Civil Investigation ,Sample Criminal Investigation ,Reviewing Background Information for a Case ,Identifying the Case Requirements, Planning the Investigation ,Conducting the Investigation: Acquiring Evidence withAccessData FTK

Module-V: Current Computer Forensics Tools,

Evaluating Computer Forensics Tool Needs ,Types of Computer Forensics Tools ,Tasks Performed by Computer Forensics Tools, Tool Comparisons ,Other Considerations for Tools ,Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools ,Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations,

Using a Write-Blocker, Recommendations for a Forensic Workstation,Validating and Testing Forensics Software ,Using National Institute of Standards and Technology (NIST) Tools ,Using Validation Protocols

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- Nelson Phillips and Enfinger Steuart, “Computer Forensics and Investigations”, Cengage Learning, New Delhi, 2009.
- Kevin Mandia, Chris Prosise, Matt Pepe, “Incident Response and Computer Forensics “, Tata McGraw -Hill, New Delhi, 2006.
- Robert M Slade,” Software Forensics”, Tata McGraw - Hill, New Delhi, 2005.
- Bernadette H Schell, Clemens Martin, “Cybercrime”, ABC – CLIO Inc, California, 2004.
- ”Understanding Forensics in IT “, NIIT Ltd, 2005.

INTRUSION DETECTION AND PREVENTION SYSTEM

Course Code: NCE6805 **Credit Units : 03**

Course Contents:

Module-I: Network Attacks: Attack Taxonomies,Probes: IPSweep and PortSweep, NMap , MScan, SAINT , Satan Privilege Escalation Attacks:Buffer Overflow Attacks, Misconfiguration Attacks , Race-condition Attacks , Man-in-the-Middle Attacks.Social Engineering Attacks**.** Denial of Service (DoS) and Distributed Denial of Service(DDoS) Attacks: Detection Approaches for DoS and DDoS Attacks **,** Prevention and Response for DoS and DDoS Attacks **,** Examples of DoS and DDoS Attacks. Worms Attacks **:**Modeling and Analysis of Worm Behaviors, Detection and Monitoring of Worm Attacks **,** Worms Containment**,** Examples of Well Known Worm Attacks. Routing Attacks:OSPF Attacks,BGP Attacks.

Module-II: Detection Approaches: Misuse Detection: Pattern Matching,Rule-based Techniques, State-based Techniques,Techniques based on Data Mining Anomaly Detection:Advanced Statistical Models,Rule based Techniques,Biological Models,Learning Models Specification-based Detection, Hybrid Detection

Module-III: Theoretical Foundation of Detection: Taxonomy of Anomaly Detection Systems, Fuzzy Logic, Bayes Theory, Artificial Neural Networks, Support Vector Machine (SVM), Evolutionary Computation, Association Rules, Clustering, Signal Processing Techniques Based Models, Comparative Study of Anomaly Detection Techniques.

Module-IV: Architecture and Implementation: Centralized, Distributed, Cooperative Intrusion Detection,Alert Management and Correlation: Data Fusion, Alert Correlation, Cooperative Intrusion Detection

Module-V: Evaluation Criteria & Intrusion Response:
Accuracy, Performance, Completeness, Timely Response, Adaptation and Cost-Sensitivity, Intrusion Tolerance and Attack Resistance, Test, Evaluation and Data Sets.
Response Type, Response Approach, Survivability and Intrusion Tolerance, case study of any commercial IDS.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- Ali A. Ghorbani, Wei Lu, "Network Intrusion Detection and Prevention: Concepts and Techniques",
- Springer, 2010.
- Carl Enrolf, Eugene Schultz, Jim Mellander, "Intrusion detection and Prevention", McGraw Hill, 2004
- Paul E. Proctor, "The Practical Intrusion Detection Handbook ",Prentice Hall , 2001.
- Ankit Fadia and Mnu Zacharia, "Intrusiion Alert", Vikas Publishing house Pvt., Ltd, 2007.
- Earl Carter, Jonathan Hogue, "Intrusion Prevention Fundamentals", Pearson Education, 2006.

CRYPTOGRAPHY FOUNDATION LAB

Course Code: NCE6806 **Credit Units : 01**

Course Contents:

- Program to implement division theorem
- checking number is prime or composite using simple logic
- Implement Miller Rabin Primality Algorithm
- Implement Euclid and Extended Algorithm.
- Implement Chinese Remainder Theorem
- Implement Baby Step Giant Step Algorithm.
- Implement at least 2 algorithms for random number generation. One is Blum Blum Shub.
- Implement Modular Exponentiation Algorithm
- Implement algorithm for modular linear equation solver.
- Implement Fermat's and Euler's theorem.
- Implement Fermat's Factorization method.
- Few programs based on Probability Theory and theorems

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

WEB SECURITY LAB

Course Code: NCE6807 **Credit Units : 01**

Exercises related to SQL injection attacks, XSS attacks, writing java script files for launching and preventing XSS attacks, Stored and Reflected XSS Attacks,URLinterpretation attack, input validation attack, buffer overflow attacks, impersonation attacks, password-based attacks, denial of service attacks, session hijacking
Use Apache Web Server or Xamp Server and create a temporary site for performing attacks.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

NETWORK SECURITY LAB

Course Code: NCE6808 **Credit Units : 01**

Course Contents:

- Learn to install wine / virtual box/vmware or any other equivalent software on the host os.
- Perform an experiment to grab a banner with telnet and perform the task using netcat utility.
- Banner grabbing is a technique to determine which application or service is running on the specified port by attempting to make a connection to this host.
- Perform an experiment for port scanning with nmap, superscan or any other software.
- Using nmap 1)find open ports on a system 2) find the machines which are active 3)find the version of remote os on other systems 4) find the version of s/w installed on other system
- Perform an experiment on active and passive fingerprinting using xprobe2 and nmap.
- Performa an experiment to demonstrate how to sniff for router traffic by using the tool wireshark
- Perform an experiment how to use dumpsec.
- Perform an wireless audit of an access point / router and decrypt wep and wpa.
- Perform an experiment to sniff traffic using arp poisoning.
- Generating password hashes with openssl

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: NCE6809 **Credit Units : 02**

Course Objectives:

The course will enhance scientific , technical and research writing skills and impart knowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination**.**

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing , bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	15	10	70	100

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla,D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R.2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J.& Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montomery, Douglas C.(2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

MINOR PROJECT

Course Code: NCE6837 **Credit Units : 08**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements**(optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

<u>Examination Scheme:</u>

Dissertation	50
Viva Voce	50
Total	**100**

BIG DATA SYSTEMS

Course Code: NCE6810 **Credit Units : 03**

Course Contents:

Module-I: A NEW PARADIGM FOR BIG DATA : Scaling with a traditional database NoSQL is not a panacea, First principles, Desired properties of a Big Data system , The problems with fully incremental architectures, Lambda Architecture, Recent trends in technologyExample application: SuperWebAnalyticscom, data model for big data: , data model for big data: illustration

Module-II: Hadoop. & MapReduce : Data! ,Data Storage and Analysis ,Comparison with Other Systems ,RDBMS ,Grid Computing ,Volunteer Computing ,A Brief History of Hadoop ,Apache Hadoop and the Hadoop Ecosystem , Hadoop Releases ,A Weather Dataset, Data Format ,Analyzing the Data with Unix Tools , Analyzing the Data with Hadoop ,Map and Reduce ,Java MapReduce ,Scaling Out ,Data Flow , Combiner Functions ,Running a Distributed MapReduce Job , Hadoop Streaming ,Ruby ,Python, Hadoop Pipes ,Compiling and Running.

Module-III: The Hadoop Distributed Filesystem: The Design of HDFS ,HDFS Concepts ,Blocks ,Namenodes and Datanodes ,HDFS Federation ,HDFS High-Availability ,The Command-Line Interface ,Basic Filesystem Operations ,Hadoop Filesystems , Interfaces ,The Java Interface ,Reading Data from a Hadoop URL ,Reading Data Using the FileSystem API ,Writing Data ,Directories ,Querying the Filesystem ,Deleting Data ,Data Flow ,Anatomy of a File Read ,Anatomy of a File Write ,Coherency Model ,Parallel Copying with distcp ,Keeping an HDFS Cluster Balanced ,Hadoop Archives ,Using Hadoop Archives ,Limitations ,

Module-IV: Hadoop I/O: Data Integrity ,Data Integrity in HDFS ,LocalFileSystem ,ChecksumFileSystem ,Compression ,Codecs , Compression and Input Splits ,Using Compression in MapReduce ,Serialization ,The Writable Interface , Writable Classes ,Implementing a Custom Writable ,Serialization Frameworks ,Avro ,File-Based Data Structures ,SequenceFile ,MapFile.

Module-V: Developing a MapReduce Application: The Configuration API ,Combining Resources ,Variable Expansion ,Configuring the Development Environment ,Managing Configuration ,GenericOptionsParser, Tool, and ToolRunner ,Writing a Unit Test ,Mapper ,Reducer ,Running Locally on Test Data ,Running a Job in a Local Job Runner , Testing the Driver ,Running on a Cluster ,Packaging ,Launching a Job ,The MapReduce Web UI ,Retrieving the Results ,Debugging a Job ,Hadoop Logs ,Remote Debugging ,Tuning a Job ,Profiling Tasks ,MapReduce Workflows ,Decomposing a Problem into MapReduce Jobs ,JobControl ,Apache Oozie.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended books:

- "Big Data: Principles and best practices of scalable realtime data systems",Nathan Matz, Manning Publications, 2015
- "Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale" Tom White, Oreilly.
- "High-Performance Big-Data Analytics, Computing Systems and Approaches" Raj, P., Raman, A., Nagaraj, D., Duggirala, S.,Springer

DISTRIBUTED SYSTEM SECURITY

Course Code: NCE6811 **Credit Units : 03**

Course Contents:

Module-I:
Introduction – Distributed Systems, Distributed Systems Security. Security in Engineering: Secure Development Lifecycle Processes - A Typical Security Engineering Process – Security Engineering Guidelines and Resources. Common Security Issues and Technologies: Security Issues, Common Security Techniques.

Module-II:
Host-level Threats and Vulnerabilities: Transient code Vulnerabilities - Resident Code Vulnerabilities - Malware: Trojan Horse – Spyware - Worms/Viruses – Eavesdropping – Job Faults. Infrastructure-Level Threats and Vulnerabilities: Network-Level Threats and Vulnerabilities - Grid Computing Threats and Vulnerabilities – Storage Threats and Vulnerabilities – Overview of Infrastructure Threats and Vulnerabilities.

Module-III:
Application-Level Threats and Vulnerabilities: Application-Layer Vulnerabilities –Injection Vulnerabilities - Cross-Site Scripting (XSS) - Improper Session Management - Improper Error Handling - Improper Use of Cryptography - Insecure Configuration Issues - Denial of Service - Canonical Representation Flaws - Overflow Issues. Service-Level Threats and Vulnerabilities: SOA and Role of Standards - Service-Level Security Requirements - Service-Level Threats and Vulnerabilities - Service-Level Attacks – Services Threat Profile.

Module-IV:
Host-Level Solutions: Sandboxing – Virtualization - Resource Management - Proof-Carrying Code - Memory Firewall – Antimalware. Infrastructure-Level Solutions: Network-Level Solutions - Grid-Level Solutions - Storage-Level Solutions. Application-Level Solutions: Application-Level Security Solutions.

Module-V:
Service-Level Solutions: Services Security Policy - SOA Security Standards Stack – Standards in Dept - Deployment Architectures for SOA Security - Managing Service-Level Threats - Compliance in Financial Services - SOX Compliance - SOX Security Solutions – Multilevel Policy-Driven Solution Architecture - Case Study: Grid - The Financial Application – Security Requirements Analysis. Future Directions – Cloud Computing Security – Security Appliances - Usercentric Identity Management - Identity-Based Encryption (IBE) - Virtualization in Host Security.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- Abhijit Belapurakar, Anirban Chakrabarti and et al., “Distributed Systems Security: Issues. Processes and solutions”, Wiley, Ltd., Publication, 2009.
- Abhijit Belapurkar, Anirban Chakrabarti, Harigopal Ponnapalli, Niranjan Varadarajan, Srinivas Padmanabhuni and Srikanth Sundarrajan, “Distributed Systems Security: Issues, Processes and Solutions”, Wiley publications, 2009.
- Rachid Guerraoui and Franck Petit, “Stabilization, Safety, and Security of Distributed Systems”, Springer, 2010.

Syllabus - Ninth Semester

BIOMETRIC SYSTEMS AND BIOMETRIC IMAGE PROCESSING

Course Code: NCE6901 **Credit Units : 03**

Course Contents:

Module-I:
Introduction: Biometric fundamentals – Biometric technologies – Biometrics Vs traditional techniques – Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes:verification, identification and biometric matching – Performance measures in biometric systems, FAR,FRR, FTE rate, EER and ATV rate, Applications of Biometric Systems, Security and Privacy Issues.
Physiological Biometrics : Leading technologies : Finger-scan – Facial-scan – Iris-scan – Voice-scan – components, working principles, competing technologies, strengths and weaknesses – Other physiological biometrics : Hand-scan, Retina-scan – components, working principles, competing technologies, strengths and weaknesses – Automated fingerprint identification systems.

Module-II:
Behavioral Biometrics: Leading technologies: Signature-scan – Keystroke scan – components, working principles, strengths and weaknesses.
Privacy and Standards in Biometrics: Assessing the Privacy Risks of Biometrics – Designing Privacy-Sympathetic Biometric Systems – Need for standards – different biometric standards.

Module-III:
Fundamentals of Image Processing: Digital Image representation - Fundamental steps in Image Processing Image Enhancement: The Spatial Domain Methods, The Frequency Domain Methods – Image Segmentation: Pixel Classification by Thresholding, Histogram Techniques, Smoothing and Thresholding - Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection.

Module-IV:
Fingerprint Biometrics: Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges - Fingerprint Image Processing - Minutiae Determination - Fingerprint Matching: Fingerprint Classification, Matching policies.

Module-V:
Iris Biometrics: Iris System Architecture, Definitions and Notations - Iris Recognition: Iris location, Doubly Dimensionless Projection, Iris code, Comparison - Coordinate System: Head Tilting Problem, Basic Eye Model, Searching Algorithm, Texture Energy Feature.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- Anil K Jain, Patrick Flynn, Arun A Ross, “Handbook of Biometrics”, Springer, 2008
- Anil K Jain, Arun A Ross, Karthik Nandakumar, “Introduction to Biometrics”, Springer, 2011
- Rafael C.Gonzalez, Richard E.Woods, Steven L.Eddins, “Digital Image Processing”, Pearson
- Education, New Delhi, 2009

SOFTWARE VULNERABILITY ANALYSIS

Course Code: NCE6902 **Credit Units : 04**

Course Contents:

Module-I: Introduction to Software Security
It's All about the Software, Dealing with Widespread Security Failures, Bugtraq, CERT Advisories, RISKS Digest, Technical Trends Affecting Software Security, The ilities, What is Security?, Isn't That Just Reliability?, Penetrate and Patch Is Bad, On Art and Engineering, Security Goals, Prevention, Traceability and Auditing, Monitoring, Privacy and Confidentiality, Multilevel Security, Anonymity, Authentication, Integrity, Know Your Enemy: Common Software Security Pitfalls, Software Project Goals, Conclusion. **Managing Software Security Risk:** An Overview of Software Risk Management for Security, The Role of Security Personnel, Software Security Personnel in the Life Cycle, Deriving Requirements, Risk Assessment, Design for Security, Implementation, Security Testing, A dose of Reality, Getting People to Think about Security, Software Risk management in Practice, When Development Goes Astray, When Security Analysis Goes Astray, The Common Criteria.

Module-II: On Open Source and Closed Source
Security by Obscurity, Reverse Engineering, Code Obfuscation, Security for Shrink-Wrapped Software, Security by Obscurity Is No Panacea, The Flip Side: Open- Source Software, Is the "Many-Eyeballs Phenomenon" Real?. Why Vulnerability Detection Is Hard, Other Worries, On Publishing Cryptographic Algorithms, Two More Open-Source Fallacies, The Microsoft Fallacy, The Java Fallacy, An Example: GNU Mailman Security, More Evidence: Trojan Horses, To Open Source or Not to Open Source, Another Security Lesson from Buffer Overflows, Beating the Drum.
Guiding Principles for Software Security: Principle1: Secure the Weakest Link, Principle 2: Practice Defense in Depth, Principle 3: Fail Securely, Principle 4: Follow the Principle of Least Privilege, Principle 5: Compartmentalize, Principle 6: Keep It Simple, Principle 7: Promote Privacy, Principle 8: Remember That Hiding Secrets is Hard, Principle 9: Be Reluctant to Trust, Principle 10: Use Your Community Resources Conclusion.

Module-III: Buffer Overflows & Access Control
What Is a Buffer Overflow?, Why Are Buffer Overflows a Security Problem?, Defending against Buffer Overflow, Major Gotchas, Internal Buffer Overflows, More Input Overflows, Other Risks, Tools That Can Help, Smashing Heaps and Stacks, Heap Overflows, Stack Overflows, Decoding the Stack, To Infinity … and Beyond!, Attack Code, A UNIX Exploit, What About Windows?The UNIX Access Control Model, How UNIX Permissions Work, Modifying File Attributes, Modifying Ownership, The unask, The Programmatic Interface, Setuid Programming, Access Control in Windows NT, Compartmentalization, Fine-Grained Privileges.

Module-IV: NETWORKING
OSI Model, Sockets, Socket Functions, Socket Addresses, Network Byte Order, Internet Address Conversion, A Simple Server Example, A Web Client Example, A Tinyweb Server, Peeling Back the Lower Layers, Data-Link Layer, Network Layer, Transport Layer , Network Sniffing, Raw Socket Sniffer, libpcap Sniffer, Decoding the Layers, Active Sniffing, Denial of Service, SYN Flooding, The Ping of Death, Teardrop, Ping Flooding, Amplification Attacks, Distributed DoS Flooding, TCP/IP Hijacking, RST Hijacking, Continued Hijacking, Port Scanning, Stealth SYN Scan, FIN, X-mas, and Null Scans, Spoofing Decoys, Idle Scanning, Proactive Defense (shroud), Reach Out and Hack Someone, Analysis with GDB, Almost Only Counts with Hand Grenades, Port-Binding Shellcode.

Module-V: SHELLCODE

Assembly vs. C, Linux System Calls in Assembly, The Path to Shellcode, Assembly Instructions Using the Stack, Investigating with GDB, Removing Null Bytes, Shell-Spawning Shellcode, A Matter of Privilege, And Smaller Still, Port-Binding Shellcode, Duplicating Standard File Descriptors, Branching Control Structures, Connect-Back Shellcode.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- "Building Secure Software: How to Avoid Security Problems the Right Way" John Viega, Gary R. Tata McGraw Hill
- Michael Howard, David LeBlanc, John Viega: 19 Deadly Sins of Software Security: Programming Flaws and How to Fix Them (Security One-off) (Addison-Wesley Professional Computing Series)
- Richard Sinn " Software Security , Theory Programming and Practice" Cengage Learning

APPLIED CRYPTOGRAPHY

Course Code: NCE6903 **Credit Units : 03**

Course Contents:

Module-I:
Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Module-II:
Advanced Encryption Standard (AES) encryption and decryption, Analysis, Principals of public key crypto systems, RSA algorithm, security of RSA. Rabin cryptosystem, Elgamal cryptosystem, Elliptical Curve cryptography,

Module-III:
Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, Random Oracle Model , hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA),SHA-512, Whirlpool, Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS).

Module-IV:
Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Entity authentication, Authentication Applications: Kerberos,

Module-V:
IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic transaction (SET).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended books:

- "Cryptography & Network Security", William Stallings, PHI
- "Cryptography & Network Security", Behrouz A. Forouzan, TMH
- "Cryptography & Network Security", Atuk Kahate, PHI

BIOMETRIC IMAGE PROCESSING LAB

Course Code: NCE6904 **Credit Units : 01**

List of Exercises

Basic exercises on image loading, manipulation, edge finding, features extraction, face recognition, segmentation, fingerprint, iris, signature recognition.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

APPLIED CRYPTOGRAPHY LAB

Course Code: NCE6905 **Credit Units : 02**

Course Contents:

- Program to implement Ceaser Cipher.
- Program to implement Ceaser Cipher for any value of shift parameter.
- Programs to implement Playfair cipher, affine cipher, vegnere cipher.
- Program to implement Vernam Cipher.
- Program to implement Hill Cipher.
- Program to implement Rail fence and Columnar transposition cipher.
- Program to implement DES/AES/IDEA algorithm
- Program to implement RSA algorithm
- Program to implement Rabin Cryptosystem and Elgamal Cryptsystem.
- Program to implement Digital Signature using RSA/Elgamal.
- Implementation study of MD5/SHA-1.
- Programs to implement ECB/CBC/OFB modes of operation.

Software: C/C++/Python/Java

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

WEB APPLICATION & PENETRATION TESTING

Course Code: NCE6906 **Credit Units : 03**

Course Contents:

Module-I: Introduction to Web Applications and Security
The Web Application Architecture ,A Brief Word about HTML ,Transport: HTTP ,The Web Client ,The Web Server,The Web Application ,The Database ,Complications and Intermediaries ,The New Model: Web Services ,Potential Weak Spots ,The Methodology of Web Hacking ,Profile the Infrastructure ,Attack Web Servers ,Survey the Application,Attack the Authentication Mechanism ,Attack the Authorization Schemes , Perform a Functional Analysis,Exploit the Data Connectivity,Attack the Management Interfaces,Attack the Client,Launch a Denial-of-Service Attack Profiling: Server Discovery,Intuition ,Internet Footprinting, DNS Interrogation Ping,Discovery Using Port Scanning , Dealing with Virtual Servers, Service Discovery , Server Identification,Dealing with SSL.

Module-II: Hacking Web Servers
Common Vulnerabilities by Platform ,Apache,Microsoft Internet Information Server (IIS), Attacks Against IIS Components, Attacks Against IIS, Escalating Privileges on IIS, Netscape Enterprise Server , Other Web Server Vulnerabilities , Miscellaneous Web Server Hacking Techniques , Automated Vulnerability Scanning Software ,Whisker, Nikto , twwwscan/arirang , Stealth HTTP Scanner, Typhon , WebInspect , AppScan , FoundScan Web Module , Denial of Service Against Web Servers,

Module-III: Surveying the Application
Documenting Application Structure , Manually Inspecting the Application , Statically and Dynamically Generated Pages, Directory Structure , Helper Files , Java Classes and Applets , HTML Comments and Content ,Forms, Query Strings , Back-End Connectivity , Tools to Automate the Survey, lynx , Wget,Teleport Pro, Black Widow, WebSleuth, Common Countermeasures , A Cautionary Note, Protecting Directories,Protecting Include Files, Miscellaneous Tips. Authentication: Authentication Mechanisms, HTTP Authentication: Basic and Digest, Forms-Based Authentication, Microsoft Passport, Attacking Web Authentication,Password Guessing, Session ID Prediction and Brute Forcing, Subverting Cookies,Bypassing SQL-Backed Login Forms,Bypassing Authentication.

Module-IV: Authorization
The Attacks, Role Matrix, The Methodology , Query String, POST Data , Hidden Tags, URI,HTTP Headers,Cookies, Final Notes,Case Study: Using Curl to Map Permissions, Apache Authorization, IIS AuthorizationAttacking Session State Management:Client-Side Techniques, Hidden Fields, The URL,HTTP Headers and Cookies, Server-Side Techniques, Server-Generated Session IDs, Session Database, SessionID Analysis, Content Analysis, Time Windows.

Module-V: Input Validation Attacks
Expecting the Unexpected, Input Validation EndGame, Where to Find Potential Targets,Bypassing Client-Side Validation Routines , Common Input Validation Attacks , Buffer Overflow, Canonicalization (dot-dot-slash),Script Attacks , Boundary Checking, Manipulating the Application , SQL Injection and Datastore Attacks,Command Execution, Common Side Effects,Common Countermeasures. Attacking Web Datastores: A SQL Primer,SQL Injection, Common Countermeasures. Web Client Hacking :The Problem of Client-Side Security,Attack Methodologies ,Active Content Attacks ,Java and JavaScript ,ActiveX,Cross-Site Scripting,Cookie Hijacking ,Case Study #: From the URL to the Command Line and Back,Case Study #: The Cross-Site Scripting Calendar

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- "Hacking Exposed Web Applications", 3rd edition, JOEL SCAMBRAY, VINCENT LIU, CALEB SIMA.
- "The Web Application Hacker's Handbook Discovering and Exploiting Security Flaws" Dafydd Stuttard, Marcus Pinto
- Rich Bowen, Ken Coar, "Apache Cookbook", O'Reilly

MALWARE ANALYSIS IN NETWORK SECURITY

Course Code: NCE6907 **Credit Units : 03**

Course Contents:

Module-I: BASIC STATIC TECHNIQUES
Antivirus Scanning: A Useful First Step, Hashing: A Fingerprint for Malware, Finding Strings, Packed and Obfuscated Malware, Packing Files, Detecting Packers with PEiD, Portable Executable File Format, Linked Libraries and Functions, Static, Runtime, and Dynamic Linking, Exploring Dynamically Linked Functions with Dependency Walker, Imported Functions, Exported Functions , Static Analysis in Practice, PotentialKeyloggerexe: An Unpacked Executable, PackedProgramexe: A Dead End, The PE File Headers and Sections, Examining PE Files with PEview, Viewing the Resource Section with Resource Hacker, Using Other PE File Tools, PE Header Summary

Module-II: VIRTUAL MACHINES & DYNAMIC ANALYSIS
The Structure of a Virtual Machine, Creating Your Malware Analysis Machine, Configuring VMware, Using Your Malware Analysis Machine, Connecting Malware to the Internet, Connecting and Disconnecting Peripheral Devices, Taking Snapshots, Transferring Files from a Virtual Machine, The Risks of Using VMware for Malware Analysis, Record/Replay: Running Your Computer in Reverse, Sandboxes: The Quick-and-Dirty Approach Using a Malware Sandbox , Sandbox Drawbacks, Running Malware, Monitoring with Process Monitor, The Procmon Display, Filtering in Procmon, Viewing Processes with Process Explorer, The Process Explorer Display, Using the Verify Option, Comparing Strings, Using Dependency Walker, Analyzing Malicious Documents, Comparing Registry Snapshots with Regshot, Faking a Network, Using ApateDNS, Monitoring with Netcat, Packet Sniffing with Wireshark, Using INetSim, Basic Dynamic Tools in Practice,

Module-III: RECOGNIZING C CODE CONSTRUCTS IN ASSEMBLY
Overview of working with IDA Pro, Global vs Local Variables, Disassembling Arithmetic Operations, Recognizing if Statements, Analyzing Functions Graphically with IDA Pro, Recognizing Nested if Statements, Recognizing Loops, Finding for Loops, Finding while Loops, Understanding Function Call Conventions, Cdecl, Stdcall, fastcall , Push vs Move ,Analyzing switch Statements ,If Style ,Jump Table ,Disassembling Arrays ,Identifying Structs ,Analyzing Linked List Traversal ,

Module-IV: ANALYZING MALICIOUS WINDOWS PROGRAMS
The Windows API, Types and Hungarian Notation, Handles, File System Functions, Special Files, The Windows Registry, Registry Root Keys, Regedit , Programs that Run Automatically, Common Registry Functions, Analyzing Registry Code in Practice, Registry Scripting with reg Files , Networking APIs , Berkeley Compatible Sockets, The Server and Client Sides of Networking, The WinINet API , Following Running Malware, DLLs , Processes, Threads ,Interprocess Coordination with Mutexes , Services , The Component Object Model , Exceptions: When Things Go Wrong ,Kernel vs User Mode , The Native API ,

Module-V: MALWARE BEHAVIOR & COVERT MALWARE LAUNCHING
Downloaders and Launchers, Backdoors, Reverse Shell, RATs, Botnets, RATs and Botnets Compared, Credential Stealers, GINA Interception, Hash Dumping, Keystroke Logging, Persistence Mechanisms, The Windows Registry, Trojanized System Binaries, DLL Load-Order Hijacking, Privilege Escalation, Using SeDebugPrivilege, Covering Its Tracks—User-Mode Rootkits, IAT Hooking, Inline Hooking, Launchers, Process Injection, DLL Injection, Direct Injection, Process Replacement, Hook Injection ,

Local and Remote Hooks, Keyloggers Using Hooks, Using SetWindowsHookEx, Thread Targeting, Detours, APC Injection, APC Injection from User Space, APC Injection from Kernel Space .

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- "Practical Malware Analysis" by Michael Sikorski and Andrew Honig
- "The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System" Second Edition by Reverend Bill Blunden
- "Rootkits: Subverting the Windows Kernel" by Jamie Butler and Greg Hoglund
- "Practical Reverse Engineering" by Dang, Gazet, Bachaalany

WEB SECURITY

Course Code: NCE6908 **Credit Units : 03**

Course Contents:

Module-I: The E-Commerce Playground
Web Languages: The Babylon of the 21st Century, Languages of the Web, HTML, Dynamic HTML (DHTML).XML,XHTML,Perl,PHP,ColdFusion,Active Server Pages,CGI,Java. Web and Database Servers: Web Servers,Apache,Microsoft's Internet Information Server (IIS),Database Servers,Microsoft SQL Server, Oracle.

Module-II: Shopping Carts and Payment Gateways
Evolution of the Storefront,Electronic Shopping,Shopping Cart Systems,Scope and Lifetime of an Electronic Shopping Cart,Collecting, Analyzing, and Comparing Selected Components,Keeping Track of the Total Cost,Change of Mind,Processing the Purchase,Implementation of a Shopping Cart Application,Product Catalog,Session Management,Database Interfacing,Integration with the Payment Gateway,Examples of Poorly Implemented Shopping Carts,Carello Shopping Cart,DCShop Shopping Cart,Hassan Consulting's Shopping Cart,Cart32 and Several Other Shopping Carts,Processing Payments,Finalizing the Order,Method of Payment,Verification and Fraud Protection,Order Fulfillment and Receipt Generation,Overview of the Payment Processing System,Innovative Ways to Combat Credit Card Fraud,Order Confirmation Page,Payment Gateway Interface,Transaction Database Interface,Interfacing with a Payment Gateway—An Example,Payment System Implementation Issues,Integration,Temporary Information,SSL,Storing User Profiles,Vulnerabilities Caused by Poor Integration of Shopping Cart and Payment Gateway,PayPal—Enabling Individuals to Accept Electronic Payments,

Module-III: HTTP and HTTPS: The Hacking Protocols,Protocols of the Web,HTTP,HTTPS (HTTP over SSL).
URL: The Web Hacker's Sword: URL Structure,Web Hacker Psychology,URLs and Parameter Passing.
URL Encoding, Meta-Characters,Specifying Special Characters on the URL String.,Meta-Characters and Input Validation,Unicode Encoding,The Acme Art, Inc. Hack,Abusing URL Encoding,Unicode Encoding and Code Red's Shell Code,Unicode Vulnerability,The Double-Decode or Superfluous Decode Vulnerability,HTML Forms,Anatomy of an HTML Form,Input Elements,Parameter Passing Via GET and POST,Case Study: Reconnaissance Leaks Corporate Assets.

Module-IV: Web: Under (the) Cover.
The Components of a Web Application,The Front-End Web Server,The Web Application ExecutioEnvironment. The Database Server,Wiring the Components,The Native Application Processing Environment.,Web Server APIs and Plug-Ins,URL Mapping and Internal Proxying,Proxying with a Back-End Application Server.Examples. Connecting with the Database,The Craftiest Hack of Them All,Using Native Database APIs.Examples.
Using ODBC,Using JDBC,Specialized Web Application Servers,Identifying Web Application Components from URLs,The Basics of Technology Identification,Examples,More Examples,Advanced Techniques for Technology Identification,Examples,Identifying Database Servers,Countermeasures, Rule 1: Minimize Information Leaked from the HTTP Header,Rule 2: Prevent Error Information from Being Sent to the Browser.

Module-V: Reading Between the Lines.

Information Leakage Through HTML,What the Browsers Don't Show You,Netscape Navigator—View | Page Source,Internet Explorer—View | Source,Clues to Look For,HTML Comments,Revision History,Developer or Author Details,Cross-References to Other Areas of the Web Application,Reminders and Placeholders, Comments Inserted by Web Application Servers,Old "Commented-Out" Code,Internal and External Hyperlinks,E-mail Addresses and Usernames,UBE, UCE, Junk Mail, and Spam,Keywords and Meta Tags,Hidden Fields,Client-Side Scripts,Automated Source Sifting Techniques,Using wget,Using grep,Sam Spade, Black Widow, and Teleport Pro.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- McClure, Stuart, Saumil Shah, and Shreeraj Shah. Web Hacking:attacks and defense. AddisonWesley. 2003.
- Garms, Jess and Daniel Somerfield. Professional Java Security. Wrox. 2001.

DIGITAL WATERMARKING & STAGENOGRAPHY

Course Code: NCE6909 **Credit Units : 03**

Course Contents:

Module-I: Introduction Applications and Properties
Information Hiding, Steganography, and Watermarking , History of Watermarking , History of Steganography , Importance of Digital Watermarking , Importance of Steganography ,Applications of Watermarking , Applications of Steganography Steganography for Dissidents, Steganography for Criminals , Properties of Watermarking Systems , Evaluating Watermarking Systems , Properties of Steganographic and Steganalysis Systems , Evaluating and Testing Steganographic Systems

Module-II: Models of Watermarking
Notation , Communications ,Communication-Based Models of Watermarking , Geometric Models of Watermarking , Modeling Watermark Detection by Correlation
Watermarking with side information: Informed Embedding, Watermarking Using Side Information, Dirty-Paper Codes

Module-III: Practical Dirty-Paper Codes
Practical Considerations for Dirty-Paper Codes , Broad Approaches to Dirty-Paper Code Design , Implementing DM with a Simple Lattice Code , Typical Tricks in Implementing Lattice Codes
Coding with Better Lattices ,Making Lattice Codes Survive Valumetric Scaling Dirty-Paper Trellis Codes
Watermark Security : Security Requirements **,**Watermark Security and Cryptography Some Significant Known Attacks

Module-IV: Steganography
Steganographic Communication , The Channel , The Building Blocks , Notation and Terminology , Information-Theoretic Foundations of Steganography , Cachin's Definition of Steganographic Security , Practical Steganographic Methods , Statistics Preserving Steganography , Model-Based Steganography Masking Embedding as Natural Processing , Minimizing the Embedding Impact , Matrix Embedding, Nonshared Selection Rule,

Module-V: Steganalysis
Steganalysis Scenarios , Detection , Forensic Steganalysis , The Influence of the Cover Work on Steganalysis , Some Significant Steganalysis Algorithms , LSB Embedding and the Histogram Attack , Sample Pairs Analysis , Blind Steganalysis of JPEG Images Using Calibration, Blind Steganalysis in the Spatial Domain.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Books:

- "Digital Watermarking and Steganography"Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, , Margan Kaufmann Publishers, New York, 2008.
- "Digital Watermarking", Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Margan KaufmannPublishers, New York, 2003.
- "Techniques and Applications of Digital Watermarking and Contest Protection", Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, Artech House, London, 2003.

SUMMER INTERNSHIP EVALUATION-III

Course Code: NCE6935 **Credit Units : 06**

Guidelines:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:
A4 size paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top & bottom margins: 1 inch/ 2.5 cm
Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the delaines.

STUDENT ASSESSMENT RECORD (SAR)

5. **Range of Research Methods used to obtain information**

6. **Execution of Research**

7. **Data Analysis**
   - Analyse Quantitative/ Qualitative information
   - Control Quality

8. **Draw Conclusions**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

Syllabus - Tenth Semester

PROJECT-DISSERTATION-II

Course Code: NCE6037 **Credit Units: 15**

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- <u>Report Layout</u>

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

ata, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
  - Font: Arial (10 points) or Times New Roman (12 points)
  - Line spacing: 1.5
  - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:		40%
(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	

Amity School of Engineering & Technology

Bachelor of Science - Information Technology

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

B.Sc. (Information Technology) Programme Overview

Bachelor of Science (Information Technology) is one of the popular courses among students who wants to make their career in IT industry. It is an undergraduate degree course of 3 years duration. The program provides a good balance between theoretical and practical aspects, analytical methods and industry practices. The study period of the course includes various subjects such as Programming (C, C++, Java), Networking (Basic and Advanced), Database, Data Structure, Website design and development (HTML, CSS, PHP), Operating System, Software Engineering, Mathematics (Basic, Discreet) etc. The course also requires the students to undergo various Internship Programs, Minor and Major Projects. After the completion of the course, students can go for higher studies MCA which is a master course in computer application considered equivalent to engineering course or work as an IT professionals.

There is a huge scope in this field. With the rapid growth of IT industry, the demand of computer professionals is increasing day by day. It has created a lot of opportunities for Computer Graduates. The student can work as a Network Administrator, System Engineer, Programmer, Website Developer or as a System Administrator. Students can do freelancing or develop their own software.

Programme Outcomes (POs)

PO1: Apply knowledge of science, mathematics, computers and Information Technology fundamentals to solve complex problems related to the discipline.

PO2: Identify, analyze and evaluate problems specific to domain using knowledge of fundamentals, computational techniques, software tools and programming principles. .

PO3: Design and develop solutions in terms of computer network, hardware and software systems, modules or processes on the basis of customer needs and business goals considering cost, security, intellectual property, copyrights and other limitations.

PO4: Analyze and evaluate existing systems to understand complex problems and derive a solution to it.

PO5: Identify and apply current techniques, skills, and tools necessary for computing practices and producing solutions.

PO6: Apply professional practices and contextual knowledge to assess societal, safety and legal issues.

PO7: Comprehend the effects of the professionally developed solutions in societal and environmental contexts to produce viable developments.

PO8: Recognize and demonstrate ethical principles, responsibilities and commitments towards the profession.

PO9: Contribute profoundly and efficiently to the profession as an individual or as a member/leader of multi-faceted team by demonstrating proper coordination..

PO10: Communicate effectively with the society and the professional community through oral and written presentations with clear descriptions.

PO11: Apply management and professional principles while assigning responsibilities, performing designated work and meeting the deadlines of a project as an individual or a team member.

PO12:Exhibit the understanding of and have readiness and capability to engage in life-long learning through education and research.

Programme Specific Outcomes (PSOs)

On completion of B.Sc.(IT) course, the students will be able to:

PSO1. Apply the fundamental knowledge of basic science and technical courses to model, design and analyse computational systems, software and web applications using the concepts of mathematics, database, computer programming and algorithms.

PSO2. Analyze and solve complex problems related to system software, data communication &networking, and other specialized domains of information technology by making use of modern tools and techniques.

PSO3. Work as an IT professional in Industry within a team or as an individual by applying principles of management, ethics, lifelong learning and able to communicate effectively in the professional environment

Enclosure (s):

- ✓ Supporting document for PSOs framing
- ✓ Programme Structure, B.Sc. IT (2017)
- ✓ Supporting document_PSOs_B.Sc. (Information Technology)

PSO1	PSO2	PSO3

Apply the fundamental knowledge of basic science and technical courses to model, design and analyse computational systems, software and web applications using the principles of mathematics, database, computer programming and algorithms.			Analyse and solve complex problems related to system software, computer network, and other specialized domains of information technology by making use of modern tools and techniques.		Work as an IT professional in Industry in a team or as an individual by applying principles of management, ethics, environment,lifelong learning and able to communicate effectively in the professional environment.			
1	2	3	4	5	6	7	8	9
Mathematical Courses	**Computational systems/Database/ Algorithms**	**Software & Web applications/ Computer Programming**	**System Software & tools**	**Computer network/ IT specialized courses**	Management domain	Team building/Ethics/Environment	Communication skills	NTCC (non-teaching credit courses)
Mathematics	Digital Electronics	Computer Programming with C Language (+Lab)	Computer Fundamentals & Tools (+Lab)	Data Communication & Computer Networks (+Lab)	Accounting & Financial Management	Environmental Studies	Effective Listening	Summer Internship Evaluation-I
Discrete Mathematics Structures with Application to CS	Introduction to Database Management System (+Lab)	Data Structure Through C Language (+Lab)	Operating System (+Lab)	Fuzzy logic	E-Commerce	Understanding Self for Effectiveness	Presentation Skills	Summer Internship Evaluation-II
Computer Oriented Numerical Methods	Computer Organization & Architecture	Web Technologies (+Lab)	Multimedia & Its Applications	Basics of Cloud Computing		Problem solving & Critical Thinking	Reading & Comprehension	Major Project (Dissertation)
Computer Oriented Statistical & Optimization Methods	Design & Analysis of Algorithms (+Lab)	Introduction to Object Oriented Programming with C++ (+Lab)	Linux (+Lab)	Internet of Things		Group Dynamics & Team building	Corporate Communication	
	Data Warehousing & Data Mining	Software Engineering		Cryptography & Network Security		Stress and Coping Strategies	Employability Skills	
		Computer Graphics (+Lab)		Mobile Computing		Individual Society and Nations	Workspace Communication	
		Java Programming (+Lab)				Interpersonal Communication and Relationship Management		

		Introduction to Open Source Technologies (PHP, MySQL) (+Lab)						

MATHEMATICS

Course Code: IFT2109 **Credit Units: 03**

L-T-P: 3-0-0

Course Objective:

The objective of this course is to provide an introduction to the fundamentals and concepts of basic mathematics covering sets, functions, differentiation, integration, differential equations, vectors and matrices. This course aims to assist the students to develop confidence in handling mathematical concepts and techniques and to understand the principles and Concept of differential Calculus.

Course Contents:

Module I:Matrices

Definition of Matrix, Submatrix, types of matrices, such as symmetric, square, diagonal matrices, singular and nonsingular matrices. Addition, Subtraction, multiplication of matrices, determinant of Square matrix, Matrix equation, Solution by Cramer's rule and Gauss elimination method.

Module II: Limits and Continuity

Limit of a function.Infinitelimits.Right hand and left hand Limit. Some important limits.Continuity of a Function.Discontinuity.Type of Discontinuity. Algebra of Continuous function.

Module III: **Differentiation**

Differentiation of function, Derivative of some common functions, polynomial, rational, exponential, logarithmic and trigonometric functions.

Successive differentiation.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text:

1. NCERT MATHEMATICS – PART I- II,Textbook for Class XII
2.R.B. Babat, Linear algebra and linear model, Hindustan book agency
3. K. Hoffman and R. Kunze, Linear algebra, second edition, Prentice Hall India Learning Private Limited

DIGITAL ELECTRONICS

Course Code: IFT2112 **Credit Units: 03**

L-T-P: 3-0-0

Course Objective:

An entry level course in digital electronics covering number systems, binary mathematics, digital codes, logic gates, Boolean algebra, Karnaugh maps, and combinational logic. Emphasis will be on circuit logic analysis and design of digital circuits. The student will explain the operation of digital logic gates and use Boolean algebra and Karnaugh mapping to express logic operations and minimize logic circuits in design. The student will construct, analyze combinational logic circuits & sequential circuits; create a truth table for standard digital logic gates; and add, subtract, multiply and divide using the binary numbering system. Student will also be able to understand about digital to analog conversion and vice versa.

Course Contents:

Module I: Number System

Decimal, Binary, Octal, Hexadecimal Number Systems and Conversion of the bases, Complements: r's complement, (r-1)'s complement, Binary codes: Grey code, BCD Code, Excess-3 code

Introduction to logic systems

Positive and negative logic, Logic functions - NOT, AND, OR, NOR, EX-OR, EX NOR
Truth tables Boolean algebra, De Morgan's theorems Standard forms for Logical Expressions - Sum of Products, Product of Sums Specification of Logical functions in terms of Minterms and Maxterms, Karnaugh Maps, Simplification of Logical functions, Introduction of "don't care" states.

Module II: Combinational Building Blocks

Multiplexers, De-multiplexers, Decoders, Encoders

Arithmetic circuits

Half Adders and Full Adders**,** Half Subtractor and Full Subtractor

Module III: Flip-flops

The RS latch, the clocked RS flip-flop, JK Flip Flop, the Master-Slave JK flip-flop, Delay and Toggle flip-flops

Flip-flops in counter circuits Asynchronous (ripple) Counters (UP/DOWN), Synchronous Counter design (UP/DOWN), Non Sequential Counting

Module IV: Shift Registers

Shift registers in general, Ring Counters, Johnson Counter

Introduction to Memory

Primary: RAM, Static RAM, Dynamic RAM, ROM, PROM, EAPROM, Secondary: Floppy Disk, Hard Disk, CDROM

Module V: Introduction to Logic Families, DACs and ADCs

Introduction to logic families-TTL, RTL,ECL,CMOS,DTL,IIL

Binary weighted resistor DAC, Resolution, linearity and settling time of DACs, Successive approximation ADC

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- R.P Jain, Mordern Digital Electronics, Tata Mcgraw Hill.

References:

- Malvino& Leach, Digital Electronics, Tata Mcgraw Hill,2006,Edition 6.
- Floyd, Digital Fundamentals,Pearson,2015.
- M.M Mano, Digital Logic and Computer Design,Pearson.

IFT 2114	COMPUTER FUNDAMENTALS AND TOOLS	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Basis of Computers				
Co-requisites	Nil				

Catalog Description

Examines key computational abstraction levels below modern high-level languages; number representation, assembly language, memory management, the operating-system process model, high-level machine architecture including the memory hierarchy, and how high-level languages are implemented.This course is aimed to provide a fundamental understanding of computer science for the students in their early stages of academic career. Various computer nomenclatures regarding to hardware and software are introduced in this course to develop an in-depth realization of several subjects and their significant roles in the field.

Course Objectives

The objective of this course is to

1. Give students an in-depth understanding of why computers are essential components in business, education and society.
2. Introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software, the Internet, networking and mobile computing.
3. Provide hands-on use of Microsoft Office 2013 applications Word, Excel, Access and PowerPoint.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the usage of computers and why computers are essential components in business and society.

CO2: Utilize the Internet Web resources and evaluate on-line e-business system.

CO3: Solve common business problems using appropriate Information Technology applications and systems.

CO4: Identify categories of programs, system software and applications. Organize and work with files and folders.

CO5: Describe various types of networks standards and communication software.

Modules	Blooms level*	Number of hours
MODULE 1: Computer and its characteristics, application of computers, digital and analog computer, Generation of computers, Storage devices: primary storage devices (RAM,ROM,PROM,EPROM,EEPROM) , secondary storage devices(Floppy disk, Hard disk, optical disk, magnetic tapes), Input and output devices (keyboard, mouse, light pen, joystick, scanner, monitor, printers etc.)	L1, L2, L3	7
MODULE 2: Software and its types (System Software, Application Software, Firmware Software's) Computer Languages and its types (Machine Language, Assembly Language, High Level Language: advantages and disadvantages of computer languages), Translators: Compiler, Linker, Interpreter, Number system and its types, conversion from one base to another and vice versa. .	L1, L2	8
MODULE 3: Word Processor and its features, Editing of Text, Find and Replace, Bullets and Numbering, Spell Checker, Grammar Checker, Auto Correct, Auto Complete, Auto Text, Header and footer, tables, mail merge, border and shading, page setup, printing.	L2, L3 and L4	7
MODULE 4: Spread sheet and its features, Entering Information in Worksheet, Editing Cell Entry, Moving and Copying Data, deleting or Inserting Cells, Rows and Columns, Custom Numeric Formats, Using Formulas and functions, Creating charts.	L2, L3, L4	7
MODULE 5: Presentation Software and its uses, steps for creating PowerPoint Presentation, PowerPoint Views, Assigning Slide Transitions, Using Preset Animations, Hiding Slides, Slide Show, Controlling the Slide Show with a Keyboard, Setting Slide Show Timings.	L3, L5 and L6	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. P.K Sinha &Priti Sinha, Computer Fundamentals, BPB Publications.

2. Peter Nortan, Introduction to Computers, Tata Mcgraw Hill.

Reference Books

1. Suresh K. Basandra, Computer Systems Today, Galgotia Publications.
2. Joyce Coax , Joan Preppernau,,Steve Lambert and Curtis Frye,2007 Microsoft Office System step by step, Microsoft Press.
3. R.K. Taxali, PC Software for Windows, Tata Mcgraw Hill.
4. Alexix Leon, Mathewes Leon, Fundamentals of Information Technology,Vikas Publishing.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**3**	--	**1**	**1**	--	--	--	--	--	--	**2**	**3**	**1**	--
CO2	**1**	**2**	--	**1**	--	--	--	--	--	--	**3**	--	**3**	**1**	--
CO3	**1**	**3**	--	**1**	**1**	--	--	--	--	--	**3**	**2**	**3**	**1**	--
CO4	**1**	--	**1**	**3**	**1**	--	--	--	**3**	--	--	**2**	**3**	**1**	--
CO5	**1**	**1**	**1**	**2**	--	**2**	**3**	--	--	--	--	--	**3**	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

IFT 2116	**Computer Programming with C Language**	L	T	P	C
Version : 2017.1	Date of Approval: 14th June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is aimed to provide a fundamental understanding of programming concepts. C Language is the language which used to write solution for the basic computational problem in the form of instructions and programs. The basic and advanced features of C Language including Data types, Operators, Conditional & Control Statements, Arrays, Strings, Structure & Union and File Handling will be introduced.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

CO 1:Define the purpose and structure of C Program for programming; identify and distinguish various datatypes and operators for arithmetic, logical relational operations; solve the problems related to finding errors and output in program.

CO 2: Describe conditional and control statement; apply if-else, Switch and loops to rewrite basic C program for problem solving.

CO 3: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs

CO 4: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language

CO 5: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
Module I: Introduction to 'C' Language History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associatively. Managing Input and output Operation, formatting I/O.	L1, L2 and L3	6
Module II: Decision making and looping Decision making in program, Relational Logical operators example, if statements, if -else, nested if-else statements, Switch, case loop, Do-While, While, for loop and nesting of loop, continue and break , Storage types , predefined processor.	L2 and L3	8
Module III: Arrays and Functions One Dimensional Arrays, Arrays Manipulation, Sorting, Searching, Function declaration, example & calling a function. Passing Arguments, call by value and call by references, Recursive function, .Recursion.	L2, L3 and L4	7
Module IV: Pointers and String Pointers: Declaration, Pointer assignments, initialization, Pointers and Dynamic Memory Allocation, Array of Pointers, strings, string handler functions.	L2, L3 and L4	8
Module V: Structure Union & file handling Structure definition, Declaration, structure Assignments, Arrays in structure, Structure Arrays, Pointer Structure, Nested Structure, Arrays of Structure, Union declaration, assignments & example programs, Difference between structure & union, file handling and the related functions.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. YashwantKanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.

2. Byron Gottfried, “Programming with C”, Third Edition, Tata McGraw Hill Education private limited, July 2017.

3. E Balagurusamy, “Computer Concepts & Programming in C”, Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO3	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**---**	**2**
CO4	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO5	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**

1: strongly related, 2: moderately related and 3: weakly related

IFT2115	**Computer Fundamentals & Tools Lab**	L	T	P	C
Version 2017.1	Date of Approval: 14 June,2017	0	0	2	1
Pre-requisites/Exposure	Knowledge of Computer				
Co-requisites	NIL				

CatalogDescription

This course is aimed to provide a fundamental understanding of computer science for the students in their early stages of academic career. Various computer nomenclatures regarding hardware and software will be introduced for students to develop an in-depth realization of several subjects and their significant roles in the field. After this course, the students will be able to understand and apply the fundamental concepts of computer.

Course Objectives

The objective of this course is

1. Give students an in-depth understanding of why computers are essential components in business, education and society.
2. Introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software, the Internet, networking and mobile computing.
3. Provide hands-on use of Microsoft Office 2016 applications Word, Excel, Access and PowerPoint. Completion of the assignments will result in MS Office applications knowledge and skills.

Course Outcomes

On completion of this course, the students will be able to:

CO 1: Outline the usage of computers and why computers are essential components in business and society. Creating the folder and apply it where necessary.

CO 2: Identify the features of windows operating system. Determine the operations of taskbar of Windows and Set the wall paper, screen saver and date/time.

CO 3: State and demonstrate the use of word document and relate its applications with the day to day use of files.

CO 4: Identify and relate the concept of macros and mail merging. Design and work with files and folders.

CO 5: List the features of the excel document and apply and relate its calculation part with the real world. Design a document for resume writing.

Modules/Topics Covered**	**Blooms**	**Number**

	level*	of hours
1. Create a new folder and do the following: a. Make a word document in it. b. Make an Excel document in it. c. Make a new folder in it d. Rename the initial folder e. Move the initial folder f. Copy the initial folder. g. Delete the initial folder	L1, L3 and L5	4
2. Implement the various well known features of Windows operating system such as Notepad, WordPad, Paint, System tools, Entertainment etc. enclosed in Start→Programs→Accessories. 3. Implement various display properties by right clicking on the Windows Desktop. 4. Explore the taskbar of Windows. 5. Set the wall paper and screen saver. 6. Set the date/time.	L1, L3	4
7. Create a document and a. Put Bullets and Numbers b. Apply various Font parameters. c. Apply Left, Right, and Centre alignments. d. Apply hyperlinks. e. Insert pictures f. Insert ClipArt g. Show the use of WordArt h. Add Borders and Shading i. Show the use of Find and Replace. j. Apply header/footers	L1, L3, L5	4
8. Create any document and show the use of File→versions. **9. Create any document and show the difference between paste and paste special.** 10. Create a document to show the use of Washout/Watermark. 11. Implement the concept of mail merge.	L1, L3, L5	4
12. Implement the concept of macros. 13. Implement the concept of importing a file/document. 14. Implement the concept of merging the documents.	L1, L3, L5	4
15. Create a student table and do the following: a. Insert new row and fill data b. Delete any existing row c. Resize rows and columns d. Apply border and shading e. Apply merging/splitting of cells f. Apply sort g. Apply various arithmetic and logical formulas. 16. Create your resume using General Templates.	L1, L3, L4, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

[1] P. S. Pradeep K. Sinha, Computer Fundamentals, BPB Publications, 2017.

[2] P. Nortan, Introduction To Computers, Tata Mcgraw Hill Publishing Co Ltd, 2017.

Reference Book

[1] S. K. Basandra, Computer Today, Galgotia Publications Pvt. Ltd., 2010.

[2] J. P. J. C. S. L. Curtis Frye, 2007 Microsoft Office System Step by Step (Step by Step (Microsoft)), Microsoft, 2007.

[3] R. Taxali, Pc Software For Windows Made Simple, Tata Mcgraw Hill Publishing Co Ltd, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**2**	--	--	--	--	--	--	--	--	--	--	--	**1**	--	--
CO2	**3**	--	--	--	--	--	--	--	--	--	--	--	**1**	--	--
CO3	**3**	--	--	--	--	--	--	--	--	--	--	--	**1**	--	**3**

CO4	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO5	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2116	Computer Programming with C Language Lab	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable.	L3	5

3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement.		
LABORATORY SESSSION 2 LOOPING 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D	L3	6
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read nnum of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and deallocation. 4. Write a program to print elements of array using pointers.	L3	4

LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. YashwantKanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3

CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO3	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO4	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2202	INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is to expose the students to the fundamentals & basic concepts in Data Base Management Systems. This course discusses architecture of Database Systems with concept of relational model & ER model. This course explains techniques for database design, Normalization and database recovery and protection.

Course Objectives

This objectives of the course is to expose the students to

1. The fundamentals & basic concepts in Data Base Management Systems.
2. Architecture of Database Systems with concept of relational model & ER model.
3. The techniques for database design, Normalization and database recovery and protection.

Course Outcomes

After completing the course, the student will be able to:

CO1: Define and list the basic terminologies used in database

CO2: Explain and describe the relational model and relational algebra

CO3: Apply and construct the concepts used in modelling

CO4: Compare and illustrate different concurrency control protocols

CO5: Design the ER Model and SQL queries

CO6: Assess and interpret different issues associated with database systems

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction to DBMS** Definition of DBMS, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances.	L1, L2	8
MODULE 2: **Relational Database & ER Model** Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views, Entity, Types of Entity, Weak Entity Attributes, Entity sets, Entity – Relationship Diagrams.	L1, L2, L3	7
MODULE 3: **Relational Model Objects** Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key, Foreign Key and their rules; Relational operators, Relational Algebra, Relational Calculus, SQL Language, Data definition, Data retrieval and update operations.	L1, L2, L3	8
MODULE 4: **Database Design** Definition Of Functional Dependencies, Process Of Normalization, First Normal Form, Second Normal Form, Third Normal Form. BoyceeCodd Normal Form, Fourth Normal Form, Fifth Normal Form.	L3, L4	5
MODULE 5: **Data Recovery & Protection** Transaction ACID Properties ,Recovery- Transaction recovery, System recovery, Media Recovery, Concurrency Control Techniques Lost Update Problem , Dirty Read Problem, Locking, Dead Lock, Serializability; Security- Introduction.	L3, L4, L5, L6	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmasari, Navathe, "Fundamentals of Database Systems", Addision Wesley.
2. Korth, Silbertz, Sudarshan, "Database Concepts". McGraw Hill.

Reference Books

1. Majumdar& Bhattacharya, “Database Management System”, Tata McGraw Hill.
2. Date C J.” An Introduction to Database Systems”, Addision Wesley.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	1	1	1	--	--	--	--	--	--	--	--	1	--	--
CO4	1	--	--	1	--	--	--	--	--	--	--	--	1	--	--
CO5	1	1	1	1	1	--	--	--	--	--	--	--	1	--	--
CO6	1	-	-	-	1	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2211	DATA STRUCTURE THROUGH C LANGUAGE	L	T	P	C
Version 2017.1	Date of Approval:14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

This course is an introduction to the use, design, and analysis of data structures in computer programs. The very commonly used data structures like arrays, stacks, queues, lists, trees, and graphs will be discussed in detail. Sorting and hashing are important topics in the study of algorithms. They are also closely related to the design of data structures. Several algorithms to implement these techniques are included in the syllabus.

Course Objectives

The objective of this course is to

1. Equip the students with the basic concepts of data structures and algorithms
2. Understand concepts about searching and sorting techniques
3. Understand basic concepts about stacks, queues, lists, trees and graphs

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain fundamental data structures and algorithms and summarize their typical uses, strengths, and weaknesses; Address calculation, application of 1D and 2D arrays and various operations applied on arrays.

CO 2: Explain Stack and Queue data structure, various types of Queues; Representation of stack and queue in memory; Applications of stack and queue.

CO 3: Explain and compare link list with other linear data structure; Advantage, disadvantages, types, application and memory representation of link list.

CO 4: Explain Binary search tree and its types. Applying in-order, pre-order and post order traversal to create the tree; application of tree in searching and storing huge amount of data.

CO 5: Analyzeand compare the complexity different searching and sorting algorithms. Evaluate

algorithms and data structures in terms of time and memory complexity of basic operations.

CO 6: Explain different types of graphs and their representation in memory.Appling BFS and DFS graph traversal scheme to find shortest path. Determine minimum spanning tree using Kruskal and Prim's method.

Modules	**Blooms level***	**Number of hours**
MODULE 1: BASIC CONCEPTS AND ARRAY Definition Accessing the address of a variable, Declaring and initializing pointers. Accessing a variable through its pointer. Meaning of static and dynamic memory allocation. Memory allocation functions :malloc, calloc, free and realloc. Representation of arrays single and multi dimensional arrays. Address calculation using column and rows major ordering. Various operations on arrays, Application of arrays: matrix multi multiplication.	L1, L2 and L3	5
MODULE 2: STACKS AND QUEUES Definition, Array representation of stack.Operations on stack: Infix, prefix and postfix notations.Conversion of an arithmetic expression from Infix to postfix. Evaluation of postfix expression using stacks. Definition, Array representation of Queue. Types of queue: Simple queue, circular queue, double ended queue (deque), priority queue, operations on all types of Queues.	L2, L3 and L4	7
MODULE 3: LINKED LIST Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list : Singly linked list, Doubly linked list, Circular linked list and circular doubly linked list. Operations on singly linked list : creation, insertion, deletion, search and display (based on the different position as specified by the user).Linked representation of Stacks & Queues.	L2, L3 and L4	7
MODULE 4:	L2, L3, L4and	6

TREES Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology : Root, Node, Degree of a node and tree, Terminal nodes, Non terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree : Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and post order. Representation of trees and its application, Binary search tree: Insertion & deletion in BST. Height balanced (AVL) tree	L5	
MODULE 5: SEARCHING, SORTING AND COMPLEXITY Searching: Sequential and binary search, Comparison between linear and binary search. Sorting: insertion, selection, bubble, quick, merge, heap sort.	L2, L3 and L4	5
MODULE 6: GRAPHS Graph representation: adjacency list, adjacency matrix. Types of Graphs:Directed & Undirected Graph .Traversal scheme: Depth first search, Breadth first search. Spanning tree: definition, minimal spanning tree algorithms.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Seymour Lipschutz , "**Data Structures**", Schaum outlines, Revised 1st Edition
2. R.L. Kruse, B.P. Leary, C.L. Tondo, **"Data structure and program design in C**", PHI
3. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, **"Data Structures and Algorithms"**, 1st Edition, Pearson Education, Reprint 2003.

Reference Books

1. J. P. Tremblay and P. G. Sorenson, **Introduction to Data Structures with Applications**, McGraw – Hill Computer Science Series, Mc-Graw – Hill New York, 1984
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest,**" Algorithms"**, Prentice-Hall India(1999).
3. YeddidyahLangsam, Moshe J.Augenstein, Aaron M. Tenen Baum, "**Data Structures Using C and C++",** 2nd Edition, Prentice-Hall India
4. Mark Allen Weiss,"**Data Structures and Algorithm analysis in C++**",Addison Wesley (3rd Indian Reprint 2000).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	3	--
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	3	--
CO4	1	2	1	--	--	--	--	--	--	--	--	--	1	3	--
CO5	1	2	1	--	--	--	--	--	--	--	--	--	1	3	2
CO6	1	1	2	2	--	--	--	--	--	--	--	--	1	3	2

1: strongly related, 2: moderately related and 3: weakly related

IFT 2217	Web Technologies	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is aimed to provide a fundamental understanding of web site creation. Hypertext Markup Language (HTML) is the language used for designing most basic web pages (static). The basic and advanced features of HTML including lists, images, hyperlinks, tables, frames and forms will be introduced. It will also provide an overview of Cascading Style Sheets (CSS) and Extensible Markup Language (XML) which can be used with HTML for better data organization and presentation of content on website.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of website design through Hypertext Markup Language and basics of Javascript.
2. Provide an overview of Cascading Style Sheets and Extensible Markup Language for better management of website content.

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Define the purpose and structure of HTML for website development; identify and distinguish various HTML tags for background settings, text-formatting, HTML lists, image insertion and hyperlinks; prepare web page/website content using basic HTML tags and attributes.

CO 2: Describe HTML table, its structure and attributes; Apply table, frameset and frame elements to web-site design.

CO 3: Compare and contrast various form controls; design various kinds of form for user related information and apply front-level validations using Javascript.

CO 4: Differentiate between Inline, Internal and external CSS; modify the website content presentation by incorporating Cascading style sheet properties to existing HTML files.

CO 5: Demonstrate the use of XML document Type Declaration; differentiate between well-formed or Valid XML document.

Modules	**Blooms level***	**Number of hours**
MODULE 1: INTRODUCTION TO HTML History of HTML, Structure of HTML, HTML Basic: Elements, Tags and Attributes. Adding Comments, Adding Title, HTML Background: using plain color, using image, Formatting Text : Paragraph, inserting line break, Heading Style, Bold text, Italicized text, Underlined text, Teletype text, Strikeout, Superscript, Subscript, Important text, Emphasized text, Inserted text, Deleted text, Larger text, Smaller text. Working with Text: Changing font Sizes and Colors. Creating List: Ordered List, Unordered List, Definition List, Nested List. Inserting image, Creating Hyper Text Links, Creating Image Links, Horizontal Rules, Marquee Tag. Address Tag.	L1, L2 and L3	10
MODULE 2: TABLES AND FRAMES Tables: Creating Tables, Table Element, Adding Border, Adding Column Headings, Cellspacing and Cellpadding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting Image, Rowspan, Colspan, Assigning Background Colors. Frames: Frameset Element, Frame Element, Noframes Element, Specifying Target,Inline Frames.	L2 and L3	8
MODULE 3: FORMS AND VALIDATION Forms: Introduction to Forms, Form Elements, Text Field, Password Field, Label, Check Box, Radio Button, Selection List, Text Area, Button. Front level validations using JavaScript: Checking a Non-empty Text/Password Field, Restricting Length of Text/Password Field.	L4 and L5	8
MODULE 4: CASCADING STYLE SHEETS Overview of style sheets, Advantages, Different ways to use style sheet: External style sheet, Internal style sheet, Inline style sheet. Selectors: Element selector, Id selector, Class selector, Grouping selector. Adding style to a Document, Adding Comments in CSS.	L4 and L5	5

MODULE 5: XML Introduction to XML, XML Basics, XML Structure, XML Tags, XML Elements, XML Attributes, Adding Comments, XML Document Type Declaration: Internal DTD and External DTD. Well formed XML Documents and Valid XML Document	L3 and L4	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ivan Bayross , "HTML, DHTML, JavaScript, Perl, CGI" ,4th revised edition, BPB Publication, 2010, New Delhi.
2. Uttam.K.Roy, "Web Technologies" , Oxford University Press, 2011, New Delhi.

Reference Books

1. Thomas A. Powell, "HTML & XHTML: The Complete Reference", 4th Edition, Tata McGraw-Hill Publishing Company Limited, 2003, New Delhi.
2. Thomas A. Powell, "HTML & CSS: The Complete Reference", 5th Edition, Tata McGraw-Hill digital, 2010, New Delhi.
3. Heather Williamson , "XML: The Complete Reference", 1st edition, McGraw-Hill Osborne Media, 2001, New Delhi.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	**3**
CO2	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	--	**3**
CO3	**1**	**2**	**1**	**3**	--	--	--	--	--	--	--	--	**1**	--	**3**
CO4	**1**	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	**1**	--	**3**
CO5	**1**	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	**1**	--	**3**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2219	Computer Organization and Architecture	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of Digital Electronics				
Co-requisites	Nil				

Catalog Description

The course provides a detailed description about Computer System and all its Components. The process of execution of an Instruction from the time it arrives till it is finished is explained. The organization of various Computer System Components such as Registers, Stack is mentioned. Further, the interaction of CPU with Memory and Input Output devices is also explained in detail. The course also provides an introduction to traditional Microprocessor Concept and Assembly Language Program.

Course Objectives

The objective of this course is:

1. To provide an overview of computer's architecture.
2. To understand how a computer is organized and what are its different components.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic Computer System Architecture describing all the components; Memory, Input Output, CPU Registers, ALU and Control unit

CO 2: Explain the Instruction Cycle and Distinguish among Memory Reference, Register Reference and Input Output Reference Instructions.

CO 3: Explain the organization of CPU and method of executing instructions in parallel to increase CPU throughput.

CO 4: Explain the interaction of CPU with Input Output Devices and Organization of Memory Section

CO 5: Apply the concept of Microprocessor and rewrite various Assembly Language Scripts.

Modules	Blooms	Number

	level*	of hours
MODULE 1: **General Computer Architecture** Block Diagram of typical Computer, Memory Section, Input/Output Section, CPU, Registers, Arithmetic Unit, Instruction handling Areas, Stacks **Register Transfer Language and Micro operations**: Register Transfer, Bus and Memory Transfer, Arithmetic Micro operations(Binary Adder, Binary Adder-subtractor, Binary increment, Arithmetic Circuit), Logic Micro operations, Shift Micro operations, Arithmetic Logic Shit Unit	L1, L2	5
MODULE 2: **Basic Computer Organization and Design** Instruction Codes, Stored program organization computer registers, common bus system, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input Output Instructions and Interrupts	L1, L2	4
MODULE 3: **Central Processing Unit** General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC, CISC **Pipelining and Vector Processing:** Parallel Processing, Pipelining(General considerations), Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors	L2, L3 and L4	6
MODULE 4: **Input Output Organization** I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP, Serial Communication **Memory Organization:** Associative Memory(Hardware organization, Match logic), Cache Memory(associative mapping, Direct Mapping, Set Associative Mapping), Virtual Memory	L2, L3 and L4	6
MODULE 5: **Introduction to Microprocessor** Machine Language, Assembly Language, Assembler, High Level Language, Compiler, Interpreter, Internal Architecture 8085.	L2, L3	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M Morris, R. Mano,**"Computer System Architecture"**, 3rd Edition, PearsonEducationNew Delhi, 2017.

2. John D. Carpinelli's, "**Computer Systems Organization & Architecture**", 1st Edition,Pearson Education. New Delhi, 2002

3. John Hayes, "**Computer Architecture and Organization",**3rd Edition, McGraw Hill Education, 2017.

Reference Books

1. William Stellings, **"Computer Organization and Architecture",** 10th Edition, Pearson Eductaion, New Delhi, 2016.
2. P Chakraborty, **"Computer Architecture & Organization**", 1st Edition, Jaico Publishing House, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**3**	**--**
CO2	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**3**	**--**
CO3	**1**	**1**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO4	**1**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**
CO5	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

DISCRETE MATHEMATICAL STRUCTURE WITH APPLICATION TO CS

CourseCode: IFT 2222 **Credit Units: 03**

L-T-P:2-1-0

Course Objective:

The Objective of this course is to provide the fundamentals and the concepts of Discrete Mathematical Structures with Applications to Computer Sciences including Mathematical Logic, Boolean Algebra and its Applications, Switching circuit & Logic Gates, Graphs and Trees. Important theorems with constructive proofs, real life problems & graph theoretic algorithms to be covered with an aim of helping the students to understand the computational and algorithmic aspects of Mathematical Logic, Boolean Algebra, Graphs and Trees in the field of Computer sciences and its applications.

Course Contents:

Module I: Introduction

Permutation and Combination : Counting Techniques.

Relation: Type and compositions of relations, Pictorial representation of relations, closures of relations, Composite Relations, Equivalence relations.

Function: Types, Composition of function, Mathematical Induction, Discrete Numeric Function and Generating Functions

Module II:Mathematical Logic

Proposition, Propositional Calculus- Propositional Variables and Compound Propositions, Basic Logical Operations: -Conjunction, Disjunction, Negation, Conditional, Bi conditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid, Arguments, Tautologies, Contradiction, Contingency , Boolean Functions – Disjunctive Normal Form, Conjunctive Normal Form.

Duality Principle.

Module III: Graphs

Basic Terminology of Graphs , Handshaking Lemma , Sub graphs, and Union of Graphs , Connected graph, Disconnected graph, Null graph, Incidence matrix, Adjacency matrix, Degree of a graph, Directed Graph, Walk, Path, Circuit, Wheel, Eulerian graph, Hamiltonian graph, Planar graph , Kuratowski's graphs-I and II , Coloring , Bipartitie Graph , Cyclic Graph.

Module IV: Trees

Tree, Properties of Tree, Spanning Tree, Fundamental Circuit, Cut-Set, Cut-Vertices. Binary Tree , Rooted Trees, Path length, Minimum Spanning Trees, Huffman Encoding.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- Kenneth H. Rosen, "Discrete Mathematics and its applications", TMH
- Elements of Discrete Mathematics: C.L. Liu,TMH, Edition 4.
- Graph Theory with Applications to Engineering and Computer Science: N. Deo

References:

- Discrete Mathematics: Harikishan&ShivrajPundir,Pragati'sPrakashans.

IFT2216	**DATA STRUCTURE THROUGH C LANGUAGE LAB**		L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017		0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C Programming					
Co-requisites	Basic concepts of C Programming					

Catalog Description

The course is designed to develop skills to design and analyse simple linear and non- linear data structures like arrays, stacks, queues, lists, trees, and graphs. It strengthen the ability of the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures.

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of basic concepts of data structures in solving complex problems.
2. Provide demonstration of the data structure concepts like stacks, queues, lists, trees, graphs and various searching and sorting techniques

Course Outcomes

On completion of this course, the students will be able to

CO 1: Apply the knowledge of basic fundamentals of data structures in order to analyze the time and space efficiency of the data structure

CO 2: Demonstrate the use and applications of Stack and Queue data structure along with various types of Queues.

CO 3: Demonstrate and compare link list with other linear data structure; Advantage, disadvantages, types and application of link list.

CO 4: Apply the knowledge of trees and heaps and demonstrate the application of tree in searching and storing huge amount of data.

CO 5: Apply algorithm for solving problems like sorting, searching, insertion and deletion of data.

CO 6: Demonstrate the usage of graphs and their applications of BFS and DFS to find shortest path.

Modules	Blooms level*	Number of hours
1. Sample programs of 1D and 2-D arrays (a) Write a program to insert an element at any position in an array (b) Write a program to perform addition of matrix for order 3*3 (c) Write a program to perform multiplication of matrix of any order	L1, L2 and L3	4
2. Sample Programs of stack and queues. (a) Write a program that perform the following function i) Create stack of integers. ii) PUSH operation on stack iii) POP operation on stack (b) Write a program that perform the following function i) Create Queue of integers. ii) Insert operation on Queue iii) Delete operation on Queue (c) Write a program that perform the following function i) Create Circular Queue of integers. ii) Insert operation on Circular Queue iii) Delete operation on Circular Queue	L2, L3	4
3. Sample Programs of Linked List **(a)** Write a C program that perform the following: i) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion **(b)** Write a C program that performs the following: a) Create a doubly linked list of integers. b) Delete a given integer from the above doubly linked list. c) Display the contents of the above list after deletion .	L2, L3 and L4	6
4. Sample Programs of trees (a) Write a C program that uses functions to perform the following: i) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in Postorder.	L2, L3, L4and L5	2
5. Sample programs on sorting and searching (a) Write C programs for implementing the Bubble Sort (b) Write C programs for implementing the Selection Sort (c) Write C programs for implementing the Insertion Sort (d) Write a program to perform linear Search (e) Write a program to perform binary Search	L2, L3 and L4	6
6. Sample programs on graphs (a) Write C programs for implementing the graph traversal algorithms:		

Depth first traversal (b) Write C programs for implementing the graph traversal algorithms: Breadth first traversal	L3, L4 and L6	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Seymour Lipschutz , "**Data Structures**", Schaum outlines, Revised 1st Edition
2. R.L. Kruse, B.P. Leary, C.L. Tondo, **"Data structure and program design in C**", PHI
3. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, **"Data Structures and Algorithms"**, 1st Edition, Pearson Education, Reprint 2003.

Reference Books

1. J. P. Tremblay and P. G. Sorenson, **Introduction to Data Structures with Applications**, McGraw – Hill Computer Science Series, Mc-Graw – Hill New York, 1984
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest,**" Algorithms"**, Prentice-Hall India(1999).
3. YeddidyahLangsam, Moshe J.Augenstein, Aaron M. Tenen Baum, "**Data Structures Using C and C++",** 2nd Edition, Prentice-Hall India
4. Mark Allen Weiss,"**Data Structures and Algorithm analysis in C++**",Addison Wesley (3rd Indian Reprint 2000).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	3	2
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	3	--
CO4	1	2	1	--	--	--	--	--	--	--	--	--	1	3	--

CO5	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**2**
CO6	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**2**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2220	**Web Technologies Lab**	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	-	-	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is aimed to provide a fundamental understanding of web site creation. Hypertext Markup Language (HTML) is the language used for designing most basic web pages (static). The basic and advanced features of HTML including lists, images, hyperlinks, tables, frames and forms will be introduced. It will also provide an overview of Cascading Style Sheets (CSS) and Extensible Markup Language (XML) which can be used with HTML for better data organization and presentation of content on website.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of website design through Hypertext Markup Languageand basics of Javascript.
2. Provide an overview of Cascading Style Sheets and Extensible Markup Language for better management of website content.

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Prepare web page/website content various HTML elements including tags and attributes for background settings, text-formatting, HTML lists, image insertion and hyperlinks, Moving content across screen.

CO 2: Apply table, frameset and frame elements to web-site design.

CO 3: Construct various kinds of forms to take user related information and apply front-level validations using Javascript.

CO 4: Design and modify the website content presentation by incorporating inline, internal and external Cascading style sheets to existing HTML files.

CO 5: Demonstrate the use of well-formed or Valid XML document.

Modules	**Blooms level***	**Number of hours**
LABORATORY SESSION 1 INTRODUCTION TO HTML 1. Design a webpage to show various tags used for formatting text. 2. Design a webpage to show usage of various heading tags, font tag and background color. 3. Design a webpage to insert image as an inline element and in the background. 4. Design a webpage to show usage of ordered list, unordered list and definition list. 5. Design a webpage to show the use of hyperlink (Text & Image) and image map. 6. Design a webpage to show scrolling text and scrolling image using marquee tag.	L3	6
LABORATORY SESSION 2 TABLES AND FRAMES 1. Design a table using rowspan, colspan, cell padding, cell spacing, grouping, caption and border. 2. Divide a webpage into various frames (row or col wise) and populate them with web content.	L3	4
LABORATORY SESSION 3 FORMS AND VALIDATION 1. Create a log-in form/sign-up/feedback/registration form using various elements of form. 2. Write Javascript code to perform basic arithmetic operations, calculate factorial and other such functions using loops, if-else, switch etc. 3. Write javascript code to perform front-end validations (basic and data format validations) on HTML forms. 4. Prepare HTML code to perform form validations using HTML 5.0 elements.	L3	8
LABORATORY SESSION 4 CASCADING STYLE SHEETS 1. Apply Inline Cascading style sheet properties to enhance the appearance and outlook of webpage. 2. Modify the placement and styling of web page content (pictures, hyperlinks, images, videos, lists etc.) using Internal and/or External CSS file.	L3 and L5	4

LABORATORY SESSION 5 XML 1. Create an XML document for saving student details (Name, Enrollment number, Course, CGPA, and Contact No.)	L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ivan Bayross ,"HTML, DHTML, JavaScript, Perl, CGI",4th revised edition, BPB Publication, 2010, New Delhi.
2. Uttam.K.Roy, "Web Technologies", Oxford University Press, 2011, New Delhi.

Reference Books

1. Thomas A. Powell, "HTML & XHTML: The Complete Reference", 4th Edition, Tata McGraw-Hill Publishing Company Limited, 2003, New Delhi.
2. Thomas A. Powell, "HTML & CSS: The Complete Reference", 5th Edition, Tata McGraw-Hill digital, 2010, New Delhi.
3. Heather Williamson , "XML: The Complete Reference", 1st edition, McGraw-Hill Osborne Media, 2001, New Delhi.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	3
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	--	3
CO3	1	2	1	3	--	--	--	--	--	--	--	--	1	--	3
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	3
CO5	1	1	2	2	3	--	--	--	--	--	--	--	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

IFT2223	Introduction to Database Management System Lab	L	T	P	C
Version 2017.1	Date of Approval: 14 June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is design to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software.

Course Objectives

The objective of this course is

1. To make students familiar with the concepts and working of SQL.
2. Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.

CO2. Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.

CO3. Design and implement various data constraints on a database for a given problem.

CO4. Solve queries using concepts like joins, subqueries, aggregate functions, triggers etc.

CO5. Prepare PL/SQL blocks.

Modules	Blooms	Number

	level*	of hours
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1and L3	2
Lab Session 3 Working with SELECT query.	L1 and L3	2
Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7 To apply various set operators on data.	L1 and L3	2
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9 Implementation different types of JOINS in database.	L1 and L3	2
Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ivan Bayross , "SQL, PL/SQL the Programming Language of Oracle", 4th Ed.,BPB Publications,2009.

2. Lynn Beighley, "Head First SQL", 1st Ed., O′Reilly, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**
CO2	**1**	**-**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**2**
CO3	**1**	**-**	**1**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**2**
CO4	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO5	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

IFT2312	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING with C++	L	T	P	C
Version 2017.1	Date of Approval: 14 June,2017	3	0	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

This course is aimed at developing Programming skills using Object Oriented Technology in C++. This purpose of this subject is to improve the programming approach and development of software using OOPS technology. The Subject involves various concepts of Object Oriented Programming such as Classes, Objects, Polymorphism, Inheritance, Exception Handling etc. needed for a better approach towards software development.

Course Objectives

The objective of this course is

1. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate the application of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax and features .

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic principles of object oriented programming approach; Differentiate it

with procedural programming approach and also discuss difference between C and C++.

CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed .Explain how the objects can be instantiated and destroyed with static data member.

CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance ; use the concept of overriding and constructors in inheritance.

CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5:Demonstrate the exception handling mechanism. Compare and contrast various formatted and unformattedi/o function in file handling.

Modules	Blooms level*	Number of hours
Module I: Overview of C++ What is Object Oriented Programming, Characteristics of OOP, Difference between C and C++. Basics:-Input/Output in C++ using cin/cout, Preprocessor Directives, Data Types-Integer, Float, character, Enumerations, library functions, comments, storage classes, manipulators, operators in C++, scope resolution operator , memory management operator. arrays and strings .	L1 and L2	5
Module II: Classes and objects Functions: Simple functions, passing arguments to functions, returning values from functions, reference arguments, returning by reference, Overloaded functions, Inline functions, friend function , Structures and class. Classes and objects: A simple class, C++ objects as physical objects, objects as function arguments, returning objects from functions, static class data, array as class data member, array of objects.	L1, L2 and L3	7
Module III: Inheritance Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Constructors, Types of constructors, Destructors.	L2, L3 and L4	8
Module IV: Polymorphism Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions	L2, L3 and L4	8
Module V: Files and Exception Handling and I/O Files and Streams: streams, string I/O, character I/O, file pointer, error handling, command line arguments. formatted and Unformatted Input output, Introduction of Exception handling, Try Catch block, Rethrowing an Exception.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text

- Programming with C++, Ravi Chandran, TMH Publisher.
- Object Oriented Programming with C++, E Balagurusamy, Tata McGraw Hill
- Programming in C++, John R Hubbard, SCHAUM's series.

References:

- The complete reference C++, Herbert Schildt, TMH Publisher.

Turbo C++, Robert Lafore, Galgotia Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO2	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO3	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**
CO4	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**
CO5	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2314	Operating System	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization and Demonstrate an understanding of the differences between processes and threads, the different process or thread synchronization methods and the, the different memory management techniques used in Operating Systems, the different I/O management techniques used in Operating Systems, the tradeoffs in design and implementation concepts used in the development of Operating Systems.

Course Objectives

The objective of this course is to

3. Equip the students with the knowledge about categories of operating systems and their functions.
4. Provide detailed knowhow about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain operating systems and their evolution also differentiate among its various types.

CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.

CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.

CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.

CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	Blooms level*	Number of hours
MODULE 1: **INTRODUCTION AND SYSTEM STRUCTURE** What is an operating system, History of OS, OS concepts, Types of OS, OS Structure, OS Operations. System calls, Types of System Calls, System Programs, OS Structure, Virtual Machines, System Boot	L1, L2 and L4	6
MODULE 2: **PROCESS MANAGEMENT** Process Concept, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Overview of Thread Scheduling and Multiprocessor scheduling, Operations on Processes, Interprocess communication with example. Client-server Communication, Overview of Multithreaded programming models	L1, L2 and L3	6
MODULE 3: **PROCESS COORDINATION** Overview of Process Synchronization, Critical Section Problem, Semaphores, Classic problems. Deadlock- Prevention, Avoidance, Detection, Recovery, Algorithms	L1, L2 and L3	6
MODULE 4: **MEMORY MANAGEMENT** Memory Management Strategies-Introduction, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management-Demand Paging, Thrashing, Page Replacement	L1, L2 and L3	6
MODULE 5: **STORAGE MANAGEMENT** Overview of File System, Access Methods, Directory and Disk Structures, File Sharing, Protection, Disk Scheduling, Disk Management, I/O hardware	L1 and L2	6
MODULE 6: **PROTECTION AND SECURITY** Goals and Principles of Protection, Access Matrix, Security Problem, Program Threats, System and Network Threats, Overview of Cryptography, Overview of User Authentication and Security Defense.	L1 and L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Milenekovic, "Operating System Concepts", McGraw Hill
2. Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

Reference Books

4. Dietel, "An introduction to operating system", Addision Wesley
5. Tannenbaum, "Operating system design and implementation", PHI
6. Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
7. A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI
8. Willam Stalling " Operating system" Pearson Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT1	A	Attd	EE
Weightage (%)	15	10	5	70

CT: Class Test, A: Assignment, Attd: Attendance , EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	2	--	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	2	--	--
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2319	SOFTWARE ENGINEERING	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The purpose of this course is to acquaint students with the concepts and methods available for software development in industrial environments. Students will be exposed to a variety of topics such as design notations, costing techniques, and testing methods, as well as to the tools, which are available to support software specification, design, testing, and maintenance.

Course Objectives

The objective of this course is to

1. Have knowledge of basic SW engineering methods and practices, and their appropriate application.

2. Describe software engineering layered technology and Process framework.

3. give a general understanding of software process models such as the waterfall and evolutionary

models.

4. Understanding of the role of project management including planning, scheduling, risk

management, etc.

5. Understanding on quality control and how to ensure good quality software.

Course Outcomes

On completion of this course, the students will have

CO1. Basic knowledge and understanding of the analysis and design of complex systems.

CO 2. Ability to apply software engineering principles and techniques.

CO 3. Ability to develop, maintain and evaluate large-scale software systems.

CO 4. Knowledge to produce efficient, reliable, robust and cost-effective software solutions.

CO 5. Ability to work as an effective member or leader of software engineering teams.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Software Development Life Cycle Evolution of Software Engineering, Software Problems, Issues Involved in Software Engineering, Fundamental Qualities of a Software Product, Approaches to Software Engineering, Planning the development Process, Development/Product Life-Cycle Model, Kinds of Software Life-Cycle Model	L1, L2 and L3	8
MODULE 2: Project Management Project Management Concepts, Project Management Activities, Size Metrics. Software Requirement analysis and Specification, Cost Models.	L2, L3 and L6	10
MODULE 3: System Design Design Objectives, Design Principles, Effective Modular Design (Functional Independence, Coupling, and Cohesion), Design Tools and Techniques, Prototyping, Structured Programming.	L1, L3 and L4	10
MODULE 4: Coding Programming Practices, Verification, Monitoring and Control.	L1, L3 and L4	10
MODULE 5: Software Testing	L3, L4	10

Testing Fundamentals, Test case design, Functional Testing, Structural Testing, Test Plan, Activities during testing, Unit System, Integration Testing, Software Maintenance.	and L6	
MODULE 6: Software Reliability Concept of Software Reliability, Software Repair and Availability, Software Errors, Failure and Faults.	L3,L4,L6	05

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. FSoftware Engineering, A Practitioner's Approach - Roger S. Pressman. Tata McGraw Hill.

Reference Books

1. U· An Integrated Approach to Software Engineering, PankajJalote., Narosa Publishing House
2. Software Engineering Concepts, Richard Fairley, Tata McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO2	**1**	**--**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**

CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**
CO4	**1**	**1**	**2**	**--**	**--**	**--2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO5	**1**	**1**	**2**	**--**	**-2-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**2**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2321	**Fuzzy Logic**	L	T	P	C
Version 2017.1	Date of Approval: 14th June 2017	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course introduces the student to intelligent control theory, introduce Machine Intelligence and to understand Fuzzy Logic. Fuzzy logic is a tool that can be applied to ambiguous, complicated, complex or non-linear systems or problems which cannot be easily solved by classical techniques. This course discusses the fundamentals of fuzzy sets theory and fuzzy logic. In addition this course also introduces applications of fuzzy logic in several areas such as fuzzy control and fuzzy decision making.

Course Objectives

The objective of this course is:

1. To provide an overview of Fuzzy Set Theory and Fuzzy Logic.
2. To understand how Fuzzy Logic can help in solving Non Linear Problems

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the concept of Crisp Sets and Fuzzy Sets. Apply the knowledge to solve various problems.

CO 2: Distinguish between Fuzzification and Defuzzification. Demonstrate various problems using Fuzzy Logic Methodology

CO 3: Distinguish between various properties of Classical and Fuzzy Sets and apply the concepts to prove the properties using numerical problems

CO 4: Explain the concepts of Fuzzy Operations and Fuzzy Arithmetic and solve various mathematical problem based on that

CO 5: Define and Summarize various applications if Fuzzy Logic in real world problem solving.

Modules	Blooms level*	Number of hours
Module I: Introduction Crisp sets: Overview, Fuzzy sets : Basic types and concepts,Characterstics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets, Applications of fuzzy logic.	L1, L2 & L3	7
Module II: Fuzzy Logic Fuzzy logic introduction, basic concepts of fuzzy logic, linguistic variable, possibility distributions, fuzzy rules, fuzzy rule based inference system, fuzzy inference systems, defuzzification.	L1, L2 & L3	7
Module III: Fuzzy Sets Classical sets, set operation, fuzzy sets, representation of fuzzy sets, types of membership functions, designing membership functions, basic operations in fuzzy sets, introduction & features of membership functions, hedges, operations of fuzzy sets, properties of fuzzy sets.	L2, L3	8
Module IV: Fuzzy operations and Fuzzy arithmetic Types of operations, Fuzzy complements, Fuzzy intersection:t-norms, Fuzzy union:t-conorms,Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables,Airthmetic operations on intervals, Airthmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.	L2, L3	8
Module V : Applications Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics.	L1, L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. George. j. klir , Bo Yuan , "Fuzzy sets and fuzzy logic theory and application",ACM.

2. S.N.Sivanandam&S.N.Deepa, "Principles of soft computing", 2nd Edition, John Wiley &Sons 2011.
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Reference Books

1. Nguyen, Prasad, Walker, and Walker ,"A First Course in Fuzzy and Neural Control", 1st Edition, Chapman and Hall/CRC, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	--	--	--	--	--	--	--	--	--	--	--	**2**	**1**	--
CO2	**1**	**2**	--	**3**	--	--	--	--	--	--	--	--	**2**	**1**	--
CO3	**1**	**1**	**1**	**1**	--	--	--	--	--	--	--	--	**1**	**2**	--
CO4	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**2**	--
CO5	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	--	**2**	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2323	Accounting and Financial Management	L	T	P	C
Version 2017.1	Date of Approval: 14th June 2017	3	0	0	3
Pre-requisites/ Exposure	Attitude and Aptitude for the accounts				
Co-requisites	General Awareness and reading of the financial statements and regular newspapers.				

Catalog Description

This course will be learnt by student of B.Sc - IT discipline is more useful who has a passion for seeking knowledge in financial accounting business and its related areas and may be in future work on accounting software's and the financial environment.

To develop intellectual formation on Accounting and Financial domain Environment - concept, significance, objectives, concepts and conventions of accounting which makes the accounting base, through the golden rules of the accounting and accounts.

The study of Journal and Ledger includes double entry system, recording of the transactions into books and creating Journal, cash books and posting the entries into the ledger. Understanding the various financial books such as purchase books, return book, sales books etc..used into day to day business transactions.

The importance of Preparation of Trial balance, Final Accounts including adjustments Trading account, Profit and Loss account. isanalyzed from the perspective of a business firm. Other important dimensions which are into business environment are also studied in detail roles of Balance sheet and its assessment to make the accounts settled.

The role of banking and its instruments such as Cheque / Passbook/Deposit Sips etc along with the different types of bank's accounts and being make familiar to the student. The requirements of the reconciliations of bank statements are also explained.

The next domain of the subject includes in the accounting side is day to day opertaingfund's –Working Capital and its management. Various types and determinents of the working capital is important for the understanding of managing the operating funds.

Further to this, overview on the topics such as Cash management, Receivable management and capital budgeting along with its principles and techniques are been taught to students to make them familiar on the domain.

Finally, the impact of Financial Statements and the role of Ratio analysis in the accounting environment of a business firm is analyzed by understanding the importance of types of rations and applying the concept to analyze the financial position of the statement.

Course Objectives

The objective of this course is :

4. Develop the ability to use accounting concepts, principles, and frameworks to analyze and effectively communicate information to a variety of audiences. Outfit the students with the ability to study of basic accounting system by creating, recording and summarizing the accounting entries and converting them into the accounting statements..

5. Furnish student the knowledge on financial acquaintance's and tools that are in direct connect with the Indian banking business operations.

6. Prepare the student on accounting management tools by making them familiar of the various ways to analyze the effect of business transactions on an organization's accounting records and financial statements.

7. Equip the students with the theoretical framework on the concept of financial statements in relationship to decision making using the financial tools and concepts for which data needed to solve a mixture of financial decision troubles. Develop the ability to use accounting information to solve a variety of business problems.

Course Outcomes

On completion of this course, the students will be able to :-

CO1:*Outline* and *distinguish* various types of Account and Accounting related to general Business, *interpret* and *describe* the golden rules of the accounting on which process off accounting directly or indirectly depends on the accounting process, and able to *determine* and *predict* and develop the skill of recording financial transactions and preparation of reports in accordance with GAAP of business accounting records by *analyzing* the factors affecting at, which will help to *judge* and make *contrast* the various types of accounting books by *relating* with conceptual knowledge.

CO2:*Identify* the various entries that need to be recorded in the accounting records and their posting, *estimate* the impact of them on the business growth, in the form of either Gross /Net – Profit/Loss and the capabilityto *interpret* various business financial entireties and problem and challenges into domains accounting environment and *demonstrate* the skill to handle the issues related to trading account, manufacturing account, profit and loss account by *analyzing* and *summarizing* using principles and formats studied and generating the balance sheets to final positions of the company at that moment of time.

CO3: Acquire the knowledge of Indian Banking system associated into Indian business environment by *defining* and *describing* various banking terms. Able to *distinguish* between various banking instruments. *Explain* the importance of banking reconciliation statements. Recognize circumstances providing for increased exposure to errors and frauds

CO4: Identify and outline the needs and outcomes of the various accounting management tools by predicting and judging their scope for the financial business scenario. The knowledge of the Working capital also able to criticize and distinguish between various types of working capital, further able to determine and relate cash management process and receivelable management which acts as major accounting tools for day to day operations of the organization. Capital Budgeting, the scope and various ways and interpreting the challenges attached with them.

CO5: Define and explain importance of Ratio analysis and its advantages and limitations to summarize the usefulness and functions of them and state the applications and advantages attached with them by analyzing the financial statements.

Modules	Blooms level*	Number of hours

MODULE 1: Overview of Accounting – Definition of Accounting, Its Objectives, Advantages and Limitation. Principles, Concepts and Conventions of Accounting, Double entry system, Recording of Transactions in subsidiary Books – Journal, Cash Book, sales Book, Purchase Book and Return Book. Posting into Ledger accounts	L1, L2, L3, L4 and L6	8
MODULE 2: Final Accounts Preparation of Trial balance, Final Accounts including adjustments Trading account, Profit and Loss account, Balance Sheet.	L1, L2, L3 and L4	8
Module 3: Banking Opening of different types of Banks Accounts, Cheque Book, Pass Book, Deposit slips, Bank Reconciliation Statements	L1 and L2	4
Module IV: Management Accounting Tools Definition of working Capital, Types of Working Capital, Determinants of working Capital, Cash Management and Receivables Management. Capital Budgeting: Principles and Techniques.	L1, L2, L3 and L5,L6	9
Module V: Analysis of Financial statements Ratio Analysis: Meaning, Advantages, limitations, types of ratios and their usefulness Statements of charges in the Financial Position on Cash basis.	L1 and L2	7

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text&References:

Text:

- S.N. Maheshwari, Suneel K Maheswari and Sharad K Maheswari, Financial Accounting, Vikas Publications
- S.N. Maheshwari, Suneel K Maheswari and Sharad K Maheswari, Accounting for Management, Sultan Chand Publications

References:

- T.S Grewal, Book keeping,, S Chand Publishing
- Prasamna Chandra, Financial Management., Tata McGraw Hill
- IM Pandey, Financial Management., Vikas Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Att**	**CT**	**RP**	**S/V/Q**	**HA/ CA**	**EE**
Weightage (%)	5	10	8	4	3	70

Att: Attendance, CT: Class Test, RP : Research Paper Writing, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, CA: Case Analysis, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1
CO2	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1
CO3	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1
CO4	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1
CO5	-	-	-	-	-	1	3	-	-	2	1	2	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

IFT2315	Object oriented Programming with C++ Lab	L	T	P	C
Version 2017.1	Date of Approval: 14 June,2017	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

In this Lab course the object oriented programming using C++ is are implemented and demonstrated. Concepts covered would enable them to create complex applications related to object oriented programming. The objective of this course is to explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++.

Course Objectives

The objective of this course is to

1. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate the application of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax and features.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic programming structure of C++ program;

CO 2:Illustrate the different ways to write a program for member function inline and explain how the private members of a class can be accessed .Demonstrate how the objects can be instantiated and destroyed with static data member?

CO 3:Demonstrate the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance ; use the concept of overriding and constructors in inheritance.

CO 4: Demonstrate polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Demonstrate the exception handling mechanism. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules/Topics Covered**	Blooms	Number

	level*	of hours
1. Sample Programs for basic structure of program in C++ using Cout and Cin. a) WAP to print Fibonacci series of ‘n’ numbers, where n is given by the programmer. b) WAP to read a set of numbers in an array and to find the largest of them. c) WAP to sort a list of names in ascending order. d) WAP to sort an array of integers using functions. e) WAP to exchange contents of two variables using call by value and call by reference.	L3, L5	6
2. Sample Programs using concept of class and object. (a) WAP to maintain the student record which contains Roll number, Name, Marks1, Marks2,Marks3 as data member and getdata(), display() and setdata() as member functions. (b) WAP to add two complex numbers using friend function. (c) Write a program to exchange values between two classes using friend function. (d) Calculate area of different geometrical figures (circle, rectangle, square, triangle) using function overloading. (e) Create a class Complex for performing all arithmetic operations with complex numbers using inline function. (f) Write a class bank, containing data member: Name of Depositor, A/c type, Type of A/c, Balance amount. Member function: To assign initial value, To deposit an amount, to withdraw an amount after checking the balance (which should be greater than Rs. 500), To display name & balance.	L3, L5	4
3. Sample Programs using inheritance. (a) Declare a class of vehicle. Derived classes are two-wheeler, three-wheeler & four-wheeler. Display the properties of each type of vehicle using member functions of classes. (b) Create two classes namely Employee and Qualification. Using multiple inheritance derive two classes Scientist and Manager.	L3, L5	6

Take suitable attributes & operations. WAP to implement this class hierarchy. (c) Consider an example of book shop which sells books and video tapes. These two classes are inherited from base class called media. The media class has command data members such as title and publication. The Book class has data members for storing number of pages in a book and tape class has playing time in a tape. Each class will have member functions such as read() and show().In the base class ,these members have to be defined as virtual functions. Write a program to model the class hierarchy for book shop and process objects of these classes using pointers to base class.		
4. Sample Programs using concepts of polymorphism. operator overloading (a) Write a program to Subtract two Complex numbers using operator overloading. (b) Write a program to add and multiply two time values by overloading + and * operators respectively. (c) Write a class string to compare two strings, overload (= =) operator. (d) Write a program to compare age of two persons using this pointer. (e) write a program to implement the concept of pointer to object and pointer to derived class.	L3, L5	5
5. Sample Programs using exception handling and file handling. (a) Demonstrate the concept of exception handling for simple try catch block and multiple catch. (b) Write the programs using file handling.	L3, L5	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text

- Programming with C++, Ravi Chandran, TMH Publisher.
- Object Oriented Programming with C++, E Balagurusamy, Tata McGraw Hill
- Programming in C++, John R Hubbard, SCHAUM's series.

References:

- The complete reference C++, Herbert Schildt, TMH Publisher.

Turbo C++, Robert Lafore, Galgotia Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**
CO2	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

IFT2320	**OPERATING SYSTEM LAB**	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	0	0	2	1

Pre-requisites/Exposure	Basic knowledge of Operating System
Co-requisites	

Catalog Description

This course introduces the UNIX operating system commands, shell programming. Explores the use of operating system utilities such as vi text editors, filters, process handling etc.

Course Objectives

The objective of this course is to

1. Provide knowledge of working on Unix OS.
2. Provide sound foundation of writing Shell scripts.
3. Implement features like piping, filters and redirection.

Course Outcomes

On completion of this course, the students will be able to

CO1: To implement various UNIX commands.
CO2: To demonstrate the use of Vi Editor and other editors of UNIX.
CO3: To write simple Shell scripts.

Modules	Blooms level*	Number of hours
1. UNIX structure, history, basic commands.	L1,L3	4
2. Working of Vi Editor and its commands.	L1,L3	4
Shell Script 1. Write a Shell Script that takes a search string and filename from the terminal & displays the results. 2. Write a Shell Script that takes pattern and filename as command line arguments and displays the results appropriately i.e. pattern found/pattern not found. 3. Write a Shell Script that accepts only three arguments from the command line. The first argument is the pattern string, the second argument is the filename in which the pattern is to be searches and the third argument is the filename in which the result is to be stored. 4. Write a Shell Script which creates the following menu and prompts for choice from user and runs the chosen command. Today's date Process of user List of files	L1,L3	16

Quit to UNIX 5. Write a Shell Script that computes the factorial of a given number 6. Write a Shell Script that changes the extension of a group of files from txt to doc 7. Write a Shell Script that accepts both filename and a set of patterns as positional parameters to a script. 8. Write a Shell Script which will redirect the output of the date command without the time into a file. 9. Write a Shell Script (using while loop) to execute endlessly (until terminated by user) a loop which displays contents of current directory, disk space status, sleep for 30 seconds and display the users currently logged in on the screen. 10. Write a Shell Script that receives two filenames as arguments. It should check whether content of the two files is same or not. If they are same, second file should be deleted. 11. If a number is input through the keyboard, WASS to calculate sum of its digits. 12. Write a Shell Script which takes a command line argument of Kms and by default converts that number into meters. Also provide options to convert km to dm and km to cm. 13. Write a Shell Script using for loop, which displays the message "Welcome to the UNIX System" 14. Write a Shell Script to change the filename of all files in a directory from lower-case to upper-case. 15. Write a Shell Script that examines each file in the current directory. Files whose names end in **old** are moved to a directory named **old files** and files whose names end in **.c** are moved to directory named **cprograms.** 16. Write a Shell Script which searches all files in the given directory (to be taken as command line argument) for the file having the title (to be taken as command line argument), as the first line in the file. a) Display the contents of the searched file. b) In the end, printthe the file is ###, where ### is small-sized if total no. of lines is <50 ### is medium-sized if total no. of lines between 50&100 ### is large-sized. 17. Write a shell script which reports names and sizes of all files in a directory (directory would be supplied as an argument to the shell script) whose size is exceeding 1000 bytes. The filenames should be printed in descending order of their sizes. The total number of such files should also be reported. 18. Write a shell script to calculate and print the first ***m*** Fibonacci numbers. 19. Write a shell script to compute the **GCD** and **LCM** of two numbers. 20. Write a shell script to generate all combinations of 1, 2 and 3 using for loop.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. " Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

Reference Books

1. “Unix Programming Environment” The Kernighan and Pike Prentice – Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, A- Attendance, LR – Lab Record, V – Viva, PR- Performance, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	--	**1**	--	--	--	--	--	--	--	--	--	**1**	--	--
CO2	**1**	--	**1**	--	--	--	--	--	--	--	--	--	**1**	--	--
CO3	**1**	--	**1**	--	--	--	--	--	--	--	--	--	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2335	**Summer Internship Evaluation I**	L	T	P	C
Version: 2017.1	Date of Approval: June 2017	0	0	0	3
Pre-requisites/Exposure	Nil				

Co-requisites	Nil

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

IFT2413	DESIGN & ANALYSIS OF ALGORITHM	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3

Pre-requisites/Exposure	Basic knowledge of Data Structure
Co-requisites	Nil

Catalog Description

The designing of algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular problem.

Course Objectives

The objective of this course is to

1. Analyze the asymptotic performance of algorithms.
2. Demonstrate a familiarity with major algorithms and data structures.
3. Apply important algorithmic design paradigms and methods of analysis.
4. Synthesize efficient algorithms in technical design situations.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain use of asymptotic notations and principles of Divide and Conquer algorithms and solve various problems using that strategy.

CO2: Explain principles of Greedy Algorithms and Dynamic Programming and apply the strategy to solve various problems.

CO3: Explain basic concepts of graphs and apply various design strategies to solve graph related problems.

CO4: Apply the various algorithms indifferent areas of Computer Science.

Modules	Blooms level*	Number of hours

Module I: Introduction Algorithm Design paradigms - motivation, concept of algorithmic efficiency, concept of running time, analysis of algorithms, Growth of Functions, Asymptotic Notations, Structure of divide-and-conquer algorithms, analysis of divide-and-conquer algorithms, example algorithms - Quick Sort, Merge Sort, Strassen Multiplication, Recurrences- Substitution Method, Recursion Tree Method, Iteration Method , Master's Method.	L1, L2 and L3	8
Module II: Advanced Design Techniques Greedy Algorithms - Introduction, elements of greedy strategy, Fractional Knapsack Problem, activity selection problem, Dynamic Programming - Overview, difference between dynamic programming and divide and conquer, Matrix Chain Multiplication, Longest Common Sub-sequence, 0/1 - Knapsack Problem. Difference between Greedy and Dynamic Programming Approach.	L2, L3 and L4	10
Module III: Graph Algorithms Representation of Graphs, Graph Traversal - BFS and DFS, Topological Sort, Strongly Connected Components. Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, , Single Source Shortest Paths, Dijkstra's Algorithm, Bellmanford Algorithm, All Pair Shortest Path Problem, Floyd Warshall's Algorithm.	L2, L3 and L4	10
Module IV: Selected Topics Back tracking - Introduction, n-Queens Problem, NP-Completeness – Definition and examples of Class P, NP, NP-Hard and NP Complete, Polynomial reduction. Approximation Algorithms – Introduction, Performance Bounds, Example Problems – Vertex Cover Problem, Travelling Salesperson Problem. Randomized Algorithms. Application of algorithms in different areas of Computer Science.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evallluation

Text Books

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm"
2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"., Addison Wesley
3. D. E. Knuth, " The art of Computer Program, Addison Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO2	**1**	**--**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO3	**1**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO5	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2424	**Multimedia & its Applications**	L	T	P	C

Version 2019.1	Date of Approval: 15 May, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is intended to describe technical characteristics and performance of multimedia system and terminals. It will help in designing creative approach in application of multimedia devices, equipment and systems. . Also provide students to interpret and analyze measurement results obtained on the multimedia system and components. It provides to test multimedia communication systems and equipment in real conditions.

Course Objectives

The objective of the course is
1. to provide an overview of different multimedia technologies like audio and video including multimedia devices.
2. to include some practical sessions on these technologies.

Course Outcomes

After the completion of course, the students will be able to,

CO1. Identify and Describe basic principles of multimedia communication systems and its application.

CO2. Identify and define concepts of digital audio representation and processing using computer techniques and tools for creating and editing the Interactive multimedia applications.

CO3. Identify and describe video technology including Raster Scanning Principles.

CO4. Identify and describe video technology including Raster Scanning Principles, Sensors for T.V.Cameras, Color Fundamentals, color Video, Video Equipments and Worldwide Television Standards.

CO5. Identify and describe Multimedia Devices, Presentation Services and the User Interface. Apply multimedia in different field of life.

Modules	Blooms level*	Number of hours

Module I: Introduction Introduction: Objectives – History of Multimedia – Its market – Content copyright – Resources for multimedia developers – Types of produces – Evaluation – Hardware Architecture – OS and Software – Multimedia Architecture – Software library – Drivers.	L1, L2 and L3	8
Module II: Digital Audio Representation and Processing Uses of audio in computer applications, digital representation of sound, transmission of digital sound, digital audio signal processing, digital audio and the computer.	L2 and L3	7
Module III: Video Technology Raster scanning principles, sensors for T.V. cameras, color fundamentals, color video, video equipment, worldwide television standards.	L4 and L5	7
Module IV: Digital Video and Image Compression Evaluating a compression system, redundancy and visibility, video compression techniques, the JPEG image compression standards, the MPEG motion video compression standard, DVI technologies, Time Based Media Representation and Delivery.	L4 and L5	5
Module V: Multimedia Devices, Presentation Services and the User Interface-Introduction .Multimedia services and Window systems, client control of continuous media, device control, temporal co ordination and composition, hyper application.	L3 and L4	5
Module VI: Application of Multimedia Intelligent multimedia system, desktop virtual reality, multimedia conferencing.	L3 and L4	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & Reference Books

1. Multimedia systems John F. Koegal Buford Addison- Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	**1**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**	**2**	**3**
CO2	**1**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**	**2**	**3**
CO3	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**	**2**	**3**
CO4	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**	**2**	**3**
CO5	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2418	DATA COMMUNICATION AND COMPUTER NETWORKS	L	T	P	C
Version 2017.1	Date of Approval:14 June, 2017	3	0	-	3
Pre-requisites/Exposure	Basics of Computers				
Co-requisites					

Catalog Description

The goal is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth includes routing process, error detection techniques, noisy protocols and various applications of layers of OSI model.

Course Objectives

The objective of this course is to

1. To provide an overview of data communication and computer networks, network specific protocols, networking devices, OSI /TCP-IP Layer concepts.
2. To serve as a foundation for the study of advanced networking concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1. State the functions of data component in communication, networking devices, characteristics of topologies and describe the functionality of layers in OSI model.

CO2. Explain parallel and serial transmission; Differentiate between periodic and aperiodic signals including data encoding techniques.

CO3. Illustrate the working and applications of guided and unguided media. Explain working of ISDN.

CO4. Explain flow control and error control protocols.

CO5. Compare and Contrast different routing algorithms; discuss the frame format of IPv4 and IPv6 with working of TCP protocol.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Data Communication, Networks-protocols, advantages, disadvantages & applications, Line Configuration, topology, Transmission mode, Classification of networks. OSI Model, functionality of layers in OSI model, Protocols at each layer, encapsulation, peer-to-peer communication.	L1, L2	8
MODULE 2: Parallel & Serial Transmissions, Analog& Digital Signals, Periodic & Aperiodic Signals, Data encoding techniques-Digital data-digital signals, Digital data-Analog signals, Analog data- Digital signals, Analog data-Analog signals, Multiplexing. .	L2, L3 and L4	8
MODULE 3: Transmission Media-Twisted Pair Cable, Coaxial Cable, Fiber-Optics Cable, Radio frequency Allocation, Terrestrial Microwave, Infrared rays, Satellite Communication, Cellular Telephony. Introduction to ISDN.	L3 and L4	6
MODULE 4: Framing, Switching, Types of Errors, Error Detection & Correction (VRC, LRC, CRC, Checksum, Hamming Code), Flow Control (Stop-and-wait & Sliding Window), Error Control (Stop & Wait ARQ, Sliding Window ARQ using Go-back n method and Selective-Reject), IEEE Standards-802.3, Token Bus (802.4), Token Ring (802.5), FDDI.	L2, L3 and L4	6
MODULE 5: Routing process, Routing Algorithms-Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Addressing-IPv4, IPv6, Internetworking, Connection–oriented Vs Connectionless protocols-TCP,UDP.	L2, L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Data Communication and Networking by BehrouzForouzan,FourthEdition,TMH.
2. Computer Networks by A.S. Tanenbaum, Fifth Edition, Prentice Hall.

References Books

1. Data and Computer Communications by W. Stallings, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	--	**1**	--
CO2	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--
CO3	**1**	**1**	**2**	**3**	**3**	--	--	--	--	--	--	--	--	**1**	--
CO4	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	--
CO5	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2422	COMPUTER GRAPHICS	L	T	P	C
Version 2017.1	Date of Approval:14 June, 2017	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course presents basic principles for the design, use and understanding of computer graphics systems. This course includes various standard algorithms and their complexity to draw graphics objects. This course also teaches the students about different algorithms for 2D /3D transformation, clipping operations on objects, hidden surface removal and detection.

Course Objectives

The objective of this course is to

1. Equip the students with mathematical concepts of graphics algorithms to draw Graphics objects using C language and standard algorithms.
2. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions.

CO 3: Demonstrate solid filling using polygon fill algorithm with interior region testing methods.

CO 4: Apply 2D geometric transformations on 2D graphics objects with their practical implementation.

CO 5: Illustrate use of coordinate mapping and their transformation and analyze use of line and polygon clipping algorithms.

CO 6: Apply 3D geometric transformations on 3D objects with their practical implementation and assess logic behind visible surface detection algorithms with practical implementation of 3D transformations.

Modules	Blooms level*	Number of hours
Module I: Introduction of Graphics Development of Computer Graphics, Basic Graphics System and Standards. Graphics Devices: Raster and Random Scan Devices, Continual Refresh and Storage Displays, Display Processor, Color Display Techniques, Frame Buffer, Concepts in Raster Graphics and color generation.	L1, L2 and L3	6
Module II: Graphics Primitives Points, Pixels, Scan Conversion, Line Drawing Algorithms, Circle Drawing Algorithms, Anti-aliasing Technique, Methods of Character generator. Polygon Polygon representation, Polygon Filling algorithm, Inside/Outside Testing .	L1, L2 and L3	7
Module III: Transformation Scaling, Translation, Rotation, Composite Transformation , Fix point scaling , Rotation about arbitrary point, Reflection, Shears, Composite Transformation, Modeling and Coordinate Transformation Viewing: Interactive Picture Construction Techniques, Interactive Input/Output Devices	L2, L3 and L4	7
Module IV: Segment Segment Table, Creating Deleting and Renaming a Segment, Visibility and Image Transformation Windowing and Clipping: Window, View-port, Line clipping, polygon clipping, Window to viewport transformation, polygon clipping using Sutherland Hodgman Algorithm.	L2, L3 and L4	8
Module V: 3-D Transformation and Visible surface detection 3-D Transformation: shearing, scaling, translation. Rotation, Homogeneous coordinates. Visible surface detection: Z - buffer algorithm, Scaline Visible surface detection algorithm, paintess algorithm, fractal and its. Properties	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal,"Principles of Computer Graphics", 2nd Edition, DhanpatRaiPublications,New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.

2. F.S. Hill, “Computer Graphics using OPENGL”, 2nd edition, Pearson Education, 2003.
3. David F. Rogers; “Procedural Elements for Computer Graphics” TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1
CO5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2

1: strongly related, 2: moderately related and 3: weakly related

IFT 2420	DATA COMMUNICATION AND COMPUTER NETWORKS LAB	L	T	P	C
Version 2017.1	Date of Approval :14 June, 2017	-	-	2	1
Pre-requisites/Exposure	Basics of CISCO router				
Co-requisites	NIL				

Catalog Description

The course familiarizes with the equipment applications and protocols installed in enterprise networks, with a focus on switched networks, IP Telephony requirements, and security. It also introduces advanced routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF) Protocol. Hands-on exercises include configuration, installation, and troubleshooting.

Course Objectives

The objective of this course is to

1. Make the students understand configuration of routing protocols.
2. Provide a demonstration of troubleshooting of different protocols.

Course Outcomes

On completion of this course, the students will be able to

CO1. Apply the knowledge of CISCO router to understand its basic configuration, Enterprise network and implement inter -VLAN routing.

CO2. Demonstrate the configuration of OSPF and RIP protocol.

CO3. Demonstrate the configuration of EIGRP and BGP protocol.

CO4. Apply the knowledge of basic WAN connections using HDLC and PPP protocol.

CO5. Demonstrate the standard and extended ACL on router.

Modules	Blooms	Number

	level*	of hours
1. Drawing an Enterprise Network for Amity University showing its different campuses across the country. 2. Configuring all the devices (PCs, Servers, Switches) to create a LAN within campuses of the Enterprise Network. 3. Configuring Virtual LANs (VLANs) in an Enterprise Network. 4. Configuring Trunking and Inter-VLAN Routing in an Enterprise Network.	L3, L5	4
5.Implementing RIP (Routing Information Protocol) to enable communication between different LANs. 6. Implementing OSPF (Open Shortest Path First) to enable communication between different LANs. .	L3, L5	2
7.Implement EIGRP (Interior Routing Protocol) to establish connectivity within domestic campuses of the Enterprise Network. **8.** Implement BGP (Border Gateway Protocol) and Redistribution to establish connectivity between different campuses of the Enterprise Network.	L3, L5	2
9. Configuring WAN connectivity using protocols-HDLC and PPP. 10. Implementing Frame-Relay to configure WAN service provider cloud.	L3, L5	2
11. Configuring Standard and Extended ACLs on a Router. **12.** Troubleshooting Switching, Routing and ACL issues.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Data Communication and Networking by BehrouzForouzan,FourthEdition,TMH.
2. Computer Networks by A.S. Tanenbaum, Fifth Edition, Prentice Hall.

References Books

1. Data and Computer Communications by W. Stallings, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Software : Packet tracer.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	--	**1**	--
CO2	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--
CO3	**1**	**1**	**2**	**3**	**3**	--	--	--	--	--	--	--	--	**1**	--
CO4	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	--
CO5	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2421	DESIGN & ANALYSIS OF ALGORITHM LAB	L	T	P	C

Version 2017.1	Date of Approval: 14 June, 2017	0	0	2	1
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Data Structure				

Catalog Description

This course is intended to implement the various algorithm strategies for solving the problems using programming language.

Course Objectives

The objective of this course is to

1. equip the students with implementation of various algorithms.
2. provide sound foundation of design strategies for problem solving.
3. measure and compare the performance of different algorithms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement the concept of Divide and Conquer algorithms to solve various problems.

CO2: Demonstrate the use of Greedy Algorithms to solve various problems.

CO3: Apply the principle of Dynamic Programming to solve various problems.

CO4: Apply various design strategies to solve graph related problems.

Modules	Blooms level*	Number of hours
1. Programs on sorting algorithms using Divide and Conquer technique. • To implement Merge Sort. • To implement Quick Sort.	L1,L3	2
2. Programs on algorithm based on Greedy Method. • Implement Fractional knapsack. • Demonstrate the Activity Selection Problem.	L1,L3	4
3. Programs on algorithm based on Dynamic programming. • Implement 0/1 Knapsack problem.	L1,L3	6

• Compute the minimum number of multiplication for given set of matrices using Matrix Chain Multiplication. • Compute the length of longest common subsequence for given sequences using LCS.		
4. Programs on Graph Algorithms. • Print all the nodes reachable from a given starting node in a digraph using BFS method. • Check whether a given graph is connected or not using DFS Method. • Find minimum spanning tree of a given graph using Prim's algorithm. • Find minimum spanning tree of a given graph using Kruskal's algorithm. • Implement Single Source Shortest Path problem using Dijkstra's algorithm.	L1,L3	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm"
2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication.

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"., Addison Wesley
3. D. E. Knuth, " The art of Computer Program, Addison Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO3	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO4	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2423	**COMPUTER GRAPHICS LAB**	L	T	P	C
Version 2017.1	Date of approval: 14 June, 2017	-	-	2	1

Pre-requisites/Exposure	Basic Knowledge of C Programming
Co-requisites	Nil

Catalog Description

This course presents basic principles for the design, use and understanding of computer graphics systems. This course includes various standard algorithms and their complexity to draw graphics objects. This course also teaches the students about different algorithms for 2D /3D transformation, clipping operations on objects, hidden surface removal and detection.

Course Objectives

The objective of this course is to

1. Equip the students with mathematical concepts of graphics algorithms to draw Graphics objects using C language and with standard algorithms.
2. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling in objects using polygon fill algorithm with interior region testing methods.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation.

CO4: Illustrate use of coordinate mapping and their transformation and analyze use of line and polygon clipping algorithms with their practical implementation.

CO 5: Apply 3D geometric transformations on 3D objects with their practical implementation and assess logic behind visible surface detection algorithms with practical implementation of 3D transformations. Illustrate use of fractal and iterated function system and analyze the use of illumination model in 3D graphics.

Modules	Blooms level*	Number of hours
Module I: Introduction of Graphics	L3,L5	2

1. Demonstrate the use of graphics library functions to draw various graphics objects. 2. Demonstrate the use of graphics library functions to draw pie chart. 3. Demonstrate the use of graphics library functions to draw bar chart on screen.		
Module II: Graphics Primitives 1. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when m<=1 and m>1. 2. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when m<=1 and m>1. 3. Demonstrate the use of Breshenham's line drawing algorithm to draw line on the screen when m<=1 and m>1. 4. Demonstrate the use of circle drawing algorithm to draw circle on the screen. 5. Write a program to draw characters on screen using bitmap character generation method. 6. Write a program to fill a polygon using boundary fill algorithm. 7. Write a program to fill a polygon using flood fill algorithm.	L3,L5	6
Module III: Transformation 1. Write a program to translate a triangle where translation factors are tx=20 and ty=30. 2. Write a program to rotate a triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a square where scaling factors are Sx=2 and Sy=3. 4. Write a program to reflect a triangle about X axis. 5. Demonstrate combine 2D transformation after applying translation, rotation and scaling transformations. 6. Write a program to demonstrate fix point scaling where	L3,L5	6

scaling factors are Sx=2 and Sy=3.		
Module IV: Segment 1. Write a program to demonstrate line clipping algorithm to clip a line where line slop is m<=1. 2. Write a program to demonstrate window to viewport transformation and liner mapping of the object coordinates in viewport where size of viewport is half to the size of window. 3. Write a program to clip a polygon using Sutherland hodgeman polygon clipping algorithm.	L3,L5	4
Module V: 3-D Transformation and Visible surface detection 1. Write a program to translate a 3D triangle where translation factors are tx=20 and ty=30. 2. Write a program to rotate a 3D triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a 3D square where scaling factors are Sx=2 and Sy=3. 4. Demonstrate combine 3D transformation after applying translation, rotation and scaling transformations. 5. Write a program to draw Bezier curve and spline curve on the screen with 4 control points. 6. Write a program to generate fractals using iterated function system.	L3,L5	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal,"Principles of Computer Graphics", 2nd Edition, DhanpatRaiPublications,New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
4. Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL", 2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:
Examination Scheme:

IA				EE
A	PR	LR	V	70
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1
CO5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2

1: strongly related, 2: moderately related and 3: weakly related

IFT2510	Java Programming	L	T	P	C

Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

The objective is to impart programming skills used in this object oriented language java.The course explores all the basic concepts of core java programming like object,classes,data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes , objects, packages, swings ,socket programming

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of byte code and platform independence, demonstrate basic java based application development using operators, if-else, loops and arrays.

CO2: Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages

CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.

CO4: Explain event delegation model anddescribe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.

CO5: Explain the architecture of applet and concept of swing package. Demonstrate applications based on java applets and swings.

Modules	Blooms	Number

	level*	of hours
Module I:Java Basics Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.	L1, L2 and L3	6
Module II: Java Object Oriented Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package. .	L2 and L3	7
Module III: Exception Handling and Threading Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception. Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.	L2, L3 and L5	8
Module IV : Event Handling And AWT Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces AWT: Working with Windows, AWT Controls, Layout Managers	L2, L3, L4 and L5	8
Module V: Java Advanced AppletClass, Architecture, Skeleton, Display Methods. Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes. Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples	L2 and L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text:

1. "JAVA The Complete Reference" by Patrick Naughton& Herbert Schild, 10th Edition,TMH
2. "Introduction to JAVA Programming a primer", E.Balaguruswamy,4th Edition,TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI
2. "Java Script", By Jeff Frentzen and Sobotka,Tata McGraw Hill,1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

COMPUTER ORIENTED NUMERICAL METHODS

Course Code: IFT2517 **Credit Units: 03**

L-T-P: 3-0-0

Course Objective:

The objective of this course is to provide conceptual understanding of various numerical methods, in particular, with reference to numerical solution of non linear equations and system of linear equations, interpolation, numerical differentiation and integration and numerical solution of ordinary differential equations. Important theorems and different formulae for various numerical methods to be covered with an aim of helping the students to understand the fundamentals, concepts and practical use of these methods in the field of computer sciences and applications.

Course Contents:

Module I: Numeric Computation

Computer Arithmatic- Floating point numbers-operations, Normalization and their Consequences, Absolute, Relative and Percent Error.

Iterative Methods:- Zeros of a single Transacendental equations and Zeros of Polynomial Equations using Bisection ,False Position, Newton-Raphson Methods, Convergence of Solution.

Module II: Simultaneous Linear Equations

Solution of Simultaneous Linear Equations. Direct Methods:- Gauss elimination method, Pivoting, Gauss-Jordan Method. Iterative methods:-Jacobi's Methods, Gauss-Seidal Method.

Module III: Polynomial Interpolation

Newtons divided difference, Forward and backward difference Formulae, Difference Tables, Lagrange's Method.

Module IV: Numerical Differentiation and Integration

Formula for first and second order derivatives using newton's- Forward and Backward formula, Numerical Integartion, Newton-Cotes Formula: Trapizoidal rule, Simpson's $1/3^{rd}$ rule ,Simpson's $3/8^{th}$ rule, Weddle's rule.

Module V: Numerical Solution of Differential Equations

Basic Terminology of Differential Equations, Picard's Method, Euler's method, Taylor's Series method, Runge-Kutta Methods, Predictor –Connector Method.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- Jain M.K, Jain R.K andIyenger, Numerical Methods for Scientific and Engineering Applications, New Age international publishers

References:

- Rajaraman V, Computer Oriented Numerical Methods. PHI Learning pvt ltd
- Krishnamuty, E.V., Sen, S.K, Computer Based Numerical Algorithms. East West Press 1976

IFT2525	BASICS OF CLOUD COMPUTING	L	T	P	C
Version 2019.1	Date of Approval: 15 May, 2019	3	1	0	4
Pre-requisites/Exposure	General Networking and basics of virtualization				
Co-requisites	Nil				

Catalog Description

The course introduces the basic concepts and methods of Cloud computing and develops the concepts and skills necessary to build applications in Cloud environments. The course starts by explaining the concepts of cloud computing, cloud architecture, model and the concepts of Virtualization. It then explains how such ideas form the basis for creating Computing Clouds where the concept of resources is virtualized. Case studies are used to show how applications can be run in a Cloud and the principles of creating images to run in Clouds are explained. The programming skills for business models that underlie Cloud Computing are also presented.

Course Objectives

The objective of this course is to

1. Equip the students with concepts virtualization and Cloud
2. Provide an overview of security issues and various tools available in Cloud

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and differentiate between different types of computing and also determine them with the upcoming Cloud Computing environment.

CO 2: Identify the different layers in the architecture of Cloud and explain the different services, deployment models and types of virtualization available.

CO 3: Explain the power of scalability and fault tolerant system and other features of cloud, analyzing the management of cloud in business.

CO 4: Explain, apply and compare the various security issues and their solutions and policies for security in Cloud environment.

CO 5: Analyze programming Models, its workings and comparing them with each other.

Modules	Blooms level*	Number of hours
MODULE 1: Overview of Client/Server Computing, Peer to Peer Computing, Distributed Computing, Col-laborative Computing, Cloud Computing; Behaviour of Cloud Computing; Pros and Cons of Cloud Computing.	L1, L2 ,L3	8
MODULE 2: Understanding of Cloud Architecture, Cloud Storage, Cloud Services; Types of Cloud service development; Software as a Service, Platform as a Service, Web Services, On Demand Com-puting; Virtualization: Fundamental concepts of compute storage, Network virtualization; Pros and Cons of Cloud Service Development; Case study with Cloud Services Development Service and Tools.	L1,L2, L3	8
MODULE 3: Introduction to Scalability and Fault Tolerance with Cloud Computing; Cloud Solutions; Cloud Ecosystems; Cloud Business Process Management; Portability and Interoperability.	L1, L2 and L4	6
MODULE 4: Security Overview; Cloud Computing Security Challenges; Security Policy Implementation, Computer Intrusion Detection and Response, Virtualization Security Management and Virtu-al Threats; Cloud Security Controls; Cloud Computing Attacks; Cloud Security services; Se-cure Cloud Software requirements; Policy Implementation.	L2, L3 and L4	8
MODULE 5: Map Reduce; Hadoop ;Analyzing the data with Hadoop; Case Study on Google App Engine, Microsoft Azure and Hadoop.	L2, L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kai Hwang, Geoffrey C Fox & Jack G Dongarra, "**Distributed and Cloud Computing, From Parallel Processing to the Internet of Things**", Morgan Kaufmann Publishers, 2012.

- Michael Miller, "**Cloud Computing**", Pearson,2008.
- Anthony T. Velte, Toby J. Velte& Robert Elsenpeter, **"Cloud Computing- A practical Approach",** McGraw Hill, Chennai, 2017.

Reference Books

1. John W.Rittinghouse and James F.Ransome, "**Cloud Computing: Implementation, Management, and Security**", CRC Press, 2010
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "**Cloud Computing, A Practical Approach**", TMH, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	**3**	--	--	--	--	--	--	--	**2**	--	**1**	**1**	-	-
CO2	**1**	**2**	**3**	--	**2**	--	--	--	--	--	--	--	**1**	**1**	-	-
CO3	**1**	**2**	--	--	--	--	--	--	--	--	**1**	--	-	**1**	-	**2**
CO4	**1**	--	**3**	--	**2**	**1**	--	--	--	--	--	--	-	**1**	-	**2**
CO5	**1**	--	**2**	--	**1**	--	--	--	--	--	--	--		**1**	-	-

1: strongly related, 2: moderately related and 3: weakly related

IFT2522	LINUX	L	T	P	C
Version 2017.1	Date of Approval: 14 June 2017	2	0	0	2
Pre-requisites/Exposure	Basics of OS				
Co-requisites	Nil				

Catalog Description

The Objective of this course is to explore the idea of Linux platform to graduate students. The fundamentals concepts of Linux Operating System, commands and Shell Programming will be prepared by the students to work on Linux platform, which is the requirement of each industry and in academic The syllabus will cover the study of scripting languages such as PERL, TCL/TK and BASH Creation of programs in the Linux environment, the principles of scripting languages and usage of scripting languages in IC design flow.

Course Objectives

The objective of this course is

1. Ability to create and run scripts using Perl / TCL.
2. Ability to use Linux environment and write programs.

Course Outcomes

On completion of this course, the students will be able to

CO1. Outline basics of UNIX OS and Linux security system.

CO2. Describe Linux file system and related commands.

CO3. Illustrate implementation of Linux networking concepts.

CO4. Demonstrate Perl and Tcl/tk scripts.

Modules	Blooms level*	Number of hours
Module I: Introduction History of Operating System, Types of Operating Systems, History of Linux and Unix, UNIX Family, Unix System Architecture, Kernel, Shell: Types of shells, Files and Directories, Absolute Path and Relative Path, root and hierarchical file structure of Unix, telnet, Introduction to Linux server security and administration.	L1 and L2	6
Module II: Linux Basics	L2 and	6

Introduction to Linux, File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, Searching a file & directory, zipping and unzipping concepts.	L3	
Module III: Linux Networking Introduction to Networking in Linux, Network basics & tools, File transfer protocol in Linux, Network file system, Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.	L1 and L3	6
Module IV: Perl Scripting and Tcl/tk Scripting Introduction to Perl Scripting, working with Simple Values, Lists and Hashes, Loops and Decisions, Regular Expressions;Data Structures, Control Flow Commands, Procedures and Scope, Evel, Working With UNIX, Reflection and Debugging, Script Libraries, Tk Fundamentals, Tk by Examples, The Pack Geometry Manager, Binding Commands to XEvents, Buttons and Menus, Simple Tk Widgets, Entry and Listbox Widgets Focus, Grabs and Dialog.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Sumitabha Das, "UNIX: Concepts and Application", TMH, 4th Edition.
2. Kanetkar. "UNIX Shell Programming", BPB
3. Richard Petersen, "Linux: The Complete Reference", Mcgraw Hill Education, ISBN: 9780070222946, 0070222940, 6th Edition.

Reference Books

1. Red Hat Enterprise Linux 4: System Administration Guide Copyright 2005 Red Hat, Inc.
2. Randal K. Michael., "Mastering Unix Shell Scripting: Bash, Bourne, and Korn Shell Scripting for Programmers, System Administrators, and UNIX Gurus.", Wiley
3. James K L, "Linux: Learning the Essentials", Phi Learning Private Limited, ISBN: 9788120344754, 8120344758, Edition: 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**
CO2	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**1**	**-**
CO3	**1**	**2**	**1**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**-**
CO4	**1**	**1**	**--**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**

1: strongly related, 2: moderately related and 3: weakly related

IFT2504	**Java Programming Lab**	L	T	P	C
Version 2017.1	Date of Approval:June,2017	0	0	2	1

Pre-requisites/Exposure	Basics of Programming
Co-requisites	NIL

Catalog Description

In this Lab course the basic features of contemporary java are implemented and demonstrated. Problems or programs will be related to concepts of classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming. Concepts covered would enable them to create basic and complex console and graphical based applications for desktop and Internet.

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of various basic java features required in solving basic and complex problems.
2. Provide a demonstration of basic java programming concepts like classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the concepts learned of operators, if-else, loops and arrays to java based application development.

CO2: Demonstrate the use of various types of inheritances, polymorphisms, class objects, inheritances, packages and other concepts to basic and complex java programming problems.

CO3: Apply the knowledge of exception handling and multithreading concepts for some simple and complex applications.

CO4: Apply knowledge of event handling and AWT controls tocreate some new dynamic graphical applications.

CO5: Demonstrate graphical applications based on java applets, swings and event handling.

Modules/Topics Covered**	Blooms level*	Number of hours

Sample Programs using Objects and classes, Variable Types, Modifier Types, operators, LoopsDecision Making, Strings and Arrays, 1. WAP to display “Hello, it’s a first program in java”. 2. WAP to find sum of two integers taken as input from user at runtime. 3. WAP to find sum of two float numbers taken as command line arguments 4. WAP to find changed case of entered character. 5. WAP to find maximum of 3 integer numbers taken as input from user at runtime. 6. WAP in java to find out the greatest out of ten numbers stored using arrays. 7. WAP to create class with “name” as String and “age” as integer data members. The class should have two methods to take input from user and display the data. 8. WAP to find factorial of a number using class and object.	L3, L5	6
Sample Programs using Inheritance, Overriding, Polymorphism, Interfaces, Packages 1. WAP in java to illustrate the concept of interfaces. 2. WAP to create a package as MyPack having a class with three methods: max, fact and show. Use it in other folder with setting classpath and without setting class path. 3. Write a program in java to showcase uses of super keyword	L3, L5	4
Sample Programs using exception handling and threads 1. Write a program to demonstrate the use of nesting of try-catch block 2. WAP in java to illustrate the concept of using multiple catch clauses to handle different types of exceptions. 3. WAP in java to create a user defined Exception and throw it explicitly. 4. Demonstrate thread using Thread class and Runnable interface 5. Demonstrate various thread methods using a program	L3, L5	6
Sample Programs using event handling and AWT controls 1. Write a program to display “hello” in different color where user clicks left mouse button and “world” where right mouse button is clicked. Use black background. 2. WAP in java to create a Frame and handle window-closing event implementing the WindowListener interface. 3. WAP to create an Applet having various different buttons, recognizing them using action command string method and	L3, L5	6

handling click event generated by them. 4. WAP to create a frame and illustrate the concept of using an adapter class in place of interfaces for handling various mouse events generated over frame window. 5. WAP in java to create a frame with AWT controls (like label, push buttons, Checkbox, Checkbox Group) and handle various events generated by them. 6. WAP in java to create a frame with various AWT controls (like choice, list, TextField and Buttons) and handle the events thrown by them.		
Sample Programs using applets, swings and stream socket 1. Write an applet which will display "HAPPY" and "DEEPAVALI" as: The word "HAPPY" will roll from top to bottom and "DEEPAVLI" from bottom to "top" . Both will run at the same speed and stop simultaneously at the center of the applet. 2. Write an applet to display last 32 shades of red, green and blue in equal sized square grid accompanied by appropriate labels like" Last 32 shades of Red/Green/Blue color". Make use of BorderFactory to apply border for each individual shade. 3. Create an applet with one single button with caption "Click". On clicking the button will open a new Frame with title "Factorial". The frame will have two three controls :TextField, Label and button. On clicking button calculate the factorial entered in TextField control. 4. Create Java programs to demonstrate day time client and server. 5. Create java programs to create echo client and server	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text:

3. "JAVA The Complete Reference" by Patrick Naughton& Herbert Schild, 10th Edition,TMH
4. "Introduction to JAVA Programming a primer", E.Balaguruswamy,4th Edition,TMH

References:

3. "Introduction to JAVA Programming" By Daniel/Young PHI
4. "Java Script", By Jeff Frentzen and Sobotka ,Tata McGraw Hill,1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	35
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2523	**Linux Lab**	L	T	P	C

Version 2017.1	Date of Approval: 14 June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of OS				
Co-requisites					

Catalog Description

This course is designed to get students familiar with the advance concepts of Linux. The course provides familiarity to concepts like C Programming in Linux, Perl and TCL scripting. Students will learn practical on Linux and hence can work on any application based on Linux advanced concepts.

Course Objectives

The objective of this course is

1. To make students familiar with the advance concepts and working of Linux.
2. Provide an overview of Perl and TCL scripting.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate Linux basic concepts like shell scripts and working.

CO2. Explain concepts of C programming in Linux and apply them in real applications.

CO3. Design and implement various Perl scripts for a given problem.

CO4. Work on TCL scripts.

Modules	Blooms level*	Number of hours
Lab Session 1-2 Review of UNIX Commands, Redirection, Piping and shell programming.	L1 and L2	4
Lab Session 3-5 Writing shell scripts.	L1and L3	6
Lab Session 6-8 Writing Perl Script.	L1 and L3	6
Lab Session 9-10 To prepare C programs in Linux	L1 and L3	4
Lab Session 11-12 Working with Foreign Key and Check Constraint.	L1 and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Sumitabha Das, "UNIX: Concepts and Application", TMH.
2. Kanetkar. "UNIX Shell Programming", BPB
3. TCL Tutorial: https://www.guru99.com/tcl-tutorial.html
4. Randal L. Schwartz "Learning Perl: Making Easy Things Easy and Hard Things Possible", O'Reilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**1**	**2**	--	--	**3**	--	--	--	--	--	--	**1**	--	**2**
CO2	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	-
CO3	**1**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	-
CO4	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	--	**1**

1: strongly related, 2: moderately related and 3: weakly related

IFT2535	Summer Internship Evaluation II	L	T	P	C
Version: 2017.1	Date of Approval: June 2017	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**IM**	**EM**
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**1**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO2	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO3	**1**	**1**	**2**	**3**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

IFT2622	Internet of Things	L	T	P	C
Version 2019.1	Date of Approval: 15 May, 2019	3	1	0	4
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the working of Internet of Things.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of internet-of-things
2. Provide an overview of designing iot devices

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the Internet of Things along with its physical and logical design

CO2: Understand the potential and value of the Internet of Things and Smart Services.

CO3: Describe the technologies used for the Internet of Things and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design python programs and have hands on experience on python programming

CO5:DevelopIoT application of moderate complexity for a well-used mobile platform.using python, raspberry Pi and arduino programming

Modules	Blooms level*	Number of hours
Module I: Introduction to Internet of Things Definition & characteristics of IoT, physical design of IoT-things in IoT, IoT protocols, logical design of IoT- IoT functional block, IoT communication models, IoT communication	L1, L2	8

APIs, IoT enabling technologies-wireless sensor networks, cloud computing, big data analytics, communication protocols, embedded systems,IoT levels and deployment templates, IoT application		
MODULE 2: IoT and M2M Introduction to M2M , difference between IoT and M2M, SDN (software defined networking) and NFV (Network Function Virtualization) and their applications for IoT.	L2, L3 and L4	8
MODULE 3: IoT system management with NETCONF-YANG Need for IoT systems management, SNMP and its limitations, Network Operator Requirements, Introduction to NETCONF and YANG.	L2, L3 and L4	8
MODULE 4: Developing Internet of Things IoT Design Methodology,Logical design using Python- Python data types & data structures, control flow, functions, modules, packages, classes, file handling, Python packages for IoTJSON, XML, HTTPLib, URLLib, SMTPLib, IoT end devices-building blocks, Introduction to Raspberry Pi.	L2, L3 and L4	12
MODULE 5: Case Studies of IoT Home Automation- Smart Lighting, Home Intrusion Dectection, Cities-Smart Parking	L2, L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Internet of Things: A Hands-On Approach by ArshdeepBahga, Vijay Madisetti.
- Designing the Internet of Things by Adrian McEwen, Hakim Cassimally

Reference Books

- From Machine-to-Machine to the Internet of Things: Introduction to a New Age by Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**1**	**-**	**-**
CO2	**1**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**1**	**-**	**-**
CO3	**1**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**1**	**-**	**2**
CO4	**1**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**-**	**2**

1: strongly related, 2: moderately related and 3: weakly related

COMPUTER ORIENTED STATISTICAL & OPTIMIZATION METHODS

Course Code: IFT2616 **Credit Units: 03**

L-T-P: 3-0-0

Course Objective:

The objective of this course is to expose students to the fundamentals and concepts of statistical and optimization methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, skew ness and kurtosis, theory of probability, linear programming problems, transportation, assignment and game problems. This course is designed with an aim of helping the students to understand important theorems, different formulae and practical applications of these statistical and optimization methods in the field of Computer Sciences and Applications.

Course Contents:

Module I

Collection of Data, Sampling and Sampling Designs, Classification and Tabulation of Data, Graphical representation of Data, Measures of Central Value, Measures of Dispersion. Moments, Skewness, Kurtosis, Correlation and Regression.

Module II: Probability

Classical Definition of Probability,Algebra of Events, Probability Axoims, Conditional Probability.

Probability Distributions: Discrete and Continuous Distributions, Binomial Distribution, Poisson distribution, Normal Distribution.

Module III: Linear Programming

Mathematical Formulation of Linear Programming models and its Graphical Solutions, Simplex Method, Charne's Big M method, Two Phase Method.

Module IV: Transportation Problem

General Transportation model, Starting basic Solutions:-North west Corner Method, Least Cost Method, Vogel's Approximation Method, Test of optimality, unbalanced Problem. Assignment Problems

Module V: Game Theory

Two-Person Zero Sum Games, Maximin-Minimax Principal, Pure Strategies, Mixed Strategies, Expected Pay off, Concept of Dominence, Graphical Solution of m X 2 and 2 X n Games.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- P.K. Gupta &Manmohan, Linear Programming and Theory of Games, S Chand & Sons Educational Publishers
- S.C Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, S Chand & Sons Educational Publishers

References:

- Hogg, Probability and Statistical Inference, Prentice Hall Publication
- Alexander. M. Mood, Introduction to the Theory of Statistics, Tata McGraw Hill

IFT 2618	INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MYSQL)	L	T	P	C
Version 2017.1	Date of Approval: 14th June 2017	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes the content about PHP and its Programming Concepts. It includes basic architecture of running a PHP Script. It also includes the concepts about Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions: Call by Value and Reference. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

After completing the course, the students will be able to,

CO 1: Explain the basic concepts of PHP programming and apply it to rewrite PHP scripts using Strings and Functions

CO 2: Distinguish between various Conditional and Control Statements and rewrite PHP scripts based on the concepts

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to prepare responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity to prepare backend support for website.

CO 5: Compare and Contrast the behavior of various PHP frameworks and apply them to construct webpages and websites

Modules	Blooms level*	Number of hours
Module I: Introduction to Open Source and PHP programming Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.	L1, L2	4
Module II: Operators, Loops, Array, Exception and Error Handling Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array. Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.	L1, L2	5
Module III: Classes, File system, Passing Information between pages Object orientedprogrammingwithPhp, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server. HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.	L2, L3	7
Module IV: Workingwithdatabase HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input usingJavascript. MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL APIBuilding Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.	L2, L3	5
Module V: WorkingwithFrameworks Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Working with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.	L2, L3 and L4	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner**"PHP : The Complete Reference",** McGraw Hill Education, 2007.
2. Ivan Bayross, **"Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP",** 4th Edition, BPB Publication, 2010.
3. Laura Thomson, **"PHP and MySQL Web Development",** 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, **"Learning PHP, MySQL and Javascript",** Shroff Publishers and Distributers private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	3	1
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1
CO5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2

1: strongly related, 2: moderately related and 3: weakly related

IFT 2620	INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MYSQL) LAB	L	T	P	C
Version 2017.1	Date of Approval: 14th June 2017	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes PHP Programming Concepts. Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions: Call by Value and Reference are implemented. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Apply the basic concepts of PHP programming to rewrite PHP scripts using Strings and Functions

CO 2: Demonstrate the concept of Conditional & Control Statements and 1 D, 2 D & Associative Array using PHP scripts

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to prepare responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity to prepare backend support for website.

Lab Sessions	Blooms level*	Number of hours
1. PHP Scripts on Basic Concepts • Write the process of installation of web server. • Write programs to print all details of your php server. Use phpinfo(). • Write a program to give demo of ECHO and PRINT	L1,L3	2

command. • Write a program to implement the string functions.		
2. PHP Script on Conditional and Control Statements • Write a script to print Fibonacci series upto a given number. • Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice. • Write a script to calculate Factorial of a given number	L1,L3	4
3. PHP Scripts on Arrays : 1D, 2D, Associative • Write a program sort ten number by using array. • Write a program to demonstrate the concept of associative array. • Write a program to demonstrate the concept of multidimensional array.	L1,L3	4
4. PHP Scripts on Object Oriented Programming and File Handling Concepts • Write a program to demonstrate the concept of Classes & objects. • Write a php script including all the file handling functions.	L1,L3	2
• **PHP Scripts on Webpage and Website Design Concepts** • Create a login form with two text fields called “login” and “password”. When user enters “Amity”as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry.HTML in case of wrong username/password. • Write a program to design login form in which find the greatest number amongst three numbers. • WAP for Marksheet generation. • Design a webpage for entering the student details with all the validations applied on it. • Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”.	L1,L3	6
5. PHP Scripts on Database Creation an Connectivity • Create a database in MySql and connect that database	L1,L3	4

from PHP. • Write a program to Update, insert and delete the values of table in database.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner**"PHP : The Complete Reference",** McGraw Hill Education, 2007.
2. Ivan Bayross, **"Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP",** 4th Edition, BPB Publication, 2010.
3. Laura Thomson, **"PHP and MySQL Web Development",** 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, **"Learning PHP, MySQL and Javascript",** Shroff Publishers and Distributers private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

PR: Practical, LR: Lab Record, V: Viva, EE: End Semester Examination, A: Attendance, IA: Internal Assessment

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**
CO3	**1**	**1**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**

1: strongly related, 2: moderately related and 3: weakly related

IFT2604	Data Warehousing and Mining	L	T	P	C
Version 2017.1	Date of Approval: 14 June, 2017	3	0	0	3
Pre-requisites/Exposure	Introduction to Database Management System				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Data warehouse and Data Mining are discussed in detail. The different data mining techniques such as clustering, classification, association are introduced. As a precursor to the study of data warehouse its architecture, types of OLAP Servers, and usage of OLAP are studied in detail. The concepts further enhances the concept of different attributes supported by data mining process, application of data mining in marketing,banking,retail sector and other areas are analyzed. .

Course Objectives

The objective of this course is to

1. Equip the students with concepts of data mining techniques namely classification, clustering and association.
2. Provide an overview of data warehouse which include the usage of OLAP ,its characteristics, OLAP architecture.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Datawarehouse,its characterstics,Metadata concepts and its importance, The schemas of Data warehouse with their application areas.

CO2: Explain the architectural components of data warehouse and the challenges the data warehousing is facing.

CO3: Explain the indexing of OLAP, the different OLAP operations performed on the data cube.

CO4: Explain the concept of Data mining, its application and advantages

CO5: Explain the concept of different data mining techniques like association, clustering and classification. The implement of these techniques on the different data sets.

Modules	Blooms level*	Number of hours
MODULE 1: **Data Warehousing:**Data Warehouse definition & Characteristics, The need for data ware housing, Operational and Informational Data Stores, Difference between Data warehouse and DBMS, Benefits of Data warehousing,Data mart, Meta Data, Conceptual Modeling of Data Warehouses: star schemas, Snowflake, Fact Constellations with example each.	L1 and L2	8
MODULE 2: **Data Warehousing Components& Architecture** Data Warehouse Architecture, Components of Data Warehouse Architecture, Data Warehousing Topologies, Meta Data, Components of Meta data, Mapping Meta Data. Challenges with Data Warehousing.	L2, L3 and L4	8
MODULE 3: **On Line Analytical Processing (OLAP)** Definition: OLAP, Difference between OLTP and OLAP, OLAP Server Architecture, OLAP Operations, Multi Relational &Multi Dimensional: MOLAP, ROLAP, OLAP Tools, Metadata Repository, Data Warehouse Back-End Tools and Utilities.	L2 and L3	10
MODULE 4: **Data Mining** Introduction to Data Mining, Applications, Limitations, Techniques, Association Rules: Apriori Algorithm, Classification: Decision Tree Cluster Analysis: Features, Types of Cluster Analysis Methods: Partitional, Hierarchical, Density Based, Grid based Methods, , Web Data Mining, Search Engine, Case Study, Limitations	L2, L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jiawei Han &MichelineKamber,"Data Mining Concepts And Techniques",3rdEdition,Morgan Kaufmann Publication,An Imprint of Elsevier, 2015.
2. VipinKumar,PangNing "Introduction to Data Mining",3rdEdition,PearsonPublication,Chennai, 2016.

3. Mohammed,Wagner " Data Mining and Analysis", 4th Edition, Cambridge University Press,Brazil, 2018.

Reference Books:

1. Daneil,D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John wiley and Sons,Canada, 2015.
2. Paulraj"Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	--
CO2	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	--
CO3	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	--	--
CO4	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**3**	--
CO5	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**3**	--

1: strongly related, 2: moderately related and 3: weakly related

IFT2611	MOBILE COMPUTING	L	T	P	C
Version 2017.1	Date of Approval: 14th June 2017	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of Computer Networks				
Co-requisites	Nil				

Catalog Description

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Objectives

The objective of this course is to

1. Give a general overview of the cellular technology and the associated terms and discuss the generations of the mobile technologies starting from 1G to 3G techniques.
2. Illustrate the GPRS and WAP model for 2G internet connectivity in detail.
3. Elaborate the third-generation mobile services
4. Describe the Global Mobile Satellite Systems in detail and basic architecture of Bluetooth technology and advanced topics in mobile computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts mobile technology, computing and basic architecture of PCS and GSM.

CO2: Describe the mobile networking Infrastructure through 2G technologies (GSM, GPRS, WAP).

CO3: Explain the basic concepts of 3G technologies (WCDMA, CDMA 2000) and WLL.

CO4: Discuss the working of mobile satellite systems like IRIDIUM and GLOBALSTAR.

CO5: Expalin the concepts of Bluetooth technology, its working and protocols, virtual networks and enterprise networks.

Modules	Blooms	Number

	level*	of hours
Module I:Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signaling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.	L1, L2 and L3	8
Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).	L1 and L2	10
Module III:Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.	L1 and L2	7
Module IV: Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.	L1 and L2	7
Module V:Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evallllluation

Text Books

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin &ImrichChlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

Reference Books

1. "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
2. "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
3. "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO2	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO3	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO5	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

IFT 2619	E-commerce	L	T	P	C
Version 2017.1	Date of Approval:14, June 2017	3	0	0	3
Pre-requisites/Exposure	Knowledge of basic computer				
Co-requisites	Nil				

Catalog Description

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Objectives

The objective of this course is to

1. Understand the students with the role of consultants, vendors and employees.
2. Provide an overview of various phases in ERP implementation and identify various technologies used in ERP.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other. Demonstrate an understanding of the foundations and importance of E-commerce and assess electronic payment systems.

CO2: Understand concepts of reengineering, data mining, data warehousing and how they relate to ERP system implementations.

CO3: Explain the challenges associated with implementing enterprise systems and their impacts on organizations.

CO4: Describe the selection, acquisition and implementation of enterprise systems and demonstrate an ability to work independently and in a group.

CO5: Identify and describe typical functionality in an ERP system.

CO 6: Analyze the strategic options for ERP identification and adoption.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION AND CONCEPTS: Networks and commercial transactions - Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions. Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.	L1, L2 and L3	8
MODULE 2: INTRODUCTION ERP An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT &Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.	L1,L2 and L3	10
MODULE 3: ERP IMPLEMENTATION To be or not to be, ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.	L1,L2 and L3	8
MODULE 4: THE BUSINESS MODULES Business Modules in an ERP Package, Finance, Manufacturing (Production),	L1,L2 and L3	8

Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution		
MODULE 5: THE ERP MARKET ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA) ERP-Present and Future Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP, Appendices"	L2, L3 and L4	8
MODULE 6: BENEFITS OF ERP Time Reduction, Resource Utilization, Performance, Customer Satisfaction, Flexibility, Quality, Accuracy.	L1,L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Alexis Leon, "**Enterprise Resource Planning**", 4th Edition, TMH,2012.

Reference Books

1. Daniel E.O'Leary, "**Enterprise Resource Planning Systems**," Cambridge University Press, 2012.
2. Ellen Monk, Bret Wagner, "**Concepts in Enterprise resource planning**," Cengage learning, 4th edition, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	--	2	--	--	--	--	--	3	--	--	1	2	--	2	2
CO2	--	--	--	-	--	--	--	--	--	--	1	2	--	2	2
CO3	--	2	--	-	-	--	--	--	2	--	1	2	--	--	1
CO4	1	1	2	--	--	--	--	--	1	1	1	2	--	--	1
CO5	--	1	1	--	--	--	--	--	--	1	1	2	3	--	--
CO6	--	--	--	--	--	--	--	--	--	1	1	3	--	--	1

1: strongly related, 2: moderately related and 3: weakly related

IFT 2621	**CRYPTOGRAPHY & NETWORK SECURITY**	L	T	P	C

Version 2017.1	Date of Approval: 14 June,2017	3	-	-	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
2. Provide an overview of various network attacks and related security mechanism , various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describe and solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic ,gcd and inverse algorithm, chinese remainder theorem and its application in cryptography; Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management ,distribution ,secure exchange of keys and authentication certificate and its applications in real life. Explain , compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols : IPSec, SSL,TLS,SET; Describing malicious softwares and illustrating various design approaches to Firewell

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES	L1, L2 and L3	7
MODULE 2: Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relativeprime numbers, Extended Euclidean Algorithm,Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primaliry testing, Chinese Remainder theorem, DiscreteLogarithmicProblem,Principals of public key crypto systems, RSA algorithm, security of RSA.	L1,L2, L3	6
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, messageauthentication code, hash functions, birthday attacks, security of hash functions, Secure hashalgorithm (SHA)Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signaturestandards (DSS).	L1,L2, L3 and L5	7
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos	L1, L2 and L3	7
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Viruses and related threats, Firewalls	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. William Stallings,**"Cryptography & Network Security"**, 4th Edition, Pearson

Education,New Delhi, 2017.

2. Behrouz A. Forouzan, "**Cryptography & Network Security**", 2ndEdition,Tata McgrawHills,New Delhi, 2015

Reference Books

1. Douglas R.Stinsons, **"Cryptography Theory and Practice"**, 3rd Edition, McMillan Publications, Londan, 2003
2. AtulKahate, **"Cryptography & Network Security"**, 3rd Edition, Tata McgrawHills,New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**
CO3	**1**	**1**	**1**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**
CO5	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

IFT2637	**Major Project/ Dissertation**	L	T	P	C

Version: 2017.1	Date of Approval: 14 June, 2017	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

Examination Scheme:

Components	**S**	**PR1**	**PR2**	**PR3**	**V**	**E**	**R**	**FP**
Weightage (%)	20	10	10	10	10	10	15	15

S-Synopsis, PR1-Progress Report-1, PR2- Progress Report-2, PR3- Progress Report-3, V – Viva, FP – Final Presentation, R – Report, E-Execution

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO2	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO3	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO4	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
C05	**1**	**1**	**--**	**--**	**--**	**--**			**1**	**-**	**-**	**-**	**--**	**--**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engg. & Technology

B.Tech. + M.Tech. – Artificial Intelligence & Machine Learning

FLEXILEARN

-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

B.Tech+M.Tech(AI & ML)

Program Overview

B.Tech + M.Tech in (Artificial Learning and Machine Learning) is an undergraduate programme with advanced learning solutions imparting knowledge of advanced innovations like machine learning, often called deep learning and artificial intelligence.

Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and reacts like humans. The core problems of artificial intelligence include programming computers for certain traits such as Knowledge, Reasoning, Problem solving, Perception, Learning and Planning.

Machine learning is core part of AI in using which we make systems learn to attain objectives of AI. Learning without any kind of supervision requires an ability to identify patterns in streams of inputs, whereas learning with adequate supervision involves classification and numerical regressions.

Carriers in AI and Ml appeals large number of students now days. There are various opportunities to become Machine Learning Engineer, Data Scientist, Business Intelligence Developer, Research Scientist and Big Data Engineer/Architect after doing specialization in these areas. The leading employers working in this area includes top companies like Amazon, NVIDIA, Microsoft, IBM, Facebook, Lenovo, Adobe, Google etc.

Programme Objectives (PO)

The student will achieve:

- PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- P04. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Programme Specific Objectives(PSO)

On completion of the B. Tech + M.Tech in Artificial Intelligence & Machine Learning the student will be able to:

PSO1: Apply the knowledge of science, mathematics, statistics, information technology and other engineering disciplines to identify and solve complex robotics engineering problems across a broad range of application areas.

PSO2: Able to apply their knowledge and skills of robotics engineering for the overall benefit of society with an understanding of realistic constraints and work, communicate effectively in inter-disciplinary environment either independently or in a team and demonstrate significant leadership qualities.

PSO3: Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements.

PSO4: Able to work with technical uncertainty, understanding of the use of technical literature and other information sources, undertaking of appropriate codes of practice and industry standards, awareness of quality issues and their application to continuous improvement, thus recognizing the need to engage in lifelong learning.

Enclosure (s):

✓Supporting document for PSOs framing

✓Programme Structure, B.Tech + M.Tech Programme-AIML

PSO 1	PSO 2	PSO 3	PSO 4
Apply the knowledge of science, mathematics, statistics, information technology and other engineering disciplines to identify and solve complex robotics engineering problems across a broad range of application areas	Able to apply their knowledge and skills of robotics engineering for the overall benefit of society with an understanding of realistic constraints and work, communicate effectively in inter-disciplinary environment either independently or in a team and demonstrate significant leadership qualities.	Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements .	Able to work with technical uncertainty, understanding of the use of technical literature and other information sources, undertaking of appropriate codes of practice and industry standards, awareness of quality issues and their application to continuous improvement, thus recognizing the need to engage in lifelong learning. .

Basic Science Courses		**Interdisciplinary domain**	**Software Design**	**Computer Organization**	**Artificial Intelligence**	**Fundamental Computer Science Courses**	**Computer Network**	**Communication Skills**	**Behaviours Skills**	**Industry Training**	**Projects**
Engineering Mathematics-I		Digital Electronics	Theory of Automata & Computation	Computer Architecture	Artificial Neural Network	Introduction to Computers & Programming in C	Data Communication & Computer Networks	English-I	Understanding Self for Effectiveness*	Summer Internship Evaluation-I	Term Paper

Engineering Physics		Communication Systems	Introduction to OST (PHP & MySQL)	Microprocessor	Artificial Intelligence	Object Oriented Programming using C++	Introduction to IOT and Wireless sensor	English-II*	Problem Solving and Creative Thinking*	Summer Internship Evaluation-II	Project
Engineering Mechanics			Software Engineering		Fuzzy Logic & Genetic Algorithm	Database Management Systems	Distributed Operating System	Effective Listening	Group Dynamics and Team Building		Workshop / Independent Study
		VHDL Programming	Java Programming		Statistics and Probability Theory	Operating Systems	Mobile Computing	Presentation Skills	Stress and Coping Strategies		
Engineering Mathematics-II		VLSI Design	System Programming and Compiler Construction			Data Structures using C		Reading & Comprehension*	Personality, Nationalism and Human Values*		
Engineering Chemistry		Digital Image Processing	Advanced Java Programming			Computer Graphics		Corporate Communication*	Interpersonal Communication		
Electrical Science			Cryptography and Network Security			Analysis & Design of Algorithm		Employability Skills	Relationship Management		
Discrete Mathematics			HTML, CSS and Java Script			Data Mining		Workplace Communication	Personal &Professional Excellence		
			Dot Net Programming								
Neural Network and Fuzzy Logic		Robotic Simulation & Simultaneous Localization Mapping, Advanced Applied Mathematics for Engineering	Decision Making Systems	Basics of Communication,	Behavioural Communication& Relationship Management	Robotic Sensors, Vision and Hardware Implementation	Automation in Manufacturing Systems	Pattern Recognition & Image Processing	Research Methodology & Technical Report Writing		

I SEMESTER

AIE6104	Introduction to Computers and Programming in C	L	T	P	C
Version: 2020.1	Date of Approval: July 2020	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

CO 1:Define the purpose and structure of C Program for programming; identify and distinguish various datatypes and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.

CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs

CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language

CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.

CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics, and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7
Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.

2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO3	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO4	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO5	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

AIE6106	**Programming in C Lab**	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1

Pre-requisites/Exposure	Nil
Co-requisites	Nil

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing, and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement.	L3	5

6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement.		
LABORATORY SESSSION 2 LOOPING 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D	L3	6
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and deallocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

II SEM

AIE6204	**Object Oriented Programming Using C++**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Equip the students with the basic features of C++ supporting object-oriented programming. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.

2. Provide the overview of major object-oriented concepts to implement object oriented programs in C++ like encapsulation, inheritance and polymorphism, stream I/O, templates and operator overloading

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.

CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed. Explain how the objects can be instantiated and destroyed with static data member?

CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Explain the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).	L1 and L2	5
MODULE 2: CLASSES AND OBJECTS Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.	L1, L2 and L3	7
MODULE 3: INHERITANCE Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes	L2, L3 and L4	8
MODULE 4: POLYMORPHISM Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	L2, L3 and L4	8
MODULE 5: STRINGS, FILES AND EXCEPTION HANDLING Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. E. Balagurusamy ,"Object Oriented Programming with C++", Mc Graw Hill,6th Edition,2013.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	**1**	**2**
CO3	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	**2**
CO4	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**1**	--	**2**
CO5	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	**1**

1: strongly related, 2: moderately related and 3: weakly related

AIE6208	**Object Oriented Programming Using C++ Lab**	L	T	P	C

Version 2020.1	Date of Approval: JULY, 2020	0	0	1	1
Pre-requisites/Exposure	Turbo C++				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Perform object-oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax, features of, and how to utilize the Standard Template Library.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define and identify the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach.

CO 2: Determine the different ways to define a member function inline and explain how the private members of a class can be accessed. Solve how the objects can be instantiated and destroyed with static data member?

CO 3: Apply the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Relate the concept polymorphism with overloading in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Determine the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using objects and classes (a) Write a program to illustrate the concept of one class with two objects by taking student data. (b) Write a program to show the relationship of class and object to display roll no., grade and fee paid by student.	L1, L3, L5	4
2. Sample Programs for different use of private, public member variables and functions and friend functions (a) Write a program to define the member function outside and inside the class. (b) Write a program to read and display the information of N persons to illustrate the concept of array of objects. (c) Write a program to add two numbers to illustrate the use of friend function.	L1, L3, L5	4
3. Sample Programs using constructors and destructors (a) Write a program to assign and copy values to illustrate the concept of parametrized and copy constructor. (b) Write a program to show the order of constructor and destructor.	L1, L3, L5	4
4. Sample Programs using operator overloading (a) Write a program to add two numbers using binary operator overloading. (b) Write a program to illustrate the assignment operator overloading.	L1, L3, L5	4
5. Sample Programs using inheritance in and accessing objects of different derived classes (a) Write a program to compute the marks explaining the concept of multiple inheritance. (b) Write a program to find the factorial of a number using inheritance.	L1, L3, L5	4

6. Sample Programs using polymorphism and virtual functions (using pointers) and File Handling (a) Write a program to find the volume of cylinder and cuboid using function overloading. (b) Write a program to reverse a string using pointers. (c) Write a program to explain the relationship of inheritance and virtual function. (d) Write a program to read the student name and fee paid using read() function from the file.	L1, L3, L4, L5	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. "Object Oriented Programming with C++" By E. Balagurusamy.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**3**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO5	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly relateds

III SEM

AIE6302	**Database Management Systems**	L	T	P	C

Version 2020.1	Date of Approval: July, 2020	3	1	0	4
Pre-requisites/Exposure	Computer Fundamentals and Mathematics Set Theory				
Co-requisites	Nil				

Catalog Description

This course is design to get students familiar with the fundamentals & basic concepts in Data Base Management Systems and their use. This course discusses architecture of Database Systems with concept of different types of available database model, concurrency techniques and new applications of the DBMS. The techniques for database design, normalization, database recovery and protection will enable students to work easily and efficiently on real databases.

Course Objectives

The objective of this course is

1. To make students familiar with the fundamental and necessary concepts of DBMS.
2. Provide an overview of normalization, concurrency techniques and database recovery with examples.

Course Outcomes

On completion of this course, the students will be able to

CO1. Differentiate between traditional data processing system and database management system and understand characteristics and applications of DBMS in real world.

CO2. Explain and use different data models such as Entity Relationship Model, Network, and Relational Model etc.

CO3. Solve queries using relational algebra, relational calculus and SQL.

CO4. Illustrate normalization concepts and apply them in real database applications.

CO5. Explain database concurrency techniques and recovery mechanisms.

Modules	Blooms level*	Number of hours
Module I: Introduction **Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction.** **Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model.**	L1, L2 and L6	9
Module II: Hierarchical model &Network Model **Concepts, Data definition, Data manipulation and implementation.** **Network Data Model, DBTG Set Constructs, and Implementation**	L1and L2	9

Module III: Relational Model **Relational database, Relational Algebra, Relational & Tuple Calculus.**	L1 and L3	10
Module IV: Relational Database Design and Query Language **SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.**	L2, L3 and L4	10
Module V: Concurrency Control and New Applications **Transaction basics: ACID property, Lifecycle of Transcation, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.**	L2, L3 and L4	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Korth, Silberschatz, "Database System Concepts", TMH, 4th Ed., 2000.
2. Elmsari and Navathe, "Fundamentals of Database Systems", A. Wesley, 6th Ed., 2004

Reference Books

1. Date C. J., "An Introduction to Database Systems", Narosa Publishing, 7th Ed., 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	-	-
CO2	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	--	--
CO3	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	--	**1**	**2**	--	--	**2**	--	**3**	--	--	--	--	**1**	**1**	-	-
CO5	**1**	**1**	**3**	--	--	--	--	--	**2**	--	--	--	**1**	--	-	**3**

1: strongly related, 2: moderately related and 3: weakly related

AIE6307	**Database Management Systems Lab**	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is designed to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software in future.

Course Objectives

The objective of this course is

1. To make students familiar with the concepts and working of SQL.
2. Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.
CO2. Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.

CO3. Design and implement various data constraints on a database for a given problem.

CO4. Solve queries using concepts like joins, subqueries, aggregate functions, triggers etc.
CO5. Prepare PL/SQL blocks.

Modules	**Blooms level***	**Number of hours**
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1and L3	2

Lab Session 3 Working with SELECT query.	L1 and L3	2
Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7 To apply various set operators on data.	L1 and L3	2
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9 Implementation different types of JOINS in database.	L1 and L3	2
Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1,Ivan Bayross , "SQL, PL/SQL the Programming Language of Oracle", 4th Ed., BPB Publications,2009.

2.Lynn Beighley, "Head First SQL", 1st Ed., O′Reilly, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO2	**1**	**-**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**1**	**-**
CO3	**1**	**-**	**1**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**1**	**2**	**-**
CO4	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO5	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**1**	**1**	**--**	**-**

1: strongly related, 2: moderately related and 3: weakly related

AIE6303	**Operating Systems**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3

Pre-requisites/Exposure	Nil
Co-requisites	Nil

Catalog Description

In this course Operating System, its generic types, characteristics and functions are discussed in detail. Concepts covered would enable students to identify various categories of operating systems, with details about concepts of process management and scheduling. Contents will be helpful in identifying deadlocks in the system and designated approaches used to prevent, handle or recover from them. Further it covers the concepts of managing memory, devices and mechanisms for providing security to system and files using operating system.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge about categories of operating systems and their functions.
2. Provide detailed knowhow about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain operating systems and their evolution, also differentiate among its various types.

CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.

CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.

CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.

CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	Blooms level*	Number of hours

MODULE 1: INTRODUCTION TO OPERATING SYSTEM Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls	L1, L2 and L4	6
MODULE 2: PROCESS MANAGEMENT Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads Interprocess Communication and Synchronization: Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication. CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non-Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling. Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach	L1, L2 and L3	12
MODULE 3: MEMORY MANAGEMENT Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays	L1, L2 and L3	7
MODULE 4: DEVICE MANAGEMENT Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling, Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage	L1, L2 and L3	7
MODULE 5: FILE SYSTEM AND PROTECTION AND SECURITY File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management. Policy Mechanism, Authentication, Internal excess Authorization	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Milenekovic, “Operating System Concepts”, McGraw Hill
2. Silberschatz, P.B. Galvin “Operating System Concepts”, John Willey & son

Reference Books

1. Dietel, “An introduction to operating system”, Addision Wesley
2. Tannenbaum, “Operating system design and implementation”, PHI
3. Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
4. A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI
5. Willam Stalling “ Operating system” Pearson Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO2	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO5	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

AIE6308	**UNIX Programming Lab**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Operating System				

Co-requisites	

Catalog Description

This course introduces the UNIX operating system commands, shell programming. Explores the use of operating system utilities such as vi text editors, filters, process handling etc.

Course Objectives

The objective of this course is to

1. Provide knowledge of working on Unix.
2. Provide sound foundation of writing Shell scripts.
3. Implement features like piping, filters and redirection.

Course Outcomes

On completion of this course, the students will be able to

CO1: To implement various Unix commands.
CO2: To demonstrate the use of Vi Editor and other editors of UNIX.
CO3: To write simple Shell scripts.

Modules	Blooms level*	Number of hours
1. UNIX structure, history, basic commands.	L1,L3	10
2. Working of Vi Editor and its commands.	L1,L3	4
3. Shell Script i. Write shell script to find largest among three numbers. ii. Write shell script to print multiplication table of any number. iii. Write a shell script that copies multiple files into directory. iv. Write a shell script to find number of words and characters in a given file. v. Write a shell script to find the sum, the average and the product of the four integers entered. vi. Write a shell script to calculate the factorial of a number. vii. Write a shell script to generate Fibonacci series. viii. Write a shell script that computes the gross salary of employee. ix. Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else. x. Write a shell script which receives two file names as arguments. It should check whether the two file contents	L1,L3	10

	are same or not. If they are same then second file should be deleted. xi. Write a shell script to calculate gcd of two numbers. xii. Write a shell script to concatenate two strings and find the length of the resultant string.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. " Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

Reference Books

1. "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6304	**DATA STRUCTURES USING C**	L	T	P	C
Version:2020.1	Date of Approval: JULY, 2020	3	1	0	4

Pre-requisites/Exposure	Basic Knowledge of C++ Programming
Co-requisites	Nil

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1:Identify operations on array, multidimensional, string and their implementation and analyze space and time complexity of algorithms.

CO 2: Explain various algorithms and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Tradeoffs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.	L1, L2	7
Module II: Introduction to Stacks and queue Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem. Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.	L1, L2, L3, L4	8
Module III: Dynamic Data Structure **Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.**	L1, L3 and L4	7
Module IV: Trees and Graphs Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.	L1, L3 and L5	7
Module V: Sorting and Searching and file structures Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting. Searching: Linear search, Binary search **File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.**	L1, L4, L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, ― Fundamentals of Data structures‖, Ga lgotia publicat ions.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, ―Data structure and program design in C, PHI
3. Data structures and algorithms‖ – Schaum Series.
4. File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall
3. India(1999).
4. Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
5. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
6. Data Structures‖ – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**2**	--	--
CO2	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**2**	**2**	**1**
CO3	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**1**
CO4	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**1**

CO5	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**2**

AIE6305	**DATA STRUCTURES USING C LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Identify operations and their implementation on array and multidimensional, string and estmation space and time complexity.

CO 2: Explain various algorithm and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	**Blooms level***	**Number of hours**
Module I: Introduction to Data structures 1. Write a program to copy one string into another without using library functions. 2. Write a program to demonstrate array and linked list implementation of sparse matrix. 3. Write a program to multiply two 2D matrix.	L3,L5	2
Module II: Introduction to Stacks and queue 1. Write a program to implement push and pop operations on the stack. 2. Write a program to demonstrate conversion of infix to postfix. 3. Write a program to implement simple queue and perform insertion and deletion operation on it. 4. Write a program to implement circular queue and perform insertion and deletion operation on it. 5. Write a program to implement dqueue and perform insertion and deletion operations on it. 6. Write a program to implement priority queue and perform	L3,L5	4

insertion and deletion operation on it.		
Module III: Dynamic Data Structure 1. **Write a program to implement singly linked list and perform following operations on it.** • **Insertion at end** • **Insertion at last** • **Insertion at desired place.** 2. **Write a program to implement singly linked list and perform following operations on it.** • **Deletion at end** • **Deletion at last** • **Deletion at desired place.** 3. **Write a program to implement doubly linked list and perform following operations on it.** • **Insertion at end** • **Insertion at last** • **Insertion at desired place.** 4. **Write a program to implement singly linked list and perform addition of two polynomials.**	L3,L5	4
Module IV: Trees and Graphs 1. Write a program to calculate in order, preorder and post order traversal on binary tree. 2. Write a program to construct binary search tree and perform following operations on it. • Deletion of element • Insertion of elements. 3. Write a program to construct binary search tree and search an element in it. 4. Write a program to implement kruskal's algorithm to find out minimum spanning tree.	L3,L5	6
Module V: Sorting and Searching and file structures 1. Write program to implement insertion sort. 2. Write a program to search an element in array using binary	L3,L5	8

search. 3. Write a program to implement merge sort. 4. Write a program to implement quick sort. 5. Write a program to implement heap sort.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, ― Fundamentals of Data structures‖, Ga lgotia publicat ions.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, ―Data structure and program design in C, PHI
3. Data structures and algorithms‖ – Schaum Series.
4. File Structures an Object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill.
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India(1999).
3. Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
4. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
5. Data Structures‖ – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**
CO2	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CO3	**1**	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CO4	**1**	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CO5	**1**	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**2**

AIE6313	**Digital Electronics**	L	T	P	C
Version 2020.1	Date of Approval: JULY, 2020	2	0	0	2

Pre-requisites/Exposure	Nil
Co-requisites	Nil

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of knowledge to understand combinational and sequential circuits.
2. Explain the operation of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the difference between analog and digital signal; Describe the Boolean algebra; Analyze the SOP & POS form of Boolean function; Solve k-map and tabulation method to simplify the logical function; Apply universal gates to implement the given logic.

CO2: Define the multiplexer and decoder; Explain the adder & subtractor; Apply multiplexer to design Boolean function; Analyze the difference between decoder and encoder.

CO3: Define flip flops; Compare combinational and sequential circuits; Describe shift registers; Design counters and synchronous sequential circuits.

CO4: Explain the logic families; Compare the RTL, DTL, TTL and ECL logic families.

CO5: Define data convertors; Explain analog to digital convertor and digital to analog convertor.

Modules	**Blooms level***	**Number of hours**
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care	L1,L2 and L3	6

conditions, XOR & XNOR simplifications of K-maps, Tabulation method.		
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.	L1, L2,L4 and L5	8
MODULE 4: LOGIC FAMILIES RTL, DTL, TTL, ECL.	L2 and L4	2
MODULE 5: DATA CONVERTERS ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1 and L2	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
2. Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
3. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	1	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	1	2	--	--	--	--	--	--	--	--	1	2	--	3
CO3	1	2	1	2	--	--	--	--	--	--	--	--	1	--	--	3
CO4	2	3	3	3	--	--	--	--	--	--	--	--	1	--	--	--
CO5	2	3	3	3	--	--	--	--	--	--	--	--	1	--	--	3

1: strongly related, 2: moderately related and 3: weakly related

AIE6314	**Digital Electronics Lab**	L	T	P	C

Version 2020.1	Date of Approval: July 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this Lab course the combination and sequential circuits are designed, and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

1.Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

2. Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of logic gates;

CO 2: Illustrate the adder and subtractors.

CO 3: Demonstrate the code convertors.

CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2

8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
4. Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
5. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

3. **Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015**
4. **Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993**

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE-External Exam

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PS O 1**	**PS O 2**	**PS O 3**	**PS O 4**
CO 1	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**
CO 2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**

CO 3	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**
CO 4	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**

1: strongly related, 2: moderately related and 3: weakly related

AIE6311	**Electronic Devices & Circuits**	L	T	P	C
Version:2020.1	Date of Approval: July 2020	2	0	0	2
Pre-requisites/Exposure	Elementary Resistive Circuit, Theorems and Analysis Techniques: KCL. KVL, Nodal & Mesh Analysis, Thevenin & Norton Equivalents, Maximum Power Transfer.				
Co-requisites	Semiconductor Physics				

Catalog Description

This is the first course in Electronics and Communication Engineering, to educate and explain the methods used for biasing circuits in a graphical analysis of non- linear electronic circuits and also includes small signal transistor models, parameters and their frequency responses. Following this, analyzing different types of feedback amplifiers, and power amplifiers using transistor and designing of different electronic circuits are included in the course. This course also considers the mathematical modeling of active solid state devices their analysis and design of single state circuits. Topics covered include the study of device characteristics and applications of p-n-junction diodes, bipolar junction transistors, and field effect transistors.

Course Objectives

The objective of this course is to

1. build from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models
2. familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers and wave shaping circuits
3. build a foundation for Analog Electronics-II, Digital Circuits and Systems I & II, VLSI design and analog CMOS IC Design.

Course Outcomes

On completion of this course, the students will be able to

CO1. explain different types of diodes and demonstrate wave shaping circuits
CO2. explain operating principal of Bipolar Junction Transistor, its properties, biasing techniques and stability
CO3. describe low and high frequency transistor amplifiers along with single and multi-stage amplifier
CO4. explain operating principal of JFET, MOSFET, its properties, and biasing techniques

CO5. solve and analyse different negative feedback amplifiers configurations
CO6. describe and outline power amplifiers and their application.

Modules	Blooms level*	Number of hours
Module I: Semiconductor Diode and Diode Circuits Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.	L1 L2 & L3	6
Module II: Bipolar Junction Transistor Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{co}, V_{BE} &β, Stabilization factors, thermal stability.	L1 L2 & L3	9
Module III: Small signal Analysis of transistor and Multistage Amplifier Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)	L2 & L3	6
Module IV: Field Effect Transistors Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower	L1, L2 & L3	5
Module V: Feedback Amplifiers Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.	L1, L2, L3 & L4	6
Module VI: Power amplifiers Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.	L1 & L2	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jacob Millman, Christos Halkias, Chetan Parikh, Millman's Integrated Electronics, McGraw Hill Education, 2nd Edition, New Delhi
2. Sanjeev Gupta, Electronic Devices and Circuits, Dhanpat Rai Publications, 2010
3. Theraja B.L., Sedha R.S, Principles of Electronic Devices and Circuits, S Chand & Company, First Edition, New Delhi, 2002

Reference Books

1.Robert L. Boylestad: Electronic Devices and Circuits, Pearson Education, 11th Edition, 2013

2.Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 1st Edition, 2006

6. Nagrath I.J, Electronics: Analog and Digital, Prentice Hall India Learning Private Limited, Second Edition, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**--**	**3**
CO 2	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**--**	**3**
CO 3	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**--**	**--**
CO 4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**--**	**3**

CO 5	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**--**	**3**
CO 6	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**--**	**3**

1: strongly related, 2: moderately related and 3: weakly related

AIE6312	E-commerce and ERP	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basic computer				
Co-requisites	Nil				

Catalog Description

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Objectives

The objective of this course is to

1. Understand the students with the role of consultants, vendors and employees.
2. Provide an overview of various phases in ERP implementation and identify various technologies used in ERP.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other. Demonstrate an understanding of the foundations and importance of E-commerce and assess electronic payment systems.

CO2: Understand concepts of reengineering, data mining, data warehousing and how they relate to ERP system implementations.

CO3: Explain the challenges associated with implementing enterprise systems and their impacts on organizations.

CO4: Describe the selection, acquisition and implementation of enterprise systems and demonstrate an ability to work independently and in a group.

CO5: Identify and describe typical functionality in an ERP system.

CO 6: Analyze the strategic options for ERP identification and adoption.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION AND CONCEPTS: Networks and commercial transactions - Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions. Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.	L1, L2 and L3	8
MODULE 2: INTRODUCTION ERP An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.	L1,L2 and L3	10
MODULE 3: ERP IMPLEMENTATION To be or not to be, ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.	L1,L2 and L3	8

MODULE 4: THE BUSINESS MODULES Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution	L1,L2 and L3	8
MODULE 5: THE ERP MARKET ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc (SSA) ERP-Present and Future Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP, Appendices"	L2, L3 and L4	8
MODULE 6: BENEFITS OF ERP Time Reduction, Resource Utilization, Performance, Customer Satisfaction, Flexibility, Quality, Accuracy.	L1,L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1.Alexis Leon, "**Enterprise Resource Planning**", 4th Edition, TMH,2012.

Reference Books

1. Daniel E.O'Leary, "**Enterprise Resource Planning Systems**," Cambridge University Press, 2012.

2. Ellen Monk, Bret Wagner, "**Concepts in Enterprise resource planning**," Cengage learning, 4th edition, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	2	--	--	--	--	--	3	--	--	1	2	--	1	2	--
CO2	--	--	--	-	--	--	--	--	--	--	1	2	--	1	2	--
CO3	--	2	--	-	-	--	--	--	2	--	1	2	--	--	1	--
CO4	1	1	2	--	--	--	--	--	1	1	1	2	--	--	1	--
CO5	--	1	1	--	--	--	--	--	--	1	1	2	3	--	--	2
CO6	--	--	--	--	--	--	--	--	--	1	1	3	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6315	**Statistics & Probability Theory**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of statistics, the science of collecting, organizing, and interpreting numerical data are discussed. Emphasis will be placed on statistical reasoning and data analysis. The main topics are study design, descriptive statistics, probability theory, and statistical inference. As a precursor to the study of cryptography studies will be made on impact of various techniques for finding independence or dependence between data variables. The concepts learnt in the studies of statistics will be applied practically to solve number of real life problems using the statistical package like R and SPSS.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of statistics through problem solving and analytical approach.
2. Provide an overview of various statistical techniques: descriptive and inferential, parametric and non-parametric and practical statistics using R and SPSS.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain, describe and distinguish various population, sample, type of variables, measurement scales, central tendency, percentile and solve problems related to them.

CO 2: Explain the concept of descriptive and inferential statistics; probability theory; Solve problems based on probability; Explain binomial, poisson distribution and solve real life problems related to discrete and continuous random variable.

CO 3: Describe the concept of sampling distribution for large and small samples; Explain the concept of hypothesis testing and solve problems related using t-distribution and standard normal distribution.

CO 4: Explain concept of covariance and correlation and its applications in real life; Explain Anova and its use in real life problem solving; Explain and compare various regression analysis methods statistics for prediction

CO 5: Explain various parametric and nonparametric test and apply them to solve real life statistical problems

Modules	Blooms level*	Number of hours
Module 1: Introduction to Statistics and Data Analysis Statistical Inference, Samples, Populations and Experimental Design, The Hole of Probability Sampling Procedures; Collection of Data,Measures of Location:, Measures of Variability ,Discrete and Continuous Data , Statistical Modeling, Scientific Inspection, and Graphical Diagnostics, Graphical Methods and Data Description ,General Types of Statistical Studies	L1, L2 and L3	7
Module 2: Probability & Probability Distribution Sample Space, Events Probability of an Event, Additive Rules, Conditional Probability ,Multiplicative Rules ,Bayes' Rule, Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions , Joint Probability Distributions ,Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem, , Discrete Uniform Distribution, Binomial and Multinomial Distributions, Poisson Distribution and the Poisson Process. Continuous Uniform Distribution, Normal Distribution ,Areas under the Normal Curve ,Applications of the Normal Distribution , Gamma and Exponential Distributions, ,Chi-Squared Distribution.	L1,L2, L3	6
Module 3: Sampling Distributions and Estimation Random Sampling, Some Important Statistics, ,Data Displays and Graphical Methods, Sampling Distributions Introduction to Estimation, Statistical Inference ,Classical Methods of Estimation, Single Sample: Estimating the Mean ,Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits Two Samples: Estimating the Difference between Two Means ,Paired Observations , , Single Sample: Estimating a Proportion, Two Samples: Estimating the Difference between Two Proportion.	L1,L2, L3	6
Module 4: Hypotheses Testing Statistical Hypotheses: General Concepts ,Testing a Statistical Hypothesis, One- and Two-Tailed Tests, The Use of *P*-Values for Decision Making in Testing Hypotheses, One Sample: Test on a Single Proportion ,Two Samples: Tests on Two Proportions, Exercises ,One- and Two-Sample Tests Concerning Variances, Goodness-of-Fit Test, Test for Independence (Categorical Data),Test for Homogeneity, Testing for Several Proportions	L1, L2 L3	7
Module 5: Simple Linear Regression and Correlation Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted. Model Analysis-of-Variance, Approach, Test for Linearity of Regression: Data with Repeated Observations, Data Plots and Transformations, Simple Linear Regression Case Study, Correlation, Classification	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Probability & Statistics for Engineers & Scientists", Ronald E. Walpole,Pearson 2007
2. Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.

3. Torsten Hothorn and Brian S. Everitt , “A Handbook of Statistical Analyses Using R”, Chapman and Hall/CRC, 2006.

Reference Books

1. Pal and Sarkar, “Statistics: Concepts and Applications”, Prentice Hall India Learning Private Limited, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO2	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**1**	**1**	**1**	--	-	--	--	--	--	--	--	--	**1**	**1**	--	--
CO4	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO5	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

IV SEM

AIE6403	**Discrete Mathematics**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Basic mathematics: Set Theory and Logic Gates				
Co-requisites					

Catalog Description

This course is intended for students, those who have little bit knowledge of logical gates and basic logical mathematics. Knowledge of basic mathematics is necessary: they need to be comfortable with simple logical, including operator precedence. They should also be comfortable working with simple recursive functions. This course will give you a better understanding on how to develop own algorithms for the conversion into programs. More importantly, you'll start to learn computational thinking, which is a fundamental approach to solving real-world problems. Computer programming languages share common fundamental concepts, and this course will introduce you to those concepts using logical thinking.

Course Objectives

The objective of the course is to:

1. Study of the logical and mathematical relationships between discrete objects using application of Boolean algebra, graphs, lattice and trees.
2. Relate computing theory with applications and design their project machine like Finite state machineusing algorithmic approach, and able
3. Apply theknowledge of graph algorithms in daily life research problem solving.

Course Outcomes

On completion of this course, the students will be able to:

CO1. To give the study of the logical and mathematical relationships between discrete objects

based on applications of propositional arguments.

CO2. Students will be able to relate computing theory with real life applications.

CO3. They can understand and design their project machine like finite state machine, Petri nets using

algorithmic approach

CO4. Able to understand the importance of graph algorithms in daily life research problem solving

CO5. To describe the applications of Boolean algebra, graphs, lattice and trees in software engineering.

Modules	Blooms level*	Number of hours
Module I: Sets, Relation and Functions: Sets and Subsets, Operations on Sets, Set Identities, Matrices, Mathematical Structures, Principle of Inclusion and Exclusion. Product Sets and Partitions, Relations and Digraphs, Properties of Relation, Equivalence Relation, Functions: Properties of Function, Composition of Function, Inverse, Binary and n-ary operations.	L1, L2 and L3	12
Module II: Logic Proposition, Propositional Calculus- Propositional Variables and Compound Propositions, Basic Logical Operations: -Conjunction, Disjunction, Negation, Conditional, Bi-conditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid, Arguments, Tautologies, Contradiction, Contingency.	L1,L2, L3	11
Module III: Counting Pigeonhole principle, Mathematical Induction, Recurrence Relation: Solving Linear Homogeneous Recurrence Relations with Constant Coefficients, Solving Recurrence Relations using Generating Functions.	L1,L2, L3 and L5	11
Module IV: Lattices Lattices: Lattices as partially ordered sets, their properties, duality, Lattices as algebraic systems, Sub lattices, Direct products, Bounded Lattices, Complete Lattices, Complemented Lattices and Distributive lattices.	L1, L2 and L3	14

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. J. P. Trembley &R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-HillBookCo.,1997.

2. J.L.Gersting, Mathematical Structurefor Computer Science (3rded.), Computer Science Press, Seymour Lepschutz, Finite Mathematics, McGraw-Hill BookCo. NewYork.

Reference Books

1. J .E .HopcroftandJ. D. Ullman, Introduction to Automata Theory Languages&Computation, Narosa Publishing House, Delhi.
2. C.L.Liu, Elements of Discrete Mathematics, Tata McGraw-Hill PublishingCo. Ltd, NewDelhi.
3. N.Deo, GraphTheory with Applications to Engineering and Computer Sciences, Prentice Hall of India,

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	2	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	2	-
CO5	1	2	2	--	--	--	--	--	--	--	--	--	2	2	3	-

AIE6404	**A**rtificial intelligence	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Exposure to data structure and programming and an ability to discuss algorithms is the only pre-requisite.				
Co-requisites	Nil				

Catalog Description

Introduction to computational models of thought and construction of intelligent information systems. Topics include search algorithms, data dependencies and truth-maintenance systems, approaches to knowledge representation, automated deduction, reasoning under uncertainty, and machine learning.The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Objectives

The objective of this course is to

1. Provide an overview of problem solving skills methods using Artificial Intelligence.
2. Equip the students with the study of programming languages that is used to develop an Intelligence System.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners and Understand the various searching techniques.

CO2: Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.

CO3: Acquire the knowledge of real world Knowledge representation. Apply concept Natural Language processing to problems leading to understanding of cognitive computing.

CO4: Use different machine learning techniques to design AI machine and Write algorithms and implement programs in ‘Prolog’ language.

CO5: Explain some of the more advanced topics of AI such as Robotics and Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.

Modules	Blooms level*	Number of hours
MODULE 1: PROBLEM SOLVING AND SCOPE OF AI Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction. PROBLEM SOLVING State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.	L1, L2, L3 and L4	10
MODULE 2: KNOWLEDGE REPRESENTATION Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.	L1, L2 and L4	6
MODULE 3: UNDERSTANDING NATURAL LANGUAGES Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts, Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation.	L1, L2 and L4	7
MODULE 4: EXPERT SYSTEM Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, R1 LEARNING Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. Programming Language: Introduction to programming	L1, L2, L4 and L5	7

Language, LISP and PROLOG. HANDLING UNCERTAINTIES Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.		
MODULE 5: INTRODUCTION TO ROBOTICS Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.	L1, L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.
3. John J. Craig, "Introduction to Robotics", Addison Wesley publication.
4. Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", PHI Publication.
5. Tsuneo Yoshikawa, "Foundations of Robotics", PHI Publication

Reference Books

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
3. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
4. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	**--**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**2**	**--**	**--**
CO2	**1**	**2**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**2**	**1**	**--**	**2**
CO3	**1**	**3**	**--**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**3**	**2**	**--**	**--**	**1**	**2**
CO4	**1**	**--**	**1**	**3**	**1**	**--**	**--**	**--**	**3**	**--**	**--**	**2**	**2**	**1**	**--**	**--**
CO5	**1**	**1**	**1**	**2**	**--**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

AIE6406	Artificial intelligence LAB	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of C and C++				
Co-requisites	Nil				

Catalog Description

PROLOG programs tell the computer what to do (declarative programming) rather than how to do it (procedural programming). PROLOG does this by making deductions and derivations, instigated by user-defined queries, from facts and rules stored in a database. The module teaches PROLOG as a practical programming tool, useful in solving various interesting problems especially in the Artificial Intelligence domain.

Course Objectives

The objective of this course is to

1. Provide an overview of a programming paradigm: programming by means of logic (also known as logic programming)
2. Provide an experience with development of AI application using PROLOG.

Course Outcomes

On completion of this course, the students will be able to

CO1: Use the basic knowledge of PROLOG programming in order to write simple PROLOG programs and explore more sophisticated PROLOG code on their own.

CO2: Use Prolog for developing artificial intelligence applications.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1: INTRODUCTION TO PROLOG- SIMPLE FACTS, FACTS WITH ARGUMENTS. **PROBLEM STATEMENT 1:** • Convert the following into Prolog Equivalent: It is raining.	L1 and L3	4

This is a book. **PROBLEM STATEMENT 2:** • Convert the following into Prolog Equivalent: 1. The cakes are delicious. 2. Priya relishes coffee. 3. Edwin plays badminton.		
2: DEFINING VARIABLES, MATCHING AND BACKTRACKING. **PROBLEM STATEMENT 3:** • Convert the sentences into Prolog Equivalent and answer the following questions: 1. Sun rises in east. 2. Dovey is a good girl. 3. Dora likes books. 4. Chin is an intelligent student? Query 1: Who is a good girl? Query 2: Dora likes What? **PROBLEM STATEMENT 4:** • Consider the following facts: 1. parent (pam, bob). 2. parent (tom, bob). 3. parent (bob, ann). 4. parent (tom, liz). Query: Who is the parent of Whom? Or Find X and Y such that X is the parent of Y.	L1, L3 and L5	4
3: RULES. **PROBLEM STATEMENT 5:** • Consider the given knowledge. Represent the knowledge into	L1, L3 and L5	2

the PROLOG equivalence and answer the question using rules. Joy is father of Jay. Jay is father of Sam. Sam is brother of Sue. Alvin is father of Ali. Sim is mother of Sam. Sis is mother of Alvin. Question: Who are Sue's parent?		
4: INPUT AND OUTPUT PREDICATES. **PROBLEM STATEMENT 6:** • Write a code to print a message on the screen. • Write a program to perform addition of two numbers.	L1 and L3	2
5: CONTROL SRRUCTURES AND RECURSION. **PROBLEM STATEMENT 7:** • Write a code in PROLOG to design a calculator. **PROBLEM STATEMENT 8:** • Write a code in PROLOG to find the largest number among two numbers. • Write a code in PROLOG to find the largest number among three numbers. **PROBLEM STATEMENT 9:** • Write a code in PROLOG to find the factorial of a number. **PROBLEM STATEMENT 10:** • Write a code in PROLOG to print the Fibonacci series.	L1, L3 and L5	8
6: Data Structure and Operations. **PROBLEM STATEMENT 11:** • Create a LIST of 10 elements and print Head and Tail. • Write a code in PROLOG to concatenate two strings. **PROBLEM STATEMENT 12:** • Write a code in PROLOG to search an item from a given LIST.	L1 and L3	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1.E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.

2.Bratko, "PROLOG Programming for A.I*"*., 3rd Ed Ed., Addison Wesley, 2001.

Reference Books

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.

Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	--	--	**2**	**1**	--	--	--	--	--	--	**3**	--	**1**	--	--
CO2	--	--	**1**	**2**	--	**3**	--	--	**2**	--	**3**	--	--	**1**	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6413	**Analysis & Design of Algorithm**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Data Structures				
Co-requisites	Nil				

Catalog Description

Designing an algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a program.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of complexity and analysis of algorithms.
2. Provide an understanding of different techniques used in designing algorithms for a variety of problems.
3. Equip the students with the concepts of complexity classes of different problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain the meaning of algorithm, analysis and design; apply the algorithmic concepts to analyze a given algorithm and compute its time complexity.

CO2: Explain and apply the concept of Divide and Conquer approach in designing algorithms; analyze a divide and conquer algorithm; explain and apply the concept of Greedy approach in designing algorithms for optimization problems.

CO3: Explain and apply the concept of Dynamic Programming in designing algorithms for optimization problems; compare and contrast the Dynamic Programming with Greedy approach and Divide and Conquer approach.

CO4: State and explain Elementary Graph Algorithms; explain and apply the concept of Branch & Bound and Backtracking in designing algorithms for different problems.

CO5: Define and explain the concept of computational complexity, Polynomial Bounded Algorithms, Class NP, Class NP Hard and Class NP Complete.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Algorithm Design paradigms - motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations. Recurrences-substitution method, recursion tree method, master method	L1, L2, L3, and L4	7
MODULE 2: **DIVIDE AND CONQUER APPROACH** Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations. **GREEDY APPROACH** Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman	L1, L2, L3, and L4	8
MODULE 3: ***DYNAMIC PROGRAMMING*** Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem	L1, L2, L3, and L4	8
MODULE 4: ELEMENTRY GRAPH ALGORITHMS Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search) BACKTRACKING Overview, 8-queen problem, and Knapsack problem BRANCH AND BOUND LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem	L1, L2, L3, and L4	9
MODULE 5: COMPUTATIONAL COMPLEXITY Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm, MIT Press, ISBN-(ISBN: 978-0262033848)

2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Pearson.

2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms," Addison-Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	**1**	**1**	**3**	**2**
CO2	**1**	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	**1**	**1**	**3**	**2**
CO3	**1**	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	**1**	**1**	**3**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	**1**	**1**	**3**	**2**
CO5	**1**	**1**	**2**	**2**	**3**	**3**	--	--	--	--	--	--	**1**	**1**	**3**	**2**

1: strongly related, 2: moderately related and 3: weakly related

AIE6416	**Analysis & Design of Algorithm Lab**	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Application of Data Structures				
Co-requisites	Nil				

Catalog Description

Designing an algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of complexity and analysis of algorithms.
2. Provide an understanding of different techniques used in designing algorithms for a variety of problems.
3. Equip the students with the concepts of complexity classes of different problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain the meaning of algorithm, analysis, and design; apply the algorithmic concepts to analyze a given algorithm and compute its time complexity.

CO2: Explain and apply the concept of Divide and Conquer approach in designing algorithms; analyze a divide and conquer algorithm; explain and apply the concept of Greedy approach in designing algorithms for optimization problems.

CO3: Explain and apply the concept of Dynamic Programming in designing algorithms for optimization problems; compare and contrast the Dynamic Programming with Greedy approach and Divide and Conquer approach.

CO4: State and explain Elementary Graph Algorithms; explain and apply the concept of Branch & Bound and Backtracking in designing algorithms for different problems.

CO5: Define and explain the concept of computational complexity, Polynomialy Bounded Algorithms, Class NP, Class NP Hard and Class NP Complete.

Modules	Blooms level*	Number of hours
MODULE 1: Implementation of the following algorithms: • Insertion Sort • Bubble Sort • Counting Number of Inversions	L1, L2, L3, and L4	3
MODULE 2: Implementation of the following algorithms: • Binary Search (Divide & Conquer) • Merge Sort (Divide & Conquer) • Quick Sort (Divide & Conquer) • Strassen's Matrix Multiplication (Divide & Conquer) • Graph RepresentationGraph Searching	L1, L2, and L3, and L4	5
MODULE 3: Implementation of the following algorithms: • Breadth First Dearch • Depth First Search • Strongly Connected Components • Topological Sort • Fractional Knapsack Problem (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 4: Implementation of the following algorithms: • Kruskal's Algorithm. (Greedy Approach) • Prim's Algorithm (Greedy Approach) • Dijkstra's Algorithm (Greedy Approach) • Bellmanford Algorithm (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 5: • 0/1-Knapsack Problem (Dynamic programming) • Matrix Chain Multiplication (Dynamic programming) • N-Queens Problem (Backtracking)	L1 and L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm, MIT Press, ISBN-(ISBN: 978-0262033848)

2. E. Horowitz, S. Sahni, and S. Rajsekaran, “Fundamentals of Computer Algorithms,” Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, “Computer Algorithms,” Pearson.
2. J.E Hopcroft, J.D Ullman, “Design and analysis of algorithms,” Addison-Wesley

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO2	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO3	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO5	**1**	**1**	**2**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**

1: strongly related, 2: moderately related and 3: weakly related

AIE6414	**DATA COMMUNICATION & COMPUTER NETWORKS**	L	T	P	C
Version : 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computers				
Co-requisites	NIL				

Catalog Description

The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP.

Course Objectives

The objective of this course is to

1. To provide an overview of data communication and computer networks, network specific protocols, networking devices, OSI /TCP-IP Layer concepts.
2. To familiarize with the basic taxonomy and terminology of computer networking area.
3. To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite.

Course Outcomes

On completion of this course, the students will be able to

CO1. State the functions of data component in communication, networking devices, characteristics of topologies and describe the functionality of layers in OSI model.

CO2. Explain Error correction and detection techniques; Differentiate between different type of protocols used at data link layer.

CO3. Describe channel allocation problem and illustrate the working and applications of different wireless LANs and WANs standards

CO4. Compare and Contrast different routing algorithms; discuss the frame format of IPv4 and IPv6 .

CO5. Compare and contrast different transport layer protocols and explain various protocols used at application layer.

Modules	Blooms level*	Number of hours
Module I: Introduction **Introduction to computer networks, evolution of computer networks and its uses, reference models, example networks** **The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system**	L1, L2	8
Module II: The data link layer **Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, example of data link protocols-HDLC, PPP Access** .	L2, L3 and L4	8
Module III: Medium access layer Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, CSMA/CA, IEEE Standard 802 for LAN and MAN, Bridges, Wireless LANs. Introduction to wireless WANs: Cellular Telephone and Satellite Networks, SONETISDH, Virtual-Circuit Networks: Frame Relay and ATM.	L2, L3	9
Module IV: The network layer **Network layer concepts, design issues, static and dynamic routing algorithms, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion control and quality of service, internetworking, Ipv4**	L2, L3 and L4	6
Module VI: The transport layer The transport services, elements of transport protocols, TCP and UDP. The application layer: Brief introduction to presentation and session layer, DNS,E-mail**,** WWW	L2, L3and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text & References:

Text:

1. Computer networks: Tanenbaum, Andrew S, Prentice Hall
2. Data communication & Neworking: Forouzan, B. A.

References:

1. Computer network protocol standard and interface: Uyless, Black
2. Data and Computer Communications, Seventh Edition (7th.) William Stallings Publisher: Prentice Hall
3. Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**	**--**
CO2	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO3	**1**	**1**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**---**
CO5	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**---**

1: strongly related, 2: moderately related and 3: weakly related.

AIE6415	**Data Communication and Computer Networks Lab**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side), routing protocols and data link layer protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of data communication and networking.
2. Provide an overview of various protocols and their configurations using networking devices and servers.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the use of Command Line Interface (CLI) and other features and Cisco Packet Tracer; describe and distinguish networking devices and transmission media.

CO 2: Apply various application layer protocols capability on server device including DNS, DHCP, HTTP, SMTP and POP.

CO 3: Construct network topology and operate routing protocols (RIP, OSPF and EIGRP) for end-to-end connectivity.

CO 4: Illustrate the use of data link protocols-HDLC and PPP; determine network connectivity issues and fix them.

Modules	Blooms level*	Number of hours
LABORATORY SESSION 1 THE PHYSICAL LAYER 1. Introduction to different types of transmission media and cables. 2. Introduction to various networking devices and equipment. 3. Construct network topology and understand configuration of devices using Cisco Packet Tracer (tool).	L2, L3	6
LABORATORY SESSION 2 THE APPLICATION LAYER 1. Configuration of Domain Name System (DNS) server using Cisco Packet Tracer. 2. Configuration of Dynamic Host Configuration Protocol (DHCP) server using Cisco Packet Tracer. 3. Configuration of mail server using Cisco Packet Tracer. 4. Configuration of web server using Cisco Packet Tracer.	L3	6
LABORATORY SESSION 3 THE NETWORK LAYER 1. Configure Routing Information Protocol (RIP) using Cisco Packet Tracer. 2. Configure Open Shortest Path First (OSPF) routing protocol using Cisco Packet Tracer. 3. Configure Enhanced Interior Gateway Routing Protocol (EIGRP) using Cisco Packet Tracer.	L3	6
LABORATORY SESSION 4 DATA LINK LAYER 1. Configure and Analyze the working of data link control protocols-HDLC and PPP access. 2. Configure PPP security protocols-PAP and CHAP using Cisco Packet Tracer. 3. Determine various issues in network connectivity and communication using troubleshooting commands. .	L3,L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Cisco Networking Academy Programme CCNA 3 & 4 Lab Companion, 3rd Edition, Pearson Education, 2003.

Reference Books

1. Scott Empson, CCNA Routing and Switching portable command guide, 3rd Edition, Cisco Press, 2016.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO2	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO3	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO4	**1**	**1**	**2**	**3**	**3**	--	--	--	--	--	--	--	**1**	**3**	--	--
CO5	**1**	**1**	**2**	**3**	**3**	--	--	--	--	--	--	--	**1**	**3**	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6411	**Artificial Neural Network**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	2	-	-	2
Pre-requisites/Exposure	Basic Knowledge of Brain functioning				
Co-requisites	Nil				

Catalog Description

The course provides introduction to neural network and a deep insight into the basics of brain & its functioning basics of various neural models & neural schema used for learning. With this course students would be able to know the basics of each introductory feature of human brain and its features which would prove to be very helpful throughout their degree and would prove helpful in understanding other related subjects also.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of learning of brain problem solving techniques and develop proficiency in creating neural structures using the MATLAB.
2. Provide an overview of various control statements, data structures, packages related to image addition, graphics, different types of neural models.

Course Outcome

On completion of this course, the students will be able to

CO 1: Define Artificial Neural Network & its similarity to biological neural network and explain its application in our day to day life.

CO 2: Analyze ANN learning, Error correction learning, Hebbian learning, Competitive learning and Boltzman Learning.

CO 3: Implement simple perceptron, Perceptron Learning rule, modified perceptron learning rule, feed forward neural network & feedback Neural Network.

CO 4: Explain self-organizing Map, Hopfield network, Adaptive resonance theory and its various learning rules.

CO 5: Analyze memory-based learning, Associative learning, Bi-directional learning and Auto associative learning.

Modules	Blooms level*	Number of hours
Module-I Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications	L1, L2 and L3	6
Module-II Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule	L1, L2 and L3	6
Module-III Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.	L2, L3 and L4	6
Module-IV Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.	L2, L3 and L4	6
Module V Associative memory, auto-associative memory, bi-directional associative memory.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Book:

1. **Kenji Suzuki (ed.) - InTech , 2013**
2. **Todd Troyer - University of Texas at San Antonio, 2005.**

Reference Book:

1. **MATLAB 2017 Book released by MATWORS**

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**												**1**			
CO2	**1**												**1**		**1**	
CO3		**1**	**2**										**1**			
CO4		**1**	**2**	**1**									**1**		**1**	
CO5			**2**										**1**			

AIE6412	**Artificial Neural Network Lab**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various neural models required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Neural Network model in MATLAB

CO5: Demonstrate usage of applications involving with Image processing & Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (a) Basic Variable deceleration & its operation (b) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (a) Basic use of Matrix and Graph Plotting (b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (a) Practice on ANN toolbox function in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN tool box & Image processing toolboix (a) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Kenji Suzuki (ed.) - InTech , 2013
2. Todd Troyer - University of Texas at San Antonio , 2005

Reference Books

1. MATLAB 2017 Book realeased by MATWORS.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

AIE6407	**Communication System**	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	2	0	0	2
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basic principles of the design and analysis of modern communication systems. It will provide a thorough study of both analog and digital modulation and demodulation schemes. The performance analysis of various techniques based on requirements of noise and bandwidth will also be explained. It also introduces the students to the information theory and coding for basic understanding of mobile communication system.

Course Objectives

The objective of this course is to

1. Provide a thorough introduction to analog and digital communications
2. Provide in depth study of various modulation and demodulation techniques.
3. Introduce students to basics of information theory and coding for applications in mobile communication.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and Distinguish analog and digital communication systems.

CO2. Differentiate modulation and demodulation techniques of AM and FM systems and compare them in terms of Bandwidth and noise.

CO3. Distinguish and categorize various digital modulation techniques.

CO4. Describe Information theory and coding for applications in mobile communication system by solving different encoding problems.

Modules	**Blooms level***	**Number of hours**
MODULE I: INTRODUCTION Communication Process, Source of Information, base-band and pass-band signals, Review of Fourier transforms, Random variables,	L1 and L2	4

different types of PDF, need of modulation process, analog versus digital communications		
MODULE II: AMPLITUDE MODULATION Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.	L1, L2, L3and L4	8
MODULE III: ANGLE MODULATION Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.	L1, L2, L3and L4	9
MODULE IV: PULSE MODULATION Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems. Basics of Digital Communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction	L1, L2, L3 and L4	6
MODULE V: NOISE Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.	L1 and L2	4
MODULE VI: INTRODUCTION TO INFORMATION THEORY Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code	L1, L2 and L3	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. B. P. Lathi and Zhi Ding ,"Modern Digital and Analog Coimmunication Systems", Fourth Edition, Oxford University Press, 2009

2. Wayne Tomasi, "Electronic Communication systems", 5th edition, Pearson Education,2008

Reference Books

1. Simon Haykin, "Communication Systems", Third Edition, John Wiley & Sons,2007

2. Taub and schilling, "Principles of Communication Systems", Third Edition, TMH,2008

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	_	--	_	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO2	**1**	**3**	**2**	--	--	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO3	**1**	**3**	**2**	--	--	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO4	**1**	**2**	**2**	--	--	**3**	--	--	--	--	--	--	**1**	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6407	**COMMUNICATION SYSTEMS LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites	Nil				

Catalog Description

To impart knowledge on Amplitude Modulation and Angle modulation principles, generation, and its types. Also, to understand the basic concepts of pulse modulation techniques like PCM and PSK.

Course Objectives

The objective of this course is to

1. To provide the basic skills required to understand, develop, and design of various engineering applications involving analog communication theory. To provide basic laboratory exposures for communication principles and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the carrier modulation techniques like AM and FM modulation.

CO2: Study digital carrier modulation techniques using amplitude shift keying and Frequency shift keying.

CO3: Demonstrate various pulse modulation techniques (PCM), DM, ASK, DPSK and QPSK.

List of Experiments:

Modules	**Blooms level***	**Number of hours**
1. To study the sampling and reconstruction of a given signal. 2. To study amplitude modulation and demodulation. 3. To study frequency modulation and demodulation. 4. To study time division multiplexing.	L1, L2	8

5. To study pulse amplitude modulation. 6. To study delta and adaptive delta modulation and demodulation. 7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.	L3 and L4	10
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying. 9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations. 10. To study quadrature phase shift keying & quadrature amplitude modulation.	L2, L4	10

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**													**2**	
CO2	**2**	**2**			**2**										**2**	
CO3	**2**										**2**				**2**	

1: strongly related, 2: moderately related and 3: weakly related

AIE6417	**Web Designing Technologies**	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTMLwith the concept of the tags, script, and code that create web pages. To understand how the web and web pages workand web pages styles using CSS3.After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.
2. Demonstrate the application of HTML5 in developing solutions to web site creation andunderstanding how CSS will affect web page creation.
3. Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.

CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.

CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.

CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.

CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I History of HTML, Basic HTML Structure, Creating title, Creating header and footer, Adding Comments, Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, setting icons for web page, Creating hypertext, anchor tag, Creating List, Creating Definition List, Creating Hyper Text Links, Creating Link Lists.	L2 and L3	8
Module II CSS building blocks, working with style sheets, Creating different types of style sheets- External , embedded and inline style sheets, defining selectors , Selecting on basis of class and id, selecting elements based on the attributes, combining selectors, Formatting text with styles, setting font properties.	L3 and L4	7
Module III CSS: Layout with style, changing the background color, setting border, changing the cursor, style sheets for mobile to desktop, working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media .	L2 and L3	7
Module IV Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, Spanning Columns, Spanning Rows Assigning Background Colors, Frame Elements, Creation of Frame Based Pages.	L3	7
Module V: Working with scripts : Loading an external script, testing & debugging web pages, publishing your web page on the web.	L2	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	--	**1**	--	**1**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO2	--	--	**2**	--	**2**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO3	--	--	**1**	--	**1**	--	--	--	--	**2**	--	--	**1**	--	--	--
CO4	--	--	**2**	--	**1**	--	--	--	--	**2**	--	--	**1**	--	--	--
CO5	--	--	**1**	--	**2**	--	--	--	**2**	**1**	--	--	**1**	**1**	--	**2**

1: strongly related, 2: moderately related and 3: weakly related

AIE6418	**Web Designing Technologies** Lab	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTMLwith the concept of the tags, script, and code that create web pages. To understand how the web and web pages workand web pages styles using CSS3.After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.

2.Demonstrate the application of HTML5 in developing solutions to web site creation andunderstanding how CSS will affect web page creation.

3.Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.

CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.

CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.

CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.

CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I **Programs based on :** • Basic HTMLStructure, Creating title, Creating header and footer, Adding Comments, • Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, • pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, • setting icons for web page, Creating hypertext, anchor tag, Creating List, • Creating Definition List, Creating Hyper Text Links, Creating Link Lists.	L2 and L3	6
Module II & Module III **Programs based on:** • CSS style sheets, Creating different types of style sheets- External , embedded and inline style sheets, • Selection on basis of class and id, selecting elements based on the attributes, combining selectors, • Formatting text with styles, setting font properties. • Changing the background color, setting border, changing the cursor, • style sheets for mobile to desktop, • working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media .	L2,L3 and L4	4
Module IV **Programs based on:** • Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, • Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings,	L3	4

• Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, • Spanning Columns, Spanning Rows Assigning Background Colors, • Frame Elements, Creation of Frame Based Pages.		
Module V: **Programs based on** Working with scripts : Loading an external script, testing & debugging web pages, publishing your web page on the web.	L2	1

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	--	**1**	--	**1**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO2	--	--	**2**	--	**2**	--	--	--	--	**1**	--	--	**1**	--	--	--

CO3	**--**	**--**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**1**	**--**	**--**	**--**
CO4	**--**	**--**	**2**	**--**	**1**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**1**	**--**	**--**	**--**
CO5	**--**	**--**	**1**	**--**	**2**	**--**	**--**	**--**	**2**	**1**	**--**	**--**	**1**	**1**	**--**	**2**

1: strongly related, 2: moderately related and 3: weakly related

V SEM

AIE6502	**COMPUTER ARCHITECTURE**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Logic Gates				
Co-requisites	nil				

Catalog Description

Computer architecture is concerned with the structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It includes basic register transfer language and computer organization and design. Complete insight on the working of CPU, Memory and I/O communication will be provided. Pipeling and related topics will also be discussed.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of computer architectures and their modules.
2. Provide an overview of various algorithms used and hardware implementation computer.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain about Register transfer language and various micro operations of arithmetic logic unit.

CO2. Explain about the organization of computer modules and their details.

CO3. Explain in details of central processing unit like general purpose register, accumulator etc. and computer arithmetic.

CO4. Explain memory organization of computer and their interconnections. Details of direct memory access.

CO5. Explain parallel processing and pipeline techniques.

Modules	Blooms level*	Number of hours
Module I: Register Transfer Language Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.	L1, L2 and L3	10
Module II: Basic Computer Organizations and Design **Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit**	L1,L2	9
Module III: Central Processing Unit **Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC Computer Arithmetic: Introduction, Addition and Subtraction Algorithm,Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations**	L1,L2, L3	10
Module IV: Memory and Intersystem Communication and Input output organisation Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniues, Virtual Memory, Memory Management Hardware Intrasystem communication and I/O: Peripheral Devices, Input-Output Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer,Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication	L1,L2, L3.	10
Module V: Pipelining, Vector Processing and Multiprocessors **Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline,** **RISC Pipeline** **Multiprocessors: Characteristics of Multiprocessors**	L1 and L2	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
2. Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References Books:

1. WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
2. Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
3. John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
4. M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	ATT	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

ATT: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO2	1	--	--		--	--	--	--	--	--	--	--	--	2	--
CO3	1	2	3	3		--	--	--	--	--	--	--	2	1	--
CO4	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6503	**Java Programming**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

The objective is to impart programming skills used in this object-oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes, objects, packages, swings, socket programming.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of byte code and platform independence, demonstrate basic java-based application development using operators, if-else, loops and arrays.

CO2: Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages.

CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.

CO4: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.

CO5: Explain the architecture of applet and concept of swing package. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
Module I: Java Basics **Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.**	L1, L2 and L3	6
Module II: Java Object Oriented **Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.** .	L2 and L3	7
Module III: Exception Handling and Threading **Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception.** **Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.**	L2, L3 and L5	8
Module IV: Event Handling And AWT Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers	L2, L3, L4 and L5	8
Module V: Java Advanced Applet Class, Architecture, Skeleton, Display Methods. Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes. Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text:

1. "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition,TMH
2. "Introduction to JAVA Programming a primer", E.Balaguruswamy,4th Edition,TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI
2. "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill,1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6507	**Java Programming Lab**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the basic features of contemporary java are implemented and demonstrated. Problems or programs will be related to concepts of classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming. Concepts covered would enable them to create basic and complex console and graphical based applications for desktop and Internet

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of various basic java features required in solving basic and complex problems.
2. Provide a demonstration of basic java programming concepts like classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the concepts learned of operators, if-else, loops and arrays to java based application development.

CO2: Demonstrate the use of various types of inheritances, polymorphisms, class objects, inheritances, packages and other concepts to basic and complex java programming problems.

CO3: Apply the knowledge of exception handling and multithreading concepts for some simple and complex applications.

CO4: Apply knowledge of event handling and AWT controls to create some new dynamic graphical applications.

CO5: Demonstrate graphical applications based on java applets, swings and event handling.

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Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using Objects and classes, Variable Types, Modifier Types, operators, Loops Decision Making, Strings and Arrays, (a) WAP to display "Hello, it's a first program in java". (b) WAP to find sum of two integers taken as input from user at runtime. (c) WAP to find sum of two float numbers taken as command line arguments (d) WAP to find changed case of entered character. (e) WAP to find maximum of 3 integer numbers taken as input from user at runtime. (f) WAP in java to find out the greatest out of ten numbers stored using arrays. (g) WAP to create class with "name" as String and "age" as integer data members. The class should have two methods to take input from user and display the data. (h) WAP to find factorial of a number using class and object.	L3, L5	6
2. Sample Programs using Inheritance, Overriding, Polymorphism, Interfaces, Packages a. WAP in java to illustrate the concept of interfaces. b. WAP to create a package as MyPack having a class with three methods: max, fact and show. Use it in other folder with setting classpath and without setting class path. c. Write a program in java to showcase uses of super keyword	L3, L5	4
1. Sample Programs using exception handling and threads a) Write a program to demonstrate the use of nesting of try-catch block b) WAP in java to illustrate the concept of using multiple catch clauses to handle different types of exceptions. c) WAP in java to create a user defined Exception and throw it explicitly. d) Demonstrate thread using Thread class and Runnable interface e) Demonstrate various thread methods using a program	L3, L5	6
(a) Sample Programs using event handling and AWT controls (b) Write a program to display "hello" in different color where user clicks left mouse button and "world" where right mouse button is clicked. Use black background. (c) WAP in java to create a Frame and handle window-closing event implementing the WindowListener interface. (d) WAP to create an Applet having various different buttons,	L3, L5	6

recognizing them using action command string method and handling click event generated by them. (e) WAP to create a frame and illustrate the concept of using an adapter class in place of interfaces for handling various mouse events generated over frame window. (f) WAP in java to create a frame with AWT controls (like label, push buttons, Checkbox, Checkbox Group) and handle various events generated by them. (g) WAP in java to create a frame with various AWT controls (like choice, list, TextField and Buttons) and handle the events thrown by them.		
5. Sample Programs using applets, swings and stream socket a) . Write an applet which will display "HAPPY" and "DEEPAVALI" as: The word "HAPPY" will roll from top to bottom and "DEEPAVLI" from bottom to "top" . Both will run at the same speed and stop simultaneously at the center of the applet. b) Write an applet to display last 32 shades of red, green and blue in equal sized square grid accompanied by appropriate labels like" Last 32 shades of Red/Green/Blue color". Make use of BorderFactory to apply border for each individual shade. c) Create an applet with one single button with caption "Click". On clicking the button will open a new Frame with title "Factorial". The frame will have two three controls :TextField, Label and button. On clicking button calculate the factorial entered in TextField control. d) Create Java programs to demonstrate day time client and server e) Create java programs to create echo client and server	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text:

1. "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition,TMH
2. "Introduction to JAVA Programming a primer", E. Balaguruswamy,4th Edition, TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI .
2. "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill,1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	35
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE6504	**ADVANCED DATA STRUCTURES & ALGORITHMS**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of data structure				
Co-requisites	Nil				

Catalog Description

The objective to this course is to equip students with advanced concepts of data structures like Huffman trees, Self organizing trees, different types of heaps and their time complexity. Advanced topics and graphs and graph algorithms, geometric algorithms and parallel algorithms.

Course Objectives

The objective of this course is to

1. Understand and apply linear data structures-List, Stack and Queue and the graph algorithms.
2. Apply data structures and algorithms in real time applications and analyze the efficiency of algorithm

Course Outcomes

On completion of this course, the students will be able to

CO1. Design and analyze programming problem statements.

CO2. Choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.

CO3. Understand the necessary mathematical abstraction to solve problems.

CO4. Comprehend and select algorithm design approaches in a problem specific manner

Modules	**Blooms level***	**Number of hours**
MODULE 1:	L1, L2	7

ADVANCED TREES Definitions Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees, Splay Tree. Augmenting Red-Black Trees to Dynamic Order Statistics and Interval Tree Applications. Operations on Disjoint sets and its union-find problem Implementing Sets. Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.	and L3	
MODULE 2: **MERGEABLE HEAPS:** Mergeable Heap Operations, Binomial Trees Implementing Binomial Heaps and itsOperations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap Implementing Fibonacci Heap. SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting andmerging network sorter.	L1,L2,l3	8
MODULE 3: **GRAPH THEORY DEFINITIONS** Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut-Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs.	L1, L2 and L3	8
MODULE 4: **GRAPH THEORY ALGORITHMS** Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph and Planarity Testing, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms	L1, L2	7
MODULE 5:Geometric algorithms Point location, convex hulls and Voronoi diagrams, Arrangements. Parallel algorithms: Basic techniques for sorting, searching, merging	L2,L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Introduction to Algorithms, by T. H. Cormen, C. E. Lieserson, R. L. Rivest, and C. Stein, Third Edition, MIT Press.
2. E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", University Press, 2007
3. 3. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, University Press, 2007

Reference Books

1. Algorithms, by S. Dasgupta, C. Papadimitrou, U Vazirani, Mc Graw Hill.
2. Algorithm Design, by J. Klienberg and E. Tardos, Pearson Education Limited.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	2	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	-	-
CO 4	2	-	3	-	-	--	--	--	--	--	--	--	2	1	1	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE6509	ADVANCED DATA STRUCTURES & ALGORITHMS Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Application of Data Structures				
Co-requisites	Nil				

Catalog Description

Designing an algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of complexity and analysis of algorithms.
2. Provide an understanding of different techniques used in designing algorithms for a variety of problems.
3. Equip the students with the concepts of complexity classes of different problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain the meaning of algorithm, analysis and design; apply the algorithmic concepts to analyze a given algorithm and compute its time complexity.

CO2: Explain and apply the concept of Divide and Conquer approach in designing algorithms; analyze a divide and conquer algorithm; explain and apply the concept of Greedy approach in designing algorithms for optimization problems.

CO3: Explain and apply the concept of Dynamic Programming in designing algorithms for optimization problems; compare and contrast the Dynamic Programming with Greedy approach and Divide and Conquer approach.

CO4: State and explain Elementary Graph Algorithms; explain and apply the concept of Branch & Bound and Backtracking in designing algorithms for different problems.

CO5: Define and explain the concept of computational complexity, Polynomialy Bounded Algorithms, Class NP, Class NP Hard and Class NP Complete.

Modules	Blooms level*	Number of hours
MODULE 1: Implementation of the following algorithms: • Insertion Sort • Bubble Sort • Counting Number of Inversions	L1, L2, L3, and L4	3
MODULE 2: Implementation of the following algorithms: • Binary Search (Divide & Conquer) • Merge Sort (Divide & Conquer) • Quick Sort (Divide & Conquer) • Strassen's Matrix Multiplication (Divide & Conquer) • Graph RepresentationGraph Searching	L1, L2, and L3, and L4	5
MODULE 3: Implementation of the following algorithms: • Breadth First Dearch • Depth First Search • Strongly Connected Components • Topological Sort • Fractional Knapsack Problem (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 4: Implementation of the following algorithms: • Kruskal's Algorithm. (Greedy Approach) • Prim's Algorithm (Greedy Approach) • Dijkstra's Algorithm (Greedy Approach) • Bellmanford Algorithm (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 5: • 0/1-Knapsack Problem (Dynamic programming) • Matrix Chain Multiplication (Dynamic programming) • N-Queens Problem (Backtracking)	L1 and L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm, MIT Press, ISBN-(ISBN: 978-0262033848)

2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Fundamentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, “Computer Algorithms,” Pearson.

2. J.E Hopcroft, J.D Ullman, “Design and analysis of algorithms,” Addison-Wesley

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO2	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO3	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO4	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO5	1	1	2	2	3	3	--	--	--	--	--	--	1	1	3	2

1: strongly related, 2: moderately related and 3: weakly related

AIE6515	**MICROPROCESSOR**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the architecture and programming issues of 8085-microprocessor family. Explanation of microprocessor in terms of ALP and timing diagrams,Memory System Design & I/O Interfacing, peripheral devices and advance Pentium Processors.

Course Objectives

The objective of this course is to

1. Equip with concepts ofmicroprocessor and interfacing with peripheral devices.
2. Provide an overview of advance microprocessors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the architecture of 8085 microprocessor.

CO2:Describe assembly language programming and show timing diagram for 8085 microprocessors.

CO3: Explain the input output interfacing with peripheral devices and design of memory system for 8085 microprocessors.

CO4: Describe the architecture of 8086 microprocessor and compare with 8085 microprocessors.

CO5: Explain the working principles and architecture of 8087, 80x86 and Pentium processors.

Modules	Blooms level*	Number of hours
Module I: Introduction to Microcomputer Systems Introduction to Microprocessors and microcomputers, Study of 8-bit Microprocessor, 8085 pin configuration, Internal Architecture and operations,interrupts, Stacks and subroutines, various data transfer schemes.	L1 and L2	8
Module II: ALP and timing diagrams **Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.**	L2 and L3	10
Module III: **Memory System Design & I/O Interfacing** **Interfacing with 8085.Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.**	L1 and L5	10
Module IV: Architecture of 16-Bit Microprocessor Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.	L1 and L2	10
Module V: Pentium Processors .Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.	L1 and L2	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
2. B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.

Reference Books

1. M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
2. Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**3**												**1**	**1**	
CO2	**1**	**2**	**3**		**3**									**3**	**1**	**3**
CO3			**1**		**2**						**3**	**3**		**2**	**1**	**3**
CO4	**1**	**2**	**3**												**1**	**3**
CO5	**1**	**2**	**3**												**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

AIE6517	**MICROPROCESSOR LAB**	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course focuses on the systematic study of the Architecture and programming of microprocessor family and its applications. The objectives of this course are:

1. To introduce students with the architecture operation and instruction set of 8085 and 8086 microprocessors.
2. To familiarize the students with the programming and interfacing of 8085 and 8086 microprocessors.
3. To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Set up programming strategies and select proper mnemonics and run their program on the training boards
CO2. Develop assembly language programs for various problems keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.
CO3. Understand the concepts related to I/O and memory interfacing and design interfacing circuits with 8085 by making use of different peripheral devices.

Modules	Blooms level*	Number of hours
Lab Session 1: ALP using 8085: 1. Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated. 2. Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated.	L2, L3,L4	4

3. Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD. 4. Write assembly language program for 8 bit multiplication and division.		
Lab Session II: To study, understand, interface and two peripheral devices with 8085.	L4,L5,L6	2
Lab session III: Any three programs using 8085 based on block of data.	L4	1
Lab session IV: ALP using 8086: 1. Write an ALP to add list of 10 given numbers. 2. Write an ALP to sum the numbers from 1-100. 3. Write an ALP to count negative numbers from a given list of 10 numbers. 4. Write an ALP to check number of vowels in a given string.	L2, L3, L4	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
2. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

1. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
2. Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO2	1	1	2	3	--	--	--	--	--	--	--	--	3	2	1	1
CO3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1

1: strongly related, 2: moderately related and 3: weakly related

AIE6516	**Theory of Computation**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisite/Exposure	NIL				
Co-requisites	NIL				

Catalog Description:

In this course the concepts of General theory of Automata are discussed in detail. The course begins with the basic mathematical preliminaries and goes on to Theory of Computation (TOC), properties of regular sets and regular expressions, and the basics of formal languages. Besides, sufficient attention is devoted to such topics as push-down automaton and its relation with context free languages, Turing machines, the basic concepts of computability such as primitive recursive functions and partial recursive functions.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of general theory of Automata
2. Provide an overview of analyzing the various models such as Finite Automata, Push down Automata and Turing Machines under various formal languages.

Course Outcomes

On completion of this course, the students will be able to,

CO1: Explain about Finite Automata including various formal languages, classify the role of DFA and NFA.

CO2: Define and analyzed various types of grammars in pushdown automata and classify PDA

CO3: Analyze the working of Turing Machine with its language and design new Turing machine based on problems

CO4: Categorize the solvable and un-solvable problems.

CO5: Compare the problems which are based on the different type of Recursive functions.

Modules	Blooms level*	Number of hours
Module 1: INTRODUCTION TO LANGUAGES AND AUTOMATA Formal Grammars and Chomsky Hierarchy, Regular Expression	L1, L2 and L4	10

Deterministic and Nondeterministic Finite Automata, Regular Expression, two way Finite Automata, Finite Automata with output, Properties of regular sets, pumping lemma for regular sets, My-Hill-Nerode Theorem.		
MODULE 2: CONTEXT FREE GRAMMARS AND PUSHDOWN AUTOMATA **CFG: Formal Definition, Derivation and Syntax trees, E-removal, Ambiguous Grammar, Properties of CFL, Normal Forms (CNF and GNF), Pushdown Automata: Definitions, Relationship between PDA and context free language, Decision Algorithms**	L1, L3 and L4	10
MODULE 3: TURING MACHINE The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Universal TM, Church's Machine. Recursive and recursively enumerable language, unrestricted grammars, Context Sensitive Language, Linear Bounded Automata (LBA).	L3 and L4	10
Module 4: UNDECIDABILITY Turing machine halting Problem, undecidable problems for recursive enumerable language, Post correspondence problems (PCP) and Modified Post correspondence problems, Undecidable problems for CFL.	L2, L3 and L4	10
Module 5: COMPUTABILITY Partial and Total Functions, Primitive Recursive functions, Recursive functions.	L2 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

1. Hopcroft and Ullman, "Introduction to Automata Theory, languages and computation", Addison Wesley,2001.
2. "An introduction to formal languages and Automata (6th ed)" by Peter Linz, D. C. Health and Company,2016.

Reference Books:

1. Introduction to theory of computation (2nd Ed) by Michael sipser.
2. Zavi Kohavi, "Switching and finite Automata Theory "John C Martin

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	2	2	2	3	--	--	--	--	--	--	1	2	3	3
CO2	1	1	1	2	2	2	--	--	--	--	--	--	1	1	3	3
CO3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	3	3
CO4	1	1	2	3	3	--	--	--	--	--	--	--	1	1	2	2
CO5	1	1	1	2	2	3	--	--	--	--	--	--	1	2	2	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE2506	PYTHON PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, I/O, and visualization using the Python programming language.

Course Objectives

The objective of this course is

1. Equip the students with the basic feature of python required in solving complex problems and build GUI applications
2. Provide a practical knowledge of implementation/demonstration of python programming concepts like of lists, tuples, dictionaries, Object Oriented Programming concepts in Python, Strings and Files in Python.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basics of python programming using if-else, loops and List, Dictionary, tuples.

CO 2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.

CO 3: Demonstrate the ability to write database applications in Python

CO 4: Demonstrate Files Handling in Python.

CO 5: Demonstrate database operation and GUI applications in python.

Modules	Blooms level*	Number of hours
1. Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5,between 2000 and 3200 (both included). The	L1,L2 and	4

numbers obtained should be printed in a comma-separated sequence on a single line. 2. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. 3. Define a function max() that takes two numbers as arguments and returns the largest of them. Use the if-then-else construct available in Python. (It is true that Python has the max() function built in, but writing it yourself is nevertheless a good exercise.) 4. Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.	L3	
5. Define a function that computes the length of a given list or string. (It is true that Python has the len() function built in, but writing it yourself is nevertheless a good exercise.) 6. Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise. 7. Write a function translate() that will translate a text into "rövarspråket" (Swedish for "robber's language"). That is, double every consonant and place an occurrence of "o" in between. For example, translate("this is fun") should return the string "tothohisosisosfofunon". 8. Define a function sum() and a function multiply() that sums and multiplies (respectively) all the numbers in a list of numbers. For example, sum([1, 2, 3, 4]) should return 10, and multiply([1, 2, 3, 4]) should return 24. 9. Define a function reverse() that computes the reversal of a string. For example, reverse("I am testing") should return the string "gnitset ma I".	L2 and L3	6
10. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user 11. Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5. 12. Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides evenly into another number. For example, 13 is a divisor of 26 because 26 / 13 has no remainder.) 13. Take two lists, say for example these two: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13] and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.	L2, L3, L4 and L5	4
14. Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.)	L2, L3 and L4	4

15. Let's say I give you a list saved in a variable: a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]. Write one line of Python that takes this list a and makes a new list that has only the even elements of this list in it. 16. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game) **Remember the rules:** • Rock beats scissors • Scissors beats paper • Paper beats rock		
14. Write a program that asks the user how many Fibonnaci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. Make sure to ask the user to enter the number of numbers in the sequence to generate.(Hint: The Fibonnaciseqence is a sequence of numbers where the next number in the sequence is the sum of the previous two numbers in the sequence. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, …) 15. Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates. **16.** Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.	L2, L3 and L4	1

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
3. Patrick Naughton & Herbert Schild ,"JAVA The Complete Reference", 10th Edition , TMH

Reference Book

4. Daniel/Young , Introduction to JAVA Programming" , PHI.
5. Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO3	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**1**

1: strongly related, 2: moderately related and 3: weakly related

AIE2535	Summer Internship Evaluation	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1

CO2	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO3	**1**	**1**	**2**	**3**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

AIE6511	**FUZZY LOGIC & GENETIC ALGO**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Computer Concepts				
Co-requisites	Nil				

Catalog Description

In this course the concepts of fuzzy logic and genetic algorithm are discussed in detail. This course will provide an understanding of fuzzy logic and genetic algorithm and an outlook on the applications of these techniques to solve real world problems. It also provides an understanding of fuzzy-genetic based machine learning.

Course Objectives

The objective of this course is to

1. Provide the student with the basic understanding of genetic algorithm and fuzzy logic fundamentals, program and design the related systems.
2. Equip the students with concepts of fuzzy logic based solutions.
3. Provide an overview of performance of genetic algorithm, simulated annealing and tabu search.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop the skills to gain a basic understanding of genetic algorithm and fuzzy logic theory.

CO2: Appreciate the learning and adaptation capability of neural and fuzzy systems.

CO3: Apply various operators to optimize. Perform mathematical calculation of the GA

CO4: Able to identify the present application areas of fuzzy logic and GA

CO5: Explain the working principle and compare the performance with other methods – Simulated annealing and Tabu search.

Modules	Blooms level*	Number of hours
MODULE 1: Crisp sets: Overview, Fuzzy sets : Basic types and concepts, Characteristics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets	L1, L2 and L3	8
MODULE 2: Types of operations, Fuzzy complements, Fuzzy intersection: t-norms, Fuzzy union: t-conorms, Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables, Arithmetic operations on intervals, Arithmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.	L2, L3 and L6	10
MODULE 3: General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata. Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics	L1, L3 and L4	10
MODULE 4: Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithm genetic modelling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.	L1, L3 and L4	10
MODULE 5: Genetic technology:- steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.	L3, L4 and L6	10
MODULE 5: Genetic Algorithm in engineering and optimization-natural evolution – Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning-Genetic Algorithm and parallel processors- composite laminates- constraint optimization- multilevel optimization- real life problem.	L3,L4,L6	05

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Fuzzy Logic with Engineering Applications, 3rd Ed., T. J. Ross, Wiley India Pvt. Ltd., India, 2011.
2. Fuzzy Logic Intelligence Control & Information, John Yen and Reza Langari, Pearson Education Limited, India, 2007.
3. David E.Goldberg, "Genetic Algorithms in search , Optimization & Machine Learning"
4. Melanie Mitchell- 'An introduction to Genetic Algorithm'- Prentice-Hall of India

Reference Books

1. Understanding Neural Networks and Fuzzy Logic, S. V. Kartalopoulas, IEEE Press and Prentice Hall India, India, 2000.
2. Neuro-Fuzzy and Soft Computing – A Computational Approach to Learning and Machine Intelligence, Prentice Hall India, India, 2009.
3. William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"
4. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems "
5. David A. Coley, "An Introduction to Genetic Algorithms for Scientists and Engineers ".

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	-
CO2	**1**	--	**2**	**3**	--	--	--	--	--	--	--	**1**	**2**	--	-
CO3	**1**	**2**	**3**	**3**	**3**	--	--	--	--	--	--	--	**1**	**2**	-
CO4	**1**	**1**	**2**	--	--	--2	--	--	--	--	--	--	**1**	**1**	**2**
CO5	**1**	**1**	**2**	--	-2-	--	--	--	--	--	--	--	-	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

AIE 6518	Advanced Web Designing Technologies	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of java scripts and apply them to create basic scripts

CO2: Explain the fundamentals of client side scripting ,document object model and apply them to create dynamic websites.

CO3: Apply basic APIs of bootstrap library to create dynamic websites

CO4: Demonstrate bootstrap java plugins and its use in designing sample websites.

CO5: Explain and apply react APIs in client side scripting

Modules	Blooms level*	Number of hours
Module 1: Basics Introduction to JavaScript, JavaScript Core Features—Overview, Data Types and Variables, Operators, Expressions, and Statements, Functions, Objects, Array, Date, Math, and Type-Related Objects, Regular Expressions	L2 and L3	8

Module 2:Fundamental of Client-Side JavaScript JavaScript Object Models, The Standard Document Object Model, Event Handling, Controlling Windows and Frames, Handling Documents, Form Handling, Dynamic Effects: Rollovers, Positioning, and Animation, Navigation and Site Visit Improvements, Browser and Capabilities Detection Advanced Topics: JavaScript and Embedded Objects, Remote JavaScript, JavaScript and XML	L2 and L3	7
Module 3: Introduction to Bootstrap (Part 1) **Bootstrap Scaffolding:** What Is Bootstrap?**,** Bootstrap File Structure**,** Basic HTML template**,** Global Styles Default: Grid System, Basic Grid HTML, Offsetting Columns, Nesting Column, Fluid Grid System, Container Layouts **Bootstrap CSS:** Typography, Code, Tables, **Bootstrap Layout Components:** Dropdown Menus, Button Groups, Buttons with Dropdowns, Navigation Elements, Navbar, Breadcrumbs Pagination, Labels, Badges, Typographic Elements	L2 and L3	7
Module 4: Introduction to Bootstrap (Part 2) **Bootstrap JavaScript Plugins:** Overview**,** Transitions **,**Modal **,**Dropdown**,** Scrollspy**,** Toggleable Tabs**,** Tooltips**,** Popover	L2and L3	7
Module 5: The React Library Writing Your First React App, Thinking in React, Server Communication, JSX and the Virtual DOM, Advanced Components, Forms in React.	L2 and L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Javascript: The Complete Reference",Thomas Powell ,Fritz Schneider,Oreilly, 2004.
2. "Bootstrap", Jake Spurlok, Orielly, 2013.
3. "Full Stack React", Anthony Accamozo, Fullstack, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO5	--	1	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

AIE 6519	Advanced Web Designing Technologies Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of java scripts and apply them to create basic scripts

CO2: Explain the fundamentals of client side scripting ,document object model and apply them to create dynamic websites.

CO3: Apply basic APIs of bootstrap library to create dynamic websites

CO4: Demonstrate bootstrap java plugins and its use in designing sample websites.

CO5: Explain and apply react APIs in client side scripting

Modules	Blooms level*	Number of hours
Module 1: Basics **Programs based on:** • JavaScript Core Features—Overview, • Data Types and Variables, Operators, Expressions, and	L2 and L3	2

Statements, Functions, • Objects, Array, Date, Math, Type-Related Objects, • Regular Expressions		
Module 2:Fundamental of Client-Side JavaScript **Programs based on:** • JavaScript Object Models, The Standard Document Object Model, • Event Handling, Controlling Windows and Frames, Handling Documents, • Form Handling, Dynamic Effects: Rollovers, Positioning, and Animation, • Navigation and Site Visit Improvements, Browser and Capabilities • Detection Advanced Topics: JavaScript and Embedded Objects, Remote JavaScript, JavaScript and XML	L2 and L3	3
Module 3: Introduction to Bootstrap (Part 1) **Programs based on:** • Bootstrap File Structure**,** Basic HTML template**,** Global Styles • Default: Grid System, Basic Grid HTML, Offsetting Columns, Nesting Column, Fluid Grid System, Container Layouts • Typography, Code, Tables, • Dropdown Menus, Button Groups, Buttons with Dropdowns, Navigation Elements, Navbar, • Breadcrumbs Pagination, Labels, Badges, Typographic Elements	L2 and L3	3
Module 4: Introduction to Bootstrap (Part 2) **Programs based on:** • Transitions **,**Modal **,**Dropdown**,** • Scrollspy**,** Toggleable Tabs**,** • Tooltips**,** Popover	L2and L3	2

Module 5: The React Library • Writing Your First React App, • Thinking in React, Server Communication, • JSX and the Virtual DOM, • Advanced Components, • Forms in React.	L2 and L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Javascript: The Complete Reference",Thomas Powell ,Fritz Schneider,Oreilly, 2004.
2. "Bootstrap", Jake Spurlok, Orielly, 2013.
3. "Full Stack React", Anthony Accamozo, Fullstack, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	**1**	**1**	--	**1**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO2	--	**1**	**2**	--	**2**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO3	--	**1**	**1**	--	**1**	--	--	--	--	**2**	--	--	**1**	--	--	--
CO4	--	**1**	**2**	--	**1**	--	--	--	--	**2**	--	--	**1**	--	--	--
CO5	--	**1**	**1**	--	**2**	--	--	--	**2**	**1**	--	--	**1**	**1**	--	**2**

1: strongly related, 2: moderately related and 3: weakly related

VI SEMESTER

AIE 6603	Advanced Java Programming	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Java Programming				
Co-requisites	NIL				

Catalog Description

In this course the advanced features of contemporary java are discussed in detail. Concepts covered would enable them to handle complex programs relating to managing data and processes over the network. Discussion will be on relating to concepts of remote method invocation to working with swings architecture. Further practical implementation of database connectivity and using them in servlet and jsp based applications will be made.

Course Objectives

The objective of this course is to

1. Equip the students with the advanced feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of advanced java programming concepts like database programming with servlets and jsp.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of an Remote method invocation application, demonstrate swing based application developed using concepts of remote method invocation

CO2: Distinguish between various java and open database connectivity drivers and able to solve complex programming problems involving database interaction.

CO3: Describe servlet and its lifecycle, along with demonstrate and design solutions for some complex dynamic web applications using servlets.

CO4: Explain jsp scripting and Differentiate between processing of servlets and jsp scripting pages. Apply knowledge of servlets and jsp scripting to create some new dynamic web applications.

CO5: Explain the architecture of Model View Controller and struts. Demonstrate applications based on java beans and struts.

Modules	Blooms level*	Number of hours
MODULE 1: DISTRIBUTED COMPUTING Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.	L1, L2 and L3	6
MODULE 2: DATABASE CONNECTIVITY ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql. .	L2 and L3	7
MODULE 3: SERVLET PROGRAMMING Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.	L2, L3 and L5	8
MODULE 4: JSP PROGRAMMING JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.	L2, L3, L4 and L5	8
MODULE 5: J2EE WEB APPLICATION The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.	L2 and L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States.
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA.
2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA.
3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6608	Advanced Java Programming Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY2020	0	0	2	1
Pre-requisites/Exposure	Basics of Java and Advanced Java Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the advanced features of contemporary java are implemented and demonstrated. Concepts covered would enable them to create complex applications related to data management. Problems or programs will be related to concepts of remote method invocation, swings, servlets, jsp and java beans.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various advanced java features required in solving complex problems.
2. Provide a demonstration of advanced java programming concepts like database programming with servlets, jsp and creating java beans.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of swings architecture and remote method invocation used to provide solution to distributed computing problems

CO2: Demonstrate the use of JDBC connectivity along with swings based architecture, thereby handling data management.

CO3: Apply the knowledge of servlets and server programming to construct dynamic web applications using web servers.

CO4: Demonstrate the differences between creating and deploying dynamic web applications using jsp concepts and servlets.

CO5: Demonstrate usage of applications involving java beans and jdbc programming to handle data management.

Modules/Topics Covered**	Blooms level*	Number of hours
1.Sample Programs using swings architecture and remote method invocation (a) Write a program using swings creating tabbed panes and menu over a frame and handle their associated events (b) Write a program using swings List control containing list of cities, allowing the user to choose any one of them and display using event handing. (c) Demonstrate an application showcasing the use of remote method invocation(RMI) for designing a distributed application. (d) Create an application using concepts of RMI to depict a client server based interaction.	L3, L5	6
2.Sample Programs using JDBC and swings (a) Create an application demonstrating the use of swings, having a menu over a frame and jdbc programming to perform insert and select operations by handling menu related events. (b) Create an application using swings, having a design providing features for iterating over a dataset performing operations like forward, backward, start and end with help of jdbc programming.	L3, L5	4
(c) Sample Programs using servlets with jdbc, html and swings 3. Create an application using servlets to perform redirection based on validating user data entered through a web form. 4. Design an application to fetch data from database using servlets and display it using its post method. 5. Demonstrate the process of writing cookies using a servlet and display a message after writing. 6. Write a program to create a session object for the username fetched from user using a servlet, further access that session value on another servlet invoked by redirection.	L3, L5	6
7. Sample Programs using JSP with jdbc, html and swings (a) Write a program using jsp to demonstrate the features of jsp elements used to declare, define and display sum of two integers. (b) Create an application using jsp to calculate and display the greatest out of two integers using if else statements. Integer	L3, L5	6

numbers should be entered using a web form. (c) Demonstrate with a jsp program mechanism to retrieve checkbox data accessed using multiple value parameters fetching approach. (d) Write a program to demonstrate the use of jsp forward action tag used with parameters and processed using another jsp page.		
8. Sample Programs using jsp, java beans and swings (a) Demonstrate the use of jsp include action tag for including an html and another jsp page in initial jsp resource. (b) Write a program creating Java bean class and setting its properties using required jsp action tags. Output should also display the retrieved property values.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA
2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA
3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Lab Record /Viva- Via /Performance/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE6604	ADVANCED DBMS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	NIL				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is to

3. To understand the basic concepts and terminology related to DBMS and Relational Database Design

4. To design and understand Distributed, parallel and object oriented Databases.

5. To understand advanced DBMS techniques to handle and optimize queries in database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the basics of database management system and implementation of relational database.

CO2. Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques.

CO3. Understand and design Distributed, parallel and object oriented Databases models and possible methods of proving them.

Modules	Blooms level*	Number of hours
MODULE 1: **Relational Database** Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about	L1, L2 and L3	8

functional dependencies.		
MODULE 2: **Query Processing and Optimization** Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information. **Objected Oriented and Object Relational Databases** Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases	L1,L2,l3	9
MODULE 3: **Parallel and Distributed Databases** Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation. **Advanced Transaction Processing** Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.	L1, L2 and L3	10
MODULE 4: Multimedia databases, Databases on the Web and Semi–Structured Data , Case Study: Oracle Xi	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", PearsonEducation, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Reference Books

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006

4. W. Kim, “Modern Database Systems”, 1995, ACM Press, Addision – Wesley,
5. D. Maier, “The Theory of Relational Databases”, 1993, Computer Science Press, Rokville, Maryland
6. Ullman, J. D., “Principals of database systems”, Galgotia publications, 1999
7. Oracle Xi Reference Manual
8. Dietrich, and Urban, “An Advanced Course in Database Systems”, Pearson, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PS O 1**	**PS O 2**	**PS O 3**	**PSO 4**
CO 1	**2**	**-**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**-**	**-**
CO 2	**2**	**2**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**-**	**-**
CO 3	**2**	**-**	**3**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

Course Code : AIE 6609	ADVANCED DBMS LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY2020	0	0	1	1
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	Nil				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is

1. Equip the students with the different issues involved in the design and implementation of a database system.
2. Provide a practical knowledge of implementation/demonstration of data manipulation language to query, update, and manage a database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Demonstrate and analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.

CO2. Demonstrate and Apply different types of constraints on the database.

CO3. Design different views of tables for different users and to apply embedded and nested queries.

CO4. Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.

Modules	Blooms level*	Number of hours
Module1: 1. Introduction to SQL and understand basic commands 2. Understand various DDl and DML commands.	L1,L2 and L3	4

3. To understand joins in SQL.		
Module 2: 1. To understand constraints SQL 2. Wild cards and aggregate functions in SQL 3. To understand and execute procedures and views in SQL	L2 and L3	6
Module 3: 1. To understand and execute triggers in SQL 2. To develop a database application to demonstrate the representation of multi valued attributes and use of nested tables to represent complex objects. Write suitable queries	L2, L3, L4 and L5	4
Module 4: 1. To understand and execute Indexes in SQL	L2, L3 and L4	4
Module 5: 1. To understand the concept of Exception handling in SQL 2. Query Evaluation Plans 3. Concurrency and Transactions	L2, L3 and L4	1

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addision wesley, 2007

Reference Book

1. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rdedition, 1997, McGrawHill, International Edition.
2. Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO3	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	**3**	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE6605	*DIGITAL COMPUTER ORGANIZATION*	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Objectives

The objective of this course is to

- An understanding of a machine's instruction set architecture (ISA) including basic instruction fetch and execute cycles, instruction formats, control ow, and operand addressing modes.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and Interpret the functional architecture of computing systems.

CO2. Identify, compare and assess issues related to ISA, memory, control and I/O functions.

CO3. Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.

CO4. Design and analyze solutions in the area of computer architecture.

Modules	Blooms level*	Number of hours
MODULE 1: **Representation of Information and Basic Building Blocks** Overview of Computer hardware generation, Number Systems, Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean algebra, K-map Simplification, Half adder, Full adder, Decoders, Multiplexes, Binary	L1, L2 and L3	7

Counters, Flip/Flops, Registers, Counters (Synchronous & Asynchronous), ALU, Micro-Operation, ALU-chip, Faster Algorithm and Implementation (multiplication & Division).		
MODULE 2: **Basic Organization** Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired and Micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing Modes, Instruction Formats, Data transfer & Manipulation, I/O organization, Bus Architecture, Programming Registers.	L1,L2,l3	8
MODULE 3: **Memory Organization** Memory hierarchy, Main Memory (RAM/ROM chips), Auxiliary memory, Associative memory, Virtual memory, Cache memory, Memory management hardware, hit/miss ratio, Magnetic disk and its performance, Magnetic Tapes etc.	L1, L2 and L3	8
MODULE 4: **Input-Output organization** Peripheral devices, I/O interface, Direct memory access, Modes of transfer, Priority Interrupt, I/O Processors, Serial Communication, Asynchronous data transfer, Strobe Control, Handshaking, I/O Controllers.	L1, L2	7
MODULE 5: **Processor Organization** Basic Concept of 8/16-bit microprocessor (8085/8086), Assembly Instruction Set, Assembly Language Program of 8085/8086: Addition of two numbers, Subtraction, Block Transfer, Find greatest number, Table search, Numeric manipulation, Introductory Concept of pipeline, Flynn's Classification, Parallel Architectural classification.	L2,L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Moris Mano, "Computer Systems Architecture", 4th Edition, Pearson/PHI, ISBN:10:0131755633

2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5 th Edition, McGraw Hill

.

Reference Books

1. Computer Organization: Vrarsie, Zaky&Hamacher (TMH Publication).
2. Tannenbaum, "Structured Computer Organization", PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	3	--	--	--	--	--	--	--	--	--	2	1	-	-
CO2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	2	-
CO3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	2	-
CO4	2	-	3	-	-	--	--	--	--	--	--	--	2	1		-

1: strongly related, 2: moderately related and 3: weakly related

CSE2613	Software ENGINEERING	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3		0	3
Pre-requisites/Exposure	Basic Knowledge of software development				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Software development are discussed in detail. Various models of SDLC are introduced along with its application. Students will be able to apply these concepts in real time software project development.

Course Objectives

The objective of this course is to

1. Gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.
2. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply current theories, models, and techniques that provide a basis for the software lifecycle.

CO2: Enable the students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.

CO3: Be able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of a software development.

CO4: Be able to evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of contemporary issues and emerging software engineering trends, models, tools, and techniques.

CO5: Work as an individual and as part of a multidisciplinary team to design,develop and deliver quality software.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction**Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM	L1, L2 and L4	5
MODULE 2: **Software Metrics and Project Planning**Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.	L2, L3 and L6	7
MODULE 3: **Software Requirement Analysis, design and coding** Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding.	L2, L3 and ,L5	8
MODULE 4: **Software Reliability, Testing and Maintenance**Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing,Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards.Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering	L2, L3 and L4,L6	10
MODULE 5: **UML**Introduction to UML,Use Case Diagrams, Class Diagram: State Diagram in UMLActivity Diagram in UMLSequence Diagram in UMLCollaboration Diagram in UML, Domain, Component Diagram and Deployment Diagram	L3,L4,L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.

2. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 5th Ed., McGraw Hill Int. Ed., 2001.

Reference Books:

1. R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
2. P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
3. Stephen R. Schach, “Classical & Object -Oriented Software Engineering”, IRWIN, 1996.
4. James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons.
5. Sommerville, “Software Engineering”, Addison Wesley, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO4**
CO1	--	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO2	**1**	--	**2**	**3**	--	--	--	--	--	--	**4**	--	**1**	**2**	--	--
CO3	--	**1**	--	--	--	--	--	--	--	**2**	**3**	--	-	**1**	**2**	--
CO4	-	**1**	-	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	--
CO5	--	--	**1**	--	--	--	--	--	**2**	--	--	--	--	--	--	**1**

1: strongly related, 2: moderately related and 3: weakly related

CSE2615	Software Engineering Lab	L	T	P	C
Version 2017.1	Date of Approval: 15 May 2019	0	0	1	1
Pre-requisites/Exposure	Basics of Software Engineering				
Co-requisites	NIL				

Catalog Description

The course provides introduction to the fundamental's principles of software engineering. The organization broadly based on the classical analysis-design-implementation framework. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software. Rational Rose Enterprise Edition software is used to serve the objectives.Students will be able to design models according to user requirement.

Course Objectives

The objective of this course is to

1. The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time.
2. Apply basic techniques of modeling computer systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: collect requirements and prepare their scenarios

CO2: Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation

CO3: Demonstrate the role and function of each UML model in developing objectoriented software.

CO4: Recognize the difference between various object relationships: inheritance, association, whole-part, and dependency relationships.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1. Introduction to Rational Rose Enterprise Edition tool and SRS (c) Explain features and characteristics of Rational Rose tool along with screenshots. (d) Create Software requirement specification document for Website application of educational institute.	L1, L2	4
2. Concept of UML and Use case diagram (c) Design Use case Diagram of ATM machine (d) Show dependencies and relationships through Use case diagram of Banking Management System	L1, L3	4
3. Class Diagrams and object diagram concepts (d) Design class diagram of Flight Reservation system (e) Design class diagram of student Management system (f) Design object diagram of courier service system (g) Design object diagram of Train Reservation system	L3, L1	8
4. Sequence, Activity, Collaboration, State chart diagram concepts (h) Design Activity diagram of Library Management system (i) Design Sequence diagram of Food Ordering system	L3, L1	8

(j) Design Collaboration diagram of Hotel Management system (k) Design State chart diagram of Turing Machine		
.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1.Rambugh,Grady Booch, Unified Modeling Language User Guide, Pearson Education 1998.

2.K.K. agrawal,Yogesh Singh, Software Engineering,

Reference Books

1. Martin Fowler,UML distilled:A Brief Guide to the Standard Object Modeling Language,Addison We sely,1997.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	1	2	3	4	--	--	--	--	--	--	--	1	--	--	--
CO2	--	--	1	2	3	--	--	--	--	--	--	--	1	2	--	--
CO3	--	1	2	3	--	--	--	--	--	4	--	--	-	2	3	--
CO4	--	1	2	3	--	--	--	--	4	--	--	--	3	--	1	2

1: strongly related, 2: moderately related and 3: weakly related

CSE2637	Minor Project I	L	T	P	C
Version: 2019.1	Date of Approval: 15 May 2019	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this minor project, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
C05	1	1	--	--	--	--			1	-	-	-	--	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

CSE2614	IoT and Wireless Sensor Network	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	0	0	3
Pre-requisites/Exposure	Concept of Networking				
Co-requisites					

Catalog Description

This course provides comprehensive and insight knowledge of Internet of Things and Wireless sensor networks. The objective of the course is to provide the students the core knowledge of architecture, routing protocols, time synchronization and security of IoT along with wireless sensor networks.

Course Objectives

The objective of this course is to

3. Equip the students with concepts of internet-of-things and provide an overview of designing IoT devices.
4. Equip the students with concepts of wireless sensor networks and its architecture.
5. Provide a thorough understanding of routing protocols and power management.
6. Give an insight of time synchronization and network security.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the Internet of Things along with its physical and logical design.

CO2: Understand the potential and value of the Internet of Things and Smart Services.

CO3: Compare and analyze different routing techniques, protocols and power management.

CO4: Explain problems, fundamentals and protocols of time synchronization and localization.

CO5: Describe the fundamentals, issues and mechanism of network security.

Modules	Blooms level*	Number of hours
Module 1: Introduction Module I: Introduction to Internet of Things Definition & characteristics of IoT, physical design of IoT-things in IoT, IoT protocols, logical design of IoT-IoT functional block, IoT communication models, IoT communication APIs, IoT enabling technologies-wireless sensor networks, cloud computing, big data analytics, communication protocols, embedded systems,IoT levels and deployment templates, IoT application.	L1, L2 and L4	9
Module 2: Developing Internet of Things IoT Design Methodology,Logical design using Python- Python data types & data structures, control flow, functions, modules, packages,	L1, L2	6

classes, file handling, Python packages for IoTJSON, XML, HTTPLib, URLLib, SMTPLib, IoT end devices-building blocks, Introduction to Raspberry Pi.		
Module 3: Introduction of WSN and Architectural Framework Motivation for a Network of Wireless Sensor Nodes, Classification of sensor networks, Hardware architecture, Applications: Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining Node Architecture: The Sensing Subsystem, the Processor Subsystem, Communication Interfaces, Prototypes. Operating Systems: Functional Aspects, Non-functional Aspects, Prototypes, Evaluation Physical Layer,	L1, L2	9
Module 4: Concept of Network Layer and Time Synchronization Basic Components, Source Encoding, Channel Encoding, Modulation Medium Access Control: Wireless MAC Protocols, Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols, Hybrid MAC Protocols Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, Clocks and the Synchronization Problem, Time Synchronization in Wireless Sensor Networks, Basics of Time Synchronization, Time Synchronization Protocols Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, Event Driven Localization.	L1, L2 and L4	8
Module 5: Security in WSN Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks , Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, IEEE 802.15.4 and Zig Bee Security	L1, L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Internet of Things: A Hands-On Approach by Arshdeep Bahga, Vijay Madisetti.
2. Designing the Internet of Things by Adrian McEwen, Hakim Classically
3. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley 2010.
4. Mohammad S. Obaidat, Sudip Misra, "Principles of Wireless Sensor Networks", Cambridge, 2014.

Reference Books

1. From Machine-to-Machine to the Internet of Things: Introduction to a New Age by Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle

2. Ian F. Akyildiz, Mehmet Can Vuran , “Wireless Sensor Networks”, Wiley 2010

3. C S Raghavendra, K M Sivalingam, Taieb Znati, “Wireless Sensor Networks”, Springer, 2010

4. C. Sivarm murthy & B.S. Manoj, “Adhoc Wireless Networks”, PHI-2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**--**	**3**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**
CO2	**3**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO3	**3**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO4	**3**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**
CO5	**1**	**2**	**--**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

AIE 6612	**VLSI Design**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	0
Pre-requisites/Exposure	Basics of semiconductor and analog electronics				
Co-requisites	Nil				

Catalog Description

This course deals with basic theories and techniques of digital VLSI design in CMOS technology. It covers the fundamental concepts and structures of designing digital VLSI systems which include CMOS devices and circuits, standardCMOSfabricationprocesses, CMOSdesignrules, staticanddynamic logic structures, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies and Stick Diagrams.

Course Objectives

The objective of this course is to

- Provide a deep understanding of the concepts, techniques and design of complex digital VLSI circuits.
- Apply mathematical methods and circuit analysis models to analyse CMOS digital circuits, and their logic components.

Course Outcomes

On completion of this course, the students will be able to

CO1.Explain the characteristics of Basic VLSI components.

CO2. Apply the knowledge of various CMOS inverters to compare their performance.

CO3. To design and realize basiccombinational and sequential functions using CMOS logic.

CO4. Design circuit Layout and Stick diagramsof CMOS logics.

Modules	**Blooms level***	**Number of hours**
Module I: Devices and the wire Dynamic and transient behavior of Diode, Diffusion capacitance, SPICE Diode model, MOSFET basic, depletion and enhancement device. MOSFET static behavior, Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model	L1, L2	8

for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS. Dynamic behavior, Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE models for MOS transistors. The Wire, Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay.		
Module II: CMOS Inverter VTC of an ideal inverter, Switching Model of the CMOS inverter: NMOS /PMOS discharge and charge, VTC of CMOS inverter : PMOS and NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer.Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tri-state inverter, Resistive load inverter. Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages, Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization.	L3, L4	8
Module III: Combinational circuits CMOS LOGIC: Good 0 and Poor 0, series and parallel N and P switches, Two and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay, Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates, Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay, Pass-transistor logic, pass gate configurations for NMOS and PMOS, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain. Dynamic CMOS design: Pre-charge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic.	L2,L3,L4	10
Module IV: Sequential Logic circuits Principle of bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, , MUX based Latches, master slave edge triggered register, Static Timing Analysis –setup, hold time, clock skew, clock period, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS	L2,L3,L4	5
ModuleV: Layout Design Rules	L2,L3,L4	5

Introduction to CMOS Process technology, Latch up and its prevention Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. **Jan M Rabaey**,Digital Integrated Circuits ,Second Edition, Pearson.
2. **David Hodges**, Analysis and Design of Digital ICs, McGrew Hill
3. **Sung-MoKang,**CMOS Digital ICs,third edition,2008

Reference Books

1. **WesteNiel and Harris**,CMOS VLSI design.A Circuits And Systems Perspective, 3/E,Pearson
2. **Weste and Eshragian**,Principles of CMOS VLSI Design: a systems perspective, Addison-Wesley Publishing Company, 01-Jan-1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	--	--	--	--	--	--	--	--	--	2	1	-	-
CO2	3	1	3	--	1	--	--	--	--	--	--	2	2	1	-	2
CO3	3	2	1	2	--	--	--	--	--	--	--	2	2	1	-	2
CO4	2	2	1	-	--	--	--	--	--	--	--	--	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

AIE 6613	VLSI Design Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of analog electronics				
Co-requisites	Basic concepts of Digital electronics				

Catalog Description

In this Lab course the designing of VLSI circuits using Mentor Graphics software are implemented and demonstrated. Concepts covered would enable them to create complex applications related to VLSI design. The objective of this course is to explore and implement the various features of VLSI design and analyze the dc and transient analysis.

Course Objectives

The objective of this course is to

Provide a deep understanding of CMOS logic using Mentor Graphics tool.

Analyze, design concepts of different combinational and sequential circuits and their simulation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of MOSFET;

CO 2: Illustrate the static and switching characteristics of inverters using CMOS with varying capacitance, width and channel Length of CMOS using Mentor Graphics tool.

CO 3: Demonstrate and create models of moderately sized CMOS circuits that realize specified digital functions using Mentor graphics Tool.

CO 4: Demonstrate the layout and stick diagrams using Mentor graphics Tool.

CO 5: Demonstrate the power consumption during transient analysis.

Modules/Topics Covered**	Blooms level*	Number of hours
1. MOSFET characteristics with varying VGS for both pmos and nmos.	L3, L5	2

2. Effect on VTC of CMOS inverter with variation of W and L.	L3, L5	2
3. Transient analysis of CMOS inverter with varying capacitive load, W and L. Rise time, fall time power dissipation, propagation delay calculation of CMOS inverter with the variation of capacitive load, W and L.	L3, L5	4
4. NOR and NAND gate - Transient analysis	L3, L5	2
5. XOR/XNOR gate - Transient analysis	L3, L5	2
6. 2:1 MUX and XOR gate with P.T.L.- Transient analysis	L3, L5	2
7. D type latch and flip flop - Transient analysis	L3, L5	2
8. 3 input NAND gate implementation with DOMINO (precharge and evaluation).	L3, L5	2
9. 4 inverter chain to derive capacitive load.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text

1. Neil Weste and K. Eshragian, "Principles of CMOS VLSI Design: A System Perspective," 2nd edition, Pearson Education (Asia) Pvt. Ltd., 2000.
2. D.A Pucknell and Eshraghain, " Basic VLSI Design", PHI, India, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 4	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 5	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE 6617	Open Source Technologies (PHP, MySQL)	L	T	P	C
Version :2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes the content about PHP and its Programming Concepts. It includes basic architecture of running a PHP Script. It also includes the concepts about Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions : Call by Value and Reference. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

After completing the course, the students will be able to,

CO 1: Explain the basic concepts of PHP programming and write PHP scripts usin Strings and functions

CO 2: Explain and write PHP scripts based on Conditional statements, control staemnts and Arrays.

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to create responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity in order to provide backend support to website to make them Dynamic in nature

CO 5: Demonstrate the website designing process on various PHP Frameworks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Open Source and PHP programming Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.	L1, L2 and L3	4
Module II: Operators, Loops, Array, Exception and Error Handling Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array. Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.	L1, L2, L3	5
Module III: Classes, File system, Passing Information between pages Object oriented programming with Php, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server. HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.	L2, L3 and L4	7
Module IV: Working with database HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input usingJavascript. MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL APIBuilding Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.	L2, L3 and L4	5
Module V: Working with Frameworks Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Working with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.	L2, L3 and L4	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner **"PHP : The Complete Reference",** Mc Graw Hill Education, 2007.
2. Ivan Bayross, **"Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP",** 4th Edition, BPB Publication, 2010.
3. Laura Thomson, **"PHP and MySQL Web Development",** 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, **"Learning PHP, MySQL and Javascript",** Shroff Publishers and Distributers private

limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	1	--	--	--	--	--	--	--	--	--			
CO2	1	1	1	--	--	--	--	--	--	--	--	--			
CO3	1	1	1	3	2	--	--	--	--	--	--	--			
CO4	1	1	2	2	2	--	--	--	--	--	--	--			
CO5	1	3	2	1	1	--	--	--	--	--	--	--			

1: strongly related, 2: moderately related and 3: weakly related

AIE6618	**Open Source Technologies (PHP, MySQL) Lab**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes PHP Programming Concepts. Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions: Call by Value and Reference are implemented. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Apply the basic concepts of PHP programming to rewrite PHP scripts using Strings and Functions

CO 2: Demonstrate the concept of Conditional & Control Statements and 1 D, 2 D & Associative Array using PHP scripts

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to prepare responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity to prepare backend support for website.

Lab Sessions	**Blooms level***	**Number of hours**
1. PHP Scripts on Basic Concepts • Write the process of installation of web server. • Write programs to print all details of your php server. Use phpinfo(). • Write a program to give demo of ECHO and PRINT command. • Write a program to implement the string functions.	L1,L3	2

2. PHP Script on Conditional and Control Statements • Write a script to print Fibonacci series upto a given number. • Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice. • Write a script to calculate Factorial of a given number	L1,L3	4
3. PHP Scripts on Arrays: 1D, 2D, Associative • Write a program sort ten number by using array. • Write a program to demonstrate the concept of associative array. • Write a program to demonstrate the concept of multidimensional array.	L1,L3	4
4. PHP Scripts on Object Oriented Programming and File Handling Concepts • Write a program to demonstrate the concept of Classes & objects. • Write a php script including all the file handling functions.	L1,L3	2
• **PHP Scripts on Webpage and Website Design Concepts** • Create a login form with two text fields called “login” and “password”. When user enters “Amity”as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry.HTML in case of wrong username/password. • Write a program to design login form in which find the greatest number amongst three numbers. • WAP for Marksheet generation. • Design a webpage for entering the student details with all the validations applied on it. • Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”.	L1,L3	6
5. PHP Scripts on Database Creation aConnectivity • Create a database in MySql and connect that database from PHP. • Write a program to Update, insert and delete the values of table in database.	L1,L3	4

**Bloom’s Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner “PHP : The Complete Reference”, Mc Graw Hill Education, 2007.
2. Ivan Bayross, “Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP”, 4th Edition, BPB Publication, 2010.
3. Laura Thomson, “PHP and MySQL Web Development”, 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, “Learning PHP, MySQL and Javascript”, Shroff Publishers and Distributers private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

PR: Practical, LR: Lab Record, V: Viva, EE: End Semester Examination, A: Attendance, IA: Internal Assessment

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO3	**1**	**1**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**	**2**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

AIE6619	Data Mining	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites	Nil				

Catalog Description

Data Mining serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	**L1, L2**	**8**
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	**L1, L2, L3**	**7**
Module III Clustering Hierarchical and k- Means Clustering, Kohenen Networks, Birch Clustering, Measuring Cluster Goodness.	**L1, L2, L3,L4**	**8**
Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	**L1, L2, L3,L6**	**9**
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	**L2, L3, L4, l5**	**8**

Bloom's Level:
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	**2**	**3**
CO2	**1**	**1**	**2**		--	--	--	--	--	--	--	--	**1**	**2**	**3**	**3**
CO3	**1**	**2**	**3**	**3**	**3**	--	--	--	--	--	--	--	**1**	**2**	**2**	**2**
CO4	**1**	**1**	**2**	--	--	**3**	--	--	--	--	--	**3**	**1**	**1**	**2**	**3**
CO5	**1**	**1**	**2**	--	--	**2**	--	--	--	--	--	**3**	**1**	**3**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

VII SEM

AIE 6702	**Computer graphics**	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers understanding of software and hardware related to computer graphics systems. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, clipping, color filling, projections, rendering techniques, visible surface detection and elimination algorithms, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Last module covers elementary image processing techniques and various library function in C to build animations.

Course Objectives

The objective of this course is to

1. Equip the students with fundamental concepts of graphics system and standards.
2. Equip the students with mathematical concepts of graphics algorithms to draw objects using C language.
3. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
4. Provide an overview of various elementary image processing techniques and basic library function in C to create animation sequence.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain applications of computer graphics and define various standards and components indevelopment of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling algorithms. Demonstrate polygon clipping and line clipping algorithmand analyze their problems and solutions.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implement -ation. Illustrate use of window to viewport transformation in computer graphics.

CO4: Apply 3D geometric transformations on 3D objects with their practical implementation.

CO 5: Illustrate the use of 3D object modeling, Visible Surface detection and elimination algorithm

and analyze their problems and solutions.

Modules	Blooms level*	Number of hours
Module I: Introduction to Graphics and Graphics Hardware System Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.	L1, L2	5
Module II: Output Primitives and Clipping operations Algorithms for drawing 2D Primitives lines (DDA and Bresenham‘s line algorithm), circles (Bresenham‘s and midpoint circle algorithm), ellipses (midpoint ellipse algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.	L2, L3, L4	6
Module III: 2D Geometric transformation 2D Transformation: Basic transformation, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.	L3 and L4	6
Module IV:3D Geometric transformation 3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation	L3 and L5	7
Module V: object modelling and Visible Surface detection	L4, L5	7

fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter‘s algorithm), Binary search partition method, Scan line method,		
Module VI: Introduction to multimedia Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design	L2, L3, L5	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1.Udit Agrawal,"Principles of Computer Graphics", 2nd Edition, DhanpatRaiPublications,New Delhi, 2017.
2.Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3.Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
4.Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL",2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	_	-	--	--	--	--	--	--	--	--	--	2	--	2
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	--	2
CO3	1	1	1	3	--	--	--	--	--	--	--	--	1	3	1
CO4	1	1	2	2	--	1	--	--	--	--	--	--	2	--	1
CO5	1	3	2	1	1	2	--	--	--	--	--	--	2	3	2
CO6	1	2	3	--	1	2	--	--	--	--	--	--	2	3	2

AIE 6706	**Computer graphics LAB**	L	T	P	C
Versionn: 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers understanding of software and hardware related to computer graphics systems. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, clipping, color filling, projections, rendering techniques, visible surface detection and elimination algorithms, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Last module covers elementary image processing techniques and various library function in C to build animations.

Course Objectives

The objective of this course is to

1. Equip the students with fundamental concepts of graphics system and standards.
2. Equip the students with mathematical concepts of graphics algorithms to draw objects using C language.
3. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.

4. Provide an overview of various elementary image processing techniques and basic library function in C to create animation sequence.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain applications of computer graphics and define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demon strate solid filling algorithms. Demonstrate polygon clipping and line clipping algorithm and analyze their problems and solutions.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementa tion. Illustrate use of window to viewport transformation in computer graphics.

CO4: Apply 3D geometric transformations on 3D objects with their practical implementation.

CO 5: Illustrate the use of 3D object modeling, Visible Surface detection and elimination algorithmsand analyze their problems and solutions.

CO 6: Explain Elementary filtering techniques and elementary Image Processing techniques. Apply C++graphics library functions to design animation sequence.

Modules	Blooms level*	Number of hours
Module I: Introduction to Graphics and Graphics Hardware System 1. Demonstrate the use of graphics library functions to draw various graphics objects. 2. Demonstrate the use of graphics library functions to draw pie chart. 3. Demonstrate the use of graphics library functions to draw bar chart on screen.	L3,L5	2

Module II: Output Primitives and Clipping operations 1. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when m<=1 and m>1. 2. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when m<=1 and m>1. 3. Demonstrate the use of Breshenham's line drawing algorithm to draw line on the screen when m<=1 and m>1. 4. Demonstrate the use of circle drawing algorithm to draw circle on the screen. 5. Write a program to draw characters on screen using bitmap character generation method. 6. Write a program to fill a polygon using boundary fill algorithm. 7. Write a program to fill a polygon using flood fill algorithm. 8. Write a program to demonstrate line clipping algorithm to clip a line where line slop is m<=1.	L3,L5	6
Module III: 2D Geometric transformation 1. Write a program to translate a triangle where translation factors are tx=20 and ty=30. 2. Write a program to rotate a triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a square where scaling factors are Sx=2 and Sy=3. 4. Write a program to reflect a triangle about X axis. 5. Demonstrate combine 2D transformation after applying translation, rotation and scaling transformations. 6. Write a program to demonstrate fix point scaling where scaling factors are Sx=2 and Sy=3. 7. Write a program to demonstrate window to viewport transformation and liner mapping of the object coordinates in viewport where size of viewport is half to the size of window.	L3,L5	6
Module IV:3D Geometric transformation 1. Write a program to translate a 3D triangle where translation factors are tx=20 and ty=30. 2. Write a program to rotate a 3D triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a 3D square where scaling factors are Sx=2 and Sy=3. 4. Demonstrate combine 3D transformation after applying translation, rotation and scaling transformations.	L3,L5	4
Module V: Object modelling and Visible Surface detection 1. Write a program to draw Bezier curve on the screen with 4 control points. 2. Write a program to draw spline curve on screen using 6 control points. 3. Write a program to implement fractal objects using Iterated Function System.	L3,L5	3

Module VI: Introduction to multimedia 1. Create animation Sequence using C++ Graphics Library Function. 2. Write a program to generate histogram of an image.	L3,L5	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Udit Agrawal,"Principles of Computer Graphics",2nd Edition, DhanpatRaiPublications,New Delhi, 2017.
2. Hughes, Van Dam, et al. "Computer Graphics Principles and Practice", 3rd Edition, Pearson, 2014.
3. Hearn and Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004.
4. Donald Hearn & M. Pauline Baker, "Computer Graphics C Version", Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, "Computer Graphics:Principles and Practice", 2nd Edition, Pearson Education, 2007.
2. F.S. Hill, "Computer Graphics using OPENGL",2nd edition, Pearson Education, 2003.
3. David F. Rogers; "Procedural Elements for Computer Graphics" TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**_**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**

CO3	**1**	**1**	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**
CO4	**1**	**1**	**2**	**2**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**
CO5	**1**	**3**	**2**	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**3**	**2**
CO6	**1**	**2**	**3**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**3**	**2**

Course Code: AIE6704	ADVANCED COMPUTER NETWORKS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Network				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks provides the knowledge of computer networks and related current research topics. This course illustrates the OSI and TCP-IP layers, services, devices, cables, protocols, network security, network performance parameters etc .This course focuses on advanced computer network concepts in theory as well as in real life applications in networking.

Course Objectives

The objective of this course is to

1. Equip the students with the advanced networking concepts.
2. Explain the different techniques of error detection and correction methods used at various layers.
3. Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of reference model, wireless Ethernet standards, protocols and applications of networks.
CO2: Describe network Layer design issues, routing algorithms, IP addressing.

CO3: State Multicasting issues and multicast routing protocol. Describe mobile IP and its use in Multicasting.

CO4: State transport and application layers and explain services, protocols, performance parameters in these layers. Also describe DNS, Email and www with applications of each in computer network.

CO5: State network security and describe various types of computer network security, the digital signature, security algorithms. Explain the social issues related to network security and web security.

Modules	Blooms level*	Number of hours
MODULE 1: Uses computer networks, Reference Models, TCP/IP suite of protocols, MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI,	L1, L2	6

DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)		
MODULE 2: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet. IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.	L2, L3	8
MODULE 3: Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.	L1, L2	8
MODULE 4: The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues. The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.	L1, L2, and L3	8
MODULE 5: Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues..	L1, L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice

   Hall, 2005, (ISBN: 978-0131873162).

Reference Books

1. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
2. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	2	1	-	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE6707	**ADVANCED COMPUTER NETWORKS LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks Lab provides the knowledge of various installations & connections of LAN, WAN, etc, study of Cisco Packet Tracer Tool and its implementations, simulation of flow-control protocols such as Sliding Window, Stop & Wait with help of programming languages. This course focuses on real-life applications in networking and its software implementation in the laboratory.

Course Objectives

The objective of this course is to

4. Equip the students with the advanced networking concepts.
5. Explain the different techniques of error detection and correction methods used at various layers.
6. Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand fundamental underlying principles of computer networking
CO2: Understand details and functionality of CISCO router
CO3:Demonstrate and configure details and functionality of DHCP server
CO4: Analyze performance of various communication protocols.
CO5: Compare routing algorithms

Modules	Blooms level*	Number of hours
MODULE 1: 1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands. 2. Configuration of IP addressing for a given scenario for a given set of topologies.	L1, L2	2
MODULE 2: 1. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address	L2, L3	2
MODULE 3: 1. Configure, implement and debug the following: Use open source tools for debugging and diagnostics. a. ARP/RARP protocols b. RIP routing protocols c. BGP routing d. OSPF routing protocols e. Static routes (check using netstat)	L1, L2	3
MODULE 4: 1. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down. 2. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment	L1, L2, and L3	3
MODULE 5: 1. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails. 2. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark.	L1, L2	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice

   Hall, 2005, (ISBN: 978-0131873162).

Reference Books

2.Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).

3. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	-	-	-	-	--	--	--	--	--	--	--	**1**	--	-	--
CO 2	**1**	-	-	-	3	--	3	--	--	--	--	--	**1**	--	-	--
CO 3	**1**	-	-	-	3	--	3	--	--	--	--	--	**1**	2	2	--
CO 4	**1**	-	-	--	2	--	2	--	3	--	--	--	**2**	**1**	-	--
CO 5	**1**	-	-	-	1	-	1	--	2	--	--	--	**2**	**1**	-	--

1: strongly related, 2: moderately related and 3: weakly related

AIE 6713	Cryptography & Network Security	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	1	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
2. Provide an overview of various network attacks and related security mechanism , various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describe and solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic ,gcd and inverse algorithm, chinese remainder theorem and its application in cryptography;Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management,distribution,secure exchange of keys and authentication certificate and its applications in real life. Explain, compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols: IPSec, SSL,TLS,SET; Describing malicious software's and illustrating various design approaches to Firewall.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES	L1, L2 and L3	7
MODULE 2: Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relativeprime numbers, Extended Euclidean Algorithm,Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primaliry testing, Chinese Remainder theorem, DiscreteLogarithmic Problem,Principals of public key crypto systems, RSA algorithm, security of RSA.	L1,L2, L3	6
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, messageauthentication code, hash functions, birthday attacks, security of hash functions, Secure hash-algorithm (SHA)Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signaturestandards (DSS).	L1,L2, L3 and L5	7
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos	L1, L2 and L3	7
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Viruses and related threats, Firewalls	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. William Stallings,**"Cryptography & Network Security"**,4th Edition, Pearson Education,NewDelhi, 2017.
2. Behrouz A. Forouzan, "**Cryptography & Network Security**", 2ndEdition,Tata Mcgraw Hills,New Delhi, 2015

Reference Books

1. Douglas R.Stinsons, **"Cryptography Theory and Practice"**, 3rd Edition, McMillan Publications, Londan, 2003
2. Atul Kahate, **"Cryptography & Network Security"**, 3rd Edition, Tata Mcgraw Hills,New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	**3**	-
CO2	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	**3**	-
CO3	**1**	**1**	**1**	--	-	--	--	--	--	--	--	--	**1**	**1**	**3**	-
CO4	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	**1**	**3**	-
CO5	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**2**	**2**	**3**	-

1: strongly related, 2: moderately related and 3: weakly related

AIE 6714	System Programming and compiler construction/System Programming	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	1	0	4
Pre-requisites/Exposure	Fundamental concept of computer architecture and operating system and theory of automata				
Co-requisites	Basics of programming languages				

Catalog Description

This course includes the concept of system programming and compiler construction in which all the system applications and programming concepts will be discussed. All the phases of compiler construction will be discussed in detail with some brief description of context free grammar. Using Basic Parsing Techniques efficient Parsers can be constructed with the help of error detection and recovery techniques.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of system programming and working of system utilities.
2. Provide an overview of estimation of performance of compiler design in real time compilation with error handling techniques during compilation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Describe the basics of compiler design and its co-relation with the subject computation theory of automation in terms of lexical analyzer.

CO 2: Explain the working of assembler and macro processor with all the phases of it. And also describe the concept of loader and other system utilities of system software at the time of program translation.

CO 3: Explain and differentiate the construction of parser through top-down and bottom up parsing techniques.

CO 4: Explain and analyze the automatic construction of different parsing table which do not allow any ambiguity and backtracking in the given grammar.

CO 5: Explain the process of syntax analyzer and identify any error occurs in this phase and also generate the three-address code the given grammar and the postfix translation.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction** Phases, FSM & RE's and their application to Lexical Analysis, Implementation of Lexical Analysers, The Syntactic specification of Languages: CFG, Derivation and Parse Trees, Capabilities of CFG.	L1 and L2	4
MODULE 2: **System Programming** Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor, First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation, Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes.Booting techniques and sub-routines.	L1 and L2	11
MODULE 3: **Basic Parsing Techniques** Parsers, Shift Reduce Parsing, Operator precedence parsing, topdown Parsing, Predictive Parsers.	L2, L3 and L4	9
MODULE 4: **Automatic Construction of efficient Parsers** LR Parsers, the canonical collection of LR(0) items, constructing SLR Parsing Tables, Constructing canonical LR Parsing tables and LALR parsing tables, An Automatic Parser Generator, Implementation of LR parsingTables, Constructing LALR sets of items.	L2, L3 and L4	8
MODULE 5: **Syntax Directed Translation** Syntax directed Translation Schemes, Implementation of Syntax directed translators,Intermediate Code, Postfix notation, Parse Trees and Syntax Trees, Three address Code, Quadruple & Triples, Translation of Assignment Statements, Postfix Translation.	L2 and L3	9

MODULE 6: **Error detection and Recovery** Lexical phase errors, syntax phase errors, semantic errors Code Optimization: Loop optimization, the DAG representation of basic blocks, value numbers and Algebraic Laws, Global Data – Flow Analysis.	L1, L2 and L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Alfread V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
2. Ullman, Principles of Compiler Design, Narosa publications.
3. Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.

Reference Books

1. Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.
2. D.M. Dhamdhere, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
3. Holub, "Compiler Design in C", PHI.
4. Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO2	**1**	--	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	--

CO3	--	--	**1**	--	--	--	--	--	--	--	--	--	--	**2**	**1**	--
CO4	--	--	**1**	**2**	--	--	--	--	--	--	--	--	--	**2**	**1**	--
CO5	--	--	**1**	--	--	--	--	--	--	--	--	--	**2**	**1**	--	
CO6	**2**	**2**	**3**	--	--	--	--	--	--	--	--	--	**2**	**1**	--	**3**

1: strongly related, 2: moderately related and 3: weakly related

AIE6716	**SYSTEM PROGRAMMING & COMPILER CONSTRUCTION LAB**	L	T	P	C
Version 2020.1	Date of Approval:JULY 2020	0	0	2	1
Pre-requisites/Exposure	concept of pointer and file handling of C/C++ programming languages				
Co-requisites	NIL				

Catalog Description

In this Lab course the concept of system programming and compiler construction are implemented and demonstrated. Concepts covered would enable them to create and solve complex problems.

Problems or programs will be related to concepts of assembler, macro processor, text editor and parser.

Course Objectives

The objective of this course is to

1.
2. Make the students apply knowledge of various system programming concepts such as assembler, macro processor and text editor.
3. Provide a demonstration of compiler concepts like parsing techniques and implementation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of regular languages and context free grammar.

CO2: Demonstrate the use of lexical analyzer and concept of editors.

CO3: Apply the knowledge of compiler design to covert the given expression into acceptable form of compiler.

CO4: Demonstrate the concept of assemble and macro-processor and their calling and expansion.

CO5: Demonstrate and apply the knowledge of compiler parsing techniques to construct parse tree for the given expression .

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1. Sample Programs using the theory of computation concepts of regular language. (a) WAP to check whether string is accepted or not for entered grammar. (b) WAP to convert NFA to DFA. (c) WAP to convert Regular Expression to NFA.	L3, L5	6
2. Sample Programs using context free grammar and editors (a) WAP to find no of Tokens in an expression. (b) Write a program to implement Text Editor.	L3, L5	4
3. Sample Programs using the notation conversion and their usage in parsing. (a) WAP to convert Infix to Postfix notation. (b) WAP to convert Infix to Prefix notation.	L3, L5	2
4. Sample Programs using the concept of assemble and macro processor (a) Write a program to implement Assembler Pass one and Pass two. (b) Write a program to implement Macro-processor.	L3, L5	4
5. Sample Programs using the compiler parsing techniques	L3, L5	6

(a) WAP to implement symbol table. (b) WAP calculate FIRST and FOLLOW of a grammar. (c) WAP to implement shift reduce parser.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Alfread V. Aho, Ravi Sethi & J.D. Ullman, "Compiler Design", Addison Wesley
2. Ullman, Principles of Compiler Design, Narosa publications.
3. Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.

Reference Books

1. Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.
2. D.M. Dhamdhere, "Compiler Construction – Principles & Practice", Macmillan India Ltd.
3. Holub, "Compiler Design in C", PHI.
4. Tremblay K.P & Sorenson P.G., "The Theory and practice of Compiler writing" McGraw Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	2	3	1	--	--	--	--	--	--	--	--	--	3	2	1	--
CO4	3	1	2	--	--	--	--	--	--	--	--	--	2	--	1	--
CO5	--	3	1	--	--	--	--	--	--	--	--	--	3	2	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE6710	**MATLAB Programming**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	4	2
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Programming				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of Mat Lab Programming.

Course Objectives

The objective of this course is to

1. To understand the basic concepts and terminology related to Mat Lab.
2. Application of Mat Lab in field of Signal Processing and Control systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the basics of Matlab programming environment.

CO2. Analysis of given LTI System and verifying its physical reliability and stability properties.

CO3. Waveform synthesis using Laplace Transforms and z-transform of a given signal and system.

Modules	Blooms level*	Number of hours
1. To write a MATLAB program to perform some basic operation on matrices such as addition, subtraction, multiplication. 2. To write a "MATLAB" Program to generate various signals and sequences, such as unit impulse, unit step, unit ramp, sinusoidal, square, saw tooth, triangular, sinc signals. 3. To performs operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power. 4. Write a program for finding even and odd parts of sequences Using MATLAB Software& program for finding real and imaginary parts of sequences Using MATLAB Software.	L1, L2 and L3	8

5. Write a program to find the out put with linear convolution operation Using MATLAB Software 6. Write a program to compute auto correlation and cross correlation between signals and Sequences. 7. Write a program to compute linearity and time invariance properties of a given continuous /discrete System.	L1,L2,l3	6
8. Write a program to Unit Step And Sinusoidal Response Of The Given LTI System And Verifying Its physical reliability and stability properties. 9. Write a program to demonstrate Gibbs Phenomenon using MATLAB. 10. Write a program to obtain Fourier Transform and Inverse Fourier Transform of a given signal / sequence and to plot its Magnitude and Phase Spectra **11.** Write a program to perform waveform synthesis using Laplace Transforms of a given signal.	L1, L2 and L3	8
12. Write a program to locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane 13. for the given transfer function. 14. Write a program to Generate Gaussian Noise and to Compute its Mean, M.S. Values, Skew, kurtosis, 15. PS and PDF 16. Write a program to demonstrate Sampling Theorem and aliasing effect using MATLAB. 17. Write a program for removal of noise by auto correlation/cross correlation.	L1, L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Amos Gilat, "MATLAB: An Introduction with Applications", Wiley; Fourth edition (2012)4ed.

Reference Books

1. Bansal, Goel and Sharma, MATLAB and its Applications in Engineering"Pearson Education India; Second edition (1 March 2016).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--

1: strongly related, 2: moderately related and 3: weakly related

AIE2535	Summer Internship Evaluation II	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects

2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:
CO1: Develop communication, interpersonal and other critical skills in the job interview process.
CO2: Design and develop software and hardware projects
CO3: Assess interests and abilities in their field of study.
CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**1**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO2	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO3	**1**	**1**	**2**	**3**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

AIE2737	Minor Project II	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this minor project, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO2	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO3	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO4	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**

C05	**1**	**1**	**--**	**--**	**--**	**--**			**1**	**-**	**-**	**-**	**--**	**--**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

AIE6710	Mobile Computing	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking				
Co-requisites	Nil				

Catalog Description

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Objectives

The objective of this course is to

1. Give a general overview of the cellular technology and the associated terms and discuss the generations of the mobile technologies starting from 1G to 3G techniques.
2. Illustrate the GPRS and WAP model for 2G internet connectivity in detail.
3. Elaborate the third-generation mobile services
4. Describe the Global Mobile Satellite Systems in detail and basic architecture of Bluetooth technology and advanced topics in mobile computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts mobile technology, computing and basic architecture of PCS and GSM.

CO2: Describe the mobile networking Infrastructure through 2G technologies (GSM, GPRS, WAP).

CO3: Explain the basic concepts of 3G technologies (WCDMA, CDMA 2000) and WLL.

CO4: Discuss the working of mobile satellite systems like IRIDIUM and GLOBALSTAR.

CO5: Explain the concepts of Bluetooth technology, its working and protocols, virtual networks and enterprise networks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.	L1, L2 and L3	8
Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).	L1,L2	10
Module III: Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.	L1, L2	7
Module IV: Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.	L1, L2	7
Module V: Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.	L1, L2	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

Reference Books

1. "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
2. "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
3. "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**1**	-	**3**	-
CO2	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	-	**3**	--
CO3	**1**	**2**	-	--	-	--	--	--	--	--	--	--	**1**	-	--	--
CO4	**1**	**2**	-	--	--	--	--	--	--	--	--	--	**1**	-	--	--
CO5	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE6717	**Robotic Process Automation Design & Development**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5:Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Bloom s level*	Number of hours
Module 1: Programming Basic and Recap **Programming Concepts Basics I -** Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, SDLC. **Programming Concepts Basics 2-** Scripting, Net Framework, Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables& Arguments.	L1, L2	8
Module II: RPA Concepts **RPA Basics -** History of Automation, what is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated. **RPA Advanced Concepts -** Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem	L2, L3 and L4	8
Module III: UiPath Introduction & Basics **Introduction to UiPath-** Installing UiPath Studio community edition, The User Interface, KeyboardShortcuts,AboutUpdating,AboutAutomationProjects,IntroductiontoAutomation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide. **Variables**, **Control Flow** **DataManipulation-** DataManipulationIntroduction,Scalarvariables,collectionsandTables, Text Manipulation, Data Manipulation, Gathering and AssemblingData. **Recording and Advanced UI Interaction -** Recording Introduction, Basic and	L2, L3 and L4	8

Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping,Scraping advanced techniques.Selectors.		
Module IV: UiPath Advanced Automation concepts and techniques Image, Text & Advanced Citrix Automation- Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, using tab for Images, Starting Apps. Excel Data Tables & PDF - Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF. Email Automation- Email Automation, Incoming Email automation, Sending Email automation	L2, L3 and L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi,Packt Publications,Ist Edition,2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	**3**	--	--	--	--	--	--	**2**	--	**1**	**1**	-	-
CO2	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	-

CO3	**1**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**1**	**-**	**2**
CO4	**1**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**-**	**2**

1: strongly related, 2: moderately related and 3: weakly related

AIE 6718	**Responsive Web Design**	L	T	P	C
Version : 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	knowledge of website design				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the and explain concept of responsive web design and responsive content.

CO2 Explain HTML and CSS contents for responsive websties; Design and Create responsive websites using html, css and media queries.

CO3: Explain the concept of responsive workflow and working with responsive web design tools; Creating responsive websites that work on variety of devices.

CO4: Designing responsive websites using the concepts of typography, navigation and header layout; Evaluating performance of responsive websites .

Modules	**Blooms level***	**Number of hours**
Module 1: Foundations of responsive design **What Is Responsive Design?:** Just the Basics ,A Short History, Why Responsive Design **Responsive Content:** Content Strategy ,Managing Content, Developing Content, Content Parity, Content Governance, Adaptive Content	L2 and L3	8
Module 2: Creating Responsive Websites **HTML for Responsive Sites:** Working with HTML, Basic Page Structure Viewport, Structural Elements, Creating a Page, Clean and Semantic HTML **CSS for Responsive Sites:** How CSS Works,Versions of CSS, Where CSS Goes, The Cascade, Using the Cascade, Comments, Organizing Your Stylesheet, The Box Model, display, Positioning, float and clear, Basic Styles **Media Queries:** What's a Media Query? Media Query Structure, Using Media Queries in Stylesheet Links, Other Ways to Use Media Queries, What We Can Query, Browser Support, Breakpoints, Design Ranges, Designing Responsively, Using Media Queries, Two-Column Layout, Setting a Maximum Width, How to Choose Breakpoints Images: Ways to Display Images, Alt Text, Image File Formats, Optimizing Images, Content Images, Background Images Responsive Images	L2 and L3	8
Module 3: Working Responsively **Responsive Workflow:** Strategy and Planning, Content Before Layout Thinking About Layout, Prototypes, Visual Design, Responsive Design Tools, Selling Responsive Design, Working with Clients **Mobile and Beyond:** User Experience , Device-Agnostic Design, Focusing on Mobile First, Do What You Can, Types of Devices, Touch, Screen Size, Accessibility (Universal Design), Deciding Which Devices to Support Why Use Real Devices for Testing, Testing	L2 and L3	8
Module 4:Designing Responsive Websites **Typography:** Start with HTML, Typefaces, Using Fonts, Sizing Text, Line Length, Whitespace, Margins and Padding, Changing Typeface for Screen Size **Navigation and Header Layout**: Responsive Navigation , Branding, Navigation Links, Navigation Patterns, Header **Performance:** Why Performance Matters, Performance as Design ,How Web Pages Are Loaded and Rendered, Measuring Performance Cleaning Up Your Code, Minimizing HTTP Requests, Server Stuff JavaScript, CSS, Hosting, Conditionally Loading Content, Reflows and Repaints, RESS	L2and L3	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. “Learning Responsive Web Design A Beginner's Guide”,Clarissa Peterson, Orielly, 2014

Reference Books:

1. “Responsive Web Design with HTML5 and CSS3”,Ben Frain, Packt, 2012
2. “Responsive Web Design by Example”, Farhaan Hussain, Packt, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

AIE 6719	**Responsive Web Design Lab**	L	T	P	C
Version : 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Knowledge of website design				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1*: Define the and explain concept of responsive web design and responsive content.*

CO2 *Explain HTML and CSS contents for responsive websties; Design and Create responsive websites using html, css and media queries.*

CO3: *Explain the concept of responsive workflow and working with responsive web design tools; Creating responsive websites that work on variety of devices.*

CO4: *Designing responsive websites using the concepts of typography, navigation and header layout; Evaluating performance of responsive websites .*

Modules	**Blooms level***	**Number of hours**
Module 1: Foundations of responsive design **Programs based on:** • Content Strategy ,Managing Content,	L2 and L3	3

• Developing Content, Content Parity, • Content Governance, Adaptive Content		
Module 2: Creating Responsive Websites **Programs based on:** • Working with HTML, Basic Page Structure Viewport, Structural Elements, Creating a Page, Clean and Semantic HTML • The Cascade, Using the Cascade, Comments, Organizing Your Stylesheet, The Box Model, display, Positioning, float and clear, Basic Styles • Media Query Structure, Using Media Queries in Stylesheet Links, Other Ways to Use Media Queries, • What We Can Query, Browser Support, Breakpoints, Design Ranges, Designing Responsively, Using Media Queries, Two-Column Layout, Setting a Maximum • Width, How to Choose Breakpoints Images: Ways to Display Images, Alt Text, Image File Formats, Optimizing Images, Content Images, Background Images Responsive Images	L2 and L3	3
Module 3: Working Responsively **Programs based on:** • **Responsive Workflow**, Visual Design, Responsive Design Tools, Selling Responsive Design, Working with Clients • **Mobile and Beyond:** User Experience , Device-Agnostic Design, Focusing on Mobile First, Do What You Can, • Types of Devices, Touch, Screen Size, Accessibility (Universal Design), Deciding Which Devices to Support Why Use Real Devices for Testing, Testing	L2 and L3	3
Module 4:Designing Responsive Websites • **Typography:** Start with HTML, Typefaces, Using Fonts, Sizing Text, Line Length, Whitespace, Margins and Padding, • Changing Typeface for Screen Size • **Navigation and Header Layout**: Responsive Navigation , Branding, Navigation Links, Navigation Patterns, Header • **Performance:** Why Performance Matters, Performance as Design ,How Web Pages Are Loaded and Rendered, • Measuring Performance Cleaning Up Your Code, Minimizing HTTP Requests, Server Stuff JavaScript, CSS, Hosting, Conditionally Loading Content, Reflows and Repaints, RESS	L2and L3	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. “Learning Responsive Web Design A Beginner's Guide”,Clarissa Peterson, Orielly, 2014

Reference Books:

1. “Responsive Web Design with HTML5 and CSS3”,Ben Frain, Packt, 2012
2. “Responsive Web Design by Example”, Farhaan Hussain, Packt, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

VIII SEMESTER

Course Code : AIE6809	**Research Methodology and Technical Report Writing**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

1. Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
2. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
3. It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Classify different research types, explain steps in research process and planning research proposal.

CO2. Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3. Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4. Demonstrate technical and scientific report writing skills, describe plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	**4**
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.	L1, L2, L3	**5**
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	**10**
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	**5**

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.

Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.

Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO 2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO 3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO 4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3
CO 5	2	1	1	-	-	-	-	-	-	-		1	3	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

AIE6837	Project Dissertation	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	8
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1

C05	**1**	**1**	**--**	**--**	**--**	**--**			**1**	**-**	**-**	**-**	**--**	**--**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

ROBOTICS (SPECIALISATION)

Course Code: RBE6801	FUNDAMENTALS OF ROBOTIC SYSTEM AND ROBOT PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: JUY 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of control system and programming				
Co-requisites	Nil				

Catalog Description

Enlighten the students about the fundamentals of robotic systems make them to understand the basics of robot, robot transformations and sensors, micro/nano robotic systems and to program them for functioning.

Course Objectives

The objective of this course is to

1. Equip the students with the basic knowledge and designing of robotics.
2. Implement their concept in robotics and design robot for various applications of engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand the design and functionality of robots

CO2: Describe the control system with the help of sensor and robot transformations.

CO3:Undersand and robot cell design and implement in micro/nano robotics system

CO4: Explain and Understand the robotic programming language and use in design of robot.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems- Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems- Hydraulic, Pneumatic and Electric system.	L1 and L2	5
MODULE 2: END EFFECTORS AND ROBOT CONTROLS Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers-Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems-Robot controls-Point to point control,	L1, L2 and L3	7

Continuous path control, Intelligent robot-Control system for robot joint-Control actions-Feedback devices-Encoder, Resolver, LVDT-Motion Interpolations-Adaptive control.		
MODULE 3: ROBOT TRANSFORMATIONS AND SENSORS Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation-Homogeneous coordinates, multiple transformation-Simple problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors.	L1 and L2	5
MODULE 4: ROBOT CELL DESIGN AND MICRO/NANO ROBOTICS SYSTEM Robot work cell design and control-Sequence control, Operator interface, Safety monitoring devices in Robot-Mobile robot working principle, actuation using MATLAB, NXT Software Introductions-Robot applications- Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot. Micro/Nanorobotics system overview-Scaling effect-Top down and bottom up approach- Actuators of Micro/Nano robotics system-Nanorobot communication techniques-Fabrication of micro/nano grippers-Wall climbing micro robot working principles-Biomimetic robot-Swarm robot-Nanorobot in targeted drug delivery system.	L1, L2, L3,L4 and L5	8
MODULE 5: BASICS OF ROBOT PROGRAMMING Robot programming-Introduction-Types- Flex Pendant- Lead through programming, Coordinate systems of Robot, Robot controller- major components, functions-Wrist Mechanism-Interpolation-Interlock commands- Operating mode of robot, Jogging-Types, Robot specifications- Motion commands, end effectors and sensors commands.	L1, L2 and L3	5
MODULE 6: VAL,VAL-II, RAPID AND AML LANGUAGE Robot Languages-Classifications, Structures- VAL- language commands motion control, hand control, program control, pick and place applications, palletizing applications using VAL, Robot welding application using VAL program-WAIT, SIGNAL and DELAY command for communications using simple applications. RAPID- language basic commands- Motion Instructions-Pick and place operation using Industrial robot- manual mode, automatic mode, subroutine command based programming. Move-master command language- Introduction, syntax, simple problems. VAL-II programming-basic commands, applications- Simple problem using conditional statements-Simple pick and place applications-Production rate calculations using robot. AML Language-General description, elements and functions, Statements, constants and variables-Program control statements-Operating systems, Motion, Sensor commands-Data processing.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Craig. J. J. “Introduction to Robotics mechanics and control”, Addison- Wesley,1999.

Reference Books

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning.,
4. 2009.
5. Deb. S. R. “Robotics technology and flexible automation”, Tata McGraw Hill publishing company limited, 1994
6. Mikell. P. Groover, “Industrial Robotics Technology”, Programming and Applications, McGraw Hill Co, 1995.
7. Klafter. R.D, Chmielewski.T.A. and Noggin’s., “Robot Engineering : An Integrated Approach”, Prentice Hall of India Pvt. Ltd.,1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**1**	**2**	**1**	**3**	--	--	--	--	--	--	-	**1**	**2**	-
CO2	**1**	**1**	**2**	**1**	**1**	--	--	--	--	--	--	--	**1**	--	-	**3**
CO3	**1**	**2**	**1**	**1**	**1**	**3**	--	--	--	--	--	--	**1**	**2**	-	-
CO4	**1**	**2**	**2**	**2**	**3**	**3**	--	--	--	--	--	--	-	--	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE6802	Advanced Control Systems Drivers For Robots	L	T	P	C
Version 2020.1	Date of Approval: JUY 2020	3	0	0	3
Pre-requisites/Exposure	Basic concepts of control system				
Co-requisites					

Catalog Description

This course provides comprehensive and insight knowledge of Digital control systems. Objective of the course is to provide the students the core knowledge of Stability theory of Digital systems and State Variable analysis of Digital System

Course Objectives

The objective of this course is to

3. Equip the students with concepts of basic control system and its stability.
4. Provide a thorough understanding of control system model by considering standard examples.
5. Give an insight of state variable methods for control systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the fundamentals of a digital control system.

CO2: Apply the standard methods to check the stability of a control system.

CO3: Design model for digital control system for an application with given requirements.

CO4: Analyze the analog and digital control systems using state variable method.

Modules	Blooms level*	Number of hours
Module 1:	L1,L2,L4	12

Introduction Configuration of the basic Digital Control Systems, types of sampling operations, Sample and Hold operations, Sampling theorem, Basic discrete time signals.		
Module 2: **Stability Methods** Mapping between s-plane and z-plane, stability methods: Modified Routh Criterion, Jury's method, modified Schur-Cohn criterion.	L3	6
Module 3: **Models Of Digital Control Systems** Digital temperature control System, Digital position control system, stepping motors and their control. Design of Digital compensator using frequency response plots.	L5	6
Module 4: **Control Systems Analysis Using State Variable Methods** State variable representation, conversion of state variable models to transfer function and vice-versa, Eigen values and eigen vectors, Solution of state equations, Concepts of controllability and observability.	L3	6
Module 5: **State Variable Analysis Of Digital Control Systems** State variable description of digital control systems, conversion of state variable models to pulse transfer function and vice versa, solution of state difference equations, controllability and observability.	L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Gopal, Digital Control and State Variable Methods,4th edition, Tata Mc-Graw-Hill.
2. K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
3. B.C Kuo, Digital Control Systems, Prentice Hall.

Reference Books

1. I.J. Nagrath & M.Gopal, Control System Engg., John Wiley & sons.
2. K.K. Aggarwal, Control System Analysis and Design, Khanna Publishers.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO2	**1**	--	--	**2**	--	--	--	--	--	--	--	--	**1**	--	--	**3**
CO3	--	--	**1**	--	**3**	--	--	--	--	--	--	--	**3**	**1**	--	--
CO4	**2**	**1**	**2**	--	**3**	--	--	--	--	--	--	--	**1**	--	--	

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE6803	**Microprocessor and interfacing**	L	T	P	C
Version 2020.1	Date of Approval: JUY 2020	3	0	0	3

Pre-requisites/Exposure	Nil
Co-requisites	Nil

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is

1. To introduce students with the architecture and operation of typical microprocessors.
2. To familiarize the students with the programming and interfacing of microprocessors
3. To provide expertise in designing the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, pin configuration, addressing modes, control words of various microprocessors and Interfacing ICs

CO2. Develop the assembly language program using 8085 and 8086 using stacks & subroutines, procedures, segments, interrupts and interfacing.

CO3. Analyze assembly language programs; select appropriate assemble into machine across assembler utility of a microprocessor and solve various automation based problems of power system.

CO4. Design circuitry to the Microprocessor I/O ports in order to interface the processor to external devices so as to provide solutions real-world control problems

Modules	Blooms level*	Number of hours
Module I: Microprocessor Intel 8085 - Introduction, register structure, memory Addressing, Addressing Modes, Instruction Set, Timing Methods, CPU Pins and Associated Signals, Instruction timing and execution. programming I/O. Interrupt System, DMA, SID & SOD lines, Instruction set, 8085 based system design.	L1, L2, L3,L4	8
Module II: Intel 8086 Introduction, Architecture, Addressing modes, instruction set, memory management, assembler dependent instructions,	L2,L3,L4	7

Input/Output, system design using 8086.		
Module III: Pentium Processors Internal Architecture of 8087, operational overview of 8087, Introduction to 80186,80286, 80386 & 80486 processors and Pentium Processors.	L2,L3	6
Module IV: Peripheral Interfacing Parallel versus serial transmission, synchronous and asynchronous serial data transmission. Interfacing or hexadecimal keyboard and display unit, interfacing of cassette recorders and parallel, serial interface standards. Study of Peripheral Devices 8255, 8253,8257, 8251, 8259	L3,L4, L5,L6	7
Module V: Microprocessor applications to Power Engineering **Protective Relaying:** over-current, impedance, MHO, reactance, bi-directional relays. **Measurements:** Frequency, power angle & power factor, Voltage and Current, KVA, KW, & KVAR, maximum demand. Resistance, Reactance, Temperature Controls.	L4,L5,L6	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
4. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

3. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
4. Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**			
CO2	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**		
CO3	**-**	**-**	**-**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**		**1**	**2**	
CO4	**-**	**-**	**-**	**1**	**--**	**2**	**--**	**--**	**2**	**3**	**3**	**--**		**2**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE6804	KINEMATICS AND DYNAMICS OF ROBOTS	L	T	P	C
Version 2020.1	Date of Approval: JUY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of robotic moments and design. The aim of this course is

1. To introduce students with the architecture and operation of robots.
2. To familiarize the students with the programming and interfacing of Robots
3. To provide expertise in designing the embedded system and kinematics of a robot based on real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, kinematic analysis for axis in Robot Design.
CO2. Understand the Workspace, Analysis And tracjectory planning

CO3. Understand the Dynamic Moments and Mathematical modeling of various forces in Moments of robotic machine

CO4. Design a robot with understanding of dynamic kinematics.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction, position and orientation of objects, objects coordinate frame Rotation matrix, Euler angles Roll, pitch and yaw angles coordinate Transformations, Joint variables and position of end effectors, Dot and cross products, coordinate frames, Rotations, Homogeneous coordinates	L1, L2, L3,L4	7
Module II: Direct Kinematics Link coordinates D-H Representation, The ARM equation. Direct kinematic analysis for Four axis, SCARA Robot and three, five and six axis Articulated Robots.	L2,L3,L4	6
Module III: Inverse Kinematics The inverse kinematics problem, General properties of solutions. Tool configuration, Inverse kinematics of four axis SCARA robot and three and five axis, Articulated robot.	L2,L3	6
Module IV: Workspace Analysis And Tracjectory Planning Workspace Analysis, work envelope of a Four axis SCARA robot and five axis articulated robot workspace fixtures, the pick and place operations, Joint space technique - continuous path motion, Interpolated motion, straight line motion and Cartesian space technique in trajectory planning.	L3,L4, L5,L6	8
Module V: Manipulator Dynamics Introduction, Lagrange's equation kinetic and potential energy. Link inertia Tensor, link Jacobian Manipulator inertia tensor. Gravity, Generalized forces, Lagrange-Euler Dynamic model, Dynamic model of a Two-axis planar robot, Newton Euler formulation, Lagrange - Euler formulation, problems.	L4,L5,L6	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Robert J. Schilling, Fundamentals of Robotics Analysis and Control, PHI Learning., 2009.

2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.

3. P.A. Janaki Raman, Robotics and Image Processing An Introduction, Tata Mc Graw Hill Publishing company Ltd., 1995.

4. Francis N-Nagy Andras Siegler, Engineering foundation of Robotics, Prentice Hall Inc., 1987.

5. Bernard Hodges, Industrial Robotics, Second Edition, Jaico Publishing house, 1993.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**-**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**			
CO 2	**1**	**1**	**-**	**-**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**1**	**2**		
CO 3	**1**	**-**	**-**	**2**	**-**	**3**	**--**	**--**	**--**	**--**	**--**	**--**		**1**	**2**	**3**
CO 4	**-**	**-**	**-**	**1**	**--**	**2**	**--**	**--**	**2**	**-**	**3**	**--**		**2**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE6805	ADVANCED APPLIED MATHEMATICS FOR ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Objective of this course is to develop analytical capability and to impart knowledge in Mathematical and Statistical methods and their applications in Engineering and Technology and to apply these concepts in engineering problems they would come across.

1. To introduce students mathematical approach in applications of Engineering
2. To familiarize the solution techniques and the concept to solve the Engineering applications
3. To provide expertise in solving real time problem and modeling it with the advance mathematical approach.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the transform method and approach in robotic design
CO2. Understand the calculus of variations in engineering.

CO3. Understand the numerical solution of partial differential equations

CO4. Explain the regression methods in various engineering problem solution.

Modules	Blooms level*	Number of hours
Module I: TRANSFORM METHODS Laplace transform methods for one-dimensional wave equation - Displacements in a string - Longitudinal vibrations of an elastic bar – Fourier transform methods for one-dimensional heat conduction problems in infinite and semi-infinite rod.	L1, L2,	6
Module II: ELLIPTIC EQUATIONS Laplace equation - Fourier transform methods for Laplace equation – Solution of Poisson equation by Fourier transform method.	L2 ,L4	7
Module III: CALCULUS OF VARIATIONS Variation and its properties - Euler's equation - Functionals dependent on first and higher order derivatives - Functionals dependent on functions of several independent variables - Some applications - Direct methods - Ritz methods.	L1,L3	7
Module IV: NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS Numerical Solution of Partial Differential Equations - Solution of Laplace's and Poisson equation on a rectangular region by Liebmann's method - Diffusion equation by the explicit and Crank Nicholson implicit methods - Solution of wave equation by explicit scheme.	L3,L4, L5,L6	9
Module V: REGRESSION METHODS Principle of least squares - Correlation - Multiple and Partial correlation - Linear and non-linear regression - Multiple linear regression.	L4 ,L6	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Sankara Rao K., Introduction to Partial Differential Equations, 4th printing, PHI, New Delhi, April 2003

2. Elsgolts L., Differential Equations and Calculus of Variations, Mir Publishers, Moscow, 1966

3. S.S. Sastry, Introductory Methods of Numerical Analysis, 3rd Edition, PHI, 2001

4. Gupta S.C. and Kapoor V.K., Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi, Reprint 2003

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**-**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**			
CO 2	**1**	**1**	**-**	**-**	**2**	**--**	**--**	**-**	**--**	**--**	**3**	**--**	**1**	**2**		
CO 3	**-**	**-**	**1**	**2**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**		**1**	**2**	**3**
CO 4	**-**	**1**	**-**	**-**	**--**	**-**	**--**	**--**	**3**	**-**	**2**	**--**		**2**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

Course Code :RBE6806	FUNDAMENTAL OF ROBOTICS SYSTEM AND ROBOT PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JUY 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

The objective of this course is to enlighten the students about the fundamentals of robotic systems. To understand the basics of robot, Robot Transformations and Sensors, Micro/Nano robotic systems and to program them for functioning.

Course Objectives

The objective of this course is to

1. Equip the students with the basic knowledge and designing of robotics.
2. Implement their concept in robotics and design robot for various applications of engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand and be able to apply a variety of techniques to solve problems in areas such as robot control and navigation

CO2: program a robot to perform a specified task (e.g obstacle avoidance or wall following) in a target environment.

CO3: Understand how simulations of robots work, where they can be useful and where they can break down.

Modules	Blooms level*	Number of hours
Lab Session 1: Study of different types of robots based on configuration and application.	L1. L2 and L3	4
Lab Session 2: Study of different type of links and joints used in robots	L1. L2, L3 and L4	4
Lab Session 3: Study of components of robots with drive system and end effectors.	L1. L2, L3 and L4	4
Lab Session 4 Determination of maximum and minimum position of links.	L3 and L4	2
Lab Session 5 Verification of transformation (Position and orientation) with respect to gripper and world coordinate system	L3 and L4	4
Lab Session 6 Estimation of accuracy, repeatability and resolution.	L3 and L4	2
Lab Session 7 Robot programming exercises	L1, L2, L3 and L4	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

Text:-

1. Craig. J. J. “Introduction to Robotics mechanics and control”, Addison- Wesley,1999.

References:-

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning.,
4. 2009.
5. Deb. S. R. “Robotics technology and flexible automation”, Tata McGraw Hill publishing company limited, 1994
6. Mikell. P. Groover, “Industrial Robotics Technology”, Programming and Applications, McGraw Hill Co, 1995.
7. Klafter. R.D, Chmielewski.T.A. and Noggin’s., “Robot Engineering : An Integrated Approach”, Prentice Hall of India Pvt. Ltd.,1994.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	3	--	--	--	--	--	--	--	--	1	1	--	3
CO2	2	2	--	3	1	--	--	--	--	--	--	--	1	1	--	3
CO3	2	--	--	--	--	1	3	--	--	--	--	--	2	1	--	3

Course Code: RBE6807	Advanced Control Systems & Drives For Robots Lab	L	T	P	C
Version 2020.1	Date of Approval: JUY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of Control Systems				
Co-requisites					

Catalog Description

This course is designed to get students an understanding of the basic concepts of control systems and its major applications.The course also includes some interdisciplinary applications like digital electronics and mechanical devices. Students will perform practical on hardware kit as well as on software.

Course Objectives

The objective of this course is to

1. Make students demonstrate the concepts of control systems.
2. Apply the concepts of control systems in various applications.

Course Outcomes

On completion of this course, the students will be able to

CO1. Practically verify the theoretical concepts of control systems.

CO2. Design various digital logic gates using programmable logic controller.

CO3. Analyse and explain the response of Process Control Simulator, Magnetic amplifier, Synchros, Servomotor and compensators.

Modules	Blooms level*	Number of hours
Lab Session 1 Determination of Transfer functions of an Electrical System	L3	1
Lab Session 2 Time Response Characteristics of a Second order System (Typical RLC network).	L3 and L4	1

Lab Session 3 Characteristics of Synchros: (a) Synchro transmitter characteristics. (b) Implementation of error detector using synchro pair	L3 and L4	2
Lab Session 4 Determination of Magnetic Amplifier Characteristics with different possible connections.	L3 and L4	2
Lab Session 5 Process Control Simulator: (a) To determine the time constant and transfer function of first order process. (b) To determine the time response of closed loop second order process with Proportional Control. (c) To determine the time response of closed loop second order process with Proportional Integral Control. (d) To determine the time response of closed loop second order process with Proportional Integral-Derivative Control. (e) To determine the effect of disturbances on a process.	L3 and L4	6
Lab Session 6 To study the compensation of the second order process by using: (a) Lead Compensator. (b) Lag Compensator. (c) Lead- Lag Compensator	L3 and L4	2
Lab Session 7 Realization of AND, OR, NOT gates, other derived gates and ladder logic on Programmable Logic Controller with computer interfacing.	L3 and L5	2
Lab Session 8 To determination of AC servomotor Characteristics	L3 and L4	2
Lab Session 9 To study the position control of DC servomotor with P, PI control actions.	L3	2
Lab Session 10 Analog Computer: (a) To examine the operation of potentiometer and adder. (b) To examine the operation of integrator	L3	2
Lab Session 11 To solve a second order differential equation.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Gopal, Digital Control and State Variable Methods,4th edition, Tata Mc-Graw-Hill.

2. K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).

3. B.C Kuo, Digital Control Systems, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	--	--	--	**2**	--	--	--	--	--	--	**2**	**1**	--	-	-
CO2	**1**	-	**3**	--	**2**	--	--	--	--	--	--	**2**	**1**	**3**	--	-
CO3	**1**	-	**2**	--	**2**	--	--	--	--	--	--	**2**	**1**	**3**	--	**3**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE6808	**MICROPROCESSOR & INTERFACING LAB**	L	T	P	C
Version 2020.1	Date of Approval: JUY 2020	0	0	2	1

Pre-requisites/Exposure	Nil
Co-requisites	Nil

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is to give the students detailed knowledge of the above microprocessor needed to develop the systems using.

Course Objectives

The objective of this course is to

1. To expose students to the operation of typical microprocessor trainer kit.

2. Learn the design aspects of I/O and Memory Interfacing circuits.

3. To provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems

Course Outcomes

On completion of this course, the students will be able to

CO1: Developing of assembly level programs and providing the basics of the processors

CO2: write programs like ASCII conversion, searching and sorting elements, reverse given string and compute nCr .

CO3: Understand the concepts related to I/O and memory interfacing

Modules	Blooms level*	Number of hours
Lab Session 1: To load the numbers 49H and 53H ion memory location 9510 & 9511.	L3 and L4	2

Lab Session 2: Respectively and add the contents of memory location 9601.	L3 and L4	2
Lab Session 3: To write the Assembly Language Programming for 8 bit addition with and without carry.	L3 and L4	2
Lab Session 4 To write the Assembly Language Programming for 8 bit subtraction with and without borrow.	L1, L2, and L3	2
Lab Session 5 To write the Assembly Language Programming for 8 bit Multiplication and Division.	L1, L2, and L3	2
Lab Session 6 To write the Assembly Language Programming for sorting an array of numbers in Ascending & Decending order.	L3 and L4	2
Lab Session 7 To write the Assembly Language Programming with Additional Instructions.	L3 and L4	2
Lab Session 8 To write and execute a program using Stacks.	L3 and L4	2
Lab Session 9 To study and program the programmable Peripheral interface (8255 board).	L1, L2 and L3	2
Lab Session 10 To study and program the programmable interval timer (8253 board).	L1, L2, L3 and L4	2
Lab Session 11	L1, L2, L3 and L4	2

To study and program the programmable DMA Controller (8257 board).		
Lab Session 12 i) To study and program the programmable Interrupt Controller (8259 board). ii) To study of programmable Serial Communication interface (8251 board).	L1, L2, L3 and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rafiquzzaman, M. Theory & Applications PHI Publications 1993.
2. Gaonkar R. S. Microprocessor Architecture, Programming and Applications John Wiley 1989.
3. Ram B. Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons 1995.
4. Liu Yu Cheng and Gibson, G.A. PHI 1992.
5. Leventhal, L.A. Introduction to Microprocessors: Software, Hardware, Programming.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3	2	2	--	1	--		--	--	--	--	1		--	--
CO2	1	1	1	2	--	--	--	2	--	--	--	3	1	2	--	--
CO3	1	2	2	3	--	--	-	--	--	--	--	--		2	1	3

RBE6809	DIGITAL IMAGE PROCESSING	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	Basics of Computer Graphics				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with visualization of real concept of Image processing. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematica.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Digital Image Processing

CO2: List out the Image Enhancement techniques in the Spatial Domain

CO3: Explain concepts of Image Enhancement in the Frequency Domain

CO4: Describe the architecture Image Compression

CO5: Explain the basics of Representation and Description

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction and Digital Image Fundamentals** The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.	L1 and L2	8
MODULE 2: **Image Enhancement in the Spatial Domain** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	L2 and L3	8
MODULE 3: **Image Enhancement in the Frequency Domain** Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphism Filtering.	L1 and L2	10
MODULE 4: **Image Compression** Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. **Image Segmentation** Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.	L2 and L3	12
MODULE 5: **Representation and Description** Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. **Object Recognition** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text:

- Rafael C. Conzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- Rosefield Kak, "Digital Picture Processing",
- W.K. Pratt, "Digital Image Processing",

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
CO 4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
CO 5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

RBE6810	**DIGITAL IMAGE PROCESSING LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1. Introduction of MATLAB (e) Basic Variable deceleration & its operation (f) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (e) Basic use of Matrix and Graph Plotting (f) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (l) Create a basic program MATLAB using functions (m) Use of basic function Image processing (n) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (c) Practice on Pattern Recognition functions in MATLAB (d) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN toolbox & Image processing toolbox (b) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

Text & References:

- Rafael C. Gonzalez & Richard E. Woods, "Image Processing Using MATLAB", 2nd edition, Pearson Education.
- "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

RBE6811	.NET Programming	L	T	P	C
Version:2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	C#.NET, HTML and CSS				
Co-requisites	Nil				

Catalog Description

This course provides knowledge regarding Creating Dynamic Web Pages with the help of ASP.NET framework. Various topics

Course Objectives

The objective of this course is to

1. Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
2. Provide knowledge to develop secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the components of .NET framework and create basic ASP.NET web page.

CO2: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO3: Establish database connectivity and perform various operations on database through ASP.NET web pages.

CO4: Maintain states at client and server site both.

CO5: Develop and use web services.

Modules	Blooms level*	Number of hours
MODULE 1: **.NET FRAMEWORK** .NET Framework and its features CLR, MSIL,CTS, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, What is ASP.NET?, Difference between ASP and ASP.NET	L1, L2	4
MODULE 2: WEB CONTROLS Standard Controls, Validation controls, Adv. Controls, Custom Controls .	L2, L3 and L4	14
MODULE 3: ADO.NET ADO.NET,ADO.NET Architecture Data Adapters, Datasets, Command, Data Reader Data Reader Data bind Controls Displaying data in data grid XML in ADO.NET	L2, L3 and L4	7
MODULE 4: SECURITY ASP.NET applications : Security, Error Handling	L2 and L3	2
MODULE 5: STATE MANAGEMENT State Management : View State, Session State, Web Services	L2, L3 and L4	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Stephen Walther, ASP.NET Unleashed, SAMS Publication

2. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
2. Jesse Liberty, Dan Hurwitz, Programming ASP.NET, OReilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	--	--	--	--	--	--	--	--	--	--	--	2	3	--	--
CO2	2	2	1	2	1	--	--	--	--	--	--	--	2	2	3	--
CO3	2	2	1	2	2	--	--	--	--	--	--	--	2	2	3	--
CO4	2	1	1	2	1	--	--	--	--	--	--	--	2	2	2	--
CO5	2	1	1	2	2	--	--	--	--	--	--	--	2	2	2	--

1: strongly related, 2: moderately related and 3: weakly related

RBE6812	.NET Programming LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	C#.NET, HTML and CSS				
Co-requisites	Nil				

Catalog Description

This lab course covers development of Web applications using ASP.NET. The concepts are designed to impart the knowledge of ASP.NET framework concepts at implementation level. The major topic covered includes theme, state management, web controls and database connectivity using ADO.NET and web services.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
2. Provide knowledge to develop secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO2: Maintain states at client and server site both.

CO3: Establish database connectivity and perform various operations on database through ASP.NET web pages.

CO4: Develop and use web services.

Modules	Blooms level*	Number of hours
1. Basics of ASP.NET Page a) Write a program to implement C#.NET class with properties and methods. b) Design a Login Page, which displays a Welcome Page on successful Login and an error message in case of invalid Id/Password. c) Design a form and apply themes (design time and dynamically).	L1, L2	4
2. State Management a) Implement state management for Login page which move to welcome page when credentials are correct. The welcome page displays a welcome message along with the user Id. b) Implement various state management methods using a suitable web form.		2
3. Built-in Controls, Custom Controls a) Design any web form and apply various validation controls. b) Create a web form which can work in Hindi and English language both. c) Design a web form to upload an image to server. d) Design a custom control, Numeric Textbox, which should accept only integer value for a particular range. The range should be customizable.	L2, L3 and L4	6
4. ADO.NET a) Create any database table and apply basic operations (Insert/Delete/Update) on it using ASP.NET application. b) Implement various methods of execution of SQL command. c) Display data in a Grid and perform basic database operations.	L2, L3 and L4	4
5. Security, Web Services a) Develop any web application to illustrate SQL Injection attack and redesign it to prevent the attack. b) Develop a web application to illustrate XSS attack and redesign it to prevent the attack	L2 and L3	2
6. Web Application Create a small web application having some application.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Stephen Walther, ASP.NET Unleashed, SAMS Publication

2. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
2. Jesse Liberty, Dan Hurwitz, Programming ASP.NET, OReilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	2	2	2	--
CO 2	2	1	--	--	--	--	--	--	--	--	--	--	2	2	2	--
CO 3	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

RBE6813	**Advanced Robotic Process Automation Design & Development**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation.

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks.

CO4: Design programs and have hands on experience on uipath software

CO5:Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module 1: Exception handling and Best Practices **Debugging and Exception Handling- Debugging** Tools, Strategies for solving issues, Catching errors. **Project Organization-** Concept of project organization, Best practices, Avoiding pitfalls, Invoke Activity.	L1, L2	8
Module II: Introduction to Orchestrator Orchestrator, Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.	L2, L3 and L4	8
Module III: merging and Future Trends in IT Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing Computer Vision	L2, L3 and L4	8
Module IV: Capstone Project Real life case studies which can be used to apply the concepts learnt during the course. The projects shall test student's skills right from process transformation and documentation to the design and development of the actual robot	L2, L3 and L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi,Packt Publications,Ist Edition,2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**1**	**-**	**-**
CO2	**1**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**1**	**-**	**-**
CO3	**1**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**1**	**-**	**2**
CO4	**1**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**-**	**2**

1: strongly related, 2: moderately related and 3: weakly related

MACHINE LEARNING (SPECIALISATION)

Course Code: MLE 6801	APPLIED STATISTICAL ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: JULY 200	3	0	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of statistics, the science of collecting, organizing, and interpreting numerical data are discussed. Emphasis will be placed on statistical reasoning and data analysis. The main topics are study design, descriptive statistics, probability theory, and statistical inference. As a precursor to the study of cryptography studies will be made on impact of various techniques for finding independence or dependence between data variables. The concepts learnt in the studies of statistics will be applied practically to solve number of real life problems using the statistical package like R and SPSS.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of statistics through problem solving and analytical approach.
2. Provide an overview of various statistical techniques: descriptive and inferential, parametric and non-parametric and practical statistics using R and SPSS.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain, describe and distinguish various population,sample,type of variables,measurement scales; Explain central tendency , percentile and solve problems related to them.

CO 2: Explain the concept of descriptive and inferential statistics; probability theory; Solve problems based on probability; Explain binomial, Poisson distribution and solve real life problems related to discrete and continuous random variable.

CO 3: Describe the concept of sampling distribution for large and small samples; Explain the concept of hypothesis testing and solve problems related using t-distribution and standard normal distribution.

CO 4: Explain concept of covariance and correlation and its applications in real life; Explain Anova and its use in real life problem solving; Explain and compare various regression analysis methods statistics for prediction

CO 5: Explain various parametric and nonparametric test and apply them to solve real life statistical problems

Modules	**Blooms level***	**Number of hours**
Module I Introduction to Statistical Analysis Introduction to Statics, Population Versus Sample, Population and Sample, Basic Terms, Types Of Variables, Quantitative Variables, Qualitative or Categorical Variables, Measurement Scales, Identifying The Scale of Measurement, Normal Variables, Ordinal Variables, Continuous Variables, Cross-Section Data, Time –Series Data, Sources of Data, Types of Statics, Measures of Central Tendency, Mean, Examples, Mode, Mode Scenarios, Symmetry, Skewness, Measures of Spread, Range, Variance and Standard Deviation, Examples, Solution, Population Parameters and Sample Statistics, Measures of Position– Quartiles and Interquartile Range, Quartiles, Example, Solution, Percentiles and Percentile Rank, Example, Solution, Box and Whisker Plot, Solution.	L1, L2 and L3	7
Module II Describing Data Raw Data, Graphical Presentation of Qualitative Data, Graphical Presentation of Qualitative Data, Graphing Quantitative Data, Frequency Distributions, Relative Frequency and Percentage Distributions, Graphing Grouped Data, Cumulative Frequency Distributions, Probability Concepts, Simple and Compound Events, Two Properties of Probability, Classical Probability, Probability Concepts, Complementary Events, Example, Discrete Random Variables, The Binomial Experiment, The Poisson Probability	L1,L2, L3	6

Distribution, Continuous Random Variables, Normal Distribution, Standard Normal Distribution.		
Module III Testing Hypothesis Population Distribution, Sampling and Non Sampling Errors, A Point Estimate, Interval Estimation, The t Distribution Hypothesis Testing, The Chi-Square Distribution.	L1,L2, L3	6
Module IV Examining Relationship Covariance, Pearson Correction Coefficient, Computational Formulas-Covariance, Computing A Correlation, Correlation Analysis, Scatter Plots, Relationships Between Continuous Variables, Correlation, Pearson Correlation Coefficient, Hypothesis Test For A Correlation, Extreme Data Values, Correlation Matrix, Anova Overview, Anova Hypothesis, Anova, Error Sum of Squares, Model Sum of Squares, Anova-Example, Simple Regression, Relationship Between Food Expenditure And Income: (A) Linear Relationship (B) Nonlinear Relationship, Plotting A Linear Equation, Y- Intercept And Slope Of A Line, Simple Linear Regression Analysis, Scatter Diagram, Least Squares Line, Error Sum Of Squares, The Least Squares Line, Example, Solution, Error Of Prediction, Positive And Negative Linear Relationship Between X And Y, Assumptions of Regression Model, Coefficient Of Determination, Regression Analysis.	L1, L2 L3	7
Module V Advanced Techniques Non Parametric Tests, Chi-Squared Goodness- of-Fit Test, Chi-Square Test of Independence, The Sign Test, Example, Mann-Whitney U Test, The Kruskal-Wallis Test, No Title, Structural Equation Modelling, Cluster Analysis, Factor Analysis, Centroid Method, Principal Components Method.	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
2. Torsten Hothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Reference Books

1. Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO2	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**1**	**1**	**1**	--	-	--	--	--	--	--	--	--	**1**	**1**	--	--
CO4	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO5	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

COURSE CODE : MLE 6802	DATA MINING AND PREDICTIVE ANALYTICS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites					

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Catalog Description

Data Mining and Predictive analytics serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different

data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	**L1, L2**	**8**
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	**L1, L2, L3**	**7**
Module III Clustering Hierarchical and k- Means Clustering, Kohenen Networks, Birch Clustering, Measuring Cluster Goodness.	**L1, L2, L3**	**8**
Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	**L1, L2, L3**	**9**
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	**L2, L3, L4, l5**	**8**

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**3**	--	--	--
CO2	**1**	**1**	**2**		--	--	--	--	--	--	--	--	--	--	**3**	--

CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**
CO4	**1**	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**2**	**--**	**--**
CO5	**1**	**1**	**2**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**-3**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE 6803	**DATA WAREHOUSING AND MULTIDIMENSIONAL MODELING**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of Database				
Co-requisites	Nil				

Catalog Description

In this course the concepts of basic concepts of Multi-dimensional database are discussed in detail. As a precursor to the study of the course it provide an in depth understanding of basic concepts of data warehouse which includes its architecture, data warehouse operations, data marts, metadata. The concept further enhances the understanding of advance concepts that cover the slowly and rapidly changing dimensions, indexes in OLAP and concept hierarchies. It also include the different application of data warehouse

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Multi-dimensional database, its need and various applications.
2. It provides an overview of some basic concepts in data warehouse such as its architecture, OLAP applications, and metadata. It also includes some advance concepts such as OLAP hierarchies, OLAP changing dimensions.

3. Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Multi-dimensional database and its importance.

CO2: Analyse the fundamental concept of data warehouse which include OLAP operations, architecture.

CO 3: Explain the different types of dimensions that exist in data warehouse.

CO4: Explain the advance concepts of data warehouse which include OLAP indexing.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction***:* Multidimensional Data Management, Multidimensional History, Related Terminology	L1 and L2	8
MODULE 2: **Fundamental Concepts** : Cubes ,Dimensions, Facts, Measures, Relational Representations, Star Schemas, Snowflake Schemas, Data Warehouses And Data Marts, Multidimensional Modelling Process, Analysis And Querying ,Roll Up, Drill Down, Drill Out, Slicing And Dicing, Drill Across, Pivot Tables, Ranking, Multi-Dimensional Querying in MDX and SQL, Graphical Querying and Visualizations .	L1, L2 and L3	8
MODULE 3: **Advance Concepts** Slowly Changing Dimensions, The Problem, Solutions, Other Special Kinds Of Dimensions, Mini dimensions, Outriggers, Degenerate Dimensions, Junk Dimensions, Time Dimensions, Data Quality Dimensions, Advanced Hierarchies, Parent-Child Hierarchies, Unbalanced Hierarchies, Non Covering Hierarchies , Non –Strict Hierarchies, Multiple Hierarchies And Parallel Hierarchies.	L2, L3 and L4	10
MODULE 4: **Module IV: Implementation Issues** Materialized Views, Indexing, Indexing Overview, Bitmap Indices, Join Indices, Query Processing, OLAP Implementations, Extract-Transform-Load.	L3, L4 and L5	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jiawei Han &Micheline Kamber,"Data Mining Concepts And Techniques",3rd Edition,Morgan Kaufmann Publication,An Imprint of Elsevier, 2015.
2. Vipin Kumar,Pang Ning "Introduction to Data Mining",3rd Edition,Pearson Publication,Chennai, 2016.
3. Mohammed,Wagner " Data Mining and Analysis", 4th Edition, Cambridge University Press,Brazil, 2018.

Reference Books:

1. Daneil,D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John wiley and Sons,Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**3**	--	--	--	-	--	--	--	--	--	-	--	-	-
CO2	**1**	--	**2**	-	--	--	--	--	--	--	--	--	-	--	--	--
CO3	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	--	--	--	--
CO4	**1**	**1**	**2**	--	--	--	**3**	--	--	--	--	--	--	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6808	**R PROGRAMMING Lab**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	4	2
Pre-requisites/Exposure	Basic knowledge of statistics				
Co-requisites	Nil				

Catalog Description

This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objectives of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Objectives

The objective of this course is

1. To make students familiar with R Programming Language and its concepts.
2. Equip the students with knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure R Studio and R packages.

CO2. Explain concepts of Structured Data, data types, data structures and Use R for mathematical operations

CO3. Describe the use of R functions, control statements, Loop constructs and apply to iterate functions across data.

CO4. Understand basic regular expressions graphics. Use of R for descriptive statistics and inferential statistics

CO5. Predict/Score new data using models, understand basic non-linear functions in models and how to link data, statistical methods.

Modules	Blooms	Number of hours

	level*	
Lab Session 1 • Installation & Configuration steps of R Studio. • use of the R interactive environment • Expand R by installing R packages • Explore and understand how to use the R documentation.	L1 and L2	2
Lab Session 2-3 • Read Structured Data into R from various sources • Understand the different data types in R • Understand the different data structures in R • Understand how to use dates in R • Use R for mathematical operations	L1and L3	4
Lab Session 4-5 • Use of vectorised calculations • Write user-defined R functions • Use control statements • Write Loop constructs in R • Use Apply to iterate functions across data	L1 and L3	4
Lab Session 6-8 • Reshape data to support different analyses • Understand split-apply-combine (group-wise operations) in R • Deal with missing data • Manipulate strings in R • Understand basic regular expressions in R • Understand base R graphics	L1 and L3	6
Lab Session 9-10 • Focus on GGplot2 graphics for R • Be familiar with trellis (lattice) graphics • Use R for descriptive statistics • Use R for inferential statistics • Write multivariate models in R	L1 and L3	4
Lab Session 11-12 • Understand confounding and adjustment in multivariate models • Understand interaction in multivariate models • Predict/Score new data using models • Understand basic non-linear functions in models • Understand how to link data, statistical methods, and actionable questions	L1 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Torsten Hothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	---	1	1	--
CO5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code:- MLE6804	BIG DATA TECHNOLOGIES	L	T	P	C
Version 2020	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of DBMS and SQL				
Co-requisites	Nil				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

1. To make students familiar with big data technologies.
2. Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain importance and applications of Big Data Analytics.

CO2. Differentiate among analytics technologies.

CO3. Demonstrate architecture of Hadoop and Mapreduce framework.

CO4. Illustrate Hadoop installation process and commands.

CO5. Introduce concepts of Hive and Pig.

Modules	Blooms level*	Number of hours
Module I: Introduction to Big Data Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.	L1 and L2	5
Module II: Big Data Technologies Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data –Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.	L2 and L5	4
Module III: Processing Big Data Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.	L1 and L3	8
Module IV: Hadoop Map Reduce Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.	L2, L3 and L4	9

Module V Big Data Tools and Techniques **Installing and Running Pig – Comparison with Databases – Pig Latin – User- Define Functions – Data Processing Operators – Installing and Running Hive – Hive QL – Tables – Querying Data – User- Defined Functions – Oracle Big Data.**	L2 and L3	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Minelli, Michehe Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Wiley CIO Series, 2013.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
3. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

Reference Books
1. Anil Maheshwari, "Big Data", McGraw Hill
2. Mayank Bhushan, "Big Data and Hadoop- Learn by Example", BPB Publications

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	-
CO2	**1**	**2**	--	**3**	**3**	--	--	--	--	--	--	--	**1**	--	**2**	-
CO3	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	**1**	--	**2**	-
CO4	**1**	**1**	**2**	--	--	**2**	--	--	--	--	**3**	--	-	--	**1**	**3**
CO5	**1**	--	**1**	--	**1**	**3**	--	--	--	--	**3**	--	**1**	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6805	APPLIED STATISTICAL ANALYSIS LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this lab the concepts of statistics, the science of collecting, organizing, and interpreting numerical data learned will be practically applied to solve number of real life problems using the statistical package like R and SPSS.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of statistics through problem solving and analytical approach.
2. Provide an overview of various statistical techniques: descriptive and inferential, parametric and non-parametric and practical statistics using R and SPSS.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain, describe and distinguish various population,sample, type of variables, measurement scales; Explain central tendency , percentile and solve problems related to them. .

CO 2: Explain the concept of descriptive and inferential statistics; probability theory ; Solve problems based on probability; Explain binomial, poisson distribution and solve real life problems related to discrete and continuous random variable.

CO 3: Describe the concept of sampling distribution for large and small samples; Explain the concept of hypothesis testing and solve problems related using t-distribution and standard normal distribution.

CO 4: Explain concept of covariance and correlation and its applications in real life; Explain Anova and its use in real life problem solving; Explain and compare various regression analysis methods statistics for prediction.

CO 5: Explain various parametric and nonparametric test and apply them to solve real life statistical problems

Programs should be based on following topics:

Quick Review of interpretation of mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them; Representation of mathematical information symbolically, visually, numerically, and verbally; Use of arithmetic, algebraic, geometric, and statistical methods to solve problems; Estimation and check answers to mathematical problems in order to determine reasonableness, Identification of alternatives, and select optimal results; and recognize the limitations of mathematical and statistical models.

Lab Sessions	Blooms level*	Number of hours
1. Getting familiar with R environment and jupyter notebook in Anaconda 2. Running basic commands and small R scripts 3. Working with operators and input output , Writing R scripts to demonstrate	L1, L2 and L3	2

various operators available in R		
1. Demonstrating decision making statements in R by writing small R scripts. 2. Creating data frames , vectors, matrices, list in R and solving practical problems in statistics	L1, L2 and L3	2
1. Running basic R commands for central tendency, measures of variations, generating frequency tables, cumulative frequency and relative frequency table. 2. Demonstrating graphics in R with simple plot command	L1, L2 and L3	2
1. Working with bar chart in R and solving practical problems in statistics 2. Demonstrating Pie chart in R for some real life problems. 3. Demonstrate concepts of quartiles using Box and whisker plot in R with some hands on data/data sets and perform analysis	L1,L2, L3	2
1. Demonstrate stem and leaf plot in R 2. Working with loops in R by writing basic scripts. 3. Drawing standard normal distribution chart in R and finding areas under the curve in figure as well as numerica	L1,L2, L3	2
1. Perform binomial and poission distribution in R 2. Perform operations related to PMF and CDF in R /SPSS	L1,L2, L3	2
1. Demonstrate hypothesis testing in R for some real life problems using standard normal distribution and Student-t distribution. 2. Running basic commands for covariance, correlation and doing analysis for some problems.	L1,L2, L3	2
1. Demonstrate chi-square, ANOVA test in R for some real life problems. 2. Demonstrate Linear Regression Analysis in R for some built-in data sets and for real life problems.	L1,L2, L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
4. Torsten Hothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Reference Books

2. Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO2	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**1**	**1**	**1**	--	-	--	--	--	--	--	--	--	**1**	**1**	--	--
CO4	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO5	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6806	**DATA MINING AND PREDICTIVE ANALYTICS LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Database				
Co-requisites	NIL				

Catalog Description

Data Mining and Predictive analytics serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic features of Data Warehousing.	L1, L2	2
2. Explore WEKA Data Mining/Machine Learning Toolkit (a) Downloading and/or installation of WEKA data mining toolkit. (b) Understand the features of WEKA tool kit such as Explorer, Knowledge flow interface, Experimenter, command-line interface. (c) Navigate the options available in the WEKA (deselect attributes panel, preprocess panel, classify panel, cluster panel, associate panel and visualize). (d) Study the ARFF file format.	L2, L3, L5	2
3. To understand the working of datasets in WEKA & to perform demonstration of preprocessing on dataset weather.arff .	L3, L4, L5	2
4. To apply Numeric Transform (data preprocessing step) on Iris Dataset.	L3, L4, L5	2
5. To understand the importance of CSV data and then load student academic record (CSV format) in Weka.	L3, L4, L5	2

6. To understand the concept of discretization and to perform discretization on the dataset airline.arff.	L3, L4, L5	2
7. To create Training, Validation and Test dataset for iris.arff.	L3, L4, L5	2
8. To perform decision tree classification using J48 algorithm on weather.arff	L3, L4, L5	2
9. To apply Apriori technique on the dataset and to generate association rules.	L3, L4, L5	2
10. (a) Demonstration of classification rule process on dataset student.arff using j48 algorithm. (b) Demonstration of classification rule process on dataset employee.arff using j48 algorithm.	L3, L4, L5	2
11. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm	L3, L4, L5	4

***Bloom's Level:** *L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation.*

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Bostjan Kaluza, "Instant Weka How-to", Packt Publishing Limited, 2013.
2. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
3. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

4. Yuan Mei Yu, Data Mining and Machine Learning: WEKA Applied Technology and Practice (Chinese Edition) Paperback 2014.
5. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
6. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
7. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Performance/Viva/ Lab Record/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**3**
CO2	**1**	**1**	**2**		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**3**
CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**2**
CO4	**1**	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**1**	**2**	**3**
CO5	**1**	**1**	**2**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code : MLE6807	DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of Database				
Co-requisites	NIL				

Catalog Description

In this Lab course Data warehousing and Multidimensional modeling programs are implemented and demonstrated using a SQL Server and ETL Tools. The Concepts that are covered would enable them to analyze the working of ETL tools and enable them to understand the following topics namely SQL Statements, SQL Built-in Functions, PL/SQL Cursors , Exception handling, Procedure, Functions, Trigger and concurrency control. Programs will be related to concepts of understanding the working of ETL tools on multidimensional data.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of Database by analyzing the different database concepts in SQL Server.
2. Provide a demonstration of ETL tools to organize the data sets.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of transaction processing to gain analysis on different data sets through concurrency control mechanism.

CO2: Demonstrate the use of SQL Built-in Functions, PL/SQL Cursors,Exception handling and Procedures.

CO3: To implement the different warehousing concepts on the given ETL tools.

CO4: Demonstrate the working of basic SQL statements and triggers.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic of SQL statements (g) Perform the following SQL statements on the table that perform the following query on the database • Create, update ,alter and delete a record • Joins and constraints on the table. • Wild card operators.	L1,L3,L4	4
2. Sample Programs to execute the concept of Procedures (g) Preliminary introduction of Procedures their Syntax and usage (h) Write a procedural program to find out minimum of two numbers. (i) Write a program to print the reverse of a number using looping construct in PL/SQL Procedures. (j) Write a procedural program to find out the factorial of number.	L3, L4,L5	4
3. Sample Programs to implement the concept of Triggers (a) Preliminary introduction of Triggers their Syntax and usage (b) Create a Trigger on Employee record that automatically updates the salary of an Employee after each financial year. (c) Create a Trigger for the following events: • Deletion of a record • Updating of a record • Insertion of a new record.	L3, L4,L5	4
4. Sample Programs to implement the concept of Cursors and Exception Handling. (a) Write a program to demonstrate the concept of Cursors in PL/SQL (b) Write a program that handles an exception that incurred in the given program.	L3,L4, L5	6
5. To perform demonstration to understand the working of ETL tools (c) Preliminary introduction of ETL Tools their features and	L4,L5,L6	6

importance. (d) Perform validation on the data set by applying the ETL tools. (e) Perform the following operations using ETL tools • Source to target mapping • Data checks on source data • Packages and schema validation • Data verification in the target system • Data integrity and quality checks in the target system		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books:

2. Jiawei Han &Micheline Kamber,"Data Mining Concepts And Techniques",3rd Edition,Morgan Kaufmann Publication,An Imprint of Elsevier, 2015.
2. Vipin Kumar,Pang Ning "Introduction to Data Mining",3rd Edition,Pearson Publication,Chennai, 2016.
3. Mohammed,Wagner " Data Mining and Analysis", 4th Edition, Cambridge University Press,Brazil, 2018.

Reference Books:

3. Daneil,D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John wiley and Sons,Canada, 2015.
4. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**--**
CO2	**2**	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**--**
CO3	**1**	**1**	**2**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**--**
CO4	**2**	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

IX SEMESTER

Course Code : AIE6935	Summer Internship Evaluation-III	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	0	6
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO	PSO

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	**1**	**2**	**1**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO2	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO3	**1**	**1**	**2**	**3**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code :- AIE6937	**Project Dissertation-I**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	0	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO2	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO3	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO4	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
C05	**1**	**1**	--	--	--	--			**1**	-	-	-	--	--	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

ROBOTICS (SPECIALISATION)

Course Code: RBE6901	**AUTOMATION IN MANUFACTURING SYSTEMS**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Production system, Manufacturing System				
Co-requisites	Automation in production and manufacturing system				

Catalog Description:

In this course the concepts and procedure for Automation of Manufacturing systems and the technology behind the automation of a manufacturing system andconcepts of computer aided manufacturing are discussed in detail. The concepts of computer aided process planning (CAPP), Hardware components for automation, group technology (GT), cellular manufacturing, automated

guided vehicle system, flexible manufacturing system (FMS), Automated inspection and just in timeare also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with basic and essential concepts of Automation in manufacturing system to usually increases production rate and labor productivity.

2. To provide high caliber engineering students with an in-depth understanding of cellular manufacturing, flexible manufacturing system (FMS) and computer aided process planning.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO1 - Define and describe the basic fundamentals of Automation in manufacturing system, computer aided manufacturing and computer integrated manufacturing.

CO2 – State, explain and demonstrate computer aided process planning, automated production lines and assembly systems.

CO3 – Outline, interpret and apply concepts of group technology and cellular manufacturing.

CO4 – Define, explain and apply knowledge of flexible manufacturing systems and industrial robotics in industries.

Modules	Blooms level*	Number of hours
Module I **Over view of Manufacturing and Automation:** Production systems, Automation in production systems, Automation principles and strategies, Manufacturing operations, production facilities. Basic elements of an automated system, levels of automation; Hardware components for automation and process control, programmable logic controllers and personal computers.	L1 and L2	7
Module II **Material Handling And Identification Technologies:** Material handling, equipment, Analysis. Storage systems, performance and location strategies, Automated storage systems, AS/RS, types. Automatic identification methods, Barcode technology, RFID	L1, L2, and L3	6
Module III **Manufacturing Systems And Automated Production Lines:** Manufacturing systems: components of a manufacturing system, Single station manufacturing cells; Manual Assembly lines, line balancing Algorithms, Mixed model Assembly lines, Alternative Assembly systems. Automated production lines, Applications, Analysis of transfer lines	L1, L2 and L3	8

Module IV **Automated Assembly Systems:** Fundamentals, Analysis of Assembly systems. Cellular manufacturing, part families, cooling, production flow analysis. Group Technology and flexible Manufacturing systems, Quantitative Analysis.	L1, L2 and L3	9
Module V **Quality Control And Support Systems:** Quality in Design and manufacturing, inspection principles and strategies, Automated inspection, contact Vs non contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.	L1, L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text books:

1. Mikell.P.Groover (2008), Automation, Production Systems and Computer Integrated Manufacturing, Prentice Hall of India.
2. N. Viswanandham, Y. Narhari "Performance Modeling of Automated Manufacturing Systems" Prentice-Hall.

Reference books:

1. M. Groover (2003), CAD/CAM Pearson Education; 1 edition.
2. S J Martin (1974), Numerical control of Machine Tools, Butterworth-Heinemann.
3. P N Rao (2017), CAD/CAM: Principles and Applications, Tata McGraw Hill Education; 3 editions.
4. Chang, Wysk & Wang (2005), Computer Aided Manufacturing, Prentice Hall of India.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**

CO 2	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO 3	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO 4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code:RBE6902	ROBOTIC SENSORS,VISIONS AND HARDWARE IMPLEMENTATION	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basics of Artificial Intelligence concepts, Sensors and basic Robotics hardware required.				
Co-requisites	Nil				

Catalog Description

Robotics sensors find many applications in the areas of robotics, visions, Artificial Intelligence, pattern recognition, controls etc. Robotics sensors offer fundamentally different types of high capable sensors. Many image processing techniques are learnt. These robotics hardware design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics sensors, visions and robotics hardware required.

Course Objectives:

The objective of this course is to

1. Introduces the basics of Robot visions and image processing sensors.
2. It deals with actual hardware implementation of robots

Course Outcomes:

On completion of this course, the students will be able to

CO1: Understand the principles of smart sensors and transducers, need and usage of sensors.

CO2: comparisonvarious visions in robotics robotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of image processing techniques which can be applied torobotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics orientation and feature extraction.

CO5: Design multicontrolled sensors robot assembly.

Modules	Blooms level*	Number of hours
MODULE 1: SENSORS IN ROBOTICS An Introduction to sensors and Transducers, History and definitions, Smart Sensing, AI sensing, Need of sensors in Robotics. Position sensors – optical, non-optical, Velocity sensors, Accelerometers, Proximity Sensors – Contact, non-contact, Range Sensing, touch and Slip Sensors, Force and Torque Sensors. Different sensing variables – smell, Heat or Temperature, Humidity, Light, Speech or Voice recognition Systems, Tele-presence and related technologies.	L1, L2	4
MODULE 2: VISIONS IN ROBOTICS The Nature of Vision- Robot vision – Need, Applications - image acquisition –illumination techniques- Point sensor, line sensor, planar sensor, camera transfer characteristic, Raster scan, Image capture time, volume sensors, Image representation, picture coding techniques. Robot Control through Vision sensors, Robot vision locating position, Robot guidance with vision system, End effector camera Sensor.	L1, L2, L3 and L4	10
MODULE 3:ELEMENTS OF IMAGE PROCESSING TECHNIQUES Discretization, Neighbours of a pixel-connectivity- Distance measures - pre-processing Neighbourhood averaging, Median filtering. Smoothening of binary Images- Image Enhancement- Histogram Equalization-Histogram Specification –Local Enhancement-Edge detection- Gradient operator-Laplace operators-Thresholding-Morphological image processing.	L1, L3, L4 and L5	5
MODULE 4:OBJECT ORIENTATION AND FEATURE EXTRACTION Image segmentation- Edge linking-Boundary detection-Region growing-Region splitting and merging- Boundary Descriptors-Freeman chain code-Regional Descriptors- recognition-structural methods- Recognition procedure, mahalanobic procedure.	L1, L2, L3, and L4	7
MODULE 5:COLLISIONS FRONTS ALGORITHM Introduction, skeleton of objects. Gradients, propagation, Definitions, propagation algorithm, Thinning Algorithm, Skeleton lengths of Top most objects.	L2, L3, L4 and L5	5
MODULE 6:MULTISENSORS CONTROLLED ROBOT ASSEMBLY Control Computer, Vision Sensor modules, Software Structure, Vision Sensor	L2, L3, L4 and	5

software, Robot programming, Handling, Gripper and Grippingmethods, accuracy – A Case study.	L5	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:-

1. Paul W Chapman, "*Smart Sensors*", an Independent Learning Module Series, 1996.

2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.

3. John Iovice, "*Robots, Androids and Animatrons*", Mc Graw Hill, 2003.

4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, "*Robotics – Control Sensing, Vision and Intelligence*", Tata McGraw-Hill Education, 2008.

5. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, Tata McGraw-Hill Education, 2012.

6. Sabrie Soloman, Sensors and Control Systems in Manufacturing, McGraw-Hill Professional Publishing, 2nd Edition, 2009.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--

CO4	**1**	**2**	**2**	**2**	--	---	--	--	--	--	--	--	**1**	**2**	--	--
CO5	**1**	3	**2**	**1**	--	--	--	--	--	--	--	--	**1**	**1**	--	**4**

Course Code: RBE6903	PATTERN RECOGNITION & IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Digital Image Processing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with Pattern Recognition. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Pattern recognition Concepts & Bayesian decision theory

CO2: List out the Univariate and Multivariate density

CO3: Explain concepts of Un-supervised learning and clustering

CO4: Describe the Image Fundamentals and Transforms

CO5: Explain the basics of Image Segmentation and Edge Detection

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction of Pattern recognition and Bayesian Decision Theory** Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation	L1 and L2	8

Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces		
MODULE 2: **Normal density** Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context	L2 and L3	8
MODULE 3: **Un-supervised learning and clustering** Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering, similarity measures, criteria function for clustering	L1 and L2	10
MODULE 4: **Image Fundamentals and Transforms** Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.	L2 and L3	12
MODULE 5: **Image Segmentation and Edge Detection** Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text & References:

Text:

1. "Fundamentals of speech Recognition", Lawerence Rabiner, Biing – Hwang Juang Pearson education.
2. "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
3. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley.

References:

1. "Pattern Recognition and Image Analysis" – Earl Gose, Richard John baugh, Steve Jost
2. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
3. "Digital Image Processing"– M. Anji Reddy, BS Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO 2	**1**	--	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO 3	**3**	--	**1**	--	**2**	--	--	--	--	--	--	--	**1**	**3**	**2**	--
CO 4	**3**	--	**2**	--	**1**	--	--	--	--	--	--	--	**1**	--	**2**	--
CO 5	**3**	--	**2**	--	**1**	--	--	--	--	--	--	--	**1**	--	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE6805	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

3. Make the students applyknowledge of various Image processing & pattern recognition required for solving complex problems.
4. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms	Number

	level*	of hours
6. Introduction of MATLAB (h) Basic Variable deceleration & its operation (i) Function use & its application	L3, L5	4
7. Sample Programs in MATLAB (k) Basic use of Matrix and Graph Plotting (l) Different type of graph plotting with use of different -2 type of data	L3, L5	6
8. Sample Programs using MATLAB functions (o) Create a basic program MATLAB using functions (p) Use of basic function Image processing (q) Practice on Basic function of Image processing tool box.	L3, L5	6
9. Sample programs of ANN functions (e) Practice on Pattern Recognition functions in MATLAB (f) Write a program for training a small network in MATLAB	L3, L5	6
10. Sample Programs using ANN toolbox & Image processing toolbox (f) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

Text & References:

- Rafael C. Gonzalez & Richard E. Woods, "Image Processing Using MATLAB", 2nd edition, Pearson Education.
- "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE6904	ROBOTICS SENSORS, VISION AND HARDWARE IMPLEMENTATION LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	MATLAB and concepts of Artificial Intelligence				
Co-requisites	Nil				

Catalog Description

Robotics sensors find many applications in the areas of robotics, visions, Artificial Intelligence, pattern recognition, controls etc. Robotics sensors offer fundamentally different types of high capable sensors. Many image processing techniques are learnt. These robotics hardware design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics sensors, visions and robotics hardware required.

Course Objectives

The objective of this course is to

1. To become familiar with basics of robot visions, image processing sensors.

2. Understand and analyse concepts of hardware implementations in robotics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of smart sensors and transducers, need and usage of sensors.

CO2: comparison various visions in robotics robotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of image processing techniques which can be applied to robotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics orientation and feature extraction.

Modules	Blooms level*	Number of hours
Lab Session 1:Generation in robot languages Learning of robot language structure, on line and offline programming	L3 and L4	2
Lab Session 2:Cartesian Trajectories Study of Joint space planning, Cartesian trajectories, path primitives, coordinate systems used to determine the positions of TCP and direction of tools	L3 and L4	4
Lab Session 3:Basic Syntax Learning of RAPID i.e. data objects, expression, function. WAIT, SIGNAL AND DELAY command.	L3 and L4	6
Lab Session 4:Routine and subroutine Write subroutine, task module, input-output interrupts, priority interrupts, and task modules. Study of built-in subroutines in RAPID.	L1, L2, and L3	2
Lab Session 5:optical sensors To study Photodiodes, phototransistors and photo resistors based sensors, light-to-light detectors, Infrared sensors (thermal, PIR, AFIR, thermopiles).	L1, L2, and L3	4
Lab Session 6: Magnetic and Electromagnetic Sensors and Actuators Study on Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (eddy current, LVDT, RVDT, Proximity, switches), Hall Effect sensors, Magneto resistive sensors.	L3 and L4	2
Lab Session 7:Mechanical Sensors Accelerometers, Force sensors (strain gauges, tactile sensors), Pressure sensors (semiconductor, piezo resistive, capacitive, VRP).	L3 and L4	2
Lab Session 8:Industrial Networks and Fields Bus Types of bus – DN, PB, ProfiNet, Eth/IP Interfacing to Controller: Connecting sensors to controller directly or through fieldbus. Configuration of digital, group, and analog IO. Use of instructions and logic. Strobing and handshaking with PLC as master, Encoder and Resolvers.	L1, L2, and L3	2
Lab Session 9:PLC Various hardware types of PLC (CPU and I/O modules).Centralized configuration of PLC.On-line with PLC (using serial port).Various languages and its over-view. Sample program down-load, Task configuration. Configuration of IP address & sample program download. Decentralized configuration of PLC (Profibus protocol).Configuration I/O modules on Profi-bus protocol. Mod-bus configuration (Master & Slave configuration). Mod-bus RTU (Remote Telemetry Unit) and Mod-bus TCP/IP communication with	L2, L3, and L4	2

PCbased software .		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:-

1. Paul W Chapman, "Smart Sensors", an Independent Learning Module Series, 1996.

2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.

3. John Iovice, "Robots, Androids and Animatrons", Mc Graw Hill, 2003.

4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, "Robotics – Control Sensing, Vision and Intelligence", Tata McGraw-Hill Education, 2008.

5. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, Tata McGraw-Hill Education, 2012.

6. Sabrie Soloman, Sensors and Control Systems in Manufacturing, McGraw-Hill Professional Publishing, 2nd Edition, 2009.

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3

Course Code: RBE 6905	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students applyknowledge of various Image processing & pattern recognition required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
11. Introduction of MATLAB (j) Basic Variable deceleration & its operation (k) Function use & its application	L3, L5	4
12. Sample Programs in MATLAB (m) Basic use of Matrix and Graph Plotting (n) Different type of graph plotting with use of different -2 type of data	L3, L5	6
13. Sample Programs using MATLAB functions (r) Create a basic program MATLAB using functions (s) Use of basic function Image processing (t) Practice on Basic function of Image processing tool box.	L3, L5	6
14. Sample programs of ANN functions (g) Practice on Pattern Recognition functions in MATLAB (h) Write a program for training a small network in MATLAB	L3, L5	6
15. Sample Programs using ANN toolbox & Image processing toolbox (g) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

Text & References:

- Rafael C. Gonzalez & Richard E. Woods, “Image Processing Using MATLAB”, 2nd edition, Pearson Education.
- “Pattern classifications”, Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE6906	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, ,principles. linear programming and queuing theory.

Course Objectives

After successful completion of the course, student will be able to understand importance of optimization of industrial process management , apply basic concepts of mathematics to formulate an optimization problem , analyse and appreciate variety of performance measures for various optimization problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand importance of optimization of industrial process management.

CO2: Apply basic concepts of mathematics to formulate an optimization problem

CO3: Analyse and appreciate variety of performance measures for various optimization problems

CO4: Use classical optimization techniques and numerical methods of optimization

CO5: Apply knowledge of optimization to formulate and solve engineering problems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to optimization – adequate and optimum design – principles of optimization – statement of an optimization problem – classification – formulation of objective function, design constraints.	L1, L2	4
MODULE 2: CLASSICAL OPTIMIZATION TECHNIQUES Single variable optimization –multivariable optimization with no constraints – exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods – Interpolation methods: quadratic and cubic, direct root method.	L1, L2, L3 and L5 , L6	12
MODULE 3:MULTIVARIABLE – UNCONSTRAINED AND CONSTRAINED OPTIMIZATION Direct search methods – descent methods – conjugate gradient method. Indirect methods – Transformation techniques, penalty function method	L1, L3 and L4	8
MODULE 4:NON – TRADITIONAL OPTIMIZATION TECHNIQUES Genetic Algorithms -steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:- Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation and Tabu search methods.	L1, L3, and L4	10
MODULE 5:OPTIMUM DESIGN OF MACHINE Desirable and undesirable effects – functional requirement – material and geometrical parameters – Design of simple axial, transverse loaded members for minimum cost and minimum weight.	L3 and L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rao, S.S., "*Optimization – Theory and Applications*", Wiley Eastern, New Delhi, 1978

2. Fox, R.L., Optimization Methods for Engineering Design, Addition – Wesley, Reading, Mass, 1971.

3. Wilde, D.J., "*Optimum Seeking Methods*", Prentice Hall, Englewood Cliffs, New Jersey, 1964

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**3**	--	**1**	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**3**	--	**2**	--	--	--	--	--	--	--	--	**1**	**2**	--	**1**
CO3	**1**	**2**	**2**	**4**	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO4	**1**	**2**	**2**	**2**	--	---	--	--	--	--	--	--	**1**	**2**	--	--
CO5	**1**	3	**2**	**1**	--	--	--	--	--	--	--	--	**1**	**1**	--	**4**

Course Code: RBE6908	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Linear algebra, advanced calculus, discrete mathematics, Boolean algebra or equivalent.				
Co-requisites	Nil				

Catalog Description

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Objectives

The objective of this course is to

1. Introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.

2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system component

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of neural networks and fuzzy Logic fundamentals.
CO2: compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.
CO3: Understand concept of classical and fuzzy sets, fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.
CO4: Get thorough knowledge in biological neuron and artificial neurons.
CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: Basic neural computation models: Network and node properties. Inference and learning algorithms.Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.	L1, L2	4
MODULE 2: Self organizing networks: Kohonen algorithm, bi-directional associative memories. Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.	L1, L2, L3 and L4	10
MODULE 3: Fuzzy Sets: Operations and properties. Fuzzy Relations: Cardinality, Operations and properties. Value Assignments: Cosine amplitude and max-min method. Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.	L1, L3, L4 and L5	6
MODULE 4: Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic,	L1, L2, L3, and L4	9

approximate reasoning. Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.		
MODULE 5:OPTIMUM DESIGN OF MACHINE Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.	L2, L3, L4 and L5	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
3. Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill1997.
4. Bart Kosho "Neural Network and Fuzzy Systems", Prentice Hall of India,1994

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**3**	--	**1**	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**3**	--	**2**	--	--	--	**2**	--	--	--	--	**1**	**2**	--	**1**
CO3	**1**	**2**	**2**	**4**	--	--	--	--	--	--	--	--	**1**	**1**	--	--

CO4	**1**	**2**	**2**	**2**	--	---	--	--	--	--	--	--	**1**	**2**	--	--
CO5	**1**	3	**2**	**1**	--	--	--	--	--	--	--	--	**1**	**1**	--	**4**

Course Code: RBE6909	**NEURAL NETWORK AND FUZZY LOGIC LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

Neural Networks offer fundamentally alternative approaches to procedural programming. Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm.

Course Objectives

The objective of this course is to

1. To become familiar with neural networks learning algorithms from available examples and give design methodologies for artificial neural networks.

2. Understand and analyse concepts of fuzzy set and use fuzzy set operations to implement current computing techniques used in fuzzy computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO2: To analyse and appreciate the applications which can use fuzzy logic.

CO3: Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications and they will be able to design inference systems

Modules	Blooms level*	Number of hours
Lab Session 1: Write a program to implement single layer perception algorithm.	L3 and L4	2
Lab Session 2: Write a program to implement back propagation learning algorithm	L3 and L4	4
Lab Session 3: Design multilayer feed forward network using back-propogation algorithm	L3 and L4	6
Lab Session 4 Study of fuzzy inference system	L1, L2, and L3	2
Lab Session 5 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, and L3	4
Lab Session 6 Write a program to implement SDPTA	L3 and L4	2
Lab Session 7 Write a program to implement RDPTA	L3 and L4	2
Lab Session 8 To Study various defuzziification techniques	L1, L2, and L3	2
Lab Session 9 Write a program to implement of fuzzy set operation	L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**3**	--	--	--	--	**3**	--	--	--	--	**1**	**2**	--	--
CO2	**1**	--	**2**	**2**	--	--	--	**3**	--	--	--	--	**1**	**2**	--	--
CO3	**1**	**2**	**2**	**3**	--	--	**3**	--	--	--	--	--	**1**	--	--	**3**

Course Code:RBE6910	DECISION MAKING SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Objectives

The objective of this course is to

1. To provide an overview of problem solving skills methods using decision making systems .
2. To serve as a foundation for the study of programming languages that is used to develop an Intelligence System

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the concept of artificial intelligence.

CO2. Differentiate between linear and non-linear problems and Learn various problem solving techniques using neural networks

CO3. Understand the concept of fuzzy logic and apply to various problems

CO4. Able to learn concepts of genetic algorithm

Modules	Blooms level*	Number of hours
Module I: Soft Computing Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.	L1, L2	12
Module II: Neural Network Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA	L2, L3 and L4	10
Module III Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative	L2, L3 and L4	8

Memory.		
Module IV: Fuzzy Logic Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.	L2, L3 and L4	7
Module V: Genetic algorithm Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.	L2, L4	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books & References:

1. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
2. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
3. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
4. Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
5. Kosko: Neural Network & Fuzzy System, PHI Publication
6. Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
7. Hagen, Neural Network Design, Cengage Learning

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	--	--	**3**	--	--	--	--	--	--	**2**	--	--	**2**	--	--
CO2	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	**1**	--	**1**	**2**
CO3	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	--	--	--	**3**
CO4	**1**	--	--	**2**	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO5	**1**	--	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO6	**1**	--	--	--	**2**	**3**	--	--	--	--	--	--	--	--	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6911	**DECISION MAKING SYSTEM LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

This lab course covers development and designing of implementing basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations. It aims to develop the concepts and techniques and foster the students' abilities in designing and implementing soft computing based solutions for real-world and engineering problems.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Soft Computing which includes Neural networks, Fuzzy logic and genetic algorithms.
2. Provide knowledge to develop Soft computing programs in Matlab.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement various neural networks using MATLAB.

CO2: Illustrate use of fuzzy in real applications.

CO3: Apply genetic algorithm to basic problems.

Modules	Blooms level*	Number of hours
Lab Session 1: Study of Biological Neural Network	L1 , L2 and L3	2
Lab Session 2: Study of Artificial Neural Network	L1, L2 and L3	1
Lab Session 3: Write a program of Perceptron Training Algorithm.	L3 and L4	2
Lab Session 4 Write a program to implement Hebb's Rule	L3, and L4	2
Lab Session 5 Write a program to implement of Delta Rule.	L3, and L3	2
Lab Session 6 Write a program to implement back propagation learning algorithm.	L3 and L4	2
Lab Session 7 Study of fuzzy inference system	L1, L2 and L3	1
Lab Session 8 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, L3 and L4	2

Lab Session 9 Write a program to implement SDPTA	L3 and L4	2
Lab Session 10 Write a program to implement RDPTA	L3 and L4	2
Lab Session 11 To Study various defuzziification techniques	L1, L2, L3 and L4	1
Lab Session 12 Write a program to implement of fuzzy set operation	L3 and L4	2
Lab Session 13 Study of genetic algorithm	L1, L2, L3 and L4	1
Lab Session 14 Study of Genetic programming and solve a real life problem	L1, L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
3. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
4. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
5. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	--	3	2	--	3	3	--	--	--	--	--	1	--	--	3

MACHINE LEARNING(SPECIALISATION)

Course Code: MLE6901	**PATTERN RECOGNITION & IMAGE PROCESSING**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Digital Image Processing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with Pattern Recognition. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Pattern recognition Concepts & Bayesian decision theory

CO2: List out the Univariate and Multivariate density

CO3: Explain concepts of Un-supervised learning and clustering

CO4: Describe the Image Fundamentals and Transforms

CO5: Explain the basics of Image Segmentation and Edge Detection

Modules	**Blooms level***	**Number of hours**
MODULE 1: **Introduction of Pattern recognition and Bayesian Decision Theory** Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces	L1 and L2	8
MODULE 2: **Normal density** Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context	L2 and L3	8
MODULE 3: **Un-supervised learning and clustering** Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering, similarity measures, criteria function for clustering	L1 and L2	10
MODULE 4: **Image Fundamentals and Transforms** Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.	L2 and L3	12
MODULE 5: **Image Segmentation and Edge Detection** Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral	L2 and L3	10

thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text & References:

Text:

4. "Fundamentals of speech Recognition", Lawerence Rabiner, Biing – Hwang Juang Pearson education.
5. "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
6. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley.

References:

4. "Pattern Recognition and Image Analysis" – Earl Gose, Richard John baugh, Steve Jost
5. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
6. "Digital Image Processing"– M. Anji Reddy, BS Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO 2	**1**	--	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO 3	**3**	--	**1**	--	**2**	--	--	--	--	--	--	--	**1**	**3**	**2**	--
CO 4	**3**	--	**2**	--	**1**	--	--	--	--	--	--	--	**1**	--	**2**	--
CO	**3**	--	**2**	--	**1**	--	--	--	--	--	--	--	**1**	--	**2**	--

5																

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6904	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students applyknowledge of various Image processing & pattern recognition required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	**Blooms level***	**Number of hours**
16. Introduction of MATLAB (l) Basic Variable deceleration & its operation (m) Function use & its application	L3, L5	4
17. Sample Programs in MATLAB (o) Basic use of Matrix and Graph Plotting (p) Different type of graph plotting with use of different -2 type of data	L3, L5	6
18. Sample Programs using MATLAB functions (u) Create a basic program MATLAB using functions (v) Use of basic function Image processing (w) Practice on Basic function of Image processing tool box.	L3, L5	6
19. Sample programs of ANN functions (i) Practice on Pattern Recognition functions in MATLAB (j) Write a program for training a small network in MATLAB	L3, L5	6
20. Sample Programs using ANN toolbox & Image processing toolbox (h) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

Text & References:

- Rafael C. Gonzalez & Richard E. Woods, "Image Processing Using MATLAB", 2nd edition, Pearson Education.
- "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6902	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Linear algebra, advanced calculus, discrete mathematics, Boolean algebra or equivalent.				
Co-requisites	Nil				

Catalog Description

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Objectives

The objective of this course is to

1. Introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.

2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system component

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of neural networks and fuzzy Logic fundamentals.
CO2: compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.
CO3: Understand concept of classical and fuzzy sets, fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.
CO4: Get thorough knowledge in biological neuron and artificial neurons.
CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: Basic neural computation models: Network and node properties. Inference and learning algorithms.Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.	L1, L2	4
MODULE 2: Self organizing networks: Kohonen algorithm, bi-directional associative memories. Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.	L1, L2, L3 and L4	10
MODULE 3:	L1, L3, L4 and	6

Fuzzy Sets: Operations and properties. Fuzzy Relations: Cardinality, Operations and properties. Value Assignments: Cosine amplitude and max-min method. Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.	L5	
MODULE 4: Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning. Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.	L1, L2, L3, and L4	9
MODULE 5:OPTIMUM DESIGN OF MACHINE Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.	L2, L3, L4 and L5	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

5. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
6. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
7. Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill1997.
8. Bart Kosho "Neural Network and Fuzzy Systems", Prentice Hall of India,1994

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	---	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

Course Code: MLE6905	NEURAL NETWORK AND FUZZY LOGIC LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

Neural Networks offer fundamentally alternative approaches to procedural programming. Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm.

Course Objectives

The objective of this course is to

1. To become familiar with neural networks learning algorithms from available examples and give design methodologies for artificial neural networks.

2. Understand and analyse concepts of fuzzy set and use fuzzy set operations to implement current computing techniques used in fuzzy computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO2: To analyse and appreciate the applications which can use fuzzy logic.

CO3: Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications and they will be able to design inference systems

Modules	Blooms level*	Number of hours
Lab Session 1: Write a program to implement single layer perception algorithm.	L3 and L4	2
Lab Session 2: Write a program to implement back propagation learning algorithm	L3 and L4	4
Lab Session 3: Design multilayer feed forward network using back-propogation algorithm	L3 and L4	6
Lab Session 4 Study of fuzzy inference system	L1, L2, and L3	2
Lab Session 5 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, and L3	4
Lab Session 6 Write a program to implement SDPTA	L3 and L4	2
Lab Session 7 Write a program to implement RDPTA	L3 and L4	2
Lab Session 8 To Study various defuzziification techniques	L1, L2, and L3	2
Lab Session 9 Write a program to implement of fuzzy set operation	L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

3. Limin Fu. “Neural Networks in Computer Intelligence” McGraw Hill, 1995.
4. Freeman J. A., and Skapura D. Mu. “Neural Networks Algorithms applications and Programming Techniques”, Addison Wesley New York, 1991.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3

Course Code: MLE6903	**Natural Language Processing**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Python				
Co-requisites	Nil				

Catalog Description

In this course general introduction including the use of state automata for language processing and syntax including a basic parse for natural language processing are discussed in detail. Basic features like regular expressions, Text Normalization, Edit Distance, n-gram model and advanced feature like feature structures and realistic parsing methodologies, part of speech tagging will be introduced. The

concepts learnt in the studies of natural language processing will be applied in jupyter notebook using python for developing small to medium level applications.

Course Objectives

The objective of this course is to

5. Equip the students with concepts of natural language processing through problem solving and practical approach.
6. Provide an overview of various tools in the field of natural language processing to gain practical understanding of the concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, knowledge in speech recognition, models and algorithms; Explain regular expressions and solve related problems; Explain and solve problems related to lemmatization and stemming, minimum edit distance.

CO2: Explain language models and compare their performance on datasets; Solve some problems on naïve bayes algorithm.

CO3: Explain logistic regression, similarity, language modelling and solve problems based on them.

CO4:.Describe ANN and Part of speech tagging; Solve problems based on them.

CO5: Describe RNN models and distinguish between simple ANN and RNN;

Modules	**Blooms level***	**Number of hours**
MODULE 1: Knowledge in Speech and Language Processing ,Ambiguity ,Models and Algorithms Language, Thought, and Understanding ,The State of the Art and The Near-Term Future Some Brief History, Regular Expressions, Words ,Corpora,Text Normalization ,Minimum Edit Distance	L1, L2 ,L3	7

MODULE 2: Evaluating Language Models, Generalization and Zeros, Smoothing, Kneser-Ney Smoothing, The Web and Stupid Backoff, Advanced: Perplexity's Relation to Entropy, Naive Bayes Classifiers, Training the Naive Bayes Classifier, Worked example, Optimizing for Sentiment Analysis, Naive Bayes for other text classification tasks, Naive Bayes as a Language Model, Evaluation: Precision, Recall, F-measure, Test sets and Cross-validation, Statistical Significance Testing Advanced: Feature Selection.	L1,L2, L3	8
MODULE 3: Classification: the sigmoid, Learning in Logistic Regression, The cross-entropy loss function, Gradient Descent, Regularization, Multinomial logistic regression, Interpreting models, Advanced: Deriving the Gradient Equation, Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Applications of the tf-idf vector model, Optional: Pointwise Mutual Information (PMI), Word2vec, Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models.	L1,L2, L3	8
MODULE 4: Units,The XOR problem, Feed-Forward Neural Networks, Training Neural Nets, Neural Language Models, (Mostly) English Word Classes, The Penn Treebank Part-of-Speech Tagset, Part-of-Speech Tagging , HMM Part-of-Speech Tagging, Maximum Entropy Markov Models, Bidirectionality, Part-of-Speech Tagging for Other Languages.	L1, L2 and L3	6
MODULE 5: Simple Recurrent Networks, Applications of RNNs, Deep Networks: Stacked and Bidirectional RNNs, Managing Context in RNNs: LSTMs and GRUs, Words, Characters and Byte-Pairs.	L1, L2,L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Daniel Jurafsky & James H.Martin, "Speech and Language Processing", 2nd Edition, Pearson Education, 2009.
2. James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
3. Manning, Christopher D and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", Cambridge, 1st Edition, MA: MIT Press, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6906	**Hadoop Lab**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	4	2
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

3. To make students familiar with big data technologies.
4. Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure Hadoop and various tools like Pig, Hive etc.

CO2. Explain concepts of files and directories in HDFS and apply them in real database applications.

CO3. Design and implement mapreduce programs for a given problem.

CO4. Solve queries using concepts of Hive and Pig.

CO5. Perform operations using HBase.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Installation & Configuration steps of Hadoop	L1 and L2	2
Lab Session 2-3 1. Working with HDFS commands :mkdir, rmdir, rm, mv, ls, du, put, rm-r, cat, tail etc 2. Working with vi editor	L1and L3	4
Lab Session 4-5 Working with Java Map Reduce : Map Class, Reduce Class, Drier Class, map side joins, reduce side joins	L1 and L3	4
Lab Session 6-8 1. Working with Hive : Queries for Hive : Create table, describe database, describe table, describe extended table, describe formatted table, drop table, drop database, display table, where clause 2. Commands : Load Files on table : Load from HDFS, load from local 3. Command :CTAS Create table as select 4. Queries to create external tables 5. Working with commands like : Order by, group by, like, upper, lower, max, min	L1 and L3	6

Lab Session 9-10 1. Working with PIG : Order by, group by, co group, like, upper, lower, Joins, Union, Cartesian, Product Pig Scripts	L1 and L3	4
Lab Session 11-12 Working with HBase : Start the hbase, data insert, modify, multiple version insertion, describe, delete truncate, drop etc. Working with Foreign Key and Check Constraint.	L1 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jeffrey Aven, "SAMS Teach Yourself Hadoop in 24 Hours", 1st Ed., Pearson ,2017.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	---	1	1	--
CO5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6907	DESCRIPTIVE ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3

Pre-requisites/Exposure	
Co-requisites	Nil

Catalog Description

This course introduces some elementary statistical methods of analysis of data and compute various measurements of central tendency, dispersion, skewness and kurtosis. Also discusses computation of the correlation coefficient from ungrouped bivariate data and interpret them and analyse data pertaining to attributes and to interpret results.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of descriptive statistics through problem solving and practical approach.
2. Provide an overview of various tools in the field of statistics to gain practical understanding of the concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain data sampling and solve related problems; Explain and solve problems related to discrete frequency distribution and continuous frequency distribution.

CO2: Explain data samples and compare their performance on datasets

CO3: Explain regression modelling and solve problems based on them.

CO4: Describe Concept of central tendency of statistical data and solve problems based on them.

CO5: Describe Concept of dispersion and distinguish between concepts of central tendency of statistical data

Modules	Blooms level*	Number of hours
MODULE 1:	L1, L2	4

Definitions: Webster's and Secrist's definition of Statistics, Importance of Statistics, Scope of Statistics: In the field of Industry, Biological Sciences, Medical Sciences, Economics Sciences, Social, Sciences, Management Sciences, Agriculture, Insurance, Actuarial Science, Education and Psychology.	,L3	
MODULE 2: Types of characteristics: Attributes: Nominal scale, ordinal scale. Variables: Interval scale, ratio scale, discrete and continuous variables, Types of data: Primary data, Secondary data, Notion of a statistical population: Finite population, infinite population, homogeneous population and heterogeneous population. Notion of sample, random sample and non-random sample, Methods of sampling: Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.	L1,L2, L3	6
MODULE 3: Classification: Raw data and its classification, Discrete frequency distribution, Sturge's rule, continuous frequency distribution, inclusive and exclusive methods of classification, Open end classes, cumulative frequency distribution and relative frequency distribution, Graphical Presentation of Data: Histogram, frequency curve, frequency polygon, ogive curves, stem and leaf chart, Check sheet, Parato diagram, Examples and Problems.	L1,L2, L3	6
MODULE 4: Concept of central tendency of statistical data, Arithmetic Mean (A.M.), combined mean of a number of groups, merits and demerits, Geometric Mean (G.M.), Harmonic Mean (H.M.), Weighted Mean, Weighted A.M., G.M. and H.M. , Mode, Median, Empirical relation between mean, median and mode, Order relation between arithmetic mean, geometric mean, harmonic mean.	L1, L2 and L3	6
MODULE 5: Concept of dispersion, characteristics of good measure of dispersion, Range, Mean deviation, Mean square definition, Variance and standard deviation, Combined variance, Combined standard deviation, generalization for n groups, Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation.	L1, L2,L3	6
MODULE 6: Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution, Bowley's coefficient of skewness, interpretation using Box plot, Karl Pearson's coefficient of skewness, Measures of	L1, L2 ,L3	4

skewness based on moments (β1, γ1), Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions, Measures of kurtosis based on moments, (β2, γ2).		
MODULE 7: Bivariate data, bivariate frequency distribution, Concept of correlation between two variables, positive correlation, negative correlation, Scatter diagram, conclusion about the type of correlation from scatter diagram, Covariance between two variables, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, In case of ties, compute Karl Pearson's correlation coefficient between ranks. Regression: lines of regression, fitting of lines of regression by the least squares method, interpretation of slope and intercept. 9.2 Regression coefficient (byx, bxy), Effect of change of origin and scale, Angle between the two lines of regression, Mean residual sum of squares , Residual plot and its interpretation.	L1, L2 ,L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Goon A.M.,Gupta M. K., Dasgupta B.(1998): Fundamentals of Statistics (V-1),World Press.
2. Miller and Fruend: Modern Elementary Statistics.
3. Snedecor and Cochran: Statistical Methods, Oxford and IBH Publishers.
4. Mukhopadhyay, P: Mathematical Statistics (1996), New Central Book Agency, Calcutta.
5. Introduction to Mathematical Statistics, Ed. 4 (1989), MacMillan Publishing Co. New York.
6. Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
7. Neil Weiss: Introductory Statistics: Pearson Publishers.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4

CO1	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO3	**1**	**1**	**1**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO5	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**3**	**-**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6908	**OPTIMIZATION TECHNIQUES**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, ,principles. linear programming and queuing theory.

Course Objectives

After successful completion of the course, student will be able to understand importance of optimization of industrial process management , apply basic concepts

of mathematics to formulate an optimization problem , analyse and appreciate variety of performance measures for various optimization problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand importance of optimization of industrial process management.

CO2: Apply basic concepts of mathematics to formulate an optimization problem

CO3: Analyse and appreciate variety of performance measures for various optimization problems

CO4: Use classical optimization techniques and numerical methods of optimization

CO5: Apply knowledge of optimization to formulate and solve engineering problems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to optimization – adequate and optimum design – principles of optimization – statement of an optimization problem – classification – formulation of objective function, design constraints.	L1, L2	4
MODULE 2: CLASSICAL OPTIMIZATION TECHNIQUES Single variable optimization –multivariable optimization with no constraints – exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods – Interpolation methods: quadratic and cubic, direct root method.	L1, L2, L3 and L5 , L6	12
MODULE 3:MULTIVARIABLE – UNCONSTRAINED AND CONSTRAINED OPTIMIZATION Direct search methods – descent methods – conjugate gradient method.	L1, L3 and L4	8

Indirect methods – Transformation techniques, penalty function method		
MODULE 4:NON – TRADITIONAL OPTIMIZATION TECHNIQUES Genetic Algorithms -steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:- Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation and Tabu search methods.	L1, L3, and L4	10
MODULE 5:OPTIMUM DESIGN OF MACHINE Desirable and undesirable effects – functional requirement – material and geometrical parameters – Design of simple axial, transverse loaded members for minimum cost and minimum weight.	L3 and L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rao, S.S., "*Optimization – Theory and Applications*", Wiley Eastern, New Delhi, 1978

2. Fox, R.L., Optimization Methods for Engineering Design, Addition – Wesley, Reading, Mass, 1971.

3. Wilde, D.J., "*Optimum Seeking Methods*", Prentice Hall, Englewood Cliffs, New Jersey, 1964

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	--	**1**	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**3**	--	**2**	--	--	--	--	--	--	--	--	**1**	**2**	--	**1**
CO3	**1**	**2**	**2**	**4**	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO4	**1**	**2**	**2**	**2**	--	---	--	--	--	--	--	--	**1**	**2**	--	--
CO5	**1**	3	**2**	**1**	--	--	--	--	--	--	--	--	**1**	**1**	--	**4**

COURSE CODE: MLE 6909	**SOCIAL NETWORK ANALYTICS**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basis of Database and Networking				
Co-requisites					

Catalog Description

This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyze empirical social

network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets.

Course Objectives

The objective of this course is to

- To provide students effective data-driven intelligence to improve their decisions making and systematically estimate the expected impact on relevant performance objectives
- To equip the students with data-driven intelligence tools, the basics of data mining techniques and develop a data-analytical approach to problem-solving with their application

Course Outcomes

On completion of this course, the students will be able to

CO1. Know the basic notation and terminology used in network science

CO2. Be able to visualize, summarize and compare networks.

CO3. Learn the basic principles behind network analysis algorithms

CO4. Develop practical skills of network analysis in R programming language

CO5: Be capable of analysing real work networks

Course Content

Modules	Bloom's level	Number of Hours
Module I Introduction Overview: Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.	**L1, L2**	**6**

Module II Community Discovery in Social Networks: Applications, Methods and Engineering Trends Introduction, Communities in Context, Core Methods, Quality Functions, The Kernighan-Lin (Kl) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,	**L1, L2, L3**	**7**
Module III Information Networks and the World Wide Web The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web- Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search.	**L1, L2, L3**	**5**
Module IV Node Classifications in Social Networks Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification	**L1, L2, L3**	**6**
Module V Data and Text Mining in Social Media Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xmland Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous Networks.	**L1, L3, L4**	**6**
Module VI Overview of Social Tagging Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions ,Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.	**LI, L2**	**6**

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
2. Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
3. Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.

Reference Books

1. Jure Leskovec, Anand Rajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2nd edition, 2014.
2. Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1st edition, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	1	1
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	1	2
CO3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	1	2
CO4	1	1	3	--	--	--	--	--	--	--	--	--	1	2	1	1
CO5	1	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE6910	AGENT BASED INTELLIGENT SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Python				
Co-requisites	Nil				

Catalog Description

This course provides students basic knowledge of employing intelligent agents in solving complex problems and gives the awareness of the building blocks of agents and working of different types of agents. It also analyses the reasons for uncertainty and ability to design agents to handle them.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge of intelligent agents in solving complex problems.
2. Provide an overview of Building Agents, Knowledge Based Agents, Planning Agents and Higher Level Agents.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of knowledge intelligent agents and use in solving complex problems.

.

CO2: Describe the concept of **Concepts for Building Agents and Knowledge Based Agents.**

CO3: Explain the concept of **Planning Agents and Higher Level Agents**.

CO4:.Describe the concept of **Agents and Uncertainty and Higher Level Agents.**

Modules	Blooms level*	Number of hours

MODULE 1: Definitions – History – Hybrid Intelligent Agents – Agents vs Multi Agent Systems– Structure – Environment – Basic Problem Solving Agents – Complex Problem Solving Agents – Formulating Search Strategies – Intelligent Search.	L1, L2 ,L3	7
MODULE 2: Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events- Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle.	L1,L2, L3	8
MODULE 3: Knowledge Representation – Logic – First Order Logic – Reflex Agent – Building a Knowledge Base – General Ontology – Interference – Logical Recovery.	L1,L2, L3	7
MODULE 4: Situational Calculus – Representation of Planning – Partial Order Planning – Practical Planners– Conditional Planning - Preplanning Agents.	L1, L2 and L3	5
MODULE 5: Acting under uncertainty – Probability – Baye's Rule – Belief Networks – Utility Theory - Decision Network- Value of Information – Decision Theoretic Agent Design.	L1, L2,L3	5
MODULE 6: Learning Agents – General Model – Inductive Learning – Learning Decision Tree – Reinforcement Learning – Knowledge in Learning – Communicative Agents – Types of Communicative Agents – Future of AI.	L1, L2 and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2010.

2. Lin Padgham, Michael Winikoff, "Developing Intelligent Agent Systems: A Practical Guide", 1st Edition, John Wiley & Sons, 2004.

3. ZiliZhang,Chengqi Zhang, "Agent-Based Hybrid Intelligent Systems: An Agent- Based Framework for Complex Problem Solving", 1st Edition, Springer-Verlag New York, LLC , 2004.

4. Ngooc Thanh Nguyaaen, Lakhmi C. Jain, “Intelligent Agents in the Evolution of Web and Applications”, 4th Edition, Springer, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO3	**1**	**1**	**1**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO5	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**3**	**-**

1: strongly related, 2: moderately related and 3: weakly related

X SEMESTER

Course Code :- AIE6037	**Project Dissertation-II**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	0	15
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.
CO2: Design and develop engineering solutions to complex problems utilising a systems approach.
CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques
CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.
CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO2	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO3	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO4	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
C05	**1**	**1**	--	--	--	--			**1**	-	-	-	--	--	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engg. & Technology

Bachelor of Technology - Computer Science Engineering International (Global Study Programme)

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Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - Semester-I

APPLIED MATHEMATICS-I

Course Code: CSG2101 **Credit Units: 4**

Course Objectives:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Prerequisites:
Students must have a back ground of Mathematics in senior secondary level.

Course Contents/Syllabus:

Module I : Matrix Algebra	**Weightage**
• Elementary operations, • Reduction of matrices to row echelon form • Rank of matrix, Rank of a matrix by Echelon form and Normal form • System of Linear Equations (Homogeneous and Nonhomogeneous) • Consistency of system linear equations using Rank • Solution of system of linear equations by Gauss Elimination method and Gauss-Jordan method • Eigen values and Eigen vectors of a matrix • Cayley-Hamilton theorem(without proof) • Application of Cayley-Hamilton for finding inverse and power of matrix • Diagonalization of a matrix	**25%**
Module II : Differential Calculus	
• Higher order derivatives($\cos(ax+b), \sin(ax+b), e^{ax+b}, \log(ax+b), (ax+b)^n$, • Successive Differentiation, Leibnitz's Theorem(without proof) • Taylor's series and Maclaurin's series (Statement only), Expansion of function of one variable by Taylor's series and Maclaurin's series • Function with two or more variable, Limit, continuity and Partial differentiation • Euler's theorem for homogeneous functions • Maxima and Minima of two variable, Method of Lagrange's multiplier • Taylor's series and Maclaurin's series for function with two variable • Jacobian	**30%**
Module III: Integral calculus	
• Definite integral: Area of plane region and length of plane curve • Double Integral, change of order of integration • Triple integral • Application to area and volume using double and triple integral	**20%**

Module IV Vector Calculus	
• Scalar and vector fields • Gradient, Directional derivative, Divergence, Curl and their properties • Line integral • Green's theorem in plane (without proof) • Surface integral • Stoke's theorem (without proof) • Volume Integral • Gauss-Divergence' theorem (without proof)	**25%**

Student Learning Outcomes:

At the end of the course, the students will be able

- to recognize, identify, classify and describe the problems like they can classify rows and columns and then to apply different transformations and explain the solutions of system of equations
- to find partial derivatives, maxima and minima of two variables, Jacobians and expand the functions using Taylor's series and students will be able to evaluate and assess the results of various problems in other subjects based on these concepts
- to calculate double, single integrals and can apply concepts to find area, volume etc.
- to find the solutions of problems using line integral, surface integral and volume integral and some important theorems of vector calculus.

Pedagogy for Course Delivery:

- This course is taught as a lecture course with student participation and use of standard text books.
- Two or three examinations which may include in-class parts.
- Short quizzes, graded homework assignments which may be included in class assessment.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
100	**NA**	**70**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**MID TERM**	**HOME ASSIGNMENT**	**VIVA**	**ATTENDANCE**	
Weightage (%)	10	7	8	5	70

Text& References:

Text:

- Advanced Engineering Mathematics by Erwin Kreyszig(9thEdition), Wiley, 2011
- Engineering Mathematics by B.S. Grewal,(43rd Edition) Khanna publication, 2014
- Higher Engineering Mathematics by B.V. Ramana, McGraw-Hill, 2010
- Higher Engineering Mathematics by H.K. Dass,(2nd Edition) S. Chand publication,2011

References:

- Calculus by Strass, Bradley and Smith(3rd Edition), Pearson Education, 2007
- Elementary Linear Algebra with Applications, Bernard Kolman& David R Hill (9thEdition), Pearson Education, New Jersey,2008

ENGINEERING PHYSICS

Course Code: CSG2102 **Credit Units: 5**

Course Objectives: The aim of this course is to introduce the students about the fundamental concepts of under graduate level Physics and which forms the basis of all applied science and engineering disciplines.

Pre-requisites: Nil

Student Learning Outcomes: After the completion of this course students will be able to gain the fundamental concepts of (i) wave optics, (ii) laser and fiber optics, (iii) electromagnetic theory, (iv) relativistic mechanics and (v) wave mechanics. Moreover, they will be able to apply these fundamental concepts in various engineering applications.

Course Contents/Syllabus:

	Weightage (%)
Module I: Wave Optics	**35**
Coherent Sources, Conditions of Interference, Interference in thin films-parallel and Wedge shaped, Newton's rings, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a Single Slit, and N Slits, Plane Transmission grating, Rayleigh criterion and Resolving power of grating, Birefringence, Nicol prism, Production and Analysis of Plane, Circularly and Elliptically Polarized Light, Half and Quarter Wave Plates, Optical and Specific Rotation. Introduction of Lasers, Induced Absorption, Spontaneous and Stimulated Emission, Einstein Coefficients, Population inversion, Concept of three and four level Lasers, Construction and Working of He-Ne and Ruby Laser.	
Module II: Electromagnetic Theory	**25**
Scalar and Vector fields, Gradient, Divergence and Curl, Gauss's and Stoke's Theorems, Gauss's Law in Electrostatics, Differential form of Gauss's Law, Ampere's Law, Displacement Current, Maxwell's Equations in Free Space and Isotropic media, EM Wave Propagation in Free Space, Poynting theorem.	
Module III: Relativistic Mechanics	**15**
Inertial and Non-inertial Frames, Postulates of Special Theory of Relativity, Lorentz Transformation, Length Contraction and Time Dilation, Addition of Velocities, Variation of Mass with Velocity, Mass Energy Equivalence.	
Module IV: Wave Mechanics	**25**
Wave particle duality, De-Broglie Matter Waves, Phase and Group Velocity, Davisson Germer's Experiment, Heisenberg Uncertainty Principle, Wave Function and its Physical Significance, Operators, Expectation Values, Time Dependent and Time Independent Schrödinger Wave Equation for Free and Bound States, Particle in a One Dimensional Potential Box. Application of emerging Physics for engineers	

Lab/Practicals details, if applicable:

List of Experiments:

1. To determine the wavelength of sodium light by Newtons's rings method.
2. To determine the thickness of a given wire using wedge shape method.
3. To find angle of the prism and to determine the dispersive power of the material of prism with the help of a spectrometer.
4. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
7. To determine the value of acceleration due to gravity (g) in the laboratory using bar pendulum.
8. To determine the acceleration due to gravity (g) by Kater's reversible pendulum.
9. To determine the moment of inertia of a flywheel about its own axis of rotation.
10. To determine the frequency of an electrically maintained tuning fork by Melde's method.
11. To find the wavelength of the prominent lines of mercury spectrum using plane transmission grating.
12. To determine the frequency of A.C. mains using sonometer and electromagnet.
13. To study the V-I characteristics of forward and reversed biased p-n junction diode.
14. To study the characteristics of a solar cell and find the fill factor.
15. To study the characteristics of a photo-cell and verify the inverse law of radiation.

Assessment/Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total (%)
75	**25**	**100**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					
Components (Drop down)	**Mid Term Exam**	**Home Assignment**	**Quizz/Viva**	**Attendance**	**End Term Examination**
Weightage (%)	10	7	8	5	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				
Components (Drop down	**Lab Record**	**Performance**	**Viva**	**Attendance**	**End Term Examination**
Weightage (%)	10	10	5	5	70

Texts and References:

- Optics: A. K. Ghatak (Tata McGraw Hill Education Private Ltd., New Delhi)
- Optics: Brijlal and Subramanian (S. Chand)
- Principles of Lasers: A Svelto, V Edition (Springer)
- Optical Fiber and Laser: Anuradha De. (New Age International)
- Introduction to Electrodynamics: D. J. Griffith (Prentice Hall)
- Electrodynamics: Gupta, Kumar and Singh (PragatiPrakashan)
- Engineering Physics: Satya Prakash (PragatiPrakashan)

- Textbook of Engineering Physics: Part I, Neeraj Mehta (PHI Learning, Pvt. Ltd.)
- Textbook of Engineering Physics: Part II, Neeraj Mehta (PHI Learning, Pvt. Ltd.)
- Concept of Modern Physics: A. Beiser (Tata Mc-Graw Hill)
- Wave Mechanics: A. Goel (Discovery Publishing House, New Delhi)
- Practical Physics: C. L. Arora (S. Chand)

INTRODUCTION TO PROGRAMMING IN C

Course Code: CSG2103 **Credit Units: 03**

Course Objectives: The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C. This Course guides the students to read, write and modify C programs and to implement basic projects.

Pre-requisites: Basic knowledge of Computers

Course Contents/Syllabus:

	Weightage (%)
Module I: Introduction	**15**
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary,octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	
Module II: Programming in C	
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operatorprecedence and associativity. Managing Input and output Operation, formatting I/O.	**20**
Module III: Fundamental Features in C	
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	**20**
Module IV : Arrays and Functions	**20**
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.ConceptofSub-programming,functionsExampleofuserdefinedfunctions.Function prototype, Return values and their types, calling function, function argument, function with variable number of argument,recursion	

Module V: Advanced features in C	**25**
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	

Student Learning Outcomes:

- Graduates will understand programming principles and techniques for problem solving in C ProgrammingLanguage
- Design, implement, and evaluate a computer-based system, process, program to meet desiredneeds.
- Ability to use techniques, skills, and tools necessary for computingpractice.
- Design and Develop principles in the construction of software systems of varyingcomplexity.

Pedagogy for Course Delivery: The class will be taught using theory and lab method. Lab helps the students to generate the logic of assigned assignments. The course instructor will spend considerable time in understanding the concept of C Programming Language from the scratch and covers most of the programming structures of C Language. The course will cover the ways to think innovatively & liberally. Tools Used: TURBOC.

Lab/ Practicals details, if applicable:

List of Experiments:

- Introduction to TURBO C IDE and ProgrammingEnvironment
- C BuildingBlocks
- Decision making the if and if-elsestructure
- Decision making the Switch case and conditionaloperator
- Loop Constructs in CLanguage
- Nestedlooping
- Functions in C-Languageprogramming
- Arrays in C (singledimensional)
- Arrays in C(Multidimensional)
- Structures andUnions
- Pointers inC-Language
- Pointers with arrays and function
- File Handling inC-Language

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
67	33	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	7	8	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination		
Components(Drop down	**A**	**PR**	**LR**	**V**	**PR**	**V**	
Weightage (%)	5	10	10	5	35	35	70

Text & References:

Text Books:

- YashwantKanetkar, "Let us C", BPB Publications,2010.
- Byron S Gottfried, "Schaum's Outlines- Programming with C, McGraw Hill,2008.

Reference Books:

- E Balagurusamy , "Programming in ANSI C", Tata McGraw Hill, Fifth Edition,2010.
- Herbert Schildt, "C: The complete references", Tata McGraw Hill, Fourth Edition,2008
- Brain W. Kernighan, Dennis Ritchie, "C Programming Language", The (ANSI C Version), PHI, 2nd Edition,1988.

Any other Study Material:

- www.ebookee.com/-request_ebook-Let-us-C_149935.html
- www.tutorialspoint.com/cprogramming
- http://www.learn-c.org

ELEMENTS OF MECHANICAL ENGINEERING LAB

Course Code: CSG2104 **Credit Units: 01**

Course Objectives: This subject gives a very primitive but general information finding vide application in day to day life with emphasis upon the principles and fundamentals involved in various operations and processes used in manufacturing. The subject also offers a birds eye-view to all students about the common engineering materials finding vide application in Mechanical Engineering Industry and about their strength and other related vital aspects.

Pre-requisites: No pre-requisites required

Student Learning Outcomes:

On completion of the course the student will be able to:

1. Identify a broad range of materials used in mechanical engineeringprocesses
2. List the different characteristics of metals used in mechanical engineeringprocesses
3. Describe how hard and soft metals are selectively used in mechanical engineeringprocesses
4. Follow a drawing or sketch for a specified mechanical engineeringtask
5. Carry out specified bench work activities using hand and powertools
6. Measure and mark out various geometric shapes accurately ontometal
7. Ability to do arc and welding and make different types ofjoints.
8. Ability to make sand moulds and patterns for castingprocess
9. Apply appropriate health, safety and personal hygiene procedures when performing mechanical engineeringtasks
10. Demonstrate the application of communications, team working and quality awareness in a engineering environment.

Pedagogy for Course Delivery:

The course pedagogy will include lectures and practical performance of various jobs.

Lab/ Practicals details, if applicable:

List of Experiments:

- To make a two side square piece from a rectangularplate.
- To make a male female joint from a rectangularplate.
- To make a dust bin from zinc coated ironsheet.
- To make a funnel of a zinc coated ironsheet
- To make a cylindrical mug with handle of zinc coated ironsheet.
- To make a two side square piece from rectangular plate forWelding.
- To make a Butt joint, Lap joint and T- joint with the help of Arc-Welding.
- To make a Butt joint, Lap joint and T- joint with the help of GasWelding.
- To make a mould casting by single piece pattern and split pattern bracket withcores.
- To make a mould casting by double piece pattern with pulleyblock.

Assessment/ ExaminationScheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
Nil	**100%**	**100%**

Lab/ Practical/ StudioAssessment:

	Continuous Assessment/Internal Assessment				End Term Examination	
Components (Drop down	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Text & References:

Text Books:

1. Welding Technology by R.S. Parmar, KhannaPublishers.
2. Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
3. Ganesan, V. Internal Combustion Engine, TataMcGraw-Hill.
4. Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication

Reference Books:

Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill

ECONOMICS FOR ENGINEERS

Course Code: CSG2105 **Credit Units: 02**

Course Objective:
The objective of this course is to familiarize the prospective engineers with elementary principles of economics. It also deals with acquainting the students with standard concepts and tools that they are likely to find useful in their profession when employed in the firm/industry/corporation in public or private sector. It also seeks to create and awareness about the status of the current economic parameters /indicators/ policy debates.

Pre-requisites:Nil

Student Learning Outcomes:

- On successful completion of the course, students will be able to:
- StudentsshouldbeabletodefinethevariouseconomicconceptsofUtility,demand,productionfunction,costandrevenuecurvesandbusinesscycles. Compare different marketstructures
- Students should be able to explain practical importance and applications of various economic tools
- Students should be able to interpret basic macroeconomic concepts in existing economic structure of the country

Course Contents/Syllabus:

	Weightage (%)
Module I: OVERVIEW	**25**
Definition of economics, nature of economic problem, relation between science, engineering , technology and economics Concepts and measurement of utility, law of diminishing marginal utility-its practical applications and importance Law of demand, elasticity of demand (price, income and cross)-Measurement, practical importance and applications	
Module II Supply and Elasticity of Supply	**25**
Law of supply, elasticity of supply and its practical applications, market equilibrium Production, factors of production, production functions (one variable, two variable, all variable and Cobb-Douglas)	

Module III concepts of Revenue and cost	**25**
Costs, various concepts of cost and revenue in short and long run. Cost and revenue curves Meaning of market, types-Perfect, Monopoly, Oligopoly, Monopolistic (Main features)	
Module IV Concepts of National Income	**25**
Concepts of GDP, GNP, NI and Disposable income. Aggregate demand and supply (Both open and closed economies) Basic concepts of inflation, deflation, stagflation, business cycles and BOP	

Pedagogy for Course Delivery:
The class will be taught using lecture method and basic concepts will be explained in detail inorder to develop conceptual understanding amongst the students. Practical application of economics will be discussed in class.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
100		**100**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Class test 1	Class Test 2	Viva	Attendance	
Weightage (%)	5%	15%	5%	5%	70%

Text Reading:

- H.L. Ahuja – Microeconomics, S. Chand & Co. Ltd., New Delhi.
- Samuelson &Nordhaus – Economics, Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi. RuddarDatt& K.P.M. Sundhram – Indian Economy, 53rd edition, S. Chand

References:

- **Koutsoyiannis, Modern economics**
- Bradley R. Schiller – The Economy Today, Mc-Graw Hill Inc. International Edition.

SOCIOLOGY FOR ENGINEERS

Course Code: CSG2106 **Credit Units: 01**

Course Objectives:

1. To familiarize the prospective engineers with elements of Indian history and sociological concepts and theories by which they could understand contemporaryissues
2. To understand the problems in Indiansociety
3. To enable its student to analyze critically the social processes of globalization, modernization and socialchange.

Pre-requisites: Student should be 10+2 from any discipline

Course Contents/Syllabus:

	Weightage (%)
Module I	
Descriptors/Topics Sociological perspective; Sociology as a science; Sociology and other social Sciences, Society, community, Institution, Association, Social Structure, Social Function, Status and Role and its Elements.	**50**
Module II	
Descriptors/Topics Introduction to sociological concepts- social institutions, Culture social stratification (caste, class, gender, power), Social Change.	**50**

Pedagogy for Course Delivery: The course is designed to be taught through the lecture mode.

Student Learning Outcomes:
Understanding of professional and ethical Responsibility to discuss the dynamics and nature of Indian Society.

Assessment/ Examination Scheme:

Theory L/T (%)	**Lab/Practical/Studio (%)**	**Total**
100	**N.A**	**100**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					**End Term Examination**
Components (Drop down)	**CT**	**HA**	**PPT**	**ATT**	
Weightage (%)	15	05	05	05	70

Text:

- Giddens, A (2009), Sociology, Polity, 6th edn.
- Haralambos M, RM Heald, M Holborn (2000), Sociology, Collins Xaxa, V (2008), State, Society and Tribes Pearson
- Chandoke, Neera& Praveen Priyadarshi (2009), Contemporary India: Economy, Society and Politics, Pearson
- Oommen,T.K.(ed.) (1997), Citizenship and National Identity: From Colonialism to Globalization, Sage.

References:

- Mohanty, M (ed.) (2004), Class, Caste & Gender- Volume 5, Sage Dhanagare, D.N. , Themes and Perspectives in Indian Sociology, Rawat
- Ramaswamy, E.A. and Ramaswamy,U.(1981), Industry and Labour, OU Press Bhowmik, S (ed.) (2010), Street Vendors in the Global Urban Economy, Routledge Rao, M.S.A. (ed.) (1974), Urban Sociology, Orient Longmans

INTRODUCTION TO ENVIRONMENTAL STUDIES

Course Code: CSG2107 **Credit Units: 03**

Course Objectives: The importance of environmental science and environmental studies cannot be disputed. The need for sustainable development is a key to the future of mankind. Continuing problems of pollution, loss of forget, solid waste disposal, degradation of environment, issues like economic productivity and national security, Global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues.It is clear that no citizen of the earth can afford to be ignorant of environment issues. Environmental management has captured the attention of health care managers. Managing environmental hazards has become very important. The objective is to sensitize students about the environmental crisis and how to overcome them.

Pre-requisites: Basic knowledge of science and humanity

Student Learning Outcomes: By the end of the course students will:

- To help students acquire awareness and sensitivity to the total environment and its allied problems
- To help students acquire a basic knowledge and understanding of the environment active participation in its improvement and resolution of its associated problems
- To provide students with an opportunity to be actively involved at all levels in working towards resolution of the environmental problems
- To help students acquire the skill for identifying and solving environmental problems
- To help students acquire a set of values and feelings of concern for the environment and motivation for active participation in the activities regarding environmental improvement and protection

Course Contents/Syllabus:

Course Contents/Syllabus:	**Weightage (%)**
Module I : The Multidisciplinary Nature of Environmental Studies & Natural Resources	**20**
Definition, scope and importance Need for public awareness. Types of natural resources, natural resource conservation, Land resources: Land as a resource, land degradation, Soil erosion, Forest resources: Use and over-exploitation, deforestation, case studies, Water resources: Use and over-utilization of surface and ground water, Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies, Food resources: Food resources effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies, Energy resources renewable and non-renewable energy sources, Changes caused by agriculture and overgrazing, Energy resources use of alternate energy sources, case studies, Role of individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles, Desertification, man induced landslides, Timber extraction, dams and their effects on forests and tribal people, Floods, drought, conflicts over water, Case studies, Uses of minerals and steps of mining and World food problems, Energy resources: Growing energy needs, Case Studies	
Module II: Ecosystems	**20**
Concept of an ecosystem & Types of ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Productivity, Food chains, food webs, Ecological pyramids, Ecological succession.	

Introduction of different Ecosystems, Types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem and Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries), Case studies of various ecosystems. • Visit to a local area to document environmental assets—river/forest/grassland/hill/ mountain, Study of simple ecosystems—pond, river, hill slopes, etc.	
Module III : Biodiversity and Its Conservation	**20**
Introduction - Definition: genetic, species and ecosystem diversity, Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, Biogeographical classification of India with respect to phytogeography & Zoogeography, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Various national parks, sanctuaries and biosphere reserves, laboratories, organizations for biodiversity conservation in India, Endemism in India with special reference to Hotspots in India, Biodiversity at global, national and local levels, Man wildlife conflicts, Case studies of loss and extinction of biodiversity • Visit to a local area to document environmental assets—river/forest/grassland/hill/ mountain, Study of common plants, insects, birds.	
Module IV: Environmental Pollution	
Definition, Cause and effects and control measures of :- Air pollution, Water pollution, Noise pollution, Soil pollution, Marine pollution, nuclear and Thermal pollution and Nuclear hazards, Introduction to various disasters, Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Visit to a local polluted site—Urban/Rural/Industrial/Agricultural Disaster management: floods, earthquake, cyclone and landslides, Pollution case studies, Role of an individual in prevention of pollution, Various types of disasters and 5R's and solution for waste management, Introduction to ETP/STP/organic farm etc facilities at the campus. • ETP/STP/organic farm etc facilities at the campus	**20**
Module V: Social Issues and the Environment & Human Population and the Environment	
Social Issues and the Environment : Water conservation, rain water harvesting, watershed management, Climate change, global warming, Acid rain, ozone layer depletion, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Resettlement and rehabilitation of people; its problems and concerns. From Unsustainable to Sustainable development, Urban problems related to energy, Wasteland reclamation, Consumerism and waste products & Nuclear accidents and holocaust. Case Studies. Environmental ethics: Issues and possible solutions. **Human Population and the Environment**: Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health. Human Rights, Value Education. Need of environmental Education, Role of Information Technology in Environment and human health. HIV/AIDS. Women and Child Welfare,Reason for growing populations and the government policies to curb the problem, Various water borne diseases and disease associated with poor and unhygienic environment, Various Case Studies related to society, environmental health.	**20**

Pedagogy for Course Delivery: Course will be delivered through both power point presentation and black board teaching. Students will be provided with reference materials in form of handouts or PPTs. Regular internal assessment will be done through class seminar and class test for evaluating the continuous progress of students.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total Marks
100%	**-**	**100**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**Class Test**	**Home Assignment**	**Seminar/viva /Quiz**	**Attendance**	
Weightage (%)	10%	5%	10%	5%	70%

Text & References:

- Kaushik&Kaushik , "principal of environmental studies"
- Asthana and Asthana, A textbook of Environmental Studies.
- Kaushik and Kaushik, Fundamentals of Environmental Studies.
- GaubaDhawan and Bisht Environmental Studies, Challenges & Solutions A quick Compendium.
- Somvanshi and Dhupper, Fundamentals of Environmental Studies.
- BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
- Down to Earth, Centre for Science and Environment (R)

Syllabus - Semester-II

APPLIED MATHEMATICS-II

Course Code: CSG2201 **Credit Units: 4**

Course Objectives:
By the end of the semester, students will be able to analyze techniques to solve differential equations, complex analysis problems and Laplace transform which can be further applied to solve practical engineering problemsin fluid dynamics, mechanics and modelling of simple electrical circuits etc.

Prerequisites: Students must have knowledge of Differential Calculus, Integral Calculus, and Complex numbers.

Course Contents/Syllabus:

Module I Ordinary Differential Equations	**Weightage%**
• Overview of solution of ordinary Differential Equations of First Order and first degree • Exact Differential Equations, equations reducible to exact differential equation • Linear Differential Equations of Higher Order • Complete Solution • Complementary Function • Particular Integrals • Euler Cauchy Equation • Legendre's Linear Equation • Simultaneous linear equations with constant coefficient.	**25%**
Module II Laplace Transform	

• Existence of Laplace transform, • Linear property • First shifting theorems • change of scale property • Laplace transform of derivative and integrals • multiplication by t^n, division by t • evaluation by integrals using Laplace transform • inverse Laplace transform, • convolution theorem, • Laplace transform of periodic functions, • Heavside function unit step function formula • unit impulse functions • second shifting theorems • solution of initial value problem by Laplace transform. •	**25%**
Module III Functions of complex variables	
• De Movier's Theorem and Roots of Complex Numbers • Logarithmic Functions • Functions of a Complex Variables • Limits, Continuity and Differentiability • Analytic Function, Necessary and sufficient condition for function to be analytic (without proof) • Cauchy-Riemann Equations • Harmonic Conjugate.	**25%**
Module IV Complex Integration	
• Complex Line Integrals • Real Line Integrals • Connection between Real and Complex Line Integrals • Cauchy Integral Theorem (without proof) • Cauchy Integral Formula (without proof) • Power Series, Taylor Series, Laurent Series • Zeroes and Singularities • Residues, Cauchy Residue Theorem (without proof) .	**25%**

Student Learning Outcomes:
After completing this course, students learning outcomes are as follows:

- Students will be able to analyze and solve first second and higher order ordinary differential equations using different analytical and numerical methods.
- Students will be able to apply concept of analyticity using Cauchy Riemann Equations and analyze harmonic function and its conjugate.
- Students will be able to evaluate complex contour integral by applying Cauchy Integral Theorem and Cauchy Integral Formula.
- Students will be able to represent complex numbers as Taylor and Laurent series.
- Students will be able to classify singularities and poles and find residue which will be further used to evaluate complex integral using Residue Theorem.
- Students will be able to learn Laplace Transform and its application.

Pedagogy for Course Delivery:

1. Reviewing relevant, previously-learned topics.

2. Presenting the new information by linking it to previous topics.
3. Providing learning guidance and assignments.
4. Providing time for practice, problem solving sessions and feedback.
5. Taking tests and quiz on regular basis.

Lab/ Practicals details, if applicable: NA

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
100%	**NA**	**70**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**MID TERM**	**HOME ASSIGNMENT**	**VIVA**	**ATTENDANCE**	
Weightage (%)	10	7	8	5	70

Recommended Text Book:

- A textbook of Engineering Mathematics by N.P.Bali
- Engineering Mathematics by Erwin Kreyszig
- Engineering Mathematics by B.S. Grewal.
- Higher Engineering Mathematics by H.K. Dass.
- Advanced Engineering Mathematics by R.K Jain and S.R.KIyenger

Recommended Reference Books :

- Complex Variables and Applications by Ruel Churchill
- Differential Equation by A.R.Forsyth.

ENGINEERING CHEMISTRY

Course Code: CSG2202 **Credit Units: 5**

#	Course Title	Weightage (%)
1	**Course Objectives:** The objective of the course is to give the students a general view on the industrial applications of chemistry in field of water technology, fuel quality, effect of corrosion and measures for control and usage of lubricants and polymers. It also gives a basic knowledge of instrumental methods to identify the structure of compounds.	
2	**Prerequisites:** Basic knowledge of Chemistry in school level	
3	**Student Learning Outcomes:** The student will be able to • Apply the knowledge of water treatment processes for water quality monitoring. • Calculate the calorific value based on fuel composition • Propose a suitable control method to combat corrosion in daily life • Choose lubricants based on their properties for a particular application. • Interpret the structure of molecules based on the spectral data. • Understand the mechanism of polymerization and gain knowledge about some commercially available polymers.	
4	**Module I Water Technology**	**25**
	• Introduction and specifications of water, • Hardness and its determination (EDTA method only), Alkalinity • Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, caustic embrittlement& corrosion : causes & prevention, • Carbonate & phosphate conditioning, colloidal conditioning &calgon treatment,	

	• Water softening processes : Lime – soda process, Zeolite, Ion exchange method, • Water for domestic use.	
5	**Module II Fuels**	**20**
	• Classification, calorific value of fuel, (gross and net), • Determination of calorific value of fuels, bomb calorimeter and its corrections, theoretical determination of Calorific value • Solid fuels - Proximate and ultimate analysis, • Knocking-Octane and Cetane rating • Numerical on combustion	
6	**Module III : Instrumental Methods of analysis**	**15**
	• Introduction; Principles of spectroscopy; Laws of absorbance • IR : Principle, Instrumentation, Application • UV : Principle, Instrumentation, Application • NMR : Principle, Instrumentation, Application	
7	**Module IV Corrosion**	**15**
	• Introduction, Mechanism of dry and wet corrosion, • Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity. • Factors influencing corrosion. • Corrosion control	
8	**Module V Polymers and Lubricants**	**25**
	• Polymers: Introduction, Classification, Mechanism of polymerization-Addition (Free radical, anionic, cationic) and Condensation, Molecular weight of polymers-number average and weight average, Preparation property and uses: PMMA, Polyester, Bakelite, Epoxy resin, Nylon 66. • Lubricants: Introduction; Mechanism of Lubrication; Types of Lubricants, Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point. • Application of Chemistry in Engineering.	
10	**Pedagogy for Course Delivery:** The course will be delivered by lectures and numericals by assignments. The students will be asked to make presentations on some topics based on practical applications.	
11	**Assessment/ ExaminationScheme:**	

	Continuous Assessment/ Internal Assessment				**End Term Examination**		**Total**
Theory Assessment	**HA**	**S/V/Q**	**CT**	**AT**	**EE**	**-**	**TT**
80%	07	08	10	05	70	-	100
Practical Assessment	**LR**	**P**	**V/Q**	**AT**	**EX**	**Viva**	**TP**
20%	5	10	10	05	35	35	100

Abbreviations:
CT – Class Test, S- Seminar, V- Viva, Q- Quiz, HA- Home Assignment, TT- Total Theory
LR- Lab record, EX-Experiment, P – Performance, TP- Total Practical
The total marks (out of 100) shall be the weighted average of TT and TP in the ratio of theory and lab credit units i.e. 4:1

List of Experiments:

- To determine the ion exchange capacity of a given cation exchanger.
- To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.
- To determine the type and extent of alkalinity of given water sample.
- Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.
- To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.
- (a) To find the cell constant of conductivity cell.

(b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically

- Determination of Dissolved oxygen in the given water sample
- To determine the total residual chlorine in water.
- Determination of viscosity of given oil by means of Redwood viscometer I.
- To determine flash point and fire point of an oil by Pensky Martin's Apparatus
- To determine the number of water molecules of crystallization in Mohr's salt.

Text & References:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene
- Theory and Practices in Chemistry- Narula&Virmani
- Experiments in AppliedChemistry- SunitaRattan, Kataria& Sons
- ExperimentalChemistry-Shashi Chawla ,Dhanpat Rai Publications
- Comprehensive Experimental Chemistry, V. K. Ahluwalia, New Age Publication, Delhi

ENGINEERING MECHANICS

Course Code: CSG2203 **Credit Units: 04**

Course Objectives: Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

Pre-requisites: The Basic Concepts of Physics and Mathematics (especially Trigonometry, Geometry and Calculus).

Course Contents/Syllabus:

	Weightage (%)
Module I: Force system & Structure	**20%**
Descriptors/Topics 1. Free bodydiagram, 2. Equilibrium equations andapplications. 3. Plane truss, perfect and imperfect truss, assumption in the trussanalysis, 4. analysis of perfect plane trusses by the method of joints, method ofsection	
Module II	**20%**
Friction 1. Static and Kinetic friction, laws of dry friction, co-efficient offriction, 2. angle of friction, angle of repose, cone of friction, frictionlock, 3. efficiency of screw jack, transmission of power throughbelt	
Module III	**40%**

Distributed Force 1. Determination of center of gravity, center of mass and centroid by direct integration and by the method of compositebodies, 2. mass moment of inertia and area moment of inertia by direct integration and composite bodiesmethod, 3. radius of gyration, parallel axistheorem, 4. Pappus theorems and its application, polar moment ofinertia.	
Module IV	**20%**
Work -Energy 1. Work energy equation, conservation ofenergy, 2. Virtual work, impulse, momentum conservation, impact of bodies, co-efficient ofrestitution, 3. loss of energy duringimpact, 4. D'alembertprinciple	

Student Learning Outcomes:
On completion of the course the student will be able to:

1. Demonstrate knowledge of fundamental concepts ofMechanics.
2. Identify various components of Trusses andmechanism.
3. Design and analyze problems relating to real worldkinematics.

Pedagogy for Course Delivery:
The course pedagogy will include lectures, numerical practice, case studies, seminars and presentations.

Lab/ Practicals details, if applicable:

List of Experiments:
- To verify the law of ForcePolygon.
- To verify the law of Moments using Parallel Force apparatus. (Simply supportedtype)
- To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclinedplane.
- To find the forces in the members of JibCrane.
- To determine the mechanical advantage, Velocity ratio and efficiency of a screwjack.
- To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the Wheel andAxle
- To determine the MA, VR, □ □ of Worm Wheel(2start)
- Verification of force transmitted by members of giventruss.
- To verify the law of moments using Bell cranklever
- To find CG and moment of Inertia of an irregular body using Computationmethod

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
75%	**25%**	**100%**

Theory Assessment (L&T):

	Continuous Assessment/Internal Assessment				End Term Examination
Components (Drop down	**A**	**CT**	**S/V/ Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination	
Components (Drop down	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Text Books:

- S.S. Bhavikatti, Engineering Mechanics, New Age InternationalLtd
- Sadhu Singh, Engineering Mechanics, UmeshPublication
- R. S. Khurmi, Engineering Mechanics, S. ChandPublication
- Engineering Mechanics LabManual

Reference Books:

- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education,2006
- Timoshenko, Engineering Mechanics, McGrawHill

BASIC ELECTRICAL ENGINEERING

Course Code: CSG2204 **Credit Units: 04**

Course Objectives:

The aim of this course is to make students aware of basic concepts of Electrical Engineering like Fundamental Law's & Theorems, Analysis of AC & DC Circuits and working principles of Electrical Machines.

Pre-requisites:

Physics & Mathematics at +2 level

Course Contents/Syllabus:

	Weightage (%)
Module I : DC Circuits and Network Theorems	
Ohm's law, Resistance in series and parallel, Voltage divider and current division rules, types of resistors, Equivalent resistance, Relative Potential Circuit Principles, Kirchhoff's Current Law, Kirchhoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Ideal Source, Independent Source and Controlled Source,NodalAnalysis,Loopanalysis.Superpositiontheorem,Thevenin'sTheorem,Norton'stheorem,Maximum Power transfer theorem.	**25**
Module II : Alternating Current Circuits	
Generation of alternating voltages and currents, Peak, Average and RMS values for alternating currents, Form and Peak factor, Power calculation, reactive power, active power, Complex power, power factor, Ac through resistance, capacitance and inductance and RLC circuit, impedance, reactance, conductance, susceptance Series and Parallel circuits, Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width., Power in choking coil.	**20**
Module III : Measuring Instruments	
Types of instruments, Construction and working principles of PMMC and moving iron type voltmeters & ammeters, Single phase dynamometer wattmeter, Use of shunts and multipliers (Simple numerical problems on shunts and multipliers).	**15**

Module IV : Three Phase Circuits	**20**
Generation, Phase sequence, Numbering, Interconnection- star and delta and current and voltages in them, Balanced star to delta and delta to star, Parallel loads, Power measurement in 3 phase circuits by three watt meter, two and one wattmeter method, Unbalanced loads.	
Module V : Electrical Machines	**20**
Single Phase Transformer: Principle of operation, construction, EMF equation, Power Losses, Efficiency (Simple Problems) DC machines: Principle and Construction, Types of DC machines based on excitation, Characteristics and Applications of DC motors (simple numerical problems).	

Student Learning Outcomes:
After completion of this course the students will have

1. An ability to apply fundamental and advance knowledge of mathematics, science and engineering to solve electrical and electronics engineering problem.
2. An ability to design and conduct experiments in electrical and electronics engineering as well as to collect, analyze and interpret data to reach logical conclusions.
3. An appreciation for the need for, and preparedness to engage in lifelonglearning.

Pedagogy for Course Delivery:

- Class room Lectures, assignments,Quiz.
- Seminars anddiscussions
- Practical on the Hard ware and studysetups

Lab/ Practicals details, if applicable:

List of Experiments:

1. To verify KVL & KCL in the givennetwork.
2. To verify SuperpositionTheorem.
3. To verify Maximum Power TransferTheorem.
4. To verify ReciprocityTheorem.
5. To determine and verify R_{Th}, V_{Th}, R_N, I_N in a givennetwork.
6. To perform open circuit & short circuit test on a single-phasetransformer.
7. To study transient response of a given RLCCircuit.
8. To perform regulation, ratio & polarity test on a single-phasetransformer.
9. To measure power & power factor in a three phase circuit by two wattmetermethod.
10. To measure power & power factor in a three phase load using three ammeter & three voltmetermethod.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
75	**25**	**100**

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**A**	**C T**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Lab/ Practical/ Studio Assessment:

Continuous Assessment/Internal Assessment					End Term Examination		
Components (Drop down	A	PR	LR	V	**PR**	**V**	70
Weightage (%)	5	10	10	5	35	35	

Text:

- B.L. Thareja: Electrical Technology: Part -1 & 2V
- Schaum's Series: ElectricalCircuits
- Basic Electrical Engineering by V.N Mittle, ArvindMittle,TMGpublication

References:

- R.J. Smith, R.C. Dorf: Circuits, devices andSystems
- Basic Electrical Engineering by, V.K Mehta S.Chandpublication

ENGINEERING GRAPHICS LAB

Course Code: CSG2205 **Credit Units: 01**

Course Objectives: This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Pre-requisites: Concepts Mathematics (especially Trigonometry and Geometry)

Student Learning Outcomes:

On completion of the course the student will be able to:

1. Acquire knowledge on the fundamentals of engineering drawing andunits.
2. Demonstrate proficiency with a metric and engineerscales.
3. Demonstrate the proper use of drawingequipment.
4. Ability to develop and/or comprehend a simple engineeringdrawing.
5. Ability to draw in both First and Third angle orthographicprojections
6. Understand the meaning of sections and cutting-planelines.
7. Understand international standards in engineering drawing practice and engineeringgraphics.

Pedagogy for Course Delivery:
The course pedagogy will include lectures, problem solving on drawing sheets in classroom and drawing assignments

Lab/ Practicals details, if applicable:

List of Drawing Sheets
Sheet no. 1- Lettering and Dimensioning
Single stroke, vertical and inclined capital letters, numerals, types of conventional lines, types of dimensioning
Sheet no.2- Geometrical Constructions
Construction of basic geometrical figures like pentagon, hexagon, conic sections by different methods.
Sheet no. 3- Scales
Construction of plain scale, diagonal scale and scale of chord.
Sheet no. 4- Projection of Points and Lines
Orthographic projection of points and lines in different angles of projection.
Sheet no. 5- Projection of Planes
Orthographic projection of planes like pentagon, hexagon, circle, rectangle etc. in 1st angle and 3rd angle.
Sheet no. 6- Projection of Solids
Orthographic projection of polyhedra and solids of revolution in 1st angle and 3rd angle.
Sheet no. 7- Section of Solids
Drawing sectional views and true shape of section for different solids.
Sheet no. 8- Development of Surfaces
Drawing developments of different solids by parallel line and radial line development method.
Sheetno.9-IsometricProjection
Isometric views of plane figures and solids by box method

Sheet no. 10- Orthographic Projection of Blocks

Drawing orthographic projection of different blocks in 1st angle and 3rd angle.

Assessment/ ExaminationScheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
Nil	**100%**	**100%**

Lab/ Practical/ StudioAssessment:

	Continuous Assessment/Internal Assessment				End Term Examination	
Components (Drop down	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Text & References:

Text Books:

- PS Gill, Engineering Drawing, KatariaPublication
- ND Bhatt, Engineering Drawing, Charotar publications

Reference Books:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- N Sidheshwar, Engineering Drawing, Tata McGrawHill
- CL Tanta, Mechanical Drawing, “DhanpatRai andSons”

LAW FOR ENGINEERS

Course Code: CSG2206 **Credit Units: 02**

Course Objective:
The aim of the course is provide general exposure to the students about the elementary knowledge of law that would be of utility in their profession; to enable the students to appreciate the importance of law and its impact on business and society.

Course Contents/Syllabus:	**Weightage (%)**
Module I: Introduction to Law and Law Making	**20**
Law: its meaning, sources and concepts; Constitutional Law with emphasis on Fundamental Rights, Directive Principles of State Policy and Fundamental Duties; Law making in India.	
Module II: General Principles of Contract under Indian Contract Act, 1872	**20**
Sec. 1 to 75 of Indian Contract Act and including Government as contracting party, Kinds of government contracts and dispute settlement, Standard form contracts; Promissory Estoppel and Legitimate Expectations.	
Module III: Adjudicatory System in India	**20**

Adjudicatory System in India as under the Constitution and statutes; Tribunals and Commissions like Competition Tribunal and Consumer Protection Commissions; Alternative Dispute Resolution: Nature, Scope and Types; Arbitration and Conciliation Act, 1996; Legal Services Authority Act, 1986.	
Module IV: Law Relating to Intellectual Property	**20**
Concept of Property, Types of Property; Introduction to IPR; Types of IPR: Copyrights, Patents, Trademarks, Designs, Trade Secrets, Plant Varieties and Geographical Indications; Infringement of IPRs and Remedies available under the Indian Law.	
Module V: Privacy in Governance and Transparency	**20**
Confidentiality in Government Business/Administration: Official Secrets Act, 1923; Right to Information Act, 2005 covering, Evolution and concept; Practice and procedures; Privileged Communications under the Indian Evidence Act, 1872; Offences under the Information Technology Act, 2000 with special reference to Protected Systems; Labour Disputes and the Settlement – Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Payment of Wages Act, 1936.	

Pedagogy for Course Delivery:

The course will be delivered by using lecture method and discussion method.

Lab/ Practicals details, if applicable: N.A. Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
100	-	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**MID TERM EXAM**	**PROJECT**	**PRESENTATION**	**ATTN.**	
Weightage (%)	10	10	5	5	70

Text & References:

- D.D. Basu (1996), Shorter Constitution of India, Prentice Hall of India
- M.P. Jain (2005), Indian Constitutional Law, Wadhwa& Co.
- M.P. Singh (1998), Constitutional Law of India, Eastern Book Co.
- P.M. Bakshi (2003), Constitution of India, Universal Law Publishing Co.
- H.M. Seervai (1993), Constitutional Law of India, Tripathi Publications
- Agarwal H.O.(2008), International Law and Human Rights, Central Law Publications
- S.K. Awasthi& R.P. Kataria(2006), Law relating to Protection of Human Rights, Orient Publishing
- S.K. Kapur(2001), Human Rights under International Law and Indian Law, Central Law Agency Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
- NeelimaChandiramani (2000),The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mum Avtarsingh(2002), Law of Contract, Eastern Book Co.
- Dutt(1994), Indian Contract Act, Eastern Law House

- Anson W.R.(1979), Law of Contract, Oxford University Press
- KwatraG.K.(2005),TheArbitration&ConciliationofLawinIndiawithcaselawonUNCITRALModel l awon Arbitration, Indian Council of Arbitration
- Avtarsingh (2005), Law of Arbitration and Conciliation, Eastern Book Co.
- Cornish W. R. (2008), Intellectual Property Rights, Patents, Trademarks, Copyrights & Allied Rights, Sweet & Maxwell Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
- P. S. Narayan (2000), Intellectual Property Rights, Gogia Law Agency
- T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House Bare text (2005), Right to Information Act
- O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers
- K.M. Desai(1946), The Industrial Employment (Standing Orders) Act
- Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia Publishing House

ASPECTS OF INDIAN HISTORY FOR ENGINEERS

Course Code: CSG2207 **Credit Units: 01**

Course Objectives: The paper is designed to provide adequate understanding of history and scientific achievements of Ancient India.

Pre-requisites: The student should have keen interest to know the history of India.

Student Learning Outcomes:
At the end of the course the student will be able to:

- Identify major dynasties.
- Examine social, economic and cultural conditions.
- Analyze the scientific achievements.
- Recognize the ancient heritage.
- Examine the past and present scenario.

	Weightage%
Module I - Ancient India: The beginning (2600- 600 BCE)	20

• Salient features of Harappan Culture
  ○ Town planning, Drainage system, Great Bath, Buildings, Seals, Social and economic condition, Reasons of decline
• Vedic Period
  ○ Vedic literature, Social ,Political and Economic conditions
• Rise ofBuddhism and Jainism	

Module II - From states to empires	20
• Early kingdoms & republics : Sixteen Mahajanpadas& ten Republics • The Mauryan Empire: Origin & growth, Administration, Achievements of Chandragupta, AshokanDhamma policy	
Module III- The Golden Period	20
• Achievements of Kanishka, Samudragupta and Chandragupta II, The Gupta administration & its decline. Main features of the Golden Era	
Module IV- Scientific Achievements in Ancient India	40
• Astronomy in ancient India • Mathematics in ancient India • Civil engineering & architecture in ancient India • Science, Medicine, Technology in ancient India • Agriculture Development and ecological balance in ancient India	

Pedagogy for Course Delivery:
Lectures, Interactive sessions, Case studies, Quiz, PPT

Assessment/ Examination Scheme:

Theory L/T (%)	**Lab/Practical/Studio (%)**	**End Term Examination**
30%	NA	70%

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					**End Term Examination**
Components (Drop down)	**CT**	HA	CP	Attendance	**70%**
Weightage (%)	10%	10%	5%	5%	

Text

- A History of Ancient and Early Medieval India: From the Stone Age to the 12th Century by Upinder Kaur
- Penguin History of Early India by RomilaThapar
- Ancient India by V D Mahajan

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

ENGINEERING MATHEMATICS-I

Course Code: DSE6101 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non-homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING PHYSICS

Course Code: DSE6102 **Credit Units: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films,Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

ENGINEERING MECHANICS

Course Code: DSE6103 **Credit Units: 03**

Course Objective:
Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

Course Contents:

Module I: Force system & Structure
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Module II: Friction
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

Module III: Distributed Force
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

Module IV: Work -Energy
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: DSE6104 **Credit Units: 03**

Course Objective:
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.
Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References*:*

- Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.
- J. B Dixit, “Fundamentals of Computers and Programming in ‘C’.
- P.K. Sinha and Priti Sinha, “Computer Fundamentals”, BPB publication.

ENGINEERING PHYSICS LAB

Course Code: DSE6105 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PROGRAMMING IN C LAB

Course Code: DSE6106 **Credit Units: 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING MECHANICS LAB

Course Code: DSE6107 **Credit Units: 01**

Engineering Mechanics:

- To verify the law of Force Polygon
- To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
- To determine the co-efficient of friction between wood and various surface (like
- Leather, Wood, Aluminum) on an inclined plane.
- To find the forces in the members of Jib Crane.
- To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
- To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
- Wheel and Axle
- To determine the MA, VR, η of Worm Wheel (2-start)
- Verification of force transmitted by members of given truss.
- To verify the law of moments using Bell crank lever
- To find CG and moment of Inertia of an irregular body using Computation method

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING GRAPHICS LAB

Course Code: DSE6108 **Credit Units: 01**

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface
Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

Syllabus - Second Semester

ENGINEERING MATHEMATICS-II

Course Code: DSE6201 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$
.

Module IV: Statistics and Probability
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ENGINEERING CHEMISTRY

Course Code: DSE6202 **Credit Units: 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels
Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter, Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module IV: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module V: Corrosion
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ELECTRICAL SCIENCE

Course Code: DSE6203 **Credit Units: 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: DSE6204 **Credit Units: 03**

Course Objective:
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

Module I: Introduction
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

ELEMENTS OF MECHANICAL ENGINEERING

Course Code: DSE6205 **Credit Units: 02**

Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

Course Contents:

Module I: Fundamental Concepts
Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

Module II: Stress And Strain Analysis
Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

Module III: Casting& Forging
Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

Module IV: Welding & Sheet metal working:
Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. *Internal Combustion Engine*, Tata McGraw-Hill.

ENGINEERING CHEMISTRY LAB

Course Code: DSE6207 **Credit Units: 01**

Course Contents:
List of Experiments:

(Any 10 Experiments)
To determine the ion exchange capacity of a given cation exchanger.

1. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

2. To determine the type and extent of alkalinity of given water sample.

3. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

4. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

5. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

6. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

7. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
8. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: DSE6208 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab

ELEMENTS OF MECHANICAL ENGINEERING LAB

Course Code: DSE6209 **Credit Units: 01**

Course Contents:

1. Welding

   (a) Arc Welding
   - Butt Joint
   - Lap Joint
   - T Joint

   (b) Gas Welding
   - Butt Joint
   - Lap Joint
   - Brazing of Broken pieces

2. Foundry
   - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal
   - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop
   - Male – Female Joint
   - Rectangular piece Filing the job

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Third Semester

DATA COMMUNICATION AND COMPUTER NETWORKS

Course Code: DSE6301 **Credit Units: 03**

Course Objective:
The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP.

Course Contents:

Module I: Introduction
Introduction to computer networks, evolution of computer networks and its uses, reference models, example networks
The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system

Module II: The data link layer
Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, example of data link protocols- HDLC, PPP Access

Module III: Medium access layer
Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, CSMA/CA, IEEE Standard 802 for LAN and MAN, Bridges, Wireless LANs. Introduction to wireless WANs: Cellular Telephone and Satellite Networks, SONETISDH, Virtual-Circuit Networks: Frame Relay and ATM.

Module IV: The network layer
Network layer concepts, design issues, static and dynamic routing algorithms, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion control and quality of service, internetworking, Ipv4

Module V: The transport layer
The transport services, elements of transport protocols, TCP and UDP
The application layer: Brief introduction to presentation and session layer, DNS, E-mail, WWW

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Computer networks: Tanenbaum, Andrew S, Prentice Hall
- Data communication & neworking: Forouzan, B. A.

References:
- Computer network protocol standard and interface: Uyless, Black
- Data and Computer Communications, Seventh Edition (7th.) William Stallings Publisher: Prentice Hall
- Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose

DATABASE MANAGEMENT SYSTEMS

Course Code: DSE6302 **Credit Units: 04**

Course Objective:
The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS.

Course Contents:

Module I: Introduction
Concept and goals of DBMS, DBMS Architecture, Database Languages, Database Users, Database Abstraction.
Basic Concepts of ER Model: Entity Type, Entity Set, Relationship type, Relationship sets, Constraints: Cardinality Ratio and Participation Constarint, Keys, Mapping, Design of ER Model

Module II: Hierarchical model &Network Model
Concepts, Data definition, Data manipulation and implementation.
Network Data Model, DBTG Set Constructs, and Implementation

Module III: Relational Model
Relational database, Relational Algebra, Relational Calculus, Tuple Calculus.

Module IV: Relational Database Design and Query Language
SQL, QUEL, QBE, Normalization using Functional Dependency, 1NF, 2NF, 3NF, BCNF, Multivalued dependency and Join dependency.

Module V: Concurrency Control and New Applications
Transaction basics: ACID property, Lifecycle of Transcation, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Korth, Silberschatz, "Database System Concepts", 4th Ed., TMH, 2000.
- Steve Bobrowski, "Oracle & Architecture", TMH, 2000

References:
- Date C. J., "An Introduction to Database Systems", 7th Ed., Narosa Publishing, 2004
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

OPERATING SYSTEMS

Course Code: DSE6303 **Credit Units: 03**

Course Objective:
Operating Systems serve as one of the most important courses for undergraduate students, since it provides the students with a new sight to envision every computerized systems especially general purpose computers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand, analyze and overcome the challenges they face with in the other courses and the real world.

Course Contents:

Module I: Introduction to operating system
Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls.

Module II: Process Management
Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads, Inter-process Communication and Synchronization:Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication.
CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling.
Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach.

Module III: Memory Management
Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays

Module IV: Device management
Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling,
Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage.

Module V: File System and Protection and security
File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management.
Policy Mechanism, Authentication, Internal excess Authorization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Milenekovic, “Operating System Concepts”, McGraw Hill
- A. Silberschatz, P.B. Galvin “Operating System Concepts”, John Willey & son

References:

- Dietel, “An introduction to operating system”, Addision Wesley
- Tannenbaum, “Operating system design and implementation”, PHI
- Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
- A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI.
- Willam Stalling “ Operating system” Pearson Education
- B. W. Kernighan & R. Pike, “The UNIX Programming Environment” Prentice Hall of India, 2000
- Sumitabha Das “ Your UNIX The ultimate guide” Tata Mcgraw Hill
- “Design of UNIX Operating System “ The Bach Prentice – Hall of India

DATA STRUCTURES USING C

Course Code: DSE6304 **Credit Units: 04**

Course Objective:
Data structure deals with organizing large amount of data in order to reduce space complexity and time requirement. This course gives knowledge of algorithms, different types of data structures and the estimation space and time complexity.

Course Contents:
Module I: Introduction to Data structures
Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Trade- offs. Use of pointers in data structures.Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion And Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.

Module II: Introduction to Stacks and queue
Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.
Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.

Module III: Dynamic Data Structure
Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation.
Stack and queue implementation using linked list.

Module IV: Trees and Graphs
Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees.
Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.

Module V: Sorting and Searching and file structures
Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting.
Searching: Linear search, Binary search, File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Horowitz and Sahani, “Fundamentals of Data structures”, Galgotia publications
- Tannenbaum, “Data Structures”, PHI
- R.L. Kruse, B.P. Leary, C.L. Tondo, “Data structure and program design in C” PHI
- “Data structures and algorithms” – Schaum Series.

DATA STRUCTURES USING C LAB

Course Code: DSE6305 **Credit Units: 01**

Software Required: Turbo C++

Assignment will be provided for following:

- Practical application of sorting and searching algorithm.
- Practical application of various data structure like linked list, queue, stack, tree

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA COMMUNICATION AND COMPUTER NETWORKS LAB

Course Code: DSE6306 **Credit Units: 01**

Equipments Required:
Switch Network Cables, Patch Chord- Fiber optical and twisted pair cable, LAN cards, RJ-45 connectors etc.
Platforms required: Linux Server

Course Contents:
- Introduction and Installation of Linux
- Administrating Linux
- Setting up a Local Area Network
- Connecting to the Internet
- Setting up Print Server
- Setting up File Server
- Setting up Mail Server
- Setting up FTP Server
- Setting up Web Server
- Setting up MySQL Database Server

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATABASE MANAGEMENT SYSTEMS LAB

Course Code: DSE6307 **Credit Units: 01**

Software Required: Oracle 9i

Topics covered in lab will include:

- Database Design
- Data Definition (SQL)
- Data Retrieval (SQL)
- Data Modification (SQL)
- Views
- Triggers and Procedures
- PL\SQL

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

UNIX PROGRAMMING LAB

Course Code: DSE6308 **Credit Units: 01**

Software Required: UNIX SCO

Assignments will be provided for the following

- Introduction to UNIX Commands
- Introduction to vi editor
- Programming in shell script
- Introduction to programming in C Shell

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India
- "Unix –Shell Programming" Kochar
- " Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

INTRODUCTION TO IOT

Course Code: DSE6309 **Credit Units: 03**

Course Objective:
The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the workingof Internet of Things. To understand the concepts of Web of Things.

Course Contents:
Module I: IOT - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.

Module II: IOT PROTOCOLS - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security

Module III: IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction, IoT and Big Data.

Module IV: WEB OF THINGS - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardizationfor WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals andBusiness Intelligence.

Module V: IOT APPLICATIONS - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc., Introduction to Fog Computing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet ofThings", Springer, 2011.
- David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.
- Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applicationsand Protocols", Wiley, 2012.

References:

- Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014
- Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013
- CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

E-COMMERCE AND ERP

Course Code: DSE6310 **Credit Units: 03**

Course Objective:
This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Contents:
Module I: Introduction E-commerce and ERP
E-commerce and its types, EDI and its basics, Digital payment systems, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies-Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT &Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.

Module II: ERP Modules
Business Modules in an ERP Packag- Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution.

Module III: Benefits of ERP
Time Reduction, On time shipment, Improved Resource Utilization, Performance, Customer Satisfaction, Flexibility, information accuracy and decision making capability, reduction in quality costs, Accuracy.

Module IV: ERP Implementation
ERP Implementation Lifecycle, Implementation Methodology, In-house implementation-Pros and cons, Vendors, Consultants and Users and their roles, Project Management and Monitoring after ERP Implementation.

Module V: The ERP Market and Future Directions
ERP Market Place- SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc. (SSA).Future directions in ERP.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Alexis Leon, "Enterprise Resource Planning", Tata McGraw Hill 2001
- Bajaj, Kamlesh K. and Nag, Debjani, E-Commerce: The Cutting Edge of Business, Tata McGraw-Hill Publishing Company

References:

- Loshin, Pete and Murphy, Paul, *Electronic Commerce*, Second edition, 1990, Jaico Publishing House, Mumbai.
- S. Sadagopan, "Enterprise Resource Planning", Tata McGraw Hill 2000

ELECTRONIC DEVICES & CIRCUITS

Course Code: DSE6311 **Credit Units: 02**

Course Objective:
This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

Course Contents:

Module I: Semeconductor physics: Mobility & conductivity, Charge densities in a semiconductor, Fermi dirac distribution, carrier concentration and Fermi levels in semiconductor, generation and recombination of charges, diffuse and continuity equations, Hall effect.

Module II: Semiconductor Diode and Diode Circuits
Junction diode, Diode as circuit element,Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.

Module III: Bipolar Junction Transistor
Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in $I_{co,}$ V_{BE} &β, Stabilization factors, thermal stability.

Module IV: Small signal Analysis of transistor and Multistage Amplifier
Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)

Module V: Field Effect Transistors
Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower

Module VI: Feedback Amplifiers
Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.

Module VII: Power Amplifiers
Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, ClassAB) class AB push pull amplifier, collector efficiency of each, cross over distortion.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.

ELECTRONIC DEVICES & CIRCUITS LAB

Course Code: DSE6312 **Credit Units: 01**

Course Contents:

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode as a voltage regulator.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations.
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Fourth Semester

THEORY OF AUTOMATA AND COMPUTATION

Course Code: DSE6401 **Credit Units: 04**

Course Objective:
The course begins with the basic mathematical preliminaries and goes on to discuss the general theory of automata, properties of regular sets and regular expressions, and the basics of formal languages. Besides, sufficient attention is devoted to such topics as pushdown automata and it's relation with context free languages, Turing machines and linear bounded automata, the basic concepts of computability such as primitive recursive functions and partial recursive functions.

Course Contents:

Module I: Introduction to Languages and Automata
Formal Grammars and Chomsky Hierarchy, Regular Expression Deterministic and Nondeterministic Finite Automata, Regular Expression, Two way Finite Automata, Finite Automata with output, Properties of regular sets, pumping lemma for regular sets, My-Hill-Nerode Theorem.

Module II: Context Free Grammars and Pushdown Automata
CFG: Formal Definition, Derivation and Syntax trees, E-removal, Ambiguous Grammar, Properties of CFL, Normal Forms (CNF and GNF)
Pushdown Automata:Definitions, Relationship between PDA and context free language, Decision Algorithms

Module III: Turing Machine
The Turing Machine Model, Language acceptability of Turing Machine, Design of TM, Universal TM, Church's Machine.
Recursive and recursively enumerable language, unrestricted grammars, Context Sensitive Language, Linear Bounded Automata (LBA).

Module IV: Undecidability
Turing machine halting Problem, undecidable problems for recursive enumerable language, Post correspondence problems (PCP) and Modified Post correspondence problems, Undecidable problems for CFL.

Module V: Computability
Partial and Total Functions, Primitive Recursive functions, Recursive functions.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Hopcroft and Ullman, "Introduction to Automata Theory, languages and computation", Addision Wesley.
- "An introduction to formal languages and Automata (2nd ed)" by Peter Linz, D. C. Health and Company.

References:

- "Introduction to theory of computation (2nd Ed)" by Michael sipser.
- Mishra & Chandrashekharan, "Theory of Computer Sciences", PHI.
- Zavi Kohavi, "Switching and finite Automata Theory "
- Kohan, "Theory of Computer Sciences".
- Korral, "Theory of Computer Sciences".

DIGITAL ELECTRONICS

Course Code: DSE6402 **Credit Units: 02**

Course Objective:
This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of computers, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. They will gain the practical skills necessary to work with digital circuits through problem solving and hands on laboratory experience with logic gates, encoders, flip-flops, counters, shift registers, adders, etc. The student will be able to analyze and design simple logic circuits using tools such as Boolean Algebra and Karnaugh Mapping, and will be able to draw logic diagrams.

Course Contents:

Module I: Boolean Functions
Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.

Module II: Combinational Circuits
Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer,.

Module III: Sequential Circuits
Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.

Module IV: Logic families
Logic families: RTL, DTL, TTL, ECL

Module V: Data Converters
Data converters: ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Moris Mano: Digital Circuits Systems
- R. P. Jain: Digital Logic & Circuits
- Thomas L. Floyd: Digital Fundamentals
- Malvino and Leech: Digital Principles & Applications

DISCRETE MATHEMATICS

Course Code: DSE6403 **Credit Units: 04**

Course Objective:
This subject provides students with an in-depth education in the conceptual foundations of computer science and in engineering complex software and hardware systems. It allows them to explore the connections between computer science and a variety of other disciplines in engineering and outside. Combined with a strong education in mathematics, sciences, and the liberal arts it prepares students to be leaders in computer science practice, applications to other disciplines, and research.

Course Contents:

Module I: Formal Logic
Statement, Symbolic Representation and Tautologies, Quantifiers, Predicator and validity, Normal form. Propositional Logic, Predicate Logic, First Order Logic.

Module II: Proof & Relation
Techniques for theorem proving: Direct Proof, Proof by Contra position, Proof by exhausting cares and proof by contradiction, principle of mathematical induction, principle of complete induction. Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients.

Module III: Sets and Combinations
Sets, Subtracts, power sets, binary and unary operations on a set, set operations/set identities, fundamental country principles, principle of inclusion, exclusion and pigeonhole principle, permutation and combination, Pascal's triangles, Comparing rates of growth: big theta, little oh, big oh and big omega.

Module IV: Relation/function and matrices
Relation/function and matrices: Relation, properties of binary relation, operation on binary relation, closures, partial ordering, equivalence relation, Function, properties of function, composition of function, inverse, binary and n-ary operations,
characteristic function, Permutation function, composition of cycles, Boolean matrices, Boolean matrices multiplication.

Module V: Lattices & Boolean Algebra
Lattices: definition, sub lattices, direct product, homomorphism Boolean algebra: definition, properties, isomorphic structures (in particulars, structures with binary operations) sub algebra, direct product and homo-morphism, Boolean function, Boolean expression, representation & minimization of Boolean function.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- J.P. Tremblay & R. Mamohan, "Discrete Mathematical Structure with Application to Computer Science," TMH, New Delhi (2000).
- Kolman, Busby & Ross "Discrete Mathematical Structures", PHI.
- Iyengar, Chandrasekaran and Venkatesh, "Discrete Mathematics", Vikas Publication.
- Peter Linz, "An Introduction to Formal Languages and Automata", Narosa Publishing House.

References:

- J. Truss, “Discrete Mathematics”, Addison Wesley.
- C.L. Liu, “Elements of Discrete Mathematics”, McGraw Hill Book Company.
- M. Lipson & Lipshutz, “Discrete Mathematics”, Schaum’s Outline series.
- J. E. Hopcroft & J. D. Ullman, “Introduction to Automata Theory, Languages and Computation”, Addison Weliy.

ARTIFICIAL INTELLIGENCE

Course Code: DSE6404 **Credit Units: 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Contents:

Module I: Problem solving and Scope of AI
Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction.
Problem Solving
State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.

Module II: Knowledge Representation
Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.

Module III: Understanding Natural Languages
Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts ,Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation..

Module IV
Expert System: Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN,R1
Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. **Programming Language:** Introduction to programming Language, LISP and PROLOG.
Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors, Fuzzy logic.

Module V: Introduction to Robotics
Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992.
- N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 1990.
- John J. Craig, “Introduction to Robotics”, Addison Wesley publication

- Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication
- Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication

References:

- D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
- Peter Jackson, “Introduction to Expert Systems”, AWP, M.A., 1992.
- R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
- M. Sasikumar, S. Ramani, “Rule Based Expert Systems”, Narosa Publishing House, 1994.

DIGITAL ELECTRONICS LAB

Course Code: DSE6405 **Credit Units: 01**

List of Experiments:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.
2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.
3. To verify the truth tables of RS, JK and D flip- flops.
4. To design and study a binary counter.
5. To design and study synchronous counter.
6. To design and study ripple counter.
7. To convert BCD number into excess 3 form
8. To design and study a decade counter.
9. To design and study a sequence detector.
10. To implement control circuit using multiplexer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

AMITY UNIVERSITY

ARTIFICIAL INTELLIGENCE LAB

Course Code: DSE6406 **Credit Units: 01**

Course Contents:

Assignments will be provided for the following:

- Programming in Prolog
- Programming for Robotics

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMMUNICATION SYSTEMS

Course Code: DSE6407 **Credit Units: 02**

Course Objective:
The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

Course Contents:

Module I: Introduction
Communication Process, Source of Information, Communication channels, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, primary communication resources, analog versus digital communications

Module II: Amplitude modulation
Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.

Module III: Angle Modulation
Narrow and wide band FM, BW calculations using Carlson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.

Module IV: Pulse Modulation
Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems,
Basics of digital communications: ASK, PSK, FSK, QPSK basics & wavform with brief mathematical introduction

Module V: Noise
Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.

Module VI: Introduction to Information Theory
Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition

References:
- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH

COMMUNICATION SYSTEMS LAB

Course Code: DSE6408 **Credit Units: 01**

List of Experiments:

- To study the sampling and reconstruction of a given signal.
- To study amplitude modulation and demodulation.
- To study frequency modulation and demodulation.
- To study time division multiplexing.
- To study pulse amplitude modulation.
- To study delta and adaptive delta modulation and demodulation.
- To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.
- To study carrier modulation techniques using binary phase shift keying and differential shift keying.
- To study pulse code modulation & differential pulse code modulation as well as relevant demodulations.
- To study quadrature phase shift keying & quadrature amplitude modulation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES
(PHP and MySql)

Course Code: DSE6409 **Credit Units: 02**

Course Objective:
This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc.

Course Contents:
Module I: Introduction to Open Source and PHP programming
Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.

Module II: Operator, Loops, Array, Exception and Error Handling
Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array.
Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.

Module III: Classes, File system, Passing Information between pages
Object orientedprogrammingwithPhp, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server.
HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.

Module IV: Workingwithdatabase
HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input usingJavascript.
MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL APIBuilding Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.

Module V: WorkingwithFrameworks
Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Woprking with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.

Examination Scheme:

Components	CT1	A/C/Q	ATTD.	EE
Weightage (%)	15	10	5	70

Text & References:
Text:
- Beginning PHP, Apache, MySQL Web Development, Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, published by Wiley, wrox
- PHP, MySQL and Apache Julie C Meloni Pearson Education ISBN : 81-297-0443-9

References:
- The Complete Reference PHP, by Steven Holzner, Tata McGraw-Hill Publication
- Beginning PHP and MYSQL, by W. Jason Gilmore, Apress Publication

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP and MySql) LAB

Course Code: DSE6410 **Credit Units: 01**

Course Contents:

1. Write the process of installation of web server.
2. Write programs to print all details of your php server. Use phpinfo().
3. Write a program to give demo of ECHO and PRINT command.
4. Write a program to implement the string functions.
5. Write a program to print Fibonacci series upto a given number using recursion.
6. Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice.
7. Write a program sort ten number by using array.
8. Write a program to demonstrate the concept of associative array.
9. Write a program to demonstrate the concept of multidimensional array.
10. Write a program to demonstrate the concept of Classes & objects.
11. Create a login form with two text fields called “login” and “password”. When user enters “Amity”as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry.HTML in case of wrong username/password.
12. How to work with sessions in PHP?
13. Introduction to Mysql creating databases, tables, using command line and gui interface, phpmyadmin
14. How to connect to MySQL using PHP ? Write programs for insertion, deletion updates and other sql queries. Design front end using html, css and write php scripts for processing of data. Try all different methods of connecting from php to MySQL
15. Make a small project with mysql and php to perform CRUD operations. Use Session also.
16. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”.
17. Write a program to design login form in which find the greatest number amongst three numbers.
18. WAP for Marksheet generation.
19. Design a webpage for entering the student details with all the validations applied on it.
20. Write a php script to print current date and time.
21. Write a pp script to use include and require functions.
22. Write a php script including all the file handling functions.
23. Design a website using Wordpress /Joomla/Drupal
24. Introduction to Laravel frame work and one simple project.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ARTIFICIAL NEURAL NETWORK

Course Code: DSE6411 **Credit Units: 02**

Course Objective:
Aim of this course is to introduce the students fundamentals concepts of Nural network and its various application in computer science.

Module I:-
Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications.

Module II:-
Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms,
Learning rule:-
Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule.

Module III:-
Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.

Module IV:-
Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.

Module V:-
Associative memory, auto-associative memory, bi-directional associative memory.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Book:

- Kenji Suzuki (ed.) - InTech **,** 2013
- Todd Troyer - University of Texas at San Antonio **,** 2005

ARTIFICIAL NEURAL NETWORK LAB

Course Code: DSE6412 **Credit Units: 01**

Course Objective
The aim of this lab to gain the practical knowledge of basic neuron models and learning algorithms.

Lab Assignment
To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox

Examination Scheme

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Fifth Semester

SOFTWARE ENGINEERING

Course Code: DSE6501 **Credit Units: 03**

Course Objective:
The basic objective of Software Engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle time. Software Engineering is the systematic approach to the development, operation, maintenance, and retirement of software.The course provides a thorough introduction to the fundamentals principles of software engineering. The organization broadly be based on the classical analysis-design-implementation framework.

Course Contents:

Module I: Introduction
Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM

Module II: Software Metrics and Project Planning
Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Module III: Software Requirement Analysis, design and coding
Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding,

Module IV: Software Reliability, Testing and Maintenance
Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing,Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards.Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering

Module V: UML
Introduction to UML,Use Case Diagrams, Class Diagram: State Diagram in UMLActivity Diagram in UMLSequence Diagram in UMLCollaboration Diagram in UML, Domain,Component Diagram and Deployement Diagram

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
- R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

References:

- R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
- P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
- Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
- James Peter, W. Pedrycz, “Software Engineering”, John Wiley & Sons.
- Sommerville, “Software Engineering”, Addison Wesley, 1999.

COMPUTER ARCHITECTURE

Course Code: DSE6502 **Credit Units: 04**

Course Objective:
This course deals with computer architecture as well as computer organization and design. Computer architecture is concerned with the structure and behaviour of the various functional modules of the computer and how they interact to provide the processing needs of the user. Computer organization is concerned with the way the hardware components are connected together to form a computer system. Computer design is concerned with the development of the hardware for the computer taking into consideration a given set of specifications.

Course Contents:
Module I: Register Transfer Language
Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.

Module II: Basic Computer Organizations and Design
Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit

Module III: Central Processing Unit
Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC. Computer Arithmetic: Introduction, Addition and Subtraction Algorithm,Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations

Module IV: Memory and Intrasystem Communication and Input output organisation
Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniues, Virtual Memory, Memory Management Hardware, **Intrasystem communication and I/O:** Peripheral Devices, Input-Output, Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer,Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication

Module V: Introduction to Pipelining and Multi-Processor
Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Multiprocessors: Characteristics of Multiprocessors

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
- Harry &Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References:
- WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.

- Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
- Kai Hwang & Faye a Briggs, McGrew Hill, inc., Computer Architecture & Parallel Processing.
- John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
- John P Hayes, McGraw-Hill Inc, Computer Architecture and Organization.
- M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.
- Hamacher, "Computer Organization," McGraw hill.
- Tennenbaum," Structured Computer Organization," PHI
- B. Ram, "Computer Fundamentals architecture and organization," New age international Gear C. w., "Computer Organization and Programming, McGraw hill

JAVA PROGRAMMING

Course Code: DSE6503 **Credit Units: 03**

Course Objective:
The objective is to impart programming skills used in this object oriented language java.The course explores all the basic concepts of core java programming. The students are expected to learn it enough so that they can develop the web solutions like creating applets etc.

Course Contents:
Module I: Java Basics
Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.

Module II: Java Object Oriented
Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package.

Module III: Exception Handling and Threading
Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception.
Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.

Module IV : Event Handling And AWT
Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers

Module V: Java Advanced
AppletClass, Architecture, Skeleton, Display Methods., Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes., Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- JAVA The Complete Reference by Patrick Naughton & Herbert Schild, TMH
- Introduction to JAVA Programming a primar, Balaguruswamy.

References:
- "Introduction to JAVA Programming" Daniel/Young PHI
- Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999

ADVANCE DATA STRUCTURE AND ALGORITHM

Course Code: DSE6504 **Credit Units: 03**

Course Objective:
The objective to this course is to equip students with advanced concepts of data structures like Huffman trees, Self organizing trees, different types of heaps and their time complexity. Advanced topics and graphs and graph algorithms, geometric algorithms and parallel algorithms.

Course Contents:

Module-I:
ADVANCED TREES: Definitions Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees, Splay Tree.Augmenting Red-Black Trees to Dynamic Order Statistics and Interval Tree Applications. Operations on Disjoint sets and itsunion-find problem Implementing Sets. Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.

Module-II:
MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees Implementing Binomial Heaps and itsOperations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci HeapImplementing Fibonacci Heap. SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting andmerging network sorter.

Module-III:
GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut-Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs.

Module-IV:
GRAPH THEORY ALGORITHMS: Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph andPlanarity Testing, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and ArticulationPoint. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.

Module-V:
Geometric algorithms: Point location, convex hulls and Voronoi diagrams, Arrangements. Parallelalgorithms: Basic techniques for sorting, searching, merging

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Rivest Cormen, “Introduction to Algorithms”;PHI

References:
- Tammasia, “Algorithm Design”, Willey

ANALYSIS AND DESIGN OF ALGORITHM

Course Code: DSE6505 **Credit Units: 03**

Course Objective:
The designing of algorithm isan important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program

Course Contents:
Module I: Introduction
Algorithm Design paradigms - motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations. Recurrences- substitution method, recursion tree method, master method

Module II: Divide and conquer
Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort**,** Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.
Greedy Method
Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman

Module III: Dynamic programming
Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem

Module IV: Graph searching and Traversal
Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search)
Back tracking
Overview, 8-queen problem, and Knapsack problem
Brach and bound
LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

Module V: Computational Complexity
Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication
- T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm,"

References:
- Sara Basse, A. V. Gelder, "Computer Algorithms," Addison W
- J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"
- D. E. Knuth, " The art of Computer Program

SOFTWARE ENGINEERING LAB

Course Code: DSE6506 **Credit Units: 01**

Software Required: Rational Rose

Assignments will be provided for the following:

- Use of Rational Rose for visual modeling.
- Creating various UML diagrams such as use case, sequence, collaboration, activity, state diagram, and class diagrams.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

JAVA PROGRAMMING LAB

Course Code: DSE6507 **Credit Units: 01**

Software Required: JDK1.3

Assignments will be provided for the following:

- Java programs using classes & objects and various control constructs such as loops etc, and data structures such as arrays, structures and functions
- Java programs for creating Applets for display of images and texts.
- Programs related to Interfaces & Packages.
- Input/Output and random files programs in Java.
- Java programs using Event driven concept.
- Programs related to network programming.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCE DATA STRUCTURES AND ALGORITHM LAB

Course Code: DSE6509 **Credit Units: 01**

Programs based on Implementation of Graphs using Adjacency Matrix, Linked List , implementation of graph algorithms like BFS,DFS, Minimum Spanning Tree, Binary Search Tree, Knapsack Problem using Greedy Algorithm, Dynamic Programming, Shortest Path Algo (Dijkstra's), Implementing B-Tree,AVL Tree ,Red Black Tree. Implementing Sets, Dictionaries, Priority Queue using Heap.

Recommended Software: Java/C++/C/Python

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ANALYSIS AND DESIGN OF ALGORITHM LAB

Course Code: DSE6510 **Credit Units: 01**

Lab assignment will be based on the following:

Programs for binary search and Quick sort by using divide and conquer techniques.
Programs on algorithm based on greedy method.
Programs on algorithm based on Dynamic programming.
Programs on Depth First and Breadth Search traversals of graphs.
Programs on algorithm based on backtracking.
Programs on algorithm based on Brach and Bound.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PYTHON PROGRAMMING LAB

Course Code: DSE6508 **Credit Units: 01**

Course Contents:

- Setting up python on Windows/Linux/Mac
- First program in python
- Programs related to basic input/ouput.
- Programs related to variables,strings,numbers
- Programs related to Lists and Tuples
- Programs related toFunctions
- Programs related to If Statements
- Programs related to While Loops and Input
- Programs related to Basic Terminal Apps
- Programs related to Dictionaries
- Programs related to Classes
- Programs related to Exceptions
- Programs related to GUI programming
- Using Word, Excel, PDF files in python.
- Web programming in python,
- Case study of application areas of python.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION-I

Course Code: DSE6535 **Credit Units: 03**

Course Objective:
The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Examination Scheme:

Feedback from industry/work place	20
Training Report	40
Viva	15
Presentation	25
Total	**100**

FUZZY LOGIC & GENETIC ALGORITHM

Course Code: DSE6511 **Credit Units: 03**

Course Objective:
This course is intended to mathematical introduction to the analysis, synthesis, and design of control systems using fuzzy logic and Genetic Algorithm. A study of the fundamentals of fuzzy sets, operations on these sets, and their geometrical interpretations. Methodologies to design fuzzy models and feedback controllers for dynamical systems,Various applications and case studies.
fuzzy inference systems, fuzzy logic control,parallelprocessors,multilevel optimization- reallife problem and other machine intelligence applications of fuzzy logic and Genetic Algorithm.

Course Contents:

Module I: Introduction
Crisp sets: Overview, Fuzzy sets : Basic types and concepts,Characterstics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets

Module II: Fuzzy operations and Fuzzy arithmetic
Types of operations, Fuzzy complements, Fuzzy intersection:t-norms, Fuzzy union:t-conorms,Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables,Airthmetic operations on intervals, Airthmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.

Module III: Fuzzy systems And Applications
General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata.Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics

Module- IV: Introduction to Genetic Algorithm
Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithmgenetic modeling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.

Module-V: Genetic Technology
Genetic technology:- steady state algorithm, fitness scaling, inversion.Geneticprogramming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm.Advanced operators and techniques in genetic search:- Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.

Module- VI: Applications **5 lecture hours**
Genetic Algorithm in engineering and optimization-natural evolution –Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning-Genetic Algorithm and parallelprocessors- composite laminates- constraint optimization- multilevel optimization- reallife problem.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Fuzzy sets and fuzzy logic theory and application by George. j. klir , Bo Yuan
- David E. Goldberg, "Genetic Algorithms in search, Optimization & Machine Learning"

References:

- A First Course in Fuzzy and Neural Control by Nguyen, Prasad, Walker, and Walker. CRC 2003
- Artificial Intelligence by Negnevisky. Addison-Wesley
- Automatic Control Systems by Colnaraghi and Kuo. 9th edition. Wiley Publisher. 2010
- William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"
- 2. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems "

VHDL PROGRAMMING

Course Code: DSE6512 **Credit Units: 02**

Course Objective:
VHDL is commonly used as a design-entry language for field-programmable gate arrays and application-specific integrated circuits in electronic design automation of digital circuits. The course aims to discuss the syntax of the language to model a digital system.

Course Contents:

Module I
Fundamental VHDL Units, LIBRARY Declarations, ENTITY, ARCHITECTURE, Introductory Examples, Specification of combinational systems using VHDL, Introduction to VHDL, Basic language element of VHDL, Behavioural Modeling, Data flow modeling, Structural modeling, Subprograms and overloading, VHDL description of gates.

Module II
Data Types; Pre-Defined Data Types, User-Defined Data Types, Subtypes, Arrays, Port Array, Records, Signed and Unsigned Data Types, Data Conversion

Module III: Sequential codes
PROCESS: Signals and Variables, IF, WAIT, CASE, LOOP, CASE versus IF, CASE versus WHEN, Bad Clocking, Using Sequential Code to Design Combinational Circuits
Description and design of sequential circuits using VHDL,

Module IV
Standard combinational modules, Design of a Serial Adder with Accumulator, State Graph for Control Network, design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of a Binary Divider.

Module V
Micro programmed Controller, Structure of a micro programmed controller, Basic component of a micro system, memory subsystem. Overview of PAL, PLA, FPGA, CPLD.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- J. Bhaskar, “A VHDL Primer”, Addison Wesley, 1999.
- Volnei A. Padroni, “Circuit Design with VHDL.”
- M. Ercegovac, T. Lang and L.J. Moreno, ”Introduction to Digital Systems”, Wiley,2000
- C. H. Roth, “Digital System Design using VHDL”, Jaico Publishing, 2001

References:
- VHDL Programming by Examples by Douglas L. Perry, TMH, 2000
- Hardware Description Languages by Sumit Ghose, PHI, 2000
- The Designer Guide to VHDL by P.J. Ashendern; Morgan Kaufmann Pub. 2000
- Digital System Design with VHDL by Mark Zwolinski; Prentice Hall Pub. 1999
- Designing with FPGA & CPLDs by Zeidman; CMP Pub. 1999
- HDL Chip Design by Douglas J. Smith; Doone Pub. 2001

VHDL PROGRAMMING LAB

Course Code: DSE6513 **Credit Units: 01**

Software Required: Mentor Graphics

Topics covered in lab will include:

- Designing Basic Gates.
- Designing Combinational circuits like adder, multiplexer, PLA
- Designing Sequent ional Circuits like flip-flops, counters, registers.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DISTRIBUTED OPERATING SYSTEM

Course Code: DSE6514 **Credit Units: 03**

Course Objective:
This Subject provides students with an in-depth knowledge about the operating system. The former treats the standard principles of single processor system, including processes, synchronization, I/O , deadlocks, mutual exclusion, fault tolerance , Memory Management, File Management systems, security and so on. This subject covers distributed operating system in detail, including communication process, file system and memory management synchronization and so on but this time in the context of distributed systems

Course Contents:
Module I: Introduction
Functions of an Operating System, Design Approaches, Review of Network Operating System and Distributed Operating System, Issue in the design of Distributed Operating System, Overview of Computer Networks, Modes of communication, System Process, Interrupt Handling, Handling Systems calls, Protection of resources, Micro-Kernel Operating System, client server architecture.

Module II: Distributed Mutual Exclusion
Lamppost's Algorithm, The Critical Section Problem, Other Synchronization Problems, Language Mechanisms for Synchronization, Axiomatic Verification of Parallel Programs, Inter process communication (Linux IPC Mechanism), Remote Procedure calls, RPC exception handling, security issues, RPC in Heterogeneous Environment, Case studies.

Module III: Synchronization in Distributed System
Deadlocks in Distributed Systems, Centralized Deadlock- Detection Algorithms, Distributed Deadlock Detection Algorithm' Path Pushing Algorithm, Edge Chasing Algorithm, Diffusion Computation Based Algorithm.
Clock Synchronization: Logical clocks, Physical clocks, Vector Clock, clock synchronization algorithms, Mutual Exclusion, Non-Token Based Algorithms – Lamport's Algorithm, Token-Based Algorithms, Suzuki-Kasami's Broadcast Algorithm, Election Algorithms,

Module IV: Distributed Shared Memory
Introduction, Architecture & Motivation Algorithms for Implementing DSM: The Central – Server Algorithms, The Migration Algorithms, The Read – Replication Algorithms, The Full- Replication Algorithms. Memory Coherence, Coherence Protocols: Write Invalidate Protocol, Write Update Protocol, Design Issues: Granularity , Page Replacement

Module V: Concurrency Control Algorithms
Basic Synchronization Primitives, Two –Phase Locking Protocol, Timestamp Based Algorithms, Two –Phase Commit Protocol. Voting Protocols: Static Voting, Majority Based Dynamic Voting Protocol.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- A. S. Tanenbaum, Distributed Operating Systems, Prentice-Hall, ISBN 0-13-219908-4.
- SinghalShivratri Advanced Concepts in Operating Systems TMH 1994.
- M. Beck et al Linux Kernal, Internal Addition Wesley, 1997.
- B. W. Kernighan and R Pide, The Unix Programming Environment Prentice Hall of India - 2000.
- A. Silberschatz P.B Galvin Operating System Concept, John Wiley & Sons (Asia) 2000.
- Cox K, "Red Hat Linux Administrator's Guide". PHI (200).

Syllabus - Sixth Semester

MICROPROCESSOR

Course Code: DSE6601 **Credit Units: 03**

Course Objective:
This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:
Module I: Introduction to Microcomputer Systems
Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations,interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams
Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing
Interfacing with 8085.Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8255, 8251.

Module IV: Architecture of 16-Bit Microprocessor
Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, Minimum mode & Maximum mode Operation. Internal architecture of 8086, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors
Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B. Ram, "Fundamentals of microprocessors and microcomputer" Dhanpat Rai, 5th Edition.]
- Douglas V Hall.

References:
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" Dhanpat Rai, 2003.
- Gosh," 0000 to 8085" PHI.

SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION

Course Code: DSE6602 **Credit Units: 03**

Course Objective:
This course provides knowledge to design various system programs.

Course Contents:
Module I: Introduction
Definition, Evolution, Components**,** Editors: Introduction to system Programming Line editor, Full screen editor and multi window editor. Case study MS-Word, DOS Editor and vi editor.

Module II: Assemblers
First pass and second pass of assembler and their algorithms. Assemblers for CISC Machines: case study x85 & x86 machines.

Module III: Compilers & Macro Processor
Introduction to various translators. Various phases of compiler. Bootstrapping for compilers, Introduction to. Design of a compiler in C++ as Prototype. Basic Macro Processor functions- Macro definition & expansion – Macro Processor Algorithm & Data Structures, conditional – Macro Expansion, Keyword Macro Parameters, Macro with in Macro Implementation, case study MASM and ANSI C Macro language.

Module IV: Debuggers, Loaders and Linkers
Introduction to various debugging techniques. Case study:- Debugging in Turbo C++ IDE. Linkers and Loaders Concept of linking. Case study of Linker in x86 machines. Loading of various loading schemes.

Module V: Operating System
Booting techniques and sub-routines. Design of kernel and various management for OS. Design of Shell and other utilities, (**Overview of Unix OS, Difference Between Unix and Linux, Commands in Unix.)-changes made**

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:

- Donovan J.J., Systems Programming, New York, Mc-Graw Hill, 1972.
- Dhamdhere, D.M., Introduction to Systems Software, Tata Mc-Graw Hill 1996.

References:

- Aho A.V. and J.D. Ullman Principles of compiler Design Addison Wesley/ Narosa 1985.

ADVANCED JAVA PROGRAMMING

Course Code: DSE6603 **Credit Units: 03**

Course Objective:
The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.

Course Contents:

Module I: Distributed Computing
Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.

Module II: Database Connectivity
ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql.

Module III: Servlet Programming
Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.

Module IV: JSP Programming
JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.

Module V: JEE Web Appliaction
The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
- Professional Java Server Programming (a Press), Allamaraju
- Developing Java Servlets (Techmedia – SAMS), James Goodwill sing Java 1.2 Special Edition (PHI), Webber

References:
- David Flanagan,Jim Parley, William Crawford & Kris Magnusson, Java Enterprise in a nutshell - A desktop Quick reference - O'REILLY, 2003
- Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
- Jaison Hunder & William Crawford, Java Servlet Programming, O'REILLY, 2002
- Dietal and Deital, “JAVA 2” PEARSON publication

ADVANCE DATABASE MANAGEMENT SYSTEM

Course Code: DSE6604 **Credit Units: 03**

Course Objective:
The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques

Course Contents:
Module I: Relational Databases
Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Module II: Query Processing and Optimization
Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.
Objected Oriented and Object Relational Databases
Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Module III: Parallel and Distributed Databases
Distributed Data Storage – Fragmentation & Replication, Location and Fragment
Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.
Advanced Transaction Processing
Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

Module IV
Multimedia databases,Databases on the Web and Semi–Structured Data
Case Study: Oracle Xi

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
***Text*:**
- Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
- Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
- R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

***References*:**
- Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
- Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
- Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
- W. Kim, "Modern Database Systems", 1995, ACM Press, Addision – Wesley,
- D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
- Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
- Oracle Xi Reference Manual
- Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

DIGITAL COMPUTER ORGANIZATION

Course Code: DSE6605 **Credit Units: 03**

Course Objective:
The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Contents:
Module I: Representation of Information and Basic Building Blocks
Number Systems, Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates, Boolean algebra, K-map Simplification, Half adder, Full adder, Decoders, Multiplexes, Binary Counters, Flip/Flops: SR FF, JK FF, Master Slave FF, T and D FF, Registers: Parallel and Serial Registers, Counters (Synchronous & Asynchronous), ALU, Micro-Operation, ALU-chip.

Module II: Basic Organization
Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired and Micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing Modes, Instruction Formats, Data transfer & Manipulation, I/O organization, Bus Architecture, Programming Registers.

Module III: Memory Organization
Memory hierarchy, Main Memory (RAM/ROM chips) with mapping, Auxiliary memory, Associative memory and its mapping, Virtual memory, Cache memory with mapping techniques, Memory management hardware.

Module IV: Input-Output organization
Peripheral devices, I/O interface, Direct memory access, Modes of transfer, Priority Interrupt, I/O Processors, Serial Communication, Asynchronous data transfer, Strobe Control, Handshaking, I/O Controllers, CPU-IOP Communication.

Module V: Processor Organization
Introductory Concept of pipeline, Flynn's Classification, Parallel processing. RISC and CISC characterstics, arithmetic pipeline with example.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Computer System Architecture: M. Mano (PHI Publication)
- William Stalling, "Computer Organization & Architecture", Pearson education Asia.
- B. Ram, "Computer Fundamental Architecture & Organization" New Age.

References:
- Computer Organization: Vrarsie, Zaky & Hamacher (TMH Publication).
- Tannenbaum, "Structured Computer Organization", PHI.

MICROPROCESSOR LAB

Course Code: DSE6606 **Credit Units: 01**

Course Contents:

- To load the numbers 49H and 53H in the memory location 9510 and 9511
- respectively and add the contents of memory location 9601
- To write assembly language programming for 8 bit addition with and without carry.
- To write assembly language programming for 8 bit subtraction with and without borrow.
- To write assembly language programming for 8 bit multiplication and division.
- To write assembly language programming for sorting an array of numbers in ascending and descending order.
- To write assembly language programming with additional instructions.
- To write and execute a program using stacks.
- To study and program the programmable peripheral interface (8255) board.
- To study and program the programmable interval timer (8253) board.
- To study and program the programmable DMA controller (8257) board.
- To study and program the programmable interrupt controller (8259) board.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION LAB

Course Code: DSE6607 **Credit Units: 01**

Software Required: Turbo C++

Assignment will be provided for following:

- WAP to determine the length of the machine instructions.
- WAP to differentiate between symbols, literals and tokens.
- WAP to implement Symbol table.
- WAP to implement base table.
- WAP to find the relative addresses.
- Design a macro to perform add operation.
- On the basis of above program display the values of PC, LC and IR.
- Perform programming on loader based programme.
- Perform programming on linker based programme.
- Perform Programming on editor based programme.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED JAVA PROGRAMMING LAB

Course Code: DSE6608 **Credit Units: 01**

Programming Language: Java

1. WAP to display label on a frame with the help of JFrame
2. WAP to display six buttons on a panel using JFrame.
3. WAP. To display an image and a string in a label on the JFrame.
4. WAP that implement a JApplet that display a simple label
5. WAP that implement a JApplet and display the following frame
   a. Customer name
   b. Customer number
   c. Age
   d. Address
6. WAP to access a table Product Master from MS-Access using Java code.
7. WAP that implement a simple servlet program.
8. WAP for authentication, which validate the login-id and password by the servlet code.
9. WAP to connecting a database using user-id and password.
10. WAP to insert data into the database using the prepared statement.
11. WAP to read data from the database using the Resulset.
12. WAP to read data send by the client (HTML page) using servlet.
13. WAP to include a HTML page into a JSP page.
14. WAP to handle the JSPException.
15. WAP to read data send by a client (HTML page) using JSP.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCE DATABASE MANAGEMENT SYSTEM LAB

Course Code: DSE6609 **Credit Units: 01**

Programs should be based on following topics:
Quick Review of Simple SQL Statements, SQL Built-in Functions, Primary Key, Foreign Key,Normalization, Joins View, Union. **Emphasis** on PL/SQL, Cursors 8. Exception handling, Procedure, Functions ,Trigger, concurrency control, transaction processing. Introduction to SQLite. Recommended Software: PostGreSQL, MySQL, Oracle.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CRYPTOGRAPHY AND NETWORK SECURITY

Course Code: DSE6610 **Credit Units: 03**

Course Objective:
The objective here is to acquaint the students with the application of networking. Detail description of the various TCP/IP protocols and the working of ATM and its performance, Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

Course Contents:

Module I: Advanced TCP/IP
TCP Services, TCP format and connection management, Encapsulation in IP, UDP Services, Format and Encapsulation in IP, IP Services, Header format and addressing, Fragmentation and reassembly, Migration to IPv6, Protocols: BOOTP, DHCP, ICMP, IGMP; Internet Routing Protocols: OSPF, RIP, EIGRP, BGP.

Module II: High Speed Networks
Packet Switching Networks; Frame Relay Networks; Asynchronous Transfer Mode (ATM); ATM protocol Architecture; ATM logical connections; ATM cells; ATM Service categories; ATM Adaptation Layer; QoS in ATM and Frame Relay

Module III: High Speed LANs
LAN Ethernet, fast Ethernet, gigabit Ethernet, FDDI, DSL, ADSL

Module IV: Wireless communication
Wireless networks, wireless channels, channel access, network architecture, IEEE 802.11, Bluetooth, Satellite Networks.

Module V: Network Security and Management
Principles of cryptography, Authentication, integrity, key distribution and certification, Access control andFirewalls, attacks and counter measures, security in manylayers. Infrastructure for network management, The internet standard managementframework, SMI, MIB, SNMP, Security and administration.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- William Stallings, "High-Speed Networks and Internets, Performance and Quality of Service", Pearson Education.
- High performance communication networks by: J. Walrand & Pravin Varaiya, Morgan Kaufman, 1999.
- Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (4th Edition) by Douglas E. Comer
- ATM networks: Concepts, Protocols, Applications by: Handel, Addision Wesseley.
- Cryptography & Networks Security Stallings, William 3rd edition

References:

- Computer networks:Tanenbaum, Andrew S, Prentice Hall
- Data communication & networking: Forouzan, B. A.
- Computer network protocol standard and interface Uyless, Black

SOFTWARE TESTING AND QUALITY ASSURANCE

Course Code: DSE6611 **Credit Units: 03**

Course Objective:
To apply all the testing skills of software testing in such a way that it can provide and improve the software development methodology. Basic objective of Software Testing is to develop methods and procedures at can scale up for large systems and that can be used to consistently produce high-quality software at low cost and with a small cycle for the development.

Course Contents:
Module I
Software Testing Fundamentals - Software Testing Definition, Importance, objectives, why is it too hard? Errors, faults and failure. Testing process, STLC, QA and QC, Verification and Validation, Inspections and walkthroughs, Test Plan, test cases, drivers, stubs, Validation checks.

Module II
Black box testing - Definition, Equivalence Class, Boundary Value Analysis, Documentation testing,state based testing, White box testing – Definition, Difference between black box testing and white box testing, Path testing, Cyclomatic complexity, graph metrics, mutation testing.

Module III
Levels of testing- Low level testing- Unit testing and Integration testing. High level testing- System testing, performance testing, stress testing, load testing, volume testing, smoke and sanity testing, Installation testing, usability testing, website testing, security testing, recovery testing, Domain testing, Static testing and dynamic testing,

Module IV
Test cases– Designing, Execution. Reducing number of test cases- Prioritization guidelines, priority category, scheme, risk analysis, regression testing. Designing scripts, RTM, TRS.

Module V
Cohesion and coupling in class testing, GUI testing, integration and system testing, Automated Testing tools - Manual vs. Automated testing, Static and Dynamic Testing tools, Characteristics: Rational tools, Quality Standards- CMM, ISO, Six sigma, McCall's Quality Factors and Criteria, Quality Metrics

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Software Testing, Srinivasan Desikan, Pearson Education
- Software Testing, R.B.Chopra
- Software Engineering: A Practitioner's Approach, Roger S. Pressman

References:
- Software Testing tools, K.V.K.K Prasad, Dreamtech
- Foundations of software Testing, ISTQB Certification, Dorothy Graham
- Software Test Engineer's Handbook, Graham Bahms

VLSI DESIGN

Course Code: DSE6612 **Credit Units: 02**

Course Objective:
In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

Course Contents:

Module I: Devices and the wire
Diode, dynamic and transient behaviour-diffusion capacitance, SPICE diode model.
MOSFET STATIC BEHAVIOUR: Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS, depletion and enhancement device
DYNAMIC BEHAVIOUR: Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE MODELS for MOS transistors
The Wire: Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay

Module II: CMOS Inverter
VTC of an ideal inverter, Switching Model of the CMOS inverter: nMOS /pMOS discharge and charge, VTC of CMOS inverter: PMOS AND NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer
Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tristate inverter, Resistive load inverter.
Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages
Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization

Module III: Combinational circuits
CMOS LOGIC: Good 0 and poor 0, Goo1 and poor 1, series and parallel N and P switches, 2 and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay,
Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates
Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay. Pass-transistor logic, pass gate configurations for nmos and pmos, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain
Dynamic CMOS design: Precharge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic

Module IV: Sequential Logic circuits
Principle of Bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, MUX based Latches, master slave edge triggered register, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS

Module V: Layout Design Rules
Introduction to CMOS Process technology, Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design

VLSI DESIGN LAB

Course Code: DSE6613 **Credit Units: 01**

Course Contents:

- Using Design architect and simulate V vs time for CMOS inverter using same W/L ratio for PMOS and NMOS.
- Design and simulate again by Sizing PMOS to NMOS appropriately and repeat experiment 1
- Design and simulate V vs t for 2 input NAND and Nor gates.
- Design and Simulation for general CMOS functions
- One bit full adder simulation
- 2:1 MUX using pass transistor logic
- Other functions using pass transistor logic
- Layout of CMOS inverter
- Layout of NAND and NOR gates
- Design and Simulation SR latch using NAND and NOR representations
- Design and simulate D flip flop

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA WAREHOUSING AND DATA MINING

Course Code: DSE6701 **Credit Units: 03**

Course Objective:
The objective of this course is to introduce students to Data Warehousing & Data mining technologies that will helpTo Inspect, Control and Secure Information through Databases.

Course Contents:
Module I: Introduction to Data Warehousing
The need for data ware housing, Operational & Informational Data Stores, Data Warehouse definition & Characteristics, Data Warehouse role & Structure, The cost of warehousing data, Foundation & Roots of Data,

Module II: Data Warehousing Components& Architecture:
Stores, warehouses and marts, Data warehouse database, Sourcing, acquisition, clean up & transformation tools, meta data, Access tools, Data ware house administration & management,.
operational & External Database layer, Information access layer, data access layer, metadata layer, process management layer, Application messaging layer, Physical DW layer, Data staging layer.

Module III: Building a Data Warehouse:
Business, Design, Technical & Implementation Considerations, DW project plan.
Overview of Mapping the DW to Multiprocessor Architecture, & DBMS Schemas for Decision Support.

Module IV: Metadata and OLAP:
METADATA: Definition, repository, management & trends.
OLAP: Need, guidelines, Multi Relational & Multi-Dimensional: MOLAP, ROLAP, OLAP Tools.

Module V: Data Mining & Visualization:
Techniques to mine the data, Market Basket analysis, Measuring data mining effectiveness, embedding data mining to business process, current limitations and challenges in DM.
Introduction to EIS, The future of Data Mining, Warehousing & Virtualization, Applications: PowerBuilder, Forte. Technical Exposure to Data Mining

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:
- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

References:
- (Berry, Michael)Data Mining Techniques.
- (Sharma, Gajendra)Data Mining, Data Warehousing and OLAP.
- (Gupta, GK) Data Mining with Case Studies.
- (Han & Kamber)Data Mining: Concepts and Techniques.
- (Paulraj Ponniah) Datawarehousing Fundamentals.

COMPUTER GRAPHICS

Course Code: DSE6702 **Credit Units: 03**

Course Objective:
The objective of the course is to provide the understanding of the fundamental graphical operations and the implementation on computer, the mathematics behind computer graphics, including the use of spline curves and surfaces. It gives the glimpse of recent advances in computer graphics, user interface issues that make the computer easy, for the novice to use.

Course Contents:

Module I: Introduction to Graphics and Graphics Hardware System
Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.

Module II: Output Primitives and Clipping operations
Algorithms for drawing 2D Primitives lines (DDA and Bresenham‘s line algorithm), circles (Bresenham‘s and midpoint circle algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.

Module III: 2D Geometric transformation
2D Transformation: Basic transformat ion, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.

Module IV: 3D Geometric transformation
3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation

Module V: Object modeling and Visible Surface detection
fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter‘s algorithm), Binary search partition method, Scan line method,

Module VI: Introduction to multimedia
Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References*:*

Text:

- Foley et. al., “Computer Graphics Principles & practice”, 2nd ed. AWL, 2000.
- D. Hearn and P. Baker, “Computer Graphics”, Prentice Hall, 1986.
- R. Plastock and G. Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, McGraw Hill, 1986

References:

- R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
- C.E. Leiserson, T.H. Cormen and R.L. Rivest, “Introduction to Algorithms”, McGraw-Hill Book Company, 1990.
- W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
- F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
- D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989
- David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
- Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 1992

ADVANCED COMPUTER ARCHITECTURE

Course Code: DSE6703 **Credit Units: 03**

Course Objective:
With increase in availability of system resources, concept of parallel architecture has obtained immense popularity. This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources. In this course we have discussed the theory, technology, architecture (hardware) and software aspects of parallel computer and Vector computers.

Course Contents:
Module I: Parallel computer models
The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks
Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Module II: System Interconnect Architectures
Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Module III: Processors and Memory Hierarchy
Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors
Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

Module IV: Backplane Bus System
Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design,Computer airthmetic principles.

Module V: Vector Processing Principles
Vector instruction types, Vector-access memory schemes.
Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Kai Hwang, "Advanced computer architecture"; TMH, 2000.

References:
- **J.P. Hayes, "computer Architecture and organization", MGH, 1998.**
- M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
- D.A. Patterson, J.L. Hennessy, "Computer Architecture: A quantitative approach", Morgan Kauffmann, 2002.
- Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH,

ADVANCED COMPUTER NETWORKS

Course Code: DSE6704 **Credit Units: 03**

Course Objective:
The objective of the course is to provide thorough understanding & in-depth knowledge of concepts in computer networks Such as Internet protocols and routing, local area networks, wireless communications and networking, performance analysis, congestion control, TCP, network address translation, multimedia over IP, switching and routing, mobile IP, multicasting, IPv6. Peer-to-peer networking, network security, and other current research topics. A focus will be placed on wireless networking, reflecting rapid advances in this area. This course motivates the students to explore current research areas in the same field.

Course Contents:
Module I : Introduction to Networks
Networking introduction, Reference Models, TCP/IP, OSI, Addressing, Protocol Layering, Transmission impairment, performance, Switching, Transmission Media, Introduction to MAC, Channel allocation, MAC protocol classification for LAN's, MAN's, MAC protocols for Adhoc N/ws, MAC Protocol for WLAN's(adhoc and sensor n/ws), Introduction to Ethernet protocol (Fast, Gigabit and standard Ethernet).

Module II: Network Layer
Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet.
IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.

Module III : Mobile IP
Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.

Module IV : Transport Layer and Application Layer
The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues.
The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.

Module V : Network Security
Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues.

Examination Scheme:

Components	A	CT	H	V/S/Q	EE
Weightage (%)	5	10	7	8	70

Text & References:
Text:
- Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
- Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

***References*:**
- Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication.
- W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
- W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
- C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices, Addison Wesley, 1997.

DATAWARE HOUSING & DATA MINING LAB

Course Code: DSE6705 **Credit Units: 01**

Course Contents:

Programming Language: Weka 3.6

List of Experiments/Programs:

- Defining Weather relation for different attributes
- Defining employee relation for different attributes
- Defining labor relation for different attributes
- Defining student relation for different attributes
- Exploring weather relation using experimenter and obtaining results in various schemes
- Exploring employee relation using experimenter
- Exploring labor relation using experimenter
- Exploring student relation using experimenter
- Setting up a flow to load an arff file (batch mode) and perform a cross validation using J48
- Design a knowledge flow layout, to load attribute selection normalize the attributes and to store the result in a csv saver.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMPUTER GRAPHICS LAB

Course Code: DSE6706 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

Assignments will be provided for the following:

- Geometrical shapes based on graphics algorithms
- 2D Geometric transformation translation, rotation, scaling, reflection.
- Clipping
- Animation

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED COMPUTER NETWORKS LAB

Course Code: DSE6707 **Credit Units: 01**

Course Contents:

Various installations and connections of LAN, WAN, ETC

Working on NS2.

Socket Programming using C Language on Linux

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MATLAB

Course Code: DSE6708 **Credit Units: 02**

Understanding The MATLAB Environment, Using the Help System in MATLAB, MATLAB Basics,Linear Algebra; Vectors and Matrices and various operations on them, M files; Scripts and User-defined functions, Plotting, Flow Control and Loops; For and While Loops, If and Case statements, structures, writing basic programs using the above, study of various toolboxes available in matlab and case study of any one tool box.

Recommended Software: MATLAB/Octave

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION-II

Course Code: DSE6735 **Credit Units: 03**

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:
A4 size paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top & bottom margins: 1 inch/ 2.5 cm
Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of

tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the delaines.

STUDENT ASSESSMENT RECORD (SAR)

1. **Range of Research Methods used to obtain information**

2. **Execution of Research**

3. **Data Analysis**
   - Analyse Quantitative/ Qualitative information
   - Control Quality

4. **Draw Conclusions**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

SOFT COMPUTING

Course Code: DSE6709 **Credit Units: 03**

Course Objective:
To develop semantic-based and context-aware systems to acquire, organise, process, share and use the knowledge embedded in multimedia content. Research will aim to maximise automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services.

Course Contents:

Module I: Soft Computing
Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Module II: Neural Network
Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA

Module III
Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.

Module IV: Fuzzy Logic
Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

Module V: Genetic algorithm
Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

Examination Scheme:

Components	CT	H	V/S/Q	AT	EE
Weightage (%)	10	8	7	5	70

Text & References:

- S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication
- Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
- Hagen, Neural Network Design, Cengage Learning

MOBILE COMPUTING

Course Code: DSE6710 **Credit Units: 03**

Course Objective:
The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Contents:

Module I: Introduction to Personal Communications Services (PCS)
PCS Architecture, Mobility management, Networks signaling.
Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP)
GPRS Architecture, GPRS Network Nodes.
Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Module III:Third Generation (3G) Mobile Services
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module IV: Global Mobile Satellite Systems
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

Module V:Enterprise Networks
Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

References:
- "Guide to Designing and Implementing wireless LANs", by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
- "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
- "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

GRID COMPUTING

Course Code: DSE6711 **Credit Units: 03**

Course Objective:
Grid computing (or the use of a *computational grid*) is applying the resources of many computers in a network to a single problem at the same time - usually to a scientific or technical problem that requires a great number of computer processing cycles or access to large amounts of data. The major objective of this course is to provide a sound foundation to the students on the concepts, percepts and practices in a field that is of immense concern to the industry and business.

Course Contents:
Module I: Introduction-Cluster to grid computing
Cluster computing models, Grid models, Mobile grid models, Applications.
Parset: System independent parallel programming on distributed systems: Motivation and introduction, Semantics of the parset construct, Expressing parallelism through parsets, Implementing parsets on a loosely coupled distributed system.
Anonymous remote computing model: Introduction, Issues in parallel computing on interconnected workstations, Existing distributed programming approaches, The arc model of computation, The two tired arc language constructs, Implementation

Module II: Integrating task parallelism with data parallelism
Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work
Anonymous remote computing and communication model: Introduction, Location in dependent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes, Case study, and Performance analysis.

Module III: Parallel programming model on CORBA
Introduction, Existing works, notion of concurrency, system support implementation performance, sitability of CORBA: introspection.
Grid computing model: Introduction, a parallel computing model over grids, Design and implementation of the model, Performance studies, Related work.

Module IV: Introducing mobility into anonymous remote computing and communication model
Introduction, issues in mobile clusters and parallel computing on mobile clusters, moset overview, moset computation model, implementation, performance.

Module V: Parallel Simulated Annealing algorithms
Introduction, Simulated annealing (SA) Technique, Clustering algorithm for simulated annealing (SA), Combination of genetic algorithm and simulated annealing (SA) algorithm

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- "Grid Computing a Research Monograph" by D. Janakiram, Tata McGraw hill publications, 2005

References:
- "Grid Computing: A Practical Guide to technology and Applications" by Ahmar Abbas, Charles River media – 2003.
- "Grid Computing" Joshy Joseph & Craig Fellenstein, Pearson Education

TERM PAPER

Course Code: DSE6731 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER
The procedure for writing a term paper may consist of the following steps:
1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of Materials
a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the Notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper
a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion
Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing & Preparing the final Paper
a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
(i) Show evidence of what an author has said.
(ii) Avoid misrepresentation through restatement.
(iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:
1) Title page
2) Table of contentsIntroduction
3) Review
4) Discussion&Conclusion
5) References
6) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:
a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

Reference
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising

rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: DSE6732 **Credit Units: 02**

Course Objective:
The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

STUDENT ASSESSMENT RECORD (SAR)

Record to be maintained by project guide.

1. **Project Tools (Hardware/ Software) used fot implementation.**

2. **Project Evaluation& Execution.**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

WORKSHOP/ INDEPENDENT STUDY

Course Code: DSE6733 **Credit Units: 02**

This is an elective, self-directed course to investigate aemerging areasof IT and Computer Science like Mobile Operating System, Cloud Computing, or from Current Research Areas etc. The primary goal of the course is to provide students with research exploration of a specific topic of interest to the individual student under the advisement of an instructor who will monitor and critique the student's progress.

Independent study provides students with the opportunity to work one-on-one with a Faculty on a particular topic. The student and faculty should discuss the aims and content of the study and present the proposal to Head of Department. The independent study proposal should include the study's title, theme, readings, work to be submitted, and syllabus. Faculty and student should meet for a minimum number of 2 hours per week. Student will give a seminar after completion of study.

Syllabus - Eighth Semester

APPLIED STATISTICAL ANALYSIS

Course Code: DSE6801 **Credit Units: 03**

Course Objective: This course is an introduction to statistics, the science of collecting, organizing, and interpreting numerical data. Emphasis will be placed on statistical reasoning and data analysis. The main topics are study design, descriptive statistics, probability theory, and statistical inference. Hands-on data analysis projects will be assigned. Students will be required to use a computer software package to solve various statistical problems.

Course Contents:

Module-I: Introduction to Statistical Analysis
Introduction to Statics, Population Versus Sample, Population and Sample, Basic Terms, Types Of Variables, Quantitative Variables, Qualitative or Categorical Variables, Measurement Scales, Identifying The Scale of Measurement, Normal Variables, Ordinal Variables, Continuous Variables, Cross-Section Data, Time –Series Data, Sources of Data, Types of Statics, Measures of Central Tendency, Mean, Examples, Mode, Mode Scenarios, Symmetry, Skewness, Measures of Spread, Range, Variance and Standard Deviation, Examples, Solution, Population Parameters and Sample Statistics, Measures of Position–Quartiles and Interquartile Range, Quartiles, Example, Solution, Percentiles and Percentile Rank, Example, Solution, Box and Whisker Plot, Solution.

Module-II: Describing Data
Raw Data, Graphical Presentation of Qualitative Data, Graphical Presentation of Qualitative Data, Graphing Quantitative Data, Frequency Distributions, Relative Frequency and Percentage Distributions, Graphing Grouped Data, Cumulative Frequency Distributions, Probability Concepts, Simple and Compound Events, Two Properties of Probability, Classical Probability, Probability Concepts, Complementary Events, Example, Discrete Random Variables, The Binomial Experiment, The Poisson Probability Distribution, Continuous Random Variables, Normal Distribution, Standard Normal Distribution.

Module-III: Testing Hypothesis
Population Distribution, Sampling and Non Sampling Errors, A Point Estimate, Interval Estimation, The t Distribution Hypothesis Testing, The Chi-Square Distribution.

Module-IV: Examining Relationship
Covariance, Pearson Correction Coefficient, Computational Formulas- Covariance, Computing A Correlation, Correlation Analysis, Scatter Plots, Relationships Between Continuous Variables, Correlation, Pearson Correlation Coefficient, Hypothesis Test For A Correlation, Extreme Data Values, Correlation Matrix, Anova Overview, Anova Hypothesis, Anova, Error Sum of Squares, Model Sum of Squares, Anova-Example, Simple Regression, Relationship Between Food Expenditure And Income: (A) Linear Relationship (B) Nonlinear Relationship, Plotting A Linear Equation, Y-Intercept And Slope Of A Line, Simple Linear Regression Analysis, Scatter Diagram, Least Squares Line, Error Sum Of Squares, The Least Squares Line, Example, Solution, Error Of Prediction, Positive And Negative Linear Relationship Between X And Y, Assumptions of Regression Model, Coefficient Of Determination, Regression Analysis.

Module-V: Advanced Techniques
Non Parametric Tests, Chi-Squared Goodness- of-Fit Test, Chi-Square Test of Independence, The Sign Test, Example, Mann-Whitney U Test, The Kruskal-Wallis Test, No Title, Structural Equation Modelling, Cluster Analysis, Factor Analysis, Centroid Method, Principal Components Method.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
- Torsten Hothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.
- Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

DATA MINING AND PREDICTIVE ANALYTICS

Course Code: DSE6802 **Credit Units: 03**

Course Objective: This course introduces the topics of Data Mining, and Data Analytics by providing a basic, practical foundation that allows the students to participate in Data Analytics projects. The course incorporates an introduction to the Data Analytics lifecycle, Machine Learning (ML), Data Mining algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data.

Course Contents:

Module I: Data Preparation
An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.

Module II: Classification
k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.

Module III: Clustering
Hierarchical and k- Means Clustering, Kohenen Networks, Birch Clustering, Measuring Cluster Goodness.

Module IV: Association Rules
Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work ? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, *J*-Measure, Association Rules are Easy to do Badly, How can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?

Module V: Case Study: Predicting Response to Direct Mail Marketing
Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
- Thomas W. Miller, "Modelling Techniques in Predictive Analytics", Pearson FT Press, 2013.
- Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016

DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING

Course Code: DSE6803 **Credit Units: 03**

Course Objective:
This course focuses on the fundamentals of data warehousing and multidimensional Modelling. Data warehouse development life cycle, Data warehouse analysis, CUBE, ROLL UP and STAR queries, Data Warehouse Design - Massive de -normalisation, STAR schema design, Data ware house Architecture, OLAP, ROLAP and MOLAP, concepts of Fact and dimension table are the major areas of coverage of this course. This course also deals with the issues while implementing the multidimensional models

Course Contents:

Module I: Introduction
Multidimensional Data Management, Multidimensional History, Related Terminology,

Module II: Fundamental Concepts
Cubes ,Dimensions, Facts, Measures, Relational Representations, Star Schemas, Snowflake Schemas, Data Warehouses And Data Marts, Multidimensional Modelling Process, Analysis And Querying ,Roll Up, Drill Down, Drill Out, Slicing And Dicing, Drill Across, Pivot Tables, Ranking, Multi-Dimensional Querying in MDX and SQL, Graphical Querying and Visualizations .

Module III: Advance Concepts
Slowly Changing Dimensions, The Problem, Solutions, Other Special Kinds Of Dimensions, Mini dimensions, Outriggers, Degenerate Dimensions, Junk Dimensions, Time Dimensions, Data Quality Dimensions, Advanced Hierarchies, Parent-Child Hierarchies, Unbalanced Hierarchies, Non Covering Hierarchies , Non –Strict Hierarchies, Multiple Hierarchies And Parallel Hierarchies.

Module IV: Implementation Issues
Materialized Views, Indexing, Indexing Overview, Bitmap Indices, Join Indices, Query Processing, OLAP Implementations, Extract-Transform-Load.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Christian S. Jensen, Christian Thomsen, and Professor Torben Pedersen, “Multidimensional Databases and Data Warehousing”, Morgan & Claypool Publisher, 2010.
- Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit: The Definitive Guide”, 3rd Edition, John Wiley & Sons, 2013.
- Len Silverston, Paul Agnew, “The Data Model Resource Book: Volume 3: Universal Patterns for Data Modeling”, John Wiley & Sons., 2009.

DATABASE AND KNOWLEDGE BASE SYSTEM

Course Code: DSE6804 **Credit Units: 03**

Course Objective:

This course discusses design methodology for databases to verify their structural correctness and implements databases. It also provides applications software primarily in the relational model using querying languages, primarily SQL, and other database supporting software applying the theory behind various database models and query languages implementing security and integrity policies relating to databases and preparation for data analytics working in group settings to design and implementing database projects.

Course Contents:

Module I: Introduction

Database Languages, Object-Base Systems, Knowledge-base Systems, History and Perspective, Data Models for Database Systems: Data Models, The Entity-relationship Model, The Relational Data Model, Operations in the Relational Data Model, The Network Data Model, The Hierarchical Data Model, An Object-Oriented Model, Logic as a Data Model: The Datalog Data Model, Evaluating Non- recursive Rules, Computing the Meaning of Recursive Rules, Incremental Evaluation of Least Fixed Points, Negations in Rule Bodies, Relational Algebra and Logic, Relational Calculus, Tuple Relational Calculus.

Module II: Relational Query and Object-Oriented Database Language

ISBL: A "Pure" Relational Algebra Language, QUEL: A Tuple Relational Calculus Language, Query-by-Example: A DRC Language, Data Definition in QBE, The Query Language SQL, Data Definition in SQL, The DBTG Data Definition language, The DBTG Query Language, The DBTG Database Modification Commands, Data Definition in IMS, A Hierarchical Data Manipulation Language, Data Definition in OPAL, Data Manipulation in OPAL

Module III: Physical Data Organization and Design of Relational Databases

The Physical Data Model, The Heap Organization, Hashed Files, Indexed Files, B-trees, Files with a Dense Index, Secondary Indices, Data Structures in DBTG Databases, Data Structures for Hierarchies, Data Structures for Relations, A Search Tree Structure, Functional Dependencies, Lossless-Join Decomposition, Normalization, Generalized Dependencies.

Module IV: Transaction Management

Basic Concepts, A Simple Transaction Model, The Two-phase Locking Protocol, a Model with Read and write-Locks, Lock Modes, A Read-Only, Write-Only Model, Concurrency for Hierarchically Structured Items, Handling Transaction Failures, Aggressive and Conservative Protocols, Recovery From Crashes, Timestamp-based Concurrency Control.

Module V: Distributed Database Management

Distributed Databases, Distributed Locking, Distributed Two-phase Locking, Distributed Commitment, A Nonblocking Commit Protocol, Timestamp-based, Distributed Concurrency, Recovery of Nodes, Distributed Deadlocks.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jeffrey D. Ullman"Principles of Database and Knowledge-Base Systems", Vol. 1, Computer Science Press, USA, 1988.
- Avi Silberschatz, Henry F. Korthand S. Sudarshan, "Database System Concepts", Mcgraw Hill Education, 2000.
- Ngoc Thanh Nguyen, Edward Szczerbicki, "Intelligent Systems for Knowledge Management", Springer-verlag Gmbh, 2009.

BIG DATA TECHNOLOGIES

Course Code: DSE6805 **Credit Units: 03**

Course Objective:
This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will prepare a sample project in Hadoop.

Course Contents:

Module I: Introduction to Big Data
Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.

Module II: Big Data Technologies
Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data –Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.

Module III: Processing Big Data
Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.

Module IV: Hadoop Map Reduce
Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

Module V: Big Data Tools and Techniques
Installing and Running Pig – Comparison with Databases – Pig Latin – User- Define Functions – Data Processing Operators – Installing and Running Hive – Hive QL – Tables – Querying Data – User-Defined Functions – Oracle Big Data.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
- Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
- Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
- Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: DSE6809 **Credit Units: 02**

Course Objectives:
The course will enhance scientific, technical and research writing skills and impart knowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:
Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination**.**

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing , bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	15	10	70	100

Text Books:
- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla,D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R.2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:
- Geode, Millian J.& Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montomery, Douglas C.(2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

APPLIED STATISTICAL ANALYSIS LAB

Course Code: DSE6806 **Credit Units: 01**

Programs should be based on following topics:

Quick Review of interpretation of mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them;
Representation of mathematical information symbolically, visually, numerically, and verbally;
Use of arithmetic, algebraic, geometric, and statistical methods to solve problems;
Estimation and check answers to mathematical problems in order to determine reasonableness,
Identification of alternatives, and select optimal results; and recognize the limitations of mathematical and statistical models.

Recommended Software: SPSS (IBM).

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA MINING AND PREDICTIVE ANALYTICS LAB

Course Code: DSE6807 **Credit Units: 01**

Course Objective:

- To analyse the data using statistical methods.
- To understand and demonstrate data mining using any open source data mining tool.

Recommended Software: ORANGE, Rapid Miner

List of Experiments

1. Data Analysis- Getting to know the Data (Using ORANGE, Rapid Miner)
   - Parametric - Means, T-Test, Correlation
   - Prediction for numerical outcomes - Linear regression
   - Correlation analysis
   - Preparing data for analysis
   - Pre-processing techniques

2. Data Mining (Using ORANGE, Rapid Miner or any open source data mining tool)
   - Implement clustering algorithm
   - Implement classification using
   - Decision tree
   - Back propagation
   - Visualization methods.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING LAB

Course Code: DSE6808 **Credit Units: 01**

Programs should be based on following topics:
Quick Review SQL Statements, SQL Built-in Functions,**Emphasis** on PL/SQL,Cursors 8. Exception handling, Procedure, Functions,Trigger, concurrency control, transaction processing. Introduction to ETL Tools:Talend Open Source Data Integrator, Scriptella, KETL
Pentaho Data Integrator - Kettle, Jaspersoft ETL, GeoKettle, CloverETL, HPCC Systems

Recommended Software: SQL Server, ETL Tools (Open Source)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MINOR PROJECT

Course Code: DSE6837 **Credit Units: 08**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements**(optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in

contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

<u>Examination Scheme:</u>

Dissertation	50
Viva Voce	50
Total	**100**

INFORMATION MANAGEMENT SYSTEM

Course Code: DSE6810 **Credit Units: 03**

Course Objective:

This course exposes students with the basics of managing the information and explores the various aspects of database design and modelling. It examines the basic issues in information governance and information integration and also helps to understand the information architecture

Course Contents:

Module I: Database Modelling, Management and Development

Database design and modelling – Business Rules and Relationship; Java database Connectivity (JDBC), Database connection Manager, Stored Procedures. Trends in Big Data systems including NoSQL – Hadoop HDFS, MapReduce, Hive, and enhancements.

Module II: Data Security and Privacy

Program Security, Malicious code and controls against threats; OS level protection; Security – Firewalls, Network Security Intrusion detection systems. Data Privacy principles. Data Privacy Laws and compliance.

Module III: Information Governance

Master Data Management (MDM) – Overview, Need for MDM, Privacy, regulatory requirements and compliance. Data Governance – Synchronization and data quality management.

Module IV: Information Architecture

Principles of Information architecture and framework, Organizing information, Navigation systems and Labelling systems, Conceptual design, Granularity of Content.

Module V: Information Lifecycle Management

Data retention policies; Confidential and Sensitive data handling, lifecycle management costs. Archive data using Hadoop; Testing and delivering big data applications for performance and functionality; Challenges with data administration;

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jeffrey A. Hoffer, Heikki Topi, V Ramesh – MODERN DATABASE MANAGEMENT, 10 Edition, PEARSON, 2012.
- Alex Berson, Larry Dubov MASTER DATA MANAGEMENT AND DATA GOVERNANCE, 2/E, Tata McGraw Hill, 2011.
- Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2006
- Information Architecture for the World Wide Web; Peter Morville, Louis Rosenfeld ; O'Reilly Media; 1998.
- http://ibm.com/big-data – Four dimensions of big data and other ebooks on Big Data Analytics

INFORMATION SYSTEM SECURITY

Course Code: DSE6811 **Credit Units: 03**

Course Objective:
This course provides a deep and comprehensive study of the security principles and practices of information systems. Topics include basic information security concepts, common attacking techniques, common security policies, basic cryptographic tools, authentication, access control, software security, operating system security, and legal and ethical issues in information systems security

Course Contents:

Module I: Introduction
Computer Security Concepts, Threats, Attacks, and Assets Security Functional Requirements A Security Architecture for Open Systems Computer Security Trends.

Module II: COMPUTER SECURITY TECHNOLOGY AND PRINCIPLES
Cryptographic Tools, User Authentication, Access Control, Database Security, Malicious Software, Denial-of-Service Attacks.

Module III: SOFTWARE SECURITY
Buffer Overflow: Stack Overflows, Defending Against Buffer Overflows, Other Forms of Overflow Attacks, Software Security: Software Security Issues, Handling Program Input, Writing Safe Program Code, Interacting with the Operating System and Other Programs, Handling Program Output

Module IV: TRUSTED SYSTEMS SECURITY
Operating System Security: Introduction to Operating System Security, System Security Planning, Operating Systems Hardening, Application Security, Security Maintenance, Linux/Unix Security, Windows Security, Virtualization Security. Trusted Computing and Multilevel Security: Bell-LaPadula Model for Computer Security, Other Formal Models for Computer Security, Concept of Trusted Systems, Application of Multilevel Security, Trusted Computing and the Trusted Platform Module, Common Criteria for Information Technology Security Evaluation, Assurance and Evaluation

Module V: MANAGEMENT ISSUES
IT Security Management and Risk Assessment, IT Security Controls, Plans, and Procedures, Physical and Infrastructure Security, Human Resources Security, Security Auditing, Legal and Ethical Aspects

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- W. Stallings, “Computer Security: Principles and Practice,” 2st Edition, Prentice Hall, ISBN: 0132775069, 2011.
- M. Stamp, “Information Security: Principles and Practice,” 2st Edition, Wiley, ISBN: 0470626399, 2011.
- M. E. Whitman and H. J. Mattord, “Principles of Information Security,” 4st Edition, Course Technology, ISBN: 1111138214, 2011.
- M. Bishop, “Computer Security: Art and Science,” Addison Wesley, ISBN: 0-201-44099-7, 2002.

Syllabus - Ninth Semester

DESCRIPTIVE ANALYSIS

Course Code: DSE6901 **Credit Units: 03**

Course Objective:
This course introduces some elementary statistical methods of analysis of data and compute various measurements of central tendency, dispersion, skewness and kurtosis. Also discusses computation of the correlation coefficient from ungrouped bivariate data and interpret them and analyse data pertaining to attributes and to interpret results.

Course Contents:

Module I: Introduction to Statistics:
Definitions: Webster's and Secrist's definition of Statistics, Importance of Statistics, Scope of Statistics: In the field of Industry, Biological Sciences, Medical Sciences, Economics Sciences, Social, Sciences, Management Sciences, Agriculture, Insurance, Actuarial Science, Education and Psychology.

Module II: Population and Sample
Types of characteristics: Attributes: Nominal scale, ordinal scale. Variables: Interval scale, ratio scale, discrete and continuous variables, Types of data: Primary data, Secondary data, Notion of a statistical population: Finite population, infinite population, homogeneous population and heterogeneous population. Notion of sample, random sample and non-random sample, Methods of sampling: Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.

Module III: Presentation of Data
Classification: Raw data and its classification, Discrete frequency distribution, Sturge's rule, continuous frequency distribution, inclusive and exclusive methods of classification, Open end classes, cumulative frequency distribution and relative frequency distribution, Graphical Presentation of Data: Histogram, frequency curve, frequency polygon, ogive curves, stem and leaf chart, Check sheet, Parato diagram, Examples and Problems.

Module IV: Measures of Central Tendency
Concept of central tendency of statistical data, Arithmetic Mean (A.M.), combined mean of a number of groups, merits and demerits, Geometric Mean (G.M.), Harmonic Mean (H.M.), Weighted Mean, Weighted A.M., G.M. and H.M. , Mode, Median, Empirical relation between mean, median and mode, Order relation between arithmetic mean, geometric mean, harmonic mean.

Module V: Measures of Dispersion
Concept of dispersion, characteristics of good measure of dispersion, Range, Mean deviation, Mean square definition, Variance and standard deviation, Combined variance, Combined standard deviation, generalization for n groups, Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation.

Module VI: Skewness and Kurtosis
Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution, Bowley's coefficient of skewness, interpretation using Box plot, Karl Pearson's coefficient of skewness, Measures of skewness basked on moments ($\beta 1$, $\gamma 1$), Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions, Measures of kurtosis based on moments, ($\beta 2$, $\gamma 2$).

Module VII: Correlation & Regression

Bivariate data, bivariate frequency distribution, Concept of correlation between two variables, positive correlation, negative correlation, Scatter diagram, conclusion about the type of correlation from scatter diagram, Covariance between two variables, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, In case of ties, compute Karl Pearson's correlation coefficient between ranks. Regression: lines of regression, fitting of lines of regression by the least squares method, interpretation of slope and intercept. 9.2 Regression coefficient (byx, bxy), Effect of change of origin and scale, Angle between the two lines of regression, Mean residual sum of squares , Residual plot and its interpretation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References :

- Goon A.M.,Gupta M. K., Dasgupta B.(1998): Fundamentals of Statistics (V-1),World Press.
- Miller and Fruend: Modern Elementary Statistics.
- Snedecor and Cochran: Statistical Methods, Oxford and IBH Publishers.
- Mukhopadhyay, P: Mathematical Statistics (1996), New Central Book Agency, Calcutta.
- Introduction to Mathematical Statistics, Ed. 4 (1989), MacMillan Publishing Co. New York.
- Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
- Neil Weiss: Introductory Statistics: Pearson Publishers.

LEARNING AND REASONING WITH BAYESIAN NETWORKS

Course Code: DSE6902 **Credit Units: 04**

Course Objective:
This course provides an in-depth exposition of knowledge representation, reasoning, and machine learning under uncertainty using the framework of Bayesian networks. Both theoretical underpinnings and practical considerations will be covered, with a special emphasis on constructing and learning graphical models, and on various exact and approximate inference algorithms.

Course Contents:

Module I: Introduction
Reasoning about beliefs using Logic and Probability Propositional Logic, Probability Calculus and Bayesian Reasoning, Bayesian Networks,: Syntax and Semantics, Building Bayesian Networks.

Module II: Bayesian Networks Inference
Inference by variable elimination, Inference by Factor Elimination (Jointree), Compiling Bayesian Networks, Complexity of probabilistic inference, compiling bayesian networks.

Module III: Approximate Inference
Inference by Belief Propagation: Algorithm, Iterative belief propagation, semantics of IBP, Join graphs, edge-detection semantics, Approximate Inference by Stochastic Sampling: Simulating a Bayesian network, direct sampling, expectations, estimating a conditional probability, Markov chain simulation.

Module IV: Learning: The Maximum Likelihood Approach
Introduction, estimating parameters from complete data, estimating parameters from incomplete data, learning network structure, searching for network structure.

Module V: Learning: The Bayesian Approach
Introduction, Meta Networks, Learning with Discrete Parameter Sets, Learning with Continuous Parameter Sets, Learning Network Structure

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Adnan Darwiche, Modelling and Reasoning with Bayesian Networks. Cambridge University Press 2009
- Richard E. Neapolitan, “Learning Bayesian networks”, Prentice Hall Series in Artificial Intelligence, 2004.
- Timo Koski, John Noble, “Bayesian Networks: An Introduction”, Wiley series in Probability and Statistics, 2009.
- Finn V. Jensen and Thomas Nielsen. Bayesian Networks and Decision Graphs. Springer 2007.

SOCIAL NETWORK DATA ANALYTICS

Course Code: DSE6903 **Credit Units: 03**

Course Objective:
This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyse empirical social network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets

Course Contents:

Module I: Introduction
Overview: Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.

Module II: Community Discovery in Social Networks: Applications, Methods and Engineering Trends
Introduction, Communities In Context, Core Methods, Quality Functions, The Kernighan-Lin (Kl) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,

Module III: Information Networks and the World Wide Web
The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web- Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search. Module IV

Module IV: Node Classifications in Social Networks
Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification.

Module V: Data and Text Mining In Social Media
Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xmland Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous Networks.

Module VI: Overview of Social Tagging
Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions ,Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
- Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
- Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.
- Jure Leskovec, Anand Rajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2 edition, 2014.
- Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1 edition, 1994.

R PROGRAMMING LAB

Course Code: DSE6904 **Credit Units: 01**

Course Objective:
This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objectives of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

R Programming Objective

- Master the use of the R interactive environment
- Expand R by installing R packages
- Explore and understand how to use the R documentation
- Read Structured Data into R from various sources
- Understand the different data types in R
- Understand the different data structures in R
- Understand how to use dates in R
- Use R for mathematical operations
- Use of vectorised calculations
- Write user-defined R functions
- Use control statements
- Write Loop constructs in R
- Use Apply to iterate functions across data
- Reshape data to support different analyses
- Understand split-apply-combine (group-wise operations) in R
- Deal with missing data
- Manipulate strings in R
- Understand basic regular expressions in R
- Understand base R graphics
- Focus on GGplot2 graphics for R
- Be familiar with trellis (lattice) graphics
- Use R for descriptive statistics
- Use R for inferential statistics
- Write multivariate models in R
- Understand confounding and adjustment in multivariate models
- Understand interaction in multivariate models
- Predict/Score new data using models
- Understand basic non-linear functions in models
- Understand how to link data, statistical methods, and actionable questions

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

HADOOP LAB

Course Code: DSE6905 **Credit Units: 02**

Course Objective:

- To provide an overview of several key technologies used in manipulating, storing, and analysing big data.
- To understand the fundamentals of Hadoop.
- To apply the learning specific problems in various domains.

Recommended Tools

Big Data Tools and Technology [Learning and Demonstration of Big Data Ecosystem]

- Hadoop
- HBase
- NoSQL
- Hive
- Pig

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

WEB TECHNOLOGY

Course Code: DSE6906 **Credit Units: 03**

Course Objectives:
This course provides knowledge on Core technologies that are needed for the web likeHTML and XML and facilitate how to build XML applications with DTD and style sheets thatspan multiple domains ranging from finance to vector graphics to genealogy for use with legacy browsers.

Course Contents:
MODULE I: Introduction
HTML Common tags, Cascading Style sheets - Introduction to Java Scripts - Objects in Java Script - Dynamic HTML with Java Script.

MODULE II: Vbscript Language Elements
Constants - Variables and Data Types - Mathematical Operations – LogicalOperators - Looping and Decision Structures - VBScript Functions and Objects:Data Conversion Functions - Mathematical Functions - Data FormattingFunctions -Text Manipulation Functions - Data and Time Functions - Built-in
Objects.

MODULE III: ASP Fundamentals
Using Server – Side Includes- Learning the SSI Directives – Creating ModularASP Code -Using the Request Object: Using Form Information - Using QueryString Information – Using Server Variables - Using the Response Object:Create Output – Managing Output – Managing the Connection.

MODULE IV: Using Cookies
Introduction to Cookies: Cookies and Your Browser – Creating a Cookie –Modifying and removing Cookies – Tracking Preferences with Cookies Usingthe Application, Session and Server Objects: The application Object – TheSession Object – The Server Object –Using the global .asa file - Active DataObjects Essentials: Microsoft's Universal Data Access Strategy – TheConnection Object – The Record set and Field Objects – The Command andParameter Objects – Using the Errors Collection.

MODULE V: Introducing XML
XML: The Life of an XML documents - Related technologies- First XMLDocument: Hello XML – Exploring the Simple XML Document – AssigningMeaning to XML Tags – Writing a Style Sheet for an XML Document – Attachinga Style Sheet to an XML Document – Style Languages: CSS Style Sheets,CSS Layouts, CSS Text Styles.

MODULE VI: Attributes, Empty Tags & XSL
Attributes – Attributes versus Elements – Empty Elements and Empty ElementTags – XSL-DTDs and Validity: Document Type Definitions – ElementDeclarations – DTD Files – Document Type Declarations – Validating Againsta DTD-Element Declaration - Entity Declarations: What Is an Entity – InternalGeneral Entities – External General Entities – Internal Parameter Entities –External Parameter Entities – Building a Document from Places-AttributeDeclaration: What is an Attribute – Declaring Attributes in DTDs – DeclaringMultiple Attributes – Specifying Default Values for Attributes – Attribute Types –Predefined Attributes – A DTD for Attribute- Based Baseball Statistics.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Dave Mercer, "ASP 3.0 Beginners Guide", Tata McGraw-Hill Edition, Sixthreprint, 2004.
- Rajkamal, "Web Technology", 1st Edition, Tata McGraw - Hill, 2001.

SERVICE ORIENTED ARCHITECTURE

Course Code: DSE6907 **Credit Units: 03**

Course Objective:
The subject gives an introduction to the fundamentals and issues relating to Service Oriented Architecture and bring out the importance of service orientation and web services. It also teaches appropriate tools as technique on how to build the Service Oriented Architecture with web services.

Course Contents:

Module I: Introduction
Basic definition - Fundamentals of SOA - Characteristics and misperceptions about SOA-Benefits and pitfalls of SOA.

Module II: Evolution of SOA
The evolution of SOA - Web service and primitive SOA - The extension of SOA - Web service extension.

Module III: Web Service and Contemporary SOA
Message Exchange Pattern- Service Activity- Coordination- Atomic Transaction- Business Activity- Orchestration – Choreography- Addressing- Reliable Messaging- Correlation and Policies- Meta data Exchange- Security- Notification and Eventing.

Module IV: Principles of Service Orientation
Principles of service orientation -Building SOA-Planning and Analysis- SOA delivery strategies - Service Oriented Analysis Introduction -Service Modelling of Service Oriented Analysis.

Module V: Service Oriented Design
Introduction to service oriented design - WSDL related XML Schema language Basics - WSDL Language Basics - SOAP Language Basics - Service interface design tools - Steps to composing SOA - Consideration for choosing service layers, positioning core SOA standards and choosing SOA extension – Service design and business process design.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Thomas Erl, "Service Oriented Architecture, Concepts, Technology and Design", Pearson Education, 2009.
- Shankar Kambhampaty, "Service Oriented Architecture for Enterprise Architecture for Enterprise Application", 1st Edition, Wiley Publication, 2008.

NATURAL LANGUAGE PROCESSING

Course Code: DSE6908 **Credit Units: 03**

Course Objective:
This course provides a general introduction including the use of state automata for language processing and syntax including a basic parse. It explains advanced feature like feature structures and realistic parsing methodologies. It also gives concepts of remotes processing and detail information about a typical natural language processing applications.

Course Contents:

Module-I: Introduction
Introduction: Knowledge in speech and language processing - Ambiguity - Models and Algorithms - Language, Thought and Understanding- Regular Expressions and automata: Regular expressions - Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology - Finite-State Morphological parsing - Combining FST lexicon and rules - Lexicon- Free FSTs: The porter stammer - Human morphological processing.

Module-II: Syntax Analysis
Word classes and part-of-speech tagging: English word classes - Tagsets for English - Part-of-speech tagging - Rule-based part-of-speech tagging - Stochastic part-of-speech tagging - Transformation-based tagging – Other issues - Context-Free Grammars for English: Constituency - Context-Free rules and trees - Sentence-level constructions - The noun phrase -
Coordination - Agreement - The verb phase and sub categorization – Auxiliaries - Spoken language syntax - Grammars equivalence and normal form - Finite- State and Context-Free grammars - Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search - A Basic Top-Down parser - Problems with the basic Top-Down parser - The early algorithm - Finite-State parsing methods.

MODULE-III: Advanced Features and Syntax
Features and Unification: Feature structures - Unification of feature structures
- Features structures in the grammar - Implementing unification - Parsing with unification constraints - Types and Inheritance. Lexicalized and Probabilistic
Parsing: Probabilistic context-free grammar - Problems with PCFGs -
Probabilistic lexicalized CFGs - Dependency Grammars - Human parsing.

MODULE-IV: Semantic
Representing Meaning: Computational desiderata for representations – Meaning structure of language - First order predicate calculus - Some linguistically relevant concepts - Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis - Attachments for a fragment of English - Integrating semantic analysis into the early parser - Idioms and compositionality - Robust semantic analysis. Lexical semantics: relational among lexemes and their senses - WordNet: A database of lexical relations - The Internal structure of words - Creativity and the lexicon.

MODULE-V: Natural Language Generation
Introduction to language generation - Architecture for generation – Surface realization - Discourse planning - Other issues- Machine Translation: Language similarities and differences - The transfer metaphor - The interlingua idea: Using meaning - Direct translation - Using statistical techniques – Usability and system development.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Daniel Jurafsky & James H.Martin, “Speech and Language Processing", 2nd Edition, Pearson Education, 2009.
- James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
- Manning, Christopher D and Hinrich Schütze, “Foundations of Statistical Natural Language Processing”, Cambridge, 1st Edition, MA: MIT Press, 1999.

AGENT BASED INTELLIGENT SYSTEMS

Course Code: DSE6909 **Credit Units: 03**

Course Objective:
This course provides students basic knowledge of employing intelligent agents in solving complex problems and gives the awareness of the building blocks of agents and working of different types of agents. It also analyses the reasons for uncertainty and ability to design agents to handle them.

Course Contents:

Module I: Introduction
Definitions – History – Hybrid Intelligent Agents – Agents vs Multi Agent Systems– Structure – Environment – Basic Problem Solving Agents – Complex Problem Solving Agents – Formulating Search Strategies – Intelligent Search.

Module II: Concepts for Building Agents
Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events- Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle.

Module III: Knowledge Based Agents
Knowledge Representation – Logic – First Order Logic – Reflex Agent – Building a Knowledge Base – General Ontology – Interference – Logical Recovery.

Module IV: Planning Agents
Situational Calculus – Representation of Planning – Partial Order Planning – Practical Planners– Conditional Planning - Preplanning Agents.

Module V: Agents and Uncertainty
Acting under uncertainty – Probability – Baye's Rule – Belief Networks – Utility Theory - Decision Network- Value of Information – Decision Theoretic Agent Design.

Module VI: Higher Level Agents
Learning Agents – General Model – Inductive Learning – Learning Decision Tree – Reinforcement Learning – Knowledge in Learning – Communicative Agents – Types of Communicative Agents – Future of AI.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

- Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2010.
- Lin Padgham, Michael Winikoff, "Developing Intelligent Agent Systems: A Practical Guide", 1st Edition, John Wiley & Sons, 2004.
- Zili Zhang,Chengqi Zhang, "Agent-Based Hybrid Intelligent Systems: An Agent- Based Framework for Complex Problem Solving", 1st Edition, Springer-Verlag New York, LLC , 2004.
- Ngooc Thanh Nguyaaen, Lakhmi C. Jain, "Intelligent Agents in the Evolution of Web and Applications", 4th Edition, Springer, 2009.

SUMMER INTERNSHIP EVALUATION-III

Course Code: DSE6935 **Credit Units: 06**

Guidelines:

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development.

The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project & Seminar Report:

1. File should be in the following specification:
A4 size paper
Font: Arial (10 points) or Times New Roman (12 points)
Line spacing: 1.5
Top & bottom margins: 1 inch/ 2.5 cm
Left & right margins: 1.25 inches/ 3 cm

2. Report Layout: The report should contain the following components:
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Table of Content**--an outline of the contents by topics and subtopics with the page number and location of each section.
3. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
4. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of

tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

5. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

ASSESSMENT OF THE INTERNSHIP FILE

The student will be provided with the Student Assessment Record (SAR) to be placed in front of the Internship File. Each item in the SAR is ticked off when it is completed successfully. The faculty will also assess each item as it is completed. The SAR will be signed by the student and by the faculty to indicate that the File is the student's own work. It will also ensure regularity and meeting the delaines.

STUDENT ASSESSMENT RECORD (SAR)

5. **Range of Research Methods used to obtain information**

6. **Execution of Research**

7. **Data Analysis**
   - Analyse Quantitative/ Qualitative information
   - Control Quality

8. **Draw Conclusions**

Examination Scheme:

Components	**V**	**S**	**R**	**FP**
Weightage (%)	20	20	20	40

V – Viva, S – Synopsis, FP – Final Presentation, R - Report

Syllabus - Tenth Semester

PROJECT-DISSERTATION-II

Course Code: DSE6037 **Credit Units: 15**

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- <u>Report Layout</u>

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

ata, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:		40%
(Based on Abstract, Regularity,		
Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	

Amity School of Engg. & Technology

Bachelor of Technology – Artificial Intelligence & Machine Learning

FLEXILEARN

-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

B.Tech (AIML)

Program Overview

B.Tech in (Artificial Learning and Machine Learning) is an undergraduate programme with advanced learning solutions imparting knowledge of advanced innovations like machine learning, often called deep learning and artificial intelligence.

Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and reacts like humans. The core problems of artificial intelligence include programming computers for certain traits such as Knowledge, Reasoning, Problem solving, Perception, Learning and Planning.

Machine learning is core part of AI in using which we make systems learn to attain objectives of AI. Learning without any kind of supervision requires an ability to identify patterns in streams of inputs, whereas learning with adequate supervision involves classification and numerical regressions.

Carriers in AI and Ml appeals large number of students now days. There are various opportunities to become Machine Learning Engineer, Data Scientist, Business Intelligence Developer, Research Scientist and Big Data Engineer/Architect after doing specialization in these areas. The leading employers working in this area includes top companies like Amazon, NVIDIA, Microsoft, IBM, Facebook, Lenovo, Adobe, Google etc.

Programme Objectives (PO)

The student will achieve:

- PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- P04. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Programme Specific Objectives(PSO)

On completion of the B. Tech in Artificial Intelligence & Machine Learning the student will be able to:

PSO1: Apply the knowledge of science, mathematics, statistics, information technology and other engineering disciplines to identify and solve complex robotics engineering problems across a broad range of application areas.

PSO2: Able to apply their knowledge and skills of machine learning for the overall benefit of society with an understanding of realistic constraints and work, communicate effectively in inter-disciplinary environment either independently or in a team and demonstrate significant leadership qualities.

PSO3: Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements.

PSO4: Able to work with technical uncertainty, understanding of the use of technical literature and other information sources, undertaking of appropriate codes of practice and industry standards, awareness of quality issues and their application to continuous improvement, thus recognizing the need to engage in lifelong learning.

Enclosure (s):

✓Supporting document for PSOs framing

✓Programme Structure, B.Tech in AIML

PSO 1	PSO 2	PSO 3	PSO 4
Apply the knowledge of science, mathematics, statistics, information technology and other engineering disciplines to identify and solve complex robotics engineering problems across a broad range of application areas	Able to apply their knowledge and skills of robotics engineering for the overall benefit of society with an understanding of realistic constraints and work, communicate effectively in inter-disciplinary environment either independently or in a team and demonstrate significant leadership qualities.	Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements .	Able to work with technical uncertainty, understanding of the use of technical literature and other information sources, undertaking of appropriate codes of practice and industry standards, awareness of quality issues and their application to continuous improvement, thus recognizing the need to engage in lifelong learning.

Basic Science Courses		**Interdisciplinary domain**	**Software Design**	**Computer Organization**	**Artificial Intelligence**	**Fundamental Computer Science Courses**	**Computer Network**	**Communication Skills**	**Behaviours Skills**	**Industry Training**
Engineering Mathematics-I		Digital Electronics	Theory of Automata & Computa	Computer Architecture	Artificial Neural Network	Introduction to Computers &	Data Communication & Compute	English-I	Understanding Self for Effectiven	Summer Internship Evaluation-I

			tion			Programming in C	r Networks		ess*	
Engineering Physics		Communication Systems	Introduction to OST (PHP & MySQL)	Microprocessor	Artificial Intelligence	Object Oriented Programming using C++	Introduction to IOT and Wireless sensor	English-II*	Problem Solving and Creative Thinking*	Summer Internship Evaluation-II
Engineering Mechanics			Software Engineering		Fuzzy Logic & Genetic Algorithm	Database Management Systems	Distributed Operating System	Effective Listening	Group Dynamics and Team Building	
		VHDL Programming	Java Programming		Statistics and Probability Theory	Operating Systems	Mobile Computing	Presentation Skills	Stress and Coping Strategies	
Engineering Mathematics-II		VLSI Design	System Programming and Compiler Construction			Data Structures using C		Reading & Comprehension*	Personality, Nationalism and Human Values*	
Engineering Chemistry		Digital Image Processing	Advanced Java Programming		Robotic Process Automation Design & Development	Computer Graphics		Corporate Communication*	Interpersonal Communication	
Electrical Science			Cryptography and Network Security		Advanced Robotic Process Automation Design & Development	Analysis & Design of Algorithm		Employability Skills	Relationship Management	
Discrete Mathematics			HTML, CSS and Java Script		Natural Language Processing	Data Mining		Workplace Communication	Personal &Professional Excellence	
			Dot Net Programming		Reinforcement Learning					

SEMESTER-I

MLE2103	Introduction to Computers and Programming in C	L	T	P	C
Version: 2020.1	Date of Approval: July 2020	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

CO 1:Define the purpose and structure of C Program for programming; identify and distinguish various datatypes and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.

CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs

CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language

CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.

CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics, and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7
Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. YashwantKanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	**2**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO2	**1**	**1**	**2**	**2**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO3	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO4	**1**	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	**1**	--	**1**	--
CO5	**1**	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	**1**	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

MLE 2106	Programming in C Lab	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing, and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable.	L3	5

3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement.		
LABORATORY SESSSION 2 LOOPING 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D	L3	6
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and deallocation.	L3	4

4. Write a program to print elements of array using pointers.		
LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. YashwantKanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO	PSO

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO3	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO4	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

II SEM

MLE 2205	Object Oriented Programming Using C++	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Equip the students with the basic features of C++ supporting object-oriented programming. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Provide the overview of major object-oriented concepts to implement object oriented programs in C++ like encapsulation, inheritance and polymorphism, stream I/O, templates and operator overloading

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.

CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed. Explain how the objects can be instantiated and destroyed with static data member?

CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Explain the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).	L1 and L2	5
MODULE 2: CLASSES AND OBJECTS Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.	L1, L2 and L3	7
MODULE 3: INHERITANCE Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes	L2, L3 and L4	8
MODULE 4: POLYMORPHISM Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	L2, L3 and L4	8
MODULE 5: STRINGS, FILES AND EXCEPTION HANDLING Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation,	L2, L3 and L4	8

Vectors.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. E. Balagurusamy ,"Object Oriented Programming with C++", Mc Graw Hill,6th Edition,2013.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. YashwantKanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	**1**	**2**
CO3	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	**2**
CO4	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**1**	--	**2**
CO5	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	**1**

1: strongly related, 2: moderately related and 3: weakly related

MLE2206	Object Oriented Programming Using C++ Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY, 2020	0	0	1	1
Pre-requisites/Exposure	Turbo C++				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Perform object-oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax, features of, and how to utilize the Standard Template Library.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define and identify the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach.

CO 2: Determine the different ways to define a member function inline and explain how the private members of a class can be accessed. Solve how the objects can be instantiated and destroyed with static data member?

CO 3: Apply the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Relate the concept polymorphism with overloading in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Determine the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1. Sample Programs using objects and classes (a) Write a program to illustrate the concept of one class with two objects by taking student data. (b) Write a program to show the relationship of class and object to display roll no., grade and fee paid by student.	L1, L3, L5	4
2. Sample Programs for different use of private, public member variables and functions and friend functions (a) Write a program to define the member function outside and inside the class. (b) Write a program to read and display the information of N persons to illustrate the concept of array of objects. (c) Write a program to add two numbers to illustrate the use of friend function.	L1, L3, L5	4
3. Sample Programs using constructors and destructors (a) Write a program to assign and copy values to illustrate the concept of parametrized and copy constructor. (b) Write a program to show the order of constructor and destructor.	L1, L3, L5	4
4. Sample Programs using operator overloading (a) Write a program to add two numbers using binary operator overloading.	L1, L3, L5	4

(b) Write a program to illustrate the assignment operator overloading.		
5. Sample Programs using inheritance in and accessing objects of different derived classes (a) Write a program to compute the marks explaining the concept of multiple inheritance. (b) Write a program to find the factorial of a number using inheritance.	L1, L3, L5	4
6. Sample Programs using polymorphism and virtual functions (using pointers) and File Handling (a) Write a program to find the volume of cylinder and cuboid using function overloading. (b) Write a program to reverse a string using pointers. (c) Write a program to explain the relationship of inheritance and virtual function. (d) Write a program to read the student name and fee paid using read() function from the file.	L1, L3, L4, L5	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. "Object Oriented Programming with C++" By E. Balagurusamy.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. YashwantKanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**3**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO5	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly relateds

III SEM

MLE2301	Database Management Systems	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	3	1	0	4
Pre-requisites/Exposure	Computer Fundamentals and Mathematics Set Theory				
Co-requisites	Nil				

Catalog Description

This course is design to get students familiar with the fundamentals & basic concepts in Data Base Management Systems and their use. This course discusses architecture of Database Systems with concept of different types of available database model, concurrency techniques and new applications of the DBMS. The techniques for database design, normalization, database recovery and protection will enable students to work easily and efficiently on real databases.

Course Objectives

The objective of this course is

1. To make students familiar with the fundamental and necessary concepts of DBMS.
2. Provide an overview of normalization, concurrency techniques and database recovery with examples.

Course Outcomes

On completion of this course, the students will be able to

CO1. Differentiate between traditional data processing system and database management system and understand characteristics and applications of DBMS in real world.

CO2. Explain and use different data models such as Entity Relationship Model, Network, and Relational Model etc.

CO3. Solve queries using relational algebra, relational calculus and SQL.

CO4. Illustrate normalization concepts and apply them in real database applications.

CO5. Explain database concurrency techniques and recovery mechanisms.

Modules	Blooms level*	Number of hours
Module I: Introduction Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model.	L1, L2 and L6	9

Module II: Hierarchical model &Network Model Concepts, Data definition, Data manipulation and implementation. Network Data Model, DBTG Set Constructs, and Implementation	L1and L2	9
Module III: Relational Model Relational database, Relational Algebra, Relational & Tuple Calculus.	L1 and L3	10
Module IV: Relational Database Design and Query Language SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.	L2, L3 and L4	10
Module V: Concurrency Control and New Applications Transaction basics: ACID property, Lifecycle of Transcation, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.	L2, L3 and L4	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Korth, Silberschatz, "Database System Concepts", TMH, 4th Ed., 2000.
2. Elmsari and Navathe, "Fundamentals of Database Systems", A. Wesley, 6th Ed., 2004

Reference Books

1. Date C. J., "An Introduction to Database Systems", Narosa Publishing, 7th Ed., 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	-	-
CO2	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	--	--
CO3	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	--	**1**	**2**	--	--	**2**	--	**3**	--	--	--	--	**1**	**1**	-	-
CO5	**1**	**1**	**3**	--	--	--	--	--	**2**	--	--	--	**1**	--	-	**3**

1: strongly related, 2: moderately related and 3: weakly related

MLE2306	Database Management Systems Lab	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is designed to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software in future.

Course Objectives

The objective of this course is

1. To make students familiar with the concepts and working of SQL.
2. Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.
CO2. Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.

CO3. Design and implement various data constraints on a database for a given problem.

CO4. Solve queries using concepts like joins, subqueries, aggregate functions, triggers etc.
CO5. Prepare PL/SQL blocks.

Modules	Blooms level*	Number of hours
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1and L3	2
Lab Session 3 Working with SELECT query.	L1 and L3	2

Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7 To apply various set operators on data.	L1 and L3	2
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9 Implementation different types of JOINS in database.	L1 and L3	2
Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1,IvanBayross , "SQL, PL/SQL the Programming Language of Oracle", 4th Ed., BPB Publications,2009.

2.LynnBeighley, "Head First SQL", 1st Ed., O′Reilly, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO2	**1**	**-**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**1**	**-**
CO3	**1**	**-**	**1**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**1**	**2**	**-**
CO4	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO5	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**1**	**1**	**--**	**-**

1: strongly related, 2: moderately related and 3: weakly related

CSE2302	Operating Systems	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course Operating System, its generic types, characteristics and functions are discussed in detail. Concepts covered would enable students to identify various categories of operating systems, with details about concepts of process management and scheduling. Contents will be helpful in identifying deadlocks in the system and designated approaches used to prevent, handle or recover from them. Further it covers the concepts of managing memory, devices and mechanisms for providing security to system and files using operating system.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge about categories of operating systems and their functions.
2. Provide detailed knowhow about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain operating systems and their evolution, also differentiate among its various types.

CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.

CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.

CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.

CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION TO OPERATING SYSTEM Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls	L1, L2 and L4	6
MODULE 2: PROCESS MANAGEMENT Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads Interprocess Communication and Synchronization: Principle of Concurrency, Producer Consumer Problem, Critical Section problem, Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication. CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non-Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling. Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach	L1, L2 and L3	12
MODULE 3: MEMORY MANAGEMENT Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays	L1, L2 and L3	7
MODULE 4: DEVICE MANAGEMENT Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling, Disk organization, Disk space management, Disk allocation Method, Disk	L1, L2 and L3	7

Scheduling, Disk storage		
MODULE 5: FILE SYSTEM AND PROTECTION AND SECURITY File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management. Policy Mechanism, Authentication, Internal excess Authorization	L1 and L2	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Milenekovic, "Operating System Concepts", McGraw Hill
2. Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

Reference Books

1. Dietel, "An introduction to operating system", Addision Wesley
2. Tannenbaum, "Operating system design and implementation", PHI
3. Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
4. A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI
5. Willam Stalling " Operating system" Pearson Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**

CO2	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO5	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

MLE2307	UNIX Programming Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Operating System				
Co-requisites					

Catalog Description

This course introduces the UNIX operating system commands, shell programming. Explores the use of operating system utilities such as vi text editors, filters, process handling etc.

Course Objectives

The objective of this course is to

1. Provide knowledge of working on Unix.
2. Provide sound foundation of writing Shell scripts.
3. Implement features like piping, filters and redirection.

Course Outcomes

On completion of this course, the students will be able to

CO1: To implement various Unix commands.
CO2: To demonstrate the use of Vi Editor and other editors of UNIX.
CO3: To write simple Shell scripts.

Modules	Blooms level*	Number of hours
1. UNIX structure, history, basic commands.	L1,L3	10
2. Working of Vi Editor and its commands.	L1,L3	4
3. Shell Script i. Write shell script to find largest among three numbers. ii. Write shell script to print multiplication table of any number. iii. Write a shell script that copies multiple files into directory. iv. Write a shell script to find number of words and characters in a given file. v. Write a shell script to find the sum, the average and the product of the four integers entered. vi. Write a shell script to calculate the factorial of a number. vii. Write a shell script to generate Fibonacci series. viii. Write a shell script that computes the gross salary of	L1,L3	10

	employee. ix. Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else. x. Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted. xi. Write a shell script to calculate gcd of two numbers. xii. Write a shell script to concatenate two strings and find the length of the resultant string.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. " Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill

Reference Books

1. "Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2305	DATA STRUCTURES USING C	L	T	P	C
Version:2020.1	Date of Approval: JULY, 2020	3	1	0	4
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1:Identify operations on array, multidimensional, string and their implementation and analyze space and time complexity of algorithms.

CO 2: Explain various algorithms and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Tradeoffs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.	L1, L2	7
Module II: Introduction to Stacks and queue Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem. Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.	L1, L2, L3, L4	8
Module III: Dynamic Data Structure Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.	L1, L3 and L4	7
Module IV: Trees and Graphs Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.	L1, L3 and L5	7

Module V: Sorting and Searching and file structures Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting. Searching: Linear search, Binary search File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.	L1, L4, L5	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, ― Fundamentals of Data structures‖, Galgotiapublicat ions.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, ―Data structure and program design in C, PHI
3. Data structures and algorithms‖ – Schaum Series.
4. File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, BregRiccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall
3. India(1999).
4. Data Structures Using C and C++ second edition by YeddidyahLangsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
5. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
6. Data Structures‖ – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2

MLE2305	DATA STRUCTURES USING C LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.

3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Identify operations and their implementation on array and multidimensional, string and estmation space and time complexity.

CO 2: Explain various algorithm and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures 1. Write a program to copy one string into another without using library functions. 2. Write a program to demonstrate array and linked list implementation of sparse matrix. 3. Write a program to multiply two 2D matrix.	L3,L5	2
Module II: Introduction to Stacks and queue 1. Write a program to implement push and pop operations on the	L3,L5	4

stack. 2. Write a program to demonstrate conversion of infix to postfix. 3. Write a program to implement simple queue and perform insertion and deletion operation on it. 4. Write a program to implement circular queue and perform insertion and deletion operation on it. 5. Write a program to implement dqueue and perform insertion and deletion operations on it. 6. Write a program to implement priority queue and perform insertion and deletion operation on it.		
Module III: Dynamic Data Structure 1. Write a program to implement singly linked list and perform following operations on it. • Insertion at end • Insertion at last • Insertion at desired place. 2. Write a program to implement singly linked list and perform following operations on it. • Deletion at end • Deletion at last • Deletion at desired place. 3. Write a program to implement doubly linked list and perform following operations on it. • Insertion at end • Insertion at last • Insertion at desired place. 4. Write a program to implement singly linked list and perform addition of two polynomials.	L3,L5	4
Module IV: Trees and Graphs 1. Write a program to calculate in order, preorder and post order traversal on binary tree. 2. Write a program to construct binary search tree and perform following operations on it.	L3,L5	6

• Deletion of element • Insertion of elements. 3. Write a program to construct binary search tree and search an element in it. 4. Write a program to implement kruskal's algorithm to find out minimum spanning tree.		
Module V: Sorting and Searching and file structures 1. Write program to implement insertion sort. 2. Write a program to search an element in array using binary search. 3. Write a program to implement merge sort. 4. Write a program to implement quick sort. 5. Write a program to implement heap sort.	L3,L5	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, ― Fundamentals of Data structures‖, Galgotiapublicat ions.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, ―Data structure and program design in C, PHI
3. Data structures and algorithms‖ – Schaum Series.
4. File Structures an Object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, BregRiccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill.
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India(1999).
3. Data Structures Using C and C++ second edition by YeddidyahLangsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
4. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
5. Data Structures‖ – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**
CO2	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CO3	**1**	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CO4	**1**	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**
CO5	**1**	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**2**

MLE 2304	Digital Electronics	L	T	P	C
Version 2020.1	Date of Approval: JULY, 2020	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of knowledge to understand combinational and sequential circuits.
2. Explain the operation of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the difference between analog and digital signal; Describe the Boolean algebra; Analyze the SOP & POS form of Boolean function; Solve k-map and tabulation method to simplify the logical function; Apply universal gates to implement the given logic.

CO2: Define the multiplexer and decoder; Explain the adder & subtractor; Apply multiplexer to design Boolean function; Analyze the difference between decoder and encoder.

CO3: Define flip flops; Compare combinational and sequential circuits; Describe shift registers; Design counters and synchronous sequential circuits.

CO4: Explain the logic families; Compare the RTL, DTL, TTL and ECL logic families.

CO5: Define data convertors; Explain analog to digital convertor and digital to analog convertor.

Modules	Blooms level*	Number of hours
MODULE 1:	L1,L2	6

BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical function, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.	and L3	
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Multiplexer, de-multiplexer, decoder & encoder, code converters, Comparators, decoder / driver for display devices, Implementation of logic functions using multiplexer / de-multiplexer.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional; Counters: ripple & synchronous counters – up / down; Synchronous Sequential circuit: design procedure.	L1, L2,L4 and L5	8
MODULE 4: LOGIC FAMILIES RTL, DTL, TTL, ECL.	L2 and L4	2
MODULE 5: DATA CONVERTERS ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1 and L2	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, “Fundamentals of Digital Circuits”, 2nd Edition, Prentice-Hall, 2004
2. Moris Mano, “Digital Design”, 2nd Edition, Pearson Education,2007.
3. R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
2. Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO4**
CO1	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO2	**1**	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**3**
CO3	**1**	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**
CO4	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO5	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**

1: strongly related, 2: moderately related and 3: weakly related

MLE 2308	Digital Electronics Lab	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this Lab course the combination and sequential circuits are designed, and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

1.Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

2. Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of logic gates;

CO 2: Illustrate the adder and subtractors.

CO 3: Demonstrate the code convertors.

CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2

8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
4. Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
5. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

3. **Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015**
4. **Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993**

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE-External Exam

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**
CO 2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**
CO	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**

3																
CO 4	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**

1: strongly related, 2: moderately related and 3: weakly related

MLE2309	Electronic Devices & Circuits	L	T	P	C
Version:2020.1	Date of Approval:July 2020	2	0	0	2
Pre-requisites/Exposure	Elementary Resistive Circuit, Theorems and Analysis Techniques: KCL. KVL, Nodal & Mesh Analysis, Thevenin & Norton Equivalents, Maximum Power Transfer.				
Co-requisites	Semiconductor Physics				

Catalog Description

This is the first course in Electronics and Communication Engineering, to educate and explain the methods used for biasing circuits in a graphical analysis of non- linear electronic circuits and also includes small signal transistor models, parameters and their frequency responses. Following this, analyzing different types of feedback amplifiers, and power amplifiers using transistor and designing of different electronic circuits are included in the course. This course also considers the mathematical modeling of active solid state devices their analysis and design of single state circuits. Topics covered include the study of device characteristics and applications of p-n-junction diodes, bipolar junction transistors, and field effect transistors.

Course Objectives

The objective of this course is to

1. build from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models
2. familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers and wave shaping circuits
3. build a foundation for Analog Electronics-II, Digital Circuits and Systems I & II, VLSI design and analog CMOS IC Design.

Course Outcomes

On completion of this course, the students will be able to

CO1. explain different types of diodes and demonstrate wave shaping circuits
CO2. explain operating principal of Bipolar Junction Transistor, its properties, biasing techniques and stability
CO3. describe low and high frequency transistor amplifiers along with single and multi-stage amplifier
CO4. explain operating principal of JFET, MOSFET, its properties, and biasing techniques

CO5. solve and analyse different negative feedback amplifiers configurations
CO6. describe and outline power amplifiers and their application.

Modules	Blooms level*	Number of hours
Module I: Semiconductor Diode and Diode Circuits Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.	L1 L2 & L3	6
Module II: Bipolar Junction Transistor Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in $I_{co,}$ V_{BE} &β, Stabilization factors, thermal stability.	L1 L2 & L3	9
Module III: Small signal Analysis of transistor and Multistage Amplifier Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid πConducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)	L2 & L3	6
Module IV: Field Effect Transistors Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower	L1, L2 & L3	5
Module V: Feedback Amplifiers Feedback concept, Classification of Feedback amplifiers, Properties of	L1, L2, L3 & L4	6

negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.		
Module VI: Power amplifiers Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.	L1 & L2	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jacob Millman, Christos Halkias, Chetan Parikh, Millman's Integrated Electronics, McGraw Hill Education, 2nd Edition, New Delhi
2. Sanjeev Gupta, Electronic Devices and Circuits, DhanpatRai Publications, 2010
3. Theraja B.L., Sedha R.S, Principles of Electronic Devices and Circuits, S Chand & Company, First Edition, New Delhi, 2002

Reference Books

1.Robert L. Boylestad: Electronic Devices and Circuits, Pearson Education, 11th Edition, 2013

2.Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 1st Edition, 2006

6. Nagrath I.J, Electronics: Analog and Digital, Prentice Hall India Learning Private Limited, Second Edition, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**

	1	2	3	4	5	6	7	8	9	10	11	12				
CO 1	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**--**	**3**
CO 2	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**--**	**3**
CO 3	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**--**	**--**
CO 4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**--**	**3**
CO 5	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**--**	**3**
CO 6	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**--**	**--**	**3**

1: strongly related, 2: moderately related and 3: weakly related

MLE2311	E-commerce and ERP	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basic computer				
Co-requisites	Nil				

Catalog Description

This course examines the evolution of enterprise resource planning (ERP) systems - from internally focused client/server systems to externally focused e-business. This class studies the types of issues that managers will need to consider in implementing cross-functional integrated ERP systems. The objective of this course is to make students aware of the potential and limitations of ERP systems. This objective will be reached through hands-on experience, case studies, lectures, guest speakers and a group project. The course would equip students with the basics of E-Commerce, technologies involved with it and various issues associated with.

Course Objectives

The objective of this course is to

1. Understand the students with the role of consultants, vendors and employees.
2. Provide an overview of various phases in ERP implementation and identify various technologies used in ERP.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other. Demonstrate an understanding of the foundations and importance of E-commerce and assess electronic payment systems.

CO2: Understand concepts of reengineering, data mining, data warehousing and how they relate to ERP system implementations.

CO3: Explain the challenges associated with implementing enterprise systems and their impacts on organizations.

CO4: Describe the selection, acquisition and implementation of enterprise systems and demonstrate an ability to work independently and in a group.

CO5: Identify and describe typical functionality in an ERP system.

CO 6: Analyze the strategic options for ERP identification and adoption.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION AND CONCEPTS: Networks and commercial transactions - Internet and other novelties; Networks and electronic transactions today, Model for commercial transactions; Internet environment - internet advantage, world wide web and other internet sales venues; Online commerce solutions. Security Technologies: Why is internet insecure? A brief introduction to Cryptography; Public key solution. Digital payment systems; First virtual internet payment system; cyber cash model Operational process of Digicash, Ecash Trail; Using Ecash; Smart cards; Electronic Data Interchange: Its basics; EDI versus Internet and EDI over Internet.	L1, L2 and L3	8
MODULE 2: INTRODUCTION ERP An Overview, Enterprise-An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, On-line Analytical Processing (OLAP), Supply Chain Management, Management Information systems (MIS), Decision support system (DSS), Executive Information systems (EIS). ERP – A Manufacturing Perspective Materials Requirement Planning (MRP), Bill of Material (Bom), Distribution Requirements Planning (DRP), JIT & Kanban, CAD/CAM, Product Data Management (PDM), Benefits of PDM, MTO, MTS, ATO, ETO, CTO.	L1,L2 and L3	10
MODULE 3: ERP IMPLEMENTATION To be or not to be, ERP Implementation Lifecycle, Implementation Methodology, Not all Packages are Created Equal!, ERP Implementation-The Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring, After ERP Implementation.	L1,L2 and L3	8
MODULE 4: THE BUSINESS MODULES Business Modules in an ERP Package, Finance, Manufacturing (Production),	L1,L2 and L3	8

Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution		
MODULE 5: THE ERP MARKET ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards World Solutions Company, Oracle Corporation, QAD, System Software Associates, Inc (SSA) ERP-Present and Future Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E-Commerce, ERP and Internet, Future Directions in ERP, Appendices"	L2, L3 and L4	8
MODULE 6: BENEFITS OF ERP Time Reduction, Resource Utilization, Performance, Customer Satisfaction, Flexibility, Quality, Accuracy.	L1,L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1.Alexis Leon, "**Enterprise Resource Planning**", 4th Edition, TMH,2012.

Reference Books

1. Daniel E.O'Leary, "**Enterprise Resource Planning Systems**," Cambridge University Press, 2012.

2. Ellen Monk, Bret Wagner, "**Concepts in Enterprise resource planning**," Cengage learning, 4th edition, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	2	--	--	--	--	--	3	--	--	1	2	--	1	2	--
CO2	--	--	--	-	--	--	--	--	--	--	1	2	--	1	2	--
CO3	--	2	--	-	-	--	--	--	2	--	1	2	--	--	1	--
CO4	1	1	2	--	--	--	--	--	1	1	1	2	--	--	1	--
CO5	--	1	1	--	--	--	--	--	--	1	1	2	3	--	--	2
CO6	--	--	--	--	--	--	--	--	--	1	1	3	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2312	**Statistics & Probability Theory**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of statistics, the science of collecting, organizing, and interpreting numerical data are discussed. Emphasis will be placed on statistical reasoning and data analysis. The main topics are study design, descriptive statistics, probability theory, and statistical inference. As a precursor to the study of cryptography studies will be made on impact of various techniques for finding independence or dependence between data variables. The concepts learnt in the studies of statistics will be applied practically to solve number of real life problems using the statistical package like R and SPSS.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of statistics through problem solving and analytical approach.
2. Provide an overview of various statistical techniques: descriptive and inferential, parametric and non-parametric and practical statistics using R and SPSS.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain, describe and distinguish various population, sample, type of variables, measurement scales, central tendency, percentile and solve problems related to them.

CO 2: Explain the concept of descriptive and inferential statistics; probability theory; Solve problems based on probability; Explain binomial, poisson distribution and solve real life problems related to discrete and continuous random variable.

CO 3: Describe the concept of sampling distribution for large and small samples; Explain the concept of hypothesis testing and solve problems related using t-distribution and standard normal distribution.

CO 4: Explain concept of covariance and correlation and its applications in real life; Explain Anova and its use in real life problem solving; Explain and compare various regression analysis methods statistics for prediction

CO 5: Explain various parametric and nonparametric test and apply them to solve real life statistical problems

Modules	Blooms level*	Number of hours
Module 1: Introduction to Statistics and Data Analysis Statistical Inference, Samples, Populations and Experimental Design , The Hole of Probability Sampling Procedures; Collection of Data ,Measures of Location:, Measures of Variability ,Discrete and Continuous Data , Statistical Modeling, Scientific Inspection, and Graphical Diagnostics, Graphical Methods and Data Description ,General Types of Statistical Studies	L1, L2 and L3	7
Module 2: Probability & Probability Distribution Sample Space, Events Probability of an Event, Additive Rules, Conditional Probability ,Multiplicative Rules ,Bayes' Rule, Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions , Joint Probability Distributions ,Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem, , Discrete Uniform Distribution, Binomial and Multinomial Distributions, Poisson Distribution and the Poisson Process. Continuous Uniform Distribution, Normal Distribution ,Areas under the Normal Curve ,Applications of the Normal Distribution , Gamma and Exponential Distributions, ,Chi-Squared Distribution.	L1,L2, L3	6
Module 3: Sampling Distributions and Estimation Random Sampling, Some Important Statistics, ,Data Displays and Graphical Methods, Sampling Distributions Introduction to Estimation, Statistical Inference ,Classical Methods of Estimation, Single Sample: Estimating the Mean ,Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits Two Samples: Estimating the Difference between Two Means ,Paired Observations , , Single Sample: Estimating a Proportion, Two Samples: Estimating the Difference between Two Proportion.	L1,L2, L3	6
Module 4: Hypotheses Testing Statistical Hypotheses: General Concepts ,Testing a Statistical Hypothesis, One- and Two-Tailed Tests, The Use of *P*-Values for Decision Making in Testing Hypotheses, One Sample: Test on a Single Proportion ,Two Samples: Tests on Two Proportions, Exercises ,One- and Two-Sample Tests Concerning Variances, Goodness-of-Fit Test, Test for Independence (Categorical Data),Test for Homogeneity, Testing for Several Proportions	L1, L2 L3	7
Module 5: Simple Linear Regression and Correlation Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted.Model Analysis-of-Variance, Approach, Test for Linearity of Regression: Data with Repeated Observations, Data Plots and Transformations, Simple Linear Regression Case Study, Correlation, Classification	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Probability & Statistics for Engineers & Scientists", Ronald E. Walpole,Pearson 2007
2. Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
3. TorstenHothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Reference Books

1. Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO2	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**1**	**1**	**1**	--	-	--	--	--	--	--	--	--	**1**	**1**	--	--
CO4	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO5	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

IV SEM

MLE2401	**Discrete Mathematics**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Basic mathematics: Set Theory and Logic Gates				
Co-requisites					

Catalog Description

This course is intended for students, those who have little bit knowledge of logical gates and basic logical mathematics. Knowledge of basic mathematics is necessary: they need to be comfortable with simple logical, including operator precedence. They should also be comfortable working with simple recursive functions. This course will give you a better understanding on how to develop own algorithms for the conversion into programs. More importantly, you'll start to learn computational thinking, which is a fundamental approach to solving real-world problems. Computer programming languages share common fundamental concepts, and this course will introduce you to those concepts using logical thinking.

Course Objectives

The objective of the course is to:

1. Study of the logical and mathematical relationships between discrete objects using application of Boolean algebra, graphs, lattice and trees.
2. Relate computing theory with applications and design their project machine like Finite state machineusing algorithmic approach, and able
3. Apply theknowledge of graph algorithms in daily life research problem solving.

Course Outcomes

On completion of this course, the students will be able to:

CO1. To give the study of the logical and mathematical relationships between discrete objects based on applications of propositional arguments.

CO2. Students will be able to relate computing theory with real life applications.

CO3. They can understand and design their project machine like finite state machine, Petri nets using algorithmic approach

CO4. Able to understand the importance of graph algorithms in daily life research problem solving

CO5. To describe the applications of Boolean algebra, graphs, lattice and trees in software engineering.

Modules	Blooms level*	Number of hours
Module I: Sets, Relation and Functions: Sets and Subsets, Operations on Sets, Set Identities, Matrices, Mathematical Structures, Principle of Inclusion and Exclusion. Product Sets and Partitions, Relations and Digraphs, Properties of Relation, Equivalence Relation, Functions: Properties of Function, Composition of Function, Inverse, Binary and n-ary operations.	L1, L2 and L3	12
Module II: Logic Proposition, Propositional Calculus- Propositional Variables and Compound Propositions, Basic Logical Operations: -Conjunction, Disjunction, Negation, Conditional, Bi-conditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid, Arguments, Tautologies, Contradiction, Contingency.	L1,L2, L3	11
Module III: Counting Pigeonhole principle, Mathematical Induction, Recurrence Relation: Solving Linear Homogeneous Recurrence Relations with Constant Coefficients, Solving Recurrence Relations using Generating Functions.	L1,L2, L3 and L5	11
Module IV: Lattices Lattices: Lattices as partially ordered sets, their properties, duality, Lattices as algebraic systems, Sub lattices, Direct products, Bounded Lattices, Complete Lattices, Complemented Lattices and Distributive lattices.	L1, L2 and L3	14

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. J. P. Trembley &R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-HillBookCo.,1997.

2. J.L.Gersting, Mathematical StructureforComputer Science (3rded.), Computer Science Press, Seymour Lepschutz, Finite Mathematics, McGraw-Hill BookCo. NewYork.

Reference Books

1. J .E .HopcroftandJ. D. Ullman, Introduction to Automata Theory Languages&Computation, NarosaPublishing House, Delhi.
2. C.L.Liu, Elements of Discrete Mathematics, Tata McGraw-Hill PublishingCo. Ltd, NewDelhi.
3. N.Deo, GraphTheorywith Applications to Engineering and Computer Sciences, Prentice Hall of India,

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	2	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	2	-
CO5	1	2	2	--	--	--	--	--	--	--	--	--	2	2	3	-

MLE2402	ARTIFICIAL INTELLIGENCE	L	T	P	C
Version2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Exposure to data structure and programming and an ability to discuss algorithms is the only pre-requisite.				
Co-requisites	Nil				

Catalog Description

Introduction to computational models of thought and construction of intelligent information systems. Topics include search algorithms, data dependencies and truth-maintenance systems, approaches to knowledge representation, automated deduction, reasoning under uncertainty, and machine learning.The field of Robotics is a multi-disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Objectives

The objective of this course is to

1. Provide an overview of problem solving skills methods using Artificial Intelligence.
2. Equip the students with the study of programming languages that is used to develop an Intelligence System.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners and Understand the various searching techniques.

CO2: Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.

CO3: Acquire the knowledge of real world Knowledge representation. Apply concept Natural Language processing to problems leading to understanding of cognitive computing.

CO4: Use different machine learning techniques to design AI machine and Write algorithms and implement programs in ‘Prolog’ language.

CO5: Explain some of the more advanced topics of AI such as Robotics and Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.

Modules	Blooms level*	Number of hours
MODULE 1: PROBLEM SOLVING AND SCOPE OF AI Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction. PROBLEM SOLVING State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm.	L1, L2, L3 and L4	10
MODULE 2: KNOWLEDGE REPRESENTATION Knowledge Representation issues, first order predicate calculus, Horn Clauses, Resolution, Semantic Nets, Frames, Partitioned Nets, Procedural Vs Declarative knowledge, Forward Vs Backward Reasoning.	L1, L2 and L4	6
MODULE 3: UNDERSTANDING NATURAL LANGUAGES Introduction to NLP, Basics of Syntactic Processing, Basics of Semantic Analysis, Basics of Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Shanks Conceptual Dependency, Scripts, Basics of grammar free analyzers, Basics of sentence generation, and Basics of translation.	L1, L2 and L4	7
MODULE 4: EXPERT SYSTEM Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, R1 LEARNING Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. Programming Language: Introduction to programming Language, LISP and PROLOG. HANDLING UNCERTAINTIES Non-monotonic reasoning, Probabilistic reasoning, use of certainty factors,	L1, L2, L4 and L5	7

Fuzzy logic.		
MODULE 5: INTRODUCTION TO ROBOTICS Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages.	L1, L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990.
3. John J. Craig, "Introduction to Robotics", Addison Wesley publication.
4. Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", PHI Publication.
5. Tsuneo Yoshikawa, "Foundations of Robotics", PHI Publication

Reference Books

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. Peter Jackson, "Introduction to Expert Systems", AWP, M.A., 1992.
3. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
4. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	**--**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**2**	**--**	**--**
CO2	**1**	**2**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**2**	**1**	**--**	**2**
CO3	**1**	**3**	**--**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**3**	**2**	**--**	**--**	**1**	**2**
CO4	**1**	**--**	**1**	**3**	**1**	**--**	**--**	**--**	**3**	**--**	**--**	**2**	**2**	**1**	**--**	**--**
CO5	**1**	**1**	**1**	**2**	**--**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

MLE2405	ARTIFICIAL INTELLIGENCE LAB	L	T	P	C
Version2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of C and C++				
Co-requisites	Nil				

Catalog Description

PROLOG programs tell the computer what to do (declarative programming) rather than how to do it (procedural programming). PROLOG does this by making deductions and derivations, instigated by user-defined queries, from facts and rules stored in a database. The module teaches PROLOG as a practical programming tool, useful in solving various interesting problems especially in the Artificial Intelligence domain.

Course Objectives

The objective of this course is to

1. Provide an overview of a programming paradigm: programming by means of logic (also known as logic programming)
2. Provide an experience with development of AI application using PROLOG.

Course Outcomes

On completion of this course, the students will be able to

CO1: Use the basic knowledge of PROLOG programming in order to write simple PROLOG programs and explore more sophisticated PROLOG code on their own.

CO2: Use Prolog for developing artificial intelligence applications.

Modules/Topics Covered**	Blooms level*	Number of hours
1: INTRODUCTION TO PROLOG- SIMPLE FACTS, FACTS WITH ARGUMENTS. **PROBLEM STATEMENT 1:** • Convert the following into Prolog Equivalent: It is raining. This is a book.	L1 and L3	4

PROBLEM STATEMENT 2: • Convert the following into Prolog Equivalent: 1. The cakes are delicious. 2. Priya relishes coffee. 3. Edwin plays badminton.		
2: DEFINING VARIABLES, MATCHING AND BACKTRACKING. **PROBLEM STATEMENT 3:** • Convert the sentences into Prolog Equivalent and answer the following questions: 1. Sun rises in east. 2. Dovey is a good girl. 3. Dora likes books. 4. Chin is an intelligent student? Query 1: Who is a good girl? Query 2: Dora likes What? **PROBLEM STATEMENT 4:** • Consider the following facts: 1. parent (pam, bob). 2. parent (tom, bob). 3. parent (bob, ann). 4. parent (tom, liz). Query: Who is the parent of Whom? Or Find X and Y such that X is the parent of Y.	L1, L3 and L5	4
3: RULES. **PROBLEM STATEMENT 5:** • Consider the given knowledge. Represent the knowledge into the PROLOG equivalence and answer the question using rules. Joy is father of Jay. Jay is father of Sam. Sam is brother of Sue. Alvin is	L1, L3 and L5	2

father of Ali. Sim is mother of Sam. Sis is mother of Alvin. Question: Who are Sue's parent?		
4: INPUT AND OUTPUT PREDICATES. **PROBLEM STATEMENT 6:** • Write a code to print a message on the screen. • Write a program to perform addition of two numbers.	L1 and L3	2
5: CONTROL SRRUCTURES AND RECURSION. **PROBLEM STATEMENT 7:** • Write a code in PROLOG to design a calculator. **PROBLEM STATEMENT 8:** • Write a code in PROLOG to find the largest number among two numbers. • Write a code in PROLOG to find the largest number among three numbers. **PROBLEM STATEMENT 9:** • Write a code in PROLOG to find the factorial of a number. **PROBLEM STATEMENT 10:** • Write a code in PROLOG to print the Fibonacci series.	L1, L3 and L5	8
6: Data Structure and Operations. **PROBLEM STATEMENT 11:** • Create a LIST of 10 elements and print Head and Tail. • Write a code in PROLOG to concatenate two strings. **PROBLEM STATEMENT 12:** • Write a code in PROLOG to search an item from a given LIST.	L1 and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1.E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992.

2.Bratko, “PROLOG Programming for A.I”., 3rd Ed Ed., Addison Wesley, 2001.

Reference Books

1. D.W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
2. R.J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	2	1	--	--	--	--	--	--	3	--	1	--	--
CO2	--	--	1	2	--	3	--	--	2	--	3	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2403	Analysis & Design of Algorithm	L	T	P	C
Version 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Data Structures				
Co-requisites	Nil				

Catalog Description

Designing an algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a program.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of complexity and analysis of algorithms.
2. Provide an understanding of different techniques used in designing algorithms for a variety of problems.
3. Equip the students with the concepts of complexity classes of different problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain the meaning of algorithm, analysis and design; apply the algorithmic concepts to analyze a given algorithm and compute its time complexity.

CO2: Explain and apply the concept of Divide and Conquer approach in designing algorithms; analyze a divide and conquer algorithm; explain and apply the concept of Greedy approach in designing algorithms for optimization problems.

CO3: Explain and apply the concept of Dynamic Programming in designing algorithms for optimization problems; compare and contrast the Dynamic Programming with Greedy approach and Divide and Conquer approach.

CO4: State and explain Elementary Graph Algorithms; explain and apply the concept of Branch & Bound and Backtracking in designing algorithms for different problems.

CO5: Define and explain the concept of computational complexity, Polynomial Bounded Algorithms, Class NP, Class NP Hard and Class NP Complete.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Algorithm Design paradigms - motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations. Recurrences-substitution method, recursion tree method, master method	L1, L2, L3, and L4	7
MODULE 2: DIVIDE AND CONQUER APPROACH Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations. GREEDY APPROACH Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman	L1, L2, L3, and L4	8
MODULE 3: DYNAMIC PROGRAMMING Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem	L1, L2, L3, and L4	8
MODULE 4: ELEMENTRY GRAPH ALGORITHMS Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search) BACKTRACKING Overview, 8-queen problem, and Knapsack problem BRANCH AND BOUND LC searching Bounding, FIFO branch and bound, LC branch and bound	L1, L2, L3, and L4	9

application: 0/1 Knapsack problem, Traveling Salesman Problem		
MODULE 5: COMPUTATIONAL COMPLEXITY Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.	L1 and L2	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm, MIT Press, ISBN-(ISBN: 978-0262033848)

2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Pearson.

2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms," Addison-Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO2	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO3	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO5	**1**	**1**	**2**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**

1: strongly related, 2: moderately related and 3: weakly related

MLE2407	Analysis & Design of Algorithm Lab	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	0	0	2	1
Pre-requisites/Exposure	Application of Data Structures				
Co-requisites	Nil				

Catalog Description

Designing an algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of complexity and analysis of algorithms.
2. Provide an understanding of different techniques used in designing algorithms for a variety of problems.
3. Equip the students with the concepts of complexity classes of different problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain the meaning of algorithm, analysis and design; apply the algorithmic concepts to analyze a given algorithm and compute its time complexity.

CO2: Explain and apply the concept of Divide and Conquer approach in designing algorithms; analyze a divide and conquer algorithm; explain and apply the concept of Greedy approach in designing algorithms for optimization problems.

CO3: Explain and apply the concept of Dynamic Programming in designing algorithms for optimization problems; compare and contrast the Dynamic Programming with Greedy approach and Divide and Conquer approach.

CO4: State and explain Elementary Graph Algorithms; explain and apply the concept of Branch & Bound and Backtracking in designing algorithms for different problems.

CO5: Define and explain the concept of computational complexity, Polynomialy Bounded Algorithms, Class NP, Class NP Hard and Class NP Complete.

Modules	Blooms level*	Number of hours
MODULE 1: Implementation of the following algorithms: • Insertion Sort • Bubble Sort • Counting Number of Inversions	L1, L2, L3, and L4	3
MODULE 2: Implementation of the following algorithms: • Binary Search (Divide & Conquer) • Merge Sort (Divide & Conquer) • Quick Sort (Divide & Conquer) • Strassen's Matrix Multiplication (Divide & Conquer) • Graph RepresentationGraph Searching	L1, L2, and L3, and L4	5
MODULE 3: Implementation of the following algorithms: • Breadth First Dearch • Depth First Search • Strongly Connected Components • Topological Sort • Fractional Knapsack Problem (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 4: Implementation of the following algorithms: • Kruskal's Algorithm. (Greedy Approach) • Prim's Algorithm (Greedy Approach) • Dijkstra's Algorithm (Greedy Approach) • Bellmanford Algorithm (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 5: • 0/1-Knapsack Problem (Dynamic programming) • Matrix Chain Multiplication (Dynamic programming) • N-Queens Problem (Backtracking)	L1 and L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm, MIT Press, ISBN-(ISBN: 978-0262033848)
2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Fundamentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Pearson.
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms," Addison-Wesley

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	**1**	**1**	**3**	**2**
CO2	**1**	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	**1**	**1**	**3**	**2**
CO3	**1**	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	**1**	**1**	**3**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	**1**	**1**	**3**	**2**
CO5	**1**	**1**	**2**	**2**	**3**	**3**	--	--	--	--	--	--	**1**	**1**	**3**	**2**

1: strongly related, 2: moderately related and 3: weakly related

MLE2404	DATA COMMUNICATION & COMPUTER NETWORKS	L	T	P	C
Version : 2020.1	Date of Approval: July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computers				
Co-requisites	NIL				

Catalog Description

The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP.

Course Objectives

The objective of this course is to

1. To provide an overview of data communication and computer networks, network specific protocols, networking devices, OSI /TCP-IP Layer concepts.
2. To familiarize with the basic taxonomy and terminology of computer networking area.
3. To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite.

Course Outcomes

On completion of this course, the students will be able to

CO1. State the functions of data component in communication, networking devices, characteristics of topologies and describe the functionality of layers in OSI model.

CO2. Explain Error correction and detection techniques; Differentiate between different type of protocols used at data link layer.

CO3. Describe channel allocation problem and illustrate the working and applications of different wireless LANs and WANs standards

CO4. Compare and Contrast different routing algorithms; discuss the frame format of IPv4 and IPv6 .

CO5. Compare and contrast different transport layer protocols and explain various protocols used at application layer.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer networks, evolution of computer networks and its uses, reference models, example networks The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system	L1, L2	8
Module II: The data link layer Data link layer design issues, error detection and correction, data link protocols, sliding window protocols, example of data link protocols-HDLC, PPP Access .	L2, L3 and L4	8
Module III: Medium access layer Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, CSMA/CA, IEEE Standard 802 for LAN and MAN, Bridges, Wireless LANs. Introduction to wireless WANs: Cellular Telephone and Satellite Networks, SONETISDH, Virtual-Circuit Networks: Frame Relay and ATM.	L2, L3	9
Module IV: The network layer Network layer concepts, design issues, static and dynamic routing algorithms, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion controland quality of service, internetworking, Ipv4	L2, L3 and L4	6
Module VI: The transport layer The transport services, elements of transport protocols, TCP and UDP. The application layer: Brief introduction to presentation and session layer, DNS,E-mail**,** WWW	L2, L3and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text & References:

Text:

1. Computer networks: Tanenbaum, Andrew S, Prentice Hall
2. Data communication &Neworking: Forouzan, B. A.

References:

1. Computer network protocol standard and interface: Uyless, Black
2. Data and Computer Communications, Seventh Edition (7th.) William Stallings Publisher: Prentice Hall
3. Computer Networking: A Top-Down Approach Featuring the Internet (3rd Edition) by James F. Kurose

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**	**--**
CO2	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO3	**1**	**1**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**---**
CO5	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**---**

1: strongly related, 2: moderately related and 3: weakly related.

MLE 2406	**Data Communication and Computer Networks Lab**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

The objective is to acquaint the students with the basics of data communication and networking. A structured approach to explain how networks work from the inside out is being covered. The physical layer of networking, computer hardware and transmission systems have been explained. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side), routing protocols and data link layer protocols.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of data communication and networking.
2. Provide an overview of various protocols and their configurations using networking devices and servers.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the use of Command Line Interface (CLI) and other features and Cisco Packet Tracer; describe and distinguish networking devices and transmission media.

CO 2: Apply various application layer protocols capability on server device including DNS, DHCP, HTTP, SMTP and POP.

CO 3: Construct network topology and operate routing protocols (RIP, OSPF and EIGRP) for end-to-end connectivity.

CO 4: Illustrate the use of data link protocols-HDLC and PPP; determine network connectivity issues and fix them.

Modules	Blooms level*	Number of hours
LABORATORY SESSION 1 THE PHYSICAL LAYER 1. Introduction to different types of transmission media and cables. 2. Introduction to various networking devices and equipment. 3. Construct network topology and understand configuration of devices using Cisco Packet Tracer (tool).	L2, L3	6
LABORATORY SESSION 2 THE APPLICATION LAYER 1. Configuration of Domain Name System (DNS) server using Cisco Packet Tracer. 2. Configuration of Dynamic Host Configuration Protocol (DHCP) server using Cisco Packet Tracer. 3. Configuration of mail server using Cisco Packet Tracer. 4. Configuration of web server using Cisco Packet Tracer.	L3	6
LABORATORY SESSION 3 THE NETWORK LAYER 1. Configure Routing Information Protocol (RIP) using Cisco Packet Tracer. 2. Configure Open Shortest Path First (OSPF) routing protocol using Cisco Packet Tracer. 3. Configure Enhanced Interior Gateway Routing Protocol (EIGRP) using Cisco Packet Tracer.	L3	6
LABORATORY SESSION 4 DATA LINK LAYER 1. Configure and Analyse the working of data link control protocols-HDLC and PPP access. 2. Configure PPP security protocols-PAP and CHAP using Cisco Packet Tracer. 3. Determine various issues in network connectivity and communication using troubleshooting commands. .	L3,L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Cisco Networking Academy Programme CCNA 3 & 4 Lab Companion, 3rd Edition, Pearson Education, 2003.

Reference Books

1. Scott Empson, CCNA Routing and Switching portable command guide, 3rd Edition, Cisco Press, 2016.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO2	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO3	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO4	**1**	**1**	**2**	**3**	**3**	--	--	--	--	--	--	--	**1**	**3**	--	--
CO5	**1**	**1**	**2**	**3**	**3**	--	--	--	--	--	--	--	**1**	**3**	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE 2408	Artificial Neural Network	L	T	P	C
Version 2020.1	Date of Approval: July 2020	2	-	-	2
Pre-requisites/Exposure	Basic Knowledge of Brain functioning				
Co-requisites	Nil				

Catalog Description

The course provides introduction to neural network and a deep insight into the basics of brain & its functioning basics of various neural models & neural schema used for learning. With this course students would be able to know the basics of each introductory feature of human brain and its features which would prove to be very helpful throughout their degree and would prove helpful in understanding other related subjects also.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of learning of brain problem solving techniques and develop proficiency in creating neural structures using the MATLAB.
2. Provide an overview of various control statements, data structures, packages related to image addition, graphics, different types of neural models.

Course Outcome

On completion of this course, the students will be able to

CO 1: Define Artificial Neural Network & its similarity to biological neural network and explain its application in our day to day life.

CO 2: Analyze ANN learning, Error correction learning, Hebbian learning, Competitive learning and Boltzman Learning.

CO 3: Implement simple perceptron, Perceptron Learning rule, modified perceptron learning rule, feed forward neural network & feedback Neural Network.

CO 4: Explain self-organizing Map, Hopfield network, Adaptive resonance theory and its various learning rules.

CO 5: Analyze memory-based learning, Associative learning, Bi-directional learning and Auto associative learning.

Modules	Blooms	Number

	level*	of hours
Module-I Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications	L1, L2 and L3	6
Module-II Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule	L1, L2 and L3	6
Module-III Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.	L2, L3 and L4	6
Module-IV Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.	L2, L3 and L4	6
Module V Associative memory, auto-associative memory, bi-directional associative memory.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Book:

1. Kenji Suzuki (ed.) - InTech **,** 2013
2. Todd Troyer - University of Texas at San Antonio**,** 2005.

Reference Book:

1. MATLAB 2017 Book released by MATWORS

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**												**1**			
CO2	**1**												**1**		**1**	
CO3		**1**	**2**										**1**			
CO4		**1**	**2**	**1**									**1**		**1**	
CO5			**2**										**1**			

MLE 2409	Artificial Neural Network Lab	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	1	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various neural models required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Neural Network model in MATLAB

CO5: Demonstrate usage of applications involving with Image processing & Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (a) Basic Variable deceleration & its operation (b) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (a) Basic use of Matrix and Graph Plotting (b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (a) Practice on ANN toolbox function in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN tool box & Image processing toolboix (a) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Kenji Suzuki (ed.) - InTech , 2013
2. Todd Troyer - University of Texas at San Antonio , 2005

Reference Books

1. MATLAB 2017 Book realeased by MATWORS.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

MLE2410	**Communication System**	L	T	P	C
Version 2020.1	Date of Approval: July, 2020	2	0	0	2
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basic principles of the design and analysis of modern communication systems. It will provide a thorough study of both analog and digital modulation and demodulation schemes. The performance analysis of various techniques based on requirements of noise and bandwidth will also be explained. It also introduces the students to the information theory and coding for basic understanding of mobile communication system.

Course Objectives

The objective of this course is to

1. Provide a thorough introduction to analog and digital communications
2. Provide in depth study of various modulation and demodulation techniques.
3. Introduce students to basics of information theory and coding for applications in mobile communication.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and Distinguish analog and digital communication systems.

CO2. Differentiate modulation and demodulation techniques of AM and FM systems and compare them in terms of Bandwidth and noise.

CO3. Distinguish and categorize various digital modulation techniques.

CO4. Describe Information theory and coding for applications in mobile communication system by solving different encoding problems.

Modules	**Blooms level***	**Number of hours**
MODULE I:	L1 and	4

INTRODUCTION Communication Process, Source of Information, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, analog versus digital communications	L2	
MODULE II: AMPLITUDE MODULATION Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.	L1, L2, L3and L4	8
MODULE III: ANGLE MODULATION Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.	L1, L2, L3and L4	9
MODULE IV: PULSE MODULATION Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems. Basics of Digital Communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction	L1, L2, L3 and L4	6
MODULE V: NOISE Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.	L1 and L2	4
MODULE VI: INTRODUCTION TO INFORMATION THEORY	L1, L2 and L3	5

Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. B. P. Lathi and Zhi Ding ,"Modern Digital and AnalogCoimmunication Systems", Fourth Edition, Oxford University Press, 2009

2. Wayne Tomasi, "Electronic Communication systems", 5th edition, Pearson Education,2008

Reference Books

1. Simon Haykin, "Communication Systems", Third Edition, John Wiley & Sons,2007

2. Taub and schilling, "Principles of Communication Systems", Third Edition, TMH,2008

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	_	--	_	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO2	**1**	**3**	**2**	--	--	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO3	**1**	**3**	**2**	--	--	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO4	**1**	**2**	**2**	--	--	**3**	--	--	--	--	--	--	**1**	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2411	COMMUNICATION SYSTEMS LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites	Nil				

Catalog Description

To impart knowledge on Amplitude Modulation and Angle modulation principles, generation, and its types. Also, to understand the basic concepts of pulse modulation techniques like PCM and PSK.

Course Objectives

The objective of this course is to

1. To provide the basic skills required to understand, develop, and design of various engineering applications involving analog communication theory. To provide basic laboratory exposures for communication principles and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the carrier modulation techniques like AM and FM modulation.

CO2: Study digital carrier modulation techniques using amplitude shift keying and Frequency shift keying.

CO3: Demonstrate various pulse modulation techniques (PCM), DM, ASK, DPSK and QPSK.

List of Experiments:

Modules	Blooms level*	Number of hours
1. To study the sampling and reconstruction of a given signal. 2. To study amplitude modulation and demodulation. 3. To study frequency modulation and demodulation. 4. To study time division multiplexing.	L1, L2	8

5. To study pulse amplitude modulation. 6. To study delta and adaptive delta modulation and demodulation. 7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.	L3 and L4	10
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying. 9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations. 10. To study quadrature phase shift keying & quadrature amplitude modulation.	L2, L4	10

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**													**2**	
CO2	**2**	**2**			**2**										**2**	
CO3	**2**										**2**				**2**	

1: strongly related, 2: moderately related and 3: weakly related

MLE2412	Web Designing Technologies	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTMLwith the concept of the tags, script, and code that create web pages. To understand how the web and web pages workand web pages styles using CSS3.After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.
2. Demonstrate the application of HTML5 in developing solutions to web site creation andunderstanding how CSS will affect web page creation.
3. Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.

CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.

CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.

CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.

CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	**Blooms level***	**Number of hours**
Module I History of HTML, Basic HTML Structure, Creating title, Creating header and footer, Adding Comments, Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, setting icons for web page, Creating hypertext, anchor tag, Creating List, Creating Definition List, Creating Hyper Text Links, Creating Link Lists.	L2 and L3	8
Module II CSS building blocks, working with style sheets, Creating different types of style sheets- External , embedded and inline style sheets, defining selectors , Selecting on basis of class and id, selecting elements based on the attributes, combining selectors, Formatting text with styles, setting font properties.	L3 and L4	7
Module III CSS: Layout with style, changing the background color, setting border, changing the cursor, style sheets for mobile to desktop, working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media .	L2 and L3	7
Module IV Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, Spanning Columns, Spanning Rows Assigning Background Colors, Frame Elements, Creation of Frame Based Pages.	L3	7
Module V: Workingwith scripts : Loading an external script, testing&debugging web pages, publishingyour web page on the web.	L2	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	--	**1**	--	**1**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO2	--	--	**2**	--	**2**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO3	--	--	**1**	--	**1**	--	--	--	--	**2**	--	--	**1**	--	--	--
CO4	--	--	**2**	--	**1**	--	--	--	--	**2**	--	--	**1**	--	--	--
CO5	--	--	**1**	--	**2**	--	--	--	**2**	**1**	--	--	**1**	**1**	--	**2**

1: strongly related, 2: moderately related and 3: weakly related

MLE2413	**Web Designing Technologies** Lab	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce the basic concepts of HTML5 and CSS3. To explore and implement the various concepts of website design using HTMLwith the concept of the tags, script, and code that create web pages. To understand how the web and web pages workand web pages styles using CSS3.After completing this course students can easily develop static web sites and style them using CSS3.

Course Objectives

The objective of this course is

1. Understand the advanced features of HTML5 which includes images, links, tables, frames and forms etc and gives an overview of CSS3 which is used to add style to the web pages.

2.Demonstrate the application of HTML5 in developing solutions to web site creation andunderstanding how CSS will affect web page creation.

3.Design a responsive web site using HTML5 and CSS3.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic concepts of HTML, structure of HTML. Apply the different tags for images, hypertext and lists in web pages.

CO 2: Illustrate the different ways to use styles in web pages using CSS? Apply CSS style sheets for formatting text in web pages.

CO 3: Explain the layout of CSS style and describe how to add audio and video in html web pages.

CO 4: Demonstrate the use of Table and frames in web pages and setting properties for tables and frames.

CO 5: Explain the writing scripts in web pages and publishing Webpages on web.

Modules	Blooms level*	Number of hours
Module I **Programs based on :** • Basic HTMLStructure, Creating title, Creating header and footer, Adding Comments, • Formatting Text, Specifying time, Indicating citations/references, quotes, abbreviations, • pre-formatted text, Inserting Images, Creating Image Links, Scaling images with the browser, • setting icons for web page, Creating hypertext, anchor tag, Creating List, • Creating Definition List, Creating Hyper Text Links, Creating Link Lists.	L2 and L3	6
Module II & Module III **Programs based on:** • CSS style sheets, Creating different types of style sheets- External , embedded and inline style sheets, • Selection on basis of class and id, selecting elements based on the attributes, combining selectors, • Formatting text with styles, setting font properties. • Changing the background color, setting border, changing the cursor, • style sheets for mobile to desktop, • working with web fonts, creating forms, organizing the form elements. Adding audio , video and other multi-media .	L2,L3 and L4	4
Module IV **Programs based on:**	L3	4

• Tables and frames, Creating Tables, Table Element, Adding Border, Adding Column Headings, • Adding Spacing and Padding, Adding a Caption, Setting the table Width and Height, Add Row Headings, • Aligning Cell contents, Setting Column Width, Centering a Table, Inserting and Image, • Spanning Columns, Spanning Rows Assigning Background Colors, • Frame Elements, Creation of Frame Based Pages.		
Module V: **Programs based on** Workingwith scripts : Loading an external script, testing&debugging web pages, publishingyour web page on the web.	L2	1

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. HTML HTML5 and CSS3, Seventh Edition: Visual QuickStart Guide ,Elizabeth Castro and Bruce Hyslop.
2. HTML, XHTML and CSS Bible, Steven M. Schefar, Wiley Publishing, Inc.

Reference Books:

1. HTML & CSS: The Complete Reference, Fifth Edition ,Thomas A. Powell, Tata McGraw Hill.
2. HTML5: Up and Running ,Mark Pilgrim, O'Reilly Media, Inc.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO2	--	--	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO3	--	--	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO4	--	--	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO5	--	--	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

V SEM

MLE2501	COMPUTER ARCHITECTURE	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Logic Gates				
Co-requisites	nil				

Catalog Description

Computer architecture is concerned with the structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It includes basic register transfer language and computer organization and design. Complete insight on the working of CPU, Memory and I/O communication will be provided. Pipeling and related topics will also be discussed.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of computer architectures and their modules.
2. Provide an overview of various algorithms used and hardware implementation computer.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain about Register transfer language and various micro operations of arithmetic logic unit.

CO2. Explain about the organization of computer modules and their details.

CO3. Explain in details of central processing unit like general purpose register, accumulator etc. and computer arithmetic.

CO4. Explain memory organization of computer and their interconnections. Details of direct memory access.

CO5. Explain parallel processing and pipeline techniques.

Modules	Blooms level*	Number of hours
Module I: Register Transfer Language Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.	L1, L2 and L3	10
Module II: Basic Computer Organizations and Design Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed control: Control Memory, Address Sequencing, Design of Control Unit	L1,L2	9
Module III: Central Processing Unit Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC Computer Arithmetic: Introduction, Addition and Subtraction Algorithm,Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations	L1,L2, L3	10
Module IV: Memory and Intersystem Communication and Input output organisation Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniues, Virtual Memory, Memory Management Hardware Intrasystem communication and I/O: Peripheral Devices, Input-Output Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer,Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication	L1,L2, L3.	10
Module V: Pipelining, Vector Processing and Multiprocessors Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Multiprocessors: Characteristics of Multiprocessors	L1 and L2	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
2. Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References Books:

1. WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
2. Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
3. John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
4. M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	ATT	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

ATT: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO2	1	--	--		--	--	--	--	--	--	--	--	--	2	--
CO3	1	2	3	3		--	--	--	--	--	--	--	2	1	--
CO4	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2502	Java Programming	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

The objective is to impart programming skills used in this object-oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes, objects, packages, swings, socket programming.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of byte code and platform independence, demonstrate basic java-based application development using operators, if-else, loops and arrays.

CO2: Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages.

CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.

CO4: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.

CO5: Explain the architecture of applet and concept of swing package. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
Module I: Java Basics Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.	L1, L2 and L3	6
Module II: Java Object Oriented Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package. .	L2 and L3	7
Module III: Exception Handling and Threading Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception. Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.	L2, L3 and L5	8
Module IV: Event Handling And AWT Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers	L2, L3, L4 and L5	8
Module V: Java Advanced Applet Class, Architecture, Skeleton, Display Methods. Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes. Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text:

1. "JAVA The Complete Reference" by Patrick Naughton& Herbert Schild, 10th Edition,TMH
2. "Introduction to JAVA Programming a primer", E.Balaguruswamy,4th Edition,TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI
2. "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill,1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2505	Java Programming Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the basic features of contemporary java are implemented and demonstrated. Problems or programs will be related to concepts of classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming. Concepts covered would enable them to create basic and complex console and graphical based applications for desktop and Internet

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of various basic java features required in solving basic and complex problems.
2. Provide a demonstration of basic java programming concepts like classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the concepts learned of operators, if-else, loops and arrays to java based application development.

CO2: Demonstrate the use of various types of inheritances, polymorphisms, class objects, inheritances, packages and other concepts to basic and complex java programming problems.

CO3: Apply the knowledge of exception handling and multithreading concepts for some simple and complex applications.

CO4: Apply knowledge of event handling and AWT controls to create some new dynamic graphical applications.

CO5: Demonstrate graphical applications based on java applets, swings and event handling.

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Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using Objects and classes, Variable Types, Modifier Types, operators, Loops Decision Making, Strings and Arrays, (a) WAP to display "Hello, it's a first program in java". (b) WAP to find sum of two integers taken as input from user at runtime. (c) WAP to find sum of two float numbers taken as command line arguments (d) WAP to find changed case of entered character. (e) WAP to find maximum of 3 integer numbers taken as input from user at runtime. (f) WAP in java to find out the greatest out of ten numbers stored using arrays. (g) WAP to create class with "name" as String and "age" as integer data members. The class should have two methods to take input from user and display the data. (h) WAP to find factorial of a number using class and object.	L3, L5	6
2. Sample Programs using Inheritance, Overriding, Polymorphism, Interfaces, Packages a. WAP in java to illustrate the concept of interfaces. b. WAP to create a package as MyPack having a class with three methods: max, fact and show. Use it in other folder with setting classpath and without setting class path. c. Write a program in java to showcase uses of super keyword	L3, L5	4
1. Sample Programs using exception handling and threads a) Write a program to demonstrate the use of nesting of try-catch block b) WAP in java to illustrate the concept of using multiple catch clauses to handle different types of exceptions. c) WAP in java to create a user defined Exception and throw it explicitly. d) Demonstrate thread using Thread class and Runnable interface e) Demonstrate various thread methods using a program	L3, L5	6
(a) Sample Programs using event handling and AWT controls (b) Write a program to display "hello" in different color where user clicks left mouse button and "world" where right mouse button is clicked. Use black background. (c) WAP in java to create a Frame and handle window-closing event	L3, L5	6

implementing the WindowListener interface. (d) WAP to create an Applet having various different buttons, recognizing them using action command string method and handling click event generated by them. (e) WAP to create a frame and illustrate the concept of using an adapter class in place of interfaces for handling various mouse events generated over frame window. (f) WAP in java to create a frame with AWT controls (like label, push buttons, Checkbox, Checkbox Group) and handle various events generated by them. (g) WAP in java to create a frame with various AWT controls (like choice, list, TextField and Buttons) and handle the events thrown by them.		
5. Sample Programs using applets, swings and stream socket a) . Write an applet which will display "HAPPY" and "DEEPAVALI" as: The word "HAPPY" will roll from top to bottom and "DEEPAVLI" from bottom to "top" . Both will run at the same speed and stop simultaneously at the center of the applet. b) Write an applet to display last 32 shades of red, green and blue in equal sized square grid accompanied by appropriate labels like" Last 32 shades of Red/Green/Blue color". Make use of BorderFactory to apply border for each individual shade. c) Create an applet with one single button with caption "Click". On clicking the button will open a new Frame with title "Factorial". The frame will have two three controls :TextField, Label and button. On clicking button calculate the factorial entered in TextField control. d) Create Java programs to demonstrate day time client and server e) Create java programs to create echo client and server	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text:

1. "JAVA The Complete Reference" by Patrick Naughton& Herbert Schild, 10th Edition,TMH
2. "Introduction to JAVA Programming a primer", E. Balaguruswamy,4th Edition, TMH

References:

1. “Introduction to JAVA Programming” By Daniel/Young PHI .
2. “Java Script”, By Jeff Frentzen and Sobotka, Tata McGraw Hill,1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	35
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE2506	PYTHON PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, I/O, and visualization using the Python programming language.

Course Objectives

The objective of this course is

1. Equip the students with the basic feature of python required in solving complex problems and build GUI applications
2. Provide a practical knowledge of implementation/demonstration of python programming concepts like of lists, tuples, dictionaries, Object Oriented Programming concepts in Python, Strings and Files in Python.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basics of python programming usingif-else, loops and List, Dictionary, tuples.

CO 2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.

CO 3: Demonstrate the ability to write database applications in Python

CO 4: Demonstrate Files Handling in Python.

CO 5: Demonstrate database operation and GUI applications in python.

Modules	Blooms level*	Number of hours
1. Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5,between 2000 and 3200 (both included). The numbers obtained should be printed in a comma-separated sequence on a	L1,L2 and L3	4

single line. 2. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. 3. Define a function max() that takes two numbers as arguments and returns the largest of them. Use the if-then-else construct available in Python. (It is true that Python has the max() function built in, but writing it yourself is nevertheless a good exercise.) 4. Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.		
5. Define a function that computes the length of a given list or string. (It is true that Python has the len() function built in, but writing it yourself is nevertheless a good exercise.) 6. Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise. 7. Write a function translate() that will translate a text into "rövarspråket" (Swedish for "robber's language"). That is, double every consonant and place an occurrence of "o" in between. For example, translate("this is fun") should return the string "tothohisosisosfofunon". 8. Define a function sum() and a function multiply() that sums and multiplies (respectively) all the numbers in a list of numbers. For example, sum([1, 2, 3, 4]) should return 10, and multiply([1, 2, 3, 4]) should return 24. 9. Define a function reverse() that computes the reversal of a string. For example, reverse("I am testing") should return the string "gnitset ma I".	L2 and L3	6
10. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user 11. Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5. 12. Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides evenly into another number. For example, 13 is a divisor of 26 because 26 / 13 has no remainder.) 13. Take two lists, say for example these two: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13] and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.	L2, L3, L4 and L5	4
14. Ask the user for a string and print out whether this string is a palindrome or	L2, L3 and	4

not. (A palindrome is a string that reads the same forwards and backwards.) 15. Let's say I give you a list saved in a variable: a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]. Write one line of Python that takes this list a and makes a new list that has only the even elements of this list in it. 16. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game) **Remember the rules:** • Rock beats scissors • Scissors beats paper • Paper beats rock	L4	
14. Write a program that asks the user how many Fibonnaci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. Make sure to ask the user to enter the number of numbers in the sequence to generate.(Hint: The Fibonnaciseqence is a sequence of numbers where the next number in the sequence is the sum of the previous two numbers in the sequence. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, …) 15. Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates. **16.** Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.	L2, L3 and L4	1

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
3. Patrick Naughton& Herbert Schild ,"JAVA The Complete Reference", 10th Edition , TMH

Reference Book

4. Daniel/Young , Introduction to JAVA Programming" , PHI.
5. Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

1: strongly related, 2: moderately related and 3: weakly related

MLE2503	**FUNDAMENTALS OF MACHINE LEARNING**	L	T	P	C
Version: 2020.1	Date of Approval: July 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of Programming				
Co-requisites	Nil				

Catalog Description

Python is a general-purpose high level programming language that is being increasingly used in data science and in designing machine learning algorithms. This course provides an introduction to Python and its libraries like numpy, pandas, matplotlib and explains how it can be applied to develop machine learning algorithms that solve real world problems.

This course starts with Python language followed by machine learning and covers concepts of python and all important concepts such as exploratory data analysis, data preprocessing, data visualization and clustering, classification, regression and model performance evaluation etc. This course covers all three types of machine learning algorithms including Supervise, Unsupervised and Reinforcement learning.

Course Objectives

The objective of this course is to

3. Equip the students with concepts of programming and problem solving and develop proficiency in creating applications using the Python Programming Language.
4. Provide knowledge of various types of machine learning models, its algorithms and development of the models using Python programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop programs in Python to develop algorithmic solutions to computational problems.

CO2: Manage data in python using available data structures such as string, list, and dictionary and file handling operations.

CO3: Apply functions to decompose python program and develop modules and packages.

CO4: Preprocess and analyze data before applying suitable machine learning models.

CO5: Understand basic concepts and techniques of Machine Learning and apply machine learning algorithms to develop machine learning models for solving real word problems.

Modules	**Blooms level***	**Number of hours**
Module-I Python basis: Installing Anaconda, Basics of Python: basic syntax, interactive shell, editing, saving, and running a script. Working with jupyternotebook,datatypes,operators,conditional statements, String, functions, Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.modules and packages.	L1, L2 and L3	6
Module-II Arrays and Matrices: The NumPy Module, Creating Arrays and Matrices, Copying, Arithmetic Operations, Cross product & Dot product , Saving and Restoring, Matrix inversion, Vectorized Functions Data Visualization: The Matplotlib Module, Histograms, Bar charts Density Plots, Box Plots, Scatter Plots, Heat Maps etc. DataFrames: Pandas , Loading data from different sources, Concept of DataFrames,Working with Dataframes such as selecting, filtering, grouping, joining etc. Dealing with missing values	L1, L2 and L3	7

Module-IV Introduction to Machine Learning: Introduction, Applications, Framework for developing machine learning models Supervised Learning: Linear regression,ridge and lasso regression Multiple linear regression, logistic regression, classification and regression trees,decision tree, Ensemble techniques,,Support Vector Machines, K-nearest neighbors,naive bayes classifier. Representing Data and Engineering Features. Categorical Variables One-Hot-Encoding (Dummy Variables), Label encoding	L2, L3 and L4	6
Preprocessing and Scaling , Different Kinds of Preprocessing ,Applying Data Transformations Overfitting, underfitting, bias-variance tradeoff. various metrics for regression,classification,confusionmatrix,crossvalidation,precision-recall curve,ROC-AUC curve,gridsearch,Algorihtm chains and pipeline,	L2, L3 and L4	7
Module-IV Unsupervised Learning: Introduction to Clustering, k-means clustering Hierarchical clusting, Dimensionality Reduction, Feature Selection, PCA, factor analysis, manifold learning.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Pilgrim, Dive, "Introduction to Python", 3rd Edition, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist Learning with Python" 2nd Edition Green Tea Press,2002.
3. Manaranjan Pradhan and U Dinesh Kumar, "Machine Learning using Python" , Wiley Publication
4. Andreas C. Müller & Sarah Guido "Introduction to Machine Learning using python",Oreilly Publications.

Reference Books

1. John V. Guttag, "Introduction to Computation and Programming using Python", Prentice Hall of India, 2014.

2. Mark Lutz, “Learning Python: Powerful Object-Oriented Programming‖”, Fifth Edition, O‘Reilly, Shroff Publishers and Distributors, 2013.
3. Michale Bowles “Machine Learning in Python: Essential Techniques for Predictive Analysis” Wiley Publication.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
CO2	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
CO3	1	3	2	1	2	--	--	--	--	--	--	--	1	1	2	--
CO4	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	--
CO5	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	---

1: strongly related, 2: moderately related and 3: weakly related

MLE2535	**Summer Internship Evaluation-I**	L	T	P	C

Version: 2020.1	Date of Approval: JULY 2020	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**1**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO2	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO3	**1**	**1**	**2**	**3**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

MLE 2509	**FUZZY LOGIC & GENETIC ALGO**	L	T	P	C

Version 2017.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Computer Concepts				
Co-requisites	Nil				

Catalog Description

In this course the concepts of fuzzy logic and genetic algorithm are discussed in detail. This course will provide an understanding of fuzzy logic and genetic algorithm and an outlook on the applications of these techniques to solve real world problems. It also provides an understanding of fuzzy-genetic based machine learning.

Course Objectives

The objective of this course is to

1. Provide the student with the basic understanding of genetic algorithm and fuzzy logic fundamentals, program and design the related systems.
2. Equip the students with concepts of fuzzy logic based solutions.
3. Provide an overview of performance of genetic algorithm, simulated annealing and tabu search.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop the skills to gain a basic understanding of genetic algorithm and fuzzy logic theory.

CO2: Appreciate the learning and adaptation capability of neural and fuzzy systems.

CO3: Apply various operators to optimize. Perform mathematical calculation of the GA

CO4: Able to identify the present application areas of fuzzy logic and GA

CO5: Explain the working principle and compare the performance with other methods – Simulated annealing and Tabu search.

Modules	Blooms level*	Number of hours

MODULE 1: Crisp sets: Overview, Fuzzy sets : Basic types and concepts, Characteristics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets	L1, L2 and L3	8
MODULE 2: Types of operations, Fuzzy complements, Fuzzy intersection: t-norms, Fuzzy union: t-conorms, Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables, Arithmetic operations on intervals, Arithmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.	L2, L3 and L6	10
MODULE 3: General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata. Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics	L1, L3 and L4	10
MODULE 4: Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithm genetic modelling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.	L1, L3 and L4	10
MODULE 5: Genetic technology:- steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.	L3, L4 and L6	10
MODULE 5: Genetic Algorithm in engineering and optimization-natural evolution – Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning-Genetic Algorithm and parallel processors- composite laminates- constraint optimization- multilevel optimization- real life problem.	L3,L4,L6	05

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Fuzzy Logic with Engineering Applications, 3rd Ed., T. J. Ross, Wiley India Pvt. Ltd., India, 2011.
2. Fuzzy Logic Intelligence Control & Information, John Yen and Reza Langari, Pearson Education Limited, India, 2007.
3. David E.Goldberg, "Genetic Algorithms in search , Optimization & Machine Learning"
4. Melanie Mitchell- 'An introduction to Genetic Algorithm'- Prentice-Hall of India

Reference Books

1. Understanding Neural Networks and Fuzzy Logic, S. V. Kartalopoulas, IEEE Press and Prentice Hall India, India, 2000.
2. Neuro-Fuzzy and Soft Computing – A Computational Approach to Learning and Machine Intelligence, Prentice Hall India, India, 2009.
3. William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"
4. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems "
5. David A. Coley, "An Introduction to Genetic Algorithms for Scientists and Engineers ".

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	-
CO2	**1**	--	**2**	**3**	--	--	--	--	--	--	--	**1**	**2**	--	-
CO3	**1**	**2**	**3**	**3**	**3**	--	--	--	--	--	--	--	**1**	**2**	-

CO4	**1**	**1**	**2**	**--**	**--**	**--2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**
CO5	**1**	**1**	**2**	**--**	**-2-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

MLE2510	Advanced Web Designing Technologies	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	Knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of java scripts and apply them to create basic scripts

CO2: Explain the fundamentals of client side scripting ,document object model and apply them to create dynamic websites.

CO3: Apply basic APIs of bootstrap library to create dynamic websites

CO4: Demonstrate bootstrap java plugins and its use in designing sample websites.

CO5: Explain and apply react APIs in client side scripting

Modules	Blooms level*	Number of hours
Module 1: Basics Introduction to JavaScript, JavaScript Core Features—Overview, Data Types and Variables, Operators, Expressions, and Statements, Functions, Objects, Array, Date, Math, and Type-Related Objects, Regular Expressions	L2 and L3	8
Module 2:Fundamental of Client-Side JavaScript JavaScript Object Models, The Standard Document Object Model, Event Handling, Controlling Windows and Frames, Handling Documents, Form Handling, Dynamic Effects: Rollovers, Positioning, and Animation, Navigation and Site Visit Improvements, Browser and Capabilities Detection Advanced Topics: JavaScript and Embedded Objects, Remote JavaScript, JavaScript and XML	L2 and L3	7
Module 3: Introduction to Bootstrap (Part 1) **Bootstrap Scaffolding:** What Is Bootstrap?**,** Bootstrap File Structure**,** Basic HTML template**,** Global Styles Default: Grid System, Basic Grid HTML, Offsetting Columns, Nesting Column, Fluid Grid System, Container Layouts **Bootstrap CSS:** Typography, Code, Tables, **Bootstrap Layout Components:** Dropdown Menus, Button Groups, Buttons with Dropdowns, Navigation Elements, Navbar, Breadcrumbs Pagination, Labels, Badges, Typographic Elements	L2 and L3	7
Module 4: Introduction to Bootstrap (Part 2) **Bootstrap JavaScript Plugins:** Overview**,** Transitions **,**Modal **,**Dropdown**,** Scrollspy**,** Toggleable Tabs**,** Tooltips**,** Popover	L2and L3	7
Module 5: The React Library Writing Your First React App, Thinking in React, Server Communication, JSX and the Virtual DOM, Advanced Components, Forms in React.	L2 and L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Javascript: The Complete Reference",Thomas Powell ,FritzSchneider,Oreilly, 2004.
2. "Bootstrap", Jake Spurlok, Orielly, 2013.
3. "Full Stack React", Anthony Accamozo, Fullstack, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	**1**	**1**	--	**1**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO2	--	**1**	**2**	--	**2**	--	--	--	--	**1**	--	--	**1**	--	--	--
CO3	--	**1**	**1**	--	**1**	--	--	--	--	**2**	--	--	**1**	--	--	--
CO4	--	**1**	**2**	--	**1**	--	--	--	--	**2**	--	--	**1**	--	--	--
CO5	--	**1**	**1**	--	**2**	--	--	--	**2**	**1**	--	--	**1**	**1**	--	**2**

1: strongly related, 2: moderately related and 3: weakly related

MLE2511	Advanced Web Designing Technologies Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Knowledge of Internet fundamentals				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of java scripts and apply them to create basic scripts

CO2: Explain the fundamentals of client-side scripting,document object model and apply them to create dynamic websites.

CO3: Apply basic APIs of bootstrap library to create dynamic websites

CO4: Demonstrate bootstrap java plugins and its use in designing sample websites.

CO5: Explain and apply react APIs in client-side scripting

Modules	Blooms level*	Number of hours
Module 1: Basics **Programs based on:** • JavaScript Core Features—Overview, • Data Types and Variables, Operators, Expressions, and Statements, Functions, • Objects, Array, Date, Math, Type-Related Objects, • Regular Expressions	L2 and L3	2
Module 2:Fundamental of Client-Side JavaScript **Programs based on:** • JavaScript Object Models, The Standard Document Object Model, • Event Handling, Controlling Windows and Frames, Handling Documents, • Form Handling, Dynamic Effects: Rollovers, Positioning, and Animation, • Navigation and Site Visit Improvements, Browser and Capabilities • Detection Advanced Topics: JavaScript and Embedded Objects, Remote JavaScript, JavaScript and XML	L2 and L3	3
Module 3: Introduction to Bootstrap (Part 1) **Programs based on:** • Bootstrap File Structure**,** Basic HTML template**,** Global Styles	L2 and L3	3

• Default: Grid System, Basic Grid HTML, Offsetting Columns, Nesting Column, Fluid Grid System, Container Layouts • Typography, Code, Tables, • Dropdown Menus, Button Groups, Buttons with Dropdowns, Navigation Elements, Navbar, • Breadcrumbs Pagination, Labels, Badges, Typographic Elements		
Module 4: Introduction to Bootstrap (Part 2) **Programs based on:** • Transitions **,**Modal **,**Dropdown**,** • Scrollspy**,** Toggleable Tabs**,** • Tooltips**,** Popover	L2and L3	2
Module 5: The React Library • Writing Your First React App, • Thinking in React, Server Communication, • JSX and the Virtual DOM, • Advanced Components, • Forms in React.	L2 and L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Javascript: The Complete Reference",Thomas Powell ,FritzSchneider,Oreilly, 2004.
2. "Bootstrap", Jake Spurlok, Orielly, 2013.
3. "Full Stack React", Anthony Accamozo, Fullstack, 2017.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--
CO5	--	1	1	--	2	--	--	--	2	1	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

VI SEM

Course Code : MLE2601	**Research Methodology and Technical Report Writing**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

1. Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
2. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
3. It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Classify different research types, explain steps in research process and planning research proposal.

CO2. Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3. Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4. Demonstrate technical and scientific report writing skills, describe plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	**4**
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.	L1, L2, L3	**5**
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	**10**
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	**5**

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.

Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.

Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO 2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO 3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO 4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3
CO 5	2	1	1	-	-	-	-	-	-	-		1	3	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

MLE2604	Advanced Java Programming	L	T	P	C
Version 2017.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Java Programming				
Co-requisites	NIL				

Catalog Description

In this course the advanced features of contemporary java are discussed in detail. Concepts covered would enable them to handle complex programs relating to managing data and processes over the network. Discussion will be on relating to concepts of remote method invocation to working with swings architecture. Further practical implementation of database connectivity and using them in servlet and jsp based applications will be made.

Course Objectives

The objective of this course is to

1. Equip the students with the advanced feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of advanced java programming concepts like database programming with servlets and jsp.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of an Remote method invocation application, demonstrate swing based application developed using concepts of remote method invocation

CO2: Distinguish between various java and open database connectivity drivers and able to solve complex programming problems involving database interaction.

CO3: Describe servlet and its lifecycle, along with demonstrate and design solutions for some complex dynamic web applications using servlets.

CO4: Explain jsp scripting and Differentiate between processing of servlets and jsp scripting pages. Apply knowledge of servlets and jsp scripting to create some new dynamic web applications.

CO5: Explain the architecture of Model View Controller and struts. Demonstrate applications based on java beans and struts.

Modules	Blooms level*	Number of hours
MODULE 1: DISTRIBUTED COMPUTING Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.	L1, L2 and L3	6
MODULE 2: DATABASE CONNECTIVITY ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql. .	L2 and L3	7
MODULE 3: SERVLET PROGRAMMING Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.	L2, L3 and L5	8
MODULE 4: JSP PROGRAMMING JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.	L2, L3, L4 and L5	8
MODULE 5: J2EE WEB APPLICATION The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.	L2 and L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States.

3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA.

2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA.

3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

MLE2605	Advanced Java Programming Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Java and Advanced Java Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the advanced features of contemporary java are implemented and demonstrated. Concepts covered would enable them to create complex applications related to data management. Problems or programs will be related to concepts of remote method invocation, swings, servlets, jsp and java beans.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various advanced java features required in solving complex problems.
2. Provide a demonstration of advanced java programming concepts like database programming with servlets, jsp and creating java beans.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of swings architecture and remote method invocation used to provide solution to distributed computing problems

CO2: Demonstrate the use of JDBC connectivity along with swings based architecture, thereby handling data management.

CO3: Apply the knowledge of servlets and server programming to construct dynamic web applications using web servers.

CO4: Demonstrate the differences between creating and deploying dynamic web applications using jsp concepts and servlets.

CO5: Demonstrate usage of applications involving java beans and jdbc programming to handle data management.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using swings architecture and remote method invocation (a) Write a program using swings creating tabbed panes and menu over a frame and handle their associated events (b) Write a program using swings List control containing list of cities, allowing the user to choose any one of them and display using event handing. (c) Demonstrate an application showcasing the use of remote method invocation(RMI) for designing a distributed application. (d) Create an application using concepts of RMI to depict a client server based interaction.	L3, L5	6
2.Sample Programs using JDBC and swings (a) Create an application demonstrating the use of swings, having a menu over a frame and jdbc programming to perform insert and select operations by handling menu related events. (b) Create an application using swings, having a design providing features for iterating over a dataset performing operations like forward, backward, start and end with help of jdbc programming.	L3, L5	4
(c) Sample Programs using servlets with jdbc, html and swings 3. Create an application using servlets to perform redirection based on validating user data entered through a web form. 4. Design an application to fetch data from database using servlets and display it using its post method. 5. Demonstrate the process of writing cookies using a servlet and display a message after writing. 6. Write a program to create a session object for the username fetched from user using a servlet, further access that session value on another servlet invoked by redirection.	L3, L5	6
7. Sample Programs using JSP with jdbc, html and swings (a) Write a program using jsp to demonstrate the features of jsp elements used to declare, define and display sum of two	L3, L5	6

integers. (b) Create an application using jsp to calculate and display the greatest out of two integers using if else statements. Integer numbers should be entered using a web form. (c) Demonstrate with a jsp program mechanism to retrieve checkbox data accessed using multiple value parameters fetching approach. (d) Write a program to demonstrate the use of jsp forward action tag used with parameters and processed using another jsp page.		
8. Sample Programs using jsp, java beans and swings (a) Demonstrate the use of jsp include action tag for including an html and another jsp page in initial jsp resource. (b) Write a program creating Java bean class and setting its properties using required jsp action tags. Output should also display the retrieved property values.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA
2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA
3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Lab Record /Viva- Via /Performance/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE 2603	**Deep Learning**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	-	2	4
Pre-requisites/Exposure	Basic Knowledge of Machine Learning & Brain functioning				
Co-requisites	Nil				

Catalog Description

In this course, students will learn the fundamentals of deep learning, and the main research activities in this field. Moreover, students will learn to implement, train, and validate their own neural network, and they will improve their understanding of the on-going research in computer vision and multimedia field.

Course Objectives

The objective of this course is to

1. Equip the students with concepts ofmajor deep learning algorithms, the problem settings.
2. Provide an overview of various deep learning applications to solve real world problems

Course Outcome

On completion of this course, the students will be able to

CO 1: Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.

CO 2: Implement deep learning algorithms and solve real-world problems.

CO3: Be able to identify reasonable work goals and estimate the resources required to achieve the objectives.

CO4: Be able to autonomously extend the knowledge acquired during the study course by reading and understanding scientific and technical documentation.

Modules	Blooms level*	Number of hours
Module 1: Review of Machine Learning Basics Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance ,Maximum Likelihood Estimation ,Bayesian Statistics ,Supervised Learning Algorithms ,Unsupervised Learning Algorithms ,Stochastic Gradient Descent ,Building a Machine Learning Algorithm ,Challenges Motivating Deep Learning	L1, L2 and L3	6
Module 2: Deep Feedforward Networks Example: Learning XOR, Gradient-Based Learning , Hidden Units , Architecture Design Back-Propagation and Other Differentiation, Algorithms **Regularization for Deep Learning:** Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multitask Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout Adversarial Training, Tangent Distance, Tangent Prop and Manifold, Tangent Classifier	L1, L2 and L3	6
Module 3: Optimization for Training Deep Models How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization. Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.	L2, L3 and L4	6
Module 4: Convolutional Networks The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient, Convolution Algorithms , Random or Unsupervised Features , The Neuroscientific Basis for Convolutional Networks , Convolutional Networks and the History of Deep Learning	L2, L3 and L4	6
Module 5: Sequence Modeling: Recurrent and Recursive Nets Unfolding Computational Graphs,Recurrent Neural Networks, Bidirectional RNNs,Encoder-Decoder Sequence-to-Sequence Architectures , Deep Recurrent Networks , Recursive Neural Networks , The Challenge of Long-Term Dependencies , Echo State Networks , Leaky Units and Other Strategies for MultipleTime Scales , The Long Short-Term Memory and Other Gated RNNs , Optimization for Long-Term Dependencies , Explicit Memory	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Book:

1. François Chollet, Deep Learning with Python", 1st Edition, Manning Publications

2. Antonio Gulli ,Sujit Pal, "Deep Learning with Keras", 1st Edition, Packt Publications

3. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.

4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**												**1**			
CO2	**1**												**1**		**1**	
CO3		**1**	**2**										**1**			
CO4		**1**	**2**	**1**									**1**		**1**	

COURSE CODE: MLE2604	DEEP LEARNING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of machine learning				
Co-requisites	NIL				

Catalog Description

This Lab course will introduce the concepts of data to formulate deep learning problems corresponding to different applications.

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Course Objectives

The objectives of this course are:

1. To understand various supervised, semi-supervised and unsupervised deep learning algorithms.
2. To familiarize various deep learning software libraries and data sets publicly available.
3. To develop deep learning based system for various real-world problems.
4. To assess how the choice of a deep learning algorithm impacts the accuracy of a system.

Course Outcomes

On completion of this course, the students will be able to

CO1: Formulate deep learning problems corresponding to different applications: data, model selection, model complexity

CO2: Demonstrate understanding of a range of deep learning algorithms along with their strengths and weaknesses

CO3: Implement deep learning solutions to classification, regression, and clustering problems

CO4: Design and implement various deep learning models, Execute and analyse deep learning algorithms

Program Covered**	Blooms level*	Number of hours

1. Develop Your First Neural Network With Keras.	L3, L5	2
2. Evaluate the Performance of Deep Learning Models.	L3, L5	2
3. Use Keras Models with scikit-learn.	L3,L4, L5	2
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples 5. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample	L3,L4, L5	2
6. Binary Classification of Sonar Returns.	L3,L4, L5	2
7. Multiclass Classification of Flower Species.	L3,L4, L5	2
8. Sequence Classification with LSTMs for Movie Reviews.	L3,L4, L5	2
9. How to Setup and Test Your Python Development Environment	L3,L4, L5	2
10. How to Run Large Deep Learning Models in the Cloud	L3,L4, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Skansi S., Introduction to Deep Learning - From Logical Calculus to Artificial Intelligence, 1st Edition, Springer International Publishing, 2018.

Reference Books

1. Buduma N., Fundamentals of Deep Learning, 1st Edition, O Reilly Media, 2016.
2. Steven Bird, Edward Loper (2016),Natural Language Processing With Python, Ed. 2, O'Reilly Media,ISBN 1491913428, 9781491913420

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO2	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	2	1	--	--
CO4	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE 2606	**R PROGRAMMING LAB**	L	T	P	C
Version 2020.1	Date of Approval: July 2020	0	0	4	2
Pre-requisites/Exposure	Basic knowledge of statistics				
Co-requisites	Nil				

Catalog Description

This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objective of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Objectives

The objective of this course is

1. To make students familiar with R Programming Language and its concepts.
2. Equip the students with knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure R Studio and R packages.

CO2. Explain concepts of Structured Data, data types, data structures and Use R for mathematical operations

CO3. Describe the use of R functions, control statements, Loop constructs and apply to iterate functions across data.

CO4. Understand basic regular expressions graphics. Use of R for descriptive statistics and inferential statistics

CO5. Predict/Score new data using models, understand basic non-linear functions in models and how to link data, statistical methods.

Modules	Blooms level*	Number of hours
Lab Session 1 • Installation & Configuration steps of R Studio. • use of the R interactive environment • Expand R by installing R packages	L1 and L2	2

• Explore and understand how to use the R documentation.		
Lab Session 2-3 • Read Structured Data into R from various sources • Understand the different data types in R • Understand the different data structures in R • Understand how to use dates in R • Use R for mathematical operations	L1and L3	4
Lab Session 4-5 • Use of vectorised calculations • Write user-defined R functions • Use control statements • Write Loop constructs in R • Use Apply to iterate functions across data	L1 and L3	4
Lab Session 6-8 • Reshape data to support different analyses • Understand split-apply-combine (group-wise operations) in R • Deal with missing data • Manipulate strings in R • Understand basic regular expressions in R • Understand base R graphics	L1 and L3	6
Lab Session 9-10 • Focus on GGplot2 graphics for R • Be familiar with trellis (lattice) graphics • Use R for descriptive statistics • Use R for inferential statistics • Write multivariate models in R	L1 and L3	4
Lab Session 11-12 • Understand confounding and adjustment in multivariate models • Understand interaction in multivariate models • Predict/Score new data using models • Understand basic non-linear functions in models • Understand how to link data, statistical methods, and actionable questions	L1 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

TorstenHothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA	EE

A	PR	LR	V	PR	V
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**-**
CO2	**1**	**-**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**1**	**-**
CO3	**1**	**-**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**1**	**-**
CO4	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**---**	**1**	**1**	**--**
CO5	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**

1: strongly related, 2: moderately related and 3: weakly related

MLE2637	Minor Project I	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will be useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this minor project, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO2	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO3	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO4	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
C05	**1**	**1**	--	--	--	--			**1**	-	-	-	--	--	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

MLE 2607	**VLSI Design**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	Basics of semiconductor and analog electronics				
Co-requisites	Nil				

Catalog Description

This course deals with basic theories and techniques of digital VLSI design in CMOS technology. It covers the fundamental concepts and structures of designing digital VLSI systems which include CMOS devices and circuits, standardCMOSfabricationprocesses, CMOSdesignrules, staticanddynamic logic structures, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies and Stick Diagrams.

Course Objectives

The objective of this course is to

- Provide a deep understanding of the concepts, techniques, and design of complex digital VLSI circuits.
- Apply mathematical methods and circuit analysis models to analyse CMOS digital circuits, and their logic components.

Course Outcomes

On completion of this course, the students will be able to

CO1.Explain the characteristics of Basic VLSI components.

CO2. Apply the knowledge of various CMOS inverters to compare their performance.

CO3. To design and realize basiccombinational and sequential functions using CMOS logic.

CO4. Design circuit Layout and Stick diagramsof CMOS logics.

Modules	**Blooms level***	**Number of hours**
Module I: Devices and the wire Dynamic and transient behavior of Diode, Diffusion capacitance, SPICE Diode model, MOSFET basic, depletion and enhancement device.MOSFET static behavior, Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of	L1, L2	8

equations for PMOS and NMOS. Dynamic behavior, Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE models for MOS transistors. The Wire, Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay.		
Module II: CMOS Inverter VTC of an ideal inverter, Switching Model of the CMOS inverter: NMOS /PMOS discharge and charge, VTC of CMOS inverter : PMOS and NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer. Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tri-state inverter, Resistive load inverter. Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages, Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization.	L3, L4	8
Module III: Combinational circuits CMOS LOGIC: Good 0 and Poor 0, series and parallel N and P switches, Two and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay, Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates, Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay, Pass-transistor logic, pass gate configurations for NMOS and PMOS, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain. Dynamic CMOS design: Pre-charge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic.	L2,L3,L4	10
Module IV: Sequential Logic circuits Principle of bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS D latch, , MUX based Latches, master slave edge triggered register, Static Timing Analysis –setup, hold time, clock skew, clock period, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS	L2,L3,L4	5
ModuleV: Layout Design Rules **5 Lecture hours**	L2,L3,L4	5

Introduction to CMOS Process technology, Latch up and its prevention Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. **Jan M Rabaey**,Digital Integrated Circuits ,Second Edition, Pearson.
2. **David Hodges**, Analysis and Design of Digital ICs, McGrew Hill
3. **Sung-MoKang,**CMOS Digital ICs,third edition,2008

Reference Books

1. **WesteNiel and Harris**,CMOS VLSI design.A Circuits And Systems Perspective, 3/E,Pearson
2. **Weste and Eshragian**,Principles of CMOS VLSI Design: a systems perspective, Addison-Wesley Publishing Company, 01-Jan-1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**2**	**1**	-	-
CO2	**3**	**1**	**3**	--	**1**	--	--	--	--	--	--	**2**	**2**	**1**	-	**2**
CO3	**3**	**2**	**1**	**2**	--	--	--	--	--	--	--	**2**	**2**	**1**	-	**2**
CO4	**2**	**2**	**1**	-	--	--	--	--	--	--	--	--	**2**	**1**	-	-

1: strongly related, 2: moderately related and 3: weakly related

MLE 2608	VLSI DESIGN LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of analog electronics				
Co-requisites	Basic concepts of Digital electronics				

Catalog Description

In this Lab course the designing of VLSI circuits using Mentor Graphics software are implemented and demonstrated. Concepts covered would enable them to create complex applications related to VLSI design. The objective of this course is to explore and implement the various features of VLSI design and analyze the dc and transient analysis.

Course Objectives

The objective of this course is to

Provide a deep understanding of CMOS logic using Mentor Graphics tool.

Analyze, design concepts of different combinational and sequential circuits and their simulation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of MOSFET;

CO 2: Illustrate the static and switching characteristics of inverters using CMOS with varying capacitance, width and channel Length of CMOS using Mentor Graphics tool.

CO 3: Demonstrate and create models of moderately sized CMOS circuits that realize specified digital functions using Mentor graphics Tool.

CO 4: Demonstrate the layout and stick diagrams using Mentor graphics Tool.

CO 5: Demonstrate the power consumption during transient analysis.

Modules/Topics Covered**	Blooms level*	Number of hours
1. MOSFET characteristics with varying VGS for both pmos and nmos.	L3, L5	2
2. Effect on VTC of CMOS inverter with variation of W and L.	L3, L5	2

3. Transient analysis of CMOS inverter with varying capacitive load, W and L. Rise time, fall time power dissipation, propagation delay calculation of CMOS inverter with the variation of capacitive load, W and L.	L3, L5	4
4. NOR and NAND gate - Transient analysis	L3, L5	2
5. XOR/XNOR gate - Transient analysis	L3, L5	2
6. 2:1 MUX and XOR gate with P.T.L.- Transient analysis	L3, L5	2
7. D type latch and flip flop - Transient analysis	L3, L5	2
8. 3 input NAND gate implementation with DOMINO (precharge and evaluation).	L3, L5	2
9. 4 inverter chain to derive capacitive load.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text

1. Neil Weste and K. Eshragian, "Principles of CMOS VLSI Design: A System Perspective," 2nd edition, Pearson Education (Asia) Pvt. Ltd., 2000.
2. D.A Pucknelland Eshraghain, " Basic VLSI Design", PHI, India, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 4	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 5	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE 2609	INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MYSQL)	L	T	P	C
Version:2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes the content about PHP and its Programming Concepts. It includes basic architecture of running a PHP Script. It also includes the concepts about Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions : Call by Value and Reference. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

After completing the course, the students will be able to,

CO 1: Explain the basic concepts of PHP programming and write PHP scripts using Strings and functions

CO 2: Explain and write PHP scripts based on Conditional statements, control statements and Arrays.

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to create responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity in order to provide backend support to website to make them Dynamic in nature

CO 5: Demonstrate the website designing process on various PHP Frameworks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Open Source and PHP programming Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.	L1, L2 and L3	4
Module II: Operators, Loops, Array, Exception and Error Handling Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative Array. Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.	L1, L2, L3	5
Module III: Classes, File system, Passing Information between pages Object orientedprogram minigwithPhp, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server. HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.	L2, L3 and L4	7
Module IV: Workingwithdatabase HTML Tables and Database tables, Databasemanipulation(Select, Insert, Update, Delete), validating User Input usingJavascript. MYSQL, Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP, MySQL APIBuilding Database Applications, Developing PHP scripts for dynamic web page like feedback form, online admission form and online test.	L2, L3 and L4	5
Module V: WorkingwithFrameworks Working with Mambo, Working with Joomla, Working with framework. Working with wordpress, Working with drupal, Use of Joomla in rapid development of website. Developing of simple website using joomla.	L2, L3 and L4	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner**"PHP : The Complete Reference",** Mc Graw Hill Education, 2007.
2. Ivan Bayross, **"Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP",** 4th Edition, BPB Publication, 2010.
3. Laura Thomson, **"PHP and MySQL Web Development",** 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, **"Learning PHP, MySQL and Javascript",** Shroff Publishers and Distributers private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**			
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**			
CO3	**1**	**1**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**			
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**			
CO5	**1**	**3**	**2**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**			

1: strongly related, 2: moderately related and 3: weakly related

MLE 2610	**INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MYSQL) LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of HTML				
Co-requisites	Nil				

Catalog Description

The course includes PHP Programming Concepts. Conditional, Control Statements, Array, Associative Array, String Functions and Concepts of Functions: Call by Value and Reference are implemented. The course also includes concepts related to Object Oriented Programming in PHP and website design support along with Database Support concepts which will be useful to design Backend for the website.

Course Objectives

The objective of this course is:

1. To provide a fundamental understanding of Dynamic Website Design in PHP.
2. To provide knowledge about various Frameworks build for Website Designing.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Apply the basic concepts of PHP programming to rewrite PHP scripts using Strings and Functions

CO 2: Demonstrate the concept of Conditional & Control Statements and 1 D, 2 D & Associative Array using PHP scripts

CO 3: Apply Object Oriented and Web Design concepts of PHP in order to prepare responsive web pages and websites

CO 4: Apply the concepts of Database and Database connectivity to prepare backend support for website.

Lab Sessions	**Blooms level***	**Number of hours**
1. PHP Scripts on Basic Concepts • Write the process of installation of web server. • Write programs to print all details of your php server. Use phpinfo(). • Write a program to give demo of ECHO and PRINT command.	L1,L3	2

• Write a program to implement the string functions.		
2. PHP Script on Conditional and Control Statements • Write a script to print Fibonacci series upto a given number. • Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice. • Write a script to calculate Factorial of a given number	L1,L3	4
3. PHP Scripts on Arrays: 1D, 2D, Associative • Write a program sort ten number by using array. • Write a program to demonstrate the concept of associative array. • Write a program to demonstrate the concept of multidimensional array.	L1,L3	4
4. PHP Scripts on Object Oriented Programming and File Handling Concepts • Write a program to demonstrate the concept of Classes & objects. • Write a php script including all the file handling functions.	L1,L3	2
• **PHP Scripts on Webpage and Website Design Concepts** • Create a login form with two text fields called “login” and “password”. When user enters “Amity”as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry. HTML in case of wrong username/password. • Write a program to design login form in which find the greatest number amongst three numbers. • WAP for Marksheet generation. • Design a webpage for entering the student details with all the validations applied on it. • Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”.	L1,L3	6
5. PHP Scripts on Database Creation a Connectivity • Create a database in MySql and connect that database from PHP.	L1,L3	4

• Write a program to Update, insert and delete the values of table in database.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Steven Holzner "PHP: The Complete Reference", Mc Graw Hill Education, 2007.
2. Ivan Bayross, "Web enabled commercial Application Development using HTML, Javascript, DHTML and PHP", 4th Edition, BPB Publication, 2010.
3. Laura Thomson, "PHP and MySQL Web Development", 5th Edition, Pearson Education, 2016.

Reference Books

1. Robin Nixon, "Learning PHP, MySQL and Javascript", Shroff Publishers and Distributers private limited, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

PR: Practical, LR: Lab Record, V: Viva, EE: End Semester Examination, A: Attendance, IA: Internal Assessment

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO3	**1**	**1**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**	**2**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

ME2618	Data Mining	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites	Nil				

Catalog Description

Data Mining serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	**L1, L2**	**8**
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	**L1, L2, L3**	**7**
Module III Clustering Hierarchical and k- Means Clustering, Kohenen Networks, Birch Clustering, Measuring Cluster Goodness.	**L1, L2, L3,L4**	**8**
Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	**L1, L2, L3,L6**	**9**
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	**L2, L3, L4, l5**	**8**

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.

2. Jiawei Han and MichelineKamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.

2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.

3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	**2**	**3**
CO2	**1**	**1**	**2**		--	--	--	--	--	--	--	--	**1**	**2**	**3**	**3**
CO3	**1**	**2**	**3**	**3**	**3**	--	--	--	--	--	--	--	**1**	**2**	**2**	**2**
CO4	**1**	**1**	**2**	--	--	**3**	--	--	--	--	--	**3**	**1**	**1**	**2**	**3**
CO5	**1**	**1**	**2**	--	--	**2**	--	--	--	--	--	**3**	**1**	**3**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

VII SEM

Course Code: DSE4308	Natural Language Processing	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Python				
Co-requisites	Nil				

Catalog Description

In this course general introduction including the use of state automata for language processing and syntax including a basic parse for natural language processing are discussed in detail. Basic features like regular expressions, Text Normalization, Edit Distance, n-gram model and advanced feature like feature structures and realistic parsing methodologies, part of speech tagging will be introduced.The concepts learnt in the studies of natural language processing will be applied in jupyter notebook using python for developing small to medium level applications.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of natural language processing through problem solving and practical approach.
2. Provide an overview of various tools in the field of natural language processing to gain practical understanding of the concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, knowledge in speech recognition, models and algorithms; Explain regular expressions and solve related problems; Explain and solve problems related to lemmatization and stemming, minimum edit distance.

CO2: Explain language models and compare their performance on datasets; Solve some problems on naïve bayes algorithm.

CO3: Explain logistic regression, similarity, language modelling and solve problems based on them.

CO4:.Describe ANN and Part of speech tagging; Solve problems based on them.

CO5:Describe RNN models and distinguish between simple ANN and RNN;

Modules	Blooms level*	Number of hours
MODULE 1: Knowledge in Speech and Language Processing ,Ambiguity ,Models and Algorithms Language, Thought, and Understanding ,The State of the Art and The Near-Term Future Some Brief History, Regular Expressions, Words ,Corpora,Text Normalization ,Minimum Edit Distance	L1, L2 ,L3	7
MODULE 2: Evaluating Language Models, Generalization and Zeros, Smoothing, Kneser-Ney Smoothing, The Web and Stupid Backoff, Advanced: Perplexity's Relation to Entropy, Naive Bayes Classifiers, Training the Naive Bayes Classifier, Worked example, Optimizing for Sentiment Analysis, Naive Bayes for other text classification tasks, Naive Bayes as a Language Model, Evaluation: Precision, Recall, F-measure, Test sets and Cross-validation, Statistical Significance Testing Advanced: Feature Selection.	L1,L2, L3	8
MODULE 3: Classification: the sigmoid, Learning in Logistic Regression, The cross-entropy loss function, Gradient Descent, Regularization, Multinomial logistic regression, Interpreting models, Advanced: Deriving the Gradient Equation, Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Applications of the tf-idf vector model, Optional: Pointwise Mutual Information (PMI), Word2vec, Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models.	L1,L2, L3	8
MODULE 4: Units,The XOR problem, Feed-Forward Neural Networks, Training Neural Nets, Neural Language Models, (Mostly) English Word Classes, The Penn Treebank Part-of-Speech Tagset, Part-of-Speech Tagging , HMM Part-of-Speech Tagging, Maximum Entropy Markov Models, Bidirectionality, Part-of-Speech Tagging for Other Languages.	L1, L2 and L3	6
MODULE 5: Simple Recurrent Networks, Applications of RNNs, Deep Networks: Stacked and Bidirectional RNNs, Managing Context in RNNs: LSTMs and GRUs, Words, Characters and Byte-Pairs.	L1, L2,L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Daniel Jurafsky& James H.Martin, “Speech and Language Processing", 2nd Edition, Pearson Education, 2009.
2. James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
3. Manning, Christopher D and HinrichSchütze, “Foundations of Statistical Natural Language Processing”, Cambridge, 1st Edition, MA: MIT Press, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO3	**1**	**1**	**1**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO5	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**3**	**-**

1: strongly related, 2: moderately related and 3: weakly related

COURSE CODE:MLE2706	NATURAL LANGUAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge on computer				
Co-requisites	NIL				

Catalog Description

This Lab course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

Course Objectives

The objectives of this course are:

5. Course provides knowledge of installation and use of NLTK in python.
6. Course provides knowledge of implementation of text files processing operations and Regular Expressions in NLP
7. Course provide knowledge of implementation of dependency parser, porter stemmer, Morphology, PoS Tagging

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand how to access the computer in terms of natural process languages.

CO2: Idea about installation and use of NLTK in python.

CO3: Understanding of implementation of text files procesing operation and Regular Expressions in NLP

CO4: Knowledge of implementation of dependency parser, porter stemmer, Morphology, PoS Tagging and other NLP applications

Program Covered**	Blooms level*	Number of hours

11. Install NLTK and perform basic preprocessing steps of NLP like tokenization, stemming, lemmatization, chunking etc using NLTK in python.	L3, L5	2
12. Write a program to perform text files statistical operation like count number of lines in files, number of words in file.	L3, L5	2
13. Working with PDF files in Python like Extracting text from PDF, Rotating PDF pages, Merging PDFs, Splitting PDF, Adding watermark to PDF pages	L3,L4, L5	2
14. Write program to count number of articles (a, an, the) in file. 15. Write a program to perform tokenization and filtering stopwords in file.	L3,L4, L5	2
16. Write a program which makes use of basics in regular expressions like /a*/, /a+/, /a? /, /[ˆAZ]/, /[ˆSs]/, etc.	L3,L4, L5	2
17. Write a program for minimum edit distance algorithm.	L3,L4, L5	2
18. Write a program for Understanding the morphology of a Marathi word. Take one or two suffixes of Marathi language and show the inflection on Gender, Number, Person, and Case.	L3,L4, L5	2
19. Write a program to demonstrate use of porter stemmer in python. 20. Write a program to demonstrate use of dependency parser.	L3,L4, L5	2
21. Write a program to demonstrate use of NP and VP chunker	L3,L4, L5	2
22. Write a program for Tagging Sentences which takes input as sentence and performs PoS Tagging.	L3,L4, L5	2
23. Write a program for bigram formation from given list	L3,L4, L5	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Indurkhya, N., &Damerau, F. J. (2010), Handbook of Natural Language Processing, 2nd Edition. New York: CRC Press Taylor and Francis Group, Boca Raton London, New York. ISBN-10: 1420085921, ISBN-13: 978-1420085921

Reference Books

3. Martin, J. H., &Jurafsky, D.(2013), Speech and Language Processing, Pearson Education India; 2 edition, ISBN-10: 9332518416, ISBN-13: 978-9332518414

4. Steven Bird, Edward Loper (2016),Natural Language Processing With Python, Ed. 2, O'Reilly Media,ISBN 1491913428, 9781491913420

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO2	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	2	1	--	--
CO4	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

COURCE CODE: MLE 2702	**Reinforcement Learning**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Concept of Machine Learning				
Co-requisites	Nil				

Catalog Description

Reinforcement Learning is a subfield of Machine Learning, but is also a general purpose formalism for automated decision-making and AI. This course introduces you to statistical learning techniques where an agent explicitly takes actions and interacts with the world. Understanding the importance and challenges of learning agents that make decisions is of vital importance today, with more and more companies interested in interactive agents and intelligent decision-making.

Course Objectives

The objective of this course is to

- Learn how to define RL tasks and the core principals behind the RL, including policies, value functions, deriving Bellman equations.
- Implement in code common algorithms following code standards and libraries used in RL
- Understand and work with tabular methods to solve classical control problems
- Recognize current advanced techniques and applications in RL

Course Outcomes

On completion of this course, the students will be able to

CO 1: Discuss possibilities and limitations of reinforcement learning.

CO 2: Analyze relevant applications, decide if they can be formulated as a reinforcement learning problem, and in such case define it formally.

CO 3: Implement and use central algorithms for reinforcement learning.

CO 4: Explore imitation learning tasks and solutions

CO 5: Analyze and evaluate methods through different performance criteria.

Course Content

Modules	Bloom's	Number

	level	of Hours
Module I Introduction Origin and history of Reinforcement Learning research. Its connections with other related fields and with different branches of machine learning. Brush up of Probability concepts - Axioms ofprobability, concepts of random variables, PMF, PDFs, CDFs, Expectation. Concepts of joint and multiple random variables, joint, conditional and marginal distributions. Correlation and independence.	**L1, L2**	**8**
Module II Markov Decision Process Introduction to RL terminology, Markov property, Markov chains, Markov reward process (MRP). Introduction to and proof of Bellman equations for MRPs along with proof of existence of solution to Bellman equations in MRP. Introduction to Markov decision process (MDP), state and action value functions, Bellman expectation equations, optimality of value functions and policies, Bellman optimality equations.	**L1, L2, L3**	**7**
Module III Prediction and Control by Dynamic Programing Overiew of dynamic programing for MDP, definition and formulation of planning in MDPs, principle of optimality, iterative policy evaluation, policy iteration, value iteration, Banach fixed point theorem, proof of contraction mapping property of Bellman expectation and optimality operators	**L1, L2, L3,L4**	**8**
Module IV Monte Carlo Methods & Function Approximation Methods Overiew of Monte Carlo methods for model free RL, First visit and every visit Monte Carlo, Monte Carlo control, On policy and off policy learning, Importance sampling. Getting started with the function approximation methods, Revisiting risk minimization, gradient descent from Machine Learning, Gradient MC and Semi-gradient TD(0) algorithms, Eligibility trace for function approximation, Afterstates, Experience replay in deep Q-Networks.	**L1, L2, L3,L6**	**9**

Module V Policy Gradients Getting started with policy gradient methods, Log-derivative trick, Naive REINFORCE algorithm, bias and variance in Reinforcement Learning, Reducing variance in policy gradient estimates, baselines, advantage function, actor-critic methods.	**L2, L3, L4, l5**	**8**

Bloom's Level:
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

3. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An introduction", Second Edition, MIT Press, 2019

4. Wiering, Marco, and Martijn Van Otterlo. "Reinforcement learning." Adaptation, learning, and optimization 12 (2012):

Reference Books

4. Li, Yuxi. "Deep reinforcement learning." arXiv preprint arXiv:1810.06339 (2018).

5. Russell, Stuart J., and Peter Norvig. "Artificial intelligence: a modern approach."Pearson Education Limited, 2016.

6. Goodfellow, Ian, YoshuaBengio, and Aaron Courville. "Deep learning." MIT press, 2016.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**3**

CO2	**1**	**1**	**2**		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**3**
CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**2**
CO4	**1**	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**1**	**2**	**3**
CO5	**1**	**1**	**2**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

COURSE CODE: MLE2704	Reinforcement Learning Lab	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of python, matlab				
Co-requisites	NIL				

Catalog Description

Reinforcement Learning is a subfield of Machine Learning, but is also a general purpose formalism for automated decision-making and AI. This course introduces you to statistical learning techniques where an agent explicitly takes actions and interacts with the world. Understanding the importance and challenges of learning agents that make decisions is of vital importance today, with more and more companies interested in interactive agents and intelligent decision-making.

Course Objectives

The objective of this course is to

- Learn how to define RL tasks and the core principals behind the RL, including policies, value functions, deriving Bellman equations.
- Implement in code common algorithms following code standards and libraries used in RL
- Understand and work with tabular methods to solve classical control problems
- Recognize current advanced techniques and applications in RL

Course Outcomes

On completion of this course, the students will be able to

CO 1: Discuss possibilities and limitations of reinforcement learning.

CO 2: Analyze relevant applications, decide if they can be formulated as a reinforcement learning problem, and in such case define it formally.

CO 3: Implement and use central algorithms for reinforcement learning.

CO 4: Explore imitation learning tasks and solutions

CO 5: Analyze and evaluate methods through different performance criteria.

Modules/Topics Covered**	Blooms level*	Number of hours
1.To understand the basic Basics of RL.	L1, L2	2
2.To apply theValue Functions and Bellman Equations by assuming the dataset.	L2, L3, L5	2
3.To understand the Temporal-Difference learning methods	L3, L4, L5	2
4.To create Training, Validation and Test dataset for REINFORCE algorithm	L3, L4, L5	2
5.Build a Stock Reinforcement Learning Algorithm	L3, L4, L5	2
6.Build any reinforcement learning algorithm in any environment	L3, L4, L5	2
7.Use Reinforcement Learning for your own scientific experiments	L3, L4, L5	2
8.To apply Naive REINFORCE algorithm on the dataset	L3, L4, L5	2
9.to implement value iteration and q-learning, a reinforcement learning algorithm	L3, L4, L5	2
10. Train the system on a larger environment. Record how the time to reach the goal state and the average reinforcement changes as the system goes through more and more learning sequences.	L3, L4, L5	2

**Bloom's Level:* *L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation.*

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An introduction", Second Edition, MIT Press, 2019

2. Wiering, Marco, and Martijn Van Otterlo. "Reinforcement learning." Adaptation, learning, and optimization 12 (2012):

Reference Books

1. Li, Yuxi. "Deep reinforcement learning." arXiv preprint arXiv:1810.06339 (2018).

2. Russell, Stuart J., and Peter Norvig. "Artificial intelligence: a modern approach."Pearson Education Limited, 2016.

3. Goodfellow, Ian, YoshuaBengio, and Aaron Courville. "Deep learning." MIT press, 2016.

Modes of Evaluation: Performance/Viva/ Lab Record/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**3**
CO2	**1**	**1**	**2**		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**3**
CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**2**
CO4	**1**	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**1**	**2**	**3**
CO5	**1**	**1**	**2**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE 2703	Social Network Analytics	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basis of Database and Networking				
Co-requisites					

Catalog Description

This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyze empirical social network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets.

Course Objectives

The objective of this course is to

- To provide students effective data-driven intelligence to improve their decisions making and systematically estimate the expected impact on relevant performance objectives
- To equip the students with data-driven intelligence tools, the basics of data mining techniques and develop a data-analytical approach to problem-solving with their application

Course Outcomes

On completion of this course, the students will be able to

CO1. Know the basic notation and terminology used in network science

CO2. Be able to visualize, summarize and compare networks.

CO3. Learn the basic principles behind network analysis algorithms

CO4. Develop practical skills of network analysis in R programming language

CO5: Be capable of analyzing real work networks

Course Content

Modules	Bloom's level	Number of Hours
Module I Introduction Overview: Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.	**L1, L2**	**6**
Module II Community Discovery in Social Networks: Applications, Methods and Engineering Trends Introduction, Communities in Context, Core Methods, Quality Functions, The Kernighan-Lin (Kl) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,	**L1, L2, L3**	**7**
Module III Information Networks and the World Wide Web The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web- Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search.	**L1, L2, L3**	**5**
Module IV Node Classifications in Social Networks Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification	**L1, L2, L3**	**6**
Module V Data and Text Mining in Social Media Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xmland Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous	**L1, L3, L4**	**6**

Networks.		
Module VI Overview of Social Tagging Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions ,Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.	**LI, L2**	**6**

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
2. Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
3. Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.

Reference Books

1. Jure Leskovec, AnandRajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2nd edition, 2014.
2. Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1st edition, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**	**1**
CO2	**1**	**--**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**	**2**
CO3	**1**	**1**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**2**

CO4	**1**	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**1**
CO5	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE 2705	**MATLAB PROGRAMMING**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Programming				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of Mat Lab Programming.

Course Objectives

The objective of this course is to

1. To understand the basic concepts and terminology related to Mat Lab.
2. Application of Mat Lab in field of Signal Processing and Control systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the basics of Matlab programming environment.

CO2. Analysis of given LTI System and verifying its physical reliability and stability properties.

CO3. Waveform synthesis using Laplace Transforms and z-transform of a given signal and system.

Modules	**Blooms level***	**Number of hours**
1. To write a MATLAB program to perform some basic operation on matrices such as addition, subtraction, multiplication. 2. To write a “MATLAB” Program to generate various signals and sequences, such as unit impulse, unit step, unit ramp, sinusoidal, square, saw tooth, triangular, sinc signals. 3. To performs operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power.	L1, L2 and L3	8

4. Write a program for finding even and odd parts of sequences Using MATLAB Software& program for finding real and imaginary parts of sequences Using MATLAB Software.		
5. Write a program to find the out put with linear convolution operation Using MATLAB Software 6. Write a program to compute auto correlation and cross correlation between signals and Sequences. 7. Write a program to compute linearity and time invariance properties of a given continuous /discrete System.	L1,L2,l3	6
8. Write a program to Unit Step And Sinusoidal Response Of The Given LTI System And Verifying Its physical reliability and stability properties. 9. Write a program to demonstrate Gibbs Phenomenon using MATLAB. 10. Write a program to obtain Fourier Transform and Inverse Fourier Transform of a given signal / sequence and to plot its Magnitude and Phase Spectra **11.** Write a program to perform waveform synthesis using Laplace Transforms of a given signal.	L1, L2 and L3	8
12. Write a program to locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane 13. for the given transfer function. 14. Write a program to Generate Gaussian Noise and to Compute its Mean, M.S. Values, Skew, kurtosis, 15. PS and PDF 16. Write a program to demonstrate Sampling Theorem and aliasing effect using MATLAB. 17. Write a program for removal of noise by auto correlation/cross correlation.	L1, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Amos Gilat, "MATLAB: An Introduction with Applications", Wiley; Fourth edition (2012)4ed.

Reference Books

1. Bansal, Goel and Sharma, MATLAB and its Applications in Engineering"Pearson Education India; Second edition (1 March 2016).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO3	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**--**

1: strongly related, 2: moderately related and 3: weakly related

MLE 2735	Summer Internship Evaluation	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4

CO1	**1**	**2**	**1**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO2	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO3	**1**	**1**	**2**	**3**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

MLE2737	Minor Project II	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	0	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this minor project, the students will be able to:
CO1: Demonstrate a sound technical knowledge of their selected project topic.
CO2: Design and develop engineering solutions to complex problems utilising a systems approach.
CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques
CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.
CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO2	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO3	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO4	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**

C05	**1**	**1**	--	--	--	--			**1**	-	-	-	--	--	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

MLE2707	**Mobile Computing**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking				
Co-requisites	Nil				

Catalog Description

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Objectives

The objective of this course is to

1. Give a general overview of the cellular technology and the associated terms and discuss the generations of the mobile technologies starting from 1G to 3G techniques.
2. Illustrate the GPRS and WAP model for 2G internet connectivity in detail.
3. Elaborate the third-generation mobile services
4. Describe the Global Mobile Satellite Systems in detail and basic architecture of Bluetooth technology and advanced topics in mobile computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts mobile technology, computing and basic architecture of PCS and GSM.

CO2: Describe the mobile networking Infrastructure through 2G technologies (GSM, GPRS, WAP).

CO3: Explain the basic concepts of 3G technologies (WCDMA, CDMA 2000) and WLL.

CO4: Discuss the working of mobile satellite systems like IRIDIUM and GLOBALSTAR.

CO5: Explain the concepts of Bluetooth technology, its working and protocols, virtual networks and enterprise networks.

Modules	Blooms level*	Number of hours
Module I: Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.	L1, L2 and L3	8
Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).	L1,L2	10
Module III: Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.	L1, L2	7
Module IV: Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.	L1, L2	7
Module V: Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Advanced techniques in mobile computing.	L1, L2	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin &ImrichChlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

Reference Books

1. "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
2. "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
3. "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**1**	-	**3**	-
CO2	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	-	**3**	--
CO3	**1**	**2**	-	--	-	--	--	--	--	--	--	--	**1**	-	--	--
CO4	**1**	**2**	-	--	--	--	--	--	--	--	--	--	**1**	-	--	--
CO5	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2708	**ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5:Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	**Bloom s level***	**Number of hours**

Module 1: Programming Basic and Recap **Programming Concepts Basics I -** Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, SDLC. **Programming Concepts Basics 2-** Scripting, Net Framework, Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables & Arguments.	L1, L2	8
Module II: RPA Concepts **RPA Basics -** History of Automation, what is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated. **RPA Advanced Concepts -** Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem	L2, L3 and L4	8
Module III: UiPath Introduction & Basics **Introduction to UiPath-** Installing UiPath Studio community edition, The User Interface, KeyboardShortcuts,AboutUpdating,AboutAutomationProjects,IntroductiontoAutomation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide. **Variables**, **Control Flow** **DataManipulation-** DataManipulationIntroduction,Scalarvariables,collectionsandTables, Text Manipulation, Data Manipulation, Gathering and AssemblingData. **Recording and Advanced UI Interaction -** Recording Introduction, Basic and Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping,Scraping advanced techniques.Selectors.	L2, L3 and L4	8
Module IV: UiPath Advanced Automation concepts and techniques Image, Text & Advanced Citrix Automation- Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, using tab for Images, Starting Apps.	L2, L3 and L4	12

Excel Data Tables & PDF - Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF. Email Automation- Email Automation, Incoming Email automation, Sending Email automation		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi,PacktPublications,Ist Edition,2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	**3**	--	--	--	--	--	--	**2**	--	**1**	**1**	-	-
CO2	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	-
CO3	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	**2**
CO4	**1**	--	--	**2**	--	--	--	--	--	--	--	--	**1**	**1**	-	**2**

1: strongly related, 2: moderately related and 3: weakly related

MLE2709	**Responsive Web Design**	L	T	P	C
Version : 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	knowledge of website design				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the and explain concept of responsive web design and responsive content.

CO2 Explain HTML and CSS contents for responsive websties; Design and Create responsive websites using html, css and media queries.

CO3: Explain the concept of responsive workflow and working with responsive web design tools; Creating responsive websites that work on variety of devices.

CO4: Designing responsive websites using the concepts of typography, navigation and header layout; Evaluating performance of responsive websites .

Modules	**Blooms level***	**Number of hours**
Module 1: Foundations of responsive design **What Is Responsive Design?:** Just the Basics ,A Short History, Why Responsive Design	L2 and L3	8

Responsive Content: Content Strategy ,Managing Content, Developing Content, Content Parity, Content Governance, Adaptive Content		
Module 2: Creating Responsive Websites **HTML for Responsive Sites:** Working with HTML, Basic Page Structure Viewport, Structural Elements, Creating a Page, Clean and Semantic HTML **CSS for Responsive Sites:** How CSS Works,Versions of CSS, Where CSS Goes, The Cascade, Using the Cascade, Comments, Organizing Your Stylesheet, The Box Model, display, Positioning, float and clear, Basic Styles **Media Queries:** What's a Media Query? Media Query Structure, Using Media Queries in Stylesheet Links, Other Ways to Use Media Queries, What We Can Query, Browser Support, Breakpoints, Design Ranges, Designing Responsively, Using Media Queries, Two-Column Layout, Setting a Maximum Width, How to Choose Breakpoints Images: Ways to Display Images, Alt Text, Image File Formats, Optimizing Images, Content Images, Background Images Responsive Images	L2 and L3	8
Module 3: Working Responsively **Responsive Workflow:** Strategy and Planning, Content Before Layout Thinking About Layout, Prototypes, Visual Design, Responsive Design Tools, Selling Responsive Design, Working with Clients **Mobile and Beyond:** User Experience , Device-Agnostic Design, Focusing on Mobile First, Do What You Can, Types of Devices, Touch, Screen Size, Accessibility (Universal Design), Deciding Which Devices to Support Why Use Real Devices for Testing, Testing	L2 and L3	8
Module 4:Designing Responsive Websites **Typography:** Start with HTML, Typefaces, Using Fonts, Sizing Text, Line Length, Whitespace, Margins and Padding, Changing Typeface for Screen Size **Navigation and Header Layout**: Responsive Navigation , Branding, Navigation Links, Navigation Patterns, Header **Performance:** Why Performance Matters, Performance as Design ,How Web Pages Are Loaded and Rendered, Measuring Performance Cleaning Up Your Code, Minimizing HTTP Requests, Server Stuff JavaScript, CSS, Hosting, Conditionally Loading Content, Reflows and Repaints, RESS	L2and L3	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Learning Responsive Web Design A Beginner's Guide",Clarissa Peterson, Orielly, 2014

Reference Books:

1. "Responsive Web Design with HTML5 and CSS3",Ben Frain, Packt, 2012
2. "Responsive Web Design by Example", FarhaanHussain, Packt, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2710	**Responsive Web Design Lab**	L	T	P	C
Version : 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Knowledge of website design				
Co-requisites	NIL				

Catalog Description

This course is aimed to provide a fundamental understanding of JavaScript and two of its related library: Bootstrap and React for dynamic web site client side scripting. Javascript is a famous scripting language for client side. The bootstrap and react libraries are rich API for creating dynamic websites. The course builds strong foundation for client-side scripting for creating dynamic websites

Course Objectives

The objective of this course is

1. Equip the students with basic and advanced features of javascript and bootstrap library to create dynamic web sites
2. Provide an overview of basic features of react library to design dynamic websites.

Course Outcomes

On completion of this course, the students will be able to

CO1*: Define the and explain concept of responsive web design and responsive content.*

CO2 *Explain HTML and CSS contents for responsive websties; Design and Create responsive websites using html, css and media queries.*

CO3: *Explain the concept of responsive workflow and working with responsive web design tools; Creating responsive websites that work on variety of devices.*

CO4: *Designing responsive websites using the concepts of typography, navigation and header layout; Evaluating performance of responsive websites* .

Modules	**Blooms level***	**Number of hours**
Module 1: Foundations of responsive design	L2 and L3	3

Programs based on: • Content Strategy ,Managing Content, • Developing Content, Content Parity, • Content Governance, Adaptive Content		
Module 2: Creating Responsive Websites **Programs based on:** • Working with HTML, Basic Page Structure Viewport, Structural Elements, Creating a Page, Clean and Semantic HTML • The Cascade, Using the Cascade, Comments, Organizing Your Stylesheet, The Box Model, display, Positioning, float and clear, Basic Styles • Media Query Structure, Using Media Queries in Stylesheet Links, Other Ways to Use Media Queries, • What We Can Query, Browser Support, Breakpoints, Design Ranges, Designing Responsively, Using Media Queries, Two-Column Layout, Setting a Maximum • Width, How to Choose Breakpoints Images: Ways to Display Images, Alt Text, Image File Formats, Optimizing Images, Content Images, Background Images Responsive Images	L2 and L3	3
Module 3: Working Responsively **Programs based on:** • **Responsive Workflow**, Visual Design, Responsive Design Tools, Selling Responsive Design, Working with Clients • **Mobile and Beyond:** User Experience , Device-Agnostic Design, Focusing on Mobile First, Do What You Can, • Types of Devices, Touch, Screen Size, Accessibility (Universal Design), Deciding Which Devices to Support Why Use Real Devices for Testing, Testing	L2 and L3	3
Module 4:Designing Responsive Websites • **Typography:** Start with HTML, Typefaces, Using Fonts, Sizing Text, Line Length, Whitespace, Margins and Padding, • Changing Typeface for Screen Size • **Navigation and Header Layout**: Responsive Navigation , Branding, Navigation Links, Navigation Patterns, Header	L2and L3	3

• **Performance:** Why Performance Matters, Performance as Design ,How Web Pages Are Loaded and Rendered, • Measuring Performance Cleaning Up Your Code, Minimizing HTTP Requests, Server Stuff JavaScript, CSS, Hosting, Conditionally Loading Content, Reflows and Repaints, RESS		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Learning Responsive Web Design A Beginner's Guide",Clarissa Peterson, Orielly, 2014

Reference Books:

1. "Responsive Web Design with HTML5 and CSS3",Ben Frain, Packt, 2012
2. "Responsive Web Design by Example", FarhaanHussain, Packt, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	--	1	1	--	1	--	--	--	--	1	--	--	1	--	--	--
CO2	--	1	2	--	2	--	--	--	--	1	--	--	1	--	--	--
CO3	--	1	1	--	1	--	--	--	--	2	--	--	1	--	--	--
CO4	--	1	2	--	1	--	--	--	--	2	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

VIII SEMESTER

VIII SEM

MLE2837	Project Dissertation	L	T	P	C
Version: 2017.1	Date of Approval: JULY 2020	0	0	0	8
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:
CO1: Demonstrate a sound technical knowledge of their selected project topic.
CO2: Design and develop engineering solutions to complex problems utilising a systems approach.
CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques
CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.
CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
C05	1	1	--	--	--	--			1	-	-	-	--	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

MLE2803	.NET PROGRAMMING	L	T	P	C
Version:2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	C#.NET, HTML and CSS				
Co-requisites	Nil				

Catalog Description

This course provides knowledge regarding Creating Dynamic Web Pages with the help of ASP.NET framework. Various topics

Course Objectives

The objective of this course is to

1. Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
2. Provide knowledge to develop secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the components of .NET framework and create basic ASP.NET web page.

CO2: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO3: Establish database connectivity and perform various operations on database through ASP.NET web pages.

CO4: Maintain states at client and server site both.

CO5: Develop and use web services.

Modules	Blooms level*	Number of hours
MODULE 1: **.NET FRAMEWORK** .NET Framework and its features CLR, MSIL,CTS, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, What is ASP.NET?, Difference between ASP and ASP.NET	L1, L2	4
MODULE 2: WEB CONTROLS Standard Controls, Validation controls, Adv. Controls, Custom Controls .	L2, L3 and L4	14
MODULE 3: ADO.NET ADO.NET,ADO.NET Architecture Data Adapters, Datasets, Command, Data Reader Data Reader Data bind Controls Displaying data in data grid XML in ADO.NET	L2, L3 and L4	7
MODULE 4: SECURITY ASP.NET applications : Security, Error Handling	L2 and L3	2
MODULE 5: STATE MANAGEMENT State Management : View State, Session State, Web Services	L2, L3 and L4	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Stephen Walther, ASP.NET Unleashed, SAMS Publication
2. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. ImarSpaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication

2. Jesse Liberty, Dan Hurwitz, Programming ASP.NET, OReilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**3**	--	--	--	--	--	--	--	--	--	--	--	**2**	**3**	--	--
CO2	**2**	**2**	**1**	**2**	**1**	--	--	--	--	--	--	--	**2**	**2**	**3**	--
CO3	**2**	**2**	**1**	**2**	**2**	--	--	--	--	--	--	--	**2**	**2**	**3**	--
CO4	**2**	**1**	**1**	**2**	**1**	--	--	--	--	--	--	--	**2**	**2**	**2**	--
CO5	**2**	**1**	**1**	**2**	**2**	--	--	--	--	--	--	--	**2**	**2**	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2804	**.NET PROGRAMMING LAB**	L	T	P	C

Version 2020.1	Date of Approval: JULY 2020	0	0	1	1
Pre-requisites/Exposure	C#.NET, HTML and CSS				
Co-requisites	Nil				

Catalog Description

This lab course covers development of Web applications using ASP.NET. The concepts are designed to impart the knowledge of ASP.NET framework concepts at implementation level. The major topic covered includes theme, state management, web controls and database connectivity using ADO.NET and web services.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
2. Provide knowledge to develop secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO2: Maintain states at client and server site both.

CO3: Establish database connectivity and perform various operations on database through ASP.NET web pages.

CO4: Develop and use web services.

Modules	Blooms level*	Number of hours
1. Basics of ASP.NET Page a) Write a program to implement C#.NET class with properties and methods. b) Design a Login Page, which displays a Welcome Page on successful Login and an error message in case of invalid Id/Password. c) Design a form and apply themes (design time and dynamically).	L1, L2	4

2. State Management a) Implement state management for Login page which move to welcome page when credentials are correct. The welcome page displays a welcome message along with the user Id. b) Implement various state management methods using a suitable web form.		2
3. Built-in Controls, Custom Controls a) Design any web form and apply various validation controls. b) Create a web form which can work in Hindi and English language both. c) Design a web form to upload an image to server. d) Design a custom control, Numeric Textbox, which should accept only integer value for a particular range. The range should be customizable.	L2, L3 and L4	6
4. ADO.NET a) Create any database table and apply basic operations (Insert/Delete/Update) on it using ASP.NET application. b) Implement various methods of execution of SQL command. c) Display data in a Grid and perform basic database operations.	L2, L3 and L4	4
5. Security, Web Services a) Develop any web application to illustrate SQL Injection attack and redesign it to prevent the attack. b) Develop a web application to illustrate XSS attack and redesign it to prevent the attack	L2 and L3	2
6. Web Application Create a small web application having some application.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Stephen Walther, ASP.NET Unleashed, SAMS Publication
2. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. ImarSpaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
2. Jesse Liberty, Dan Hurwitz, Programming ASP.NET, OReilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	2	2	2	--
CO 2	2	1	--	--	--	--	--	--	--	--	--	--	2	2	2	--
CO 3	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

MLE2805	**ADVANCED ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and

Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation.

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks.

CO4: Design programs and have hands on experience on uipath software

CO5:Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module 1: Exception handling and Best Practices **Debugging and Exception Handling- Debugging** Tools, Strategies for solving issues, Catching errors. **Project Organization-** Concept of project organization, Best practices, Avoiding pitfalls, Invoke Activity.	L1, L2	8
Module II: Introduction to Orchestrator Orchestrator, Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.	L2, L3 and L4	8
Module III: merging and Future Trends in IT Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing Computer Vision	L2, L3 and L4	8

Module IV: Capstone Project Real life case studies which can be used to apply the concepts learnt during the course. The projects shall test student's skills right from process transformation and documentation to the design and development of the actual robot	L2, L3 and L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi,PacktPublications,Ist Edition,2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	**3**	--	--	--	--	--	--	**2**	--	**1**	**1**	-	-
CO2	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	-
CO3	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	**2**
CO4	**1**	--	--	**2**	--	--	--	--	--	--	--	--	**1**	**1**	-	**2**

1: strongly related, 2: moderately related and 3: weakly related

MLE2801	DIGITAL IMAGE PROCESSING	L	T	P	C
Version: 2020.1	Date of Approval: JULY 2020	2	0	0	2
Pre-requisites/Exposure	Basics of Computer Graphics				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with visualization of real concept of Image processing. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Digital Image Processing takes full advantage of the computational technology of Mathematica.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Digital Image Processing

CO2: List out the Image Enhancement techniques in the Spatial Domain

CO3: Explain concepts of Image Enhancement in the Frequency Domain

CO4: Describe the architecture Image Compression

CO5: Explain the basics of Representation and Description

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction and Digital Image Fundamentals** The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.	L1 and L2	8
MODULE 2: **Image Enhancement in the Spatial Domain** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	L2 and L3	8
MODULE 3: **Image Enhancement in the Frequency Domain** Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphism Filtering.	L1 and L2	10
MODULE 4: **Image Compression** Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. **Image Segmentation** Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.	L2 and L3	12
MODULE 5: **Representation and Description** Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. **Object Recognition** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text:

- Rafael C. Conzalez& Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- RosefieldKak, "Digital Picture Processing",
- W.K. Pratt, "Digital Image Processing",

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO 2	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO 3	**3**	**--**	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**2**	**--**
CO 4	**3**	**--**	**2**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO 5	**3**	**--**	**2**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

MLE2802	**DIGITAL IMAGE PROCESSING LAB**	L	T	P	C
Version 2020.1	Date of Approval: JULY 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various Image processing & pattern recognition required for solving complex problems.
2. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (c) Basic Variable deceleration & its operation (d) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (c) Basic use of Matrix and Graph Plotting (d) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (d) Create a basic program MATLAB using functions (e) Use of basic function Image processing (f) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (c) Practice on Pattern Recognition functions in MATLAB (d) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN toolbox & Image processing toolbox (b) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

Text & References:

- Rafael C. Gonzalez & Richard E. Woods, "Image Processing Using MATLAB", 2nd edition, Pearson Education.
- "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

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Amity School of Engg. & Technology

Bachelor of Technology - Biomedical Engineering

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

POs_B.Tech Programme

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

P04. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PSOs for B.Tech (BiomedicalEngineering)

PSO1. Apply fundamental knowledge of basic science and engineering courses to develop core competency in the areas of biomedical engineering.

PSO2. Able to apply knowledge of biomedical modalities, clinical science, safety & hazards and accessibility in the fields maintaining biomedical equipment as per standard specifications.

PSO3. Apply interdisciplinary core competency such as mechanics, electronics, programming and artificial intelligence with modern tools in field of biomedical to analyse and solve real healthcare problems.

PSO4. Apply the principles of creativity & innovation, entrepreneurial skill with integrated knowledge approach to develop project and provide solution to healthcare contemporary issues, considering legal, ethical and socio-economic aspects.

Purpose of Meeting and Revision of Syllabus:

1. Revise the syllabus from Learning Base to Outcome Based Education.
2. Revise the curriculum from Teaching Centric Approach to Student Centric Approach.
3. Revise the syllabus from Pedagogic Learning to Skill Development & Capacity Building.

Supporting document for PSOs of B.Tech (Biomedical Engineering)

Basic Science Course	Basic Engineering and Prerequisite	Clinical Application	Biomedical Modalities	Biomedical Programming Skill	Biomedical Mechanics	Biomedical Electronics	Legal, Ethical, socio-economic and Soft & Managerial Skill	Innovation and Life-Long Learning
Knowledge		**Core Competency**		**Interdisciplinary Skills and Modern Tools**			**Integrated Approach**	
Apply fundamental knowledge of basic science and engineering courses to develop core competency in the areas of biomedical engineering.		Able to apply knowledge of biomedical modalities, clinical science, safety & hazards and accessibility in the fields maintaining biomedical equipment as per standard specifications.		Apply interdisciplinary core competency such as mechanics, electronics, programming and artificial intelligence with modern tools in field of biomedical to analyse and solve real healthcare problems.			Apply the principles of creativity & innovation, entrepreneurial skill with integrated knowledge approach to develop project and provide solution to healthcare contemporary issues, considering legal, ethical and socio-economic aspects.	
PSO1		**PSO2**		**PSO3**			**PSO4**	
Mathematics, Physics, Chemistry, Biology	Element of Mechanical Engg.,Engg. Graphics	Tissue Engg., Clinical Sciences, Clinical Safety &Hazards	Biomedical Instrumentation, Medical Devices	OOPS, Data-structure, Medical Image Processing, Virtual reality	Biomaterials, Biomechanics, Artificial Organ and rehabilitation Engg.	Microprocessor, Microcontroller, Recent Modern Embedded System	Legal, Medical Standards, Ethical	Hospital Visit and Clinical Needs, Projects,
Biology for Engineers, Electrical Engg.,	Computer and Programming	Testing, calibration,	Medical Imaging Technology, Telemedicine	Neural network, Machine Learning, AI, DL	Computed Aided Graphic Design; Ansys	Control System and Theory,	Socio-economics,	Seminar, Summer Internship, term Paper
Engg. Drawing	Electronics: Analog, Digital, Device, Circuit Theory					Transducer & Sensors	Hospital Management System	
	Anatomy & Physiology,						Behavioural Sciences, Soft Skills, Languages, team Building, group dynamic	

ENGINEERING MATHEMATICS - I

Course Code: BME2112
L-T-P : 3-1-0 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Differential Calculus by Shanti Narain

- Integral Calculus by Shanti Narain

References:

- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING CHEMISTRY

Course Code: **BME2114**
L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention,
Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels

Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter,Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module III: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module VI: Corrosion
Introduction, Mechanism of dry and wet corrosion,

Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

BME2104	Introduction to Computers and Programming in C	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

CO 1:Define the purpose and structure of C Program for programming; identify and distinguish various data types and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.

CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs

CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language

CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.

CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7
Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.Strings and C string library.Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO3	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO4	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO5	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

BME2106	ELEMENTS OF MECHANICAL ENGINEERING	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	3	0	0	3
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

In this course the concepts of various prime movers like I C Engine, Gas Turbine, Steam Turbine, and Hydraulic Turbine are discussed in detail. Concept of power absorbing devices and power transmission devices are discussed in detail. Elementary concept of mechanics of material and machine tool also discussed in detail. The aim of this course is to make the students familiar with the basic mechanical engineering.

Course Objectives

The objective of this course is to

1. Equip the students with concept of heat engine, steam, boiler, steam turbine, hydraulic turbine, hydraulic pumps, stress and strain, power transmission.

2. Provide an overview of machine tool and manufacturing system.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain working of I C engine, Gas turbine, Air standard efficiency of Otto Cycle &Diesel Cycle and Boilers.

CO2: Explain working of Steam Turbine, Hydraulic Turbine and Hydraulic Pumps.

CO3: Describe the stress strain diagram, Elastics constants and Transmission system.

CO4: Discuss the metal cutting and working of machine tool with manufacturing system.

Modules	Blooms level*	Number of hours
MODULE 1: Prime Mover (I. C. Engine) Internal Combustion Engine: Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle. Working principle of gas turbine, Constant pressure gas turbine cycle.	L1, L2 and L3	7
MODULE 2: Prime Mover (Turbine) Steam Turbine: Classification of boilers, Classification of steam turbines, Working principle of impulse and reaction. Hydraulic Turbine: Classification of hydraulic turbine, Construction details and working of Pelton, Francis and Kaplan turbines.	L1, L2 and L3	8
MODULE 3: Power Absorbing machine Power absorbing devices: Hydraulic Pumps: Classification of hydraulic pumps, Working of Reciprocating and centrifugal pumps. Power transmission devices: Introduction to Power transmission, Belt drive, Rope drive, Chain drive, Gear drive, Gear train.		7
MODULE 4: Mechanics of Material Stress & Strain: Introduction, Concept & types of Stresses and strains, Poison's ratio, Stress-strain diagrams, Hooks law, Elastic constants & their relationships, Stresses and strains in simple and compound bars under axial loading, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc.	L1, L2 and L3	6
MODULE 5: Machine Tool Machine Tool: Introduction to Metal Cutting, Classification of machine tool, working and operations of Lathe, Shaper, Milling, Drilling machines. Manufacturing system: Component of Manufacturing Systems, Fundamentals of Numerical Control (NC), Advantage of NC systems, Classifications of NC, Computer Numerical control, Comparison of NC and CNC. Comparison between conventional and NC machines.	L1, L2 and L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Rajput, R.K. (2013). *Elements of Mechanical Engineering*, Delhi: Lakmi Publication.
- Jain, V. (2011). *Basics of Mechanical Engineering*, Delhi :Dhanpat Rai Publication.
- Kumar, D.S. (2013). *Elements of Mechanical Engineering*, , Delhi : S.K. Kataria and Sons Publications.

Reference Books

- Ganesan, V. (2017). *Internal Combustion Engine*, New-Delhi: Tata McGraw Hill.
- Nag, P.K. (2013). *Engineering thermodynamics*, New-Delhi: Tata McGraw Hill.
- Kumar, D.S. (2013).*Thermal Engineering*, New-Delhi: S.K. Kataria and Sons Publications.
- Hazra, S.K. and Chaudhary, A.K. (2012). *Workshop Technology Vol. II* . New Delhi: Asian Book Comp.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

BME2117	Basic Electrical and Electronics Engineering	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of electricity and electrical circuits are discussed in detail. Theorems related to electrical circuits, law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network will be introduced.

Course Objectives

The objective of this course is to:

1. Provide the overview of concept of flow of current/voltage of electrical circuits.
2. Provide the basic knowledge about the concepts of electrical circuits.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Explain the fundamental theorems and laws related to the electrical circuits.

CO2. Derive equations and solve problems related to network theorems.

CO3. Draw phasor diagrams for different alternating current waveforms and Explain the working principle and estimate the performance of single phase transformers.

CO4. Explain the operation, characteristic and application of PN Junction Diode, Rectifiers, Zener Diode and Bipolar Junction Transistor.

Modules	Blooms level*	Number of hours
Module I: **Direct Current Circuits:** Ohm'sLaw,Kirchoff'sCurrent Law, Kirchoff's Voltage Law Network Reduction: Star-Delta Transformation, Source Transformation, Nodal Analysis, Mesh analysis, Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem, Maximum Power transfer theorem.	L1 and L2	9
Module II: **Alternating Current Circuits:** Peak, Average and RMS values for	L1, L2 and L3	8

alternating currents, Power calculation: reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.		
Module III: **Transformer:** Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.	L1, L2 and L3	6
Module IV: **Rotating Electrical Machines:** D.C. machines (motors and generators), Induction motor, Synchronous machines (motors and generators): construction, working principle, classification and applications.	L1, L2 and L3	6
Module V: **Semiconductor Devices:** Principle of operation characteristic and application of PN Junction Diode, Rectifiers, Zener Diode, Principle of operation, characteristic and application of Bipolar Junction Transistor, Regulated Power Supply.	L1, L2 and L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. V K Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd edition, S. Chand Publications, 2014, New Delhi
2. D. P. Kothari and I. J. Nagrath, Theory and Problem of Basic Electrical Engineering, PHI Learning Pvt. Ltd., 2015, New Delhi.
3. J B Gupta, Electrical Science, S K Kataria and Sons, 2015, New Delhi.

Reference Books

1. R J Smith and R C Dorf, Circuits Devices and Systems, 5th Edition, John Wiley
2. B.L. Thareja, Basic Electronics, 5th edition, S. Chand Publishing, 2011, New Delhi
3. V. Del Toro, Electrical Engineering fundamentals, PHI, 2016
4. Mahmood Nahvi, Joseph Edminister, Electric Circuits, 7th edition, McGraw-Hill Education, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO2	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO3	**1**	**1**	**3**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

BME2109	Programming in C Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

3. Equip the students with concepts of Programming through C Language
4. Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING 1. Write a program to calculate simple interest and amount.	L3	5

2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement.		
LABORATORY SESSSION 2 LOOPING 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D	L3	6
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and de-allocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure.	L3	4

3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
- Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly relate

BME2111	ELEMENTS OF MECHANICAL ENGINEERING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Pre –Requisite: Elements ofMechanical Engineering
Catalog Description

In this course the concepts of various prime movers like I C Engine, Gas Turbine, Steam Turbine, and Hydraulic Turbine are discussed in detail. Concept of power absorbing devices and power transmission devices are discussed in detail. Elementary concept of mechanics of material and machine tool also discussed in detail. The aim of this course is to make the students familiar with the basic mechanical engineering.

Course Objectives:

The objective of this course is to

1. Equip the students with practical concepts of Boiler, Turbine, IC Engine and Machine tools.
2. Understand the elements of mechanical engineering by working models and experiments.

Course Outcomes (COs): After studying this course the students will be able to:

CO 1- Define the basics of working of boilers, Steam turbines.

CO 2- Explain the principle and working of two strokes and four strokes internal combustion engines.

CO 3- Explain the working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.

CO 4 - Describe the tensile test and power transmission derives.

CO 5- Identify and demonstrate the machine tools and lathe operation.

List of Experiments	Blooms level*	Number of hours
1. To Study the Cochran and Babcock & Wilcox boilers.	L1, L2 and L3	2
2. To study the working of impulse and reaction steam turbines	L1, L2 and L3	2
3. To study Two-Stroke & Four-Stroke Diesel Engines.	L1, L2 and L3	2
4. To Study Two-Stroke & Four-Stroke Petrol Engines.	L1, L2 and L3	2
5. To study the constructional features and working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.	L1, L2 and L3	2
6. To perform tensile test, plot the stress-strain diagram and evaluate the tensile properties of a given metallic specimen.	L1, L2 and L3	2
7. To Study the different power transmission drives.	L1, L2 and L3	2
8. To Study different types of machine tools (lathe, milling, drilling & shaper).	L1, L2 and L3	2
9. To perform the metal cutting operation on Lathe machine.	L1, L2 and L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rajput, R.K. Elements of Mechanical Engineering, Lakmi Publication, Delhi, 2013. .
- Jain, V. Basics of Mechanical Engineering, Dhanpat Rai Publication, Delhi , 2011.
- Kumar, D.S. Elements of Mechanical Engineering, S.K. Kataria and Sons Publications, Delhi 2013.

Reference Books

- Ganesan, V. Internal Combustion Engine , New-Delhi : Tata McGraw Hill, New delhi, 2017.
- Heine, R.W. Loper and P.C. Rosenthal, Principles of metal casting, McGraw Hill, New-Delhi, 2001

- Nag, P.K. Engineering thermodynamics,: Tata McGraw Hill, New-Delhi, 2013.
- Kumar, D.S.Thermal Engineering, S.K. Kataria and Sons Publications, New-Delhi, 2013.

Hazra, S.K. and Chaudhary, A.K. Workshop Technology Vol. II . Asian Book Comp, New-Delhi, 2012

ENGINEERING CHEMISTRY LAB

Course Code: **BME2116**
L-T-P :0-0-2 **Credit Units: 01**

Course Contents:

List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BME2118	Basic Electrical and Electronics Engineering Lab	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify RTh, VTh, RN, IN in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.
11. To obtain the characteristics of a transistor under common base (CB) and common emitter (CE) configuration.

Examination Scheme:

IA			**EE**		
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

ENGLISH – I

Cource Code: CSS2152

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	**H.W. Longfellow**

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	05	15	10	70

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

*** 30 hrs Programme to be continued for Full year**

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH 2151

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

This course aims at imparting:
Understanding self & process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and its effective on personality
Building Emotional Competence

Course Contents:

Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept, Self confidence, Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance, Components of self esteem, High and low self esteem, Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude
Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - I

Course Code: LAN2151

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

Course Contents:

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Object if 1, 2
Only grammar of Unité 3: object if 3, 4 and 5

Contenu lexical :Unité 1 : Découvrir la langue française : (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3:Organiser son temps

1. dire la date et l'heure

Contenu grammatical :

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN - I

Course Code: LAN2152

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Introduction

Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel

To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics

Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages

To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles

The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions

To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns

Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours

All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"

The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

Module X: Revision list of Question pronouns

W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – I

Course Code: LAN2153

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

Course Contents:

Module I

A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II

Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III

Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV

Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V

Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI

Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

RUSSIAN – I

Course Code: LAN2154

L-T-P : 3-0-0 **Credit Units: 03**

CHINESE – I

Course Code: LAN2155

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II

Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III

Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV

Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

PORTUGUESE - I

Course Code: LAN2156

L-T-P : 3-0-0 **Credit Units: 03**

ENGINEERING MATHEMATICS - II

Course Code: BME2210
L-T-P : 3-1-0 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

Module IV: Statistics and Probability
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.

- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ENGINEERING PHYSICS

Course Code: **BME2211**
L-T-P : 2-1-0 **Credit Units: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .
Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

BME2203	**Engineering Mechanics**	**L**	**T**	**P**	**C**
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Basics of Mathematics, Mathematical Equations, Force systems				
Co-requisites	-				

Catalog Description

Engineers are the ultimate problem solvers. This course introduces the principles required to solve engineering mechanics problems. It addresses the modelling and analysis of static equilibrium problems with an emphasis on real-world engineering applications and problem solving. To master this course, students should have a background in basic mathematical calculus and physics covering classical mechanics. These basic concepts of physics and mathematics will be applied to formulate problems on force systems, trusses, friction, centroid, simple lifting machines, power transmission devices and law of conservation of energy.

Course Objectives

The objective of this course is to

5. Equip the students with concepts of free body diagram, friction, centroid or center of gravity, trusses, energy, force system and its effect on the behavior of the bodies

6. Provide an overview of estimation of performance of belts and simple lifting machines under various operating conditions.

Course Outcomes

After completing the course, the students will be able to

CO1. Explain the concept of free body diagram, classify various force system sand apply equilibrium equations to solve different truss problems.

CO2. Define and compute various terms associated with the friction, determine the efficiency of simple lifting machines and power transmission devices.

CO3. Describe various theorems and apply them to determine centroid, centre of gravity, moment of inertia, mass moment of inertia of various bodies.

CO4. Analyse and setting up the problems involving the concept of work, energy, impulse and momentum.

Modules	Blooms level*	Number of hours
Module I: **<u>Force system</u>** Types of forces, Parallelogram law of forces, Triangle law of forces, Polygon law of forces, Free body diagram, Equilibrium equations and applications. Lami's theorem and its applications. Moment and its applications,	L1, L2 and L3	10
Module II: **<u>Determinate Structures</u>** Plane truss, perfect and imperfect truss, assumption in solving the truss problems, method of joints, method of section.	L1, L2,and L3	8
Module III: **<u>Friction</u>** Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, ladder friction, Screw jack & determination of its efficiency	L2 and L3	10
Module IV: **<u>Distributed Force</u>** Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, perpendicular axis theorem, parallel axis theorem, and its application, polar moment of inertia.	L2, L3 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- **S. Timoshenko, D. H. Young**, Engineering Mechanics, 5th Ed, McGraw Hill, 2008, New-Delhi
- **S. S. Bhavikatti, K. G. Rajashekarappa**, Engineering Mechanics, New Age International Ltd, 1998, New Delhi
- **D.S. Kumar**, Engineering Mechanics, S. Chand Publication, 2013, New-Delhi

Reference Books

- **I. H. Shames & G. K. M. Rao**, Engineering Mechanics: Statics and dynamics, 4th Ed, PHI, 2002.
- **Beer Ferdinand P, Russel Johnston Jr., David F Mazure**, Vector Mechanics for Engineers: Statics and Dynamics (SIE), 5th Ed, McGraw Hill, 2008, New-Delhi
- **J. L. Meriam and L. G. Kraige**, Engineering Mechanics, Vol I – Statics, Vol II – Dynamics, 6th Ed, John Wiley, 2008.
- **R. C. Hibbler**, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press, 2006.
- **Andy Ruina and Rudra Pratap**, Introduction to Statics and Dynamics, Oxford University Press, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO 2	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO 3	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**
CO	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**

4																

1: strongly related, 2: moderately related and 3: weakly related

BME2204	**Biology For Engineers**	**L**	**T**	**P**	**C**
Version	Date of Approval: May 16 2019	**2**	**-**	**-**	**2**
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended for engineering students to make them understand the various components of any biological systems and how an engineer can deal with various problems associated with the living systems. The biological system is highly complex, sensitive and delicate. It is important for an engineer to understand the basic structure of any living organism, its requirements, and limitations so that more sophisticated, efficient and safe approaches can be designed for any existing situation by any engineering personnel. Since, nature uses most specialized but efficient engineering skills to execute all biochemical, biophysical processes such as energy production, transportation, and defense against all the different types of threats one can get inspired and come out with novel problem-solving ideas for modern life hassles. This program would make them realize that living system is not only a seeker but could be providers also.

Course Objectives

The objective of this course is to

1. To provide an overview of modern biology to solve problems encountered in living systems.

2. To serve as a foundation for the engineers and allow them to analyze a problem from both an engineering and biological perspective; to anticipate the special difficulties in working with living systems and to evaluate a wide range of possible approaches to solutions

Course Outcomes

On completion of this course, the students will be able to

CO1. List the fundamental units and components of living systems

CO2. Identify various Biochemical and biophysical processes responsible for the generation of energy to sustain life within living organisms and their management

CO3. Identify the molecular structure of various macro-molecules/ micro-molecules' structure, function and their interrelationship under natural environments.

CO4. Describe various biological processes and their regulation through various energy regulating factors such as enzymes, cofactors, conversion of chemical to mechanical energy and physiological forces

Course Content

Modules	Blooms level*	Number of hours
Module I: **From Atoms to organism** The Cell: Basic Unit of Life, Molecular Components of Cells, Gene expression, Protein Structure and Function, Cell Metabolism,Homeostasis, theExternal response of cells, Cell Reproduction, Cell Differentiation.	L1, L2	5
Module II **Molecular design of life** Biochemistry and Genomic Revolution, DNA illustrates between form and function, Chemical Bonds in Biochemistry, Protein Synthesis	L1, L2	5
Module III: **Catalytic Strategies** Proteases: Speed up a reaction, Enzyme Inhibitor, Highly specific DNA cleavage reactions – Nucleoside Monophosphate Kinases,Hydrolysis, phosphoryl group exchange,metabolism, anabolism and catabolism,photosynthesis, carbon fixation, biology energy production.	L1, L2	5
Module IV: **Mechano-Chemistry** Conversion of chemical energy to mechanical work, ATP synthase structure, Power Stroke,Bacterial flagellar motion, proton motive force, sodium motive force, Chimeric Kinesin Motors, chimeric myosin motors.	L1, L2	5
Module V: **Sensory and Immune** General principles of cell signaling, Cellular basis of immunity, antibodies and their properties, T cells and their structure	L1, L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Lehninger Principles of Biochemistry
2. Lodish, 2004 Molecular Cell biology

Reference Books

1. J.M.Berg, J.L.Tymosezko and L.Sryer., Biochemistry, W.H.Freeman Publications
2. Student Companion to accompany,Biochemistry, Fifth Edition – Richard I.Gumport
3. Frank H.Deis, Nancy Counts Gerber, Roger E.Koeppe, II Molecular motors
4. Alberts, 2003 Molecular biology of the cell

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**						--	--	--	--	--	--	**1**			
CO2	**1**						--	--	--	--	--	--	**1**			
CO3	**1**						--	--	--	--	--	--	**1**			
CO4	**1**						--	--	--	--	--	--	**1**			
CO5	**1**						--	--	--	--	--	--	**1**			
CO6	**1**						--	--	--	--	--	--	**2**			

BME2205	Object Oriented Programming Using C++	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Equip the students with the basic features of C++ supporting object-oriented programming. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.

2. Provide the overview of major object-oriented concepts to implement object oriented programs in C++ like encapsulation, inheritance and polymorphism, stream I/O, templates and operator overloading

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.

CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed. Explain how the objects can be instantiated and destroyed with static data member?

CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Explain the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).	L1 and L2	5
MODULE 2: CLASSES AND OBJECTS Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.	L1, L2 and L3	7
MODULE 3: INHERITANCE Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes	L2, L3 and L4	8
MODULE 4: POLYMORPHISM Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	L2, L3 and L4	8
MODULE 5: STRINGS, FILES AND EXCEPTION HANDLING Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.

3. E. Balagurusamy ,"Object Oriented Programming with C++", Mc Graw Hill,6th Edition,2013.

4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.

2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.

3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	**1**	**2**
CO3	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	**2**
CO4	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**1**	--	**2**
CO5	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**1**	--	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: BME2208	ENGINEERING GRAPHICS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	0	0	4	2
Pre-requisites/Exposure	Concepts Mathematics (especially Trigonometry and Geometry)				
Co-requisites	Machine Drawing & CAD				

Catalog Description:

A freshman level course which provides the undergraduate engineering students with a background in descriptive geometry, orthographic projection, engineering drawing standards and annotation,computer-aided engineering graphics. The concepts ofpoint, line and plane relationships in projection, multi-view engineering drawings, auxiliary and section views, basic dimensioning and annotation, engineering applications of drawings are also discussed.

Course Objective:

The objective of this course is to

1. Equip the students with the in-depth knowledge of drawings of points, straight line, planes, cylinders, prisms, pyramids, parabola, ellipse etc.

2. Draw different figures manually and will be capable of using various instruments involved in drawings.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO 1 - Define and explain basic principles of projections of points and lines.

CO 2 - Define, describe and construct the different orientations and projections of planes.

CO 3 – Explain and construct the projections of solids and sectioning of solids in different orientations.

CO 4 - State and draw the concepts of development of surfaces and introduction to auto CAD.

CO 5 – Define and construct orthographic and isometric view of an object.

Modules	Blooms level*	Number of hours
Module I: Introduction Importance, significance and scope of engineering drawing, drawing instruments and their use, lettering, dimensioning, scales, sense of proportioning, different types of projections, B.I.S. Specifications.	L1 and L2	8

Module II: Projection of points, lines and plane surface Principal planes, principles of orthographic projections, Projection of points in all quadrants, Projection methods - First angle & third angle projection, Projections of straight lines (first angle projection) inclined to both the planes, true lengths and traces, projection of planes, projection of planes in simple position and inclined to both the principal planes, auxiliary planes and views	L1, L2 and L3	12
Module III: Projection of solids & section of solids Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both of the principal planes, Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other, obtaining true shape of section	L1, L2 and L3	12
Module IV: Development of surfaces & Isometric projections Development of surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones, Principles of isometric projection, isometric scale, Isometric projections of simple solids and truncated solids, Prisms, pyramids, cylinders, cones, Conversion of Orthographic Views to Isometric Views and Vice-versa.	L1, L2 and L3	8
Module V: Introduction to CAD Introduction to CAD and use of its commands, practice of some 2D figures using CAD.	L1, L2 and L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	50	20

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- PS Gill, 2013, Engineering Drawing, Kataria Publication.
- ND Bhatt, 2014, Engineering Drawing, Charotar publications.

References Books:

- N Sidheshwar, 2014 Machine Drawing Drawing, Tata McGraw Hill
- M.B. Shah & B.C. Rana, 2007, Engineering Drawing, Pearson Education.
- CADFolks, AutoCAD 2018 For Beginners, CreateSpace Independent *Publishing* Platform; 6 edition.

CO, PO and PSO mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO2	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO3	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO5	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

BME2209	Object Oriented Programming Using C++ Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Turbo C++				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Perform object-oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax, features of, and how to utilize the Standard Template Library.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define and identify the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach.

CO 2: Determine the different ways to define a member function inline and explain how the private members of a class can be accessed. Solve how the objects can be instantiated and destroyed with static data member?

CO 3: Apply the concept of inheritance, types and implementation with suitable examples; find outambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Relate the concept polymorphism with overloading in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Determine the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in filehandling.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using objects and classes (a) Write a program to illustrate the concept of one class with two	L1, L3, L5	4

objects by taking student data. (b) Write a program to show the relationship of class and object to display roll no., grade and fee paid by student.		
2. Sample Programs for different use of private, public member variables and functions and friend functions (a) Write a program to define the member function outside and inside the class. (b) Write a program to read and display the information of N persons to illustrate the concept of array of objects. (c) Write a program to add two numbers to illustrate the use of friend function.	L1, L3, L5	4
3. Sample Programs using constructors and destructors (a) Write a program to assign and copy values to illustrate the concept of parametrized and copy constructor. (b) Write a program to show the order of constructor and destructor.	L1, L3, L5	4
4. Sample Programs using operator overloading (a) Write a program to add two numbers using binary operator overloading. (b) Write a program to illustrate the assignment operator overloading.	L1, L3, L5	4
5. Sample Programs using inheritance in and accessing objects of different derived classes (a) Write a program to compute the marks explaining the concept of multiple inheritance. (b) Write a program to find the factorial of a number using inheritance.	L1, L3, L5	4
6. Sample Programs using polymorphism and virtual functions (using pointers) and File Handling (a) Write a program to find the volume of cylinder and cuboid using function overloading. (b) Write a program to reverse a string using pointers. (c) Write a program to explain the relationship of inheritance and virtual function. (d) Write a program to read the student name and fee paid using read() function from the file.	L1, L3, L4, L5	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. "Object Oriented Programming with C++" By E. Balagurusamy.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**3**	**1**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO5	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--

1: strongly related, 2: moderately related and 3: weakly related

ENGINEERING PHYSICS LAB

Course Code: **BME2212**
L-T-P : 0-0-2 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGLISH-II

Course Code: CSS2252

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	**H.W. Longfellow**

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	05	15	10	70

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH 2251

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To enable the students:
Understand the process of problem solving and creative thinking.
Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
Making Predictions and Reasoning
Memory and Critical Thinking
Emotions and Critical Thinking
Thinking skills

Module II: Hindrances to Problem Solving Process
Perception
Expression
Emotion
Intellect
Work environment

Module III: Problem Solving
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
Perception
Expression
Emotion
Intellect
Work environment

Module IV: Plan of Action
Construction of POA
Monitoring
Reviewing and analyzing the outcome

Module V: Creative Thinking
Definition and meaning of creativity
The nature of creative thinking
Convergent and Divergent thinking
Idea generation and evaluation (Brain Storming)
Image generation and evaluation
Debating
The six-phase model of Creative Thinking: ICEDIP model

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

ENVIRONMENTAL STUDIES

Course Code: ENV 2252
L-T-P : 4-0-0 **Credit Units: 04**

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness

Module II: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution

Definition

- Causes, effects and control measures of:
  a. Air pollution
  b. Water pollution

FRENCH - II

Course Code: LAN2251

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.
To make them learn the basic rules of French Grammar.

Course Contents:

Module A : pp.38 – 47 : Unité 3: Objectif 3, 4, 5, 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3 : Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

Unité 4: **Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5: s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de :
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN – II

Course Code: LAN2252

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Grammar to consolidate the language base learnt in Semester I

Course Contents:

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: 'In the market place'
'At the Hotel'

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – II

Course Code: LAN2253

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Possessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

RUSSIAN – II

Course Code: LAN2254

L-T-P : 3-0-0 **Credit Units: 03**

CHINESE – II

Course Code: CSE2255

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II
Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV
Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V
The verb "qu"
- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets
- Going to the post office, buying stamps
- Going to the market to buy things.. etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.
Comprehension and answer questions based on it.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

PORTUGUESE - II

Course Code: LAN2256

L-T-P : 3-0-0 **Credit Units: 03**

BME2302	Analog Electronics I	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Elementary Resistive Circuit, Theorems and Analysis Techniques: KCL. KVL, Nodal & Mesh Analysis, Thevenin & Norton Equivalents, Maximum Power Transfer.				
Co-requisites	Semiconductor Physics				

Catalog Description

This is the first course in Electronics and Communication Engineering, to educate and explain the methods used for biasing circuits in a graphical analysis of non linear electronic circuits and also includes small signal transistor models, parameters and their frequency responses. Following this, analyzing different types of feedback amplifiers, and power amplifiers using transistor and designing of different electronic circuits are included in the course. This course also considers the mathematical modelling of active solid state devices their analysis and design of single state circuits. Topics covered include the study of device characteristics and applications of p-n-junction diodes, bipolar junction transistors, and field effect transistors.

Course Objectives

The objective of this course is to

1. build from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models
2. familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers and wave shaping circuits
3. build a foundation for Analog Electronics-II, Digital Circuits and Systems I & II, VLSI de-sign and analog CMOS IC Design

Course Outcomes

On completion of this course, the students will be able to

CO1. explain different types of diodes and demonstrate wave shaping circuits
CO2.explain operating principal of Bipolar Junction Transistor, its properties, biasing techniques and stability
CO3. describe low and high frequency transistor amplifiers along with single and multi-stage amplifier
CO4. explain operating principal of JFET, MOSFET, its properties, and biasing techniques
CO5. solve and analyse different negative feedback amplifiers configurations
CO6. describe and outline power amplifiers and their application.

Modules	Blooms level*	Number of hours
Module I: Semiconductor Diode and Diode Circuits Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.	L1 L2 & L3	6
Module II: Bipolar Junction Transistor Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{co}, V_{BE}&□, Stabilization factors, thermal stability.	L1 L2 & L3	9
Module III: Small signal Analysis of transistor and Multistage Amplifier Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)	L2 & L3	6
Module IV: Field Effect Transistors Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower	L1, L2 & L3	5
Module V: Feedback Amplifiers Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.	L1, L2, L3 & L4	6
Module VI: Power amplifiers Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.	L1 & L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jacob Millman, Christos Halkias, Chetan Parikh, Millman's Integrated Electronics, McGraw Hill Education, 2nd Edition, New Delhi
2. Sanjeev Gupta, Electronic Devices and Circuits, Dhanpat Rai Publications, 2010
3. Theraja B.L., Sedha R.S, Principles of Electronic Devices and Circuits, S Chand & Company, First Edition, New Delhi, 2002

Reference Books

1. Robert L. Boylestad: Electronic Devices and Circuits, Pearson Education, 11th Edition, 2013
2. Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 1st Edition, 2006
3. Nagrath I.J, Electronics: Analog and Digital, Prentice Hall India Learning Private Limited, Second Edition, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**3**	**1**	--	--	**3**
CO2	**1**	**2**	--	--	--	--	--	--	--	--	--	**3**	**1**	**3**	--	**3**
CO3	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	-	--	--
CO4	**1**	**2**	--	--	--	--	--	--	--	--	--	**3**	**1**	**3**	--	**3**
CO5	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**3**	**1**	--	--	**3**
CO6	**1**	**3**	--	--	--	--	--	--	--	--	--	**3**	**1**	--	--	**3**

1: strongly related, 2: moderately related and 3: weakly related

BME2303	CIRCUITS AND SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of circuits analysis based on Resistance, Inductance and Capacitance are discussed in detail. voltage- current relationship of basic circuit elements – resistors, inductors, capacitors, dependent and independent voltage and current sources; apply Kirchhoff's current and voltage laws to circuits in order to determine voltage, current and power in branches of any circuits excited by DC voltages and current sources will be discussed. Concept learnt in the studies will be applied to solve DC circuit problems using basic circuit theorems and structured methods like node voltage and mesh current analysis.

Course Objectives

The objective of this course is to

1. Equip the students with concepts basic network analysis of electrical circuits using KVL and KCL.

2. Provide an overview of one port and two port network analysis in time and frequency domain.

Course Outcomes

On completion of this course, the students will be able to

CO1: Expiation of graph theory for solving complex electrical circuits.

CO2: Analysis of RL, RC and RLC circuits using time domain approach.

CO3: Apply Laplace transform to solve RL, RC and RLC circuits in frequency domain.

CO4: Explanation and application of various network theorems to solve the given circuit.

CO5: Synthesis of RL, RC and RLC electrical circuits and explanation of two port network parameters.

Modules	Blooms level*	Number of hours
Module 1: Graph Theory and Network equations Graph of a network, Trees, Co-trees and loops, cut set matrix, Tie set matrix, number of possible trees of a graph, duality, Loop Analysis and Node Analysis.	L1 and L2	8
Module 2: Analysis of circuits using classical Method Time and Frequency domain analysis of RL, RC and RLC circuits, Linear constant coefficient differential equation.	L2 and L3	10
Module 3: Signals and Laplace Transforms Unit step signal, Ramp signal, impulse signal, Laplace transformations and its properties, Gate function, Inverse Laplace transformations, Application of Laplace Transforms in circuit analysis.	L3 and L4	10
Module 4: Network Theorems Reciprocity theorem, Superposition theorem, Thevenin's and Norton's theorems, Millman's theorem, Maximum power transfer theorem, Compensation theorem, Tellegan's theorem.	L2 and L3	10
Module 5: Two port Network & Network Functions Introduction, two port z-, y-, T-, h-parameters, Inter-relations among parameters, Condition for reciprocity and symmetry, Interconnections of two port networks, Driving point and transfer functions, Poles, Zeros and nECE2ssary condition for driving point and transfer function.	L1, L3	10
Module 6: Network Synthesis Hurwitz polynomial, Positive real functions, synthesis of LC, RC, RL immittance functions.	L1 and L5	

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M.E. Valkenburg, "Network analysis", 3 ed, Pearson Education, 2015.
2. D. R. Choudhary, "Networks and Systems", 2 ed, New Age International, 2013.
3. K.M. Soni, "Circuits and Systems", S.K. Kataria & Sons Delhi, 2013.

Reference Books

4. Bhise, Chadda, Kulshreshtha, "Engineering network analysis and filter design", Umesh Publication, 2012.
5. F.F. Kuo, "Network Analysis and Synthesis", 2 ed, Wiley India Pvt. Ltd, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	--	--	--	2	--	--	--	--	--	--	--	--	2	--	--
CO2	1	--	3	--	--	--	--	--	--	--	--	--	2	1	3	3
CO3	1	--	3	--	1	--	--	--	--	--	--	--	--	1	--	--
CO4	2	3	--	--	--	--	--	--	--	--	--	--	3	1	3	3
CO5	2	3	2	--	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Engineering Mathematics III

Subject Code: ECE2310 **Credits: 3**

L-T-P: 3-1-0

Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Types of Matrices, Inverse of a matrix by elementary transformations, Rank of a matrix (Echelon & Normal form), Linear dependence, Consistency of linear system of equations and their solution, Characteristic equation, Eigenvalues and Eigenvectors, Cayley-Hamilton Theorem, Diagonalization, Complex and Unitary Matrices and its properties, Vector space, Linear independence and dependence of vectors, Linear Transformations.

Module II: Analytic functions, C-R equations and harmonic functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions, Liouvilles theorem, Fundamental theorem of algebra. Representation of a function by power series, Taylor's and Laurent's series, R Singularities, zeroes and poles, Residue theorem, evaluation of real integrals of type $\int_0^{2\pi} f(cos\theta, sin\theta)d\theta$ and $\int_{-\infty}^{\infty} f(x)dx$, Conformal mapping and bilinear transformations.

Module III: Probability space, conditional probability, Bayes theorem, Moments, Moment generating functions, Skewness, Kurtosis, Correlation and Regression, Binomial distribution, Poisson distribution, Normal distribution. Method of least squares and curve fitting of straight line and parabola, Solution of cubic and biquadratic equations.

Module IV: Numerical solution of algebraic and transcendental equations: bisection, secant method, Newton-Raphson method, fixed point iteration; interpolation: error of polynomial interpolation, Lagrange, Newton interpolations; numerical integration: Trapezoidal and Simpson rules; numerical solution of systems of linear equations: direct methods (Gauss elimination, LU decomposition); iterative methods (Jacobi and Gauss-Seidel).

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References

1. E. Kreyszig, Advanced Engineering Mathematics, 10th Edition, John-Wiley & Sons, 2011.

2. B. V. Ramana, Higher Engineering Mathematics; Publisher: Tata McGraw Hill Publishing Company; New Delhi; Year 2007.

3. R.K.Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2017.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd edition (2014).

5. Peter V. O Neil, Advanced Engineering Mathematics, CENGAGE Learning Custom Publishing; 7th Revised ed. edition (1 January 2011).

6. Thomas & Finley, Calculus, Narosa Publishing House, 1996.

BME2314	Medical Imaging Techniques-I	L	T	P	C
Version 1.1	Date of Approval: May 16, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronic, Biology for Engineers, Physics				
Co-requisites	General Science				

Catalog Description

Catalog Description

This course helps the students to understand various diagnostic imaging modalities used in medical profession e.g. X-Rays, CT scan, MRI, Ultrasound, and PET, Optical imaging, Near-Infra-red Imaging etc. etc. The content of the course will also speak about the artefacts and other problems related to the machines. The course also stresses the importance of radiation safety, ethics and legal considerations as well as professionalism.

Course Objectives

The objective of this course is to

The objective of this course is to

1. To provide an overview of medical imaging principles and machine.
2. To serve as a foundation for clinical significance of medical images.

Course Outcomes

On completion of this course, the students develop capabilities of:

CO1. *Identify* various component of Ultrasound and Doppler machine and *explain* the working principle of ultrasound and its different operating modes.
CO2. *Describe*the principle of production of X-Rays and *identify* function of various component of X-Ray machine.
CO3. *List* various component of CT-Scan, *explain* principle of CT-Scan imaging.
CO4. *List* the MRI hardware components, *explain* principles of MRI imaging, and *determine* the cause of artefact by observing the MRI images.
CO5. *Explain* the principles of PET, Optical imaging and Infrared Imaging and *determine* application of each for various pathological situation.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Ultrasonic and Doppler Imaging** Basic of Imaging techniques and Clinical Application Introduction to Ultrasonic and Doppler Medical imaging modalities, Physics of ultrasound, Principles of image formation, Capture and display, Principles of A-Mode, B-Mode, M-Mode, Scan convertersFrame grabbers, Single line and multi-line monitoring of ultrasound displays. Various Application of Ultrasound and Doppler imaging.	L1 and L2	8
MODULE II: **X-Ray and Angiography Imaging** Principles and production of soft and hard X- rays, Photon Interaction and K-shell, Details of radiographic and fluoroscopic images in X-Ray systems. Screen-film and image intensifier systems, Different generation of x-rays, X-Ray machine, Clinical significance of X-ray images, Digital Subtraction Angiography and its application.	L1 and L2	7
MODULE III: **CT-Scanner** Principle of CT-Scan, Evolution of CT Machines, CT image formation, Conversion of X-Ray data into scan image, Mathematical details of various algorithms, Spiral CT, Transverse Tomography, CT Angiography.	L1 and L2	5
MODULE IV: **Magnetic Resonance Imaging** MRI Hardware, Principle of MRI, Lamour Frequency, Mathematical Equation Governing MRI, Bloch equation, Time of Echo (TE) and Repetition Time(TR) and its significance, Image acquisition in magnetic resonance imaging, T1, T2, proton density weighted images, , Artifacts in imaging, Various Application of T1, T2 and PD weighted images, NMR spectroscopy	L2 and L3	10
MODULE V: **Other Advance Imaging techniques** Principles and Application of PET, Infrared Imaging, Optical Imaging.	L1 L2 and L3	6

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
2. Webb, S., The Physics of Medical Imaging, Adern Hilger, Bristol & Philadelphia. 2013
3. Hay.B.A. Edtd., Medical Images, Formation, Perception and Measurement, John Wiley, 2008

Reference Books

1. Rabiner and Gold, *Digital Signal Processing*,
2. A.C. KAK, Principles of Computed Tomography, IEEE Press, New York

Other readings:

1. http://www.learningradiology.com/itunesfeed.htm

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2											1	2		
CO2	1	2											1	2		
CO3	1	2										3	1	2		
CO4	1	2										3	1	2		
CO5	1	2										3	1	2		

1: strongly related, 2: moderately related and 3: weakly related

BME2351	Human Anatomy and Phisiology	L	T	P	C
Version 1.1	Date of Approval: 16,MAY,2019	3	0	0	3
Pre-requisites/Exposure	Biology for Engineers				
Co-requisites	General Science				

Catalog Description

Catalog Description

This course provides students a basic understanding of the human body structure and functioning. Students will be able to relate basic human body systems and life processes, name the major body systems and their functions, understand the anatomy of various body systems, including musclo-skeletal System, nervous system, cardiovascular system, Renal system, etc.. This course covers the basic anatomy and physiology topics for better understanding of the human body. This is the first part of this course which is continued in the next semester.

Course Objectives

The objective of this course is to

1. To provide the student with an in-depth study of anatomy and physiology (structure and function) of the human body.
2. To explain and identify biological levels of organization: i.e. cells to tissues, tissues to organs.
3. To identify and develop understanding of major organ systems, list the organs found in each, and their primary functions.
4. To identify the basic structural and functional principles of human organ systems including repair systems.

Course Outcomes

On completion of this course, the students develop capabilities of:

CO6. *Outline*cell organization and *describe* the physiology of various cell functioning.

CO7. *List*various muscles, bone and joint and *distinguish* between joint functioning & Structure.

CO8. *List and Describe* various structure and functioning of blood component and functioning of heart. *Apply* Einthoven's triangle to heart functioning to obtain ECG.

CO9. *Explain* the physiology of respiratory and digestive system and *determine* respiratory clinical parameters.

CO10. *Outline and describe* anatomy and physiology of nervous and renal system in interaction with endocrine gland.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Basic Cell Structure and physiology** Basic cell structure, various cell organelles and their functions, Cell, cell membrane, polarization and repolarisation, resting membrane potential, Nernst equation, Donnans equilibrium, Goldman equation, action potential and its propagation, synaptic transmission. Tissues- their types, structure and function, structure and function of skin.	L1 and L2	6
MODULE II: **Musclo-Skeletal System and Its Physiology** Different types of muscles and their function, General description of bones, their structure and function, types of joints and their structure and function.1. Functional aspect of bones and joints 2. Shoulder joint, Elbor joint 3. Radioulnar and wrist joint 4. Joints of hand 5. Hip joint 6. Knee joint 7. Ankle and foot	L1 and L2	7
MODULE III: **Cardiovascular System and its Physiology** Blood, Lymph and circulation: blood composition, properties and function. Structure and functions of RBCs, WBCs and platelets, Blood types, Homeostasis, Immune mechanisms, Lymph, Heart position, structure and functions, Heartbeat, electrical excitation, Einthoven's triangle, Cardiac and peripheral regulation, blood pressure and its regulation, blood flow and its regulation	L1, L2 and L3	7
MODULE IV: **Respiratory System and Digestive System** Respiratory System: position and functions. Mechanics of respiration, Lung volumes and capacities, Gas exchange between lungs and tissues, regulation of respiration. Digestive system: Different parts of digestive system, functions of each organ, digestion of proteins, carbohydrates, fats, vitamins and minerals.	L2 and L3	8
MODULE V: **Nervous System, Renal System and endocrine system** Nervous system: Basic functions and structure of CNS,ventricles, and CSF, ANS. Organs of vision,hearing,taste, and smell. Mechanism of sight, colored vision,hearing,reflex action and reflex arc. Renal system: parts of the renal system , its structure and function , formation and composition of urine . Endocrine System and Reproductive system: basic knowledge of endocrine glands, functions of male and female reproductive parts and contraception.	L1 and L2	8

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Guyton A.C and J.E. Hall, “Text book of Medical Physiology “Harcourt India Pvt. Ltd.
2. Principles of Human Anatomy and Physiology , Tortora , Wiley
3. Ross and Wilson,” Anatomy and Physiology in Health and Illness” by Anne Waugh and Allison Grant.

Reference Books

1. Ganong W.F. “ Review of Medical Physiology” , Prentice Hall
2. Gray's Anatomy for Students - Gray's Anatomy by A. Wayne Vogl, Richard Drake, Adam W. M. Mitchell

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1												1	3		
CO2	1	3											1	3		
CO3	1												1	3		
CO4	1	3											1	3		
CO5	1												1	3		

1: strongly related, 2: moderately related and 3: weakly related

BME2306	Analog Electronics - I Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides the practical implementation and verification of the theoretical facts studied in theory course. It includes studying the characteristics of diodes, rectifiers, transistors and amplifiers.

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Course Objectives

The objective of this course is to

1. Provide a demonstration of various analog components like diodes, rectifiers etc.
2. Equip with understanding of different circuits like BJT, JFET, MOSFET and amplifiers.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the characteristics of pn junction and zener diode.

CO 2: Obtain and analyze the output of clipper-clamper circuit and rectifiers with various filters.

CO 3: Plot the characteristics of BJT, JFET and MOSFET.

CO 4: Obtain the gain and demonstrate the frequency response of single stage and double stage amplifiers.

Modules/Topics Covered**	Blooms level*	Number of hours
Lab Session-1 1. To study and plot the characteristics of a junction diode. 2. To study Zener diode I-V characteristics.	L3, L5	2
Lab Session-1I 3. To study diode based clipping and clamping circuits. 4. To study half wave, full wave and bridge rectifier with filters.	L3, L5	2
Lab Session-1II 5. To study the input and output characteristics of a transistor in its various configurations (CE and CB). 6. To study various types of Bias Stabilization for a transistor. 7. To study and plot the characteristics of a MOSFET in its various configurations. 8. To study and plot the characteristics of a JFET in its various configurations .	L3, L5	6

Lab Session-1V . 9. To study the gain and plot the frequency response of a single stage transistor amplifier. 10. To measure gain and plot the frequency response of double stage RC coupled amplifier.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
- Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
- R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO2	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO3	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO4	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

COMPUTER AIDED GRAPHIC DESIGN LAB

Course Code:

L-T-P : 0-0-2 **Credit Units : 01**

Course Contents:

1. To study and introduction to 3-D CAD Software to develop 3-D CAD model of Rectangular beam
2. To develop a 3-D CAD model of Hollow shaft.
3. To develop a 3-D CAD model of Nut & Bolt.
4. To develop a 3-D CAD model of Blood Vessels.
5. To develop a 3-D CAD model of Ball & Socket Joint.
6. To develop a 3-D CAD model of Knuckle Joint.
7. To develop a 3-D CAD model of Cotter Joint.
8. To study 3D rendering and develop 3D model from 2D stack of DICOM images.
9. Introduction to finishing tools for medical 3D rendered model.
10. To analyse wall-thickness, curvature analysis and part comparison.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BME2316	MEASURMENT AND MEASURING INSTRUMENTS	L	T	P	C
Version 2017.1	Date of Approval: 16 May ,2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides a brief knowledge of measurements and measuring instruments related to engineering. It introduces measuring elements of instruments, characteristics of measuring instruments, error analysis, transducers and its classification, measurement of resistance, capacitance and inductance, principles of analog and digital meters and different display techniques.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of measurement, measuring elements and challenges in measurement.
2. Provide in depth knowledge of each element of measurement system.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain measuring elements and characteristics of measurement system and solve problems related with measurement errors.

CO2. Classify different types of transducers and solve problems related with transducers.

CO3. Solve problems of resistance, capacitance and inductance measurement.

CO4: Explain and solve problems on different types of analog and digital meters suitable for voltage and current measurement.

CO5: Explain display devices used in measurement system and analyze the signals on CRO.

Course Content

Modules	Bloom s level*	Number of hours
Module 1: **BasicsofMeasurementSystems** ElementsofGeneralizedMeasurementSystem;Static&DynamicCharacteristicsofInstruments;Errorsin Measurements–SourcesandTypesofErrors;StatisticalTreatmentofData–Mean,MeasuresofDispersion, Rejectionofdatabasedonconfidenceinterval	L1, L2 and L3	5
Module 2: **Transducers** Classification; Selection of Transducers; Resistive Transducers – Potentiometer, Strain gauge, Rosettes, Thermistorsand RTD;CapacitiveTransducers– Measurementof Liquidlevelbychangeinvariationof dielectricconstant;VariableInductanceTransducers–self-generating typeandpassivetype;Piezoelectric Transducers;PhotoelectricTransducers;DigitalTransducer	L1, L2, L3 and L4	9
Module 3: **MeasurementofResistance,InductanceandCapacitance** D.C.Bridges:Wheatstone‘sbridge,Sensitivity&Limitations;CareyFosterBridge;Kelvindoubleb ridge; Megaohm bridge. A.C.Bridges:Maxwell‘sInductanceCapacitanceBridge;AndersonsBridge;DeSauty‘sBridge;Sc hering Bridge.	L1, L2, and L3	8
Module 4: **AnalogandDigitalMeters** Analogmeters:PMMCmeters-construction, torqueequation, ammetershunts,multirangeammeter,voltmeter multiplier, sensitivity, ohmmeters, multimeters; Construction &general equation of moving iron, electrodynamometer,hotwireinstruments. Digitalmeters:Digitalvoltmeter–ramptype,integratingtype,potentiometertype,Applications	L1, L2, and L3	8
Module 5: **DisplayDevicesandRecorders** LED,LCD,ColdCathodedisplays,IncandescentDisplays,FluorescentDisplays,LVD,VDU CathodeRayOscillioscope:Basicfunctioning,MeasurementofVoltage,Current,PhaseandFrequency.	L1, L2, L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New

Delhi Ed. 2005.

- Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

Reference Books

- Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.
- Electronics Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	**2**	-	--	--	--	--	--	--	**3**	**2**	--	**1**	--
CO2	**1**	**1**	--	**2**	--	--	--	--	--	--	--	**2**	**2**	--	**1**	--
CO3	**1**	**2**	--	--	--	--	--	--	--	--	--	**2**	**2**	--	**1**	--
CO4	**1**	**2**	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	**2**	--
CO5	**1**	**2**	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

BME2317	Measurement and Measuring Instruments Lab	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Course Contents:

1. To Study various Temperature Measuring Instruments and to Estimate their Response times.

2. To study the working of Bourdon Pressure Gauge and to check the calibration of the gauge in a dead-weight pressure gauge calibration set up

3. To study a Linear Variable Differential Transformer (LVDT) and use it in a simple Experimental set up to measure a small displacement.

4. To measure load (tensile/compressive) using load cell on a tutor.

5. To measure torque of a rotating shaft using torsion meter/strain gauge torque transducer.

6. To measure the speed of a motor shaft with the help of non-contact type pickups (magnetic or photoelectric).

7. Measurement of distance using capacitive pick up

8. Measurement of temperature using RTD.

9. Measurement of pressure using piezoelectric pick up.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BME2318	Virtual Instrumentation	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This Course introduces virtual instrumentation and its comparison over conventional instrumentation. In this course, LabVIEW has been adopted as the platform of virtual instrumentation programming. System hardware and its interfacing techniques are introduced. Applications of virtual instrumentation are explained in various field e.g. Aviation, Automotive Defence, Medical etc.

Course Objectives

The objective of this course is to

1. To provide the core knowledge of Virtual Instruments used in research and industry.
2. To provide a LabVIEW platform on which low cost virtual instruments can be designed in very short time.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain virtual instrumentation and compare it with tradition instruments.

CO2. Explain components of LabVIEW, apply programming concept and design basic virtual instruments using LabVIEW software.

CO3. Explain the concepts of LabVIEW system hardware including input, output and interfacing devices.

CO4: Explain applications of virtual instrumentation in industries.

Course Content

Modules	Blooms level*	Number of hours
Module 1: **Introduction to Virtual Instrumentation** Introduction,Historical perspective, advantages, block diagram and architecture of a virtual instrument, conventional vs. virtual instrumentation.	L1, L2 and L4	4
Module 2: **Introduction to Software** Introduction to Lab VIEW, Front panel, back panel representations, Block diagram, Menus, Palettes, VI and Sub VI, Editing and Debugging VI, Structures, Arrays, Clusters, Charts and Graphs, Data acquisition, Instrument Control, Signal Generation and Signal Processing Examples	L1, L2, L3, L4 and L5	9
Module 3: **Introduction to systems hardware** ADC, DAC, D/O, counters and timer, PC hardware structure, timing, interrupts, DMA, software and hardware installation, Configuring data acquisition hardware using the drives in application software, use of DAQ library functions for different analog and digital input/output operations. Input/output devices & functions like data gloves, joysticks, CRT etc.	L1 and L2	6
Module 4: **Application of Virtual Instrumentation in various fields** Aviation, Automotive, High Voltage, Defense, Chemical, Industrial, Marine, Medical, Mining, Nuclear Energy, Virtual landscapes.	L1 and L2	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.
2. Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.

Reference Book

1. LabVIEW Basic 1 Course Manual, National Instruments
2. LabVIEW for everyone -Wells Lisa K and Travis Jeffrey, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	-	-	--	--	--	--	--	--	**3**	--	--	**1**	**2**
CO2	**1**	**1**	**2**	**2**	--	--	--	--	--	--	--	**2**	--	--	**1**	**2**
CO3	**1**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	--	**1**	**2**
CO4	**1**	**2**	--	-	--	--	--	--	--	--	--	**2**	--	--	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

BME2319	Virtual Instrumentation Lab	L	T	P	C
Version 2019.1	Date of Approval: 16 May 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites					

List of Experiments:

1. To open, and explore the components of LabView.

2. To build a simple VI that converts a Celsius temperature reading to Fahrenheit.

3. (a) To create an icon and a connector pane so you can use a VI as a subVI.

   (b) To build a VI and create its icon and connector pane so you can use it as a subVI.

4. To build a VI to generate 4*5 two dimensional array of random numbers (between 1 to2).

5. To Build a VI that generate Fibonacci series starting from ‘0’.

6. To build a VI which finds roots of quadratic equation using formula node.

7. To build a VI that reverses the contents of an array.

8. To build a VI that can be used for sorting of numeric array i.e. in ascending or descending order.

9. To build a VI for 4*1 multiplexer operation.

10. To build a VI for 3*8 Decoder operation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BME2320	Statistics & Probability Theory	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of statistics, the science of collecting, organizing, and interpreting numerical data are discussed. Emphasis will be placed on statistical reasoning and data analysis. The main topics are study design, descriptive statistics, probability theory, and statistical inference. As a precursor to the study of cryptography studies will be made on impact of various techniques for finding independence or dependence between data variables. The concepts learnt in the studies of statistics will be applied practically to solve number of real life problems using the statistical package like R and SPSS.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of statistics through problem solving and analytical approach.
2. Provide an overview of various statistical techniques: descriptive and inferential, parametric and non-parametric and practical statistics using R and SPSS.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain, describe and distinguish various population, sample, type of variables, measurement scales, central tendency, percentile and solve problems related to them.

CO 2: Explain the concept of descriptive and inferential statistics; probability theory; Solve problems based on probability; Explain binomial, poisson distribution and solve real life problems related to discrete and continuous random variable.

CO 3: Describe the concept of sampling distribution for large and small samples; Explain the concept of hypothesis testing and solve problems related using t-distribution and standard normal distribution.

CO 4: Explain concept of covariance and correlation and its applications in real life; Explain Anova and its use in real life problem solving; Explain and compare various regression analysis methods statistics for prediction

CO 5: Explain various parametric and nonparametric test and apply them to solve real life statistical problems

Modules	Blooms level*	Number of hours
Module 1: Introduction to Statistics and Data Analysis Statistical Inference, Samples, Populations and Experimental Design , The Hole of Probability Sampling Procedures; Collection of Data ,Measures of Location:, Measures of Variability ,Discrete and Continuous Data , Statistical Modeling, Scientific Inspection, and Graphical Diagnostics, Graphical Methods and Data Description ,General Types of Statistical Studies	L1, L2 and L3	7

Module 2: Probability & Probability Distribution Sample Space, Events Probability of an Event, Additive Rules, Conditional Probability ,Multiplicative Rules ,Bayes' Rule, Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions , Joint Probability Distributions ,Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem, , Discrete Uniform Distribution, Binomial and Multinomial Distributions, Poisson Distribution and the Poisson Process. Continuous Uniform Distribution, Normal Distribution ,Areas under the Normal Curve ,Applications of the Normal Distribution , Gamma and Exponential Distributions, ,Chi-Squared Distribution.	L1,L2, L3	6
Module 3: Sampling Distributions and Estimation Random Sampling, Some Important Statistics, ,Data Displays and Graphical Methods, Sampling Distributions Introduction to Estimation, Statistical Inference ,Classical Methods of Estimation, Single Sample: Estimating the Mean ,Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits Two Samples: Estimating the Difference between Two Means ,Paired Observations , , Single Sample: Estimating a Proportion, Two Samples: Estimating the Difference between Two Proportion.	L1,L2, L3	6
Module 4: Hypotheses Testing Statistical Hypotheses: General Concepts ,Testing a Statistical Hypothesis, One- and Two-Tailed Tests, The Use of *P*-Values for Decision Making in Testing Hypotheses, One Sample: Test on a Single Proportion ,Two Samples: Tests on Two Proportions, Exercises ,One- and Two-Sample Tests Concerning Variances, Goodness-of-Fit Test, Test for Independence (Categorical Data),Test for Homogeneity, Testing for Several Proportions	L1, L2 L3	7
Module 5: Simple Linear Regression and Correlation Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted .Model Analysis-of-Variance, Approach, Test for Linearity of Regression: Data with Repeated Observations, Data Plots and Transformations, Simple Linear Regression Case Study, Correlation, Classification	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Probability & Statistics for Engineers & Scientists", Ronald E. Walpole,Pearson 2007
2. Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
3. Torsten Hothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Reference Books

1. Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**	**--**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**1**	**1**	**1**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO4	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO5	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

EFFECTIVE LISTENING

Course Code: CSS2151

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:
To form written communication strategies necessary in the workplace

Course Contents:
Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats
Module III
Memo
Agenda and Minutes
Notice and Circulars
Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

GROUP DYNAMICS AND TEAM BUILDING

Course Code: **BEH2351**

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To inculcate in the students an elementary level of understanding of group/team functions
To develop team spirit and to know the importance of working in teams

Course Contents:

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change

- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - III

Course Code: LAN2351

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To provide the students with the know-how

- To master the current social communication skills in oral and in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

Course Contents:

Module B: pp. 76 – 88 Unité 6

Module C: pp. 89 to103 Unité 7

Contenu lexical: **Unité 6:se faire plaisir**

1. acheter : exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restaurant
3. parler des différentes occasions de faire la fête

Unité 7: Cultiver ses relations

1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.
3. caractériser une personne (aspect physique et caractère)

Contenu grammatical:

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN - III

Course Code: LAN2352

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Modal verbs
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns
Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions
Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues
In the Restaurant,

At the Tourist Information Office,

A telephone conversation

Module VII: Directions
Names of the directions
Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions

To assimilate the knowledge of the conjunctions learnt indirectly so far

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – III

Course Code: LAN2353

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir….*
Weather

Module II
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

Module V
Reflexives

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

RUSSIAN - III

Course Code: LAN2354

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – III

Course Code: LAN2355

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between “hii” and “neng”, “keyi”.

Module III
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g.; fever, cold, stomach ache, head ache.
Use of the modal particle “le”
Making a telephone call
Use of “jiu” and “cal” (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV
The ordinal number “di”
“Mei” the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle “de” (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of “li” and “cong”.
Comprehension reading followed by questions.

Module V
Persuasion-Please don’t smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of “it doesn’t matter”
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I, Part-2" Lesson 21-30

PORTUGUESE-III

Course Code : LAN2356

L-T-P : 2-0-0 **Credit Units: 02**

BME2408	Digital Electronics	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of combinational and sequential circuits.
2. Equip with the understanding of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the various logic gates, Boolean algebra and solve the k-map & tabulation method to simplify the logical function.

CO2: Explain the adder & subtractor; Apply and analyze multiplexer, decoder & encoder to design Boolean function.

CO3: Describe flip flops, shift registers & Design counters and synchronous sequential circuits.

CO4: Explain & compare different logic families and explain data convertors.

Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1`s complement and 2`s complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method	L1,L2 and L3	6
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.	L2,L3, L4 and L5	7
MODULE 4: LOGIC FAMILIES & DATA CONVERTERS Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1, L2,L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, “Fundamentals of Digital Circuits”, 2nd Edition, Prentice-Hall, 2004
2. Moris Mano, “Digital Design”, 2nd Edition, Pearson Education,2007.
3. R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
2. Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--	3
CO3	1	2	1	--	--	--	--	--	--	--	--	2	1	--	--	3
CO4	2	3	3	--	--	--	--	--	--	--	--	--	1	--	--	3

1: strongly related, 2: moderately related and 3: weakly related

BME2412	Bio-Materials	L	T	P	C
Version 1.1	Date of Approval: MAY 16,2019	3	0	0	0
Pre-requisites/Exposure	Anatomy & physiology, Engineering Physics, Element of Mechanical Engineering, Engineering Mechanics				
Co-requisites	General Science				

Catalog Description

The course is about the biomaterials used in biomedical implants. It includes the concept of biocompatibility and toxicity test. Various biomaterial used in specific applications are content of course. It consist of metallic, polymer, ceramics and biological tissues. Course also provide understanding with material testing and sterilisation techniques.

Course Objectives

After successfully completing this course, students will be able to:

1. Understand the fundamental principals in biomedical engineering, material science and chemistry, and how they contribute to biomaterial development and performance.
2. Apply the math, science, and engineering knowledge gained in the course to biomaterial selection and design.
3. Critically review papers from the scientific literature and identify areas of research opportunities

Course Outcomes

On completion of this course, the students develop capabilities of:

CO11. *Define* the biomaterials and its requirements. *Explain* the metallic implant properties. .

CO12. *Define* the polymer and ceramic biomaterial and *describe* their application in various implants.

CO13. *Describe* methodology to enhance biomaterial properties for better compatibility with biological tissues. *Setup* test for Biocompatibility and toxicological aspect of material.

CO14. *Explain*sterilization techniques and *determine* mechanical testing setup for biomaterials for various application.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Introduction** Definition of biomaterials, requirements of biomaterials, classification of biomaterials, Comparison of properties of some common biomaterials. Effects of physiological fluid on the properties of biomaterials,Surface properties, physical properties and mechanical properties of materials. Host tissue reactions to biomaterials **Metallic implant materials**: Stainless steel, Co-based alloys, Ti and Ti-based alloys. Importance of stress-corrosion cracking,corrosion behavior and the importance of passive films for tissue adhesion. Hard tissue replacement implant: Orthopedic implants and Dental implants. Soft tissue replacement implants: Percutaneous,skin implants and vascular implants,	L1 and L2	9
MODULE II: **Polymeric implant materials** Classification of polymers according to thermosets, thermoplastics and elastomers : Polyolefins, polyamides, acrylic polymers, fluorocarbon polymers, silicon rubbers, acetals. Physiochemical characteristics of biopolymers. Biodegradable polymers for medical purposes, Biopolymers in controlled release systems,Synthetic polymeric membranes and their biological applications. **Ceramic implant materials:** Definition of bioceramics. Common types of bioceramics: Aluminium oxides, Glass ceramics, Carbons. Bioresorbable and bioactive ceramics	L1 and L2	9
MODULE III: **Composite implant materials**: Mechanics of improvement of properties by incorporating different elements. Composite theory of fiber reinforcement (short and long fibers, fibers pull out). Polymers filled with osteogenic fillers (e.g. hydroxyapatite). Host tissue reactions to composite materials.. **Biocompatibility & toxicological screening of biomaterials**: Definition of biocompatibility, blood compatibility and tissue compatibility. Toxicity tests: acute and chronic toxicity studies (in situ implantation, tissue culture, haemolysis, thrombogenic potential tests, systemic toxicity, intracutaneous irritation test), sensitization, carcinogenicity, mutagenicity and special tests.	L1, L2 and L3	9
MODULE IV: **Sterilisation Techniques:** Defination of sterilization, Types of sterilization: autoclaving, ETO and gamma radiation. Effects of sterilization on the properties of materials**.** **Testing of biomaterials/Implants**: In vitro testing (Mechanical testing): tensile, compression, wears, fatigue, corrosion studies and fracture toughness. In-vivo testing (animals studies): biological performance of implants. Ex-vivo testing: in vitro testing simulating the in vivo conditions. Standards of implant materials.	L2 and L3	9

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Biomaterials Science: An Introduction to Materials in Medicine, by Buddy D. Ratner, et. al. (Academic Press, San Diego, 1996)

2. Biomaterials - Science and Engineering by J B Park, (Plenum Press, 1984)
3. Biomaterials, An interfacial Approach: Hench L.L. Ethridge E.C
4. Encylopedia of Medical Devices and Instruments. I-IV: John G.Webster, Bols
5. Vol.I Biocompatibility of Clinical implantws materials: David F. Williams
6. A text book of Biomedical Engineering: Kennedy R.M.

Reference Books

1. Text book of Polymer Sciences: Fred W. Billmeyer Jr.
2. The Biomedical Engineering Hand book, CRC Press 1995: Bronzins J.D.
3. Biomaterials by Lawrence Stark & Gyan Agarwal 2. Biomaterials - An Interfacial approach by L. Hench & E. C. Ethridge
4. Biomedical Engineering Fundamentals by Joseph D. Bronzino (Publisher CRC)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2										3			1	3
CO2	1	2										3			1	3
CO3	1	2										3		2	1	3
CO4	1	2										3		2	1	3

1: strongly related, 2: moderately related and 3: weakly related

BME2413	Signals and Systems	L	T	P	C
Version 2019.1	Date of Approval: May 16, 2019	2	1	0	3
Pre-requisites/Exposure	Differentiation & Integration concepts				
Co-requisites					

Catalog Description

This course deals in Digital signal processing with significant skills in advance methods for modification, analysis, classification & sampling of signals. It provides the broad knowledge of design, and realization of digital signal processing systems. The problems based on transformation of domains and filter design will be focused on.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of signals and systems.
2. Provide in-depth knowledge of representation of signals in frequency & z-domain.

Course Outcomes

On completion of this course, the students will be able to

CO1: Represent, analyze & categorize discrete-time signals and systems in time domain with an emphasis on linear time invariant systems.

CO2: Apply the fourier series expansion to signals and obtain its constituent frequencies.

CO3: Convert the signals from time domain to frequency domain using fourier transform.

CO4: Apply the z- transform on discrete signals to solve the problems related to computational complexity.

Modules	Blooms level*	Number of hours
Module 1: **Signals And Systems** Introduction of signals and systems; classification of signal, continuous time and discrete time signals, operations performed on them, even and odd signals, periodic and non periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.	L1,L2 and L4	8
Module 2: **LTI System** Response of LTI system for continuous and discrete time systems, Impulse response, Step response, properties of continuous LTI and discrete LTI systems, LTI systems described by differential and difference equation, analysis of LTI Systems, interconnection of systems.	L1,L2 and L4	6
Module 3: **Fourier Series** Representation of continuous time periodic signal, properties of continuous time Fourier series, representation of discrete time periodic signals, convergence of the Fourier series, properties of discrete time Fourier series, Fourier series and LTI systems.	L2,L3	7
Module 4: **Fourier Transform** Continuous time Fourier transform, properties of continuous time Fourier transform, discrete time Fourier transform, properties of discrete time Fourier transform; applications; Bandwidth determination of signals and systems.	L2,L3	7
Module 4: **z-Transform** Definition of z-transform, region of convergence, properties of z-transform, first order system, second order system, inverse z-transform, analysis of LTI system using z-transform.	L2,L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. **Proakis, Manolakis**, Digital Signal processing, 4th edition, Pearson, 2007.
2. **Oppenheim & Schaffer**, Digital Signal Processing, 1st edition, Pearson, 1975.

Reference Books

1. **Simon Haykin**, Signals and Systems, 2nd Edition, Willy Publications.
2. **B.P.Lathi**, Linear Systems & Signals, 2nd Edition, Oxford Publication.
3. **Roberts**, Fundamentals of Signals and Systems, Tata Mcgraw Hills Publication.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO2	**2**	**1**	--	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	--
CO3	**2**	**1**	--	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	--
CO4	**2**	**1**	--	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

BME2451	Bio-Instrumentation	L	T	P	C
Version 1.1	Date of Approval: 16, May 2017	3	0	0	3
Pre-requisites/Exposure	Anatomy &Physiology and Electronic Circuit				
Co-requisites	General Science				

Catalog Description

Bio-instruments comprise of all equipment use in healthcare system for diagnosis and therapy. This course is consist of diagnosis equipment using various physiological parameters. Courseinculcate an understanding of the measurement principles of medical instrumentation, including biochemical sensors, bio-potential amplifiers, bioelectrical signals (ECG, EEG), measurement of respiratory function, cardiac variables, blood pressure, blood flow as well as medical devices.

Course Objectives

The objective of this course is to

3. To provide an overview of bio-instrumentation principles and constraint.
4. To serve as a foundation for design and use of medical instruments.

Course Outcomes

On completion of this course, the students develop capabilities of:

CO15. *Identify* appropriate transducer and electrode to *estimate* specific physiological parameter.
CO16. *List* electro-physiological signal (ECG, EEG, EMG) specification and *construct* device to analysis signal characteristics.
CO17. *List* various respiratory parameter and *demonstrate* the use of electrical impedance tomography for plethysmography.
CO18. *Explain* the principle of oximetry and *construct* oximeter device.
CO19. *Explain*and *demonstrate* the principle of non-invasive blood pressure measurement.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Introduction to Bio-Instrumentation** Transducers and Reference electrodes: classification of transducers, temperature transducers, displacement transducer, pressure transducer. Magnetic induction transducer, photoelectric transducer, piezoelectric transducer, magnetic induction.Electrode theory,	L1 and L2	10

biopotential electrodes, microelectrodes, skin surface electrodes, needle electrodes.		
MODULE II: **Electrophysiological Signals and Measurement Devices** ECG: electrodes and conversion of ionic potentials to electric potential, ECG instrumentation amplifiers, driven right leg circuitry.Introduction and characteristics of bio signals (EEG, ECG, EMG), removal of artifacts, event detection and correlation analysis of ECG signals.	L1, L2 and L3	8
MODULE III: **Respiratory System and Measurement Devices** Respiratory System: position and functions. Methods to measure residual volumes, Introduction to respiration measurement using electrical impedance plethysmography, Electrical impedance changes during breathing, 2 and 4 electrode measurement, 4 electrode technique.	L1, L2 and L3	6
MODULE IV: **Oximetry and Measurement devices** Introduction to Oxygen saturation using pulse oximetry, optical characteristics of oxygenated and deoxygenated blood, amplifiers.Principles of pulse oximetry, circuits of pulse oximetry, constant current source, current – voltage converter	L2 and L3	6
MODULE V: **Blood Pressure measurement techniques** Theories of Non-invasive blood pressure measurement, Korotkoff sounds and circuitry for method based on oscillometry. Fino-sphygmomanometer principles and limitation.	L2 and L3	6

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

4. Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
5. Leslie Cromwell, Fred J. Weibell, Erich A Pfeiffer, Biomedical Instrumentation and Measurements , PHI , 2nd Edition , 2004.

Reference Books

3. John G.Webster, Medical Instrumentation : Application and Design, 3rd Edition , John Wiley & Sons , New York , 1998 .

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1												1		
CO2		1		2										1		
CO3	1		2											1		
CO4		1	2											1		
CO5		1	2											1		

1: strongly related, 2: moderately related and 3: weakly related

BME2403	Bio-Instrumentation Lab	L	T	P	C
Version 2019.1	Date of Approval: 16, May 2019	0	0	2	1
Pre-requisites/Exposure	Anatomy &Physiology and Electronic Circuit				
Co-requisites	General Science				

Course Objectives

The objective of this course is to

5. To provide hands-on practice with medical signal analysis.
6. To serve as a foundation for design of medical device.

Course Outcomes

On completion of this course, the students will be able to

CO20. Designing of medical device component as amplifier, sensors, power supplies, filters etc.
CO21. Design and measure the physiological signal in real time.

Catalog Description

This course helps the students to do hands-on practice with various medical equipment as pulse oximeter, ECG, EMG etc. Course also help student to build capacity to design components for medical devices as, electronic filter, power supplies, amplifiers, etc. with desire output. Course included the basic demonstration of transducer and sensors use for measurement. It consists of signal analysis and visual presentation of analyzed result.

Course Content

Laboratory Session 1: 2 hours

1. Study of pulmonary function analyzer using spirogram.

Laboratory Session 2: 2 hours

2. To study finger-tip oximeter.

Laboratory Session 3: 2 hours

3. Designing of instrumentation amplifier.

Laboratory Session 4: 2 hours

4. Designing of notch filter.

Laboratory Session 5: 2 hours

5. To study voltage regulator IC 7805, 7809, 7812 series.

Laboratory Session 6: 2 hours

6. To determine Bradycardia and Tachycardia using ECG Training Kit.

Laboratory Session 7: 2 hours

7. To determine heart rate using ECG simulator Kit.

Laboratory Session 8: 2 hours

8. Circuitry explanation for patient leakage current.

Laboratory Session 9: 2 hours

9. To determine balancing condition for thermistor using wheat stone bridge.

Laboratory Session 10: 2 hours

10. Study of pressure changes using strain gauge.

Text Books

6. Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
7. Webb, S., The Physics of Medical Imaging, Adern Hilger, Bristol & Philadelphia. 2013
8. Hay.B.A. Edtd., Medical Images, Formation, Perception and Measurement, John Wiley, 2008
9. Lab Practical Manual

Reference Books

4. Rabiner and Gold, *Digital Signal Processing*,
5. A.C. KAK, Principles of Computed Tomography, IEEE Press, New York

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1												1		
CO2		1		2										1		

BME2409	DigitalElectronics Lab	L	T	P	C
Version 2019.1	Date of Approval: 16, May 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites	Nil				

List of Experiments:

1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.

2. To obtain half adder, full adder using gates and verify their truth tables.

3. To obtain half subtractor, full subtractor using gates and verify their truth tables.

4. To implement control circuit using multiplexer.

5. To convert BCD code into excess 3 code and verify the truth table.

6. To verify the truth tables of RS, D, JK and T flip- flops.

7. To implement and verify 3-bit bi-directional shift register.

8. To design and study asynchronous/ripple counter.

9. To design and study synchronous counter.

10. To design and study a sequence detector.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BME2414	Signals & Systems Lab	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Matlab				
Co-requisites					

Course Objectives

The objective of this course is to

1. To equip the students with the signal processing tool of Matlab through practical exposure.
2. To provide sound foundation of the basic signal generation and its various operations in Matlab.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the concepts of basic signals and write matlab code to generate them.

CO2. Write programs related to various operations performed between two signals like correlation & convolution.

CO3. Write programs for transforming the signal from time domain to frequency domain & z-domain.

CO4. Use Matlab as a computation and visualization tool in the study of signals and systems.

Catalog Description

This lab exercises provide opportunities for applying & implementing basic signal and system concepts. Topics include signal generation, convolution, correlation, discrete Fourier Transforms and z transforms with an emphasis on using computer software (Matlab) for analysis and simulation.

Course Content

Laboratory Session 1: 4 hours

1. To Study auto correlation of two signals.
2. To study cross correlation of two sequences.

Laboratory Session2: 2 hours

3. To study convolution of two sequences.

4. To study impulse response.

Laboratory Session 3: 4 hours

5. To study z transform of a a) sinusoidal signal, b) step function.

6. To compare fourier and z transform of a signal.

Laboratory Session 4: 2 hours

7. To study convolution theorem in time and frequency domain

.Text Books

1. Alan.V Oppenheim, Signals and Systems, 4th Edition 2007, Pearson Prentice Hall Publication.
2. K.M. Soni, Signals and Systems; 3rd Edition, S.K. Kataria & Sons Publication.
3. P.Ramesh Babu, Signal and Systems, 3rd Edition, Scitech Publications (INDIA) Pvt. Ltd.

Reference Books

1. Simon Haykin, Signals and Systems, 2nd Edition, Willy Publications.
2. B.P.Lathi, Linear Systems & Signals, 2nd Edition, Oxford Publication.
3. Roberts, Fundamentals of Signals and Systems, TMH Publication.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BME 2407	Analog Electronics- II	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronics and Circuital Analysis				
Co-requisites	Nil				

Catalog Description

This course introduces the application of semiconductor devices in linear analog circuits. The course stresses on circuit designs using the operational amplifier, active filters and oscillators. The course also provides the overview on the applications of IC Analog Multiplier & Timer.

Course Objectives

The objective of this course is to

1. Provide the fundamental knowledge of linear analog circuits.
2. Provide the knowledge about practical circuit designs using OP Amp.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the circuits having BJT and Operational Amplifiers.

CO2. Solve the Linear and Non-linear circuits and analyze them in terms of their parameters and applications.

CO3. Categorize the waveform generation circuits and apply them in laboratory projects.

CO4. Analyze the circuital knowledge to Linear ICs and filters and apply them for industry problem.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Building Blocks of Analog ICs 6 lecture hours Differential amplifier, Op-amp Model, op-amp DC & AC parameters, virtual ground, Current mirrors, Active loads, Level shifters and output stages.	L1 and L2	6
MODULE II: Operational amplifiers Introduction, open loop and closed loop configuration, op-amp parameters (input offset current, output offset current, i/p bias current, CMRR, PSRR, null adjustment range, etc,)	L1 and L2	5

Inverting and non-inverting configuration, voltage gain of inverting and non inverting configurations.		
MODULE III: Linear & Non Linear Wave shaping Adders, Voltage to current, current to voltage Converter, Integrators, Differentiators**,** Voltage follower (voltage buffer), summer, subtractor, Comparators, log/antilog circuits using Op-amps, precision rectifiers.	L2, L3 and L4	6
MODULE IV: Waveform Generations Damped and undamped oscillations, Barkhausen criterion for sustained oscillation. Tank circuit generator Astable multi Vibrators, OTA-C Oscillators, Crystal oscillator**.** Types of oscillators: LC-Hartley and Colpitts, RC-RC phase shift and Wien bridge oscillator, Basics of tuned Amplifiers, Voltage Controlled Oscillator.	L2 L3 and L4	7
MODULE V: Active RC Filters & Applications of Linear Circuits Idealistic & Realistic response of filters (LP, BP, and HP), Butter worth & Chebyshev approximation filter functions, LP,BP,HP and All pass, Notch Filter, Operational transconductance amplifier (OTA)-C filters.	L2, L3 and L4	6
MODULE VI: Applications of IC Analog Multiplier & Timer IC phase locked loops, 555 Timer, IC voltage regulators-(fixed, variable) 78xx, 79xx series and adjustable.	L3 and L4	6

*Bloom's Level:
L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. **Ramakant Gaekwad,** Op-Amps and Linear Integrated Circuits, 4th Edition PHI, 2001.
2. **D. Roy Choudhury and Shail B. Jain,** Linear Integrated Circuits, 2nd Edition, New ageInternational, 2006.

Reference Books

1. **Adel S. Sedra and K. C. Smith** Microelectronic Circuits, Sixth Edition, Oxford University Press,2013.
2. **George Clayton and Steve Winder**, Operational Amplifiers, 5th Edition, Elsevier, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO3	1	2	3	-	-	3	-	-	-	-	--	-	1	1	-	-
CO4	1	1	-	-	-	2	-	-	-	-	-	-	1	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

BME2417	ANALOG ELECTRONICS – II LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Circuit Theory				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Analog Electronics are discussed. Design and analysis of efficient circuits using op-amp like adder, subtractor, filters and oscillators.

Course Objectives

The objective of this course is to

1. To provide the basic skills required to understand, develop, and design of various engineering applications involving Analog Electronic & Circuits.
2. To provide basic laboratory exposures for Analog Circuits and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Construct adder, subtractor, an inverting and non-inverting amplifier.

CO2: Design transistor-based RC oscillator (Wien bridge and RC phase shift oscillator) circuit.

CO3: Construct astable and mono-stable mode timer circuit using IC 555.

CO4: Design of Integrator, differentiator and low pass & high pass active filter circuit using Op-Amp (I.C-741)

List of Experiments:

Modules	Blooms level*	Number of hours
1. To study the op amp as an inverting and non inverting amplifier. 2. To use the op amp as an adder, subtractor, integrator and differentiator. 3. To design a ramp and a square wave generator. 4. To study the IC-555 timer as stable and bistable multivibrator.	L1, L2	8

5. To design low pass, high pass and band pass filters using op- amp. and plot their frequency response. 6. To design and study class a power amplifier. 7. To design and study a class B push pull amplifier.	L3 and L4	10
8. To study various feedbacks such as voltage series feedback. 9. To design RC phase shift and Wein bridge oscillators using op amplifier. 10. To design and study Colpitt and Hartley oscillators.	L2, L4	10

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**2**		**3**										**1**			
CO2		**2**	**3**										**3**			
CO3	**3**												**2**			
CO4	**3**	**2**	**2**								**2**		**1**			

1: strongly related, 2: moderately related and 3: weakly related

BME2415	Bio-Chemistry	L	T	P	C
Version 1.1	Date of Approval: 16 May, 2019	3	1	0	4
Pre-requisites/Exposure	Anatomy & physiology and Engineering Chemistry				
Co-requisites	General Science				

Catalog Description

This course explores the basic principles of biochemistry and develops the student's appreciation and understanding of biological networks.

This course focuses on the understanding of biochemical processes in the context of chemical principles; and the importance of research design and application in the investigation of questions in biochemistry. Because the field of biochemistry is continually evolving and touches many areas of cell biology.

Course Objectives

The objective of this course is to

7. To provide an overview of biochemistry and application in field of biomedical.
8. To serve as a foundation for biocompatibility and interaction of biological tissues with changing environment.

Course Outcomes

On completion of this course, the students develop capabilities of:

CO22. *Define* biochemistry and *describe* cell transportation phenomenon.
CO23. *List*various proteins, enzyems and nuclei acids and *describe* their biological
CO24. *List* various biochemical clinical parameters and *describe* analytical techniques to observe them.
CO25. *Explain* the principle of acid-base homeostasis and *application* of various radio-isotopes for biological cycle.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Introduction to Bio-Chemistry** Introduction to Biochemistry and Medicine: Cell, Eukaryotic cell structure, functional role of each Organelle, Sub cellular Fractionation: Differential Centrifugation, Redox potentials & Oxidative phosphorylation, Transport of substances across biological membrane function.	L1 and L2	10
MODULE II:	L1 and L2	10

Enzymes and Nucleic Acids **Enzymes (Proteins):** Chemical nature of enzymes (Proteins). Spectrophotometric measurement of enzymes (proteins), isolation methods, Study of enzyme properties, Diagnostic enzymes, Enzyme biotechnology **Nucleic Acids:** Composition and functions of nucleic acids (A brief account) Genes, Outlines of DNA structure, Recombinant DNA and its applications		
MODULE III: **Biochemical Clinical Parameters and Analytic techniques** **Urine chemistry:** Chemical composition of urine under normal and abnormal conditions. **Analytic Techniques:** Principles and applications of photometry, spectrophotometry fluorometry, Nephalometry and turbidimetry, Biochemical analysis carried out in the estimation of blood constituents like glucose, urea, creatinine, protein, cholesterol, bilirubin etc., Separation of Serum Proteins by electrophoresis, Automation in biochemical analysis.	L1 and L2	15
MODULE IV: **Acid base homeostasis:** Acids, bases, measurement of pH and glass electrodes, Role of kidney and lungs in acid base balance, Biochemical measurement of acid base status of patients, Blood gas analyzer, disorders of acid-base balances. **Isotopes:** Definitions, Units, radioactive isotopes, Applications of isotopes in life sciences and medicine.	L1 and L2	13

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Biochemistry- Dr. U. Satyanarayana (Books & Allied pvt. Ltd.)
2. Instant Notes on Biochemistry-Hooper et.al. (BIOS Scientific Publishers)
3. Enzymes-Biochemistry, Biotechnology, Clinical chemistry-Trenor Palmer (Woodhead Publication 2007)

Reference Books

1. Organic Analytical chemistry-Theory and Practice by Jagmohan. (Narosa Publishing house)
2. Harper s Biochemistry, 25 th edition (McGraw Hill Publications)
3. Fundamentals of Biochemistry-J.L. Jain, Sanjay Jain (S.Chand Publications)
4. Organic Spectroscopy-Principles and Applications by Jagmohan, (Narosa Publishing House)
5. A textbook of Biochemistry-A.V.S.S. Rama Rao (UBS Publishers & Distributors)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2												1		
CO2	1	2												1		
CO3	1	2												1		
CO4	1	2												1		

1: strongly related, 2: moderately related and 3: weakly related

BME2416	Medical Imaging Techniques-II	L	T	P	C
Version 1.1	Date of Approval: 16 May, 2019	3	1	0	3
Pre-requisites/Exposure	Basic Electronic, Biology for Engineers, Physics				
Co-requisites	General Science				

Catalog Description

Catalog Description

This course helps the students to understand various advance techniques imaging modalities used in medical profession e.g. MRI, MRI Pulse Sequenses, Diffision, Perfusion, Contrast imaging, ,etc. The content of the course will also speak about the artefacts and other problems related to the machines. The course also stresses the importance of radiation safety, ethics and legal considerations as well as professionalism.

Course Objectives

The objective of this course is to

1. To provide an overview of advance medical imaging principles and machine.

2.To serve as a foundation for research in field of medical imaging.

Course Outcomes

On completion of this course, the students develop capabilities of:

CO26. *Explain* basic component of Pulse sequence and *design* and *stimulate* Echoes.
CO27. *Describe* advance techniques of pulse sequences, and able to *differentiate* between them
CO28. *Describe* various contrast imaging principles and *analyses* clinical parameters.
CO29. *Illustrate* MRS and MRE and *compile* processed data.
CO30. *Describe* application of MRI in field of clinical research and diagnosis.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Basic of Magnetic Resonance Pulse Sequences** Basic Classification, Response to a single RF Pulse: Saturation and inverse recovery, Spin Echo, Spin-echo equation, General Response of two or more RF pulses: Stimulated Echoes.	L2, L3, and L4	8
MODULE II: **Advance Techniques of Pulse Sequences** Review of the main classes of imaging pulse sequence, Gradient Echo-Pulse	L2 and L3	10

sequence(GRE), Rapid-GRE, Echo-planar and spiral imaging, Interleaved and hybrid sequence, Multislice vs 'True-3D' sequence for volume imaging, Acquisition Strategies in k-space, Gating, Parallel imaging. Other imaging Methods with Historical Interest: Points Methods and Line Scanning Methods		
MODULE III: **Image contrast Mechanism and Quantitative Imaging** General Principles of Quantitative Imaging(QI), Relaxation Times and Dynamic contrast enhance MRI, Flow, ,Diffusion and Perfusion, Susceptibility and functional MRI, Ultra-Short TE imaging, Magnetic transfer and polarisation Transfer, Chemical shift Imaging, Current-Density Imaging, Imaging of nuclei other than Hydrogen	L2, L3 and L4	15
MODULE IV: **MR Spectroscopy and MR elastrography** Introduction to MRS, Chemical –Shifted Spectroscopy, 1D Spectroscopy data processing, Introduction to MRE and its typical application.	L2 and L3	8
MODULE V: **Application of MR in Medicine** Cancer, Neurology, Cardiology, Interventional Procedures and Monitoring of Therapy, Other Medical Applications, Molecular and Cellular Imaging, Genetic Phenotyping for Pre-Clinical Imaging	L1 and L2	7

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

10. Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
11. Webb, S., The Physics of Medical Imaging, Adern Hilger, Bristol & Philadelphia. 2013
12. Hay.B.A. Edtd., Medical Images, Formation, Perception and Measurement, John Wiley, 2008

Reference Books

6. Rabiner and Gold, *Digital Signal Processing*,
7. A.C. KAK, Principles of Computed Tomography, IEEE Press, New York

Other readings:

2. http://www.learningradiology.com/itunesfeed.htm

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		1	2									3		1	2	3
CO2		2	1									3		1	2	3
CO3		2	1									3		1	2	3
CO4		2	1									3		1	2	3
CO5		2	2	1								3		1	2	3

1: strongly related, 2: moderately related and 3: weakly related

BME2418	Artificial Neural Network	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basic Knowledge of Brain functioning				
Co-requisites	Nil				

Catalog Description

The course provides introduction to neural network and a deep insight into the basics of brain & its functioning basics of various neural models & neural schema used for learning. With this course students would be able to know the basics of each introductory feature of human brain and its features which would prove to be very helpful throughout their degree and would prove helpful in understanding other related subjects also.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of learning of brain problem solving techniques and develop proficiency in creating neural structures using the MATLAB.
2. Provide an overview of various control statements, data structures, packages related to image addition, graphics, different types of neural models.

Course Outcome

On completion of this course, the students will be able to

CO 1: Define Artificial Neural Network & its similarity to biological neural network and explain its application in our day to day life.
CO 2: Analyze ANN learning, Error correction learning, Hebbian learning, Competitive learning and Boltzman Learning.
CO 3: Implement simple perceptron, Perceptron Learning rule, modified perceptron learning rule, feed forward neural network & feedback Neural Network.
CO 4: Explain self-organizing Map, Hopfield network, Adaptive resonance theory and its various learning rules.
CO 5: Analyze memory-based learning, Associative learning, Bi-directional learning and Auto associative learning.

Modules	Blooms level*	Number of hours
Module-I Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications	L1, L2 and L3	6
Module-II Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule	L1, L2 and L3	6
Module-III Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.	L2, L3 and L4	6

Module-IV Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.	L2, L3 and L4	6
Module V Associative memory, auto-associative memory, bi-directional associative memory.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

TextBook:

1. **Kenji Suzuki (ed.) - InTech , 2013**
2. **Todd Troyer - University of Texas at San Antonio, 2005.**

Reference Book:

1. **MATLAB 2017 Book released by MATWORS**

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**												**1**			
CO2	**1**												**1**		**1**	
CO3		**1**	**2**										**1**			
CO4		**1**	**2**	**1**									**1**		**1**	
CO5			**2**										**1**			

1: strongly related, 2: moderately related and 3: weakly related

BME2419	Artificial Neural Network Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

3. Make the students apply knowledge of various neural models required for solving complex problems.
4. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Neural Network model in MATLAB

CO5: Demonstrate usage of applications involving with Image processing & Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
7. Introduction of MATLAB (a) Basic Variable deceleration & its operation (b) Function use & its application	L3, L5	4
8. Sample Programs in MATLAB (a) Basic use of Matrix and Graph Plotting (b) Different type of graph plotting with use of different -2 type of data	L3, L5	6

9. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
10. Sample programs of ANN functions (a) Practice on ANN toolbox function in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
11. Sample Programs using ANN tool box & Image processing toolboix (a) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

- Kenji Suzuki (ed.) - InTech , 2013
- Todd Troyer - University of Texas at San Antonio , 2005

Reference Books

1. MATLAB 2017 Book realeased by MATWORS.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

PRESENTATION SKILLS

Course Code: CSS2251

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To teach the participants strategies for improving academic reading and writing.
Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

Course Contents:

Module I: Social Communication Skills
Small Talk
Conversational English
Appropriateness
Building rapport

Module II: Context Based Speaking
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

Module III: Professional Skills
Presentations
Negotiations
Meetings
Telephony Skills

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman – Prakash, Oxford

STRESS AND COPING STRATEGIES

Course Code:BEH2451

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:

Module I: Stress
Meaning & Nature
Characteristics
Types of stress

Module II: Stages and Models of Stress
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interact ional model.
Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress
Personal
Organizational
Environmental

Module IV: Consequences of stress
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

FRENCH - IV

Course Code: LAN2451

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students:

- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision
-

Course Contents:

Module C: pp. 104 – 139 : Unités 8,9

Contenu lexical :Unité 8: Découvrir le passé

1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

Unité 9: Entreprendre

1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
3. parler du futur

Contenu grammatical:

1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN - IV

Course Code: LAN2452

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Advanced Grammar Language and Professional Jargon

Course Contents:

Module I: Present perfect tense
Present perfect tense, usage and applicability
Usage of this tense to indicate near past
Universal applicability of this tense in German

Module II: Letter writing
To acquaint the students with the form of writing informal letters.

Module III: Interchanging prepositions
Usage of prepositions with both accusative and dative cases
Usage of verbs fixed with prepositions
Emphasizing on the action and position factor

Module IV: Past tense
Introduction to simple past tense
Learning the verb forms in past tense
Making a list of all verbs in the past tense and the participle forms

Module V: Reading a Fairy Tale
Comprehension and narration
- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

Module VI: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module VII: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module VIII: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3

- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - IV

Course Code: LAN2453

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules
Introduction to Present Continuous Tense (Gerunds)

Module II
Translation with Present Continuous Tense
Introduction to Gustar, Parecer, Apetecer, doler

Module III
Imperatives (positive and negative commands of regular verbs)

Module IV
Commercial/business vocabulary

Module V
Simple conversation with help of texts and vocabulary
En la recepcion del hotel
En el restaurante
En la agencia de viajes
En la tienda/supermercado

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras (Nivel – Elemental)

RUSSIAN - IV

Course Code: LAN2454

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – IV

Course Code: LAN2455

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Dialogue Practice
Observe picture and answer the question
Pronunciation and intonation
Character writing and stroke order.
Electronic items

Module II
Traveling – The Scenery is very beautiful
Weather and climate
Grammar question with – "bu shi …. Ma?"
The construction "yao … le" (Used to indicate that an action is going to take place)
Time words "yiqian", "yiwai" (Before and after).
The adverb "geng".

Module III
Going to a friend house for a visit meeting his family and talking about their customs.
Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.
Aspect particle "guo" shows that an action has happened some time in the past.
Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.
To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

Module IV
Shipment. Is this the place to checking luggage?
Basic dialogue on – Where do u work?
Basic dialogue on – This is my address
Basic dialogue on – I understand Chinese
Basic dialogue on – What job do u do?
Basic dialogue on – What time is it now?

Module V
Basic dialogue on – What day (date) is it today?
Basic dialogue on – What is the weather like here.
Basic dialogue on – Do u like Chinese food?
Basic dialogue on – I am planning to go to China.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader, Part-2" Lesson 31-38

PORTUGUESE-IV

Course Code : LAN2456

L-T-P : 2-0-0 **Credit Units: 02**

BME2501	Microprocessor Systems	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is

1. To introduce students with the architecture and operation of typical microprocessors.
2. To familiarize the students with the programming and interfacing of microprocessors
3. To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, pin configuration, addressing modes, control words, timing diagram, instruction set of 8085 microprocessors and Interfacing ICs

CO2. Explain the architecture, pin configuration, addressing modes, control words of 8086, 8087 and other 16 bit microprocessors and Interfacing ICs

CO3. Develop the assembly language program using 8085 using stacks & subroutines.

CO4. Design circuitry to the Microprocessor I/O ports in order to interface the processor to external devices so as to provide solutions real-world control problems

Modules	Blooms level*	Number of hours
Module I: Introduction to Microcomputer Systems Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations,interrupts, Stacks and subroutines, various data transfer schemes.	L1, L2, L3,L4	6
Module II: ALP and timing diagrams Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.	L4,L5,L6	8
Module III: Memory System Design & I/O Interfacing Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system.	L3,L4, L5,L6	9

Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.		
Module IV: Architecture of 16-Bit Microprocessor Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.	L2, L3, L4	7
Module V: Pentium Processors Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV). .	L1,L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
2. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

1. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
2. Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO2	1	1	2	3	--	--	--	--	--	--	--	--	3	3	2	
CO3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1
CO4	-	-	-	1	--	2	--	--	2	3	3	--		2	2	1

1: strongly related, 2: moderately related and 3: weakly related

BME2513	Medical Image Processing	L	T	P	C
Version 1.1	Date of Approval: 21 May, 2019	3	0	0	3
Pre-requisites/Exposure	Engineering Mathematics				
Co-requisites	General Science				

Catalog Description

Course give introduction to digital image processing and its application with clinical image. Course consists of image enhancement, denoise, filtering in spatial and frequency domain etc. techniques. Its include image segmentation and feature extraction methods. Besides, course gives the insight in the process of registration and its application. Course provide the foundation for medical image constriction, to develop complex algorithm and application of machine learning. Furthermore, course develop a life long learning capabilities in the students.

Course Objectives

The objective of this course is to

9. To provide an overview of medical image processing and its constraint.
10. To serve as a foundation for design and develop complex medical image processing algorithms.

Course Outcomes

On completion of this course, the students develop capabilities of:

CO31. *Identify*the relation between pixels in an image, and coceots of quantization, resolution inn images.
CO32. *Apply* intensity transformation and spatial filter for various application of Image Processing.
CO33. *Develop and Apply* various frequency domain operation on an image for filtering, and analyzing.
CO34. *Deploy* the programming skill of segmentation of RoI using various algorithm.
CO35. *Deploy* the programming skill of Registration of images using various algorithm

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Introduction to Medical Imaging** Digital image processing, fundamental steps in digital image processing, Component of Image processing. Simple Image Formation Model, Image Sampling and Quantization,Representing Digital Images, Spatial and Intensity Resolution, Image Interpolation, Some Basic Relationships between Pixels, An Introduction to the Mathematical Tools Used in Digital Image Processing, Medical Imaging History, Various Projection or View of Medical Imaging, Fundamental Principles of Medical imaging, DICOM images format.	L1 and L2	10

MODULE II: **Intensity Transformations and Spatial Filtering** The Basics of Intensity Transformations and Spatial Filtering, Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Noise model and noise filtering, Application	L1, L2 and L3	8
MODULE III: **Filtering in the Frequency Domain Filtering in the Frequency Domain** The brief Introduction to Fourier Series and Transform, The Basics of Filtering in the Frequency Domain Image Smoothing Using Frequency Domain Filters , Image Sharpening Using Frequency Domain Filters, Noise filtering in frequency domain, Application.	L1, L2 and L3	6
MODULE IV: **Segmentation** Morphological Image Processing: Erosion and Dilation, Opening and Closing and its segmentation application. Point, Line, and Edge Detection, Thresholding Region-Based Segmentation; Region Growing, Hough Transformation.	L2 and L3	6
MODULE V: **Registration** Geometric Transformation, Intensity interpolation, Similarity measure, Sum of Square difference, Correlation coefficient, Mutual Information, Structural Similarity Index, Feature based registration, Least Square Fit.	L2 and L3	6

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

13. Rafael C., Gonzalez and Richard E. Woods, *Digital Image Processi*ng, Pearson Education Asia, 2001

Reference Books

1. Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall of India, 1997
2. William K. Pratt, *Digital Image Processing*, John Wiley, NJ, 1987.
3. Albert Macouski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
4. Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1			2		1										1	
CO2				2	1										1	
CO3			2		1										1	
CO4			2		1										1	
CO5			2		1										1	

1: strongly related, 2: moderately related and 3: weakly related

BME2514	Machine Learning	L	T	P	C
Version 1.1	Date of Approval: 16, May 2020	3	0	0	3
Pre-requisites/Exposure	Engineering Mathematics				
Co-requisites	General Science				

Catalog Description

Machine learning is the science of getting computers to act without being explicitly programmed. In the past decade, machine learning has given us self-driving cars, practical speech recognition, effective web search, and a vastly improved understanding of the human genome. Machine learning is so pervasive today that you probably use it dozens of times a day without knowing it. Many researchers also think it is the best way to make progress towards human-level AI. In this class, you will learn about the most effective machine learning techniques, and gain practice implementing them and getting them to work for yourself. More importantly, student will learn about not only the theoretical underpinnings of learning, but also gain the practical know-how needed to quickly and powerfully apply these techniques to new problems. Finally, student will learn about some of Silicon Valley's best practices in innovation as it pertains to machine learning and AI.

This course provides a broad introduction to machine learning, datamining, and statistical pattern recognition. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI). The course will also draw from numerous case studies and applications, so that you'll also learn how to apply learning algorithms to building smart robots (perception, control), text understanding (web search, anti-spam), computer vision, medical informatics, audio, database mining, and other areas.

Course Objectives

The objective of this course is to

11. To provide an overview of Machine Learning and its constraint.
12. To serve as a foundation for design and develop complex ML algorithms.

Course Outcomes

On completion of this course, the students develop capabilities of:

CO36. *Identify*the constrain of ML, *differentiate* between supervised and unsupervised learning; *develop* function for regression and cost function.
CO37. *Apply* the concept of ML and *deploy* gradient descent algorithm for logistic regression.
CO38. *Apply* the regularization parameters to optimize the ML algorithm.
CO39. *Develop* the Algorithm using Neural network principle.
CO40. *Deploy* the principle of ML for Optimization and rectification of output error.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Introduction to Machine Learning** What is Machine Learning? Supervised Learning, Unsupervised Learning; Linear **Regression with One Variable:**Model Representation, Cost Function, Cost Function - Intuition I, Cost Function - Intuition II, Gradient Descent, Gradient Descent Intuition, Gradient Descent For Linear Regression; **Linear Algebra Review:**Matrices and Vectors, Addition and Scalar Multiplication, Matrix Vector Multiplication, Matrix Multiplication, Matrix Multiplication Properties, Inverse and Transpose	L1 and L3	10
MODULE II: Linear Regression with Multiple Variables Multiple Features: Gradient Descent for Multiple Variables, Gradient Descent in Practice I - Feature Scaling, Gradient Descent in Practice II - Learning Rate, Features and Polynomial Regression, Normal Equation, Normal Equation Noninvertibility; Logistic Regression: Classification, Hypothesis Representation, Decision Boundary, Cost Function, Simplified Cost Function and Gradient Descent, Advanced Optimization, Multiclass Classification: One-vs-all	L1, L2 and L3	8
MODULE III: Regularization The Problem of Overfitting, Cost Function, Regularized Linear Regression, Regularized Logistic Regression	L1, L2 and L3	6
MODULE IV: Neural Networks: Representation Non-linear Hypotheses, Neurons and the Brain, Model Representation I, Model Representation II, Examples and Intuitions I, Examples and Intuitions II, Multiclass Classification Neural Networks: Learning Cost Function, Backpropagation Algorithm, Backpropagation Intuition, Implementation Note: Unrolling Parameters, Gradient Checking, Random Initialization, Putting It Together	L2 and L3	6
MODULE V: Practical Aspects for Applying Machine Learning Deciding What to Try Next, Evaluating a Hypothesis, Model Selection and Train/Validation/Test Sets, Diagnosing Bias vs. Variance, Regularization and Bias/Variance, Learning Curves, Deciding What to Do Next Revisited Machine Learning System Design Prioritizing What to Work On, Error Analysis, Error Metrics for Skewed Classes,	L2 and L3	6

Trading Off Precision and Recall, Data For Machine Learning		

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

14. Ethem Alpaydin, Introduction to Machine Learning, Second Edition , http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12012. This book will cover all the material in the course.
15. https://www.coursera.org/learn/machine-learning#enroll (One of the online platform, where students could get every for learning. Mentioned course is design and delivered by Andrew Ng(Stanford University))

Reference Books

1. Stephen Marsland, Machine Learning: An Algorithmic Perspective. http://www.amazon.com/Machine-Learning-Algorithmic-PerspectiveRecognition/dp/1420067184
2. Christopher M. Bishop, Pattern Recognition and Machine Learning. http://research.microsoft.com/en-us/um/people/cmbishop/prml/.
3. Tom Mitchell, Machine Learning, http://www.cs.cmu.edu/~tom/mlbook.html.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1			2		1										1	2
CO2			2		1										1	2
CO3			2		1										1	2
CO4			2		1										1	2
CO5			2		1										1	2

1: strongly related, 2: moderately related and 3: weakly related

BME2504	MICROPROCESSOR SYSTEMS LAB	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course focuses on the systematic study of the Architecture and programming of microprocessor family and its applications. The objectives of this course are:

1. To introduce students with the architecture operation and instruction set of 8085 and 8086 microprocessors.
2. To familiarize the students with the programming and interfacing of 8085 and 8086 microprocessors.
3. To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Set up programming strategies and select proper mnemonics and run their program on the training boards

CO2. Develop assembly language programs for various problems keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.

CO3. Understand the concepts related to I/O and memory interfacing and design interfacing circuits with 8085 by making use of different peripheral devices.

Modules	Blooms level*	Number of hours
Lab Session 1: ALP using 8085: 1. Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated. 2. Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated. 3. Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD. 4. Write assembly language program for 8 bit multiplication and division.	L2, L3,L4	4

Lab Session II: To study, understand, interface and two peripheral devices with 8085.	L4,L5,L6	2
Lab session III: Any three programs using 8085 based on block of data.	L4	1
Lab session IV: ALP using 8086: 1. Write an ALP to add list of 10 given numbers. 2. Write an ALP to sum the numbers from 1-100. 3. Write an ALP to count negative numbers from a given list of 10 numbers. 4. Write an ALP to check number of vowels in a given string.	L2, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
4. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

3. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
4. Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO 2	1	1	2	3	--	--	--	--	--	--	--	--	3	2	1	1
CO 3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1

1: strongly related, 2: moderately related and 3: weakly related

BME2515	Machine Learning Lab	L	T	P	C
Version 1.1	Date of Approval: 21 May 2019	0	0	2	1
Pre-requisites/Exposure	Matlab, Engineering Mathematics				
Co-requisites					

Pre –Requisite: Matlab Programming
Catalog Description

This course helps the students to do hands-on practice with various machine learning techniques. Machine Learning is known to be future electricity and a key need in medical data processing. Course built the foundation for develop software program for medical data processing. It also lay down the foundation for deep Learning and Artificial intelligence for life-long learning.

The objective of this course is to

13. To provide hands-on practice with machine learning.
14. To serve as a foundation for develop critical thinking for developing software program for medical data processing.

Course Outcomes

On completion of this course, the students will be able to

CO1. *Develop*machine learning programming program for data classification, using linear regression and logistic regression.
CO2. *Optimization* of machine learning program using regularization techniques.
CO3. *Develop* Neural Network program for identification and multi level classification.
CO4. *Analysis* of error and rectify algorithm for accurate classification using machine learning concept.

List of Experiments	**Blooms level***	**Number of hours**
10. Write program of basic matrix operation in using MATLAB.	L1, L2 and L3	2
11. Write a program to learning programming using loops and decision structure in MATLAB	L1, L2 and L3	2
12. To write Function to compute the cost of linear regression. 13. To write Function to run gradient descent. 14. To write function to normalize features. 15. To writes function to compute normal equation.	L1, L2 and L3	2
16. To write and execute program Function to plot 2D classifcation data 17. To write and execute program Sigmoid Function	L1, L2 and L3	2

18. To write and execute program Logistic Regression Cost Function 19. To write and execute program Logistic Regression Prediction Function 20. To write and execute program Regularized Logistic Regression Cost for geometric transformation of image		
21. To write and execute program Logistic regression cost function 22. To write and execute program Train a one-vs-all multi-class classi_er 23. To write and execute program Predict using a one-vs-all multi-class classifier	L1, L2 and L3	2
24. Write and execute programs Neural network prediction function	L1, L2 and L3	2

Text Books

16. Rafael C., Gonzalez and Richard E. Woods, *Digital Image Processin*g Using MATLAB, Pearson Education Asia, 2001

17. Lab Practical Manual

Reference Books

1. William K. Pratt, Digital Image Processing, John Wiley, NJ, 1987.
2. Albert Macouski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
3. Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	--	--	**2**	--	**1**	--	--	--	--	--	--	--		--	**1**	**2**
CO2	--	--	**2**	--	**1**	--	--	--	--	--	--	--		--	**1**	**2**
CO3	--	--	**2**	--	**1**	--	--	--	--	--	--	--		--	**1**	**2**
CO4	--	--	**2**	--	**1**	--	--	--	--	--	--	--		--	**1**	**2**
CO5	--	--	**2**	--	**1**	--	--	--	--	--	--	--		--	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

BME2516	MEDICAL IMAGE PROCESSING LAB	L	T	P	C
Version 1.1	Date of Approval: 21 May 2019	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Pre –Requisite: Matlab Programming
Catalog Description

This course helps the students to do hands-on practice with various medical image processing techniques. Medical imaging and post processing is a key need for diagnostic techniques. Course built the foundation for develop software program for medical image enhancement, denoising, segmentation and registration. It also includes the use of MatLab image processing toolbox use for medical images post processing.

The objective of this course is to

15. To provide hands-on practice with medical images.
16. To serve as a foundation for develop critical thinking for developing software program for medical imaging.

Course Outcomes

On completion of this course, the students will be able to

CO5. Develop program to enhance, denoise and better visualization in medical image (Region of Interest) ROI.
CO6. Develop program for image segmentation and registration for selection of ROI and using MatLab Image Processing Toolbox.

List of Experiments	**Blooms level***	**Number of hours**
25. Write program to read and display digital image using MATLAB.	L1, L2 and L3	2
26. Write a program to perform convolution operation for 1D and 2D data in MATLAB	L1, L2 and L3	2
27. To write and execute programs for image arithmetic operations 28. To write and execute programs for image logical operations	L1, L2 and L3	2
29. To write and execute program for geometric transformation of image	L1, L2 and L3	2
30. To understand various image noise models and to write programs for image restoration	L1, L2 and L3	2
31. Write and execute programs to remove noise using spatial filters	L1, L2 and L3	2

32. Write and execute programs for image frequency domain filtering	L1, L2 and L3	2
33. Write a program in MATLAB for edge detection using quick mask	L1, L2 and L3	2
34. Write a program in MATLAB for histogram calculation and equalization. 35. Write and execute programs of image manipulation Zoom and Shrink	L1, L2 and L3	2
36. To process image using image processing toolbox	L1, L2 and L3	2

Text Books

18. Rafael C., Gonzalez and Richard E. Woods, *Digital Image Processin*g Using MATLAB, Pearson Education Asia, 2001
19. Lab Practical Manual

Reference Books

4. William K. Pratt, Digital Image Processing, John Wiley, NJ, 1987.
5. Albert Macouski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
6. Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--
CO2	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--
CO3	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--
CO4	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--
CO5	--	--	2	--	1	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related

BME 2535	SUMMER INTERNSHIP EVALUATION I	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	3
Pre-requisites/Exposure	Basic Concepts of Programming Language and Electronics				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview ofpresentation and preparation of report.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and *identify* the problem statement

CO2: Work on a real world problem and *solve* it using latest technology

CO3: *Prepare* a detailed report of the project

CO4: *Prepare* a brief presentation of their project

CO5: Present and e*xplain* the project for evaluation

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**IM**	**EM**
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	--	1	--	--	--	--	--	--	--	-		2	1
CO2	--	--	--	-	1	--	--	--	--	--	--	--	-	-	2	1
CO3	--	--	--	--	1	--	--	--	--	--	--	--	-	-	2	1
CO4	--	--	--	--	1	--	--	--	--	--	--	--	-	-	2	1

1: strongly related, 2: moderately related and 3: weakly related

BME2503	CONTROL SYSTEM	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides the students the core knowledge of control systems. This introduces the methods of mathematical modeling of control systems with time & frequency domain analysis along with concepts of stability.

Course Objectives

The objective of this course is to

5. Equip the students with concepts of Control System.
6. Provide the students in depth knowledge of time domain, frequency domain and concepts of stability.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and compare between types of control system and find mathematical model of control system.

CO2. Understand, explain and solve problems on time domain analysis.

CO3. Understand, explain and solve problems on frequency domain analysis.

CO4: Analysis of control system stability

Modules	Blooms level*	Number of hours
Module 1: **Input / Output Relationship** Introduction of open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical Mechanical and Thermal), derivation of transfer function for different types of systems, block diagram & signal flow graph, Reduction Technique, Mason's Gain Formula.	L1, L2, L3 and L4	9
Module 2: **Time – Domain Analysis** Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID Controllers.	L1, L2 and L3	9

Module 3: **Frequency Domain Analysis** Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots), gain and phase margins, relative stability, Correlation with time domain, constant close loop frequency responses, from open loop response, Nyquist Plot.	L1, L2 and L3	9
Module 4: **Concept of Stability** Asymptotic stability and conditional stability, Routh – Hurwitz criterion, Root Locus plots and their applications. Compensation Techniques:Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques. P, PI, PID controllers.	L1, L2, L3 and L4	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Dr. N.K Jain, 2005,"Automatic Control System Engineering", Dhanpat Rai Publication.
2. J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.

References Books:

1. B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.
2. M, K. Ogata, 2002, "Modern Control Engineering, PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	1	-	2	3	-	-	-	-	-	-	3	-	1	-	2
CO 2	1	1	-	3	3	-	-	-	-	-	-	3	-	1	-	3
CO 3	1	1	-	3	3	-	-	-	-	-	-	3	-	1	-	3
CO 4	1	1	-	2	3	-	-	-	-	-	-	3	-	1	-	2

1: strongly related, 2: moderately related and 3: weakly related

BME2512	CONTROL SYSTEM LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	MATLAB Basics				
Co-requisites	Nil				

Catalog Description

Control System has become an important field for research and development in science and engineering. This course provides the students the core knowledge of control systems. This course introduces the Practical of control system with time & frequency domain analysis along with stability of control systems on kits and MATLAB.

Course Objectives

The objective of this course is to

Perform experiments of control system.

Time & frequency domain analysis along with stability of control systems on kits and MATLAB

Course Outcomes

On completion of this course, the students will be able to

CO1. Perform and analyse experiments on time domain of control system.

CO2. Perform and analyse experiments on frequency domain of control system.

CO3. Perform and analyse experiments for stability of control system.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Study and draw a) Step response of open Loop system (linear 1st order, 2nd order b) Step response of closed loop systems (1st order) 2. Study and draw temperature control system the open loop response and closed loop response with different values of gains	L2, L3 and L5	3
Lab Session 2 1. Study of operations and characteristics of a stepper motor 2. To Study a D.C. motor speed control system.	L2, L3 and L5	3
Lab Session 3	L2, L3	3

1. Performance evaluation and design of PID controller. 2. To design a suitable cascade compensator for the given system and verify the resulting improvement.	and L5	
Lab Session 4 1. Note: three experiments in MATLAB have to be performed in the slot of MATLAB. Using MATLAB obtain the unit-step response and unit impulse response of the following system: $\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$ 2. For a 2nd order transfer function using MATLAB a) Bode Plot b)Root locus plot c)Nyquist plot.	L2, L3 and L5	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Dr. N.K Jain, 2005,"Automatic Control System Engineering", Dhanpat Rai Publication.
4. J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.
5. Rudra Pratap, "Getting started with MATLAB", Oxford University Press.

References Books:

3. B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.
4. M, K. Ogata, 2002, "Modern Control Engineering, PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3
CO 2	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3
CO 3	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3

1: strongly related, 2: moderately related and 3: weakly related

BME 2507	DIGITAL CIRCUITS & SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of combinational and sequential circuits.
2. Equip with the understanding of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the various logic gates, Boolean algebra and solve the k-map & tabulation method to simplify the logical function.

CO2: Explain the adder & subtractor; Apply and analyze multiplexer, decoder & encoder to design Boolean function.

CO3: Describe flip flops, shift registers & Design counters and synchronous sequential circuits.

CO4: Explain & compare different logic families and explain data convertors.

Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1`s complement and 2`s complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.	L1,L2 and L3	6

MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.	L2,L3, L4 and L5	7
MODULE 4: LOGIC FAMILIES&DATA CONVERTERS Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1, L2,L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004

Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.

R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--	3
CO3	1	2	1	--	--	--	--	--	--	--	--	2	1	--	--	3
CO4	2	3	3	--	--	--	--	--	--	--	--	--	1	--	--	3

1: strongly related, 2: moderately related and 3: weakly related

BME 2509	DIGITAL CIRCUITS AND SYSTEMS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this Lab course the combination and sequential circuits are designed and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

1. Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
2. Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of logic gates;
CO 2: Illustrate the adder and subtractors.
CO 3: Demonstrate the code convertors.
CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2
8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

5. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
6. Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
7. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

3. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
4. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 3	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3

1: strongly related, 2: moderately related and 3: weakly related

BME2517	DATA STRUCTURES with C ++	L	T	P	C
Version:2017.1	Date of Approval: 2020	3	1	2	5
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C++ programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1:Identify operations on array, multidimensional, string and their implementation and analyze space and time complexity of algorithms.

CO 2: Explain various algorithms and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Tradeoffs. Use of pointers in data structures. Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C++, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.	L1, L2	7
Module II: Introduction to Stacks and queue Stack: Definition, Array representation of stacks, Operations Associated with Stacks-Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem. Queue: Definition, Representation of Queues, Operations of queues-QInsert, QDelete, Priority Queues, Circular Queue, Deque.	L1, L2, L3, L4	8
Module III: Dynamic Data Structure Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.	L1, L3 and L4	7
Module IV: Trees and Graphs Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.	L1, L3 and L5	7
Module V: Sorting and Searching and file structures Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting. Searching: Linear search, Binary search File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.	L1, L4, L5	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. D. S. Malik, Data Structure Using C++, 2nd Edition, Course Technology, Cangage Learning, Boston, 2004

2. Data structures and algorithms‖ – Schaum Series.
3. File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall
3. India(1999).
4. Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
5. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
6. Data Structures‖ – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**2**	--	--	-
CO2	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**2**	**2**	**1**	-
CO3	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**1**	-
CO4	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**1**	
CO5	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**2**	

BME2518	DATA STRUCTURES With C++ LAB	L	T	P	C
2017.1	Date of Approval: 2020	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C++ programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Identify operations and their implementation on array and multidimensional, string and estmation space and time complexity.

CO 2: Explain various algorithm and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures 1. Write a program to copy one string into another without using library functions. 2. Write a program to demonstrate array and linked list implementation of sparse matrix. 3. Write a program to multiply two 2D matrix.	L3,L5	2
Module II: Introduction to Stacks and queue 1. Write a program to implement push and pop operations on the stack. 2. Write a program to demonstrate conversion of infix to postfix. 3. Write a program to implement simple queue and perform insertion and deletion operation on it. 4. Write a program to implement circular queue and perform insertion and deletion operation on it. 5. Write a program to implement dqueue and perform insertion and deletion operations on it. 6. Write a program to implement priority queue and perform insertion and deletion operation on it.	L3,L5	4
Module III: Dynamic Data Structure 1. Write a program to implement singly linked list and perform following operations on it. • Insertion at end • Insertion at last • Insertion at desired place. 2. Write a program to implement singly linked list and perform following operations on it. • Deletion at end • Deletion at last • Deletion at desired place. 3. Write a program to implement doubly linked list and perform following operations on it. • Insertion at end • Insertion at last • Insertion at desired place. 4. Write a program to implement singly linked list and perform addition of two polynomials.	L3,L5	4

Module IV: Trees and Graphs 1. Write a program to calculate in order, preorder and post order traversal on binary tree. 2. Write a program to construct binary search tree and perform following operations on it. • Deletion of element • Insertion of elements. 3. Write a program to construct binary search tree and search an element in it. 4. Write a program to implement kruskal's algorithm to find out minimum spanning tree.	L3,L5	6
Module V: Sorting and Searching and file structures 1. Write program to implement insertion sort. 2. Write a program to search an element in array using binary search. 3. Write a program to implement merge sort. 4. Write a program to implement quick sort. 5. Write a program to implement heap sort.	L3,L5	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. D. S. Malik, Data Structure Using C++, 2nd Edition, Course Technology, Cangage Learning, Boston, 2004
2. Data structures and algorithms‖ – Schaum Series.
3. File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill.
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India(1999).
3. Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India

4. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).

5. Data Structures‖ – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**2**	--	--	-
CO2	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**2**	**2**	**1**	-
CO3	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**1**	-
CO4	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**1**	-
CO5	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**2**	-

BME 2519	FUZZY LOGIC & GENETIC ALGO	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Computer Concepts				
Co-requisites	Nil				

Catalog Description

In this course the concepts of fuzzy logic and genetic algorithm are discussed in detail. This course will provide an understanding of fuzzy logic and genetic algorithm and an outlook on the applications of these techniques to solve real world problems. It also provides an understanding of fuzzy-genetic based machine learning.

Course Objectives

The objective of this course is to

1. Provide the student with the basic understanding of genetic algorithm and fuzzy logic fundamentals, program and design the related systems.
2. Equip the students with concepts of fuzzy logic based solutions.
3. Provide an overview of performance of genetic algorithm, simulated annealing and tabu search.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop the skills to gain a basic understanding of genetic algorithm and fuzzy logic theory.

CO2: Appreciate the learning and adaptation capability of neural and fuzzy systems.

CO3: Apply various operators to optimize. Perform mathematical calculation of the GA

CO4: Able to identify the present application areas of fuzzy logic and GA

CO5: Explain the working principle and compare the performance with other methods – Simulated annealing and Tabu search.

Modules	Blooms level*	Number of hours
MODULE 1: Crisp sets: Overview, Fuzzy sets : Basic types and concepts, Characteristics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets	L1, L2 and L3	8
MODULE 2: Types of operations, Fuzzy complements, Fuzzy intersection: t-norms, Fuzzy union: t-conorms, Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables, Arithmetic operations on intervals, Arithmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.	L2, L3 and L6	10
MODULE 3: General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata. Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics	L1, L3 and L4	10
MODULE 4: Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithm genetic modelling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.	L1, L3 and L4	10
MODULE 5: Genetic technology:- steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.	L3, L4 and L6	10
MODULE 5: Genetic Algorithm in engineering and optimization-natural evolution – Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning-Genetic Algorithm and parallel processors- composite laminates- constraint optimization- multilevel optimization- real life problem.	L3,L4,L6	05

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Fuzzy Logic with Engineering Applications, 3rd Ed., T. J. Ross, Wiley India Pvt. Ltd., India, 2011.
2. Fuzzy Logic Intelligence Control & Information, John Yen and Reza Langari, Pearson Education Limited, India, 2007.

3. David E.Goldberg, "Genetic Algorithms in search , Optimization & Machine Learning"
4. Melanie Mitchell- ’An introduction to Genetic Algorithm’- Prentice-Hall of India

Reference Books

1. Understanding Neural Networks and Fuzzy Logic, S. V. Kartalopoulas, IEEE Press and Prentice Hall India, India, 2000.
2. Neuro-Fuzzy and Soft Computing – A Computational Approach to Learning and Machine Intelligence, Prentice Hall India, India, 2009.
3. William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"
4. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems “
5. David A. Coley, "An Introduction to Genetic Algorithms for Scientists and Engineers ".

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	-
CO2	**1**	--	**2**	**3**	--	--	--	--	--	--	--	**1**	**2**	--	-
CO3	**1**	**2**	**3**	**3**	**3**	--	--	--	--	--	--	--	**1**	**2**	-
CO4	**1**	**1**	**2**	--	--	--2	--	--	--	--	--	--	**1**	**1**	**2**
CO5	**1**	**1**	**2**	--	-2-	--	--	--	--	--	--	--	-	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

READING & COMPREHENSION

Course Code: CSS2351

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.

Course Contents:

Module I
Reading Comprehension
Summarizing
Paraphrasing

Module II
Essay Writing
Dialogue Report

Module III
Writing Emails
Brochure
Leaflets

Module IV: Introduction to Phonetics
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

PERSONALITY, NATIONALISM & HUMAN VALUES

Course Code: BEH2552

L-T-P : 1-0-0 **Credit Units: 01**

FRENCH – V

Course Code: LAN2551

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life

Course Contents:

Module D: pp. 131 – 156 Unités 10,11

Contenu lexical: Unité 10: Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

Unité 11: faire face aux problèmes

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

Contenu grammatical:

1. comparatif - comparer des qualités/ quantités/actions
2. supposition: Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN - V

Course Code: LAN2552

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Genitive case

Genitive case – Explain the concept of possession in genitive

Mentioning the structure of weak nouns

Module II: Genitive prepositions

Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs

Verbs with accusative case

Verbs with dative case

Difference in usage in the two cases

Module IV: Verbs with fixed prepositions

Verbs with accusative case

Verbs with dative case

Difference in the usage of the two cases

Module V: Texts

A poem 'Maxi'

A text Rocko

Module VI: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - V

Course Code: LAN2553

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules

Module II
Future Tense

Module III
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

Module IV
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

Module V
General revision of Spanish language learnt so far.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras, Greenfield

Russian - V

Course Code: LAN2554

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – V

Course Code: LAN2555

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

What English words come from Chinese? Some of the more common English words with Chinese roots areginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'al chi, kung-fu. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

Module II
Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

Module III
Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

Module IV
Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

Module V
Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?
Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

PORTUGUESE - V

Course Code: LAN2556

L-T-P : 2-0-0 **Credit Units: 02**

BME 2601	Microcontroller and its Biomedical Applications	L	T	P	C
Version 2017.1	Date of Approval: July 2017	3	1	0	4
Pre-requisites/Exposure	Digital Electronics, Microprocessor				
Co-requisites	Nil				

Catalog Description

In this course the 8051 microcontroller is discussed in detail. Assembly language programming concepts are introduced to program 8051 as a timer and to provide serial communication. Further, the use of microcontroller in biomedical engineering has been described. The concepts learnt in the assembly language programming has been applied in the studies and interfacing of ADC, DAC and 8255. The overall educational objective is to provide hands-on experiences of how an embedded system could be used to solve biomedical application based problems.

Course Objectives

The objective of this course is to

7. Provide the knowledge of 8051 microcontroller and with a basic understanding of instruction sets & assembly language programming.
8. Inculcate a working knowledge of the necessary steps and methods used to interface a microcontroller system to devices such as DAC, sensors, ADC etc.
9. Provide the general knowledge of the microcontroller architecture in biomedical applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: List the main features of 8051 microcontroller; Distinguish between microprocessor and microcontroller; Describe the block and pin diagram of 8051.

CO2: Explain the various addressing modes of 8051; Describe the instruction set; Apply the branching instruction to generate delay.

CO3: Describe the timer modes; Apply timers to generate square wave; Calculation of delay; Explain the concept of interrupt and apply concept of interrupt in serial interface.

CO4: Explain the memory interfacing; Demonstrate a working knowledge of the necessary steps and methods used to interface a microcontroller system to devices such as DAC, LCD, ADC and 8255.

CO5: List the use of microcontroller in biomedical application; Explain the use of computer in biomedical engineering; apply the general knowledge of microcontroller in biomedical applications

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION 8051, Comparison with microprocessor, pin diagram explanation, internal diagram 8051.	L1 and L2	10
MODULE 2: INSTRUCTION SET Addressing mode, data transfer instruction, logical, arithmetic instruction, bit instruction, branching instruction.	L1, L2 and L3	10
MODULE 3: TIMERS AND INTERRUPTS Mode of timers, simple programming, generation of square wave. 8051connection to RS 232, Interrupt priority in 8051, generation of waveforms using interrupt, serial interface using interrupt	L1, L2,L3 and L4	10
MODULE 4: INTERFACING Interfacingof memory, intelligent LCD, 8255, ADC, DAC, LED display.	L2 and L3	10
MODULE 5: APPLICATIONS Introduction to DSP processor, Applications of microcontrollers and computersin biomedical engineering, microcontrollers in embedded biomedical applications.	L1, L2 and L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", 2nd Edition, Prentice-Hall, 2004
- Raj Kamal, "Embedded Systems", 1st Edition,Tata McGraw-Hill, 2004
- Peter Atkins James W. Stewart and Kai X. Miao, "The 8051 microcontroller", 2nd Edition, Pearson Education, 2008

Reference Books

5. David E. Simon, "An Embedded Software Primer", 1st Edition, Pearson Education, 1999
6. K.J. Ayala, "The 8051 Microcontroller", 2nd Edition, Penram International, 1999
7. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", 1st Edition, Jaico Press, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	--	--	--	--	--	--	--	--	--	--	--	--	**1**	--
CO2	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	--
CO3	**1**	**2**	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	**3**
CO4	**2**	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**3**
CO5	--	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

BME2608	Medical Imaging and Reconstruction Algorithm	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	3	0	1	4
Pre-requisites/Exposure	Medical Imaging Techniques, Medical Image Processing				
Co-requisites	Engineering Mathematics, General Science				

Catalog Description

Fundamentals and applications of medical image reconstruction and processing. Reconstruction from non-uniformly sampled data, projection data, regularly/randomly undersampled data. Parallel imaging and compressed sensing for medical imaging. Improving image quality, denoising, deconvolution, off-resonance correction. Post-processing of images, image registration, image segmentation. Examples from magnetic resonance imaging (MRI), X-ray computed tomography (CT), and magnetic particle imaging (MPI)..

The objective of this course is to

17. To provide hands-on practice with Image Reconstruction Algorithm specific with Ct and MRI.
18. To serve as a foundation for to develop an advanced medical image reconstruction or processing technique.

Course Outcomes

On completion of this course, the students will be able to

CO7. Develop various reconstruction algorithm for CT-Scan raw images.
CO8. Develop various restructuring algorithm for quantitative data extraction from MRI images.
CO9. Develop Neural Network program for reconstruction of images.
CO10. Develop 3D rendering algorithm for medical image stack.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Basic Principle of Tomography** Tomography, Projection, Image Reconstruction, Back-projection, Mathematical Expression: Projection, Back-Projection, The Dirac Function	L1 and L2	12
MODULE II: **CT-Image Reconstruction** Fan Beam Geometry and Point Spread Function, Parallel Beam to Fan-Beam Algorithm Conversion, Short Scan, Radon Transformation, Inverse Radon Transformation: parallel Beam Geometry; Filtered Back Projection; Radon and Inverse radon Transformation: fan Beam Geometry. Image Reconstruction.	L1, L2 and L3	12
MODULE III:	L1, L2 and L3	12

MRI Image Reconstruction Introduction to MRI Image Reconstruction, Data Acquisition and Pulse Sequences, Spin-Echo Sequence Mathematical Equation describe Signal intensity relation to machine and biological parameters, Gradient Echo Sequence Mathematical Equation describe Signal intensity relation to machine and biological parameters		
MODULE IV: Quantitative MRI Introduction to Quantitative Mapping and image construction, T2- mapping, T1-mapping, T2*- mapping: Equation and Implementation Advance reconstruction algorithm using Machine Learning and Deep Learning	L2 and L3	12

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

20. John L Semmlow, Biosignal and Biomedical Image Processing: MATLAB based Application, 3rd Edition, 2004, Marcel Dekker, Inc.
21. Gengsheng Lawrence Zeng, Medical Image reconstruction, Springer 2009

Reference Books

1. https://humanhealth.iaea.org/HHW/MedicalPhysics/NuclearMedicine/ImageAnalysis/3Dimagereconstruction/index.html
2. Zhang, H.M. and Dong, B., 2020. A review on deep learning in medical image reconstruction. Journal of the Operations Research Society of China, pp.1-30

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1		2	--	--	1	--	--	--	--	--	--	--		2	1	--
CO2		2	--	--	1	--	--	--	--	--	--	--		2	1	--
CO3		2	--	--	1	--	--	--	--	--	--	--		2	1	--
CO4		2	--	--	1	--	--	--	--	--	--	--		2	1	--
CO5		2	--	--	1	--	--	--	--	--	--	--		2	1	--

1: strongly related, 2: moderately related and 3: weakly related

BME2651	BIOMECHANICS	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	3	0	0	3
Pre-requisites/Exposure	Medical Imaging Techniques, Medical Image Processing				
Co-requisites	Engineering Mathematics, General Science				

Catalogue Description

This course is intended for engineering students to make them understand the various components of biomechanics which deals with the application of mechanics to biology. Mechanics is a branch of applied mathematics that deals with movement and tendency to movement.. it entails the study of the action of external and internalforces on the living body, especially on the skeletal system. A biomechanist is often interested in the physiology underlying movement (muscle physiology, nervous control, for example) and also the biological role of the movement)and ergonomics that is the analysis of a human performing for a given task and the design of appropriate tools. One part of this analysis is to understand the mechanics of the person and any interactions with surroundings.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of the basics of bone movement , gait analysis and mechanics of bone and muscles
2. To provide the overview of Structure and composition of bone , microstructure of bone, muscle. Joint motions and various forces implied, basic mechanical models , injuries and factors affecting biomechanical properties of human body

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the human body joints, axes of planes and motions, degree of freedom and related matrixes calculations.

CO2: Derive equations and solve problems related to Inverse Dyanamics to calculate resultant force and momentum

CO3: Analyze gait cycle, angular kinematics of hip, knee and ankle

CO4: Describe microstructure of bone, skeletal muscle, mechanism of muscle, viscoelasticity and other related issues

Modules	Blooms level*	Number of hours
Module I: Joint motion: relative position of two bones meeting at a joint , description of a rigid body , degrees of freedom , euler angles , rotation matrices, rotation angle anatomical directions , anatomical planes ,	L-1, L-2, L-3	**12**
Module II : Inverse Dyanamics to calculate resultant force and momentum within the body link segment models , intersegmental force and moment ,	L-1, L-2, L-3	**12**
Module III : Human Gait analysis , gait cycle , angular kinematics of hip , knee and ankle , force plates and ground reaction force , gait abnormalities .	L-1, L-2, L-3	**12**
Module IV : Structure and composition of bone , microstructure of bone , skeletal muscle , mechanism of muscle contraction , force length and force velocity relationships , basic muscle models , tendons and ligaments , their basic mechanical models , injuries and factors affecting biomechanical properties , Cartilage , viscoeleasticity and viscoelastic models .	L-1, L-2, L-3	**12**

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

1. M Nordin and VH Frankel; Lea& Febiger, Basic biomechanics of the musculoskeletal system, London 1989)
2. BM Nigg, W Herzog, Biomechanics of the musculo-skeletal system, John Wiley & Sons, Chichester 1994)
3. DA Winter; Biomechanics and motor control of human movement John Wiley &Sons, Chichester, 1990

References Books

1. Christine Gunn, Bones and Joints: A Guide for Students.. Churchill Livingstone,Edinburgh 1996
2. G.J. Tortora, Principles of Human Anatomy. Harper & Row, New York, 1983
3. R.S. Snell. Clinical Anatomy for Medical Students., Little, Brown, and Company, Boston 1995.
4. J.D. Currey, Bones: Structure and Mechanics. Princeton University Press, 2002.

5. RS Snell. Little, Brown and Co., Clinical Anatomy for Medical Students. Boston 1995
6. TA McMahon, Muscles, Reflexes, and Locomotion.. Princeton University Press, 1984
7. Hazelman, B., Riley, G. and Speed, C. (eds.) Soft tissue rheumatology.Oxford University Press, 2004
8. Margareta Nordin, Victor Hirsch, Basic biomechanics of the musculoskeletal system, Lippincott Williams & Wilkins, 2001

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS) 4
CO1	1	1	--	--	3	-3-	--	--	--	3	--	--		3	1	
CO2	1	1	2	3	--	-3	--	--	--	--	--	--		3	1	
CO3	1	2	3	3	3	--	--	--	--	--	--	--		3	1	
CO4	1	1	2	--	--	--	--	--	--	--	--	--		3	1	

1:

BME2609	Clinical Need Assessment and Mini Project	L	T	P	C
Version 1.1	Date of Approval:2020	2	0	0	2
Pre-requisites/Exposure	Anatomy &Physiology, Biomedical Instrumentation				
Co-requisites	General Science				

Catalog Description

This course helps the students to understand various requirements of hospital and healthcare systems including all stakeholders of hospital system. Various department of hospital get exposed by student to understand needs and its drive students to find solutions for them. The content of the course will also give opportunities to interact with end user of medical equipment to find out their concern and what difficulties they face. The course also familiar students with working culture of hospital including safety standards, ethical and legal considerations as well as professionalism.

Students will learn techniques for improving the flexibility and originality of their thinking and will explore approaches used by managers and organizations to create and sustain high levels of innovation. Topics include: personal thinking preferences, everyday creativity and eliminating mental blocks, creative thinking techniques, idea selection approaches, teaming techniques for creativity, conditions that promote creativity, design for interaction, disruptive technologies, and intellectual property. The course uses fun and hands-on activities to stimulate innovation.

Course Objectives

The objective of this course is to

19. To provide an overview of hospital equipment and requirements.
20. To serve as a foundation for innovation in healthcare by understanding the difficulties of hospital system.

Course Outcomes

On completion of this course, the students will be able to

CO41. Identify and explain the requirements and difficulties of hospital system.
CO42. Provide the innovative solution for healthcare system with understanding of present need.
CO43. Demonstrate the capability of critical thinking, brainstorming, presentation and team building process.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Introduction to Innovation** IntroductionMaking a case for creativity, Creative thinking as a skill, Valuing diversity in thinking, Thinking preferences, Creativity styles,Recognizing and avoiding mental blocks, Avoiding mindsets, Risk taking, Paradigm shift and paradigm paralysis, Individual and teamwork	L2, L3 and L4	4

MODULE II: **Creativity and Problem Solving** Creativity in problem solving, Problem Definition, Understanding, Representing, Pattern Breaking, Thinking differently, Changing your point of view, Watching for paradigm shift, Challenging conventional wisdom, Lateral thinking, provocation (escape, random word), Mind stimulation: games, brain-twisters and puzzles	L2, L3 and L4	4
MODULE III: **Ideation and Solution** Decision and Evaluation, Focused thinking framework, Six thinking hats, PMI, Ethical considerations, Design for Interaction, Introduction to design for interaction,	L2, L3 and L4	4
MODULE III: **Project and Peer Review** Each student must spend 3 hours per week or 6 hours every two weeks observing and shadowing a doctor in a hospital environment. The visits will be organized by ASET. Students will be exposed to practical implementation of biomedical engineering. Students will be required to identify some key clinical needs in the hospitals and come up with a biomedical engineering solution for the same. Students will have to present their findings and solutions in the form of a presentation at the end of the term	L2, L3 and L4	12

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Reference Books

22. Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw-Hill, 2008
23. Webb, S., The Physics of Medical Imaging, Adern Hilger, Bristol & Philadelphia. 2013
24. Hay.B.A. Edtd., Medical Images, Formation, Perception and Measurement, John Wiley, 2008
25. Rabiner and Gold, Digital Signal Processing,
26. A.C. KAK, Principles of Computed Tomography, IEEE Press, New York
27. H. S. Fogler and S.E. LeBlanc, *Strategies for Creative Problem Solving*, Prentice Hall, 1995.
28. E. Sickafus, Unified Structured Inventive Thinking, Ntelleck, 1997.
29. E. Lumsdaine and M. Lumsdaine, Creative Problem Solving, McGraw Hill, 1995.
30. Kaplan, Introduction to TRIZ, Ideation International, Inc., 1995.
31. G. Altschuller, Creativity as an Exact Science, 1983.
32. The Art of Inventing (And Suddenly The Inventor Appeared).
33. 40 Principles, Keys to Technical Innovation, Technical Innovation Center, 1997.
34. E. de Bono, The Use of Lateral Thinking, Penguin Books, 1990.
35. De Bono's Thinking Course, Facts on File, 1981.
36. Serious Creativity, Harper Collins, 1992.
37. Six Thinking Hats, Little, Brown & Co., 1985.
38. CoRT Thinking, Advanced Practical Thinking Training, Inc., 1995.
39. Tony Buzon, Use Both Sides of Your Brain, Dutton, 1983.

40. Scott G. Isaksen, Brian Dorval, and Donald Treffinger, Creative Approaches to Problem Solving, Kendall Hunt, 1994.
41. F. Osborn, Applied Imagination: Principles and Procedures of Creative Problem Solving, Charles Scribner's Sons, 1979.
42. D. Tanner, Total Creativity in Business and Industry, Advanced Practical ◆ Thinking Training, 1997.
43. D. Pressman, Patent It Yourself, NOLO Press, 2006.
44. T. Kelley. The Art of Innovation. Doubleday, 2001.
45. T. Kelley. The Ten Faces of Innovation. Doubleday, 2005.
46. J. Goldenberg and D. Mazursky, Creativity in product innovation. Cambridge University Press, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**F**	**R**	**P**
Weightage (%)	20	40	40

F: Feedback from hospital, R: Report, P: Presentation

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1					3						2	1		2	2	1
CO2					3						2	1		2	2	1
CO3					3						2	1		2	2	1

1: strongly related, 2: moderately related and 3: weakly related

BME2610	Medical Imaging and Reconstruction Algorithm Lab	L	T	P	C
Version 1.1	Date of Approval: 16 May 2019	0	0	2	1
Pre-requisites/Exposure	Matlab, Engineering Mathematics, Medical Image Processing				
Co-requisites					

Pre –Requisite: MatLab Programming
Catalog Description

Fundamentals and applications of medical image reconstruction and processing. Reconstruction from non-uniformly sampled data, projection data, regularly/randomly undersampled data. Parallel imaging and compressed sensing for medical imaging. Improving image quality, denoising, deconvolution, off-resonance correction. Post-processing of images, image registration, image segmentation. Examples from magnetic resonance imaging (MRI), X-ray computed tomography (CT), and magnetic particle imaging (MPI)..

The objective of this course is to

21. To provide hands-on practice with Image Reconstruction Algorithm specific with Ct and MRI.

22. To serve as a foundation for to develop an advanced medical image reconstruction or processing technique.

Course Outcomes

On completion of this course, the students will be able to

CO11. Develop various reconstruction algorithm for CT-Scan raw images.
CO12. Develop various restructuring algorithm for quantitative data extraction from MRI images.
CO13. Develop Neural Network program for reconstruction of images.
CO14. Develop 3D rendering algorithm for medical image stack.

List of Experiments	**Blooms level***	**Number of hours**
37. Write program of basic Fourier transformation.	L1, L2 and L3	2
38. Write a program for Radon Transformation to reconstruct images.	L1, L2 and L3	2
39. To write Function for 3D rendering of stack of imaging 40. To writes function to compute T2 Mapping.	L1, L2 and L3	2
1. To writes function to compute T1 Mapping.	L1, L2 and L3	2
2. To writes function to compute T1-Values.	L1, L2 and L3	2

3. To writes function to compute T2-Values.	L1, L2 and L3	2
4. To writes function to compute PD weighted-Values.	L1, L2 and L3	2
5. To write and execute program for Neural style Learning (Using Deep Learning Concept)	L1, L2 and L3	2
6. Advance Deep Learning Programming for reconstruct T1 weighted Images from PD-Weighted	L1, L2 and L3	2

Text Books

47. John L Semmlow, Biosignal and Biomedical Image Processing: MATLAB based Application, 3rd Edition, 2004, Marcel Dekker, Inc.
48. Gengsheng Lawrence Zeng, Medical Image reconstruction, Springer 2009

Reference Books

3. https://humanhealth.iaea.org/HHW/MedicalPhysics/NuclearMedicine/ImageAnalysis/3Dimagereconstruction/index.html
4. Zhang, H.M. and Dong, B., 2020. A review on deep learning in medical image reconstruction. Journal of the Operations Research Society of China, pp.1-30
5. William K. Pratt, Digital Image Processing, John Wiley, NJ, 1987.
6. Albert Macouski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
7. Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1		**2**	--	--	**1**	--	--	--	--	--	--	--		**2**	**1**	--
CO2		**2**	--	--	**1**	--	--	--	--	--	--	--		**2**	**1**	--
CO3		**2**	--	--	**1**	--	--	--	--	--	--	--		**2**	**1**	--
CO4		**2**	--	--	**1**	--	--	--	--	--	--	--		**2**	**1**	--
CO5		**2**	--	--	**1**	--	--	--	--	--	--	--		**2**	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

BME2607	Hospital Management System	L	T	P	C
Version 1.1	Date of Approval: 16 May, 2019	3	0	0	3
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

This course provides students a basic understanding of the working, regulations and management of a hospital environment.

Course Objectives

The objective of this course is

5. To develop the basic awareness of management functions and various dimensions of organizational life.
6. To make the students aware of the various functional aspects of management.
7. To develop the understanding of the functioning and management of the hospital in general and also aware about the critical issues related to managing a hospital.
8. To make the student understand the health environment in India and also the regulatory mechanisms involved in promoting the health programs.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify the working and management of a hospital environment.

CO2. Identify the role of the manager in healthcare and how organizations and people work within the healthcare system.

CO3. Evaluate and use measurement tools for quality and safety.

CO4. List the various departments in hospital.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Introduction to Hospital Architecture** Classification of hospital & architecture: General hospital, specialized hospital, primary health care –their role and functions. Aspects of hospital services: inpatient, outpatient and emergency, location and environment of hospital, hierarchy of medical and paramedical staff & their functions and responsibilities. Modern Hospital Architecture- space in a hospital building, design of ward, intensive care units, air conditioning, plumbing & sanitation, gas supply, waste disposal, cleaning, dietary, sterilizing, laundry, storage and operation theatre systems, Radiology, Central labs,	L1 and L2	14

Blood banks, OPD, Casualty, etc		
MODULE II: **Hospital Air and Gas Supply** Air conditioning & gas supply systems: Air conditioning and refrigeration systems for small and large areas, Air changes, filtering, and sterility, Deodorization, disinfection, dehumidification, cryogenic systems, Centralized supply of air, oxygen, nitrous oxide & vacuum, Principle of production of liquid oxygen. Management lifts fire fighting equipments	L1 and L2	8
MODULE III: **Hospital engineering & Management:** Definition of biomedical Engineering, clinical engineering &hospital engineering. Importance of BME department – servicing and maintenance, testing, acceptance & maintenance protocols, computerized preventive maintenance planning, MROs, Training of men for medical equipments preventive and periodical maintenance procedures. Preparation of estimates, specifications, tender details etc. Importance of ISO 9000 Certificates: Obtaining ISO certificates in hospitals, proposed protocols. Necessity for standardization, FDA, AERB, Joint Commission on Accreditation of hospitals, ICRP and other standard organization, methods to monitor the standards.	L1and L2	7
MODULE IV: **Hospital Information system:** Role of database in HIS, Need of networking in HIS, overview of Networking, topologies and its configuration, structuring medical records to carry out functions like admissions, discharges, treatment history etc. , Computerization in pharmacy & billing, automated clinical laboratory systems & radiology information system. Need for evolving health policy, health organization in state, health financing system, health education, health insurance, health legislation.	L1 and L2	7

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. P.E. Stanley, Handbook of hospital safety, CRC Press (UNIT II)
2. Arun Kumar, Hospital Management, Anmol Publications Pvt. Ltd., Jan 2000 , 1st.ed (UNITS IV & V)
3. Harold E. Smalley, "Hospital Management Engineering – A guide to the improvement of hospital management system", PHI
4. Sharma, Essentials for Hospital Support Services and Physical Infrastructure, 1/e, Jaypee Medical Publishers 2003
5. Hospital Engineering And Facilities Management 2007 - Report, Fifth official report of the International Federation of Hospital Engineering (IFHE), January 2007

Reference Books

1. Gupta, Kant, Chandrashekhar, Satpathy, Modern Trends in Planning and Designing of Hospitals Principles and Practice with CD-ROM, Jaypee Medical publishers, 1/e, 2007
2. Sakharkar, Principles of Hospital Administration and Planning, Jaypee Medical publishers 1/e, Reprint 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written

Examination Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1									1	1				2		1
CO2				2						1				2		1
CO3			2						1					2		1
CO4			2							1				2		1
CO5			2							1				2		1

1: strongly related, 2: moderately related and 3: weakly related

BME2611	Threpuetic and Surgical Equipments	L	T	P	C
Version 1.1	Date of Approval: 16 May 2019	3	0	0	3
Pre-requisites/Exposure	Bio-instrumentation				
Co-requisites	Engineering Mathematics, General Science				

Catalog Description

Therapeutic medical instruments are widely used in the field of biomedical engineering. The students studying the subject are supposed to learn the therapy for any disease after diagnosing it. The course in addition, will provide knowledge of principle and constructional features of various therapeutic medical equipments. The course will also deal with different advance Therapeutic Technology..

Course Objectives

The objective of this course is to

23. To provide an overview of Threpuetic and Surgical Equipments.
24. To serve as a foundation for design and develop a new insight in Medical Equipment use in Surgrey.

Course Outcomes

On completion of this course, the students develop capabilities of:

CO44. *Identify* appropriate design aspects of defibrillator and Pacemaker.
CO45. *Identify* various electro-Surgical equipment and its application.
CO46. *Identify* various monitor and control parameters of ventilator and *design* aspects custom built ventilator.
CO47. *Explain* the principle of Hemodialysis machine and its component.
CO48. *Explain* and *demonstrate* the principle of physiotherapy machine.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Pacemaker and Defibrillator** Need of Pacemaker, External and Implantable Pacemaker, Various type of pacemaker as per clinical need, Recent Advancement in Pacemaker; Need of Defibrillator, Type as of Defibrillator, Mono-phasic and Bi-Phasic Defibrillator, Physiological mechanism of therapy	L1 and L2	10
MODULE II: **Surgical Equipment** Principle of Surgical Diathermy, Surgical Diathermy Machine, Safety aspects in Electro-Surgical Units	L1 and L2	7

MODULE III: Ventilator Introduction to Ventilator, Basic therapeutic mechanism of ventilators; Types of Ventilators, Ventilator monitoring and Control Parameters, Ventilator design and machine,	L1, L2 and L3	7
MODULE IV: Hemodialysis Machine Functioning of Kidney, Artificial Kidney, Dialyzers, Membrane of Hemodialysis , dialysis machine	L1 and L2	5
MODULE IV: Physiotherapy and Electrotherapy Equipment High Frequency Heat Therapy, Short-wave Diathermy, Microwave Diathermy, Ultrasonic Therapy Unit, Electrodiagnostic/Therapeutic Apparatus, Pain Relief Through Electrical Stimulation	L1 and L2	7

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

49. R. S. Khandpur, Biomedical Instrumentation: technology and Application, 2nd Edition, 2003, Tata McGraw-Hill.

Reference Books

8. Leslie Cromwell, Fred J. Weibell, Erich A Pfeiffer, Biomedical Instrumentation and Measurements , PHI , 2nd Edition , 2004.

9. John G.Webster, Medical Instrumentation : Application and Design, 3rd Edition , John Wiley & Sons , New York , 1998 .

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1												1		
CO2		1		2										1		
CO3	1		2											1		
CO4		1	2											1		
CO5		1	2											1		

1: strongly related, 2: moderately related and 3: weakly related

BME2612	Data Mining	L	T	P	C
Version 2019.1	Date of Approval: 15 May 2019	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites	Nil				

Catalog Description

Data Mining serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	**L1, L2**	**8**
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	**L1, L2, L3**	**7**
Module III Clustering Hierarchical and k- Means Clustering, Kohenen Networks, Birch Clustering, Measuring Cluster Goodness.	**L1, L2, L3,L4**	**8**
Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	**L1, L2, L3,L6**	**9**
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	**L2, L3, L4, l5**	**8**

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.

2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.

2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.

3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--		2	1	3
CO2	1	1	2		--	--	--	--	--	--	--	--		2	1	3
CO3	1	2	3	3	3	--	--	--	--	--	--	--		2	1	2
CO4	1	1	2	--	--	3	--	--	--	--	--	3		1	1	3
CO5	1	1	2	--	--	2	--	--	--	--	--	3		3	1	1

1: strongly related, 2: moderately related and 3: weakly related

CORPORATE COMMUNICATION

Course Code: CSS2451

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:
To enhance the skills needed to work in an English-speaking global business environment.

Course Contents:
Module I: Business/Technical Language Development
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism
Individualised pronunciation practice
Module II: Social Communication
Building relationships through Communication, Communication, Culture and Context, Entertainment and Communication, Informal business/ Technical Communication

Module III: Business Communication
Reading Business/ Technical press, Listening to Business/ Technical reports (TV, radio)
Researching for Business /Technology
Module IV: Presentations
Planning and getting started, Design and layoutof presentation
Information Packaging, Making the Presentation

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:
- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

INTERPERSONAL COMMUNICATION

Course Code: BHE2652

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

This course provides practical guidance on
Enhancing personal effectiveness and performance through effective interpersonal communication
Enhancing their conflict management and negotiation skills

Course Contents:

Module I: Interpersonal Communication: An Introduction
Importance of Interpersonal Communication
Types – Self and Other Oriented
RapportBuilding – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Behavioural Communication
Meaning and Nature of behavioural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

Module III: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles

Module IV: Conflict Management
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

Module V: Negotiation Skills
Meaning and Negotiation approaches (Traditional and Contemporary)
Process and strategies of negotiations
Negotiation and interpersonal communication
Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- HarvardBusinessSchool, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - VI

Course Code: LAN2651

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To strengthen the language of the students both in oral and written so that they can:
i) express their sentiments, emotions and opinions, reacting to information, situations;
ii) narrate incidents, events;
iii) perform certain simple communicative tasks.

Course Contents:

Module D: pp. 157 – 168 – Unité 12

Unité 12: s'évader

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

Contenu grammatical:

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN - VI

Course Code: LAN2652

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Adjective endings
Adjective endings in all the four cases discussed so far
Definite and indefinite articles
Cases without article

Module II: Comparative adverbs
Comparative adverbs as and like

Module III: Compound words
To learn the structure of compound words and the correct article which they take
Exploring the possibility of compound words in German

Module IV: Infinitive sentence
Special usage of 'to' sentences called zu+ infinitive sentences

Module V: Texts
A Dialogue: 'Ein schwieriger Gast'
A text: 'Abgeschlossene Vergangenheit'

Module VI: Comprehension texts
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VII: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – VI

Course Code: LAN2653

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations in Present as well as in Present Perfect Tense with ease.

Course Contents:

Module I
Revision of the earlier modules
Module II
Present Perfect Tense
Module III
Commands of irregular verbs
Module IV
Expressions with **Tener que** and **Hay que**
Module V
En la embajada
Emergency situations like fire, illness, accident, theft

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

RUSSIAN - VI

Course Code: LAN2654

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – VI

Course Code: LAN2655

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

Chinese emperor Qin Shi Huang – Ti who built the great wall of China also built a network of 270 palaces, linked by tunnels, and was so afraid of assassination that he slept in a different palace each night. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order.

Module II

Going out to see a science exhibition
Going to the theatre.
Train or Plane is behind schedule.
Indian Economy-Chinese Economy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. etc.

Module III

Temperature – how to say – What is the temperature in May here?How is the weather in summer in your area?
Around 30 degrees
Heating, air-conditioning
Is winter is Shanghai very cold?
Talking about birthdays and where you were born?
The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.
Tell the following in Chinese – My name is …. I was born in … (year). My birthday is …… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ……. (do what)? At week end, I ……. On Sundays I usually …… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ……. (where). She is working (or studying)…… where… She lives in …….. (where.)

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Elementary Chinese Reader Part-2, 3; Lesson 47-54

PORTUGUESE - VI

Course Code: LAN2656

L-T-P : 2-0-0 **Credit Units: 02**

BME2710	EMBEDDED SYSTEM WITH RECENT TECHNOLOGY	L	T	P	C
Version: 2019.1	Date of Approval: May 16, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This practical course is designed to quickly take students from beginner to basic functional knowledge of the Arduino microcontroller in three weekend 5-hour sessions. You can expect to learn a) how to write and upload simple code for the Arduino to perform basic logic functions like reading a switch to change a motors direction, b) how to integrate a variety of physical inputs including knobs, distance sensors, and light sensors, c) how to integrate a variety of physical outputs such as motors, lights, and speakers, and d) how to put all of these together to build simple self-contained low-cost low-power systems.

Course Objectives

The objective of this course is to

1. Provide an overview of embedded system and real time operating system.

2. Equip the students with concepts of Arduino microcontroller and its interfacing with external devices.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and analyse the architecture of Arduino microcontroller, Debugging and programming techniques.

CO2: Explain and classify embedded systems and its applications.

CO3: Explain hardware and software design concepts of embedded system.

CO4: Explain real time operating system for embedded system.

Modules	Blooms level*	Number of hours
Module 1 **Introduction to Arduino** The Arduino Platform, Block diagram, Architecture, Pin functions, overview of main features such as I/O Ports, Timers, interrupts serial port, PWM, ADC, etc. Introduction to Arduino IDE, writing, saving, compiling and uploading sketches.	L1, L2, L3 and L4	8
Module2		8

Introduction to Arduino IDE Introduction to Arduino IDE, writing, saving, compiling and uploading sketches.		
Module3 **Arduino and Interfaces** Interfacing discrete LEDs, Binary counter, Seven Segment LEDs. Interfacing LCD, switch Interface. Interfacing with different type of sensors and communication modules	L1, L2 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jeremy Blum, "Exploring Arduino: Tools and Techniques for Engineering Wizardry", 2nd Edition, Wiley, 2010.
2. John Nassey, "Arduino for Dummies" 3rd Edition, Wiley, 2009.

Reference:

1.https://www.coursera.org/learn/arduino-platform

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO2	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO3	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO4	1	2	-	2	2							2			1	3

1: strongly related, 2: moderately related and 3: weakly related

BME2711	Artificial organs and rehabilitation engineering	L	T	P	C
Version	Date of Approval: 16 May 2019	3	0	-	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is intended for Biomedical engineering students to make them understand the various techniques developed to restore the functionalities of malfunctioning organs/organ system. It entails information of different health parameters by restoring the biochemical/ biophysical and physiological processing which might have undergone deterioration due to some disease or accidental injuries. The subject is designed to introduce the initial level of details about various artificial engineering instruments or devices which are used to maintain vital functions such as blood circulation, renal activities, breathing supporting measure,. &Wheeled and seated mobility devices.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Artificial organs, prosthetics and engineering solution for various impairments
2. Provide an over view of Artificial Heart, artificial kidney, Artificial heart lung machine, Wheeled and seated mobility devices (WSMDs), Audimetric devices & associated assisting devices

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain concepts of modern artificial organs, Biomaterials, Rheological properties of blood

CO2: Explain functioning and design of Artificial heart lung machine, artificial artificial heart lung devices, Oxygenators, artificial pancreas , blood and skin .

CO3: Describe Audiometry :Wheeled and seated mobility devices (WSMDs) & ergonomics of wheelchair propulsion , power wheelchair electrical systems .

CO4: Explain the concepts of Impairments , disabilities and handicaps, engineering concepts in sensory and motor rehabilitation

Modules	Blooms level*	Number of hours
Module I: Introduction to artificial organs , biomaterials , inflammation , rejection , correction . Rheological properties of blood , blood viscosity , effect of shear rate , haematocrit , temperature and protein contents . Casson equation , flow of blood thorugh blood vessels , problems of extracorporeal blood flow.	L-1, L-2, L-3	8
Module II:	L-1, L-2,	10

Artificial heart lung machine : brief explanation of gas exchange , artificial heart lung devices , Oxygenators : bubble , film oxygenators and membrane oxygenator . Liver support system , artificial pancreas , blood and skin .	L-3	
Module III: Audiometry : air conduction , bone conduction , masking , functional diagram of audiometer . Wheeled mobility : categories of wheelchairs , wheelchair structure and component design , ergonomics of wheelchair propulsion , power wheelchair electrical systems .	L-1, L-2, L-3	8
Module IV Rehabilitation Engineering : Impairments , disabilities and handicaps , engineering concepts in sensory and motor rehabilitation . Rehab for locomotion , vision , speech and hearing . Artificial limbs , prosthetic heart valves . Externally powered and controlled prosthetics . Spinal rehabilitation and Marcus study .	L-1, L-2, L-3	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Robbinson C.J.,Rehabilitation engineering . CRC press 1995
2. Gerald E.Miller , Artificial Organs , Morgan & Claypool Publishers ,2006.
3. Bronzino Joseph , Handbook of biomedical engineering . CRC 2nd edition ,1999
4. R.S. Khandpur , Handbook of biomedical instrumentation . Tata McGraw Hill Publishers
5. Ballabio E.et.al , Rehabilitation engineering . IOS press 1993

References Books

1. Donald A. Neumann, **Kinesiology of the Musculoskeletal System - E-Book: Foundations for Rehabilitation** 2nd Edition**Publisher:** Mosby; 2 edition, 2013

2. **Michael Lysaght, Thomas J. Webster,** Biomaterials for Artificial Organs-A volume in Woodhead Publishing Series in Biomaterials **2011**
3. Saverio Affatato, Wear of Orthopaedic Implants and Artificial JointsA volume in Woodhead Publishing Series in Biomaterials, 2012

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**1**	**--**	**--**	**3**	**-3-**	**--**	**--**	**--**	**3**	**--**	**--**	**2**	**--**	**1**	**--**
CO2	**1**	**1**	**2**	**3**	**--**	**-3**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**--**
CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**--**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**--**
CO5	**1**	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**2**	**--**	**3**	**2**	**--**	**1**	**3**

1:

BME2712	Clinical Electrical Hazards and Safety	L	T	P	C
Version 1.1	Date of Approval:16, May 2020	2	0	0	2
Pre-requisites/Exposure	Anatomy &Physiology				
Co-requisites	Electronic Circuit				

Catalog Description

The objective of the course is to provide a brief knowledge of Clinical Electrical Hazards, safety standards and Safety procedures. Curriculum introduce students with safety testing method and equipment.

Course Objectives

The objective of this course is to

25. To provide an overview of clinical electrical hazards and safety.
26. To introduces and overview of various safety standard and organization

Course Outcomes

On completion of this course, the students develop capabilities of:

On completion of this course, the students will be able to

CO49. Differentiate various electrical hazards with effect of level of currents.
CO50. Deploy various safety techniques with knowledge of various medical standard, in designing of medical equipment.
CO51. Conduct various test to confirm safety standards for medical device and clinical setup.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Clinical Electrical Hazard** Introduction to electrical safety; Various effect of current flowing from one contact point to another: Sensitivity Limits, Let-go current, Muscles Contraction, Suffocation, Cardiac fibrillation, Burn; Difference between Macro-shocks and Micro-shocks	L1 and L2	4
MODULE II: **Electrical Safety** Physical Test, electrical Safety Analyzer Setup, Ground Wire Resistance, Insulation Test, Equipment Leakage Current (Direct, Differential, Alternative), Patient Applied part leakage current, Leads Isolation Test/Mains applied part Leakage.	L1, L2 and L3	4

MODULE III: **Type of Test** Physical Test, electrical Safety Analyzer Setup, Ground Wire Resistance, Insulation Test, Equipment Leakage Current (Direct, Differential, Alternative), Patient Applied part leakage current, Leads Isolation Test/Mains applied part Leakage.	L1, L2 and L3	4

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Electrical Safety Practice and Standards: CRC Press Publication

Reference Books

1. Electrical Safety Handbook by John Cadick, P.E., Mary Capelli-Schellpfeffer, M.D., M.P.A.,, Dennis K. Neitzel, C.P.E.,, Al Winfield, Publisher: McGraw-Hill

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		3	1										3	1		
CO2		3	1										3	1		
CO3		2	1										3	1		

1: strongly related, 2: moderately related and 3: weakly related

BME2713	Biomechanics Simulation Lab	L	T	P	C
Version 1.1	Date of Approval: 16 May, 2019	0	0	2	1
Pre-requisites/Exposure	Engineering Mathematics, Medical Image Processing,				
Co-requisites					

Pre –Requisite: Matlab Programming
Catalog Description

This course helps the students to do hands-on practice with various simulation techniques use for Biomechanics. Biomechanics simulations study are known to be one of efficient techniques for various application of healthcare. Course built the foundation for develop software program for medical data processing.

The objective of this course is to

27. To provide hands-on practice with 3D Modelling Tools.
28. To provide hands-on practice with FEA Modelling.

Course Outcomes

On completion of this course, the students will be able to

CO15. Develop an efficient 3D model of human body part from 3D stackes of images.
CO16. Develop a FEA Model for solve an approximate solution on Medical Data.

List of Experiments	**Blooms level***	**Number of hours**
41. To Develop a Bone3D modeling using 3D rendering Software.	L1, L2 and L3	2
42. To operate smoothening function on 3D model using 3D rendering Software.	L1, L2 and L3	2
43. To operate wrapping function on 3D model using 3D rendering Software.	L1, L2 and L3	2
7. To operate error analysis and rectification on 3D model using 3D rendering Software.	L1, L2 and L3	2
8. To operate 3D analysis Tool on 3D model using 3D rendering Software.	L1, L2 and L3	2
9. To develop assembly of 3D bone.	L1, L2 and L3	2
10. To Assign material properties to each component of 3D model.	L1, L2 and L3	2
11. To develop meshed 3D model.	L1, L2 and	2

	L3	
12. To apply boundary condition and force component on 3D surfaces.	L1, L2 and L3	2
13. To simulate for FEA modelling.	L1, L2 and L3	2

Text Books

50. By Christopher C. Pollitt, The Illustrated Horse's Foot - E-Book: A comprehensive guide, Elsevier Health Sciences, 16-Nov-2015 - Medical - 272 pages
51. Moaveni Saeed Finite Element Analysis : theory and Application with Ansys, 3rd Edition, Pearson Education, 2010
52. Lab Practical Manual

Reference Books

7. https://www.materialise.com/en/medical/mimics-innovation-suite/mimics
8. https://www.ansys.com/solutions/solutions-by-industry/healthcare

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO4**
CO1		**2**	--	--	**1**	--	--	--	--	--	--	--		-3	1	--
CO2		**2**	--	--	**1**	--	--	--	--	--	--	--		3	**1**	--
CO3		**2**	--	--	**1**	--	--	--	--	--	--	--		3	**1**	--
CO4		**2**	--	--	**1**	--	--	--	--	--	--	--		3	**1**	--
CO5		**2**	--	--	**1**	--	--	--	--	--	--	--		3	**1**	--

1: strongly related, 2: moderately related and 3: weakly relat

BME2714	Embedded System with Recent technology Lab	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	0	0	2	1
Pre-requisites/Exposure	Engineering Mathematics, Medical Image Processing,				
Co-requisites					

Catalog Description

This practical course is designed to quickly take students from beginner to basic functional knowledge of the Arduino microcontroller in three weekend 5-hour sessions. You can expect to learn a) how to write and upload simple code for the Arduino to perform basic logic functions like reading a switch to change a motors direction, b) how to integrate a variety of physical inputs including knobs, distance sensors, and light sensors, c) how to integrate a variety of physical outputs such as motors, lights, and speakers, and d) how to put all of these together to build simple self-contained low-cost low-power systems.

Course Objectives

The objective of this course is to

3. Provide an overview of embedded system and real time operating system.

4. Equip the students with concepts of Arduino microcontroller and its interfacing with external devices.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and analyse the architecture of Arduino microcontroller, Debugging and programming techniques.

CO2: Explain and classify embedded systems and its applications.

CO3: Explain hardware and software design concepts of embedded system.

CO4: Explain real time operating system for embedded system.

List of Experiments	**Blooms level***	**Number of hours**
14. Designing a push button to turn ON and OFF a LED.	L1, L2 and L3	2
15. Designing a potentiometer to change the resistance values of an LED.	L1, L2 and L3	2
16. using the PWM pins on Arduino to increase or decrease the intensity of the LED.	L1, L2 and L3	2

17. Design a scrolling LED loop where 6 LEDs blink, one at a time, back and forth.	L1, L2 and L3	2
18. Designing a Bar graph by using Potentiometer and LEDs	L1, L2 and L3	2
19. Arduino-based data acquisition into Excel, LabVIEW, and MATLAB	L1, L2 and L3	2
20. Arduino Interface with GSM kit	L1, L2 and L3	2
21. Arduino interface with electronic Motor	L1, L2 and L3	2
22. Arduino interfaces with Sensor	L1, L2 and L3	2
23. A low Budget Arduino Project	L1, L2 and L3	2

Text Books:

3. Jeremy Blum, "Exploring Arduino: Tools and Techniques for Engineering Wizardry", 2nd Edition, Wiley, 2010.
4. John Nassey, "Arduino for Dummies" 3rd Edition, Wiley, 2009.

Reference:

1.https://www.coursera.org/learn/arduino-platform

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--		--	**1**	--
CO2	**1**	**2**	--	--	--	--	--	--	--	--	--	--		--	**1**	--
CO3	**1**	**2**	--	--	--	--	--	--	--	--	--	--		--	**1**	--
CO4	**1**	**2**	--	--	--	--	--	--	--	--	--	--		--	**1**	--
CO5	**1**	**2**	--	--	--	--	--	--	--	--	--	--		--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

BME2735	SUMMER INTERNSHIP EVALUATION II	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	3
Pre-requisites/Exposure	NA				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview ofpresentation and preparation of report.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1				--	--	--	--	--	1	2	2	--	-	2	2	1
CO2				-	--	--	--	--	1	2	2	--	-	2	2	1
CO3				--	--	--	--	--	1	2	-	--	-	2	2	1
CO4				--	--	--	--	--	1	2	3	--	-	2	2	1

1: strongly related, 2: moderately related and 3: weakly related

BME2737	PROJECT (DISSERTATION-I)	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	8
Pre-requisites/Exposure	Whole Curriculum				
Co-requisites	Nil				

Catalog Description

Major Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview ofpresentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**-**			**1**
CO2	**1**	**2**	**2**	**-**	--	--	--	--	--	--	--	--	**-**	**-**		**1**
CO3	**1**	**2**	**-**	--	--	--	--	--	--	--	--	--	**-**	**-**		**1**
CO4	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**-**	**-**		**1**

1: strongly related, 2: moderately related and 3: weakly related

BME2715	Clinical Sciences	L	T	P	C
Version 1.1	Date of Approval:16, May, 2019	3	0	0	3
Pre-requisites/Exposure	Anatomy &Physiology				
Co-requisites					

Catalog Description

The objective of the course is to provide a brief knowledge of Clinical Science. It is to provide the students of biomedical, a clinical aspects of Nephrology, General Surgery and Gastroenterology and cardiology. Engineering student able to understand clinical related issue and develop foundation to built futuristic solution for them.

Course Objectives

The objective of this course is to

29. To provide an overview of clinical science.
30. To develop the foundation to provide solution with understanding of clinical aspects of problems.

Course Outcomes

On completion of this course, the students develop capabilities of:

On completion of this course, the students will be able to

CO52. Identify various clinical aspects and issue related to Nephrology.
CO53. Identify various clinical aspects and issue related to general surgery.
CO54. Identify various clinical aspects and issue related to Cardiology.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Nephrology-I** Diseases in Nephrology, Principles of dialysis, Haemodialysis, Acetate dialysis, Bicarbonate dialysis. Peritonial dialysis, Chronic ambulatory peritonealdialysis, Haemoperfusion, Sequential ultra-filtration. Haemofiltration, Adequacy ofdialysis, Clearance, dialysance, Components of dialysing system, Dialysate, compositionof dialysate, Types of dialysers, controls and monitoring devices for dialysers. Clinicalsignificance. Renal transplantation: Basic principles.	L1 and L2	9
MODULE II: **Nephrology-II**	L1 and L2	9

Diseases of nervous system, Electroencephalography, Pneumoencephalography, neuromuscular stimulation, Electromyography, Clinical applications. Motor neuron disorders, the electrical study of reflexes, the silent period. The F response, The H reflex, the axion reflexes, Disorders of neuromuscular transmission		
MODULE III: **General Surgery and Gastroenterology** Pre- operative preparation for surgical patient, Study and operation of surgical equipment, safety aspects in electro-surgical units, Anatomy and physiology of G.I.T. Nutritional support and parenteral therapy, Height and weight estimations according to age. Intravenous cannulae, stomach wash tubes, Introduction to Hypertension and Diabetes..	L1 and L2	9
MODULE IV: **Cardiology:** Cardio vascular measurements, Normal and abnormal ECG, interpretation of ECG, Prosthetic devices, Monitors, Heart lung machine applications and Clinical significance, CVP and SWAN catheters. Diagnostic applications, Cardiac pacing. Diagnostic indications. Criteria for selection. Therapeutic indications.	L1 and L2	9

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

2. Strauss, Maurice B. & Louis G. Welt. Disease of Kidney, Vol 1 & 2 Little Brown. 1997
3. James G. Mcleopd, Physiological Approach to Clinical Neurology, Butterworth Heinemann Lt., 3rd edition, 1981

Reference Books

1. Robert F Rushmer, Cardio vascular Dynamics. WB Saunders, 1976.
2. T.L Dent. W.E. Stodel, J. G. Turcotte, Surgical Endoscopy, year book Medical pub, 1985.
3. Jones DB, Wu JS, Soper NJ, Laproscopic surgery: Principles and Procedures, 2nd Ed, Marcel Dekker, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		3	1										3	1		
CO2		3	1										3	1		
CO3		2	1										3	1		

1: strongly related, 2: moderately related and 3: weakly related

BME2716	Neural Network and Fuzzy Logic	L	T	P	C
Version 1.1	Date of Approval:16, May, 2019	3	0	0	3
Pre-requisites/Exposure	Machine Learning				
Co-requisites					

Catalog Description

Course has been divided in to two parts: Neural Networks and Fuzzy Logic. Neural networks part aims at introducing the fundamental theory and concepts of biological and artificial neural network and their applications in the area of machine intelligence. This part also offers knowledge of learning rules and architecture of various neural nets. The second part covers fuzzy logic: Fuzzy logic is a tool that can be applied to ambiguous problems, which cannot easily solved by classical techniques. Course discusses the fundamental of fuzzy set theory and fuzzy logic. In addition, this course also introduces applications of fuzzy logic in several areas such as fuzzy control and fuzzy decision making.

Course Objectives

The objective of this course is to

1. To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.

Course Outcomes

On completion of this course, the students will be able to

CO55. Demonstrate the concepts of feed forward neural networks
CO56. Demonstrate adequate knowledge about feedback networks.
CO57. Apply the concept of fuzziness involved in various systems.
CO58. Demonstrate adequate knowledge about fuzzy set theory
CO59. Apply fuzzy logic control to real time systems.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Architecture** Introduction –Biological neuron-Artificial neuron-Neuron modeling Learning rules-Single layer-Multi layer feed forward network-Back propagation-Learning factors.	L1 and L2	7
MODULE II: **Neural Network for Control** Feedback networks-Discrete time hop field networks-Schemes of neuro –control, identification and control of dynamical systems-case studies (Inverted Pendulum, Articulation Control).	L1 and L2	7
MODULE III:	L1 and L2	7

Fuzzy System Classical sets-Fuzzy sets-Fuzzy relations-Fuzzification – Defuzzification- Fuzzy rules.		
MODULE IV: **Fuzzy Logic Control** Membership function – Knowledge base-Decision –making logic – Optimizations of membership function using neural networks-Adaptive fuzzy systems-Introduction to generate to genetic algorithm.	L1 and L2	8
MODULE IV: Application of FLC Fuzzy logic control-Inverted pendulum-Image processing-Home Heating system-Blood pressure during anesthesia-Introduction to neuro fuzzy controller	L1 and L2	7

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Kosko, B, "Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence", PrenticeHall, NewDelhi, 2004.
2. Timothy J Ross, "Fuzzy Logic with Engineering Applications", John Willey and Sons, West Sussex, England, 2005.

Reference Books

1. Jack M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., Boston, 2002
2. Klir G.J. &Folger T.A., "Fuzzy sets, Uncertainty and Information", Prentice –Hall of India Pvt. Ltd., New Delhi, 2008.
3. Zimmerman H.J., "Fuzzy set theory and its Applications", Kluwer Academic Publishers Dordrecht, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		3			1										1	3
CO2		3			1										1	3
CO3		2			1										1	3
CO4		2			1										1	3
CO54		2			1										1	3

1: strongly related, 2: moderately related and 3: weakly related

BME2717	VIRTUAL REALITY	L	T	P	C
Version: 2019.1	Date of Approval: 16 May 2019	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers understanding of software and hardware related to computer graphics systems. Topics include an introduction to the basic concepts, 2-D and 3-D modeling and transformations, viewing transformations, clipping, color filling, projections, rendering techniques, visible surface detection and elimination algorithms, graphical software packages and graphics systems. Students will use a standard computer graphics API to reinforce concepts and study fundamental computer graphics algorithms. Last module covers elementary image processing techniques and various library function in C to build animations.

Course Objectives

The objective of this course is to

1. Equip the students with fundamental concepts of graphics system and standards.
2. Equip the students with mathematical concepts of graphics algorithms to draw objects using C language.
3. Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
4. Provide an overview of various elementary image processing techniques and basic library function in C to create animation sequence.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain applications of computer graphics and define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demon strate solid filling algorithms. Demonstrate polygon clipping and line clipping algorithm and analyze their problems and solutions.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implement -ation. Illustrate use of window to viewport transformation in computer graphics.

CO4: Apply 3D geometric transformations on 3D objects with their practical implementation.

CO 5: Illustrate the use of 3D object modeling, Visible Surface detection and elimination algorithm and analyze their problems and solutions.

Modules	Blooms level*	Number of hours
Module I: Introduction to Graphics and Graphics Hardware System Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor.	L1, L2	5
Module II: Output Primitives and Clipping operations Algorithms for drawing 2D Primitives lines (DDA and Bresenham‘s line algorithm), circles (Bresenham‘s and midpoint circle algorithm), ellipses (midpoint ellipse algorithm), Antialiasing and filtering techniques. Line clipping (cohen-sutherland algorithm), Curve clipping algorithm, and polygon clipping with Sutherland Hodgeman algorithm, Area fill algorithms for various graphics primitives: Scanline fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Character generation techniques.	L2, L3, L4	6
Module III: 2D Geometric transformation 2D Transformation: Basic transformation, Translation, Rotation, Rotation relative to an arbitrary point, scaling, Matrix Representations and Homogeneous coordinates, window to viewport transformation.	L3 and L4	6
Module IV:3D Geometric transformation 3D Concepts: Parallel projection and Perspective projection, 3D Transformations, composite 3D transformation, co-ordinate transformation, Inverse transformation	L3 and L5	7
Module V: object modelling and Visible Surface detection fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals. Bezier curves and Bezier surfaces, Bspline curves and surfaces, Visible surface detection method: Basic illumination, diffuse reflection, specular reflection, shadows. Ray tracing method, Depth-buffer method, A-buffer method, Depth-sorting method (painter‘s algorithm), Binary search partition method, Scan line method,	L4, L5	7
Module VI: Introduction to multimedia Design of animation sequences, Computer Animation languages, Elementary filtering techniques and elementary Image Processing techniques, graphics library functions used in animation design	L2, L3, L5	5

**Bloom’s Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1.Udit Agrawal,“Principles of Computer Graphics”, 2nd Edition, DhanpatRaiPublications,New Delhi, 2017.
2.Hughes, Van Dam, et al. “Computer Graphics Principles and Practice”, 3rd Edition, Pearson, 2014.
3.Hearn and Baker, “Computer Graphics with OpenGL”, 3rd Edition, Prentice Hall, 2004.
4.Donald Hearn & M. Pauline Baker, “Computer Graphics C Version”, Pearson Education, New Delhi, 2004.

Reference Books

1. James D. Foley, Andries van Dam, Steven K. Feiner, John Hughes, “Computer Graphics: Principles and Practice”, 2nd Edition, Pearson Education, 2007.

2. F.S. Hill, “Computer Graphics using OPENGL”,2nd edition, Pearson Education, 2003.

3. David F. Rogers; “Procedural Elements for Computer Graphics” TMH. Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**_**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**		**--**	**1**	**2**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**		**--**	**1**	**2**
CO3	**1**	**1**	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**		**3**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**		**--**	**1**	**2**
CO5	**1**	**3**	**2**	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**		**3**	**1**	**2**
CO6	**1**	**2**	**3**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**3**	**2**	

BME2718	ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2019.1	Date of Approval: 16May, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5:Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Bloom s level*	Number of hours
Module 1: Programming Basic and Recap **Programming Concepts Basics I -** Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, SDLC. **Programming Concepts Basics 2-** Scripting, Net Framework, Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables & Arguments.	L1, L2	8

Module II: RPA Concepts **RPA Basics -** History of Automation, what is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated. **RPA Advanced Concepts -** Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem	L2, L3 and L4	8
Module III: UiPath Introduction & Basics **Introduction to UiPath-** Installing UiPath Studio community edition, The User Interface, KeyboardShortcuts,AboutUpdating,AboutAutomationProjects,IntroductiontoAutomation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide. **Variables**, **Control Flow** **DataManipulation-** DataManipulationIntroduction,Scalarvariables,collectionsandTables, Text Manipulation, Data Manipulation, Gathering and AssemblingData. **Recording and Advanced UI Interaction -** Recording Introduction, Basic and Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping,Scraping advanced techniques.Selectors.	L2, L3 and L4	8
Module IV: UiPath Advanced Automation concepts and techniques Image, Text & Advanced Citrix Automation- Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, using tab for Images, Starting Apps. Excel Data Tables & PDF - Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF. Email Automation- Email Automation, Incoming Email automation, Sending Email automation	L2, L3 and L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi,Packt Publications,Ist Edition,2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	1	-	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	-	1	-	2
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	1	-	2

1: strongly related, 2: moderately related and 3: weakly related

EMPLOYABILITY SKILLS

Course Code: CSS2751

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

Course Contents:

Module I

Introduction to Public Speaking

Business Conversation, Effective Public Speaking, Art of Persuasion

Module II: Speaking for Employment

Types of Interview, Styles of Interview, Facing Interviews-Fundamentals and Practice Session

Conducting Interviews- Fundamentals and Practice Session

Question Answer on Various Dimensions

Module III

Resume Writing, Covering Letters, Interview Follow Up Letters

Module IV: Basic Telephony Skills

Guidelines for Making a Call, Guidelines for Answering a Call

Module V: Work Place Speaking

Negotiations, Participation in Meetings, Keynote Speeches

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File

GD – Group Discussion

GP – Group Presentation

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

RELATIONSHIP MANAGEMENT

Course Code: BEH 2751

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To understand the basis of interpersonal relationship
To understand various communication style
To learn the strategies for effective interpersonal relationship

Course Contents:

Module I: Understanding Relationships
Importance of relationships
Role and relationships
Maintaining healthy relationships

Module II: Bridging Individual Differences
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

Module III: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

Module IV: Theories of Interpersonal Relationships
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

Module V: Impression Management
Meaning & Components of Impression Management
Impression Management Techniques (Influencing Skills)
Impression Management Training-Self help and Formal approaches

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - VII

Course Code: LAN2751

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:
Revise the portion covered in the first volume, give proper orientation in communication and culture.

Course Contents:
Module A: Unités 1 – 3: pp. 06 - 46

Contenu lexical :

Unité 1: Rédiger et présenter son curriculum vitae
Exprimer une opinion
Caractériser, mettre en valeur
Parler des rencontres, des lieux, des gens

Unité 2: Imaginer - Faire des projets
Proposer - conseiller
Parler des qualités et des défauts
Faire une demande écrite
Raconter une anecdote
Améliorer son image

Unité 3: Exprimer la volonté et l'obligation
Formuler des souhaits
Exprimer un manque/un besoin
Parler de l'environnement, des animaux, des catastrophes naturelles

Contenu grammatical :

Le passé : passé composé/imparfait
Pronoms compléments directs/indirects, y/en (idées/choses)
Propositons relatives introduites par qui, que, où
Comparatif et superlatif
Le conditionnel présent
Situer dans le temps
Féminin des adjectifs
La prise de paroles : expressions
Le subjonctif : volonté, obligation

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 2**

GERMAN - VII

Course Code: LAN2752

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Dass- Sätze

Explain the use of the conjunction "-that", where verb comes at the end of the sentence

Module II: Indirekte Fragesätze

To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, where again the verb falls in the last place in that sentence.

Module III: Wenn- Sätze

Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of the sentence.

Module IV: Weil- Sätze

Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in the sentence.

Module V: Comprehension texts

Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VI: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation; I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - VII

Course Code: LAN2753

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, expressions used on telephonic conversation and other situations to handle everyday Spanish situations with ease.

Course Contents:

Module I

Revision of earlier semester modules

Module II

Zodiac signs. More adjectives…to describe situations, state of minds, surroundings, people and places.

Module III

Various expressions used on telephonic conversation (formal and informal)

Module IV

Being able to read newspaper headlines and extracts (Material to be provided by teacher)

Module V

Negative commands (AR ending verbs)

Module VI

Revision of earlier sessions and introduction to negative ER ending commands, introduction to negative IR ending verbs

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

RUSSIAN - VII

Course Code: LAN2754

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – VII

Course Code: LAN2755

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

The story of Cinderella first appears in a Chinese book written between 850 and 860 A.D. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills
Dialogue practice
Observe picture and answer the question.
About china part –I Lesson 1,2.

Module II

Pronunciation and intonation
Character Writing and stroke order.

Module III

Ask someone what he/she usually does on weekends?
Visiting people, Party, Meeting, After work….etc.

Module IV

Conversation practice
Translation from English to Chinese and vise-versa.
Short fables.

Module V

A brief summary of grammar.
The optative verb "yuanyi".
The pronoun "ziji".

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References: "Kan tu shuo hua" Part-I Lesson 1-7

PORTUGUESE - VII

Course Code: LAN2756

L-T-P : 2-0-0 **Credit Units: 02**

BME2837	PROJECT (DISSERTATION)	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	8
Pre-requisites/Exposure	Whole Curriculum				
Co-requisites	Nil				

Catalog Description

Major Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility

Course Objectives

The objective of this course is to

3. Equip the students with concepts of new technologies and practical exposure
4. Provide an overview ofpresentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	-			**1**
CO2	**1**	**2**	**2**	-	--	--	--	--	--	--	--	--	-	-		**1**
CO3	**1**	**2**	-	--	--	--	--	--	--	--	--	--	-	-		**1**
CO4	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	-	-		**1**

1: strongly related, 2: moderately related and 3: weakly related

BME2802	Introduction to Medical Physics	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	3	0	0	3
Pre-requisites/Exposure	Engineering Physics, Biomedical Instrumentation				
Co-requisites	Anatomy and Physiology				

Catalog Description

This Course addresses DNA damage, depression of Macro molecular synthesis, Chromosomal damage, radiation and contamination surveys, instrument calibration, radioactive waste disposal, radiation safety compliance, and other matters contributing to professional competence in the field of medical health physics. Course includes lectures and seminars.

Course Objectives

The course objective is

1. To clear the concepts and methods of physics in the diagnosis and treatment of human disease
2. To provide the knowledge of the application of physics in the area of medicine.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and describe fundamental principles of Atomic and nuclear physics.
CO2. Identify and explain fundamental theories of Radiology and radiation therapy.
CO3. Describe the basic phenomenon associated with photo medicines, its effect and hazards.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Atomic physics** Definition of atom, periodic system of elements, mechanical properties of atom, emission of light and its frequencies. Electromagnetic spectra. Interaction with Living cells: Target theory, single hit and multi target theory, cellular effects of radiation, DNA damage, depression of Macro molecular synthesis, Chromosomal damage.	L1 and L2	8
MODULE II: **Principles of nuclear physics** Natural radioactivity, Decay series, type of radiation and their applications, artificially produced isotopes and its application, accelerator principles; Radionuclides used in Medicine and technology	L1 and L2	5
MODULE III: **Fundamental physics of radiology** Radioactivity materials, Production of X-ray, Effects of X-rays, Interaction of X-ray	L1 and L2	8

and Gamma rays with matter. Somatic Effect of Radiation: Radio sensitivity protocol of different tissues in human, LD 50/30 effect of radiation on skin, blood forming organs, lenses of eye, embryo and Endocrinal glands.		
MODULE IV: **Genetic effect of radiation** Threshold of linear dose effect, relationship, factors affecting frequency of radiation induced mutation, Gene controlled hereditary diseases, biological effect of microwave and RF wave. Variation in dielectric constant and specific conductivity of tissues. Penetration and propagation of signals effects in various vital organs, Protection standards.	L1 and L2	8
MODULE V: **Photo medicine** Synthesis of Vitamin D in early and late cutaneous effects, Phototherapy, Photo chemotherapy, exposure level, hazards and maximum permissible exposures. LASER PHYSICS – Characteristics of Laser radiation, Laser speckle, biological effects, laser safety management.	L1 and L2	7

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Atoms, Molecules and Lasers, by K P R Nair
2. Fundamental Physics of Radiology, by W. J Meridith & J.B Massey

Reference Books

1. Moselly, Non-Ionising Radiation, Adam Hilgar Brustol 1988
2. Branski.S and Cherski.P, Biological Effects of Microwave, Hutchinson & ROSS Inc. Strondsburg 1980

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1											2	1		
CO2	2	1											2	1		
CO3	2	1											2	1		
CO4	2	1											2	1		
CO5	2	1											2	1		

1: strongly related, 2: moderately related and 3: weakly related

BME2803	Medical Informatics	L	T	P	C
Version 1.1	Date of Approval: 16, May 2019	3	0	0	3
Pre-requisites/Exposure	Engineering Physics, Biomedical Instrumentation				
Co-requisites	Anatomy and Physiology				

Catalog Description

Collecting, storing and using information has always been an integral part of the practice of medicine. It has, however, become more complex and technology-based thereby creating an increasing need for biomedical graduates to be competent in information handling skills ranging from simple record-keeping to accessing and using computer-based data. As well as having the technical skills to undertake such tasks it is important that graduates appreciate the role of informatics in the day-to-day care of medical equipment and the advancement of medical science in general.

Course Objectives

The objective of course is to

1. To provide an overview of computers and multimedia applications in medical field to develop educational / training packages.
2. To serve as a foundation for the study of components of virtual reality and virtual reality applications in medicine.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and Explain requirements of the implementation of medical database.
CO2. Outline and explain the visual basic tools for medical information system.
CO3. Identify and explain various requirement of Computer, multimedia systems and its algorithm for Medical informatics.
CO4. Explain the role of Computer in Medical research.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Medical Database Implementation** Medical data acquisition and database systems: PC based multichannel data acquisition system; storage, analysis and retrieval techniques	L1 and L2	6
MODULE II: **Visual Basic** Visual programming concepts; visual Basic environment, tools and controls; Dynamic data exchange; VB based Medical Information System	L1 and L2	6

MODULE III: **Computers in system design** Hospital Information System its design and functional characteristics; Principles and application of Artificial Intelligence, Pattern Recognition, Neural Network and Fuzzy Logic in Medicine	L1 and L2	6
MODULE IV: **Multimedia and virtual reality applied to medicine** Basic concepts of Multimedia; Design of Multimedia information systems; Components of virtual reality; Virtual reality applications in medicine	L1 and L2	8
MODULE V: **Computers in medical research** Medical Informatics and its levels; Design and development of educational packages on medical sciences; Integrated design concepts; Interactive multimedia, Virtual and digital libraries, Internet and its applications.	L1 and L2	10

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. R.D.Lele, Computer in Medicine , Tata McGraw-Hill, New Delhi, 1997
2. Tay Vaughan, Multimedia making it work, Tata McGraw-Hill, New Delhi, 1997.
3. Davis Chapman, Teach Yourself Visual Basic 6 in 21 days, New Delhi, 1997.

Reference Books

1. Harold Sackman, Biomedical Information Technology, Academic Press, New York, 1997.
2. Mary Brth Fecko, Electronics Resources: Access and Issues, Bowker and Saur, London, 1997

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1													1	2
CO2	2	1													1	2
CO3	2	1													1	2
CO4	2	1													1	2
CO5	2	1													1	2

1: strongly related, 2: moderately related and 3: weakly related

BME2804	Recent Advancement in Biomedical Modalities	L	T	P	C
Version 1.1	Date of Approval: May 16, 2019	3	0	0	3
Pre-requisites/Exposure	Engineering Physics, Biomedical Instrumentation				
Co-requisites	Anatomy and Physiology				

Catalog Description

This course provide insight in the recent development in the field of Biomedical Equipment. It is a open ended course for final semester students where recent on going research and newly adapt technologies in market would be discuss. Course largely help student to develop carrier path and a lifelong learning opportunities.

Course Objectives

The objective of course is to

3. To provide an insight in recent development in field of Biomedical.
4. To serve as a foundation for life-long learning in field of biomedical.

Course Outcomes

On completion of this course, the students will be able to

CO5. Identify the new development in field of MRI.
CO6. Identify the new development in field of CT-Scan.
CO7. Identify the new development in field of Artificial Intelligence in Medicine.
CO8. Identify the new development in field of robotic surgery.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: **Recent Advancements in Field of MRI** Medical data acquisition and database systems: PC based multichannel data acquisition system; storage, analysis and retrieval techniques	L1 and L2	9
MODULE II: **Recent Advancement in Field of CT-Scan** Visual programming concepts; visual Basic environment, tools and controls; Dynamic data exchange; VB based Medical Information System	L1 and L2	9
MODULE III: **Recent Advancement in aspect of Artificial Intelligence in Medical Equipments** Hospital Information System its design and functional characteristics; Principles and	L1 and L2	9

application of Artificial Intelligence, Pattern Recognition, Neural Network and Fuzzy Logic in Medicine		
MODULE IV: **Robotic Surgery and its technolgy** Basic concepts of Multimedia; Design of Multimedia information systems; Components of virtual reality; Virtual reality applications in medicine	L1 and L2	9

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

4. R.D.Lele, Computer in Medicine , Tata McGraw-Hill, New Delhi, 1997
5. Tay Vaughan, Multimedia making it work, Tata McGraw-Hill, New Delhi, 1997.
6. PubMed

Reference Books

3. Harold Sackman, Biomedical Information Technology, Academic Press, New York, 1997.
4. Mary Brth Fecko, Electronics Resources: Access and Issues, Bowker and Saur, London, 1997

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1												1		2
CO2	2	1												1		2
CO3	2	1													1	2
CO4	2	1												1		2

1: strongly related, 2: moderately related and 3: weakly related

BME2805	ADVANCED ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT	L	T	P	C
Version 2019.1	Date of Approval: 16May 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5:Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	Blooms level*	Number of hours
Module 1: Exception handling and Best Practices **Debugging and Exception Handling- Debugging** Tools, Strategies for solving issues, Catching errors. **Project Organization-** Concept of project organization, Best practices, Avoiding pitfalls, Invoke Activity.	L1, L2	8
Module II: Introduction to Orchestrator	L2, L3	8

Orchestrator, Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.	and L4	
Module III: merging and Future Trends in IT Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing Computer Vision	L2, L3 and L4	8
Module IV: Capstone Project Real life case studies which can be used to apply the concepts learnt during the course. The projects shall test student's skills right from process transformation and documentation to the design and development of the actual robot	L2, L3 and L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi,Packt Publications,Ist Edition,2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	**3**	--	--	--	--	--	--	**2**	--	**1**		**1**	-
CO2	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-		**1**	-
CO3	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-		**1**	**2**
CO4	**1**	--	--	**2**	--	--	--	--	--	--	--	--	**1**		**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

WORKPLACE COMMUNICATION

Course Code: CSS2651

L-T-P : 1-0-0 **Credit Units: 01**

PERSONAL AND PROFESSIONAL EXCELLENCE

Course Code: BEH 2851

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

Importance of Personal and Professional excellence
Inculcating the components of excellence

Course Contents:

Module I: Components of Excellence
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

Module II: Managing Personal Effectiveness
Setting goals to maintain focus
Dimensions of personal effectiveness (self disclosure, openness to feedback and perceptiveness)
Integration of personal and organizational vision for effectiveness
A healthy balance of work and play
Managing Stress creatively and productively

Module III: Personal Success Strategy
Time management
Handling criticism and interruptions
Dealing with difficult people
Mapping and evaluating the situations
Identifying long-term goals

Module IV: Positive Personal Growth
Understanding & Developing positive emotions
Positive approach towards future
Resilience during loss and challenge
Module V: Professional Success
Building independence & interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Amity School of Engg. & Technology

Bachelor of Technology - Electronics & Communication Engineering

FLEXILEARN

-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

POs_B.Tech Programme

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

P04. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PSOs for B.Tech (Electronics & Communication Engineering)

PSO1: Applythe knowledge of science, mathematics, electronics & communication related technology and other engineering disciplines to identify and solve relevant engineering problems across a broad range of application areas.

PSO2: Ableto apply the knowledge & skills gained in the field of signal processing, microelectronics, embedded system, control system and circuit system to solve the industrial problems.

PSO3: Able to apply technical knowledge and skills gained in RF & microwaveand communication system into telecom sector with an understanding of realistic constraints.

PSO4: Ableto comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements.

Enclosure (s):

- Supporting document for PSOs framing
- Programme Structure for B.Tech (ECE)

Supporting document for PSOs of B.Tech (Electronics & Communication Engineering)

PSO1		PSO2			PSO3			PSO4		
Apply the knowledge of science, mathematics, electronics & communication related technology and other engineering disciplines to identify and solve relevant engineering problems across a broad range of application areas.		Able to apply the knowledge & skills gained in the field of signal processing, microelectronics, embedded system, control system and circuit system to solve the industrial problems.			Able to apply technical knowledge and skills gained in communication system, instrumentation and interdisciplinary domains into telecom sector with an understanding of realistic constraints.			Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements.		
1	2	3	4	5	6	7	8	9	10	11
Basic Science & Engineering Courses	**Basic Electronics Engineering Courses**	**Signals and Control Theory**	**Design & Fabrication**	**Programming**	**Communication Systems**	**Instrumentation**	**Interdisciplinary domain**	**Project (Dissertation)**	**Ethics/Env. & social issues**	**Value added courses**
Engineering Mathematics-I	Analog Electronics	Circuits & Systems	PCB Fabrications	Introduction to Computers & Programming in C	Digital Communications	Measurement & Measuring Instruments	Computer Architecture	Summer Internship Evaluation-I	Environmental Studies	English-I
Engineering Mathematics-II	Digital Electronics	Control Systems	Digital Circuits & Systems	Object Oriented Programming using C++	Antenna & Wave Propagation	Biomedical Instrumentation	Fuzzy Logic & Neural Networks	Summer Internship Evaluation-II	Personality, Nationalism and Human Values	English-II
Engineering Physics	Electromagnetic Field Theory	Signals & Systems	VLSI Design	Data Structure using C	Radar & Satellite Communications	Microprocessor Systems	Operating System	Project (Dissertation)	Employability Skills	Understanding Self for Effectiveness
Engineering Chemistry		Digital Image Processing	Embedded System	RTOS Programming	Microwave Engineering	Virtual Instrumentation	Computer Networks	Independent Study	Relationship Management	Problem Solving and Creative Thinking
Elements of Mechanical Engineering			Advanced VLSI Design	Verilog Programming	Mobile Communications		Advanced Networking	Term Paper		Effective Listening
Electrical Science				Software Engineering	Optical Communications		Information Storage & Management			Group Dynamics and Team Building
Engineering Graphics Lab				Java Programming			Database Management Systems			Presentation Skills
				MATLAB						Stress and Coping Strategies
										Reading & Comprehension
										Corporate Communication
										Interpersonal Communication
										Workplace Communication
										Personal & Professional Excellence

ENGINEERING MATHEMATICS - I

Course Code: ECE2112
L-T-P : 3-1-0 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Differential Calculus by Shanti Narain

- Integral Calculus by Shanti Narain

References:

- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING CHEMISTRY

Course Code: **ECE2114**
L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention,
Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels

Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter,Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module III: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication;
Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module VI: Corrosion
Introduction, Mechanism of dry and wet corrosion,

Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity.
Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ECE2104	ELEMENTS OF MECHANICAL ENGINEERING	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

In this course the concepts of various prime movers like I C Engine, Gas Turbine, Steam Turbine, and Hydraulic Turbine are discussed in detail. Concept of power absorbing devices and power transmission devices are discussed in detail. Elementary concept of mechanics of material and machine tool also discussed in detail. The aim of this course is to make the students familiar with the basic mechanical engineering.

Course Objectives

The objective of this course is to

1. Equip the students with concept of heat engine, steam, boiler, steam turbine, hydraulic turbine, hydraulic pumps, stress and strain, power transmission.

2. Provide an overview of machine tool and manufacturing system.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain working of I C engine, Gas turbine, Air standard efficiency of Otto Cycle &Diesel Cycle and Boilers.

CO2: Explain working of Steam Turbine, Hydraulic Turbine and Hydraulic Pumps.

CO3: Describe the stress strain diagram, Elastics constants and Transmission system.

CO4: Discuss the metal cutting and working of machine tool with manufacturing system.

Modules	Blooms level*	Number of hours
MODULE 1: Prime Mover (I. C. Engine) Internal Combustion Engine: Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle. Working principle of gas turbine, Constant pressure gas turbine cycle.	L1, L2 and L3	7
MODULE 2: Prime Mover (Turbine) Steam Turbine:Classification of boilers, Classification of steam turbines, Working principle of impulse and reaction. Hydraulic Turbine: Classification of hydraulic turbine, Construction details and working of Pelton, Francis and Kaplan turbines.	L1, L2 and L3	8
MODULE 3: Power Absorbing machine Power absorbing devices: Hydraulic Pumps: Classification of hydraulic pumps, Working of Reciprocating and centrifugal pumps. Power transmission devices: Introduction to Power transmission, Belt drive, Rope drive, Chain drive, Gear drive, Gear train.		7
MODULE 4: Mechanics of Material Stress & Strain: Introduction, Concept & types of Stresses and strains, Poison's ratio, Stress-strain diagrams, Hooks law, Elastic constants & their relationships, Stresses and strains in simple and compound bars under axial loading, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc.	L1, L2 and L3	6
MODULE 5: Machine Tool Machine Tool: Introduction to Metal Cutting, Classification of machine tool, working and operations of Lathe, Shaper, Milling, Drilling machines. Manufacturing system: Component of Manufacturing Systems, Fundamentals of Numerical Control (NC), Advantage of NC systems, Classifications of NC, Computer Numerical control, Comparison of NC and CNC. Comparison between conventional and NC machines.	L1, L2 and L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Rajput, R.K. (2013). *Elements of Mechanical Engineering*, Delhi: Lakmi Publication.
- Jain, V. (2011). *Basics of Mechanical Engineering*, Delhi :Dhanpat Rai Publication.
- Kumar, D.S. (2013). *Elements of Mechanical Engineering*, , Delhi : S.K. Kataria and Sons Publications.

Reference Books

- Ganesan, V. (2017). *Internal Combustion Engine*, New-Delhi: Tata McGraw Hill.
- Nag, P.K. (2013). *Engineering thermodynamics*, New-Delhi: Tata McGraw Hill.
- Kumar, D.S. (2013).*Thermal Engineering*, New-Delhi: S.K. Kataria and Sons Publications.
- Hazra, S.K. and Chaudhary, A.K. (2012). *Workshop Technology Vol. II* . New Delhi: Asian Book Comp.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2105	Introduction to Computers and Programming in C	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

CO 1:Define the purpose and structure of C Program for programming; identify and distinguish various data types and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.

CO 2: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs

CO 3: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language

CO 4: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.

CO 5: Apply the concept of Computer Graphics using C programming concepts for implementing line drawing, circle drawing algorithms.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7
Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.Strings and C string library.Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO3	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO4	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO5	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ECE2117	Basic Electrical and Electronics Engineering	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of electricity and electrical circuits are discussed in detail. Theorems related to electrical circuits, law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network will be introduced.

Course Objectives

The objective of this course is to:

1. Provide the overview of concept of flow of current/voltage of electrical circuits.
2. Provide the basic knowledge about the concepts of electrical circuits.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Explain the fundamental theorems and laws related to the electrical circuits.

CO2. Derive equations and solve problems related to network theorems.

CO3. Draw phasor diagrams for different alternating current waveforms and Explain the working principle and estimate the performance of single phase transformers.

CO4. Explain the operation, characteristic and application of PN Junction Diode, Rectifiers, Zener Diode and Bipolar Junction Transistor.

Modules	Blooms level*	Number of hours
Module I: **Direct Current Circuits:** Ohm'sLaw,Kirchoff'sCurrent Law, Kirchoff's Voltage Law Network Reduction: Star-Delta Transformation, Source Transformation, Nodal Analysis, Mesh analysis, Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem, Maximum Power transfer theorem.	L1 and L2	9
Module II: **Alternating Current Circuits:** Peak, Average and RMS values for	L1, L2 and L3	8

alternating currents, Power calculation: reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.		
Module III: **Transformer:** Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.	L1, L2 and L3	6
Module IV: **Rotating Electrical Machines:** D.C. machines (motors and generators), Induction motor, Synchronous machines (motors and generators): construction, working principle, classification and applications.	L1, L2 and L3	6
Module V: **Semiconductor Devices:** Principle of operation characteristic and application of PN Junction Diode, Rectifiers, Zener Diode, Principle of operation, characteristic and application of Bipolar Junction Transistor, Regulated Power Supply.	L1, L2 and L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. V K Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd edition, S. Chand Publications, 2014, New Delhi
2. D. P. Kothari and I. J. Nagrath, Theory and Problem of Basic Electrical Engineering, PHI Learning Pvt. Ltd., 2015, New Delhi.
3. J B Gupta, Electrical Science, S K Kataria and Sons, 2015, New Delhi.

Reference Books

1. R J Smith and R C Dorf, Circuits Devices and Systems, 5th Edition, John Wiley
2. B.L. Thareja, Basic Electronics, 5th edition, S. Chand Publishing, 2011, New Delhi
3. V. Del Toro, Electrical Engineering fundamentals, PHI, 2016
4. Mahmood Nahvi, Joseph Edminister, Electric Circuits, 7th edition, McGraw-Hill Education, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO2	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO3	**1**	**1**	**3**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

ENGINEERING CHEMISTRY LAB

Course Code: **ECE2116**
L-T-P :0-0-2 **Credit Units: 01**

Course Contents:

List of Experiments:

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically
9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ECE2110	Programming in C Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

3. Equip the students with concepts of Programming through C Language
4. Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING 1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement.	L3	5
LABORATORY SESSSION 2 LOOPING 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D	L3	6
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and de-allocation.	L3	4

4. Write a program to print elements of array using pointers.		
LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING 1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.	L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
- Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO3	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO4	**1**	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ECE2109	ELEMENTS OF MECHANICAL ENGINEERING LAB	L	T	P	C
Version 2019.1	Date of Approval: July 14, 2019	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Pre –Requisite: Elements ofMechanical Engineering
Catalog Description

In this course the concepts of various prime movers like I C Engine, Gas Turbine, Steam Turbine, and Hydraulic Turbine are discussed in detail. Concept of power absorbing devices and power transmission devices are discussed in detail. Elementary concept of mechanics of material and machine tool also discussed in detail. The aim of this course is to make the students familiar with the basic mechanical engineering.

Course Objectives:

The objective of this course is to

1. Equip the students with practical concepts of Boiler, Turbine, IC Engine and Machine tools.
2. Understand the elements of mechanical engineering by working models and experiments.

Course Outcomes (COs): After studying this course the students will be able to:

CO 1- Define the basics of working of boilers, Steam turbines.

CO 2- Explain the principle and working of two strokes and four strokes internal combustion engines.

CO 3- Explain the working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.

CO 4 - Describe the tensile test and power transmission derives.

CO 5- Identify and demonstrate the machine tools and lathe operation.

List of Experiments	Blooms level*	Number of hours
1. To Study the Cochran and Babcock & Wilcox boilers.	L1, L2 and L3	2

2. To study the working of impulse and reaction steam turbines	L1, L2 and L3	2
3. To study Two-Stroke & Four-Stroke Diesel Engines.	L1, L2 and L3	2
4. To Study Two-Stroke & Four-Stroke Petrol Engines.	L1, L2 and L3	2
5. To study the constructional features and working of Pelton wheel Turbine, Francis Turbine and Kaplan Turbine.	L1, L2 and L3	2
6. To perform tensile test, plot the stress-strain diagram and evaluate the tensile properties of a given metallic specimen.	L1, L2 and L3	2
7. To Study the different power transmission drives.	L1, L2 and L3	2
8. To Study different types of machine tools (lathe, milling, drilling & shaper).	L1, L2 and L3	2
9. To perform the metal cutting operation on Lathe machine.	L1, L2 and L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rajput, R.K. Elements of Mechanical Engineering, Lakmi Publication, Delhi, 2013. .
- Jain, V. Basics of Mechanical Engineering, Dhanpat Rai Publication, Delhi , 2011.
- Kumar, D.S. Elements of Mechanical Engineering, S.K. Kataria and Sons Publications, Delhi 2013.

Reference Books

- Ganesan, V. Internal Combustion Engine , New-Delhi : Tata McGraw Hill, New delhi, 2017.
- Heine, R.W. Loper and P.C. Rosenthal, Principles of metal casting, McGraw Hill, New-Delhi, 2001
- Nag, P.K. Engineering thermodynamics,: Tata McGraw Hill, New-Delhi, 2013.
- Kumar, D.S.Thermal Engineering, S.K. Kataria and Sons Publications, New-Delhi, 2013.

Hazra, S.K. and Chaudhary, A.K. Workshop Technology Vol. II . Asian Book Comp, New-Delhi, 2012.

ECE2118	Basic Electrical and Electronics Engineering Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course, students will become familiar with basic electrical circuits. The students will learn practical aspects and implementation of theorems related to electrical circuits, law's related to flow of current, voltages, transformer and transistors.

Course Objectives

The objective of this course is to:

1. Provide the overview of concept of flow of current/voltage of electrical circuits.
2. Provide the basic knowledge about the concepts of electrical circuits and BJTs.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Explain the fundamental theorems and laws related to the electrical circuits and experimentally verify the basic circuit theorems

CO2. Explain the working principle and estimate the performance of single phase transformers.

CO3. Understand 3 phase balanced and unbalanced, star and delta connected supply and load and to measure power in 3 phase circuits

CO4. Able to design circuit with Bipolar Junction Transistor in CB, CE & CC configurations

Modules	Blooms level*	Number of hours
Lab Session 1: Network Analysis Techniques & Theorems 1. To verify KVL & KCL in the given network. 2. To verify Superposition Theorem. 3. To verify Maximum Power Transfer Theorem. 4. To verify Reciprocity Theorem. 5. To determine and verify R_{Th}, V_{Th}, R_N, I_N in a given network.	L1 , L2 and L3	6
Lab session II: Transformers and transistors	L1, L2 and	3

1. To perform open circuit & short circuit test on a single-phase transformer. 2. To perform regulation, ratio & polarity test on a single-phase transformer. 3. To obtain the characteristics of a transistor under common base (CB) and common emitter (CE) configuration.	L3	
Lab session III: Alternating Current Circuits 1. To study transient response of a given RLC Circuit. 2. To measure power & power factor in a three phase circuit by two wattmeter method. 3. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.	L1, L2 and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. V K Mehta and Rohit Mehta, Principles of Electrical Engineering and Electronics, 3rd edition, S. Chand Publications, 2014, New Delhi
2. D. P. Kothari and I. J. Nagrath, Theory and Problem of Basic Electrical Engineering, PHI Learning Pvt. Ltd., 2015, New Delhi.
3. J B Gupta, Electrical Science, S K Kataria and Sons, 2015, New Delhi.

Reference Books

(a) R J Smith and R C Dorf, Circuits Devices and Systems, 5th Edition, John Wiley

(b) B.L. Thareja, Basic Electronics, 5th edition, S. Chand Publishing, 2011, New Delhi

(c) V. Del Toro, Electrical Engineering fundamentals, PHI, 2016

(d) Mahmood Nahvi, Joseph Edminister, Electric Circuits, 7th edition, McGraw-Hill Education, 2017

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-
CO 2	1	1	2	3	--	--	--	--	--	--	--	--	1	-	-
CO 3	1	1	3	3	-	--	--	--	--	--	--	--	1	-	-
CO 4	1	1	2	--	--	--	--	--	--	--	--	--	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ENGLISH – I

Cource Code: CSS2152

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	**H.W. Longfellow**

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	05	15	10	70

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

*** 30 hrs Programme to be continued for Full year**

UNDERSTANDING SELF FOR EFFECTIVENESS

Course Code: BEH 2151

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

This course aims at imparting:
Understanding self & process of self exploration
Learning strategies for development of a healthy self esteem
Importance of attitudes and its effective on personality
Building Emotional Competence

Course Contents:

Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept, Self confidence, Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance, Components of self esteem, High and low self esteem, Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - I

Course Code: LAN2151

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

Course Contents:

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Object if 1, 2
Only grammar of Unité 3: object if 3, 4 and 5

Contenu lexical :Unité 1 : Découvrir la langue française : (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3:Organiser son temps

1. dire la date et l'heure

Contenu grammatical :

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN - I

Course Code: LAN2152

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Introduction
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics
Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions
To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch

- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – I

Course Code: LAN2153

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

Course Contents:

Module I

A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II

Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III

Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV

Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V

Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI

Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

RUSSIAN – I

Course Code: LAN2154

L-T-P : 3-0-0 **Credit Units: 03**

CHINESE – I

Course Code: LAN2155

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects

of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

PORTUGUESE - I

Course Code: LAN2156

L-T-P : 3-0-0 **Credit Units: 03**

ENGINEERING MATHEMATICS - II

Course Code: ECE2209
L-T-P : 3-1-0 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

Module IV: Statistics and Probability
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.

- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ECE2203	**Object Oriented Programming Using C++**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Equip the students with the basic features of C++ supporting object-oriented programming. Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.

2. Provide the overview of major object-oriented concepts to implement object oriented programs in C++ like encapsulation, inheritance and polymorphism, stream I/O, templates and operator overloading

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach and also discuss difference between C and C++.

CO 2: Illustrate the different ways to define a member function inline and explain how the private members of a class can be accessed. Explain how the objects can be instantiated and destroyed with static data member?

CO 3: Explain the concept of inheritance, types and implementation with suitable examples; find out ambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Explain polymorphism in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Explain the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in file handling.

Modules	**Blooms level***	**Number of hours**
MODULE 1: INTRODUCTION Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).	L1 and L2	5
MODULE 2: CLASSES AND OBJECTS Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an	L1, L2 and L3	7

object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.		
MODULE 3: INHERITANCE Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes	L2, L3 and L4	8
MODULE 4: POLYMORPHISM Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	L2, L3 and L4	8
MODULE 5: STRINGS, FILES AND EXCEPTION HANDLING Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. E. Balagurusamy ,"Object Oriented Programming with C++", Mc Graw Hill,6th Edition,2013.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

Reference Book

1. Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	2
CO3	1	1	2	--	--	--	--	--	--	--	--	--	1	--	2	2
CO4	1	1	2	3	--	--	--	--	--	--	--	--	1	1	--	2
CO5	1	1	2	--	--	--	--	--	--	--	--	--	1	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2204	Engineering Mechanics	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Basics of Mathematics, Mathematical Equations, Force systems				
Co-requisites	-				

Catalog Description

Engineers are the ultimate problem solvers. This course introduces the principles required to solve engineering mechanics problems. It addresses the modelling and analysis of static equilibrium problems with an emphasis on real-world engineering applications and problem solving. To master this course, students should have a background in basic mathematical calculus and physics covering classical mechanics. These basic concepts of physics and mathematics will be applied to formulate problems on force systems, trusses, friction, centroid, simple lifting machines, power transmission devices and law of conservation of energy.

Course Objectives

The objective of this course is to

5. Equip the students with concepts of free body diagram, friction, centroid or center of gravity, trusses, energy, force system and its effect on the behavior of the bodies

6. Provide an overview of estimation of performance of belts and simple lifting machines under various operating conditions.

Course Outcomes

After completing the course, the students will be able to

CO1. Explain the concept of free body diagram, classify various force system sand apply equilibrium equations to solve different truss problems.

CO2. Define and compute various terms associated with the friction, determine the efficiency of simple lifting machines and power transmission devices.

CO3. Describe various theorems and apply them to determine centroid, centre of gravity, moment of inertia, mass moment of inertia of various bodies.

CO4. Analyse and setting up the problems involving the concept of work, energy, impulse and momentum.

Modules	Blooms level*	Number of hours
Module I: **<u>Force system</u>** Types of forces, Parallelogram law of forces, Triangle law of forces, Polygon law of forces, Free body diagram, Equilibrium equations and applications. Lami's theorem and its applications. Moment and its applications,	L1, L2 and L3	10
Module II: **<u>Determinate Structures</u>** Plane truss, perfect and imperfect truss, assumption in solving the truss problems, method of joints, method of section.	L1, L2,and L3	8
Module III: **<u>Friction</u>** Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, ladder friction, Screw jack & determination of its efficiency	L2 and L3	10
Module IV: **<u>Distributed Force</u>** Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, perpendicular axis theorem, parallel axis theorem, and its application, polar moment of	L2, L3 and L4	8

inertia.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- **S. Timoshenko, D. H. Young**, Engineering Mechanics, 5th Ed, McGraw Hill, 2008, New-Delhi
- **S. S. Bhavikatti, K. G. Rajashekarappa**, Engineering Mechanics, New Age International Ltd, 1998, New Delhi
- **D.S. Kumar**, Engineering Mechanics, S. Chand Publication, 2013, New-Delhi

Reference Books

- **I. H. Shames & G. K. M. Rao**, Engineering Mechanics: Statics and dynamics, 4th Ed, PHI, 2002.
- **Beer Ferdinand P, Russel Johnston Jr., David F Mazure**, Vector Mechanics for Engineers: Statics and Dynamics (SIE), 5th Ed, McGraw Hill, 2008, New-Delhi
- **J. L. Meriam and L. G. Kraige**, Engineering Mechanics, Vol I – Statics, Vol II – Dynamics, 6th Ed, John Wiley, 2008.
- **R. C. Hibbler**, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press, 2006.
- **Andy Ruina and Rudra Pratap**, Introduction to Statics and Dynamics, Oxford University Press, 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**1**	--	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--

CO3	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ECE2206	**Object Oriented Programming Using C++ Lab**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Turbo C++				
Co-requisites	NIL				

Catalog Description

The objective of this course is to introduce object-oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Objectives

The objective of this course is

1. Perform object-oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
2. Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching, syntax, features of, and how to utilize the Standard Template Library.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define and identify the basic principles of object-oriented programming approach; Differentiate it with procedural programming approach.

CO 2: Determine the different ways to define a member function inline and explain how the private members of a class can be accessed. Solve how the objects can be instantiated and destroyed with static data member?

CO 3: Apply the concept of inheritance, types and implementation with suitable examples; find outambiguity problem in inheritance; use the concept of overriding and constructors in inheritance.

CO 4: Relate the concept polymorphism with overloading in detail and implement the concept of overloading in functions as well as in operators. Write the programs for virtual function and pointer with objects.

CO 5: Determine the exception handling mechanism. Design the programs for class and function Template. Compare and contrast various formatted and unformatted i/o function in filehandling.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1. Sample Programs using objects and classes (a) Write a program to illustrate the concept of one class with two objects by taking student data. (b) Write a program to show the relationship of class and object to display roll no., grade and fee paid by student.	L1, L3, L5	4
2. Sample Programs for different use of private, public member variables and functions and friend functions (a) Write a program to define the member function outside and inside the class. (b) Write a program to read and display the information of N persons to illustrate the concept of array of objects. (c) Write a program to add two numbers to illustrate the use of friend function.	L1, L3, L5	4
3. Sample Programs using constructors and destructors (a) Write a program to assign and copy values to illustrate the concept of parametrized and copy constructor. (b) Write a program to show the order of constructor and destructor.	L1, L3, L5	4
4. Sample Programs using operator overloading (a) Write a program to add two numbers using binary operator overloading. (b) Write a program to illustrate the assignment operator overloading.	L1, L3, L5	4
5. Sample Programs using inheritance in and accessing objects of different derived classes (a) Write a program to compute the marks explaining the concept of multiple inheritance. (b) Write a program to find the factorial of a number using inheritance.	L1, L3, L5	4

6. Sample Programs using polymorphism and virtual functions (using pointers) and File Handling (e) Write a program to find the volume of cylinder and cuboid using function overloading. (f) Write a program to reverse a string using pointers. (g) Write a program to explain the relationship of inheritance and virtual function. (h) Write a program to read the student name and fee paid using read() function from the file.	L1, L3, L4, L5	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
3. "Object Oriented Programming with C++" By E. Balagurusamy.
4. Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

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2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
3. Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**3**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO5	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly relateds

ENGINEERING PHYSICS

Course Code: **ECE2110**
L-T-P : 2-1-0 **Credit Units: 03**

Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves

Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance

Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.

Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light

Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .

Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.

Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.

Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

ENGINEERING PHYSICS LAB

Course Code: **ECE2111**
L-T-P : 0-0-2 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.

2. To determine the dispersive power of the material of prism with the help of a spectrometer.

3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.

4. To determine the speed of ultrasonic waves in liquid by diffraction method.

5. To determine the width of a narrow slit using diffraction phenomena.

6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.

7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.

8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.

9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.

10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.

11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.

12. To determine the moment of inertia of a flywheel about its own axis of rotation.

13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Course Code: ECE2208	**ENGINEERING GRAPHICS LAB**	L	T	P	C
Version 2019.1	Date of Approval: July 14, 2019	0	0	4	2
Pre-requisites/Exposure	Concepts Mathematics (especially Trigonometry and Geometry)				
Co-requisites	Machine Drawing & CAD				

Catalog Description:

A freshman level course which provides the undergraduate engineering students with a background in descriptive geometry, orthographic projection, engineering drawing standards and annotation,computer-aided engineering graphics. The concepts ofpoint, line and plane relationships in projection, multi-view engineering drawings, auxiliary and section views, basic dimensioning and annotation, engineering applications of drawings are also discussed.

Course Objective:

The objective of this course is to

1. Equip the students with the in-depth knowledge of drawings of points, straight line, planes, cylinders, prisms, pyramids, parabola, ellipse etc.

2. Draw different figures manually and will be capable of using various instruments involved in drawings.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO 1 - Define and explain basic principles of projections of points and lines.

CO 2 - Define, describe and construct the different orientations and projections of planes.

CO 3 – Explain and construct the projections of solids and sectioning of solids in different orientations.

CO 4 - State and draw the concepts of development of surfaces and introduction to auto CAD.

CO 5 – Define and construct orthographic and isometric view of an object.

Modules	Blooms level*	Number of hours
Module I: Introduction Importance, significance and scope of engineering drawing, drawing instruments and their use, lettering, dimensioning, scales, sense of proportioning, different types of projections, B.I.S. Specifications.	L1 and L2	8

Module II: Projection of points, lines and plane surface Principal planes, principles of orthographic projections, Projection of points in all quadrants, Projection methods - First angle & third angle projection, Projections of straight lines (first angle projection) inclined to both the planes, true lengths and traces, projection of planes, projection of planes in simple position and inclined to both the principal planes, auxiliary planes and views	L1, L2 and L3	12
Module III: Projection of solids & section of solids Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both of the principal planes, Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other, obtaining true shape of section	L1, L2 and L3	12
Module IV: Development of surfaces & Isometric projections Development of surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones, Principles of isometric projection, isometric scale, Isometric projections of simple solids and truncated solids, Prisms, pyramids, cylinders, cones, Conversion of Orthographic Views to Isometric Views and Vice-versa.	L1, L2 and L3	8
Module V: Introduction to CAD Introduction to CAD and use of its commands, practice of some 2D figures using CAD.	L1, L2 and L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	50	20

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- PS Gill, 2013, Engineering Drawing, Kataria Publication.
- ND Bhatt, 2014, Engineering Drawing, Charotar publications.

References Books:

- N Sidheshwar, 2014 Machine Drawing Drawing, Tata McGraw Hill
- M.B. Shah & B.C. Rana, 2007, Engineering Drawing, Pearson Education.
- CADFolks, AutoCAD 2018 For Beginners, CreateSpace Independent *Publishing* Platform; 6 edition.

CO, PO and PSO mapping

	PO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PSO**	**PSO**	**PSO**	**PSO**

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO2	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO3	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO5	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ENGLISH-II

Course Code: CSS2252

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module IV: Communication
The process and importance
Principles & benefits of Effective Communication

Module V: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module VI: Communication Skills-I
Developing listening skills
Developing speaking skills

Module VII: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module VIII: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module IX: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	**H.W. Longfellow**

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	05	15	10	70

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

PROBLEM SOLVING AND CREATIVE THINKING

Course Code: BEH 2251

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To enable the students:
Understand the process of problem solving and creative thinking.
Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning:
Making Predictions and Reasoning
Memory and Critical Thinking
Emotions and Critical Thinking
Thinking skills

Module II: Hindrances to Problem Solving Process
Perception
Expression
Emotion
Intellect
Work environment

Module III: Problem Solving
Recognizing and Defining a problem
Analyzing the problem (potential causes)
Developing possible alternatives
Evaluating Solutions
Resolution of problem
Implementation
Barriers to problem solving:
Perception
Expression
Emotion
Intellect
Work environment

Module IV: Plan of Action
Construction of POA
Monitoring
Reviewing and analyzing the outcome

Module V: Creative Thinking
Definition and meaning of creativity
The nature of creative thinking
Convergent and Divergent thinking
Idea generation and evaluation (Brain Storming)
Image generation and evaluation
Debating
The six-phase model of Creative Thinking: ICEDIP model

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

ENVIRONMENTAL STUDIES

Course Code: **ENV 2252**

L-T-P : 4-0-0 **Credit Units: 04**

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental

sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness

Module II: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution
Definition

- Causes, effects and control measures of:
  a. Air pollution
  b. Water pollution

FRENCH - II

Course Code: LAN2251

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.
To make them learn the basic rules of French Grammar.

Course Contents:

Module A : pp.38 – 47 : Unité 3: Objectif 3, 4, 5, 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3 : Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

Unité 4: **Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5: s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de :
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN – II

Course Code: LAN2252

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Grammar to consolidate the language base learnt in Semester I

Course Contents:

Module I: Everything about Time and Time periods

Time and times of the day.

Weekdays, months, seasons.

Adverbs of time and time related prepositions

Module II: Irregular verbs

Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs

To comprehend the change in meaning that the verbs undergo when used as such

Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension

Reading and deciphering railway schedules/school time table

Usage of separable verbs in the above context

Module V: Accusative case

Accusative case with the relevant articles

Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns

Nominative and accusative in comparison

Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions

Accusative propositions with their use

Both theoretical and figurative use

Module VIII: Dialogues

Dialogue reading: 'In the market place'

'At the Hotel'

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3

- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – II

Course Code: LAN2253

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Possessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

RUSSIAN – II

Course Code: LAN2254

L-T-P : 3-0-0 **Credit Units: 03**

CHINESE – II

Course Code: CSE2255

L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II
Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV
Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V
The verb "qu"
- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets
- Going to the post office, buying stamps
- Going to the market to buy things.. etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.
Comprehension and answer questions based on it.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

PORTUGUESE - II

Course Code: LAN2256

L-T-P : 3-0-0 **Credit Units: 03**

ECE2302	Analog Electronics I	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Elementary Resistive Circuit, Theorems and Analysis Techniques: KCL. KVL, Nodal & Mesh Analysis, Thevenin & Norton Equivalents, Maximum Power Transfer.				
Co-requisites	Semiconductor Physics				

Catalog Description

This is the first course in Electronics and Communication Engineering, to educate and explain the methods used for biasing circuits in a graphical analysis of non linear electronic circuits and also includes small signal transistor models, parameters and their frequency responses. Following this, analyzing different types of feedback amplifiers, and power amplifiers using transistor and designing of different electronic circuits are included in the course. This course also considers the mathematical modelling of active solid state devices their analysis and design of single state circuits. Topics covered include the study of device characteristics and applications of p-n-junction diodes, bipolar junction transistors, and field effect transistors.

Course Objectives

The objective of this course is to

1. build from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models
2. familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers and wave shaping circuits
3. build a foundation for Analog Electronics-II, Digital Circuits and Systems I & II, VLSI de-sign and analog CMOS IC Design

Course Outcomes

On completion of this course, the students will be able to

CO1. explain different types of diodes and demonstrate wave shaping circuits
CO2.explain operating principal of Bipolar Junction Transistor, its properties, biasing techniques and stability
CO3. describe low and high frequency transistor amplifiers along with single and multi-stage amplifier
CO4. explain operating principal of JFET, MOSFET, its properties, and biasing techniques
CO5. solve and analyse different negative feedback amplifiers configurations
CO6. describe and outline power amplifiers and their application.

Modules	Blooms level*	Number of hours
Module I: Semiconductor Diode and Diode Circuits Different types of diodes: Zener, Schottky, LED. Zener as voltage regulator, Diffusion capacitance, Drift capacitance, the load line concept, half wave, full wave rectifiers, clipping and clamping circuits.	L1 L2 & L3	6
Module II: Bipolar Junction Transistor Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Bias stabilization: Need for stabilization, fixed Bias, emitter bias, self bias, bias stability with respect to variations in I_{co}, V_{BE}&□, Stabilization factors, thermal stability.	L1 L2 & L3	9
Module III: Small signal Analysis of transistor and Multistage Amplifier Hybrid model for transistors at low frequencies, Analysis of transistor amplifier using h parameters, emitter follower, Miller's theorem, THE CE amplifier with an emitter resistance, Hybrid π model, Hybrid π Conducatnces and Capacitances, CE short circuit current gain, CE short circuit current gain with R_L Multistage amplifier: Cascading of Amplifiers, Coupling schemes(RC coupling and Transformer coupling)	L2 & L3	6
Module IV: Field Effect Transistors Field effect transistor (JFET, MOSFET): volt-ampere characteristics, small signal model –common drain, common source, common gate, operating point, MOSFET, enhancement and -depletion mode, Common source amplifier, Source follower	L1, L2 & L3	5
Module V: Feedback Amplifiers Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.	L1, L2, L3 & L4	6
Module VI: Power amplifiers Power dissipation in transistors, difference with voltage amplifiers, Amplifier classification (Class A, Class B, Class C, Class AB) class AB push pull amplifier, collector efficiency of each, cross over distortion.	L1 & L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jacob Millman, Christos Halkias, Chetan Parikh, Millman's Integrated Electronics, McGraw Hill Education, 2nd Edition, New Delhi
2. Sanjeev Gupta, Electronic Devices and Circuits, Dhanpat Rai Publications, 2010
3. Theraja B.L., Sedha R.S, Principles of Electronic Devices and Circuits, S Chand & Company, First Edition, New Delhi, 2002

Reference Books

1. Robert L. Boylestad: Electronic Devices and Circuits, Pearson Education, 11th Edition, 2013
2. Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 1st Edition, 2006
3. Nagrath I.J, Electronics: Analog and Digital, Prentice Hall India Learning Private Limited, Second Edition, 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**3**	**1**	--	--	**3**
CO2	**1**	**2**	--	--	--	--	--	--	--	--	--	**3**	**1**	**3**	--	**3**
CO3	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	**1**	-	--	--
CO4	**1**	**2**	--	--	--	--	--	--	--	--	--	**3**	**1**	**3**	--	**3**
CO5	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**3**	**1**	--	--	**3**
CO6	**1**	**3**	--	--	--	--	--	--	--	--	--	**3**	**1**	--	--	**3**

1: strongly related, 2: moderately related and 3: weakly related

ECE2303	CIRCUITS AND SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of circuits analysis based on Resistance, Inductance and Capacitance are discussed in detail. voltage- current relationship of basic circuit elements – resistors, inductors, capacitors, dependent and independent voltage and current sources; apply Kirchhoff's current and voltage laws to circuits in order to determine voltage, current and power in branches of any circuits excited by DC voltages and current sources will be discussed. Concept learnt in the studies will be applied to solve DC circuit problems using basic circuit theorems and structured methods like node voltage and mesh current analysis.

Course Objectives

The objective of this course is to

1. Equip the students with concepts basic network analysis of electrical circuits using KVL and KCL.

2. Provide an overview of one port and two port network analysis in time and frequency domain.

Course Outcomes

On completion of this course, the students will be able to

CO1: Expiation of graph theory for solving complex electrical circuits.

CO2: Analysis of RL, RC and RLC circuits using time domain approach.

CO3: Apply Laplace transform to solve RL, RC and RLC circuits in frequency domain.

CO4: Explanation and application of various network theorems to solve the given circuit.

CO5: Synthesis of RL, RC and RLC electrical circuits and explanation of two port network parameters.

Modules	Blooms level*	Number of hours
Module 1: Graph Theory and Network equations Graph of a network, Trees, Co-trees and loops, cut set matrix, Tie set matrix, number of possible trees of a graph, duality, Loop Analysis and Node Analysis.	L1 and L2	8
Module 2: Analysis of circuits using classical Method Time and Frequency domain analysis of RL, RC and RLC circuits, Linear constant coefficient differential equation.	L2 and L3	10
Module 3: Signals and Laplace Transforms Unit step signal, Ramp signal, impulse signal, Laplace transformations and its properties, Gate function, Inverse Laplace transformations, Application of Laplace Transforms in circuit analysis.	L3 and L4	10
Module 4: Network Theorems Reciprocity theorem, Superposition theorem, Thevenin's and Norton's theorems, Millman's theorem, Maximum power transfer theorem, Compensation theorem, Tellegan's theorem.	L2 and L3	10
Module 5: Two port Network & Network Functions Introduction, two port z-, y-, T-, h-parameters, Inter-relations among parameters, Condition for reciprocity and symmetry, Interconnections of two port networks, Driving point and transfer functions, Poles, Zeros and nECE2ssary condition for driving point and transfer function.	L1, L3	10
Module 6: Network Synthesis Hurwitz polynomial, Positive real functions, synthesis of LC, RC, RL immittance functions.	L1 and L5	

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M.E. Valkenburg, "Network analysis", 3 ed, Pearson Education, 2015.
2. D. R. Choudhary, "Networks and Systems", 2 ed, New Age International, 2013.
3. K.M. Soni, "Circuits and Systems", S.K. Kataria & Sons Delhi, 2013.

Reference Books

4. Bhise, Chadda, Kulshreshtha, "Engineering network analysis and filter design", Umesh Publication, 2012.
5. F.F. Kuo, "Network Analysis and Synthesis", 2 ed, Wiley India Pvt. Ltd, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	--	--	--	2	--	--	--	--	--	--	--	--	2	--	--
CO2	1	--	3	--	--	--	--	--	--	--	--	--	2	1	3	3
CO3	1	--	3	--	1	--	--	--	--	--	--	--	--	1	--	--
CO4	2	3	--	--	--	--	--	--	--	--	--	--	3	1	3	3
CO5	2	3	2	--	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2311	DATA STRUCTURES USING C	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of C++ Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1:Identify operations on array, multidimensional, string and their implementation and analyze space and time complexity of algorithms.

CO 2: Explain various algorithms and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures like linked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures Data structures: Definition, Types. Algorithm design, Complexity, Time-Space Tradeoffs. Use of pointers in data structures.Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Function Associated with Arrays, Character String in C, Character String Operations, Arrays as parameters, Implementing One Dimensional Array, Sparse matrix.	L1, L2	7
Module II: Introduction to Stacks and queue Stack: Definition, Array representation of stacks, Operations Associated with Stacks- Push & Pop, Polish expressions, Conversion of infix to postfix, infix to prefix (and vice versa),Application of stacks recursion, polish expression and their compilation, conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.Queue: Definition, Representation of Queues, Operations of queues- QInsert, QDelete, Priority Queues, Circular Queue, Deque.	L1, L2, L3, L4	8
Module III: Dynamic Data Structure Linked list: Introduction to Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, doubly linked list, circular linked list, generalized list. Applications of Linked List-Polynomial representation using linked list and basic operation. Stack and queue implementation using linked list.	L1, L3 and L4	7
Module IV: Trees and Graphs Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, extended binary trees, Traversing binary trees, Searching, Insertion and Deletion in binary search trees, General trees, AVL trees, Threaded trees, B trees. Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees.	L1, L3 and L5	7
Module V: Sorting and Searching and file structures Sorting: Insertion Sort, Bubble sort, Selection sort, Quick sort, two-way Merge sort, Heap sort, Partition exchange sort, Shell sort, Sorting on different keys, External sorting. Searching: Linear search, Binary search File structures: Physical storage media, File Organization, Linked organization of file, Inverted file, Organization records into blocks, Sequential blocks, Hash function, Indexing & Hashing, Multilevel indexing, Tree Index, Random file, Primary Indices, Secondary Indices, B tree index files.	L1, L4, L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, ― Fundamentals of Data structures‖, Ga lgotia publicat ions.
2. R.L. Kruse, B.P. Leary, C.L. Tondo, ―Data structure and program design in C, PHI
3. Data structures and algorithms‖ – Schaum Series.
4. File Structures An object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall
3. India(1999).
4. Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
5. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
6. Data Structures‖ – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**2**	--	--
CO2	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**2**	**2**	**1**
CO3	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**1**
CO4	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**1**
CO5	**1**	**2**	**2**	**1**	--	--	--	--	--	--	--	--	**2**	**2**	**2**

ECE2305	Analog Electronics - I Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides the practical implementation and verification of the theoretical facts studied in theory course. It includes studying the characteristics of diodes, rectifiers, transistors and amplifiers.

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Course Objectives

The objective of this course is to

1. Provide a demonstration of various analog components like diodes, rectifiers etc.
2. Equip with understanding of different circuits like BJT, JFET, MOSFET and amplifiers.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the characteristics of pn junction and zener diode.

CO 2: Obtain and analyze the output of clipper-clamper circuit and rectifiers with various filters.

CO 3: Plot the characteristics of BJT, JFET and MOSFET.

CO 4: Obtain the gain and demonstrate the frequency response of single stage and double stage amplifiers.

Modules/Topics Covered**	Blooms level*	Number of hours
Lab Session-1 1. To study and plot the characteristics of a junction diode. 2. To study Zener diode I-V characteristics.	L3, L5	2
Lab Session-1I 3. To study diode based clipping and clamping circuits. 4. To study half wave, full wave and bridge rectifier with filters.	L3, L5	2
Lab Session-1II 5. To study the input and output characteristics of a transistor in its various configurations (CE and CB). 6. To study various types of Bias Stabilization for a transistor. 7. To study and plot the characteristics of a MOSFET in its various configurations. 8. To study and plot the characteristics of a JFET in its various configurations .	L3, L5	6

Lab Session-1V . 9. To study the gain and plot the frequency response of a single stage transistor amplifier. 10. To measure gain and plot the frequency response of double stage RC coupled amplifier.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
- Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
- R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO2	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO3	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3
CO4	3	1	--	--	--	--	--	--	3	--	--	2	--	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2306	Circuits and Systems Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is intended for solving and synthesis of electrical circuits. A knowledge of grade school mathematics and physics is necessary. This course will give you a better understanding on how to solve various circuits using graph theory, nodal and mesh analysis and theorems in both time and Laplace domain.

Course Objectives

The objective of this course is to

1. Provide the capability to analyze the circuits.
2. Synthesize the circuits with given transfer function.

Course Outcomes

On completion of this course, the students will be able to

CO1. Analyze the circuits by various methods like graph, theorems.
CO2. Understand the various parameters to design electrical circuits.
CO3. Understand the realizability of the circuits by driving point and transfer function.

Course Content

Modules	Blooms level*	Number of hours
LABORATORY SESSSION 1 1. To verify Thevenin's theorem in a given network. 2. To verify reciprocity theorem in each network.	L1 L2 and L3	2
LABORATORY SESSSION 2 3. 2 To verify maximum power transfer theorem in a given network. 4. To verify Tellegen's theorem in a given network.	L1 and L3	2
LABORATORY SESSSION 3 5. To determine the Z- and Y- parameters of a resistive two-port network. 6. To determine the T- (ABCD) parameters of a resistive two-port network. 7. To determine the h- parameters of a resistive two-port network.	L1 and L3	4

LABORATORY SESSSION 4 8. To design series-series connection of 2 two-port networks and determine its Z- parameters. 9. To design parallel-parallel connection of 2 two-port networks and determine its Y- parameters. 10. To design a cascade connection of 2 two-port networks and determine its T- (ABCD) parameters.	L2 and L3	4

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

Textbooks

4. M E Valkenburg, "Network Analysis", PHI.
5. D. R. Choudhary, "Network and Systems", New Age International, Second Edition, 2005.

Reference Books

1. K. M. Soni, "Circuit and Systems", VIII Edition, S.K. Kataria and sons, Delhi, 2009.
2. F.F. Kuo, "Network Analysis and Synthesis", Wiley India Pvt Ltd., Second Edition, 2011.
3. Bhise, Chaddha, Kulshrestha, "Engineering analysis and Filter Design", Umesh Publication, 2002.

Examination Scheme:

IA				**EE**
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1		2		-	2	-	1	2	2	-	2	1	-		-
CO2	2	1	1	2	-	-	-	-	2	-	-	2	1	-		-

C O3		2	1	3	-	-	-	-	2	-	--	2	1	-		-

1: strongly related, 2: moderately related and 3: weakly related

ECE2312	DATA STRUCTURES USING C LAB	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using C programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems. At the end of this course student will gain knowledge about different kinds of file structures and their related operations.

Course Objectives

The objective of this course is to

1. Equip the students with knowledge of algorithms, different types of data structures and analysis of space and time complexity.
2. Provide an overview of various algorithms of data structures like stack and queues and related operations and implementation.
3. Provide an overview of dynamic Data Structure like linked list and its related operations, algorithms and programs. Demonstrate practical use of dynamic data structure to solve engineering problems.
4. Equip the students with knowledge of algorithms and operations related to tree and graph data structures and their practical applications.
5. Provide an overview of Sorting, Searching and file structures and its related algorithms and techniques.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Identify operations and their implementation on array and multidimensional, string and estmation space and time complexity.

CO 2: Explain various algorithm and operations of data structures like stack and queues and analyze complexity of each operation.

CO 3: Explain dynamic data structures and various algorithms and operations of data structures likelinked list and their applications in computer science.

CO 4: Illustrate the algorithms and operations related to tree and graph data structures, their practical applications and analyze complexity of algorithm associated with each operations.

CO5: Explain Sorting, Searching and file organization and its related techniques.

Modules	Blooms level*	Number of hours
Module I: Introduction to Data structures 1. Write a program to copy one string into another without using library functions. 2. Write a program to demonstrate array and linked list implementation of sparse matrix. 3. Write a program to multiply two 2D matrix.	L3,L5	2
Module II: Introduction to Stacks and queue 1. Write a program to implement push and pop operations on the stack. 2. Write a program to demonstrate conversion of infix to postfix. 3. Write a program to implement simple queue and perform insertion and deletion operation on it. 4. Write a program to implement circular queue and perform insertion and deletion operation on it. 5. Write a program to implement dqueue and perform insertion and deletion operations on it. 6. Write a program to implement priority queue and perform insertion and deletion operation on it.	L3,L5	4
Module III: Dynamic Data Structure 1. Write a program to implement singly linked list and perform following operations on it. • Insertion at end • Insertion at last • Insertion at desired place. 2. Write a program to implement singly linked list and perform following operations on it.	L3,L5	4

• Deletion at end • Deletion at last • Deletion at desired place. 3. Write a program to implement doubly linked list and perform following operations on it. • Insertion at end • Insertion at last • Insertion at desired place. 4. Write a program to implement singly linked list and perform addition of two polynomials.		
Module IV: Trees and Graphs 1. Write a program to calculate in order, preorder and post order traversal on binary tree. 2. Write a program to construct binary search tree and perform following operations on it. • Deletion of element • Insertion of elements. 3. Write a program to construct binary search tree and search an element in it. 4. Write a program to implement kruskal's algorithm to find out minimum spanning tree.	L3,L5	6
Module V: Sorting and Searching and file structures 1. Write program to implement insertion sort. 2. Write a program to search an element in array using binary search. 3. Write a program to implement merge sort. 4. Write a program to implement quick sort. 5. Write a program to implement heap sort.	L3,L5	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Horowitz and Sahani, ― Fundamentals of Data structures‖, Ga lgotia publicat ions.

2. R.L. Kruse, B.P. Leary, C.L. Tondo, ―Data structure and program design in C, PHI
3. Data structures and algorithms‖ – Schaum Series.
4. File Structures an Object-Oriented Approach with C++ by Michael J. Folk, Bill Zoellick, Breg Riccardi, Published by Addison Wesley (1st ISE Reprint,1999).

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill.
2. Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Published by Prentice-Hall India(1999).
3. Data Structures Using C and C++ second edition by Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, Published by Prentice-Hall India
4. Data Structures and Algorithm analysis in C++ by Mark Allen Weiss, Published by Addison Wesley (3rd Indian Reprint 2000).
5. Data Structures‖ – R. S. Salaria

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	--	--	--	--	--	--	--	--	--	2	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	2	2	1
CO3	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO4	1	2	2	1	--	--	--	--	--	--	--	--	2	2	1
CO5	1	2	2	1	--	--	--	--	--	--	--	--	2	2	2

Engineering Mathematics III

Subject Code: ECE2310 **Credits: 4**

L-T-P: 3-1-0

Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Types of Matrices, Inverse of a matrix by elementary transformations, Rank of a matrix (Echelon & Normal form), Linear dependence, Consistency of linear system of equations and their solution, Characteristic equation, Eigenvalues and Eigenvectors, Cayley-Hamilton Theorem, Diagonalization, Complex and Unitary Matrices and its properties, Vector space, Linear independence and dependence of vectors, Linear Transformations.

Module II: Analytic functions, C-R equations and harmonic functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions, Liouvilles theorem, Fundamental theorem of algebra. Representation of a function by power series, Taylor's and Laurent's series, R Singularities, zeroes and poles, Residue theorem, evaluation of real integrals of type $\int_0^{2\pi} f(cos\theta, sin\theta)d\theta$ and $\int_{-\infty}^{\infty} f(x)dx$, Conformal mapping and bilinear transformations.

Module III: Probability space, conditional probability, Bayes theorem, Moments, Moment generating functions, Skewness, Kurtosis, Correlation and Regression, Binomial distribution, Poisson distribution, Normal distribution. Method of least squares and curve fitting of straight line and parabola, Solution of cubic and biquadratic equations.

Module IV: Numerical solution of algebraic and transcendental equations: bisection, secant method, Newton-Raphson method, fixed point iteration; interpolation: error of polynomial interpolation, Lagrange, Newton interpolations; numerical integration: Trapezoidal and Simpson rules; numerical solution of systems of linear equations: direct methods (Gauss elimination, LU decomposition); iterative methods (Jacobi and Gauss-Seidel).

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References

1. E. Kreyszig, Advanced Engineering Mathematics, 10th Edition, John-Wiley & Sons, 2011.

2. B. V. Ramana, Higher Engineering Mathematics; Publisher: Tata McGraw Hill Publishing Company; New Delhi; Year 2007.

3. R.K.Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2017.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd edition (2014).

5. Peter V. O Neil, Advanced Engineering Mathematics, CENGAGE Learning Custom Publishing; 7th Revised ed. edition (1 January 2011).

6. Thomas & Finley, Calculus, Narosa Publishing House, 1996.

ECE2315	MEASURMENT AND MEASURING INSTRUMENTS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides a brief knowledge of measurements and measuring instruments related to engineering. It introduces measuring elements of instruments, characteristics of measuring instruments, error analysis, transducers and its classification, measurement of resistance, capacitance and inductance, principles of analog and digital meters and different display techniques.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of measurement, measuring elements and challenges in measurement.
2. Provide in depth knowledge of each element of measurement system.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain measuring elements and characteristics of measurement system and solve problems related with measurement errors.

CO2. Classify different types of transducers and solve problems related with transducers.

CO3. Solve problems of resistance, capacitance and inductance measurement.

CO4: Explain and solve problems ondifferent types of analog and digital meters suitable for voltage and current measurement.

CO5: Explain display devices used in measurement system and analyze the signals on CRO.

Modules	Blooms level*	Number of hours
Module 1: **Basics of Measurement Systems** Elements of Generalized Measurement System; Static & Dynamic Characteristics of Instruments; Errors in Measurements – Sources and Types of Errors; Statistical Treatment of Data – Mean, Measures of Dispersion, Rejection of data based on confidence interval	L1, L2 and L3	5
Module 2: **Transducers** Classification; Selection ofTransducers; ResistiveTransducers– Potentiometer, Strain gauge, Rosettes, Thermistors and RTD; Capacitive Transducers – Measurement of Liquid level by change in variation of dielectric constant; Variable Inductance Transducers – self-generating type and passive type; Piezoelectric Transducers; Photoelectric Transducers; Digital Transducer	L1, L2, L3 and L4	9
Module 3: **Measurement of Resistance, Inductance and Capacitance** D.C. Bridges: Wheatstone‘s bridge, Sensitivity & Limitations; Carey Foster Bridge; Kelvin double bridge; Megaohm bridge. A.C. Bridges: Maxwell‘s Inductance Capacitance Bridge; Andersons Bridge; De Sauty‘s Bridge; Schering Bridge.	L1, L2, and L3	8
Module 4: **Analog and Digital Meters** Analog meters : PMMC meters- construction, torque equation, ammeter shunts, multirange ammeter, voltmeter multiplier, sensitivity, ohmmeters, multimeters; Construction & general equation of moving iron, electrodynamometer, hot wire instruments. Digital meters: Digital voltmeter – ramp type, integrating type, potentiometer type, Applications	L1, L2, and L3	8
Module 5: **Display Devices and Recorders** LED, LCD, Cold Cathode displays, Incandescent Displays, Fluorescent Displays, LVD, VDU Cathode Ray Oscillioscope : Basic functioning, Measurement of Voltage, Current, Phase and Frequency.	L1, L2, L3	6

**Bloom’s Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.

2. Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

Reference Books

1. Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.
2. Electronics Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	**2**	-	--	--	--	--	--	--	**3**	--	**3**	--	**3**
CO2	**1**	**1**	--	**2**	--	--	--	--	--	--	--	**2**	--	**2**	--	**2**
CO3	**1**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--	**3**
CO4	**1**	**2**	--	**2**	--	--	--	--	--	--	--	**2**	--	**2**	--	**3**
CO5	**1**	**2**	--	**2**	--	--	--	--	--	--	--	**2**	--	**2**	--	**3**

1: strongly related, 2: moderately related and 3: weakly related

ECE2316	Measurement and Measuring Instruments Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Measurement System has become an important field for research and development in science and engineering.This course provides the students the core knowledge of measurement systems. This course introduces the experiments of measurement of various non electrical parameters.

Course Objectives
The objective of this course is to

1. Perform experiments of measurement system.
2. Analyze characteristics of measurement system.

Course Outcomes

On completion of this course, the students will be able to

CO1. To study working principles of various transducers utilized in measurement system.

CO2. Perform and analyze experiments on measurement system.

CO3.Draw and analyze characteristics system.

Modules	Blooms level*	Number of hours
Lab Session 1 1. 1 To Study various Temperature Measuring Instruments and to Estimate their Response times. 2. To study the working of Bourdon Pressure Gauge and to check the calibration of the gauge in a dead-weight pressure gauge calibration set up	L2, L3,L4 and L5	3
Lab Session 2 1. To study a Linear Variable Differential Transformer (LVDT) and use it in a simple Experimental set up to measure a small displacement.	L2, L3,L4 and L5	3

2. To measure load (tensile/compressive) using load cell on a tutor.		
Lab Session 3 1. To measure torque of a rotating shaft using torsion meter/strain gauge torque transducer. 2. To measure the speed of a motor shaft with the help of non-contact type pickups (magnetic or photoelectric).	L2, L3,L4 and L5	3
Lab Session 4 1. Measurement of distance using capacitive pick up 2. Measurement of temperature using RTD. 3. Measurement of pressure using piezoelectric pick up	L2, L3,L4 and L5	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Electronic Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.

2. Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

Reference Books

1. Electronics Instrumentation & Measurement Techniques by W.D. Cooper & A.D. Helfrick, PHI 3rd Ed.

2. Electronics Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	**-**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**1**	**3**
CO2	**1**	**2**	**-**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**1**	**3**
CO3	**1**	**2**	**-**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

ECE2313	Virtual Instrumentation	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This Course introduces virtual instrumentation and its comparison over conventional instrumentation. In this course, LabVIEW has been adopted as the platform of virtual instrumentation programming. System hardware and its interfacing techniques are introduced. Applications of virtual instrumentation are explained in various field e.g. Aviation, Automotive Defence, Medical etc.

Course Objectives

The objective of this course is to

1. To provide the core knowledge of Virtual Instruments used in research and industry.
2. To provide a LabVIEW platform on which low cost virtual instruments can be designed in very short time.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain virtual instrumentation and compare it with tradition instruments.

CO2. Explain components of LabVIEW, apply programming concept and design basic virtualinstruments using LabVIEW software.

CO3. Explain the concepts of LabVIEW system hardware including input, output and interfacing devices.

CO4: Explain applications of virtual instrumentation in industries.

Modules	Blooms level*	Number of hours
Module 1: **Introduction to Virtual Instrumentation** Introduction, Historical perspective, advantages, block diagram and architecture of a virtual instrument, conventional vs. virtual instrumentation.	L1, L2 and L4	4
Module 2: **Introduction to Software** Introduction to Lab VIEW, Front panel, back panel representations, Block diagram, Menus, Palettes, VI and Sub VI, Editing and Debugging VI, Structures, Arrays, Clusters, Charts and Graphs, Data acquisition, Instrument Control, Signal Generation and Signal Processing Examples	L1, L2, L3, L4 and L5	9
Module 3: **Introduction to systems hardware** ADC, DAC, D/O, counters and timer, PC hardware structure, timing, interrupts, DMA, software and hardware installation, Configuring data acquisition hardware using the drives in application software, use of DAQ library functions for different analog and digital input/output operations. Input/output devices & functions like data gloves, joysticks, CRT etc.	L1 and L2	6
Module 4: **Application of Virtual Instrumentation in various fields** Aviation, Automotive, High Voltage, Defense, Chemical, Industrial, Marine, Medical, Mining, Nuclear Energy, Virtual landscapes.	L1 and L2	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.

2. Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.

Reference Book

1. LabVIEW Basic 1 Course Manual, National Instruments
2. LabVIEW for everyone - Wells Lisa K and Travis Jeffrey, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	-	-	--	--	--	--	--	--	3	--	-	3	3
CO2	1	1	2	2	--	--	--	--	--	--	--	2	--	-	2	2
CO3	1	2	--	--	--	--	--	--	--	--	--	2	--	-	2	3
CO4	1	2	--	-	--	--	--	--	--	--	--	2	--	-	2	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2314	Virtual Instrumentation Lab	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

This Course introduces virtual instrumentation. In this course, LabVIEW has been adopted as the platform of virtual instrumentation programming. Experiments are introduced to create virtual instrument based on various logics. Experiments are based on graphical programming.

Course Objectives

The objective of this course is to

Introduce LabVIEW software to design virtual instrument.

Design various logic in form virtual instrument using graphical programming.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain and use various functions available in LabVIEW.

CO2. Explain and create sub VIs which can be used as functions in complex VIs.

CO3. Analyse and create virtual instrument using graphical programming of various logics.

Modules	Blooms level*	Number of hours
Lab Session 1 1. To open, and explore the components of LabView. 2. To build a simple VI that converts a Celsius temperature reading to Fahrenheit.	L2, L3, L4 and L5	3
Lab Session 2 1. (a) To create an icon and a connector pane so you can use a VI as a subVI. (b) To build a VI and create its icon and connector pane so you can use it as a subVI. 2. To build a VI to generate 4*5 two dimensional array of random numbers (between1 to 2).	L2, L3, L4 and L5	3
Lab Session 3	L2, L3, L4 and	3

1. To Build a VI that generate Fibonacci series starting from '0'. 2. To build a VI which finds roots of quadratic equation using formula node. 3. To build a VI that reverses the contents of an array.	L5	
Lab Session 4 1. To build a VI that can be used for sorting of numeric array i.e. in ascending or descending order. 2. To build a VI for 4*1 multiplexer operation. 3. To build a VI for 3*8 Decoder operation.	L2, L3, L4 and L5	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.
4. Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.

Reference Book

3. LabVIEW Basic 1 Course Manual, National Instruments
4. LabVIEW for everyone - Wells Lisa K and Travis Jeffrey, Prentice Hall.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**-**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**1**	**3**
CO2	**1**	**2**	**-**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**1**	**3**
CO3	**1**	**2**	**-**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

ECE2317	**Statistics & Probability Theory**	L	T	P	C

Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of statistics, the science of collecting, organizing, and interpreting numerical data are discussed. Emphasis will be placed on statistical reasoning and data analysis. The main topics are study design, descriptive statistics, probability theory, and statistical inference. As a precursor to the study of cryptography studies will be made on impact of various techniques for finding independence or dependence between data variables. The concepts learnt in the studies of statistics will be applied practically to solve number of real life problems using the statistical package like R and SPSS.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of statistics through problem solving and analytical approach.
2. Provide an overview of various statistical techniques: descriptive and inferential, parametric and non-parametric and practical statistics using R and SPSS.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain, describe and distinguish various population, sample, type of variables, measurement scales, central tendency, percentile and solve problems related to them.

CO 2: Explain the concept of descriptive and inferential statistics; probability theory; Solve problems based on probability; Explain binomial, poisson distribution and solve real life problems related to discrete and continuous random variable.

CO 3: Describe the concept of sampling distribution for large and small samples; Explain the concept of hypothesis testing and solve problems related using t-distribution and standard normal distribution.

CO 4: Explain concept of covariance and correlation and its applications in real life; Explain Anova and its use in real life problem solving; Explain and compare various regression analysis methods statistics for prediction

CO 5: Explain various parametric and nonparametric test and apply them to solve real life statistical problems

Modules	Blooms level*	Number of hours
Module 1: Introduction to Statistics and Data Analysis Statistical Inference, Samples, Populations and Experimental Design , The Hole of Probability Sampling Procedures; Collection of Data ,Measures of Location:, Measures of Variability ,Discrete and Continuous Data , Statistical Modeling, Scientific Inspection, and Graphical Diagnostics, Graphical Methods and Data Description ,General Types of Statistical Studies	L1, L2 and L3	7
Module 2: Probability & Probability Distribution Sample Space, Events Probability of an Event, Additive Rules, Conditional Probability ,Multiplicative Rules ,Bayes' Rule, Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions , Joint	L1,L2, L3	6

Probability Distributions ,Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem, , Discrete Uniform Distribution, Binomial and Multinomial Distributions, Poisson Distribution and the Poisson Process. Continuous Uniform Distribution, Normal Distribution ,Areas under the Normal Curve ,Applications of the Normal Distribution , Gamma and Exponential Distributions, ,Chi-Squared Distribution.		
Module 3: Sampling Distributions and Estimation Random Sampling, Some Important Statistics, ,Data Displays and Graphical Methods, Sampling Distributions Introduction to Estimation, Statistical Inference ,Classical Methods of Estimation, Single Sample: Estimating the Mean ,Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits Two Samples: Estimating the Difference between Two Means ,Paired Observations , , Single Sample: Estimating a Proportion, Two Samples: Estimating the Difference between Two Proportion.	L1,L2, L3	6
Module 4: Hypotheses Testing Statistical Hypotheses: General Concepts ,Testing a Statistical Hypothesis, One- and Two-Tailed Tests, The Use of *P*-Values for Decision Making in Testing Hypotheses, One Sample: Test on a Single Proportion ,Two Samples: Tests on Two Proportions, Exercises ,One- and Two-Sample Tests Concerning Variances, Goodness-of-Fit Test, Test for Independence (Categorical Data),Test for Homogeneity, Testing for Several Proportions	L1, L2 L3	7
Module 5: Simple Linear Regression and Correlation Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted .Model Analysis-of-Variance, Approach, Test for Linearity of Regression: Data with Repeated Observations, Data Plots and Transformations, Simple Linear Regression Case Study, Correlation, Classification	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Probability & Statistics for Engineers & Scientists", Ronald E. Walpole,Pearson 2007
2. Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
3. Torsten Hothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Reference Books

1. Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**	**--**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**1**	**1**	**1**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO4	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO5	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

EFFECTIVE LISTENING

Course Code: **CSS2151**

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:
To form written communication strategies necessary in the workplace

Course Contents:
Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats
Module III
Memo
Agenda and Minutes
Notice and Circulars
Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

GROUP DYNAMICS AND TEAM BUILDING

Course Code: **BHE2351**

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To inculcate in the students an elementary level of understanding of group/team functions
To develop team spirit and to know the importance of working in teams

Course Contents:

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change

- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - III

Course Code: LAN2351

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To provide the students with the know-how

- To master the current social communication skills in oral and in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

Course Contents:

Module B: pp. 76 – 88 Unité 6

Module C: pp. 89 to103 Unité 7

Contenu lexical: **Unité 6:se faire plaisir**

1. acheter : exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restaurant
3. parler des différentes occasions de faire la fête

Unité 7: Cultiver ses relations

1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.
3. caractériser une personne (aspect physique et caractère)

Contenu grammatical:

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN - III

Course Code: LAN2352

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Modal verbs
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns
Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions
Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues
In the Restaurant,

At the Tourist Information Office,

A telephone conversation

Module VII: Directions
Names of the directions
Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions

To assimilate the knowledge of the conjunctions learnt indirectly so far

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – III

Course Code: LAN2353

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir….*
Weather

Module II
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

Module V
Reflexives

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

RUSSIAN - III

Course Code: LAN2354

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – III

Course Code: LAN2355

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between “hii” and “neng”, “keyi”.

Module III
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g.; fever, cold, stomach ache, head ache.
Use of the modal particle “le”
Making a telephone call
Use of “jiu” and “cal” (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV
The ordinal number “di”
“Mei” the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle “de” (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of “li” and “cong”.
Comprehension reading followed by questions.

Module V
Persuasion-Please don’t smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of “it doesn’t matter”
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I, Part-2" Lesson 21-30

PORTUGUESE-III

Course Code : LAN2356

L-T-P : 2-0-0 **Credit Units: 02**

ECE 2402	**Communication System**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basic principles of the design and analysis of modern communication systems.It will provide a thorough study of both analog and digital mod-ulation and demodulation schemes. The performance analysis of various techniques based on re-quirements of noise and bandwidth will also be explained. It also introduces the students to the in-formation theory and coding for basic understanding of mobile communication system.

Course Objectives

The objective of this course is to

1. Provide a thorough introduction to analog and digital communications
2. Provide in depth study of various modulation and demodulation techniques.
3. Introduce students to basics of information theory and coding for applications in mobile com-munication.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and distinguish analog and digital communication systems.

CO2. Differentiate modulation and demodulation techniques of AM and FM systems and compare them in terms of Bandwidth and noise.

CO3. Distinguish and categorize various digital modulation techniques.

CO4. Describe Information theory and coding for applications in mobile communication system by solving different encoding problems.

Modules	Blooms level*	Number of hours
MODULE I: INTRODUCTION Communication Process, Source of Information, base-band and pass-band signals, Review of Fourier transforms, Random variables, different types of PDF, need of modulation process, analog versus digital communications	L1 and L2	4
MODULE II: AMPLITUDE MODULATION Amplitude modulation with full carrier, suppressed carrier systems, single side band transmission, switching modulators, synchronous detection, envelope detection, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial side band transmission.	L1, L2, L3and L4	8
MODULE III: ANGLE MODULATION Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, phase modulation, Demodulation of FM signals, noise reduction using pre & de-emphasis.	L1, L2, L3and L4	9
MODULE IV: PULSE MODULATION Pulse amplitude, width & position modulation, generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems. Basics of Digital Communications: ASK, PSK, FSK, QPSK basics & waveform with brief mathematical introduction	L1, L2, L3 and L4	6
MODULE V: NOISE Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure.	L1 and L2	4
MODULE VI: INTRODUCTION TO INFORMATION THEORY	L1,L2 and L3	5

Measurement of Information, mutual, Shannon's theorem, Source coding, channel coding and channel capacity theorem, Huffman code		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. B. P. Lathi and Zhi Ding ,"Modern Digital and Analog Coimmunication Systems", Fourth Edition, Oxford University Press, 2009

2. Wayne Tomasi, "Electronic Communication systems", 5th edition, Pearson Education,2008

Reference Books

1. Simon Haykin, "Communication Systems", Third Edition, John Wiley & Sons,2007

2. Taub and schilling, "Principles of Communication Systems", Third Edition, TMH,2008

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	_	--	_	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO2	**1**	**3**	**2**	--	--	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO3	**1**	**3**	**2**	--	--	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO4	**1**	**2**	**2**	--	--	**3**	--	--	--	--	--	--	**1**	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

ECE 2403	Analog Electronics- II	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronics and Circuital Analysis				
Co-requisites	Nil				

Catalog Description

This course introduces the application of semiconductor devices in linear analog circuits. The course stresses on circuit designs using the operational amplifier, active filters and oscillators. The course also provides the overview on the applications of IC Analog Multiplier & Timer.

Course Objectives

The objective of this course is to

1. Provide the fundamental knowledge of linear analog circuits.
2. Provide the knowledge about practical circuit designs using OP Amp.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the circuits having BJT and Operational Amplifiers.

CO2. Solve the Linear and Non-linear circuits and analyze them in terms of their parameters and applications.

CO3. Categorize the waveform generation circuits and apply them in laboratory projects.

CO4. Analyze the circuital knowledge to Linear ICs and filters and apply them for industry problem.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Building Blocks of Analog ICs 6 lecture hours Differential amplifier, Op-amp Model, op-amp DC & AC parameters, virtual ground, Current mirrors, Active loads, Level shifters and output stages.	L1 and L2	6
MODULE II: Operational amplifiers Introduction, open loop and closed loop configuration, op-amp parameters (input offset current, output offset current, i/p bias current, CMRR, PSRR, null adjustment range, etc,)	L1 and L2	5

Inverting and non-inverting configuration, voltage gain of inverting and non inverting configurations.		
MODULE III: Linear & Non Linear Wave shaping Adders, Voltage to current, current to voltage Converter, Integrators, Differentiators**,** Voltage follower (voltage buffer), summer, subtractor, Comparators, log/antilog circuits using Op-amps, precision rectifiers.	L2, L3 and L4	6
MODULE IV: Waveform Generations Damped and undamped oscillations, Barkhausen criterion for sustained oscillation. Tank circuit generator Astable multi Vibrators, OTA-C Oscillators, Crystal oscillator**.** Types of oscillators: LC-Hartley and Colpitts, RC-RC phase shift and Wien bridge oscillator, Basics of tuned Amplifiers, Voltage Controlled Oscillator.	L2 L3 and L4	7
MODULE V: Active RC Filters & Applications of Linear Circuits Idealistic & Realistic response of filters (LP, BP, and HP), Butter worth & Chebyshev approximation filter functions, LP,BP,HP and All pass, Notch Filter, Operational transconductance amplifier (OTA)-C filters.	L2, L3 and L4	6
MODULE VI: Applications of IC Analog Multiplier & Timer IC phase locked loops, 555 Timer, IC voltage regulators-(fixed, variable) 78xx, 79xx series and adjustable.	L3 and L4	6

*Bloom's Level:
L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. **Ramakant Gaekwad,** Op-Amps and Linear Integrated Circuits, 4th Edition PHI, 2001.
2. **D. Roy Choudhury and Shail B. Jain,** Linear Integrated Circuits, 2nd Edition, New ageInternational, 2006.

Reference Books

1. **Adel S. Sedra and K. C. Smith** Microelectronic Circuits, Sixth Edition, Oxford University Press,2013.
2. **George Clayton and Steve Winder**, Operational Amplifiers, 5th Edition, Elsevier, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO3	1	2	3	-	-	3	-	-	-	-	--	-	1	1	-	-
CO4	1	1	-	-	-	2	-	-	-	-	-	-	1	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ECE2404	Electromagnetic Field Theory	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	0
Pre-requisites/Exposure	Mathematical Basics				
Co-requisites	Wave phenomena				

Catalog Description

Electromagnetic field theory is the most fundamental subject in the curriculum of electronics and electrical engineering education. Electromagnetics explains universal concepts in three-dimension real world, i.e., electro-magnetic wave propagation in free-space. This course provides a general introduction to the important physical concepts and mathematical methods used in treating all types of wave phenomena and electromagnetic signal propagation. This course provides essential background and basic preparation for more advanced work in device physics, microwave and ultra-fast circuitry, transmission lines, electro dynamic wave propagation. Antenna design, and optoelectronics.

Course Objectives

The objective of this course is to

1. Equip the students with the fundamental understanding of electro-magnetic wave system.
2. To lay the foundations of mathematical Maxwell equations, electrodynamic wave propaga-tion and transmission lines.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and apply vector calculus to static and time varying electric-magnetic fields in differ-ent engineering situations.

CO2: Explain and able to solve Electromagnetic Relation using Maxwell Formulae

CO3: Examine the phenomena of electrodynamic wave propagation in unbounded media and its interfaces.

CO4: Analyze and generalized the concepts of guided structures like transmission lines and their characteristics.

Modules	Blooms level*	Number of hours
MODULE 1: **Mathematical Basics and Electrostatics** Coordinate Systems: Spherical and Cylindrical coordinates, Dirac delta function, Coulomb‘s law, Gauss‘s law, Poisson‘s Equation, Laplace‘s Equation, Electrostatic Boundary conditions, Work and Energy in Electro-	L1, L2 and L3	8

statics, Conductors, Surface charge and force on conductors. .		
MODULE 2: Magnetostatics and Magnetic Fields in matter Magnetic induction and Faraday‘s law, Magnetic Flux density, Magnetic Field Intensity, Biot Savart Law, steady currents, Ampere‘s law, Magneto-static Boundary conditions, magnetic field inside matter, magnetic susceptibility and permeability, ferromagnetism, energy stored in a Magnetic field, Magnetic Vector Potential	L2, L3 and L4	8
MODULE 3: **Electrodynamics** Faraday‘s laws, Maxwell‘s equations, Maxwell‘s modification of Ampere‘s law, continuity equation and Poynting theorem	L2 ,L3and L4	6
MODULE 4: **Electrodynamics Waves** Wave propagation in unbounded media, Boundary conditions, reflection and transmission, polarization, E.M. waves in vacuum, E. M. waves in matter: reflection and transmission of plane waves.	L1, L2 and L3	8
MODULE 4: **Introduction to Transmission Lines** Transmission Line, Line Parameters, Characteristic Impedance, Image Impedance, HVDC and HVAC Common faults in transmission lines. Skin Effect, Ferranti Effect and Corona.	L1, L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- David J. Griffiths " Introduction to Electrodynamic" Pearson Education India Learning Private Limited; 4 edition (2015)
- Fawwaz T. Ulaby "Fundamentals of Applied Electromagnetics" Pearson; 7 edition (October 11, 2014)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**

CO2	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO3	**1**	**1**	**3**	**--**	**--**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**
CO4	**1**	**1**	**1**	**--**	**--**	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

ECE 2411	Digital Electronics	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of combinational and sequential circuits.
2. Equip with the understanding of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the various logic gates, Boolean algebra and solve the k-map & tabulation method to simplify the logical function.

CO2: Explain the adder & subtractor; Apply and analyze multiplexer, decoder & encoder to design Boolean function.

CO3: Describe flip flops, shift registers & Design counters and synchronous sequential circuits.

CO4: Explain & compare different logic families and explain data convertors.

Modules	Blooms level*	Number of hours
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1`s complement and 2`s complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method	L1,L2 and L3	6
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Implementation of full adder using half adder, full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.	L1, L2,L3 and L4	6
MODULE 3: SEQUENTIAL CIRCUITS Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.	L2,L3, L4 and L5	7
MODULE 4: LOGIC FAMILIES & DATA CONVERTERS Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1, L2,L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, “Fundamentals of Digital Circuits”, 2nd Edition, Prentice-Hall, 2004
2. Moris Mano, “Digital Design”, 2nd Edition, Pearson Education,2007.
3. R.P. Jain, “Modern Digital Electronics”, 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
2. Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--	3
CO3	1	2	1	--	--	--	--	--	--	--	--	2	1	--	--	3
CO4	2	3	3	--	--	--	--	--	--	--	--	--	1	--	--	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2417	Signals and Systems	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Differentiation & Integration concepts				
Co-requisites					

Catalog Description

This course deals in Digital signal processing with significant skills in advance methods for modification, analysis, classification & sampling of signals. It provides the broad knowledge of design, and realization of digital signal processing systems. The problems based on transformation of domains and filter design will be focused on.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of signals and systems.
2. Provide in-depth knowledge of representation of signals in frequency & z-domain.

Course Outcomes

On completion of this course, the students will be able to

CO1: Represent, analyze & categorize discrete-time signals and systems in time domain with an emphasis on linear time invariant systems.

CO2: Apply the fourier series expansion to signals and obtain its constituent frequencies.

CO3: Convert the signals from time domain to frequency domain using fourier transform.

CO4: Apply the z- transform on discrete signals to solve the problems related to computational complexity.

Modules	Blooms level*	Number of hours
Module 1: **Signals And Systems** Introduction of signals and systems; classification of signal, continuous time and discrete time signals, operations performed on them, even and odd signals, periodic and non periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.	L1,L2 and L4	8
Module 2: **LTI System** Response of LTI system for continuous and discrete time systems, Impulse response, Step response, properties of continuous LTI and discrete LTI systems, LTI systems described by differential and difference equation, analysis of LTI Systems, interconnection of systems.	L1,L2 and L4	6
Module 3: **Fourier Series** Representation of continuous time periodic signal, properties of continuous time Fourier series, representation of discrete time periodic signals, convergence of the Fourier series, properties of discrete time Fourier series, Fourier series and LTI systems.	L2,L3	7
Module 4: **Fourier Transform** Continuous time Fourier transform, properties of continuous time Fourier transform, discrete time Fourier transform, properties of discrete time Fourier transform; applications; Bandwidth determination of signals and systems.	L2,L3	7
Module 4: **z-Transform** Definition of z-transform, region of convergence, properties of z-transform, first order system, second order system, inverse z-transform, analysis of LTI system using z-transform.	L2,L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. **Proakis, Manolakis**, Digital Signal processing, 4th edition, Pearson, 2007.
2. **Oppenheim & Schaffer**, Digital Signal Processing, 1st edition, Pearson, 1975.

Reference Books

1. **Simon Haykin**, Signals and Systems, 2nd Edition, Willy Publications.
2. **B.P.Lathi**, Linear Systems & Signals, 2nd Edition, Oxford Publication.
3. **Roberts**, Fundamentals of Signals and Systems, Tata Mcgraw Hills Publication.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO2	**2**	**1**	--	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	--
CO3	**2**	**1**	--	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	--
CO4	**2**	**1**	--	--	**2**	--	--	--	--	--	--	--	**2**	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2406	COMMUNICATION SYSTEMS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites	Nil				

Catalog Description

To impart knowledge on Amplitude Modulation and Angle modulation principles, generation, and its types. Also, to understand the basic concepts of pulse modulation techniques like PCM and PSK.

Course Objectives

The objective of this course is to

1. To provide the basic skills required to understand, develop, and design of various engineering applications involving analog communication theory. To provide basic laboratory exposures for communication principles and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the carrier modulation techniques like AM and FM modulation.

CO2: Study digital carrier modulation techniques using amplitude shift keying and Frequency shift keying.

CO3: Demonstrate various pulse modulation techniques (PCM), DM, ASK, DPSK and QPSK.

List of Experiments:

Modules	Blooms level*	Number of hours
1. To study the sampling and reconstruction of a given signal. 2. To study amplitude modulation and demodulation. 3. To study frequency modulation and demodulation. 4. To study time division multiplexing.	L1, L2	8

5. To study pulse amplitude modulation. 6. To study delta and adaptive delta modulation and demodulation. 7. To study carrier modulation techniques using amplitude shift keying and Frequency shift keying.	L3 and L4	10
8. To study carrier modulation techniques using binary phase shift keying and differential shift keying. 9. To study pulse code modulation & differential pulse code modulation as well as relevant demodulations. 10. To study quadrature phase shift keying & quadrature amplitude modulation.	L2, L4	10

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**													**2**	
CO2	**2**	**2**			**2**										**2**	
CO3	**2**										**2**				**2**	

1: strongly related, 2: moderately related and 3: weakly related

ECE2407	ANALOG ELECTRONICS – II LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Circuit Theory				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Analog Electronics are discussed. Design and analysis of efficient circuits using op-amp like adder, subtractor, filters and oscillators.

Course Objectives

The objective of this course is to

1. To provide the basic skills required to understand, develop, and design of various engineering applications involving Analog Electronic & Circuits.
2. To provide basic laboratory exposures for Analog Circuits and applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Construct adder, subtractor, an inverting and non-inverting amplifier.

CO2: Design transistor-based RC oscillator (Wien bridge and RC phase shift oscillator) circuit.

CO3: Construct astable and mono-stable mode timer circuit using IC 555.

CO4: Design of Integrator, differentiator and low pass & high pass active filter circuit using Op-Amp (I.C-741)

List of Experiments:

Modules	Blooms level*	Number of hours
1. To study the op amp as an inverting and non inverting amplifier. 2. To use the op amp as an adder, subtractor, integrator and differentiator.	L1, L2	8

3. To design a ramp and a square wave generator. 4. To study the IC-555 timer as stable and bistable multivibrator.		
5. To design low pass, high pass and band pass filters using op- amp. and plot their frequency response. 6. To design and study class a power amplifier. 7. To design and study a class B push pull amplifier.	L3 and L4	10
8. To study various feedbacks such as voltage series feedback. 9. To design RC phase shift and Wein bridge oscillators using op amplifier. 10. To design and study Colpitt and Hartley oscillators.	L2, L4	10

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**2**		**3**										**1**			
CO2		**2**	**3**										**3**			
CO3	**3**												**2**			
CO4	**3**	**2**	**2**								**2**		**1**			

1: strongly related, 2: moderately related and 3: weakly related

ECE2412	DIGITAL ELECTRONICS LAB	L	T	P	C
Version 2019.1	Date of Approval: 14 July, 2019	0	0	2	1
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

In this Lab course the combination and sequential circuits are designed and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

1. Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
2. Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of logic gates;

CO 2: Illustrate the adder and subtractors.

CO 3: Demonstrate the code convertors.

CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2
8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
- Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
- R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

3. Thomas L. Floyd, “Digital Fundamentals”, 11th Edition, Pearson Education, 2015
4. Malvino and Leech, “Digital Principles & Applications”, 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	
Weightage (%)	5	10	10	5	**70**

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	**3**
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	**3**
CO3	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	**3**
CO4	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	**3**

1: strongly related, 2: moderately related and 3: weakly related

ECE2418	ELECTRONIC WORKSHOP & PCB LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	NIL				
Co-requisites					

Catalog Description

The students will be able to understand the contribution of electronics to some extent. PCB's have definitely contributed in a significant manner as a means of interconnection of various electronic components. The field of PCB designing is a mutual contribution of wide range of various other fields.

Course Objectives

The objective of this course is to

1. To identify basic electronic components and understand operation of electrical devices.
2. To implement mini projects based on concept of electronics circuit concepts .

Course Outcomes

On completion of this course, the students will be able to

CO1. Measure voltage,frequency and phase of any waveform using CRO. Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.

CO2. Analyse the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers,amplifiers etc.

CO3. Obtain the PCB for a simple circuit.

Course Content

Experiments	Blooms level*	Number of hours
1. Study of CRO, DMM & Function Generator 2. Identification of Active & Passive Components	L1 and L2	2

1. Winding shop: Step down transformer winding of less than 5VA. 2. Soldering shop: Fabrication of DC regulated power supply	L1 and L2	2
1. PCB Lab: (a) Artwork & printing of a simple PCB. (b) Etching & drilling of PCB.	L1 and L2	3
1. Wiring & fitting shop: Fitting of power supply along with a meter in cabinet. 2. Testing of regulated power supply fabricated.	L1 and L2	2

*Bloom's Level:

L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

6. **John Keown,** OrCAD PSpice and circuit simulation,4th Edition Pearson, 2001.

Reference Books

1. 1**. Muhammad H. Rasid**, Introduction to PSpice Using OrCAD for circuit and electronics, Prentice Hall of India Pvt. Ltd, 1988.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA – Internal Assessment, EE - External Exam, PR - Performance, LR – Lab Record, V – Viva.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	1

CO2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	1
CO3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2414	PCB Fabrications	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basic Electronics				
Co-requisites					

Catalog Description

This course will introduce students to the process of fabrication of PCB and various design and analysis concepts for the techniques used. The role of environment will also be discussed. The assembly of components on PCB and testing for quality assaurance will also be discussed.

Course Objectives

The objective of this concentration elective is

1. To allow students to have insight knowledge of PCB Fabrication.
2. To enhance their knowledge domain beyond main subjects for application in working on various projects.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the design flow of PCB Fabrication.

CO2. Distinguish and Explain the techniques used and design considerations.

CO3. Apply the knowledge of computer for automation in PCB fabrication.

CO4. Prepare PCB for simple circuits in lab for projects.

Modules	Blooms level*	Number of hours
MODULE I: INTRODUCTION TO THE PCB Definition and Evolution of the Printed Circuit Board (PCB), Purposes of a PCB, Applications, Market Drivers, Typical Development Flow for a PCB, Printed Circuit Technology, Basic Electronic Components, Resistors, Capacitors, Inductors, Diodes, Transistors, Relays, Connectors, Integrated Circuits: How a silicon wafer becomes an IC, Printed Circuit Board Characteristics, PCB Materials, Fillers, resins, laminates, base material characteristics, Dielectric, conductors, Engineering References	L1and L2	5

MODULE II: DESIGN AND ANALYSES Design and Environmental Requirements: Functional, Thermal, Vibration, Shock, EMI/EMC; Electrical Engineering: Analog and digital signals, Signal integrity, Grounding concepts, Current carrying capacity, CAD, Schematics, Layout rules of thumb; Mechanical Engineering: Panels, Standard board sizes, Packaging, Thermal Design, Heat transfer basics, Convection, Conduction, PCB Thermal Design Features, Thermal modeling, Cycling and fatigue , Component Vibration Fatigue, Vibration Models and Terminology, Combined Thermal and Structural Fatigue	L1, L2 and L3	5
MODULE III: CONTAMINATION CONTROL/ENVIRONMENTAL CONTROL Contamination Control, Conformal Coatings, Polluting Agents, Safety Controls, Pollution Controls, Recycling, Standards; Manufacturing: PCB Manufacturing Information, PCB Layout and Artwork; Fabrication: Machining Operations, Blanking, Cutting, Punching, Drilling, Laminating Techniques, Plating, Etching, Surface Finishing, Conformal Coatings, Inspection and Checkout, Specifications and Standards.	L1 and L2	5
MODULE IV: ASSEMBLY PCB Assembly Drawing Examples, Component Considerations, Component mounting and support, Mechanical Devices, Soldering Technology, Non solder Connections, Cleaning, Parts Staking, Conformal Coating Removal, Repair and Rework, Safety Considerations, ESD protection, Specifications and Standards.	L1and L2	5
MODULE V: TESTING & QUALITY ASSURANCE Common PCB Production Faults, Bare Board Testing, Electrical Performance Testing, Assembled PCB Testing, Quality Assurance in Design, FMEA – Failure Mode and Effects Analysis, Software Tools, Quality Assurance in Manufacturing and in Assembly, Specifications and Standards.	L1 and L2	4

*Bloom's Level:
L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. RS Khandpur, “Printed Circuit Boards”, Third Edition, Tata McGraw-Hill Education, 2008

Reference Books

1. Christopher T Robertson, “Printed Circuit Board Designer's Reference: Basics”, Second Edition, Prentice Hall Professional, 2004
2. Charles Harper, “High Performance Printed Circuit Boards”, First Edition, McGraw-Hill Education, 2000

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	3	-	-	3	3	-	-	-	-	1	2	1	-	2
CO2	2	-	3	-	-	2	2	-	-	-	-	1	2	1	-	2
CO3	2	-	3	-	1	3	-	-	-	-	-	1	2	1	-	1
CO4	2	-	-	-	1	-	-	-	-	-	-	-	2	1	-	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2421	**Artificial Neural Network**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2

Pre-requisites/Exposure	Basic Knowledge of Brain functioning
Co-requisites	Nil

Catalog Description

The course provides introduction to neural network and a deep insight into the basics of brain & its functioning basics of various neural models & neural schema used for learning. With this course students would be able to know the basics of each introductory feature of human brain and its features which would prove to be very helpful throughout their degree and would prove helpful in understanding other related subjects also.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of learning of brain problem solving techniques and develop proficiency in creating neural structures using the MATLAB.
2. Provide an overview of various control statements, data structures, packages related to image addition, graphics, different types of neural models.

Course Outcome

On completion of this course, the students will be able to

CO 1: Define Artificial Neural Network & its similarity to biological neural network and explain its application in our day to day life.
CO 2: Analyze ANN learning, Error correction learning, Hebbian learning, Competitive learning and Boltzman Learning.
CO 3: Implement simple perceptron, Perceptron Learning rule, modified perceptron learning rule, feed forward neural network & feedback Neural Network.
CO 4: Explain self-organizing Map, Hopfield network, Adaptive resonance theory and its various learning rules.
CO 5: Analyze memory-based learning, Associative learning, Bi-directional learning and Auto associative learning.

Modules	Blooms level*	Number of hours
Module-I Artificial Neural Networks (ANN) and biological neural networks, supervised and unsupervised learning rules, neural network applications	L1, L2 and L3	6
Module-II Unsupervised learning:- Hebbian learning and competitive learning. Supervised learning:- Back propagation algorithms, Learning rule:- Delta learning rule, Widrow-Hoff learning rule, Winner-Take-All learning rule	L1, L2 and L3	6
Module-III Feed forward neural network, feed backward neural network, Perceptron and its learning law, single-layer perceptron, multi-layer perceptron.	L2, L3 and L4	6
Module-IV Self organizing networks: Kohonen algorithm, Hopfield Networks: Hopfield network algorithm, Adaptive resonance theory: Network and learning rules.	L2, L3 and L4	6

Module V Associative memory, auto-associative memory, bi-directional associative memory.	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

TextBook:

1. **Kenji Suzuki (ed.) - InTech , 2013**
2. **Todd Troyer - University of Texas at San Antonio, 2005.**

Reference Book:

1. **MATLAB 2017 Book released by MATWORS**

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**												**1**			
CO2	**1**												**1**		**1**	
CO3		**1**	**2**										**1**			
CO4		**1**	**2**	**1**									**1**		**1**	
CO5			**2**										**1**			

1: strongly related, 2: moderately related and 3: weakly related

ECE2422	Artificial Neural Network Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various neural models required for solving complex problems.

2. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Neural Network model in MATLAB

CO5: Demonstrate usage of applications involving with Image processing & Its Toolbox used by MATLAB

Modules/Topics Covered**	**Blooms level***	**Number of hours**
7. Introduction of MATLAB (a) Basic Variable deceleration & its operation (b) Function use & its application	L3, L5	4
8. Sample Programs in MATLAB (a) Basic use of Matrix and Graph Plotting (b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
9. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
10. Sample programs of ANN functions (a) Practice on ANN toolbox function in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
11. Sample Programs using ANN tool box & Image processing toolboix (a) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

- Kenji Suzuki (ed.) - InTech , 2013
- Todd Troyer - University of Texas at San Antonio , 2005

Reference Books

1. MATLAB 2017 Book realeased by MATWORS.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ECE2419	Java Programming	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

The objective is to impart programming skills used in this object-oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes, objects, packages, swings,socket programming.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of byte code and platform independence, demonstrate basic java-based application development using operators, if-else, loops and arrays.

CO2: Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages.

CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.

CO4: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.

CO5: Explain the architecture of applet and concept of swing package. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
Module I:Java Basics Concepts of OOP, Features of Java, How Java is different from C++, Environmental setup, Basic syntax, Objects and classes, Basic Data Types, Variable Types, Modifier Types, Basic operators, Loop Control, Decision Making, Strings and Arrays, Methods, I/O.	L1, L2 and L3	6
Module II: Java Object Oriented Inheritance, Overriding, Polymorphism, Abstraction, Encapsulation, Interfaces, Packages, Exploring java.util package. .	L2 and L3	7
Module III: Exception Handling and Threading Exception Hierarchy, Exception Methods, Catching Exceptions, Multiple catch Clauses, Uncaught Exceptions Java's Built-in Exception. Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads, Multi-threading.	L2, L3 and L5	8
Module IV: Event Handling And AWT Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls, Layout Managers	L2, L3, L4 and L5	8
Module V: Java Advanced AppletClass, Architecture, Skeleton, Display Methods.Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes.Socket Programming: Socket methods, Server Socket methods, Socket Client and Socket Server examples.	L2 and L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text:

1. "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition,TMH
2. "Introduction to JAVA Programming a primer", E.Balaguruswamy,4th Edition,TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI
2. "Java Script", By Jeff Frentzen and Sobotka,Tata McGraw Hill,1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2420	Java Programming Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the basic features of contemporary java are implemented and demonstrated. Problems or programs will be related to concepts of classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming. Concepts covered would enable them to create basic and complex console and graphical based applications for desktop and Internet

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of various basic java features required in solving basic and complex problems.
2. Provide a demonstration of basic java programming concepts like classes, objects, threads, packages, exception handling, applets, AWT control, swings and socket programming

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the concepts learned of operators, if-else, loops and arrays to javabased application development.

CO2: Demonstrate the use of various types of inheritances, polymorphisms, class objects, inheritances, packages and other concepts to basic and complex java programming problems.

CO3: Apply the knowledge of exception handling and multithreading concepts for some simple and complex applications.

CO4: Apply knowledge of event handling and AWT controls to create some new dynamic graphical applications.

CO5: Demonstrate graphical applications based on java applets, swings and event handling.

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Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using Objects and classes, Variable Types, Modifier Types, operators, LoopsDecision Making, Strings and Arrays, (a) WAP to display "Hello, it's a first program in java". (b) WAP to find sum of two integers taken as input from user at runtime. (c) WAP to find sum of two float numbers taken as command line arguments (d) WAP to find changed case of entered character. (e) WAP to find maximum of 3 integer numbers taken as input from user at runtime. (f) WAP in java to find out the greatest out of ten numbers stored using arrays. (g) WAP to create class with "name" as String and "age" as integer data members. The class should have two methods to take input from user and display the data. (h) WAP to find factorial of a number using class and object.	L3, L5	6
2. Sample Programs using Inheritance, Overriding, Polymorphism, Interfaces, Packages a. WAP in java to illustrate the concept of interfaces. b. WAP to create a package as MyPack having a class with three methods: max, fact and show. Use it in other folder with setting classpath and without setting class path. c. Write a program in java to showcase uses of super keyword	L3, L5	4
1. Sample Programs using exception handling and threads a) Write a program to demonstrate the use of nesting of try-catch block b) WAP in java to illustrate the concept of using multiple catch clauses to handle different types of exceptions. c) WAP in java to create a user defined Exception and throw it explicitly. d) Demonstrate thread using Thread class and Runnable interface e) Demonstrate various thread methods using a program	L3, L5	6
(a) Sample Programs using event handling and AWT controls (b) Write a program to display "hello" in different color where user clicks left mouse button and "world" where right mouse button is clicked. Use black background. (c) WAP in java to create a Frame and handle window-closing event implementing the WindowListener interface. (d) WAP to create an Applet having various different buttons, recognizing them using action command string method and handling click event generated by them. (e) WAP to create a frame and illustrate the concept of using an adapter class in place of interfaces for handling various mouse events	L3, L5	6

generated over frame window. (f) WAP in java to create a frame with AWT controls (like label, push buttons, Checkbox, Checkbox Group) and handle various events generated by them. (g) WAP in java to create a frame with various AWT controls (like choice, list, TextField and Buttons) and handle the events thrown by them.		
5. Sample Programs using applets, swings and stream socket a) . Write an applet which will display "HAPPY" and "DEEPAVALI" as: The word "HAPPY" will roll from top to bottom and "DEEPAVLI" from bottom to "top" . Both will run at the same speed and stop simultaneously at the center of the applet. b) Write an applet to display last 32 shades of red, green and blue in equal sized square grid accompanied by appropriate labels like" Last 32 shades of Red/Green/Blue color". Make use of BorderFactory to apply border for each individual shade. c) Create an applet with one single button with caption "Click". On clicking the button will open a new Frame with title "Factorial". The frame will have two three controls :TextField, Label and button. On clicking button calculate the factorial entered in TextField control. d) Create Java programs to demonstrate day time client and server e) Create java programs to create echo client and server	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text:

1. "JAVA The Complete Reference" by Patrick Naughton & Herbert Schild, 10th Edition,TMH
2. "Introduction to JAVA Programming a primer", E. Balaguruswamy,4th Edition, TMH

References:

1. "Introduction to JAVA Programming" By Daniel/Young PHI .
2. "Java Script", By Jeff Frentzen and Sobotka, Tata McGraw Hill,1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	35
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO3	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**2**	**--**
CO5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ECE2415	**Database Management Systems**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Computer Fundamentals and Mathematics Set Theory				
Co-requisites	Nil				

Catalog Description

This course is design to get students familiar with the fundamentals & basic concepts in Data Base Management Systems and their use. This course discusses architecture of Database Systems with concept of different types of available database model, concurrency techniques and new applications

of the DBMS. The techniques for database design, normalization, database recovery and protection will enable students to work easily and efficiently on real databases.

Course Objectives

The objective of this course is

3. To make students familiar with the fundamental and necessary concepts of DBMS.
4. Provide an overview of normalization, concurrency techniques and database recovery with examples.

Course Outcomes

On completion of this course, the students will be able to

CO1. Differentiate between traditional data processing system and database management system and understand characteristics and applications of DBMS in real world.

CO2. Explain and use different data models such as Entity Relationship Model, Network, and Relational Model etc.
CO3. Solve queries using relational algebra, relational calculus and SQL.
CO4. Illustrate normalization concepts and apply them in real database applications.
CO5. Explain database concurrency techniques and recovery mechanisms.

Modules	Blooms level*	Number of hours
Module I: Introduction Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model.	L1, L2 and L6	9
Module II: Hierarchical model &Network Model Concepts, Data definition, Data manipulation and implementation. Network Data Model, DBTG Set Constructs, and Implementation	L1and L2	9
Module III: Relational Model Relational database, Relational Algebra, Relational & Tuple Calculus.	L1 and L3	10
Module IV: Relational Database Design and Query Language SQL, QUEL, QBE, Normalization using Functional Dependency, Multivalued dependency and Join dependency.	L2, L3 and L4	10
Module V: Concurrency Control and New Applications Transaction basics: ACID property, Lifecycle of Transcation, Why Concurrency Control, Schedule, Serializability, Lock Based Protocols, Time Stamped Based Protocols, Deadlock Handling, Crash Recovery. Distributed Database, Objective Oriented Database, Multimedia Database, Data Mining, Digital Libraries.	L2, L3 and L4	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Korth, Silberschatz, "Database System Concepts", TMH, 4th Ed., 2000.
2. Elmsari and Navathe, "Fundamentals of Database Systems", A. Wesley, 6th Ed., 2004

Reference Books

- Date C. J., "An Introduction to Database Systems", Narosa Publishing, 7th Ed., 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	2	3	--	--	--	--	--	--	--	--	1	2	--	--
CO4	--	1	2	--	--	2	--	3	--	--	--	--	1	1	-	-
CO5	1	1	3	--	--	--	--	--	2	--	--	--	1	--	-	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2416	Database Management Systems Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is designed to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software in future.

Course Objectives
The objective of this course is

1. To make students familiar with the concepts and working of SQL.
2. Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.

CO2. Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.

CO3. Design and implement various data constraints on a database for a given problem.

CO4. Solve queries using concepts like joins, subqueries, aggregate functions, triggers etc.

CO5. Prepare PL/SQL blocks.

Modules	Blooms level*	Number of hours
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1and L3	2
Lab Session 3 Working with SELECT query.	L1 and L3	2
Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7 To apply various set operators on data.	L1 and L3	2
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9 Implementation different types of JOINS in database.	L1 and L3	2
Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Ivan Bayross , “SQL, PL/SQL the Programming Language of Oracle”, 4th Ed., BPB Publications,2009.

- Lynn Beighley, “Head First SQL”, 1st Ed., O′Reilly, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO2	**1**	**-**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**1**	**-**
CO3	**1**	**-**	**1**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**1**	**2**	**-**
CO4	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO5	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**1**	**1**	**--**	**-**

1: strongly related, 2: moderately related and 3: weakly related

PRESENTATION SKILLS

Course Code: CSS2251

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To teach the participants strategies for improving academic reading and writing.
Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

Course Contents:

Module I: Social Communication Skills
Small Talk
Conversational English
Appropriateness
Building rapport

Module II: Context Based Speaking
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

Module III: Professional Skills
Presentations
Negotiations
Meetings
Telephony Skills

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman – Prakash, Oxford

STRESS AND COPING STRATEGIES

Course Code: BEH2451

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:

Module I: Stress
Meaning & Nature
Characteristics
Types of stress

Module II: Stages and Models of Stress
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interact ional model.
Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress
Personal
Organizational
Environmental

Module IV: Consequences of stress
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress And its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

FRENCH - IV

Course Code: LAN2451

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students:

- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision
-

Course Contents:

Module C: pp. 104 – 139 : Unités 8,9

Contenu lexical :Unité 8: Découvrir le passé

1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

Unité 9: Entreprendre

1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
3. parler du futur

Contenu grammatical:

1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN - IV

Course Code: LAN2452

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Advanced Grammar Language and Professional Jargon

Course Contents:

Module I: Present perfect tense
Present perfect tense, usage and applicability
Usage of this tense to indicate near past
Universal applicability of this tense in German

Module II: Letter writing
To acquaint the students with the form of writing informal letters.

Module III: Interchanging prepositions
Usage of prepositions with both accusative and dative cases
Usage of verbs fixed with prepositions
Emphasizing on the action and position factor

Module IV: Past tense
Introduction to simple past tense
Learning the verb forms in past tense
Making a list of all verbs in the past tense and the participle forms

Module V: Reading a Fairy Tale
Comprehension and narration
- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

Module VI: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module VII: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module VIII: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch

- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - IV

Course Code: LAN2453

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules
Introduction to Present Continuous Tense (Gerunds)

Module II
Translation with Present Continuous Tense
Introduction to Gustar, Parecer, Apetecer, doler

Module III
Imperatives (positive and negative commands of regular verbs)

Module IV
Commercial/business vocabulary

Module V
Simple conversation with help of texts and vocabulary
En la recepcion del hotel
En el restaurante
En la agencia de viajes
En la tienda/supermercado

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras (Nivel – Elemental)

RUSSIAN - IV

Course Code: LAN2454

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – IV

Course Code: LAN2455

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Dialogue Practice
Observe picture and answer the question
Pronunciation and intonation
Character writing and stroke order.
Electronic items

Module II
Traveling – The Scenery is very beautiful
Weather and climate
Grammar question with – "bu shi …. Ma?"
The construction "yao … le" (Used to indicate that an action is going to take place)
Time words "yiqian", "yiwai" (Before and after).
The adverb "geng".

Module III
Going to a friend house for a visit meeting his family and talking about their customs.
Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.
Aspect particle "guo" shows that an action has happened some time in the past.
Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.
To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

Module IV
Shipment. Is this the place to checking luggage?
Basic dialogue on – Where do u work?
Basic dialogue on – This is my address
Basic dialogue on – I understand Chinese
Basic dialogue on – What job do u do?
Basic dialogue on – What time is it now?

Module V
Basic dialogue on – What day (date) is it today?
Basic dialogue on – What is the weather like here.
Basic dialogue on – Do u like Chinese food?
Basic dialogue on – I am planning to go to China.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader, Part-2" Lesson 31-38

PORTUGUESE-IV

Course Code : LAN2456

L-T-P : 2-0-0 **Credit Units: 02**

ECE 2501	DIGITAL CIRCUITS & SYSTEMS	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3

Pre-requisites/Exposure	Nil
Co-requisites	Nil

Catalog Description

This course explores the theory and operation of the basic building blocks of digital electronics which includes combinational and sequential circuits. This course also explains the logic families and data convertors. The concepts learnt in the studies of sequential circuits will be applied in the design and analysis of Melay and Moore machines.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of digital logic levels and application of combinational and sequential circuits.
2. Equip with the understanding of logic family and data convertors.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the various logic gates, Boolean algebra and solve the k-map & tabulation method to simplify the logical function.

CO2: Explain the adder & subtractor; Apply and analyze multiplexer, decoder & encoder to design Boolean function.

CO3: Describe flip flops, shift registers & Design counters and synchronous sequential circuits.

CO4: Explain & compare different logic families and explain data convertors.

Modules	**Blooms level***	**Number of hours**
MODULE 1: BOOLEAN FUNCTIONS Analog & digital signals, AND, OR, NOT, NAND, NOR , XOR & XNOR gates, Boolean algebra, DeMorgan's theorems, Implementation of logical function using only NAND/NOR gates, 1`s complement and 2`s complement, BCD to Gray and Gray to BCD code conversion, Standard representation of logical functions (SOP and POS forms), K-map representation and simplification of logical function up to five variables, don't care conditions, XOR & XNOR simplifications of K-maps, Tabulation method.	L1,L2 and L3	6
MODULE 2: COMBINATIONAL CIRCUITS Adders, Subtractors, Implementation of full adder using half adder,	L1, L2,L3	6

full subtractor using half subtractor, Multiplexer, de-multiplexer, decoder & encoder, code converters, 1 & 2 bit comparators, BCD to seven segment decoder/encoder, Implementation of logic functions using multiplexer/de-multiplexer and decoder, Implementation of 16×1 MUX using 4×1 MUX, 4×16 decoder using 3×8 decoder etc., logic implementations using PROM, PLA & PAL.	and L4	
MODULE 3: SEQUENTIAL CIRCUITS Difference between combinational and sequential circuits, Latch, Flip-flops: SR, JK, D & T flip flops – Truth table, Excitation table, Conversion of flip-flops, set up and hold time, race around condition, Master Slave flip flop, Shift registers: SIPO, PISO, PIPO, SIPO, Bi-directional, 4-bit universal shift register; Counters: Asynchronous/ripple & synchronous counters – up/down, Ring counter, sequence detector.	L2,L3, L4 and L5	7
MODULE 4: LOGIC FAMILIES&DATA CONVERTERS Logic families: Special characteristics (Fan out, Power dissipation, propagation delay, noise margin), working of RTL, DTL, TTL, ECL and CMOS families; Data converters: Special characteristics, ADC – successive approximation, linear ramp, dual slope; DAC – Binary Weighted, R-2R ladder type.	L1, L2,L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004

Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.

R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

1. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
2. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	2	1	--	--	3
CO3	1	2	1	--	--	--	--	--	--	--	--	2	1	--	--	3
CO4	2	3	3	--	--	--	--	--	--	--	--	--	1	--	--	3

1: strongly related, 2: moderately related and 3: weakly related

ECE 2502	Digital Communication	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Signal and System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basic principles of the design and analysis of digital communication systems.It will provide a thorough study of digital modulation techniques and receiver design.

Course Objectives

The objective of this course is to

1. Provide a thorough introduction to digital communications
2. Provide in depth study of various analog and digital modulation techniques.
3. Introduce students to basics of multiplexing in digital signals.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and distinguish analog and digital communication systems.

CO2. Compare different analog and digital modulation techniques and their receiver design.

CO3. Explain the concepts of digital multiplexing.

Modules	Blooms level*	Number of hours
MODULE I: DIGITAL COMMUNICATION SYSTEM BASICS Basic building blocks of Digital communications, analog versus digital communication, Advantages disadvantages of digital communications.	L1 and L2	4
MODULE II: DIGITAL BASEBAND TRANSMISSION Pulse code modulation, Signal to quantization ratio, non-uniform quantization companding, BW calculations.	L1, L2, and L4	8
MODULE III: TRANSMISSION OF ANALOG SAMPLES Delta Modulation, Adaptive delta-modulation, DPCM, ADCM, ADPCM, Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise	L1, L2 and L4	9

Ratio. Correlator receiver, Decision Threshold and Error Probability For, Unipolar (ON-OFF) Signaling, ISI, Nyquist Criterion For Zero ISI & Raised Cosine Spectrum		
MODULE IV: DIGITAL MODULATION TECHNIQUES Gram-Schmidt Orthogonalization Procedure, Types of Digital Modulation, Wave forms for Amplitude, Frequency and Phase Shift Keying, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, FSK & PSK Differential Phase Shift Keying, Quadrature Modulation Techniques QPSK, Probability of Error and Comparison of Various Digital Modulation Techniques.	L1, L2 and L4	6
MODULE V: DIGITAL MULTIPLEXING Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization and Signaling of T1, TDM, PCM Hierarchy, T1 to T4 PCM TDM System (DS1 to DS4 Signals)	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. B. P. Lathi and Zhi Ding ,"Modern Digital and Analog Coimmunication Systems", Fourth Edition, Oxford University Press, 2009
2. Wayne Tomasi, "Electronic Communication systems", 5th edition, Pearson Education,2008

Reference Books

1. Simon Haykin, "Communication Systems", Third Edition, John Wiley & Sons,2007
2. Taub and schilling, "Principles of Communication Systems", Third Edition, TMH,2008

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4

CO1	1	--	_	--	_	2	--	--	--	--	--	--	1	--	2	--
CO2	1	3	2	--	--	2	--	--	--	--	--	--	1	--	2	--
CO3	1	3	2	--	--	2	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2503	CONTROL SYSTEM	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course provides the students the core knowledge of control systems. This introduces the methods of mathematical modeling of control systems with time & frequency domain analysis along with concepts of stability.

Course Objectives

The objective of this course is to

3. Equip the students with concepts of Control System.
4. Provide the students in depth knowledge of time domain, frequency domain and concepts of stability.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and compare between types of control system and find mathematical model of control system.

CO2. Understand, explain and solve problems on time domain analysis.

CO3. Understand, explain and solve problems on frequency domain analysis.

CO4: Analysis of control system stability

Modules	Blooms level*	Number of hours
Module 1: **Input / Output Relationship** Introduction of open loop and closed loop control systems, mathematical modeling and representation of physical systems (Electrical Mechanical and Thermal), derivation of transfer function for different types of systems, block diagram & signal flow graph, Reduction Technique, Mason's Gain Formula.	L1, L2, L3 and L4	12
Module 2: **Time – Domain Analysis** Time domain performance criteria, transient response of first, second & higher order systems, steady state errors and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indices, response with P, PI and PID Controllers.	L1, L2 and L3	12

Module 3: **Frequency Domain Analysis** Polar and inverse polar plots, frequency domain specifications, Logarithmic plots (Bode Plots), gain and phase margins, relative stability, Correlation with time domain, constant close loop frequency responses, from open loop response, Nyquist Plot.	L1, L2 and L3	12
Module 4: **Concept of Stability** Asymptotic stability and conditional stability, Routh – Hurwitz criterion, Root Locus plots and their applications. Compensation Techniques:Concept of compensation, Lag, Lead and Lag-Lead networks, design of closed loop systems using compensation techniques. P, PI, PID controllers.	L1, L2, L3 and L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Dr. N.K Jain, 2005,"Automatic Control System Engineering", Dhanpat Rai Publication.
2. J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.

References Books:

1. B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.
2. M, K. Ogata, 2002, "Modern Control Engineering, PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO	1	1	-	2	3	-	-	-	-	-	-	3	-	1	-	2

1																
CO 2	1	1	-	3	3	-	-	-	-	-	-	3	-	1	-	3
CO 3	1	1	-	3	3	-	-	-	-	-	-	3	-	1	-	3
CO 4	1	1	-	2	3	-	-	-	-	-	-	3	-	1	-	2

1: strongly related, 2: moderately related and 3: weakly related

ECE2509	Microprocessor Systems	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is

1. To introduce students with the architecture and operation of typical microprocessors.
2. To familiarize the students with the programming and interfacing of microprocessors
3. To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, pin configuration, addressing modes, control words, timing diagram, instruction set of 8085 microprocessors and Interfacing ICs

CO2. Explain the architecture, pin configuration, addressing modes, control words of 8086, 8087 and other 16 bit microprocessors and Interfacing ICs

CO3. Develop the assembly language program using 8085 using stacks & subroutines.

CO4. Design circuitry to the Microprocessor I/O ports in order to interface the processor to external devices so as to provide solutions real-world control problems

Modules	Blooms level*	Number of hours
Module I: Introduction to Microcomputer Systems Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations,interrupts, Stacks and subroutines, various data transfer schemes.	L1, L2, L3,L4	6
Module II: ALP and timing diagrams Introduction to 8085 instruction set, advance 8085 programming, Addressing modes, Counters and time Delays, Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.	L4,L5,L6	8
Module III: Memory System Design & I/O Interfacing Memory interfacing with 8085. Interfacing with input/output	L3,L4,	9

devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.	L5,L6	
Module IV: Architecture of 16-Bit Microprocessor Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.	L2, L3, L4	7
Module V: Pentium Processors Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV). .	L1,L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
2. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

1. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
2. Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO2	1	1	2	3	--	--	--	--	--	--	--	--	3	3	2	
CO3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1
CO4	-	-	-	1	--	2	--	--	2	3	3	--		2	2	1

1: strongly related, 2: moderately related and 3: weakly related

ECE 2504	DIGITAL CIRCUITS AND SYSTEMS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this Lab course the combination and sequential circuits are designed and their functionality is verified using truth table. Concepts covered would enable them to create complex circuits related to digital design. The objective of this course is to explore and implement the various features of digital logic using basic logic gates.

Course Objectives

The objective of this course is to

1. Provide a basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
2. Equip with understanding of different combinational and sequential circuits.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of logic gates;
CO 2: Illustrate the adder and subtractors.
CO 3: Demonstrate the code convertors.
CO 4: Demonstrate the combinational and sequential circuits.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To verify the truth tables of NOT, OR, AND, NOR, NAND, XOR, XNOR gates.	L3, L5	2
2. To obtain half adder, full adder using gates and verify their truth tables.	L3, L5	2
3. To obtain half subtractor, full subtractor using gates and verify their truth tables.	L3, L5	2
4. To implement control circuit using multiplexer.	L3, L5	2
5. To convert BCD code into excess 3 code and verify the truth table.	L3, L5	2
6. To verify the truth tables of RS, D, JK and T flip- flops.	L3, L5	2
7. To implement and verify 3-bit bi-directional shift register.	L3, L5	2
8. To design and study asynchronous/ripple counter.	L3, L5	2
9. To design and study synchronous counter.	L3, L5	2
10. To design and study a sequence detector.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Anand Kumar, "Fundamentals of Digital Circuits", 2nd Edition, Prentice-Hall, 2004
4. Moris Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
5. R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003

Reference Books

3. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2015
4. Malvino and Leech, "Digital Principles & Applications", 1st Edition, Tata McGraw Hill, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 3	3	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3
CO 4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2505	**MICROPROCESSOR SYSTEMS LAB**	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course focuses on the systematic study of the Architecture and programming of microprocessor family and its applications. The objectives of this course are:

1. To introduce students with the architecture operation and instruction set of 8085 and 8086 microprocessors.
2. To familiarize the students with the programming and interfacing of 8085 and 8086 microprocessors.
3. To provide the basic knowledge of the microprocessor needed to develop the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Set up programming strategies and select proper mnemonics and run their program on the training boards

CO2. Develop assembly language programs for various problems keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.

CO3. Understand the concepts related to I/O and memory interfacing and design interfacing circuits with 8085 by making use of different peripheral devices.

Modules	**Blooms level***	**Number of hours**
Lab Session 1: ALP using 8085: 1. Write at least three different programs for addition of two 8 bit numbers assuming carry may or may not be generated. 2. Write at least three different programs for subtraction of two 8 bit numbers assuming borrow may or may not be generated. 3. Write two different programs for 16 bit addition, one using instruction DAD and another without using instruction DAD. 4. Write assembly language program for 8 bit multiplication and division.	L2, L3,L4	4

Lab Session II: To study, understand, interface and two peripheral devices with 8085.	L4,L5,L6	2
Lab session III: Any three programs using 8085 based on block of data.	L4	1
Lab session IV: ALP using 8086: 1. Write an ALP to add list of 10 given numbers. 2. Write an ALP to sum the numbers from 1-100. 3. Write an ALP to count negative numbers from a given list of 10 numbers. 4. Write an ALP to check number of vowels in a given string.	L2, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
4. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

6. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
7. Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	3	2	1	
CO 2	1	1	2	3	--	--	--	--	--	--	--	--	3	2	1	1

CO 3	-	-	-	1	2	3	--	--	--	--	--	--		2	2	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2506	CONTROL SYSTEM LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	MATLAB Basics				
Co-requisites	Nil				

Catalog Description

Control System has become an important field for research and development in science and engineering. This course provides the students the core knowledge of control systems. This course introduces the Practical of control system with time & frequency domain analysis along with stability of control systems on kits and MATLAB.

Course Objectives

The objective of this course is to

Perform experiments of control system.

Time & frequency domain analysis along with stability of control systems on kits and MATLAB

Course Outcomes

On completion of this course, the students will be able to

CO1. Perform and analyse experiments on time domain of control system.

CO2. Perform and analyse experiments on frequency domain of control system.

CO3. Perform and analyse experiments for stability of control system.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Study and draw a) Step response of open Loop system (linear 1st order, 2nd order b) Step response of closed loop systems (1st order) 2. Study and draw temperature control system the open loop response and closed loop response with different values of gains	L2, L3 and L5	3
Lab Session 2 1. Study of operations and characteristics of a stepper motor 2. To Study a D.C. motor speed control system.	L2, L3 and L5	3
Lab Session 3	L2, L3	3

1. Performance evaluation and design of PID controller. 2. To design a suitable cascade compensator for the given system and verify the resulting improvement.	and L5	
Lab Session 4 1. Note: three experiments in MATLAB have to be performed in the slot of MATLAB. Using MATLAB obtain the unit-step response and unit impulse response of the following system: $\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$ 2. For a 2nd order transfer function using MATLAB a) Bode Plot b)Root locus plot c)Nyquist plot.	L2, L3 and L5	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Dr. N.K Jain, 2005,"Automatic Control System Engineering", Dhanpat Rai Publication.
4. J. Nagrath & M. Gopal, 2000, "Control System Engineering", New Age International.
5. Rudra Pratap, "Getting started with MATLAB", Oxford University Press.

References Books:

3. B. C. Kuo, 2001, "Automatic Control system, Prentice Hall of India.
4. M, K. Ogata, 2002, "Modern Control Engineering, PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3

1																
CO 2	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3
CO 3	1	2	-	3	2	--	--	--	--	--	--	2	-	1	-	3

1: strongly related, 2: moderately related and 3: weakly related

ECE 2535	SUMMER INTERNSHIP EVALUATION I	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	3
Pre-requisites/Exposure	Basic Concepts of Programming Language and Electronics				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview ofpresentation and preparation of report.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**IM**	**EM**
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	-		1	2
CO2	1	2	2	-	--	--	--	--	--	--	--	--	-	-	1	1
CO3	1	2	-	--	--	--	--	--	--	--	--	--	-	-	1	1
CO4	1	2	3	--	--	--	--	--	--	--	--	--	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2512	**Nano Electronics**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				

Co-requisites	Nil

Catalog Description

This course will help the students earn the basic understanding of nano electronics followed with advanced understanding of the fabrication at nano-micro level. It provides an in-depth study of device electronics for integrated circuits, a foundation for the device fabrication and various applications in the field of sensors technology, optoelectronics, communication and nanotechnology etc.

Course Objectives

The objective of this course is to

1. Equip the students with fundamentals of Nanoelectronics and Nanostructures.
2. Provide in depth knowledge of fabrication steps and process.
3. Throw light on different applications in the field of sensors technology, optoelectronics, communication and nanotechnology

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the fundamentals of Nanoelectronics and Nanostructures.

CO2. Illustratedifferent steps and process involved in fabrication of nanostructures.

CO3. Explain the applications of nanoelectronics in context of sensors technology, logic devices ,communication and optoelectronics.

Modules	**Blooms level***	**Number of hours**
Module 1: **Introduction to Nanoelectronics** Overview of nanoscience and engineering, development milestones in microfabrication and electronic industry, Moore's law and continued miniaturization, Classification of Nanostructures, Electronic properties of atoms and solids: Isolated atom, Bonding between atoms, Giant molecular solids, Free electron models and energy bands, crystalline solids, Periodicity of crystal lattices, Electronic conduction, effects of nanometerlength scale, Fabrication methods: Top down processes, Bottom up processes methods for templating the growth of nanomaterials, ordering of nanosystems	L1 and L2	6
Module 2: **Fabrication techniques** Requirements of ideal semiconductor, epitaxial growth of quantum wells, lithography and etching, cleaved-edge over growth, growth of vicinal substrates, strain induced dots and wires, electro statically induced dots and wires, Quantum well width fluctuations, thermally annealed quantum wells, semiconductor nanocrystals, collidal quantum dots, self-assembly techniques. Physical processes: modulation doping, quantum hall effect, resonant tunneling, charging effects, ballistic carrier transport, Inter band absorption, intra band absorption, Light emission processes, phonon bottleneck, quantum confined stark effect, nonlinear effects, coherence and dephasing, characterization of semiconductor nanostructures: optical electrical and structural	L1, L2	9
Module 3: **Carbon Nanostructures & Nanosenors** Carbon molecules, Carbon Clusters, Carbon Nanotubes, application of Carbon Nanotubes Nanosensors: Introduction, What is Sensor and Nanosensors?, What makes them Possible?, Nanosensors Based On Quantum Size Effects, Electrochemical Sensors, Sensors Based On Physical Properties, Nanobiosensors, Smartdust-Sensor for the future.	L1, L2	8
Module 4: **Logic Devices &Applications** Logic Devices-Silicon MOSFETs-Ferroelectric Field Effect Transistors-Quantum Transport Devices Based on Resonant Tunneling-Single-Electron Devices for Logic Applications: Injection lasers, quantum cascade lasers, single-photon sources, biological tagging, optical memories, coulomb blockade devices, photonic structures,	L1, L2	6

QWIP's, NEMS, MEMS		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ed Robert Kelsall, Ian Hamley, Mark Geoghegan, "Nanoscale Science and Technology", John Wiley, 2007.
2. Charles P Poole, Jr, Frank J Owens, "Introduction to Nanotechnology", John Wiley, Copyright 2006, Reprint 2011.
3. T Pradeep, "Nano: The essentials-Understanding Nanoscience and Nanotechnology", Tata Mcgraw Hill.

Reference Books

1. Ed William A Goddard III, Donald W Brenner, Sergey E. Lyshevski, Gerald J Iafrate, "Hand Book of Nanoscience Engineering and Technology", CRC press, 2003.
2. Jaap Hoekstra, "Introduction to Nanoelectronic Single-Electron Circuit Design", Pan Stanford Publishing 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	2	--	--	--	--	--	--	--	--	--	--	3	--	1	--
CO2	2	--	3	--	1	--	--	--	--	--	--	--	3	--	1	--
CO3	1	2	--	--	3	--	--	--	--	--	--	3	3	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2507	**Operating Systems**	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course Operating System, its generic types, characteristics and functions are discussed in detail. Concepts covered would enable students to identify various categories of operating systems, with details about concepts of process management and scheduling. Contents will be helpful in identifying deadlocks in the system and designated approaches used to prevent,

handle or recover from them. Further it covers the concepts of managing memory, devices and mechanisms for providing security to system and files using operating system.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge about categories of operating systems and their functions.
2. Provide detailed knowhow about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain operating systems and their evolution, also differentiate among its various types.

CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.

CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.

CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.

CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	**Blooms level***	**Number of hours**
MODULE 1: INTRODUCTION TO OPERATING SYSTEM Operating system and function, Evolution of operating system, Batch, Interactive, multiprogramming, Time Sharing and Real Time System, multiprocessor system, Distributed system, System protection. Operating System structure, Operating System Services, System Program and calls	L1, L2 and L4	6
MODULE 2: PROCESS MANAGEMENT Process concept, State model, process scheduling, job and process synchronization, structure of process management, Threads Interprocess Communication and Synchronization: Principle of Concurrency, Producer Consumer Problem, Critical Section problem,	L1, L2 and L3	12

Semaphores, Hardware Synchronization, Critical Regions, Conditional critical region, Monitor, Inter Process Communication. CPU Scheduling: Job scheduling functions, Process scheduling, Scheduling Algorithms, Non-Preemptive and preemptive Strategies, Algorithm Evaluation, Multiprocessor Scheduling. Deadlock: System Deadlock Model, Deadlock Characterization, Methods for handling deadlock, Prevention strategies, Avoidance and Detection, Recovery from deadlock combined approach		
MODULE 3: MEMORY MANAGEMENT Single Contiguous Allocation: H/W support, S/W support, Advantages and disadvantages, Fragmentation, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Paged replaced algorithm, Allocation of frames, Thrashing, Cache memory, Swapping, Overlays	L1, L2 and L3	7
MODULE 4: DEVICE MANAGEMENT Principles of I/O hardware, Device controller, Device Drivers, Memory mapped I/O, Direct Access Memory, Interrupts, Interrupt Handlers, Application I/O interface, I/O Scheduling, Buffering, Caching, Spooling, Disk organization, Disk space management, Disk allocation Method, Disk Scheduling, Disk storage	L1, L2 and L3	7
MODULE 5: FILE SYSTEM AND PROTECTION AND SECURITY File Concept, File Organization and Access Mechanism, File Directories, Basic file system, File Sharing, Allocation method, Free space management. Policy Mechanism, Authentication, Internal excess Authorization	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Milenekovic, "Operating System Concepts", McGraw Hill
2. Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

Reference Books

1. **Dietel, "An introduction to operating system", Addision Wesley**
2. **Tannenbaum, "Operating system design and implementation", PHI**
3. **Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000**
4. **A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI**
5. **Willam Stalling " Operating system" Pearson Education**

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 4	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 5	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2513	Computer Networks	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The course provides a unified and fundamental view of the broad field of computer networks. The objective is to acquaint the students with the basics of networking The world of computer networking is introduced in a top down Approach. A structured approach to explain how networks work from the inside out is being covered. In-depth application coverage includes email, the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP.

Course Objectives

The objective of this course is to

1. To provide an overview of data transmission and computer networks.
2. To familiarize with the basic taxonomy and terminology of computer networking area.
3. **T**o equip with the knowledge of different protocols and different layers of computer networks.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain different concepts of data transmission and apply the knowledge of encoding techniques.

CO2. Illustrate the concepts and applications of different data communication methods.

CO3. Explain different concepts of computer networks and its layers.

CO4: Compare and contrast different layers and protocols used at different layers.

Modules	Blooms level*	Number of hours
Module 1: **Data Transmission** Analog and Digital transmission, transmission media, line configuration, data communications codes, error detection and correlation methods. Data encoding methods: analog to digital, digital to analog etc.	L1,L2 and L3	6
Module 2: **Data Communication Methods** Data communication interface, line control unit, UART, USRT, Serial interface, terminal types. SDLC, HDLC, Addressing Switched networks, circuit switching,	L1, L2, L3	7

packet switching, broadcast networks. IEEE 802 LAN Standards, framing, error control, flow control.		
Module 3: **Introduction to Computer Networking** Internet, Circuit switching vs Packet switching, Network Access and Physical Media, ISPs, Delay and Loss in Packet Switched Networks, Five Layer concept and their PDUs .	L1, L2, L3	5
Module 4: **Application layer and Transport layer** Application Layer Protocols: Web and HTTP, FTP, SMTP, DNS, brief overview of socket Programming with TCP and UDP Multiplexing and Demultiplexing, UDP, Reliable Data Transfer, UDP segment structure, Reliable Data Transfer, TCP, TCP segment Structure, Basics of Congestion Control	L2, L3 and L4	7
Module 5: **Network Layer** Datagram and virtual circuit, link state routing, distance vector routing, Heirarchical Routing, IP, Ipv4 Addressing, Ipv6	L2, L3 and L4	4
Module VI: **Link Layer and Physical Layer** Services Provided, Error Detection and Correction, Mulple Access Protocols, TDM, FDM and CDMA, ALOHA, CSMA, LANs, Ethernet, Hubs, Bridges and Switches, Introduction to PPP The physical layer: Theoretical basis for data communication, transmission media, wireless transmission, telecom infrastructure, PSTN, communication satellites, mobile telephone system	L2, L3 and L4	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. James F. Kurose, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education India
2. Forouzan, B. A.,"Data Communication & networking", McGraw Hill Education.

Reference Books

1. Tanenbaum,"Computer Networks" Prentice Hall.
2. W. Tomasi, "Advanced Electronic Communication Systems", Pearson Education India.
3. James Martin, "Telecommunications & the Computer", 3rd Edition, PHI. 2001
4. P. C. Gupta, "Data Communications, PHI, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	--	--	1	--
CO3	1	2	2	3	3	--	--	--	--	--	--	--	--	--	1	--

CO4	1	1	2	3	--	--	--	--	--	--	--	--	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2508	**COMPUTER ARCHITECTURE**	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Logic Gates				
Co-requisites	nil				

Catalog Description

Computer architecture is concerned with the structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It includes basic register transfer language and computer organization and design. Complete insight on the working of CPU, Memory and I/O communication will be provided. Pipeling and related topics will also be discussed.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of computer architectures and their modules.
2. Provide an overview of various algorithms used and hardware implementation computer.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain about Register transfer language and various micro operations of arithmetic logic unit.

CO2. Explain about the organization of computer modules and their details.

CO3. Explain in details of central processing unit like general purpose register, accumulator etc. and computer arithmetic.

CO4. Explain memory organization of computer and their interconnections. Details of direct memory access.

CO5. Explain parallel processing and pipeline techniques.

Modules	**Blooms level***	**Number of hours**
Module I: Register Transfer Language Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic shift Unit.	L1, L2 and L3	10
Module II: Basic Computer Organizations and Design **Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Design of Accumulator Logic. Hardwired and Microprogrammed**	L1,L2	9

control: Control Memory, Address Sequencing, Design of Control Unit		
Module III: Central Processing Unit **Introduction, General Register Organization, Stack Organization, Instruction representation, Instruction Formats, Instruction type, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer RISC and CISC Computer Arithmetic: Introduction, Addition and Subtraction Algorithm,Multiplication Algorithms, Booth Multiplication, Division Algorithms, Floating-Point Arithmetic Operations**	L1,L2, L3	10
Module IV: Memory and Intersystem Communication and Input output organisation Memory: Memory types and organization Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory with mapping techniues, Virtual Memory, Memory Management Hardware Intrasystem communication and I/O: Peripheral Devices, Input-Output Controller and I/O driver, IDE for hard disk, I/O port and Bus concept, Bus cycle, Synchronous and asynchronous transfer,Modes of Transfer, DMA, DMA Transfer, DMA Controller, I/O Processor, CPU-IOP Communication	L1,L2, L3.	10
Module V: Pipelining, Vector Processing and Multiprocessors **Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline** **Multiprocessors: Characteristics of Multiprocessors**	L1 and L2	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Book:

1. Morris Mano, Computer System Architecture, 3rd Edition – 1999, Prentice-Hall of India Private Limited.
2. Harry & Jordan, Computer Systems Design & Architecture, Edition 2000, Addison Wesley, Delhi.

References Books:

1. WIliam Stallings, Computer Organization and Architecture, 4th Edition-2000, Prentice-Hall of India Private Limited.
2. Kai Hwang-McGraw-Hill, Advanced Computer Architecture.
3. John D. Carpinelli, Computer system Organization & Architecture, Edition 2001, Addison Wesley, Delhi
4. M. Morris Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education, ASIA.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	ATT	CT	S/V/Q	HA	EE

Weightage (%)	5	10	8	7	70

ATT: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO2	1	--	--		--	--	--	--	--	--	--	--	--	2	--
CO3	1	2	3	3		--	--	--	--	--	--	--	2	1	--
CO4	1	2	3	3	--	--	--	--	--	--	--	--	2	1	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

ECE 2514	**FUZZY LOGIC & GENETIC ALGO**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Computer Concepts				
Co-requisites	Nil				

Catalog Description

In this course the concepts of fuzzy logic and genetic algorithm are discussed in detail. This course will provide an understanding of fuzzy logic and genetic algorithm and an outlook on the applications of these techniques to solve real world problems. It also provides an understanding of fuzzy-genetic based machine learning.

Course Objectives

The objective of this course is to

1. Provide the student with the basic understanding of genetic algorithm and fuzzy logic fundamentals, program and design the related systems.
2. Equip the students with concepts of fuzzy logic based solutions.
3. Provide an overview of performance of genetic algorithm, simulated annealing and tabu search.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop the skills to gain a basic understanding of genetic algorithm and fuzzy logic theory.

CO2: Appreciate the learning and adaptation capability of neural and fuzzy systems.

CO3: Apply various operators to optimize. Perform mathematical calculation of the GA

CO4: Able to identify the present application areas of fuzzy logic and GA

CO5: Explain the working principle and compare the performance with other methods – Simulated annealing and Tabu search.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Crisp sets: Overview, Fuzzy sets : Basic types and concepts, Characteristics and significance of paradigm shift, Fuzzy sets vs Crisp sets, Representation of fuzzy sets	L1, L2 and L3	8

MODULE 2: Types of operations, Fuzzy complements, Fuzzy intersection: t-norms, Fuzzy union: t-conorms, Combination of operations, Aggregation operation, Fuzzy numbers , Linguistic variables, Arithmetic operations on intervals, Arithmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equation.	L2, L3 and L6	10
MODULE 3: General discussion, Fuzzy controller: Overview and example, Fuzzy systems and neural networks, Fuzzy neural network, Fuzzy automata. Pattern recognition in fuzzy logic, Database and information retrieval in fuzzy logic, decision making in fuzzy logic, engineering applications and fuzzy logic, Fuzzy logic in Medicine and Economics	L1, L3 and L4	10
MODULE 4: Fundamentals of genetic algorithm: A brief history of evolutionary computation, biological terminology, search space encoding, reproduction elements of genetic algorithm genetic modelling, comparison of GA and traditional search methods. The Fundamental Theorem, Schema Processing at work, Two-armed and k-armed Bandit problem, The Building block hypothesis.	L1, L3 and L4	10
MODULE 5: Genetic technology:- steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation.	L3, L4 and L6	10
MODULE 5: Genetic Algorithm in engineering and optimization-natural evolution – Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations. Applications of Genetic based machine learning-Genetic Algorithm and parallel processors- composite laminates- constraint optimization- multilevel optimization- real life problem.	L3,L4,L6	05

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Fuzzy Logic with Engineering Applications, 3rd Ed., T. J. Ross, Wiley India Pvt. Ltd., India, 2011.
2. Fuzzy Logic Intelligence Control & Information, John Yen and Reza Langari, Pearson Education Limited, India, 2007.
3. David E.Goldberg, "Genetic Algorithms in search , Optimization & Machine Learning"
4. Melanie Mitchell- 'An introduction to Genetic Algorithm'- Prentice-Hall of India

Reference Books

1. Understanding Neural Networks and Fuzzy Logic, S. V. Kartalopoulas, IEEE Press and Prentice Hall India, India, 2000.

2. Neuro-Fuzzy and Soft Computing – A Computational Approach to Learning and Machine Intelligence, Prentice Hall India, India, 2009.

3. William B. Langdon, Riccardo Poli,"Foundations of Genetic Programming"

4. P. J. Fleming, A. M. S. Zalzala "Genetic Algorithms in Engineering Systems "

5. David A. Coley, "An Introduction to Genetic Algorithms for Scientists and Engineers ".

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	-
CO2	**1**	--	**2**	**3**	--	--	--	--	--	--	--	**1**	**2**	--	-
CO3	**1**	**2**	**3**	**3**	**3**	--	--	--	--	--	--	--	**1**	**2**	-
CO4	**1**	**1**	**2**	--	--	--2	--	--	--	--	--	--	**1**	**1**	**2**
CO5	**1**	**1**	**2**	--	-2-	--	--	--	--	--	--	--	-	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

READING & COMPREHENSION

Course Code: CSS2351

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.

Course Contents:

Module I
Reading Comprehension
Summarizing
Paraphrasing

Module II
Essay Writing
Dialogue Report

Module III
Writing Emails
Brochure
Leaflets

Module IV: Introduction to Phonetics
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

PERSONALITY, NATIONALISM & HUMAN VALUES

Course Code: BEH2552

L-T-P : 1-0-0 **Credit Units: 01**

FRENCH – V

Course Code: LAN2551

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life

Course Contents:

Module D: pp. 131 – 156 Unités 10,11

Contenu lexical: Unité 10: Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

Unité 11: faire face aux problèmes

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

Contenu grammatical:

1. comparatif - comparer des qualités/ quantités/actions
2. supposition: Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 1**

GERMAN - V

Course Code: LAN2552

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Genitive case

Genitive case – Explain the concept of possession in genitive

Mentioning the structure of weak nouns

Module II: Genitive prepositions

Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs

Verbs with accusative case

Verbs with dative case

Difference in usage in the two cases

Module IV: Verbs with fixed prepositions

Verbs with accusative case

Verbs with dative case

Difference in the usage of the two cases

Module V: Texts

A poem 'Maxi'

A text Rocko

Module VI: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - V

Course Code: LAN2553

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules

Module II
Future Tense

Module III
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

Module IV
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

Module V
General revision of Spanish language learnt so far.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras, Greenfield

Russian - V

Course Code: LAN2554

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – V

Course Code: LAN2555

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

What English words come from Chinese? Some of the more common English words with Chinese roots areginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'al chi, kung-fu. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

Module II
Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

Module III
Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

Module IV
Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

Module V
Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?
Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

PORTUGUESE - V

Course Code: LAN2556

L-T-P : 2-0-0 **Credit Units: 02**

ECE2601	**VLSI DESIGN**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	0

Pre-requisites/Exposure	Basics of semiconductor and analog electronics
Co-requisites	Nil

Catalog Description

This course deals with basic theories and techniques of digital VLSI design in CMOS technology. It covers the fundamental concepts and structures of designing digital VLSI systems which include CMOS devices and circuits, standard CMOS fabrication processes, CMOS design rules, static and dynamic logic structures, CMOS chip layout, simulation and testing, low power techniques, design tools and methodologies and Stick Diagrams.

Course Objectives

The objective of this course is to

- Provide a deep understanding of the concepts, techniques and design of complex digital VLSI circuits.
- Apply mathematical methods and circuit analysis models to analyse CMOS digital circuits, and their logic components.

Course Outcomes

On completion of this course, the students will be able to

CO1.Explain the characteristics of Basic VLSI components.

CO2. Apply the knowledge of various CMOS inverters to compare their performance.

CO3. To design and realize basic combinational and sequential functions using CMOS logic.

CO4. Design circuit Layout and Stick diagrams of CMOS logics.

Modules	Blooms level*	Number of hours
Module I: Devices and the wire Dynamic and transient behavior of Diode, Diffusion capacitance, SPICE Diode model, MOSFET basic, depletion and enhancement device. MOSFET static behavior, Threshold voltage and its dependence on V_{SB} MOSFET Operation in resistive and saturation region, channel length modulation, Velocity saturation and its impact on sub micron devices, sub threshold conduction, Model for manual analysis, Equivalent resistance for MOSFET in (velocity) saturated region, comparison of equations for PMOS and NMOS. Dynamic behavior, Channel capacitance in different regions of operation, junction capacitance, Level 1 SPICE models for MOS	L1, L2	8

transistors. The Wire, Interconnect parameters: resistance, capacitance and Inductance, Lumped RC model, Elmore Delay.		
Module II: CMOS Inverter VTC of an ideal inverter, Switching Model of the CMOS inverter: NMOS /PMOS discharge and charge, VTC of CMOS inverter : PMOS and NMOS operation in various regions including velocity saturation, Switching threshold, (W/L)p/(W/L)n ratio for setting desired V_M with and without velocity saturation, Noise Margins, buffer. Ratioed logic: Pseudo NMOS inverter and PMOS to NMOS ratio for performance, tri-state inverter, Resistive load inverter. Load Capacitance calculations: fan out capacitance, self capacitance calculations: Miller effect, wire capacitance; Improving delay calculation with input slope, Propagation delay: first order analysis, analysis from a design perspective, sizing a chain of inverters for minimum delay, choosing optimum number of stages, Power, Energy and Energy Delay: Dynamic power consumption, Static power, Glitches and power dissipation due to direct path currents, power and delay trade off, Transistor sizing for energy minimization.	L3, L4	8
Module III: Combinational circuits CMOS LOGIC: Good 0 and Poor 0, series and parallel N and P switches, Two and Higher input NAND and NOR gates, Functions of the type (AB+C(D+E)) and their complements, XOR and XNOR gates, 2 input Multiplexer, Full Adder; Transistor sizing in CMOS logic for optimal delay, Pseudo NMOS NAND NOR and other gates and the transistor sizing, Introduction to DSVCL logic, CPL AND/NAND, OR/NOR, XOR/XNOR gates, Logical effort, Electrical Effort, Branching effort, Examples of sizing Combinational logic chains for minimum delay, Pass-transistor logic, pass gate configurations for NMOS and PMOS, 2 input and 4 input MUX, XOR, XNOR and implementation of general functions like AB+AB*C+A*C*, Robust and Efficient PTL Design, Delay of Transmission Gate chain. Dynamic CMOS design: Pre-charge and Evaluation, charge leakage, bootstrapping, charge sharing, Cascading Dynamic Gates, DOMINO Logic, Optimization of Domino Logic Gates, simple example circuit implementations of DOMINO logic.	L2,L3,L4	10
Module IV: Sequential Logic circuits Principle of bistability, NAND and NOR based SR latch, and clocked SR Latch, JK latch, example of master slave flip flop, CMOS	L2,L3,L4	5

D latch, , MUX based Latches, master slave edge triggered register, Static Timing Analysis –setup, hold time, clock skew, clock period, non ideal clocks, clock overlap, C2MOS register, TSPCR Register, Schmitt Trigger, Pipelining and NORA CMOS		
Module V: Layout Design Rules Introduction to CMOS Process technology, Latch up and its prevention Layout of CMOS inverter, CMOS NAND and NOR gates, Concept of Euler path, and stick diagrams for functions like (AB+E+CD)*.	L2,L3,L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- **Jan M Rabaey**,Digital Integrated Circuits ,Second Edition, Pearson.
- **David Hodges** , Analysis and Design of Digital ICs, McGrew Hill
- **Sung-MoKang,**CMOS Digital ICs,third edition,2008

Reference Books

- **Weste Niel and Harris**,CMOS VLSI design. A Circuits And Systems Perspective, 3/E,Pearson
- **Weste and Eshragian**, Principles of CMOS VLSI Design: a systems perspective, Addison-Wesley Publishing Company, 01-Jan-1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	3	--	--	--	--	--	--	--	--	--	--	2	1	-	-
CO	3	1	3	--	1	--	--	--	--	--	--	2	2	1	-	2

2																
CO 3	3	2	1	2	--	--	--	--	--	--	--	2	2	1	-	2
CO 4	2	2	1	-	--	--	--	--	--	--	--	--	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ECE2602	DIGITAL SIGNAL PROCESSING	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	1	0	3
Pre-requisites/Exposure	Hands on knowledge of MATLAB Programming				
Co-requisites	Basic signals & Systems				

Catalog Description

This course deals in Digital signal processing with significant skills in advance methods for modification, analysis, classification & sampling of signals. It provides the broad knowledge of design, and realization of digital signal processing systems. The problems based on transformation of domains and filter design will be focused on.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of signals and systems.
2. Provide in-depth knowledge of various transformations and filtering concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Represent, analyze & categorize discrete-time signals and systems in time domain.

CO2: Apply the transformations to solve the problems related to computational complexity.

CO3: Explain the technique for conversion of real life signals to processing ready signals.

CO4: Design a digital filter with desired response and specifications.

Modules	Blooms level*	Number of hours
Module 1: **Discrete Time Signals And Systems In Time Domain** Classification of signal, signal processing operations, classification of systems, discrete time systems, examples of types of signal, sampling process, time domain characterization of LTI discrete- time systems, state space representation of LTI discrete time systems.	L1,L2 and L4	10
Module 2: **Discrete Time Signals In Transform Domain** DTFT, properties, applications, inverse DTFT, DFT, properties, applications, inverse DFT, Z-transform, properties, applications, inverse Z-transform, frequency response, transfer function, Fast Fourier transform algorithms: DIT algorithm, DIF algorithm.	L2,L3	16

Module 3: **Discrete Time Processing Of Continuous Time Signals** Discrete time processing of continuous time signal sampling, analog filter design, anti-aliasing filter design	L2,L4 and L5	10
Module 4: **Discrete Time Processing Of Discrete- Time Signals** Digital filters: Digital filter structure: FIR filter structure, IIR filter structure Digital filter design: Impulse invariance method, bilinear transform method of IIR filter design, FIR filter design.	L2,L3 and L5	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. **Proakis, Manolakis**, Digital Signal processing, 4th edition, Pearson, 2007.
2. **Oppenheim & Schaffer**, Digital Signal Processing, 1st edition, Pearson, 1975.

Reference Books

1. **Fafael C. Gonzalez, Richard E. Woods,** Digital Image Processing, Pearson, 2009.
2. **Anil Kumar Jain,** Fundamentals of Digital Image Processing, 1st edition, Prentice Hall Information and System Sciences Series.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--
C	2	1	--	--	2	--	--	--	--	--	--	--	2	1	--	--

O2																
CO3	1	2	2	--	2	--	--	--	--	--	--	3	2	1	--	3
CO4	--	2	1	--	2	--	--	--	--	--	--	3	2	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2615	**ANTENNA AND MICROWAVE ENGINEERING**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronics and Electromagnetic Theory				
Co-requisites	Nil				

Catalog Description

The basic objective of this course is to provide the core knowledge of antenna and wave propagation. The course also focuses on measurements of the antenna parameters**.** Microwaves are important when we are going to the high frequency regime. By studying this course students will be able to know about the microwave components and devices,

microwave generators and their characteristics, microwave applications and measurement. Also, they will be familiar about the rectangular and circular waveguides, their equations and the modes existing in these waveguides.

Course Objectives

The objective of this course is to

1. Provide the basic knowledge of antenna fundamentals and Equip with the understanding various antenna types and measurements of antenna parameters .
2. Provide the fundamental knowledge of microwave frequencies, behavior of circuits at high frequencies and waveguides.
3. Provide the knowledge about microwave components and tubes.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the antenna working principle, its parameters and use of arrays for improving them.

CO2: Describe the design equations of the practical antennas and their applications and Explain measurement methods of the antenna parameters.

CO3: Describe the microwave frequencies and behavior of circuits at high frequencies and waveguides.

CO4: Describe and analysis of rectangular and circular waveguides and Categorize various microwave components and describe them on basis of their parameters.

Modules	**Blooms level***	**Number of hours**
MODULE I: ANTENNA Antenna Principles: Potential Functions & Electromagnetic Field, Current Elements, Radiation from Monopole & Half Wave Dipole, power radiated by current element, radiation resistance. Directional Properties of Dipole Antenna. Antenna parameters: Radiation intensity, Radiation pattern, beam area, beam efficiency Antenna Gain, Directivity, Effective Area, Antenna Efficiency, Antenna Terminal Impedance, Antenna Temperature and Signal to Noise Ratio.	L1and L2	9
MODULE II: PRACTICAL ANTENNAS & MEASUREMENTS Antennas Arrays: Two Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Multiplication of patterns, Practical Antenna, their principle, geometrical equations, parameters & applications : Loop Antennas, Yagi-Uda array: Parabolic Reflectors, Horn Antenna, Log periodic antenna, spiral antenna, Microstrip	L1,L2 and L3	10

antennas. Measurements: Radiation Pattern measurement, Gain Measurement: Comparison method, Near field method, Polarization measurement.		
MODULE III: WAVE PROPAGATION Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Reflection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave	L1, L2 and L3	10
MODULE IV: MICROWAVE & WAVEGUIDES Microwave frequencies, standard frequency bands, behaviour of circuits at conventional and microwave frequencies, microwave application. Overview of guided waves, TE, TM and TEM modes, rectangular and cylindrical wave guide resonators, choice of the type of waveguide	L1, L2 and L3	9
MODULE V: MICROWAVE COMPONENTS AND DEVICES Scattering matrix and its properties, coupling probes, coupling loops, windows, waveguide tuners, termination, E-plane Tee, H-plane Tee, Magic Tee, Phase-Shifter, attenuators, Directional Coupler, Gunn diode, Resonator and circulators, IMPATT and TRAPATT Microwave tubes: Transit-time effect, limitations of conventional tubes, Two-cavity and multi-cavity Klystrons, Reflex Klystron, TWT and Magnetrons.	L1, L2 and L3, L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- S. Y. Liao, Microwave Devices and Circuits, 4th Edition PHI, 2001.
- Antennas: For All Applications by Kraus, John D. & Mashefka, Ronald J., Tata McGraw Hill, 3rd Ed.
- 3. Antennas and Wave Propagation by Prasad, K.D. Khanna Publications.
- 2.O.P. Gandhi,Microwave Engineering and Application, New York, Maxwell Macmillan Pub, 1981.

Reference Books

- 3.E. S. Yang, Microelectronic Devices, Ma Graw Hill -Education, 1988.
- 4.A. G. Milness, Semiconductor Devices and Integrated Electronics, Springer, 2012.

- 5.K. C. Gupta, Microwave Engineering, John Wiley & Sons, 1980.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	_	--	_	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO2	**1**	**3**	**2**	--	--	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO3	**1**	**3**	**2**	--	--	**2**	--	--	--	--	--	--	**1**	--	**1**	--
CO4	**1**	**2**	**2**	--	--	**3**	--	--	--	--	--	--	**1**	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2616	**Antenna and Microwave Engineering Lab**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic Electronics and Electromagnetic Theory.				
Co-requisites	Nil				

Catalog Description

Antennas are used to transmit electromagnetic energy and Microwaves are important when we are going to the high frequency regime. By studying this course students will be able to understand antenna design parameters and know about the microwave components and devices, microwave generators and their characteristics, microwave applications and measurement.

Course Objectives

The objective of this course is to

1. Provide knowledge about Radiation phenomena and pattern and characteristics of different types of antennas.
2. Provide the fundamental knowledge of microwave frequencies and components of microwave bench.
3. Provide the knowledge about microwave components, tunes and oscillators.

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyze the radiation mechanisms of antennas and Demonstrate knowledge of antennas in communication systems.

CO2: Describe the characteristics of microwave oscillators and Explain and study the working of the various microwave tees.

CO3: Analyse microwave frequency signal and Categorize various microwave components and study their operations.

Course Content

Experiments	**Blooms level***	**Number of hours**
1. To study and design dipole antenna, horn antenna and yadi uda antenna in Simulation software like ANSYS HFSS. 2. To design a rectangular microstrip patch antenna in Simulation software and draw its hardware on LPKF Protomat PCB machine.	L1 L2 and L3	4
1. To measure frequency and guided wavelength of a microwave signal. 2. To measure the impedance of a given load. 3. To measure various parameters of a directional coupler.	L1 L2 and L3	3
1. To study the characteristic and functions of an isolator. 2. To study and simulate the characteristic and functions of a circulator. 3. To study and simulate the characteristic and functions of various tees.	L1 L2 and L3	3
1. To study the characteristics of reflex klystron. 2. To study the characteristic of Gunn diode.	L1 L2 and L3	2

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1.S. Y. Liao, Microwave Devices and Circuits, 4th Edition PHI, 2001.

2.O.P. Gandhi,Microwave Engineering and Application, New York, Maxwell Macmillan Pub, 1981.

Reference Books

1.E. S. Yang, Microelectronic Devices, Ma Graw Hill -Education, 1988.

2.A. G. Milness, Semiconductor Devices and Integrated Electronics, Springer, 2012.

3.K. C. Gupta, Microwave Engineering, John Wiley & Sons, 1980.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**

5	10	10	5	35	35

Note: IA – Internal Assessment, EE - External Exam, PR - Performance, LR – Lab Record, V – Viva.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	1
CO2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	1
CO3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

ECE 2605	VLSI DESIGN LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of analog electronics				
Co-requisites	Basic concepts of Digital electronics				

Catalog Description

In this Lab course the designing of VLSI circuits using Mentor Graphics software are implemented and demonstrated. Concepts covered would enable them to create complex applications related to VLSI design. The objective of this course is to explore and implement the various features of VLSI design and analyze the dc and transient analysis.

Course Objectives

The objective of this course is to

Provide a deep understanding of CMOS logic using Mentor Graphics tool.

Analyze, design concepts of different combinational and sequential circuits and their simulation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basic concept of MOSFET;
CO 2: Illustrate the static and switching characteristics of inverters using CMOS with varying capacitance, width and channel Length of CMOS using Mentor Graphics tool.
CO 3: Demonstrate and create models of moderately sized CMOS circuits that realize specified digital functions using Mentor graphics Tool.
CO 4: Demonstrate the layout and stick diagrams using Mentor graphics Tool.
CO 5: Demonstrate the power consumption during transient analysis.

Modules/Topics Covered**	Blooms level*	Number of hours
1. MOSFET characteristics with varying VGS for both pmos and nmos.	L3, L5	2
2. Effect on VTC of CMOS inverter with variation of W and L.	L3, L5	2
3. Transient analysis of CMOS inverter with varying capacitive load, W and L. Rise time, fall time power dissipation, propagation delay calculation of CMOS inverter with the variation of capacitive load, W and L.	L3, L5	4
4. NOR and NAND gate - Transient analysis	L3, L5	2
5. XOR/XNOR gate - Transient analysis	L3, L5	2
6. 2:1 MUX and XOR gate with P.T.L.- Transient analysis	L3, L5	2

7. D type latch and flip flop - Transient analysis	L3, L5	2
8. 3 input NAND gate implementation with DOMINO (precharge and evaluation).	L3, L5	2
9. 4 inverter chain to derive capacitive load.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text

1. Neil Weste and K. Eshragian, "Principles of CMOS VLSI Design: A System Perspective," 2nd edition, Pearson Education (Asia) Pvt. Ltd., 2000.
2. D.A Pucknell and Eshraghain, " Basic VLSI Design", PHI, India, 1995.

References:

3. Mentor Graphics user Manual

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 4	3	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--

5																

1: strongly related, 2: moderately related and 3: weakly related

ECE 2609	DIGITAL SIGNAL PROCESSING LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites					

Catalog Description

Signal processing has become an important tool for research and investigation in many areas of science and engineering. This course is designed to provide the students an understanding of the basic concepts of digital signal processing and various techniques used in it. Students will perform practical on MATLAB to demonstrate the theoretical concepts of the subject.

Course Objectives
The objective of this course is to

1. Make students demonstrate the basic concepts of digital signal processing.
2. Design filters and determine its coefficients.

Course Outcomes

On completion of this course, the students will be able to

CO1. Practically apply the theoretical concepts of digital signal processing.

CO2. Design analog and digital filters using different techniques.

CO3. Verify FFT algorithm in decimation in time and decimation in frequency domain.

Modules	Blooms level*	Number of hours
Lab Session 1 1. To generate unit step sequence, exponential sequence and sinusoidal sequence. 2. To determine convolution of two given sequences. 3. To compute DFT and IDFT of a given sequence. 4. To determine the circular convolution of two given sequences. 5. To determine z and inverse z transform of a given sequence	L3	4
Lab Session 2 6. To design various analog filters. 7. To design FIR filter using Hamming window. 8. To convert Analog filter into Digital Filter using bilinear transformation. 9. To plot the frequency response of an FIR system	L3 and L4	4
Lab Session 3 10. To verify 8 points FFT algorithm in decimation in time (DIT)	L3 and L4	4

&decimation in frequency (DIF). 11. To determine the filter coefficient using Ramez exchange algorithm. 12. To design an IIR digital filter and its parallel realization.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Proakis, Manolakis, Digital Signal processing, 4th edition, Pearson, 2007.
- Oppenheim & Schaffer, Digital Signal Processing, 1st edition, Pearson, 1975.

References:

- Fafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson, 2009.
- Anil Kumar Jain, Fundamentals of Digital Image Processing, 1st edition, Prentice Hall Information and System Sciences Series.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-
CO 2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO 3	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2637	MINOR PROJECT	L	T	P	C
Version : 2019.1	Date of Approval: May 21, 2019	0	0	4	2
Pre-requisites/Exposure	Basics of Electronics and Communication				
Co-requisites	Nil				

Catalog Description

Minor Project is a professional problem-solving activity included in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with latest technology for development of solution of real-world problems. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. This course develops attributes like intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview of presentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a brief report of the project

CO4: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	2	1	2	2	2	2	2	3	3	2	1	1	1	2

CO2	**1**	**2**	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**1**	**1**	**1**	**1**
CO3	**1**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**3**	**2**	**1**	**1**	**1**	**1**
CO4	**1**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**1**	**3**	**2**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

ECE2607	**ADVANCED JAVA PROGRAMMING**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basics of Java Programming				
Co-requisites	NIL				

Catalog Description

In this course the advanced features of contemporary java are discussed in detail. Concepts covered would enable them to handle complex programs relating to managing data and processes over the network. Discussion will be on relating to concepts of remote method invocation to working with swings architecture. Further practical implementation of database connectivity and using them in servlet and jsp based applications will be made.

Course Objectives

The objective of this course is to

1. Equip the students with the advanced feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of advanced java programming concepts like database programming with servlets and jsp.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of an Remote method invocation application, demonstrate swing based application developed using concepts of remote method invocation

CO2: Distinguish between various java and open database connectivity drivers and able to solve complex programming problems involving database interaction.

CO3: Describe servlet and its lifecycle, along with demonstrate and design solutions for some complex dynamic web applications using servlets.

CO4: Explain jsp scripting and Differentiate between processing of servlets and jsp scripting pages. Apply knowledge of servlets and jsp scripting to create some new dynamic web applications.

CO5: Explain the architecture of Model View Controller and struts. Demonstrate applications based on java beans and struts.

Modules	**Blooms level***	**Number of hours**
MODULE 1: DISTRIBUTED COMPUTING Introduction to Java RMI, RMI services, RMI client, Running client and server, Introduction of Swing, Swing Components, Look and Feel for Swing Components, Introduction to Multimedia Programming.	L1, L2 and L3	6
MODULE 2: DATABASE CONNECTIVITY ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology, JDBC with mysql, postgresql. .	L2 and L3	7
MODULE 3: SERVLET PROGRAMMING Introduction to Servlets, Servlet Life Cycle, Servlet based	L2, L3 and L5	8

Applications, Servlet and HTML.Filters, jdbc with servelets, session Management techniques in detail.		
MODULE 4: JSP PROGRAMMING JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.	L2, L3, L4 and L5	8
MODULE 5: J2EE WEB APPLICATION The Model-View-Controller Architecture What is Struts, Struts Tags, Creating Beans, Other Bean Tags, Bean Output, Creating HTML Forms, The Action Form class The Action class, Simple Struts: a simple Struts application; Introduction to EJB.	L2 and L3	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States.
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

1. D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA.
2. S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA.
3. J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4

CO 1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2610	**ADVANCED JAVA PROGRAMMING LAB**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of Java and Advanced Java Programming				
Co-requisites	NIL				

Catalog Description

In this Lab course the advanced features of contemporary java are implemented and demonstrated. Concepts covered would enable them to create complex applications related to data management. Problems or programs will be related to concepts of remote method invocation, swings, servlets, jsp and java beans.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various advanced java features required in solving complex problems.
2. Provide a demonstration of advanced java programming concepts like database programming with servlets, jsp and creating java beans.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of swings architecture and remote method invocation used to provide solution to distributed computing problems

CO2: Demonstrate the use of JDBC connectivity along with swings based architecture, thereby handling data management.

CO3: Apply the knowledge of servlets and server programming to construct dynamic web applications using web servers.

CO4: Demonstrate the differences between creating and deploying dynamic web applications using jsp concepts and servlets.

CO5: Demonstrate usage of applications involving java beans and jdbc programming to handle data management.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Sample Programs using swings architecture and remote method invocation (a) Write a program using swings creating tabbed panes and menu over a frame and handle their associated events (b) Write a program using swings List control containing list of cities, allowing the user to choose any one of them and display using event handing. (c) Demonstrate an application showcasing the use of remote method invocation(RMI) for designing a distributed application. (d) Create an application using concepts of RMI to depict a client server based interaction.	L3, L5	6
2.Sample Programs using JDBC and swings (a) Create an application demonstrating the use of swings, having a menu over a frame and jdbc programming to perform insert and select operations by handling menu related events. (b) Create an application using swings, having a design providing features for iterating over a dataset performing operations like forward, backward, start and end with help of jdbc programming.	L3, L5	4
(c) Sample Programs using servlets with jdbc, html and swings 3. Create an application using servlets to perform redirection based	L3, L5	6

on validating user data entered through a web form. 4. Design an application to fetch data from database using servlets and display it using its post method. 5. Demonstrate the process of writing cookies using a servlet and display a message after writing. 6. Write a program to create a session object for the username fetched from user using a servlet, further access that session value on another servlet invoked by redirection.		
7. Sample Programs using JSP with jdbc, html and swings (a) Write a program using jsp to demonstrate the features of jsp elements used to declare, define and display sum of two integers. (b) Create an application using jsp to calculate and display the greatest out of two integers using if else statements. Integer numbers should be entered using a web form. (c) Demonstrate with a jsp program mechanism to retrieve checkbox data accessed using multiple value parameters fetching approach. (d) Write a program to demonstrate the use of jsp forward action tag used with parameters and processed using another jsp page.	L3, L5	6
8. Sample Programs using jsp, java beans and swings (a) Demonstrate the use of jsp include action tag for including an html and another jsp page in initial jsp resource. (b) Write a program creating Java bean class and setting its properties using required jsp action tags. Output should also display the retrieved property values.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. J. Jaworski, Java 1.2 Unleashed, Techmedia – SAMS, 1998, United States
2. S. Allamaraju, Professional Java Server Programming, Wrox Press Limited, 2001, United States
3. J. Goodwill and B. Morgan, Developing Java Servlets, Techmedia – SAMS, 2017, United States

Reference Books

- D. Flanagan, J. Parley, W. Crawford and K. Magnusson, Java Enterprise in a nutshell - A desktop Quick reference, O'REILLY, 2003, USA
- S. Ausbury and S. R. Weiner, Developing Java Enterprise Applications, John Wiley and Sons, 2001, USA
- J. Hunder and W. Crawford, Java Servlet Programming, O'REILLY, 2002, USA

Modes of Evaluation: Lab Record /Viva- Via /Performance/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2617	**IoT & WIRELESS SENSOR NETWORKS**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Circuit Theory				
Co-requisites	Nil				

Catalog Description

This course covers the fundamentals of IoT systems with emphasis on translating theoretical bases into practical network design and technologies. It covers the bigger picture of IoT systems with a focus on wireless IoT technologies, network design, system architecture, Overview of Wireless Sensor Networks and Communication Protocols.

Course Objective:
The objective of this course is to

Introduction and description of core concepts of IoT, role and scope of smart sensors for insuring convergence of Technologies and multidisciplinary engineering practices, Machine Intelligence Quotient.

Course Outcomes

On completion of this course, the students will be able to

CO1: Introduction and description of core concepts of IoT, role and scope.
CO2: Architecture and Design Principles of internet network for IoT based system applications.
CO3: Introduction to physical devices used in IoT based systems.
CO4: Recognize upcoming challenges in Sensor Networks.
CO5: To identify communication protocols employed in WSNs.

Course Contents:

Modules	Blooms level*	Number of hours
Module 1 Overview of Internet of Things IoT Conceptual Framework, IoT Architectural View, Technology Behind IoT, Sources of IoT,M2M communication, Examples of IoT. Modified OSI Model for the IoT/M2M Systems, data enrichment, data consolidation and device management at IoT/M2M Gateway, web communication protocols used by connected IoT/M2M devices, Message communication protocols (CoAP-SMS, CoAP-MQ, MQTT,XMPP) for IoT/M2M devices.	L1 and L2	8

Module-2 Architecture and Design Principles for IoT Internet connectivity, Internet-based communication,IPv4, IPv6, 6LoWPAN protocol, IP Addressing in the IoT, Application layer protocols: HTTP, HTTPS,FTP,TELNET and ports Data Collection, Storage and Computing using a Cloud Platform**:** Introduction, Cloud computing paradigm for data collection, storage and computing, Cloud service models, IoT Cloud- based data collection, storage and computing services using Nimbits.	L2 and L3	10
Module-3: IoT Physical Devices and Endpoints Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.	L2 and L4	10
Module-4Overview of Wireless Sensor Networks Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks. Architectures: Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture-Sensor Network Scenarios, Optimization Goals and Figures of Merit, Design principles for WSNs, Service interfaces of WSNs Gateway Concepts.	L3 and L4	10
Modue-5Communication Protocols: Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Contention based protocols(CSMA,PAMAS), Schedule based protocols (LEACH, SMACS, TRAMA) Address and Name Management in WSNs, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing, Hierarchical networks by clustering.	L1 and L2	10

Text Books:

1. Raj Kamal, ”Internet of Things-Architecture and design principles”, McGraw Hill Education, 2017.

2. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.
3. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
4. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, 1 st Edition, Pearson Education.

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, 1 stEdition, VPT, 2014.
2. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks Technology, Protocols, And Applications”, John Wiley, 2007.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**3**													**2**	
CO2		**2**													**3**	
CO3	**2**	**1**			**2**						**3**				**2**	**2**
CO4		**2**			**1**						**3**				**1**	**2**
CO5	**1**											**3**			**2**	

ECE2618	**Data Mining**	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites	Nil				

Catalog Description

Data Mining serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	**L1, L2**	**8**
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	**L1, L2, L3**	**7**
Module III Clustering Hierarchical and k- Means Clustering, Kohenen Networks, Birch Clustering, Measuring Cluster Goodness.	**L1, L2, L3,L4**	**8**

Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	**L1, L2, L3,L6**	**9**
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	**L2, L3, L4, l5**	**8**

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	**2**	**3**
CO2	**1**	**1**	**2**		--	--	--	--	--	--	--	--	**1**	**2**	**3**	**3**

CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**2**
CO4	**1**	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**1**	**2**	**3**
CO5	**1**	**1**	**2**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

ECE2613	**Embedded System**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Hands on knowledge of Microcontrollers, their interfacing, and programing, and Embedded Systems				
Co-requisites					

Course Description:
The syllabus is divided into two parts, the first one deals with 8051 architecture and its interfacing with other devices. Second part of the syllabus deals with the basic embedded system and it's design. This course will provide an introduction of the basic concepts of embedded systems design, RTOSs, various types of microcontrollers, communication with 8051 microcontroller, RS 232, analog-digital interface, and A/D and D/A conversions. This course also provides the knowledge of C-language programing for microcontrollers. The syllabus makes student perfect in assembly language programming, addressing modes etc. apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. Real Time Operating System is also explained at length.8051 C programming is also incorporated in the syllabus.

Course Objectives:
The objective of this course is to;

1. Provide the basic knowledge of introduction to an embedded systems design and RTOS, OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model.
2. Equip with the understanding of various types of microcontrollers, arithmetic instructions and programs, and several application based programing.
3. Equip with the understanding of basics of communication, overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB), and analog-digital interfacing.
4. Provide the basic knowledge of 8051 C, 8051 memory constitution, Data interface, and A/D and D/A conversions.
5. Provide the knowledge of advance microcontrollers, PIC microcontrollers, AVR microcontrollers, and ARM microcontrollers.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Explain the design of embedded systems and RTOS, and RTOS Task Scheduling model.
CO2: Describe the fundamentals of various types of microcontrollers, and their several applications based programing.
CO3: Describe fundamentals of communication of 8051 microcontroller, RS-232, I2C Bus, 8051 C, 8051, analog-digital interfacing, and A/D and D/A conversions.
CO4: Explain the fundamentals of advance microcontrollers, PIC microcontrollers, AVR microcontrollers, and ARM microcontrollers.

Modules	**Blooms level***	**Number of hours**

Module1: **Introduction to an embedded systems design & RTOS** Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.	L1, L2, L3, and L4	8
Module 2: **Overview of Microcontroller** Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bitinstruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.	L1, L2, L3, and L4	8
Module 3: Communication with 8051 Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).	L1, L2. L3, and L5	7
Module 4: 8051 C Programming Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types. Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs, Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions.	L1, L2 L3, and L5	7

Module 5: Introduction to Advance Microcontrollers Introduction to PIC microcontrollers, Introduction to AVR Microcontrollers, Introduction to ARM microcontrollers.	L1, L2 L3, and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Evaluation

Text Books:

1. Raj Kamal, 2004, "Embedded Systems", TMH.
2. James W. Stewart and Kai X. Miao, 2en Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
3. M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.

References Books:

1. David E. Simon,1999, "An Embedded Software Primer", Pearson Education
2. K.J. Ayala, 1991, "The 8051 Microcontroller", Penram International.
3. Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
4. Dr. Prasad, 2004, "Embedded Real Time System", Wiley Dreamtech.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	3	2	--	2	--	--	--	--	--	--	--	--	1	--	--
CO3	1	3	2	--	2	--	--	--	--	--	--	--	--	1	--	--
CO4	1	3	2	--	2	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

ECE 2614	EMBEDDED SYSTEM LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of Microcontroller (8051), its programing and interfacing				
Co-requisites					

Course Description:

This course will provide the practical introduction of microcontroller 8051, its interfacing and programming for various applications, and also designing of microcontrollers.

Course Objectives:

The objective of this course is to;

1. Provide the practical knowledge of microcontrollers (specially 8051), and its interfacing and programming.
2. Equip with the understanding of designing of a model of microcontroller.
3. Equip with understanding of parallel data communication, interfacing microcontroller with a LCD.

Course Outcomes:

On completion of this laboratory course work, the students will be able to:

CO1: Explain the interfacing of microcontroller 8051, and its programming for several applications.

CO2: Describe the fundamentals of design of microcontroller model, and their several applications based programing.

CO3: Describe fundamentals of parallel data communication by interfacing microcontroller (8051) with a LCD.

Modules	Blooms level*	Number of hours

Lab Session 1 13. Write a program to add two 8-bit numbers using microcontroller 8051. 14. Write a program to multiply two 8-bit numbers using microcontroller 8051.	L1 and L3	2
Lab Session 2 15. Write a program to divide two 8-bit numbers using microcontroller 8051. 16. Write a program to subtract two 8-bit numbers using microcontroller 8051.	L1, L3, and L4	2
Lab Session 3 17. Write a program to generate a geometric progression using microcontroller 8051. 18. Write a program to generate a square wave using microcontroller 8051.	L1, L3, and L4	4
Lab Session 4 19. Write a program to generate a delay of 5 ms using microcontroller 8051. 20. Study and implement serial communication by interfacing microcontroller with a computer.	L1, L3, and L4	2
Lab Session 5 9. Study and implement parallel data communication by interfacing microcontroller with a LCD. 10. Study of temperature measurement.	L1, L3, and L4	2
Lab Session 5 *Student has to submit working model based on 8051 and its interfaces.	L1, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

4. Raj Kamal, 2004, "Embedded Systems", TMH.
5. James W. Stewart and Kai X. Miao, 2en Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
6. M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	--	1	--	2	--	--	--	2	--	--	--	--	1	--	3
CO2	2	--	1	--	2	--	--	--	2	--	--	--	--	1	--	3
CO3	2	--	1	--	2	--	--	--	2	--	--	--	--	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

CORPORATE COMMUNICATION

Course Code: CSS2451

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To enhance the skills needed to work in an English-speaking global business environment.

Course Contents:

Module I: Business/Technical Language Development

Advanced Grammar: Syntax, Tenses, Voices

Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Individualised pronunciation practice

Module II: Social Communication

Building relationships through Communication, Communication, Culture and Context, Entertainment and Communication, Informal business/ Technical Communication

Module III: Business Communication

Reading Business/ Technical press, Listening to Business/ Technical reports (TV, radio)

Researching for Business /Technology

Module IV: Presentations

Planning and getting started, Design and layoutof presentation

Information Packaging, Making the Presentation

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File

GD – Group Discussion

GP – Group Presentation

Text & References:

- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

INTERPERSONAL COMMUNICATION

Course Code: BHE2652

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

This course provides practical guidance on
Enhancing personal effectiveness and performance through effective interpersonal communication
Enhancing their conflict management and negotiation skills

Course Contents:

Module I: Interpersonal Communication: An Introduction
Importance of Interpersonal Communication
Types – Self and Other Oriented
RapportBuilding – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Behavioural Communication
Meaning and Nature of behavioural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

Module III: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles

Module IV: Conflict Management
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

Module V: Negotiation Skills
Meaning and Negotiation approaches (Traditional and Contemporary)
Process and strategies of negotiations
Negotiation and interpersonal communication
Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- HarvardBusinessSchool, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - VI

Course Code: LAN2651

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To strengthen the language of the students both in oral and written so that they can:
i) express their sentiments, emotions and opinions, reacting to information, situations;
ii) narrate incidents, events;
iii) perform certain simple communicative tasks.

Course Contents:

Module D: pp. 157 – 168 – Unité 12

Unité 12: s'évader

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

Contenu grammatical:

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN - VI

Course Code: LAN2652

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Adjective endings

Adjective endings in all the four cases discussed so far

Definite and indefinite articles

Cases without article

Module II: Comparative adverbs

Comparative adverbs as and like

Module III: Compound words

To learn the structure of compound words and the correct article which they take

Exploring the possibility of compound words in German

Module IV: Infinitive sentence

Special usage of 'to' sentences called zu+ infinitive sentences

Module V: Texts

A Dialogue: 'Ein schwieriger Gast'

A text: 'Abgeschlossene Vergangenheit'

Module VI: Comprehension texts

Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VII: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – VI

Course Code: LAN2653

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations in Present as well as in Present Perfect Tense with ease.

Course Contents:

Module I
Revision of the earlier modules
Module II
Present Perfect Tense
Module III
Commands of irregular verbs
Module IV
Expressions with **Tener que** and **Hay que**
Module V
En la embajada
Emergency situations like fire, illness, accident, theft

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

RUSSIAN - VI

Course Code: LAN2654

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – VI

Course Code: LAN2655

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

Chinese emperor Qin Shi Huang – Ti who built the great wall of China also built a network of 270 palaces, linked by tunnels, and was so afraid of assassination that he slept in a different palace each night. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order.

Module II

Going out to see a science exhibition
Going to the theatre.
Train or Plane is behind schedule.
Indian Economy-Chinese Economy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. etc.

Module III

Temperature – how to say – What is the temperature in May here?How is the weather in summer in your area?
Around 30 degrees
Heating, air-conditioning
Is winter is Shanghai very cold?
Talking about birthdays and where you were born?
The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.
Tell the following in Chinese – My name is …. I was born in … (year). My birthday is …… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ……. (do what)? At week end, I ……. On Sundays I usually …… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ……. (where). She is working (or studying)…… where… She lives in …….. (where.)

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Elementary Chinese Reader Part-2, 3; Lesson 47-54

PORTUGUESE - VI

Course Code: LAN2656

L-T-P : 2-0-0 **Credit Units: 02**

ECE 2719	Radar and Satellite Communications	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Basic Electronics and Communication systems				
Co-requisites	Nil				

Catalog Description

This course builds basic knowledge of different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

Course Objectives

The objective of this course is to

1. Provide the fundamental knowledge of Radar and its types.
2. Provide the knowledge about satellite communication and its components.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the working of Radar and its equation.

CO2. Describe the various types of radars and their applications.

CO3. Explain the satellite communications and the components used in this communication.

CO4. Explain the various access techniques used in communication and the satellite link budget.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: Introductionto Radar Principle of detection and ranging, Radar frequencies and bands. Applications, Radar block diagram and operation. Radar Range Equation: Range prediction, Minimum detectable signal, Receiver noise SNR, Integration of radar pulses, Radar cross section of targets, Transmitter Power, PRF and system losses & Propagation effects.	L1 and L2	6
MODULE II: CW FM Radar Doppler effect, CW Radar, Frequency-modulated CW Radar, Multiple-frequency CW Radar. MTI and Pulse Doppler Radar: MTI delay lines, Delay line Cancellers, Coherent and Non-Coherent MTI, Pulse Doppler Radar.	L1 and L2	7
MODULE III: Introduction to Satellite Communication satellites, Orbiting satellites, Frequencies and bands, Satellite multiple access formats. Satellite Channel: Power flow, Polarization, Atmospheric losses, Receiver noise, CNR, Satellite link analysis for uplinks and downlinks. Overview of Coaxial cable system and optical Network (SONET); Overview of WLL (Wireless loop)	L1 and L2	8
MODULE IV: Satellite Transponder Transponder model, Satellite signal processing RF-RF translation, IF demodulation.	L2 L3 and L4	7
Module V: Multiple-Access FDMA; amplification with multiple FDMA carriers, AM/FM Conversion with FDMA, Switched FDMA, Synchronization, SS-TDMA; CDMA; DS CDMA, Frequency- hopped, CDMA. Carrier recovery & bit timing. Satellite link budget analysis	L2 L3 and L4	8

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. M.I. Skolnik. Introduction to Radar Systems, 2nd EditionTata Mc Graw-Hill.

2. T. Pratt & C.W. Boston,Satellite Communications, New York, John Wiley & Sons, 1986.

Reference Books

1. Tri Ha, Digital Satellite Communication, Tata Mc Graw-Hill , 1990-03
2. Harry and Vam Trees, Satellite Communication, IEEE Proceeding, 1979.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-
CO2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	-
CO3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	-
CO4	1	2	-	-	-	2	-	-	-	-	-	-	2	-	1	-

1: strongly related, 2: moderately related and 3: weakly related

ECE2720	ADVANCED MOBILE COMMUNICATIONS	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Communication systems, Digital Communication				
Co-requisites	NIL				

Catalog Description

This course introduces fundamental concepts of mobile communications and global system for mobile. This course enables the student to understand the technical functionality of a mobile network. This course also gives mathematical formulations to calculate losses using different propagation models.

Course Objectives

The objective of this course is to

1. Make students familiar with fundamentals of mobile communication systems
2. Understand different multiple access systems like TDMA, FDMA, CDMA with respect to complexity, installation cost, speed of transmission, channel properties etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain the concepts of mobile communications.

CO2: Explain and compare different multiple access techniques

CO3: Obtain propagation losses for a given transmission system.

CO4: Explain fundamentals of GSM system.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction to Wireless Communication System** Evolution of mobile radio communication, Mobile radiotelephony in U.S., Mobile radio system around the world, second generation (2G) cellular network, evolution to 2.5G wireless network, evolution for 2.5G TDMA standards, third generation (3G) and forth generation wireless networks.	L1 and L2	4
MODULE 2: **The Cellular Concept** System design fundamentals, frequency reuse channel assignment strategies, Hand off strategies, Interference and system capacity, improving coverage and capacity in cellular system.	L2 and L3	10
MODULE 3: **Propagation Model and Spread Spectrum Modulation Techniques** Longley rice model, okumara model, hata model, pcs extension to hata model, wolfish and bertoni model, Pseudo Noise (PN) sequence, Direct sequence spread spectrum (DSSS), frequency hopped spread spectrum (FHSS).	L2 and L4	12
MODULE 4: **Multiple Access Techniques for Wireless Communication** Introduction to multiple access, Frequency division multiple access (FDMA), Time division Multiple access (TDMA), Spread spectrum multiple access, Packet Radio.	L2 and L3	6
MODULE 5: **Global System for Mobile** Global system for mobile (GSM), GSM system architecture, GSM radio subsystem, GSM channel types, Example of a GSM cell, Frame structure of GSM.	L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks

Text:

- Theodore S. Rappaport, "Wireless Communication", 2nd edition, Pearson Education, 2009.

References:

- William Stallings,"Wireless Communications & Networks", 2nd edition, Pearson Education, 2009.
- Gerry Christensen, Robert Duncan, Paul G. Florack, "Wireless Intelligent Networking", 2nd edition , Artec House Publication 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	3	--	--	--	3	--	1	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	2		1	--
CO3	1	2	--	--	--	--	--	--	3	--	--	--	--	--	1	--
CO4	1	2	--	--	--	--	--	--	3	--	--	--	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

ECE2721	**EMBEDDED SYSTEM WITH ARM MICROCONTROLLER**	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course introduces the concept of architecture and programming of advanced embedded microcontrollers i.e, ARM family of microcontrollers that are widely used in design of real time sophisticated embedded systems like tablets, hand held devices, automation and industrial control systems.

Course Objectives

The objective of this course is to

1. Provide an overview of embedded system and real time operating system.

2. Equip the students with concepts of ARM microcontroller and its interfacing with external devices.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and analyse the architecture of ARM microcontroller, Debugging and programming techniques.

CO2: Explain and classify embedded systems and its applications.

CO3: Explain hardware and software design concepts of embedded system.

CO4: Explain real time operating system for embedded system.

Modules	**Blooms level***	**Number of hours**
Module 1	L1, L2, L3 and	9

ARM Microcontroller A brief history of ARM evolution, ARM-32 bit Microcontroller: Thumb-2 technology and applications of ARM, Architecture of ARM Cortex M3, Various Units in the architecture, Debugging support, General Purpose Registers, Special Registers, exceptions, interrupts, stack operation, reset sequence ARM Cortex M3 Instruction Sets and Programming: Assembly basics, Instruction list and description, Useful instructions, Memory mapping, Bit-band operations and CMSIS, Assembly and C language Programming	L4	
Module2 **Embedded System Components** Embedded Vs General computing system, Classification of Embedded systems, Major applications and purpose of ES. Core of an Embedded System including all types of processor/controller, Memory, Sensors, Actuators, LED, 7 segment LED display, Optocoupler, Relay, Piezo buzzer, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components.	L1, L2 and L4	9
Module 3 **Embedded System Design Concepts** Characteristics and Quality Attributes of Embedded Systems, Operational and non-operational quality attributes, Embedded 86 Systems-Application and Domain specific, Hardware Software Co-Design and Program Modelling (excluding UML), Embedded firmware design and development (excluding C language).	L1 and L2	9
Module 4 **RTOS and IDE for Embedded System Design** Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Preemptive Task scheduling techniques, Task Communication, Task synchronization issues – Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques.	L1 and L2	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Joseph Yiu, "The Definitive Guide to the ARM Cortex-M3", 2nd Edition, Newnes, (Elsevier), 2010.

2. Shibu K V, “Introduction to Embedded Systems”, Tata McGraw Hill Education Private Limited, 2nd Edition, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO2	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO3	1	2	-	2	2	--	--	--	--	--	--	2	-	-	1	3
CO4	1	2	-	2	2							2				

1: strongly related, 2: moderately related and 3: weakly related

ECE 2722	Radar and Satellite Communications Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic Electronics and Communication systems				
Co-requisites	Nil				

Catalog Description

This course builds basic knowledge and practical skills for different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

Course Objectives

The objective of this course is to

1. Provide the fundamental knowledge of Radar and its types.
2. Provide the knowledge about modulation techniques.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the working of AM transmitter and receiver.

CO2. Describe the working of FM transmitter and receiver.

CO3. Explain the satellite communications and the components used in this communication.

CO4. Explain the various access techniques used in communication.

Course Content

Modules	Blooms level*	Number of hours
1. To study AM transmitter and receiver.	L1 and L2	1
2. To study FM transmitter and receiver.	L1 and L2	1
3. To implement the following circuits. - AM Transmitter - FM Transmitter - AM Receiver - FM Receiver - Remote Control - Wireless Mic System	L1 and L2	3
4. To study RF portion of satellite receiver. - Study of dish antenna and section N.B section	L2 L3 and L4	3

- Study of tuner - Study of R.F modulator section		
5. To study the base-band portion of satellite receiver - study of video section - study of sound section - study of signal indictor - study of power supply section	L2 L3 and L4	4

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1.M.I. Skolnik. Introduction to Radar Systems, 2nd EditionTata Mc Graw-Hill.
2.T. Pratt & C.W. Boston,Satellite Communications, New York, John Wiley & Sons, 1986.

Reference Books

3. Tri Ha, Digital Satellite Communication, Tata Mc Graw-Hill , 1990-03
4. Harry and Vam Trees**,** Satellite Communication, IEEE Proceeding, 1979.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-
CO2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	-
CO3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	-
CO4	1	2	-	-	-	2	-	-	-	-	-	-	2	-	1	-

1: strongly related, 2: moderately related and 3: weakly related

ECE2723	**Python Lab**	L	T	P	C
Version : 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Python programming platform basics				
Co-requisites	Nil				

Catalog Description

Python has become an important programming tool for research and development in science and engineering. It can be used for programming very easily using various already available packages. This course provides the students the knowledge of python programming. This course introduces the experiments related to logic design using python.

Course Objectives
The objective of this course is

1. Demonstration of python tool for programming.
2. Practice of logic development using python.

Course Outcomes

On completion of this course, the students will be able to

CO1. Use python platform for programming purpose.

CO2. Perform experiments and analyze output for various logics.

CO3. Simulate and analyze real problems using python.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Compute the GCD of two numbers. 2. Find the square root of a number (Newton‘s method) 3. Exponentiation (power of a number)	L2, L3,L4 and L5	3
Lab Session 2 1. Find the maximum of a list of numbers 2. Linear search and Binary search 3. Selection sort, Insertion sort	L2, L3,L4 and L5	3
Lab Session 3 3. Merge sort 4. First n prime numbers 5. Multiply matrices 6. Programs that take command line arguments (word count)	L2, L3,L4 and L5	3
Lab Session 4 4. Find the most frequent words in a text read from a file 5. Simulate elliptical orbits in Pygame	L2, L3,L4 and L5	3

6. Simulate bouncing ball using Pygame		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Chun, J Wesley, Core Python Programming, Second Edition, Pearson, 2007 Reprint 2010
2. Barry, Paul, Head First Python, 2nd Edition, O Rielly, 2010

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**3**	**-**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**1**	**-**	**3**
CO2	**1**	**2**	**-**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**1**	**-**	**3**
CO3	**1**	**2**	**-**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**1**	**-**	**3**

1: strongly related, 2: moderately related and 3: weakly related

ECE2735	**SUMMER INTERNSHIP EVALUATION II**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	3
Pre-requisites/Exposure	NA				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview ofpresentation and preparation of report.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**IM**	**EM**
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	-		**1**	**2**
CO2	**1**	**2**	**2**	-	--	--	--	--	--	--	--	--	-	-	**1**	**1**
CO3	**1**	**2**	-	--	--	--	--	--	--	--	--	--	-	-	**1**	**1**
CO4	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	-	-	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

ECE2706	OPTICAL COMMUNICATION	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the study of fundamentals of optical communication. This includes the properties of optical fibers and how they are used to establish optical links for communication systems. The aim of this course is

1. To introduce students with the basics of optical communication system through the wave propagation principles in optical fiber, different sources and detectors used for formation of optical links.

2. To familiarize the students with the different degradation factors for quality of transmission.

3. To gives exposure of advanced Communication use in present optical communication networks through advanced multiplexing technologies, networking and system set up.

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate basics of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.

CO2: Describe the principles of optical sources and detectors and power launching-coupling methods.

CO3: Estimate the losses and analyze the propagation characteristics of an optical signal in different types of fibers

CO4: Identify the applications of optical fiber communication links in various fields.

Modules	Blooms level*	Number of hours
Module I: Fundamentals of Fiber Optics Different generations of optical fiber communication systems, Optical fiber structure, light propagation- total internal reflection, acceptance angle and numerical aperture, signal attenuation and dispersion. Modes in an optical fiber, Optical fibers: step-index, Graded-index, Single and Multimode, other types of fibers.	L1, L2, L3, L4	5
Module II: Optical Sources LED-spontaneous emission- material used in LED, LED efficiency, surface emitting LED, edge emitters, stimulated emission, spontaneous emission, Structure of various LED's, LASER: stimulated emission, double heterostructure LASER, LASER tuning and degradation, driver for LED and LASER.	L2, L3	4
Module III: Photo Detectors Characteristics of photo detector, direct and indirect band gap semiconductors, homo junction and hetro junction photodiodes, p-i-n photodiode, avalanche photodiode, phototransistor, optocouplers	L2, L3	4
Module IV: Fiber Properties Fiber end preparation, fiber splicing, fiber connectors, connection losses, fiber couplers, fiber materials, fiber fabrication, mechanical properties of fibers, different fiber cables.	L2	3
Module V: Fiber Optic Communication System Basic communication components, coupling to and from the fiber, multiplexing and coding, repeaters, bandwidth and rise time budgets, noise, bit error rate and eye pattern.	L3, L4, L5	5
Module VI: Application of Fiber Optics Long haul communication, LAN, medical application, undersea communication, military application, coherent optical communication, Fiber optic sensors- Intensity modulated sensor, Phase sensor, Diffraction Grating sensors.	L3, L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

G. Keiser, Optical fiber Communication. Mc. Graw Hill, 2017.

Reference Books

1. J. Senior, Optical Fiber Communications- principles & practice., PHI, 2010.

2. G.P. Agrawal, Fiber-Optic Communication Systems.,Wiley, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1		2			2		1					3		1	
CO2	2	3	3										3		1	
CO3	2	1		1		2	3							3	1	2
CO4		3			2	2	2		3		2				1	2

1: strongly related, 2: moderately related and 3: weakly related

ECE2716	OPTICAL COMMUNICATIONS LAB	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the practical aspects of fundamentals of optical communication. This includes the properties of optical fibers and how they are used to establish optical links for communication systems. The aim of this course is

1. To introduce students with the basics of optical communication system through the basics of optical waveguides, their parameters and link set up using different type of fibers.

2. To familiarize the students with the different degradation factors for quality of transmission.

3. To gives exposure of multiplexing techniques, coding, coupling techniques used in present optical communication networks

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyze different types of optical waveguides for their properties like Numerical Aperture, basic properties, coupling and transmission characteristic of optical fibres.

CO2: Identify and estimate the losses in optical fiber that affect the performance of transmission systems.

CO3: Design the basic optical links through digital and analog links, different modulation and coding techniques.

Modules	Blooms level*	Number of hours
Lab Session 1: To measure the Numerical Aperture of a multimode fiber	L1,L2	1
Lab Session II: To measure attenuation by cut Back technique.	L4	1
Lab session III: To study the model properties of a multimode fiber.	L1,L2	1
Lab session IV: To couple the light into a single mode fiber & measure the far-field power distribution	L2, L3, L4	1
Lab session V: To measure various fiber alignment losses.	L3,L4	1
Lab session VI: To estimate the power budget for a fiber optic system.	L3,L4	1

Lab session VII: To set up a fiber optic analog link.	L3	1
Lab session VIII: To set up a fiber optic digital link.	L3	1
Lab session IX: To study Time Division Multiplexing of signals.	L3	1
Lab session X: To study Manchester Coding.	L3	1
Lab session XI To study voice digitization	L3	1
Lab session XII: To simulate optical fiber wave guide.	L4, L5	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

G. Keiser, Optical fiber Communication. Mc. Graw Hill, 2017.

Reference Books

1. J. Senior, Optical Fiber Communications- principles & practice., PHI, 2010.

2. G.P. Agrawal, Fiber-Optic Communication Systems.,Wiley, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1		2			2		1					3		1	
CO2	2	3	3										3		1	
CO3	2	1		1		2	3							3	1	2
CO4		3			2	2	2		3		2				1	2

1: strongly related, 2: moderately related and 3: weakly related

ECE 2712	DIGITAL IMAGE PROCESSING	L	T	P	C
Version: 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basics of Signal Processing				
Co-requisites	NIL				

Catalog Description

Image processing has become an important tool for research and investigation in many areas of science and engineering. It takes full advantage of the computational technology of Mathematics and utilization of various tools. This course gives a detailed insight of Image Processing with different techniques used for different purposes.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of digital image processing.
2. Provide in-depth knowledge of various techniques used at different steps of image processing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain the fundamentals of image and its histogram.

CO2: Explain different techniques of image restoration and enhancement.

CO3: Apply coding techniques to remove different types of redundancies in image.

CO4: Represent and recognize the image.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction to Digital Image Fundamentals** The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations. **Image Enhancement in the Spatial Domain:** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	L1 and L2	7
MODULE 2: **Image Enhancement in Frequency Domain** Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering. **Image Restoration:** A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invariant Degradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.	L2 and L3	13
MODULE 3: **Image Compression** Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. *Image Segmentation:*Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation,	L1 and L2	12

Motion based segmentation		
MODULE 4: **Representation and Description** Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. **Object Recoginition:** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.	L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text:

- Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- Maher A. Sid-Ahmed, "Image Processing Theory, Algorithms and Architectures", McGraw-Hill, 1995.
- William K. Pratt, "Digital Image Processing", Wiley-Interscience publication, Second Edition, 1991.
- R. Arthyr, "Fundamentals of Electronic Image Processing", PHI.
- Image processing, Analysis, and Machine vision by Milan Sonka vaclan Halavac Roger Boyle, Vikas Publishing House

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO2	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**

CO3	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**3**	**--**	**--**	**--**	**1**	**3**	**2**	**--**
CO4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ECE 2713	**DIGITAL IMAGE PROCESSING LAB**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites					

Catalog Description

Image processing has become an important tool for research and investigation in many areas of science and engineering. This course is designed to provide the students an understanding of the basic concepts of digital image processing and various techniques used in it. Students will perform practical on hardware kit as well as on software.

Course Objectives
The objective of this course is to

1. Make students demonstrate the concepts of image processing.
2. Apply the different techniques to process image.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the basic image processing tools and commands.

CO2. Apply the filters to remove noise in spatial & frequency domain.

CO3. Apply image processing techniques for compression, segementation and restoration.

Modules	Blooms level*	Number of hours
Lab Session 1 1. To study about the basic image processing tools. 2. Write program for histogram processing.	L3	3
Lab Session 2 3. Write program for filtering in frequency domain. 4. Write program for filtering in spatial domain.	L3 and L4	3
Lab Session 3 5. Write programs for different compression schemes. 6. Write program image restoration.	L3 and L4	3
Lab Session 4 7. Write program for performing different morphological operations. 8. Write program for image segmentation.	L3 and L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- Maher A. Sid-Ahmed, "Image Processing Theory, Algorithms and Architectures", McGraw-Hill, 1995.
- William K. Pratt, "Digital Image Processing", Wiley-Interscience publication, Second Edition, 1991.
- R. Arthyr, "Fundamentals of Electronic Image Processing", PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-

1																
CO 2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO 3	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2724	**ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT**	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5:Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	**Bloom**	**Number of**

	s level*	hours
Module 1: Programming Basic and Recap **Programming Concepts Basics I -** Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, SDLC. **Programming Concepts Basics 2-** Scripting, Net Framework, Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables & Arguments.	L1, L2	8
Module II: RPA Concepts **RPA Basics -** History of Automation, what is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated. **RPA Advanced Concepts -** Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem	L2, L3 and L4	8
Module III: UiPath Introduction & Basics **Introduction to UiPath-** Installing UiPath Studio community edition, The User Interface, KeyboardShortcuts,AboutUpdating,AboutAutomationProjects,IntroductiontoAutomation Debugging, Managing Activation Packages, Reusing Automations Library, Installing the Chrome Extension, Installing the Firefox Extension, Connecting your project to a source control system, Activities Guide. **Variables**, **Control Flow** **DataManipulation-** DataManipulationIntroduction,Scalarvariables,collectionsandTables, Text Manipulation, Data Manipulation, Gathering and AssemblingData. **Recording and Advanced UI Interaction -** Recording Introduction, Basic and Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping,Scraping advanced techniques.Selectors.	L2, L3 and L4	8
Module IV: UiPath Advanced Automation concepts and techniques Image, Text & Advanced Citrix Automation- Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, using tab for Images, Starting Apps. Excel Data Tables & PDF - Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, extracting a single piece of data, Anchors, Using anchors in PDF.	L2, L3 and L4	12

Email Automation- Email Automation, Incoming Email automation, Sending Email automation		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi,Packt Publications,Ist Edition,2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	**3**	--	--	--	--	--	--	**2**	--	**1**	**1**	-	-
CO2	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	-
CO3	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	**2**
CO4	**1**	--	--	**2**	--	--	--	--	--	--	--	--	**1**	**1**	-	**2**

1: strongly related, 2: moderately related and 3: weakly related

ECE2731	**TERM PAPER**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	2

Pre-requisites/Exposure	Nil
Co-requisites	Nil

Catalog Description

Term paper evaluation course requires the students to study about the current technology topic in detail. The students have to read research papers, books and other study sources and finalize the topics for their presentation. Then the student has to prepare it in detail and write a detailed a research paper mentioning all the content related to the topic. The evaluation is later done and a presentation is also to be prepared.

Course Objectives

The objective of this course is to

1. To increase the knowledge and the understanding of a particular topic.
2. To introduce the students about how to write technical papers/research papers.

It trains the students to make use of research tools and material available both in print and digital formats.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the current technical topic

CO2: Study the identified topic in detail

CO3: Prepare a detailed report including the introduction, architecture, advantages, disadvantages etc

CO4: Prepare a brief presentation of the concerned topic

CO5: Present and explain the topic for evaluation

Text Books

As per topic of term paper and discussion with guide.

Reference Books

As per topic of term paper and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**IM**	**EM**
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	-	-	1
CO2	2	1	--	--	--	--	--	--	--	--	--	--	2	-	-	1
CO3	2	2	-	--	--	--	--	--	--	--	--	1	2	-	-	1
CO4	2	2	--	--	--	--	--	--	--	--	1	1	2	-	-	1
CO5	2	2	--	--	--	--	--	--	--	--	1	1	2	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2732	**Project(With Presentation & Evaluation)**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	2
Pre-requisites/Exposure	Basics of Electrical & Electronics				
Co-requisites	Nil				

Catalog Description

Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies and practical exposure
2. Provide an overview of presentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**IM**	**EM**
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	2	2	2	--	--	--	--	--	--	--	--	1	2	-	-	1
CO2	2	2	2	-	1	--	--	--	--	3	--	1	2	-	-	1
CO3	2	2	-	--	--	--	--	--	--	3	--	1	2	-	-	1
CO4	2	2	3	--	--	--	--	--	--	--	1	1	2	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

EMPLOYABILITY SKILLS

Course Code: CSS2751

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

Course Contents:

Module I

Introduction to Public Speaking

Business Conversation, Effective Public Speaking, Art of Persuasion

Module II: Speaking for Employment

Types of Interview, Styles of Interview, Facing Interviews-Fundamentals and Practice Session

Conducting Interviews- Fundamentals and Practice Session

Question Answer on Various Dimensions

Module III

Resume Writing, Covering Letters, Interview Follow Up Letters

Module IV: Basic Telephony Skills

Guidelines for Making a Call, Guidelines for Answering a Call

Module V: Work Place Speaking

Negotiations, Participation in Meetings, Keynote Speeches

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File

GD – Group Discussion

GP – Group Presentation

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

RELATIONSHIP MANAGEMENT

Course Code: BEH 2751

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

To understand the basis of interpersonal relationship
To understand various communication style
To learn the strategies for effective interpersonal relationship

Course Contents:

Module I: Understanding Relationships
Importance of relationships
Role and relationships
Maintaining healthy relationships

Module II: Bridging Individual Differences
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

Module III: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

Module IV: Theories of Interpersonal Relationships
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

Module V: Impression Management
Meaning & Components of Impression Management
Impression Management Techniques (Influencing Skills)
Impression Management Training-Self help and Formal approaches

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - VII

Course Code: LAN2751

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:
Revise the portion covered in the first volume, give proper orientation in communication and culture.

Course Contents:
Module A: Unités 1 – 3: pp. 06 - 46

Contenu lexical :

Unité 1: Rédiger et présenter son curriculum vitae
Exprimer une opinion
Caractériser, mettre en valeur
Parler des rencontres, des lieux, des gens

Unité 2: Imaginer - Faire des projets
Proposer - conseiller
Parler des qualités et des défauts
Faire une demande écrite
Raconter une anecdote
Améliorer son image

Unité 3: Exprimer la volonté et l'obligation
Formuler des souhaits
Exprimer un manque/un besoin
Parler de l'environnement, des animaux, des catastrophes naturelles

Contenu grammatical :

Le passé : passé composé/imparfait
Pronoms compléments directs/indirects, y/en (idées/choses)
Propositons relatives introduites par qui, que, où
Comparatif et superlatif
Le conditionnel présent
Situer dans le temps
Féminin des adjectifs
La prise de paroles : expressions
Le subjonctif : volonté, obligation

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- **le livre à suivre: Campus: Tome 2**

GERMAN - VII

Course Code: LAN2752

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.

To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Dass- Sätze

Explain the use of the conjunction "-that", where verb comes at the end of the sentence

Module II: Indirekte Fragesätze

To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, where again the verb falls in the last place in that sentence.

Module III: Wenn- Sätze

Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of the sentence.

Module IV: Weil- Sätze

Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in the sentence.

Module V: Comprehension texts

Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VI: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation; I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - VII

Course Code: LAN2753

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, expressions used on telephonic conversation and other situations to handle everyday Spanish situations with ease.

Course Contents:

Module I

Revision of earlier semester modules

Module II

Zodiac signs. More adjectives…to describe situations, state of minds, surroundings, people and places.

Module III

Various expressions used on telephonic conversation (formal and informal)

Module IV

Being able to read newspaper headlines and extracts (Material to be provided by teacher)

Module V

Negative commands (AR ending verbs)

Module VI

Revision of earlier sessions and introduction to negative ER ending commands, introduction to negative IR ending verbs

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

RUSSIAN - VII

Course Code: LAN2754

L-T-P : 2-0-0 **Credit Units: 02**

CHINESE – VII

Course Code: LAN2755

L-T-P : 2-0-0 **Credit Units: 02**

Course Objective:

The story of Cinderella first appears in a Chinese book written between 850 and 860 A.D. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills
Dialogue practice
Observe picture and answer the question.
About china part –I Lesson 1,2.

Module II

Pronunciation and intonation
Character Writing and stroke order.

Module III

Ask someone what he/she usually does on weekends?
Visiting people, Party, Meeting, After work….etc.

Module IV

Conversation practice
Translation from English to Chinese and vise-versa.
Short fables.

Module V

A brief summary of grammar.
The optative verb "yuanyi".
The pronoun "ziji".

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References: "Kan tu shuo hua" Part-I Lesson 1-7

PORTUGUESE - VII

Course Code: LAN2756

L-T-P : 2-0-0 **Credit Units: 02**

ECE2837	**PROJECT (DISSERTATION)**	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	0	8
Pre-requisites/Exposure	Basics of Electronics and Communication				
Co-requisites	Nil				

Catalog Description

Major Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility

Course Objectives

The objective of this course is to

3. Equip the students with concepts of new technologies and practical exposure
4. Provide an overview ofpresentation and preparation of report

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the problem statement

CO2: Work on a real world problem and solve it using latest technology

CO3: Prepare a detailed report of the project

CO4: Prepare a brief presentation of their project

CO5: Present and explain the project for evaluation

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	V	PPT	R	IM	EM
Weightage (%)	10	10	10	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**		**1**	**2**
CO2	**1**	**2**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**1**
CO3	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**1**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

ECE 2815	Information Theory and Coding	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Communication System				
Co-requisites					

Catalog Description

The purpose of this course is to introduce students to the basics of coding used in communication system. The course aims to discuss the different entropies, channel capacity and purpose of encoding

Course Objectives

The objective of this course is to

4. Provide a thorough introduction to coding used in communication system.
5. Provide in depth study of entropies, channel capacity and purpose of encoding.

Course Outcomes

On completion of this course, the students will be able to

CO1. Measure entropy in terms of probability and mutual information.

CO2 Explain shannon fano and Huffman coding.

CO3. Prepare linear and cyclic codes for communication system.

CO4 Synthesize different BCH and convolutional codes for information source.

Modules	Blooms level*	Number of hours
MODULE I: **Basic Concepts of Information Theory** A measure of Uncertainty, Binary Sources, Measure of Information for two – dimensional discrete finite probability Scheme, Noise characteristics of channel, Basic relationship among different entropies, Measure of mutual information channel capacity, Capacity of channel with symmetric noise structure BSC and BEC.	L1 and L2	7
MODULE II: **Element of Encoding** Propose of encoding separable binary codes, Shannon Fano encoding , Noiseless coding Theorem of decidability, Mc Millen's Theorem, Average length of encoding	L1 and L2	9

massage, Shannon's Binary encoding, Fundamental Theorem of discrete Noiseless coding, Huffman's Minimum Redundancy codes. **Coding for Reliable Digital Transmission & Storage** Introduction, types of codes, Modulation and Demodulation, Maximum likelihood decoding, types of error, error control strategies.		
MODULE III: **Introduction to Algebra** Groups, Fields Binary field Arithmetic, Construction of Galois field GF (2m), Basic Properties of Galois Field GF (2m), Vector Spacer, Matrices. Linear Block Codes: Introduction to Linear Block codes, Syndrome and Error detection, Minimum distance of block code, error detecting and Error correcting capability a block code Hamming Code. **Cyclic Codes:** Description of Cyclic codes, Generator and parity cheek matrices of cyclic codes, encoding of cyclic codes syndrome computation & error detection decoding of cyclic codes, Error trapping decoding of cyclic codes, Goley Codes. .	L1, L2, L3and L4	10
MODULE IV: **BCH Codes** Description of codes, Decoding of BCH codes, Implementation of Galoes Field Arithmetic, Implementation of error connection, **Convolution Codes:** Encoding of convolution codes, structural properties of Convolution codes, distance properties of Convolution codes, Distance Properties of convolution codes, Maximum likelihood decoding of convolution codes. **Automatics Repeat Request Strategies** Stop and wait, Go back and selective repeat ARQ strategies, Hybrid ARQ Schemes.	L1, L2, L3 and L4	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. F.M. Reza, "An introduction to Information Theory", McGraw Hill, 2000.

4. Viterbi A and Omura J K, "Principles of Digital Communication and Coding", McGraw Hill, 1979

Reference Books

3. Cover T M and Thomas J A, "Elements of Information theory", 2nd edition, John Wiley & Sons, 2006

4. Roth R, "Introduction to Coding theory", Cambridge University Press, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**2**	**2**	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**
CO2	**2**	**3**	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO3	**2**	**3**	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**
CO4	**2**	**3**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ECE2805	**RTOS Programming**	L	T	P	C
Version 2019.1	Date of Approval: 14, July 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The syllabus introduces real time operating systems and resource analysis. It introduces the concepts of Processing, I/O Resources, Memory, Multi-resource, Soft Real-Time Services, Embedded System components, Debugging Components, Performance Tuning, High availability and Reliability Design.

Course Objectives

The objective of this course is to

1. Provide an overview of real time operating system.
2. Equip the students with concepts of Resources ,debugging techniques, performance tuning and reliability analysis.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain history of real time operating system and the concepts of resource analysis.

CO2: Explain the concepts of processing and I/O resources.

CO3: Explain the concept of memory, multi-resource and soft real-time services.

CO4: Explain embedded system components and apply debugging techniques.

CO5: Explain performance tuning, high availability and the concepts of reliability design.

Modules	**Blooms level***	**Number of hours**
Module-1 **Introduction to Real-Time Embedded Systems:** Brief history of Real Time Systems, A brief history of Embedded Systems, System Resources: Resource Analysis, Real-Time Service Utility, Scheduling Classes, The	L1 and L2	7

Cyclic Executive, Scheduler Concepts, Preemptive Fixed Priority Scheduling Policies, Real-Time OS, Thread Safe Reentrant Functions.		
Module-2 **Processing and I/O Resources:** Preemptive Fixed-Priority Policy, Feasibility, Rate Monotonic least upper bound, Necessary and Sufficient feasibility, Deadline – Monotonic Policy, Dynamic priority policies, I/O Resources: Worst-case Execution time, Intermediate I/O, Execution efficiency, I/O Architecture.	L1 and L2	8
Module-3 **Memory, Multi-resource and Soft Real-Time Services:** Physical hierarchy, Capacity and allocation, Shared Memory, ECC Memory, Flash file systems, Multi-resource Services: Blocking, Deadlock and livestock, Critical sections to protect shared resources, priority inversion, Soft Real-Time Services: Missed Deadlines, QoS, Alternatives to rate monotonic policy, Mixed hard and soft real-time services.	L1 and L2	8
Module-4 **Embedded System and Debugging Components:** Firmware components, RTOS system software mechanisms, Software application components, Debugging Components**:** Execptions assert, Checking return codes, Single-step debugging, kernel scheduler traces, Test access ports, Trace ports, Power-On self test and diagnostics, External test equipment, Application-level debugging.	L1, L2 and L3	7
Module-5 **Performance Tuning, High availability and Reliability Design:**Basic concepts of drill-down tuning, hardware – supported profiling and tracing, Building performance monitoring into software, Path length, Efficiency, and Call frequency, Fundamental optimizations. High availability and Reliability Design: Reliability and Availability, Similarities and differences, Reliability, Reliable software, Available software, Design tradeoffs, Hierarchical applications for Fail-safe design.	L1, L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. "Real-Time Embedded Systems and Components", Sam Siewert, Cengage Learning India Edition, 2007.
2. "Programming and Customizing the PIC microcontroller", Myke Predko, 3rd Ed, TMH, 2008.

Reference Books:

3. "Programming for Embedded Systems", Dreamtech Software Team, Jhon Wiley, India Pvt. Ltd., 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**2**	**2**	**-**	**-**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**3**			
CO2	**1**	**2**	**-**	**-**	**2**	**--**	**--**	**--**	**-**	**--**	**--**	**2**			
CO3	**1**	**2**	**-**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**-**	**2**			
CO4	**1**	**2**	**-**	**-**	**2**	**-**	**--**	**--**	**-**	**--**	**-**	**2**			
CO5	**1**	**2**	**-**	**-**	**1**	**-**	**--**	**--**	**-**	**--**	**-**	**2**			

1: strongly related, 2: moderately related and 3: weakly related

ECE 2806	VERILOG PROGRAMMING	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	2	0	0	2
Pre-requisites/Exposure	Basic Digital Electronics				
Co-requisites	Nil				

Catalog Description

This course discusses fundamental Verilog concepts of today's most advanced digital design techniques. it offers broad coverage of Verilog HDL from a practical design perspective. Introduces students to gate, dataflow (RTL), behavioural, and switch level modeling, describes leading logic synthesis methodologies; explains timing and delay simulation; and introduces many other essential techniques for creating tomorrows complex digital designs

Course Objectives

The objective of this course is to

1. Provide the fundamental knowledge of Verilog HDL for practical designs.
2. Introduces the knowledge logic synthesis and design methodologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the basic concepts of Verilog HDL.

CO2. Design and solve the Gate level and dataflow modeling of various circuits.

CO3. Solve the circuits using Behavioural modeling.

CO4. Utilize the circuital knowledge on advanced Verilog topics.

Course Content

Modules	Blooms level*	Number of hours
MODULE I: : Introduction to Verilog HDL and Basic Concepts Emergence of HDL, typical design flow, trends in HDL, Modeling concept Design methodologies, modules, instances, simulation, design block and stimulus block Lexical conventions, Data Types. System Tasks and Compiler Directives, Modules and Ports	L1 and L2	6

MODULE II: Gate-Level Modeling and Dataflow Modeling Gate Types. Gate Delays, Continuous Assignments. Delays. Expressions, Operators, and Operands. Operator Types. Examples for combinational and sequential circuit using Gate level and Data-flow modeling.	L1 and L2	5
MODULE III: Behavioural Modeling Structured Procedures. Procedural Assignments. Timing Controls. Conditional Statements. Multiway Branching. Loops. Sequential and Parallel Blocks. Generate Blocks. Examples	L1 and L2	6
MODULE IV: Tasks and Functions and Useful Modeling Techniques Difference between Tasks and Functions. Tasks. Functions. Procedural Continuous Assignments. Overriding Parameters. Conditional Compilation and Execution. Time Scales. Useful System Tasks	L1 and L2	7
MODULE V: Advanced Verilog Topics Timing and Delays. Switch Level Modeling, User-Defined Primitives, Logic Synthesis with Verilog HDL, Advanced Verification Techniques.	L2, L3 and L5	6

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1.Samir Palnitkar, Verilog HDL, 2nd Edition Pearson Education, 1996.

2.Donald Thomas, Philip moorby, The Verilog hardware Description language, 5th Edition, Kluwer Academic publishers,2002.

Reference Books

3.J. Bhasker, Verilog HDL Synthesis: A Practical Primer, Star Galaxy publications,1998.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	P	P	P	P	P	P	P	P	P	PO	PO	PO	PS	PS	PS	PS

	O1	O2	O3	O4	O5	O6	O7	O8	O9	10	11	12	O1	O2	O3	O4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO3	1	2	3	-	-	3	-	-	-	-	--	-	1	1	-	-
CO4	1	1	-	-	-	2	-	-	-	-	-	-	1	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

ECE 2813	Verilog Programming Lab	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	0	0	2	1
Pre-requisites/Exposure	Basic digital electronics				
Co-requisites	Nil				

Catalog Description

This course discusses fundamental Verilog concepts of today's most advanced digital design techniques. it offers broad coverage of Verilog HDL from a practical design perspective. Introduces students to gate, dataflow (RTL), behavioral, and switch level modeling, describes leading logic synthesis methodologies; explains timing and delay simulation; and introduces many other essential techniques for creating tomorrows complex digital designs

Course Objectives

The objective of this course is to

1. Provide the fundamental knowledge of designing digital circuits in Verilog HDL.
2. Provide the knowledge logic synthesis methodologies of digital circuits.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the codes for various combinational circuits.

CO2. Write the codes for various sequential circuits.

CO3. Model circuits using behavioral and dataflow methods.

CO4. Synthesize the circuits using various methodologies.

Course Content

Experiments	Blooms level*	Number of hours
1. Write a Verilog code to realize all the logic gates. 2. Write a Verilog code to implement Half Adders, Full adders and Subtracters using Gates.	L1 and L2	2
3. Write a Verilog code to describe the function of Multiplexer and Demultiplexer using different modelling styles. 4. Write a Verilog code to realize D Flip-Flop and D Latch.	L1 and L2	2

5. Write a Verilog code to implement 2:1 Mux and D Latch using Switches. 6. Write a Verilog code to implement Encoders and Decoders Using if-else Statement and case Statement.	L1 and L2	2
7. Write a Verilog code to implement SR Flip Flop using UDP (User Defined Program). 8. Write the Verilog code for a JK Flip-flop, and its test bench. Use all possible combinations of inputs to test its working.	L1 and L2	3
9. Write the hardware description of a 8-bit register with parallel load, shift left and shift right modes of operation and test its operation. 10. Write a Verilog code to realize Up/Down Counter and Divide by 4.5 Counter. Write a Verilog code to describe the function of Synchronous FIFO. 11. Write a Verilog code using FSM to realize a sequence detector (101101).	L1 and L2	3

*Bloom's Level: L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1.Samir Palnitkar, Verilog HDL, 2nd Edition Pearson Education, 1996.

2.Donald Thomas, Philip moorby, The Verilog hardware Description language, 5th Edition, Kluwer Academic publishers,2002.

Reference Books

1. J. Bhasker, Verilog HDL Synthesis: A Practical Primer, Star Galaxy publications,1998.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA – Internal Assessment, EE - External Exam, PR - Performance, LR – Lab Record, V – Viva.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	1
CO2	1	2	-	-	-	3	-	-	-	-	-	-	2	-	1	1
CO3	1	2	3	-	-	3	-	-	-	-	--	-	2	-	1	1
CO4	1	2	-	-	-	2	-	-	-	-	-	-	2	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

ECE2818	**WIRELESS COMMUNICATION**	L	T	P	C
Version : 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Communication System				
Co-requisites	Nil				

Course Objective:
The objective of the course is to provide an overview of Wireless Communication networks area and its applications in communication engineering. The contribution of Wireless Communication networks to overall technological growth and the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks are described.

Course Objectives

The objective of this course is to

1. To introduce advanced wireless communication systems.
2. To learn the wireless channel characteristics and models.

Course Outcomes

On completion of this course, the students will be able to

CO1: Evolution of mobile radio communications and comparative study of 2G, 3G.

CO2: Explain cellular concepts, fading, wireless networks and Wireless standards.

CO3: Apply the TDMA, FDMA and CDMA techniques for a given network application.

CO4: Comparison based on various parameters of wireless, telephone and ISDN networks.

CO5: Study the advanced concepts of Intelligent cell concept and application.

Course Contents:

Modules	Blooms level*	Number of hours
Module 1 Introduction to Wireless Communication Systems Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems.	L1 and L2	8

Modern Wireless Communication Systems: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks.		
Module 2 Introduction to Cellular Mobile Systems Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems. Ellular System Design Fundamentals: Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity.	L2 and L3	10
Module 3 Multiple Access Techniques For Wireless Communication Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.	L2 and L4	10
Module 4 Wireless Networking Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks.	L3 and L4	10
Module 5 Intelligent cell concept and application Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.	L1 and L2	10

Text Books:

1. Theodore S. Rappaport, Wireless Communications, Pearson, 2010.
2. W.C.Y.Lee, Mobile Cellular Telecommunication, Tata McGraw Hill, 2010.

Reference Book:

1. Jochen Schiller, Mobile Communications, Pearson, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2													2	
CO2		3									2				1	3
CO3	2				3						2				2	3
CO4		3													3	
CO5	2		3												1	

ECE2816	**ADVANCED ROBOTIC PROCESS AUTOMATION DESIGN & DEVELOPMENT**	L	T	P	C
Version 2019.1	Date of Approval: 14 July 2019	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

This course aims at providing knowledge of basic concepts of Robotic Process Automation to University students. It further builds on these concepts and introduces key RPA Design and Development strategies and methodologies specifically in context of UiPath products. The student undergoing the course shall develop the competence to design and develop a robot for a defined process.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of robotic process automation
2. Provide an overview of designing with uipath software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain key terms and trends around the robotic process automation along with its physical and logical design

CO2: Understand the potential and value of the robotic process automation .

CO3: Describe the technologies used for the robotic process automation and mobile devices, including (passive and active) sensors, the physical communications layer, communications protocols, programming frameworks,.

CO4: Design programs and have hands on experience on uipath software

CO5:Develop RPA programs of moderate complexity for a well-used robotic automation process using uipath.

Modules	**Blooms level***	**Number of hours**
Module 1: Exception handling and Best Practices **Debugging and Exception Handling- Debugging** Tools, Strategies for solving issues, Catching errors. **Project Organization-** Concept of project organization, Best practices, Avoiding pitfalls, Invoke Activity.	L1, L2	8
Module II: Introduction to Orchestrator	L2, L3	8

Orchestrator, Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.	and L4	
Module III: merging and Future Trends in IT Artificial Intelligence, Machine Learning, Agent awareness, Natural Language Processing Computer Vision	L2, L3 and L4	8
Module IV: Capstone Project Real life case studies which can be used to apply the concepts learnt during the course. The projects shall test student's skills right from process transformation and documentation to the design and development of the actual robot	L2, L3 and L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

"Learning Robotic Process Automation" By Alok Mani Tripathi,Packt Publications,Ist Edition,2018

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	**3**	--	--	--	--	--	--	**2**	--	**1**	**1**	-	-
CO2	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	-
CO3	**1**	--	**1**	**2**	--	--	--	--	--	--	--	--	-	**1**	-	**2**
CO4	**1**	--	--	**2**	--	--	--	--	--	--	--	--	**1**	**1**	-	**2**

1: strongly related, 2: moderately related and 3: weakly related

ECE 2812	ADVANCED VLSI DESIGN	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	VLSI Design				
Co-requisites	Nil				

Catalog Description

This course explores the theory and operation of the basic building blocks of VLSI design which includes current mirror and Op-amp. This course also explains the designing of OTA and their types. The concepts learnt in the studies of OTA will be applied in the design and analysis of filters and oscillators.

Course Objectives

The objective of this course is to

1. Provide the advanced knowledge of VLSI design with building blocks and designing of OTA.
2. Equip with the understanding various types of OTA with their noise analysis.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic operation of MOS transistor, cascade transistors and noise performances.

CO2: Explain the CMOS inverter with DC characteristics, active load and current mirrors.

CO3: Describe gain margin and phase margin; Design and analysis of OTA and explanation on CMRR, offset and PSRR.

CO4: Explain & design cascade and folded OTA.

Modules	Blooms level*	Number of hours
MODULE 1: **Review of Elementary Transistor Stages** MOST single transistor amplifying phase, BJT single transistor, Source and emitter follower and their noise performance, Cascade transistors and noise performance.	L1 and L2	8
MODULE 2:	L1, L2	10

Inverter stage and Building Blocks CMOS inverter, DC analysis, low frequency gain, bandwidth, current capacity, slew rate, amplifying phase, BJT inverter stage and Noise performance, Cascade and its Bandwidth, active load, differential stages, current mirrors and their noise output.	and L3	
MODULE 3: **Op amp Design: Introduction** Design of single transistor OTA: GBW and phase margin, Miller CMOS OTA: GBW and phase margin, Full Dc analysis: Common mode input voltage range versus current supply, output range versus supply voltage, maximum output current, source and sink, Noise analysis of OTAs.	L2,L3, L4 and L5	10
MODULE 4: **Op amp Design: Matching specifications** Transistor mismatch, Offset voltage definition, Mismatch definition, differential stage with active load, Offset drift, CMRR, Offset and CMRR of Miller OTA, Offset in BJT and JFET, Power Supply rejection ratio of simple and Miller OTA.	L1, L2,L3 and L4	10
MODULE 5: **Design of OTAs and design Options** Symmetrical, Cascade OTA, Folded Cascade OTA, Operational Current Amplifier, design for optimum GBW and SR, CMOS Configurations, Bipolar op amp configurations.	L1, L2,L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1.Behzad Razavi, "Design of Analog CMOS Integrated Circuits", 2nd Edition, Tata Mcgraw Hill, 2017

2.Gray, Hurst, Lewis and Meyer, "Analysis and design of Analog ICs", 5th Edition, Wiley publication, 2008

Reference Books

1.Meyer Gray, Hurst, Lewis , "Analysis and Design of Analog Integrated Circuits", 5th Edition, Wiley publication, 2009

2.Allen, "CMOS Analog Circuit Design", 3rd Edition, Oxford University Press,2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	3	2	3	--	--	--	--	--	--	--	--	2	--	1	--	3
CO3	3	2	1	--	1	--	--	--	--	--	--	2	--	1	--	3
CO4	2	3	3	--	1	--	--	--	--	--	--	--	--	1	--	3

1: strongly related, 2: moderately related and 3: weakly related

ECE2814	Power Electronics	L	T	P	C
Version 2019.1	Date of Approval: May 21, 2019	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course introduces students to the theory of Power Electronics. It includes basics of Thyristor family devices with its firing circuits. It includes the design concepts of Converter, Inverter, Chopper, AC voltage controller, cycloconverter along with some basic application based on power electronics.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Power Electronics Devices.
2. Provide in depth knowledge so that they can design applications based on Power Electronic concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain concept of various triggering elements.

CO2. Explain and solve problems on thyristor, its rating, protection and firing circuits as well as compare and design firing circuits of thyristor.

CO3. Analyze and solve the problems of Converter, Inverter, Chopper, AC voltage controller and

Cycloconverter for different types of load.

CO4: Explain design concept of power electronic applications.

Modules	Blooms level*	Number of hours
Module 1: **Triggering Devices** Triggering devices, Unijunction Transistor, Characteristics and applications of UJT, Programmable Unijunction Transistor, DIAC, Silicon Controlled Switch, Silicon Unilateral Switch, silicon Silicon bilateral Switch, Shockley diode.	L1 and L2	6

Module 2: **Thyristor Firing Circuits, Turn on systems** Two transistor model of Thyristor, Method of Triggering a thyristor, Thyristor Types, Requirement for triggering circuits, Thyristor Firing Circuits, Fullwave control of Ac with one thryristor, Light activated SCrs (LASCR), Control Circuit, dv/dt and di/dt protection of Thyristor, Pulse Transformer triggering, Firing SCR by UJT, TRIAC firing circuit, Phase control of SCR by pedestal and Ramp.	L1, L2, L3, L4 and L5	9
Module 3: **Controlled Rectifiers** Types of Converters, effect of inductive load, Commutating diode or free wheeling diode, controlled rectifiers, Bi phase half wave, single phase full wave phase controlled converter using bridge principle, harmonics.	L1, L2, L3 and L4	8
Module 4: **Inverters** Types of Inverters, Bridge Inverters, Voltage Source Inverters, Pulse Width Modulation Inverters, Current source Inverters.	L1, L2, L3 and L4	6
Module 5: **AC Voltage Controllers** Types of AC voltage Controllers, AC Phase Voltage controllers, single Phase Voltage Controller with RL load, harmonic analysis of single phase full wave controller with RL load.	L1, L2, L3 and L4	5
Module VI: **DC to DC Converters** DC choppers, Chopper classification, two quadrant chopper, Four quadrant chopper.	L1, L2, L3 and L4	5
Module VII: **Cyclo Converter** Single phase and three phase cycloconverters.	L1, L2, L3 and L4	4
Module VIII: **Industrial Applications** One shot Thyristor trigger Circuit, over voltage protection, simple battery charger, battery charging regulator, AC static switches, DC static switch	L1 and L2	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Michael Jacob "Power Electronics: Principles and Applications", Thomson Press (India) Ltd
4. P. S. Bimbhara, "Power Electronics" Khanna Publications

Reference Books

5. H. C. Rai, “Power Electronics Devices, Circuits, Systems and Application”, Galgotia, 3rd Ed.
6. M. H. Rashid, “Power Electronics Devices, Circuits and Applications”, Pearson Education India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	--	3	--	3
CO 2	1	1	2	--	--	--	--	--	--	--	--	3		2	--	2
CO 3	1	1	--	--	--	--	--	--	--	--	--	3		2	--	2
CO 4	1	1	3	--	--	-	--	--	--	--	--	3		2	--	2

1: strongly related, 2: moderately related and 3: weakly related

WORKSPLACE COMMUNICATION

Course Code: CSS2651

L-T-P : 1-0-0 **Credit Units: 01**

PERSONAL AND PROFESSIONAL EXCELLENCE

Course Code: BEH 2851

L-T-P : 1-0-0 **Credit Units: 01**

Course Objective:

Importance of Personal and Professional excellence
Inculcating the components of excellence

Course Contents:

Module I: Components of Excellence
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.

Module II: Managing Personal Effectiveness
Setting goals to maintain focus
Dimensions of personal effectiveness (self disclosure, openness to feedback and perceptiveness)
Integration of personal and organizational vision for effectiveness
A healthy balance of work and play
Managing Stress creatively and productively

Module III: Personal Success Strategy
Time management
Handling criticism and interruptions
Dealing with difficult people
Mapping and evaluating the situations
Identifying long-term goals

Module IV: Positive Personal Growth
Understanding & Developing positive emotions
Positive approach towards future
Resilience during loss and challenge
Module V: Professional Success
Building independence & interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

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AMITY UNIVERSITY HARYANA

GURUGRAM

FIRST SEMESTER

MATHEMATICS – I

Course Code:

L-T-P : 2-1-0 **Credit Units : 03**

Course Objective:
The objective of this course is to provide an introduction to the fundamentals and concepts of basic mathematics covering sets, functions, differentiation, integration, differential equations, vectors and matrices. This course aims to assist the students to develop confidence in handling mathematical concepts and techniques and to understand the principles and Concept of differential Calculus.

Course Contents:

Module I:Matrices and Determinants
Definition of Matrix, Sub matrix, types of Matrices such as Symmetric and Asymmetric, Square, Diagonal Matrices, Singular and Nonsingular matrices, Addition, Subtraction, Multiplication of Matrices, Determinant of Square Matrix, System of linear equations, Solution by Cramer's rule and Gauss Elimination method.

Module II: Differentiation and Integration
Differentiation of standard functions: Polynomial, Rational, Exponential, Logarithmic and Trigonometric functions, Product rule, Quotient rule, Successive Differentiation.Integration of functions, Method of change of variables and Method of substitution for Integrals, Definite Integrals, and their properties., Practical applications of integrals.

Module III: Differential equations
Order and Degree of ODE, General solution and Particular solution, formation of ODEs, Differential equations of first order, Variable separable method, Homogeneous method and its variants, Differential equations of second order with constant coefficients, Complementary function and Particular Integral for some standard functions.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text/References:

Tesxt:

- NCERT MATHEMATICS – PART I- II,Textbook for Class XII
- R.B. Babat, Linear algebra and linear model, Hindustan book agency
- Advanced Engineering Mathematics By Erwin Kreyszig.
- Ordinary Differential Equationbs By Tenebaum and Pollard

References :

- K. Hoffman and R. Kunze, Linear algebra, second edition, Prentice Hall India Learning Private Limited

- Elementry Differential Equations,William E.Boyee|Richard C.DiPrima(Ninth Edition)

COMPUTER FUNDAMENTALS AND TOOLS

Course Code: IFT **Credit Units: 03**
L-T-P:3-0-0

Course Objective:

This course is aimed to provide a fundamental understanding of computer science for the students in their early stages of academic career. Various computer nomenclatures regarding to hardware and software will be introduced for students to develop an in-depth realization of several subjects and their significant roles in the field. After this course, you will be able to understand fundamental concepts of computer.

Course Contents:

Module I Computer and its characteristics, application of computers, digital and analog computer, Generation of computers, Storage devices: primary storage devices (RAM,ROM,PROM,EPROM,EEPROM) , secondary storage devices(Floppy disk, Hard disk, optical disk, magnetic tapes), Input and output devices (keyboard, mouse, light pen, joystick, scanner, monitor, printers etc.)

Module II Software and its types (System Software, Application Software, Firmware Softwares) Computer Languages and its types (Machine Language, Assembly Language, High Level Language: advantages and disadvantages of computer languages),Translators :Compiler, Linker, Interpreter . Number system and its types, conversion from one base to another and vice versa.

Module III Word Processor and its features, Editing of Text, Find and Replace, Bullets and Numbering, Spell Checker, Grammar Checker, Auto Correct, Auto Complete, Auto Text, Header and footer, tables, mail merge, border and shading, page setup, printing.

Module IV Spread sheet and its features, Entering Information in Worksheet, Editing Cell Entry, Moving and Copying Data, deleting or Inserting Cells, Rows and Columns, Custom Numeric Formats, Using Formulas and functions, Creating charts.

Module V Presentation Software and its uses, steps for creating PowerPoint Presentation, PowerPoint Views, Assigning Slide Transitions, Using Preset Animations, Hiding Slides, Slide Show, Controlling the Slide Show with a Keyboard, Setting Slide Show Timings.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Test & References
Text:

- P.K Sinha & Priti Sinha, Computer Fundamentals, BPB Publications.
- Peter Nortan, Introduction to Computers, Tata Mcgraw Hill.

References:

- Suresh K. Basandra, Computer Systems Today, Galgotia Publications.
- Joyce Coax , Joan Preppernau,,Steve Lambert and Curtis Frye,2007 Microsoft Office System step by step, Microsoft Press
- R.K. Taxali, PC Software for Windows, Tata Mcgraw Hill.

DIGITAL ELECTRONICS

Course Code: IFT **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:
An entry level course in digital electronics covering number systems, binary mathematics, digital codes, logic gates, Boolean algebra, Karnaugh maps, and combinational logic. Emphasis will be on circuit logic analysis and design of digital circuits. The student will explain the operation of digital logic gates and use Boolean algebra and Karnaugh mapping to express logic operations and minimize logic circuits in design. The student will construct, analyze combinational logic circuits & sequential circuits; create a truth table for standard digital logic gates; and add, subtract, multiply and divide using the binary numbering system. Student will also be able to understand about digital to analog conversion and vice versa.

Course Contents:

Module I: Number System
Decimal, Binary, Octal, Hexadecimal Number Systems and Conversion of the bases, Complements: r's complement, (r-1)'s complement, Binary codes: Grey code, BCD Code, Excess-3 code
Introduction to logic systems
Positive and negative logic, Logic functions - NOT, AND, OR, NOR, EX-OR, EX NOR
Truth tables Boolean algebra, De Morgan's theorems Standard forms for Logical Expressions - Sum of Products, Product of Sums Specification of Logical functions in terms of Minterms and Maxterms, Karnaugh Maps, Simplification of Logical functions, Introduction of "don't care" states.

Module II: Combinational Building Blocks
Multiplexers, De-multiplexers, Decoders, Encoders
Arithmetic circuits
Half Adders and Full Adders**,** Half Subtractor and Full Subtractor

Module III: Flip-flops
The RS latch, the clocked RS flip-flop, JK Flip Flop, the Master-Slave JK flip-flop, Delay and Toggle flip-flops
Flip-flops in counter circuits
Asynchronous (ripple) Counters (UP/DOWN), Synchronous Counter design (UP/DOWN), Non Sequential Counting

Module IV: Shift Registers
Shift registers in general, Ring Counters, Johnson Counter
Introduction to Memory
Primary: RAM, Static RAM, Dynamic RAM, ROM, PROM, EAPROM, Secondary: Floppy Disk, Hard Disk, CDROM

Module V: Introduction to Logic Families, DACs and ADCs
Introduction to logic families-TTL, RTL,ECL,CMOS,DTL,IIL
Binary weighted resistor DAC, Resolution, linearity and settling time of DACs, Successive approximation ADC

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- R.P Jain, Mordern Digital Electronics, Tata Mcgraw Hill.

References:

- Malvino & Leach, Digital Electronics, Tata Mcgraw Hill,2006,Edition 6.
- Floyd, Digital Fundamentals,Pearson,2015.
- M.M Mano, Digital Logic and Computer Design,Pearson.

COMPUTER PROGRAMMING WITH C LANGUAGE

Course Code: IFT **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:
The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate linked lists.

Course Contents:

Module I: Introduction to 'C' Language
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associatively. Managing Input and output Operation, formatting I/O.

Module II: Decision making and looping

Decision making in program, Relational Logical operators example, if statements, if -else, nested if-else statements, Switch, case loop, Do-While, While, for loop and nesting of loop, continue and break , Storage types , predefined processor.

Module III: Arrays and Functions
One Dimensional Arrays, Arrays Manipulation, Sorting, Searching, Function declaration, example & calling a function. Passing Arguments, call by value and call by references, Recursive function, .Recursion.

Module IV: Pointers and String
Pointers: Declaration, Pointer assignments, initialization, Pointers and Dynamic Memory Allocation, Array of Pointers, strings, string handler functions.

Module V: Structure Union & file handling
Structure definition, Declaration, structure Assignments, Arrays in structure, Structure Arrays, Pointer Structure, Nested Structure, Arrays of Structure, Union declaration, assignments & example programs, Difference between structure & union, file handling and the related functions.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- Problem Solving through C language, E. Balagurusamy, TMH publication.
- Peter Nortons, “Introduction to Computers”, TMH publication.

References:

- Peter Nortons, “DOS Guide”, Prentice Hall
- Gottfried, “Programming in C”, Schaum, Tata McGraw Hill
- Y. Kanetkar, “Let us C”, BPB Publications
- Y. Kanetkar, “Understanding Pointers”, BPB Publications
- Schidlt, “The Complete Reference of C”, Tata McGraw Hill

Computer Fundamentals & Tools Lab

Course Code: IFT **Credit Units: 01**
L-T-P:0-0-2

1. Create a new folder and do the following:
    1. Make a word document in it.
    2. Make an Excel document in it.
    3. Make a new folder in it
    4. Rename the initial folder
    5. Move the initial folder
    6. Copy the initial folder.
    7. Delete the initial folder
2. Implement the various well known features of Windows operating system such as Notepad, WordPad, Paint, System tools, Entertainment etc. enclosed in Start→Programs→Accessories.
3. Implement various display properties by right clicking on the Windows Desktop.
4. Explore the taskbar of Windows.
5. Set the wall paper and screen saver.
6. Set the date/time.

MS-Word

1. Create a document and
    a. Put Bullets and Numbers
    b. Apply various Font parameters.
    c. Apply Left, Right, and Centre alignments.
    d. Apply hyperlinks
    e. Insert pictures
    f. Insert ClipArt
    g. Show the use of WordArt
    h. Add Borders and Shading
    i. Show the use of Find and Replace.
    j. Apply header/footers
2. Create any document and show the use of File→versions.
3. Create any document and show the difference between paste and paste special.
4. Create a document to show the use of Washout/Watermark.
5. Implement the concept of mail merge.
6. Implement the concept of macros.
7. Implement the concept of importing a file/document.
8. Implement the concept of merging the documents.
9. Crate a student table and do the following:
    a. Insert new row and fill data
    b. Delete any existing row
    c. Resize rows and columns
    d. Apply border and shading
    e. Apply merging/splitting of cells
    f. Apply sort
    g. Apply various arithmetic and logical formulas.
10. Create your resume using General Templates.

COMPUTER PROGRAMMING WITH C LANGUAGE Lab

Course Code: IFT **Credit Units: 01**
L-T-P:0-0-2

1. Write a program to swap 2 no

2. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order.
3. Write a program to perform the arithmetic expression using switch statement.
4. Write a program to find factorial of given no using do while statement.
5. Write a program to print prime up to n no.
6. Write a program to sum of n natural no.
7. Write a program to print the product of two matrices of any order.
8. Write a program to print Fibonacci series.
9. Write a program to print the following pattern using for loop
   1
   2 2
   3 3 3
   4 4 4 4
10. Write a program to read n num of students and 5 subjects marks.
11. Write a program to find factorial of a num using 3 types of functions.
12. Write a program to convert all lower case to uppercase characters
13. Write a program to find the factorial of a number using recursion
14. WAP program to print the element of array using pointers.
15. WAP program to implement call by reference.
16. WAP program to find greatest of 'n' num using function.
17. WAP to Create , initialize and access the elements of a structure.
18. WAP program to print the elements of a structure using pointers
19. WAP program to display student information by initializing structures
20. WAP program to find total number of marks.
21. WAP program to find the total salary of employee and employee details using structure.
22. Program to write data into file and read data from file.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SECOND SEMESTER

MATHEMATICS – II

Course Code:

L-T-P : 2-1-0 **Credit Units : 03**

Course Objective: The objective of this course is to expose the students to the fundamentals and the concepts of Mathematics including application of derivatives, partial differentiations and vector calculus.This course is designed to understand the basic mathematical logic as a foundation of computer science and applications.

Module I: Application of Derivatives
Rolle's theorem, Mean value theorem: Langrange's form, Cauchy's form.Generalized Mean value theorem: Taylor's theorem, Indeterminate form: Taylor's infinite series, Maclaurian's series, Power Series expension of some standard functions: e.g., sin x, cos x, log (1+x), etc., Maxima and minima of one variable functions. Partial differentiation, Euler's theorem for homogeneous functions.

Module II: Vector calculus
Differentiation of vectors,scalar and vector point function. Gradient of a scalar field.directional derivative,divergence and curl of a vector field and their physical interpretations.integration of vectors,line integral, surface integral, volume integral .

Module III: Partial Diffrential equation and its applications.
Formation of partial differential equations,Lagrange's linear partial differential equation. Classification of second order partial differential equations. Method of separation of variables and its application to wave equation, one dimensional heat equation, Laplace equation.
Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text/References:

Text:

- NCERT MATHEMATICS – PART I- II,Textbook for Class XII
- "Higher Engineering Mathematics '' by Grewal,B S

References :

- "Essential Calculus with application'' by Richard A Silverman
- W.A.Strauss,Partial Differential Equations:An Introduction,Wiley2007 (2nd edition)
- Strauss, M. J., Bradley, G. L. and Smith, K. J. (2007): Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

WEB TECHNOLOGIES

Course Code: IFT **Credit Units: 03**
L-T-P : 3-0-0

Course Objective:
This course is aimed to provide a fundamental understanding of web site creation. HTML is the language used for designing most basic web pages. Syllabus includes basic and advanced features of HTML.It also give an overview of XML and CSS.

Course Contents:

Module I: Introduction to HTML
History of HTML, Structure of HTML, HTML Basic: Elements, Tags and Attributes. Adding Comments, Adding Title, HTML Background: using plain color, using image, Formatting Text : Paragraph, inserting line break, Heading Style, Bold text, Italicized text, Underlined text, Teletype text, Strikeout, Superscript, Subscript, Important text, Emphasized text, Inserted text, Deleted text, Larger text, Smaller text. Working with Text: Changing font Sizes and Colors.
Creating List: Ordered List, Unordered List, Definition List, Nested List. Inserting image, Creating Hyper Text Links, Creating Image Links, Horizontal Rules, Marquee Tag. Address Tag.

Module II: Table & Frames
Tables: Creating Tables, Table Element, Adding Border, Adding Column Headings, Cellspacing and Cellpadding, Adding a Caption, Setting the table Width and Height, Add Row Headings, Aligning Cell contents, Setting Column Width, Centering a Table, Inserting Image, Rowspan, Colspan, Assigning Background Colors.
Frames: Frameset Element, Frame Element, Noframes Element, Specifying Target,Inline Frames.

Module III: Forms and validation
Forms: Introduction to Forms, Form Elements, Text Field, Password Field, Label, Check Box, Radio Button, Selection List, Text Area, Button.
Front level validations using JavaScript: Checking a Non-empty Text/Password Field, Restricting Length of Text/Password Field.

Module IV: Cascading Style Sheets
Overview of style sheets, Advantages, Different ways to use style sheet: External style sheet, Internal style sheet, Inline style sheet.
Selectors: Element selector, Id selector, Class selector, Grouping selector. Adding style to a Document, Adding Comments in CSS.

Module V: XML
Introduction to XML, XML Basics, XML Structure, XML Tags, XML Elements, XML Attributes, Adding Comments, XML Document Type Declaration: Internal DTD and External DTD. Well formed XML Documents and Valid XML Documents.

Examination Scheme:

Components	CT	A/C/Q	ATTD.	EE
Weightage	15	10	5	70

Text & References:

Text:

- HTML, DHTML, JavaScript, Perl, CGI, Ivan Bayross, BPB Publication.
- Web Technologies,Uttam.K.Roy,Oxford University Press.

References:

- HTML Complete Reference, BPB Publication.

DATA STRUCTURES THROUGH 'C' LANGUAGE

Course Code: IFT **Credit Units: 03**
L-T-P:3-0-0

Course Objective:

This course is an introduction to the use, design, and analysis of data structures in computer programs. The very commonly used data structures like arrays, stacks, queues, lists, trees, and graphs will be discussed in detail. Sorting and hashing are important topics in the study of algorithms. They are also closely related to the design of data structures. Several algorithms to implement these techniques are included in the syllabus.

Course Contents:

Module I: Basic concepts and Array

Definition Accessing the address of a variable, Declaring and initializing pointers. Accessing a variable through its pointer. Meaning of static and dynamic memory allocation. Memory allocation functions : malloc, calloc, free and realloc.

Representation of arrays single and multi dimensional arrays. Address calculation using column and rows major ordering. Various operations on arrays, Application of arrays: matrix multi multiplication.

Module II: Stacks and Queues

Definition, Array representation of stack.Operations on stack: Infix, prefix and postfix notations.Conversion of an arithmetic expression from Infix to postfix. Evaluation of postfix expression using stacks.

Definition, Array representation of Queue. Types of queue: Simple queue, circular queue, double ended queue (deque), priority queue, operations on all types of Queues.

Module III: Linked List

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list : Singly linked list, Doubly linked list, Circular linked list and circular doubly linked list. Operations on singly linked list : creation, insertion, deletion, search and display (based on the different position as specified by the user).Linked representation of Stacks & Queues.

Module IV: Trees

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology : Root, Node, Degree of a node and tree, Terminal nodes, Non terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree : Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and post order. Representation of trees and its application, Binary search tree: Insertion & deletion in BST. Height balanced (AVL) tree

Module V: Searching, sorting and complexity

Searching: Sequential and binary search, Comparison between linear and binary search. Sorting: insertion, selection, bubble, quick, merge, heap sort.

Module VI: Graphs

Graph representation: adjacency list, adjacency matrix. Types of Graphs:Directed & Undirected Graph .Traversal scheme: Depth first search, Breadth first search. Spanning tree: definition, minimal spanning tree algorithms.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**ATTD.**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- Brian W. Kernighan, Dennis M. Ritchie"The C Programming Language",Prentice Hall.
- T. Langsam, M.J Augenstein and A.M. Tanenbaum, "Data structure using C and C++ Second edition, 2000, Prentice hall of India.
- R. Kruse, G.L. Tonodo and B. Leung," Data structures and progam design in C", Second Edition, 1997, Pearson education.
- S. Chottopadhayay, D. Ghoshdastidar & M. Chottopadhayay. Data structures through language", First edition, 2001, BPB Publication.

References:

- G.L. Heileman, Data structures, Algorithms and object oriented programming," First Edition 2002, Tata McGraw Hill.
- E. Horowitz, Sahni and D. Mehta," Fundamentals of data structures in C++,"2000 Galgotia Publication

DATABASE MANAGEMENT SYSTEMS

Course Code: IFT **Credit Units: 03**
L-T-P:3-0-0

Course Objective:

The objective of this course is to expose the students to the fundamentals & basic concepts in Data Base Management Systems. This course discusses architecture of Database Systems with concept of relational model & ER model. This course explains techniques for database design, Normalization and database recovery and protection.

Course Contents:

Module I: Introduction to DBMS
Definition of DBMS, Characteristics and Application of Database, Data Independence, DBMS Architecture, Levels, Database Administrator, File System Approach Vs DBMS Approach, Advantages of Using a DBMS, Data Models, Schemas, and Instances, Classification of DBMS.

Module II: Relational Database & ER Model
Relational System, Codd's Rule, Relational Model, Optimization, Tables and Views, Entity, Types of Entity, Weak Entity Attributes, Entity sets , Entity – Relationship Diagrams, Overview of Enhanced-Entity Relationship (EER) Model.

Module III: Relational Model Objects
Domains and Relations, Relations and predicates, Relational Data Integrity; Primary Key, Candidate Key , Foreign Key and their rules; Relational operators, Relational Algebra, Relational Calculus, SQL Language: Schema Definition, Constraints, Queries and Views.

Module IV: Database Design
Definition of Functional Dependencies, Process Of Normalization, First Normal Form, Second Normal Form, Third Normal Form. Boycee Codd Normal Form, Fourth Normal Form, Fifth Normal Form, Database design and implementation process.

Module V: Data Recovery & Protection
Introduction to Transaction Processing, Types of Failure, Database Recovery techniques: Based on Deferred Update, based on Immediate Update, Shadow Paging. Concurrency Control Techniques: Two-Phase Locking technique, Timestamp Ordering, Multiversion Technique.
Introduction to Database Security, Data Security Requirements, Protecting data within database.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:
- Fundamental of Database Systems, Elmasri & Navathe, Pearson Education, Asia
- Database System Concepts, Korth & Sudarshan, TMH

References:

- Raghurama Krishnan: Data base Management Systems, Johannes Gehrke, Tata McGrawHill Latest Edition.
- C.J.Date: Introduction to Database Systems, Pearson Education.
- Data Base Management System, Leon & Leon, Vikas Publications

- Introduction to Database Systems, Bipin C Desai, Galgotia
- Oracle 9i The Complete Reference, Oracle Press

COMPUTER ORGANISATION AND ARCHITECTURE

Course Code: IFT **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:
The student will develop an understanding of the underlying operation of a modern digital

computer, identify and understand the various "building blocks" from which a modern computer is constructed. The student will learn to develop simple assembly language programs and understand the underlying operations of more complex programs using Intel's 8085 Microprocessor.

Course Contents:

Module I: General Computer Architecture
Block Diagram of typical Computer, Memory Section, Input/Output Section, CPU, Registers, Arithmetic Unit, Instruction handling Areas, Stacks

Register Transfer Language and Micro operations: Register Transfer, Bus and Memory Transfer, Arithmetic Micro operations(Binary Adder, Binary Adder-subtractor, Binary incrementer, Arithmetic Circuit), Logic Micro operations, Shift Micro operations, Arithmetic Logic Shit Unit

Module II: Basic Computer Organization and Design
Instruction Codes,stored program organization computer registers, common bus system, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input Output Instructions and Interrupts

Module III: Central Processing Unit
General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC, CISC
Pipelining and Vector Processing: Parallel Processing, Pipelining(General considerations), Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors

Module IV: Input Output Organization
I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP, Serial Communication
Memory Organization: Associative Memory(Hardware organization, Match logic), Cache Memory(associative mapping, Direct Mapping, Set Associative Mapping), Virtual Memory

Module V: Introduction to Microprocessor
Machine Language, Assembly Language, Assembler, High Level Language, Compiler, Interpreter, Internal Architecture 8085.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:
- Computer System Architecture, M.M. Mano, Pearson Education.

References:
- Computer Architecture and Organization, J.P Hayes, TMH.

- Hayes Computer Architecture and Organization, TMH Publisher.

DATA STRUCTURES THROUGH 'C' LANGUAGE LAB

Course Code: IFT **Credit Units: 01**
L-T-P: 0-0-2

Course Contents:

1. Write a program to perform the following operations on two given matrices: Addition and Multiplication
2. Write a program to insert & delete an element from the kth element of an array
3. Write a program to search an element in a given array using linear search.
4. Write a program to search an element in a given array using binary search.
5. Write a program to sort the elements of an array using Bubble Sort.
6. Write a program to sort the elements of an array using Selection Sort.
7. Write a program to sort the elements of an array using Insertion Sort.
8. Write a program using the concept of iteration and recursion to sort the elements of an array using Quick Sort.
9. Write a program to implement a Stack, show overflow and underflow while performing push and pop operations respectively.
10. Write a program to implement a queue and show the following: insertion and deletion
11. Write a program to implement Linear Linked List and show the following operations: creation, display, insertion, deletion and searching.
12. Write a program to implement Doubly Linked List and show the following operations: creation, display, insertion, deletion and searching.
13. Write a program to construct a Binary Search tree and perform the following operations: Insertion and Deletion of a node.
14. Write a program to implement Depth First Search using linked representation of graph.
15. Write a program to implement Breadth First Search using linked representation of graph.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

WEB TECHNOLOGIES LAB

Course Code: IFT **Credit Units: 01**
L-T-P : 0-0-2

Course Contents:

Design a webpage to show a basic structure of html document using tags like head, title and body.
Design a webpage to show various tags used for formatting text.
Design a webpage to show usage of various heading tags, font tag and background color.
Design a webpage to insert image in the background.
Design a webpage to insert image with alignment.
Design a webpage to show the use of link(Text & Image).
Design a webpage to show scrolling text and scrolling image using marquee tag.
Design a webpage to show usage of ordered list.
Design a webpage to show usage of unordered list.
Design a webpage to show usage of definition list.
Design a webpage to show usage of nested list.
Design a table with 5 rows and 5 columns.
Design a table using rowspan, colspan, cell padding and cell spacing.
Divide a webpage into 3 blocks using frame tag(row wise) .
Divide a webpage into 3 blocks using frame tag(column wise) .
Design a log-in form to show various elements of form.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DBMS LAB

Course Code: IFT **Credit Units: 01**

L-T-P: 0-0-2

1. Given the table STUDENT:

Student No.	Class	Name	GAME	Grade1	SUPW	Grade2
10	7	Sameer	Cricket	B	Photography	A
11	8	Sujit	Tennis	A	Gardening	C
12	7	Kamal	Swimming	B	Photography	B
13	7	Veena	Tennis	C	Cooking	A
14	9	Archana	Basket Ball	A	Literature	A
15	10	Arpit	Cricket	A	Gardening	C

(i) Display the names of the students who are getting a grade C in either GAME or SUPW.
(ii) Display the number of students getting grade A in cricket.
(iii) Display the different games offered in the school.
(iv) Display the SUPW taken by the students, whose name starts with 'A'.
(v) Add a new column named 'Marks'.
(vi) Assign a value 200 for Marks for all those who are getting grade B or above in GAME.
(vii) Arrange the whole table in the alphabetical order to SUPW.

2. Given the table SPORTS:

Student No.	Class	Name	GAME1	Grade1	GAME2	Grade2
10	7	Sameer	Cricket	B	Swimming	A
11	8	Sujit	Tennis	A	Skating	C
12	7	Kamal	Swimming	B	Football	B
13	7	Veena	Tennis	C	Tennis	A
14	9	Archana	Basket Ball	A	Cricket	A
15	10	Arpit	Cricket	A	Athletics	C

(i) Display the names of the students who are getting a grade C in either GAME1 or GAME2.
(ii) Display the number of students getting grade A in cricket.
(iii) Display the names of the students who have same game for both GAME1 and GAME2.
(iv) Display the games taken by the students, whose name starts with 'A'.
(v) Add a new column named 'Marks'.
(vi) Assign a value 200 for Marks for all those who are getting grade B or above in GAME.
(vii) Arrange the whole table in the alphabetical order of Name.

3. Given the table STUDENT:

Student No.	Name	Stipend	Stream	AvgMarks	Grade	Class
1	Karan	400.00	Medical	78.5	B	12B

2	Divakar	450.00	Commerce	89.2	A	11C
3	Divya	300.00	Commerce	68.6	C	12C
4	Arun	350.00	Humanities	73.1	B	12C
5	Sabina	500.00	Nonmedical	90.6	A	11A
6	John	400.00	Medical	75.4	B	12B
7	Robert	250.00	Humaities	64.4	C	11A
8	Rubina	450.00	Nonmedical	88.5	A	12A
9	Vikas	500.00	Nonmedical	92.0	A	12A
10	Mohan	300.00	Commerce	67.5	C	12C

(i) Select all the Nonmedical stream students from STUDENT.
(ii) List the names of those students who are in class 12 sorted by Stipend.
(iii) List all students sorted by AvgMarks in descending order.
(iv) Display a report listing Name, Stipend, Stream, and amount of Stipend received in a year assuming that the stipend is paid every month.
(v) Count the number of students with Grade ‘A’.
(vi) Insert a new student in the STUDENT table and fill all the columns with some values.
(vii) Give the output of the following SQL statements:
(a) Select MIN(AvgMarks) from STUDENT where AvgMarks > 75;
(b) Select SUM(Stipend) from STUDENT where Grade = ‘B’;
(c) Select AVG(Stipend) from STUDENT where Class = ‘12A’;
(d) Select COUNT(DISTINCT);

4. Write SQL statement to create EMPLOYEE relation which contain EmpNo, Name, Skill, PayRate.

5. Create a table with the under-mentioned structure (Table name is Emp)

EmpNo	NUMBER(4)
DeptNo	NUMBER(2)
EmpName	CHAR(10)
Job	CHAR(10)
Manager	NUMBER(4)
HireDate	DATE
Salary	NUMBER(7, 2)
Commission	NUMBER (7, 2)

6. Find out the number of employees having manager as job.

7. Display only the jobs with maximum salary greater than or equal to 3000.

8. Find all those employees whose job does not start with ‘M’.

9. List the minimum and maximum salary of each job type.

10. Find all the employees who have no manager.

11. Create a table with the under-mentioned structure (Table name is Dept)

DeptNo	NUMBER(2)
DeptName	CHAR(12)

Location CHAR(12)

12. Create a table with the under-mentioned structure (Table name is PROJECT)

ProjId	NUMBER(4)
ProjDesig	CHAR(20)
ProjStartDT	DATE
ProjEndDT	DATE
BudgetAmount	NUMBER(7)
MaxNoStaff	NUMBER(2)

13. Create a table with the under-mentioned structure (Table name is SalGrade)

LowSal	NUMBER(7, 2)
HighSal	NUMBER(7, 2)
Grade	NUMBER(2)

Where LowSal is the lowest salary limit in the grade and HighSal is the highest salary limit in the grade.

14. Write SQL statements to list all employees in the following format:

EMPLOYEE WORKS IN DEPARTMENT	Dept. No
SMITH WORKS IN DEPARTMENT	20
SUDHIR WORKS IN DEPARTMENT	20
RAJWORKS IN DEPARTMENT	10
SMITHS WORKS IN DEPARTMENT	30
SANTOSH WORKS IN DEPARTMENT	30

15. Given the table MOV:

No.	Title	Type	Rating	Stars	Qty	Price
1	Gone with the Wind	Drama	G	Gable	4	39.95
2	Friday the 13th	Horror	R	Jason	2	69.95
3	Top Gun	Drama	PG	Cruise	7	49.95
4	Splash	Comedy	PG13	Hanks	3	29.95
5	Independence Day	Drama	R	Turner	3	19.95
6	Risky Business	Comedy	R	Cruise	2	44.95
7	Cocoon	Scifi	PG	Ameche	2	31.95
8	Crocodile Dundee	Comedy	PG13	Harris	2	69.95
9	101 Dalmations	Comedy	G		3	59.95
10	Tootsie	Comedy	PG	Hoffman	1	29.95

Find the total value of the movie cassettes available I the library.
Display a list of all movies with Price over 20 and sorted by Price.
Display all the movies sorted by Qty in descending order.
Display a report listing a movie number, current value and replacement value for each movie in the above table. Calculate the replacement value for all movies as Qty * Price * 1.15.

Count the number of movies where rating is not ‘G’.
Insert a new movie in the MOV table. Fill all the columns with some values.
Give the output of the following SQL statements:
Select AVG (Price) from MOV where Price < 30;
Select MAX (Price) from MOV where Price > 30;
Select SUM (Price * Qty) from MOV where Qty < 4;
Select COUNT (DISTINCT);

16. Write a PL/SQL program for:

    a) Printing the Fibonacci series from 1 to 50.
    b) Printing the smallest number among any three numbers.
    c) Printing the table of any specific number entered.

17. Create a trigger named “Client_Master” which keeps track of records deleted or updated when such operations are carried out. Records in this table are inserted into table “Audit” when database trigger fires due to an update or delete statement fired on this table “Client”.

    Table: Client

Column name	**Data type**	**Size**
Client_no	Varchar2	6
Name	Varchar2	20
Address	Varchar2	30
Balance_Due	Number	10,2

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

THIRD SEMESTER

DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO CS

CourseCode: IFT **Credit Units: 03**
L-T-P:2-1-0

Course Objective:
The Objective of this course is to provide the fundamentals and the concepts of Discrete Mathematical Structures with Applications to Computer Sciences including Mathematical Logic, Boolean Algebra and its Applications, Switching circuit & Logic Gates, Graphs and Trees. Important theorems with constructive proofs, real life problems & graph theoretic algorithms to be covered with an aim of helping the students to understand the computational and algorithmic aspects of Mathematical Logic, Boolean Algebra, Graphs and Trees in the field of Computer sciences and its applications.

Course Contents:

Module I: Introduction
Permutation and Combination : Counting Techniques.

Relation: Type and compositions of relations, Pictorial representation of relations, closures of relations, Composite Relations, Equivalence relations.

Function: Types, Composition of function, Mathematical Induction, Discrete Numeric Function and Generating Functions

Module II:Mathematical Logic
Proposition, Propositional Calculus- Propositional Variables and Compound Propositions, Basic Logical Operations: -Conjunction, Disjunction, Negation, Conditional, Bi conditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid, Arguments, Tautologies, Contradiction, Contingency , Boolean Functions – Disjunctive Normal Form, Conjunctive Normal Form.
Duality Principle.

Module III: Graphs
Basic Terminology of Graphs , Handshaking Lemma , Sub graphs, and Union of Graphs , Connected graph, Disconnected graph, Null graph, Incidence matrix, Adjacency matrix, Degree of a graph, Directed Graph, Walk, Path, Circuit, Wheel, Eulerian graph, Hamiltonian graph, Planar graph , Kuratowski's graphs-I and II , Coloring , Bipartitie Graph , Cyclic Graph.

Module IV: Trees
Tree, Properties of Tree, Spanning Tree, Fundamental Circuit, Cut-Set, Cut-Vertices. Binary Tree , Rooted Trees, Path length, Minimum Spanning Trees, Huffman Encoding.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- Kenneth H. Rosen, “Discrete Mathematics and its applications”, TMH
- Elements of Discrete Mathematics: C.L. Liu,TMH, Edition 4.
- Graph Theory with Applications to Engineering and Computer Science: N. Deo

References:

- Discrete Mathematics: Harikishan & Shivraj Pundir,Pragati’s Prakashans.

MANAGEMENT INFORMATION SYSTEM

Course Code:
L-T-P :3-0-0 **Credit Units: 03**

Course Objective:
This course will provide the students with an understanding of the principles of information systems technology and its impact on the strategic goals and direction of the organization. They will learn how MIS concepts are applied in business and how information systems can provide solutions to the entire organization.

Course Contents:

Module I: Introduction to MIS and Fundamentals of Information
Background,meaning,nature,characteristics,myhts,requirements,problems and solutions, benefits, limitations, significance and role of management information system,Concept of information, characteristics of information, value of information, source of information, type of information, process of management.

Module II: Conceptual Framework of Information System
Concept of system, definition of system, characteristics of system, system stake holder, types of system, evolution of information system, approaches to management information system, A framework for MIS architecture, components of MIS, classification of information system.

Module III: Concept of Decision Making and MIS
Introduction, Decision Making and managers, Classification of managerial decision, Model for decision making process, MIS and Decision Making, Concept of balance, efficiency and effectiveness.

Module IV: Development, Implementation, Evaluation and Maintenance of MIS
Principles for information system development, MIS development process, methods of implementing of MIS, evaluation of MIS, structure for evaluation of MIS, maintenance, problems related to maintenance and measure to overcome these problems.

Module V: Control and Security Issues in MIS
Meaning of control, need of control, types of control, security hazards, goal of security control against hazards, security techniques.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:
- Management Information System, Dharmender kumar and Sangeeta gupta, Excel books,Ist edition.

References:

- Management Information System: managing the digital firm, Laudon & Laudon, 14th edition.(E-book is also available free)
- Simplified approach to management information system, Ravi kumar, ranjeev k chopra, Katson books, Ist edition.

INTRODUCTION TO OBJECT ORIENTED PROGRAMMING AND C++

Course Code: IFT **Credit Units: 03**

L-T-P : 3-0-0

Course Objective:
C++ is one of the most widely used programming languages for solving problems. The objective of this course is to provide object oriented programming fundamentals using C++. Topics to be covered include fundamentals of syntax & semantics of C++, loops & decisions, functions, classes and structures and features of classes such as overloading and inheritance, files, streams, pointers etc.

Course Contents:

Module I: Overview of C++
What is Object Oriented Programming, Characteristics of OOP, Difference between C and C++. Basics:-Input/Output in C++ using cin/cout, Preprocessor Directives, Data Types-Integer, Float, character, Enumerations, library functions, comments, storage classes, manipulators, operators in C++, scope resolution operator , memory management operator. arrays and strings .

Module II: Classes and objects
Functions: Simple functions, passing arguments to functions, returning values from functions, reference arguments, returning by reference, Overloaded functions, Inline functions, friend function , Structures and class.
Classes and objects: A simple class, C++ objects as physical objects, objects as function arguments, returning objects from functions, static class data, array as class data member, array of objects.

Module III: Inheritance
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Constructors, Types of constructors, Destructors.

Module IV: Polymorphism
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Files and Exception Handling and I/O
Files and Streams: streams, string I/O, character I/O, file pointer, error handling, command line arguments.
formatted and Unformatted Input output, Introduction of Exception handling, Try Catch block, Rethrowing an Exception.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text

- Programming with C++, Ravi Chandran, TMH Publisher.
- Object Oriented Programming with C++, E Balagurusamy, Tata Mc Graw Hill
- Programming in C++, John R Hubbard, SCHAUM's series.

References:

- The complete reference C++, Herbert Schildt, TMH Publisher.
- Turbo C++, Robert Lafore, Galgotia Publications.

OPERATING SYSTEMS

Course Code: IFT **Credit Units: 03**
L-T-P : 3-0-0

Course Objective:
To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization and Demonstrate an understanding of the differences between processes and threads, the different process or thread synchronization methods and the, the different memory management techniques used in Operating Systems, the different I/O management techniques used in Operating Systems, the tradeoffs in design and implementation concepts used in the development of Operating Systems.

Course Contents:

Module I :Introduction and System Structure
What is an operating system, History of OS, OS concepts, Types of OS, OS Structure, OS Operations.
System calls, Types of System Calls, System Programs, OS Structure, Virtual Machines, System Boot

Module II:Process Management
Process Concept, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Overview of Thread Scheduling and Multiprocessor scheduling, Operations on Processes, Interprocess communication with example. Client-server Communication, Overview of Multithreaded programming models

Module III:Process Coordination
Overview of Process Synchronization, Critical Section Problem, Semaphores, Classic problems. Deadlock- Prevention, Avoidance, Detection, Recovery, Algorithms

Module IV:Memory Management
Memory Management Strategies-Introduction, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management- Demand Paging, Thrashing, Page Replacement

Module V :Storage Management
Overview of File System, Access Methods, Directory and Disk Structures, File Sharing, Protection, Disk Scheduling, Disk Management, I/O hardware

Module VI:Protection and Security
Goals and Principles of Protection, Access Matrix, Security Problem, Program Threats, System and Network Threats, Overview of Cryptography, Overview of User Authentication and Security Defense.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage	15	10	5	70

Text & References:

Text :

- Operating System Principles , Arbraham Silberschatz & Peter Baer Galvin by Wiley Student Publication
- Tannenbaum A.S., Modern Operating System,Pearson Publisher, 2015.

References:

- Crowly Charrles, Operating System- A design Approach,Addison Publisher.
- Dietel H.M., Operating Systems, TMH Publisher.

FUNDAMENTALS OF SOFTWARE ENGINEERING

Course Code:
L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:

The purpose of this course is to acquaint students with the concepts and methods available for software development in industrial environments. Students will be exposed to a variety of topics such as design notations, costing techniques, and testing methods, as well as to the tools which are available to support software specification, design, testing, and maintenance.

Course Contents:

Module I: Software Development Life Cycle
Evolution of Software Engineering, Software Problems, Issues Involved in Software Engineering, Fundamental Qualities of a Software Product, Approaches to Software Engineering, Planning the development Process, Development/Product Life-Cycle Model, Kinds of Software Life-Cycle Model.

Module II: Project Management
Project Management Concepts, Project Management Activities, Size Metrics. Software Requirement analysis and Specification, Cost Models.

Module III: System Design
Design Objectives, Design Principles, Effective Modular Design (Functional Independence, Coupling, and Cohesion), Design Tools and Techniques, Prototyping, Structured Programming.

Module IV: Coding
Programming Practices, Verification, Monitoring and Control.

Module V: Software Testing
Testing Fundamentals, Test case design, Functional Testing, Structural Testing, Test Plan, Activities during testing, Unit System, Integration Testing, Software Maintenance.

Module VI: Software Reliability
Concept of Software Reliability, Software Repair and Availability, Software Errors, Failure and Faults.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Software Engineering, A Practitioner's Approach - Roger S. Pressman., Tata Mc Graw Hill

References:

- An Integrated Approach to Software Engineering, Pankaj Jalote., Narosa Publishing House
- Software Engineering Concepts, Richard Fairley., Tata Mc Graw Hill

INTRODUCTION TO OBJECT ORIENTED PROGRAMMING AND C++ LAB

Course Code: IFT **Credit Units: 01**
L-T-P : 0-0-2

Course Contents:

1. WAP to calculate factorial of a given number n.
2. WAP to do the following:
    a. Generate the following menu:
        1. Add two numbers.
        2. Subtract two numbers.
        3. Multiply two numbers.
        4. Divide two numbers.
        5. Exit.
    b. Ask the user to input two integers and then input a choice from the menu. Perform all the arithmetic operations which have been offered by the menu. Checks for errors caused due to inappropriate entry by user and output a statement accordingly.
3. WAP to read a set of numbers in an array & to find the largest of them.
4. WAP to exchange contents of two variables using call by value.
5. WAP to exchange contents of two variables using call by reference.
6. Calculate area of different geometrical figures (circle, rectangle,square, triangle) using function overloading.
7. WAP to add two complex numbers using friend function.
8. WAP to maintain the student record which contains Roll number, Name, Marks1, Marks2, Marks3 as data member and getdata(), display() and setdata() as member functions.
9. WAP to increment the employee salaries on the basis of there designation (Manager-5000, General Manager-10000, CEO-20000, worker-2000). Use employee name, id, designation and salary as data member and inc_sal as member function (Use array of object).
10. Write a class bank, containing data member: Name of Depositor, A/c type, Type of A/c, Balance amount. Member function: To assign initial value, To deposit an amount, to withdraw an amount after checking the balance (which should be greater than Rs. 500) , To display name & balance.
11. WAP to define nested class ‘student_info’ which contains data members such as name, roll number and sex and also consists of one more class ‘date’ ,whose data members are day, month and year. The data is to be read from the keyboard & displayed on the screen.
12. WAP to generate a series of Fibonacci numbers using copy constructor, where it is defined outside the class using scope resolution operator.
13. Write a class string to compare two strings, overload (= =) operator.
14. Write a class to concatenate two strings, overload (+) operator.
15. Create a class item, having two data members x & y, overload ‘-‘(unary operator) to change the sign of x and y.
16. Create a class Employee. Derive 3 classes from this class namely, Programmer, Analyst & Project Leader. Take attributes and operations on your own. WAP to implement this with array of pointers.
17. Create two classes namely Employee and Qualification. Using multiple inheritance derive two classes Scientist and Manager. Take suitable attributes & operations. WAP to implement this class hierarchy.

18. WAP to read data from keyboard & write it to the file. After writing is completed, the file is closed. The program again opens the same file and reads it.
19. WAP to creat a class student containing Name & class as parameters, create another class marks which inherit student class taking own data members as mark1 & mark2 &show result.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

OPERATING SYSTEM LAB

Course Code: IFT **Credit Units: 01**
L-T-P: 0-0-2

Unix Programmes

1. Write a Shell Script that takes a search string and filename from the terminal & displays the results.
2. Write a Shell Script that takes pattern and filename as command line arguments and displays the results appropriately i.e. pattern found/pattern not found.
3. Write a Shell Script that accepts only three arguments from the command line. The first argument is the pattern string, the second argument is the filename in which the pattern is to be searches and the third argument is the filename in which the result is to be stored.
4. Write a Shell Script which creates the following menu and prompts for choice from user and runs the chosen command.

    Today's date
    Process of user
    List of files
    Quit to UNIX

5. Write a Shell Script that computes the factorial of a given number
6. Write a Shell Script that changes the extension of a group of files from txt to doc
7. Write a Shell Script that accepts both filename and a set of patterns as positional parameters to a script.
8. Write a Shell Script which will redirect the output of the date command without the time into a file.
9. Write a Shell Script (using while loop) to execute endlessly (until terminated by user) a loop which displays contents of current directory, disk space status, sleep for 30 seconds and display the users currently logged in on the screen.
10. Write a Shell Script that receives two filenames as arguments. It should check whether content of the two files is same or not. If they are same, second file should be deleted.
11. If a number is input through the keyboard, WASS to calculate sum of its digits.
12. Write a Shell Script which takes a command line argument of Kms and by default converts that number into meters. Also provide options to convert km to dm and km to cm.
13. Write a Shell Script using for loop, which displays the message "Welcome to the UNIX System"
14. Write a Shell Script to change the filename of all files in a directory from lower-case to upper-case.
15. Write a Shell Script that examines each file in the current directory. Files whose names end in **old** are moved to a directory named **old files** and files whose names end in **.c** are moved to directory named **cprograms.**
16. Write a Shell Script which searches all files in the given directory (to be taken as command line argument) for the file having the title (to be taken as command line argument), as the first line in the file.

    a) Display the contents of the searched file.
    b) In the end, printthe the file is ###, where
    ### is small-sized if total no. of lines is <50
    ### is medium-sized if total no. of lines between 50&100
    ### is large-sized.

17. Write a shell script which reports names and sizes of all files in a directory (directory would be supplied as an argument to the shell script) whose size is exceeding 1000 bytes. The filenames should be printed in descending order of their sizes. The total number of such files should also be reported.
18. Write a shell script to calculate and print the first **m** Fibonacci numbers.
19. Write a shell script to compute the **GCD** and **LCM** of two numbers.
20. Write a shell script to generate all combinations of 1, 2 and 3 using **for loop.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER PROJECT- I

Course Code: IFT **Credit Units: 03**

Objective:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

Guidelines
In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification
- A4 size paper
- Spiral Binding
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.
Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components
Front Page
Declaration
Student Certificate (University)
Certificate (Company)
Acknowledgement
Abstract
Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters

Appendices(optional)
References / Bibliography

The above components are described below:
1. **The Title Page**-- Format will be given by coordinator/supervisor.
2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Company Certificate: This is a certificate, which the company gives to the students.
5. Contents-This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.
6. Acknowledgement-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
7. Abstract and **Keywords-**This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.
8. Company Profile: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
9. **Chapters**—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment consists of topic relevance, progress report and industry feedback on company letterhead. Final Assessment includes viva, presentation, execution and report marks.

Examination Scheme:

Components	**IF**	**PR**	**R**	**E**	**V**	**FP**
Weightage (%)	20	20	15	15	15	15

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR-Progress Report, E-Execution

FOURTH SEMESTER

MULTIMEDIA AND ITS APPLICATIONS

Course Code: **Credit Units: 04**

L-T-P :3-1-0

Course Objective:
The objective of the course is to give an overview of different multimedia technologies like audio and video including multimedia devices. The course also includes some practical sessions on these technologies.

Course Contents:

Module I: Introduction
Introduction: Objectives – History of Multimedia – Its market – Content copyright – Resources for multimedia developers – Types of produces – Evaluation – Hardware Architecture – OS and Software – Multimedia Architecture – Software library – Drivers.
Module II: Digital Audio Representation and Processing
Uses of audio in computer applications, digital representation of sound, transmission of digital sound, digital audio signal processing, digital audio and the computer.

Module III: Video Technology
Raster scanning principles, sensors for T.V. cameras, color fundamentals, color video, video equipment, worldwide television standards.

Module IV: Digital Video and Image Compression
Evaluating a compression system, redundancy and visibility, video compression techniques, the JPEG image compression standards, the MPEG motion video compression standard, DVI technologies, Time Based Media Representation and Delivery.

Module V: Multimedia Devices, Presentation Services and the User Interface
Introduction .Multimedia services and Window systems, client control of continuous media, device control, temporal co ordination and composition, hyper application.

Module VI: Application of Multimedia
Intelligent multimedia system, desktop virtual reality, multimedia conferencing.

Examination Scheme:

Components	**CT1**	**PR.**	**ATTD.**	**EE**
Weightage (%)	10	15	5	70

Text & References:

- Multimedia systems John F. Koegal Buford Addison- Wesley

COMPUTER NETWORK

Course Code: IFT **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:
The objective of the course is to provide introductory concepts in Data Communications such as Signaling, Encoding, Modulation, Error Detection & Correction. The course is also aimed at providing basic understanding of Computer networks starting with OSI Reference Model, Protocols at different layers with special emphasis on IP, TCP & UDP and Routing algorithms.

Course Contents:

Module I
Introduction to Data Communication, Networks-protocols, advantages, disadvantages & applications, Line Configuration, topology, Transmission mode, Classification of networks. OSI Model, functionality of layers in OSI model, Protocols at each layer, encapsulation, peer-to-peer communication.

Module II:
Parallel & Serial Transmissions, Analog & Digital Signals, Periodic & Aperiodic Signals, Data encoding techniques-Digital data-digital signals, Digital data-Analog signals, Analog data-Digital signals, Analog data- Analog signals, Multiplexing.

Module III
Transmission Media-Twisted Pair Cable, Coaxial Cable, Fiber-Optics Cable, Radio frequency Allocation, Terrestrial Microwave, Infrared rays, Satellite Communication, Cellular Telephony. Introduction to ISDN.

Module IV
Framing, Switching, Types of Errors, Error Detection & Correction (VRC, LRC, CRC, Checksum, Hamming Code), Flow Control (Stop-and-wait & Sliding Window), Error Control (Stop & Wait ARQ, Sliding Window ARQ using Go-back n method and Selective-Reject), IEEE Standards-802.3, Token Bus (802.4), Token Ring (802.5), FDDI.

Module IV
Routing process, Routing Algorithms-Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Addressing-IPv4, IPv6, Internetworking, Connection–oriented Vs Connectionless protocols- TCP,UDP.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- Data Communication and Networking by Behrouz Forouzan,Fourth Edition,TMH.
- Computer Networks by A.S. Tanenbaum, Fifth Edition, Prentice Hall.

References:

- Data and Computer Communications by W. Stallings, Prentice Hall.

BASICS OF ALGORITHM

Course Code: IFT **Credit Units: 03**
L-T-P:3-0-0

Course Objective:
The designing of algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular problem. Upon completion of this course, students will be able to do the following:

- Analyze the asymptotic performance of algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in technical design situations.

Course Contents:

Module I: Introduction

Algorithm Design paradigms - motivation, concept of algorithmic efficiency, concept of running time, analysis of algorithms, Growth of Functions, Asymptotic Notations, Structure of divide-and-conquer algorithms, analysis of divide-and-conquer algorithms, example algorithms - Quick Sort, Merge Sort, Strassen Multiplication, Recurrences- Substitution Method, Recursion Tree Method, Iteration Method , Master's Method.

Module II: Advanced Design Techniques

Greedy Algorithms - Introduction, elements of greedy strategy, Fractional Knapsack Problem, activity selection problem,

Dynamic Programming - Overview, difference between dynamic programming and divide and conquer, Matrix Chain Multiplication, Longest Common Sub-sequence, 0/1 - Knapsack Problem. Difference between Greedy and Dynamic Programming Approach.

Module III: Graph Algorithms
Representation of Graphs, Graph Traversal - BFS and DFS, Topological Sort, Strongly Connected Components.

Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, , Single Source Shortest Paths, Dijkstra's Algorithm, Bellmanford Algorithm, All Pair Shortest Path Problem, Floyd Warshall's Algorithm.

Module IV: Selected Topics
Back tracking - Introduction, n-Queens Problem, NP-Completeness – Definition and examples of Class P, NP, NP-Hard and NP Complete, Polynomial reduction. Approximation Algorithms – Introduction, Performance Bounds, Example Problems – Vertex Cover Problem, Travelling Salesperson Problem. Randomized Algorithms.

Application of algorithms in different areas of Computer Science.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm,", PHI

References:

- E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication
- Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
- J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"., Addison Wesley
- D. E. Knuth, " The art of Computer Program, Addison esley

PRINCIPLES OF MANAGEMENT

Course Code:
L-T-P : 3-0-0 **Credit Units : 03**

Course Objective:

- To provide a basis of understanding to the students with reference to working of Business Organizations through the process of Management.
- To inculcate the managerial skills of planning, organizing, and controlling and to teach how it can be executed in a variety of circumstances and apply concepts of strategic and tactical organizational planning.
- On completion of the syllabi the student will understand the basic principles of management - will acquaint himself with management process, functions and principles. Student will also get the idea about new developments in management.

Course Contents:

Module I: NATURE OF MANAGEMENT
Meaning, Definition, it's nature purpose, importance & Functions, Management as Art, Science & Profession-
Management as social System Concepts of management-Administration-Organization,
Levels of Management - Concept, Significance, Role & Skills, Concepts of PODSCORB, Managerial Grid.
Evolution of Management thoughts : Contribution of F.W Taylor, Henry Fayol and Contingency Approach.

Module II: PLANNING AND DECISION MAKING
Planning : Meaning, Importance, Elements, Process, Types and levels, Limitations
Decision Making: Meaning, Importance, Process, Techniques of Decision Making

Module III: ORGANISING
Organizing: Concepts, Structure (Formal & Informal, Line & Staff and Matrix), Meaning, Advantages and Limitations. Departmentation: Meaning, Basis and Significance, Span of Control: Meaning, Graicunas Theory, Factors affecting span of Control, Centralization vs Decentralization, Delegation: Authority & Responsibility relationship

Module IV: DIRECTING , LEADERSHIP, CO-ORDINATION AND CONTROLLING
Directing: Meaning and Process,
Leadership: Meaning, Styles and Qualities of Good Leader, Co-Ordination as an Essence of Management,
Controlling: Meaning, Process and Techniques

Module V: Recent Trends
Challenges in recent Trends : Green Management, CSR, Increasing Concern for the Environment, Greater Personalization and Customization, Faster Pace of Innovation, Increasing Complexity, Increasing Competition for Talent

Solution Trends : Becoming More Connected, Becoming More Global, Becoming More Mobilem Rise of the Creative Class, Increasing Collaboration

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text Books : Essential of Business Administration - K.Aswathapa Himalaya Publishing House

Books Recommended:-

- Essential of Management - Horold Koontz and Iteinz Weibrich - McGrawhills International
- Management Theory & Practice - J.N.Chandan
- Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - New Delhi
- Business Organization & Management - Dr. Y.K. Bhushan
- Management: Concept and Strategies By J. S. Chandan, Vikas Publishing
- Principles of Management, By Tripathi, Reddy Tata McGraw Hill
- Business organization and Management by Talloo by Tata McGraw Hill
- Business Environment and Policy – A book on Strategic Management/Corporate Planning By Francis Cherunilam Himalaya Publishing House 2001 Edition

COMPUTER NETWORK LAB

Course Code: **Credit Units: 01**

Course Objective:
The course familiarizes with the equipment applications and protocols installed in enterprise networks, with a focus on switched networks, IP Telephony requirements, and security. It also introduces advanced routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF) Protocol. Hands-on exercises include configuration, installation, and troubleshooting.

Course Contents:
1. Drawing an Enterprise Network for Amity University showing its different campuses across the country.
2. Configuring all the devices (PCs, Servers, Switches) to create a LAN within campuses of the Enterprise Network.
3. Configuring Virtual LANs (VLANs) in an Enterprise Network.
4. Configuring Trunking and Inter-VLAN Routing in an Enterprise Network.
5. Implementing RIP (Routing Information Protocol) to enable communication between different LANs.
6. Implementing OSPF (Open Shortest Path First) to enable communication between different LANs.
7. Implement EIGRP (Interior Routing Protocol) to establish connectivity within domestic campuses of the Enterprise Network.
8. Implement BGP (Border Gateway Protocol) and Redistribution to establish connectivity between different campuses of the Enterprise Network.
9. Configuring WAN connectivity using protocols-HDLC and PPP.
10. Implementing Frame-Relay to configure WAN service provider cloud.
11. Configuring Standard and Extended ACLs on a Router.
12. Troubleshooting Switching, Routing and ACL issues.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.
Software : Packet tracer.

BASICS OF ALGORITHM LAB

Course Code: **Credit Units: 01**

Lab assignment will be based on the following:

- Programs sorting algorithms based on divide and conquer technique.
- Programs on algorithm based on greedy method.
- Programs on algorithm based on Dynamic programming.
- Programs on Graph Algorithms.
- Programs on algorithm based on backtracking.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

FIFTH SEMESTER

COMPUTER ORIENTED NUMERICAL METHODS

Course Code:

L-T-P : 3-0-0 **Credit Units : 03**

Course Objective:
The objective of this course is to provide conceptual understanding of various numerical methods, in particular, with reference to numerical solution of non linear equations and system of linear equations, interpolation, numerical differentiation and integration and numerical solution of ordinary differential equations. Important theorems and different formulae for various numerical methods to be covered with an aim of helping the students to understand the fundamentals, concepts and practical use of these methods in the field of computer sciences and applications.

Course Contents:

Module I: Numeric Computation
Computer Arithmatic- Floating point numbers-operations, Normalization and their Consequences, Absolute, Relative and Percent Error.
Iterative Methods:- Zeros of a single Transacendental equations and Zeros of Polynomial Equations using Bisection ,False Position, Newton-Raphson Methods, Convergence of Solution.

Module II: Simultaneous Linear Equations

Solution of Simultaneous Linear Equations. Direct Methods:- Gauss elimination method, Pivoting, Gauss-Jordan Method. Iterative methods:-Jacobi's Methods, Gauss-Seidal Method.

Module III: Polynomial Interpolation

Newtons divided difference, Forward and backward difference Formulae, Difference Tables, Lagrange's Method.

Module IV: Numerical Differentiation and Integration

Formula for first and second order derivatives using newton's- Forward and Backward formula, Numerical Integartion, Newton-Cotes Formula: Trapizoidal rule, Simpson's $1/3^{rd}$ rule ,Simpson's $3/8^{th}$ rule, Weddle's rule.

Module V: Numerical Solution of Differential Equations

Basic Terminology of Differential Equations, Picard's Method, Euler's method, Taylor's Series method, Runge-Kutta Methods, Predictor –Connector Method.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Jain M.K, Jain R.K and Iyenger, Numerical Methods for Scientific and Engineering Applications, New Age international publishers

References:

- Rajaraman V, Computer Oriented Numerical Methods. PHI Learning pvt ltd
- Krishnamuty, E.V., Sen, S.K, Computer Based Numerical Algorithms. East West Press 1976

ACCOUNTING AND FINANCIAL MANAGEMENT

Course Code:

L-T-P : 2-1-0 **Credit Units : 03**

Course Objective:
The objective of this course is to provide to students of IFT and IMCA with an introduction to fundamentals, concepts and principles / practices of Accounting and Financial Management. The topics covered including basic accounting, preparation of Trial Balance, Profit and Loss Account and Balance Sheet Account as applied to Banking including Bank Reconciliation Statement, Definition and Principles of Working Capital Management, Capital Budgeting and Analysis of Financial Statements.

Course Contents:

Module I: Accounting
Definition of Accounting, Its Objectives, Advantages and Limitation. Principles, Concepts and Conventions of Accounting, Double entry system, Recording of Transactions in subsidiary Books – Journal, Cash Book, sales Book, Purchase Book and Return Book. Posting into Ledger accounts.

Module II: Final Accounts
Preparation of Trial balance, Final Accounts including adjustments Trading account, Profit and Loss account, Balance Sheet.

Module III:Banking
Opening of different types of Banks Accounts, Cheque Book, Pass Book, Deposit slips, Bank Reconciliation Statements.

Module IV:Working Capital Management

Definition of working Capital, Types of Working Capital, Determinants of working Capital, Cash Management and Receivables Management.
Capital Budgeting: Principles and Techniques.

Module V: Analysis of Financial statements
Ratio Analysis: Meaning, Advantages, limitations, types of ratios and their usefulness Statements of charges in the Financial Position on Cash basis.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

- T.S Grewal, Book keeping,, S Chand Publishing
- Prasamna Chandra, Financial Management., Tata Mc Graw Hill
- IM Pandey, Financial Management., Vikas Publishing

CORE JAVA**PROGRAMMING**

Course Code: IFT **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:
The objective of this course is to give proficiency in developing applications and applets in Java, in-depth knowledge of object oriented concepts, developing GUI applications in Java, creation of packages, Event Handling, Layout Manager, SWING and String handling in Java

Course Contents:

Module I: Introduction to Java Programming

Concepts of OOP, Features of Java, How Java is different from C++, Data types, Control Statements, identifiers, arrays, operators. Variables, Applications and Applets, Classes and methods, Constructor, method overloading, Inheritance: method overriding, Abstract classes, Final classes, String classess

Module III: Java Packages and interfaces
Package creation, Packages deployment, using packages, Interfaces, Exception Handling and Multithreading

Module IV: AWT and Event Handling
Introduction to AWT, Layout Manager, Event handling Mechanism, Event Model, Event Classes, Sources of Events, Event Listener Interfaces, AWT: Working with Windows, AWT Controls,Html basic tags, Applet Classes,

Module V: Java Swings
Swing classes & controls. Advantages of Swing over AWT, event handling

Examination Scheme:

Components	**CT1**	**PR.**	**ATTD.**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:
- Naughton, Schidt "The Complete Reference JAVA 2 " TMH

References:
- Balaguruswamy "Programming in JAVA", Tata Mc Graw Hill
- Deitel & Deitel "Java™ How to Program, 6/E**",** Prentice Hall

BASICS OFCOMPUTER GRAPHICS

Course Code: **Credit Units: 03**

L-T-P: 3-0-0

Course Objective:
The objective of this course is to present the basic principles for the design, use and understanding of computer graphics systems. Both hardware and software components of graphics systems are discussed here. This course also teaches the students about different algorithms for creating and manipulating graphics displays. Varieties of mathematical methods are used in various computer graphics algorithm.

Course Contents:

Module I: Introduction of Graphics
Development of Computer Graphics, Basic Graphics System and Standards.

Graphics Devices:
Raster and Random Scan Devices, Continual Refresh and Storage Displays, Display Processor, Color Display Techniques, Frame Buffer, Concepts in Raster Graphics and color generation.

Module II: Graphics Primitives
Points, Pixels, Scan Conversion, Line Drawing Algorithms, Circle Drawing Algorithms, Anti-aliasing Technique, Methods of Character generator.

Polygon
Polygon representation, Polygon Filling algorithm, Inside/Outside Testing

Module III: Transformation
Scaling, Translation, Rotation, Composite Transformation , Fix point scaling , Rotation about arbitrary point, Reflection, Shears, Composite Transformation, Modeling and Coordinate Transformation

Viewing: Interactive Picture Construction Techniques, Interactive Input/Output Devices,

Module IV: Segment
Segment Table, Creating Deleting and Renaming a Segment, Visibility and Image Transformation

Windowing and Clipping: Window, View-port, Line clipping, polygon clipping, Window to viewport transformation , polygon clipping using Sutherland Hodgman Algorithm.

Module V: 3-D Transformation and Visible surface detection
3-D Transformation : shearing, scaling , translation . rotation, Homogeneous coordinates.
Visible surface detection: Z - buffer algorithm, Scaline Visible surface detection algorithm, paintess algorithm, fractal and its.properties, Basic Illumination, diffuse reflection, specular reflection.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Computer Graphics By Donald Hearn And Pauline Baker, Pearson Education
- Harrington's "Computer Graphics " A Programming Approach, Tata Mc Gra Hill

References:

- Principle of Interactive Computer Graphics By New, W. M. And Spraull, Tata Mc Gra Hill
- Foley "Computer Graphics" Addission Wesley
- Rogers' "Procedural Elements Of Computer Graphics " Mc-Grawhilll

CORE JAVAPROGRAMMING LAB

Course Code: IFT **Credit Units: 01**

Course Contents:

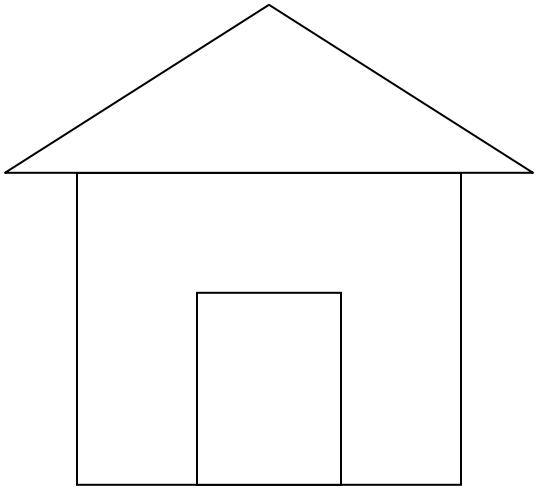
1. Create a “Hello, World” program that simply prints out that statement.
2. Write a program that prints three arguments taken from the command line.
3. Write a program that prints values from 1 to 100.
4. Create a class with a default constructor (one that takes no arguments) that prints a message. Create an object of this class.
5. Write Java assignment statements to evaluate the following equations:
   (i) Energy = mass(acceleration*height+(velocity)sqr(2)/2)
   (ii) Torque = 2m1m2/m1+m2 * g
6. Design and write a Java program to define a class called Rectangle that contains members for representing its length and breadth. Provide members to get and set these attributes.
7. Design a class to represent a bank account. Include the following members:
   Data members:
   Name of the depositor
   Account number
   Type of account
   Balance amount in the account
   Methods:
   To assign initial values
   To deposit an amount
   To withdraw an amount after checking balance
   To display the name and balance
8. Write simple program to calculate the sum of digits of any number.
9. Write a simple program to display a “*” I triangle shape.
   Output will be like this

```
    *
  * * *
* * * * *
```

10. Write a simple program to call a method called simple from a main function. The method simple should accept an integer as an argument and calculate the square of the number in the method simple.
11. Write a Java program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use method overloading to achieve this.
12. Write a program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MultDiv that extends from AddSub class to use the member data of the superclass. MultDiv should have methods to multiply and divide. A main method should access the method and perform the mathematical operations.
13. Write an interface with a method called display. Implement this method I a class to display two names.
14. Write an interface that has two methods called push and pop of a stack. Write a class to implement the two methods for a fixed size stack creation.
15. Write a small program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.
16. Write a program to handle Null Pointer Exception and use the finally clause to display a message to the user.
17. Write a Java program that takes a string and converts it into uppercase and lowercase letters.
18. Write a Java program to find the volume of a sphere and a cone.

19. Write a Java program to convert rupees to dollars.
20. Write a Java program to find x to the power y. Use overloading for different cases when x and y are combinations of integer and floating point numbers.
21. Create an abstract class called Figure that has an abstract method called draw (). Make the subclasses called Filled_Rectangle, Filled_Arc and override the draw method in which you would print the message regarding the current object.
22. Write a Java program that has integer variables a, b, c and result as float. Store some values in them and apply the formula result = a/(b-c). Catch the probable exception.
23. Write applets to draw the following shapes:
    (i) Cone
    (ii) Cylinder
    (iii) Cube
    (iv) Square inside a circle
    (v) Circle inside a square

24. Write an applet to display the following figure:



25. Write an swings to display five buttons and five labels.
26. Write a Java program to create 5 threads by extending Thread class.
27. Write a Java program to create 5 threads by implementing Runnable interface.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BASICS OF COMPUTER GRAPHICS LAB

Course Code: **Credit Units: 01**
L-T-P:0-0-2

1) Write a program to change the working mode from text to graphics and plot a pixel.
2) Write a program to draw a line of same dimension in three different graphics mode.
3) Write a program to display line, rectangle, circle and polyline using graphics command.
4) Write a program to draw a line of slope between 0 and 1 using DDA algorithm.
5) Write a program to draw a line of slope between 1 and ∞ using DDA algorithm.
6) Write a program to draw a line of slope between 0 and 1 using midpoint algorithm.
7) Write a program to draw a line of slope between 1 and ∞ using midpoint algorithm
8) Write a program to draw a dashed line of slope 1 using any line algorithm
9) Write a program to draw a dotted line of slope 1 using DDA algorithm
10) Write a program to draw a line of slope between 0 and -1 using midpoint algorithm.
11) Write a program to draw a line of slope between -1 and -∞ using midpoint algorithm.
12) Write a program to draw an octant of a circle with it's center at point (0,0) a using midpoint circle drawing.
13) Write a program to draw a circle with its center at point (0, 0) and radius r using midpoint circle drawing.
14) Write a program to draw an octant of a circle with it's center at point (a, b) and radius r using midpoint circle drawing.
15) Write a program to a circle with it's center at point (a, b) and radius r using midpoint circle drawing.
16) Write a program to fill a polygon using flood-fill method.
17) Write a program to fill a polygon using boundary-fill method.
18) Write a program to reflect a point in X and Y-axis both.
19) Write a program to rotate a point (100, 50) about origin in anti-clock wise direction.
20) Write a program to rotate a point (100,150) about point (30, 40) in clock wise direction..

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER PROJECT - II

Course Code: IFT **Credit Units: 06**

Objective:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

Guidelines
In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page
Declaration
Student Certificate (University)
Certificate (Company)
Acknowledgement
Abstract
Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters
Appendices(optional)
References / Bibliography

The above components are described below:

1. **The Title Page**-- Format will be given by coordinator/supervisor.
2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Company Certificate: This is a certificate, which the company gives to the students.
5. Contents-This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.
6. Acknowledgement-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
7. Abstract and **Keywords-**This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.
8. Company Profile: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
9. **Chapters**—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment consists of topic relevance, progress report and industry feedback on company letterhead. Final Assessment includes viva, presentation, execution and report marks.

Examination Scheme:

Components	**IF**	**PR**	**R**	**E**	**V**	**FP**
Weightage (%)	20	20	15	15	15	15

V – Viva, IF – Industry Feedback, FP – Final Presentation, R – Report, PR-Progress Report, E-Execution

SIXTH SEMESTER

COMPUTER ORIENTED STATISTICAL & OPTIMIZATION METHODS

Course Code:
L-T-P : 3-0-0 **Credit Units : 03**

Course Objective:
The objective of this course is to expose students to the fundamentals and concepts of statistical and optimization methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, skew ness and kurtosis, theory of probability, linear programming problems, transportation, assignment and game problems. This course is designed with an aim of helping the students to understand important theorems, different formulae and practical applications of these statistical and optimization methods in the field of Computer Sciences and Applications.

Course Contents:

Module I
Collection of Data, Sampling and Sampling Designs, Classification and Tabulation of Data, Graphical representation of Data, Measures of Central Value, Measures of Dispersion. Moments, Skewness, Kurtosis, Correlation and Regression.

Module II: Probability
Classical Definition of Probability,Algebra of Events, Probability Axoims, Conditional Probability.

Probability Distributions: Discrete and Continuous Distributions, Binomial Distribution, Poisson distribution, Normal Distribution.

Module III:Linear Programming
Mathematical Formulation of Linear Programming models and its Graphical Solutions, Simplex Method, Charne's Big M method, Two Phase Method.

Module IV: Transportation Problem
General Transportation model, Starting basic Solutions:-North west Corner Method, Least Cost Method, Vogel's Approximation Method, Test of optimality, unbalanced Problem. Assignment Problems

Module V:Game Theory
Two-Person Zero Sum Games, Maximin-Minimax Principal, Pure Strategies, Mixed Strategies, Expected Pay off, Concept of Dominence, Graphical Solution of m X 2 and 2 X n Games.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- P.K. Gupta & Manmohan, Linear Programming and Theory of Games, S Chand & Sons Educational Publishers
- S.C Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, S Chand & Sons Educational Publishers

References:

- Hogg, Probability and Statistical Inference, Prentice Hall Publication
- Alexander. M. Mood, Introduction to the Theory of Statistics, Tata Mc Graw Hill

INTERNET OF THINGS

Course Code: IFT **Credit Units : 04**

L-T-P : 3-1-0

Course Objective:

Course Objective:
The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables student to understand the basics of Internet of things and protocols. It introduces some of the application areas where Internet of Things can be applied. Students will learn about the working of Internet of Things.

Course Contents:

Module I: INTRODUCTION TO IOT
Introduction to IoT, its importance, Elements of an IoT ecosystem, Characteristics of IoT, Physical design of IoT:Things in IoT, Logical design of IoT- IoT functional blocks, IoT communication models, IoT communication API's

Module II:IoT ENABLING TECHNOLOGIES & IOT LEVELS
Wireless Sensor Networks, cloud computing, big data analytics, communication protocols, embedded systems, IOT components, IoT levels: Level 1, Level 2, Level 3, Level 4, Level 5 and level 6.

Module III: IOT AND M2M
Introduction to M2M, difference between IoT and M2M, Software Defined Networking(SDN) for IoT: its architecture, key elements and its layers, Network Function Virtualization(NFV) -its architecture and key elements

Module IV: IoT SYSTEM MANGEMENT:
Need for IoT system management, SNMP and its limitations, Network Operator Requirements, NETCONF(Network Configuration Protocol) :its protocol layers, YANG

Module V: IOT DESIGN METHODOLOGY & APPLICATIONS
Steps in designing IoT device,Smart Applications, Introduction to Python and Raspberry Pi

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition,
- VPT, 2014Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet ofThings", Springer, 2011.

- David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a HighlyConnected World”, Cambridge University Press, 2010.
- Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applicationsand Protocols”, Wiley, 2012.

References:

- Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything”, 1st Edition, Apress Publications, 2013
- Cuno Pfister, Getting Started with the Internet of Things, O‟Reilly Media, 2011, ISBN: 978-1-4493-9357-1

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES
(PHP, MySql)

Course Code: **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:
This course is aimed to provide a fundamental understanding of dynamic web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc. It also gives an overview open source framework like JOOMLA, ZEND etc...

Course Contents:

Module I: Introduction to Open Source and PHP programming

Introduction to Open Sources Technologies, Introduction to PHP, installation and configuration, Advantages and Disadvantages of PHP, Client Side Scripting, Server Side Scripting, Variables, data types, various types of function, creating your own function, Strings in PHP, String Functions.

Module II: Operator, Loops, Array, Exception and Error Handling

Operators, Conditions, Loops, Using for each, Creating and Using Arrays, Multidimensional Array, Associative array.
Error Handling in PHP, Errors and Exceptions, Exception class, try/catch block, throwing an exception, defining your own Exception subclass.

Module III: Classes, File system, Passing Information between pages

Object oriented programming with Php, Working with Datetime, code re-use, require (), include(), and the include_path; Understanding PHP file permissions, File reading and writing functions, File system functions, File uploads, Sending mail & use of email server.
HTTP, GET arguments, POST arguments, Using Session in PHP, cookies, The setcookie() function, Deleting Cookies and Reading Cookies.

Module IV: Working with database

HTML Tables and Database tables, Database manipulation(Select, Insert, Update, Delete), validating User Input using Javascript.
MYSQL, Introducing MySQL; database design concepts; the Structured Query, Language (SQL); communicating with a MySQL backend via the PHP, MySQL APIBuilding Database Applications,

Module V: Working with Frameworks

Working with Mambo, Working with Joomla, Working with framework. Use of Joomla in rapid development of website. Developing of simple website using joomla.

Examination Scheme:

Components	**CT1**	**PR.**	**ATTD.**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- Beginning PHP, Apache, MySQL Web Development, Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, published by Wiley, wrox

References:

- The Complete Reference PHP, by Steven Holzner, Tata McGraw-Hill Publication
- Beginning PHP and MYSQL, by W. Jason Gilmore, Apress Publication

INTRODUCTION TO OPEN SOURCE TECHNOLOGIES (PHP, MySql) LAB

Course Code: **Credit Units: 01**
L-T-P:0-0-2

Course Contents:

1. Write the process of installation of web server.
2. Write programs to print all details of your php server. Use phpinfo().
3. Write a program to give demo of ECHO and PRINT command.
4. Write a program to implement the string functions.
5. Write a program to print Fibonacci series upto a given number.
6. Write a menu driven program to implement a calculator which performs only addition, subtraction, multiplication and division. The operation should happen based on user choice.
7. Write a program sort ten number by using array.
8. Write a program to demonstrate the concept of associative array.
9. Write a program to demonstrate the concept of multidimensional array.
10. Write a program to demonstrate the concept of Classes & objects.
11. Create a login form with two text fields called “login” and “password”. When user enters “Amity”as a user name and “university” as a password it should be redirected to a Welcome.HTML page or toSorry.HTML in case of wrong username/password.
12. Create a database in MySql and connect that database from PHP.
13. Write a program to Update, insert and delete the values of table in database.
14. Create a form with a text box asking to enter your favorite city with a submit button when the user enters the city and clicks the submit button another php page should be opened displaying “Welcometo the city”.

15. Write a program to design login form in which find the greatest number amongst three numbers.
16. WAP for Marksheet generation.
17. Design a webpage for entering the student details with all the validations applied on it.
18. Write a php script to print current date and time.
19. Write a pp script to use include and require functions.
20. Write a php script including all the file handling functions.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MOBILE COMPUTING

Course Code: **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:

The course objectives are to make the student understand the concept of mobile computing paradigm, Its novel applications and limitations, to understand the typical mobile networking Infrastructure through 2G technologies (GSM, GPRS, EDGE), 3G technologies (WCDMA, UMTS, HSPA), to understand the issues and solutions of various layers of mobile networks, WLANs and Mobile IP, to understand the Global Mobile Satellite Systems, to understand the advanced techniques and current trends (4G and 5G networks)

Course Contents:

Module I: Introduction

Introduction to cellular engineering, Frequency Re-use, Channel Assignment Strategies, Fixed and Dynamic Channel Assignment Strategies, Handoff Process, Factors affecting Handoff Process, Handoff detection Strategies, Few practical cases of Handoff Scenario, Interference and System Capacity, Cell Splitting, Sectoring, History of Mobile phone generations, 1G technology

Module II: Second Generation (2G) Mobile Technologies

PCS Architecture, Mobility management in PCS, GSM, Architecture, GSM addresses and identifiers, Protocol Stack, GSM security, Mobility Management in GSM,GPRS (2.5G), GPRS Architecture, GPRS Network Nodes, Protocol Stack.

Module III: Mobile Data Communication

Bluetooth: Architecture, Network and Protocol stack.

WLANs (Wireless LANs), Modes of operation of WLANs, IEEE 802.11 standard, System Architecture, Protocol stack, Wireless) Multiple Access techniques: SDMA, FDMA, TDMA, CDMA.
Mobile IP, Motivation, Problems, Data Transfer, Encapsulation and tunneling.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, Wireless Markup Languages (WML).

Module IV:Third Generation (3G) Mobile Technologies
Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, 3GPP, UMTS, Wideband Code Division Multiple Access (W-CDMA), CDMA 2000, HSPA, Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module V: Global Mobile Satellite Systems
Global Mobile Satellite Systems, Global History, Applications, Classical Satellite System, Terminologies, Geostationary and Geosynchronous Satellites, Types of Orbits based upon distance from Earth (LEO, MEO, GEO, HEO), Based upon Eccentricity (Circular and Elliptical), Routing, Localization and Handover in satellite systems, case studies on IRIDIUM and GLOBALSTAR LEO satellite systems.

Module VI:Forth Generation (4G) Mobile Technologies and Current Trends
4G standard: IMT Advanced requirement, Long Term Evolution, architecture, Mobile IPV6 (MIPV6), WiMax standard IEEE 802.16, VoIP, VoLTE, Presence Aware Technology, Pervasive Networks, NFC (Near Field Communication), Overview into 5G technology, NGMNA and IoT.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:

- JochenSchiller,"MobileCommunications",Addison-Wesley, second edition, 2004
- Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028

References:

- Mark Ciampa, Thomson learning ,"Guide to Designing and Implementing wireless LANs",Vikas Publishing House, 2001
- Yi-Bing Lin &ImrichChlamtac ,"Wireless and Mobile Networks Architectures", John Wiley & Sons, 2001.
- Raj Pandya,"Mobile and Personal Communication systems and services", Prentice Hall of India, 2001.
- AfifOsseiran**,** Jose F. Monserrat**,**Patrick Marsch**,** "5G Mobile and Wireless Communications Technology", Cambridge University Press, October 2016
- Arunabha Ghosh, Jun Zhang , Jeffrey G. Andrews, Rias Muhamed, "Fundamentals of LTE", Princeton Hall, First Edition

NETWORK SECURITY

Course Code: **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:
Network Security was always important, but has gained significance with the increase of application of Internet associated e-commerce. Threat and compromise /Breach potentially increased with the introduction of the end user involment,communication and networking .Thus the course is introduced to make the student acquainted with the concepts and practices to make the network environment secure.

Module 1:

Integer arithmetic, modular arithmetic, matrices, Linear Congruence: Definition – Basic properties of congruence, Divisibility - Greatest common divisor, equivalence classes, residue classes. Chinese remainder theorem, Euclid and Extended Euclid, modular inverse, exponentiation and logarithm. Algebraic structures: groups, fields, rings, Modulo groups - Primitive roots - Discrete logarithms.

Module 2:
Introduction to security attacks, services and mechanism, Classical encryption techniques, substitution cipher:ceaser cipher, playfair cipher, mono/polyalphabetic cipher, hill cipher, affine cipher. Transposition techniques: columnar cipher,rail fence cipher up to two round.

Module 3:
Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES.

Module 4

Principals of public key crypto systems, RSA algorithm, security of RSA. Message Digest: Authentication requirements, authentication functions, hash function and SHA-1,message authentication code. Concept of Digital Signature. Diffie-Hellman Key Exchange.

Module 5:
IP Security: Architecture, Authentication header, Encapsulating security payloads, HTTPS, Viruses, Worms, Malware, Botnets, Firewall and its types.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

Text :

- "Cryptography & Network Security", William Stallings, PHI
- "Cryptography & Network Security", Behrouz A. Forouzan, TMH
- "Cryptography & Network Security", Atuk Kahate,

E-COMMERCE

Course Code:
L-T-P : 3-0-0 **Credit Units: 03**

Course Objective:
This course is aimed at incorporating the fundamentals of E-Commerce which involves study of Network Infrastructure, Mobile Commerce, Web Security, encryption, etc. which are essential components of Managing e-transactions making life even simpler and getting rid of various time consuming and tedious activities.

Course Contents:

Module I: Introduction
Traditional commerce – an overview, What is E-commerce?, Comparison between Traditional and Electronic commerce, Issues associated with electronic commerce. Types of E-Commerce: Inter Organizational E- commerce, Intra Organizational E-Commerce, Architectural frame work of E-Commerce, Benefits, Advantages and Disadvantages of E- Commerce.

Module II: Web Security
Firewalls, Types of Firewalls, Transaction Security, Cryptography: Secret Key Encryption, Public key Encryption, Implementation & management issues, Virtual Private Networks, Client Server Network Security.

Module III: E**lectronic Payment Scheme**

Limitations of Traditional Payment system, Cyber Cash, First Virtual payment schemes, Online credit card system: SET, Smart card, Electronic cheques, Digital Cash, Debit card.

Module IV: Electronic Data Interchange (EDI)

Definition of EDI, EDI in action, Types of EDI, Benefits of EDI.

Module V: E-Commerce and Market

SCM, marketing issues, Advertising and online publishing, Copyright and its protection methods

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

Text:

- Ravi Kalakota. Andrew Whinston. "Frontiers of Electronic Commerce ". Addison Wesley

References:

- Denial Amor "The E Business revolution", Addison Wesley
- Greenstein & Feinman, " Electronics Commerce", Tata McGraw Hill

DATA WAREHOUSE AND DATA MINING

Course Code: **Credit Units: 03**
L-T-P: 3-0-0

Course Objective:
This course is divided into two parts: one on Data Warehousing and one on Data Mining. Both data warehousing and data mining are advanced recent developments in database technology which aim to address the problem of extracting information from the overwhelmingly large amounts of data which modern societies are capable of amassing. Data warehousing focuses on supporting the analysis of data in a multidimensional way. Data mining focuses on inducing compressed representations of data in the form of descriptive and predictive models. Course gives an in-depth knowledge of both the concepts.

Course Contents:

Module I:Introduction to Data Warehousing

Data Warehouse definition & Characteristics, The need for data ware housing, Operational and Informational Data Stores, Difference between Data warehouse and DBMS, Benefits of Data warehousing,Data mart, Meta Data, Conceptual Modeling of Data Warehouses: star schemas, Snowflake, Fact Constellations with example each.

Module II:Data Warehousing Components& Architecture

Data Warehouse Architecture, Components of Data Warehouse Architecture, Data Warehousing Topologies, Meta Data, Components of Meta data, Mapping Meta Data. Challenges with Data Warehousing.

Module III: On Line Analytical Processing (OLAP)

Definition: OLAP, Difference between OLTP and OLAP, OLAP Server Architecture, OLAP Operations, Multi Relational & Multi Dimensional: MOLAP, ROLAP, OLAP Tools, Metadata Repository, Data Warehouse Back-End Tools and Utilities.

Module IV: Data Mining : Association Rules ,Classification and Clustering

Introduction to Data Mining, Applications, Limitations, Techniques, Association Rules: Apriori Algorithm, Classification: Decision Tree

Cluster Analysis: Features, Types of Cluster Analysis Methods: Partitional, Hierarchical, Density Based, Grid based Methods, , Web Data Mining, Search Engine, Case Study, Limitations.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text::

- Han & Kamber)Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, March 2006
- Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.

References:

- George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.
- M.H.Dunham,”Data Mining:Introductory and Advanced Topics” Pearson Education.
- Jiawei Han, Micheline Kamber, “Data Mining Concepts & Techniques” Elsevier.

MAJOR PROJECT

Course Code: **Credit Units: 30**

Objective:
Major Project/Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology, practical skill enhancement and an opportunity to work closely with a industry external guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Students require professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.**
- After project approval student will submit synopsis as per given guidelines.
- Student will maintain a file (**Internship File/Project Report**) which he/she will submit after completion of internship. **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the cosurse modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

In general, the Project Report File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

- Any problems that have arisen that may be useful to document for future reference.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Hard Bound- Dark Green Colour

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

  The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components
Front Page
Declaration
Student Certificate (University)
Certificate (Company)
Acknowledgement
Abstract
Contents
List of Figures
List of Tables
Company Profile (optional)
Chapters
Appendices(optional)
References / Bibliography

The above given components are described below:

1. **The Title Page**-- Format will be given by coordinator/supervisor.
2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). It is given by the Institute. The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Company Certificate: This is a certificate, which the company gives to the students.
5. Contents-This is page number (iii). The table of Contents should be titled just Contents (not Table of Contents). Try to fit it into one or two pages.
6. Acknowledgement-This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
7. Abstract and **Keywords-**This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.
8. Company Profile: A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.

9. **Chapters**—Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.

10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment 50 Marks

Final Assessment arks

Continuous Internal Assessment consists of topic relevance, synopsis, progress report and draft report. Final Assessment includes viva, presentation, report and execution marks.

Examination Scheme:

Components	**S**	**PR1**	**PR2**	**PR3**	**V**	**E**	**R**	**FP**
Weightage	20	10	10	10	10	10	15	15

S-Synopsis, PR1-Progress Report-1, PR2- Progress Report-2, PR3- Progress Report-3, V – Viva, FP – Final Presentation, R – Report, E-Execution

BIOMEDICAL

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
BME2351	Human Anatomy and Physiology-I	3	-	-	3
BME2451	Bioinstrumentation	3	-	-	3
BME2551	Tissue Engineering	3	-	-	3
BME2651	Biomechanic	3	-	-	3
BME2751	Medical Image Processing	3	-	-	3
BME2851	Seminar –Biomedical Engineering	3	-	-	3
	TOTAL				**18**

BIOMEDICAL

Syllabus

HUMAN ANATOMY AND PHYSIOLOGY-I

Course Code: BME2351 **Credit Units: 03**

Course Objective:
To provide students a basic understanding of the human body structure and functioning. Students will be able to relate basic human body systems and life processes, name the major body systems and their functions , understand the anatomy of various body systems .

Course Contents:
Module I:
Basic cell structure , various cell organelles and their functions , Tissue- their types , structure and function , structure and function of skin , Different types of muscles and their function , General description of bones , their structure and function , types of joints and their structure and function .

Module II:
Cell , cell membrane , polarisation and repolarisation , resting membrane potential , Nernst equation , Donnans equilibrium , Goldman equation action potential and its proapagation , synaptic transmission ,

Module III
Blood , Lymph and circulation : blood composition , properties and function . Structure and functions of RBCs, WBCs and platelets , Blood types , Homeostasis , Immune mechanisms , Lymph., Heart position , structure and functions , Heartbeat , electrical excitation , Einthovens triangle , Cardiac and peripheral regulation , blood pressure and its regulation , blood flow and its regulation.

Module IV
Respiratory System : position and functions . Mechanics of respiration , Lung volumes and capacities , Gas exchange between lungs and tissues , regulation of respiration .Digestive system : Different parts of digestive system , functions of each organ , digestion of proteins , carbohydrates , fats , vitamins and minerals.

Module V
Osteology , Bone , brief introduction to different bones in skull , vertebral column , upper extremity , hands , lower extremity , foot .

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References

- Guyton A.C and J.E. Hall , " Text book of Medical Physiology " Harcourt India Pvt. Ltd.
- Principles of Human Anatomy and Physiology , Tortora , Wiley
- Ganong W.F. " Review of Medical Physiology" , Prentice Hall
- Gray's Anatomy for Students - Gray's Anatomy by A. Wayne Vogl, Richard Drake, Adam W. M. Mitchell

BIOINSTRUMENTATION

Course Code : BME2451 **Credit Units: 03**

Course Objective:
To enable the student to understand the working and construction of various equipments used in the medical field.

Course Contents:

Module I:
Transducers and Reference electrodes: classification of transducers, temperature transducers , displacement transducer , pressure tranducer , catheter transducer , photoelectric transducer , piezoelectric transducer . po2 electrodes , membrane electrodes , blood gas analysis , Ion specific electrodes .

Module II :
ECG : electrodes and conversion of ionic potentials to electric potential , ECG instrumentation amplifiers, driven right leg circuitry.Introduction and characteristics of bio signals (EEG , ECG , EMG) . , removal of artefacts , event detection and correlation analysis of ECG signals .

Module III :
Respiration measurement using electrical impedance plethysmography : electrical impedance changes during breathing , 2 and 4 electrode measurement , 4 electrode technique .

Module IV :
Oxygen saturation using pulse oximetry : optical characteristics of oxygenated and deoxygenated blood , principles of pulse oximetry , circuits of pulse oximetry , constant current source , current – voltage converter , amplifiers .

Module V :
Non invasive blood pressure measurement : theory and circuitry of method using Korotkoff sounds and method based on oscillometry .

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Leslie Cromwell , Fred J. Weibell , Erich A Pfeiffer , Biomedical Instrumentation and Measurements , PHI , 2nd Edition , 2004.
- R.S. Khandpur , Handbook of Biomedical Instrumentation , Tata McGraw Hill 2004 .
- John G.Webster , Medical Instrumentation : Application and Design, 3rd Edition , John Wiley & Sons , New York , 1998 .

TISSUE ENGINEERING

Course Code: BME2551 **Credit Units: 03**

Course Objective:
To enable students to understand the principles of tissue engineering and learn the basics of cell culture , tissue culture ,scaffolding , types of bioreactors and mass transfer reactions .

Course Contents:
Module I:
Cell culture: Different cell types, progenitor cells and cell differentiations, different kind of matrix, cell-cell interaction. Aspect of cell culture: cell expansion, cell transfer, cell storage and cell characterization, Bioreactors.

Module II :
Molecular biology aspects: Cell signaling molecules, growth factors, hormone and growth factor signaling, growth factor delivery in tissue engineering, cell attachment: differential cell adhesion, receptor-ligand binding, and Cell surface markers.**Module III** :

Module III :
Scaffold and transplant: Engineering biomaterials for tissue engineering, Degradable materials (collagen, silk and polylactic acid), porosity, mechanical strength, 3-D architecture and cell incorporation. Engineering tissues for replacing bone, cartilage, tendons, ligaments, skin and liver. Basic transplant immunology, stems cells: introduction, hepatopoiesis.

Module IV :
Cryopreservation of cells and tissues, Transport in biological system, Mass transport through cell membranes, Mathematical modelling of mass transfer in engineered tissues

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Clemens van Blitterswijk, Tissue Engineering, Academic Press, 2008
- Principles of tissue engineering, Robert. P.Lanza, Robert Langer & William L. Chick,Academic press.
- The Biomedical Engineering –Handbook, Joseph D. Bronzino, CRC press.
- Tissue Engineering, B. Palsson, J.A. Hubbell, R.Plonsey & J.D. Bronzino, CRC- Taylor &Francis

BIOMECHANICS

Course Code: BME2651 **Credit Units: 03**

Course Objective:
To enable students to understand the basics of bone movement , gait analysis and mechanics of bone and muscles

Course Contents:
Module I:
Joint motion: relative position of two bones meeting at a joint , description of a rigid body , degrees of freedom , euler angles , rotation matrices, rotation angle anatomical directions , anatomical planes ,

Module II :
Inverse Dyanamics to calculate resultant force and momentum within the body link segment models , intersegmental force and moment ,

Module III :
Human Gait analysis , gait cycle , angular kinematics of hip , knee and ankle , force plates and ground reaction force , gait abnormalities .

Module IV :
Structure and composition of bone , microstructure of bone , skeletal muscle , mechanism of muscle contraction , force length and force celocity relationships , basic muscle models , tendons and ligaments , their basic mechanical models , injuries and factors affecting biomechanical properties , Cartilage , viscoeleasticity and viscoelastic models .

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Basic biomechanics of the musculoskeletal system (M Nordin and VH Frankel; Lea& Febiger, London 1989)
- Biomechanics of the musculo-skeletal system (BM Nigg, W Herzog (eds); John Wiley & Sons, Chichester 1994)
- Biomechanics and motor control of human movement (DA Winter; John Wiley &Sons, Chichester 1990)
- Bones and Joints: A Guide for Students. Christine Gunn. Churchill Livingstone,Edinburgh 1996 (3rd ed.)

MEDICAL IMAGE PROCESSING

Course Code: BME2751 **Credit Units: 03**

Course Objective:
To enable students to understand techniques used in imaging in the medical profession , the artefacts and other problems experience in doing so .

Course Contents:
Module I:
Digital image fundamental : Elements of digital image processing systems, Elements of Visual perception, Image sampling and quantization,– Some Basic relationships between pixels, Matrix and Singular Value representation of discrete images

Module II :
Image transforms1DDFT, 2D DFT, Cosine, Sine Hadamard, Haar, Slant, KL transform and their properties

Module III :
Image enhancement : Histogram – Modification and specification techniques, Enhancement by point processing Image smoothening,Image sharpening, generation of spatial masks from frequency domain specification, Homomorphic filtering,and color image processing.

Module IV :
Image segmentation : spatial feature extraction , transforms features , segmentation techniques , analysis techniques,application of matlab for digital image processing .

Module V
Run length, Huffman coding, arithmetic coding, Pixel coding, transform coding, JPEG Standard, predictivetechniques, Application of image processing techniques in thermography, SPECT, PET images.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Rafael C., Gonzalez and Richard E. Woods, *Digital Image Processin*g, Pearson Education Asia, 2001
- Anil K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall of India, 1997
- William K. Pratt, *Digital Image Processing*, John Wiley, NJ, 1987.
- Albert Macouski, *Medical Imaging systems*, Prentice Hall, New Jersey.1983.
- Sid Ahmed M.A., *Image Processing Theory, Algorithm and Architectures*, McGraw Hill, 1995.

CLOUD COMPUTING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
CSE2353	Computer Networks	3	-	-	3
CSE2453	Distributed System	3	-	-	3
CSE2553	High Performance Computing	3	-	-	3
CSE2653	Information Storage Management	3	-	-	3
CSE2753	Interfacing with Virtualization	3	-	-	3
CSE2853	Cloud Computing Tools & Techniques	3	-	-	3
	TOTAL				**18**

CLOUD COMPUTING

Syllabus

COMPUTER NETWORKS

Course Code: CSE2353 **Credit Units: 03**

Course Objective:
The course provides a unified and fundamental view of the broad field of computer networks. Furthermore, the easy to understand and extremely relevant world of Computer Net working is introduced in a top down Approach. Introduction to intranets and intranet servers and browsers, networks and network servers, LANs/WANs, internetworking technologies, the OSI reference model for networking protocols, CSMA/CD, TCP/IP implementation

Course Contents:
Module I: Introduction
Introduction to computer networks, evolution of computer networks and its uses, Advantages and Disadvantages of Computer Network, reference models: OSI reference Models, TCP/IP Protocol Suit
Networking fundamentals: Internet, Circuit switching vs Packet switching, ISPs, Delay and Loss in Packet Switched Networks

Module II: Local Area Network
LAN Architecture, LAN topologies- Bus/ Tree LAN, Ring LAN, Star LAN, Wireless LAN, Ethernet and Fast Ethernet, Token Ring

Module III: Application layer and data link layer
Application Layer Protocols: HTTP, FTP, SMTP, DNS
Data link layer design issues, Flow Control- Stop and Wait, Error Detection, Error Control, error detection and correction, data link layer protocols, sliding window protocols, example of data link protocol- HDLC

Module IV: Medium access layer
Channel allocation problem, multiple access protocols, Introduction to ALOHA, CSMA/CD, CSMA/CA

Module V: The network layer
Introduction, Routers, Network layer concepts, shortest path routing, flooding, distance vector routing, link state routing (without algorithms), congestion control and quality of service, internetworking, IP, Ipv4 Addressing vs Ipv6

Module VI: The transport layer
The transport layer services, elements of transport protocols, TCP and UDP, Brief introduction to presentation and session layer, E-mail

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Data Communication & networking: Forouzan, B. A.
- Data and Computer Communications, W. Stallings, Prentice Hall of India

References:

- Computer Networks: Tanenbaum, Andrew S, Prentice Hall

DISTRIBUTED SYSTEM

Course Code: CSE2453 **Credit Unit: 03**

Course Objective:
It serves as one of the important courses in terms of having an understanding about the basic concepts about distributed systems, their types or categories with some concepts about basic networking and various different directions in which it is useful and applicable. The outcome of the course implicitly and explicitly affects the abilities of students to have a good understanding of the upcoming other related courses.

Course Contents:
Module 1: Introduction to Distributed System
Introduction, Goals of Distributed System Examples of distributed systems , Trends in distributed systems , Resource sharing in distributed system, Challenges faced, System Models basics, types of System Models, Physical models , Architectural models , Fundamental models.

Module 2: Networking and Internetworking
Introduction to networking, Networking issues for distributed systems, Types of network (LAN, MAN, WAN, WLAN, WMAN, WWAN, internetworks), Network principles, Internet protocols, Basics of Inter-Process communication, Multicast Communication, Network virtualization: overlay networks, Remote invocation, Remote Procedure Call, Remote method invocation.

Module 3: Operating System Support, Web Services and Security
Introduction , Operating System layer, Operating System Architecture, Virtualization at Operating System level, Introduction to web services, Service descriptions and IDL for web services, Applications of web services, Overview of Security Techniques, Cryptographic algorithms , Digital signatures, Needham–Schroeder, Kerberos techniques.

Module 4: Distributed File Systems and Distributed Transactions
Introduction (URI, URL's) , Name services and the Domain Name System(NameSpace, Name Resolution, DNS), Directory services, Transactions , Nested transactions , Locks , Optimistic concurrency control, Flat and nested distributed transactions , Atomic commit protocols , Concurrency control in distributed transactions , Distributed deadlocks.

Module 5: Distributed Multimedia System and Distributed Algorithms
Characteristics of multimedia data, Quality of service management, Resource management, Stream adaptation, Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- Coulouris, Dollimore, Kindberg, Blair, "Distributed System: Concepts and Design", Fifth Edition, Pearson Ed.
- Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill

References:

- Andrew S. Tanenbaum, "Computer Networks", 4th ed., Prentice Hall
- Gerald Tel, "Distributed Algorithms", Cambridge University Press

HIGH PERFORMANCE COMPUTING

Course Code: CSE2553 **Credit Units: 03**

Course Objective:
This course gives an insight about Cluster and Grid computing. The major objective of this course is to provide a sound foundation to the students on the concepts, percepts and practices in a field that is of immense concern to the industry and business. This would be helpful to students for understanding a subject related to but a bit higher in its hierarchy.

Course Contents:
Module 1: Parallel and Distributed Programming Models
Introduction to high performance computing, basic definitions: cluster, grid, meta-computing, middleware etc., examples of representative applications. Programming models: shared memory, message passing, peer-to-peer. Development of parallel and distributed applications, Design phases, Common parallel patterns, Performance metrics and profiling.

Module 2: Overview of Cluster Computing
The Role of Clusters, Definition and Taxonomy, Distributed Computing, Limitations, Architecture of cluster-based systems, Design Decisions, Network Hardware, Network Software, Protocols Distributed File Systems, Virtualization technologies, Issues in cluster design: performance, single-system-image, fault tolerance, manageability, programmability, load balancing, security, storage.

Module 3: Introduction of Grid Computing
Introduction, Evolution of the Grid, Definitions of Grid Computing, Infrastructure of hardware and software, Grid models, Applications, Examples of usage, Research possibilities / scope in Grid Computing, HPC and Grids, Scheduling HPC applications in Grids, Grid Monitoring Architecture (GMA) – An Overview of Grid Monitoring Systems.

Module 4: Integrating task parallelism with data parallelism
Introduction and motivation, A model for integrating task parallelism into data parallel programming platforms, Integration of the model into ARC, Design and implementation applications, performance analysis, guidelines for composing user programs, related work.
Anonymous remote computing and communication model: Introduction, Location in dependent inter task communication with DP, DP model of iterative grid computations, Design and implementation of distributed pipes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:
- "Grid Computing a Research Monograph" by D. Janakiram, Tata McGraw hill publications

References:
- Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson Education
- "Grid Computing: A Practical Guide to technology and Applications" by Ahmar Abbas, Charles River media

INFORMATION STORAGE MANAGEMENT

Course Code: CSE2653 **Credit Units: 03**

Course Objective:
The course provides detailed knowledge, practical training and insight into the implementation and management of various storage technologies with a focus towards applying these technologies in an information lifecycle paradigm. This course focuses on evolution of storage and implementation models, Storage devices principles, Storage classes (SAN, NAS. CAS) and Backup, Business Continuity, and Disaster Recovery principles

Course Contents:
Module 1: Introduction to Storage Technology
Information Storage - Data, Types of Data, Information, Storage, Evolution of Storage Technology and Architecture, Data Center Infrastructure, Key Challenges in Managing Information, Information Lifecycle -Information Lifecycle Management, ILM Implementation, ILM Benefits.

Module 2: Data Protection & Intelligent Storage System
Components of a Storage System Environment, RAID -Implementation of RAID, RAID Array Components, RAID levels, RAID Impact on Disk Performance, Components of an Intelligent Storage System, Intelligent Storage Array-High-end Storage Systems, Midrange Storage System

Module 3: Storage Networking Technologies & Virtualization
Direct-Attached Storage and Introduction to SCSI- Types of DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, Storage Area Networks- Fibre Channel: Overview, SAN and its evolution, Components of SAN, Network-Attached Storage- General Purpose Servers vs. NAS Devices, Benefits of NAS, Components of NAS.

Module 4: CAS and Business Continuity
CAS: Fixed Content and Archives, Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS.
Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis.

Module 5: Backup, Recovery & Replication
Backup and Recovery : Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Process, Backup and Restore Operations, Backup Topologies, Backup Technologies.
Replication: Local Replication- Uses of Local Replicas, Data Consistency, Local Replication Technologies, Remote Replication- Modes of Remote Replication, Remote Replication Technologies.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:
- Information Storage and Management, Wiley Publication ISBN: 978-81-265-2147-0

References:
- Marc Farley Osborne, "Building Storage Networks", Tata McGraw Hill
- Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill

INTERFACING WITH VIRTUALIZATION

Course Code: CSE2753 **Credit Units: 03**

Course Objective:
This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Contents:
Module-I: Introduction to Virtualization
Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations
Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization
Desktop virtualization: Software virtualization – Memory virtualization - Storage virtualization – Data virtualization – Network virtualization

Module-II: Hypervisors and Virtual machines
Server Virtualization: Understanding Server Virtualization, types of server virtualization, Virtual machine basics, types of virtual machines, hypervisor concepts and types

Module-III: Virtualization Solutions
Understanding Microsoft's Virtualization solutions: Microsoft's Infrastructure Optimization Model, Virtualization and the Infrastructure Optimization Model, Benefits of Virtualization, Achieving the Benefits of Datacenter Virtualization, Achieving the Benefits of Client Virtualization, Achieving the Benefits of Cloud Virtualization

Module-IV: Migrating into a Cloud
Introduction, Challenges while migrating to Cloud, Broad approaches to migrating into the cloud-why migrate -deciding on cloud migration, the Seven-step model of migration into a cloud, Migration Risks and Mitigation, Enterprise cloud computing paradigm, relevant Deployment Models for Enterprise Cloud Computing, Adoption and Consumption Strategies, issues for enterprise applications on the cloud

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

References:

- Publications, 2006. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011
- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010

CLOUD COMPUTING TOOLS AND TECHNIQUES

Course Code: CSE2853 **Credit Units: 03**

Course Objective:
This course gives students an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Contents:
Module-I: Cloud Computing Overview
Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.

Module-II: Cloud Insights
Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

Module-III: Cloud Architecture- Layers and Models
Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption.
Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

Module-IV: Cloud Simulators- CloudSim and GreenCloud
Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud

Module-V: Introduction to VMWare Simulator
Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

References:

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

EMBEDDED SYSTEM

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
ECE2352	Introduction to Microprocessor System	3	-	-	3
ECE2452	Microcontroller	3	-	-	3
ECE2552	PCB Fabrication	3	-	-	3
ECE2652	Robotics and Automation	3	-	-	3
ECE2752	Simulation and Modelling Processing	3	-	-	3
ECE2852	Project (Embedded System)	3	-	-	3
	TOTAL				**18**

EMBEDDED SYSTEM

Syllabus

INTRODUCTION TO MICROPROCESSOR SYSTEMS

Course Code: ECE2352 **Credit Units: 03**

Course Objective:
This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Introduction to Microcomputer Systems
Introduction to Microprocessors and microcomputers, Study of 8 bit Microprocessor, 8085 pin configuration, Internal Architecture and operations,interrupts, Stacks and subroutines, various data transfer schemes.

Module II: ALP and timing diagrams
Introduction to 8085 instruction set, advance 8085 programming , Addressing modes, Counters and time Delays, , Instruction cycle, machine cycle, T-states, timing diagram for 8085 instruction.

Module III: Memory System Design & I/O Interfacing
Memory interfacing with 8085. Interfacing with input/output devices (memory mapped, peripheral I/O), Cache memory system. Study of following peripheral devices 8255, 8253, 8257, 8259, 8251.

Module IV: Architecture of 16-Bit Microprocessor
Difference between 8085 and 8086, Block diagram and architecture of 8086 family, pin configuration of 8086, minimum mode & maximum mode Operation, Bus Interface Unit, Register Organization, Instruction Pointer, Stack & Stack pointer, merits of memory segmentation, Execution Unit, Register Organization.

Module V: Pentium Processors
.Internal architecture of 8087, Operational overview of 8087, Introduction to 80186, 80286, 80386 & 80486 processors, Pentium processor (P-II, P-III, P-IV).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Ramesh. S. Gaonkar, "Microprocessor architecture Programming and Application with 8085" Penram International Publishing, 4th Edition
- B.Ram, "Fundamentals of microprocessors and microcomputer" DhanpatRai, 5th Edition.]
- Douglas V Hall.
- M. Rafiquzzaman, "Microprocessor Theory and Application" PHI – 10th Indian Reprint.
- Naresh Grover, "Microprocessor comprehensive studies Architecture, Programming and Interfacing" DhanpatRai, 2003.
- Gosh," 0000 to 8085" PHI.

MICROCONTROLLER

Course Code: ECE2452 **Credit Units: 03**

Course Objective:
The syllabus deals with 8051 architecture and its interfacing with other devices. A microcontroller is an integrated circuit that is programmable. The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. 8051 C programming is also incorporated in the syllabus.

Course Contents:

Module I: Overview of Microcontroller
Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.

Module II: Communication with 8051
Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).

Module III: Basics of 8051 C Programming
Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types.Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs.

Module IV: 8051 C Programming
Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions, Common control problem examples (Centronics parallel interface,Printer interace, Memory access, Key matrix scanning, Stepper motor control and digital clock.).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Raj Kamal, 2004, "Embedded Systems", TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.

References:

- David E. Simon,1999, "An Embedded Software Primer", Pearson Education
- K.J. Ayala, 1991, "The 8051 Microcontroller", Penram International.
- Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
- Dr. Prasad, 2004, "Embedded Real Time System", Wiley Dreamtech

PCB FABRICATION

Course Code: ECE2552 **Credit Units: 03**

Aim: To equip the students with the knowledge of PCB design and fabrication processes.
Objective:

- To make familiar with PCB design and various processes involved.
- To provide in-depth core knowledge in design, performance analysis and fabrication of Printed Circuit Boards.
- To provide the knowledge in PCB fabrication process and factors affecting PCB performance.

Module I: Introduction to the PCB
Definition and Evolution of the Printed Circuit Board (PCB), Purposes of a PCB, Applications, Market Drivers, Typical Development Flow for a PCB, Printed Circuit Technology, Basic Electronic Components, Resistors, Capacitors, Inductors, Diodes, Transistors, Relays, Connectors, Integrated Circuits: How a silicon wafer becomes an IC, Printed Circuit Board Characteristics, PCB Materials, Fillers, resins, laminates, base material characteristics, Dielectric, conductors, Engineering References

Module II: Design and Analyses
Design and Environmental Requirements: Functional, Thermal, Vibration, Shock, EMI/EMC; Electrical Engineering: Analog and digital signals, Signal integrity, Grounding concepts, Current carrying capacity, CAD, Schematics, Layout rules of thumb; Mechanical Engineering: Panels, Standard board sizes, Packaging, Thermal Design, Heat transfer basics, Convection, Conduction, PCB Thermal Design Features, Thermal modeling, Cycling and fatigue , Component Vibration Fatigue, Vibration Models and Terminology, Combined Thermal and Structural Fatigue

Module III: Contamination Control/Environmental Control
Contamination Control, Conformal Coatings, Polluting Agents, Safety Controls, Pollution Controls, Recycling, Standards; Manufacturing: PCB Manufacturing Information, PCB Layout and Artwork; Fabrication: Machining Operations, Blanking, Cutting, Punching, Drilling, Laminating Techniques, Plating, Etching, Surface Finishing, Conformal Coatings, Inspection and Checkout, Specifications and Standards

Module IV: Assembly
PCB Assembly Drawing Examples, Component Considerations, Component mounting and support , Mechanical Devices, Soldering Technology, Nonsolder Connections, Cleaning, Parts Staking, Conformal Coating Removal, Repair and Rework, Safety Considerations, ESD protection, Specifications and Standards

Module V: Testing & Quality Assurance
Common PCB Production Faults, Bare Board Testing, Electrical Performance Testing, Assembled PCB Testing, Quality Assurance in Design, FMEA – Failure Mode and Effects Analysis, Software Tools, Quality Assurance in Manufacturing and in Assembly, Specifications and Standards

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text &References:

- Jon Uarteresian, 2002, “Fabricating Printed Circuit Boards”, Newnes (Elsevier Science)
- RS Khandpur, 2008, “Printed Circuit Boards”, Tata McGraw-Hill Education
- Christopher T Robertson, 2004, “Printed Circuit Board: Designer's Reference, Basics”, Prentice Hall Professional, 2004

Charles Harper, 2000, “High Performance Printed Circuit Boards”, McGraw-Hill Education

ROBOTICS AND AUTOMATION

Course Code: ECE2652 **Credit Units: 03**

Aim: To equip the students with the knowledge of Robotics, Automation and their applications.
Objective:

- To make students familiar with the field of robotics.
- To provide in-depth core knowledge in design and performance analysis of bots.
- To provide the knowledge in sensors, actuators, motion planning and kinematics & dynamics of robots.

Module-I: Introduction to Robotics
History, Robots, Robot Usage, Robot Subsystems, Robot Classification by Application, Robot Classification by Coordinate System, Robot Classification by Actuation System, Robot Classification by Control Method, Robot Classification by Programming Method

Module-II: Actuators and Sensors
Pneumatic Actuators, Hydraulic Actuators, Electric Actuators, Selection of Motors, Sensor Classification, Internal Sensors, External Sensors, Vision System, Sensor Selection,

Module-III: Transformations and Kinematics
Robot Architecture, Pose of a Rigid Body, Coordinate Transformation, Denavit and Hartenberg (DH) Parameters,, Forward Position Analysis, Inverse Position Analysis, Velocity Analysis: The Jacobian Matrix, Link Velocities *133*, Jacobian Computation, Jacobian Using the DeNOC, Singularity, Acceleration Analysis,

Module-IV: Statics and Dynamics
Forces and Moment Balance, Recursive Calculation, Equivalent Joint Torques, Role of Jacobian in Statics, Force Ellipsoid, Inertia Properties, Euler–Lagrange Formulation, Newton—Euler Formulation, Recursive Newton–Euler Algorithm, Dynamics Algorithms

Module-V: Recursive Robot Dynamics and Control
Dynamic Modelling, Analytical Expressions, Recursive Inverse Dynamics using RIDIM, Recursive Forward Dynamics and Simulation, Control Techniques, Second-Order Linear Systems, Feedback Control, Performance of Feedback Control Systems, A Robotic Joint, Joint Controller, Non-linear Trajectory Control, State-space Representation and Control, Stability, Cartesian and Force Controls

Module-VI: Motion Planning
Joint Space Planning, Cartesian Space Planning, Position and Orientation Trajectories, Point-to-Point Planning, Continuous Path Generation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- John J. Craig, 2004, “Introduction to Robotics: Mechanics and Control” Prentice Hall,3rd Edition
- S K Saha, 2008, “Introduction to Robotics”, McGraw-Hill Education (India)
- Thomas R. Kurfess, 2004, “Robotics and Automation Handbook”, CRC Press

SIMULATION & MODELLING LAB

Course Code: ECE2752 **Credit Units: 03**

Course Contents:

List of Experiments:

1. Layout & Simulation of CMOS Inverter using CAD Tools.
2. Layout & Simulation of NAND & NOR Gates with Optimal Aspect Ratio.
3. Design & Simulation of SR Latch using NAND & NOR Representations.
4. Design & Simulation of JK Flip Flop using SR Latch.
5. Design & Simulation of Master Slave JK Flip Flop.
6. Design & Simulation of R2R Ladder DAC.
7. Design & Simulation of ADC using DAC.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

GEOTECHNICAL ENGINEERING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
CIV2351	Engineering Geology	3	-	-	3
CIV2451	Geo informatics	3	-	-	3
CIV2551	Geotechnical Engineering-I	3	-	-	3
CIV2651	Geotechnical Engineering-II	3	-	-	3
CIV2751	Project (Geotechnical Engineering)	3	-	-	3
CIV2851	Seminar (Geotechnical Engineering)	3	-	-	3
	TOTAL				**18**

GEOTECHNICAL ENGINEERING

Syllabus

ENGINEERING GEOLOGY

Course Code: CIV2351 **Credit Units: 03**

Course Objective:
The student is given an introduction to basics of Geology genesis and characteristic of rocks: Geological structure and other effects of civil engineering structures. Geology of India is introduced.

Course Contents:
Module I: Branches and scope of geology
Physical geology
Geological agents and their action, weathering, volcanism, earthquake and plate tectonics

Module II: Elements of crystallography and mineralogy
Petrology
Types of rocks, genesis and physical and chemical characters, Building stones

Module III: Structural geology
Types of structures and classification and their effect on civil engineering projects and Geological mapping
Hydrogeology
Groundwater and occurrence, investigations, quality, artificial recharge

Module IV: Geology in Civil Engineering
Tunnels, dams, reservoirs, bridges, Runways, Roads and Buildings.
Slope failures and landslides. Investigations, Remote sensing and GIS applications
Geology of India
Types, age and occurrence of rock formations and economic importance

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Parbin Singh, Engineering & General Geology, S.K. Kataria & Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

GEOINFORMATICS

Course Code: CIV2451 **Credit Units: 03**

Course Objective:
Geoinformatics is an important data system for all civil engineering activities including construction of structures, dams, water systems etc. Correct and reliable information and geographical data are a requirement today. The course thus addresses this issue.

Course Contents:
Module I
Triangulation - principle - reconnaissance - selection of site for base line - selection of stations - orders of triangulation - triangulation figures - scaffolds and signals - marking of stations - intervisibility and heights of stations - satellite stations - base line measurement - equipment and corrections - adjustment of observations.

Module II
Survey adjustments and theory of errors – introduction – laws of accidental errors –probability curve – principle of least squares – laws of weights – probable error – normal equation – most probable value – method of correlates – angle adjustment – station adjustment – figure adjustment – adjustment of triangles – adjustment of a geodetic quadrilateral.

Module III
Curves - types of curves - elements of a curve - simple curves - different methods of setting out – introduction to compound curves - reverse curves, transition curves, vertical curves -hydrographic survey - scope - shoreline survey - river survey - soundings – sounding equipment - methods - ranges - locating sounding - plotting - three point problem.

Module IV
Photogrammetry – terrestrial and aerial photogrammetry – heights and distances from Photographs – flight planning – elements of stereoscopy – photo mosaic – photo interpretation – applications of photogrammetry. GNSS – GPS – differential GPS.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts & References:

- S.K Duggal, Sruveying Vol. I and II, 2nd ed., Tata McGraw Hill, New Delhi (2004).
- Arora K.R., Surveying Vol. I & II, Standard Book House, New Delhi (2008)
- Punmia B.C., Ashok Kr. Jain, Arun Kr. Jain, Surveying Vol. I &II, Laxmi Pub, New Delhi (2004)

GEOTECHNICAL ENGINEERING-I

Course Code: CIV2551 **Credit Units: 04**

Course Objective:
Soil mechanics and related topics are important areas in Civil Engineering and the first part of Geotechnical Engineering deals with soils and their characteristics.

Course contents:
Module I: Nature of soil and functional relationships
Soil type -Concepts of single grained, honey combed and flocculent structure and their effects on the basic soil properties - 3 phase system - void ratio - specific gravity - dry density - porosity - water content - saturated unit weight - submerged unit weight - degree of saturation. Laboratory and field identification of soils: Determination of water content by oven drying -Specific gravity using pycnometer and specific gravity bottle - Grain size analysis by sieve analysis, hydrometer analysis and pipette analysis - Atterberg limits and indices – Visual identification by simple field tests - Field density by core cutter, sand replacement and wax coating methods. Classification of soils: Necessity -Principles of classification - I.S. classification – Plasticity charts - Group index.

Module II: Soil Water, Permeability and Stress Distribution
Soil water: Types - Effective stress - Total stress - Pore pressure - Pressure diagrams. Permeability: Definition - Darcy's law - Factors affecting permeability – Laboratory determination - Stratified soils: average permeability. Stress distribution: Boussinesq's equations for vertical pressure due to point loads- Assumptions and limitations - pressure bulb – Influence diagram - Vertical pressure due to uniformly distributed loads, line loads and strip loads - Newmark charts and their use - Westergaard's solution.

Module III: Consolidation and Compation
Consolidation: Definition - Concepts of coefficient of compressibility - Coefficient of volume change and compression index - e-log p curves - Terzaghi's theory of one dimensional consolidation – Determination of coefficient of consolidation- pre-consolidation pressure difference between consolidation and compaction. Compaction: Definition and objectives of compaction - Proctor test and modified proctor test - Concept of OMC and maximum dry density - Zero air voids line -Factors influencing compaction.- Effect of compaction on soil properties - Field compaction methods - Proctor needle for field control.

Module IV: Shear Strength and Stability of Slopes
Shear Strength: Definition - Mohr's strength and stress circles - origin of planes - Mohr's envelope - Mohr-Coulomb strength theory -Direct, triaxial and UCC tests - Drainage conditions - Measurement of pore pressure - Vane shear tests -Total and effective stress -strength parameters – Stress path, Liquefaction of sand - Choice of test conditions for field problems. Stability of slopes: Slope failure, base failure and toe failure - Swedish circle method - $\varphi=0$ analysis and $c=0$ analysis - Friction circle method - Taylor's stability number -Stability charts - Sliding block analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Terzaghi K. & Peck R.B., Soil Mechanics in Engineering Practice, John Wiley Sons, 1967.
- Alam Singh, Soil Engineering-Theory and Practice, Asia Pub, 1967.
- Punmia B.C., Soil Mechanics and Foundations, Saurabh,1992.
- Murthy V.N.S., Soil Mechanics and Foundation Engineering, Dhanpat Rai, 1984
- Khan I.H., Text Book of Geotechnical Engineering, Prentice Hall of India

GEOTECHNICAL ENGINEERING-II

Course Code: CIV2651 **Credit Units: 04**

Course Objective:
Advanced topics of soil mechanics and the design of foundations are covered in this course.

Course Contents:
Module I: Earth pressure
Earth pressure at rest. Active and passive earth pressure for cohesionless and cohesive soils. Coulomb's and Rankine's theories. Point of application of earth pressure for cases of with and without surcharge in cohesionless and cohesive soils. Culmann's and Rebhan's graphical construction for active earth pressure. Friction circle method for active earth pressure. Site investigation and soil exploration: Objectives. Planning. Reconnaissance. Depth of exploration. Methods of subsurface exploration. Test pits. Auger borings. Wash boring. Rotary drilling. Percussion drilling. Core drilling. Sampling. Types of soil samples. Splitspoon sampler. Thin walled sampler. Piston sampler. Denison sampler. Hand cut samples. Location of water table. S.P.T. Field vane shear test. Introduction to geophysical methods. Boring log. Soil profile.

Module II: Bearing capacity
Ultimate and allowable bearing capacity. Terzaghi's equation for bearing capacity for continuous circular and square footings. Types of shear failures. Bearing capacity factors and charts. Effect of water table on bearing capacity. Meyerhoff's bearing capacity heory. Skempton's formulae. Bearing capacity from field tests. Bearing capacity from building codes. Net bearing pressure. Methods of improvement of soil bearing capacity: vibro flotation and sand drains.
Settlement analysis: Distribution of contact pressure. Immediate and consolidation settlement. Estimation of initial and final settlement under building loads. Limitations in settlement computation. Causes of . Permissible, total and differential settlements. Cracks and effects of settlement.

Module III: Foundations
General considerations: Functions of foundations. Requisites of satisfactory foundations. Different types of foundations. Definition of shallow and deep foundation. Selection of type of foundation. Advantages and limitations of various types of foundations. Design considerations . Footings subjected to eccentric loading. Conventional procedure for proportioning footings for equal settlements.
Open excavation: Open foundation excavations with unsupported slopes. Supports for shallow and deep excavations. Stress distribution in sheeting and bracing of shallow and deep excavations. Stability of bottom of excavations. Raft foundations: Bearing capacity equations. Design considerations. Conventional design procedure for rigid mat. Uplift pressures. Methods of resisting uplift. Floating foundations.

Module IV: Pile foundations
Uses of piles. Classification of piles based on purpose and material. Determination of type and length of piles. Determination of bearing capacity of axially loaded. Single vertical pile. Static and dynamic formulae. Determination of bearing capacity by penetration tests and pile load tests (IS methods). Negative skin friction. Group action and pile spacing. Analysis of pile groups. Load distribution by Culmann's method. Caissons and piers: Open (well) caissons. Box (floating) caissons. Pneumatic caissons. Construction details and design considerations of well foundations. Drilled piers and their construction details.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Joseph E. & Bowles, Foundation Analysis & Design, McGraw Hill
- Leonards G.A., Foundation Engineering, McGraw Hill
- Punmia B.C., Soil Mechanics & Foundations, Laxmi, 1988.
- Tomlinson M.J., Foundation Design & Construction, Pitman, 1963.
- Terzaghi & Peck, Soil Mechanics in Engineering Practice, Asia Publishing
- Arora K.R., Soil Mechanics & Foundation Engg., Standard Publications, 1987.
- Murthy V.N.S., Soil Mechanics & Foundations**.**

PROJECT (Geotechnical Engineering)

Course Code: CIV2751 **Credit Units: 03**

Methodology

The topic for the project work can be a design/experimental/field / analytical/simulation project in any topic of Geotechnical Engineering area. The work can be done individually or by a group of students under the guidance of a faculty of the Department. On completion of the project, the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	**100**

SEMINAR (GEOTECHNICAL ENGINEERING)

Course Code: CIV2851 **Credit Units: 03**

Objectives:
To enable the students to acquire knowledge for searching compilation and to
Develop skills for presentation in the form of the seminar

Contents:
The seminar comprises the selection of an appropriate research proposal and developing research proposals. The student is required to organize and analyze the data/ information collected and write a complete document and presenting the document in the form of seminar.

Text Book:
Relevant technical/ professional material and references in Geotechnical Engineering courses and journals.

INSTRUMENTATION ENGINEERING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
ECE2351	Basic Instrumentation	3	-	-	3
ECE2451	Virtual Instrumentation	3	-	-	3
ECE2551	Biomedical Instrumentation	3	-	-	3
ECE2651	Analytical Instrumentation	3	-	-	3
ECE2751	Industrial Process Control	3	-	-	3
ECE2851	Project (Instrumentation Engineering)	3	-	-	3
	TOTAL				**18**

INSTRUMENTATION ENGINEERING

Syllabus

BASIC INSTRUMENTATION

Course Code: ECE2351 **Credit Units: 03**

Introduction
Review of measurement and measuring systems. Functional elements of a measuring system.Input-output configuration of instrumentation systems.Methods of correction for interfering and modifying inputs.Errors and uncertainty in measurements, Statistical analysis of errors. Loading effects, Generalised impedance and stiffness.

Generalized Performance Characteristics
Static and Dynamic performance characteristics, Characteristic of periodic and transient inputs and the response of measuring system to these inputs.Response of measuring system to random inputs, Frequency spectra, auto correlation, cross correlation spectral density, Experimental determination of system parameters, requirement of instrument transfer function to ensure accurate measurement.

Measurement System
Introduction, principle, design of various active and passive transducers.Introduction to semiconductor sensors and its applications, design of signal conditioning circuits for various Resistive, Capacitive and Inductivetransducers and piezoelectric transducer, Analog to Digital and Digital to Analog converters, modulation – types, filters – active, passive, digital, Data transmission and telemetry-classification, Recorders – Types of recorders, XY-Plotters, Ultraviolet, magnetic and digital recording.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

LABORATORY/FIELD EXPERIENCES
1. Experimental determination of system parameters.
2. Study and verification of transducer characteristics.
3. Study of signal conditioning techniques.
4. Verification of dynamic performance characteristics of a given system.
5. Case study of a real life measuring system in an industry.
6. Various data acquisition software.

BOOKS RECOMMENDED

- Measurement System, Applications, and Design, E.O. Doeblin. McGraw-Hill International.
- Introduction to Instrumentation & Control, A.K Ghosh, Prentice Hall of India.
- Principles of Measurement and Instrumentation, Alan S Morris, Prentice Hall of India
- Tranducers and Instrumentation, DVS Murthy, Prentice Hall of India
- Electrical and Electronics Measurement and instrumentation, A.K. Sawhney, DhanpatRai& Sons. Delhi

VIRTUAL INSTRUMENTATION

Course Code: ECE2451 **Credit Units: 03**

Course Contents:

Introduction to Virtual Instrumentation: Introduction,Historical perspective, advantages, block diagram and architecture of a virtual instrument, conventional vs. virtual instrumentation.

Introduction to Software : Introduction to Lab VIEW, Front panel, back panel representations, Block diagram, Menus, Palettes, VI and Sub VI, Editing and Debugging VI, Structures, Arrays, Clusters, Charts and Graphs, Data acquisition, Instrument Control, Signal Generation and Signal Processing Examples

Introduction to systems hardware:ADC, DAC, D/O, counters and timer, PC hardware structure, timing, interrupts, DMA, software and hardware installation, Configuring data acquisition hardware using the drives in application software, use of DAQ library functions for different analog and digital input/output operations. Input/output devices & functions like data gloves, joysticks, CRT etc.

Application of Virtual Instrumentation in various fields: Aviation, Automotive, High Voltage, Defense, Chemical, Industrial, Marine, Medical, Mining, Nuclear Energy, Virtual landscapes.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

LABORATORY / FIELD EXPERIENCES

1. Geographical programming using Lab VIEW
2. Applications of Lab VIEW

BOOKS RECOMMENDED

- Learning with LabVIEW 7 Express – R.H. Bishop, Pearson Education, Delhi.
- LabVIEW Basic 1 Course Manual, National Instruments
- Virtual Instrumentation Using LabVIEW- Sanjay Gupta & Joseph John, TMG; 2005.
- LabVIEW for everyone -Wells Lisa K and Travis Jeffrey, Prentice Hall.

BIOMEDICAL INSTRUMENTATION

Course Code: ECE2551 **Credit Units: 03**

Course Contents:

Sensors and Transducers for biological applications

Types, properties, characteristics and selection of transducers for biological instrumentation.

Measurement of electrical parameters

Leads and electrodes, electrocardiography, electrical activity of the heart, equivalent cardiac generator. Einthoven lead system, standardization of recording and display of ECT (Electrocardiogram), EEG (Electroencephalogram), EMG (Electromyogram), EOG (Electroocculogram), ERG (Electroretinogram), EGG (Electrogastogram).

Measurement of non-electrical parameters

Blood flow, drop recorder, electromagnetic flow meter, measurement of systolic and diastolic pressures, blood pressure instruments, intraocular pressure, lung air pressure, Audiometers.Measurement of body temperature, thermography. Cardiac tachometer, respiration rate phonocardiogram, heart sounds electrical stethoscope pulmonary function analysers. CO2 - O2 - Concentration in exhaled air, blood and lungs, pH value of blood, impedance pletnysmography blood gas analysers, blood cell counters.

Medical Imaging Systems

Medical display systems, medical thermography X-Ray, diathermy equipment.Ultrasonics in biomedical application for diagnostic and therapeutic, CAT, MRI, Laser applications in biomedical field.

Patient safety

Electrical Safety of Medical Equipments, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Test Instruments for checking Safety parameters of biomedical equipments.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

BOOKS RECOMMENDED

- Biomedical Instrumentation and Measurements; L.C. Cronwell F.J. Weibell. E.A. Pfeiffer, PHI.
- Principles of applied instrumentation: Gaddes and Baker, John Wiley & Sons.
- Handbook of Bio-medical Instrumentation; R.S. Khandpur, McGraw Hill
- Medical Instrumentation – Application & Design, John G. Webster, Editor, John Wiley & Sons.

ANALYTICAL INSTRUMENTATION

Course Code: ECE2651 **Credit Units: 03**

Course Contents:

Analytical Methods of Measurements

Physical methods of chemical analysis, special methods of analysis, basic techniques, terminologies, units, Interaction of electromagnetic radiations with matter, emission, absorption and scattering techniques. Instrumentation related to X-Ray, Ultraviolet and Infrared techniques.

Special Analysis

Various light sources, spectrometer, detectors and data processing, comparison of various spectral analytical techniques, refractometry, nuclear magnetic resonance spectrometry. Analytical techniques based on separation method: Basics of chromatography liquid, gas and HPLC Mass Spectrometry and related instrumentation.

Electrometric Methods of Analysis

Techniques and related instrumentations for pH and selective potentiometery, Voltametery, Colometery and Conductometery, Analytical data presentation. Error analysis, Design considerations of an analytical laboratory, automated analysis, Atomic absorption, spectrometry, polarmetery, Turbidimetery, Nophelometry.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

BOOKS RECOMMENDED

- Instrumental Methods of Chemical analysis; Galen W. Ewing, McGraw-Hill, Koga Kusha Ltd.
- Instrumental Methods of Analysis: HW Willard, LynnelMerriktt. Jr John A. Dean, F.A. Settle, Jr. Wadsworth Publishing Co. U.S.A.
- Introduction to Instrumentation Analysis: Robert D.Braun McGraw Hill Co. International Ed.
- Analytical Instrumentation HandBook: Galen W.Ewing, Marcel Decker Inc, USA.
- Instrumental Methods of Chemical Analysis: GurdeepChetwal, Sham Anand Himalaya Publishing House.
- Instrumental Methods of Chemical Analysis: B.K. Sharma, Goel Publishing House, Meerut.
- Instrumentation Engineers Hand Book-Process Control, BG Liptak, Butterworth Heinemann.

INDUSTRIAL PROCESS CONTROL

Course Code: ECE2751 **Credit Units: 03**

Course Contents:

Process Characteristics: Process, Process variable, mathematical modeling of liquid, gas, thermal, mechanical and chemical system. Linearizing techniques, liquid level control in a tank. Dynamics of manometer, response of non-interacting and interacting first order elements in series.

Controller characteristics: Characteristics of on-off, proportional, integral, derivative modes and their combinations.

Automatic control: Single and combined modes in closed loop, static error, velocity error. Dynamic behavior of feedback control processes for different modes. IAE, ISE, IATE criteria. Tuning of controllers.

Controllers: Electronics, pneumatic, hydraulic controllers implementing. Single and composite mode of controllers. Latest trends in industrial controllers employing PLCs & other logic devices such as fuzzy logic control DCS & Computer based systems etc.

Final control elements:

Types & function of Control valves. Electrical, Pneumatic, hydraulic actuators.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Books recommended:

- Instrument Engineers' Handbook of Process Control; Bela G. Liptak; 3rd Edn. Chilton Book Company Randor Pennsylvania
- Process Control Instrumentation Technology; CD Johnson 8th Edn; PHI 2006
- Automatic Process Control; D.P.Eckman; 1992 Wiley Eastern Ltd.
- Industrial Instrumentation; D.P. Eckman; Wiley Eastern Ltd.
- Principles of Industrial Process Control; D.P.Eckman;Wiley Eastern Ltd.
- Process System analysis & control; D.R.Coughanowr; 2ndEdn; 1991;McGraw International Edn.
- Principles of Process Control; D. Patranabis; 2nd Edn.1998 TMH
- Process Control; Peter Harriot; 2000, TMH
- Chemical Process Control; G. Stephanopoulus; 2002; PHI

LASER SYSTEM

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LOE2351	Basics of Lasers	2	-	2	3
LOE2451	Laser Technology & Applications	3	-	-	3
LOE2551	Laser Systems & Devices	3	-	-	3
LOE2651	Lasers in Defense Applications	3	-	-	3
LOE2751	Lasers in Industrial Applications	3	-	-	3
LOE2851	Lasers in Atmospheric Studies	3	-	-	3
	TOTAL				**18**

LASER SYSTEM

Syllabus

BASICS OF LASERS

Course Code: LOE2351 **Credit Units: 3**

Course Objective:
The basic aim of this Course is to make students (with Physics &Maths background up to 12th standard) appreciate the fundamentals of lasers and their diversified applications. The approach will stress more on the concepts & fundamentals with very simple or sometimes no mathematical equations. The outcome of this Course will make the students/trainees more excited to more about lasers and their applications in specific fields of their interest.

- **Overview of Lasers :**History, Types and Applications of Lasers
- **Nature of Light**: Corpuscular Theory, Wave Theory, Electromagnetic Spectrum, Qunatum nature of light, Dual nature of nature, De Broglies's hypothesis, wavelength associated with particle, momentum of photon, Energy-mass relation, Momentum of photon. Mass of photon.
- **Matter:** Structure of Atoms & Molecules. Energy Levels, Electronic, Vibrational and Rotational Energy Levels with Examples. Two-level representation.
- **Interaction of Radiation with Matter:** Absorption, Spontaneous Emission, Stimulated Emission, Einstein's A & B Coefficients of Transitions, Maxwell Boltzmann Distribution, Planck's law of blackbody radiation.
- **Principle of Laser action:** Population inversion, metastable states, gain medium, Pumping mechanisms, feedback mechanism, threshold condition for laser beam generation.
- **Optical Resonators :**Types of Resonators, Stability Criteriia, g-parameters.
- **Characteristics of Laser Beams:**Monochromaticicity, Directionality, Brightness, Coherence: temporal & spatial, Focusability, Ultra-short pulse generation.
- **Types of Lasers:**Three- level and Four-level Lasers, Solid, Liquid and Gas Lasers. Brief description of Ruby, He-Ne, Nd:YAG, Carbon Dioxide Lasers, Semiconductor Lasers. X-Ray Lasers, Free-electron Lasers. Fiber Lasers.
- **Longitudinal & Transverse Modes** : Temporal modes, Spatial Modes & characteristics.
- **Application of Lasers:** General Applications of Lasers, Laser Applications in Industry, Defence, Medicine, Entertainment etc.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Laser Principles, Types & Applications: K R Nambiar, New Age International, 2004.
- Lasers: Theory and Applications : A K Ghatak and K Thyagarajan, McMillan, 2003.

LASER TECHNOLOGY & APPLICATIONS

Course Code: LOE2451 **Credit Units: 3**

Course Objective: The aim of this Course is to make students/traineesunderstand the fundamentals of lasers, laser systems, their characteristics and diversified applications including industry, medicine & Defence. The approach will be to stress more on the fundamentals with the help of very simple mathematical equations. The outcome of this Course will prepare the students/trainees to use this knowledge for applications of lasers in specific fields of their interest.

Module I: INTERACTION OF LIGHT WITH MATTER Einstein coefficients, Relation between these coefficients, Lifetime of excited state, Line Broadening mechanisms, Population inversion, Threshold condition for Laser, Laser-Rate equations for three-level and four-level systems, Conditions for CW and pulsed laser action.

Module II: DIFFERENT POPULATION INVERSION TECHNIQUES WITH EXAMPLES
Optically pumped lasers, solid state lasers, dye lasers, electrical-discharge pumped lasers, gas lasers, chemical lasers, gas dynamic lasers, semiconductor lasers, free-electron lasers, gamma ray lasers, fiber lasers (only introductory description of these lasers).

Module III: OPTICAL RESONATORS
General considerations, Laser resonators,General conditions of stability, Plane and spherical mirror cavities, Modes and optical resonators, Gaussian beam propagation,Theory of Q-switching and experimental methods - Theory of Mode locking and experimental methods. Frequency stabilization of laser beams.Multimode oscillation.

Module-IV: CHARACTERISTICS OF LASER BEAMS AND APPLICATIONS
Monochromaticity, Spatial & temporal coherence, temporal coherence & monochromaticity relation, connection between spatial coherence and directionality, rightness, Focusability, ultra-short pulse generation. Peak Power, Average Power, Duty Cycle in Pulsed Lasers.

Module V: TYPES OF LASERS
Solid, Liquid and Gas Lasers. Brief description of Ruby, He-Ne, Nd:YAG, Nd:glass, Er:glass, Er:YAG, Carbon Dioxide Lasers, Nitrogen Lasers, Semiconductor Lasers. X-Ray Lasers, Free-electron Lasers. Fiber Lasers, Femtosecond lasers, Raman Lasers.

Module VI: APPLICATION OF LASERS
General Applications of Lasers including Industry, Defence, Medicine, Entertainment etc.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

REFERENCES:

- Laser Principles, Types & Applications: K R Nambiar, New Age International, 2004.
- Lasers: Theory and Applications : A K Ghatak and K Thyagarajan, McMillan, 2003.
- Lecture Notes on “Laser Technology & Applications” (LOE2451) by Prof. (Dr.) Jai Paul Dudeja

LASER SYSTEMS & DEVICES

Course Code: LOE2551 **Credit Units: 3**

Course Objective: This course describes in details the principles, energy level diagrams, block diagrams and operation of various types of laser systems: solid, semiconductor, liquid and gas lasers. These laser systems are further classified according to the pumping schemes employed and systems output characteristics of each laser system are then explained. This course will make the students understand the actual functioning of various laser systems.

Module I: OPTICAL MATERIALS
Optical materials for IR to UV wavelengths

Module II: LASER COMPONENTS
(a) MLD Components: metal coated, multilayer dielectric coated, AR coated, thin film polarizers, narrow-band filters.
(b) Optical Components: Polarizers, beam splitters, beam expanders and collimators, gratings, graticules.
(c) Arc/Flash Lamps: Electrical and spectral characteristics of arc/flash lamps, pulse forming networks for flash lamps.

Module III: LASER POWER SUPPLIES
Simple DC high-voltage power supplies, switch-mode power supply (SMPS), constant current power supply. High-voltage fast switches: spark gaps, SCR, thyratrons, krytrons, saturable magnetic core, avalanche transistors. Pulsed power supplies for lasers: Marx generators for CO_2 lasers, pulsed circuits for nitrogen, copper, excimer and semiconductor lasers,

Module IV: DESIGN OF OPTICALLY-PUMPED LASERS
(a) Optically Pumped Lasers: Ruby, Nd:YAG, Er:glass, Dye lasers, FIR lasers, Raman shifted lasers
(b) Electrical Discharged Lasers: He-Ne, Nitrogen, Various types of CW and Pulsed Carbodioxide lasers, argon-ion, copper and copper compound lasers, Excimer lasers.
(c) Brief Description of Other Lasers: Chemical Lasers, Semiconductor Lasers, Free electron laser, X-ray laser, Fiber Lasers.

Module V: LASER PARAMETRS MEASUREMENTS
Types of detectors (for UV, IR and visible wavelenghths) and their characteristics, Measurement laser average power, peak power, energy, wavelength, frequency, linewidth, pulse duration, pulse repetition rate, beam quality, divergence, beam diameter etc. Choppers, Monocromators, Lock-in Amplifiers, Box-car averagers, Spectroradiometers, Spectrophotometers, spectrum analyzers, wavemeters, densitometers.

Module VI: LASER HAZARDS AND SAFETY MEASURES
Types of hazards, hazards to eyes and skin, Maximum Permissible Exposure (MPE), Classification of lasers, from the point of view of hazards, safety measures, NOHD, buffer zone, laser safety measures.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Laser Principles, Types and Applications , K R Nambiar, New Age International 2004.
- Laser Fundamentals, William T Sifvast, Cambridge University Press, 2004
- J. Verdeyen, Laser Electronics, Prentice Hall, 1995
- Solid State Laser Engineering, W. Koechner, Springer Series in Optical Sciences, Vo. 1, Springer Verlag

LASERS IN DEFENSE APPLICATIONS

Course Code: LOE2651 **Credit Units: 3**

Course Objective: This course describes various applications of lasers Defence.

Module I: LASER BEAM PROPAGATION THROUGH ATMOSPHERE
Atmospheric absorption and scattering by molecules and aerosols, Atmospheric transmission, Beer's law, atmospheric windows. Absorption of laser radiation by carbon dioxide, ozone and water molecules.Scattering of laser radiation by air molecules, haze particles, fog droplets, cloud droplets and rain drops. Types of atmospheric scattering : Rayleigh, Mie scattering, diffraction theory. Atmospheric attenuation coefficient.Visibility of the atmosphere.Atmospheric turbulence and turbidity.Refractive-index structure coefficient. Nonlinear effects in the atmosphere: thermal blooming, beam bending, kinetic cooling, bleaching, self-induced transparency, Air breakdowm.

Module II: LASER RANGE FINDERS
Solid-state (Nd:glass, Nd:YAG and Er:glass) laser rangefinders (LRFs), Waveguide carbondioxide LRFs, Semiconductor LRFs. Discussion in each about the laser transmitter, receiver, signal processing unit, optical arrangement. Laser range equation, maximum and minimum ranges, range accuracy, range blocking, first echo/last echo logic, field of view, boresighting. Eye safe laser rangefinders.Optoelectronic proximity fuze, Satellite to Submarine Laser Range Finders.

Module III: LASER TARGET DESIGNATORS AND LASER-GUIDED WEAPONS
Laser Guidance, Laser target designators, laser guided missiles, laser guided bomb. Laser beam riding of missiles.Laser & electro-optic surveillance systems.IR guidance.

Module IV: LASER WEAPONS : Laser blinding gun, gas dynamic laser-baser weapon, COIL-based lassr weapon, HF/DF laser based weapon.

Module V: LASER GYROSCOPES & SENSORS: Laser ring gyro, optical fiber gyro, optical sensors (including fiber-optic sensors) in tanks, ships, aircraft etc.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text& References:

- Laser Principles, Types and Applications , K R Nambiar, New Age International 2004.
- Laser Fundamentals, William T Sifvast, Cambridge University Press, 2004
- J. Verdeyen, Laser Electronics, Prentice Hall, 1995

LASERS IN INDUSTRIAL APPLICATIONS

Course Code: LOE2751 **Credit Units: 3**

Course Objective: To endow the students with knowledge about industrial laser systems and interaction of laser radiation with matter and applications of lasers in various materials processing like cutting, welding, surface treatment etc.

MODULE I INDUSTRIAL LASER SYSTEMS
High power laser systems - Focusing optics - Steering optics - Mechanisms - Overview of industrial lasers - CW &pulsed - Q-switched and Mode locked.

MODULE II THERMAL PROCESSES IN INTERACTION ZONE
Depth of penetration with respect to laser energy density - Reflectivity of Metals with respect to wavelength - Rate of heating and cooling - Maximum temperature rise and depth of hardened layer - Different gases used during laser materials processing - Operational parameters in laser materials processing - Key hole effect.

MODULE III SURFACE TREATMENT
Surface modification:- surface cladding - surface alloying - Hard facing - Shock hardening - laser parameters for surface alloying - process variables - Beam profiles - Different methods to obtain desired penetration depths - Experimental set-up.

MODULE IV LASER WELDING
Different modes of laser beam welding - Comparison between laser beam and electron beam welding - Influence of different parameters - Absorptivity - Welding speed - Focussing conditions - Advantages and limitations of laser welding - Laser welding of industrial materials - Recent developments in laser welding techniques

MODULE V LASER CUTTING AND DRILLING
Laser energy density for cutting and drilling - Melt flashing mechanism - Various assisting gases and their importance - Advantages of laser cutting - Laser instrumentation for cutting and drilling - Factors affecting cutting rates - Effect of laser pulse energy on diameter and depth of drilled hole.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

TEXTS & REFERENCES:

- Reddy J.F., 'High Power Laser Applications', Academic Press, 1977.
- Ian W. Boyd, 'Laser Processing of Thin Films and Microstructures', Springer - Verlag, 1987.
- Duley W.W., 'Laser Processing and Analysis of Materials', Plenum Press, New York, 1983.

LASERS IN ATMOSPHERIC STUDIES

Course Code: LOE2851 **Credit Units: 3**

Course Objective:
This course aims to train the students on the basics of applications of lasers and various laser-based techniques to remotely detect and measure the concentration and size etc. of various constituents of the atmosphere including aerosols, pollutants and other toxic agents.

MODULE I: Introduction and Overview of Laser-Based Remote Sensing Techniques
Why Lasers for Remote Sensing of Environment. Aerosols, Pollutants, CBW Agents, Toxicity Levels, Non-Laser based Detection Techniques.

MODULE II: Lidar Techniques

Aerosol Lidar Differential Absorption Lidar (DIAL), Heterodyne Lidar, Micro-Pulse Lidar, LIF-Based Lidar, Raman Lidar, Doppler Lidar, Space Borne Lidar

MODULE III: Laser Sources for Remote Detection
Nd: YAG Laser, Carbondioxide Laser, UV Lasers, Tunable Lasers, Semiconductor Lasers

MODULE IV: Detectors and Telescopes and Data Processing:
Various Types of Detectors and their characteristics for different wavelengths and applications, Telescopes, Data acquisition and processing systems

MODULE V: Laser Based Techniques forStandoff Detection of Explosive Materials
Laser Induced Breakdown Spectroscopy (LIBS). Laser Induced Fluorescence (LIF). Raman Techniques, Hybrid (Integrated) Sensors.

Examination Scheme:

Components	**A**	**MP**	**EE**
Weightage (%)	5	25	70

MP: Mini Project, EE: End Semester Examination; A: Attendance

TEXTS & REFERENCES:
Laser Remote Sensing: Fundamentals and Applications. RM Measures. John Wiley

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

ADVANCED DATA STRUCTURE & ALGORITHMS

Course Code: DSE4101 **Credit Units: 03**

Course Objective:
The objective to this course is to equip students with advanced concepts of data structures like Huffman trees, Self-organizing trees, different types of heaps and their time complexity. Advanced topics and graphs and graph algorithms, geometric algorithms and parallel algorithms.

Course Contents:

Module-I
ADVANCED TREES: Definitions Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees, Splay Tree.Augmenting Red-Black Trees to Dynamic Order Statistics and Interval Tree Applications. Operations on Disjoint sets and itsunion-find problem Implementing Sets. Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.

Module-II
MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci HeapImplementing Fibonacci Heap. SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting andmerging network sorter.

Module-III
GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut-Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs.

Module-IV
GRAPH THEORY ALGORITHMS: Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph andPlanarity Testing, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and ArticulationPoint. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.

Module-V
Geometric algorithms: Point location, convex hulls and Voronoi diagrams, Arrangements. Parallelalgorithms: Basic techniques for sorting, searching, merging

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- RivestCormen, “Introduction to Algorithms”;PHI

References:
- Tammasia, “Algorithm Design”, Willey

ADVANCED DATABASE MANAGEMENT SYSTEMS

Course Code: DSE4102 **Credit Units: 03**

Course Objective:
The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques

Course Contents:
Module I: Relational Databases
Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Module II: Query Processing and Optimization
Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.
Objected Oriented and Object Relational Databases
Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Module III: Parallel and Distributed Databases
Distributed Data Storage – Fragmentation & Replication, Location and Fragment
Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.
Advanced Transaction Processing
Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

Module IV
Multimedia databases,Databases on the Web and Semi–Structured Data. Case Study: Oracle Xi

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
***Text*:**

- Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
- Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
- R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

***References*:**

- Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
- Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
- Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
- W. Kim, "Modern Database Systems", 1995, ACM Press, Addision – Wesley,
- D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
- Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
- Oracle Xi Reference Manual
- Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

ADVANCED COMPUTER NETWORKS

Course Code: DSE4104 **Credit Units: 03**

Course Objective:
The objective of the course is to provide thorough understanding & in-depth knowledge of concepts in computer networks Such as Internet protocols and routing, local area networks, wireless communications and networking, performance analysis, congestion control, TCP, network address translation, multimedia over IP, switching and routing, mobile IP, multicasting, IPv6. Peer-to-peer networking, network security, and other current research topics. A focus will be placed on wireless networking, reflecting rapid advances in this area. This course motivates the students to explore current research areas in the same field.

Course Contents:

Module I
Uses computer networks, Reference Models, TCP/IP suite of protocols, MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)

Module II
Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet.
IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.

Module III
Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.

Module IV
The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues.
The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.

Module V
Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues.

Examination Scheme:

Components	A	CT	H	V/S/O	EE
Weightage (%)	5	10	7	8	70

Text & References:
Text:
- Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
- Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

***References*:**
- Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication.
- W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
- W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
- C. E. Perkins, B. Woolf, and S. R. Alpert. Mobile IP: Design Principles and Practices, Addison Wesley, 1997.

DIGITAL COMPUTER ORGANIZATION

Course Code: DSE4103 **Credit Units: 03**

Course Objective:
With increase in availability of system resources, concept of parallel architecture has obtained immense popularity. This course provides a comprehensive study of scalable and parallel computer architectures for achieving a proportional increase in performance with increasing system resources. In this course we have discussed the theory, technology, architecture (hardware) and software aspects of parallel computer and Vector computers.

Course Contents:
Module I: Parallel computer models
The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks
Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms

Module II: System Interconnect Architectures
Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Module III: Processors and Memory Hierarchy
Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors
Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology

Module IV: Backplane Bus System
Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design,Computer airthmetic principles.

Module V: Vector Processing Principles
Vector instruction types, Vector-access memory schemes.
Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Kai Hwang, “Advanced computer architecture”; TMH, 2000.

References:

- J.P. Hayes, “computer Architecture and organization”, MGH, 1998.
- M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”, Narosa Publishing, 1998.
- D.A. Patterson, J.L. Hennessy, “Computer Architecture: A quantitative approach”, Morgan Kauffmann, 2002.
- Hwang and Briggs, “Computer Architecture and Parallel Processing”; MGH,

ADVANCED DATABASE MANAGEMENT SYSTEM LAB

Course Code: DSE4106 **Credit Units: 01**

Programs should be based on following topics:

Quick Review of Simple SQL Statements, SQL Built-in Functions,Primary Key, Foreign Key, Normalization,Joins View, Union. **Emphasis** on PL/SQL,Cursors 8. Exception handling,Procedure, Functions, Trigger, concurrency control, transaction processing. Introduction to SQLite.

Recommended Software: PostGreSQL, MySQL, Oracle.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED COMPUTER NETWORK LAB

Course Code: DSE4107 **Credit Units: 01**

Course Contents:

1. Study of different types of networking cables, and implement cross and straight cable using clamping tool
2. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
3. Study of Socket Programming and Client
4. Write a code simulating ARP /RARP protocols.
5. Write a code simulating PING and TRACEROUTE commands
6. Create a socket for HTTP for web page upload and download.
7. Write a program to implement RPC (Remote Procedure Call)
8. Implementation of Subnetting
9. Applications using TCP Sockets like Echo client and echo server, Chat Server, File Transfer, Applications using TCP and UDP Sockets ,DNS,SNMP
10. Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS.
11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer Link State routing, Flooding, Distance vector.

Recommend Software:C/C++ on Linux/Unix, NS, Packet Tracer

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED DATA STRUCTURE & ALGORITHMS LAB

Course Code: DSE4105 **Credit Units: 01**

Programs based on Implementation of Graphs using Adjacency Matrix, Linked List , implementation of graph algorithms like BFS,DFS, Minimum Spanning Tree, Binary Search Tree, Knapsack Problem using Greedy Algorithm, Dynamic Programming, Shortest Path Algo (Dijkstra's), Implementing B-Tree,AVL Tree ,Red Black Tree. Implementing Sets, Dictionaries, Priority Queue using Heap.

Recommended Software: Java/C++/C/Python

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MATLAB

Course Code: DSE4108 **Credit Units: 02**

Understanding The MATLAB Environment, Using the Help System in MATLAB, MATLAB Basics,Linear Algebra; Vectors and Matrices and various operations on them, M files; Scripts and User-defined functions, Plotting, Flow Control and Loops; For and While Loops, If and Case statements, structures, writing basic programs using the above, study of various toolboxes available in matlab and case study of any one tool box.

Recommended Software: MATLAB/Octave

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PYTHON PROGRAMMING LAB

Course Code: DSE4109 **Credit Units: 01**

Course Contents:

1. Setting up python on Windows/Linux/Mac
2. First program in python
3. Programs related to basic input/ouput.
4. Programs related to variables,strings,numbers
5. Programs related to Lists and Tuples
6. Programs related to.Functions
7. Programs related to If Statements
8. Programs related to While Loops and Input
9. Programs related to Basic Terminal Apps
10. Programs related to Dictionaries
11. Programs related to Classes
12. Programs related to Exceptions
13. Programs related to GUI programming
14. Using Word, Excel, PDF files in python.
15. Web programming in python,
16. Case study of application areas of python.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

APPLIED STATISTICAL ANALYSIS

Course Code: DSE4201 **Credit Units: 03**

Course Objective: This course is an introduction to statistics, the science of collecting, organizing, and interpreting numerical data. Emphasis will be placed on statistical reasoning and data analysis. The main topics are study design, descriptive statistics, probability theory, and statistical inference. Hands-on data analysis projects will be assigned. Students will be required to use a computer software package to solve various statistical problems.

Course Contents:

Module-I: Introduction to Statistical Analysis
Introduction to Statics, Population Versus Sample, Population and Sample, Basic Terms, Types Of Variables, Quantitative Variables, Qualitative or Categorical Variables, Measurement Scales, Identifying The Scale of Measurement, Normal Variables, Ordinal Variables, Continuous Variables, Cross-Section Data, Time –Series Data, Sources of Data, Types of Statics, Measures of Central Tendency, Mean, Examples, Mode, Mode Scenarios, Symmetry, Skewness, Measures of Spread, Range, Variance and Standard Deviation, Examples, Solution, Population Parameters and Sample Statistics, Measures of Position–Quartiles and Interquartile Range, Quartiles, Example, Solution, Percentiles and Percentile Rank, Example, Solution, Box and Whisker Plot, Solution.

Module-II: Describing Data
Raw Data, Graphical Presentation of Qualitative Data, Graphical Presentation of Qualitative Data, Graphing Quantitative Data, Frequency Distributions, Relative Frequency and Percentage Distributions, Graphing Grouped Data, Cumulative Frequency Distributions, Probability Concepts, Simple and Compound Events, Two Properties of Probability, Classical Probability, Probability Concepts, Complementary Events, Example, Discrete Random Variables, The Binomial Experiment, The Poisson Probability Distribution, Continuous Random Variables, Normal Distribution, Standard Normal Distribution.

Module-III: Testing Hypothesis
Population Distribution, Sampling and Non Sampling Errors, A Point Estimate, Interval Estimation, The t Distribution Hypothesis Testing, The Chi-Square Distribution.

Module-IV: Examining Relationship
Covariance, Pearson Correction Coefficient, Computational Formulas- Covariance, Computing A Correlation, Correlation Analysis, Scatter Plots, Relationships Between Continuous Variables, Correlation, Pearson Correlation Coefficient, Hypothesis Test For A Correlation, Extreme Data Values, Correlation Matrix, Anova Overview, Anova Hypothesis, Anova, Error Sum of Squares, Model Sum of Squares, Anova-Example, Simple Regression, Relationship Between Food Expenditure And Income: (A) Linear Relationship (B) Nonlinear Relationship, Plotting A Linear Equation, Y-Intercept And Slope Of A Line, Simple Linear Regression Analysis, Scatter Diagram, Least Squares Line, Error Sum Of Squares, The Least Squares Line, Example, Solution, Error Of Prediction, Positive And Negative Linear Relationship Between X And Y, Assumptions of Regression Model, Coefficient Of Determination, Regression Analysis.

Module-V: Advanced Techniques
Non Parametric Tests, Chi-Squared Goodness- of-Fit Test, Chi-Square Test of Independence, The Sign Test, Example, Mann-Whitney U Test, The Kruskal-Wallis Test, No Title, Structural Equation Modelling, Cluster Analysis, Factor Analysis, Centroid Method, Principal Components Method.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
- TorstenHothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.
- Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

DATA MINING AND PREDICTIVE ANALYTICS

Course Code: DSE4202 **Credit Units: 03**

Course Objective: This course introduces the topics of Data Mining, and Data Analytics by providing a basic, practical foundation that allows the students to participate in Data Analytics projects. The course incorporates an introduction to the Data Analytics lifecycle, Machine Learning (ML), Data Mining algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data.

Course Contents:

Module-I: Data Preparation
An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.

Module-II: Classification
k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.

Module-III: Clustering
Hierarchical and k- Means Clustering, Kohenen Networks, Birch Clustering, Measuring Cluster Goodness.

Module-IV: Association Rules
Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work ? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, *J*-Measure, Association Rules are Easy to do Badly, How can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?

Module-V: Case Study: Predicting Response to Direct Mail Marketing
Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Daniel T. Larose, Chantal D. Larose, “Data Mining and Predictive Analytics”, John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
- Thomas W. Miller, “Modelling Techniques in Predictive Analytics”, Pearson FT Press, 2013.
- Markus Hofmann, Ralf Klinkenberg, “Rapid-Miner: Data Mining Use Cases and Business Analytics Applications”, Chapman and Hall/CRC, 2016

DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING

Course Code: DSE4203 **Credit Units: 03**

Course Objective: This course focuses on the fundamentals of data warehousing and multidimensional Modelling. Data warehouse development life cycle, Data warehouse analysis, CUBE, ROLL UP and STAR queries, Data Warehouse Design - Massive de -normalisation, STAR schema design, Data ware house Architecture, OLAP, ROLAP and MOLAP, concepts of Fact and dimension table are the major areas of coverage of this course. This course also deals with the issues while implementing the multidimensional models

Course Contents:

Module I Introduction
Multidimensional Data Management, Multidimensional History, Related Terminology,

Module II Fundamental Concepts
Cubes ,Dimensions, Facts, Measures, Relational Representations, Star Schemas, Snowflake Schemas, Data Warehouses And Data Marts, Multidimensional Modelling Process, Analysis And Querying ,Roll Up, Drill Down, Drill Out, Slicing And Dicing, Drill Across, Pivot Tables, Ranking, Multi-Dimensional Querying in MDX and SQL, Graphical Querying and Visualizations .

Module III Advance Concepts
Slowly Changing Dimensions, The Problem, Solutions, Other Special Kinds Of Dimensions, Mini dimensions, Outriggers, Degenerate Dimensions, Junk Dimensions, Time Dimensions, Data Quality Dimensions, Advanced Hierarchies, Parent-Child Hierarchies, Unbalanced Hierarchies, Non Covering Hierarchies , Non –Strict Hierarchies, Multiple Hierarchies And Parallel Hierarchies.

Module IV Implementation Issues
Materialized Views, Indexing, Indexing Overview, Bitmap Indices, Join Indices, Query Processing, OLAP Implementations, Extract-Transform-Load.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Christian S. Jensen, Christian Thomsen, and Professor Torben Pedersen, “Multidimensional Databases and Data Warehousing”, Morgan & Claypool Publisher, 2010.
- Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit: The Definitive Guide”, 3rd Edition, John Wiley & Sons, 2013.
- Len Silverston, Paul Agnew, “The Data Model Resource Book: Volume 3: Universal Patterns for Data Modeling”, John Wiley & Sons., 2009.

DATABASE AND KNOWLEDGE BASE SYSTEMS

Course Code: DSE4204 **Credit Units: 03**

Course Objective: This course discusses design methodology for databases to verify their structural correctness and implements databases. It also provides applications software primarily in the relational model using querying languages, primarily SQL, and other database supporting software applying the theory behind various database models and query languages implementing security and integrity policies relating to databases and preparation for data analytics working in group settings to design and implementing database projects.

Course Contents:

Module-I: Introduction

Database Languages, Object-Base Systems, Knowledge-base Systems, History and Perspective, Data Models for Database Systems: Data Models, The Entity-relationship Model, The Relational Data Model, Operations in the Relational Data Model, The Network Data Model, The Hierarchical Data Model, An Object-Oriented Model, Logic as a Data Model: The Datalog Data Model, Evaluating Non- recursive Rules, Computing the Meaning of Recursive Rules, Incremental Evaluation of Least Fixed Points, Negations in Rule Bodies, Relational Algebra and Logic, Relational Calculus, Tuple Relational Calculus.

Module-II: Relational Query and Object-Oriented Database Language

ISBL: A "Pure" Relational Algebra Language, QUEL: A Tuple Relational Calculus Language, Query-by-Example: A DRC Language, Data Definition in QBE, The Query Language SQL, Data Definition in SQL, The DBTG Data Definition language, The DBTG Query Language, The DBTG Database Modification Commands, Data Definition in IMS, A Hierarchical Data Manipulation Language, Data Definition in OPAL, Data Manipulation in OPAL

Module-III: Physical Data Organization and Design of Relational Databases

The Physical Data Model, The Heap Organization, Hashed Files, Indexed Files, B-trees, Files with a Dense Index, Secondary Indices, Data Structures in DBTG Databases, Data Structures for Hierarchies, Data Structures for Relations, A Search Tree Structure, Functional Dependencies, Lossless-Join Decomposition, Normalization, Generalized Dependencies.

Module-IV: Transaction Management

Basic Concepts, A Simple Transaction Model, The Two-phase Locking Protocol, a Model with Read and write-Locks, Lock Modes, A Read-Only, Write-Only Model, Concurrency for Hierarchically Structured Items, Handling Transaction Failures, Aggressive and Conservative Protocols, Recovery From Crashes, Timestamp-based Concurrency Control.

Module-V: Distributed Database Management

Distributed Databases, Distributed Locking, Distributed Two-phase Locking, Distributed Commitment, A Nonblocking Commit Protocol, Timestamp-based, Distributed Concurrency, Recovery of Nodes, Distributed Deadlocks.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jeffrey D. Ullman"Principles of Database and Knowledge-Base Systems", Vol. 1, Computer Science Press, USA, 1988.
- AviSilberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", Mcgraw Hill Education, 2000.
- Ngoc Thanh Nguyen, Edward Szczerbicki, "Intelligent Systems for Knowledge Management", Springer-verlagGmbh, 2009.

BIG DATA TECHNOLOGIES

Course Code: DSE4205 **Credit Units: 03**

Course Objective:
This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will prepare a sample project in Hadoop.

Course Contents:

Module I: Introduction to Big Data
Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.

Module II: Big Data Technologies
Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data –Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.

Module III: Processing Big Data
Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.

Module IV: Hadoop Map Reduce
Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

Module V: Big Data Tools and Techniques
Installing and Running Pig – Comparison with Databases – Pig Latin – User- Define Functions – Data Processing Operators – Installing and Running Hive – Hive QL – Tables – Querying Data – User-Defined Functions – Oracle Big Data.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, AmbigaDhiraj, Wiely CIO Series, 2013.
- Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
- Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
- Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: DSE4206 **Credit Units: 02**

Course Objectives: The course will enhance scientific , technical and research writing skills and impart knowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination**.**

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing , bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	**15**	**10**	**70**	**100**

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla,D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R.2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J.& Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montomery, Douglas C.(2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

APPLIED STATISTICAL ANALYSIS LAB

Course Code: DSE4207 **Credit Units: 01**

Programs should be based on following topics:

Quick Reviewof interpretation of mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them;
Representation of mathematical information symbolically, visually, numerically, and verbally;
Use of arithmetic, algebraic, geometric, and statistical methods to solve problems;
Estimation and check answers to mathematical problems in order to determine reasonableness,
Identification of alternatives, and select optimal results; and recognize the limitations of mathematical and statistical models.

Recommended Software: SPSS (IBM).

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA MINING AND PREDICTIVE ANALYTICS LAB

Course Code: DSE4208 **Credit Units: 01**

Course Objective:

- To analyse the data using statistical methods.
- To understand and demonstrate data mining using any open source data mining tool.

Recommended Software: ORANGE, Rapid Miner

List of Experiments

1. Data Analysis- Getting to know the Data (Using ORANGE, Rapid Miner)
   - Parametric - Means, T-Test, Correlation
   - Prediction for numerical outcomes - Linear regression
   - Correlation analysis
   - Preparing data for analysis
   - Pre-processing techniques

2. Data Mining (Using ORANGE, Rapid Miner or any open source data mining tool)
   - Implement clustering algorithm
   - Implement classification using
   - Decision tree
   - Back propagation
   - Visualization methods.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DATA WAREHOUSING AND MULTIDIMENSIONAL MODELLING LAB

Course Code: DSE4209 **Credit Units: 01**

Programs should be based on following topics:
Quick Review SQL Statements, SQL Built-in Functions,**Emphasis** on PL/SQL,Cursors 8. Exception handling, Procedure, Functions,Trigger, concurrency control, transaction processing. Introduction to ETL Tools:Talend Open Source Data Integrator, Scriptella, KETL
Pentaho Data Integrator - Kettle, Jaspersoft ETL, GeoKettle, CloverETL, HPCC Systems

Recommended Software: SQL Server, ETL Tools (Open Source)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INFORMATION MANAGEMENT SYSTEM

Course Code: DSE4210 **Credit Units: 03**

Course Objective:
This course exposes students with the basics of managing the information and explores the various aspects of database design and modelling. It examines the basic issues in information governance and information integration and also helps to understand the information architecture

Course Contents:

Module-I: Database Modelling, Management and Development
Database design and modelling – Business Rules and Relationship; Java database Connectivity (JDBC), Database connection Manager, Stored Procedures. Trends in Big Data systems including NoSQL – Hadoop HDFS, MapReduce, Hive, and enhancements.

Module-II: Data Security and Privacy
Program Security, Malicious code and controls against threats; OS level protection; Security – Firewalls, Network Security Intrusion detection systems. Data Privacy principles. Data Privacy Laws and compliance.

Module-III: Information Governance
Master Data Management (MDM) – Overview, Need for MDM, Privacy, regulatory requirements and compliance. Data Governance – Synchronization and data quality management.

Module-IV: Information Architecture
Principles of Information architecture and framework, Organizing information, Navigation systems and Labelling systems, Conceptual design, Granularity of Content.

Module-V: Information Lifecycle Management
Data retention policies; Confidential and Sensitive data handling, lifecycle management costs. Archive data using Hadoop; Testing and delivering big data applications for performance and functionality; Challenges with data administration;

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Jeffrey A. Hoffer, HeikkiTopi, V Ramesh – MODERN DATABASE MANAGEMENT, 10 Edition, PEARSON, 2012.
- Alex Berson, Larry Dubov MASTER DATA MANAGEMENT AND DATA GOVERNANCE, 2/E, Tata McGraw Hill, 2011.
- Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2006
- Information Architecture for the World Wide Web; Peter Morville, Louis Rosenfeld ; O'Reilly Media; 1998.
- http://ibm.com/big-data – Four dimensions of big data and other ebooks on Big Data Analytics

INFORMATION SYSTEM SECURITY

Course Code: DSE4211 **Credit Units: 03**

Course Objective:
This course provides a deep and comprehensive study of the security principles and practices of information systems. Topics include basic information security concepts, common attacking techniques, common security policies, basic cryptographic tools, authentication, access control, software security, operating system security, and legal and ethical issues in information systems security

Course Contents:

Module-I: Introduction
Computer Security Concepts, Threats, Attacks, and Assets Security Functional Requirements A Security Architecture for Open Systems Computer Security Trends.

Module-II: COMPUTER SECURITY TECHNOLOGY AND PRINCIPLES
Cryptographic Tools, User Authentication, Access Control, Database Security, Malicious Software, Denial-of-Service Attacks.

Module-III: SOFTWARE SECURITY
Buffer Overflow: Stack Overflows, Defending Against Buffer Overflows, Other Forms of Overflow Attacks, Software Security: Software Security Issues, Handling Program Input, Writing Safe Program Code, Interacting with the Operating System and Other Programs, Handling Program Output

Module-IV: TRUSTED SYSTEMS SECURITY
Operating System Security: Introduction to Operating System Security, System Security Planning, Operating Systems Hardening, Application Security, Security Maintenance, Linux/Unix Security, Windows Security, Virtualization Security. Trusted Computing and Multilevel Security: Bell-LaPadula Model for Computer Security, Other Formal Models for Computer Security, Concept of Trusted Systems, Application of Multilevel Security, Trusted Computing and the Trusted Platform Module, Common Criteria for Information Technology Security Evaluation, Assurance and Evaluation

Module-V: MANAGEMENT ISSUES
IT Security Management and Risk Assessment, IT Security Controls, Plans, and Procedures, Physical and Infrastructure Security, Human Resources Security, Security Auditing, Legal and Ethical Aspects

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- W. Stallings, "Computer Security: Principles and Practice," 2st Edition, Prentice Hall, ISBN: 0132775069, 2011.
- M. Stamp, "Information Security: Principles and Practice," 2st Edition, Wiley, ISBN: 0470626399, 2011.
- M. E. Whitman and H. J. Mattord, "Principles of Information Security," 4st Edition, Course Technology, ISBN: 1111138214, 2011.
- M. Bishop, "Computer Security: Art and Science," Addison Wesley, ISBN: 0-201-44099-7, 2002.
- Elmsari and Navathe, "Fundamentals of Database Systems", 4th Ed., A. Wesley, 2004
- Ullman J. D., "Principles of Database Systems", 2nd Ed., Galgotia Publications, 1999.

Syllabus - Third Semester

DESCRIPTIVE ANALYSIS

Course Code: DSE4301 **Credit Units: 03**

Course Objective:
This course introduces some elementary statistical methods of analysis of data and compute various measurements of central tendency, dispersion, skewness and kurtosis. Also discusses computation of the correlation coefficient from ungrouped bivariate data and interpret them and analyse data pertaining to attributes and to interpret results.

Course Contents:

Module-I: Introduction to Statistics
Definitions: Webster's and Secrist's definition of Statistics, Importance of Statistics, Scope of Statistics: In the field of Industry, Biological Sciences, Medical Sciences, Economics Sciences, Social, Sciences, Management Sciences, Agriculture, Insurance, Actuarial Science, Education and Psychology.

Module-II: Population and Sample
Types of characteristics: Attributes: Nominal scale, ordinal scale. Variables: Interval scale, ratio scale, discrete and continuous variables, Types of data: Primary data, Secondary data, Notion of a statistical population: Finite population, infinite population, homogeneous population and heterogeneous population. Notion of sample, random sample and non-random sample, Methods of sampling: Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.

Module-III: Presentation of Data
Classification: Raw data and its classification, Discrete frequency distribution, Sturge's rule, continuous frequency distribution, inclusive and exclusive methods of classification, Open end classes, cumulative frequency distribution and relative frequency distribution, Graphical Presentation of Data: Histogram, frequency curve, frequency polygon, ogive curves, stem and leaf chart, Check sheet, Parato diagram, Examples and Problems.

Module-IV: Measures of Central Tendency
Concept of central tendency of statistical data, Arithmetic Mean (A.M.), combined mean of a number of groups, merits and demerits, Geometric Mean (G.M.), Harmonic Mean (H.M.), Weighted Mean, Weighted A.M., G.M. and H.M. , Mode, Median, Empirical relation between mean, median and mode, Order relation between arithmetic mean, geometric mean, harmonic mean.

Module-V: Measures of Dispersion
Concept of dispersion, characteristics of good measure of dispersion, Range, Mean deviation, Mean square definition, Variance and standard deviation, Combined variance, Combined standard deviation, generalization for n groups, Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation.

Module-VI: Skewness and Kurtosis
Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution, Bowley's coefficient of skewness, interpretation using Box plot, Karl Pearson's coefficient of skewness, Measures of skewness basked on moments ($\beta 1$, $\gamma 1$), Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions, Measures of kurtosis based on moments, ($\beta 2$, $\gamma 2$).

Module-VII: Correlation & Regression

Bivariate data, bivariate frequency distribution, Concept of correlation between two variables, positive correlation, negative correlation, Scatter diagram, conclusion about the type of correlation from scatter diagram, Covariance between two variables, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, In case of ties, compute Karl Pearson's correlation coefficient between ranks. Regression: lines of regression, fitting of lines of regression by the least squares method, interpretation of slope and intercept. 9.2 Regression coefficient (byx, bxy), Effect of change of origin and scale, Angle between the two lines of regression, Mean residual sum of squares, Residual plot and its interpretation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References :

- Goon A.M.,Gupta M. K., Dasgupta B.(1998): Fundamentals of Statistics (V-1),World Press.
- Miller and Fruend: Modern Elementary Statistics.
- Snedecor and Cochran: Statistical Methods, Oxford and IBH Publishers.
- Mukhopadhyay, P: Mathematical Statistics (1996), New Central Book Agency, Calcutta.
- Introduction to Mathematical Statistics, Ed. 4 (1989), MacMillan Publishing Co. New York.
- Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
- Neil Weiss: Introductory Statistics: Pearson Publishers.

LEARNING AND REASONING WITH BAYESIAN NETWORKS

Course Code: DSE4302 **Credit Units: 04**

Course Objective:
This course provides an in-depth exposition of knowledge representation, reasoning, and machine learning under uncertainty using the framework of Bayesian networks. Both theoretical underpinnings and practical considerations will be covered, with a special emphasis on constructing and learning graphical models, and on various exact and approximate inference algorithms.

Course Contents:

Module-I: Introduction
Reasoning about beliefs using Logic and Probability Propositional Logic, Probability Calculus and Bayesian Reasoning, Bayesian Networks,: Syntax and Semantics, Building Bayesian Networks.

Module-II: Bayesian Networks Inference
Inference by variable elimination, Inference by Factor Elimination (Jointree), Compiling Bayesian Networks, Complexity of probabilistic inference, compiling bayesian networks.

Module-III: Approximate Inference
Inference by Belief Propagation: Algorithm, Iterative belief propagation, semantics of IBP, Join graphs, edge-detection semantics, Approximate Inference by Stochastic Sampling: Simulating a Bayesian network, direct sampling, expectations, estimating a conditional probability, Markov chain simulation.

Module-IV: Learning: The Maximum Likelihood Approach
Introduction, estimating parameters from complete data, estimating parameters from incomplete data, learning network structure, searching for network structure.

Module-V: Learning: The Bayesian Approach
Introduction, Meta Networks, Learning with Discrete Parameter Sets, Learning with Continuous Parameter Sets, Learning Network Structure

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Adnan Darwiche, Modelling and Reasoning with Bayesian Networks. Cambridge University Press 2009
- Richard E. Neapolitan, “Learning Bayesian networks”, Prentice Hall Series in Artificial Intelligence, 2004.
- TimoKoski, John Noble, “Bayesian Networks: An Introduction”, Wiley series in Probability and Statistics, 2009.
- Finn V. Jensen and Thomas Nielsen. Bayesian Networks and Decision Graphs. Springer 2007.

SOCIAL NETWORK DATA ANALYTICS

Course Code: DSE4303 **Credit Units: 03**

Course Objective:
This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyse empirical social network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets

Course Contents:

Module-I: Introduction
Overview: Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.

Module-II: Community Discovery in Social Networks: Applications, Methods and Engineering Trends
Introduction, Communities In Context, Core Methods, Quality Functions, The Kernighan-Lin (Kl) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,

Module-III: Information Networks and the World Wide Web
The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web- Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search. Module IV

Module-IV: Node Classifications in Social Networks
Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification.

Module-V: Data and Text Mining In Social Media
Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xmland Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous Networks.

Module-VI: Overview of Social Tagging
Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions ,Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
- Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
- Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.
- Jure Leskovec, AnandRajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2 edition, 2014.
- Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1 edition, 1994.

R PROGRAMMING LAB

Course Code: DSE4304 **Credit Units: 01**

Course Objective:
This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objectives of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

R Programming Objective

- Master the use of the R interactive environment
- Expand R by installing R packages
- Explore and understand how to use the R documentation
- Read Structured Data into R from various sources
- Understand the different data types in R
- Understand the different data structures in R
- Understand how to use dates in R
- Use R for mathematical operations
- Use of vectorised calculations
- Write user-defined R functions
- Use control statements
- Write Loop constructs in R
- Use Apply to iterate functions across data
- Reshape data to support different analyses
- Understand split-apply-combine (group-wise operations) in R
- Deal with missing data
- Manipulate strings in R
- Understand basic regular expressions in R
- Understand base R graphics
- Focus on GGplot2 graphics for R
- Be familiar with trellis (lattice) graphics
- Use R for descriptive statistics
- Use R for inferential statistics
- Write multivariate models in R
- Understand confounding and adjustment in multivariate models
- Understand interaction in multivariate models
- Predict/Score new data using models
- Understand basic non-linear functions in models
- Understand how to link data, statistical methods, and actionable questions

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

HADOOP LAB

Course Code: DSE4305 **Credit Units: 02**

Course Objective:

- To provide an overview of several key technologies used in manipulating, storing, and analysing big data.
- To understand the fundamentals of Hadoop.
- To apply the learning specific problems in various domains.

Recommended Tools

Big Data Tools and Technology [Learning and Demonstration of Big Data Ecosystem]

- Hadoop
- HBase
- NoSQL
- Hive
- Pig

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION

Course Code: DSE4335 **Credit Units: 06**

Guidelines:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.
In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit synopsis in the format given by coordinator/supervisor.**
- Student will maintain a file (**Internship File/Project Report**). **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report
1. File should be in the following specification

- A4 size paper
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.
Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.
Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components

Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.

2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.

3. Certificate-This is page number (ii). The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).

4. Acknowledgements-This is page number (iii). Keep this brief and avoid using informal language. This page must be signed by the candidate.

5. Abstract and **Keywords-**This is page number (iv). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.

The keywords (maximum 6) are a hint that what is contained in the report.

7. Contents-This is page number (v). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.

8. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.

9. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment	**Final Assessment**
40 Marks	60 Marks

Continuous Internal Assessment consists of topic relevance, progress report and synopsis marks. Final Assessment includes viva, presentation and report marks.

Examination Scheme:

Components	**V**	**S**	**R**	**PR**	**FP**
Weightage (%)	20	20	20	20	20

V – Viva, S – Synopsis, FP – Final Presentation, R – Report, PR-Progress Report

PROJECT-DISSERTATION-I

Course Code: DSE4337 **Credit Units: 05**

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**
- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research
Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions
Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

ata, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between ‘dissertation topic’ and ‘dissertation title’. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author’s name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the ‘acknowledgements’.

- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:		40%
(Based on Abstract, Regularity,		
Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	

WEB TECHNOLOGY

Course Code: DSE4306 **Credit Units: 03**

Course Objectives:
This course provides knowledge on Core technologies that are needed for the web likeHTML and XML and facilitate how to build XML applications with DTD and style sheets thatspan multiple domains ranging from finance to vector graphics to genealogy for use with legacy browsers.

Course Contents:
MODULE-I: Introduction
HTML Common tags, Cascading Style sheets - Introduction to Java Scripts - Objects in Java Script - Dynamic HTML with Java Script.

MODULE-II: Vbscript Language Elements
Constants - Variables and Data Types - Mathematical Operations – LogicalOperators - Looping and Decision Structures - VBScript Functions and Objects:Data Conversion Functions - Mathematical Functions - Data FormattingFunctions -Text Manipulation Functions - Data and Time Functions - Built-in
Objects.

MODULE-III: ASP Fundamentals
Using Server – Side Includes- Learning the SSI Directives – Creating ModularASP Code -Using the Request Object: Using Form Information - Using QueryString Information – Using Server Variables - Using the Response Object:Create Output – Managing Output – Managing the Connection.

MODULE-IV: Using Cookies
Introduction to Cookies: Cookies and Your Browser – Creating a Cookie –Modifying and removing Cookies – Tracking Preferences with Cookies Usingthe Application, Session and Server Objects: The application Object – TheSession Object – The Server Object –Using the global .asa file - Active DataObjects Essentials: Microsoft's Universal Data Access Strategy – TheConnection Object – The Record set and Field Objects – The Command andParameter Objects – Using the Errors Collection.

MODULE-V: Introducing XML
XML: The Life of an XML documents - Related technologies- First XMLDocument: Hello XML – Exploring the Simple XML Document – AssigningMeaning to XML Tags – Writing a Style Sheet for an XML Document – Attachinga Style Sheet to an XML Document – Style Languages: CSS Style Sheets,CSS Layouts, CSS Text Styles.

MODULE-VI: Attributes, Empty Tags & XSL
Attributes – Attributes versus Elements – Empty Elements and Empty ElementTags – XSL-DTDs and Validity: Document Type Definitions – ElementDeclarations – DTD Files – Document Type Declarations – Validating Againsta DTD-Element Declaration - Entity Declarations: What Is an Entity – InternalGeneral Entities – External General Entities – Internal Parameter Entities –External Parameter Entities – Building a Document from Places-AttributeDeclaration: What is an Attribute – Declaring Attributes in DTDs – DeclaringMultiple Attributes – Specifying Default Values for Attributes – Attribute Types –Predefined Attributes – A DTD for Attribute- Based Baseball Statistics.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Dave Mercer, "ASP 3.0 Beginners Guide", Tata McGraw-Hill Edition, Sixthreprint, 2004.
- Rajkamal, "Web Technology", 1st Edition, Tata McGraw - Hill, 2001.

SERVICE ORIENTED ARCHITECTURE

Course Code: DSE4307 **Credit Units: 03**

Course Objective:
The subject gives an introduction to the fundamentals and issues relating to Service Oriented Architecture and bring out the importance of service orientation and web services. It also teaches appropriate tools as technique on how to build the Service Oriented Architecture with web services.

Course Contents:

Module I: Introduction
Basic definition - Fundamentals of SOA - Characteristics and misperceptions about SOA-Benefits and pitfalls of SOA.

Module II: Evolution of SOA
The evolution of SOA - Web service and primitive SOA - The extension of SOA - Web service extension.

Module III: Web Service and Contemporary SOA
Message Exchange Pattern- Service Activity- Coordination- Atomic Transaction- Business Activity- Orchestration – Choreography- Addressing- Reliable Messaging- Correlation and Policies- Meta data Exchange- Security- Notification and Eventing.

Module IV: Principles of Service Orientation
Principles of service orientation -Building SOA-Planning and Analysis- SOA delivery strategies - Service Oriented Analysis Introduction -Service Modelling of Service Oriented Analysis.

Module V: Service Oriented Design
Introduction to service oriented design - WSDL related XML Schema language Basics - WSDL Language Basics - SOAP Language Basics - Service interface design tools - Steps to composing SOA - Consideration for choosing service layers, positioning core SOA standards and choosing SOA extension – Service design and business process design.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Thomas Erl, “Service Oriented Architecture, Concepts, Technology and Design”, Pearson Education, 2009.
- Shankar Kambhampaty, “Service Oriented Architecture for Enterprise Architecture for Enterprise Application”, 1st Edition, Wiley Publication, 2008.

NATURAL LANGUAGE PROCESSING

Course Code: DSE4308 **Credit Units: 03**

Course Objective:
This course provides a general introduction including the use of state automata for language processing and syntax including a basic parse. It explains advanced feature like feature structures and realistic parsing methodologies. It also gives concepts of remotes processing and detail information about a typical natural language processing applications.

Course Contents:

Module-I: Introduction
Introduction: Knowledge in speech and language processing - Ambiguity - Models and Algorithms - Language, Thought and Understanding- Regular Expressions and automata: Regular expressions - Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology - Finite-State Morphological parsing - Combining FST lexicon and rules - Lexicon- Free FSTs: The porter stammer - Human morphological processing.

Module-II: Syntax Analysis
Word classes and part-of-speech tagging: English word classes - Tagsets for English - Part-of-speech tagging - Rule-based part-of-speech tagging - Stochastic part-of-speech tagging - Transformation-based tagging – Other issues - Context-Free Grammars for English: Constituency - Context-Free rules and trees - Sentence-level constructions - The noun phrase -
Coordination - Agreement - The verb phase and sub categorization – Auxiliaries - Spoken language syntax - Grammars equivalence and normal form - Finite- State and Context-Free grammars - Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search - A Basic Top-Down parser - Problems with the basic Top-Down parser - The early algorithm - Finite-State parsing methods.

MODULE-III: Advanced Features and Syntax
Features and Unification: Feature structures - Unification of feature structures
- Features structures in the grammar - Implementing unification - Parsing with unification constraints - Types and Inheritance. Lexicalized and Probabilistic
Parsing: Probabilistic context-free grammar - Problems with PCFGs -
Probabilistic lexicalized CFGs - Dependency Grammars - Human parsing.

MODULE-IV: Semantic
Representing Meaning: Computational desiderata for representations – Meaning structure of language - First order predicate calculus - Some linguistically relevant concepts - Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis - Attachments for a fragment of English - Integrating semantic analysis into the early parser - Idioms and compositionality - Robust semantic analysis. Lexical semantics: relational among lexemes and their senses - WordNet: A database of lexical relations - The Internal structure of words - Creativity and the lexicon.

MODULE-V: Natural Language Generation
Introduction to language generation - Architecture for generation – Surface realization - Discourse planning - Other issues- Machine Translation: Language similarities and differences - The transfer metaphor - The interlingua idea: Using meaning - Direct translation - Using statistical techniques – Usability and system development.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Daniel Jurafsky& James H.Martin, “Speech and Language Processing", 2nd Edition, Pearson Education, 2009.
- James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
- Manning, Christopher D and HinrichSchütze, “Foundations of Statistical Natural Language Processing”, Cambridge, 1st Edition, MA: MIT Press, 1999.

AGENT BASED INTELLIGENT SYSTEMS

Course Code: DSE4309 **Credit Units: 03**

Course Objective:
This course provides students basic knowledge of employing intelligent agents in solving complex problems and gives the awareness of the building blocks of agents and working of different types of agents. It also analyses the reasons for uncertainty and ability to design agents to handle them.

Course Contents:

Module-I: Introduction
Definitions – History – Hybrid Intelligent Agents – Agents vs Multi Agent Systems– Structure – Environment – Basic Problem Solving Agents – Complex Problem Solving Agents – Formulating Search Strategies – Intelligent Search.

Module-II: Concepts for Building Agents
Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events- Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle.

Module-III: Knowledge Based Agents
Knowledge Representation – Logic – First Order Logic – Reflex Agent – Building a Knowledge Base – General Ontology – Interference – Logical Recovery.

Module-IV: Planning Agents
Situational Calculus – Representation of Planning – Partial Order Planning – Practical Planners– Conditional Planning - Preplanning Agents.

Module-V: Agents and Uncertainty
Acting under uncertainty – Probability – Baye's Rule – Belief Networks – Utility Theory - Decision Network- Value of Information – Decision Theoretic Agent Design.

Module-VI: Higher Level Agents
Learning Agents – General Model – Inductive Learning – Learning Decision Tree – Reinforcement Learning – Knowledge in Learning – Communicative Agents – Types of Communicative Agents – Future of AI.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

- Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2010.
- Lin Padgham, Michael Winikoff, "Developing Intelligent Agent Systems: A Practical Guide", 1st Edition, John Wiley & Sons, 2004.
- ZiliZhang,Chengqi Zhang, "Agent-Based Hybrid Intelligent Systems: An Agent- Based Framework for Complex Problem Solving", 1st Edition, Springer-Verlag New York, LLC , 2004.
- Ngooc Thanh Nguyaaen, Lakhmi C. Jain, "Intelligent Agents in the Evolution of Web and Applications", 4th Edition, Springer, 2009.

Syllabus - Fourth Semester

PROJECT-DISSERTATION-II

Course Code: DSE4437 **Credit Units: 15**

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50

Total 100

ata, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.

- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

- Has the student made a clear statement of the objective or objective(s).
- If there is more than one objective, do these constitute parts of a whole?
- Has the student developed an appropriate analytical framework for addressing the problem at hand.
- Is this based on up-to-date developments in the topic area?
- Has the student collected information / data suitable to the frameworks?
- Are the techniques employed by the student to analyse the data / information appropriate and relevant?
- Has the student succeeded in drawing conclusion form the analysis?
- Do the conclusions relate well to the objectives of the project?
- Has the student been regular in his work?
- Layout of the written report.

Assessment Scheme:

Continuous Evaluation:		40%
(Based on Abstract, Regularity,		
Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	

Amity School of Engg. & Technology

Master of Technology - Electronics & Communication Engineering

FLEXILEARN
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Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

LOW POWER VLSI DESIGN

Course Code: ECE4101 **Credit Units: 03**

Course Objective:
This course deals with the design issues of low power circuit in digital perspective. In this course, MOS transistor modeling is emphasized for low power applications. After completing this course the student have thorough knowledge of modeling of various MOS parameter and SPICE simulation for low power applications, correlation analysis in DSP systems, Monte Carlo simulation, low power memory design.

Course Contents:
Module I: Introduction to Low Power VLSI Design
Need for low power VLSI chips, Sources of power dissipation on Digital Integrated circuits. Emerging Low power approaches. Physics of power dissipation in CMOSdevices.

Module II: Device & Technology Impact on Low Power
Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation.

Module III: Simulation Power analysis
SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power, gate level capacitance estimation, architecture level analysis, data correlation analysis in DSP systems. Monte Carlo simulation.
Probabilistic power analysis: Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy.

Module IV: Low Power Design
Circuit level: Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library
Logic level: Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic.

Module V: Low power Architecture & Systems
Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design.

Module VI: Low power Clock Distribution
Power dissipation in clock distribution, single driver Vs distributed buffers, Zero skew Vs tolerable skew, chip & package co design of clock network Algorithm & architectural level methodologies: Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Gary K. Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002
- Rabaey, Pedram, "Low power design methodologies" Kluwer Academic, 1997

References:
- Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000

ADVANCED DIGITAL COMMUNICATION SYSTEMS

Course Code: ECE4102 **Credit Units: 03**

Course Objective:
The purpose of this course is to provide a thorugh knowledge of Advanced digital communications systems with in depth study of various digital modulation techniques, spread spectrum techniques, and information theory.

Course Contents:

Module I: Introduction
Geometric representation of modulation signals, Liner modulation technique, $\pi/4$ QPSK, Offset QPSK Constant envelop modulation technique, MSK, GMSK, Linear & constant envelop modulation techniqyes, M-ary PSK, M-ary QAM**.**

Module II
Spread spectrum system like DS-Sprad spectrum, Pseudo noise sequences, Performance of DS-SS, Frequency Hopping system, Modulation Error Performance for Binary signal in AWGN, Detection of M-ary orthogonal, M-ary orthogonaling with non-coherent detection.

Module III: Equalization
Adaptive equalizer, Linear Equalizer, Nonlinear Equalizer, ISI interference, RAKE receiver, Maximum likelihood sequence estimation (MLSE) equalizer.

Module IV
Railey fading distribution, Ricean fading distribution, Speed coding, Characterization of speech signals, Vector quantization, Adaptive quantization, Power spectrum for general memory less modulation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Book Haykin: Communication System, Wiley eastern Ltd. Ed. 1998
- J.Dassm S K Mullick & P K Chatterjee: Principle of Digital Communication, Wiley Eastern Ltd.
- Martin S. Roden: Digital and Data Communication System P.H.I London. Ed. 1998.
- Viterbi, A.I and J.K.Qmura : Principles of Digital Communication, McGraw Hill Company, New York.

STOCHASTIC METHODS

Course Code: ECE4103 **Credit Units: 03**

Course Objective:
This course deals with the comprehensive knowledge of Probability theory, probability distributions, transition probabilities, Markov Chains, birth and death processes, Network of queues, correlation and regression analysis and Analysis of variance.

Course Contents:

Module I: Random Variables
Probability Bay's rule, Distribution function, Discrete random vectors, different distributions, jointly distributed random variables. Order statistics, Distribution of sums, expectations, moments, transform methods mean time to failure, Inequalities and limit theorems, Mixture distribution, Conditional expectations, Imperfect fault coverage & reliability, Random sums.

Module II: Stochastic Processes
Classification Bernoulli process, Poisson process, Renewal processes, available analysis,. Random incidence, renewal model of program behavior.

Module III: Markov Chains
n-step transition probabilities, limiting distribution, distribution of times between state changes, irreducible finite chains with a periodic states, the m/g/I, queueing system discrete parameter, Birth Data Processes, Markov chains with absorbing states, Birth and death Processes, Non – Birth Death Processes.

Module IV: Network of Queues
Open and close queuing networks, Non exponential service item distributions and multiple job type, non product form networks. Correlation & Regression: Introduction, least squares curve fitting, Coefficient of determination, Confidence of intervals in linear regression, conclation analysis, non linear regression, Analysis of variance.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Papoulis,A., Probability, Random Varibles and Stochstic Processes, Third Edition, McGraw-Hill
- K.S.Trivedi: Probability and Statistics, PHI, 3rd Ed.
- S.P.Gupta, Statistical Methods, Sultan Chand Sons
- V.K. Kapoor and S. C. Gupta Fundamentals of Statistics, Sultan Chand and Sons.

ADVANCED CONTROL SYSTEMS

Course Code: ECE4104 **Credit Units: 04**

Course Objective:
Course provides comprehensive and insight knowledge of Digital control systems. Objective of the course is to provide the students the core knowledge of Stability theory of Digital systems and State Variable analysis of Digital System

Course Contents:

Module I: Introduction
Configuration of the basic Digital Control Systems, types of sampling operations, Sample and Hold operations, Sampling theorem, Basic discrete time signals.

Module II: Stability Methods
Mapping between s-plane and z-plane, stability methods: Modified Routh Criterion, Jury's method, modified Schur-Cohn criterion.

Module III: Models of Digital Control Systems
Digital temperature control System, Digital position control system, stepping motors and their control. Design of Digital compensator using frequency response plots.

Module IV: Control Systems Analysis Using State Variable Methods
State variable representation, conversion of state variable models to transfer function and vice-versa, Eigen values and eigen vectors, Solution of state equations, Concepts of controllability and observability.

Module V: State Variable analysis of Digital Control Systems
State variable description of digital control systems, conversion of state variable models to pulse transfer function and vice versa, solution of state difference equations, controllability and observability.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- M. Gopal, Digital Control and State Variable Methods, Tata Mc-Graw-Hill.
- K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
- B.C Kuo , Digital Control Systems , Prentice Hall.
- I.J. Nagrath & M.Gopal , Control System Engg., John Wiley & sons.
- K.K. Aggarwal, Control System Analysis and Design, Khanna Publishers.

DIGITAL SIGNAL PROCESSING

Course Code: ECE4105 **Credit Units: 04**

Course Objective:
Digital Signal Processing gives a brief overview of the evolution of Digital Signal from its parent Analog Signal, it's processing in terms of detection, classification, quantization and discrete response them various hardware and software techniques. It also realizes the need of Analog signal construction three various complex mathematical operations on, unit impulse responses in any considerate measuring domain and preparing the synthesized signal for accurate, fast and pre-determinedly programmed digital converssion.

Course Contents:

Module I: Discrete – Time Description of Signals & Systems
Discrete – time sequences, response sequence, time invariant systems, stability and causality criterion for discrete – time systems, linear constant coefficient difference equation, properties of real valued sequences, convolution, correlation.

Module II: The Z – Transform
Sampling Definition of Z – Tranform, Properties of z-transform, The complex Z – plene, Region of convergence in the Z-Plane, evaluation of Z-Transform, Relation between FT & Z-transform, The Z-transform of Symmetric sequences, The Inverse Z-transform . The systems function of a digital filter.

Module III: The Discrete Fourier Transform (DFT)
Definition, its properties, DFT,IDFT pair , circular convolution, Computations for evaluating the DFT,FFT algorithm, Analytic derivation of the "decimation-intime FFT algorithm", Some general observation on the FFT.

Module IV: Infinite Impulse Response (IIR) Filter Design Techniques
Introduction, Analog filter system function & frequency response, Analog low pass filter design techniques for Butterworth, Chebyshev Type- I and Type –II filter, Impulse invariance and Bilinear Transformation methods to convert Analog filters into Digital Filters. Transformation for converting low pass filters into other types.

Module V: Finite Impulse Response (FIR) Filter Design Techniques
Introduction, Designing FIR filters by DFT method and frequency sampling method. Study of windows (rectangular, Triangular, Hamming and Kaiser).
Digital Filter Structure: The direct from I & II structure, Cascade & parallel combination of IInd order sections.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- J.G. Proakis and D.G. Manolakis: Digital Signal Processing, 1995 (PHI) III, Edition.
- A. Oppenheim, R. Schafer, and J. Buck: Discrete Time Signal Processing, 1996 (PHI) VI, Edition.
- L. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, 1975, Prentice Hall of India.

LOW POWER VLSI DESIGN LAB

Course Code: ECE4106 **Credit Units: 01**

Course Contents:

List of Experiments:

1) Layout of CMOS Inverter.
2) Layout of NAND & NOR Gates.
3) Design & Simulation of SR Latch using NAND & NOR Representations.
4) Design & Simulation of D Flip Flop using NAND & NOR Representations.
5) Design & Simulation of JK Flip Flop using NAND & NOR Representations.
6) Design & Simulation of T Flip Flop using NAND & NOR Representations.
7) Design & Simulation of Master Slave JK Flip Flop using NAND & NOR Representations.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED DIGITAL COMMUNICATION SYSTEMS LAB

Course Code: ECE4107 **Credit Units: 01**

Course Contents:

List of Experiments:

1. To study carrier modulation techniques using Amplitude shift keying and frequency shift keying
2. To study carrier modulation techniques using binary phase shift and differential shift keying.
3. To study data coding and decoding for NRZ format (NRZ L, M&S)
4. To study data coding and decoding for phase encoding format (Biphase L, M&S).
5. To study data coding and decoding for unipolar to bipolar and vice versa (Rz, AMI, URZ)
6. To study slop overload and increased gain in data modulation.
7. To study delta modulation and demodulation with CVSD modulation.
8. To study compander and expander

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DIGITAL SIGNAL PROCESSING LAB

Course Code: ECE4108 **Credit Units: 01**

Course Contents:

List of Experiments:

1. To design FIR Filter using Hamming window
2. To convert Analog filter into Digital Filter using bilinear transformation
3. To determine z and inverse z transform of a given sequence
4. To verify 7 points FFT algorithm in decimation in time (DIT) & decimation in frequency (DIF).
5. To deter main the filter coefficient using Ramaz exchange algorithm
6. To design an IIR digital filter and its parallel realization

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

INFORMATION THEORY AND CODING

Course Code: ECE4201 **Credit Units: 03**

Course Objective:
This course introduces how various coding takes place in communication and what type of different codes are used in communication system. It also introduces different entropies, channel capacity and prupsoe of encoding.

Course Contents:

Module I: Basic Concepts of Information Theory
A measure of Uncertainty, Binary Sources, Measure of Information for two – dimensional discrete finite probability Scheme, Noise charactererics of channel, Basic relationship among different entropies, Measure of mutual information channel capacity, Capacity of channel with symmetric noise structure BSC and BEC.

Module II: Element of Encoding
Propose of encoding separable binary codes, Shannon Fano encoding , Noiseless coding Theorem of decidability, Mc Millen's Theorem, Average length of encoding massage, Shannon's Binary encoding, Fundamental Theorem of discrete Noiseless coding, Huffman's Minimum Redundancy codes.
Coding for Reliable Digital Transmission & Storage
Introduction, types of codes, Modulation and Demodulation, Maximum likelihood decoding, types of error, error control strategies.

Module III: Introduction to Algebra
Groups, Fields Binary field Arithmetic, Construction of Galois field GF (2m), Basic Properties of Galois Field GF (2m), Vector Spacer, Matrices.
Linear Block Codes: Introduction to Linear Block codes, Syndrome and Error detection, Minimum distance of block code, error detecting and Error correcting capability a block code Hamming Code.
Cyclic Codes: Description of Cyclic codes, Generator and parity cheek matrices of cyclic codes, encoding of cyclic codes syndrome computation & error detection decoding of cyclic codes, Error trapping decoding of cyclic codes, Goley Codes.

Module IV: BCH Codes
Description of codes, Decoding of BCH codes, Implementation of Galoes Field Arithmetic, Implementation of error connection,
Convolution Codes: Encoding of convolution codes, structural properties of Convolution codes, distance properties of Convolution codes, Distance Properties of convolution codes, Maximum likelihood decoding of convolution codes.
Automatics Repeat Request Strategies
Stop and wait, Go back and selective repeat ARQ strategies, Hybrid ARQ Schemes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- F.M. Reza: Information Theory, McGraw Hill
- ShuLin & J Costeib: Error Control Coding, (PHI)
- Dass, Mullick & Chatterjee : Digital Communication, John Wiley, Ed. 1992

ADVANCED COMPUTER NETWORKS

Course Code: ECE4202 **Credit Units: 03**

Course Objective:
This course gives a through understanding of the advanced concepts of Computer Network by giving in depth knowledge of protocol used at various layers of the references model. It also introduces the students with network topologies and applications of Computer Networks.

Course Contents:

Module I
Introduction to computer Networks, Evolution of Computer networks and its uses, references models, example networks
The physical layer: Theoretical basis for data communication, Transmission media, wireless transmission. Telecom infrastructure, PSTN, Communication satellites,
Mobiles telephone System

Module II: The data link layer
Data link layer design issues, Error detection and correction, data link protocols, sliding window protocols, example of data link protocols – HDLC, PPP Access

Module III: Medium access layer
Channel allocation problem, multiple access protocols, ALOHA, CSMA/CD, IEEE standard 802 for LAN and MAN, Bridges

Module IV: The network layer
Network layer concepts, design issues, static and dynamic routing, algorithm, shortest path routing, flooding, distance vector routing, link state routing, distance vector routing, multicast routing, congestion control algorithm, internetworking, Ipv4

Module V: The transport layer
The transport services, elements of transport, TCP and UDP the application layer: Brief introduction to presentation and session layer, DNS, E-mail, WWW

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:
- Tananbaum A.S., "Computer Networks", 3rd Ed, PHI, 1999.
- Laura Chappell (ed), "Introduction to Cisco Router Configuration", echmedia, 1999.

References:
- Black U., "Computer Networks-Protocols, Standards and Interfaces", PHI, 996.
- Stallings W., "Computer Communication Networks", PHI.
- Michael A. Miller, "Data & Network Communications", Vikas Publication.
- William A. Shay, "Understanding Data Communications & Networks".

ADVANCED MICROWAVE ENGINEERING

Course Code: ECE4203 **Credit Units: 03**

Course Objective:
This course provides the comprehensive knowledge of microwave frequencies; construction and characteristic of Transistor, FET at Microwave frequency, Microwave Devices, Concept of MICS, Materials used for fabrication in MICS, different fabrication techniques, concept of Transmission line on MICS. This course also deals with the study of microwave sources, detection diodes and applications of microwave in modern technology.

Course Contents:

Module I
Microwave frequencies, microwave transistor, microwave field effect transistor

Module II
Tunnel diode, backward diode, and MIS tunnel diode, Transferred electron devices-Gunn Diode, Avalanche Transit Time Devices: IMPATT Diode, BARRITT Diode, DOVETT Diode, and TRAPATT Diode.

Module III: Microwave Integrated Circuit
Introduction, Circuit Forms, Transmission lines for MICs, Lumped Elements for MICs, Material for MICs: Substrate, Conductor, dielectric and resistive Materials, Fabrication techniques, Typical example of fabrication, Hybrid fabrication.

Module IV: Microwave tubes
Klystron, Reflex Klystron and Magnetron, Traveling wave tubes, microwave detection diodes, application of microwave

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Microwave Devices and Circuits by S. Y. Liao, PHI
- Microwave Engineering and application by O.P. Gandhi, Maxwell Macmillan Pub.
- Microelectronic Devices by E. S. Yang, MGH
- Semiconductor Devices and Integrated Electronics by A. G. Milness, CBS Pub.

ADVANCED OPTICAL COMMUNICATION

Course Code: ECE4204 **Credit Units: 04**

Course Objective:
The objective of this course is to introduce the student to the fundamental basics and understanding of fiber optical communications. This includes the properties of optical fibers and how they are used to establish optical links for communication systems. The course also gives exposure of Advance Optial Communication use in present communications networks.

Introduction:
concepts of information, general communication systems, evolution of optical fiber communication systems, advantages, disadvantages of optical fiber, communication systems.

Course Contents:

Module I: Wave propagation in dielectric waveguide
snell's law, internal reflection, dielectric slab wave guide, numerical aperture, propagation of model & rays. step-index fibers, graded index fibers.

Module II: Attenuation in optics fibers
Fiber attenuation, connectors &splices, bending loses, Absorption, scattering, very low loss materials, plastic & polymer-clad-silica fibers.

Module III: Wave propagation in fibers
wave propagation in step index & graded index fiber, fiber dispersion, single mode fibers, multimode fibers, dispersion shifted fiber, dispersion flattened fiber, polarization.

Module IV: Optical sources & detectors
Principles of light emitting diodes (LED's) , design of LED's for optical fiber communications, semiconductor LASER for optical fiber communication system ,principles of semiconductor photodiode detectors, PIN photodiode, Avalance photodiode detectors.

Module V: Optical fiber communication system
Telecommunication, local distribution series, computer networks local data transmission & telemetry, digital optical fiber communication system, first & second generation system, future system.

Module VI: Advanced multiplexing strategies
Optical TDM, subscriber multiplexing (SCM), WDM
Optical networking: data communication networks, network topologies, MAC protocols, Network Architecture- SONET/TDH, optical transport network, optical access network, optical premise network.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Senior J., optical fiber communications, principles & practice, PHI.
- Keiser G., optical fiber communications, Mcgraw-hill.
- Gowar J., optical communication systems, PHI.
- William B. Jones jr., Introduction to optical fiber communication systems, Holt, Rinehrt and Winston, Inc.

RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING

Course Code: ECE4214 **Credit Units: 02**

Course Objectives: The course will enhance scientific , technical and research writing skills and impart knowledge about various stages of research process, statistical analysis, statistical tests and their applications in statistical decision making.

Course Contents:

Module I: Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.

Module II: Population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, large and small samples, primary and secondary data, data processing and analysis. Sample surveys and questionnaire designing, scaling techniques.

Module III: Dependent and independent variables, univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: null hypothesis and alternate hypothesis, errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation, coefficient of determination**.**

Module IV: Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing , bibliography and footnotes. Making presentation-use of visual aids and PPTs. Publication of research papers, citations,. Intellectual property rights and copy rights, plagiarism, patents and patent laws, commercialization and ethical issues.

Examination Scheme:

Attendance	Assignment/Library consultation / Thesis writing	Class test	Final Exam	Total
5	15	10	70	100

Text Books:

- Blake, G. and Bly, R.W. 1993, The Elements of Technical Writing. MacMillan, New York
- Booth, V. 1981. Writing a Scientific Paper and Speaking at Scientific Meetings. The Biochemical Society, London
- Chawla,D and Sondhi, N. 2016, Research Methodology- Concepts and Cases. Vikas Publishing House Pvt Ltd. New Delhi
- Kothari, C.R.2008. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi.

Reference Books:

- Geode, Millian J.& Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi.
- Montomery, Douglas C.(2007), 5th Ed. Design and Analysis of Experiments, Wiley India.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi-110001
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd. Patpargang, Delhi- 110092

ADVANCED COMPUTER NETWORKS LAB

Course Code: ECE4205 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Study of Router Configuration in interface mode. (Cisco 800 & Cisco 1751
2. Router Conferguration with LAN setup by using 1700 Series Router and using belnet modem.
3. Study of CISCO switch 5100 series (12 ports) and setup VLAN
4. Socket Programming with JAVA
5. Network Programming by using JAVA Program.
6. Router Configuration with ISDN Line.
7. To study wide area network through serial ports via DTF & DLE cable.
8. To interconnect different network through routers
9. To study Real (Lease Line Scenario) DCE devices using RAD Modems
10. Recovering ISCO router password.
11. To study ISDN (BRI & PRI)
12. To study accessing of router from different location using> For CCNA, ISDN is required & card is ISDN card Removable)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

DEVICE MODELING AND SIMULATION LAB

Course Code: ECE4206 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Layout & Simulation of CMOS Inverter using CAD Tools.
2. Layout & Simulation of NAND & NOR Gates with Optimal Aspect Ratio.
3. Design & Simulation of SR Latch using NAND & NOR Representations.
4. Design & Simulation of JK Flip Flop using SR Latch.
5. Design & Simulation of Master Slave JK Flip Flop.
6. Design & Simulation of R2R Ladder DAC.
7. Design & Simulation of ADC using DAC.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED OPTICAL COMMUNICATION LAB

Course Code: ECE4207 **Credit Units: 01**

Course Contents:

List of Experiments:

1. To study LASER free space Communication.
2. To study losses in optical fiber.
3. To measure the Numerical Aperture of the Fiber.
4. To characterize optical sources.
5. Design and evaluation of LD digital transmission system.
6. To study video transmission through optical fiber link.
7. To study WDM in optical fibers.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SATELLITE COMMUNICATION

Course Code: ECE4208 **Credit Units: 03**

Course Objective:
This course contents topics related with technologies envolved with modern satellite communication systems. It also gives indeath knowledge about on board equipment use in Satellite Transponder and earth station. Various multiaccess techniques used in Satellite Communication alont with link engineering are also covered.

Course Contents:

Module I: Introduction
Satellite communication, Brief History, Orbits of satellite: Low, medium and geo-synchronous main characteristics, Angle period, Returning perio, Angle of Evaluation, Propagation Delay, Orbital spacing.

Module II Satellite Links
Delay transponder, Earth Stations, Antennas and Earth Coverage, Altitude and eclipses.

Module III: Earth space propagation effects
Frequency window, Free space loss, Atmospheric absorption, Rainfall Attenuation, Inospheric scintillatin, Telemetry, Tracking and command of satellites**.**
Detection: QPSK offset QPSK and MSK, Coherent and non-coherent detection, Error rate performance.

Module IV: Synchronization
Principal and techniques, Multiple Access Techniques, FDMA, SPADE system, TDMA system, Concept and configuration, system timing frames format, SSMA Basu Principles, VSAT, Random Access, space communication, link design descriptional of operational in TELSAT and INSAT system.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- J. Martin : Communication Satellite System, PH Englewood
- D.C. Aggarwal: Satellite Communication, Khanna Pub.
- Tri Ha Digital Satellite Communication Tata Mc Graw-Hill
- Harry and Vam Trees: Satellite Communication, IEEE Proceeding, 1979

BLUETOOTH TECHNOLOGY

Course Code: ECE4209 **Credit Units: 03**

Course Objective:
This subject provides Introduction to various wireless technologies with special emphasis on Bluetooth networking and Implementation.

Course Contents:

Module I: Introduction to wireless technologies
WAP services, Serial and Parallel Communication, Asynchronous and synchronous Communication, FDM, TDM, TFM, Spread spectrum Technology

Module II: Introduction to Bluetooth
Specification, Core protocols, Cable replacement protocol Bluetooth Radio: Type of Antenna, Antenna Parameters, Frequency hoping

Module III: Bluetooth Networking
Wireless networking, wireless network types, devices roles and states, adhoc network, scatternet Connection establishment procedure, notable aspects of connection establishment, Mode of connection, Bluetooth security, Security architecture, Security level of services,

Module IV: Profile and usage model
Generic access profile (GAP), SDA, Serial port profile, Secondary bluetooth profile.

Module V: Hardware
Bluetooth Implementation, Baseband overview, packet format, Transmission, buffers, Protocol Implementation: Link Manager Protocol, Logical Link Control, Adaptation Protocol, Host control Interface, Protocol Interaction with layers

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Bluetooth Technology by C.S.R. Prabhu and A.P. Reddi; PHI

CLUSTER AND GRID COMPUTING

Course Code: ECE4210 **Credit Units: 03**

Course Objective:
The basic objective of Cluster and Grid Computing is to provide introduction to Cluster Computing with special and details emphassion grid technologies and Applications execution.

Course Contents:

Module I: Cluster Computing
Introduction, Parallel systems, Cluster Architecture, Parallel Paradigms..

Module II: Programming
Parallel Programming with MPI, Resource management and scheduling.

Module III: Grid Computing
Introduction, Grids and Grid Technologies, Programming models and Parallelization Techniques, Standard application development tools and paradigms such as message-passing and parameter parallel programming, Grid Security Infrastructure, Data Management.

Module IV: Application Case Study
Molecular Modeling for Drug D5esign and Brain Activity, Analysis, Resource management and scheduling, Setting up Grid, deployment of Grid, software and tools, and application execution.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- R. Buyya (editor), High Performance Cluster Computing, Vol1. and Vol.2, Prentice Hall, USA, 1999.
- I. Foster and C. Kesselman (editors), The Grid: Blueprint for a New Computing Infrastructure, Morgan Kaufmann Publishers, 1999.
- R. Buyya, "Economic-based Distributed Resource Management and Scheduling for Grid Computing, Ph.D. Thesis, Monash University, Melbourne, Australia, April 2002

REAL TIME SYSTEMS AND SOFTWARE

Course Code: ECE4211 **Credit Units: 03**

Course Objective:
The basic objective of Real Time System and Software Engineering is to study different real time systems their application in time constraints software that can scale up for large systems and that can be used to consistently produce high-quality software at low cost and accurate time limit.

Course Contents:

Module I: Introduction
Real-time Versus Conventional Software, Computer Hardware for Monitoring and Control, Software Engineering Issues. Process and State-based Systems model, Periodic and Sporadic Process, Cyclic Executives, CE definitions and Properties, Foreground-Background Organiazations, Standard OS and Concurrency – Architectures, Systems Objects and Object-Oriented Structures, Abstract Data Types, General Object Classes.

Module II: Requirements and Design Specifications
Classification of Notations, Data Flow Diagrams, Tabular Languages, State Machine, Communicating Real Time State Machine- Basic features, Timeing and clocks, Sementics Tools and Extensions, Statecharts-Concepts and Graphical Syntax, Semantics and Tools

Module III: Declarative Specifications
Regular Expressions and Extensions, Traditional Logics- Propositional Logic, Predicates, Temporal logic, Real time Logic Deterministic Scheduling: Assumptions and Candidate Algorithms, Basic RM and EDF Results,

Module IV
Process Interactions - Prority Inversion Inheritance Execution Time Prediction: Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Prediction by optimisation, System Interference and Architectural Complexities Timer Application, Properities of Real and ideal clocks, Clock Servers – Lamport's Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization-Centralized Synchronization, Distributed Synchronization

Module V: Programming Languages
Real Time Language Features, Ada-Core Language, Annex Mechanism for Real Time Programming, Ada and Software Fault Tolerance, Java and
Real-time Externsions, CSP and Occam

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Real – Time Systems and software by Alan C. Shaw ; John Wiley & Sons Inc

MEMS AND IC INTEGRATION

Course Code: ECE4212 **Credit Units: 03**

Course Objective:
This course gives the exposure of various techniques used in MEMS and IC Integration. RF and Optical MEMS are also covered.

Course Contents:

Module I
Overview of CMOS process in IC fabrication, MEMS system-level design methodology,

Module II
Equivalent Circuit representation of MEMS, signal-conditioning circuits, and sensor, noise calculation.

Module III
Pressure sensors with embedded electronics (Analog/Mixed signal): Accelerometer with transducer. Gyroscope, RF MEMS switch with electronics, Bolo meter design

Module IV
RF MEMS, and Optical MEMS MECS, thermo actuator MOEMS CILV, Digital
Micro mirror device Laser light.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Gregory T.A. Kovacs, Micromachined Transducers Sourecbook, The McGraw- Hill, Inc. 1998
- Stephen D. Senturia, Microsystem Design, Kluar Publishers, 2001
- Nadim Maluf, An Introduction to Microelectro mechanical Systems Engineering, Artech House, 2000.
- M.H. Bao, Micro Mechanical Transducers, Volume 8, Handbook of Sensors and Actuators, Elsevier, 2000.
- Masood Tabib-Azar, Microactuators, Kluwer, 1998.
- Ljubisa Ristic, Editor, Sensor Technology and Devices, Artech House, 1994
- D. S. Ballantine, et. al., Acoustic Wave Sensors, Academic Press, 1997
- H. J. De Los Santos, Introduction to Microelectro mechanical (MEM) Microwave Systems, Artech, 1999.
- James M. Gere and Stephen P. Timoshenko, Mechanics of Materials, 2nd Edition, Brooks/Cole Engineering Division, 1984

Syllabus - Third Semester

ADVANCED INSTRUMENTATION

Course Code: ECE4301 **Credit Units: 03**

Course Objective:
The basic objective of this course is to provide the students the core knowledge of industrial instrumentaion so that they learn how to implement instrumentation techniques is industry.

Course Contents:

Module I: Transducers:
Classification of Transducers including analog and digital transducers, Selection of Transducers, Static and Dynamic response of transducer System.

Module II
Measurement of length & thickness, linear Displacement, Angular Displacement, force, weight, torque, Moisture, Level, Flow, pH & Thermal Conductivity, Measurement of Frequency, Proportional, Geigermuller & Scintillation Counters.

Module III: Telemetry
Basic Principles, Proximity & remote Action Telemetry systems, Multiplexing; Time Division and frequency division.

Module IV: Various types of Display Device
Digital Voltmeters, Dual Slope DVMS, Digital encoders, Analog and Digital encoders, Analog and Digital Data Acquisition System, A/D Converter.

Module V
Fibre Optic Technology for data transmission, Supervisory Control and Data
Acquisition Systems (SCADA), Q-meter. Electrical noise in control signals, its remedial measures.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- W.D. Cooper & A.D. Helfrick, Electronic Instrumentation and Measurement Techniques, PHI.
- B.C. Nakra and K.K. Chaudhary, Instrumentation Measurement Analysis, Tata McGraw-Hill.
- Instrument Transducers by Hermann, K.P. Neubert.
- Electrical Transducers for Industrial Measurement by pH Mansfleld.
- Instrumentation systems by Mani Sharma, Rangan.
- Principles & Methods of Telemetry by Borden & Thgnel.
- Telemetry Method by Foster.

NANO SCIENCE AND TECHNOLOGY

Course Code: ECE4302 **Credit Units: 03**

Course Objective:
Introduction to nanoscience and nanotechnology includes concept of quantum electronics, nanoscale fabrication technology, nanomaterials, i.e CNT and fullerenes.

Course Contents:

Module I: Introduction to Nanoscale Science
Concept of quantum electronics, Molecules as building blocks of nanomaterials, band energy etc.

Module II: Introduction to Nanoscale Technology
Nanoscale fabrication techniques, Molecular self-assembly, wet chemical synthesis, top down and bottom up approaches

Module III: Nanostructured Materials
Buckballs, Nanoparticle preparation in emulsion and microemulsion, Nanostructures and nanoparticles in thin organic films, Amphiphiles and surfactants.

Module IV: Applications of Nanomaterials
Details of nanostructured materials, applications in Sensors, clothes, paints, health care, electronics, computers, and other industrial and consumer products.

Module V: Fullereness and Carbon Nanotubes
Importance, properties and application of CNT and Fullerenes.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Introduction to nanotechnology, Charles P Poole, Jr. and Franks J Qwens
- Synthesis, Functionlization and surface treatment of Nanoparticle, Marie Isabella Buraton
- The Chemistry of Nanomaterials, CNR Rao, A K Cheethan
- Surface and Interface, M C Rastogi

ADVANCED IMAGE PROCESSING

Course Code: ECE4303 **Credit Units: 04**

Course Objective:
Processing color and grayscale images or other two-dimensional signals has become an important tool for research and investigation in many areas of science and engineering. Advance Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop. Advance Image Processing takes full advantage of the computational technology of Mathematica.

Course Contents:

Module I*:* Introduction and Digital Image Fundamentals
Human visual system and image perception, monochrome & color vision models, color representation; image sampling & quantization; 2-D systems; image transforms; image coding, stochastic models for image representation, some basic relationships like neighbours, connectivity, Distance measure between pixels, Imaging Geometry.
Histogram: Definition, decision of contrast basing on histogram, operations basing on histograms like image stretching, image sliding, Image classification. Definition and Algorithm of Histogram equalization.

Module II: Image enhancement, restoration & reconstruction
Image Transforms: Discrete Fourier Transform, Some properties of the two-dimensional fourier transform, Fast Fourier transform, Inverse FFT, Walsh, Hadamard , Discrete cosine, Haar, Slant, KL Transforms
Image Enhancement: SPATIAL Domain Methods: Arithmetic and logical operations, pixel or point operations, size operations, Smoothing filters-Mean, Median, Mode filters, Comparative study, Edge enhancement filters – Directorial filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity & DIFF Filters, prewitt filter, Contrast Based edge enhancement techniques, Colour image processing.
Frequency Domain Methods: Design of Low pass, High pass, EDGE Enhancement, smoothening filters in Frequency Domain. Butter worth filter, Homomorphic filters in Frequency Domain, Advantages of filters in frequency domain, comparative study of filters in frequency domain and spatial domain.
Image Restoration: Degradation model, Diagnolization of Circulant and Block-Circulant Matrices, Algebraic Approach to Restoration, Inverse filtering, Wiener filter, Constrained Least Square Restoration, Interactive Restoration, Restoration in Spatial Domain.

Module III: Image analysis using multiresolution techniques
Image Segmentation: Definition, characteristics of segmentation. Detection of Discontinuities, Thresholding, Pixel based segmentation method. Region based segmentation methods – segmentation by pixel aggregation, segmentation by sub region aggregation, histogram based segmentation, spilt and merge technique. Use of motion in segmentation (spatial domain technique only), Threshold detection methods, edge based image segmentation
Morphology: Dilation, Erosion, Opening, closing, Hit-and-Miss transform, Boundary extraction, Region filling, connected components, thinning, Thickening, skeletons, Morphological segmentation - particles segmentation and watersheds, particles segmentation.

Module IV: Wavelet Transform for Image Processing
Harr wavelets, Daubechies wavelets, Frequency analysis, Wavelet packet transforms, Continuous wavelet transforms, multi-resolution analysis, Image Restoration using Multiresolution Texture Synthesis

Module V: Image Compression
Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Error free comparison, Lossy compression, Image compression standards.
Representation and Description: Representation schemes like chain coding, Polygonal Approximatiion, Signatures, Boundary Segments, Skeleton of region, Boundary description, Regional descriptors, Morphology.

Recognition and Interpretation: Elements of Image Analysis, Pattern and Pattern Classes, Decision-Theoretic Methods, Structural Methods, Interpretation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson Reprint, 2001.
- Anil K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall of India, New Delhi, 2001.

References:

- Maher A. Sid-Ahmed, "Image Processing Theory, Algorithms and Architectures", McGraw-Hill, 1995.
- William K. Pratt, "Digital Image Processing", Wiley-Interscience publication, Second Edition, 1991.
- Rosefield Kak, "Digital Picture Processing",
- Fundamentals of Electronic Image Processing by Arthyr –R – Weeks, Jr. (PHI)
- Image processing, Analysis, and Machine vision by Milan Sonka vaclan Halavac Roger Boyle, Vikas Publishing House.

MICROPROCESSOR ENGINEERING AND APPLICATION

Course Code: ECE4304 **Credit Units: 03**

Course Objective:
This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is to give the students detailed knowledge of the above microprocessor needed to develop the systems using it.

Course Contents:

Module I: Microprocessor
Intel 8085 - Introduction, register structure, memory Addressing, Addressing Modes,
Instruction Set, Timing Methods, CPU Pins and Associated Signals, Instruction timing and execution. programming I/O. Interrupt System, DMA, SID & SOD lines, Instruction set, 8085 based system design.

Module II: Intel 8086
Introduction, Architecture, Addressing modes, instruction set, memory
management, assembler dependent instructions, Input/Output, system design using 8086.

Module III: Pentium Processors
Internal Architecture of 8087, operational overview of 8087, Introduction to 80186,80286, 80386 & 80486 processors and Pentium Processors.

Module IV: Peripheral Interfacing
Parallel versus serial transmission, synchronous and asynchronous serial data transmission. Interfacing or hexadecimal keyboard and display unit, interfacing of cassette recorders and parallel, serial interface standards. Study of Peripheral Devices 8255, 8253,8257, 8251, 8259.

Module V: Microprocessor applications to Power Engg.
Protective Relaying: over-current, impedance, MHO, reactance, bi-directional relays.
Measurements: Frequency, power angle & power factor, Voltage and Current, KVA, KW, & KVAR, maximum demand. Resistance, Reactance, Temperature Controls.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Rafiquzzaman, M. Theory & Applications PHI Publications 1993.
- Gaonkar R. S. Microprocessor Architecture, Programming and Applications John Wiley 1989.
- Ram B. Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons 1995.
- Liu Yu Cheng and Gibson, G.A. PHI 1992.
- Leventhal, L.A. Introduction to Microprocessors: Software, Hardware, Programming.

ADVANCED INSTRUMENTATION LAB

Course Code: ECE4305 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Measurement of thickness & resolution of LVDI (Displacement measurement
2. Study of vibration measurement by stroboscope (natural frequency of a cantilever)
3. Measurement of angular frequency (speed of rotation objects) measurement by stroboscope.
4. Study of calibration of pressure transducer.
5. Measurement of free (Proving ring)
6. Study of torque cell.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ADVANCED IMAGE PROCESSING LAB

Course Code: ECE4306 **Credit Units: 01**

Course Contents:

List of Experiments:

1. Simulate all programs using MATLAB
2. To study about the basic image processing tools.
3. Write program for histogram processing.
4. Write program for filtering in frequency domain.
5. Write program for filtering in spatial domain.
6. Write programs for different compression schemes.
7. Write program image restoration.
8. Write program for performing different morphological operations.
9. Write program for image segmentation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MICROPROCESSOR ENGINEERING AND APPLICATION LAB

Course Code: ECE4307 **Credit Units: 01**

Course Contents:

List of Experiments:

1. To load the numbers 49H and 53H ion memory location 9510 & 9511.
2. Respectively and add the contents of memory location 9601.
3. To write the Assembly Language Programming for 8 bit addition with and without carry.
4. To write the Assembly Language Programming for 8 bit subtraction with and without borrow.
5. To write the Assembly Language Programming for 8 bit Multiplication and Division.
6. To write the Assembly Language Programming for sorting an array of numbers in Ascending & Decending order.
7. To write the Assembly Language Programming with Additional Instructions.
8. To write and execute a program using Stacks.
9. To study and program the programmable Peripheral interface (8255 board).
10. To study and program the programmable interval timer (8253 board).
11. To study and program the programmable DMA Controller (8257 board).
12. To study and program the programmable Interrupt Controller (8259 board).
13. To study of programmable Serial Communication interface (8251 board).

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER INTERNSHIP EVALUATION

Course Code: ECE4335 **Credit Units: 06**

Guidelines:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit synopsis in the format given by coordinator/supervisor.**
- Student will maintain a file (**Internship File/Project Report**). **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:

1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Acknowledgements-This is page number (iii). Keep this brief and avoid using informal language. This page must be signed by the candidate.
5. Abstract and **Keywords-**This is page number (iv). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.
7. Contents-This is page number (v). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
8. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
9. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.

10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment	**Final Assessment**
40 Marks	60 Marks

Continuous Internal Assessment consists of topic relevance, progress report and synopsis marks. Final Assessment includes viva, presentation and report marks.

Examination Scheme:

Components	**V**	**S**	**R**	**PR**	**FP**
Weightage (%)	20	20	20	20	20

V – Viva, S – Synopsis, FP – Final Presentation, R – Report, PR-Progress Report

DISSERTATION-I

Course Code: ECE4337 **Credit Units: 05**

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- Report Layout

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in

contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

ata, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.

- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
  - Font: Arial (10 points) or Times New Roman (12 points)
  - Line spacing: 1.5
  - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:		40%
(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	

MOBILE COMPUTING

Course Code: ECE4308 **Credit Units: 03**

Course Objective:
The objective of this subject is to make students familiar about the basic and advance concepts of mobile technology, computing. The 3G and mobile services and global satellite communication is also covered.

Course Contents:

Module I: Introduction to Personal Communications Services (PCS)
PCS Architecture, Mobility management, Networks signaling
Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling. GSM Additional services: Teletext, Facsimile, Videotext services.
General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes.

Module II: (Wireless) Medium Access Control
Motivation for a specialized
MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.
Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).
Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Module III: Database Issues
Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.
Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

Module IV: Mobile Data Communication
W LANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.
Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).
Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.
Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module V: Global Mobile Satellite Systems
Mobile Satellite Systems (GEO, MEO and LEO), case studies of the IRIDIUM and GLOBALSTAR systems.
Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.
Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- "Wireless and Mobile Networks Architectures", by Yi-Bing Lin & Imrich Chlamtac, John Wiley & Sons, 2001.
- "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

References:

- "Guide to Designing and Implementing wireless LANs", by Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.
- "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
- "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
- "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

OPTIMIZATION TECHNIQUES

Course Code: ECE4309 **Credit Units: 03**

Course Objective:
In a fast changing enviornment an undersating is required which will provide facility to implement a problem for minimum cost, greater efficiancy better customer service and higher quality. Optimization Techniques gives us help in solving such type of problems.

Course Contents:

Module I: Introduction to Optimization
Statement of an optimization problem, Classification of optimization problems, Optimization techniques, Engg. applications of optimization.

Module II: Classical Optimization Techniques
Single variable optimization, Multivariable optimization with no constraints, Multivariable optimization with equality constraints, Multivariable optimization with in equality constraints.

Module III: Linear Programming
Standard form of linear programming, Graphical solution, Simplex method, Twophase simplex method, Computer implementation of the simplex method, Duality theory.

Module IV: Transportation Problem
North-West Corner rule, Least cost method, Vogel approximation method, testing for optimality.

Module V: Non-Linear Programming: One–dimensional minimization methods
Unimodal function, Dichotomous search, Fibonacci search, Quadratic interpolation method, Cubic interpolation method .

Module VI: Non-Linear Programming-Unconstrained Optimization Techniques
Random search method, Steepest descent method, Conjugate gradient method,
Variable metric method.

Module VII: Non-Linear Programming - Constrained Optimization Techniques
Interior Penalty function method, Exterior penalty function method.
Further Topics in Optimization
Critical path method (CPM), Program evaluation and review technique (PERT).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- S.S. Rao, Optimization: Theory and applications, Wiley Eastern Ltd.
- G.V. Reklaitis, Engg. optimization Methods & applications, Wiley.

ADVANCED POWER ELECTRONICS

Course Code: ECE4310 **Credit Units: 03**

Course Objective:
The course aims to introduce them to the theory of operation, analytical, circuit models and basic design concepts of Electric Power components and system.

Course Contents:

Module I: Power Semiconductor Diodes
Diode V -I Characteristics, Reverse Recovery Characteristics, Power Diodes Types, Forward and Reverse Recovery Time. Series & Parallel Connected Diodes.

Module II: Thyristor
V-I Characteristics, Turn ON & Turn OFF Characteristics, di/dt and dv/dt protection, Series and Parallel Operation of Thyristors, Thyristor firing circuits, UJT and PUJT, Thyristor commutation Techniques.

Module III: Power Transistors
Bipolar Junction Transistors, their steady State & Switching Characteristics, Power
MOSFET'S and their steady state & switching characteristics, Gate drive SIT's & IGBTS's, Series & Parallel Operation, di/dt and dv/dt limitations,

Module IV: Controlled Rectifiers
Single Phase & Three Phase full Converters with R-L load, Single phase &: three phase dual converters, Power factor improvement technique.

Module V: A.C. Voltage Controllers
Principle of phase control, Single phase and three phase full controllers, Cycloconvertor, A.C. voltage Controllers with PWM Control, Effects of source & Load Inductances.

Module VI: D.C Choppers
Chopper Classification, Thyristor Chopper Circuits, Chopper Circuit Design.

Module VII: PWM Inverters
Principle of Operation, Performance parameters, single phase bridge invertors and their voltage Control, Harmonic Reduction, Inverter Circuit Design.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- M.H. Rashid , Power Electronics Circuits Devices application, PHI.1994
- P. C. Sen., Power Electronics TMH 1987.
- P S. Bimbhra., Power Electronics, Khanna Publishers 1993.
- Cyril W Lander, Power Electronics, MHL, 1993.
- M.D Singh & K.B. Khanchandani, Power Electronics, TMH.1998.

RADAR SYSTEMS

Course Code: ECE4311 **Credit Units: 03**

Course Objective:
This course builds basic knowledge of different types of Radar systems along with link designing & application. It also covers different modulation schemes & channels used.

Course Contents:

Module I: Introduction & basic working principle of radar
Basic radar, radar equation, its block diagram, frequencies, applications and origins
Different radar systems MTI and pulse Doppler radar, traking radar delay line cancellers, staggered pulse repetition frequencies Doppler filler banks digital MTI processing AMTI, tracking with radar, mono-pulse tracking limitation of tracking ADT.

Module II: Detection of signals in noise
Receiver noise and S/N ratio, probability density function probabilities of detection and false alarm, integrating radar pulses, radar cross section of targets, cross section fluctuations, PRF matched filter receiver, detectors, automatic detection, integrators, constant, pulse alarm rate receivers, radar operators, signal management

Module III: Radar signal processing & clutter
Basic radar measurement accuracy & radar measurement ambiguity diagram, pulse compression, target recognition. Introduction to radar clutter, surface clutter radar equation, land clutter, sea clutter, statistical models for surface clutter, weather clutter, non spherical clutter, detection of targets in clutter.

Module IV: Radar transmitter & receivers
Aspects of radar transmitters & receivers, linear beam power tubes solid state RF power sources.
Receiver noise figure, super heterodyne receiver duplexers and receiver protectors, radar displays.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- Introduction to Radar System – M. I. Skolnik
- Radar Fundamentals – G.J Wheeler
- Radar Engineering – D. G. Rink

RELIABILITY ENGINEERING

Course Code: ECE4312 **Credit Units: 03**

Course Objective:
The primary objective of this presentation is to share the experience gained in improving reliability and maintainability (R&M) features of the Advances Light Helicopter (ALH), designed and developed by the Hindustan Aeronautics Limited, Bangalore, India. The presentation briefly describes the advance technology features adopted and their impacty on R&M and outlines the reliability management aspects adopted during prototype development and poduction phases. The specific R&M features incorporated in design are elaborated. The failure reporting, analysis and corrective action system (FRACAS) established for R&M analysis is described and efforts made to improve R&M are illustrated with examples of held service data obtained from customers on initial production batches. The ALH experience reinforces the need for a well – established FRACAS and a system for customer inteaction to improve product R&M.

Course Contents:

Module I: Reliability Mathematics
Random experiments, probability, random variables, distribution functions, discrete distributions ,Continuous distributions.

Module II: Network Modelling and reliability evaluation of simple systems
Series systems, parallel system, series-parallel systems, partially redundant systems, standby redundant systems.

Module III: Networks and reliability evaluation of complex systems
Cut set method, Tie-set method, Connection matrix techniques, Event trees, Fault trees.

Module IV: Probability distributions in reliability Evaluation
General reliability function, Poisson distribution, normal distribution, exponential distribution.

Module V: Discrete Markov Chains
General modelling Concept, Stochastic transitional prob. matrix, Time dependent prob. evaluation, Limiting state Prob. evaluation, Absorbing States.

Module VI: Continuous Markov Processes:
General modeling concepts, state space diagrams, Stochastic transitional probability matrix, Evaluating limiting state probabilities.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- L.S. Srinath, Reliability Engineering, Affiliated East –West Press Pvt. Ltd., New Delhi
- E. Balagurusamy, Reliability Engineering, Tata McGraw Hill Publishing Company Ltd., New Delhi.
- R. Billinton & Ronald N. Allan, Reliability Evaluation of Engg. Systems: Concepts & Techniques, Plenum Press, N.Y. and London.

Syllabus - Fourth Semester

DISSERTATION-II

Course Code: ECE4437 **Credit Units: 15**

- Dissertation
- Seminar & Progress Report
- Comprehensive Viva

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan
- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.

- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation
- A4 size Paper
  - Font: Arial (10 points) or Times New Roman (12 points)
  - Line spacing: 1.5
  - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

11. Has the student made a clear statement of the objective or objective(s).
12. If there is more than one objective, do these constitute parts of a whole?
13. Has the student developed an appropriate analytical framework for addressing the problem at hand.
14. Is this based on up-to-date developments in the topic area?

15. Has the student collected information / data suitable to the frameworks?
16. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
17. Has the student succeeded in drawing conclusion form the analysis?
18. Do the conclusions relate well to the objectives of the project?
19. Has the student been regular in his work?
20. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:		40%
(Based on Abstract, Regularity, Adherence to initial plan, Records etc.)		
Final Evaluation: Based on,		60%
Contents & Layout of the Report,	20	
Conceptual Framework,	05	
Objectives & Methodology and	05	
Implications & Conclusions	10	
Viva & Presentation	20	

Amity School of Applied Sciences

Master of Technology - Solar & Alternative Energy

FLEXILEARN
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Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

RENEWABLE ENERGY CONVERSION SYSTEMS

Course Code: SAE4101 **Credit Units: 03**

Course Objective:
Course provides an introduction to different renewable energy sources. It analyses the full range of renewable energy supplies needed for modern economies. The course includes power from sun, wind, bio, tidal, ocean, geo and hydro.

Course Contents:
Module I: Introduction to Renewable Energy
Renewable and Non-Renewable Energy, World energy scenario; Fossil fuel resources - estimates and duration; India's energy scenario; Synergy between energy and environment, global environment issues, greenhouse gas emission, global warming, green energy solutions, technical and social implications of renewable energy

Module II: Solar Concepts
Introduction, Sun as the source of radiation, Earth and Solar constant, Extra-terrestrial solar radiation, components of radiation, effects of earth's atmosphere, Introduction to solar PV, Introduction to solar Thermal.

Module III: Biofuels, Wind Energy
Biofuels- Definition, generations and types
Wind-Characteristics, Sources of wind, components of wind turbines, advantages and environmental aspects of wind energy

Module IV: Hydro Energy, Tidal Energy
Hydro- Principles, hydro-turbines, social and environmental aspects
Tidal- The nature of the resource, physics, power generation, technical factors, environmental factors, tidal energy potential, tidal barrage, tidal stream, tidal current turbines.

Module V: Geothermal, OTEC
Geothermal- Principles, suitable sites and criteria, Advantages and disadvantages,
OTEC- Principles, Open and closed systems.

Examination Scheme:

Components	CT	Assignment	V/Q	Attendance	EE
Weightage (%)	15	5	5	5	70

Text & References:

- Renewable energy resources – J. W. Twidell
- Renewable energy engineering and technology-edited by V. V.N. Kishore
- Wind Energy Comes of Age, Paul Gipe, John Wiley & Sons Inc.
- Directory, Indian Windpower 2004, CECL, Bhopal.
- Solar Energy: Fundamentals, design, modeling and applications, Authored by G. N. Tiwari

BASICS OF MECHANICAL ENGINEERING

Course Code: SAE4102 **Credit Units: 4**

Course Objective:
The objective of this course is to impart the basic knowledge of thermodynamics, heat transfer through conduction, convection and radiation. Stress- strain, material properties and various manufacturing processes like casting, forging, welding to the students.

Course Contents:
Module I: Thermodynamics
Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, concepts of availability, irreversibility, Zeroth, first and second law of thermodynamics, Carnot Cycle

Module II: Heat Transfer
One-dimensional steady-state conduction through homogeneous and composite plane walls, cylinders and spheres, critical thickness of insulation. Physical mechanism of natural convection; buoyant force; empirical heat transferrelations for natural convection over vertical plates and cylinders, basics of Forced convection **Thermal radiation:** Kirchoff's law; Planck's distribution law, Wien's displacement law; Stefan-Boltzmann's relation, Configuration factors; radiant interchange between black and grey surfaces; radiation shielding solar radiation.

Module III: Stress And Strain Analysis
Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of materials (strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc).

Module IV: Casting& Forging
Introduction of casting, pattern and its types, moulding sand and its types, casting defects,pattern allowances, forging, upsetting, drop forging, press-forging & machine forging.

Module V: Welding & Sheet metal working
Introduction of welding processes, classification, gas welding, arc welding, resistance welding, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing.

Examination Scheme:

Components	CT	Assignment	V/Q	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- Heat and Thermodynamics: R. H. Dittman and M. W. Zemansky
- Heat Transfer-a basic Approach: Ozisik
- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.

BASICS OF ELECTRONICS DEVICES AND CIRCUITS

Course Code: SAE4103 **Credit Units: 04**

Course Objective:
To enable the students to understand the basics of Electronic devices and circuits

Course Contents:
Module I
pn junction, V I characteristics of pn junction diode, rectifier, zener diode and its application, LED, Diode circuits; clipper, clamper circuits, *recombination of carries in pn junction, solar cell designing aspects from diode, equations of solar cell*

Module II
BJT characteristics; BJT biasing; CE-biasing circuits: fixed bias, emitter-stabilized bias, voltage-divider bias, JFET, MOSFET.

Module III
Operational amplifier: basic model; OpAmp as inverting amplifier; non-inverting amplifier; summing amplifier, integrator; differentiator; Schmitt trigger.

Module IV
Logic Gates, Introduction to combinational circuits, combination circuit: Multiplexer: Decoder, Encoder; Minimization techniques: K MAP, *application of digital logic circuits to solar system designing.*
.
Module V
Introduction to Sequential Design. Flip-flop: latch; S-R flip-flop; JK master slave flip-flop; D-flip flop; FF type conversion; *Introduction to MATLAB, matrix operation, different graphical output, integration and solution to differential equation, Simulation of solar PV system model using MATLAB.*

Examination Scheme:

Components	CT	Assignment	V/Q	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- R.L. Boylestad, L. Nashelsky, Electronic devices and circuit theory, Prentice Hall,
- R.A. Gayakwad, Op-amps and linear integrated circuits, Prentice Hall of India,
- M. Morris Mano, Digital Design, Prentice Hall of India,
- R P Jain, Modern Digital Electronics, Tata McGrawHill,

INSTRUMENTATION TECHNIQUES AND CHARACTERIZATION

Course Code: SAE4104 **Credit Units: 04**

Course Objective:
Understanding of various sophisticated analytical techniques and their applications to characterize nanomaterials.

Course Contents:

Module I
Basic Measurement Concepts, Error analysis, Transducer classification, Static and dynamic characteristics of transducers, Real time Monitoring and data processing.

Module II
Energy audit instruments, measuring temperature, humidity, radiation, flow , pressure, thermal conductivity, sp.Heat , measurement of electrical quantities i.e. current, voltage; Power, power factor, stability and transient analysis of power producing systems.

Module III: Vacuum and thin film coating techniques
Vacuum ranges (low, high and ultra high vacuum) and their application, vacuum pumps (rotary, diffusion, ion, turbomolecular pumps), vacuum gauges (Knudsen, pirani, penning gauges).
Thin film deposition by physical/chemical vapour deposition, PECVD, sputtering, MBE, spin coating

Module IV: Spectroscopic Characterization Technique
UV-VIS-IR Spectrophotometer, Principle of operation and application for band gap measurements. Photoelectron spectroscopy, Raman spectroscopy, FTIR

Module V: Structural Analysis Techniques
Scanning and Transmission electron microscopy, AFM, XRD (Single Crystal), XRF, - detailed principle, operation and applications.

Examination Scheme:

Components	CT	Assignment	V/Q	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- Measurement, instrumentation and experiment design in physics and engineering, Sayer and Mansingh
- Instrumentation, Measurement and Analysis, B C Nakra and K KChaudhary, Tata McGraw – Hill Publishing House, New Delhi,
- Modern Spectroscopy, J Michael Hollas, Wiley International
- The Powder Method - I.V. Azaroff and M.J. Buerger.
- Introduction to Solids - I.V. Azaroff
- Elements of X-ray diffraction - A.D Cullity
- Differential Thermal Analysis - R.C. Mackenzie
- Thermal Methods of Analysis - W.W. Wendlandt

BIOMASS

Course Code: SAE4106 **Credit Units: 04**

Course Objective:

The objectives of this course are as follows:

a) To provide a thorough understanding of various renewable feed stocks, their availability and attributes for biofuels production.

b) To provide a thorough understanding of the broad concept of second and third generation biofuel production from biomass and other low-cost agri-residues and biowastes.

c) To provide students with tools and knowledge necessary for biofuel facility operations.

d) To teach our students to analyze and design processes for biofuel production.

Course Contents:

Module 1: Biomass

Properties of biomass, sources of biomass, photosynthesis, broad classification, agro and forestry tresidues utilization through conversion routes:biological, chemical and thermochemical

Module 2: Bio conversion mechanism

Bioconversion mechanism, source of waste undergoing bio-treatment,energetic and rate processes of major biological significance, Bioconversion of substratres into biogas, alcohols, organic acids, solvents, amino acids, antibiotics etc.

Module 3: Thermochemical Conversion

Thermochemical conversion of biomass, energy balance, conversion to solid, liquid and gaseous fuels, pyrolysis, biodiesel, gasification and their economics

Module 4: Chemical Conversion

Chemical conversion process, hydrolysis, pretreatments and hydrogenation, solvent, extraction of hydrocarbons

Module 5: Government Polices

Supporting programs and policies on biogas, bio-hydrogen, biodiesel and bioethanol, biogas purification technology and waste to energy programe.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**Attendance**	**EE**
Weightage%	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- Biomass for renewable energy, fuels and chemicals by Donald L. Klass
- Biorenewable Resources: Engineering New Products from Agriculture. Robert C. Brown. Wiley-Blackwell Publishing (2003).

BASICS OF MECHANICAL ENGINEERING LAB

Course Code: SAE4107 **Credit Units: 01**

Course Contents:

1. Welding

   (a) Arc Welding
   - Butt Joint
   - Lap Joint
   - T Joint

   (b) Gas Welding
   - Butt Joint
   - Lap Joint
   - Brazing of Broken pieces

2. Foundry
   - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal
   - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop
   - Male – Female Joint
   - Rectangular piece
   - Filing the job

1. To make a wooden box of given dimension with cover
2. To make a box of aluminum of given dimension with cover

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELECTRONICS LAB

Course Code: SAE4108 **Credit Units: 01**

Experiment List

1. To study and plot the characteristics of a junction diode.
2. To study Zener diode I-V characteristics.
3. To study diode based clipping and clamping circuits.
4. To study half wave, full wave and bridge rectifier with filters.
5. To study the input and output characteristics of a transistor in its various configurations (CE and CB).
6. To study and plot the characteristics of a JFET in its various configurations.
7. To study and plot the characteristics of a MOSFET in its various configurations.
8. To study various types of Bias Stabilization for a transistor.
9. To study the gain and plot the frequency response of a single stage transistor amplifier.
10. To measure gain and plot the frequency response of double stage RC coupled amplifier.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

SOLAR THERMAL ENGINEERING: CONVERSION AND STORAGE; FLAT PLATE COLLECTORS AND CONCENTRATORS

Course Code: SAE4201 **Credit Units: 04**

Course Objective:
To cover areas related with the fundamentals of solar energy, storage, and design of solar appliances.

Course Contents:

Module I: Introduction
Solar spectrum, solar radiation, instruments (pyrheliometers, pyranometers), solar radiation on horizontal surface (estimation of average solar radiation, estimation of clear sky radiation), solar thermal energy conversion.

Module II: Flat plate collector
Flat plate collector (FPC) (glazing material, collector plates), classification (evacuated tubular collectors, Types of FPCs), testing of collectors, heat transfer coefficients, optimization of heat losses, determination of fin efficiency, thermal analysis of FPC, effect of heat capacity in FPC.

Module III: Solar Concentrator
Characteristic parameters, classification, types of concentrators (tracking concentrator, non-tracking concentrators), geometrical optics in concentrators, theoretical solar image, thermal analysis, tracking methods, materials for concentrators.

Module IV: Applications
Solar air heater, solar crop drying, solar distillation, solar house, solar water heating systems, heating of swimming pool by solar energy.

Examination Scheme:

Components	CT	Assignment	V	Attendance	EE(1)
Weightage (%)	15	05	05	05	70

Text & References:
- Solar Energy: Fundamentals, design, modeling and applications, Authored by G. N. Tiwari
- Renewable Energy Engineering and Technology, Edited by V.V. N. Kishore

SOLAR PHOTOVOLTAIC CELLS: PHYSICS AND FABRICATION TECHNIQUES

Course Code: SAE4202 **Credit Units: 04**

Course Objective:
This course covers the basic operating principles, fabrication, and design of solar cells. Provides an in-depth knowledge on efficiency and lifetime measurements of the solar cells.

Course Contents:

Module I: Solar Cells and Sunlight
Outline of solar cell development, physical source of sunlight, review of solar intensity at the Earth's surface, solar insolation data, space-based solar power.

Module II: Review of Semiconductor Properties
Crystal structures and orientations, forbidden energy gaps, dynamics of electrons and holes, carrier density, carrier transport, generation and recombination of carriers due to light, direct and in-direct band gap semiconductors, basic device physics, p-n junction diode, solar cell output parameters, characteristic lifetime, diffusion length, diffusion coefficient, absorption coefficient, efficiency limits, losses, and measurements.

Module III: Standard Silicon Solar Cell Technology (From Cell to Module Production)
Review of fabrication technology, polysilicone and single crystal silicon cell technologies. Solar cells to solar module, improved silicon cell technology.

Module IV: EmergingSolar Cellstechnologies and concepts
Multi-junctionsolar cells**,** Organic solar cells, Dye-sensitized solar cells, Perovskite solar cells, new solar cell technologies, Thin Film Solar cells-Polysilicone silicon, amorphous silicone, gallium arsenide solar cells, copper sulfide and cadmium sulfide solar cells

Examination Scheme:

Components	**CT**	**Assignment**	**V**	**Attendance**	**EE(1)**
Weightage (%)	15	05	05	05	70

Text & References:

- Martin A. Green, Solar Cells-Operating Principles, Technology, and System Applications
- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki;
- M. S. Tyagi, Introduction to Semiconductor Materials and Devices

SOLAR ENERGY STORAGE SYSTEMS

Course Code: SAE4203 **Credit Units: 03**

Course Objective:
This course covers the various solar energy storage systems available for solar thermal, solar PV and wind energy applications

Course Contents:

Module I: Energy Storage
Need of energy storage; Different modes of Energy Storage. Potential energy: Pumped hydro storage; KE and Compressed gas system: Flywheel storage, compressed air energy storage; Electrical and magnetic energy storage: Capacitors, electromagnets; Chemical Energy storage: Thermo-chemical, photo-chemical, bio-chemical, electro-chemical, fossil fuels and synthetic fuels. Hydrogen for energy storage. Solar Pondsfor energy storage

Module II: Electrochemical Energy Storage Systems
Batteries: Primary, Secondary, Lithium, Solid-state and molten solvent batteries; Lead Lead acid batteries; Nickel Cadmium Batteries; Advanced Batteries. Role of carbon nano-tubes in electrodes, Smart and thermal batteries.

Module III: Magnetic and Electric Energy Storage Systems
Superconducting Magnet Energy Storage(SMES) systems; Capacitor and Batteries:
Comparison and application; Super capacitor: Electrochemical Double Layer Capacitor (EDLC), principle of working, structure, performance and application, role of activated carbon and carbon nano-tube.

Module IV: Sensible Heat Storage
SHS mediums; Stratified storage systems; Rock-bed storage systems; Thermal storage in buildings; Earth storage; Energy storage in aquifers; Heat storage in SHS systems; Aquifers storage.

Module V: Some Areas of Application of Energy Storage
Food preservation; Waste heat recovery; Solar energy storage; Green house heating; Power plant applications; Drying and heating for process industries, Portable and compact fuel cell.

Examination Scheme:

Components	**CT(2)**	**Assignment**	**V(1)**	**Attendance**	**EE(1)**
Weightage (%)	15	5	5	5	70

Text & References:

- Solar Engineering Of Thermal Processes - J. A. Duffie, W. A. Beckman, Solar Energy Laboratory Lecture Notes
- Solar Energy, Principles of Thermal Collection and Storage- S P Sukhatme and J K Nayak, Tata McGraw Hill EduPvt Ltd

ENERGY MANAGEMENT RELATED TO RENEWABLE ENERGY SYSTEMS

Course Code: SAE4204 **Credit Units: 03**

Course Objective:
This course covers the basic principles of energy management, economics of solar energy and design of energy efficient building.

Course Contents:

Module I: Renewable Energy Economics
Energy scenario, environmental policies, energy policies, economics of energy infrastructure, rural renewable energy economics.

Module II: Energy Management &Audit
Energy management: objectives, necessary steps and general principles of energy management, Energy Manager: functions, qualities, duties and guidelines.

Energy Auditing: Surveying, Audit: Purpose, Definition and Objectives, types of energy audit-preliminary and detailed; questionnaire, energy audit instruments, energy audit report writing. Energy conservation schemes, energy index, cost index, pie charts, Sankey diagrams, load profiles (histograms)

Module III: Economic Benefits of Solar Energy
Solar energy benefits, environmental benefits, solar energy cost and economic impact, understanding the cost of solar energy, economics of installing solar panel, solar cooling concepts and economic benefits.

Module IV: Solar Industrial Economics
Solar power plants, integration with industrial process, integration with grid, storage of energy, economics.

Module V: Planning of Energy Efficient Building
Green building design, solar heating, passive solar heating homes and concepts, other lightening methods, use of bio-energy; energy, water and material efficiency, cost analysis.
Various Energy Efficiency Rating Systems for Buildings- LEEDS, BEE & GRIHA, case study.

Examination Scheme:

Components	**CT(2)**	**Assignment**	**V(1)**	**Attendance**	**EE(1)**
Weightage (%)	15	5	5	5	70

Text & References:

- Renewable Energy: Power For A Sustainale Future, Second Ed. Edited By Godfrey Boyle
- Solar Engineering Of Thermal Processes - J. A. Duffie, W. A. Beckman, Solar Energy Laboratory Lecture Notes
- Handbook on Energy Audit and Environment Management: YP Abbi and Shashank Jain, (TERI Press, 2006)

SOLAR PV LAB

Course Code: SAE4206 **Credit Units: 02**

Experiment List

1. Measure the V-I characteristics of a Photovoltaic cell
2. To study the illumination characteristics, power load characteristics, areal characteristics of a solar cell.
3. Measure the V-I characteristics of a Photovoltaic Panel subjected to variable load
4. To study the effect of angle of the panel on V-I characteristic of a Photovoltaic Panel
5. Measure the V-I characteristics of a Photovoltaic Panels connected in series and parallel without load.
6. Measure the V-I characteristics of a Photovoltaic Panels connected in series and parallel with load.
7. Fabrication of thermo couple based on thin films and its characterization.
8. Fabrication and characterization of MOS.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

FINANCIAL EVALUATION OF RENEWABLE ENERGY TECHNOLOGIES

Course Code: SAE4205 **Credit Units: 04**

Course Objective:
This course covers the basic principles of financial evaluation of renewable energy technologies

Course Contents:

Module I: Introduction, Economic efficiency, time value of money, interest, inflation,

Module II: Basic formulae of financial Mathematics- cash flow diagrams, interest formula relating present & future worth of single amount, uniform series compound amount factor, uniform series sinking fund factor, uniform series present worth factor, uniform series capital recovery factor, interest formulae with continuous compounding.
Interest formulae for uniform or arithmetic gradient of cash flows

Module III: Indicators of Financial Performance- Simple & discounted payback periods, net present value (NPV), equivalent uniform annual worth, benefit cost ratio method, interest rate of return (IRR), computation of IRR, multiple values of IRR.

Module IV: Incremental Analysis of Investment Projects- incremental analysis, incremental analysis in Net Present Value Method, incremental analysis in Equivalent Uniform Annual Worth method, incremental analysis in Benefit Cost Ratio method, incremental analysis in Internal Rate of return method

Module V: Depreciation & Depreciation Accounting- Definitions, Depreciation methods, straight line Depreciation, declining balance method, sum of the year digits method of Depreciation

Module VI: Case studies of financial evaluation of renewable energy technologies- solar distillation, domestic solar water heating, solar PV lanterns

Examination Scheme:

Components	**CT(2)**	**Assignment**	**V(1)**	**Attendance**	**EE(1)**
Weightage (%)	15	5	5	5	70

Text & References:

- Financial Evaluation of Renewable Energy Technologies, T C Kandpal, H P Garg, MacMillan

RENEWABLE ENERGY FOR HEAT APPLICATIONS

Course Code: SAE4207 **Credits Units: 04**

Course Objective:
At the end of the course the students should be able to: Understand the factors that influence the use of solar radiation as an energy source; know the various active and passive technologies that are available for collecting solar energy; have the ability to apply design principles to selection of an appropriate solar energy installation to meet requirements.

Course Contents:
Module I: Passive Solar Heating Systems
Choosing the Type of Passive System, Advantages and Disadvantages of Passive Solar Systems, Direct Gain Systems, Solar Windows, Indirect Gain Systems, Masonry and Water Thermal Storage Wall, Phase Change Energy Storage, Attached Green House, The Envelope House, Sizing Thermal Storage, Predicting Solar Heating Performance

Module II: Active Solar Heating Systems
Space Heating- Liquid and Air Systems, System Design Principles, Sizing of Collectors and Thermal Storage. Domestic Hot Water Heating- Thermo-siphoned and Pumped Circulation Systems, Domestic Hot Water Heating Loads, Sizing of System Components, System Installation Principles**.**
Swimming Pool Heating, Predicting Solar Heating Performance

Module III: Green Buildings
Introduction, factors affecting climate, Climatic zones and their characteristics, Implications of climate on building design, Principles of energy conscious buildings, Building Envelope, Passive Heating, Passive Cooling, Daylighting, Building Materials

Module IV: Thermal Performance and Design of Buildings
Introduction, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation. Design Guidelines- Description of Buildings, Design Methodology, General Recommendations, Specific Guidelines, Integration of emerging technologies.

Examination Scheme:

Components	**CT(2)**	**Assignment**	**V(1)**	**Attendance**	**EE(1)**
Weightage (%)	15	5	5	5	70

Text & References:

- Principle of Solar Engineering" by D. Yogi Goswami, Frank Kreithand Jan F. Kreider, 2nd ed. Taylor & Francis, 2000, ISBN-10: 1-56032-714-6, ISBN -13:978-156032-714-1.
- Fundamentals of Heat and Mass Transfer" by Frank P. Incropera and David P. DeWitt, John Wiley & Sons, Inc., 6th Ed., 2006
- Solar Heating and Cooling" by John F. Kreider and Frank Kreith,2nd ed., Hemisphere Publishing Corp, 1982
- The Passive Solar Energy Book" by Edward Mazria, Rodale Press, 1979
- Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors" National Renewable Energy Laboratory, 1994,
- Modeling Daylight Availability and Irradiance Components from Direct and Global Irradiance" by R. Perez, P. Ineichen, R. Seals, J. Michalsky and R. Stewart, Solar Energy 44 (5) pp. 271-289
- 2009 ASHRAE Handbook – Fundamentals (Inch-Pound Edition), American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (Stevens E-book on line)

WIND ENERGY

Course Code: SAE4208 **Credits Units: 04**

Course Objective: Introduction to wind energy engineering and its application

Course Contents:

Module I: Wind characteristics: Sources of wind, wind classification, sitting in flat terrain, sitting in non-flat terrain, ecological indicators of site suitability, site resource assessment: anemometer, met towers, wind map, wind rose.

Module II: Wind energy system: Bernoulli's equation and significance; energy and power in wind, different types of rotors: horizontal and vertical; wind turbine components, electric power generation, Fixed and variable speed; and storage.

Module III: Applied aerodynamics:
Airfoil structure, aerodynamics of airfoil: lift, drag and stall; lift based wind turbines, drag machines, pitch concept, yaw concept, Betz law, axial momentum theory, tip speed ratio, forces and moments due to vertical wind gradient.
Role of dynamics in wind power- cross wind axis machines, wind axis machines- general momentum theory- vortex strip theory, forces and moments due to vertical wind gradient, control mechanism.

Module IV: Towers and systems installation:
Specific types of towers, tower height, tower and system raising, wiring, lightening protection, installation, maintenance of other equipments.

Module V: **Wind energy conversion systems:**
Specification and characteristics of commercial water-pumping wind mills, electricity producing wind energy, conversion systems, selection of system case study, Environment aspects.

Examination Scheme:

Components	**CT**	**Assignment**	**V**	**Attendance**	**EE(1)**
Weightage (%)	15	05	05	05	70

Text & References:

- Paul Gipe, Wind Energy Comes of Age, John Wiley & Sons Inc.
- L. L. Freris, Wind Energy Conversion System, Printice Hall.
- Tony Burton et al, Wind energy Hand Book, John Wiley & Sons Inc.
- Directory, Indian Windpower 2004, CECL, Bhopal.

ORGANIC PHOTOVOLTAICS

Course Code: SAE4209 **Credits Units: 04**

Course Objective:
Introduction to a new class of solar cell technology: processing and performance of organic solar cells.

Course Contents:

Module I: General Properties of Organic Semiconductors
Introduction to organic semiconductors, polarons, excitons, p and n- type organic semiconductors, structural properties of organic semiconductors, photo generation of free charges, comparison between organic and inorganic semiconductors

Module II: Properties of organic photovoltaic materials
Donor, acceptor materials and donor/ acceptor interfaces, substrate and electrode materials and electrode/semiconductor interfaces, conjugate polymers and fullerene blend, transport properties of conjugate polymers

Module III: Photovoltaic Characterization
Power conversion efficiency, equivalent circuit diagram, open circuit voltage V_{oc}, upper limit of $V_{oc,}$ effect of shunt résistance, photocurrent and short circuit current I_{sc}, interpretation of IV characteristics

Module IV: Quantum solar energy conversion and application to organic solar cell
Solar radiation, Optical properties of organic photovoltaic materials, doping of organic photovoltaic materials, desired properties of organic photovoltaic materials and electrodes, fabrication of single layer devices, performance of single layer devices.

Module V: Organic bulk hetero-junction; hybrid; and dye sensitized solar cells
Device architectures of bulk hetero- junction solar cells, fabrication and performance of double layer devices; hybrid polymer/ nanocrystal photovoltaic devices; Dye sensitized solar cells: operating principle and cell structure.

Examination Scheme:

Components	**CT**	**Assignment**	**V**	**Attendance**	**EE(1)**
Weightage (%)	15	05	05	05	70

Text & References:

- Organic photovoltaics: mechanism, materials and devices, Sam Shajing Sun, NiyaziSerdarSariciftci
- Organic photovoltaics: concepts and realization , Christoph J. Brabec - Technology & Engineering – 2003
- Organic Photovoltaics: Materials, Device Physics, and Manufacturing Technologies
- Christoph Brabec, Vladimir Dyakonov, Ullrich Scherf - Technology & Engineering - 2008

ENERGY ACCESS AND PLANNING

Course Code: SAE4211 **Credit Units: 04**

Course Objective:
Energy access planning is aimed at developing a socially inclusive energy supply system that gives both the poor and the rich sustainable access to at least the minimum amount of energy for their basic needs. This type of planning is also done to identify environmentally sound and climate-friendly technologies and resource options for providing energy access, and the associated investment opportunities.

Course Contents:
Module I: Sustainable Energy Access Planning Framework
Background, Objectives of this Study, Elements of Sustainable Energy Access Planning, Key Steps in Sustainable Energy Access Planning and Linkages between Assessments

Module II: Energy Poverty Assessment
Introduction, Energy Poverty Defined, Approaches to Energy Poverty Assessment , Energy Poverty Assessment Approaches for Use in Sustainable Energy Access Planning , Data Requirements

Module III: Demand & Resource Assessment
Introduction, Approaches to Assessing Energy Demand, Demand Assessment Methodology for Sustainable Energy Access Planning, Dimensions of Resource Assessment , Approaches to Resource Assessment, Data Requirements

Module IV: Cost & Benefit Assessment
Introduction, Review of Cost Assessment Models, Proposed Sustainable Energy Access Planning Methodology, Incremental Cost of Energy Access, Applications of the Incremental Energy Access Cost, with Case Studies, Potential Benefits of an Energy Access Program, Approaches to Benefit Assessment,
Data Requirements

Module V: Sustainability & Affordability Assessment
Introduction, Approaches to Sustainability Assessment, Methodologies for Sustainability Assessment, Different Forms of the Affordability Problem, Approaches to Affordability Assessment, Assessment of Support Programs to Make Energy Services Affordable, Data Requirements

Examination Scheme:

Components	CT	Assignment	V/Q	Attendance	EE
Weightage (%)	15	5	5	5	70

Text & References:

- Sustainable Energy Access Planning- A Framework- Ram M Shrestha and Jiwan S Acharya

RISK MANAGEMENT IN RENEWABLE ENERGY PROJECTS

Course Code: SAE4212 **Credit Units: 04**

Course Objective: This module will help participants to understand the risks involved in the project and the loan application evaluation process to be followed.

Course Contents:

Module I: Conventional energy projects and related uncertainties

Introduction, the study, challenges in RE projects, risk associated with conventional energy projects, risk management approach in energy policies

Module II: Uncertainties in RES projects

RES project characteristics, Risk associated with specific RES technologies. Risk: Definition and types, Risk analysis, Risk Identification, Risk impact assessment, Risk prioritization, Risk tracking, Risk mitigation planning, implementation and progress monitoring, tools for risk mitigation, Case study for managing risks in industries.

Module III: Recommended Risk Management methodology

Project definition & requirement, risk identification, risk evaluation, risk control, risk follow up, risk feedback, risk management implementation in RES investment lifecycle

Module IV: Support measures

Measures to address political risk, Measures to address economic risks, Measures to address technical risks, Measures to address social risks, generic interventions, Conclusions & recommendation

Examination Scheme:

Components	CT(2)	Assignment	V(1)	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- The Owner's Role in Project Risk Management. National Academic Press
- Risk Analysis in Project Management, by J. Raftery

Syllabus - Third Semester

MODELLING AND SIMULATION OF SOLAR THERMAL SYSTEMS

Course Code: SAE4301 **Credit Units: 04**

Course Objective:
This course covers the design and engineering of solar thermal systems.

Course Contents:

Module I: Solar thermal systems- Solar cookers, performance analysis of cookers, solar stills, thermal analysis of solar stills

Module II: Solar cooling systems, Application of solar energy in Refrigeration and air conditioning, Solar air heaters, description, design, application

Module III:
Solar Thermo- Mechanical Power: Principles of solar engines, solar heat engines, steam engines, turbines, Stirling engines, Brayton Engines, Solarthermal power generation, central receiver power plant, parabolic trough power plants.

Module IV: Modelling& simulation of solar thermal systems, f chart method, f chart for liquid systems, f chart for air systems, design of active systems by utilizability methods, hourly utilizability,daily utilizability, the φ, f chart method

Examination Scheme:

Components	CT(2)	A	V(1)	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- 1.Solar Engineering of Thermal processes – Duffie & Beckman
- Hsieh, J. S., 1986. *Solar Energy Engineering*. Prentice-Hall, US.
- Sukhatme, S.P., 2003. *Solar Energy – Principles of Thermal Collection and Storage.* Second ed. Tata McGraw-Hill Publishing Company Ltd. India

DESIGN AND ENGINEERING OF SOLAR PHOTOVOLTAIC CELLS AND PANELS

Course Code: SAE4302 **Credit Units: 04**

Course Objective:
This course covers the design and engineering of solar cells along with their modules and panels.

Course Contents:

Module I: Introduction of Design and Engineering of Solar Cells
Various Commercialized, Un-commercialized Designs of Solar Cells (Homo-junction, multi-junction and concentrator solar cells; c- / a- / pc- / mc- Si solar cells, CIGS, CIS, CdTe, quantum dots, organic, inorganic-organic hybrid, dye-sensitized solar cells), Various Processes for Maximizing the Light-Trapping and Absorption in Solar Cells, Anti-reflection coating & Surface texturing, Back surface reflector, Self-cleaning surface.

Module II: Packaging of Solar Photovoltaic Modules
Cell matrix, Layers of modules, Lamination, post-lamination and curing, Special modules batteries, charge controls, net power meters. PV array installation, operation, costs, reliability**.**

Module III: Electrical & Optical Performance of Solar Photovoltaic Modules
Electrical & thermal characteristics, Fabrication spread and Mismatch losses, Local shading and Hot spot formation, Field performance of module, Maximizing the efficiency of SPV modules, Study of Maximum power point tracking techniques for PV modules Troubleshooting of solar cells.

Module IV: Module Manufacturing of Commercialized Solar Cells
Module manufacturing of a-Si solar cells (Continuous roll-to-roll manufacturing, a-Si on glass substrate, manufacturing cost, safety & other issues, module performance), Module manufacturing of CIGS, CIS, CdTe solar cells.

Module V: Photovoltaic Power System Configuration and their Applications
Grid-independent PV system for small devices and appliances, PV systems for remote consumers, Decentralized grid-connected PV systems, Centralized grid-connected PV systems.Case studies of energy system optimization – Application - Analysis and design of solar thermal and photovoltaic systems. Stand-alone PV system designing for an isolated place using MATLAB software.

Examination Scheme:

Components	**CT(2)**	**A**	**V(1)**	**Attendance**	**EE(1)**
Weightage (%)	15	5	5	5	70

Text & References:
- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki;
- Handbookof Photovoltaic Science and Engineering by Antonio Luque& Steven Hegedus - Wiley; Lecture notes.

LARGE SCALE GRID INTEGRATION OF RENEWABLE ENERGY SOURCES

Course Code: **SAE4309** **Credit Units: 04**

Course Objective:
This course covers the challenges, technology and application of large scale grid integration of renewable energy sources.

Module-I: RE generation: The present, the future and the integration challenges
Introduction, Drivers of RE development, Present status of RE generation and future projections, Demand side management: peak clipping, valley filling, load shifting, RE grid integration challenges, RE generation Technology, Transmission technology, Operational technologies and practices

Module-II: Future technical solutions for integrating more large-capacity RE
Introduction to fundamentals of Grid interaction, Grid-Friendly RE generation, improved flexibility in conventional generation, Transmission expansion, Operational enhancement, Demand response

Module-III: Application of Large Capacity Electrical Energy Storage to support RE integration
Introduction to Promising large –capacity Electrical Energy Storage (EES) technologies, Roles of RE integration, Technology needs of large –Capacity EES applications, General, Present situation, Future needs

Module-IV:-Smart Grids
Concept of smart grid, smart grid control, Communications and Sensing in a Smart Grid, Advance metering Infrastructure and smart meters, Hardware Architecture, Software architecture, Protocol detail, Discrete control and Analog control, application & benefits, PMU communication interface, Future trends.

Examination Scheme

Components	CT	Assignment	V	Attendance	EE
Weightage (%)	15	5	5	5	70

CT- Class Test, V- Viva, EE- End Term Exam

Text & References:

- Grid Integration of large capacity Renewable energy sources & use of large capacity electrical energy storage ,White paper IEC
- T. Gönen, Electric Power Distribution System Engineering, McGraw-Hill, 1986. ISBN: 0-8493-5806-X.
- Distribution System Protection Manual, McGraw-Edison Power Systems, 1990.
- Westinghouse Electric Utility Ref. Book, Vol.3, Distribution Systems, 1965.
- R. E. Brown, Electric Power Distribution Reliability, Marcel Dekker Inc., 2002

SOLAR AND WIND ENERGY METEOROLOGY

Course Code: SAE4310 **Credit Units: 03**

Course Objective: Course provides introduction to different renewable energy sources. Analyze the full spectrum of range of renewable energy supplies needed for modern economies. Course will include power from sunshine, wind, and biomass.

Course Contents:

Module I: An Overview
Importance of meteorology, various branches of meteorology and their applications
Earth Sun relationship, Ecliptic and equatorial plane, Rotation and revolution of the earth Equinoxes, Solstices, Perihelion and Aphelion, Causes of seasons, Seasonal and latitudinal variation of insolation. Weather, climate, Elements of weather, climate controls, weather phenomena, Semi-diurnal variation of pressure, Diurnal variation of temperature, Pressure and wind belts, Distribution of pressure and temperature over the surface of the earth.

Module II: Surface Energy Balance (long wave /thermal): Stefan's law, emissivity. Greenhouse effect. Surface energy balance: net radiation, ground heat flux, sensible and latent heat flux. Sensors and instrumentation. Other applications: Building heating, ventilation, and air conditioning (HVAC). Evapotranspiration and irrigation,

Module III: Atmospheric boundary layer: Mean Boundary Layer characteristics (*Definition, depth and structure, turbulent transport, Taylor's hypothesis*); Mathematical and Conceptual tools (*Turbulence spectrum, spectral gap, kinematic flux, eddy flux, basic governing equations to turbulent flow*); Turbulence Kinetic Energy, Stability and Scaling (*TKE budget, stability concepts, Richardson number, Obukhov length*)

Module IV: Measuring Climate Data & Estimation: Introduction (History, scales, units, climate change); Measuring climate data (climate stations, measurement accuracy, measuring temperature, humidity, wind, rainfall, irradiance, evaporation, archiving, analyzing climate data); Climate Resources (Solar radiation – nature, attenuation, measurement, linkage to climate change; wind – causes, profiles, frequency, spatial variation, wind power); Precipitation – processes, spatial and temporal variation of rainfall, dew, snow, linkage to climate change)

Module V: Wind power meteorology:
Wind Energy Meteorology: Introduction, turbines types and terms, linear momentum and basic theory, dynamic matching, stream tube theory, characteristics of wind, Atmospheric flow and boundary layer, Mean velocity profile. Wind resource assessment. Flow over hills. Low-level jet. Sensors and instrumentation, Indian wind atlas.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage (%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

References:

- Renewable energy resources – J. W. Twidell

SOLAR THERMAL LAB

Course Code: SAE4305 **Credit Units: 02**

Experiment List:

1. Determine the thermal efficiency of a with flat plate collector
2. Determine the thermal efficiency of an evacuated tube collector
3. Determine the efficiency of a water heating system
4. Determine thermal performance of a box type solar cooker with load
5. Determine thermal performance of a box type solar cooker without load
6. Design & fabrication of solar flat plate collector

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BIOFUELS & BIOMETHANATION

Course Code: SAE4306 **Credit Units: 04**

Course Objective:

Course Contents:

Module I- Bio Fuels & Bio Reactors
Enzymatic conversion of biomass**,** Enzyme kinetics, Biochemistry and process parameters of biomethanation; Biogas digester types; Digester design and biogas utilization; Economics of biogas plant with their environmental and social impacts; Bioconversion of substrates into alcohol: Methanol & ethanol Production, organic acids, solvents, amino acids, antibiotics etc.

Batch, plug low reactor (PFR), continuous stirred rank reactors (CSTR), fluidized bed reactor bubble column, fixed film reactors, air lift fermentor etc. concept of ideal and non-ideal reactor

Module II- Design and analysis of Reactors
Residence time distribution, models of non-ideal reactor-plug flow reactor for microbial processes, optimization of reactor systems. Multiphase bioreactors –packed bed with immobilized enzymes and or microbial cells. Three phase fluidized bed tricking bed reactor, Design and analysis of above reactor systems.

Module III- Bioreactors
Gas liquid reactors, unconventional bioreactors like Hollow fiber reactor, membrane reactor, reactors for biofuels. Reactor stability, various biogas reactors.

Module IV- Reactor Engineering and its optimization
Thermodynamic and stoiciometric aspects of microbial processes, engineering analysis of metabolic pathways, optimization of fermentation media, kinetic modeling of enzyme and microbial processes, mass transfer in bio-chemical processes, scales up concept, bath fed bath and continuous microbial reactors.

Module V- Separation technologies and process control
Distillation, cryogenic, adsorption and absorption, PSA and membrane separation process, sensors for monitoring bioprocess parameters. Bioprocess control and computer coupled bioreactors. Growth and production formation by recombinant cells.

Examination Scheme:

Components	CT	Assignment	V	Attendance	EE(1)
Weightage (%)	15	05	05	05	70

Text & References:

- The Biomass Assessment Handbook: Bioenergy for a Sustainable Environment By Francisco RosilloCallé, Frank Rosillo-Calle
- Biofuels: Alternative Feedstocks and Conversion Processes edited by Ashok Pandey, Christian Larroche, Steven C. Ricke, Claude-Gilles Dussap, EdgardGnansounou
- Bioenergy and Biofuel from Biowastes and Biomass edited by Samir Kumar Khanal
- Biofuels: Securing the Planet,Äôs Future Energy Needs By AyhanDemirbaş
- Biogas Technology: towards sustainable development, R S Khoiyangbam, Navindu Gupta, and Sushil Kumar

WIND ENERGY: ENERGY CONVERSION AND DESIGN OF TURBINES SMALL HYDRO SYSTEMS

Course Code: SAE4307 **Credit Units: 04**

Course Objective:
To give an insight into the context and importance of wind energy sources and their potential, present status, fundamental principles, applications and environmental aspects.

Course Contents:

Module I: Aerodynamics of blade and rotor
Aerodynamics of aerofoil, Lift; drag and stall, Effect of Reynold's number, Actuator disc, Momentum theory and Betz coefficient.
Effect of Reynold's number, Actuator disc momentum theory, Blade element theory, wake analysis, Strip theory, Vortex theory

Module II: Design of wind turbine blade
Effect of stall and blade pitch on coefficient of power vs tip speed ratio and coefficient of torque vs tip speed ratio characteristics, Optimal choice of cut-in, rated and cut-out wind speeds, Blade materials.

Module III: Wind turbine design
Vertical and horizontal axis turbines, Design characteristics, Multiple stream tube theory, Vortex wake structure, Tip losses, Rotational sampling.

Module IV: Wind turbine design programs
Aerodynamic loads, Tower shadow; wind shear, Blade coning, gyroscopic, transient and extreme loads, Aerodynamic damping and stability, teetering motion, stiff and soft, towers, Power train dynamics.

Module V: Control Mechanisms
Pitch control and yaw control, Electrical and Mechanical aerodynamic braking, teeter mechanism, Wind turbine dynamics with DC and AC generators: induction and synchronous generators.

Examination Scheme:

Components	**CT**	**Assignment**	**V**	**Attendance**	**EE(1)**
Weightage (%)	15	05	05	05	70

Text & References:

- Paul Gipe, Wind Energy Comes of Age, John Wiley & Sons Inc.
- L. L. Freris, Wind Energy Conversion System, Printice Hall.
- Tony Burton et al, Wind energy Hand Book, John Wiley & Sons Inc.
- Directory, Indian Windpower 2004, CECL, Bhopal.

DESIGNING OF SOLAR PROJECTS

Course Code: SAE4311 **Credit Units: 04**

Course Objective:
This course covers the designing criteria for solar projects and its implementation through case studies.

Course Contents:

Module I: Applications of Solar Energy
Solar Photovoltaic applications -Solar home lighting systems, Solar water pumping systems, Solar power plants; Solar Thermal applications-Solar water heating systems. Factors to be considered in Solar System Design: Solar Radiation, Atmospheric effect on Solar Radiation, Daily and Seasonal Temperature Variations, Physical parameters, Availability of Land foundation needs, Orientation and Obstructions, Proximity of power Evacuation, Water availability, Any industries of pollution nearby, Power supply for construction. Typical Site Evaluation Methodology

Module II: System Design of Solar Photovoltaic Systems
Load Analysis- Accurate sizing, Peak current loads, Worst case scenarios, Plan for future, Compatibility issues, Determining design margins. Solar Array Design- Collector size, Selection of most appropriate module, Dust and Other contaminating effects, Orientation and Tilt issues, Design of Balance of Systems (BOS). Battery Design- Physical and Performance Requirement, Reserve Capacity, temperature and Ageing duration, Regulation and Charge control.

Module III: Designing Solar Home Lighting Systems (Case study)
Case description, Assessment of load profile, Typical System Design, Assumptions in System Design, Battery Design, PV Array Design, Inverter Capacity, Charge Controller, Overall System Design, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties, Finalization of Order, Inspection of goods Received, Parameters to be checked during Installation

Module IV: Designing Solar PV Water pumping system (Case study)
System Design Methodology, Typical System Design, Case Description, Assumptions in System Design, Insolation Availability, Pumping Flow Requirement, Pumping Head Requirement (Static), Pumping Head Requirement (Dynamic), Pumping Energy Requirement, Pump Selection PV Array Design, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties Finalization of Order, Inspection of goods Received, Parameters to be checked during Installation

Module V: Designing Solar Thermal Water Heating System (Case study)
Case Description Typical System Design, Assumptions in System Design, Energy required for heating water, Collector Area Required, Request for Quotation, Evaluation of Quotations, Negotiation with the Parties, Finalization of Order, inspection of goods Received, Parameters to be checked during Installation

Module VI: Designing of various applications using MATLAB and PVSYST software
Introduction to MATLAB, arithmetic operations on MATLAB, designing of solar photovoltaic power system on MATLAB, load estimation, Introduction to PVSYST, locational aspects of solar PV power point installation, designing of SPV power plant using PVSYST.

Examination Scheme:

Components	CT(2)	Assignment	V(1)	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- Solar Energy Resource Assessment Handbook- Dr. P Jayakumar, APCTT
- Introduction to MATLAB: Katsons publications.
- Introduction to PVSYST: Manual

THERMOELECTRIC SYSTEMS AND DEVICES

Course Code: SAE4312 **Credit Units: 04**

Course Objective:
To understand the fundamentals of thermoelectric generators and coolers; to apply to the optimum design problems; to experience state-of-the-art technologies in the fields.

Course Contents:
Module I: Introduction to Thermoelectric systems
History of thermoelectricity, thermoelectric generator, thermoelectric cooler, thermoelectric heat pump, applications of thermoelectric devices

Module II: Performance evaluation of thermoelectric systems
Figure of merit, Formulation of basic equations, Performance parameters of thermoelectric modules, Maximum parameters, Normalized charts, Commercial modules

Module III: Optimal design with dimensional analysis
Modeling of TEG,TEC and TEHP devices, applications in various areas e.g. STEG, automotive waste recovery through thermoelectric devices.

Module IV: Designing aspects of heat sink
Designing aspects of fins in heat sink, different type of fins, material for fins, thermocouples for thermoelectric generator, thermoelectric cooler and heat pump, materials for thermoelectric devices, characteristics of fins.

Examination Scheme:

Components	**CT(2)**	**Assignment**	**V(1)**	**Attendance**	**EE(1)**
Weightage (%)	15	5	5	5	70

Text & References:

- Thermoelectrics: Design and Materials" by HoSung Lee, 2015
- Thermal Design: Heat Sinks, Thermoelectrics, Heat Pipes, Compact Heat Exchangers, Solar Cells, by HoSung Lee, Wiley, 2010 1st Edition, 648 pages, ISBN-978-0-470-49662-6

SMART GRIDS AND RENEWABLES

Course Code: SAE4313 **Credit Units: 04**

Course Objective:
Course provides an introduction to how in developed countries, smart grid technologies can be used to upgrade, modernize or extend old grid systems, while at the same time providing opportunities for new, innovative solutions to be implemented.

Course Contents:
Module I: Introduction: Smart Grids and Renewables
Making the Transition to a Smarter Grid, Start with Pilot and Demonstration, Projects, Specific Technology Recommendations, Costs and Benefits: Making the Business Case for Smart Grid Technologies, Recognise and Respond to Technological conservatism, Leverage the Need for Private Sector, Investment, Recognise the Continual Nature of Technological Change, Regulation

Module II: How Smart Grids Enable Renewables
Smart Grids and Variability, Smart Grids and Distributed Generation, Smart Grids and Capital Intensity, Improved Consumer Information, Control, and Choice, Improved Transmission and Distribution System Monitoring and Control, Integration of New Resources,

Module III: Nontechnical Barriers to Smart Grids
Data Ownership and Privacy, Grid Security, Control of Distributed Resources, The Role of New Private Sector Grid Players, The Need for Standards

Module IV:Smart Grid Technologies
Advanced Metering Infrastructure, Advanced Electricity Pricing, Demand Response, Distribution Automation, Renewable Resource Forecasting, Smart Inverters, Distributed Storage, Microgrids and Virtual Power Plants, Bulk Power Technologies

Examination Scheme:

Components	**CT**	**Assignment**	**V/Q**	**Attendance**	**EE**
Weightage (%)	15	5	5	5	70

Text & References:
- Smart Grid & Renewables- A Guide for Effective Development- IRENA 2013

ADVANCED ENERGY SYSTEMS

Course Code: SAE4314 **Credit Units: 04**

Course Objective: This course covers the basic operating principles, fabrication, and design of solar cells. It provides an in-depth knowledge on efficiency and lifetime measurements of the solar cells.

Module I: Fuel Cells
Introduction, electrochemistry, alkaline fuel cells, phosphoric acid fuel cells, solid oxide fuel cells, direct methonal fuel cells, fuel processing, proton exchange membrane fuel cells, fuel processing, hydrogen storage, life cycle assessment of fuel cell systems. Thermodynamics and Performance of Fuel cells and their applications.

Module II: Introduction of Hydrogen Energy Systems
Hydrogen pathways introduction – current uses, General introduction to infrastructure requirement for hydrogen production, storage, dispensing and utilization, and Hydrogen production power plants

Module III: Hydrogen Production Processes
Thermal-Steam Reformation – Thermo chemical Water Splitting – Gasification – Pyrolysis, Nuclear thermo catalytic and partial oxidation methods. Electrochemical – Electrolysis – Photo electro chemical. Biological – Photo Biological – Anaerobic Digestion – Fermentative Micro-organisms

Module IV: Hydrogen Storage
Physical and chemical properties – General storage methods, compressed storage – Composite cylinders – Glass micro sphere storage - Zeolites, Metal hydride storage, chemical hydride storage and cryogenic storage.

Module V: Hydrogen Utilization
Overview of Hydrogen utilization: I.C. Engines, gas turbines, hydrogen burners, power plant, refineries, domestic and marine applications. Hydrogen fuel quality, performance, COV, emission and combustion characteristics of Spark Ignition engines for hydrogen, back firing, knocking, volumetric efficiency, hydrogen manifold and direct injection, fumigation, NOx controlling techniques, dual fuel engine, durability studies, field trials, emissions and climate change

Module VI: Hydrogen Safety
Safety barrier diagram, risk analysis, safety in handling and refueling station, safety in vehicular and stationary applications, fire detecting system, safety management, and simulation of crash tests.

Examination Scheme:

Components	CT	Assignment	V	Attendance	EE(1)
Weightage (%)	15	05	05	05	70

Text & References:

- Fuel Cells – Principles and Applications – B. Vishwanathan and M. A. Scibioh

SUMMER INTERNSHIP EVALUATION

Course Code: SAE4335 **Credit Units: 06**

Course Objective:
To evaluate the project carried out in the industry/R&D institution during the summer internship.

Summer Training Programme
During the summer training, each student will be given an opportunity to interact with R&D institutions/Industries, where she/he will work on a project and get training of handling Renewable Energy Systems, its fabrication / processing units for a short duration of 45-60 days. Students will submit the work to course coordinator after being examined by a guide/supervisor of the institute under whom she/he will work.

Examination Scheme:

Project	:	60%
Presentation/Seminar	:	20%
Viva	:	20%
Total	**:**	**100%**

Syllabus - Fourth Semester

ENERGY POLICIES

Course Code: SAE4401 **Credit Units: 03**

Course Objective: This course aims at imparting knowledge about the different national policies, regulations and guidelines given by the government for installing a PV system. It provides the knowledge of the approval requirements and safety regulations given by the State.

Course Content:

Module-I : Renewables In The Global Energy Economy: Today And Tomorrow
Introduction, Leading Renewable Energy Resources and its growth, RE global market, Resources and Technology Summaries, Energy Policy-Purpose, Perspective, Contents and Formulation: Contents of energy policy, Features of good policy making, Drivers of energy policy, Policy instruments, Environmental, Social and Economic Considerations, Energy-Environment Linkage, pollutants from energy uses and control measures, Greenhouse Gases, Greenhouse Effect, Global Warming, Climate Change

Module-II: Energy and Welfare Economics
Evaluation of policy instruments, Energy return on investment, Concept of welfare economics, Energy goods and energy services, Renewable Energy in Developing Countries, World Energy Council Action Plan.

Module-III: Renewable Energy Policy Frame work
Importance of renewable energy policies, avantages and interaction with other policies ; Designing a regulatory/support mechanism: approaches and types ; regulatory policies, country specific case study.
Renewable energy (RE) market, RE targets, RE support policies comparison, RE and Energy Efficiency action plans, national RE action plan, national EE action plan, case studies.

Module-IV: Regulations and Guidelines
Identification of relevant statutory regulations of India and other countries- Electricity Act, National Electricity Policy, Tariff Policy, National Mission for Enhanced Energy Efficiency; Inter Governmental Panel on Climate Change (IPCC), Montreal Protocol, Kyoto Protocol, Emission Trading, Clean Development Mechanism, National Action Plan on Climate Change (NAPCC), National Solar Mission (NSM), National Mission on Enhanced Energy Efficiency (NMEEE), National Mission on Sustainable Habitat (NMSH), Paris Agreement

Examination Scheme:

Components	CT	Assignment	V	Attendance	EE
Weightage (%)	15	5	5	5	70

CT- Class Test, V- Viva, EE- End Term Exam

Text & References:

- India Energy Policy, Laws and Regulations Handbook, By IBP, Inc
- Europe Renewable Energy Policy Handbook 2015

GREEN BUILDINGS

Course Code: SAE4402 **Credit Units: 03**

Course Objective:
To cover areas related with the fundamentals and designing aspects of green and buildings.

Course Contents:
Module-I: Climate
Introduction, Climate & its Component, Factor Affecting Climate, Climatic Zones and their characteristics, Urban Climate, Microclimate.

Module-II: Green Building- Concepts, Design and Performance.
Building, Implications of climate on building design, Green Buildings, Objective & Essential Characteristics of Green Buildings (i.e. Building Envelope, Passive Heating, Passive Cooling, Day lighting, Building Materials, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation), solar rooftop, solar water heating

Module-III: Green Building Rating System
Various green building rating National and International stage, USGBC, IGBC, GRIHA, BREAM, STAR RATING.

Module-IV: Policies & Examples
Different policies (National & International), Energy Conservation Act 2005, ECBC, BEE
Different example at National and International stage.

Examination Scheme:

Components	**CT**	**Assignment**	**V**	**Attendance**	**EE**
Weightage (%)	15	5	5	5	70

CT- Class Test, V- Viva, EE- End Term Exam

Text & References:

- Handbook of Energy Conscious Buildings- J K Nayak, J A Prajapati
- Solar Energy: Fundamentals, design, modeling and applications, Authored by G. N. Tiwari
- Renewable Energy Engineering and Technology, Edited by V.V. N. Kishore
- Manual of Tropical Housing and Building: Climate Design, Authored by H Koenigsberger
- Manual/Guidelines of GRIHA (Volume I - V)
- Manual Guidelines of IGBC (All Volume)
- Manual Guidelines of US-GBC (All Volume)
- Sustainable Building Design Book edited and published by SB05 TOKYO
- Green Building – Guidebook for Sustainable Architecture Authored By Michael Bauer
- Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings Authored Arvind Krishan

DISSERTATION/SEMINAR & PROGRESS REPORT/COMPREHENSIVE VIVA

Course Code: SAE4437 **Credit Units: 10**

Course Objective:
To give an in-depth understanding of the research problem and to generate experimental expertise. The students will work in a R & D institutions / industries.

Course Contents:

To carry out research project on specific problem for dissertation

Dissertation of six months in a R&D institution or industry.
The students will work on a project either under the joint guidance of a Professor/Scientist in that organization. The work after completion will be submitted to Programme Director of M Tech Solar & Alternative Energy, which is a part of their M. Tech (Solar and Alternative Energy) degree programme of Amity University Haryana.

Examination Scheme:

Project	:	60%
Presentation/Seminar	:	20%
Viva	:	20%
Total	**:**	**100%**

Amity School of Engg. & Technology

Master of Technology - Artificial Intelligence

FLEXILEARN

-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

M.Tech.-Artificial Intelligence (Specialisation: (1) Robotics and (2) Machine Learning)

Overview

M.Tech. in Artificial Intelligence (Robotics& Machine Learning) programme provides a sound knowledge of Robotic system, principles and their applications in scientific and engineering domains. It not only develops the ability to analyze complex robotics engineering problems and generate their solutions through Artificial Intelligence but also gives an exposure to the principles and practices of design and development of robotics systems. After completing M.Tech in Artificial Intelligence & Machine Learning the student understand to develop robots on the basis of different application.

Programme Objectives (PO's)

PO1: Apply knowledge of science, mathematics, computers and Information Technology fundamentals to solve complex problems related to the discipline.
PO2: Identify, analyze and evaluate problems specific to domain using knowledge of fundamentals, computational techniques, software tools and programming principles. .
PO3: Design and develop solutions in terms of computer network, hardware and software systems, modules or processes on the basis of customer needs and business goals considering cost, security, intellectual property, copyrights and other limitations.
PO4: Analyze and evaluate existing systems to understand complex problems and derive a solution to it.
PO5: Identify and apply current techniques, skills, and tools necessary for computing practices and producing solutions.
PO6: Apply professional practices and contextual knowledge to assess societal, safety and legal issues.
PO7: Comprehend the effects of the professionally developed solutions in societal and environmental contexts to produce viable developments.
PO8: Recognize and demonstrate ethical principles, responsibilities and commitments towards the profession.
PO9: Contribute profoundly and efficiently to the profession as an individual or as a member/leader of multi-faceted team by demonstrating proper coordination. .
PO10: Communicate effectively with the society and the professional community through oral and written presentations with clear descriptions.
PO11: Apply management and professional principles while assigning responsibilities, performing designated work and meeting the deadlines of a project as an individual or a team member.
PO12: Exhibit the understanding of and have readiness and capability to engage in life-long learning through education and research.

PSOs_M.Tech AIML (Artificial Intelligence-Robotics& Machine Learning)

PSO1: Apply the knowledge of science, mathematics, statistics, information technology and other engineering disciplines to identify and solve complex robotics engineering problems across a broad range of application areas.

PSO2: Able to apply their knowledge and skills of robotics engineering for the overall benefit of society with an understanding of realistic constraints and work, communicate effectively in inter-disciplinary environment either independently or in a team and demonstrate significant leadership qualities.

PSO3: Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements.

PSO4: Able to work with technical uncertainty, understanding of the use of technical literature and other information sources, undertaking of appropriate codes of practice

and industry standards, awareness of quality issues and their application to continuous improvement, thus recognizing the need to engage in lifelong learning.

Supporting document PSOs M.Tech. (AI)

PSO 1				**PSO 2**			**PSO 3**		**PSO 4**	
Apply the knowledge ofscience, mathematics, statistics, information technology and other engineering disciplines to identify and solve complex robotics engineering problems across a broad range of application areas.				Able to apply their knowledge and skills of robotics engineering for the overall benefit of society with an understanding of realistic constraints and work, communicate effectively in inter-disciplinary environment either independently or in a team and demonstrate significant leadership qualities.			Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements.		Able to work with technical uncertainty, understanding of the use of technical literature and other information sources, undertaking of appropriate codes of practice and industry standards, awareness of quality issues and their application to continuous improvement, thus recognizing the need to engage in lifelong learning.	
1	2	3	4	5	6	7	8	9	10	11
Science Courses	mathematics, statistics Courses	IT/ programming base Courses	complex robotics engineering Courses	write and Communicate effective	Team Building	Applying robotics engineering	multidisciplinary environment	Technical Advanced Courses	Technical literature and writing Courses	NTCC
Neural Network and Fuzzy Logic	Advanced Applied Mathematics for Engineering	Robotic Simulation & Simultaneous Localization Mapping	Decision Making Systems	Basics of Communication	Behavioural Communication& Relationship Management	Robotic Sensors, Vision and Hardware Implementation	Automation in Manufacturing Systems	Pattern Recognition & Image Processing	Research Methodology & Technical Report Writing	Summer Internship Evaluation
		MATLAB	Fundamental of Robotics	Self Development and Interp	Leading Through Teams	Fundamentals of Artificial Intellige	CNC Machines & Adaptive	Advanced Computer Networks		Dissertation-I

			System &Robot Programming	ersonal Skills		nce for Robotics	Control			
		Python Programming		Corporate Communication			Kinematics & Dynamics of Robots	Advanced Database Management Systems		Dissertation-II
		Advanced Data Structure & Algorithms		Interpersonal Communication			Microprocessor and Interfacing			
		Digital Computer Organization								

Course Code: AIE4101	ADVANCED DATA STRUCTURES & ALGORITHMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of data structure				
Co-requisites	Nil				

Catalog Description

The objective to this course is to equip students with advanced concepts of data structures like Huffman trees, Self organizing trees, different types of heaps and their time complexity. Advanced topics and graphs and graph algorithms, geometric algorithms and parallel algorithms.

Course Objectives

The objective of this course is to

1. Understand and apply linear data structures-List, Stack and Queue and the graph algorithms.
2. Apply data structures and algorithms in real time applications and analyze the efficiency of algorithm

Course Outcomes

On completion of this course, the students will be able to

CO1. Design and analyze programming problem statements.

CO2. Choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.

CO3. Understand the necessary mathematical abstraction to solve problems.

CO4. Comprehend and select algorithm design approaches in a problem specific manner

Modules	Blooms level*	Number of hours
MODULE 1: **ADVANCED TREES** Definitions Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees, Splay Tree. Augmenting Red-Black Trees to Dynamic Order Statistics and Interval Tree Applications. Operations on Disjoint sets and its union-find problem Implementing Sets. Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.	L1, L2 and L3	7
MODULE 2: **MERGEABLE HEAPS:** Mergeable Heap Operations, Binomial Trees Implementing Binomial Heaps and itsOperations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap Implementing Fibonacci Heap. SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting andmerging network sorter.	L1,L2,l3	8
MODULE 3: **GRAPH THEORY DEFINITIONS** Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut-Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two	L1, L2 and L3	8

Graphs.		
MODULE 4: **GRAPH THEORY ALGORITHMS** Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph and Planarity Testing, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms	L1, L2	7
MODULE 5:Geometric algorithms Point location, convex hulls and Voronoi diagrams, Arrangements. Parallel algorithms: Basic techniques for sorting, searching, merging	L2,L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Introduction to Algorithms, by T. H. Cormen, C. E. Lieserson, R. L. Rivest, and C. Stein, Third Edition, MIT Press.
2. E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", University Press, 2007
3. 3. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, University Press, 2007

Reference Books

1. Algorithms, by S. Dasgupta, C. Papadimitrou, U Vazirani, Mc Graw Hill.
2. Algorithm Design, by J. Klienberg and E. Tardos, Pearson Education Limited.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	2	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	-	-
CO 4	2	-	3	-	-	--	--	--	--	--	--	--	2	1	1	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4102	ADVANCED DBMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	NIL				

Catalog Description
The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives
The objective of this course is to
3. To understand the basic concepts and terminology related to DBMS and Relational Database Design
4. To design and understand Distributed, parallel and object oriented Databases.
5. To understand advanced DBMS techniques to handle and optimize queries in database.

Course Outcomes
On completion of this course, the students will be able to

CO1. Understand the basics of database management system and implementation of relational database.

CO2. Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques.

CO3. Understand and design Distributed, parallel and object oriented Databases models and possible methods of proving them.

Modules	Blooms level*	Number of hours
MODULE 1: **Relational Database** Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.	L1, L2 and L3	8
MODULE 2: **Query Processing and Optimization** Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information. **Objected Oriented and Object Relational Databases** Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases	L1,L2,l3	9

MODULE 3: **Parallel and Distributed Databases** Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation. **Advanced Transaction Processing** Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.	L1, L2 and L3	10
MODULE 4: Multimedia databases, Databases on the Web and Semi–Structured Data , Case Study: Oracle Xi	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", PearsonEducation, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Reference Books

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
4. W. Kim, "Modern Database Systems", 1995, ACM Press, Addision – Wesley,
5. D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
6. Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
7. Oracle Xi Reference Manual
8. Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	2	-	-
CO	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	-

2																
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4103	DIGITAL COMPUTER ORGANIZATION	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Objectives

The objective of this course is to

6. An understanding of a machine's instruction set architecture (ISA) including basic instruction fetch and execute cycles, instruction formats, control ow, and operand addressing modes.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and Interpret the functional architecture of computing systems.

CO2. Identify, compare and assess issues related to ISA, memory, control and I/O functions.

CO3. Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.

CO4. Design and analyze solutions in the area of computer architecture.

Modules	Blooms level*	Number of hours
MODULE 1: **Parallel computer models** The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms	L1, L2 and L3	7
MODULE 2: **System Interconnect Architectures** Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.	L1,L2,l3	8
MODULE 3: **Processors and Memory Hierarchy** Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW	L1, L2 and L3	8

Architectures, Vector and Symbolic processors Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory Technology		
MODULE 4: **Backplane Bus System** Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, Direct mapping and associative caches. Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines	L1, L2	7
MODULE 5: **Vector Processing Principles** Vector instruction types, Vector-access memory schemes. Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement	L2,L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Moris Mano, "Computer Systems Architecture", 4th Edition, Pearson/PHI, ISBN:10:0131755633
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5 th Edition, McGraw Hill

Reference Books

1. J.P. Hayes, "computer Architecture and organization", MGH, 1998.
2. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
3. D.A. Patterson, J.L. Hennessy, "Computer Architecture: A quantitative approach", Morgan Kauffmann, 2002.
4. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	1	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	2	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	2	-
CO 4	2	-	3	-	-	--	--	--	--	--	--	--	2	1		-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4104	ADVANCED COMPUTER NETWORKS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Network				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks provides the knowledge of computer networks and related current research topics. This course illustrates the OSI and TCP-IP layers, services, devices, cables, protocols, network security, network performance parameters etc .This course focuses on advanced computer network concepts in theory as well as in real life applications in networking.

Course Objectives

The objective of this course is to

- Equip the students with the advanced networking concepts.
- Explain the different techniques of error detection and correction methods used at various layers.
- Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of reference model, wireless Ethernet standards, protocols and applications of networks.

CO2: Describe network Layer design issues, routing algorithms, IP addressing.

CO3: State Multicasting issues and multicast routing protocol. Describe mobile IP and its use in Multicasting.

CO4: State transport and application layers and explain services, protocols, performance parameters in these layers. Also describe DNS, Email and www with applications of each in computer network.

CO5: State network security and describe various types of computer network security, the digital signature, security algorithms. Explain the social issues related to network security and web security.

Modules	Blooms level*	Number of hours
MODULE 1: Uses computer networks, Reference Models, TCP/IP suite of protocols, MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)	L1, L2	6
MODULE 2: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet. IPv6 basic protocol, extensions and options, support for QoS, security, etc.,	L2, L3	8

Changes to other protocols, Application Programming Interface for IPv6.		
MODULE 3: Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.	L1, L2	8
MODULE 4: The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues. The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.	L1, L2, and L3	8
MODULE 5: Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues..	L1, L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

1. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
2. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	2	1	-	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4105	ADVANCED DATA STRUCTURES & ALGORITHMS Lab	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Application of Data Structures				
Co-requisites	Nil				

Catalog Description
Designing an algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program.

Course Objectives
The objective of this course is to
1. Equip the students with the concepts of complexity and analysis of algorithms.
2. Provide an understanding of different techniques used in designing algorithms for a variety of problems.
3. Equip the students with the concepts of complexity classes of different problems.

Course Outcomes
On completion of this course, the students will be able to
CO1: State and explain the meaning of algorithm, analysis and design; apply the algorithmic concepts to analyze a given algorithm and compute its time complexity.
CO2: Explain and apply the concept of Divide and Conquer approach in designing algorithms; analyze a divide and conquer algorithm; explain and apply the concept of Greedy approach in designing algorithms for optimization problems.
CO3: Explain and apply the concept of Dynamic Programming in designing algorithms for optimization problems; compare and contrast the Dynamic Programming with Greedy approach and Divide and Conquer approach.
CO4: State and explain Elementary Graph Algorithms; explain and apply the concept of Branch & Bound and Backtracking in designing algorithms for different problems.
CO5: Define and explain the concept of computational complexity, Polynomialy Bounded Algorithms, Class NP, Class NP Hard and Class NP Complete.

Modules	Blooms level*	Number of hours
MODULE 1: Implementation of the following algorithms: • Insertion Sort • Bubble Sort • Counting Number of Inversions	L1, L2, L3, and L4	3
MODULE 2: Implementation of the following algorithms: • Binary Search (Divide & Conquer) • Merge Sort (Divide & Conquer) • Quick Sort (Divide & Conquer) • Strassen's Matrix Multiplication (Divide & Conquer)	L1, L2, and L3, and L4	5

• Graph RepresentationGraph Searching		
MODULE 3: Implementation of the following algorithms: • Breadth First Dearch • Depth First Search • Strongly Connected Components • Topological Sort • Fractional Knapsack Problem (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 4: Implementation of the following algorithms: • Kruskal's Algorithm. (Greedy Approach) • Prim's Algorithm (Greedy Approach) • Dijkstra's Algorithm (Greedy Approach) • Bellmanford Algorithm (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 5: • 0/1-Knapsack Problem (Dynamic programming) • Matrix Chain Multiplication (Dynamic programming) • N-Queens Problem (Backtracking)	L1 and L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm, MIT Press, ISBN-(ISBN: 978-0262033848)
2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Fundamentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Pearson.
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms," Addison-Wesley

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO2	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO3	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO4	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO5	1	1	2	2	3	3	--	--	--	--	--	--	1	1	3	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4106	ADVANCED DBMS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	Nil				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is

1. Equip the students with the different issues involved in the design and implementation of a database system.
2. Provide a practical knowledge of implementation/demonstration of data manipulation language to query, update, and manage a database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Demonstrate and analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.

CO2. Demonstrate and Apply different types of constraints on the database.

CO3. Design different views of tables for different users and to apply embedded and nested queries.

CO4. Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.

Modules	Blooms level*	Number of hours
Module1: 1. Introduction to SQL and understand basic commands 2. Understand various DDl and DML commands. 3. To understand joins in SQL.	L1,L2 and L3	4
Module 2: 1. To understand constraints SQL 2. Wild cards and aggregate functions in SQL 3. To understand and execute procedures and views in SQL	L2 and L3	6
Module 3: 1. To understand and execute triggers in SQL 2. To develop a database application to demonstrate the representation of multi valued attributes and use of nested tables to represent complex objects. Write suitable queries	L2, L3, L4 and L5	4
Module 4: 1. To understand and execute Indexes in SQL	L2, L3 and L4	4
Module 5:		1

1. To understand the concept of Exception handling in SQL 2. Query Evaluation Plans 3. Concurrency and Transactions	L2, L3 and L4	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addision wesley, 2007

Reference Book

1. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rdedition, 1997, McGrawHill, International Edition.
2. Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4107	ADVANCED COMPUTER NETWORKS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks Lab provides the knowledge of various installations & connections of LAN, WAN, etc, study of Cisco Packet Tracer Tool and its implementations, simulation of flow-control protocols such as Sliding Window, Stop & Wait with help of programming languages. This course focuses on real-life applications in networking and its software implementation in the laboratory.

Course Objectives

The objective of this course is to

- Equip the students with the advanced networking concepts.
- Explain the different techniques of error detection and correction methods used at various layers.
- Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand fundamental underlying principles of computer networking
CO2: Understand details and functionality of CISCO router
CO3:Demonstrate and configure details and functionality of DHCP server
CO4: Analyze performance of various communication protocols.
CO5: Compare routing algorithms

Modules	Blooms level*	Number of hours
MODULE 1: 1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands. 2. Configuration of IP addressing for a given scenario for a given set of topologies.	L1, L2	2
MODULE 2: 1. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address	L2, L3	2
MODULE 3: 1. Configure, implement and debug the following: Use open source tools for debugging and diagnostics. a. ARP/RARP protocols	L1, L2	3

b. RIP routing protocols c. BGP routing d. OSPF routing protocols e. Static routes (check using netstat)		
MODULE 4: 1. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down. 2. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment	L1, L2, and L3	3
MODULE 5: 1. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails. 2. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark.	L1, L2	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

2. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

3. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
4. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	-	-	-	--	--	--	--	--	--	--	1	--	-	--
CO2	1	-	-	-	3	--	3	--	--	--	--	--	1	--	-	--
CO3	1	-	-	-	3	--	3	--	--	--	--	--	1	2	2	--
CO4	1	-	-	--	2	--	2	--	3	--	--	--	2	1	-	--
CO5	1	-	-	-	1	-	1	--	2	--	--	--	2	1	-	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4108	MATLAB PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Programming				

Catalog Description
The objective of this course is to expose the students to the implementation techniques of Mat Lab Programming.

Course Objectives
The objective of this course is to
7. To understand the basic concepts and terminology related to Mat Lab.
8. Application of Mat Lab in field of Signal Processing and Control systems.

Course Outcomes
On completion of this course, the students will be able to

CO1. Understand the basics of Matlab programming environment.

CO2. Analysis of given LTI System and verifying its physical reliability and stability properties.

CO3. Waveform synthesis using Laplace Transforms and z-transform of a given signal and system.

Modules	Blooms level*	Number of hours
1. To write a MATLAB program to perform some basic operation on matrices such as addition, subtraction, multiplication. 2. To write a "MATLAB" Program to generate various signals and sequences, such as unit impulse, unit step, unit ramp, sinusoidal, square, saw tooth, triangular, sinc signals. 3. To performs operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power. 4. Write a program for finding even and odd parts of sequences Using MATLAB Software& program for finding real and imaginary parts of sequences Using MATLAB Software.	L1, L2 and L3	8
5. Write a program to find the out put with linear convolution operation Using MATLAB Software 6. Write a program to compute auto correlation and cross correlation between signals and Sequences. 7. Write a program to compute linearity and time invariance properties of a given continuous /discrete System.	L1,L2,l3	6
8. Write a program to Unit Step And Sinusoidal Response Of The Given LTI System And Verifying Its physical reliability and stability properties. 9. Write a program to demonstrate Gibbs Phenomenon using MATLAB. 10. Write a program to obtain Fourier Transform and Inverse Fourier Transform of a given signal / sequence and to plot its Magnitude	L1, L2 and L3	8

and Phase Spectra **11.** Write a program to perform waveform synthesis using Laplace Transforms of a given signal.		
12. Write a program to locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane 13. for the given transfer function. 14. Write a program to Generate Gaussian Noise and to Compute its Mean, M.S. Values, Skew, kurtosis, 15. PS and PDF 16. Write a program to demonstrate Sampling Theorem and aliasing effect using MATLAB. 17. Write a program for removal of noise by auto correlation/cross correlation.	L1, L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Amos Gilat, "MATLAB: An Introduction with Applications", Wiley; Fourth edition (2012)4ed.

Reference Books

Bansal, Goel and Sharma, MATLAB and its Applications in Engineering"Pearson Education India; Second edition (1 March 2016).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: AIE4109	PYTHON PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, I/O, and visualization using the Python programming language.

Course Objectives

The objective of this course is

3. Equip the students with the basic feature of python required in solving complex problems and build GUI applications
4. Provide a practical knowledge of implementation/demonstration of python programming concepts like of lists, tuples, dictionaries, Object Oriented Programming concepts in Python, Strings and Files in Python.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basics of python programming using if-else, loops and List, Dictionary, tuples.

CO 2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.

CO 3: Demonstrate the ability to write database applications in Python

CO 4: Demonstrate Files Handling in Python.

CO 5: Demonstrate database operation and GUI applications in python.

Modules	Blooms level*	Number of hours
Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5,between 2000 and 3200 (both included). The numbers obtained should be printed in a comma-separated sequence on a single line. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. Define a function max() that takes two numbers as arguments and returns the largest of them. Use the if-then-else construct available in Python. (It is true that Python has the max() function built in, but writing it yourself is nevertheless a good exercise.) Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.	L1,L2 and L3	4
Define a function that computes the length of a given list or string. (It is true that Python has the len() function built in, but writing it yourself is nevertheless a good exercise.) Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise. Write a function translate() that will translate a text into	L2 and L3	6

"rövarspråket" (Swedish for "robber's language"). That is, double every consonant and place an occurrence of "o" in between. For example, translate("this is fun") should return the string "tothohisosisosfofunon". Define a function sum() and a function multiply() that sums and multiplies (respectively) all the numbers in a list of numbers. For example, sum([1, 2, 3, 4]) should return 10, and multiply([1, 2, 3, 4]) should return 24. Define a function reverse() that computes the reversal of a string. For example, reverse("I am testing") should return the string "gnitset ma I".		
Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5. Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides evenly into another number. For example, 13 is a divisor of 26 because 26 / 13 has no remainder.) Take two lists, say for example these two: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13] and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.	L2, L3, L4 and L5	4
Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.) Let's say I give you a list saved in a variable: a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]. Write one line of Python that takes this list a and makes a new list that has only the even elements of this list in it. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game) **Remember the rules:** Rock beats scissors Scissors beats paper • Paper beats rock	L2, L3 and L4	4
Write a program that asks the user how many Fibonnaci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. Make sure to ask the user to enter the number of numbers in the sequence to generate.(Hint: The Fibonnaciseqence is a sequence of numbers where the next number in the sequence is the sum of the previous two numbers in the sequence. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, …) Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates. Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.	L2, L3 and L4	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010

3. Patrick Naughton & Herbert Schild ,"JAVA The Complete Reference", 10th Edition , TMH

Reference Book

1. Daniel/Young , Introduction to JAVA Programming" , PHI.
2. Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 2	3	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 3	1	3	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO 4	1	3	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO 5	1	3	--	--	--	--	--	--	--	--	--	--	1	2	--	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code:AIE4206	RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING	L	T	P	C
Version 2019.1	Date of Approval: 19 July 2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

- Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
- Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
- It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Classify different research types, explain steps in research process and planning research proposal.

CO2. Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3. Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4. Demonstrate technical and scientific report writing skills, describe plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	**4**
Module II: Sampling Methods Measurement scales, population and sample, parameter and	L1, L2, L3	**5**

statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.		
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	**10**
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	**5**

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.

Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3
CO5	2	1	1	-	-	-	-	-	-	-		1	3	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4201	FUNDAMENTALS OF ROBOTIC SYSTEM AND ROBOT PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of control system and programming				
Co-requisites	Nil				

Catalog Description

Enlighten the students about the fundamentals of robotic systems make them to understand the basics of robot, robot transformations and sensors, micro/nano robotic systems and to program them for functioning.

Course Objectives

The objective of this course is to

1. Equip the students with the basic knowledge and designing of robotics.
2. Implement their concept in robotics and design robot for various applications of engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand the design and functionality of robots

CO2: Describe the control system with the help of sensor and robot transformations.

CO3:Undersand and robot cell design and implement in micro/nano robotics system

CO4: Explain and Understand the robotic programming language and use in design of robot.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems-Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems-Hydraulic, Pneumatic and Electric system.	L1 and L2	5
MODULE 2: END EFFECTORS AND ROBOT CONTROLS Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type-Magnetic grippers-Vacuum grippers-Air operated grippers-Gripper force analysis-Gripper design-Simple problems-Robot controls-Point to point control, Continuous path control, Intelligent robot-Control system for robot joint-Control actions-Feedback devices-Encoder, Resolver, LVDT-Motion Interpolations-Adaptive control.	L1, L2 and L3	7
MODULE 3: ROBOT TRANSFORMATIONS AND SENSORS Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation- Homogeneous coordinates, multiple transformation-Simple problems. Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors.	L1 and L2	5
MODULE 4: ROBOT CELL DESIGN AND MICRO/NANO ROBOTICS SYSTEM	L1, L2, L3,L4 and L5	8

Robot work cell design and control-Sequence control, Operator interface, Safety monitoring devices in Robot-Mobile robot working principle, actuation using MATLAB, NXT Software Introductions-Robot applications- Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot. Micro/Nanorobotics system overview-Scaling effect-Top down and bottom up approach- Actuators of Micro/Nano robotics system-Nanorobot communication techniques-Fabrication of micro/nano grippers-Wall climbing micro robot working principles-Biomimetic robot-Swarm robot-Nanorobot in targeted drug delivery system.		
MODULE 5: BASICS OF ROBOT PROGRAMMING Robot programming-Introduction-Types- Flex Pendant- Lead through programming, Coordinate systems of Robot, Robot controller- major components, functions-Wrist Mechanism-Interpolation-Interlock commands-Operating mode of robot, Jogging-Types, Robot specifications- Motion commands, end effectors and sensors commands.	L1, L2 and L3	5
MODULE 6: VAL,VAL-II, RAPID AND AML LANGUAGE Robot Languages-Classifications, Structures- VAL- language commands motion control, hand control, program control, pick and place applications, palletizing applications using VAL, Robot welding application using VAL program-WAIT, SIGNAL and DELAY command for communications using simple applications. RAPID- language basic commands- Motion Instructions-Pick and place operation using Industrial robot- manual mode, automatic mode, subroutine command based programming. Move-master command language- Introduction, syntax, simple problems. VAL-II programming-basic commands, applications- Simple problem using conditional statements-Simple pick and place applications-Production rate calculations using robot. AML Language-General description, elements and functions, Statements, constants and variables-Program control statements-Operating systems, Motion, Sensor commands-Data processing.	L1, L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Craig. J. J. "Introduction to Robotics mechanics and control", Addison- Wesley,1999.

Reference Books

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning.,
4. 2009.
5. Deb. S. R. "Robotics technology and flexible automation", Tata McGraw Hill publishing company limited, 1994
6. Mikell. P. Groover, "Industrial Robotics Technology", Programming and Applications, McGraw Hill Co, 1995.
7. Klafter. R.D, Chmielewski.T.A. and Noggin's., "Robot Engineering : An Integrated Approach", Prentice Hall of India Pvt. Ltd.,1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	1	3	--	--	--	--	--	--	-	1	2	-
CO2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	-	3
CO3	1	2	1	1	1	3	--	--	--	--	--	--	1	2	-	-
CO4	1	2	2	2	3	3	--	--	--	--	--	--	-	--	2	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4202	Advanced Control Systems Drivers For Robots	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic concepts of control system				
Co-requisites					

Catalog Description
This course provides comprehensive and insight knowledge of Digital control systems. Objective of the course is to provide the students the core knowledge of Stability theory of Digital systems and State Variable analysis of Digital System

Course Objectives
The objective of this course is to
3. Equip the students with concepts of basic control system and its stability.
4. Provide a thorough understanding of control system model by considering standard examples.
5. Give an insight of state variable methods for control systems.

Course Outcomes
On completion of this course, the students will be able to
CO1: Explain the fundamentals of a digital control system.
CO2: Apply the standard methods to check the stability of a control system.
CO3: Design model for digital control system for an application with given requirements.
CO4: Analyze the analog and digital control systems using state variable method.

Modules	Blooms level*	Number of hours
Module 1: **Introduction** Configuration of the basic Digital Control Systems, types of sampling operations, Sample and Hold operations, Sampling theorem, Basic discrete time signals.	L1,L2,L4	12
Module 2: **Stability Methods** Mapping between s-plane and z-plane, stability methods: Modified Routh Criterion, Jury's method, modified Schur-Cohn criterion.	L3	6
Module 3: **Models Of Digital Control Systems** Digital temperature control System, Digital position control system, stepping motors and their control. Design of Digital compensator using frequency response plots.	L5	6
Module 4: **Control Systems Analysis Using State Variable Methods** State variable representation, conversion of state variable models to transfer function and vice-versa, Eigen values and eigen vectors, Solution of state equations, Concepts of controllability and observability.	L3	6
Module 5: **State Variable Analysis Of Digital Control Systems** State variable description of digital control systems, conversion of state variable models to pulse transfer function and vice versa, solution of state	L3	6

difference equations, controllability and observability.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Gopal, Digital Control and State Variable Methods,4th edition, Tata Mc-Graw-Hill.
2. K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
3. B.C Kuo, Digital Control Systems, Prentice Hall.

Reference Books

1. I.J. Nagrath & M.Gopal, Control System Engg., John Wiley & sons.
2. K.K. Aggarwal, Control System Analysis and Design, Khanna Publishers.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	--	2	--	--	--	--	--	--	--	--	1	--	--	3
CO 3	--	--	1	--	3	--	--	--	--	--	--	--	3	1	--	--
CO 4	2	1	2	--	3	--	--	--	--	--	--	--	1	--	--	

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4203	MICROPROCESSOR AND INTERFACING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is

1. To introduce students with the architecture and operation of typical microprocessors.
2. To familiarize the students with the programming and interfacing of microprocessors
3. To provide expertise in designing the embedded system based products as a solution to real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, pin configuration, addressing modes, control words of various microprocessors and Interfacing ICs

CO2. Develop the assembly language program using 8085 and 8086 using stacks & subroutines, procedures, segments, interrupts and interfacing.

CO3. Analyze assembly language programs; select appropriate assemble into machine across assembler utility of a microprocessor and solve various automation based problems of power system.

CO4. Design circuitry to the Microprocessor I/O ports in order to interface the processor to external devices so as to provide solutions real-world control problems

Modules	Blooms level*	Number of hours
Module I: Microprocessor Intel 8085 - Introduction, register structure, memory Addressing, Addressing Modes, Instruction Set, Timing Methods, CPU Pins and Associated Signals, Instruction timing and execution. programming I/O. Interrupt System, DMA, SID & SOD lines, Instruction set, 8085 based system design.	L1, L2, L3,L4	8
Module II: Intel 8086 Introduction, Architecture, Addressing modes, instruction set, memory management, assembler dependent instructions, Input/Output, system design using 8086.	L2,L3,L4	7
Module III: Pentium Processors Internal Architecture of 8087, operational overview of 8087, Introduction to 80186,80286, 80386 & 80486 processors and Pentium Processors.	L2,L3	6
Module IV: Peripheral Interfacing Parallel versus serial transmission, synchronous and asynchronous serial data transmission. Interfacing or hexadecimal keyboard and display unit, interfacing of cassette recorders and parallel, serial interface standards. Study of Peripheral Devices 8255, 8253,8257, 8251, 8259	L3,L4, L5,L6	7
Module V: Microprocessor applications to Power Engineering **Protective Relaying:** over-current, impedance, MHO, reactance, bi-	L4,L5,L6	8

directional relays. **Measurements:** Frequency, power angle & power factor, Voltage and Current, KVA, KW, & KVAR, maximum demand. Resistance, Reactance, Temperature Controls.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas Hall, Microprocessor and Interfacing:, Tata McGraw Hill, 2017
2. Gaonkar R. S , Microprocessor Architecture, Programming and Applications, Wiley

Reference Books

1. Yu Cheng Liu & Glen A. Gibson, Microcomputer Systems: 8086/8088 family Architecture, Programming and Design, PHI Publication, 2016.
2. Ram B., Fundamentals of Microprocessors and Microcomputers, DhanpatRai& Sons, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1			
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	2		
CO3	-	-	-	1	2	3	--	--	--	--	--	--		1	2	
CO4	-	-	-	1	--	2	--	--	2	3	3	--		2	1	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4204	KINEMATICS AND DYNAMICS OF ROBOTS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course deals with the systematic study of the Architecture and programming issues of robotic moments and design. The aim of this course is

1. To introduce students with the architecture and operation of robots.
2. To familiarize the students with the programming and interfacing of Robots
3. To provide expertise in designing the embedded system and kinematics of a robot based on real time problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the architecture, kinematic analysis for axis in Robot Design.
CO2. Understand the Workspace, Analysis And tracjectory planning
CO3. Understand the Dynamic Moments and Mathematical modeling of various forces in Moments of robotic machine
CO4. Design a robot with understanding of dynamic kinematics.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction, position and orientation of objects, objects coordinate frame Rotation matrix, Euler angles Roll, pitch and yaw angles coordinate Transformations, Joint variables and position of end effectors, Dot and cross products, coordinate frames, Rotations, Homogeneous coordinates	L1, L2, L3,L4	7
Module II: Direct Kinematics Link coordinates D-H Representation, The ARM equation. Direct kinematic analysis for Four axis, SCARA Robot and three, five and six axis Articulated Robots.	L2,L3,L4	6
Module III: Inverse Kinematics The inverse kinematics problem, General properties of solutions. Tool configuration, Inverse kinematics of four axis SCARA robot and three and five axis, Articulated robot.	L2,L3	6
Module IV: Workspace Analysis And Tracjectory Planning Workspace Analysis, work envelope of a Four axis SCARA robot and five axis articulated robot workspace fixtures, the pick and place operations, Joint space technique - continuous path motion, Interpolated motion, straight line motion and Cartesian space technique in trajectory planning.	L3,L4, L5,L6	8
Module V: Manipulator Dynamics Introduction, Lagrange's equation kinetic and potential energy. Link inertia Tensor, link Jacobian Manipulator inertia tensor. Gravity, Generalized forces, Lagrange-Euler Dynamic model, Dynamic model of a Two-axis planar robot, Newton Euler formulation, Lagrange - Euler formulation, problems.	L4,L5,L6	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Robert J. Schilling, Fundamentals of Robotics Analysis and Control, PHI Learning., 2009.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. P.A. Janaki Raman, Robotics and Image Processing An Introduction, Tata Mc Graw Hill Publishing company Ltd., 1995.
4. Francis N-Nagy Andras Siegler, Engineering foundation of Robotics, Prentice Hall Inc., 1987.
5. Bernard Hodges, Industrial Robotics, Second Edition, Jaico Publishing house, 1993.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	-	--	--	--	2	--	--	--	--	--	--	1			
CO2	1	1	-	-	2	--	--	3	--	--	--	--	1	2		
CO3	1	-	-	2	-	3	--	--	--	--	--	--		1	2	3
CO4	-	-	-	1	--	2	--	--	2	-	3	--		2	1	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4205	ADVANCED APPLIED MATHEMATICS FOR ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Objective of this course is to develop analytical capability and to impart knowledge in Mathematical and Statistical methods and their applications in Engineering and Technology and to apply these concepts in engineering problems they would come across.

1. To introduce students mathematical approach in applications of Engineering
2. To familiarize the solution techniques and the concept to solve the Engineering applications
3. To provide expertise in solving real time problem and modeling it with the advance mathematical approach.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the transform method and approach in robotic design
CO2. Understand the calculus of variations in engineering.
CO3. Understand the numerical solution of partial differential equations
CO4. Explain the regression methods in various engineering problem solution.

Modules	Blooms level*	Number of hours
Module I: TRANSFORM METHODS Laplace transform methods for one-dimensional wave equation - Displacements in a string - Longitudinal vibrations of an elastic bar – Fourier transform methods for one-dimensional heat conduction problems in infinite and semi-infinite rod.	L1, L2,	6
Module II: ELLIPTIC EQUATIONS Laplace equation - Fourier transform methods for Laplace equation – Solution of Poisson equation by Fourier transform method.	L2,L4	7
Module III: CALCULUS OF VARIATIONS Variation and its properties - Euler's equation - Functionals dependent on first and higher order derivatives - Functionals dependent on functions of several independent variables - Some applications - Direct methods - Ritz methods.	L1,L3	7
Module IV: NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS Numerical Solution of Partial Differential Equations - Solution of Laplace's and Poisson equation on a rectangular region by Liebmann's method - Diffusion equation by the explicit and Crank Nicholson implicit methods - Solution of wave equation by explicit scheme.	L3,L4, L5,L6	9
Module V: REGRESSION METHODS Principle of least squares - Correlation - Multiple and Partial correlation - Linear and non-linear regression - Multiple linear regression.	L4,L6	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Sankara Rao K., Introduction to Partial Differential Equations, 4th printing, PHI, New Delhi, April 2003
2. Elsgolts L., Differential Equations and Calculus of Variations, Mir Publishers, Moscow, 1966
3. S.S. Sastry, Introductory Methods of Numerical Analysis, 3rd Edition, PHI, 2001
4. Gupta S.C. and Kapoor V.K., Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi, Reprint 2003

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO1	1	-	--	--	--	2	--	--	--	--	--	--	1			
CO2	1	1	-	-	2	--	--	-	--	--	3	--	1	2		
CO3	-	-	1	2	-	-	--	--	--	--	--	--		1	2	3
CO4	-	1	-	-	--	-	--	--	3	-	2	--		2	1	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code :RBE4206	FUNDAMENTAL OF ROBOTICS SYSTEM AND ROBOT PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

The objective of this course is to enlighten the students about the fundamentals of robotic systems. To understand the basics of robot, Robot Transformations and Sensors, Micro/Nano robotic systems and to program them for functioning.

Course Objectives

The objective of this course is to

1. Equip the students with the basic knowledge and designing of robotics.
2. Implement their concept in robotics and design robot for various applications of engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand and be able to apply a variety of techniques to solve problems in areas such as robot control and navigation

CO2: program a robot to perform a specified task (e.g obstacle avoidance or wall following) in a target environment.

CO3: Understand how simulations of robots work, where they can be useful and where they can break down.

Modules	Blooms level*	Number of hours
Lab Session 1: Study of different types of robots based on configuration and application.	L1. L2 and L3	4
Lab Session 2: Study of different type of links and joints used in robots	L1. L2, L3 and L4	4
Lab Session 3: Study of components of robots with drive system and end effectors.	L1. L2, L3 and L4	4
Lab Session 4 Determination of maximum and minimum position of links.	L3 and L4	2
Lab Session 5 Verification of transformation (Position and orientation) with respect to gripper and world coordinate system	L3 and L4	4
Lab Session 6 Estimation of accuracy, repeatability and resolution.	L3 and L4	2
Lab Session 7 Robot programming exercises	L1, L2, L3 and L4	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

Text:-

1. Craig. J. J. “Introduction to Robotics mechanics and control”, Addison- Wesley,1999.

References:-

1. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
2. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012
3. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning.,
4. 2009.
5. Deb. S. R. “Robotics technology and flexible automation”, Tata McGraw Hill publishing company limited, 1994
6. Mikell. P. Groover, “Industrial Robotics Technology”, Programming and Applications, McGraw Hill Co, 1995.
7. Klafter. R.D, Chmielewski.T.A. and Noggin’s., “Robot Engineering : An Integrated Approach”, Prentice Hall of India Pvt. Ltd.,1994.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	3	--	--	--	--	--	--	--	--	1	1	--	3
CO2	2	2	--	3	1	--	--	--	--	--	--	--	1	1	--	3
CO3	2	--	--	--	--	1	3	--	--	--	--	--	2	1	--	3

Course Code: RBE4207	ADVANCED CONTROL SYSTEMS & DRIVES FOR ROBOTS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of Control Systems				
Co-requisites					

Catalog Description

This course is designed to get students an understanding of the basic concepts of control systems and its major applications .The course also includes some interdisciplinary applications like digital electronics and mechanical devices. Students will perform practical on hardware kit as well as on software.

Course Objectives
The objective of this course is to
1. Make students demonstrate the concepts of control systems.
2. Apply the concepts of control systems in various applications.

Course Outcomes
On completion of this course, the students will be able to
CO1. Practically verify the theoretical concepts of control systems.
CO2. Design various digital logic gates using programmable logic controller.

CO3. Analyse and explain the response of Process Control Simulator, Magnetic amplifier, Synchros, Servomotor and compensators.

Modules	Blooms level*	Number of hours
Lab Session 1 Determination of Transfer functions of an Electrical System	L3	1
Lab Session 2 Time Response Characteristics of a Second order System (Typical RLC network).	L3 and L4	1
Lab Session 3 Characteristics of Synchros: (a) Synchro transmitter characteristics. (b) Implementation of error detector using synchro pair	L3 and L4	2
Lab Session 4 Determination of Magnetic Amplifier Characteristics with different possible connections.	L3 and L4	2
Lab Session 5 Process Control Simulator: (a) To determine the time constant and transfer function of first order process. (b) To determine the time response of closed loop second order process with Proportional Control. (c) To determine the time response of closed loop second order process with Proportional Integral Control. (d) To determine the time response of closed loop second order process with Proportional Integral-Derivative Control. (e) To determine the	L3 and L4	6

effect of disturbances on a process.		
Lab Session 6 To study the compensation of the second order process by using: (a) Lead Compensator. (b) Lag Compensator. (c) Lead- Lag Compensator	L3 and L4	2
Lab Session 7 Realization of AND, OR, NOT gates, other derived gates and ladder logic on Programmable Logic Controller with computer interfacing.	L3 and L5	2
Lab Session 8 To determination of AC servomotor Characteristics	L3 and L4	2
Lab Session 9 To study the position control of DC servomotor with P, PI control actions.	L3	2
Lab Session 10 Analog Computer: (a) To examine the operation of potentiometer and adder. (b) To examine the operation of integrator	L3	2
Lab Session 11 To solve a second order differential equation.	L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

4. M. Gopal, Digital Control and State Variable Methods,4th edition, Tata Mc-Graw-Hill.
5. K.Ogata, Discrete Time Control Systems, Pearson Education, (Singapore) (Thomson Press India).
6. B.C Kuo, Digital Control Systems, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-
CO2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO3	1	-	2	--	2	--	--	--	--	--	--	2	1	3	--	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4208	MICROPROCESSOR & INTERFACING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description
This course deals with the systematic study of the Architecture and programming issues of microprocessor family and its applications. The aim of this course is to give the students detailed knowledge of the above microprocessor needed to develop the systems using.

Course Objectives

The objective of this course is to
1. To expose students to the operation of typical microprocessor trainer kit.

2. Learn the design aspects of I/O and Memory Interfacing circuits.

3. To provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems

Course Outcomes

On completion of this course, the students will be able to
CO1: Developing of assembly level programs and providing the basics of the processors

CO2: write programs like ASCII conversion, searching and sorting elements, reverse given string and compute nCr .

CO3: Understand the concepts related to I/O and memory interfacing

Modules	Blooms level*	Number of hours
Lab Session 1: To load the numbers 49H and 53H ion memory location 9510 & 9511.	L3 and L4	2
Lab Session 2: Respectively and add the contents of memory location 9601.	L3 and L4	2
Lab Session 3: To write the Assembly Language Programming for 8 bit addition with and without carry.	L3 and L4	2
Lab Session 4 To write the Assembly Language Programming for 8 bit subtraction with and without borrow.	L1, L2, and L3	2
Lab Session 5 To write the Assembly Language Programming for 8 bit Multiplication and Division.	L1, L2, and L3	2
Lab Session 6 To write the Assembly Language Programming for sorting an array of numbers in Ascending & Decending order.	L3 and L4	2

Lab Session 7 To write the Assembly Language Programming with Additional Instructions.	L3 and L4	2
Lab Session 8 To write and execute a program using Stacks.	L3 and L4	2
Lab Session 9 To study and program the programmable Peripheral interface (8255 board).	L1, L2 and L3	2
Lab Session 10 To study and program the programmable interval timer (8253 board).	L1, L2, L3 and L4	2
Lab Session 11 To study and program the programmable DMA Controller (8257 board).	L1, L2, L3 and L4	2
Lab Session 12 i) To study and program the programmable Interrupt Controller (8259 board). ii) To study of programmable Serial Communication interface (8251 board).	L1, L2, L3 and L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rafiquzzaman, M. Theory & Applications PHI Publications 1993.
2. Gaonkar R. S. Microprocessor Architecture, Programming and Applications John Wiley 1989.
3. Ram B. Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai & Sons 1995.
4. Liu Yu Cheng and Gibson, G.A. PHI 1992.
5. Leventhal, L.A. Introduction to Microprocessors: Software, Hardware, Programming.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	3	2	2	--	1	--		--	--	--	--	1		--	--
CO2	1	1	1	2	--	--	--	2	--	--	--	3	1	2	--	--
CO3	1	2	2	3	--	--	-	--	--	--	--	--		2	1	3

Course Code: RBE4209	FUNDAMENTALS OF ARITIFICAL INTELLIGENCE FOR ROBOTICS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of computer system				
Co-requisites	Nil				

Catalog Description
Expose the students to the fundamentals of AI and expert systems and its application in Robotics and familiarize to the students with the Fundamental concept of AI and expert system.

Course Objectives
The objective of this course is to
6. Equip the students with the artificial technique concepts used in robotics.
7. Provide an overview of various technique and design the expert system with the help of these technique.

Course Outcomes
On completion of this course, the students will be able to
CO1: Explain and Understand artificial intelligence techniques and their limitation.
CO2: Describe the various searching techniques to solve the problem of different field.
CO3:Implement artificial intelligence based program in various application using basic AI language.
CO4: Understand and design the expert system for inter-dispensary engineering system.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION :- Introduction – History, Definition of AI, Emulation of human cognitive process, Intelligent agents – The concept of rationality, the nature of environments, the structure of agents.	L1 and L2	6
MODULE 2: SEARCH METHODS :- Problem – Solving Agents : Problem Definitions, Formulating Problems, Searching for solutions – Measuring Problem – Solving Performance with examples. Search Strategies : Uninformed search strategies – Breadth – first Search, Uniform – Cost Search, depth –first search, depth – limited search, Iterative deepening depth – first search, bidirectional search, comparing uniformed search strategies. Informed search strategies – Heuristic information, Hill climbing methods, best – first search, branch – and – bound search, optimal search and A* and Iterative deepening A*.	L1, L2 and L3	9
MODULE 3: PROGRAMMING AND LOGICS IN ARTIFICIAL INTELLIGENCE :- LISP and other programming languages – Introduction to LISP, Syntax and numerical function, LISP and PROLOG distinction, input, output and local variables, interaction and recursion, property list and arrays alternative languages, formalized symbolic logics – properties of WERS, non-deductive	L1, L2 and L3	11

inference methods.		
MODULE 4: EXPERT SYSTEM :- Expert system – Introduction, difference between expert system and conventional programs, basic activities of expert system – Interpretation, Prediction, Diagnosis, Design, Planning, Monitoring, Debugging, Repair, Instruction, Control. Basic aspects of expert system – Acquisition module, Knowledge base – Production rules, semantic net, frames. Inference engine – Backward chaining and forward chaining. Explanatory interface.	L1, L2, L3,L4 and L5	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Russell Stuart, Norvig Peter, "Artificial Intelligence Modern Approach", Pearson Education series in AI, 3rd Edition, 2010.

Reference Books

1. Dan.W.Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI Learning, 2009.
2. Donald.A.Waterman, "A guide to Expert Systems", Pearson, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	1	--	--	--	--	--	--	--	-	2	3	-
CO2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	2	-
CO3	1	2	1	1	1	--	--	--	--	--	--	--	-	2	3	-
CO4	1	2	2	2	3	--	--	--	--	--	--	--	1	--	2	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4210	ROBOTICS SIMULATIONS AND SIMULTANEOUS LOCALIZATION MAPPING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basics of Artificial Intelligence concepts, Robotics and simulations required.				
Co-requisites	Nil				

Catalog Description

Robotics Simulations find many applications in the areas of Artificial Intelligence, pattern recognition, controls etc. Robotics Simulations offer fundamentally alternative approaches to simulation. These robotics design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics, location mapping, simulation techniques, robotic motion, robotic parts etc.

Course Objectives

The objective of this course is to

1. Introduces the basics of Robotics and Artificial Intelligence.
2. It deals with essentials of techniques of simulations for robot design and location mapping.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of robotics and robotics movements, robotics simulations and robotics design.

CO2: comparisonrobotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of robotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics packages and robotic linkages.

CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTIONS Robotics systems, robot movements, quality of simulation, types of simulation, robotics applications, robotics simulation displays. Simulationnotation, Auto lisp functions, Features, Command syntax, writing design functions.	L1, L2	4
MODULE 2: ROBOTIC PRINCIPLES Straight lines, Angles and optimal moves circular interpolation, Robotic functions Geometrical commands, Edit commands. Selecting robot views, standard Robot part, using the parts in a simulation.	L1, L2, L3 and L4	10

MODULE 3:LOCALIZATION AND MAPPINGS Introduction, Robotic perception – localization, mappings planning to move – configuration space, cell decomposition methods, skeletonization methods, Planning uncertain movements – Robust methods. Moring –dynamics and control, Potential Field control, reactive control, Robotics software architecture, Applications.	L1, L3, L4 and L5	5
MODULE 4:ROBOTIC SIMULATION Simulation packages, Loading the simulation, Simulation editors, delay, Resume commands. Slide commands, program flow control. Robot motion control, Analysis of robot elements, Robotic linkages.	L1, L2, L3, and L4	7
MODULE 5:R**OBOTIC MOTION** Solids construction, Solid animation. Types of motion, velocity and acceleration, Types of simulation motion Harmonic motion, parabolic motion, and uniform motion velocity and acceleration analysis for robots.	L2, L3, L4 and L5	5
MODULE 6:ROBOT DESIGN Linkages, Types, Transmission elements Flexible connectors, pulley-and-Belt drives, variable speed transmission. Design of Robot for particular applications – A case study.	L2, L3, L4 and L5	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

- "Robotics Simulations "Daniel L. Ryan, CRC Press Inc., 1994.
- "Robotics Engineering an Integrated Approach", Richard D.Klafter, Thomas A, Chri Elewski, Micheal Negin, Phi Learning 2009.
- "Fundamentals of Robotics Analysis and Control", Robert schilling PHI Learning, 2009.
- " Industrial Robotics, Technology programming and Applications",Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, McGraw Hill, 2012.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**3**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO2	**1**	**3**	**--**	**2**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**1**
CO3	**1**	**2**	**2**	**4**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO4	**1**	**2**	**2**	**2**	**--**	**---**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO5	**1**	**3**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**4**

Course Code: MLE4201	Applied Statistical Analysis	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of statistics, the science of collecting, organizing, and interpreting numerical data are discussed. Emphasis will be placed on statistical reasoning and data analysis. The main topics are study design, descriptive statistics, probability theory, and statistical inference. As a precursor to the study of cryptography studies will be made on impact of various techniques for finding independence or dependence between data variables. The concepts learnt in the studies of statistics will be applied practically to solve number of real life problems using the statistical package like R and SPSS.

Course Objectives

The objective of this course is to

- Equip the students with concepts of statistics through problem solving and analytical approach.
- Provide an overview of various statistical techniques: descriptive and inferential, parametric and non-parametric and practical statistics using R and SPSS.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain, describe and distinguish various population, sample, type of variables, measurement scales; Explain central tendency , percentile and solve problems related to them.

CO 2: Explain the concept of descriptive and inferential statistics; probability theory; Solve problems based on probability; Explain binomial, Poisson distribution and solve real life problems related to discrete and continuous random variable.

CO 3: Describe the concept of sampling distribution for large and small samples; Explain the concept of hypothesis testing and solve problems related using t-distribution and standard normal distribution.

CO 4: Explain concept of covariance and correlation and its applications in real life; Explain Anova and its use in real life problem solving; Explain and compare various regression analysis methods statistics for prediction

CO 5: Explain various parametric and nonparametric test and apply them to solve real life statistical problems

Modules	Blooms level*	Number of hours
Module I Introduction to Statistical Analysis Introduction to Statics, Population Versus Sample, Population and Sample, Basic Terms, Types Of Variables, Quantitative Variables, Qualitative or Categorical Variables, Measurement Scales, Identifying The Scale of Measurement, Normal Variables, Ordinal Variables, Continuous Variables, Cross-Section Data, Time –Series Data, Sources of Data, Types of Statics, Measures of Central Tendency, Mean, Examples, Mode, Mode Scenarios, Symmetry, Skewness, Measures of Spread, Range, Variance and Standard Deviation, Examples, Solution, Population Parameters and Sample Statistics, Measures of Position–Quartiles and Interquartile Range, Quartiles, Example,	L1, L2 and L3	7

Solution, Percentiles and Percentile Rank, Example, Solution, Box and Whisker Plot, Solution.		
Module II Describing Data Raw Data, Graphical Presentation of Qualitative Data, Graphical Presentation of Qualitative Data, Graphing Quantitative Data, Frequency Distributions, Relative Frequency and Percentage Distributions, Graphing Grouped Data, Cumulative Frequency Distributions, Probability Concepts, Simple and Compound Events, Two Properties of Probability, Classical Probability, Probability Concepts, Complementary Events, Example, Discrete Random Variables, The Binomial Experiment, The Poisson Probability Distribution, Continuous Random Variables, Normal Distribution, Standard Normal Distribution.	L1,L2, L3	6
Module III Testing Hypothesis Population Distribution, Sampling and Non Sampling Errors, A Point Estimate, Interval Estimation, The t Distribution Hypothesis Testing, The Chi-Square Distribution.	L1,L2, L3	6
Module IV Examining Relationship Covariance, Pearson Correction Coefficient, Computational Formulas-Covariance, Computing A Correlation, Correlation Analysis, Scatter Plots, Relationships Between Continuous Variables, Correlation, Pearson Correlation Coefficient, Hypothesis Test For A Correlation, Extreme Data Values, Correlation Matrix, Anova Overview, Anova Hypothesis, Anova, Error Sum of Squares, Model Sum of Squares, Anova-Example, Simple Regression, Relationship Between Food Expenditure And Income: (A) Linear Relationship (B) Nonlinear Relationship, Plotting A Linear Equation, Y-Intercept And Slope Of A Line, Simple Linear Regression Analysis, Scatter Diagram, Least Squares Line, Error Sum Of Squares, The Least Squares Line, Example, Solution, Error Of Prediction, Positive And Negative Linear Relationship Between X And Y, Assumptions of Regression Model, Coefficient Of Determination, Regression Analysis.	L1, L2 L3	7
Module V Advanced Techniques Non Parametric Tests, Chi-Squared Goodness- of-Fit Test, Chi-Square Test of Independence, The Sign Test, Example, Mann-Whitney U Test, The Kruskal-Wallis Test, No Title, Structural Equation Modelling, Cluster Analysis, Factor Analysis, Centroid Method, Principal Components Method.	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
2. Torsten Hothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Reference Books

1. Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	3	--	--
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO5	1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code : MLE4202	Data Mining and Predictive Analytics	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Concept of Database and Data Mining				
Co-requisites					

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Catalog Description

Data Mining and Predictive analytics serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Content

Modules	Bloom's level	Number of Hours
Module I Data Preparation An introduction to data mining and predictive analytics, Data Pre-processing Exploratory Data Analysis, Dimension- Reduction Methods.	**L1, L2**	**8**
Module II Classification k- Nearest Neighbour Algorithm, Decision Trees, Model Evaluation Technique, Cost –Benefit Analysis Using Data Driven Cost.	**L1, L2, L3**	**7**
Module III Clustering Hierarchical and k- Means Clustering, Kohenen Networks, Birch Clustering, Measuring Cluster Goodness.	**L1, L2, L3**	**8**

Module IV Association Rules Affinity Analysis and Market Basket Analysis, Data Representation for Market Basket Analysis, Support, Confidence, Frequent Item sets, and the a Priori Property, How Does a Priori Algorithm Work? Generating Frequent Item sets, Generating Association Rules, Extension from Flag Data to General Categorical Data, Information-Theoretic Approach: Generalized Rule Induction Method, J-Measure, Association Rules are Easy to do Badly, how can we Measure the Usefulness of Association Rules? Do Association Rules Represent Supervised or Unsupervised Learning?	**L1, L2, L3**	**9**
Module IV Case Study: Predicting Response to Direct Mail Marketing Business Understanding, Data Preparation, and Eda, Clustering and Principal Components Analysis, Modelling and Evaluation for Performance and Interpretability, Modelling and Evaluation for High Performance.	**L2, L3, L4, l5**	**8**

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
2. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill.
2. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
3. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**
CO 2	**1**	**1**	**2**		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**
CO 3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**
CO 4	**1**	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**2**	**--**	**--**
CO 5	**1**	**1**	**2**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**-3**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MlE4203	Data Warehousing and Multidimensional Modeling	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of Database				
Co-requisites	Nil				

Catalog Description

In this course the concepts of basic concepts of Multi-dimensional database are discussed in detail. As a precursor to the study of the course it provide an in depth understanding of basic concepts of data warehouse which includes its architecture, data warehouse operations, data marts, metadata. The concept further enhances the understanding of advance concepts that cover the slowly and rapidly changing dimensions, indexes in OLAP and concept hierarchies. It also include the different application of data warehouse

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Multi-dimensional database, its need and various applications.
2. It provides an overview of some basic concepts in data warehouse such as its architecture, OLAP applications, and metadata. It also includes some advance concepts such as OLAP hierarchies, OLAP changing dimensions.
3. **Course Outcomes**

On completion of this course, the students will be able to

CO1: Explain the concept of Multi-dimensional database and its importance.

CO2: Analyse the fundamental concept of data warehouse which include OLAP operations, architecture.

CO 3: Explain the different types of dimensions that exist in data warehouse.

CO4: Explain the advance concepts of data warehouse which include OLAP indexing.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction***:* Multidimensional Data Management, Multidimensional History, Related Terminology	L1 and L2	8
MODULE 2: **Fundamental Concepts** : Cubes ,Dimensions, Facts, Measures, Relational Representations, Star Schemas, Snowflake Schemas, Data Warehouses And Data Marts, Multidimensional Modelling Process, Analysis And Querying ,Roll Up, Drill Down, Drill Out, Slicing And Dicing, Drill Across, Pivot Tables, Ranking, Multi-Dimensional Querying in MDX and SQL, Graphical Querying and Visualizations .	L1, L2 and L3	8
MODULE 3: **Advance Concepts** Slowly Changing Dimensions, The Problem, Solutions, Other Special Kinds Of Dimensions, Mini dimensions, Outriggers, Degenerate Dimensions, Junk Dimensions, Time Dimensions, Data Quality Dimensions, Advanced Hierarchies, Parent-Child Hierarchies, Unbalanced Hierarchies, Non Covering Hierarchies , Non –Strict Hierarchies, Multiple Hierarchies And Parallel Hierarchies.	L2, L3 and L4	10

MODULE 4: **Module IV: Implementation Issues** Materialized Views, Indexing, Indexing Overview, Bitmap Indices, Join Indices, Query Processing, OLAP Implementations, Extract-Transform-Load.	L3, L4 and L5	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jiawei Han &Micheline Kamber,"Data Mining Concepts And Techniques",3rd Edition,Morgan Kaufmann Publication,An Imprint of Elsevier, 2015.
2. Vipin Kumar,Pang Ning "Introduction to Data Mining",3rd Edition,Pearson Publication,Chennai, 2016.
3. Mohammed,Wagner " Data Mining and Analysis", 4th Edition, Cambridge University Press,Brazil, 2018.

Reference Books:

1. Daneil,D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John wiley and Sons,Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**3**	**--**	**--**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**-**	**--**	**-**	**-**
CO2	**1**	**--**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**--**	**--**	**--**
CO3	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code:- MLE4204	Big Data Technologies	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of DBMS and SQL				
Co-requisites	Nil				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

1. To make students familiar with big data technologies.
2. Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain importance and applications of Big Data Analytics.
CO2. Differentiate among analytics technologies.
CO3. Demonstrate architecture of Hadoop and Mapreduce framework.
CO4. Illustrate Hadoop installation process and commands.
CO5. Introduce concepts of Hive and Pig.

Modules	Blooms level*	Number of hours
Module I: Introduction to Big Data Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.	L1 and L2	5
Module II: Big Data Technologies Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data –Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.	L2 and L5	4
Module III: Processing Big Data Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.	L1 and L3	8
Module IV: Hadoop Map Reduce Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms –Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.	L2, L3 and L4	9
Module V Big Data Tools and Techniques	L2 and	10

Installing and Running Pig – Comparison with Databases – Pig Latin – User-Define Functions – Data Processing Operators – Installing and Running Hive – Hive QL – Tables – Querying Data – User- Defined Functions – Oracle Big Data.	L3	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Minelli, Michehe Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Wiley CIO Series, 2013.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
3. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

Reference Books

1. Anil Maheshwari, "Big Data", McGraw Hill
2. Mayank Bhushan, "Big Data and Hadoop- Learn by Example", BPB Publications

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**-**
CO 2	**1**	**2**	**--**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**-**
CO 3	**1**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**-**
CO 4	**1**	**1**	**2**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**3**	**--**	**-**	**--**	**1**	**3**
CO 5	**1**	**--**	**1**	**--**	**1**	**3**	**--**	**--**	**--**	**--**	**3**	**--**	**1**	**-**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4205	Applied Statistical Analysis Lab	L	T	P	C
Version 2020.1	Date of Approval: 19 July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description
In this lab the concepts of statistics, the science of collecting, organizing, and interpreting numerical data learned will be practically applied to solve number of real life problems using the statistical package like R and SPSS.

Course Objectives
The objective of this course is to

4. Equip the students with concepts of statistics through problem solving and analytical approach.
5. Provide an overview of various statistical techniques: descriptive and inferential, parametric and non-parametric and practical statistics using R and SPSS.

Course Outcomes
On completion of this course, the students will be able to
CO 1: Explain, describe and distinguish various population,sample,type of variables,measurement scales; Explain central tendency , percentile and solve problems related to them. .
CO 2: Explain the concept of descriptive and inferential statistics; probability theory ; Solve problems based on probability; Explain binomial, poisson distribution and solve real life problems related to discrete and continuous random variable.
CO 3: Describe the concept of sampling distribution for large and small samples; Explain the concept of hypothesis testing and solve problems related using t-distribution and standard normal distribution.
CO 4: Explain concept of covariance and correlation and its applications in real life; Explain Anova and its use in real life problem solving; Explain and compare various regression analysis methods statistics for prediction.
CO 5: Explain various parametric and nonparametric test and apply them to solve real life statistical problems
Programs should be based on following topics:
Quick Review of interpretation of mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them; Representation of mathematical information symbolically, visually, numerically, and verbally; Use of arithmetic, algebraic, geometric, and statistical methods to solve problems; Estimation and check answers to mathematical problems in order to determine reasonableness, Identification of alternatives, and select optimal results; and recognize the limitations of mathematical and statistical models.

Lab Sessions	Blooms level*	Number of hours
1. Getting familiar with R environment and jupyter notebook in Anaconda 2. Running basic commands and small R scripts 3. Working with operators and input output , Writing R scripts to demonstrate various operators available in R	L1, L2 and L3	2
1. Demonstrating decision making statements in R by writing small R scripts. 2. Creating data frames , vectors, matrices, list in R and solving practical problems in statistics	L1, L2 and L3	2

1. Running basic R commands for central tendency, measures of variations, generating frequency tables, cumulative frequency and relative frequency table. 2. Demonstrating graphics in R with simple plot command	L1, L2 and L3	2
1. Working with bar chart in R and solving practical problems in statistics 2. Demonstrating Pie chart in R for some real life problems. 3. Demonstrate concepts of quartiles using Box and whisker plot in R with some hands on data/data sets and perform analysis	L1,L2, L3	2
1. Demonstrate stem and leaf plot in R 2. Working with loops in R by writing basic scripts. 3. Drawing standard normal distribution chart in R and finding areas under the curve in figure as well as numerica	L1,L2, L3	2
1. Perform binomial and poission distribution in R 2. Perform operations related to PMF and CDF in R /SPSS	L1,L2, L3	2
1. Demonstrate hypothesis testing in R for some real life problems using standard normal distribution and Student-t distribution. 2. Running basic commands for covariance, correlation and doing analysis for some problems.	L1,L2, L3	2
1. Demonstrate chi-square, ANOVA test in R for some real life problems. 2. Demonstrate Linear Regression Analysis in R for some built-in data sets and for real life problems.	L1,L2, L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Spectrum Editorial Board, Statistical Analysis Graphs and Diagrams, Spectrum Books Pvt Ltd, 2013.
4. Torsten Hothorn and Brian S. Everitt , "A Handbook of Statistical Analyses Using R", Chapman and Hall/CRC, 2006.

Reference Books

2. Pal and Sarkar, "Statistics: Concepts and Applications", Prentice Hall India Learning Private Limited, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**3**	--	--
CO 2	**1**	**1**	**1**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--

CO 3	**1**	**1**	**1**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO 4	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO 5	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE 4206	Data Mining and Predictive Analytics Lab	L	T	P	C
Version 2020.1	Date of Approval: 19 July, 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Database				
Co-requisites	NIL				

Catalog Description

Data Mining and Predictive analytics serve as one of the most important courses for postgraduate students, since it builds computational abilities, inferential thinking, and practical skills for tackling core data scientific challenges. The students will get a comprehensive understanding of different data mining techniques that can be used for prediction and for discovering patterns, be prepared to select the right technique for a given data problem and will be able to create a general-purpose analytic process.

Course Objectives

The objective of this course is to

- Provide students with an in-depth knowledge of data mining. To introduce students to basic applications, concepts, and techniques of data mining.
- Develop skills for using recent data mining software to solve practical problems and prediction in a variety of disciplines and
- Gain experience doing independent study and research.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain concepts of Data mining, predictive analytics and analyses architecture of data mining. Differentiate between supervised and unsupervised methods

CO 2: Apply classification techniques on different data sets and solve cost –benefit analysis numerical. Analyze decision tree methods.

CO 3: Implement various clustering algorithm on different data sets and describe these algorithms.

CO 4: Prepare data representation for market basket analysis and determine the usefulness of association rules. Interpret supervised and unsupervised learning methods.

CO 5: Predict market trends and outline different factors associated mail marketing.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic features of Data Warehousing.	L1, L2	2
2. Explore WEKA Data Mining/Machine Learning Toolkit (a) Downloading and/or installation of WEKA data mining toolkit. (b) Understand the features of WEKA tool kit such as Explorer, Knowledge flow interface, Experimenter, command-line interface. (c) Navigate the options available in the WEKA (deselect attributes panel, preprocess panel, classify panel, cluster panel, associate panel and visualize). (d) Study the ARFF file format.	L2, L3, L5	2
3. To understand the working of datasets in WEKA & to perform demonstration of preprocessing on dataset weather.arff .	L3, L4, L5	2
4. To apply Numeric Transform (data preprocessing step) on Iris Dataset.	L3, L4, L5	2
5. To understand the importance of CSV data and then load student academic record (CSV format) in Weka.	L3, L4, L5	2
6. To understand the concept of discretization and to perform discretization	L3, L4,	2

on the dataset airline.arff.	L5	
7. To create Training, Validation and Test dataset for iris.arff.	L3, L4, L5	2
8. To perform decision tree classification using J48 algorithm on weather.arff	L3, L4, L5	2
9. To apply Apriori technique on the dataset and to generate association rules.	L3, L4, L5	2
10. (a) Demonstration of classification rule process on dataset student.arff using j48 algorithm. (b) Demonstration of classification rule process on dataset employee.arff using j48 algorithm.	L3, L4, L5	2
11. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm	L3, L4, L5	4

***Bloom's Level:** *L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation.*

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

3. Bostjan Kaluza, "Instant Weka How-to", Packt Publishing Limited, 2013.
4. Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
5. Jiawei Han and Micheline Kamber, "Data mining: concepts and techniques", Morgan Kaufmann, Second Edition, 2006.

Reference Books

1. Yuan Mei Yu, Data Mining and Machine Learning: WEKA Applied Technology and Practice (Chinese Edition) Paperback 2014.
2. Alex Berson, Data Warehousing, Data Mining, and Olap, Tata McGraw Hill, 2014.
3. Markus Hofmann, Ralf Klinkenberg, "Rapid-Miner: Data Mining Use Cases and Business Analytics Applications", Chapman and Hall/CRC, 2016.
4. George M Marakas, Modern Data Warehousing, Mining & Visualization Core Concepts, Pearson Education.

Modes of Evaluation: Performance/Viva/ Lab Record/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE-External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**3**
CO 2	**1**	**1**	**2**		**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**3**
CO 3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**2**
CO 4	**1**	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**1**	**2**	**3**
CO 5	**1**	**1**	**2**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code : MLE4207	DATA WAREHOUSING AND MULTIDIMENSIONS MODELLING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	Basic Knowledge of Database				
Co-requisites	NIL				

Catalog Description

In this Lab course Data warehousing and Multidimensional modeling programs are implemented and demonstrated using a SQL Server and ETL Tools. The Concepts that are covered would enable them to analyze the working of ETL tools and enable them to understand the following topics namely SQL Statements, SQL Built-in Functions, PL/SQL Cursors , Exception handling, Procedure, Functions, Trigger and concurrency control. Programs will be related to concepts of understanding the working of ETL tools on multidimensional data.

Course Objectives

The objective of this course is to

6. Make the students apply knowledge of Database by analyzing the different database concepts in SQL Server.
7. Provide a demonstration of ETL tools to organize the data sets.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of transaction processing to gain analysis on different data sets through concurrency control mechanism.

CO2: Demonstrate the use of SQL Built-in Functions, PL/SQL Cursors,Exception handling and Procedures.

CO3: To implement the different warehousing concepts on the given ETL tools.

CO4: Demonstrate the working of basic SQL statements and triggers.

Modules/Topics Covered**	Blooms level*	Number of hours
1. To understand the basic of SQL statements (a) Perform the following SQL statements on the table that perform the following query on the database • Create, update ,alter and delete a record • Joins and constraints on the table. • Wild card operators.	L1,L3,L4	4
2. Sample Programs to execute the concept of Procedures (a) Preliminary introduction of Procedures their Syntax and usage (b) Write a procedural program to find out minimum of two numbers. (c) Write a program to print the reverse of a number using looping construct in PL/SQL Procedures. (d) Write a procedural program to find out the factorial of number.	L3, L4,L5	4
3. Sample Programs to implement the concept of Triggers (a) Preliminary introduction of Triggers their Syntax and usage (b) Create a Trigger on Employee record that automatically updates the salary of an Employee after each financial year. (c) Create a Trigger for the following events:	L3, L4,L5	4

• Deletion of a record • Updating of a record • Insertion of a new record.		
4. Sample Programs to implement the concept of Cursors and Exception Handling. (a) Write a program to demonstrate the concept of Cursors in PL/SQL (b) Write a program that handles an exception that incurred in the given program.	L3,L4, L5	6
5. To perform demonstration to understand the working of ETL tools (a) Preliminary introduction of ETL Tools their features and importance. (b) Perform validation on the data set by applying the ETL tools. (c) Perform the following operations using ETL tools • Source to target mapping • Data checks on source data • Packages and schema validation • Data verification in the target system • Data integrity and quality checks in the target system	L4,L5,L6	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation
** Sample Programs provided are not limited to these only, can include others as desired.

Text Books:

2. Jiawei Han &Micheline Kamber,"Data Mining Concepts And Techniques",3rd Edition,Morgan Kaufmann Publication,An Imprint of Elsevier, 2015.
2. Vipin Kumar,Pang Ning "Introduction to Data Mining",3rd Edition,Pearson Publication,Chennai, 2016.
3. Mohammed,Wagner " Data Mining and Analysis", 4th Edition, Cambridge University Press,Brazil, 2018.

Reference Books:

3. Daneil,D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John wiley and Sons,Canada, 2015.
4. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 2	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO 3	1	1	2	--	1	--	--	--	--	--	--	--	2	1	--	--
CO 4	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

MLE4208	**R PROGRAMMING LAB**	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	Knowledge of statistics				
Co-requisites	Nil				

Catalog Description

This lab will provide a basic introduction to the R programming Language and the use of R to perform basic statistics and programming tasks. The main objectives of this lab is to impart the students with the knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Objectives

The objective of this course is

3. To make students familiar with R Programming Language and its concepts.
4. Equip the students with knowledge of R Programming, Machine Learning using R Mining from streaming Data, Mining from Distributed Data.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure R Studio and R packages.

CO2. Explain concepts of Structured Data, data types, data structures and Use R for mathematical operations

CO3. Describe the use of R functions, control statements, Loop constructs and apply to iterate functions across data.

CO4. Understand basic regular expressions graphics. Use of R for descriptive statistics and inferential statistics

CO5. Predict/Score new data using models, understand basic non-linear functions in models and how to link data, statistical methods.

Modules	**Blooms level***	**Number of hours**
Lab Session 1 • Installation & Configuration steps of R Studio. • use of the R interactive environment • Expand R by installing R packages • Explore and understand how to use the R documentation.	L1 and L2	2
Lab Session 2-3 • Read Structured Data into R from various sources • Understand the different data types in R • Understand the different data structures in R • Understand how to use dates in R	L1and L3	4

• Use R for mathematical operations		
Lab Session 4-5 • Use of vectorised calculations • Write user-defined R functions • Use control statements • Write Loop constructs in R • Use Apply to iterate functions across data	L1 and L3	4
Lab Session 6-8 • Reshape data to support different analyses • Understand split-apply-combine (group-wise operations) in R • Deal with missing data • Manipulate strings in R • Understand basic regular expressions in R • Understand base R graphics	L1 and L3	6
Lab Session 9-10 • Focus on GGplot2 graphics for R • Be familiar with trellis (lattice) graphics • Use R for descriptive statistics • Use R for inferential statistics • Write multivariate models in R	L1 and L3	4
Lab Session 11-12 • Understand confounding and adjustment in multivariate models • Understand interaction in multivariate models • Predict/Score new data using models • Understand basic non-linear functions in models • Understand how to link data, statistical methods, and actionable questions	L1 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jeffrey Aven, "SAMS Teach Yourself Hadoop in 24 Hours", 1st Ed., Pearson ,2017.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**-**
CO2	**1**	**-**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**1**	**-**
CO3	**1**	**-**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**1**	**1**	**-**
CO4	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**---**	**1**	**1**	**--**
CO5	**1**	**-**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**

1: strongly related, 2: moderately related and 3: weakly related

Course Code : MLE4209	DATABASE AND KNOWLEDGEBASE SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	0
Pre-requisites/Exposure	Basic Knowledge of Database AND AI				
Co-requisites	NIL				

Catalog Description

This course discusses design methodology for databases to verify their structural correctness and implements databases. It also provides applications software primarily in the relational model using querying languages, primarily SQL, and other database supporting software applying the theory behind various database models and query languages implementing security and integrity policies relating to databases and preparation for data analytics working in group settings to design and implementing database projects.

Course Objectives

The objective of this course is to

8. To understand the basic concepts and terminology related to DBKBS and Relational Database Design.
9. To design and implement Distributed Databases and Knowledge base.

Course Outcomes

CO1: Write complex queries including full outer joins self-join, sub queries, and set theoretic queries and do their optimization.

CO2: Know how Optimization, Transaction management, Query and database administration is done in distributed databases.

CO3: Learning various types of deadlines in real-time database.

CO4: Familiarizing with the present applications of knowledge base.

CO5: Understand the concepts of multilevel transactions in databases.

Modules	Blooms level*	Number of hours
MODULE 1: Database Languages, Object-Base Systems, Knowledge-base Systems, History and Perspective, Data Models for Database Systems: Data Models, The Entity-relationship Model, The Relational Data Model, Operations in the Relational Data Model, The Network Data Model, The Hierarchical Data Model, An Object-Oriented Model, Logic as a Data Model: The Datalog Data Model, Evaluating Non- recursive Rules, Computing the Meaning of Recursive Rules, Incremental Evaluation of Least Fixed Points, Negations in Rule Bodies, Relational Algebra and Logic, Relational Calculus, Tuple Relational Calculus.	L1, L2 and L3	8
MODULE 2: ISBL: A “Pure” Relational Algebra Language, QUEL: A Tuple Relational Calculus Language, Query-by-Example: A DRC Language, Data Definition in QBE, The Query Language SQL, Data Definition in SQL, The DBTG Data Definition language, The DBTG Query Language, The DBTG Database Modification Commands, Data Definition in IMS, A Hierarchical Data Manipulation Language, Data Definition in OPAL, Data Manipulation in	L2, L3 and L6	10

OPAL.		
MODULE 3: The Physical Data Model, The Heap Organization, Hashed Files, Indexed Files, B-trees, Files with a Dense Index, Secondary Indices, Data Structures in DBTG Databases, Data Structures for Hierarchies, Data Structures for Relations, A Search Tree Structure, Functional Dependencies, Lossless-Join Decomposition, Normalization, Generalized Dependencies.	L1, L3 and L4	10
MODULE 4: Basic Concepts, A Simple Transaction Model, The Two-phase Locking Protocol, a Model with Read and write-Locks, Lock Modes, A Read-Only, Write-Only Model, Concurrency for Hierarchically Structured Items, Handling Transaction Failures, Aggressive and Conservative Protocols, Recovery From Crashes, Timestamp-based Concurrency Control.	L1, L3 and L4	10
MODULE 5: Distributed Databases, Distributed Locking, Distributed Two-phase Locking, Distributed Commitment, A Nonblocking Commit Protocol, Timestamp-based, Distributed Concurrency, Recovery of Nodes, Distributed Deadlocks.	L3, L4 and L6	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Jeffrey D. Ullman"Principles of Database and Knowledge-Base Systems", Vol. 1, Computer Science Press, USA, 1988.
2. Ngoc Thanh Nguyen, Edward Szczerbicki, "Intelligent Systems for Knowledge Management", Springer-verlagGmbh, 2009.

Reference Books

5. AviSilberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", Mcgraw Hill Education, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**--**	**2**	
CO2	**1**	**--**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	
CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**--**	**-**	**3**
CO4	**1**	**1**	**2**	**--**	**--**	**--2**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**2**	**-**	**3**
CO5	**1**	**1**	**2**	**--**	**-2-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	

1: strongly related, 2: moderately related and 3: weakly related

Course Code : MLE4210	Information Management System	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Information management systems includes basics of managing the information and explores the various aspects of database design and modelling. It examines the basic issues in information governance and information integration and also helps to understand the information architecture.

Course Objectives

The objective of this course is to

1. Understand the basic principles and working of information technology.
2. Provide the role of information technology and information system in business.
3. To contrast and compare how internet and other information technologies support business systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: State and explain the fundamental concepts of information management systems.

CO2: Develop the knowledge about management of information systems.

CO3: Interpret and recommend the use of information technology to solve business problems.

CO4: Apply a framework and process for aligning organizations IT objective with business strategies.

Modules	Blooms level*	Number of hours
Module I:**Database Modelling, Management and Development** Database design and modelling – Business Rules and Relationship; Java database Connectivity (JDBC), Database connection Manager, Stored Procedures. Trends in Big Data systems including NoSQL – Hadoop HDFS, MapReduce, Hive, and enhancements.	L1 and L2	6
MODULE II:Data **Security and Privacy** Program Security, Malicious code and controls against threats; OS level protection; Security – Firewalls, Network Security Intrusion detection systems. Data Privacy principles. Data Privacy Laws and compliance.	L1, L2, and L3	8
MODULE III: **Information Governance** Master Data Management (MDM) – Overview, Need for MDM, Privacy, regulatory requirements and compliance. Data Governance – Synchronization and data quality management.	L1, L2 and L3	7
MODULE IV: **Information Architecture** Principles of Information architecture and framework, Organizing information, Navigation systems and Labelling systems, Conceptual design, Granularity of Content.	L1, L2, and L3	8
Module V: **Information Lifecycle Management** Data retention policies; Confidential and Sensitive data handling, lifecycle	L1 and	7

management costs. Archive data using Hadoop; Testing and delivering big data applications for performance and functionality; Challenges with data administration;	L2	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Jeffrey A. Hoffer, HeikkiTopi, V Ramesh – MODERN DATABASE MANAGEMENT, 10 Edition, PEARSON, 2012.
2. Alex Berson, Larry Dubov MASTER DATA MANAGEMENT AND DATA GOVERNANCE, 2/E, Tata McGraw Hill, 2011.

Reference Books

1. Security in Computing, 4/E, Charles P. Pfleeger, Shari Lawrence Pfleeger, Prentice Hall; 2006
2. Information Architecture for the World Wide Web; Peter Morville, Louis Rosenfeld ; O'Reilly Media; 1998.
3. http://ibm.com/big-data – Four dimensions of big data and other ebooks on Big Data Analytics

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**3**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO2	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO3	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO4	**1**	**1**	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4211	FUNDAMENTALS OF ARITIFICAL INTELLIGENCE	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of computer system				
Co-requisites	Nil				

Catalog Description
Expose the students to the fundamentals of AI and expert systems and its application in Robotics and familiarize to the students with the Fundamental concept of AI and expert system.

Course Objectives
The objective of this course is to

10. Equip the students with the artificial technique concepts used in robotics.
11. Provide an overview of various technique and design the expert system with the help of these technique.

Course Outcomes
On completion of this course, the students will be able to
CO1: Explain and Understand artificial intelligence techniques and their limitation.
CO2: Describe the various searching techniques to solve the problem of different field.
CO3:Implement artificial intelligence based program in various application using basic AI language.
CO4: Understand and design the expert system for inter-dispensary engineering system.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION :- Introduction – History, Definition of AI, Emulation of human cognitive process, Intelligent agents – The concept of rationality, the nature of environments, the structure of agents.	L1 and L2	6
MODULE 2: SEARCH METHODS :- Problem – Solving Agents : Problem Definitions, Formulating Problems, Searching for solutions – Measuring Problem – Solving Performance with examples. Search Strategies : Uninformed search strategies – Breadth – first Search, Uniform – Cost Search, depth –first search, depth – limited search, Iterative deepening depth – first search, bidirectional search, comparing uniformed search strategies. Informed search strategies – Heuristic information, Hill climbing methods, best – first search, branch – and – bound search, optimal search and A* and Iterative deepening A*.	L1, L2 and L3	9
MODULE 3: PROGRAMMING AND LOGICS IN ARTIFICIAL INTELLIGENCE :- LISP and other programming languages – Introduction to LISP, Syntax and numerical function, LISP and PROLOG distinction, input, output and local variables, interaction and recursion, property list and arrays alternative languages, formalized symbolic logics – properties of WERS, non-deductive inference methods.	L1, L2 and L3	11

MODULE 4: EXPERT SYSTEM :- Expert system – Introduction, difference between expert system and conventional programs, basic activities of expert system – Interpretation, Prediction, Diagnosis, Design, Planning, Monitoring, Debugging, Repair, Instruction, Control. Basic aspects of expert system – Acquisition module, Knowledge base – Production rules, semantic net, frames. Inference engine – Backward chaining and forward chaining. Explanatory interface.	L1, L2, L3,L4 and L5	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

2. Russell Stuart, Norvig Peter, "Artificial Intelligence Modern Approach", Pearson Education series in AI, 3rd Edition, 2010.

Reference Books

1. Dan.W.Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI Learning, 2009.
2. Donald.A.Waterman, "A guide to Expert Systems", Pearson, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**2**	**3**	**-**
CO2	**1**	**1**	**2**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**-**
CO3	**1**	**2**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**2**	**3**	**-**
CO4	**1**	**2**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

Course Code : AIE4335	Summer Internship Evaluation	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	0	6
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**1**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO2	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO3	**1**	**1**	**2**	**3**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code :- AIE4337	Project Dissertation-I	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	0	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO2	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO3	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
CO4	**1**	**1**	--	--	--	--	--	--	**1**	--	--	--	--	--	**1**	**1**
C05	**1**	**1**	--	--	--	--			**1**	-	-	-	--	--	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4301	AUTOMATION IN MANUFACTURING SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Production system, Manufacturing System				
Co-requisites	Automation in production and manufacturing system				

Catalog Description:
In this course the concepts and procedure for Automation of Manufacturing systems and the technology behind the automation of a manufacturing system andconcepts of computer aided manufacturing are discussed in detail. The concepts of computer aided process planning (CAPP), Hardware components for automation, group technology (GT), cellular manufacturing, automated guided vehicle system, flexible manufacturing system (FMS), Automated inspection and just in timeare also discussed in detail.

Course Objectives:
The overall objective of this course is
1. To equip the students with basic and essential concepts of Automation in manufacturing system to usually increases production rate and labor productivity.
2. To provide high caliber engineering students with an in-depth understanding of cellular manufacturing, flexible manufacturing system (FMS) and computer aided process planning.

Course Outcomes (COs):
At the end of the course, the student shall be able to:
CO1 - Define and describe the basic fundamentals of Automation in manufacturing system, computer aided manufacturing and computer integrated manufacturing.
CO2 – State, explain and demonstrate computer aided process planning, automated production lines and assembly systems.
CO3 – Outline, interpret and apply concepts of group technology and cellular manufacturing.
CO4 – Define, explain and apply knowledge of flexible manufacturing systems and industrial robotics in industries.

Modules	Blooms level*	Number of hours
Module I **Over view of Manufacturing and Automation:** Production systems, Automation in production systems, Automation principles and strategies, Manufacturing operations, production facilities. Basic elements of an automated system, levels of automation; Hardware components for automation and process control, programmable logic controllers and personal computers.	L1 and L2	7
Module II **Material Handling And Identification Technologies:** Material handling, equipment, Analysis. Storage systems, performance and location strategies, Automated storage systems, AS/RS, types. Automatic identification methods, Barcode technology, RFID	L1, L2, and L3	6
Module III **Manufacturing Systems And Automated Production Lines:** Manufacturing systems: components of a manufacturing system, Single station manufacturing cells; Manual Assembly lines, line balancing	L1, L2 and L3	8

Algorithms, Mixed model Assembly lines, Alternative Assembly systems. Automated production lines, Applications, Analysis of transfer lines		
Module IV **Automated Assembly Systems:** Fundamentals, Analysis of Assembly systems. Cellular manufacturing, part families, cooling, production flow analysis. Group Technology and flexible Manufacturing systems, Quantitative Analysis.	L1, L2 and L3	9
Module V **Quality Control And Support Systems:** Quality in Design and manufacturing, inspection principles and strategies, Automated inspection, contact Vs non contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.	L1, L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text books:

1. Mikell.P.Groover (2008), Automation, Production Systems and Computer Integrated Manufacturing, Prentice Hall of India.
2. N. Viswanandham, Y. Narhari "Performance Modeling of Automated Manufacturing Systems" Prentice-Hall.

Reference books:

1. M. Groover (2003), CAD/CAM Pearson Education; 1 edition.
2. S J Martin (1974), Numerical control of Machine Tools, Butterworth-Heinemann.
3. P N Rao (2017), CAD/CAM: Principles and Applications, Tata McGraw Hill Education; 3 editions.
4. Chang, Wysk & Wang (2005), Computer Aided Manufacturing, Prentice Hall of India.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--
CO2	**1**	**2**	--	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--
CO3	**1**	**2**	--	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--
CO4	**1**	**2**	--	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code:RBE4302	ROBOTIC SENSORS,VISIONS AND HARDWARE IMPLEMENTATION	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Knowledge of basics of Artificial Intelligence concepts, Sensors and basic Robotics hardware required.				
Co-requisites	Nil				

Catalog Description

Robotics sensors find many applications in the areas of robotics, visions, Artificial Intelligence, pattern recognition, controls etc. Robotics sensors offer fundamentally different types of high capable sensors. Many image processing techniques are learnt. These robotics hardware design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics sensors, visions and robotics hardware required.

Course Objectives:

The objective of this course is to

2. Introduces the basics of Robot visions and image processing sensors.
3. It deals with actual hardware implementation of robots

Course Outcomes:

On completion of this course, the students will be able to

CO1: Understand the principles of smart sensors and transducers, need and usage of sensors.

CO2: comparisonvarious visions in robotics robotic functions, robotic views and robotic parts in simulations.

CO3: Understand concept of image processing techniques which can be applied torobotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.

CO4: Get thorough knowledge in robotics orientation and feature extraction.

CO5: Design multicontrolled sensors robot assembly.

Modules	Blooms level*	Number of hours
MODULE 1: SENSORS IN ROBOTICS An Introduction to sensors and Transducers, History and definitions, Smart Sensing, AI sensing, Need of sensors in Robotics. Position sensors – optical, non-optical, Velocity sensors, Accelerometers, Proximity Sensors – Contact, non-contact, Range Sensing, touch and Slip Sensors, Force and Torque Sensors. Different sensing variables – smell, Heat or Temperature, Humidity, Light, Speech or Voice recognition Systems, Tele-presence and related technologies.	L1, L2	4
MODULE 2: VISIONS IN ROBOTICS The Nature of Vision- Robot vision – Need, Applications - image acquisition –illumination techniques- Point sensor, line sensor, planar sensor, camera	L1, L2, L3 and L4	10

transfer characteristic, Raster scan, Image capture time, volume sensors, Image representation, picture coding techniques. Robot Control through Vision sensors, Robot vision locating position, Robot guidance with vision system, End effector camera Sensor.		
MODULE 3:ELEMENTS OF IMAGE PROCESSING TECHNIQUES Discretization, Neighbours of a pixel-connectivity- Distance measures - pre-processing Neighbourhood averaging, Median filtering. Smoothening of binary Images- Image Enhancement- Histogram Equalization-Histogram Specification –Local Enhancement-Edge detection- Gradient operator-Laplace operators-Thresholding-Morphological image processing.	L1, L3, L4 and L5	5
MODULE 4:OBJECT ORIENTATION AND FEATURE EXTRACTION Image segmentation- Edge linking-Boundary detection-Region growing-Region splitting and merging- Boundary Descriptors-Freeman chain code-Regional Descriptors- recognition-structural methods- Recognition procedure, mahalanobic procedure.	L1, L2, L3, and L4	7
MODULE 5:COLLISIONS FRONTS ALGORITHM Introduction, skeleton of objects. Gradients, propagation, Definitions, propagation algorithm, Thinning Algorithm, Skeleton lengths of Top most objects.	L2, L3, L4 and L5	5
MODULE 6:MULTISENSORS CONTROLLED ROBOT ASSEMBLY Control Computer, Vision Sensor modules, Software Structure, Vision Sensor software, Robot programming, Handling, Gripper and Grippingmethods, accuracy – A Case study.	L2, L3, L4 and L5	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:-

1. Paul W Chapman, "*Smart Sensors*", an Independent Learning Module Series, 1996.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. John Iovice, "*Robots, Androids and Animatrons*", Mc Graw Hill, 2003.
4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, "*Robotics – Control Sensing, Vision and Intelligence*", Tata McGraw-Hill Education, 2008.
5. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, Tata McGraw-Hill Education, 2012.
6. Sabrie Soloman, Sensors and Control Systems in Manufacturing, McGraw-Hill Professional Publishing, 2nd Edition, 2009.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**3**	--	**1**	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**3**	--	**2**	--	--	--	**2**	--	--	--	--	**1**	**2**	--	**1**
CO3	**1**	**2**	**2**	**4**	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO4	**1**	**2**	**2**	**2**	--	---	--	--	--	--	--	--	**1**	**2**	--	--
CO5	**1**	3	**2**	**1**	--	--	--	--	--	--	--	--	**1**	**1**	--	**4**

Course Code: RBE4303	PATTERN RECOGNITION & IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Digital Image Processing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with Pattern Recognition. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Pattern recognition Concepts & Bayesian decision theory

CO2: List out the Univariate and Multivariate density

CO3: Explain concepts of Un-supervised learning and clustering

CO4: Describe the Image Fundamentals and Transforms

CO5: Explain the basics of Image Segmentation and Edge Detection

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction of Pattern recognition and Bayesian Decision Theory** Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces	L1 and L2	8
MODULE 2: **Normal density** Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context	L2 and L3	8
MODULE 3: **Un-supervised learning and clustering** Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering, similarity measures, criteria function for clustering	L1 and L2	10
MODULE 4: **Image Fundamentals and Transforms** Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete	L2 and L3	12

Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.		
MODULE 5: **Image Segmentation and Edge Detection** Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,	L2 and L3	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text & References:

Text:

1. "Fundamentals of speech Recognition", Lawerence Rabiner, Biing – Hwang Juang Pearson education.
2. "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
3. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley.

References:

1. "Pattern Recognition and Image Analysis" – Earl Gose, Richard John baugh, Steve Jost
2. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
3. "Digital Image Processing"– M. Anji Reddy, BS Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
CO 4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
CO 5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4304	ROBOTICS SENSORS,VISION AND HARDWARE IMPLEMENTATION LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	MATLAB and concepts of Artificial Intelligence				
Co-requisites	Nil				

Catalog Description
Robotics sensors find many applications in the areas of robotics, visions, Artificial Intelligence, pattern recognition, controls etc. Robotics sensors offer fundamentally different types of high capable sensors. Many image processing techniques are learnt. These robotics hardware design, architecture, mapping and localization can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of robotics sensors, visions and robotics hardware required.

Course Objectives
The objective of this course is to
1. To become familiar with basics of robot visions, image processing sensors.
2. Understand and analyse concepts of hardware implementations in robotics.

Course Outcomes
On completion of this course, the students will be able to
CO1: Understand the principles of smart sensors and transducers, need and usage of sensors.
CO2: comparison various visions in robotics robotic functions, robotic views and robotic parts in simulations.
CO3: Understand concept of image processing techniques which can be applied to robotic perception, robotic movements, dynamics and controls of robotic movement, with which they can be able to apply the conceptual things to the robotic software architecture and applications.
CO4: Get thorough knowledge in robotics orientation and feature extraction.

Modules	Blooms level*	Number of hours
Lab Session 1:Generation in robot languages Learning of robot language structure, on line and offline programming	L3 and L4	2
Lab Session 2:Cartesian Trajectories Study of Joint space planning, Cartesian trajectories, path primitives, coordinate systems used to determine the positions of TCP and direction of tools	L3 and L4	4
Lab Session 3:Basic Syntax Learning of RAPID i.e. data objects, expression, function. WAIT, SIGNAL AND DELAY command.	L3 and L4	6
Lab Session 4:Routine and subroutine Write subroutine, task module, input-output interrupts, priority interrupts, and task modules. Study of built-in subroutines in RAPID.	L1, L2, and L3	2
Lab Session 5:optical sensors To study Photodiodes, phototransistors and photo resistors based sensors,	L1, L2, and L3	4

light-to-light detectors, Infrared sensors (thermal, PIR, AFIR, thermopiles).		
Lab Session 6: Magnetic and Electromagnetic Sensors and Actuators Study on Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (eddy current, LVDT, RVDT, Proximity, switches), Hall Effect sensors, Magneto resistive sensors.	L3 and L4	2
Lab Session 7:Mechanical Sensors Accelerometers, Force sensors (strain gauges, tactile sensors), Pressure sensors (semiconductor, piezo resistive, capacitive, VRP).	L3 and L4	2
Lab Session 8:Industrial Networks and Fields Bus Types of bus – DN, PB, ProfiNet, Eth/IP Interfacing to Controller: Connecting sensors to controller directly or through fieldbus. Configuration of digital, group, and analog IO. Use of instructions and logic. Strobing and handshaking with PLC as master, Encoder and Resolvers.	L1, L2, and L3	2
Lab Session 9:PLC Various hardware types of PLC (CPU and I/O modules).Centralized configuration of PLC.On-line with PLC (using serial port).Various languages and its over-view. Sample program down-load, Task configuration. Configuration of IP address & sample program download. Decentralized configuration of PLC (Profibus protocol).Configuration I/O modules on Profi-bus protocol. Mod-bus configuration (Master & Slave configuration). Mod-bus RTU (Remote Telemetry Unit) and Mod-bus TCP/IP communication with PCbased software .	L2, L3, and L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:-

1. Paul W Chapman, "Smart Sensors", an Independent Learning Module Series, 1996.
2. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Phi Learning., 2009.
3. John Iovice, "Robots, Androids and Animatrons", Mc Graw Hill, 2003.
4. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, "Robotics – Control Sensing, Vision and Intelligence", Tata McGraw-Hill Education, 2008.
5. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, Industrial Robotics, Technology programming and Applications, Tata McGraw-Hill Education, 2012.
6. Sabrie Soloman, Sensors and Control Systems in Manufacturing, McGraw-Hill Professional Publishing, 2nd Edition, 2009.

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3

Course Code: RBE4305	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

12. Make the students applyknowledge of various Image processing & pattern recognition required for solving complex problems.
13. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of MATLAB (b) Basic Variable deceleration & its operation (c) Function use & its application	L3, L5	4
2. Sample Programs in MATLAB (e) Basic use of Matrix and Graph Plotting (f) Different type of graph plotting with use of different -2 type of data	L3, L5	6
3. Sample Programs using MATLAB functions (a) Create a basic program MATLAB using functions (b) Use of basic function Image processing (c) Practice on Basic function of Image processing tool box.	L3, L5	6
4. Sample programs of ANN functions (a) Practice on Pattern Recognition functions in MATLAB (b) Write a program for training a small network in MATLAB	L3, L5	6
5. Sample Programs using ANN toolbox & Image processing toolbox (d) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

Text & References:

- Rafael C. Gonzalez & Richard E. Woods, “Image Processing Using MATLAB”, 2nd edition, Pearson Education.
- “Pattern classifications”, Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE-External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4306	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description
The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, ,principles. linear programming and queuing theory.

Course Objectives

After successful completion of the course, student will be able to understand importance of optimization of industrial process management , apply basic concepts of mathematics to formulate an optimization problem , analyse and appreciate variety of performance measures for various optimization problems.

Course Outcomes

On completion of this course, the students will be able to
CO1: Understand importance of optimization of industrial process management.
CO2: Apply basic concepts of mathematics to formulate an optimization problem
CO3: Analyse and appreciate variety of performance measures for various optimization problems
CO4: Use classical optimization techniques and numerical methods of optimization
CO5: Apply knowledge of optimization to formulate and solve engineering problems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to optimization – adequate and optimum design – principles of optimization – statement of an optimization problem – classification – formulation of objective function, design constraints.	L1, L2	4
MODULE 2: CLASSICAL OPTIMIZATION TECHNIQUES Single variable optimization –multivariable optimization with no constraints – exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods – Interpolation methods: quadratic and cubic, direct root method.	L1, L2, L3 and L5 , L6	12
MODULE 3:MULTIVARIABLE – UNCONSTRAINED AND CONSTRAINED OPTIMIZATION Direct search methods – descent methods – conjugate gradient method. Indirect methods – Transformation techniques, penalty function method	L1, L3 and L4	8
MODULE 4:NON – TRADITIONAL OPTIMIZATION TECHNIQUES Genetic Algorithms -steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge	L1, L3, and L4	10

based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation and Tabu search methods.		
MODULE 5:OPTIMUM DESIGN OF MACHINE Desirable and undesirable effects – functional requirement – material and geometrical parameters – Design of simple axial, transverse loaded members for minimum cost and minimum weight.	L3 and L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rao, S.S., "*Optimization – Theory and Applications*", Wiley Eastern, New Delhi, 1978
2. Fox, R.L., Optimization Methods for Engineering Design, Addition – Wesley, Reading, Mass, 1971.
3. Wilde, D.J., "*Optimum Seeking Methods*", Prentice Hall, Englewood Cliffs, New Jersey, 1964

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	--	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	---	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

COMPUTER NUMERICAL CONTROL (CNC) MACHINES AND ADAPTIVE CONTROL

Course Code:RBE4307 **Credit Units: 03**

Course Objective:
This course objective is to understand NC,CNC and DNC manufacturing and generate manual part program for CNC machining. Concept of adaptive control and its various applications

Module-I
Concepts of NC, CNC, DNC. Classification of CNC machines, Machine configurations, Types of control, CNC controllers characteristics, Interpolators. Cutting tool materials, carbide inserts classification, qualified, semi qualified and preset tooling, tooling system for Machining centre and Turning centre, work holding devices, of CNC Machines.

Module-II
Programming CNC machines, Part print analysis and Process planning, Advanced Programming features , Canned cycles, Subroutines, Macros, special cycles etc. APT part programming using CAD/CAM, Parametric Programming. Manual part programming for CNC turning, milling and machining center. Computer assisted part programming techniques , Conversational and Graphics based software, Solids based part programming. Freeform surface machining. Simulation and Verification of CNC programs.

Module-III
Robot anatomy, robot configuration, motions joint notation work volume, robot drive system, control system and dynamic performance, precision of movement. Robot activation and feedback components. MOTION ANALYSIS AND CONTROL: Manipulator kinematics, position representation forward transformation, homogeneous transformation, manipulator path control, robot dynamics, configuration
of robot controller.

Module-IV
END EFFECTORS: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. SENSORS: Desirable features, tactile, proximity and range sensors, uses sensors in robotics. Positions sensors, velocity sensors, actuators sensors, power transmission system.
MACHINE VISION: Functions, Sensing and Digitizing-imaging, Devices, Lighting
techniques, Analog to digital single conversion, image storage, Image processing and Analysis-image

Module-V
Review of Lyapunov analysis, model Reference Adaptive Control, Composite Adaptation, Parameter Convergence: Persistency of Excitation /Uniform Complete Observe-ability, Adaptive Control in the Presence of Input Constraints, Direct MRAC for Nonlinear systems with Matched Structured Nonlinearities, Robustness of MRAC: Parameter Drift, Adaptive Control in the Presence of Uniformly Bounded Residual Nonlinearity, Disturbance Rejection, Input-to-State Stability, fast adaptation.

Examination Scheme:

Components	**CT**	**H**	**V/S/Q**	**EE**
Weightage (%)	10	07	08	70

Text & References:

1. Krar, S., and Gill, A., “CNC Technology and Programming”, McGraw Hill publ Co, 1990.
2. Gibbs, D., “An Introduction to CNC Machining”, Casell, 1987.
3. Seames, W.S., “Computer Numerical Control Concepts and Programming”, Delmar Publishers, 1986.
4. Lynch, M., “Computer Numerical Control for Machining”, McGraw Hill, 1992.
5. Koren Y, “Computer Control of Manufacturing Systems”, McGraw, 1986.

Course Code: RBE4308	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Linear algebra, advanced calculus, discrete mathematics, Boolean algebra or equivalent.				
Co-requisites	Nil				

Catalog Description

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Objectives

The objective of this course is to

1. Introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.

2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system component

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of neural networks and fuzzy Logic fundamentals.

CO2: compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.

CO3: Understand concept of classical and fuzzy sets, fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.

CO4: Get thorough knowledge in biological neuron and artificial neurons.

CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: Basic neural computation models: Network and node properties. Inference and learning algorithms.Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.	L1, L2	4
MODULE 2: Self organizing networks: Kohonen algorithm, bi-directional associative memories.	L1, L2, L3 and L4	10

Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.		
MODULE 3: Fuzzy Sets: Operations and properties. Fuzzy Relations: Cardinality, Operations and properties. Value Assignments: Cosine amplitude and max-min method. Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.	L1, L3, L4 and L5	6
MODULE 4: Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning. Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.	L1, L2, L3, and L4	9
MODULE 5:OPTIMUM DESIGN OF MACHINE Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.	L2, L3, L4 and L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
3. Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill1997.
4. Bart Kosho "Neural Network and Fuzzy Systems", Prentice Hall of India,1994

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	---	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

Course Code: RBE4309	NEURAL NETWORK AND FUZZY LOGIC LAB	L	T	P	C
Version 2020.1	Date of Approval: 20 July 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

Neural Networks offer fundamentally alternative approaches to procedural programming. Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm.

Course Objectives

The objective of this course is to

To become familiar with neural networks learning algorithms from available examples and give design methodologies for artificial neural networks.

2. Understand and analyse concepts of fuzzy set and use fuzzy set operations to implement current computing techniques used in fuzzy computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO2: To analyse and appreciate the applications which can use fuzzy logic.

CO3: Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications and they will be able to design inference systems

Modules	Blooms level*	Number of hours
Lab Session 1: Write a program to implement single layer perception algorithm.	L3 and L4	2
Lab Session 2: Write a program to implement back propagation learning algorithm	L3 and L4	4
Lab Session 3: Design multilayer feed forward network using back-propogation algorithm	L3 and L4	6
Lab Session 4 Study of fuzzy inference system	L1, L2, and L3	2
Lab Session 5 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, and L3	4
Lab Session 6 Write a program to implement SDPTA	L3 and L4	2
Lab Session 7 Write a program to implement RDPTA	L3 and L4	2
Lab Session 8	L1, L2,	2

To Study various defuzziification techniques	and L3	
Lab Session 9 Write a program to implement of fuzzy set operation	L2, L3, and L4	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3

Course Code:RBE4310	DECISION MAKING SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking Concepts				
Co-requisites	Nil				

Catalog Description

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these.

Course Objectives

The objective of this course is to

1. To provide an overview of problem solving skills methods using decision making systems .
2. To serve as a foundation for the study of programming languages that is used to develop an Intelligence System

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the concept of artificial intelligence.

CO2. Differentiate between linear and non-linear problems and Learn various problem solving techniques using neural networks

CO3. Understand the concept of fuzzy logic and apply to various problems

CO4. Able to learn concepts of genetic algorithm

Modules	Blooms level*	Number of hours
Module I: Soft Computing Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.	L1, L2	12
Module II: Neural Network Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA	L2, L3 and L4	10
Module III Counter propagation network, architecture, functioning & characteristics of	L2, L3 and L4	8

counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.		
Module IV: Fuzzy Logic Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.	L2, L3 and L4	7
Module V: Genetic algorithm Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.	L2, L4	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books & References:

1. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
2. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
3. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
4. Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
5. Kosko: Neural Network & Fuzzy System, PHI Publication
6. Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
7. Hagen, Neural Network Design, Cengage Learning

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	--	2	--	--
CO2	1	--	1	2	--	--	--	--	--	--	--	--	1	--	1	2
CO3	1	--	1	2	--	--	--	--	--	--	--	--	--	--	--	3
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO5	1	--	2	3	--	--	--	--	--	--	--	--	1	2	--	--
CO6	1	--	--	--	2	3	--	--	--	--	--	--	--	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: RBE4311	DECISION MAKING SYSTEM LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

This lab course covers development and designing of implementing basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations. It aims to develop the concepts and techniques and foster the students' abilities in designing and implementing soft computing based solutions for real-world and engineering problems.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Soft Computing which includes Neural networks, Fuzzy logic and genetic algorithms.
2. Provide knowledge to develop Soft computing programs in Matlab.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement various neural networks using MATLAB.

CO2: Illustrate use of fuzzy in real applications.

CO3: Apply genetic algorithm to basic problems.

Modules	Blooms level*	Number of hours
Lab Session 1: Study of Biological Neural Network	L1 , L2 and L3	2
Lab Session 2: Study of Artificial Neural Network	L1, L2 and L3	1
Lab Session 3: Write a program of Perceptron Training Algorithm.	L3 and L4	2
Lab Session 4 Write a program to implement Hebb's Rule	L3, and L4	2
Lab Session 5 Write a program to implement of Delta Rule.	L3, and L3	2
Lab Session 6 Write a program to implement back propagation learning algorithm.	L3 and L4	2
Lab Session 7 Study of fuzzy inference system	L1, L2 and L3	1
Lab Session 8 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, L3 and L4	2
Lab Session 9 Write a program to implement SDPTA	L3 and L4	2

Lab Session 10 Write a program to implement RDPTA	L3 and L4	2
Lab Session 11 To Study various defuzziification techniques	L1, L2, L3 and L4	1
Lab Session 12 Write a program to implement of fuzzy set operation	L3 and L4	2
Lab Session 13 Study of genetic algorithm	L1, L2, L3 and L4	1
Lab Session 14 Study of Genetic programming and solve a real life problem	L1, L2, L3, and L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
3. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
4. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
5. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	--	3	2	--	3	3	--	--	--	--	--	1	--	--	3

Course Code: MLE4301	PATTERN RECOGNITION & IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Digital Image Processing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with Pattern Recognition. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

This course covers the theory and methods for learning from data, with an emphasis on pattern classification. Digital Image Processing is designed to give professionals and students a powerful collection of fundamental and advanced image processing tools on the desktop.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain introductory part of Pattern recognition Concepts & Bayesian decision theory

CO2: List out the Univariate and Multivariate density

CO3: Explain concepts of Un-supervised learning and clustering

CO4: Describe the Image Fundamentals and Transforms

CO5: Explain the basics of Image Segmentation and Edge Detection

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction of Pattern recognition and Bayesian Decision Theory** Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation Introduction, continuous features – two categories classifications, minimum error-rate classification- zero–one loss function, classifiers, discriminant functions, and decision surfaces	L1 and L2	8
MODULE 2: **Normal density** Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context	L2 and L3	8
MODULE 3: **Un-supervised learning and clustering** Introduction, mixture densities and Identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering, similarity measures, criteria function for clustering	L1 and L2	10
MODULE 4: **Image Fundamentals and Transforms** Elements of visual perception – Image sampling and quantization, Basic relationship between pixels, Some basic grayscale transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT, Separable Image Transforms, Walsh, Hadamard, Discrete	L2 and L3	12

Cosine Transform, Haar, Slant, Karhunen, Loeve transforms.		
MODULE 5: **Image Segmentation and Edge Detection** Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection,	L2 and L3	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text & References:

Text:

4. "Fundamentals of speech Recognition", Lawerence Rabiner, Biing – Hwang Juang Pearson education.
5. "Pattern classifications", Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition.
6. R.C Gonzalez and R.E. Woods, "Digital Image Processing", Addison Wesley.

References:

4. "Pattern Recognition and Image Analysis" – Earl Gose, Richard John baugh, Steve Jost
5. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India.
6. "Digital Image Processing"– M. Anji Reddy, BS Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO 2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO 3	3	--	1	--	2	--	--	--	--	--	--	--	1	3	2	--
CO 4	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--
CO 5	3	--	2	--	1	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4302	NEURAL NETWORK AND FUZZY LOGIC	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Linear algebra, advanced calculus, discrete mathematics, Boolean algebra or equivalent.				
Co-requisites	Nil				

Catalog Description

Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. Neural Networks offer fundamentally alternative approaches to procedural programming. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm. The integration of fuzzy systems and neural networks gives a tremendous potential which can be applied to many complicated problems of Artificial Intelligence and other applications in Real World Computing. This course provides a comprehensive treatment of neural network architectures and learning algorithms, with an in-depth look at problems in data mining and in knowledge discovery.

Course Objectives

The objective of this course is to

1. Introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks.

2. It deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system component

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the principles of neural networks and fuzzy Logic fundamentals.

CO2: compare analysis between human and computer, Artificial Neural Networks models, characteristics of ANN's learning strategies, learning rules and basics of fuzzy logic.

CO3: Understand concept of classical and fuzzy sets, fuzzification and defuzzification, with which they can be able to apply the conceptual things to the real world electrical and electronics problems and applications.

CO4: Get thorough knowledge in biological neuron and artificial neurons.

CO5: Design the required and related systems

Modules	Blooms level*	Number of hours
MODULE 1: Basic neural computation models: Network and node properties. Inference and learning algorithms.Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.	L1, L2	4
MODULE 2: Self organizing networks: Kohonen algorithm, bi-directional associative memories.	L1, L2, L3 and L4	10

Hopfield Networks: Hopfield network algorithm. Adaptive resonance theory: Network and learning rules. Neural network applications.		
MODULE 3: Fuzzy Sets: Operations and properties. Fuzzy Relations: Cardinality, Operations and properties. Value Assignments: Cosine amplitude and max-min method. Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.	L1, L3, L4 and L5	6
MODULE 4: Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning. Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.	L1, L2, L3, and L4	9
MODULE 5:OPTIMUM DESIGN OF MACHINE Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.	L2, L3, L4 and L5	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

5. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
6. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.
7. Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill1997.
8. Bart Kosho "Neural Network and Fuzzy Systems", Prentice Hall of India,1994

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	3	--	2	--	--	--	2	--	--	--	--	1	2	--	1
CO3	1	2	2	4	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	2	2	2	--	---	--	--	--	--	--	--	1	2	--	--
CO5	1	3	2	1	--	--	--	--	--	--	--	--	1	1	--	4

Course Code: MLE4303	Natural Language Processing	L	T	P	C
Version 2020.1	Date of Approval: 19 July,2020	3	0	0	3
Pre-requisites/Exposure	Basics of Python				
Co-requisites	Nil				

Catalog Description

In this course general introduction including the use of state automata for language processing and syntax including a basic parse for natural language processing are discussed in detail. Basic features like regular expressions, Text Normalization, Edit Distance, n-gram model and advanced feature like feature structures and realistic parsing methodologies, part of speech tagging will be introduced.. The concepts learnt in the studies of natural language processing will be applied in jupyter notebook using python for developing small to medium level applications.

Course Objectives

The objective of this course is to

14. Equip the students with concepts of natural language processing through problem solving and practical approach.
15. Provide an overview of various tools in the field of natural language processing to gain practical understanding of the concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, knowledge in speech recognition, models and algorithms; Explain regular expressions and solve related problems; Explain and solve problems related to lemmatization and stemming, minimum edit distance.

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CO2: Explain language models and compare their performance on datasets; Solve some problems on naïve bayes algorithm..

CO3:; Explain logistic regression, similarity, language modelling and solve problems based on them.

CO4:.Describe ANN and Part of speech tagging; Solve problems based on them.

CO5:Describe RNN models and distinguish between simple ANN and RNN;

Modules	Blooms level*	Number of hours
MODULE 1: Knowledge in Speech and Language Processing ,Ambiguity ,Models and Algorithms Language, Thought, and Understanding ,The State of the Art and The Near-Term Future Some Brief History, Regular Expressions, Words ,Corpora,Text Normalization ,Minimum Edit Distance	L1, L2 ,L3	7
MODULE 2: Evaluating Language Models, Generalization and Zeros, Smoothing, Kneser-Ney Smoothing, The Web and Stupid Backoff, Advanced: Perplexity's Relation to Entropy, Naive Bayes Classifiers, Training the Naive Bayes	L1,L2, L3	8

Classifier, Worked example, Optimizing for Sentiment Analysis, Naive Bayes for other text classification tasks, Naive Bayes as a Language Model, Evaluation: Precision, Recall, F-measure, Test sets and Cross-validation, Statistical Significance Testing Advanced: Feature Selection.		
MODULE 3: Classification: the sigmoid, Learning in Logistic Regression, The cross-entropy loss function, Gradient Descent, Regularization, Multinomial logistic regression, Interpreting models, Advanced: Deriving the Gradient Equation, Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Applications of the tf-idf vector model, Optional: Pointwise Mutual Information (PMI), Word2vec, Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models.	L1,L2, L3	8
MODULE 4: Units,The XOR problem, Feed-Forward Neural Networks, Training Neural Nets, Neural Language Models, (Mostly) English Word Classes, The Penn Treebank Part-of-Speech Tagset, Part-of-Speech Tagging , HMM Part-of-Speech Tagging, Maximum Entropy Markov Models, Bidirectionality, Part-of-Speech Tagging for Other Languages.	L1, L2 and L3	6
MODULE 5: Simple Recurrent Networks, Applications of RNNs, Deep Networks: Stacked and Bidirectional RNNs, Managing Context in RNNs: LSTMs and GRUs, Words, Characters and Byte-Pairs.	L1, L2,L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Daniel Jurafsky & James H.Martin, "Speech and Language Processing", 2nd Edition, Pearson Education, 2009.
2. James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
3. Manning, Christopher D and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", Cambridge, 1st Edition, MA: MIT Press, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4304	PATTERN RECOGNITION AND IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

In this Lab course first student should learn about advanced level of software used for easy calculation and toolbox used for software like MATLAB.

Course Objectives

The objective of this course is to

16. Make the students applyknowledge of various Image processing & pattern recognition required for solving complex problems.
17. Provide a demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

CO5: Demonstrate usage of applications involving with Image processing & Recognition Its Toolbox used by MATLAB

Modules/Topics Covered**	Blooms level*	Number of hours
6. Introduction of MATLAB (d) Basic Variable deceleration & its operation (e) Function use & its application	L3, L5	4
7. Sample Programs in MATLAB (g) Basic use of Matrix and Graph Plotting (h) Different type of graph plotting with use of different -2 type of data	L3, L5	6
8. Sample Programs using MATLAB functions (d) Create a basic program MATLAB using functions (e) Use of basic function Image processing (f) Practice on Basic function of Image processing tool box.	L3, L5	6
9. Sample programs of ANN functions (c) Practice on Pattern Recognition functions in MATLAB (d) Write a program for training a small network in MATLAB	L3, L5	6
10. Sample Programs using ANN toolbox & Image processing toolbox (e) Demonstrate the use of ANN tool box & Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

Text & References:

- Rafael C. Gonzalez & Richard E. Woods, “Image Processing Using MATLAB”, 2nd edition, Pearson Education.
- “Pattern classifications”, Richard O. Duda, PeterE. Hart, David G. Stroke. Wiley student edition, Second Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE-External Exam

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	3	1	--	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	3	2	--	--	--	--	--	--	--	--	--	2	--	2	--
CO5	1	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4305	NEURAL NETWORK AND FUZZY LOGIC LAB	L	T	P	C
Version 2020.1	Date of Approval: 20 July 2020	0	0	2	1
Pre-requisites/Exposure	C/C++/MATLAB				
Co-requisites	Nil				

Catalog Description

Neural Networks offer fundamentally alternative approaches to procedural programming. Fuzzy sets and fuzzy logic find many applications in the areas of stability theory, pattern recognition, controls etc. These systems proved their applicability to the problems where there are missing data or information or the problems which could not be defined in an algorithm.

Course Objectives

The objective of this course is to

To become familiar with neural networks learning algorithms from available examples and give design methodologies for artificial neural networks.

2. Understand and analyse concepts of fuzzy set and use fuzzy set operations to implement current computing techniques used in fuzzy computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO2: To analyse and appreciate the applications which can use fuzzy logic.

CO3: Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications and they will be able to design inference systems

Modules	Blooms level*	Number of hours
Lab Session 1: Write a program to implement single layer perception algorithm.	L3 and L4	2
Lab Session 2: Write a program to implement back propagation learning algorithm	L3 and L4	4
Lab Session 3: Design multilayer feed forward network using back-propogation algorithm	L3 and L4	6
Lab Session 4 Study of fuzzy inference system	L1, L2, and L3	2
Lab Session 5 To study fuzzy logic controller using fuzzy logic toolbox	L1, L2, and L3	4
Lab Session 6 Write a program to implement SDPTA	L3 and L4	2
Lab Session 7 Write a program to implement RDPTA	L3 and L4	2
Lab Session 8 To Study various defuzziification techniques	L1, L2, and L3	2

Lab Session 9 Write a program to implement of fuzzy set operation	L2, L3, and L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

3. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
4. Freeman J. A., and Skapura D. Mu. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York, 1991.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	3	--	--	--	--	3	--	--	--	--	1	2	--	--
CO2	1	--	2	2	--	--	--	3	--	--	--	--	1	2	--	--
CO3	1	2	2	3	--	--	3	--	--	--	--	--	1	--	--	3

Course Code: MLE4306	**HADOOP LAB**	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

5. To make students familiar with big data technologies.
6. Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure Hadoop and various tools like Pig, Hive etc.

CO2. Explain concepts of files and directories in HDFS and apply them in real database applications.

CO3. Design and implement mapreduce programs for a given problem.

CO4. Solve queries using concepts of Hive and Pig.

CO5. Perform operations using HBase.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Installation & Configuration steps of Hadoop	L1 and L2	2
Lab Session 2-3 1. Working with HDFS commands :mkdir, rmdir, rm, mv, ls, du, put, rm-r, cat, tail etc 2. Working with vi editor	L1and L3	4
Lab Session 4-5 Working with Java Map Reduce : Map Class, Reduce Class, Drier Class, map side joins, reduce side joins	L1 and L3	4
Lab Session 6-8 1. Working with Hive : Queries for Hive : Create table, describe database, describe table, describe extended table, describe formatted table, drop table, drop database, display table, where clause 2. Commands : Load Files on table : Load from HDFS, load from local 3. Command :CTAS Create table as select 4. Queries to create external tables	L1 and L3	6

5. Working with commands like : Order by, group by, like, upper, lower, max, min		
Lab Session 9-10 1. Working with PIG : Order by, group by, co group, like, upper, lower, Joins, Union, Cartesian, Product, Pig Scripts	L1 and L3	4
Lab Session 11-12 Working with HBase : Start the hbase, data insert, modify, multiple version insertion, describe, delete truncate, drop etc. Working with Foreign Key and Check Constraint.	L1 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

3. Jeffrey Aven, "SAMS Teach Yourself Hadoop in 24 Hours", 1st Ed., Pearson ,2017.
4. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	---	1	1	--
CO5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4307	DESCRIPTIVE ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: 19 July,2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites	Nil				

Catalog Description

This course introduces some elementary statistical methods of analysis of data and compute various measurements of central tendency, dispersion, skewness and kurtosis. Also discusses computation of the correlation coefficient from ungrouped bivariate data and interpret them and analyse data pertaining to attributes and to interpret results.

Course Objectives

The objective of this course is to

18. Equip the students with concepts of descriptive statistics through problem solving and practical approach.
19. Provide an overview of various tools in the field of statistics to gain practical understanding of the concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain data sampling and solve related problems; Explain and solve problems related to discrete frequency distribution and continuous frequency distribution.

CO2: Explain data samples and compare their performance on datasets

CO3: Explain regression modelling and solve problems based on them.

CO4: Describe Concept of central tendency of statistical data and solve problems based on them.

CO5: Describe Concept of dispersion and distinguish between concepts of central tendency of statistical data

Modules	Blooms level*	Number of hours
MODULE 1: Definitions: Webster's and Secrist's definition of Statistics, Importance of Statistics, Scope of Statistics: In the field of Industry, Biological Sciences, Medical Sciences, Economics Sciences, Social, Sciences, Management Sciences, Agriculture, Insurance, Actuarial Science, Education and Psychology.	L1, L2 ,L3	4
MODULE 2: Types of characteristics: Attributes: Nominal scale, ordinal scale. Variables: Interval scale, ratio scale, discrete and continuous variables, Types of data: Primary data, Secondary data, Notion of a statistical population: Finite population, infinite population, homogeneous population and heterogeneous population. Notion of sample, random sample and non-random sample, Methods of sampling: Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.	L1,L2, L3	6

MODULE 3: Classification: Raw data and its classification, Discrete frequency distribution, Sturge's rule, continuous frequency distribution, inclusive and exclusive methods of classification, Open end classes, cumulative frequency distribution and relative frequency distribution, Graphical Presentation of Data: Histogram, frequency curve, frequency polygon, ogive curves, stem and leaf chart, Check sheet, Parato diagram, Examples and Problems.	L1,L2, L3	6
MODULE 4: Concept of central tendency of statistical data, Arithmetic Mean (A.M.), combined mean of a number of groups, merits and demerits, Geometric Mean (G.M.), Harmonic Mean (H.M.), Weighted Mean, Weighted A.M., G.M. and H.M. , Mode, Median, Empirical relation between mean, median and mode, Order relation between arithmetic mean, geometric mean, harmonic mean.	L1, L2 and L3	6
MODULE 5: Concept of dispersion, characteristics of good measure of dispersion, Range, Mean deviation, Mean square definition, Variance and standard deviation, Combined variance, Combined standard deviation, generalization for n groups, Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation.	L1, L2,L3	6
MODULE 6: Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution, Bowley's coefficient of skewness, interpretation using Box plot, Karl Pearson's coefficient of skewness, Measures of skewness based on moments ($\beta 1$, $\gamma 1$), Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions, Measures of kurtosis based on moments, ($\beta 2$, $\gamma 2$).	L1, L2 ,L3	4
MODULE 7: Bivariate data, bivariate frequency distribution, Concept of correlation between two variables, positive correlation, negative correlation, Scatter diagram, conclusion about the type of correlation from scatter diagram, Covariance between two variables, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient, In case of ties, compute Karl Pearson's correlation coefficient between ranks. Regression: lines of regression, fitting of lines of regression by the least squares method, interpretation of slope and intercept. 9.2 Regression coefficient (byx, bxy), Effect of change of origin and scale, Angle between the two lines of regression, Mean residual sum of squares , Residual plot and its interpretation.	L1, L2 ,L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Goon A.M.,Gupta M. K., Dasgupta B.(1998): Fundamentals of Statistics (V-1),World Press.

2. Miller and Fruend: Modern Elementary Statistics.
3. Snedecor and Cochran: Statistical Methods, Oxford and IBH Publishers.
4. Mukhopadhyay, P: Mathematical Statistics (1996), New Central Book Agency, Calcutta.
5. Introduction to Mathematical Statistics, Ed. 4 (1989), MacMillan Publishing Co. New York.
6. Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
7. Neil Weiss: Introductory Statistics: Pearson Publishers.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4308	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description
The purpose of this course is to develop a knowledge in the field of optimization techniques their basic concepts, ,principles. linear programming and queuing theory.

Course Objectives

After successful completion of the course, student will be able to understand importance of optimization of industrial process management , apply basic concepts of mathematics to formulate an optimization problem , analyse and appreciate variety of performance measures for various optimization problems.

Course Outcomes

On completion of this course, the students will be able to
CO1: Understand importance of optimization of industrial process management.
CO2: Apply basic concepts of mathematics to formulate an optimization problem
CO3: Analyse and appreciate variety of performance measures for various optimization problems
CO4: Use classical optimization techniques and numerical methods of optimization
CO5: Apply knowledge of optimization to formulate and solve engineering problems

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction to optimization – adequate and optimum design – principles of optimization – statement of an optimization problem – classification – formulation of objective function, design constraints.	L1, L2	4
MODULE 2: CLASSICAL OPTIMIZATION TECHNIQUES Single variable optimization –multivariable optimization with no constraints – exhaustive search, Fibonacci method, golden selection, Random, pattern and gradient search methods – Interpolation methods: quadratic and cubic, direct root method.	L1, L2, L3 and L5 , L6	12
MODULE 3:MULTIVARIABLE – UNCONSTRAINED AND CONSTRAINED OPTIMIZATION Direct search methods – descent methods – conjugate gradient method. Indirect methods – Transformation techniques, penalty function method	L1, L3 and L4	8
MODULE 4:NON – TRADITIONAL OPTIMIZATION TECHNIQUES Genetic Algorithms -steady state algorithm, fitness scaling, inversion. Genetic programming:- Genetic Algorithm in problem solving, Implementing a Genetic Algorithm:- computer implementation, operator (reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge	L1, L3, and L4	10

based techniques in Genetic Algorithm. Advanced operators and techniques in genetic search:-Dominance, Diploidy and Abeyance. Inversion and other reordering operators, Niche and speciation and Tabu search methods.		
MODULE 5:OPTIMUM DESIGN OF MACHINE Desirable and undesirable effects – functional requirement – material and geometrical parameters – Design of simple axial, transverse loaded members for minimum cost and minimum weight.	L3 and L4	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text & References:

1. Rao, S.S., "*Optimization – Theory and Applications*", Wiley Eastern, New Delhi, 1978
2. Fox, R.L., Optimization Methods for Engineering Design, Addition – Wesley, Reading, Mass, 1971.
3. Wilde, D.J., "*Optimum Seeking Methods*", Prentice Hall, Englewood Cliffs, New Jersey, 1964

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course Code: MLE4309	Social Network Analytics	L	T	P	C
Version 2020.1	Date of Approval: 19th July 2020	3	0	0	3
Pre-requisites/Exposure	Basis of Database and Networking				
Co-requisites					

Catalog Description
This course gives an introduction to social network analysis, with a focus on modelling. It provides an overview of research questions connected to social networks, and of descriptive measures, models, and methods of analysis that can be used to analyze empirical social network data. It helps to understand the online interactive demonstrations and hands-on analysis of real-world data sets.

Course Objectives
The objective of this course is to

- To provide students effective data-driven intelligence to improve their decisions making and systematically estimate the expected impact on relevant performance objectives
- To equip the students withdata-driven intelligence tools, the basics of data mining techniques and develop a data-analytical approach to problem-solving with their application

Course Outcomes
On completion of this course, the students will be able to
CO1. Know the basic notation and terminology used in network science

CO2. Be able to visualize, summarize and compare networks.

CO3. Learn the basic principles behind network analysis algorithms

CO4. Develop practical skills of network analysis in R programming language

CO5: Be capable of analyzing real work networks

Course Content

Modules	Bloom's level	Number of Hours
Module I Introduction Overview: Social network data-Formal methods- Paths and Connectivity-Graphs to represent social relations-Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.	**L1, L2**	**6**
Module II Community Discovery in Social Networks: Applications, Methods and Engineering Trends Introduction, Communities in Context, Core Methods, Quality Functions, The Kernighan-Lin (Kl) Algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-Level Graph Portioning, Markov Clustering. Other Approaches, Emerging Fields and Problems, Community Discovery in Dynamic Networks, Community Discovery in Heterogeneous Networks, Community Discovery in Directed Networks, Coupling Content and Relationship Information for Community Discovery,	**L1, L2, L3**	**7**

Module III Information Networks and the World Wide Web The Structure of the Web- World Wide Web- Information Networks, Hypertext, and Associative Memory- Web as a Directed Graph, Bow-Tie Structure of the Web- Link Analysis and Web Search, Searching the Web: Ranking, Link Analysis using Hubs and Authorities- Page Rank- Link Analysis in Modern Web Search, Applications, Spectral Analysis, Random Walks, and Web Search.	**L1, L2, L3**	**5**
Module IV Node Classifications in Social Networks Introduction, Problem Formulation, Representing Data As A Graph, The Node Classification Problem, Methods Using Local Classifiers, Iterative Classification Method, Random Walk Based Methods, Label Propagation, Graph Regularization, Adsorption, Applying Node Classification To Large Social Networks, Basic Approaches, Second-Order Methods, Implementation Within Map-Reduce, Inference Using Graphical Models, Metric Labelling, Spectral Partitioning, Graph Clustering, Variations on Node Classification	**L1, L2, L3**	**6**
Module V Data and Text Mining in Social Media Data Mining In Nutshell, Social Media, Motivations For Data Mining In Social Media, Data Mining Methods For Social Media, Data Representation, Data Mining- A Process, Social Networking Sites: Illustrative Examples, Related Efforts, Ethnography And Netnography, Event Maps, Text Mining: Keyword Search, Query Semantics And Answer Ranking, Keyword Search over Xmland Relational Data, Keyword Search Over Graph Data, Classification Algorithms, Clustering Algorithms, Transfer Learning in Heterogeneous Networks.	**L1, L3, L4**	**6**
Module VI Overview of Social Tagging Introduction, Problems With Metadata Generation and Fixed Taxonomies, Tags: Why And What?, Different User Tagging Motivations, Kinds Of Tags, Linguistic Classifications Of Tags, Game-Based Tagging, Tag Generation Models, Tagging System Design, Tag Analysis, Tagging Distributions ,Identifying Tag Semantics, Tags Versus Keywords, Visualization Of Tags, Tag Clouds For Browsing/Search, Tag Selection For Tag Clouds, Tag Hierarchy Generation, Tag Cloud Display Formats, Tag Evolution Visualization.	**LI, L2**	**6**

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
2. Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
3. Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.

Reference Books

1. Jure Leskovec, Anand Rajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2nd edition, 2014.
2. Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1st edition, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	1	1
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	3	1	2
CO3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	1	2
CO4	1	1	3	--	--	--	--	--	--	--	--	--	1	2	1	1
CO5	1	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: MLE4310	AGENT BASED INTELLIGENT SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19th July,2020	3	0	0	3
Pre-requisites/Exposure	Basics of Python				
Co-requisites	Nil				

Catalog Description

This course provides students basic knowledge of employing intelligent agents in solving complex problems and gives the awareness of the building blocks of agents and working of different types of agents. It also analyses the reasons for uncertainty and ability to design agents to handle them.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge of intelligent agents in solving complex problems.
2. Provide an overview of Building Agents, Knowledge Based Agents, Planning Agents and Higher Level Agents.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of knowledge intelligent agents and use in solving complex problems.

.

CO2: Describe the concept of **Concepts for Building Agents and Knowledge Based Agents.**

CO3: Explain the concept of **Planning Agents and Higher Level Agents**.

CO4:.Describe the concept of **Agents and Uncertainty and Higher Level Agents.**

Modules	Blooms level*	Number of hours
MODULE 1: Definitions – History – Hybrid Intelligent Agents – Agents vs Multi Agent Systems– Structure – Environment – Basic Problem Solving Agents – Complex Problem Solving Agents – Formulating Search Strategies – Intelligent Search.	L1, L2 ,L3	7
MODULE 2: Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events- Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle.	L1,L2, L3	8
MODULE 3: Knowledge Representation – Logic – First Order Logic – Reflex Agent – Building a Knowledge Base – General Ontology – Interference – Logical Recovery.	L1,L2, L3	7
MODULE 4: Situational Calculus – Representation of Planning – Partial Order Planning – Practical Planners– Conditional Planning - Preplanning Agents.	L1, L2 and L3	5
MODULE 5: Acting under uncertainty – Probability – Baye's Rule – Belief Networks –	L1, L2,L3	5

Utility Theory - Decision Network- Value of Information – Decision Theoretic Agent Design.		
MODULE 6: Learning Agents – General Model – Inductive Learning – Learning Decision Tree – Reinforcement Learning – Knowledge in Learning – Communicative Agents – Types of Communicative Agents – Future of AI.	L1, L2 and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text & References:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2010.
2. Lin Padgham, Michael Winikoff, "Developing Intelligent Agent Systems: A Practical Guide", 1st Edition, John Wiley & Sons, 2004.
3. ZiliZhang,Chengqi Zhang, "Agent-Based Hybrid Intelligent Systems: An Agent- Based Framework for Complex Problem Solving", 1st Edition, Springer-Verlag New York, LLC , 2004.
4. Ngooc Thanh Nguyaaen, Lakhmi C. Jain, "Intelligent Agents in the Evolution of Web and Applications", 4th Edition, Springer, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code :- AIE4437	Project Dissertation-II	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	0	15
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
C05	1	1	--	--	--	--			1	-	-	-	--	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engg. & Technology

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA
GURUGRAM

SEMESTER-I (Syllabus)

- **Course Title : Systems and warfare Platforms**
  Course Code : DTE4101
  Teaching Scheme : L: 4, T: 0, P:0 Credits: 4

Course Objectives:
The main objective of the course is to provide knowledge to the students about various types of military platforms used in air, naval & land warfare. Students will also be apprised for weapon system and self-protection strategies and tech- niques.

Course Outcomes :
At the end of the course the student should be able to

- Understand types of warfare platform used for Army, Air and Marine and their design fundamentals.
- Understand the weapon systems like guns, ordnance, missiles projectiles, mines/ countermines, lasers, undersea weapons, air-launched weapons, anti- aircraft, anti-ship and anti-submarine.

Course Content:

Module	Contents	Contact Hrs.
1.	Types of platforms: land, sea, air; Lifecycle: concept, design, pre-production, production, operations, support.	7
2.	Ship design fundamentals: buoyancy, stability, ship resistance, survivability; damage control, NBCD, crew numbers, power requirements. Submarine design: buoyancy, stability, hull/tank design, air interdependence.	7
3.	Mechanics of flight: fixed and rotary wing, straight and level flight of aircraft, aircraft control and movement, aircraft control surfaces, aerodynamics, power requirements, range; speed, ceiling, survivability, payload.	7
4.	Military vehicle fundamentals: tracked, wheeled, A, B and C vehicles.	7
5.	Weapon systems: guns, ordnance, missiles, rockets, bombs, sub-munitions, projectiles, mines/ countermines, lasers, undersea weapons, air-launched weapons, anti-aircraft, anti-personnel, anti-ship, anti-submarine.	6
6.	Self defence and Protection systems: Armour, smoke, chaff, decoys; Introduction to instrumentation, lab tests and flight trials.	6
	Total	40

References / Suggested Books:

1. "Light And Heavy Vehicle Technology ", by Nunney. Publisher Elsevier.
2. "Practical approach to motor vehicle engineering and maintenance", by Bonnick Allan et. Al. Publisher: Yesdee.

3. “Automotive Vibration Control Technology: Fundamentals, Materials, Construc- tion, Simulation, and Applications”, by Trelleborg.
4. “An Introduction to Weapons Systems”, by Yacov Bar-Shlomo. Publisher : Create Space Independent Publishing Platform.
5. “Heavy Vehicle Mechanics”, by Ian Nicholson.Publisher : McGraw-Hill Education – Europe.
6. “Military Laser Technology for Defense: Technology for Revolutionizing 21st Century Warfare”, by Alastair D. McAulay. Publisher : Wiley-Interscience; 1st edition.
7. Literature / books suggested by respective course Lecturers.

- **Course Title : Warfare Simulations & Strategies**
  Course Code : DTE4102
  Teaching Scheme : L: 4, T:0, P:0, Credits: 4

Course Objectives:
The main objective of the course is to provide knowledge to the students about warfare system and affluent them with combat modeling using mathematical modeling.

Course Outcomes:
At the end of the course the student should be able to
- Understand the systems used in warfare scenario.
- Understand combat simulation & modelling
- Understand the war gaming simulation & modelling and human factor representation.

Course Content

Module	Contents	Contact Hrs.
1.	Introduction to Warfare systems: air, surface, subsurface, littoral, electronic	7
2.	Military capabilities: air warfare, surface warfare, sub surface warfare, littoral warfare	7
3.	Introduction to the methods used in modeling combat and theirapplication in support of defence decision making and training, Combat simulation.	7
4.	War gaming/interactive simulation, Lanchester"s equations, Mathematical models of combat.	7
5.	War gaming and combat modeling in practice, manual war gaming.	6
6.	Human factors representation in war gaming and combat modeling.	6
	Total	40

References / Suggested Books:

1. "Defense Modeling, Simulation, and Analysis: Meeting the Challenge". Publisher: National Academies Press (October 22, 2006).
2. "Introduction to Electronic Warfare Modeling and Simulation"by David L. Adamy". Publisher : Artech Print on Demand (October 31, 2002).
3. "Engineering Principles of Combat Modeling and Distributed Simulation", by An- dreas Tolk (Editor), Old Dominion University. Publisher : John Wiley & Sons.
4. Literature / books suggested by respective course Lecturers.

- **Course Title : Advanced Engineering Mathematics**
  Course Code : DTE4103
  Teaching Scheme : L: 4, T:0, P:0 Credits: 4

Course Objectives

The main objective of the course is to provide knowledge to the students of probability theory, algebra, solutions of Differential equations, Transform techniques, special functions & their applications in the areas with defence relevance.

Course Outcomes

At the end of the course the student should be able to

- Know the methods for solving differential equations, generating functions.
- Understand basic concepts of Fourier Transform, Laplace Transforms and solve problems with periodic functions, step functions, impulse functions and convolution.
- Demonstrate MATLAB programming for engineering problems.
- Understand the utilization of mathematical methods for solving problems having relevance to defence applications.

Course Content:

Module	Contents	Contact Hrs.
1.	Elements of Probability and Statistics, components of operations research, Linear Algebra	6
2.	Ordinary Differential equations, Numerical methods for ODE and P.D.E. Generating functions, recurrence relations	7
3.	Transform Techniques, Fourier series, Fourier Transform, Laplas Transform	7
4.	Special functions: Power series method, Frobenious method, Legendre equation, Legendre polynomials, Bessel equation, Bessel functions of first kind, Orthogonal property.	7
5.	Elements of Ramsey theory, theorems of Burnside and Polya, and balanced incomplete block designs.	7
6.	Application areas with defence relevance range from mathematics to computer science and operations research, applications in probability, game theory, network design, coding theory, and experimental design.	6
	Total	40

References / Suggested Books:

1. "Advanced engineering mathematics", by Kreyszig. Publisher: Wiley.
2. "Advanced engineering mathematics",by Jain/Iyenger. Publisher: Narosa.
3. "Advanced engineering mathematics",byTaneja. Publisher: I K international
4. "Advanced engineering mathematics",by Alan Jeffery. Publisher: Academic Press.
5. "Advanced engineering mathematics",by Peter V. O"Neil. Publisher: Cengage Learning.
6. Literature / books suggested by respective course Lecturers.

- **Course Title** : **Rockets & Missiles Fundamentals**
  Course Code : **DTE4106**
  Teaching Scheme : L: 3, T:0, P:0 Credits: 3

Course Objectives:

The main objective of the course is to provide knowledge to the students about missile system, classification of missiles, aerodynamics of missiles, subsystems and missile trajectory.

Course Outcomes:

At the end of the course the student should be able to

- Understand basics of missile physics as well as the engineering aspects of missile integration.
- Understand physics behind guided missiles and aero dynamics of missiles.
- Characterization of sub-systems used in missiles.

Course Content:

Module	Contents	Contact Hrs.
1.	Basics of Missile Physics, Introduction to Guided Missiles, Classification of Missiles,	5
2.	Missile Aerodynamic Configurations, Introduction to Missile System, Interrelationship between various Missile Sub-Systems.	5
3.	Basic Characteristics of Guided Missile Systems, Missile System Reliability, Range dispersion and CEP Concept,	5
4.	Design, System Layout and integration of Sub-Systems,	7
5.	Coordinate Transformation, Transformation Matrices. Two, Three and Six DOF Equations of Motion, Ballistic Missile Trajectory,	7
6.	Effect of Curvature of Earth, Rotation of Earth, Variation of Gravity on Missile Trajectory.	7
	Total	36

References / Suggested Books:

1. "Fundamentals of Guided Missiles",by S. R. Mohan. Publisher : Defence Re- search and Development Organisation.
2. "Estimation and Prediction of Ballistic Missile Trajectories" by Jeffrey A. Isaac- son, David R. Vaughan.Publisher : RAND (29 May 1996)
3. "Introduction to Modern Algebra and Matrix Theory", by O. Schreier, E. Sperner, Martin David, Melvin Hausner. Publisher : Dover Publications.
4. Literature / books suggested by respective course Lecturers.

- **Course Title : Advanced Thermal Engineering**
  Course Code : DTE4107
  Teaching Scheme : L: 3, T: 0, P:0 Credits: 3

Course Objectives

The main objective of the course is to provide knowledge to the students for the thermal management requirements / problems of the defence systems and thermal system design & simulation for the various air, land & naval defence systems utilized under different environmental conditions.

Course Outcomes:

At the end of the course the student should be able to

- Understand thermal design and simulations for system design.
- Carry out CFD simulations, design of heat exchangers, refrigeration.
- Understand the concept of thermal management requirement & design for defence systems.

Course Content:

Module	Contents	Contact Hrs.
1.	System thermal design & Analysis, Tools for thermal design and simulation, Heat transfer analysis (conduction, convection & radiation),	7
2.	Computation fluid dynamics (CFD), Thermal Finite Element Analysis	7
3.	Heat Exchangers for: Heat Exchanger Network Design	6
4.	Refrigeration, Humidifiers, Air Washers and Cooling Towers	5
5.	Thermal management design of defence system (combat vehicles, missiles, aerial vehicles etc.)	6
6.	Thermal testing, thermal operation, and integration of thermal design into the defence systems.	5
	Total	36

References / Suggested Books:

1. "Fundamentals of Heat and Mass Transfer", by Incropera and Dewitt. Publication: John Wiley.
2. "Convective Heat and Mass Transfer", by W M Kays and M E Crawford. Publisher: McGraw-Hill publishing Company.
3. "Thermal Radiation Heat Transfer" by J Siegel and R Howell. Publisher: Elsevier.
4. "Manohar Prasad, Refrigeration and Air Conditioning", 3rd Edition, New Age International, 2015.
5. "Computational Fluid Dynamics – The Basics with Applications", by John D Anderson. Publisher :1st Edition, McGraw Hill, 2012.
6. "Thermal System Design and Simulation", by P.L. Dhar, 1st Edition.
7. Literature / books suggested by respective course Lecturers.

- **Course Title : Numerical methods for science and engineering**
  Course Code : DTE4108
  Teaching Scheme : L: 3, T:0, P:0 Credits: 3

Course Objectives

The main objective of the course is to provide knowledge to the students to develop numerical methods aided by technology to solve algebraic equations, calculate derivatives and integrals, curve fitting and optimization techniques. The course will also develop an understanding of the finite element analysis and computational fluid engineering.

Course Outcomes

At the end of the course the student should be able to:

- Use the numerical techniques (algorithms) to find the solution (approximate) algebraic equations and system of equations.
- Fit the data using interpolation technique and spline methods.
- Use to finite element analysis, interpretation of analysis results.
- Understanding of computational engineering process.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction, solution of non-linear equations, solution of linear systems.	5
2.	Introduction and polynomial approximation, curve fitting, Numerical applications & intergradations, numerical optimization.	5
3.	Matrices and types of linear systems, direct elimination methods, conditioning and stability of solutions,	5
4.	Introduction to Finite Element Analysis (FEA) simulation software, Pre- and Post-Processing, Free mesh and Mapped mesh techniques, Quality checks on nodes and elements, Boundary conditions,	7
5.	Introduction to computational fluid engineering, Fundamental equations, Computational Engineering Process.	7
6.	Fluid Simulation for Computer Graphics, Modelling techniques.	7
	Total	36

References / Suggested Books:

1. "Numerical Methods for Scientific and Engineering Computation",by M. K. Jain and S.R.K. Iyengar. Publisher : New Age International Publishers.
2. "Applied Numerical Analysis", by Gerald & Wheatley. Publisher Addison – Wesley.
3. "Introductory Methods of Numerical Analysis", by, S.S. Sastry. Publisher: PHI Pvt. Ltd., 5th Edition,New Delhi, 2009.
4. "Applied Numerical Methods Using MATLAB", by W.Y. Yang, W. Cao, T.S.Chung and J. Morris. Publisher: Wiley India Edn., 2007.
5. "Numerical Methods for Engineers with Programming and Software Applications", by Steven C. Chapra and Ra P. Canale. Publisher: Tata McGraw Hill, 2014 7th

Edition.
6. “Finite Element Procedures”, by K.J. Bathe, Prentice Hall of India.
7. “Finite Elements in Engineering”, by Chandrupatla and Belegundu.
8. “Finite element Method”, by J.N.Reddy.
9. Literature / books suggested by respective course Lecturers.

- **Course Title : Communication Technology**
  Course Code : DTE4109
  Teaching Scheme : L: 3, T: 0, P:0 Credits: 3

Course Objectives

The main objective of the course is to provide knowledge to the students about communication system design, calculation of bandwidth and signal-to-noise ratio of a signal, digital communication systems, performance evaluation, explain the concepts of link budget and multiple accesses as it applies to wireless communication.

Course Outcomes:

At the end of the course the student should be able to

- Understand communication system design methodologies, communication system architecture, analogue & digital modulation techniques.
- Computation of data rates, bandwidth, BER.
- To carry out the link budget analysis.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction on Communication Systems, Basics of wireless channel behavior	6
2.	Digital data communication systems, digital signaling techniques	6
3.	Data rates and bandwidth calculation in digital data communication systems	5
4.	Probability of error and BER calculation, Modulation technologies (analogue & digital), Voice source coding, transmitter and receiver systems	7
5.	Communication system architectures, terminal design and performance, associated information systems	7
6.	Link budget calculations, telemetry and control and IO/IW implications. Antenna types and their impact on the communicaiton systems	5
	Total	36

References / Suggested Books:

1. "Fundamentals of communication systems," by Proakis and Salehi. Publisher: Pearson.
2. "Communication Systems", by Simon Haykin and Michael Moher. Publisher: Wiley.
3. "Modern digital and analog communication systems," by B.P. Lathi and Zhi Ding. Publisher: Oxford University Press.
4. Literature / books suggested by respective course Lecturers.

- **Course Title : Advanced Mechanical Engineering**
  Course Code : DTE4110
  Teaching Scheme : L: 3, T: 0, P:0 - Credits: 3

Course Objectives:
The main objective of the course is to provide knowledge to the students about different methods of mechanical system analysis, mechanical simulation soft- ware and use of computational techniques for structural and fluid dynamics.

Course Outcomes
At the end of the course the student should be able to

- Understand mechanical analysis software and carry out mathematical mod- eling for simulation of phenomena behind the structural and fluid dynamics.
- Carry out design & finite element analysis of components of systems and sub-systems.
- Carry out the CFD analysis.

Course Content

Module	Contents	Contact Hrs.
1.	Introduction to tools for mechanical design & analysis	5
2.	Stress engineering – theory & simulation, mechanics of solids	7
3.	Finite element methods in structural dynamics, Structural integrity	7
4.	Fluid mechanics	5
5.	Computational fluid dynamics	7
6.	Component design, Applied materials and corrosion	5
	Total	36

References / Suggested Books:

1. "An Introduction to Computational Fluid Dynamics: The Finite Volume Method " by H. Versteeg. Publisher : Pearson.
2. "Computational Fluid Dynamics the Basics with Applications", by John D. Ander Jr. Publisher : McGraw Hill Education (1 July 2017)
3. "Fluid Mechanics: Volume 2: Foundations and Applications of Mechanics (Cam- bridge-iisc)" by C. S. Jog. Publisher : Cambridge University Press.
4. " Fundamentals of Machine Component Design", by Robert C. Juvinall, Kurt M. Marshek. Publisher : John Wiley & Sons
5. Literature / books suggested by respective course Lecturers.

- **Course Title : Autonomy and Navigation Technology**
  Course Code : DTE4111
  Teaching Scheme : L: 3, T: 0, P: 0 - Credits: 3

Course Objectives:
The main objective of the course is to provide knowledge to the students about technology of modern navigation systems, particularly satellite-based systems, UAV guidance systems, GPS, SLAM.

Course Outcomes:
At the end of the course the student should be able to:

- Describe the basic principle of operation of a global navigation satellite system
- Understand the navigation systems and derive the navigation equations.
- Carry out path planning the UGV / UAV.
- Solve the equations for calculating a position estimate from a given satellite constellation.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction on navigation and guidance systems, Guidance approaches: conventional guidance such as PN (Proportional Navigation)	6
2.	Geodetic fundamentals of navigation, positioning, reference- and coordinate systems and computational methods for navigation and positioning on the surface of the earth.	7
3.	Geometric guidance, path planning and following, and optimal guidance; path planning for UGV/UAV guidance systems	7
4.	Navigation approaches: navigation systems, Understanding the Global Positioning System (GPS)	5
5.	GNSS (Global Navigation Satellite System), terrain based navigation	6
6.	SLAM (Simultaneous Localization and Mapping); Cooperative guidance and collision avoidance.	5
Total		36

References / Suggested Books:

1. "Global Navigation Satellite Systems: Insights Into GPS", by Bhatta, B., Glonass, Galileo, Compass, and Others. Publisher : BS Publications, New Delhi 2010.
2. "Global Positioning Systems, Inertial Navigation, and Integration", by Grewal, M. S., Weill, L. R., Andrews, A. P., Publisher: John Wiley & Sons, New York, 2006.
3. "GNSS – Global Navigation Satellite Systems", by Verlag Wien. Hofmann-Wellenhof, B., Lichtenegger, H., Wasle, E.. Publisher: Springer 2008.
4. "Global Positioning System Theory and Practice", Hofmann-Wellenhof, B., Lichtenegger, H., Verlag Wien, Collins, J. Publisher: Springer 2001.
5. Literature / books suggested by respective course Lecturers.

- **Course Title : Optimization theory & applications**
  Course Code : DTE4112
  Teaching Scheme : L: 3, T:0 , P: 0 - Credits: 3

Course Objectives

The main objective of the course is to provide knowledge to the students on the numerical optimization algorithms. The course objective is to cover the concepts of optimization methods and algorithms developed for solving various types of optimization problems. Apply the mathematical results and numerical techniques of optimization theory to various Engineering and Analytics problems and applications in both theoretical and applied research areas.

Course Outcomes

At the end of the course the student should be able to

- Understand mathematical modeling and the formulation of optimization problems.
- Create programs based on different optimization algorithms using IT tools, such as MATLAB etc.
- Understand theory about linear programming, integer programming, and stochastic programming
- Understand the process of finalizing design of engineering systems by applying the numerical optimization.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction to optimization, classical optimization techniques.	6
2.	Linear programming & non linear programming and dimensional minimization methods.	7
3.	Non coordination optimization techniques, coordinated optimization techniques, coordinated programming.	7
4.	Dynamic programming, integer programming, stochastic programming.	6
5.	Solution of a variety of design problems in mechanical engineering, using numerical optimization techniques.	5
6.	Additional Topics: multi-objective, optimization, game theory, optical control theory.	5
	Total	36

References / Suggested Books:

1. "Numerical Optimization", by Jorge Nocedal and Stephen J.Write. Publisher: Springer, 2006.
2. "Practical methods of Optimization" by R.Fletcher. Publisher : Wiley, 1987.
3. "Iterative method for optimization" by C. T. Kelley. Publisher : SIAM, 1999.
4. "Introduction to Nonlinear Optimization:Theory, Algorithm, and Applicationwith MATLAB. MOS-SIAM Series on Optimization",by Amir Becker.
5. "Dynamic Programming and Optimal Control (VolumeI) " by Dimitri P. Bertsekas. Publisher : Athena Scientic, 2005.
6. "Optimization Theory and Applications", by SS Rao.
7. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Military Electronics System Engineering**
Course Code : DTE4113
Teaching Scheme : L: 3, T:0 , P: 0 - Credits: 3

Course Objectives

The main objective of the course is to provide knowledge to the students about the learning of the electronics systems requirement for military environment, generation of system requirements, limitations of COTS equipment and radiation effects on the electronic systems.

Course Outcome

At the end of the course the student should be able to:

- Understand the military electronics systems.
- Generate system design requirements as per mission needs & operational requirements.
- To create digital simulation models.
- Understand the limitations of the COTS available electronics systems
- Evaluate the radiation effects on the performance of electronics systems

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction to electronics engineering concepts and methods for the design and integration of complex defense systems.	5
2.	Familiarity with the systems engineering process through case studies of representative defense systems.	5
3.	Introduction to methods used for determination of system requirements from mission needs and operational requirements.	6
4.	Digital simulation models, including those in current used in defence for determining engineering and performance trade-offs.	7
5.	Limitations of commercial-off-the-shelf (COTS) integrated circuits, thermal failure, electrostatic breakdown, noise in solid state devices, packaging reliability issues.	7
6.	Radiation effects due to space and nuclear environments, and the limited availability of military integrated circuit suppliers.	6
Total		36

References / Suggested Books:

1. "Introduction to Electronic Defense Systems", by Neri Filippo. Publisher: Artech House Publishers.
2. "Military Handbook of Electronic Reliability design", by US Department of Defence.
3. "Defence Electronics Standards and Quality Assurance", by Ray Tricker. Pub- lisher : Elsevier
4. "Handbook of Defence Electronics and Optronics: Fundamentals, Technologies and Systems", by Anil K. Maini. Publisher: John Wiley & Sons Ltd
5. "Digital Simulation Methods", by M.G. Hartley. Publisher : P.Peregrinus Ltd
6. "Analysis and Simulation of Noise in Nonlinear Electronic Circuits and Systems", By Alper Demir. Publisher : Springer.
7. Literature / books suggested by respective course Lecturers.

❖ **Course Title : System engineering and analysis**
Course Code : DTE4114
Teaching Scheme : L: 3, T:0, P:0 Credits: 3

Course Objectives:
The course is intended to provide knowledge to the students about the military systems engineering, system requirements, basics of system design, architecture, operational requirements, system reliability and management.

Course Outcome
At the end of the course the student should be able to:
- Understand the system design requirements, architecture, functional requirements
- Generate the system requirements documents as per the requirement analysis.
- Understand the system reliability, maintainability, usability issues.
- Carry out the system reliability analysis.

Course Content

Module	Contents	Contact Hrs.
1.	Fundamentals of systems engineering and system architecting of weapon system, *system engg. standards 15288*, requirements analysis, functional analysis and allocation, preliminary system architecture.	7
2.	systems analysis, system design, and the basics of test and evaluation, Introduction to combat systems,	6
3.	System development phases (Conceiving, Designing, Implementing, and Operating),	5
4.	Techniques of system design and assessment for operational feasibility, including reliability, maintainability, usability (including human factors and human performance).	7
5.	Supportability, and producibility, System cost assessment and effectiveness estimation.	4
6.	Reliability analysis and management (basic tools and methods of reliability for developing complex systems including electronic components, mechanical components, and software), *redundancy, graceful degradation, fault tolerance, MTBF.*	7
	Total	36

References / Suggested Books:

1. "The Engineering Design of Systems: Models and Methods", by Buede D.M.2. Publisher: John Wiley & Sons Inc.
2. "Systems engineering fundamentals", by Defense Acquisition University Pressfort Belvoir, Virginia
3. "System Analysis Design and Development", by Charles S. Wasson. Publisher : Wiley

Series in System Engineering and Management.
4. “Principles of Planned Maintenance”, by Clifton R H. Publisher: McGraw Hill, New York.
5. “An introduction to Reliability and Maintainability Engineering”, by Ebling CE. Tata Mc Graw Hill.
6. "Reliability Engineering", by Srinath L S. Publisher : Affiliated East-West Press Limited, New Delhi, 2002.
7. “Engineering Maintainability”, by Dhillon B S. Publisher : Prentice Hall of India.
8. Literature / Literature / books suggested by respective course Lecturers.

SEMESTER-II (Syllabus)

Combat Vehicle Engineering (Specialisation)

- **Course Title : Combat Vehicle Dynamics**
  Course Code : DTE4201
  Teaching Scheme : L: 4, T: 0, P: 0 Credits: 4

Course Objectives:
The main objective of the course is to provide knowledge to the students about important concepts of combat vehicle dynamics, terrain modeling, vehicle sus- pension systems, wheeled & tracked vehicles.

Course Outcomes
At the end of the course the student should be able to

- Carry out terrain modeling.
- Carry out simulation and testing of suspension system.
- Carry out design of military vehicles.
- Understand longitudinal dynamic response during acceleration and braking,
- Vertical dynamic response to analyze ride, pitch and roll.

Course Content:

Module	Contents	Contact Hrs.
1.	Human response to vibration (HRV).	5
2.	Terrain modeling.	7
3.	Selection and design for military vehicles.	6
4.	Suspension types, modeling, simulation and testing of suspension systems and components, this includes transient, frequency random response.	8
5.	Spring and damper types, selection and characteristics, effects of noise Tires for military and civilian vehicles and their behavior.	7
6.	Wheeled and tracked vehicles at low and high speed including steady state and transient response.	7
	Total	40

References / Suggested Books:

1. "Vehicle Refinement: Controlling Noise and Vibration in Road Vehicles", by Mat- thew Harrison. Publisher : Butterworth-Heinemann .
2. "Vehicle Noise and Vibration Refinement", by Xu Wang. Publisher : Woodhead Publishing.
3. "Noise and Torsional Vibration Analysis of Hybrid Vehicles (Synthesis Lectures on Advances in Automotive Technology)", by Xiaolin Tang, Yanjun Huang. Pub- lisher : Morgan & Claypool Publishers.
4. "Principles of Vibration Analysis with Applications in Automotive", by C.Q. Liu. Publisher : SAE International.
5. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Combat System Engineering**
Course Code : DTE4202
Teaching Scheme : L: 4, T: 0, P: 0 Credits: 4

Course Objectives:
The main objective of the course is to provide knowledge to the students about the basic principles, processes and products of combat systems engineering, sensor technologies. They will also be introduced to weapons of mass destruction.

Course Outcome:
At the end of the course the student should be able to:

- Understand principles of design of combat systems.
- Learn how to design, build, and maintain systems that control different kinds of weapons, including nuclear, chemical, and biological weapons.
- Understand sensor systems, such as radar and sonar.
- Understand risks and threats to combat systems.

Course Content:

Module	Contents	Contact Hrs.
1.	Engineering principles to the design of combat systems with emphasis on detection, tracking, and identification systems	6
2.	Threat Spectrum, Battle Field Environment.	6
3.	Vehicle Configuration, Man Machine Interface.	6
4.	Sensor technologies (radars, ESM, active and passive sonar, infrared, electro-optical, and magnetic/electric/gravity field sensors).	8
5.	Introduction to information warfare and weapons (including electronic warfare).	7
6.	Directed energy weapons, weapons of mass destruction (nuclear, chemical, biological, and radiological), and nonlethal weapons.	7
Total		40

References / Suggested Books:

1. "Warship Combat System Engineering Management Software" by Zhao Xiao Zhe.
2. "Measurement, Instrumentation and sensor Handbook", by John G Webster. Publisher: CRC Press, Florida 2nd edition.
3. "Engineering Principles of Combat Modeling and Distributed Simulation", by Andreas Tolk. Publisher: Wiley Publication.
4. "Sensors and Transducers", by Patranabis D. Publisher: Prentice Hall India Limited.
5. "Magnetic Sensors Principles and Applications" by Author Kuang.
6. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Test and Evaluation of weapon system**
Course Code : DTE4203
Teaching Scheme : L: 4, T: 0, P: 0 Credit: 4

Course Objectives:
The main objective of the course is to provide knowledge to the students about weapon system, the factors that affect their performance and test methodologies.

Course Outcome:
At the end of the course the student should be able to:
- Understand the weapon system requirements and weapon performance characterization under operating and ambient conditions.
- Understand the system reliability, maintenance, life cycle cost, and test procedures that govern the acceptance and induction of system.

Course Content

Module	Contents	Contact Hrs.
1.	Weapon system requirements (land, air, naval).	6
2.	Weapon performance characterization, Operating environment and ambient conditions.	6
3.	Factors affecting system performance, System Acceptance testing.	6
4.	System reliability, system maintenance concept, functional analysis, life cycle costs, logistics support analysis, systems design, production, spare/repair parts management	8
5.	Static test procedures, Shock and vibration tests, Accelerated environmental tests. Closed vessel test. Conditioning chambers.	7
6.	Test methods for evaluation of safety. Dynamic trials. Range requirement analysis, range instrumentation. Post trial Analysis.	7
	Total	40

References / Suggested Books:

1. "Reliability Evaluation of Engineering Systems Concepts and Techniques", by Billinton, Roy, Allan, Ronald N. Publisher: Springer
2. "Man-Machine-Environment System Engineering", by Editors: Long, Shengzhao, Dhillon, Balbir S. Publisher: Springer.
3. "Vibration Testing: Theory and Practice", by Kenneth G. Mcconnell. Publisher : John Wiley & Sons.
4. "Vibration Monitoring, Testing, and Instrumentation", by Clarence W. de Silva. Publisher : CRC Press.
5. Literature / books suggested by respective course Lecturers.

Aerospace Technology (Specialisation)

- **Course Title : Aerospace System Configuration, Design and Simulation**
  Course Code : **DTE4206**
  Teaching Scheme : L: 4, T:0, P:0 Credits: 4

Course Objectives
The main objective of the course is to provide knowledge to the students about the process & techniques of aerospace system design, meeting the specified design requirements. They will also learn about carrying structural and aerodynamic analysis, performance evaluation of aircraft and stability analysis.
Course Outcomes:
At the end of the course the student should be able to:

- Understand the concept of missile system and its design requirements and process.
- Design an aerospace vehicle and articulate its benefits in written and verbal forms.
- Understand the methods for aero-elastic analysis, computational fluid analysis and advances in aero-dynamics.
- Understand the air to air, ground to air, air to ground weapon system, UAV mounted GW and UCAVs.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction (aero-elastic phenomena and design requirements), Introduction to missiles & systems, Design process.	6
2.	Structural requirement, Structural and aerodynamic stiffness, Static aero-elasticity: torsional divergence, Structural vibration and modal analysis.	6
3.	Aerodynamic loads on an oscillating lifting surface, Characteristics of flutter and important design parameters, Methods for aero-elastic analysis, Computational fluid dynamics, advances in aero dynamics (Hypersonic Flows and Aerodynamic Heating).	7
4.	Aircraft performance (cruising, climb, descent, takeoff, landing, maneuver, flight path).	7
5.	System‟s stability & control, aerodynamics control, Introduction to dynamic stability, first and second order responses, Equations of motion and modal characteristics.	7
6.	Introduction to air to air, ground to air, air to ground weapon systems, UAV mounted GW and UCAVs.	7
	Total	40

References / Suggested Books:

1. "Aircraft design: a conceptual approach", by D. Raymer
2. "Flight Dynamics Principles", by Michael V. Cook
3. "Introduction to Structural Dynamics and Aeroelasticity", by Dewey H. Hodges, G. Alvin Pierce
4. "Airplane Aerodynamics and Performance", by Chuan Tau Edward Lan
5. "Fundamentals of Structural Dynamics", by Roy R. Craig Jr., Andrew J. Kurdila.
6. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Guidance & control**
Course Code : DTE4207
Teaching Scheme : L: 4, T:0, P:0 Credits: 4

Course Objectives

The main objective of the course is to provide knowledge to the students about fundamental of satellite navigation, navigation mathematics, principles of radio navigation, INS/GNSS integration and missile control methods.

Course Outcome:

At the end of the course the student should be able to:

- Understand the principles of satellite navigation, inertial navigation, radio positioning.
- Understand various aspects of designing a navigation system.
- Develop mathematical model of missile dynamics.
- Carry out simulation for aircraft/missile using mathematical tools like MATLAB.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction to Navigation, Navigation Mathematics.	6
2.	GNSS: fundamentals, Signals, and Satellites: Fundamentals of Satellite Navigation, Inertial Navigation, Advanced satellite Navigation, Principles of radio Positioning, Terrestrial radio Navigation, Short- Range Positioning, Satellite Navigation Processing.	7
3.	Errors and Geometry, Dead Reckoning, Attitude, and Height Measurement, Feature matching, INS/GNSS Integration.	6
4.	Missile Control Methods: Aerodynamic and Thrust Vector Control, Polar and Cartesian Control.	6
5.	Mathematical Modeling of Missile Dynamics; Missile Actuators and Sensors. Roll and Roll Rate Stabilization.	8
6.	Design and Analysis of Lateral Autopilots, 6 DOF simulation for aircraft/missile using MATLAB	7
	Total	40

References / Suggested Books:

1. "Modern Inertial Technology Navigation, Guidance, and Control", by Anthony Lawrence 2012. Publisher :Springer New York.
2. "The Global Positioning System & Inertial Navigation", by Jay Farrell. Publisher : McGraw-Hill Education (16 December 1998).
3. "MATLAB for Engineering Applications", by William Palm. Publisher : McGraw- Hill Education; 4th edition (February 6, 2018).
4. "Global Navigation Satellite Systems, Inertial Navigation, and Integration", by Grewal, M. S., Andrews, A. P., Bartone, C. G. (2013). Publisher: John Wiley and Sons Inc.
5. "Principles of GNSS, inertial and multi-sensor integrated navigation systems", by Groves, P. D. Publisher : Artech House.
6. "Optimal State Estimation", by Kalman, H Infinity.
7. "Nonlinear Approaches", by Simon, D. (2006). Publisher: Wiley-Interscience
8. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Aerospace Propulsion**
Course Code : DTE4208
Teaching Scheme : L: 4, T: 0, P: 0 Credits: 4

Course Objectives
The main objective of the course is to provide knowledge to the students about different criteria for the selection and evaluation of different types of propulsion systems, analysis of propulsion systems and the thermodynamics behind the critical parts of Aerospace system.

Course Outcomes
At the end of the course the student will have:
- Knowledge about thermodynamics and fluid dynamics behind the aerospace system.
- Understanding of Rocket motor design
- Understanding of different design aspects related to propulsion systems used in aerospace.

Course Content

Module	Contents	Contact Hrs.
1.	Classification & mode of operation of various propulsion systems, basis thermodynamics & fluid Dynamics.	7
2.	Rocket motor design & analysis, Gas Turbine Engine design, GT engine efficiency, GT engine heat transfer & cooling.	8
3.	Aircraft performance, jet engine performance.	6
4.	Jet engine control (compressor performance, axial turbine performance, Fuel systems & pumps, airframe fuel systems, hydro- mechanical fuel metering, Electronics engine control)	7
5.	System integration	6
6.	Computational fluid dynamics (flow modelling strategies, physical modelling, finite difference equations, etc.)	6
	Total	40

References / Suggested Books:

1. "Rocket Propulsion Elements", by George Paul Sutton and Oscar Biblarz. Pub- lisher: John Wiley & Sons
2. "Modern Engineering for Design of Liquid-Propellant Rocket Engines: Progress in Astronautics and Aeronautics Series" by Dieter K. Huzel, David H. Huang.
3. "An Introduction to Computational Fluid Dynamics: The Finite Volume Method" by H. Versteeg. Publisher : Pearson; 2nd edition.
4. "Computational Fluid Dynamics the Basics with Applications" by John D. Ander- son, Jr. Publisher : McGraw Hill Education (1 July 2017)
5. " Fluid Mechanics: Volume 2: Foundations and Applications of Mechanics", by C. S. Jog. Publisher : Cambridge University Press; 3rd edition.
6. "Parallel Processing for Jet Engine Control"" by Thompson, Haydn A, Publisher: Springer- Verlag London
7. "Fundamentals of Machine Component Design", by Robert C. Juvinall, Kurt M. Marshek. Publisher : John Wiley & Sons.
8. "Gas Turbines for Electric Power Generation",by S. Can Gülen.
9. "Gas Turbine Theory ",by H.I.H. Saravanamuttoo , Prof G.F.C. Rogers , H. Co- hen. Publisher : Prentice Hall.
10. "Elements of Propulsion: Gas Turbines and Rockets" by Jack D. Mattingly, Keith Boyer. Publisher : American Institute of Aeronautics & Astronautics.
11. Literature / books suggested by respective course Lecturers.

Communication Systems and Sensors (Specialisation)

- **Course Title : Radar Technologies**
  Course Code : DTE4211
  Teaching Scheme : L: 4, T: 0, P:0 Credits: 4

Course Objectives

The main objective of the course is to provide knowledge to the students about learning on the radar systems, radar parameters, radar environment, theory of detection and design of radar elements, different types of radars & their application.

Course Outcomes

At the end of the course the student should be able to:

- Understand the design of radar systems, solve range equations.
- Apply appropriate mathematical and computer models relevant to radar systems to calculate system performance, and assess the limitations of particular cases
- Understand the major components of a modern radar system
- Learn basic radar signal processing techniques.
- Understand advanced radar techniques.
- Know the major functions and applications of a modern radar systems.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction to RADAR, Radar parameters/definitions, radar equations.	6
2.	Radar cross section (RCS) & Theory of detection, Clutter.	6
3.	Atmospheric propagation, Surveillance and Tracking Radar, Radar Designs.	6
4.	Radar elements Design, Radar Transmitter design, Radar antenna design, Duplexer/TR switch & Radar Receiver.	7
5.	Radar signals and networks, Radar signal processing chain, Pulse compression and micro-doppler processing, Tracking algorithms	7
6.	Phased array radar, Data processing for phased array radar, Airborne radar, imaging radar, Synthetic aperture radar, inverse synthic aperture radar, adaptive array processing.	8
	Total	40

References / Suggested Books:

1. "Introduction to Radar Systems",by M.I. Skolnik. Publisher: Tata Mcgraw hill edition, 2001.
2. "Radar Systems Analysis and Design using MATLAB",by B.R.Mahafza. Publisher CRC Press, 2013.
3. "Monopulse Principles and Techniques", by S.M.sherman and D.K.Barton. Publisher : Artech house, 2011
4. "Fundamentals of Radar Signal Processing", by M.A.Richards. Publisher Tata Mcgraw hill.
5. "Ground Penetrating Radar: Theory and Applications",by, Editor: H.M. Jolt. Publisher: Elsevier.
6. "Radar, Sonar And Navigation Engineering", by K. K Sharma. Publisher: S K Kataria& Sons.
7. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Digital & Satellite Communication and Navigation from Space**
Course Code : **DTE4212**
Teaching Scheme : L: 4, T: 0, P:0 Credits: 4

Course Objectives
The main objective of the course is to provide knowledge to the students on the analogue and digital communication systems, optical communication, satellite communications systems, modulations techniques, signal propagation effects, navigation techniques.
Course Outcomes:
At the end of the course the student should be able to:

- Understand the communication techniques
- Evaluate the performance of communication systems
- Design the analogue and digital communication systems
- Understand and analyse the signal transmission effects
- Understand the different types of navigation techniques

Course Content

Module	Contents	Contact Hrs.
1.	Elements of a communications system and their relationship to system performance.	6
2.	Free space optical communication, Fiber optics communication, Wireless/cellular communications.	7
3.	Fundamental concepts such as current/voltage relationships, time and frequency domains, power spectral density, random signals, Communications system components and functions, analog and digital communications systems,	7
4.	Modulation transmission and reception; baseband and passband digital modulation; system, noise, transmission lines, waveguides and antennas, FEC techniques for mitigating channel errors.	7
5.	Propagation effects on signal transmission; end-to-end path calculations for wire/coax, and RF systems including terrestrial ground links and satellite communications, Spread spectrum, conecpt of frequency hoping.	7
6.	Navigation techniques from space regarding functioning of GPS, GLONASS, IRNSS & Galileo	6
	Total	40

References / Suggested Books:

1. "Satellite communication", by T. Pratt, C. W. Bostian, J. E.Allnut. Publisher: John Willey and sons
2. "Satellite Communications Systems: systems, techniques and technology", by G. Maral, M. Bousquet, Z. Sun. Publisher:John Willy and sons
3. "Digital Communications: Fundamentals and Applications", B. Sklar . Prentice- Hall, Inc.
4. "Understanding of GPS/GNSS: Principles and Applications",by E. Kaplan and C. Hegarty. Publisher: Artech House Publishers.
5. Literature / books suggested by respective course Lecturers.

- **Course Title : Tactical Battlefield Communication & Electronic Warfare**
  Course Code : DTE4213
  Teaching Scheme : L: 4, T:0, P: 0 Credits: 4

Course Objectives

The main objective of the course is to provide knowledge to the students on the techniques for setting up intercept and jamming links for Electronic Warfare(EW) against ground to ground enemy communication signals, UAV command and data links, cell phone links and weapon control links, techniques for predicting intercept and jamming performance.

Course Outcomes:

At the end of the course the student should be able to:

- Understand the nature of tactical battlefield communication
- Calculate communication link performance
- Calculate the requirements for interception of tactical communication
- Calculate the requirements for emitter location, intercept and jamming of tactical comm. signals including weapon control link, UAV links, Cell phone links.
- Use various tools to perform electronic warfare calculations

Course Content:

Module	Contents	Contact Hrs.
1.	Radiometry and power calculation, signature generation, atmospheric effects.	6
2.	Radar ES operational use, radar/ES detection battle, quiet radar, jamming techniques & strategies, jamming of SAR systems.	6
3.	Introduction to radar waveform interception, Technology andoperational characteristics of electronic warfare, Signal processing statics & analysis, statistics & noise, analogue & digital signal processing.	7
4.	Decision theory- hypothesis testing, probabilities of false alarm and detection, Bayesian systems, error probability and bit error rate, receiver operating.	7
5.	UAV Payload/link Issues, cell phone issues, Intercept links, Frequency hopping and other LPI threats;Special techniques for jamming LPI signals	7
6.	Introduction to electronic counter measures and counter-counter measures.	7
	Total	40

References / Suggested Books:

1. "Tactical Battlefield Communications Electronic Warfare", by David Adamy 2008
2. "Military Communications in the Future Battlefield", by Marko Suojanen.
3. "Electronic Warfare for the Digitized Battlefield", by Michael Frater, Michael Ryan.
4. Literature / books suggested by respective course Lecturers.

Directed Energy Technology (Specialisation)

- **Course Title : Directed Energy Sources (Lasers, Microwave)**
  Course Code : DTE4216
  Teaching Scheme : L: 4, T: 0, P:0 Credits: 4

Course Objectives

The main objective of the course is to provide knowledge to the students on the high power laser sources, laser power scaling methodologies, laser beam characterization, optics requirements for high power lasers and generation of high power microwave sources.

Course Outcome:

At the end of the course the student should be able to:

- Understand high power lasers sources, power scaling methodologies of lasers.
- Carry out the atmospheric effects on high power laser beam propagation.
- Estimate optics requirement for handling high power laser beams.
- Understand generation and testing of high power microwave sources.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction of directed energy weapons, Potential weapon applications, how they work, application scenarios	6
2.	High power laser sources (solid state, fiber, free election, liquid etc.), Laser power scaling	7
3.	Atmospheric Laser Beam propagation.	7
4.	Characterization of laser beam parameters	6
5.	Optical material & coating for high energy lasers.	7
6.	High power microwave sources, HPM effects, testing of HPM sources.	7
Total		40

References / Suggested Books:

1. "High Power Laser Handbook,by HagopInjeyan& Gregory D. Goodno
2. "High Power Microwaves James Benford", by John A. Swegle, EdlSchamiloglu.
3. "Coherent Laser Beam Combining", by Arnaud Brignon.
4. "High-Power Optics Lasers and Applications", by Apollonov, Victor V.
5. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Beam Control Technology, Target Acquisition, Beam Pointing & Tracking**
Course Code : DTE4217
Teaching Scheme : L: 4, T: 0, P:0 Credits: 4

Course Objectives
The main objective of the course is to provide knowledge to the students about high power laser & microwave beam control technologies, laser beam directors, their operational requirements, design procedure, design criticality, active target imaging & target tracking, recent developments in the target tracking, atmospheric effects on laser propagation, mitigation methodologies and adaptiveoptics.

Course Outcome:
At the end of the course the student should be able to:
- Understand of high power laser & microwave beam directors, design requirements & design methodologies.
- Gain knowledge of active target imaging, coarse & fine target tracking and contemporary target tracking technologies
- Compute atmospheric effects on the laser beam performance and hence carry out conceptual design of adaptive optics.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction to beam control, Beam control hardware	6
2.	Introduction to laser beam directors, Requirement for high power laser beam directors, Conceptual optical design & analysis of beamDirtectors.	7
3.	Laser beam tracking, pointing & control, Gimbals, Coarse & fine tracking.	7
4.	Active laser imaging & target tracking, Closed loop image tracking, Hardware requirement, Various tracking algorithms, multi-spectral	6
	target imaging, Multiple target engagements, rapid retargeting.	
5.	Atmospheric propagation of Laser beams, atmospheric propagation of laser beams, Correction of atmospheric effects, Adaptive optics, Atmospheric modeling of laser propagation.	6
6.	Introduction to HPM beam control technology, major sub-assemblies.	8
	Total	40

References / Suggested Books:

1. "Beam Control for Laser Systems", by Paul Merritt.
2. "Principles of Adaptive Optics", by Robert Tyson.
3. Literature / books suggested by respective course Lecturers.

- **Course Title : Directed Energy Weapon (DEW) System Engineering**
  Course Code : DTE4218
  Teaching Scheme : L: 4, T: 0, P:0 Credits: 4

Course Objectives

The main objective of the course is to provide knowledge to students about Directed Energy Weapon sub-systems, systems. They will also gain knowledge about system design & analysis, thermal management & power management of DEW and the operational requirements. The course will also provide an insight about the DEW systems developed internationally.

Course Outcome:

At the end of the course the student should be able to:

- Understand of DEW systems, design requirements
- Evaluate the thermal and power requirements
- Evaluate the system performance.

Course Content:

Module	Contents	Contact Hrs.
1.	Attributes of DEW, System requirements, DEW system design, system analysis.	6
2.	DEW subsystems, System modeling & simulation.	6
3.	Thermal management of DEW, Power management of DEW.	7
4.	Operational requirements of directed energy systems, platform integration.	7
5.	Weapon effectiveness under different operating conditions.	7
6.	Overview of internationally developed systems (Airborne Laser	7
	Laboratory, Airborne Laser, Tactical High Energy Laser, Advanced Tactical Laser, and Space-Based Laser programs).	
Total		40

References / Suggested Books:

1. "Directed-Energy Beam Weapons Hardcover", by Bahman Zohuri.
2. "Directed Energy Weapons: Physics of High Energy Lasers (HEL)", by Bahman Zohuri.
3. "An Introduction to Laser Weapon Systems", by Glen P. Perram.
4. "Effects of Directed Energy Weapons", by Philip Nielsen.
5. Literature / books suggested by respective course Lecturers.

- **Course title : Directed energy laser source Lab**
  Course Code : DTE4219
  Teaching Scheme : L: 0, T:0, P: 2 Credits: 2

List of Experiments:

1. Optical resonator design and experimental evaluation
2. Optics Alignment using He-Ne laser
3. Measurement of Laser Power, Beam Width, Spatial Profile, Wavelength
4. Measurement of Laser Beam Parameter (M^2)
5. Optics Surface Quality test using Interferometer
6. Optical Coating Reflectivity, Transmission Test
7. Characterization of Microwave sources

More experiments may be planned in discussion with the concern DRDO Lab.

High Energy Materials Technology (Specialisation)

- **Course Title : High Energy Materials Modeling & Simulation**
  Course Code : DTE4221
  Teaching Scheme : L: 4, T:0, P:0 Credits: 4

Course Objectives

The main objective of the course is to provide knowledge to the students about high-energy materials from theoretical and practical standpoints. This course also includes detailed formulations and reactions presented with thermochemical calculations to aid understanding to the theory and chemical types of explosives.

Course Outcome

At the end of the course the student should be able to:

- Formulate the basis for evaluating competitive and alternative high energy material systems.
- Understand the theory and methods of simulations and applications of high energy materials.
- Understand the usage of tools for carrying out modeling & simulation of high energy materials for using them for creating defence related systems.

Course Content:

Module	Contents	Contact Hrs.
1	Understanding of high energy materials from theoretical and practical standpoints, to formulate the bases for evaluating competitive and alternative high energy material systems	8
2	High energy materials physics and chemistry	6
3	Molecular energetic of the high energy materials molecule including molecular orbital and valence bonding and resonance stabilization	7
4	Concepts and practical implications of sensitivity and energy potential, oxygen balance and thermodynamic, reaction rate theory, hot-spot theory, shock physics and detonation theory	7
5	Tools for high energy materials modeling & simulation	6
6	Overview high energy materials modeling using FEM technique	6
	Total	40

References / Suggested Books:

1. "Chemistry of High-Energy Materials", by Thomas M. Klapötke, De Gruyter, 2012
2. "Shock Waves Science and Technology Library, Detonation Dynamics- Vol. 6," by Zhang F. Publisher : Springer.
3. "Physics of Shock Waves" by Zel'dovich & Raizer.
4. "The Chemistry of Explosives", by Jacqueline Akhavan 2011
5. "High energy materials modeling & simulation", by Andreoni Wanda, Yip Sid- ney. Publisher: Springer, 2020.
6. Literature / books suggested by respective course Lecturers.

- **Course Title : Munitions and Target Response**
  Course Code : DTE4222
  Teaching Scheme : L: 4, T:0 , P: 0 Credits: 4
  Course Objectives
  The main objective of the course is to provide knowledge to students about warheads, ammunition and armour design, and the underlying wound ballistics and human vulnerability. The course will also cover characterization of high energy materials for different properties.

  Course Outcome
  At the end of the course the student should be able to:
  - Design warheads, ammunition and armours.
  - Understand fragmentation theory, small arms and cannon ammunition.
  - Understand the characterization of high energy materials.

Course Content:

Module	Contents	Contact Hrs.
1	Introduction to warheads and ammunition, Introduction to armour design	7
2	Wound ballistics and human vulnerability, Fragmentation theory and warheads, Small arms and cannon ammunition, Shell and projectile design	7
3	Target penetration and shock events covering subsonic to hydrodynamic regimes, Shaped charge and Explosively Formed Penetrator (EFP) warhead design, Kinetic Energy (KE) ammunition and penetrator design	7
4	Mine threat and damage mechanisms, Complex armour, spacing, obliquity, disposition and failure mechanisms	7
5	Characterization and testing of materials for high strain rate loading	6
6	Blast effects, blast-structure interactions including internal detonations, Terminal ballistics demonstration	6
	Total	40

References / Suggested Books:

1. "A Comprehensive Guide to Munitions: Bullets, Bombs, Artillery, Mines, Missiles & Explosives" 2016", by Paul F. Kisak.
2. "Ammunition: Small Arms, Grenades and Projected Munitions",by Ian V. Hogg. Publisher: Greenhill Books.
3. "MILITARY SMALL ARMS: Design Principles and Operating", by Derek Allsop
4. "Armour: Materials, Theory, and Design", by Paul J. Hazell. Publisher: CRC Press, 2015.
5. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Manufacturing and Materials Properties of Explosives**
Course Code : DTE4223
Teaching Scheme : L: 4, T:0, P: 0 Credits: 4

Course Objectives:
The main objective of the course is to provide knowledge to students about synthesis of high energy materials such as Lead Azide/Styphnate, TNT, RDX, NC, NG etc. Various properties of high energy materials, filling processes of high energy materials, plant design, and safety issues will be covered.

Course Outcome:
At the end of the course the student should be able to:

- Understand the basic chemistry of nitration for the synthesis of high energy material molecules
- Have environmental awareness Engineering of the manufacturing of high energy materials.
- Understand physics of high energy materials: Detonation theory, Shocks physics, Explosives train.

Course Content:

Module	Contents	Contact Hrs.
1	Chemistry of the synthesis of high energy material molecules: Basic chemistry of nitration ,	8
2	Synthesis examples of Lead Azide/Styphnate, TNT, RDX, NC, NG, Basic stability/compatibility	6
3	Material science of high energy materials: Basic hazard/performance properties, Crystal properties, Binder properties, Mechanical properties,	7
4	Environmental awareness, Engineering of the manufacturing of high energy materials	6
5	Filling processes of high energy materials, Plant design, safety, Quality control	6
6	Physics of high energy materials: Detonation theory, Shocks physics, Explosives train.	7
	Total	40

References / Suggested Books:

1. "Detonation: Theory and Experiment", by Wildon Fickett. Publisher: Dover Publications Inc.
2. "Organic Chemistry of Explosives", Jai Prakash Agrawal, Robert Dale Hodgson, Publisher: Wiley and sons, 2006
3. "High explosives and propellants", by S. Fordham.
4. "Demystifying Explosives: Concepts in High Energy Materials", by Sethurama Sharma Venugopalan.
5. "Chemistry and Physics of Energetic Materials", by Bulusu, S.N. Publisher: Springer.
6. "High Energy Materials: Propellants, Explosives and Pyrotechnics", by Jai Prakash Agrawal. Publisher : Wiley.
7. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Robotics (MSS, MCC)**
Course Code : **DTE4226**
Teaching Scheme : **L: 3, T:0, P: 0** **Credits: 3**

Course Objectives:

The course is intended to provide learning on the basic concepts of robotics by ex- posing students to a broad range of topics with emphasis on basics of manipula- tors, coordinate transformation and kinematics, trajectory planning, control tech- niques, sensors and devices, robot applications and economics analysis.

Course Outcomes:

At the end of the course the student should be able to:

- Use matrix algebra and Lie algebra for computing the kinematics of robots.
- Calculate the forward kinematics and inverse kinematics of serial and parallel robots.
- Calculate the Jacobian for serial and parallel robot.
- To do the path planning for a robotic system.
- To use software tools for analysis and design of robotic systems.

Course Content:

Module	Contents	Contact Hrs.
1.	Fundamentals of land-based robotic systems covering the areas of locomotion, manipulation, grasping, sensory perception, and teleoperation.	7
2.	Kinematics, dynamics, manipulability, motion/force control, real-time programming, controller architecture, motion planning, navigation, and sensor integration, Control system design.	5
3.	Transformation of coordinates, Kinematics and inverse kinematics, Jacobians.	4
4.	Modelling Control, Proportional (P), Proportional-Integral (PI), Proportional-Integral-Derivative (PID) and Model Based Predictive Controller (MPC)	7
5.	Feedback Control System, Motion and path planning, Collision avoidance and navigation	7
6.	Fundamental of AI, Programming methods for robotics, Human-Robot interaction.	6
Total		36

References / Suggested Books:

1. Text Book: Introduction to Robotics by S.K. Saha (Tata McGraw- Hill, New Delhi, India 2008, 1st Reprint 2009)
2. "Introduction to Robitcs: Mechanics and Control", by Craig, J.J. Publisher : Pear- son, Delhi.
3. "Fundamentals of Robotics: Analysis and Control", by Schilling Robert J. Publish- er : Prentice-Hall, 1990.
4. "An Introduction to Robotics Analysis, Systems, Applications", by Niku Saeed B. Publisher: Prentice-Hall, 2001.
5. Stuart Russell and Peter Norvig, Publisher: Prentice Hall
6. Literature / books suggested by respective course Lecturers.

❖ **Course Title : EMI/EMC in Military Systems**
Course Code : DTE4227
Teaching Scheme : L: 3, T:0, P:0 Credits: 3

Course Objectives:
The course is intended to provide learning on the basic concepts of EMI/ EMCdesign, techniques for prevention of electronic equipment through good EMI/EMC design techniques – grounding, shielding, cable management, and power interface design, troubleshooting techniques, EMI/EMC standards.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the concept of EMI / EMC protection of equipment
- Identify and prevent the common EMI/EMC problems in military systems.
- Understand the Design impact (by requirement) of military EMC specifications.
- Understand EMI/EMC troubleshooting tips and techniques.
- Learn generate EMI/EMC requirements document.

Course Content

Module	**Contents**	**Contact Hrs.**
1.	Basic Concepts: Definition of EMI/EMC *and EMP*, Classification of EMI/EMC, Sources of EMI, EMI coupling modes, ESD Phenomena and effects, Transient phenomena and suppression,	6
2.	EMC requirements for electronic systems, Non-ideal Behaviors of Components; EMI Measurements: Basic principles of EMI measurements, EMI measuring instruments;	6
3.	EMI Control Methods: Conducted and radiated emissions and	6
	susceptibility, Crosstalk and shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator; *Faraday cage, isolation of shelters*	
4.	EMC Standard and Regulations: National and Intentional standardizing organizations, Frequency assignment, Spectrum conversation;	5
5.	EMC Design and Interconnection Techniques: Cable routing and connection, Component selection and mounting, PCB design (Trace routing, Impedance control, decoupling, Zoning and grounding);	7
6.	EMC analysis and detection techniques: Using tools for signal integrity analysis, Study eye diagrams for communication systems.	6
Total		36

References / Suggested Books:

1. "EMI/EMC Computational Modeling Handbook", by brucearchambeault, Omar M. Ramahi, et al.
2. "EMI/EMC Computational Modeling Handbook: 630 (The Springer International Series in Engineering and Computer Science)", by Bruce R. Archambeault, Omar M. Ramahi, et al.
3. "A practical approach to electromagnetic compatibility", by Chetan Kathalay
4. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Defence Electro-Optics and Imaging Systems**
Course Code : DTE4228
Teaching Scheme: L: 3, T:0, P:0 Credits: 3

Course Objectives:
The aim of the course is to provide an introduction to the principles of wide range of current and future electro-optic and imaging devices. Course will also to enable students to light on application of electro-optics and imaging system in defence application.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the technology and principles underpinning electro-optic devices and systems.
- Apply their knowledge to practical electro-optic design and acquisition problems.
- Understand the trade-offs in electro-optic systems design.

Course Content

Module	Contents	Contact Hrs.
1.	Principles of radiometry, The human eye, Visible band optical sighting systems.	6
2.	Camera systems, Image intensifiers, Missile seekers.	6
3.	Electro-optic countermeasures.	6
4.	Thermal imagers, II cameras, Hyper-spectral imaging, Digital image processing.	7
5.	EO sensors for Lasers and laser DEW	5
6.	Electro-optic protection measures.	6
	Total	36

References / Suggested Books:

1. "Systems engineering analysis of electro-optical and Infra red system", by William Wolfgang Arrasmith.
2. "Introduction to Infrared and Electro-Optical Systems", by Author Ronald G. Driggers Ronald G. Driggers.
3. "Handbook of Defence Electronics and Optronics: Fundamentals, Technologies and Systems", by Author(s): Anil K. Maini
4. "Building Electro-Optical Systems: Making It all Work", by Author Philip C. D. Hobbs.
5. "Electro-Optical Instrumentation: Sensing and Measuring with Lasers", by Author Silvano Donati.
6. "Electro-optical systems design, Analysis and testing", by Author Michael C. Dudzik.
7. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Structural Dynamics and Aero-elasticity**
Course Code : DTE4229
Teaching Scheme : L: 3, T:0, P: 0 Credits: 3

Course Objectives:
The course is intended to provide learning on the mathematics behind the computational analysis, Different methods of analysis, Mathematical modeling of the various phenomena related to vibration analysis, various failure criteria and theory related to elastic fracture.

Course Outcomes:
At the end of the course the student should be able to:
- Understand vibrations and fluid dynamics behind the aerospace system.
- Understand of different design aspects related to loading in aerospace system.
- Do the system dynamic analysis using finite element methods.

Course Content:

Module	Contents	Contact Hrs.
1	Principles and methods of computational structural dynamics and vibration analysis.	6
2	Introduction to dynamic analysis using the finite element method, Calculation of modal parameters.	6
3	System dynamic response via mode superposition, frequency response, model reduction, and structural synthesis techniques,Fatigue analysis.	7
4	Introduction to aero-elasticity, Aerodynamic Loading, Bending Moment, Sectional properties of Aerofoil, V-n Diagram,	6
5	Basic theory of linear elastic fracture mechanics; strain energy release rate;	6
6	Applications to delamination crack growth in polymer composite laminates, Damage tolerance issues in composites	5
	Total	36

References / Suggested Books:

1. "Elements of vibration analysis", by Leonard Meirovitch. Publisher : McGraw-Hill Inc.,US; 2nd edition (1 March 1986)
2. "Finite Element Analysis Theory And Application With ANSYS", by Moaveni Publisher : Pearson Education; 3rd edition (1 January 2011)
3. "Mechanical Vibrations | SI Edition | Sixth Edition", by Singiresu S. Rao. Publisher: Pearson
4. "Elements of Fracture Mechanics", by Prashant Kumar. Publisher : McGraw Hill Education.
5. "Introduction to Structural Dynamics and Aeroelasticity", by Dewey H. Hodges and G. Alvin Pierce. Publisher: Cambridge University Press.
5. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Safety, Health & Hazard Management**
Course Code : **DTE4241**
Teaching Scheme : **L: 3, T:0, P: 0** **Credits: 3**
Course Objectives:
The main objectives of the course will be to inculcate a holistic approach towards safety health and hazard management. The course will provide understanding on the safety & hazard management of the toxic chemicals, gases, explosives etc.

Course Outcomes:
At the end of the course the student should be able to:

- Understand chemical safety standards, fire safety, hazard management.
- Handle toxic liquids & gases, explosives.
- Understand the NBC warfare safety, health & environment safety.

Course Content

Module	Contents	Contact Hrs.
1.	Chemical Safety: Standards and regulations of chemical safety in Industries or Laboratories, Storage of hazardous chemicals, Compatibility and classification codes, Chemical risk analysis and management	6
2.	Fire triangle and Handling of Toxic, Industrial Gases	4
3.	Hazard Management: HAZOP and HAZAN techniques, Hazard in manufacture, Hazard prevention measures, Disposal of hazardous materials;	7
4.	Warfare: Classifications of explosives based on hazards, Nuclear, biological and chemical warfare safety;	7
5.	Health: Assessment of human factors, Health & Environment safety	6
6.	Nano materials safety (Toxicology study)	6
	Total	**36**

References / Suggested Books:

1. "Occupational Health and Safety Management A Practical Approach", by Charles D. Reese. Publisher : CRC Press.
2. "Occupational and Environmental Safety and Health", Arezes, P.M., Baptista, J.S., Barroso, M.P., Carneiro, P., Cordeiro, P., Costa, N., Melo, R.B., Abreu dos Santos Baptista, J.M., Perestrelo, G. (Eds.). Publisher : Springers, 2019
3. "Handbook of Occupational Safety and Health", by S. Z. Mansdorf. Publisher : Wiley.
4. "Institution of Chemical Engineers", by Trevor Kletz"Hazop and Hazan
5. "Handbook Of Toxicology Of Chemical Warfare Agents", by Ramesh C. Gupta 2nd Edition Elsevier, 2015
6. "Nanomaterials Safety Toxicity And Health Hazards", by Shyamasree Ghosh De Gruyter.
7. "Hazardous Chemicals Handbook", by Phillip Carson, Clive Mumford Butterworth-Heinemann.
8. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Fundamental of telemetry, telecommand & transponder**
Course Code : **DTE4242**
Teaching Scheme : **L: 3, T:0, P:0** **Credits: 3**

Course Objectives:

The main objectives of the course will be to provide knowledge of the students about the satellite communication, telemetry, modulation techniques, target tracking, signal processing of communication systems.

Course Outcomes:

The students will have in depth knowledge on:

- Satellite communication and related technologies.
- Overall control of satellites through collection, processing, and transmission of data.
- Determination of the satellite‟s exact location through the reception, processing, and transmitting of ranging signals.
- Proper control of satellite through the reception, processing, and implementation of commands transmitted from the ground.

Course Content:

Module	**Contents**	**Contact Hrs.**
1	Fundamental of satellite communication, different modulation and multiplexing schemes.	6
2	Satellite Telemetry, Tracking and Tele-command, Multiple Access Techniques Telemetry, Data Transmission, Methods of Modulation, Time Division and Frequency Division Multiplexing, FDMA, TDMA, CDMA and DAMA, Coding Schemes.	6
3	Satellite Packet Communications, Tracking and Telemetry.	6
4	Doppler and Electro-Optical methods of tracking, Airborne Missile.	6
5	Signal Processing: Processing of Signal, Data Acquisition and Reduction.	6
6	Introduction to satellite communication, transponders.	6
	Total	36

References / Suggested Books:

- "Spacecraft TT&C and Information Transmission Theory and Technologies", by, Jiaxing Liu. Publisher : Springer, 2014
- "Introduction to PCM Telemetering Systems", by Stephen Horan. Publisher: CRC Press
- "Satellite Communications Systems: Systems, Techniques and Technology", by Gerard Maral, Michel Bousquet, Zhili Sun. Publisher : Wiley, 2020
- "Satellite Communications", by Timothy Pratt, Jeremy E. Allnutt, 3rd Edition Publisher : Wiley.
- "Principles of Modern Communication Systems", by Samuel O. Agbo , Matthew N. O. Sadiku 2017
- Literature / books suggested by respective course Lecturers.

❖ **Course Title : Jamming and ECM/ECCM technologies**
Course Code : DTE4243
Teaching Scheme : L: 3, T: 0, P:0 Credits: 3

Course Objectives:
The course is intended to provide learning on the concept of jamming, frequency matching, continuous interference, factors affecting ECM, basic principle of noise jamming, different types of jamming systems, ECM techniques, and ECCM.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the concept of electronic attacks.
- Understand the principles and the practical applications of current and evolving electronic jamming technology
- Understand the different types of electronics counter measures and counter – counter measures.

Course Content

Module	Contents	Contact Hrs.
1.	Principals of Electronic Attack (EA), Jamming-to-Signal Ratio, Jamming Types Burn-Through, Cover Jamming, Range Deceptive Jamming, Inverse Gain Jamming.	7
2.	Repeater Jamming Equations, Noise Jamming vs. Deception, Repeater vs. Transponder, Side lobe Jamming vs. Main lobe Jamming.	6
3.	Stand-Off Jamming, Escort Jamming, Self-Protection Jamming, ECM techniques, On-Board ECM Systems, Off-Board ECM Systems.	5
4.	Infrared Countermeasures (IRCM), Off-Board ECM Systems, Communications Countermeasures (COM-ECM), Electro-Optic Counter Measure (EOCM) Systems.	6
5.	Airborne Tactical Jamming System, Shipboard Self-Defense System, EA/Susceptibility against Weapon Systems. Search Radar Counter-Countermeasures, Tracking Radar.	6
6.	Counter-Countermeasures, Infrared Counter-Countermeasures, Communications Counter-Countermeasures.	6
Total		36

References / Suggested Books:

1. "Electronic Countermeasure and Electronic Counter-Countermeasure", by Bahman Zohuri.
2. "Fundamentals of Electronic Warfare 2001", by S.A. Vakin , L.N. Shustov, R.H. Dunwell.
3. "Communications, Radar and Electronic Warfare by Adrian Graham 2010
4. "Electronic Warfare & Radar Systems Engineering Handbook" 2013, Naval Air Warfare Center Weapons Division.
5. "EW 101: A First Course in Electronic Warfare (Artech House Radar Library)", 1st Edition
6. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Software defined Radios**
Course Code : DTE4244
Teaching Scheme : L: 3, T:0 , P:0 Credits: 3

Course Objectives:
The course is intended to provide understanding of the fundamental of software defined radios, different aspects of SDRs, practical scenarios along with knowledge of different SDR hardware and software.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the concept, application of SDRs.
- Understand of analog RF components as front end block in implementation of SDR.
- Gain knowledge of digital hardware architectures and its development techniques.
- Gain knowledge of software development for embedded wireless systems.

Course Content:

Module	Contents	Contact Hrs.
1.	SDR introduction, major standards, SDR architecture, SDR enablers, advantage / disadvantages, Applications.	6
2.	Waveform platform bifurcation, red – black separation, digital modulation-advanced linear and non-linear bandwidth efficient modulations. Bandwidth and power efficiency, peak to average power, error vector magnitude and error probability.	6
3.	SDR Hardware, super-heterodyne architecture, homodyne architecture, advantages & disadvantages, Software for SDR, Processing architecture for SDR.	6
4.	RF channels, receiver channel equalization, multiple access techniques Frequency, time and code division techniques as well as carrier sensing, Wireless sensor networks and beam steering in azimuth and elevation, receiver analogue signal processing, receiver digital signal processing..	6
5.	Source and channel coding (Source and channel coding, sampling, entropy, data compression, voice coding, block and convolution coding, turbo coding, space-time coding and trellis coding).	7
6.	Case studies in software radio design, Introduction and a Historical perspective	5
Total		36

References / Suggested Books:

1. "Software Radio, (A modern approach to radio engineering)", by Jeffery H.Reed Publisher : PHI PTR.
2. "RF and Digital Signal Processing for Software Defined Radio", by John J. Rouphael. Publisher : Elesiver.
3. "Digital Techniques in Frequency Synthesis", by B.G.Golderg. Publisher: McGraw-Hill.
4. "Multirate Signal Processing", by N.J.Fliege. Publisher: John Wiley and sons.
5. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Advanced Lightweight and Composite Structures**
Course Code : **DTE4245**
Teaching Scheme : **L: 3, T:0, P: 0** **Credits: 3**

Course Objectives:

The main objectives of this course is to impart thorough knowledge of advanced composite materials, their manufacturing techniques and to develop mathematical models & design structures made of composites. Basic understanding of structures used in airborne systems like missiles and aircrafts& their performance under static and dynamic loading, including crash and bird strike will also be covered.

Course Outcomes:

At the end of the course the student should be able to:

- Understand the design of advanced structures and lightweight materials for aerospace materials.
- Understand the numerical and analytical skills in structural mechanics for both composite and metallic components.
- Apply knowledge to solve real engineering problems.

Course Content:

Module	**Contents**	**Contact Hrs.**
1.	Review of Strength of Materials, Introduction to Aerospace Materials – Metal Alloys and Fiber Reinforced Composite	6
2.	Introduction to different types of constructions: Monocoque, Semi-Monocoque, Truss, and Corrugated shell	7
3.	Introduction to Aircraft and Missile Structural Components: Spars; Ribs; Stringer; Longerons	6
4.	Analysis of stress; Analysis of strain	7
5.	Material Constitutive Relations	5
6.	Failure Theories; Fatigue theory	5
	Total	36

References / Suggested Books:

1. "Composite Structures Safety Management", by Dr. Bjorn Backman. Publisher : Elsevier Science.
2. "Composite Structures: Design, Mechanics, Analysis, Manufacturing and Testing", by Manoj Kumar Buragohain. Publisher : CRC Press.
3. "Lightweight Composite Structures in Transport: Design, Manufacturing, Analysis and Performance", by James Njuguna Woodhead Publishing, 2016
4. "Structural and Stress Analysis", by T.H.G. Megson. Publisher: Butterworth-Heinemann.
5. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Test Methodologies for DEW Systems (Lasers & Microwave)**
Course Code : **DTE4246**
Teaching Scheme : **L: 3, T:0, P: 0 Credits: 3**

Course Objectives:
The course is intended to provide learning on the testing requirements, characterization, system performance testing procedures, test setups, safety standards, safety tools of laser and microwave based DEW systems.

Course Outcomes:
At the end of the course the student should be able to:
- Understand the characterization and testing requirements of DEW systems.
- Carry out the indoors & outdoors system performance testing.
- Understand the safety issues, safety standards, handling high power sources.

Course Content:

Module	Contents	Contact Hrs.
1.	Testing requirements of DEW system, types of testing, laser effect testing on target, system output testing.	6
2.	System performance testing, System outdoor test & measurement instruments.	7
3.	Laser testing issues, Laser safety, Laser safety standards, laser safety tools.	5
4.	Microwave system testing Impedance measurement, S-Parameters and the Smith Chart.	5
5.	Power Measurement, Noise Figure and Phase Noise measurement, Frequency measurements (Spectrum Analysis), Gain Compression and Intermodulation, Network Analysis,	7
6.	Microwave subsystem / system characterization techniques. HPM safety tools, safety standards.	6
Total		36

References / Suggested Books:

1. "An Introduction to Microwave Measurements", by Ananjan Basu.
2. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Advanced Analytical techniques/Lab testing**
Course Code : DTE4247
Teaching Scheme : L: 3, T:0, P: 0 Credits: 3

Course Objectives:
The main objective of the course is to impart an in-depth knowledge of material characterization by all the conventional well established techniques used worldwide. The course provides understanding on the material characterization, having main focus on polymeric techniques, chromatography and Spectroscopy.

Course Outcomes:
At the end of the course the student should be able to:
- Understand different characterization techniques.
- Apply appropriate analytical technique for a particular material organic/ inorganic/ nanomaterial/ polymer etc.

Course Content:

Module	Contents	Contact Hrs.
1.	Instrumental Analysis: Qualitative analysis	4
2.	Genesis of instrumental analysis, hyphenated techniques	4
3.	Polymeric Techniques: Rheology Techniques, Molecular weight determination; Thermal Techniques: Thermo Gravimetry (TG), Differential Thermal Analysis (DTA), and Differential Scanning Calorimetry (DSC)	8
4.	Chromatographic Techniques: Gas Chromatography (GC), High Performance Liquid Chromatography (HPLC), Thin Layer Chromatography (TLC), Ion chromatography	8
5.	Spectroscopy: Ultra Violet-Visible Spectroscopy UV-VIS, Infra-Red spectroscopy (IR), Nuclear Magnetic Resonance (NMR), Mass spectroscopy, Atomic Absorption Spectroscopy (AAS)	8
6.	XRD and SEM techniques, Sensitivity studies.	4
	Total	36

References / Suggested Books:

1. "Fundamentals of molecular spectroscopy" by C. N. Banwell. Publisher : McGraw Hills.
2. "Introduction to Spectroscopy" by Donald L. Pavia, Gary M. Lampman, and George S. Kriz. Publisher: Cengage Learning, 2014.
3. "Chromatography: Concepts and Contrasts" by James M. Miller. Publisher : Wiley.
4. "Chromatography: Principles and Instrumentation", by Mark F. Vitha. Publisher: Wiley.
5. "Elements of X-Ray Diffraction" by B.D. Cullity Deceased, S.R. Stock. Publisher : Pearson.
6. "Electron Microscopy: Principles and Fundamentals" by S. Amelinckx, Dirk van Dyck, J. van Landuyt, Gustaaf van Tendeloo. Publisher : Wiley.
7. "Polymer Characterization: Physical Techniques", by Dan Campbell, Richard A. Pethrick, Jim R. White 2nd Edition. Publisher CRC Press.
8. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **SONAR System Engineering**
Course Code : **DTE4248**
Teaching Scheme : **L: 3, T:0, P: 0** **Credits: 3**

Course Objectives:
The objective of the course is to provide an in-depth understanding of underwater acoustic principles, sonar technology and applications, hardware and software de- sign engineers new to sonar system design.

Course Outcomes:
After the successful completion of the course student should be able to

- Know the basic building blocks of a radar system**.**
- Have an in-depth knowledge on different types of signals that are used.
- Know about the ambiguity function and its significance in radar signal processing.
- Know the physics behind sound propagation in water and principle of operation of sonar.
- Apply the knowledge acquired in this course in real time applications**.**

Course Content

Module	**Contents**	**Contact Hrs.**
1.	Mathematical development and discussion of fundamental principles that pertain to the design and operation of passive and active sonar systems critical to naval operation.	6
2.	Topics from complex aperture theory, array theory.	6
3.	Signal processing	5
4.	Introduction to undersea warfare and engineering acoustics	6
5.	Principles of optimal signal processing techniques for detecting signals in noise, maximum likelihood, Bayes risk.	7
6.	Neyman-Pearson and min-max criteria and calculations of their associated error probabilities (ROC curves)	6
Total		36

References / Suggested Books:

1. "Fundamentals of Radar, Sonar and Navigation Engineering", by K. K. Sharma.
2. "Principles of Modern Radar: Advanced techniques", by editor William L. Melvin.
3. "An Introduction to Sonar Systems Engineering", by Lawrence J. Ziomek.
4. "Sonar for practicing engineers", by A. D. Waite.
5. "Underwater Acoustics: Analysis, Design and Performance of Sonar", by Richard P. Hodges.
6. Literature / books suggested by respective course Lecturers

❖ **Course Title** : **Unmanned Aerial Vehicle Design**
Course Code : **DTE4249**
Teaching Scheme : **L: 3, T: 0, P:0** **Credits: 3**

Course Objectives:
The course is intended to provide the understanding of the initial designing and sizing process for rapidly growing fixed – wing UAV technology, integrated with its performance and stability analysis, air-safety issues, airworthiness and prototype testing.

Course Outcomes:
At the end of the course the student should be able to:
- Understand the design requirements, design parameters of UAV.
- Perform the aerodynamic analysis, performance and stability analysis.
- Understand the performance testing of the UAVs.
- Understand the airworthiness and safety requirements of UAV.

Course Content:

Module	Contents	Contact Hrs.
1.	UAV design Requirements, design parameters, design algorithms, Certification approaches: aircrafts and UAVs. Airworthiness of aircrafts and UAVs.	6
2.	Air safety issues. Handling qualities. Maneuverability requirements. Aircraft design; UAV system design. UAV system identification	6
3.	UAV aerodynamics, structures and propulsion, performance and stability analysis.	7
4.	UAV project life cycles. Stages of Aircraft design. Initial sizing: aircrafts and of UAVs.	6
5.	Ground control systems. Ground and flight testing of UAVs. UAV guidance and Navigation. Design for reliability.	5
6.	Wind Tunnel Testing, Aerodynamic Characterization through Wind Tunnel Testing.	6
Total		36

References / Suggested Books:

1. "Introduction to Flight", by John D. Anderson
2. "Performance, Stability, Dynamics, and Control of Airplanes", by Bandu N. Pamadi.
3. "Aircraft performance and design", by John D. Anderson.
4. "Unmanned Aircraft Design A review of fundamentals", by Mohammad H. Sadraey.
5. "Aircraft Design : A Conceptual Approach", by Daniel P. Raymer.
6. "Unmanned Aircraft Systems : UAVs Design Development and Deployment", by Reg Austin.
7. "Small Unmanned Fixed-wing Aircraft Design: A Practical Approach", by Andrew J. Keane and James P. Scanlan.
8. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Naval Ocean Analysis and Prediction**
Course Code : **DTE4250**
Teaching Scheme : **L: 3, T:0, P:0** **Credits: 3**

Course Objectives:
The course is intended to provide understanding of the science and art of Naval Ocean. They will learn methods of analysis of ocean data, to model Naval ocean, to generate global ocean circulation prediction system, Shallow Water Analysis and Forecast System (SWAFS).

Course Outcomes:
At the end of the course the student should be able to:

- Understand and develop the Navy Ocean modeling and prediction program.
- Understand the need to evaluate ocean models and prediction systems for operational and tactical applications.
- Understand and predict environmental conditions in the coastal ocean.

Course Content:

Module	Contents	Contact Hrs.
1.	Advanced knowledge of the Indian Navy ocean analysis and prediction systems.	6
2.	Naval Ocean Modeling Program (NOMP), Naval ocean data systems.	5
3.	Atmospheric forcing systems, data assimilation systems.	6
4.	Optimal Thermal Interpolation System (OTIS), Thermal Ocean Prediction Systems (TOPS).	6
5.	Fundamental concepts in turbulence. The atmospheric planetary boundary layer, including surface layer, and bulk formula for estimating air- sea fluxes.	7
6.	The global ocean circulation prediction system, Shallow Water Analysis and Forecast System (SWAFS), Knowledge of ocean eddies.	6
Total		36

References / Suggested Books:

1. Indian Navy: Ocean of opportunities (Defence Series Books) Author: by PRANAV ZOPE
2. Elements of Ocean Engineering. Author Robert E. Randall
3. Ocean Modelling for Beginners - Using Open-Source Software. Author Jochen Kaempf.
4. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Modeling &Simulation of Laser Matter Interaction**
Course Code : DTE4261
Teaching Scheme : L: 3, T: 0, P: 0 Credits: 3

Course Objectives:
The course is intended to provide understanding on the high power laser beam interaction with metals and composite materials, physics based models for the lethality modeling, damage mechanism & damage threshold measurement techniques and performance evaluation of high power laser systems.

Course Outcomes:
At the end of the course the student should be able to:
- Understand of the laser matter interaction.
- Develop physics-based model for evaluation of effect of laser on metals and composites.
- Understand the laser parameter measurement techniques.
- Analyze the performance of high-power laser systems.

Course Content:

Module	Contents	Contact Hrs.
1.	Laser beam characteristics, Laser lethality modeling & simulation with metal targets & composite materials.	5
2.	Physics based models for vulnerability assessment, Effect of laser on metals & composite materials.	7
3.	Measurement and Characterization of Damage Thresholds, Mechanisms of Damage, Exposure Limits and Their Interpretation.	7
4.	Analysis Tools for the Estimation of Hazards, Laser parameters measurement techniques.	6
5.	Tools to analyze and predict Laser System performance under different conditions like land, sea air, etc.	5
6.	Introduction of full scale end to end modeling of laser system performance.	6
Total		36

References / Suggested Books:

1. "High Power Laser-Matter Interaction", by Mulser, Peter, Bauer, Dieter. Publisher : Springer.
2. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Computational Aerodynamics**
Course Code : DTE4262
Teaching Scheme : L: 3, T:0, P:0 Credits: 3

Course Objectives:
The course is intended to provide learning on the computational aerodynamics, numerical methods for solving systems of equations, numerical modelling of fluids, CFD analysis, turbulence modelling.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the CFD analysis, fluid mechanics, heat transfer analysis, numerical modelling of fluids.
- Generate numerical model related to fluid dynamics
- To do the pre and post processing of CFD analysis.

Course Content:

Module	Contents	Contact Hrs.
1.	Introduction to fluid mechanics & heat transfer,	5
2.	Introduction to numerical analysis, Discretisation approaches: finite difference, finite volume, finite element and spectral methods,	6
3.	Numerical methods for algebraic equations/systems of equations, Numerical schemes for hyperbolic, parabolic and elliptic systems and for fluid dynamics,	6
4.	CFD analysis	7
5.	Numerical modeling of compressible & in-compressible flow, turbulence modeling,	6
6.	Grid generation/CAD, data analysis and uncertainties.	6
	Total	40

References / Suggested Books:

1. "A Textbook of Heat Transfer Paperback", by S.P. Sukhatme. Publisher: Univer- sities Press.
2. "An Introduction to Computational Fluid Dynamics: The Finite Volume Method", by H. Versteeg. Publisher : Pearson.
3. "Computational Fluid Dynamics the Basics with Applications", by John D. Ander- son, Jr. Publisher : McGraw Hill Education.
4. "Fluid Mechanics: Volume 2: Foundations and Applications of Mechanics (Cam- bridge-iisc)", by C. S. Jog. Publisher : Cambridge University Press; 3rd edition.
5. "Numerical Modeling and Computer Simulation", Edited by DraganCvetković, publisher intechopen.
6. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Launch Vehicle Design & Analysis**
Course Code : **DTE4263**
Teaching Scheme : **L: 3, T:0, P:0** **Credits: 3**

Course Objectives:
The course is intended to provide learning on the launch vehicle design and analysis, components and subsystems of the launch vehicle, propulsion systems.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the launch vehicle requirements, its functioning.
- Design and analysis of launch vehicles.
- Understand the propellant requirement for launch vehicles.

Course Content:

Module	Contents	Contact Hrs.
1	Introduction to propulsion for launch vehicles, beginning with mission energy requirements and an overview of current and proposed launch propulsion devices.	6
2	Performance analysis, operating characteristics and propellant selection criteria for air breathing and solid	5
3	Liquid and nuclear rocket motor propulsion systems.	7
4	Advanced cycles and concepts are presented. Design of components and subsystems	7
5	FE modelling: Idealization, Discretization, Meshing and Post Processing,	6
6	Tracking and controlling errors, Nonlinear analysis in FEM, Launch dynamic analysis.	5
	Total	36

References / Suggested Books:

1. "Design of Rockets and Space Launch Vehicles", by Don Edberg, Willie Costa. Publisher : American Institute of Aeronauti cs &Ast. (August 21, 2020)
2. "Modern Engineering for Design of Liquid Propellant Rocket Engines (Progress in Astronautics and Aeronautics)", by Dieter K Huzel, David H Huang. Publisher : AIAA (American Institute of Aeronautics & Astronautics); Revised, Subsequent edition.
3. "Fundamentals of Astrodynamics 1st Edition", by Roger R. Bate, Donald D. Mueller. Publisher: The American Design Ethic, MIT, USA.
4. "Commercial Launch Vehicle Design", by Nickolay Mykola Zosimovych. Publish- er: Lap Lambert Academic Publishing.
5. "Space Vehicle Design, Second Edition", by Michael D. Griffin and James R. French. Publisher The American Institute of Aeronautics and Astronautics, Inc.
6. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Acquisition, Tracking & Pointing Technology**
Course Code : **DTE4264**
Teaching Scheme : **L: 3, T: 0, P: 0** **Credits: 3**

Course Objectives:
The course is intended to provide learning on the acquisition, tracking & pointing technologies, development of tracking algorithms, design and analysis of tracking systems.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the concepts and basic systems requirements tracking systems.
- Understand the system configurations and critical component characteristics required in the design of stabilized pointing and tracking systems, along with an introduction to some more advanced concepts.
- Understand the control system and algorithm techniques and practices com- monly utilized in the design of tracking systems.

Course Content:

Module	**Contents**	**Contact Hrs.**
1.	Acquisition, tracking, and pointing (ATP) design for military systems	6
2.	Target tracking and related mathematics, SNR requirement, the Johnson criteria, probability of estimation, detection criteria	6
3.	Tracking algorithms, track filters, multi target tracking,	6
4.	Electronic countermeasures against modern target tracking radars	7
5.	multiplatform-multi-sensor-multi target tracking	6
6.	Doppler and Electro-Optical methods of tracking	5
	Total	36

References / Suggested Books:

1. "Acquisition, Tracking, Pointing, and Laser Systems Technologies XXI (Proceed- ings of SPIE)" 30 October 2007 by Steven L. Chodos (Editor), William E. Thompson (Editor).
2. "Acquisition, Tracking, and Pointing, January 2017 In book: Free Space Optical Communication", by Hemani Kaushal, Vk Jain and SubratKar. Publisher: Springer India.
3. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Data acquisition, tracking & post flight analysis**
Course Code : DTE4265
Teaching Scheme : L: 3, T:0, P: 0 Credits: 3

Course Objectives:
The course is intended to provide learning on the various aspects of flight trials, measurements & calibration, Generation & analysis of Data.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the interfaces used in data acquisition and standalone instruments to real-world signals.
- Understand the Sensors and transducers, Data acquisition hardware and data acquisition software
- Carry out post flight analysis.

Course Content:

Module	Contents	Contact Hrs.
1.	Importance of Flight Trials in Missile Development, Facilities, Safety Requirements	4
2.	Methods of Measurement, Introduction to Measuring Instruments: Functional elements of an instrument	6
3.	Static and Dynamic Characteristics, Zero, First and Second order of Instruments and their response	6
4.	Calibration of Instruments	5
5.	Sensors and Transducers: Passive and Active types, their uses in measurement of acceleration, angle, vibration, pressure, flow and temperature, strain etc.,	8
6.	Methods for post flight data analysis.	7
	Total	36

References / Suggested Books:

1. "Advances in Missile Guidance, Control, and Estimation: 47 (Automation and Control Engineering)", by editors S.N. Balakrishnan, A. Tsourdos, B.A. White.
2. "Calibration Handbook of Measuring Instruments 1st Edition", by Alessandro Brunelli. Publisher : International Society of Automation.
3. "Calibration Book", by Janne Kivilaakso, Antero Pitkäkoski Jori Valli, Mike John- son, Nobuo Inamoto Arja Aukia Masaki Saito. Publisher: VaisalaOyj.
4. "Sensors and Transducers", by Patranabis D. Publisher : Prentice Hall India Learning Private Limited.
5. "Sensors And Transducers Paperback", by Ian Sinclair. Publisher : Elsevier.
6. Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Air Independent Propulsion and Batteries**
Course Code : **DTE4266**
Teaching Scheme : **L: 3, T:0, P: 0** **Credits: 3**

Course Objective

The course is intended to provide learning on the air independent propulsion systems, hybrid electric vehicles, power requirement of the vehicles, energy storage systems.

Course Outcome:

At the end of the course the student should be able to:

- Understand the requirements of air independent propulsion systems.
- Design and analysis of hybrid electric drive trains.
- Design and analysis Energy storage systems for hybrid electric vehicles.

Course Content:

Module	Contents	Contact Hrs.
1	Introduction to Hybrid Electric Vehicles: Impact of modern drive-trains on energy supplies;	6
2	Hybrid Electric Drive-trains: hybrid traction, various hybrid drive-train topologies, power flow control, fuel efficiency analysis;	7
3	Electric Drive-trains: electric traction, electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis;	7
4	Electric Propulsion unit: electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, Switch Reluctance Motor drives, drive system efficiency;	6
5	Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles,	6
6	Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.	6
	Total	36

References / Suggested Books:

1. "Hybrid Electric Vehicles: Principles and Applications with Practical Perspec- tives", by Chris Mi, M. Abul Masrur. Publisher: Wiley.
2. "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Second Edition (Power Electronics and Applications Series)",by Mehrdad Ehsani, YiminGao, Ali Emadi, Publisher : Standards media.
3. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Advanced digital modulation technologies & standards**
Course Code : DTE4267
Teaching Scheme : L: 3, T:0, P:0 Credits: 3
Course Objectives:
The objective of this course is to provide knowledge on the engineering principles, theories and practices of a digital communication system. The course will deal with the design principles of transmitter and receiver so as to establish a reliable communication link.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the design digital communication systems.
- Understand the transmitter, receiver communications system models, voice source coding– pulse code modulation, delta modulation and vocoders.
- Understand the requirement of cellular communication.

Course Content:

Module	Contents	Contact Hrs.
1.	Design of digital communication system, transmitter and receiver communications system model	6
2.	Voice source coding– pulse code modulation, delta modulation, vocoders	6
3.	Digital modulation – Amplitude-shift, Frequency-shift, Phase-shift, differential phase-shift, Quadrature phase-shift, Quadrature phase-shift, and Minimum-shift keying, Quadrature amplitude modulation	8
4.	Communications channel – Multipath effects, fading and diversity, models of Egli and Murphy	6
5.	Receivers – super heterodyne systems, balanced and unbalanced mixers, frequency synthesizers, Link budget analysis	5
6.	Introduction to cellular communication – CDMA, OFDM, MIMO, Introduction to digital modulation standards.	5
	Total	36

References / Suggested Books:

- "Communication Systems", by, Haykin, S. Publisher : John Wiley & Sons.
- "Modern Digital and Analog Communication Systems", by, Lathi, B.P. and Ding, Z. Publisher: Oxford University Press.
- "Signal Processing for Wireless Communication Systems", by H. Vincent Poor, Lang Tong, Publisher : Springers.
- "Digital Communication: Fundamentals and Applications", by Sklar, B., and Ray, P.K. Dorling Kindersley.
- "Communication Systems: An Introduction to Signals and Noise in Electrical Communication", by Carlson, A.B., Crilly, P.B. and Rutledge, J.C Publisher: McGraw-Hill.
- "Detection, Estimation and Modulation Theory Part I", by Van Trees, H.L. Pub- lisher : Wiley Inter science.
- "Information Theory, Coding and Cryptography", by Bose, R. Tata McGraw-Hill.
- "Digital Communication", by Barry, J.R., Lee, E.A. and Messerschmitt, D.G.Kluwer.
- "Principles of Digital Transmission: Wireless Applications", by Benedetto, S. andBiglieri, E. Publisher : Springer.
- Literature / books suggested by respective course Lecturers.

❖ **Course Title** : **Trajectories modelling& simulation**
Course Code : **DTE4268**
Teaching Scheme : **L: 3, T:0, P:0** **Credits: 3**

Course Objectives:
The course is intended to provide the understanding of flight dynamics, trajectory design analysis, flight performance analysis and practical implications of trajectory planning.

Course Outcomes:
At the end of the course the student should be able to:
- Understand the flight trajectories design requirements.
- Evaluate and predict the flight performance for different trajectories.
- Understand the practical implications while trajectory design.
- Carry out MATLAB based simulation for trajectory modelling.

Course Content:

Module	Contents	Contact Hrs.
1.	Flight Dynamics, Flight envelope limitations. Aerodynamic sizing- equations of motion. Accuracy of simplified equations of motion, orbital mechanics.	6
2.	Role of rocket propulsion in orbital trajectories and maneuvers, Maximizing missile flight performance. Benefits of flight trajectoryshaping.	7
3.	Flight performance prediction of boost, climb, cruise, coast, steady descent, ballistic, maneuvering, divert, and homing flight.	7
4.	Practical implementation of integrated trajectory planning, Agility in maneuvering trajectories.	5
5.	Multiplier theory and its use in solving practical problems covered from a real-time computational viewpoint, No-fly zones and engineering requirements, formulation as a mathematical mixture of state and decision-variable constraints.	5
6.	Extensive MATLAB-based mini-projects.	6
	Total	36

References / Suggested Books:

1. "Flight Dynamics", by Robert F. Stengel. Publisher : Princeton University Press.
2. Literature / books suggested by respective course Lecturers.

❖ **Course Title : Sensor Technology**
Course Code : DTE4269
Teaching Scheme : L: 3, T: 0, P: 0 Credits: 3
Course Objectives:
The main objective of the course is to provide learning on the basic physical principles and characteristic features in sensor technology, design, function and applications of different sensors.

Course Outcomes:
At the end of the course the student should be able to:

- Understand the basic principles of sensor systems required for satellites and tactical aircraft.
- Understand the atmospheric propagation and its impact on the performance of sensors
- Troubleshoot, repair/replace a faulty sensor in optimize process efficiency.

Course Content:

Module	Contents	Contact Hrs.
1	Physical principles underlying the sensor systems needed for satellites and tactical aircraft, as well as limitations imposed by the atmosphere and operating environment on these systems and their communication links,	6
2	Phased array and pulsed compressed radars, imaging synthetic aperture and inverse synthetic aperture radars	5
3	Atmospheric propagation of signal. Noise resources and thermal radiation	5
4	Principles of semiconductor devices. Optical and infrared imaging detector systems.	8
5	Detector resolution limitations and bandwidth requirements, Relationship between signals and noise.	6
6	The characteristics of critical sensor functions (including detection, estimation, imaging, and tracking).	6
	Total	**36**

References / Suggested Books:

1. "Handbook of Modern Sensors", by Jacob Fraden. Publisher : Springer.
2. "Micro sensors, Principles and Applications", by J. W. Gardner. Publisher : Wiley.
3. "Semiconductor Sensors", by S. M. Sze. Publisher : Wiley.
4. Literature / books suggested by respective course Lecturers.

**** The communication has been done with the DRDO Laboratory for getting the details of laboratory work under semester 1 &2. The document will be amended once the details of laboratory work are finalized.***

Annexure A

List of DRDO Labs

Sl No	DRDO Labs	Location
1.	Aerial Delivery Research & Development Establishment (ADRDE)	Agra
2.	Vehicle Research & Development Establishment (VRDE)	Ahmadnagar
3.	Naval Materials Research Laboratory (NMRL)	Ambernath
4.	Combat Vehicles Research & Development Establishment (CVRDE)	Avadi
5.	Integrated Test Range (ITR)	Balasore
6.	Aeronautical Development Establishment (ADE)	Bengaluru
7.	Centre for Air Borne System (CABS)	Bengaluru
8.	Centre for Artificial Intelligence & Robotics (CAIR)	Bengaluru
9.	Centre for Military Airworthiness & Certification (CEMILAC)	Bengaluru
10.	Defence Avionics Research Establishment (DARE)	Bengaluru
11.	Electronics & Radar Development Establishment (LRDE)	Bengaluru
12.	Microwave Tube Research & Development Centre (MTRDC)	Bengaluru
13.	Gas Turbine Research Establishment (GTRE)	Bengaluru
14.	Advanced Systems Laboratory (ASL)	Bengaluru
15.	Centre for Advanced Systems (CAS)	Bengaluru
16.	Centre for High Energy Systems and Sciences (CHESS)	Bengaluru
17.	Defence Electronics Research Laboratory (DLRL)	Bengaluru
18.	DGRE	Chandigarh
19.	Defence Metallurgical Research Laboratory (DMRL)	Bengaluru
20.	Defence Research & Development Laboratory (DRDL)	Bengaluru

21.	Research Centre Imarat (RCI)	Bengaluru
22.	Terminal Ballistics Research Laboratory (TBRL)	Chandigarh
23.	Naval Physical & Oceanographic Laboratory (NPOL)	Cochin
24.	Defence Electronics Applications Laboratory (DEAL)	Dehradun
25.	Instruments Research & Development Establishment (IRDE)	Dehradun
26.	Advanced Numerical Research & Analysis Group (ANURAG)	Hyderabad
27.	Advanced Systems Laboratory (ASL)	Hyderabad
28.	Centre for Advanced Systems (CAS)	Hyderabad
29.	Centre for High Energy Systems and Sciences (CHESS)	Hyderabad
30.	Defence Electronics Research Laboratory (DLRL)	Hyderabad
31.	Defence Metallurgical Research Laboratory (DMRL)	Hyderabad
32.	Defence Research & Development Laboratory (DRDL)	Hyderabad
33.	Research Centre Imarat (RCI)	Hyderabad
34.	Defence Materials & Stores R&D Establishment (DMSRDE)	Kanpur
35.	Defence Research and Development Establishment (DRDE)	Gwalior
36.	Centre for Millimeter Wave Semiconductor Devices & Systems (CMSDS)	Kolkata
37.	High Energy Materials Research Laboratory (HEMRL)	Pune
38.	Armament Research & Development Establishment (ARDE)	Pune
39.	Research & Development Establishment (Engrs) [R&D (Engrs)]	Pune
40.	Naval Science & Technological Laboratory (NSTL)	Visakhapatnam

Annexure B

M.Tech. (Defence Technology)

Provisional List of Superannuated Scientists from DRDO Labs

Following is the provisional list of the superannuated senior scientists from DRDO labs who are interested in taking the teaching assignments / guest lectures for the M.Tech. (Defence Technology). The list will be updated as more willing working / superannuated scientist interested for taking lectures are identified. The academic institute may also create a pool of willing faculties to take lecturers for the mentioned courses.

Semester -1 (Compulsory Courses)

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	Systems and Platforms	Dr Vikas Kumar (Naval)	9849597942	DMRL	Hyderabad
		Sh C. Govindarajan (Combat Vehicles)	9962022929	CVRDE	Chennai
		Sh Srikumar P (Aero)	09448231455	ADE	Bangalore
		Sri. Bhave SM (Naval)	9440858537	NSTL	Vizag
		Sh. K Sreethar (Artillery)	9841323414	CVRDE	Chennai
		Sh. K B Satyanarayana (Combat vehicles)	8500305996	CHESS	Hyderabad
		Sh. Mukesh Chand (Aero)	9490956151	DRDL	Hyderabad
		Sh. Sharma Rakesh Kumar (Aero)	9989157000	DRDL	Hyderabad
		Sh. Karthikeyan S	09482479046	SEMILAC	Bangalore
		Sh. P C Verma (Instrumentation)	94410319061	IRDE	Dehradun
		Sh. U Solomon (Combat Vehicles)	9445040353 / 9629952303	CVRDE	Chennai
		Sh. Suranjan Pal (Laser)	9868240545	HQ	Delhi
		Sh. KSS Rao (Laser)	9885031113	DLRL	Hyderabad
2.	Warefare,Simulations & Strategies	Dr. R N Pralhad (Ballistic, modeling, simulation)	9764157707	DG(ACE)	Pune
		Sh. S T Shah	9422005720	ARDE	Pune

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
		(Armaments)			
		Sh. P Raghevendra Rao (Warfare)	9490792715	DLRL	Hyderabad
		Prof. G Kumaraswami Rao (Warfare)	9347611184 / 9440881501	DLRL	Hyderabad
3.	Advanced Engineering Mathematics	Sh. Subbukutti S	09448011201	ADE	Bangalore
		Dr. K K Chand (System analysis & modeling)	9437453842 / 9437026085	PXE	Balasore
		Course can be taken by Institute Faculty.			

Semester-1 Elective 1

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1	Rockets& Missiles Fundamentals	Dr. Vijay Govund Borkar	9441282985, 040-29552985	RCI	Hyderabad
		Dr. Gadgil SB		RCI	Hyderabad
		Sh. Mukesh Chand	9490956151 mcag2009@gmail.com	DRDL	Gaziabad
2	Advanced Thermal Engineering	N Venkateswaran	Ph. 9444947188 kasven1985@gmail.com	CVRDE	Chennai
		Course can be taken by Institute Faculty.			
3	Numerical methods for Science & Engineering	Dr. K K Chand	9437453842, 9437026085 kkchandpxe@hotmail.com	PXE	Balasore
		Sh. Subbukutti S	9448011201	ADE	Bangalore
		Course can be taken by Institute Faculty.			
4	Communication Technology	Mrs. Sekhar Sellammal	9910011797	HQ_DER&IPR	Delhi
		Sh. L Gnana Michael	9448365755 lgmprakasam@gmail.com	LRDE	Bangalore
		Sh. G Kumaraswamy Rao	9347611184 9440881501	DLRL	Hyderabad
		Sh. Hemant Gupta	9811378026	HQ_DFTM	Delhi
		Dr. R J Mukhedkar	9423012225	ARDE	Pune

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
		Sh. K Ramesh	9448380617	CAIR	Bangalore
		Course can be taken by Institute Faculty.			
5	Advanced Mechanical Engineering	Dr Kumar S Sai	09490956638	DRDL	Hyderabad
		Shri Murthy JK	09490166633	RCI	Hyderabad
		Course can be taken by Institute Faculty.			

Semester-1 Elective 2

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	Autonomy and Navigation Technology	K Ramesh	9448380617	CAIR	Bangalore
		R Regunathan	9448383361	CAIR	Bangalore
		Dr. N Rama Murhty	9449346693	CAIR	Bangalore
		Sh. S Varadarajan	9448324568 varad1950@gmail.com	LRDE	Bangalore
		Sh. L Gnana Michael	9448365755 lgmprakasam@gmail.com	LRDE	Bangalore
		Sh. G Kumaraswamy Rao	9347611184 9440881501	DLRL	Hyderabad
		Course can be taken by Institute Faculty.			
2.	Optimization Theory & Applications	In process of selection / identification of lecturers. Course can also be taken by Institute Faculty.			
3.	Military Electronics System Engineering	Sh. Sangamkar AK	9490956850	DRDL	Hyderabad
		Course can be taken by Institute Faculty.			
4.	System Engineering & Analysis	Dr. K K Chand (System analysis & modeling)	9437453842 / 9437026085	PXE	Balasore
		Sh. B Bhaskar Rao (System Eng. & Analysis)	9483775480	DLRL	Hyderabad
		Sh. B V Nityanand (System Eng. & Analysis)		DLRL	Hyderabad

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
		Sh. C Chandrasekharan (QC, Management)	9444703314	CVRDE	Chennai
		Sh. Aga Mirkhushal (Reliability)	8788869930	GTRE	Bangalore
		Dr. Shivpal Singh Panwar (Reliability)	9440125067	DRDL	Hyderabad
		Course can be taken by Institute Faculty.			

Semester 2 – Combat Vehicle Engineering (Compulsory Course)

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	Combat Vehicle Dynamics	Sh. U Solomon	9445040353 / 9629952303	CVRDE	Chennai
		Sh. N Venkateswaran	9444947188	CVRDE	Chennai
2.	Combat System Engineering	Sh. U Solomon	9445040353 / 9629952303	CVRDE	Chennai
		Sh. N Venkateswaran	9444947188	CVRDE	Chennai
3.	Test & Evaluation of Weapon System	Dr. K K Chand	9437453842 / 9437026085	PXE	Balasore

Semester 2 – Aerospace Technology (Compulsory Course)

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	Aerospace System Configuration, Design & Simulation	Shri Srikumar P	09448231455 psrikumar@nias@res.in	ADE	Bangalore
		Shri Thakur DN	09490956181	DRDL	Hyderabad
		Shri Mukesh Chand	09490956151	DRDL	Hyderabad
		Shri Sharma Rakesh Kumar	09989157000	DRDL	Hyderabad
		Dr Satyanarayana A	09490956232	DRDL	Hyderabad
		Shri Prabhakaran V	09449649186	ADE	Bangalore
2.	Guidance &	Air Commode P	9674279119	ITR	Balasore

	control	Banerjee			
		Dr. A K Sarkar	9490748628	DRDL	Hyderabad
		Sh. Mahendra Jha	9423009850	ARDE	Pune
3.	Aerospace Propulsion	Sh. K Jana	9437754489	ITR	Balasore
		Sh. Kamal Sagarmail Jain	9049872281 jainkamalsa@gmail.com	VRDE	Pune
		Dr. R N Pralhad	9403321102 / 9764157707	ARDE	Pune
		Sh. Y S Dhoke	9673145127	ARDE	Pune
		Dr. R J Mukhedkar	9423012225	ARDE	Pune
		Sh. V Sundararajan	9741012514	GTRE	Bangalore
		Sh. T Venkatakrishnaiah	9902919644	GTRE	Bangalore
		Shri Chandramouli G	09848347443	DRDL	Hyderabad

Semester 2 – Communication Systems & Sensors (Compulsory Course)

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	Radar Technologies	Sh. S Varadarajan	9448324568 varad1950@gmail.com	LRDE	Bangalore
		Dr. D C Pandey	9449048858 pande.dc@gmail.com	LRDE	Bangalore
		Sh. L GnanaMichael	9448365755 lgmprakasam@gmail.com	LRDE	Bangalore
		Sh. G Kumaraswamy Rao, Sc „H"	9347611184 9440881501	DLRL	Hyderabad
		Dr. M Lakshminarayana	9440805818	DLRL	Hyderabad
		Dr. B Rama Krishna Rao	9949418424	DLRL	Hyderabad
		Sh. T V PrakashRao	9845662650	DLRL	Hyderabad
		Course can be taken by Institute Faculty.			
2.	Digital & satellite Communication and Navigation from Space	K Ramesh	9448380617	CAIR	Bangalore
		R Regunathan	9448383361	CAIR	Bangalore
		Dr. N Rama Murhty	9449346693	CAIR	Bangalore
		Sh. S Varadarajan	9448324568 varad1950@gmail.com	LRDE	Bangalore
		Sh. L Gnana Michael	9448365755 lgmprakasam@g	LRDE	Bangalore

			mail.com		
		Sh. G Kumaraswamy Rao,Sc „H"	9347611184 9440881501	DLRL	Hyderabad
		Dr. M Lakshminarayana	9440805818	DLRL	Hyderabad
		Course can also be taken by Institute Faculty.			
3.	Tactical battlefield Communication & Electronic Warfare	Sanjay Burman	9845244674	CAIR	Bangalore
		Dr. M Lakshminarayana	9440805818	DLRL	Hyderabad
		Dr. B Rama KrishnaRao	9949418424	DLRL	Hyderabad
		Sh. P RaghevendraRao (Warfare)	9490792715	DLRL	Hyderabad
		Dr. Ashwani Kumar	9441286216	DLRL	Hyderabad
		Sh. B V Nityananda	9483775480	DLRL	Hyderabad
		Sh. T V Prakash Rao	9845662650	DLRL	Hyderabad

Semester 2 – Directed Energy Technology (Compulsory Course)

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	Directed Energy Sources (Lasers,	Sh. Suranjan Pal	9868240545	HQ	Delhi
		Sh. KSS Rao	9885031113	DLRL	Hyderabad
		Sh. P Raghevendra Rao	9490792715	DLRL	Hyderabad
	Microwave)	(Warfare)			
		Course can also be taken by Institute Faculty.			
2.	Beam Control Technology, Target acquisition, Beam Pointing & Tracking	Sh. Varadarajan V	9448975626	DG ECS	Bangalore
		Sh. Suranjan Pal	9868240545	HQ	Delhi
		Sh. KSS Rao	9885031113	DLRL	Hyderabad
3.	Directed Energy Weapons (DEW) System Engineering	Sh. Suranjan Pal	9868240545	HQ	Delhi
		Sh. KSS Rao	9885031113	DLRL	Hyderabad

Semester 2 – High Energy Materials Technology (Compulsory Course)

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	High Energy Materials Modeling & Simulation	Dr. S G Kulkarni	9960640787	DIAT	Pune
		Dr. A Appa Rao	9423582171	HEMRL	Pune
		Dr. Mehilal	9923331983	HEMRL	Pune
		Dr. R K Sinha	9422987632	HEMRL	Pune
		Dr. S N Asthana	7588026160	HEMRL	Pune
		Dr. R V Singh	6306142342	HEMRL	Lucknow
		Dr. A K Sikadar	9420496646	HEMRL	Pune
		Dr. P B Navale	9890944457	HEMRL	Pune
		Dr. R K Pandey	9423572521	HEMRL	Pune
2.	Munitions and Target Response	Dr. R N Pralhad	9403321102 / 9764157707	ARDE	Pune
		Sh. Y S Dhoke	9673145127	ARDE	Pune

		Dr. R J Mukhedkar	9423012225	ARDE	Pune
3.	Manufacturing and Materials Properties of	Dr. S G Kulkarni	9960640787	DIAT	Pune
		Dr. A Appa Rao	9423582171	HEMRL	Pune
		Dr. Mehilal	9923331983	HEMRL	Pune

	Explosives	Dr. R K Sinha	9422987632	HEMRL	Pune
		Dr. S N Asthana	7588026160	HEMRL	Pune
		Dr. R V Singh	6306142342	HEMRL	Lucknow
		Dr. P B Navale	9890944457	HEMRL	Pune
		Dr. R K Pandey	9423572521	HEMRL	Pune
		Dr. (Mrs) U R Nair	9923800038	HEMRL	Pune
		Dr. Javaid Athar	9423585986	HEMRL	Pune

Semester 2 – Elective 1

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	Robotics	In process of selection / identification of lecturers. Course can also be taken by Institute Faculty.			
2.	EMI/EMC in Military Systems	Dr. DC Pande	9449048858 pande.dc@gmail.com	LRDE	Bangalore
		Sh. B Bhaskar Rao	9483775480	DLRL	Hyderabad
		Sh. B V Nityananda		DLRL	Hyderabad
		Course can also be taken by Institute Faculty.			
3.	Defence Electro-Optics and Imaging Systems	Sh. Varadarajan V	9448975626	O/o DG (ECS)	Bangalore
		Sh. Nagi SS	9412915391	IRDE	Dehradun
		Sh. A K Sahay	9410394305	IRDE	Dehradun
		Sh. Amitava Ghosh	9410394308	IRDE	Dehradun
		Sh. Tyagi Rameshwar P	9411106584	IRDE	Dehradun
4.	Structural Dynamics and Aero-Elasticity	Dr. K Ramachandra	9448077779	GTRE	Bangalore
		Dr. D N Khatri	9868266493	ISSA	Delhi
		Course can be taken by Institute Faculty.			
5.	Safety, Health & Hazard Managment	In process of selection / identification of lecturers. Course can also be taken by Institute Faculty.			
6.	Fundamental of telemetry, telecommand & transponder	Sh. R Reghunathan	9448383361	CAIR	Bangalore
		Sh. L Gnana Michael Prakasam,	9448365755 lgmprakasam@gmail.com	LRDE	Bangalore
		Sh. G Kumaraswamy Rao	9347611184 9440881501	DLRL	Hyderabad
		Dr. N Rama Murthy	9449346693	CAIR	Bangalore

		Course can be taken by Institute Faculty.			
7.	Jamming and ECM/ECCM technologies	Sh. G Kumaraswamy Rao	9347611184 9440881501	DLRL	Hyderabad
		Dr. M Lakshminarayana	9440805818	DLRL	Hyderabad
		Sh. P Raghevendra	9490792715	DLRL	Hyderabad

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
		Rao			
8.	Software Defined Radios	In process of selection / identification of lecturers.			
9.	Advanced Lightweight and Composite Structures	Sh. Anil	9449811240	ADE	Bangalore
		Sh. Prabhakaran V	9449649186	ADE	Bangalore
		Dr. Vijay Kumar Varma	9449078557 varmavij@gmail.com	DRDL	Hyderabad
		Dr. S B Singh	9412054196 sbs50@rediffmail.com	VRDE	Pune
		Course can be taken by Institute Faculty.			
10.	Test methodologies for DEW systems (Lasers & Microwave)	Dr N S Vasan	9456512916	IRDE	Dehradun
		Sh. Suranjan Pal	9868240545	HQ	Delhi
		Sh. KSS Rao	9885031113	DLRL	Hyderabad
		Sh. P Raghevendra Rao (Warfare)	9490792715	DLRL	Hyderabad
11.	Advanced Analytical Techniques / Lab testing	Dr. S N Asthana	7588026160	HEMRL	Pune
		Dr. R V Singh	6306142342	HEMRL	Lucknow
		Dr. A K Sikadar	9420496646	HEMRL	Pune
		Dr. R K Pandey	9423572521	HEMRL	Pune
		Dr. Mehilal	9923331983	HEMRL	Pune
		Dr. (Mrs) U R Nair	9923800038	HEMRL	Pune
		Dr. Javaid Athar	9423585986	HEMRL	Pune
12.	Sonar System Engineering	Sh. Reddy KP	9966455778	NSTL	Vizag
		Sh. Shiakumar N	9446416689	NPOL	Kochi

Semester 2 – Elective 2

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
1.	Unmanned Aerial Vehicle Design	In process of selection / identification of lecturers. Course can also be taken by Institute Faculty.			

2.	Naval Ocean Analysis and	In process of selection / identification of lecturers.

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
	Prediction				
3.	Modeling & simulation of Laser Matter Interaction	Dr. Arvind Bharti	8527266969	HQ_DCC	Delhi
		Dr. N S Vasan	9456512916	IRDE	Dehradun
		Sh. Suranjan Pal	9868240545	CHESS	Gurgaon
4.	Computational Aerodynamics	Sh. Mukesh Chand	9490956151 mcag2009@gmail.com	DRDL	Hyderabad
		Sh. T Venkatakrishnaiah	9902919644	GTRE	Bangalore
5.	Launch Vehicle Design & Analysis	In process of selection / identification of lecturers.			
6.	Acquisition , Tracking & Pointing Technology	Sh. S Varadarajan	9448324568 varad1950@gmail.com	LRDE	Bangalore
		Sh. Suranjan Pal	9868240545	CHESS	Gurgaon
7.	Data acquisition, tracking & post flight analysis	Sh. K S Ramprasad		GTRE	Bangalore
		Sh. B K Paltasing	9437011267	ITR	Balasore
		Dr. S N Banerjee	9861261136 / 9078689820 drsnbano@gmail.com	ITR	Balasore
8.	Air independent propulsion & batteries	Sh. Rajsekharan Nair KV	9847472936	NPOL	Kochi
		Sh. Chandramouli G	9848347443	DRDL	Hyderabad
9.	Advanced digital modulation technologies & standards	Sh. S Varadarajan	9448324568 varad1950@gmail.com	LRDE	Bangalore
		Sh. L Gnana Michael	9448365755 lgmprakasam@gmail.com	LRDE	Bangalore
		Sh. G Kumaraswamy Rao	9347611184 9440881501	DLRL	Hyderabad
		Dr. M Lakshminarayana	9440805818	DLRL	Hyderabad
		Course can be taken by Institute Faculty.			
10.	Trajectories modelling & simulation	Sh. M V Bhaskarachary	9437297128 mvbc57@gmail.com	ITR	Balasore

S. No.	Subjects	Name & Designation	Contact Details	Associated DRDO Lab	Location
11.	Sensor Technology	Sh. G Kumaraswamy Rao	9347611184 9440881501	DLRL	Hyderabad
		Dr. B Rama Krishna Rao	9949418424	DLRL	Hyderabad
		Dr. Ashwani Kumar	9441286216	DLRL	Hyderabad
		Sh. T V Prakash Rao	9845662650	DLRL	Hyderabad
		Course can be taken by Institute Faculty.			

Amity School of Engineering & Technology

Master of Technology - Network & Cyber Security

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

PSOs M.Tech. NCS (Network & Cyber Security)

PSO1: Apply the knowledge of science, mathematics, statistics, information technology and solve complex computer network security problems and its solutions.

PSO2: Able to apply their knowledge and skills related to cyber security and understands, analyzes and resolve the various cyber related issue which effects the society in better way.

PSO3: Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements.

PSO4: Able to work with technical uncertainty, understanding ethical value in a cyber system and other information sources, undertaking of appropriate codes of practice according to cyber law and industry standards, awareness of quality issues and their application to continuous improvement, thus recognizing the need to engage in lifelong learning.

Supporting document PSOs M.Tech. NCS (Network & Cyber Security)

PSO 1				PSO 2		PSO 3		PSO 4	
Apply the knowledge of science, mathematics, statistics, information technology and solve complex computer network security problems and its solutions.				Able to apply their knowledge and skills related to cyber security and understands, analyzes and resolve the various cyber related issue which effects the society in better way		Able to comprehend and write effective technical project reports in multidisciplinary environment with regards to evolving technological advancements..		Able to work with technical uncertainty, understanding ethical value in a cyber system and other information sources, undertaking of appropriate codes of practice according to cyber law and industry standards, awareness of quality issues and their application to continuous improvement, thus recognizing the need to engage in lifelong learning.	
1	2	3	4	5	6	7	8	9	10
Science Courses	mathematics, statistics Courses	IT/ computer base Courses	Programming/ Networking Courses	Cyber Security Courses	Applied security and Cyber Engg. Courses	multidisciplinary environment	Technical Advanced Courses	Technical literature and writing Courses	NTCC
Digital Computer Organization	Mathematical Foundation for Cyber Security	Advanced Data Structure & Algorithms	Advanced Computer Networks	Cyber Crime Investigation & Forensics	Web Security	Self Development and Interpersonal Skills	Cryptography Foundation Lab	Research Methodology & Technical Report Writing	Summer Internship Evaluation
Digital Watermarking &Stagenography	Applied Cryptography	Advanced Database Management Systems	MATLAB	Intrusion Detection & Prevention System	Malware Analysis in Network Security	Basics of Communication	Big Data Systems		Dissertation-I

			Network and Wireless Security	Network Security Lab	Biometric Systems & Biometric Image Processing	Behavioral Communication& Relationship Management	Cyber Crime and IT Law		Dissertation-II
			Software Vulnerability Analysis	Distributed System Security		Corporate Communication			
						Leading Through Teams			

POs M.Tech NCS (Network and Cyber Security)

PO1: Apply knowledge of science, mathematics, computers and Information Technology fundamentals to solve complex problems related to the discipline.

PO2: Identify, analyze and evaluate problems specific to domain using knowledge of fundamentals, computational techniques, software tools and programming principles.

PO3: Design and develop solutions in terms of computer network, hardware and software systems, modules or processes on the basis of customer needs and business goals considering cost, security, intellectual property, copyrights and other limitations.

PO4: Analyze and evaluate existing systems to understand complex problems and derive a solution to it.

PO5: Identify and apply current techniques, skills, and tools necessary for computing practices and producing solutions.

PO6: Apply professional practices and contextual knowledge to assess societal, safety and legal issues.

PO7: Comprehend the effects of the professionally developed solutions in societal and environmental contexts to produce viable developments.

PO8: Recognize and demonstrate ethical principles, responsibilities and commitments towards the profession.

PO9: Contribute profoundly and efficiently to the profession as an individual or as a member/leader of multi-faceted team by demonstrating proper coordination.

PO10: Communicate effectively with the society and the professional community through oral and written presentations with clear descriptions.

PO11: Apply management and professional principles while assigning responsibilities, performing designated work and meeting the deadlines of a project as an individual or a team member.

PO12: Exhibit the understanding of and have readiness and capability to engage in life-long learning through education and research.

Course Code: NCE4101	ADVANCED DATA STRUCTURES & ALGORITHMS	L	T	P	C
Version 2020.1	Date of Approval: 19 June 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of data structure				
Co-requisites	Nil				

Catalog Description

The objective to this course is to equip students with advanced concepts of data structures like Huffman trees, Self organizing trees, different types of heaps and their time complexity. Advanced topics and graphs and graph algorithms, geometric algorithms and parallel algorithms.

Course Objectives

The objective of this course is to

1. Understand and apply linear data structures-List, Stack and Queue and the graph algorithms.
2. Apply data structures and algorithms in real time applications and analyze the efficiency of algorithm

Course Outcomes

On completion of this course, the students will be able to

CO1. Design and analyze programming problem statements.

CO2. Choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.

CO3. Understand the necessary mathematical abstraction to solve problems.

CO4. Comprehend and select algorithm design approaches in a problem specific manner

Modules	Blooms level*	Number of hours
MODULE 1: **ADVANCED TREES** Definitions Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees, Splay Tree. Augmenting Red-Black Trees to Dynamic Order Statistics and Interval Tree Applications. Operations on Disjoint sets and its union-find problem Implementing Sets. Dictionaries, Priority Queues and Concatenable Queues using 2-3 Trees.	L1, L2 and L3	7
MODULE 2: **MERGEABLE HEAPS:** Mergeable Heap Operations, Binomial Trees Implementing Binomial Heaps and itsOperations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap Implementing Fibonacci Heap. SORTING NETWORK: Comparison network, zero-one principle, bitonic sorting andmerging network sorter.	L1,L2,l3	8
MODULE 3: **GRAPH THEORY DEFINITIONS** Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut-Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs.	L1, L2 and L3	8
MODULE 4: **GRAPH THEORY ALGORITHMS**	L1, L2	7

Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph and Planarity Testing, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms		
MODULE 5:Geometric algorithms Point location, convex hulls and Voronoi diagrams, Arrangements. Parallel algorithms: Basic techniques for sorting, searching, merging	L2,L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Introduction to Algorithms, by T. H. Cormen, C. E. Lieserson, R. L. Rivest, and C. Stein, Third Edition, MIT Press.
2. E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", University Press, 2007
3. 3. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, University Press, 2007

Reference Books

1. Algorithms, by S. Dasgupta, C. Papadimitrou, U Vazirani, Mc Graw Hill.
2. Algorithm Design, by J. Klienberg and E. Tardos, Pearson Education Limited.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	2	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	-	-
CO 4	2	-	3	-	-	--	--	--	--	--	--	--	2	1	1	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4102	ADVANCED DBMS	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	NIL				

Catalog Description
The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives
The objective of this course is to
3. To understand the basic concepts and terminology related to DBMS and Relational Database Design
4. To design and understand Distributed, parallel and object oriented Databases.
5. To understand advanced DBMS techniques to handle and optimize queries in database.

Course Outcomes
On completion of this course, the students will be able to

CO1. Understand the basics of database management system and implementation of relational database.

CO2. Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques.

CO3. Understand and design Distributed, parallel and object oriented Databases models and possible methods of proving them.

Modules	Blooms level*	Number of hours
MODULE 1: **Relational Database** Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.	L1, L2 and L3	8
MODULE 2: **Query Processing and Optimization** Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information. **Objected Oriented and Object Relational Databases** Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases	L1,L2,l3	9

MODULE 3: **Parallel and Distributed Databases** Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation. **Advanced Transaction Processing** Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.	L1, L2 and L3	10
MODULE 4: Multimedia databases, Databases on the Web and Semi–Structured Data , Case Study: Oracle Xi	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", PearsonEducation, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Reference Books

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
4. W. Kim, "Modern Database Systems", 1995, ACM Press, Addision – Wesley,
5. D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
6. Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
7. Oracle Xi Reference Manual
8. Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	-	3	--	--	--	--	--	--	--	--	--	2	2	-	-
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	-
CO 3	2	-	3	-	-	--	--	--	--	--	--	--	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4103	DIGITAL COMPUTER ORGANIZATION	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The Objective of this course is to expose the students to the fundamentals and the concepts of Digital & Computer Organization and Representation of Information and Basic Building Blocks, Basic Organization, Memory Organization, Input-Output Organization, Processor Organization etc. This course is designed to understand the concepts of Computer Organization for Research & Development as well as for application.

Course Objectives

The objective of this course is to

6. An understanding of a machine's instruction set architecture (ISA) including basic instruction fetch and execute cycles, instruction formats, control ow, and operand addressing modes.

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand and Interpret the functional architecture of computing systems.

CO2. Identify, compare and assess issues related to ISA, memory, control and I/O functions.

CO3. Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.

CO4. Design and analyze solutions in the area of computer architecture.

Modules	Blooms level*	Number of hours
MODULE 1: **Parallel computer models** The state of computing, Multiprocessors and multicomputers, Multivector and SIMD computers, Architectural development tracks Program and network properties: Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms, Control flow versus data flow, Data flow architecture, Demand driven mechanisms, Comparisons of flow mechanisms	L1, L2 and L3	7
MODULE 2: **System Interconnect Architectures** Network properties and routing, Static interconnection networks, Dynamic interconnection Networks, Multiprocessor system interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.	L1,L2,l3	8
MODULE 3: **Processors and Memory Hierarchy** Advanced processor technology, Instruction-set Architectures,CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors,VLIW Architectures, Vector and Symbolic processors Memory Technology: Hierarchical memory technology, Inclusion, Coherence and Locality, Memory capacity planning, Virtual Memory	L1, L2 and L3	8

Technology		
MODULE 4: **Backplane Bus System** Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt, Cache addressing models, Direct mapping and associative caches. Pipelining: Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch handling techniques, Arithmetic Pipeline Design, Computer arithmetic principles, Static arithmetic pipeline, Multifunctional arithmetic pipelines	L1, L2	7
MODULE 5: **Vector Processing Principles** Vector instruction types, Vector-access memory schemes. Synchronous Parallel Processing: SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, SIMD Computers and Performance Enhancement	L2,L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. M. Moris Mano, "Computer Systems Architecture", 4th Edition, Pearson/PHI, ISBN:10:0131755633
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5 th Edition, McGraw Hill

.

Reference Books

1. J.P. Hayes, "computer Architecture and organization", MGH, 1998.
2. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design", Narosa Publishing, 1998.
3. D.A. Patterson, J.L. Hennessy, "Computer Architecture: A quantitative approach", Morgan Kauffmann, 2002.
4. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PS O 1**	**PS O 2**	**PS O 3**	**PSO 4**
CO 1	**2**	**-**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**-**	**-**
CO 2	**2**	**2**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**2**	**-**
CO 3	**2**	**-**	**3**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**2**	**-**
CO 4	**2**	**-**	**3**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**		**-**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4104	ADVANCED COMPUTER NETWORKS	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Network				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks provides the knowledge of computer networks and related current research topics. This course illustrates the OSI and TCP-IP layers, services, devices, cables, protocols, network security, network performance parameters etc .This course focuses on advanced computer network concepts in theory as well as in real life applications in networking.

Course Objectives

The objective of this course is to

1. Equip the students with the advanced networking concepts.
2. Explain the different techniques of error detection and correction methods used at various layers.
3. Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of reference model, wireless Ethernet standards, protocols and applications of networks.

CO2: Describe network Layer design issues, routing algorithms, IP addressing.

CO3: State Multicasting issues and multicast routing protocol. Describe mobile IP and its use in Multicasting.

CO4: State transport and application layers and explain services, protocols, performance parameters in these layers. Also describe DNS, Email and www with applications of each in computer network.

CO5: State network security and describe various types of computer network security, the digital signature, security algorithms. Explain the social issues related to network security and web security.

Modules	Blooms level*	Number of hours
MODULE 1: Uses computer networks, Reference Models, TCP/IP suite of protocols, MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)Fast access technologies. (For example, ADSL, Cable Modem, etc.)	L1, L2	6
MODULE 2: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service, Internet Working, Network Layer in Internet.	L2, L3	8

IPv6 basic protocol, extensions and options, support for QoS, security, etc., Changes to other protocols, Application Programming Interface for IPv6.		
MODULE 3: Mobile IP, IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc.	L1, L2	8
MODULE 4: The Transport Protocol: The Transport Service, Elements of transport protocol, a simple Transport Protocol, Internet Transport Protocols UDP, Internet Transport Protocols TCP, TCP extensions for high-speed networks, transaction-oriented applications Performance Issues. The Application Layer: DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia.	L1, L2, and L3	8
MODULE 5: Overview of network security, Secure-HTTP, SSL, ESP, Key distribution protocols. Digital signatures, digital certificates-mail Security, Web security, Social Issues..	L1, L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

1. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
2. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	-	-	-	-	--	--	--	--	--	--	--	**1**	--	-	--
CO2	**1**	-	-	-	3	--	3	--	--	--	--	--	**1**	--	-	--
CO3	**1**	-	-	-	3	--	3	--	--	--	--	--	**2**	1	-	--
CO4	**1**	-	-	--	2	--	2	--	3	--	--	--	2	**1**	-	--
CO5	**1**	-	-	-	1	-	1	--	2	--	--	--	**1**	**2**	-	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4105	ADVANCED DATA STRUCTURES & ALGORITHMS Lab	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	0	0	2	1
Pre-requisites/Exposure	Application of Data Structures				
Co-requisites	Nil				

Catalog Description
Designing an algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular program.

Course Objectives
The objective of this course is to
1. Equip the students with the concepts of complexity and analysis of algorithms.
2. Provide an understanding of different techniques used in designing algorithms for a variety of problems.
3. Equip the students with the concepts of complexity classes of different problems.

Course Outcomes
On completion of this course, the students will be able to
CO1: State and explain the meaning of algorithm, analysis and design; apply the algorithmic concepts to analyze a given algorithm and compute its time complexity.
CO2: Explain and apply the concept of Divide and Conquer approach in designing algorithms; analyze a divide and conquer algorithm; explain and apply the concept of Greedy approach in designing algorithms for optimization problems.
CO3: Explain and apply the concept of Dynamic Programming in designing algorithms for optimization problems; compare and contrast the Dynamic Programming with Greedy approach and Divide and Conquer approach.
CO4: State and explain Elementary Graph Algorithms; explain and apply the concept of Branch & Bound and Backtracking in designing algorithms for different problems.
CO5: Define and explain the concept of computational complexity, Polynomialy Bounded Algorithms, Class NP, Class NP Hard and Class NP Complete.

Modules	Blooms level*	Number of hours
MODULE 1: Implementation of the following algorithms: • Insertion Sort • Bubble Sort • Counting Number of Inversions	L1, L2, L3, and L4	3
MODULE 2: Implementation of the following algorithms: • Binary Search (Divide & Conquer) • Merge Sort (Divide & Conquer) • Quick Sort (Divide & Conquer) • Strassen's Matrix Multiplication (Divide & Conquer) • Graph RepresentationGraph Searching	L1, L2, and L3, and L4	5

MODULE 3: Implementation of the following algorithms: • Breadth First Dearch • Depth First Search • Strongly Connected Components • Topological Sort • Fractional Knapsack Problem (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 4: Implementation of the following algorithms: • Kruskal's Algorithm. (Greedy Approach) • Prim's Algorithm (Greedy Approach) • Dijkstra's Algorithm (Greedy Approach) • Bellmanford Algorithm (Greedy Approach)	L1, L2, L3, and L4	6
MODULE 5: • 0/1-Knapsack Problem (Dynamic programming) • Matrix Chain Multiplication (Dynamic programming) • N-Queens Problem (Backtracking)	L1 and L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm, MIT Press, ISBN-(ISBN: 978-0262033848)
2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Fundamentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Pearson.
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms," Addison-Wesley

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO2	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO3	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO4	**1**	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**
CO5	**1**	**1**	**2**	**2**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4106	ADVANCED DBMS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of DBMS				
Co-requisites	Nil				

Catalog Description

The objective of this course is to expose the students to the implementation techniques of database system. This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Course Objectives

The objective of this course is

1. Equip the students with the different issues involved in the design and implementation of a database system.
2. Provide a practical knowledge of implementation/demonstration of data manipulation language to query, update, and manage a database.

Course Outcomes

On completion of this course, the students will be able to

CO1. Demonstrate and analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.

CO2. Demonstrate and Apply different types of constraints on the database.

CO3. Design different views of tables for different users and to apply embedded and nested queries.

CO4. Design and implement a database for a given problem according to well known design principles that balance data retrieval performance with data consistency.

Modules	Blooms level*	Number of hours
Module1: 1. Introduction to SQL and understand basic commands 2. Understand various DDl and DML commands. 3. To understand joins in SQL.	L1,L2 and L3	4
Module 2: 1. To understand constraints SQL 2. Wild cards and aggregate functions in SQL 3. To understand and execute procedures and views in SQL	L2 and L3	6
Module 3: 1. To understand and execute triggers in SQL 2. To develop a database application to demonstrate the representation of multi valued attributes and use of nested tables to represent complex objects. Write suitable queries	L2, L3, L4 and L5	4
Module 4: 1. To understand and execute Indexes in SQL	L2, L3 and L4	4
Module 5: 1. To understand the concept of Exception handling in SQL	L2, L3	1

2. Query Evaluation Plans 3. Concurrency and Transactions	and L4	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011
2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addisionwesley, 2007

Reference Book

1. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rdedition, 1997, McGrawHill, International Edition.
2. Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO 2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO 3	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**--**
CO 4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO 5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4107	ADVANCED COMPUTER NETWORKS LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	0	0	2	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description

Advanced Computer Networks Lab provides the knowledge of various installations & connections of LAN, WAN, etc, study of Cisco Packet Tracer Tool and its implementations, simulation of flow-control protocols such as Sliding Window, Stop & Wait with help of programming languages. This course focuses on real-life applications in networking and its software implementation in the laboratory.

Course Objectives

The objective of this course is to

4. Equip the students with the advanced networking concepts.
5. Explain the different techniques of error detection and correction methods used at various layers.
6. Provide an overview of various algorithms involved in advanced computer networks at OSI and TCP-IP Layers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand fundamental underlying principles of computer networking
CO2: Understand details and functionality of CISCO router
CO3:Demonstrate and configure details and functionality of DHCP server
CO4: Analyze performance of various communication protocols.
CO5: Compare routing algorithms

Modules	Blooms level*	Number of hours
MODULE 1: 1. Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands. 2. Configuration of IP addressing for a given scenario for a given set of topologies.	L1, L2	2
MODULE 2: 1. Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address	L2, L3	2
MODULE 3: 1. Configure, implement and debug the following: Use open source tools for debugging and diagnostics. a. ARP/RARP protocols b. RIP routing protocols	L1, L2	3

c. BGP routing d. OSPF routing protocols e. Static routes (check using netstat)		
MODULE 4: 1. Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down. 2. Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment	L1, L2, and L3	3
MODULE 5: 1. Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails. 2. Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark.	L1, L2	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

2. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

3. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
4. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	-	-	-	-	--	--	--	--	--	--	--	**1**	--	-	--
CO2	**1**	-	-	-	3	--	3	--	--	--	--	--	**1**	--	-	--
CO3	**1**	-	-	-	3	--	3	--	--	--	--	--	**1**	2	2	--
CO4	**1**	-	-	--	2	--	2	--	3	--	--	--	**2**	**1**	-	--
CO5	**1**	-	-	-	1	-	1	--	2	--	--	--	**2**	**1**	-	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4108	MATLAB PROGRAMMING	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Programming				

Catalog Description
The objective of this course is to expose the students to the implementation techniques of Mat Lab Programming.

Course Objectives
The objective of this course is to
7. To understand the basic concepts and terminology related to Mat Lab.
8. Application of Mat Lab in field of Signal Processing and Control systems.

Course Outcomes
On completion of this course, the students will be able to

CO1. Understand the basics of Matlab programming environment.

CO2. Analysis of given LTI System and verifying its physical reliability and stability properties.

CO3. Waveform synthesis using Laplace Transforms and z-transform of a given signal and system.

Modules	Blooms level*	Number of hours
1. To write a MATLAB program to perform some basic operation on matrices such as addition, subtraction, multiplication. 2. To write a "MATLAB" Program to generate various signals and sequences, such as unit impulse, unit step, unit ramp, sinusoidal, square, saw tooth, triangular, sinc signals. 3. To performs operations on signals and sequences such as addition, multiplication, scaling, shifting, folding, computation of energy and average power. 4. Write a program for finding even and odd parts of sequences Using MATLAB Software& program for finding real and imaginary parts of sequences Using MATLAB Software.	L1, L2 and L3	8
5. Write a program to find the out put with linear convolution operation Using MATLAB Software 6. Write a program to compute auto correlation and cross correlation between signals and Sequences. 7. Write a program to compute linearity and time invariance properties of a given continuous /discrete System.	L1,L2,l3	6
8. Write a program to Unit Step And Sinusoidal Response Of The Given LTI System And Verifying Its physical reliability and stability properties. 9. Write a program to demonstrate Gibbs Phenomenon using MATLAB. 10. Write a program to obtain Fourier Transform and Inverse Fourier Transform of a given signal / sequence and to plot its Magnitude	L1, L2 and L3	8

and Phase Spectra **11.** Write a program to perform waveform synthesis using Laplace Transforms of a given signal.		
12. Write a program to locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane 13. for the given transfer function. 14. Write a program to Generate Gaussian Noise and to Compute its Mean, M.S. Values, Skew, kurtosis, 15. PS and PDF 16. Write a program to demonstrate Sampling Theorem and aliasing effect using MATLAB. 17. Write a program for removal of noise by auto correlation/cross correlation.	L1, L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

4. Amos Gilat, "MATLAB: An Introduction with Applications", Wiley; Fourth edition (2012)4ed.

Reference Books

9. Bansal, Goel and Sharma, MATLAB and its Applications in Engineering"Pearson Education India; Second edition (1 March 2016).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PS O 1**	**PS O 2**	**PS O 3**	**PSO 4**
CO 1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO 2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO 3	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4109	PYTHON PROGRAMMING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The course is designed to provide an introduction to the Python programming language. The focus of the course is to provide students with an introduction to programming, I/O, and visualization using the Python programming language.

Course Objectives

The objective of this course is

- Equip the students with the basic feature of python required in solving complex problems and build GUI applications
- Provide a practical knowledge of implementation/demonstration of python programming concepts like of lists, tuples, dictionaries, Object Oriented Programming concepts in Python, Strings and Files in Python.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the basics of python programming using if-else, loops and List, Dictionary, tuples.

CO 2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.

CO 3: Demonstrate the ability to write database applications in Python

CO 4: Demonstrate Files Handling in Python.

CO 5: Demonstrate database operation and GUI applications in python.

Modules	Blooms level*	Number of hours
4. Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5,between 2000 and 3200 (both included). The numbers obtained should be printed in a comma-separated sequence on a single line. 5. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. 6. Define a function max() that takes two numbers as arguments and returns the largest of them. Use the if-then-else construct available in Python. (It is true that Python has the max() function built in, but writing it yourself is nevertheless a good exercise.) 7. Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.	L1,L2 and L3	4
8. Define a function that computes the length of a given list or string. (It is true that Python has the len() function built in, but writing it yourself is nevertheless a good exercise.) 9. Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise. 10. Write a function translate() that will translate a text into "rövarspråket" (Swedish for "robber's language"). That is, double	L2 and L3	6

every consonant and place an occurrence of "o" in between. For example, translate("this is fun") should return the string "tothohisosisosfofunon". 11. Define a function sum() and a function multiply() that sums and multiplies (respectively) all the numbers in a list of numbers. For example, sum([1, 2, 3, 4]) should return 10, and multiply([1, 2, 3, 4]) should return 24. 12. Define a function reverse() that computes the reversal of a string. For example, reverse("I am testing") should return the string "gnitset ma I".		
13. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user 14. Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5. 15. Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides evenly into another number. For example, 13 is a divisor of 26 because 26 / 13 has no remainder.) 16. Take two lists, say for example these two: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13] and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.	L2, L3, L4 and L5	4
17. Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.) 18. Let's say I give you a list saved in a variable: a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]. Write one line of Python that takes this list a and makes a new list that has only the even elements of this list in it. 19. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game) **Remember the rules:** • Rock beats scissors • Scissors beats paper • Paper beats rock	L2, L3 and L4	4
20. Write a program that asks the user how many Fibonnaci numbers to generate and then generates them. Take this opportunity to think about how you can use functions. Make sure to ask the user to enter the number of numbers in the sequence to generate.(Hint: The Fibonnaciseqence is a sequence of numbers where the next number in the sequence is the sum of the previous two numbers in the sequence. The sequence looks like this: 1, 1, 2, 3, 5, 8, 13, …) 21. Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates. **22.** Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.	L2, L3 and L4	1

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
3. Patrick Naughton & Herbert Schild ,"JAVA The Complete Reference", 10th Edition , TMH

Reference Book

1. Daniel/Young , Introduction to JAVA Programming" , PHI.
2. Jeff Frentzen and Sobotka, "Java Script", Tata McGraw Hill,1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO 2	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO 3	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**--**
CO 4	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**
CO 5	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4201	Mathematical Foundations for Cyber Security	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Modern cryptography applies theory from mathematics and computer science to design and implement strong encryption methods which are so important to the safety of computer systems today. This course focuses on building strong mathematical foundations which can be applied in designing secure cryptographic applications in the modern computing environment.

Course Objectives

The objective of this course is to

1. Equip the students with the mathematical concepts used in cryptography.
2. Provide an overview of different mathematical structures used in designing cryptographic algorithms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and apply the concept of modular arithmetic in cryptographic applications.

CO2: State and apply the algorithms for primality testing and quadratic congruence.

CO3: Describe the different algebraic structures and apply them in cryptographic applications.

CO4: State the Shannon's Theory and explain its applications in cryptography.

CO5: Describe the concept of pseudorandom number generation and apply it in designing pseudorandom number generators.

Modules	Blooms level*	Number of hours
MODULE 1: ARITHMETIC IN CRYPTOGRAPHY Integer arithmetic, modular arithmetic, matrices, Linear Congruence: Definition – Basic properties of congruence, Divisibility - Greatest common divisor, equivalence classes, residue classes.	L1, L2 and L3	8
MODULE 2: PRIME NUMBERS Primes, primality testing, factorization, Chinese remainder theorem, quadratic congruence, exponentiation and logarithm	L1, L2, L3 and L4	8
MODULE 3: ALGEBRAIC STRUCTURES Groups, Rings, Fields, Modulo groups - Primitive roots - Discrete logarithms. Finite fields – GF (p), GF(2n) – polynomial arithmetic MATHEMATICS OF ELLIPTIC CURVES Elliptic Curves, Wiestrass Equation, Elliptic Curve Point Addition, Point Doubling	L1, L2 and L3	8
MODULE 4: SHANNON'S THEORY	L1, L2, and L3	4

Introduction, Elementary Probability Theory, Perfect Secrecy, Entropy, Properties of Entropy, Spurious Keys & Unicity distance, Product Cryptosystems		
MODULE 5: PSEUDORANDOM NUMBER GENERATION Introduction and examples Indistinguishability of Probability Distributions - Next Bit Predictors - The Blum-Blum-Shub Generator – Security of the BBS Generator.	L1, L2, and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005,(ISBN: 978-0131873162).

Reference Books

1. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
2. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO2	**1**	**1**	**2**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO3	**1**	**2**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO4	**1**	**2**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO5	**1**	**2**	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4202	Network and Wireless Security	L	T	P	C
Version 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Network				
Co-requisites	Nil				

Catalog Description

In this course the concepts of network and wireless security are discussed in detail. The wireless technologies, techniques and methodologies will be introduced. The studies will be made on impact of the thoughtfulness and longevity of implementations. The concepts learnt in the studies of wireless application protocols and other protocols will be applied in the studies and analysis of security issues in wireless networks.

Course Objectives

The objective of this course is to

3. Equip the students with concepts of network wireless security.
4. Provide an overview of spread spectrum, cellular network, WLAN, WAP, WTLS, SSH, Bluetooth security.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain wireless security issues and its recent trends in wireless networks, cellular networks and all generations of wireless technologies.

CO2: Describe wireless transmission media, spread spectrum and its techniques, wireless standards and various threats and countermeasures in network security. Write the steps of authentication techniques.

CO3: Demonstrate the working of WAP Model and comparison with TCP/IP, OSI models; state the terminologies: viruses, authorization, non repudiation, secure sessions, security products; Construct WAP security architecture and elaborate its fields; determine issues related to marginal security.

CO4: Describe secure socket layer and transport layer security; Design SSL in OSI reference model. Draw authentication header format and describe each field of AH; Distinguish SSL/TLS; Explain WTLS and fix vulnerabilities of WTLS; Discuss LEAP with reference to WTLS.

CO5: Design and configure Bluetooth security technology; Designing its security architecture; determine security functions of the service discovery protocol. Discuss issues related encryption with ciphers. Compare threats to Bluetooth security. Write Bluetooth holes in Bluetooth technology.

Modules	Blooms level*	Number of hours
MODULE 1: Network concepts – Threats in networks – Network security controls – Importance ofsecurity – Threat models – Security concepts – Common mitigation methods **Why is Wireless Different?** Introduction ,Protecting the Means Of Communication Protecting Privacy, Promoting Safety ,The Personal and the Public ,Shaking Up the Status Quo ,Understanding Wireless Forecasts ,Reasonable Degrees of Security, Regulatory Environments and Issues, Security-Related Regulations ,Security Related Market Factors, Guidelines for Security Measures, Cellular Networks and Bearer Technologies ,First-Generation Wireless (1G), Second-Generation Wireless	L1, L2 and L3	6

(2G), Spread Spectrum, Code Division Multiple Access (CDMA) ,Time Division Multiple Sccess (TDMA) , Global System for Mobile Communications (GSM) ,Third-Generation Wireless (3G) ,Short Message Service (SMS) ,Fourth-Generation Wireless (4G)		
MODULE 2: **The Wireless Local Area Network (WLAN)** Wireless Transmission Media, Infrared Systems ,Narrowband Radio System, Wideband Radio Systems: Spread Spectrum, Frequency-Hopping Spread Spectrum (FHSS) ,Direct-Sequence Spread Spectrum (DSSS) ,WLAN Products and Standards—Today's Leaders?,802.11 Security? IEEE 802.11b ,Securing WLANs ,Eavesdropping ,Unauthorized Access , Interference and Jamming ,Physical Threats ,Countermeasures, Frequency-Hopping Spread Spectrum (FHSS), Direct-Sequence Spread Spectrum (DSSS) ,Infrared (IR) ,Narrowband ,The Infamous WEP ,Encryption ,Authentication, Wired Equivalency Protocol Flaws Too Public , Other Authentication Techniques ,Physical Security	L1, L2 and L3	8
MODULE 3: **Wireless Application Protocol(WAP)** Comparison of the TCP/IP, OSI, and WAP Models, How WAP Works ,The Security Status of WAP , Viruses ,Authorization ,Non-repudiation ,Authentication, Secure Sessions ,Security Products ,Securant Technologies Clear Trust Control, WAP Security Architecture ,Marginal Security ,Wireless Access to the Internet, Wireless Middleware	L1, L2 and L3	8
MODULE 4: **Wireless Transport Layer Security (WTLS)** Secure Socket Layer, Record Protocol, SSL Handshake Protocol ,Transport Layer Security, Advantages and Disadvantages of SSL/TLS, Netscape ,Microsoft ,Entrust ,EAP-TLS ,Alternatives to SSL/TLS IP Security (IPSec) ,Authentication Header Protocol (AH) ,Encapsulating Security Payload (ESP) ,Transport and Tunnel Modes, Secure Shell (SSH) ,SSH Transport Layer Protocol ,SSH Versus TLS Implementations ,Light Extensible Authentication Protocol (LEAP) ,Wireless Transport Layer Security and WAP ,Understanding Wireless Transport Layer Security , WTLS Handshake Protocol ,WTLS Alert Protocol ,WTLS Change Cipher Protocol ,Pros and Cons of WTLS ,WTLS Vulnerabilities ,Implementations of WTLS	L2, L3 and L4	8
MODULE 5: **Bluetooth Security** Bluetooth Basic Specifications ,Bluetooth Technology, Bluetooth Specification Development ,Design Decisions ,Piconets ,Bluetooth Security Architecture ,Scatternets ,The Bluetooth stack, Security Functions at the Baseband Layer ,Security Functions of the Service Discovery Protocol ,Security Functions at the Link Layer, Frequency-Hopping , Channel Establishment ,Security Manager ,Authentication, Authentication with the SAFER1 Block Cipher ,Encryption ,Encryption Modes ,Key Length Negotiation ,Encryption With the E0 Stream Cipher ,Threats to Bluetooth Security ,Jamming ,Bluetooth holes.	L1, L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Nichols and P. Lekka, Wireless Security Models, Threats and Solutions, Tata McGrawHill, Edition 2, 2006.
2. Charles P. Fleeger, Security in Computing, Prentice Hall, edition 2, 2009, New Delhi,

Reference Books

1. Behrouz A. Forouzan, Data Communication and Networking, Tata McGraw-Hill, Edition 4, 2007.
2. William Stallings, "Cryptography and Network security", Edition 6, 2013.
3. Behrouz A. Forouzan, "Cryptography and Network security", Edition 3, 6July 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO2	**1**	**2**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO3	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**-**	**3**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**-**	**3**
CO5	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**2**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4203	CYBER CRIME INVESTIGATONS & IT Law	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Level of security which is related to the safety of computer systems, data and network is very important in today era. If cyber-crime comes in the frame, how it detect, react and measure on our network and system. The police and law related to each cyber crimetoday. This course focuses on different types of attacks and its policies.

Course Objectives

The objective of this course is to

5. Equip the students with the laws and its safety concepts used in cyber crime.
6. Provide an overview of different attacks and prevention technique in a network.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand the Cyber Crime and its Investigations as a Profession.

CO2: Describe the different type of attacks and cyber crime.

CO3 : Conduct the computer investigations and implement the laws for its solution.

CO4: Processing cyber-crime in investigation according to the law.

CO5: Apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.

Modules	Blooms level*	Number of hours
MODULE 1: **POWER OF ARREST WITHOUT WARRANT UNDER THE IT ACT, 2000: A CRITIQUE** Crimes of this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce, Forgetting the Line Between Cognizable and Non-Cognizable Offences, Necessity of Arrest without Warrant from Any Place, Public or Otherwise, Checks and Balances Against Arbitrary Arrests, Arrest for "About to Commit" an Offence Under the IT Act: A Tribute to Draco, Arrest, But No Punishment.	L1, L2 and L3	7
MODULE 2: **CYBER CRIME AND CRIMINAL JUSTICE: PENALTIES, ADJUDICATION AND APPEALS UNDER THE IT ACT, 2000** Concept of 'Cyber Crime' and the IT Act, 2000, Hacking, Teenage Web vandals, Cyber Fraud and Cyber cheating, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences, Monetary Penalties, Adjudication and Appeals Under IT Act, 2000, Network Service Providers, Jurisdiction and cyber Crimes, Nature of Cyber Criminality, Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications on Cyber Crime.	L1, L2 and L3	8
MODULE 3: **JURISDICTION IN THE CYBER WORLD** Questioning the Jurisdiction and Validity of the Present Law of Jurisdiction, Civil Law of Jurisdiction in India, Cause of Action, Jurisdiction and the	L1, L2 L3 and L4	9

Information Technology Act,2000, Foreign Judgments in India, Place of Cause of Action in Contractual and IPR Disputes, Exclusion Clauses in Contracts, Abuse of Exclusion Clauses, Objection of Lack of Jurisdiction, Misuse of the Law of Jurisdiction, Legal Principles on Jurisdiction in the United States of America, Jurisdictional Disputes W.R.T. the Internet in the United States of America.		
MODULE 4: **BATTLING CYBER SQUATTERS AND COPYRIGHT PROTECTION IN THE CYBER WORLD** Concept of Domain Name and Reply to Cyber Squatters, Meta-Tagging, Legislative and Other Innovative Moves Against Cyber Squatting, The Battle Between Freedom and Control on the Internet, Works in Which Copyright Subsists and Meaning of Copyright, Copyright Ownership and Assignment, Licence of Copyright, Copyright Term and Respect for Foreign Works, Copyright Infringement, Remedies and Offences, Copyright Protection of Content on the Internet; Copyright Notice, Disclaimer and Acknowledgement, Downloading for Viewing Content on the Internet, Hyper-linking and Framing, Liability of ISPs for Copyright violations in the Cyber World: Legal Developments in the US, Napster and its Cousins: A Revolution on the Internet but a Crisis for Copyright Owners, Computer Software Piracy.	L1, L2, L3,L4,L5 and L6	7
MODULE 5: **PROTECTION OF CYBER CONSUMERS IN INDIA** Are Cyber consumers Covered Under the Consumer Protection Act, Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on Cyber Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a consumer in India	L1, L2, and L3	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. **"**Cyber Law Simplified" ,VivekSood, TMH, 2001

Reference Books

1. "Cyber Security, Cyber Crime and Cyber Forensics: Applications and Perspectives" Raghu Santanam, M. Sethumadhavan, Information Science Reference.
2. Cyberlaw – The Indian Perspective ByPavanDuggal, Saakshar Law Publications.
3. Jonathan Rosenoer,"Cyber Law: The law of the Internet", Springer-Verlag, 1997

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	-	-	1	-	-	1	-	-	1	1	-	1	-
CO 2	1	2	-	-	-	-	-	-	-	-	-	1	-	-	1	2
CO 3	-	2	1	1	1	-	-	-	-	-	-	-	-	1	1	-
CO 4	1	-	-	-	2	-	1	-	-	2	-	-	-	-	1	2
CO 5	-	-	-	-	-	-	1	2	1	3	1	-	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4204	CYBER CRIME INVESTIGATONS & FORENSICS	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Level of security which is related to the safety of computer systems, data and network is very important in today era. If cyber crime come in the frame, how it detect, react and measure on our network and system. The police and law related to each cyber crime today. This course focuses on different type attack and investigation level, police comes under the parameter of cyber law on network which can be applied in designing secure network applications in the modern computing environment.

Course Objectives

The objective of this course is to

7. Equip the students with the investigation concepts used in cyber crime.
8. Provide an overview of different attacks and prevention technique in a network.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and Understand the Computer Forensics and Investigations as a Profession.

CO2: Describe the different type of attacks and cyber crime.

CO3 : Conduct the computer investigations and implement data acquisition concept in investigation.

CO4: Processing cyber crime and incident scenes in investigation according to the law.

CO5: Use the different -2 computer forensics tools in modern era according to the type of crime

Modules	Blooms level*	Number of hours
MODULE 1: COMPUTER FORENSICS AND INVESTIGATIONS AS A PROFESSION, UNDERSTANDING Computer Forensics ,Computer Forensics Versus Other Related Disciplines ,A Brief History of Computer Forensics, Understanding Case Law ,Developing Computer Forensics Resources ,Preparing for Computer Investigations, Understanding Law Enforcement Agency Investigations, Following the Legal Processes, Understanding Corporate Investigations, Establishing Company Policies, Displaying Warning Banners ,Designating an Authorized Requester, Conducting Security Investigations, Distinguishing Personal and Company Property ,Maintaining Professional Conduct.	L1, L2 and L3	7
MODULE 2: UNDERSTANDING COMPUTER INVESTIGATIONS Preparing a Computer Investigation, An Overview of a Computer Crime ,An Overview of a Company Policy Violation ,Taking a Systematic Approach ,Assessing the Case ,Planning Your Investigation ,Securing Your Evidence ,Procedures for Corporate High-Tech Investigations, Employee Termination Cases, InternetAbuse Investigations-mail Abuse Investigations, Attorney-Client Privilege Investigations, Media Leak Investigations, Industrial	L1, L2 and L3	8

Espionage Investigations, Interviews and Interrogations in High-Tech Investigations ,Understanding Data Recovery Workstations and Software, Setting Up Your Workstation for Computer Forensics ,Conducting an Investigation, Gathering the Evidence ,Understanding Bit-stream Copies ,Acquiring an Image of Evidence Media, Using Pro-Discover Basic to Acquire a USB Drive ,Analyzing Your Digital Evidence, Completing the Case, Critiquing the Case		
MODULE 3: DATA ACQUISITION Understanding Storage Formats for Digital Evidence, Raw Format, Proprietary Formats,Advanced Forensic Format ,Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions ,Using Acquisition Tools ,Windows XP Write-Protection with USB Devices, Acquiring Data with a Linux Boot CD, Capturing an Image with Pro-Discover Basic ,Capturing an Image with Access Data FTK Imager ,Validating Data Acquisitions ,Linux Validation Methods, Windows Validation Methods ,Performing RAID Data Acquisitions ,Understanding RAID ,Acquiring RAID Disks ,Using Remote Network Acquisition Tools ,Remote Acquisition with Pro Discover, Remote Acquisition with EnCase Enterprise , Remote Acquisition with R-Tools R-Studio ,Remote Acquisition with WetStone Livewire, Remote Acquisition with F-Response ,Remote Acquisition with Runtime Software ,Using Other Forensics Acquisition Tools, SnapBackDatArrest ,NTI Safe Back,DIBS USA RAID ,Look Investigator I imager ,ASR Data SMART ,Australian Department of DefencePyFlag,	L1, L2 L3 and L4	9
MODULE 4: PROCESSING CRIME AND INCIDENT SCENES Identifying Digital Evidence, Understanding Rules of Evidence ,Collecting Evidence in Private-Sector Incident Scenes, Processing Law Enforcement Crime Scenes ,Understanding Concepts and Terms Used in Warrants ,Preparing for a Search ,Identifying the Nature of the Case, Identifying the Type of Computing System, Determining Whether You Can Seize a Computer, Obtaining a Detailed Description of the Location, Determining Who Is in Charge, Using Additional Technical Expertise ,Determining the Tools You Need ,Preparing the Investigation Team, Securing a Computer Incident or Crime Scene ,Seizing Digital Evidence at the Scene ,Preparing to Acquire Digital Evidence, Processing an Incidentor Crime Scene ,Processing Data Centers with RAID Systems ,Using a Technical Advisor, Documenting Evidence in the Lab, Processing and Handling Digital Evidence ,Storing Digital Evidence, Evidence Retention and Media Storage Needs, Documenting Evidence ,Obtaining a Digital Hash, Reviewing a Case ,Sample Civil Investigation ,Sample Criminal Investigation ,Reviewing Background Information for a Case ,Identifying the Case Requirements, Planning the Investigation ,Conducting the Investigation: Acquiring Evidence with AccessData FTK	L1, L2, L3,L4,L5 and L6	7
MODULE 5: CURRENT COMPUTER FORENSICS TOOLS Evaluating Computer Forensics Tool Needs ,Types of Computer Forensics	L1, L2, and L3	5

Tools ,Tasks Performed by Computer Forensics Tools, Tool Comparisons ,Other Considerations for Tools ,Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools ,Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations, Using a Write-Blocker, Recommendations for a Forensic Workstation,Validating and Testing Forensics Software ,Using National Institute of Standards and Technology (NIST) Tools ,Using Validation Protocols		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Nelson Phillips and EnfingerSteuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

Reference Books

1. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw -Hill, New Delhi, 2006.
2. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005.
3. Bernadette H Schell, Clemens Martin, "Cybercrime", ABC – CLIO Inc, California, 2004.
4. "Understanding Forensics in IT ", NIIT Ltd, 2005

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	
CO2	**1**	**1**	**2**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**-**	**2**
CO3	**1**	**2**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**--**	**3**	
CO4	**1**	**2**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	
CO5	**1**	**2**	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4205	INTRUSION DETECTION AND PREVENTION SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Networking				
Co-requisites	Nil				

Catalog Description

Intrusion Detection System (IDS) is a rapidly growing field that deals with detecting and responding to malicious network traffic and computer misuse. Intrusion detection is the process of identifying and (possibly) responding to malicious activities targeted at computing and network resources. Any hardware or software automation that monitors, detects or responds to events occurring in a network or on a host computer is considered relevant to the intrusion detection approach. This course introduces various network malicious activities, detection techniques and evaluation criteria.

Course Objectives

The objective of this course is to

9. Equip the students with various network attacks and their examples.
10. Provide knowledge of various approaches to develop IDS and also to evaluate them.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the network attacks and their possible reasons.

CO2: Compare currently available detection approaches to detect intrusion and anomalous activities.

CO3: Understand strengths and weaknesses of machine learning and data mining approached to choose the best approach to design and develop IDS.

CO4: Apply number of approaches to evaluate IDS using various evaluation criteria.

Modules	Blooms level*	Number of hours
MODULE 1:NETWORK ATTACKS Attack Taxonomies, Probes: IPSweep and PortSweep, NMap ,MScan, SAINT , Satan, Privilege Escalation Attacks:Buffer Overflow Attacks, Misconfiguration Attacks , Race-condition Attacks , Man-in-the-Middle Attacks. Social Engineering Attacks**.** Denial of Service (DoS) and Distributed Denial of Service (DDoS) Attacks: Detection Approaches for DoS and DDoS Attacks, Prevention and Response for DoS and DDoS Attacks, Examples of DoS and DDoS Attacks.Worms Attacks:Modeling and Analysis of Worm Behaviors, Detection and Monitoring of Worm Attacks, Worms Containment**,** Examples of Well Known Worm Attacks. Routing Attacks: OSPF Attacks, BGP Attacks.	L1 and L2	6
MODULE 2: DETECTION APPROACHES Misuse Detection: Pattern Matching, Rule-based Techniques, State-based Techniques, Techniques based on Data Mining Anomaly Detection: Advanced Statistical Models,Rule based Techniques, Biological Models, Learning Models Specification-based Detection, Hybrid Detection	L1 and L2	8
MODULE 3: THEORETICAL FOUNDATION OF DETECTION Taxonomy of Anomaly Detection Systems, Fuzzy Logic, Bayes Theory, Artificial Neural Networks, Support Vector Machine (SVM),	L1, L2 and L3	10

Evolutionary Computation, Association Rules, Clustering, Signal Processing Techniques Based Models, Comparative Study of Anomaly Detection Techniques		
MODULE 4: ARCHITECTURE AND IMPLEMENTATION Centralized, Distributed, Cooperative Intrusion Detection, Alert Management and Correlation: Data Fusion, Alert Correlation, Cooperative Intrusion Detection	L1 and L2	4
MODULE 5: EVALUATION CRITERIA & INTRUSION RESPONSE Accuracy, Performance, Completeness, Timely Response, Adaptation and Cost-Sensitivity, Intrusion Tolerance and Attack Resistance, Test, Evaluation and Data Sets. Response Type, Response Approach, Survivability and Intrusion Tolerance, Case study of any commercial IDS.	L2 and L4	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

2. Ali A. Ghorbani, Wei Lu, "Network Intrusion Detection and Prevention: Concepts and Techniques", Springer, 2010.
3. Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications

Reference Books

1. Carl Enrolf, Eugene Schultz, Jim Mellander, "Intrusion detection and Prevention", McGraw Hill, 2004
2. Paul E. Proctor, "The Practical Intrusion Detection Handbook ", Prentice Hall , 2001.
3. Earl Carter, Jonathan Hogue, "Intrusion Prevention Fundamentals", Pearson Education, 2006.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PS O 1**	**PS O 2**	**PS O 3**	**PS O 4**
CO 1	--	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	**3**	--
CO 2	**1**	**1**	**3**	--	**5**	--	--	--	--	--	--	--	**1**	--	**3**	--
CO 3	**1**	**1**	**2**	--	**5**	--	--	--	--	--	--	--	**1**	--	**3**	--
CO 4	**1**	**2**	--	--	**1**	--	--	--	--	--	--	--	**1**	--	**3**	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4206	Research Methodology and Technical Report Writing	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

9. Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
10. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
11. It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Classify different research types, explain steps in research process and planning research proposal.

CO2. Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3. Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4. Demonstrate technical and scientific report writing skills, describe plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	**4**
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps,	L1, L2, L3	**5**

types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.		
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	**10**
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	**5**

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.

Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**2**	**-**
CO2	**1**	**3**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**2**	**-**
CO3	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**3**	**2**	**-**
CO4	**1**	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**2**	**3**
CO5	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**1**	**3**	**1**	**2**	**-**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4207	Cryptography Foundation Lab	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Modern cryptography applies theory from mathematics and computer science to design and implement strong encryption methods which are so important to the safety of computer systems today. This course focuses on building strong mathematical foundations which can be applied in designing secure cryptographic applications in the modern computing environment.

Course Objectives

The objective of this course is to

11. Equip the students with the mathematical concepts used in cryptography.
12. Provide an overview of different mathematical structures used in designing cryptographic algorithms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and apply the concept of modular arithmetic in cryptographic applications.
CO2: State and apply the algorithms for primality testing and quadratic congruence.
CO3: Describe the different algebraic structures and apply them in cryptographic applications.
CO4: State the Shannon's Theory and explain its applications in cryptography.
CO5: Describe the concept of pseudorandom number generation and apply it in designing pseudorandom number generators.

Modules	Blooms level*	Number of hours
MODULE 1: 1. Program to implement division theorem 2. checking number is prime or composite using simple logic 3. Implement Miller Rabin Primality Algorithm	L1, L2 and L3	3
MODULE 2: 4.Implement Euclid and Extended Algorithm. 5. Implement Chinese Remainder Theorem 6. Implement Baby Step Giant Step Algorithm.	L1, L2, L3 and L4	3
MODULE 3: 7. Implement at least 2 algorithms for random number generation. One is Blum BlumShub. 8. Implement Modular Exponentiation Algorithm 9. Implement algorithm for modular linear equation solver.	L1, L2 and L3	3

10.Implement Fermat's and Euler's theorem. 11. Implement Fermat's Factorization method. 12. Few programs based on Probability Theory and theorems	L1, L2, and L3	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

4. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005,(ISBN: 978-0131873162).

Reference Books

3. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
4. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PS O 1**	**PS O 2**	**PS O 3**	**PS O 4**
CO 1	**1**	**2**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO 2	**1**	**1**	**2**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO 3	**1**	**2**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO 4	**1**	**2**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**
CO 5	**1**	**2**	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**3**	**--**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4208	WEB SECURITY LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description
Web security isan important component of computer science. The objective of this course is to make students aware of various techniques and simulations used to understand building blocks of Web security.

Course Objectives
The objective of this course is to
13. Equip the students with the practical aspects of concepts of web security.
14. Provide an understanding of different techniques used in web security.
15. Equip the students with the working knowledge of different tools and simulators used in web security.

Course Outcomes
On completion of this course, the students will be able to
CO1: State, explain, and apply SQL injection , XSS attacks.
CO2: State, explain, and write java script files for XSS attacks..
CO3: State, explain, and perform URL Interpretation, Input validation, Buffer overflow attacks.
CO4: Perform password based attacks.
CO5: Apply DoS and hijacking.

Modules	Blooms level*	Number of hours
MODULE 1: • Exercises related to SQL injection attacks, • XSS attacks	L1, L2, and L3	3
MODULE 2: writing java script files • for launching and preventing XSS attacks • Stored and Reflected XSS Attacks,	L1, L2, and L3	5
MODULE 3: • Perform URLinterpretation attack, • Perform input validation attack, • buffer overflow attacks	L1, L2, and L3	6
MODULE 4: • Perform impersonation attacks • Perform password-based attacks	L1, L2, and L3	6
MODULE 5:	L1, L2,	6

• Perform an experiment for denial of service attacks • Perform an experiment for session hijacking	and L3	

**Bloom's Level:*

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	1	1	1	1	1	1	--	--	1	--	--	--	1	1	3	2
CO 2	1	1	1	1	1	1	--	1	--	--	2	--	1	1	3	2
CO 3	1	1	1	1	1	1	--	--	--	2	--	--	1	1	3	2
CO 4	1	1	1	1	1	1	1	3	--	--	3	1	1	1	3	2
CO 5	1	1	2	2	3	3	--	--	2	--	1	--	1	1	3	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4209	Network Security Lab	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Computer Networks				
Co-requisites	Nil				

Catalog Description
Network and wireless security isan important component of computer science. The objective of this course is to make students aware of various techniques and simulations used to understand building blocks of network and wireless security.

Course Objectives
The objective of this course is to
16. Equip the students with the practical aspects of concepts of network and wireless security.
17. Provide an understanding of different techniques used in network and wireless security.
18. Equip the students with the working knowledge of different tools and simulators used in network security.

Course Outcomes
On completion of this course, the students will be able to
CO1: State, explain, and apply wine / virtual box/vmware in security simulations.
CO2: State, explain, and apply nmap, superscan, and nmap1 in security simulations.
CO3: State, explain, and apply xprobe2 and wiresharkin security simulations.
CO4: State, explain, and apply dumpsecin security simulations.
CO5: State, explain, and apply arp poisoning and opensslin security simulations.

Modules	Blooms level*	Number of hours
MODULE 1: • Learn to install wine / virtual box/vmware or any other equivalent software on the host os. • Perform an experiment to grab a banner with telnet and perform the task using netcat utility. Banner grabbing is a technique to determine which application or service is running on the specified port by attempting to make a connection to this host. •	L1, L2, and L3	3
MODULE 2: • Perform an experiment for port scanning with nmap, superscan or any other software. • Using nmap 1)find open ports on a system 2) find the machines which are active 3)find the version of remote os on other systems 4)find the version of s/w installed on other system	L1, L2, and L3	5
MODULE 3: • Perform an experiment on active and passive fingerprinting using xprobe2 and nmap. • Performa an experiment to demonstrate how to sniff for router traffic	L1, L2, and L3	6

by using the tool wireshark		
MODULE 4: • Perform an experiment how to use dumpsec. • Perform an wireless audit of an access point / router and decrypt wep and wpa.	L1, L2, and L3	6
MODULE 5: • Perform an experiment to sniff traffic using arp poisoning. • Generating password hashes with openssl	L1, L2, and L3	6

**Bloom's Level:*

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO 2	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO 3	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO 4	1	1	1	1	1	1	--	--	--	--	--	--	1	1	3	2
CO 5	1	1	2	2	3	3	--	--	--	--	--	--	1	1	3	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4210	BIG DATA SYSTEMS	L	T	P	C
Version 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Data Base				
Co-requisites	Nil				

Catalog Description
This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives
The objective of this course is to:

- To make students familiar with big data technologies.
- Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes
On completion of this course, the students will be able to:
CO1. Explain importance, applications and challenges of Big Data Analytics.
CO2. Different analytics technologies.
CO3. Demonstrate architecture of Hadoop and Mapreduce framework.
CO4. Illustrate Hadoop I/O commands.
CO5. Introduce concepts Distributed File systems.

Modules	Blooms level*	Number of hours
MODULE 1: **A NEW PARADIGM FOR BIG DATA** Scaling with a traditional database NoSQL is not a panacea, First principles, Desired properties of a Big Data system , The problems with fully incremental architectures, Lambda Architecture, Recent trends in technologyExample application: SuperWebAnalyticscom, data model for big data: , data model for big data: illustration	L1, L2 and L3	6
MODULE 2: **Hadoop & MapReduce** Data! ,Data Storage and Analysis ,Comparison with Other Systems ,RDBMS ,Grid Computing ,Volunteer Computing ,A Brief History of Hadoop ,Apache Hadoop and the Hadoop Ecosystem , Hadoop Releases ,A Weather Dataset, Data Format ,Analyzing the Data with Unix Tools , Analyzing the Data with Hadoop ,Map and Reduce ,Java MapReduce ,Scaling Out ,Data Flow , Combiner Functions ,Running a Distributed MapReduce Job , Hadoop Streaming ,Ruby ,Python, Hadoop Pipes ,Compiling and Running.	L1, L2 and L3	8
MODULE 3: **The Hadoop Distributed Filesystem** The Design of HDFS ,HDFS Concepts ,Blocks ,Namenodes and Datanodes ,HDFS Federation ,HDFS High-Availability ,The Command-Line Interface ,Basic Filesystem Operations ,HadoopFilesystems , Interfaces ,The Java	L1, L2 and L3	8

Interface ,Reading Data from a Hadoop URL ,Reading Data Using the FileSystem API ,Writing Data ,Directories ,Querying the Filesystem ,Deleting Data ,Data Flow ,Anatomy of a File Read ,Anatomy of a File Write ,Coherency Model ,Parallel Copying with distcp ,Keeping an HDFS Cluster Balanced ,Hadoop Archives ,Using Hadoop Archives ,Limitations.		
MODULE 4: **Hadoop I/O** Data Integrity ,Data Integrity in HDFS ,Local Filesystem ,Checksum Filesystem ,Compression,Codecs ,Compression and Input Splits ,Using Compression in MapReduce, Serialization ,The Writable Interface ,Writable Classes ,Implementing a Custom Writable ,Serialization Frameworks ,Avro ,File-Based Data Structures ,Sequence File ,Map File.	L2, L3 and L4	8
MODULE 5: **Developing a MapReduce Application** The Configuration API ,Combining Resources ,Variable Expansion ,Configuring the Development Environment ,Managing Configuration ,GenericOptionsParser, Tool, and ToolRunner ,Writing a Unit Test ,Mapper ,Reducer ,Running Locally on Test Data ,Running a Job in a Local Job Runner , Testing the Driver ,Running on a Cluster ,Packaging ,Launching a Job ,The MapReduce Web UI ,Retrieving the Results ,Debugging a Job ,Hadoop Logs ,Remote Debugging ,Tuning a Job ,Profiling Tasks ,MapReduce Workflows ,Decomposing a Problem into MapReduce Jobs ,JobControl ,Apache Oozie.	L1, L2 and L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Big Data: Principles and best practices of scalable realtime data systems",NathanMatz, Manning Publications, 2015
2. "Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale" Tom White, Oreilly.
3. "High-Performance Big-Data Analytics, Computing Systems and Approaches" Raj, P., Raman, A., Nagaraj, D., Duggirala, S.,Springer.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**2**	**--**	**--**	**--**	**1**	**--**	**2**	**--**	**--**	**--**	**1**	**--**	**2**	**-**
CO2	**1**	**2**	**2**	**-**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**-**
CO3	**1**	**2**	**3**	**1**	**2**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**1**	**2**	**2**	**3**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**3**	**--**	**-**	**2**	**2**	**3**
CO5	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**1**	**--**	**-**	**2**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4211	Distributed Systems Security	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Distributed Systems Security serve as one of the most important courses for postgraduate students, since it provides an in-depth coverage of security threats and issues across the 4 tiers-Host, Application, Infrastructure, Service layers. Therefore, the students are supposed to study, practice and discuss on the major fields discussed in the course to ensure the success of the education process. The outcome of this course implicitly and explicitly affects the abilities the students to understand and analyze design and working of distributed systems security.

Course Objective

The objective of this course is to:

1. equip the students to identify the security issues and techniques to cope up with the threats.
2. provide the overview of various threats and vulnerabilities, also solutions to handle those threats.

Course Outcomes

After completing the course, the students will be able to,

CO 1: describe the distributed system security issues and techniques and build a secure system using security development lifecycle.

CO 2: apply the knowledge by doing practical work for the host and network level threats like worms, virus.

CO 3: explain the use cryptographic techniques. Also describe the application level threats such as cross site scripting, error handling.

CO 4: conclude the ways to handle host, network level threats with the help of sandboxing, resource management, etc.

CO 5: Design solutions after having knowledge of standards and policies for security. And also go through the case studies like cloud computing, IBE.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction** Distributed Systems, Distributed Systems Security. Security in Engineering: Secure Development Lifecycle Processes - A Typical Security Engineering Process – Security Engineering Guidelines and Resources. Common Security Issues and Technologies: Security Issues, Common Security Techniques	L1and L2	5
MODULE 2: **Host-level Threats and Vulnerabilities** Transient code Vulnerabilities - Resident Code Vulnerabilities - Malware: Trojan Horse – Spyware - Worms/Viruses – Eavesdropping – Job Faults. Infrastructure-Level Threats and Vulnerabilities: Network-Level Threats and Vulnerabilities - Grid Computing Threats and Vulnerabilities – Storage Threats and Vulnerabilities – Overview of Infrastructure Threats and Vulnerabilities.	L1, L2, L3 and L6	7
MODULE 3: **Application-Level Threats and Vulnerabilities**	L1, L2, L3, L4	9

Application-Layer Vulnerabilities –Injection Vulnerabilities - Cross-Site Scripting (XSS) - Improper Session Management - Improper Error Handling - Improper Use of Cryptography - Insecure Configuration Issues - Denial of Service - Canonical Representation Flaws - Overflow Issues. Service-Level Threats and Vulnerabilities: SOA and Role of Standards - Service-Level Security Requirements - Service-Level Threats and Vulnerabilities - Service-Level Attacks – Services Threat Profile	and L6	
MODULE 4: **Host-Level Solutions** Sandboxing – Virtualization - Resource Management - Proof-Carrying Code - Memory Firewall – Antimalware. Infrastructure-Level Solutions: Network-Level Solutions - Grid-Level Solutions - Storage-Level Solutions. Application-Level Solutions: Application-Level Security Solutions.	L2, L3, L5	7
MODULE 5: **Service-Level Solutions** Services Security Policy - SOA Security Standards Stack – Standards in Dept - Deployment Architectures for SOA Security - Managing Service-Level Threats - Compliance in Financial Services - SOX Compliance - SOX Security Solutions – Multilevel Policy-Driven Solution Architecture - Case Study: Grid - The Financial Application – Security Requirements Analysis. Future Directions – Cloud Computing Security – Security Appliances - Usercentric Identity Management - Identity-Based Encryption (IBE) - Virtualization in Host Security.	L3, L5 and L6	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Abhijit Belapurakar, AnirbanChakrabarti and et al.,**"Distributed Systems Security: Issues, Processes and solutions"**,1st Edition, Wiley, Ltd., Publications,New Delhi, 2009.
- S.S.Dara, "**AtextbookofEngineeringChemistry**",10thEdition,SChand&Co.Ltd., New Delhi, 2014.

Reference Books

- RachidGuerraoui and Franck Petit, "**Stabilization, Safety, and Security of Distributed Systems**", Springer, 2010.
- R Bengaluru, 2015.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	--	--	--	--	--	--	3	--	--	--	--	1	--	3	-
CO2	--	2	--	--	--	1	--	3	--	--	--	--	1	--	3	-
CO3	--	2	--	--	--	--	--	3	--	--	--	--	1	--	3	-
CO4	--	--	2	--	--	1	--	--	--	--	--	--	1	--	3	-
CO5	--	--	2	--	--	--	--	--	--	--	--	--	1	--	3	-

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4212	BLOCKCHAIN TECHNOLOGY	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	Basic Networking and Data Structure Concepts				
Co-requisites	Nil				

Catalog Description

Blockchain is an emerging technology platform for developing decentralized applications and data storage, over and beyond its role as the technology underlying the cryptocurrencies. The basic tenet of this platform is that it allows one to create a distributed and replicated ledger of events, transactions, and data generated through various IT processes with strong cryptographic guarantees of tamper resistance, immutability, and verifiability. This course will enable the graduate students to gain the knowledge of this emerging technology and will update them with the required employability skills.

Course Objectives

The objective of this course is to:

- Familiarise the functional/operational aspects of blockchain and cryptocurrency.
- Understand emerging abstract models for Blockchain Technology.
- Identify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain.

Course Outcomes

On completion of this course, the students will be able to:

CO1. Understand and explain the mechanism of Blockchain Technology.
CO2. Identify and describe the cryptographic techniques used in blockchain technology.
CO3. Understand and explain the bitcoin blockchain.
CO4. Understand and apply the different models of blockchain.
CO5. Understand and explain the concept of Ethereum and Hyperledger.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Basic ideas behind blockchain, how it is changing the landscape of digitalization, peer-to-peer network, Blockchain Mechanism, Blockchain vs Distributed Systems, introduction to cryptographic concepts required, Hashing, public key cryptosystems, private vs public blockchain and use cases, Hash Puzzles, Introduction to Bitcoin Blockchain, Centralization vs. Decentralization, Security of Blockchain	L1, L2	8
MODULE 2: CRYPTOGRAPHIC BASICS FOR CRYPTOCURRENCY A short overview of Hashing, SHA 256, signature schemes, encryption schemes, Elliptic Curve Mathematics, Point Addition, Point Doubling, Elliptic Curve Cryptography, Security of Elliptic Curve Cryptography	L1, L2	7

MODULE 3: BITCOIN BLOCKCHAIN Distributed consensus, Consensus without identity using a block chain, Incentives and proof of work, Mining, Mechanics of Bitcoin, Bitcoin and blocks, Bitcoin Mining, Bitcoin and Anonymity, Bitcoin - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin.	L1, L2	8
MODULE 4: BLOCKCHAIN MODELS Abstract Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS)	L1, L2, L3	7
MODULE 5: ETHEREUM AND HYPERLEDGER Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts, Hyperledger, Zero Knowledge proofs and protocols in Blockchain	L1,L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016. (Free download available).
2. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015

Reference Books

1. R.Pass et al, Analysis of Blockchain protocol in Asynchronous networks , EUROCRYPT 2017, (eprint.iacr.org/2016/454).
2. R.Pass et al, Fruitchain, a fair blockchain, PODC 2017 (eprint.iacr.org/2016/916).
3. Eric Traub, Learn Blockchain Programming with JavaScript, Packt, 2018.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	2	2	3	--	--	--	--	--	--	--	--	--	2	1	-	2
CO 2	2	2	3	-	--	--	--	--	--	--	--	--	2	1	-	2
CO 3	2	2	3	-	-	--	--	--	--	--	--	--	2	1	-	3
CO 4	1	2	3	-	2	--	--	--	--	--	--	--	2	1	1	2
CO 5	2	3	3	-	-	--	--	--	--	--	--	--	2	1	1	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4301	BIOMETRIC SYSTEMS AND BIOMETRIC IMAGE PROCESSING	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Biometric systems and biometric image processingaims at designing and implementingalgorithms which are so important for the secure source of authentication today. This course focuses on building strong mathematical foundations which can be applied in designing a vast range of applications like broadcast monitoring, copy control.

Course Objectives

The objective of this course is to

1. Enable the students with the technical and non-technical concepts used in Biometric systems and biometric image processing
2. Provide an overview of different case studies used in designing biometrics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Grasp the nontechnical but very important basics of Biometric systems and biometric image processingwhich will make their foundation for application creation.

CO2: Elaborate and apply the algorithms, by studying different examples of biometric systems.

CO3:Learn about essentials of image processing and the application areas of image processing

CO4:Build and study the models of fingerprint biometrics and learn all the concepts for building finger print based authentication system.

CO5: Build and study the models of iris biometrics and learn all the concepts for building iris based authentication system.

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Modules	Blooms level*	Number of hours
MODULE 1: **Introduction:** Biometric fundamentals – Biometric technologies – Biometrics Vs traditional techniques –Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes:verification, identification and biometric matching – Performance measures in biometric systems, FAR,FRR, FTE rate, EER and ATV rate, Applications of Biometric Systems, Security and Privacy Issues. **Physiological Biometrics :** Leading technologies : Finger-scan – Facial-scan – Iris-scan – Voice-scan –components, working principles, competing technologies, strengths and weaknesses – Other physiological biometrics : Hand-scan, Retina-scan – components, working principles, competing technologies, strengths and weaknesses – Automated fingerprint identification systems.	L1, L2 AND L3	8
MODULE 2:	L1, L2,	8

Behavioral Biometrics: Leading technologies: Signature-scan – Keystroke scan – components, workingprinciples, strengths and weaknesses. **Privacy and Standards in Biometrics**: Assessing the Privacy Risks of Biometrics – Designing Privacy-Sympathetic Biometric Systems – Need for standards – different biometric standards.	L3	
MODULE 3: **Fundamentals of Image Processing:** Digital Image representation - Fundamental steps in Image Processing Image Enhancement: The Spatial Domain Methods, The Frequency Domain Methods –ImageSegmentation: Pixel Classification by Thresholding, Histogram Techniques, Smoothing and Thresholding- Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection.	L1, L2 and L3	8
MODULE 4: **Fingerprint Biometrics:** Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width betweentwo ridges - Fingerprint Image Processing - Minutiae Determination - Fingerprint Matching: FingerprintClassification, Matching policies.	L1, L2, and L3	4
MODULE 5: **Iris Biometrics:** Iris System Architecture, Definitions and Notations - Iris Recognition: Iris location,Doubly Dimensionless Projection, Iris code, Comparison - Coordinate System: Head Tilting Problem,Basic Eye Model, Searching Algorithm, Texture Energy Feature.	L1, L2, and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

Recommended Books:

1. 1. Anil K Jain, Patrick Flynn, Arun A Ross, "Handbook of Biometrics", Springer, 2008
   Reference Books
2. 1. "2. Anil K Jain, Arun A Ross, KarthikNandakumar, "Introduction to Biometrics", Springer, 2011
3. 3. Rafael C.Gonzalez, Richard E.Woods, Steven L.Eddins, "Digital Image Processing", Pearson
4. Education, New Delhi, 2009

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2	1	1	--	--	--	--	--	--	--	--	3	3	2	2

CO2	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2
CO3	2	2	1	1	--	--	--	--	--		--	--	2	2	2	2
CO4	2	2	2	1	--	--	--	--	--	--	--	--	2	2	2	2
CO5	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4302	Software Vulnerability Analysis	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course focuses on the foundations of software security and considers important software vulnerabilities and attacks that exploit them such as buffer overflows, SQL injection, and session hijacking. This course helps to prevent or mitigate these attacks, including advanced testing and program analysis techniques.

Course Objectives

The purpose of this course is to provide understanding of the main issues related to security in modern software security systems. In addition, this course will present different domains of code exploitation and how they can be used together to test the security of an application.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of software security, goals of software security and management of software security risk.

CO2:Describe the principles of software security and methods of security violation in software system.

CO3:State and apply the knowledge of different types of overflow attack and access control in different operating system.

CO4: Explain the basic knowledge of network layers and various types of hijacking, flooding attacks.

CO5: Implement the concept of shell code.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction to Software Security** It's All about the Software, Dealing with Widespread Security Failures, Bugtraq, CERT Advisories, RISKS Digest, Technical Trends Affecting Software Security, The ilities, What is Security?, Isn't That Just Reliability?, Penetrate and Patch Is Bad, On Art and Engineering, Security Goals, Prevention, Traceability and Auditing, Monitoring, Privacy and Confidentiality, Multilevel Security, Anonymity, Authentication, Integrity, Know Your Enemy: Common Software Security Pitfalls, Software Project Goals, Conclusion. **Managing Software Security Risk:** An Overview of Software Risk Management for Security, The Role of Security Personnel, Software Security Personnel in the Life Cycle, Deriving Requirements, Risk Assessment, Design for Security, Implementation, Security Testing, A dose of Reality, Getting People to Think about Security, Software Risk management in Practice, When Development Goes Astray, When Security Analysis Goes Astray, The Common Criteria.	L1, L2 and L3	12
MODULE 2: **On Open Source and Closed Source**	L1, L2, L3 and	10

Security by Obscurity, Reverse Engineering, Code Obfuscation, Security for Shrink-Wrapped Software, Security by Obscurity Is No Panacea, The Flip Side: Open- Source Software, Is the "Many-Eyeballs Phenomenon" Real? Why Vulnerability Detection Is Hard, Other Worries, On Publishing Cryptographic Algorithms, Two More Open-Source Fallacies, The Microsoft Fallacy, The Java Fallacy, An Example: GNU Mailman Security, More Evidence: Trojan Horses, To Open Source or Not to Open Source, Another Security Lesson from Buffer Overflows, Beating the Drum. **Guiding Principles for Software Security:** Principle1: Secure the Weakest Link, Principle 2: Practice Defence in Depth, Principle 3: Fail Securely, Principle 4: Follow the Principle of Least Privilege, Principle 5: Compartmentalize, Principle 6: Keep It Simple, Principle 7: Promote Privacy, Principle 8: Remember That Hiding Secrets is Hard, Principle 9: Be Reluctant to Trust, Principle 10: Use Your Community Resources Conclusion.	L4	
MODULE 3: **Buffer Overflows & Access Control** What Is a Buffer Overflow?, Why Are Buffer Overflows a Security Problem?, Defending against Buffer Overflow, Major Gotchas, Internal Buffer Overflows, More Input Overflows, Other Risks, Tools That Can Help, Smashing Heaps and Stacks, Heap Overflows, Stack Overflows, Decoding the Stack, To Infinity … and Beyond!, Attack Code, A UNIX Exploit, What About Windows?The UNIX Access Control Model, How UNIX Permissions Work, Modifying File Attributes, Modifying Ownership, The unask, The Programmatic Interface, Setuid Programming, Access Control in Windows NT, Compartmentalization, Fine-Grained Privileges.	L1, L3 and L4	8
MODULE 4: **NETWORKING** OSI Model, Sockets, Socket Functions, Socket Addresses, Network Byte Order, Internet Address Conversion, A Simple Server Example, A Web Client Example, A Tinyweb Server, Peeling Back the Lower Layers, Data-Link Layer, Network Layer, Transport Layer , Network Sniffing, Raw Socket Sniffer, libpcap Sniffer, Decoding the Layers, Active Sniffing, Denial of Service, SYN Flooding, The Ping of Death, Teardrop, Ping Flooding, Amplification Attacks, Distributed DoS Flooding, TCP/IP Hijacking, RST Hijacking, Continued Hijacking, Port Scanning, Stealth SYN Scan, FIN, X-mas, and Null Scans, Spoofing Decoys, Idle Scanning, Proactive Defense (shroud), Reach Out and Hack Someone, Analysis with GDB, Almost Only Counts with Hand Grenades, Port-Binding Shellcode.	L1, L3, and L4	10
MODULE 5: **SHELLCODE** Assembly vs. C, Linux System Calls in Assembly, The Path to Shellcode, Assembly Instructions Using the Stack, Investigating with GDB, Removing Null Bytes, Shell-Spawning Shellcode, A Matter of Privilege, And Smaller Still, Port-Binding Shellcode, Duplicating Standard File Descriptors, Branching Control Structures, Connect-Back Shellcode.	L1, L2, and L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Recommended Books:

1. "Building Secure Software: How to Avoid Security Problems the Right Way" John Viega, Gary R. Tata McGraw Hill

2. Michael Howard, David LeBlanc, John Viega: 19 Deadly Sins of Software Security: Programming Flaws and How to Fix Them (Security One-off) (Addison-Wesley Professional Computing Series)
3. Richard Sinn " Software Security , Theory Programming and Practice" Cengage Learning

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	1	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	2	--	2	--	--	--	--	--	--	--	--	1	1	--	1
CO3	1	1	3	3	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	3	1	--	---	--	--	--	--	--	--	1	1	--	--
CO5	1	2	3	1	--	--	--	--	--	--	--	--	1	1	--	3

Course Code: NCE4303	Applied Cryptography	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	3	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

19. Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
20. Provide an overview of various network attacks and related security mechanism , various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describeand solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

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CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic ,gcd and inverse algorithm, chinese remainder theorem and its application in cryptography;Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management ,distribution ,secure exchange of keys and authentication certificate and its applications in real life. Explain , compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols :IPSec, SSL,TLS,SET; Describing malicious softwares and illustrating various design approaches to Firewell

.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES	L1, L2 AND L3	8

MODULE 2: Advanced Encryption Standard (AES) encryption and decryption, Analysis, Principals of public key crypto systems, RSA algorithm, security of RSA. Rabin cryptosystem, Elgamal cryptosystem, Elliptical Curve cryptography,	L1, L2, L3	8
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, Random Oracle Model , hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA),SHA-512, Whirlpool, Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS).	L1, L2 and L3	8
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Entity authentication, Authentication Applications: Kerberos,	L1, L2, and L3	4
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic transaction (SET).	L1, L2, and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. William Stallings,**"Cryptography & Network Security"**,4th Edition, Pearson Education,NewDelhi, 2017.
2. Behrouz A. Forouzan, "**Cryptography & Network Security**", 2ndEdition,Tata McgrawHills,NewDelhi, 2015

Reference Books

1. Douglas R.Stinsons, **"Cryptography Theory and Practice"**, 3rd Edition, McMillan Publications, Londan, 2003
2. AtulKahate, **"Cryptography & Network Security"**, 3rd Edition, Tata McgrawHills,New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-
CO	1	1	1	--	--	--	--	--	--	--	--	--	1	1	3	-

2																
CO 3	1	1	1	--	-	--	--	--	--	--	--	--	1	1	3	-
CO 4	1	2	3	--	--	--	--	--	--	--	--	--	1	1	3	-
CO 5	1	2	3	--	--	--	--	--	--	--	--	--	2	2	3	-

1: strongly related, 2: moderately related and 3: weakly related

NCE4304	BIOMETRIC IMAGE PROCESSING LAB	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites					

Catalog Description

Biometric Image processing has become an important tool for research and investigation in many areas of science and engineering. This course is designed to provide the students an understanding of the basic concepts of digital image processing and various techniques used in it. Students will perform practical on hardware kit as well as on software.Students will do basic exercises on image loading, manipulation, edge finding, features extraction, face recognition, segmentation, fingerprint, iris, signature recognition.

Course Objectives

The objective of this course is to

1. Make students demonstrate the concepts of image processing.
2. Apply the different techniques to process image.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the basic image processing tools and commands.

CO2. Apply the filters to remove noise in spatial & frequency domain.

CO3. Apply image processing techniques for compression, segementation and restoration.

Modules	Blooms level*	Number of hours
Lab Session 1 1. To study about the basic image processing tools. 2. Write program for histogram processing.	L3	3
Lab Session 2 3. Write program for filtering in frequency domain. 4. Write program for filtering in spatial domain.	L3 and L4	3
Lab Session 3 5. Write programs for different compression schemes. 6. Write program image restoration.	L3 and L4	3
Lab Session 4 7. Write program for performing different morphological operations.	L3 and L4	3

8. Write program for image segmentation.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
- A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

- Maher A. Sid-Ahmed, "Image Processing Theory, Algorithms and Architectures", McGraw-Hill, 1995.
- William K. Pratt, "Digital Image Processing", Wiley-Interscience publication, Second Edition, 1991.
- R. Arthyr, "Fundamentals of Electronic Image Processing", PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	--	--	2	--	--	--	--	--	--	2	1	--	-	-
CO2	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	-
CO3	1	-	3	--	2	--	--	--	--	--	--	2	1	3	--	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4305	Applied Cryptography Lab	L	T	P	C
Version 2020.1	Date of Approval: 19 July 2020	0	0	4	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

21. Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
22. Provide an overview of various network attacks and related security mechanism , various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describeand solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

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CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic ,gcd and inverse algorithm, chinese remainder theorem and its application in cryptography;Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management ,distribution ,secure exchange of keys and authentication certificate and its applications in real life. Explain , compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols :IPSec, SSL,TLS,SET; Describing malicious softwares and illustrating various design approaches to Firewell

.

Modules	Blooms level*	Number of hours
MODULE 1: 1.Program to implement Ceaser Cipher. 2. Program to implement Ceaser Cipher for any value of shift parameter. 3. Programs to implement Playfair cipher, affine cipher, vegnere cipher	L1, L2 and L3	3
MODULE 2:	L1, L2,	3

4.Program to implement Vernam Cipher. 5. Program to implement Hill Cipher. 6. Program to implement Rail fence and Columnar transposition cipher	L3 and L4	
MODULE 3: 7.Program to implement DES/AES/IDEA algorithm 8. Program to implement RSA algorithm 9. Program to implement Rabin Cryptosystem and ElgamalCryptsystem.	L1, L2 and L3	3
10.Program to implement Digital Signature using RSA/Elgamal. 11. Implementation study of MD5/SHA-1. 12. Programs to implement ECB/CBC/OFB modes of operation.	L1, L2, and L3	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

5. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005,(ISBN: 978-0131873162).

Reference Books

5. Behrouz A. Forouzan, Cryptography & Network Security, McGraw-Hill, 2007, USA. (ISBN: 0073327530 9780073327532).
6. Douglas R. Stinson, Chapman and Hall, Cryptography Theory & Practice, CRC Press, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	1	2	1	--	--	--	--	--	--	--	1	--	3	--
CO 2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 3	1	2	1	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 4	1	2	2	2	3	--	--	--	--	--	--	--	1	--	3	--
CO 5	1	2	2	2	2	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code : NCE4335	Summer Internship Evaluation	L	T	P	C
Version: 2020.1	Date of Approval: 19 July 2020	0	0	0	6
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live projects that will increase capability to work on actual problem in industry. This training may undergo in an industrial environment or may be an in-house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Develop communication, interpersonal and other critical skills in the job interview process.

CO2: Design and develop software and hardware projects

CO3: Assess interests and abilities in their field of study.

CO4: Demonstrate excellent technical and communication skills to acquire employment contacts leading directly to a full-time job following graduation from college.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	2	2	--	--	--	1	--	--	--	1	1	1	1
CO2	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1
CO3	1	1	2	3	2	--	--	--	1	--	--	--	1	1	1	1
CO4	1	1	2	2	2	--	--	--	1	--	--	--	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

Course Code :- NCE4337	Project Dissertation-I	L	T	P	C
Version: 2020.1	Date of Approval: 19 July 2020	0	0	0	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO2	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO3	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
CO4	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**
C05	**1**	**1**	**--**	**--**	**--**	**--**			**1**	**-**	**-**	**-**	**--**	**--**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4306	Web Application & Penetration Testing	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The Web Application and Penetration Testing course provides all the advanced skills necessary to carry out a thorough and professional penetration test against modern web applications.

Course Objectives

The objective of this course is to

1. help students move beyond push-button scanning to professional, thorough, high-value web application penetration testing.
2. enable students to assess a web application's security posture and convincingly demonstrate the impact of inadequate security that plagues most organizations

Course Outcomes

On completion of this course, the students will be able to

CO1: Grasp the nontechnical but very important basics of web application and penetration testingwhich will make their foundation for application creation.
CO2: Elaborate and apply the attacks, by studying different techniques of hacking.
CO3:Learn about essentials of web application structure, Apache, authentication mechanisms.
CO4:Learn IIS authentication, and various attacks and security issues.
CO5: Study the models input validation checks and associated case studies.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction to Web Applications and Security** The Web Application Architecture ,A Brief Word about HTML ,Transport: HTTP ,The Web Client ,The Web Server,The Web Application ,The Database ,Complications and Intermediaries ,The New Model: Web Services ,Potential Weak Spots ,The Methodology of Web Hacking ,Profile the Infrastructure ,Attack Web Servers ,Survey the Application,Attack the Authentication Mechanism ,Attack the Authorization Schemes , Perform a Functional Analysis,Exploit the Data Connectivity,Attack the Management Interfaces,Attack the Client,Launch a Denial-of-Service Attack Profiling: Server Discovery,Intuition ,Internet Footprinting, DNS Interrogation Ping,Discovery Using Port Scanning , Dealing with Virtual Servers, Service Discovery , Server Identification,Dealing with SSL.	L1, L2 AND L3	8
MODULE 2: **Hacking Web Servers** Common Vulnerabilities by Platform ,Apache,Microsoft Internet Information	L1, L2, L3	8

Server (IIS), Attacks AgainstIIS Components, Attacks Against IIS, Escalating Privileges on IIS, Netscape Enterprise Server , Other Web Server Vulnerabilities , Miscellaneous Web Server Hacking Techniques , Automated Vulnerability Scanning Software ,Whisker, Nikto , twwwscan/arirang , Stealth HTTP Scanner, Typhon , WebInspect , AppScan, FoundScan Web Module , Denial of Service Against Web Servers,		
MODULE 3: Documenting Application Structure , Manually Inspecting the Application , Statically and Dynamically Generated Pages, Directory Structure , Helper Files , Java Classes and Applets , HTML Comments and Content ,Forms, Query Strings , Back-End Connectivity , Tools to Automate the Survey, lynx , Wget,TeleportPro,Black Widow, WebSleuth, Common Countermeasures , A Cautionary Note, Protecting Directories,Protecting Include Files, Miscellaneous Tips. Authentication: Authentication Mechanisms, HTTP Authentication: Basic and Digest, Forms-Based Authentication, Microsoft Passport, Attacking Web Authentication,Password Guessing, Session ID Prediction and Brute Forcing, Subverting Cookies,Bypassing SQL-Backed Login Forms,Bypassing Authentication.	L1, L2 and L3	8
MODULE 4: The Attacks, Role Matrix, The Methodology , Query String, POST Data , Hidden Tags, URI,HTTP Headers,Cookies, Final Notes,Case Study: Using Curl to Map Permissions, Apache Authorization, IIS AuthorizationAttacking Session State Management:Client-Side Techniques, Hidden Fields, The URL,HTTP Headers and Cookies, Server-Side Techniques, Server-Generated Session IDs, Session Database, SessionID Analysis, Content Analysis, Time Windows.	L1, L2, and L3	4
MODULE 5: **Input Validation Attacks** Expecting the Unexpected, Input Validation EndGame, Where to Find Potential Targets,Bypassing Client-Side Validation Routines , Common Input Validation Attacks , Buffer Overflow, Canonicalization (dot-dot-slash),Script Attacks , Boundary Checking, Manipulating the Application , SQL Injection and DatastoreAttacks,Command Execution, Common Side Effects,Common Countermeasures. Attacking Web Datastores: A SQL Primer,SQL Injection, Common Countermeasures. Web Client Hacking :The Problem of Client-Side Security,Attack Methodologies ,Active Content Attacks ,Java and JavaScript ,ActiveX,Cross-Site Scripting,Cookie Hijacking ,Case Study #: From the URL to the Command Line and Back,Case Study #: The Cross-Site Scripting Calendar	L1, L2, and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

Recommended Books:

1. Hacking Exposed Web Applications", 3rd edition, JOEL SCAMBRAY, VINCENT LIU, CALEB SIMA.
2. "The Web Application Hacker's Handbook Discovering and Exploiting Security Flaws" DafyddStuttard, Marcus Pinto
3. Rich Bowen, Ken Coar, "Apache Cookbook", O'Reilly

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2	1	1	--	--	--	--	--	--	--	--	3	3	2	2
CO2	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2
CO3	2	2	1	1	--	--	--	--	--		--	--	2	2	2	2
CO4	2	2	2	1	--	--	--	--	--	--	--	--	--	2	2	2	2
CO5	2	2	1	1	--	--	--	--	--	--	--	--	--	2	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4307	MALWARE ANALYSIS IN NETWORK SECURITY	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Malware Analysis in Network Security lays the Groundwork for the course by presenting the key tools andtechniques malware analyst use to examine malicious programs. Students will learn how tosave time by Exploring malware in two phases. Behavioral analysis focuses on the Specimen's interactionwith its Environment such as Registry, Network, the File system
Code Analysis focuses on the specimen's code and make use of a disassembler and a debugger.

Course Objectives

The objective of this course is to

1. Enable the students how to extract host- and network-based indicators from a malicious program using dynamic and static analysis techniques.
2. Learn the basics of finding the functionality of a program by analyzing disassembly and by watching how it modifies a system as it runs in a debugger.

Course Outcomes

On completion of this course, the students will be able to
CO1: Grasp the nontechnical but very important basics of Malware analysis like antivirus scanning etc.
CO2: Elaboratevirtual machines & dynamic analysis; study the structure of a virtual machine.
CO3:Recognizing C Code Constructs in Assembly and understanding function conventions
CO4:Study and Analyzing Malicious Windows Program, handling file systems.
CO5: Study Malware behavior& covert malware launching in network

Modules	Blooms level*	Number of hours
MODULE 1:**BASIC STATIC TECHNIQUES** Antivirus Scanning: A Useful First Step, Hashing: A Fingerprint for Malware, Finding Strings, Packed and Obfuscated Malware, Packing Files, Detecting Packers with PEiD, Portable Executable File Format, Linked Libraries and Functions, Static, Runtime, and Dynamic Linking, Exploring Dynamically Linked Functions with Dependency Walker, Imported Functions, Exported Functions , Static Analysis in Practice, PotentialKeyloggerexe: An Unpacked Executable, PackedProgramexe: A Dead End, The PE File Headers and Sections, Examining PE Files with PEview, Viewing the Resource Section with Resource Hacker, Using Other PE File Tools, PE Header Summary	L1, L2 AND L3	8
MODULE 2:**VIRTUAL MACHINES & DYNAMIC ANALYSIS** The Structure of a Virtual Machine, Creating Your Malware Analysis Machine, Configuring VMware, Using Your Malware Analysis Machine, Connecting Malware to the Internet, Connecting and Disconnecting Peripheral Devices, Taking Snapshots, Transferring Files from a Virtual Machine, The Risks of Using VMware for Malware Analysis, Record/Replay: Running Your Computer in Reverse, Sandboxes: The Quick-and-Dirty Approach Using a Malware Sandbox ,	L1, L2, L3	8

Sandbox Drawbacks, Running Malware, Monitoring with Process Monitor, The Procmon Display, Filtering in Procmon, Viewing Processes with Process Explorer, The Process Explorer Display, Using the Verify Option, Comparing Strings, Using Dependency Walker, Analyzing Malicious Documents, Comparing Registry Snapshots with Regshot, Faking a Network, Using ApateDNS, Monitoring with Netcat, Packet Sniffing with Wireshark, Using INetSim, Basic Dynamic Tools in Practice		
MODULE 3:**RECOGNIZING C CODE CONSTRUCTS IN ASSEMBLY** Overview of working with IDA Pro, Global vs Local Variables, Disassembling Arithmetic Operations, Recognizing if Statements, Analyzing Functions Graphically with IDA Pro, Recognizing Nested if Statements, Recognizing Loops, Finding for Loops, Finding while Loops, Understanding Function Call Conventions, Cdecl, Stdcall, fastcall , Push vs Move ,Analyzing switch Statements ,If Style ,Jump Table ,Disassembling Arrays ,Identifying Structs ,Analyzing Linked List Traversal ,	L1, L2 and L3	8
MODULE 4:**ANALYZING MALICIOUS WINDOWS PROGRAMS** The Windows API, Types and Hungarian Notation, Handles, File System Functions, Special Files, The Windows Registry, Registry Root Keys, Regedit , Programs that Run Automatically, Common Registry Functions, Analyzing Registry Code in Practice, Registry Scripting with reg Files , Networking APIs , Berkeley Compatible Sockets, The Server and Client Sides of Networking, The WinINet API , Following Running Malware, DLLs , Processes, Threads ,Interprocess Coordination with Mutexes , Services , The Component Object Model , Exceptions: When Things Go Wrong ,Kernel vs User Mode , The Native API	L1, L2, and L3	4
MODULE 5:**: MALWARE BEHAVIOR & COVERT MALWARE LAUNCHING** Downloaders and Launchers, Backdoors, Reverse Shell, RATs, Botnets, RATs and Botnets Compared, Credential Stealers, GINA Interception, Hash Dumping, Keystroke Logging, Persistence Mechanisms, The Windows Registry, Trojanized System Binaries, DLL Load-Order Hijacking, Privilege Escalation, Using SeDebugPrivilege, Covering Its Tracks—User-Mode Rootkits, IAT Hooking, Inline Hooking, Launchers, Process Injection, DLL Injection, Direct Injection, Process Replacement, Hook Injection , Local and Remote Hooks, Keyloggers Using Hooks, Using SetWindowsHookEx, Thread Targeting, Detours, APC Injection, APC Injection from User Space, APC Injection from Kernel Space .	L1, L2, and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Recommended Books:

1. "Practical Malware Analysis" by Michael Sikorski and Andrew Honig
2. "The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System" Second Edition by Reverend Bill Blunden
3. "Rootkits: Subverting the Windows Kernel" by Jamie Butler and Greg Hoglund
4. "Practical Reverse Engineering" by Dang, Gazet, Bachaalany

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2	1	1	--	--	--	--	--	--	--	--	3	3	2	2
CO2	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2
CO3	2	2	1	1	--	--	--	--	--		--	--	2	2	2	2
CO4	2	2	2	1	--	--	--	--	--	--	--	--	2	2	2	2
CO5	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4308	WEB SECURITY	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Modern cryptography applies theory from mathematics and computer science to design and implement strong encryption methods which are so important to the safety of computer systems today. This course focuses on introducing students to the issues of WEB security, especially in terms of business systems' dependence on communication. Acquisition of knowledge about dangers that threaten the Internet and how to protect oneself from them. Introduction to practical methods, measures and resources that can be applied in the construction and development of WWW securitysystem

Course Objectives

The objective of this course is to

1. Identify domain space and security challenges of the web and information systems based on web technologies, classify threats and ways to deal with them for individuals and information systems.
2. Propose ways for technical and legal protection of systems based on web technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1:Analyse and apply legal regulations in the field of electronic business, electronic trade, digital signature, protection of personal data, etc

CO2: Determine the most suitable security protocol to protect web applications

CO3: Identify domain space and security challenges of the web.

CO4: Explain the operating principles of web information systems.

CO5: Understand the technicalities of mails i.e. junk or spam mails.

Modules	Blooms level *	Number of hours
MODULE 1: **The E-Commerce Playground** Web Languages: The Babylon of the 21st Century, Languages of the Web, HTML, Dynamic HTML (DHTML).XML,XHTML,Perl,PHP,ColdFusion,Active Server Pages,CGI,Java. Web and Database Servers: Web Servers,Apache,Microsoft's Internet Information Server (IIS),Database Servers,Microsoft SQL Server,Oracle.	L1, L2 and L3	8
MODULE 2: **Shopping Carts and Payment Gateways** Evolution of the Storefront,ElectronicShopping,Shopping Cart Systems,Scope and Lifetime of an Electronic Shopping Cart,Collecting, Analyzing, and Comparing Selected Components,Keeping Track of the Total Cost,Change of Mind,Processing the Purchase,ImplementationofaShoppingCartApplication,ProductCatalog,SessionManagement,DatabaseInterfacing,Integration with the Payment Gateway,Examples of Poorly Implemented Shopping Carts,Carello Shopping Cart,DCShop Shopping Cart,Hassan Consulting's Shopping Cart,Cart32 and Several Other Shopping Carts,ProcessingPayments,Finalizing the Order,Method of Payment,Verification and	L1, L2, L3 and L4	8

Fraud Protection,OrderFulfillment and Receipt Generation,Overview of the Payment Processing System,Innovative Ways to Combat Credit Card Fraud,Order Confirmation Page,Payment Gateway Interface,Transaction Database Interface,Interfacing with a Payment GatewayAnExample,PaymentSystemImplementationIssues,Integration,TemporaryInformation,SSL,Storing User Profiles,Vulnerabilities Caused by Poor Integration of Shopping Cart and Payment Gateway,PayPal—Enabling Individuals to Accept Electronic Payments,		
MODULE 3: **HTTP and HTTPS: The Hacking Protocols,Protocols of the Web,HTTP,HTTPS (HTTP over SSL).** URL: The Web Hacker's Sword: URL Structure,Web Hacker Psychology,URLs and Parameter Passing. URL Encoding, Meta-Characters,Specifying Special Characters on the URL String.,Meta-Characters and Input Validation,UnicodeEncoding,The Acme Art, Inc. Hack,Abusing URL Encoding,Unicode Encoding and Code Red's Shell Code,UnicodeVulnerability,The Double-Decode or Superfluous Decode Vulnerability,HTMLForms,Anatomy of an HTML Form,InputElements,Parameter Passing Via GET and POST,Case Study: Reconnaissance Leaks Corporate Assets.	L1, L2 and L3	8
MODULE 4: **Web: Under (the) Cover.** The Components of a Web Application,The Front-End Web Server,The Web Application ExecutioEnvironment. The Database Server,Wiring the Components,The Native Application Processing Environment.,Web Server APIs and Plug-Ins,URL Mapping and Internal Proxying,Proxying with a Back-End Application Server.Examples. Connecting with the Database,The Craftiest Hack of Them All,Using Native Database APIs.Examples.UsingODBC,UsingJDBC,Specialized Web Application Servers,Identifying Web Application Components from URLs,The Basics of Technology Identification,Examples,MoreExamples,Advanced Techniques for Technology Identification,Examples,Identifying Database Servers,Countermeasures, Rule 1: Minimize Information Leaked from the HTTP Header,Rule 2: Prevent Error Information from Being Sent to the Browser.	L1, L2, and L3	4
MODULE 5: **Reading Between the Lines.** Information Leakage Through HTML,What the Browsers Don't Show You,Netscape Navigator—View | Page Source,Internet Explorer—View | Source,Clues to Look For,HTMLComments,RevisionHistory,Developer or Author Details,Cross-References to Other Areas of the Web Application,Reminders and Placeholders, Comments Inserted by Web Application Servers,Old "Commented-Out" Code,Internal and External Hyperlinks,E-mail Addresses and Usernames,UBE, UCE, Junk Mail, and Spam,Keywords and Meta Tags,HiddenFields,Client-Side Scripts,Automated Source Sifting Techniques,Usingwget,Usinggrep,Sam Spade, Black Widow, and Teleport Pro.	L1, L2, and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

6. McClure, Stuart, Saumil Shah, and Shreeraj Shah. Web Hacking:attacks and defense. AddisonWesley. 2003.
7. 2. Garms, Jess and Daniel Somerfield. Professional Java Security. Wrox. 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PS O 4
CO 1	1	2	1	2	1	--	--	--	--	--	--	--	1	--	3	--
CO 2	1	1	2	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 3	1	2	1	1	1	--	--	--	--	--	--	--	1	--	3	--
CO 4	1	2	2	2	3	--	--	--	--	--	--	--	1	--	3	--
CO 5	1	2	2	2	2	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: NCE4309	DIGITAL WATERMARKING & STAGENOGRAPHY	L	T	P	C
Version 2020.1	Date of Approval: 19 July2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Modern Digital watermarking and steganography apply theory from mathematics, digital signal processing, image processing and computer science to design and implement algorithms which are so important for the secure communication today. This course focuses on building strong mathematical foundations which can be applied in designing a vast range of applications like broadcast monitoring, copy control.

Course Objectives

The objective of this course is to

3. Enable the students with the technical and non-technical concepts used in Digital Watermarking and Steganography.
4. Provide an overview of different mathematical structures used in designing digital watermarking and steganographic algorithms.

Course Outcomes

On completion of this course, the students will be able to

CO1: grasp the nontechnical but very important basics of Digital Watermarking and Steganography which will make their foundation for application creation.
CO2: Elaborate and apply the algorithms, by studying different models of watermarking systems.
CO3:Learn about one of the main tools Dirty Paper Codes that are needed for optimal watermarking of Gaussian signals they will study about the different security techniques need and used in Watermarking systems.

CO4:Build and study the models of Steganography and how to optimize the use of embedding techniques.

CO5: Describe the concept of stegnalysis, and applying steganographic algorithms to design the required application.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Applications and Properties Information Hiding, Steganography, and Watermarking , History of Watermarking , History of Steganography , Importance of Digital Watermarking , Importance of Steganography ,Applications of Watermarking , Applications of Steganography Steganography for Dissidents, Steganography for Criminals, Properties of Watermarking Systems , Evaluating Watermarking Systems , Properties of Steganographic and Steganalysis Systems , Evaluating and Testing Steganographic Systems	L1, L2 AND L3	8
MODULE 2:	L1, L2,	8

MODELS OF WATERMARKING Notation,Communications ,Communication-Based Models of Watermarking , Geometric Models of Watermarking , Modeling Watermark Detection by Correlation Watermarking with side information: Informed Embedding, Watermarking Using Side Information, Dirty-Paper Codes	L3	
MODULE 3: PRACTICAL DIRTY-PAPER CODES Practical Considerations for Dirty-Paper Codes , Broad Approaches to Dirty-Paper Code Design	L1, L2 and L3	8
MODULE 4: STEGANOGRAPHYSteganographic Communication , The Channel , The Building Blocks , Notation and Terminology,Information-Theoretic Foundations of Steganography , Cachin's Definition of Steganographic Security , Practical Steganographic Methods , Statistics Preserving Steganography , Model-Based Steganography , Masking Embedding as Natural Processing , Minimizing the Embedding Impact , Matrix Embedding , Nonshared Selection Rule ,	L1, L2, and L3	4
MODULE 5: STEGNALYSIS Steganalysis Scenarios , Detection , Forensic Steganalysis , The Influence of the Cover Work on Steganalysis , Some Significant Steganalysis Algorithms , LSB Embedding and the Histogram Attack , Sample Pairs Analysis , Blind Steganalysis of JPEG Images Using Calibration , Blind Steganalysis in the Spatial Domain.	L1, L2, and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

5. William Stallings, Cryptography & Network Security: Principles and Practices, Prentice Hall, 2005, (ISBN: 978-0131873162).

Reference Books

1. "Digital Watermarking and Steganography"Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, ,Margan Kaufmann Publishers, New York, 2008.
6. 2. "Digital Watermarking", Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, MarganKaufmannPublishers, New York, 2003.
7. 3. "Techniques and Applications of Digital Watermarking and Contest Protection", Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, Artech House, London, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2	1	1	--	--	--	--	--	--	--	--	3	3	2	2
CO2	2	2	1	1	--	--	--	--	--	--	--	--	2	2	2	2
CO3	2	2	1	1	--	--	--	--	--		--	--	2	2	2	2
CO4	2	2	2	1	--	--	--	--	--	--	--	--	--	2	2	2	2
CO5	2	2	1	1	--	--	--	--	--	--	--	--	--	2	2	2	2

1: strongly related, 2: moderately related and 3: weakly related

Course Code :- NCE4437	Project Dissertation-II	L	T	P	C
Version: 2020.1	Date of Approval: 19 July 2020	0	0	0	15
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course is to provide practical training on some live/demo projects that will increase capability to work on actual problem in industry. It will be an in house training on some latest software which is in high demand in market. This training will be designed such that it will useful for their future employment in industry.

Course Objectives

The objective of this course is to

1. Provide practical training on live projects
2. Increase technical capabilities on solving real life problems in company environment

Course Outcomes

On completion of this summer internship, the students will be able to:

CO1: Demonstrate a sound technical knowledge of their selected project topic.

CO2: Design and develop engineering solutions to complex problems utilising a systems approach.

CO3: Analyse various approaches for solving a complex engineering problem using different tools and techniques

CO4: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO5: Apply technical skills and knowledge in completing the project.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO2	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO3	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
CO4	1	1	--	--	--	--	--	--	1	--	--	--	--	--	1	1
C05	1	1	--	--	--	--			1	-	-	-	--	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

OVERVIEW

M.Tech. in Civil Engineering with the specialization in (Structural Engineering/Construction Technology and Management/ Transportation engineering/Environmental Engineering) is one of the programmes as a centre of excellence for the development of science, engineering and technology, research, etc. that comes under the Civil Engineering Department. Solely this programme is focusing to provide a broad domain of knowledge with a view to produce quality engineer and researchers. This programme provides detailed knowledge about Building Physics, Concrete Technology, and Construction Management, Transportation, Environmental aspects. It will help in applying basic and technical knowledge of mathematics, science, engineering, technology and management in various application areas in the field of construction. The programme will give the students an insight into scientific principles involved in construction, understanding about the behaviour of construction materials and the fundamentals of structural mechanics and environmental aspects. Construction students will be imbibed with good knowledge about different types of materials used for construction, along with testing procedures to assure quality control which will help them in analysing the real-world problems by using their theoretical knowledge and putting it in practical use. At the same time, the student will be able to use his/her knowledge in different domains meeting the realistic constraints such as economic, environmental, social, health, safety, management and sustainability issues.

PROGRAMME OBJECTIVES (POs)

The post-graduates will

PO 1: Application of Mathematics and sciences: Apply the knowledge of mathematics, science, engineering fundamentals, technological advancements, management and an engineering specialization to the solution of complex problems.

PO 2: Identify and Research to Solve: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design and Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conducting Investigations and Research: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of the M. Tech in Civil Engineering with the specialization in (Structural Engineering/ Construction Technology and Management/ Transportation Engineering/ Environmental Engineering), the student will be able to:

PSO1: Apply knowledge and understanding of the scientific principles, mathematics and statistics to quantify and optimize relevant current technologies, and applications of the key engineering principles and practices related to Structural Engineering/Construction Technology and Management/Transportation Engineering /Environmental Engineering.

PSO2: Design, utilize principle, methods, software and code of practice to excel in areas of structural engineering/construction technology and management/Transportation Engineering /Environmental Engineering to meet desired needs within realistic constraints and conduct experiments of different civil engineering materials and interpret data.

PSO3: Understand and evaluate user needs, including considerations such as code requirement, aesthetics etc. and Design The Building/Structural And The Transportation System Keeping Consideration Of Environmental, Social, Safety And Sustainability.

PSO4: Apply the principle of soft computing skills, problem solving, creative thinking, group dynamics, team building, Leadership Skills, Decision Making Skills, self-development and interpersonal skills, contributing to overall personality and career development.

PSO1	PSO2			PSO3		PSO4	
Apply knowledge and understanding of the scientific principles, mathematics and statistics to quantify and optimize relevant current technologies, and applications of the key engineering principles and practices related to structural engineering/construction technology and management/Transportation Engineering /Environmental Engineering.	Ability to design, utilize principle, methods, software and code of practice to excel in areas of structural engineering/construction technology and management/Transportation Engineering /Environmental Engineering to meet desired needs within realistic constraints and conduct experiments of different civil engineering materials and interpret data.			Ability to understand and evaluate user needs, including considerations such as code requirement, Aesthetics Etc. And Design the Building/Structural And The Transportation System Keeping Consideration Of Environmental, Social, Safety And sustainability.		Apply the principle of soft computing skills, problem solving, creative thinking, group dynamics, team building, Leadership Skills, Decision Making Skills, Self-Development and Interpersonal Skills, Contributing to overall personality and career development.	
Basic Engineering/Statistics & Optimization	**Design/ Treatment**	**Materials**	**Planning/ Management**	**Structural/Traffic Engineering**	**Environment/Safety**	**NTCC Courses**	**Value Added Courses**
Applied Numerical Methods	Design of Industrial Structures	Advanced Civil Engineering Lab	Building Services & Maintenance Management	Structural Dynamics	Sustainable Constructions	Summer Internship	Basics of Communicatio n
Optimization & Quantitative Methods in Civil Engineering	Advanced Steel Design	Advances in Construction Practices and Machinery	Process Analysis & Theory of Constraints	Advanced Structural Analysis	Disaster Mitigation and Management	Project Dissertation-I	Self-Development & Interpersonal Skills
Research Methodology & Technical Report Writing	Advanced Concrete Design	Pavement Materials & Construction	Reliability in Construction Management	Finite Element Method	Environmental Impact Assessment For Civil Engineers	M. Tech Dissertation	Corporate Communicatio n
Environmental Chemistry	Advanced Bridge Design	Pavement Material Lab	Construction Planning & Management	Theory of Plates& Shells	System Design & Value Analysis		Behavioural Communicatio n & Relationship Management

Optimization of Water Resources	Pre-Engineered Construction Technology	Advanced Concrete Technology	Transportation Planning	Soil Structure Interaction	Accidents Analysis & Prevention		Interpersonal Communicatio n
Soft Computing Techniques in Civil Engineering	Geometric Design of Highways	Advanced Construction Materials	Transportation Economics & Finance	Advanced Structural Engineering Lab	Road Safety Audit		Leading Through Teams
Soft Computing Techniques in Civil Engineering Lab	Highway Design Lab	Advanced Construction Materials Lab	Air Pollution & Control	Public Transportation Systems	Environmental Engineering Lab		
	Pavement Analysis and Design	Geotechnics in Construction	Solid & Hazardous Waste Management	Intelligent Transportation Systems			
	Water Treatment Plant Design and Operation	Geotechnica l Lab for Construction Engineers	GIS & Remote Sensing for Land & Water Management	GIS Application in Transportation Engineering			
	Offshore Structures		Construction Economics & Finance	GIS Lab for Transportation Engineers			
	Design of Tall Buildings		GIS Applications in Construction Engineering	Traffic Engineering & Modeling			
	Pre-stressed Concrete Design		Construction Quality & Safety Management	Traffic Engineering & Modeling Lab			
	Advanced Steel and Concrete Composite Structures		Operations Strategy				
	Airport Infrastructure		Contract Laws & Regulations				

	Planning & Design						
	Transportation Infrastructure Design		Water Resource Planning & Management				
	Bridge Engineering for Highways		Transport Phenomenon of Waste Water				
	Railway Infrastructure, Planning & Design		Water Reclamation & Reuse				
	Biological Process of Waste Water Treatment		Air & Water Quality Modeling				
	Industrial Waste Water Treatment & Design		Air & Water Quality Modeling Lab				
	Advanced Waste Water Engineering						
	Advanced Waste Water Engineering Lab						

CIV4101	APPLIED NUMERICAL METHODS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/ Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The purpose of this course is to provide students with the skill, knowledge and attitude required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical technique, and to demonstrate the importance of selecting the right numerical technique for a particular application, and carefully analyzing and interpreting the results obtained.

Course Objectives

The objective of this course is to:

1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
2. Apply numerical methods to obtain approximate solutions to mathematical problems.
3. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define and describe the Algebraic and Transcendental Equation and solve the problems using appropriate Numerical methods.

CO2. Describe the interpolation methods to find intermediate values in given graphical or tabulated data.

CO3. Describe and Define the sets of linear simultaneous equations and solve the problems using Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods.

CO4. Describe and apply Trapezoidal and Simpson's Rule to solve given integration problems.

CO5. Define and describe Runga-Kutta method and Euler's Method to solve differential equations

Course Content

Modules	Blooms level*	Number of hours
Module I: Solution of Algebraic & Transcendental Equations Newton-Raphson method including method of complex roots, Graeffe's root square method (Computer based algorithm and program for these methods)	L1, L2, L3	10
Module II: Interpolation & Approximation Lagrange's and Newton-divided difference formula, Newton interpolation formula for finite differences, Gauss's forward and backward interpolation formulae, Bessel's and Laplace-Everett's formulae, Cubic spline, least squares approximation using Chebyshev polynomial. Solution of partial differential equations of linear and non-linear nature with finite difference scheme and iteration techniques	L1, L2, L3	10
Module III: Solution of Linear Simultaneous Equations Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods, Solution of Eigen Value problems; Smallest, largest and intermediate Eigen values (Computer based algorithm and Programme for these methods)	L1, L2, L3	10
Module IV: Numerical Differentiation & Integration Numerical differentiation using difference operators, Simpson's 1/3 and 3/8 rules, Boole's rule, Weddle's rule.	L1, L2, L3	8
Module V: Solution of Differential Equations	L1, L2,	10

Modified Euler's method, Runge-Kutta method of 2nd, 3rd and 4th orders, Predictor- Corrector method, Stability of Ordinary differential equation, Solution of Laplace's and Poisson's equations by Liebman's method, Relaxation method.	L3	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- V. Rajaraman, Computer oriented Numerical Methods, PHI Learning, New Delhi, 1993.
- Gerald, Whealey, Applied Numerical Analysis, Pearson Education Limited, New Delhi, 2006.
- Grewal B S, Numerical methods in Engineering and Science, Khanna Publishers, Delhi, 2014.

Reference Books

- T Veerarajan, T Ramachandran, Theory and Problems in Numerical Methods, Tata Mcgraw Hill, New Delhi, 2002.
- Pradip Niyogi, Numerical Analysis and Algorithms, Tata Mcgraw Hill, New Delhi, 1984.
- Francis Scheld, Numerical Analysis, Tata Mcgraw Hill, New Delhi, 2000.
- Sastry S. S, Introductory Methods of Numerical Analysis, Prentice Hall India, New Delhi, 2012.
- Gupta C.B., Vijay Gupta, Introduction to Statistical Methods, Vikas Publishing, Noida, 2004.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**3**
CO 2	**1**	**2**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**	**3**
CO 3	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**	**3**
CO 4	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**	**3**
CO 5	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**3**

1: strongly related, 2: moderately related and 3: weakly related

CIV4102	SUSTAINABLE CONSTRUCTIONS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course includes the concept of Sustainably, Sustainable construction materials and methodologies related to commercial construction, including LEED/Green certifications. It also includes the life cycle assessment with case studies.

Course Objectives:

The objective of this course is to:

1. Demonstrate an ability to evaluate and design whole or parts of projects, taking into account not only the financial and economic issues but also the social and environmental impacts affecting the sustainability of infrastructure.
2. Future challenges in sustainable development based on possible scenarios considering the level of success of current mitigation and adaptation measures.
3. Learn social sustainability in construction and development of built assets, and the roles of construction processes, outputs and outcomes on people and society.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the basic concepts of sustainability, sustainable development and sustainable construction, understand rating systems and compares key features such as cost, ease of use, and building Performance.

CO2. Define and Differentiate rating systems in detail, including its evolution, objectives, criteria, levels of certification benefits, and shortcomings.

CO3. Demonstrate a functional knowledge of formulating and specifying practical measures for environmental sustainability that can be implemented in design and construction.

CO4. Explain the quality control monitoring in the project, project safety management and construction project information.

Course content

Modules	Blooms level*	Number of hours
Module I: Introduction and Sustainable Site Planning Principles of sustainability: Introduction to Course, Definition of sustainability, Major Environmental Challenges, Global Warming, Introduction to Green Buildings; LEED, Sustainable Urban Development, Sustainable Sites - LEED Credits., Case study	L1, L2, L3	12
Module II: Energy Conservation Energy Conservation in Buildings, HVAC Systems, Energy and Atmosphere - LEED Credits, Fossil Fuels vs. Renewable Energy, Case study	L2, L3	12
Module III: Water Conservation and Indoor Environment Quality Water Conservation in Buildings, Storm Water Harvesting and Management, Indoor Environmental Quality – Basic, parameters, do's and don'ts, LEED credits, calculations, compliances, important points to be considered, Case study	L2, L3	12
Module IV: Green Building Construction Green Construction Materials, Materials and Resources - LEED Credits, Building Deconstruction, C&D Recycling, Building Commissioning, Economics of Green Buildings, LCC/LCA., Case study	L2, L3, L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- C.J. Kibert, Sustainable Construction: Green Building Design and Delivery, 2nd Ed., John Wiley, New Jersey, 2008.
- J. K. Yates and Daniel Castro-Lacouture, Sustainability in Engineering Design and Construction,1stEdition, CRC Press, Taylor and Francis group, New York, 2015.

Reference Books

- G.T. Miller Jr., Living in the Environment: Principles, Connections, and Solutions, 14th Ed., Brooks Cole, Pacific Grove, California, 2004.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	--	--	2	1	--	2	2	--	1	--	--	--	2	--	1	2
CO 2	--	--	--	1	--	2	2	--	--	--	--	--	2	--	1	1
CO 3	--	2	2	1	--	--	--	--	3	--	--	--	2	--	1	-
CO 4	--	--	--	--	--	2	1	--	3	--	--	--	2	--	1	3

1: strongly related, 2: moderately related and 3: weakly related

CIV4103	DISASTER MITIGATION AND MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:
This course is intended to provide fundamental understanding of different aspects of Disaster Management. It will expose the students to the concept and functions of Disaster Management and to build competencies of Disaster Management professionals and development practitioners for effective supporting environment as put by the government in legislative manner. It would also provide basic knowledge, skills pertaining to Planning, Organizing and Decision-making process for Disaster Risk Reduction.

Course Objectives:

The objective of this course is to:

1. Ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention, risk reduction and the basic understanding of the research methodology for risk reduction measures.
2. Equipped with knowledge, concepts, and principles, skills pertaining to Planning, Organizing, Decision-making and problem solving methods for Disaster Management.
3. Develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

Course Outcomes:
On completion of this course, the students will be able to
CO1: Increase the knowledge and understanding of the disaster phenomenon and, its factors.
CO2: Understand the relationship of hazard, risk and vulnerability
CO3: Obtain the skills in role of education and training in disaster prevention.
CO4: Ensure skills in post disaster management activities
CO5: Get the knowledge in understanding various prone zones in India

Course Content

Modules	Blooms level*	Number of hours
Module I UNDERSTANDING DISASTER Introduction – Types of Disaster (Rapid disaster – Natural, manmade disaster and slow disaster – Natural, manmade disaster) – Factors of Disaster, Geology and topography, Weather and climate, Ecosystems, Human factors, Earthquake: epicentres and scale of earthquake.	L1, L2 and L3	8

Module II HAZARD, RISK AND VULNERABILITY Hazard classification and assessment - Hazard evaluation and hazard control - Concept And Elements of disaster risk - Techniques of Risk Assessment - Vulnerability Concept and Parameters, Risk and Vulnerability Relationship, Observation and Perception Of Vulnerability, Vulnerability Identification, Socio-Economic Factors of Vulnerability, Vulnerability Analysis.	L2 and L3	9
Module III PRE-DISASTER MANAGEMENT ACTIVITIES Introduction - Institutional arrangements - Vulnerability and capacity assessment - Prevention and mitigation - Structural Mitigation And Non-Structural Mitigation - Preparedness and planning - Institutional learning and memory - Warning indicators - Public Awareness, Role Of Education And Training In Disaster Prevention.	L2, L3 and L4	7
Module IV POST-DISASTER MANAGEMENT ACTIVATES Critical stress debriefing – Debriefing Checklist – Claims and follow-up of disaster - Insurance companies – Sale of debris – The relative risk of communicable disease after disaster – Persistence of many serious communicable disease	L2, L3 and L4	6
Module V DISASTER MANAGEMENT IN INDIA Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami - Rescue, Relief And Rehabilitation - National Disaster Policy Of India (Salient Features) - News Media In Disaster Management - Impact Of Media On Policy.	L2 and L3	6

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- D.B.N. Murthy, Disaster Management: Text and Case Studies, Deep & Deep Publications Pvt. Ltd.
- Parag Diwan, "A Manual on Disaster Management",Ritomate International, Noida Special
  Economic Zone, India.

Reference Books:

- White, Gilbert F. and J. Eugene Hass, 1975, Assessment of Research on Natural Hazards, Cambridge, the MIT Press, MA
- Alexander, D. Natural Disasters, ULC press Ltd, London, 1993.

- Carter, W. N. Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
- Chakrabarty, U. K. Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi 2007.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	--	--	--	--	2	1	--	2	2	2	--	--	2	--	1
CO 2	--	--	--	--	--	--	--	2	1	1	--	--	2	--	1
CO 3	--	--	--	--	--	2	--	2	2	1	--	--	2	--	1
CO 4	--	--	--	--	--	--	--	1	1	2	--	--	2	--	1
CO 5	--	--	--	--	--	--	--	1	--	--	--	--	2	--	1

1: strongly related, 2: moderately related and 3: weakly related

CIV4104	ENVIRONMENT IMPACT ASSESSMENT FOR CIVIL ENGINEERS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course introduces the methodology of environmental impact assessment (EIA) as a vital tool for sound environmental management and decision-making. The course provides an overview of the concepts, methods, issues and various forms and stages of the EIA process.

Course Objectives:

The objective of this course is to:

1. Explain the major principles of environmental impact assessment.
2. Understand the different steps within environmental impact assessment.
3. Different levels and systems of EIA are examined to highlight the diversity of approach and impact of the EIA process.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Carry out scoping and screening of developmental projects for environmental and social assessments.

CO2: Explain different methodologies for environmental impact prediction and assessment.

CO3: Plan environmental impact assessments and environmental management plans.

CO4: Evaluate environmental impact assessment reports.

CO5: Able to access different case studies/examples of EIA in practice

Course Content

Modules	Blooms	Number of hours

	level*	
Module I INTRODUCTION Impact of development projects under Civil Engineering on environment – Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA.	L1, L2 and L3	10
Module II METHODOLOGIES Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives – Case studies.	L2 and L3	10
Module III PREDICTION AND ASSESSMENT Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA.	L2, L3 and L4	10
Module IV ENVIRONMENTAL MANAGEMENT PLAN Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000	L2, L3 and L4	10
Module V CASE STUDIES EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects	L2 and L3	8

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Canter, R.L., “Environmental Impact Assessment”, McGraw Hill Inc., New Delhi, 1996.
- Shukla, S.K. and Srivastava, P.R., “Concepts in Environmental Impact Analysis”, Common Wealth Publishers, New Delhi, 1992.

Reference Books:

- John G. Rau and David C Hooten “Environmental Impact Analysis Handbook”, McGraw Hill Book Company, 1990.

- "Environmental Assessment Source book", Vol. I, II & III. The World Bank, Washington, D.C., 1991.
- Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II", Blackwell Science, 1999.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	--	1	1	--	--	--	--	--	--	--	2	3	--	1
CO2	--	--	--	2	--	1	1	2	--	--	--	--	3	--	1
CO3	2	--	--	--	--	--	--	--	--	--	--	--	3	--	1
CO4	--	--	1	1	--	--	--	2	--	1	1	--	3	--	1
CO5	--	--	--	1	--	--	--	2	--	1	1	--	3	--	1

1: strongly related, 2: moderately related and 3: weakly related

CIV4105	OPTIMIZATION AND QUANTITATIVE METHODS IN CIVIL ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

This course discusses about the basics of optimization, formulation of design problem and classification of optimization problems. It deals with various optimization techniques i.e. penalty function, Lagrange multipliers unconstrained minimization etc. and their applications in civil engineering. The different linear and Non-Linear programming techniques and their applications in civil engineering are also discussed.

Course Objectives

The objective of this course is to

1. Deal with different optimization methods Optimization to minimize the effort required or to maximize the desired benefit in design, construction and maintenance in civil engineering system.
2. Impart knowledge of Linear Programming, Non-Linear Programming and Dynamic Programming techniques with number of applications in civil engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the concept of optimization and formulation of design problem.
CO2. Describe various optimization techniques and their application in civil engineering.
CO3. Analyze the problems related to Linear Programming and Algorithms.
CO4. Apply different Linear Programming applications in transportation, water resources, and structural and other optimization problems.

Course Content

Modules	Blooms level*	Number of hours

Module I: Introduction Introduction: Engineering application of Optimization, Formulation of design problems as mathematical programming problems, classification of optimization problems	L1, L2	10
Module II: **Optimization Techniques** Classical optimization, multivariable with no constraints, unconstrained minimization techniques, penalty function techniques, Lagrange multipliers and feasibility techniques. Linear Programming: Graphical method, Simplex method, Duality in linear programming (LP), Sensitivity analysis Applications in civil engineering;	L1, L2, L3	14
Module III: **Non-Linear Programming Techniques/Method** Unconstrained optimization, one dimensional minimization, golden section, elimination, quadratic and cubic, Fibonacci, interpolation, Direct search, Descent, Constrained optimization, Direct and indirect, Optimization with calculus, Khun- Tucker conditions.	L1, L2, L3, L4	14
Module IV: **Applications** Application of optimization techniques in Civil Engineering:	L1, L2, L3	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- S.S. Rao, Engineering Optimization: Theory and Practice, New Age International Pvt. Ltd., New Delhi, 2000.
- G. Hadley, Linear programming, Narosa Publishing House, New Delhi, 1990.

References

- H.A. Taha, Operations Research: An Introduction, 5th Edition, Macmillan, New York, 1992.

- K. Deb, Optimization for Engineering Design Algorithms and Examples, Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.
- K. Srinivasa Raju and D. Nagesh Kumar, Multi criterion Analysis in Engineering and Management, PHI Learning Pvt. Ltd., New Delhi, India, 2010.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**3**	**1**	**1**	**-**	**-**	**-**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**-**	**3**	**1**	**1**	**-**	**-**	**-**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**1**	**-**	**-**	**-**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**1**	**-**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

CIV4106	ADVANCED CIVIL ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

In this lab course the various tests are conducted on different types of basic construction materials such as aggregate, sand, cement, admixtures. It also includes the tests on concrete design mix, different tests related to fresh and hardened state concrete with both destructive and non-destructive tests.

Course Objective

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.
2. Strengthen the knowledge on construction materials, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance.

Course Outcomes

On the completion of this course, the student will be able to:

CO1. Perform the tests on various construction materials such as cement, aggregates, etc. to apply the results in the practical life.

CO2. Perform different tests on soil for knowing its properties & application construction for the quality assurance.

CO3. Convince on different tests required from environmental point of view.

CO4. Perform the various tests on which are non- destructive in nature.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Specific gravity, Grain Size analysis, Crushing and Impact factor test	L1, L2, L3, L5,	6

	L6	
Module II: Core cutter test and CBR	L1, L2, L3, L5, L6	6
Module III: Determination of pH value, conductivity, solids	L1, L2, L3, L5, L6	6
Module IV: Non -Destructive Testing of Concrete, Rebound Hammer,UPV Test ,Rebar Locator	L1, L2, L3, L5, L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

References

- Relevant Indian Standards, ASTM Standards, BIS, ISO.
- IS: 456, IS: 383, IS: 2386, IS: 516, IS: 10262, etc.
- IS: 13311- part 1- 1992, IS: 13311- part 2- 1992

- **Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**
- **Examination Scheme:**

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**1**	**1**	**--**	**1**	**3**	**1**	**2**	**3**
CO 2	**1**	**2**	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**1**	**2**	**3**
CO 3	**1**	**2**	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**1**	**2**	**3**

CO 4	**1**	**2**	**1**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

SECOND SEMESTER

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
CIV4201	Research Methodology and Technical Report Writing	2	-	-	2
	Structural Engineering (Specialization) Elective-I (Any Three)				**12**
STE4201	Structural Dynamics	3	1	-	4
STE4202	Advanced Steel Design	3	1	-	4
STE4204	Design of Industrial Structures	3	1	-	4
STE4212	Advanced Structural Analysis	3	1	-	4
	Structural Engineering (Specialization) Elective-II (Any Two)				**8**
STE4208	Advanced Bridge Design	3	1	-	4
STE4211	Advanced Concrete Design	3	1	-	4
STE4213	Finite Element Method	3	1	-	4
	Construction Technology & Management (Specialization) Elective-I (Any Three)				**12**
CME4201	Construction Methods & Equipment	3	1	-	4
CME4203	Building Services & Maintenance Management	3	1	-	4
CME4204	Systems Design and Value Analysis	3	1	-	4
CME4211	Process Analysis & Theory of Constraints	3	1	-	4
	Construction Technology & Management (Specialization) Elective-II (Any Two)				**8**
CME4207	Reliability Analysis in Construction Management	3	1	-	4
CME4212	Pre-Engineered Construction	3	1	-	4

	Technology				
CME4213	Construction Planning and Management	3	1	-	4
	Transportation Engineering (Specialization) **Elective-I (Any Three/ Three Set)**				**12**
TRE4201	Transportation Planning	3	1	-	4
TRE4214	Accidents Analysis & Prevention	4	-	-	4
TRE4216	Pavement Materials & Construction	3	-	-	3
TRE4217	Pavement Materials & Construction Lab	-	-	2	1
TRE4218	Geometric Design of Highways	3	-	-	3
TRE4219	Geometric Design of Highways Lab	-	-	2	1
	Transportation Engineering (Specialization) **Elective-II (Any Two)**				**8**
TRE4210	Transportation Economics & Finance	3	1	-	4
TRE4211	Pavement Analysis and Design	3	1	-	4
TRE4215	Road Safety Audit	3	1	-	4
	Environmental Engineering (Specialization) **Elective-I (Any Three)**				**12**
EVE4201	Environmental Policies and Legislation	3	1	-	4
EVE4208	Solid and Hazardous Waste Management	3	1	-	4
EVE4211	Water Treatment Plant Design and Operation	3	1	-	4
EVE4212	Air Pollution and Control	3	1	-	4
	Environmental Engineering (Specialization) **Elective-II (Any Two/ Two Set)**				**8**
EVE4205	Optimization of Water Resources System	3	1	-	4
EVE4213	Environmental Chemistry	3	-	-	3
EVE4214	Environmental Engineering Lab	-	-	2	1

EVE4215	GIS & Remote Sensing for Land and Water Management	3	1	-	4
	Open Electives				**5**
CSS4251	Corporate Communication	1	-	-	1
BEH4251	Behavioural Communication& Relationship Management	1	-	-	1
	Foreign Business Language-II	3	-	-	3
LAN4251	French-II				
LAN4252	German-II				
LAN4253	Spanish-II				
LAN4254	Russian-II				
LAN4255	Chinese-II				
LAN4256	Portuguese-II				
LAN4257	Korean-II				
LAN4258	Japanese-II				
LAN4259	Hindi-II				
	TOTAL				**27**

SUMMER INTERNSHIP

CIV4201	RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	2	0	0	2
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

1. Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.

2. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.

3. Deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Classify different research types; explain steps in research process and planning research proposal.

CO2: Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3: Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4: Demonstrate technical and scientific report writing skills, describe, plagiarism, patent laws and intellectual property rights.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	4
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.	L1, L2, L3	5
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	10
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

- Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
- Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.
- Kothari, C.R.Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

- Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India, 2005.
- Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt. Ltd., New Delhi, 2009.
- Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners, 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**2**	**-**
CO 2	**1**	**3**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**2**	**-**
CO 3	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**3**	**2**	**-**
CO 4	**1**	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly relate

STE4201	STRUCTURAL DYNAMICS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

Earthquake disaster is increasingly becoming global concern as it threatens the world's population, economy, and sustainable development. It is the responsibility of civil engineers to design and build earthquake resistant structures in order to minimize the risk due to earthquake. By reducing the losses of lives and properties, socio-economical sustainability can be easily achieved. This course offers the fundamental knowledge pf the basic science of earthquakes and its effects on the natural and built environment. Concept and techniques of seismic analysis with respect to the various elements of the building would be discussed in detail along with the design principles and concept. The Indian codal provisions will be kept in mind while considering the design aspects. To take all the above into consideration, the structural dynamics plays a very important role. Without understanding the dynamics of a structure, one cannot move further in designing for earthquake resistant structures.

Course Objectives

The objective of this course is to:

1. Analysis of structural members and systems subject to dynamic loads
2. Introduce the students with the deeper understanding of the dynamics of structures taking into consideration the single and multi-degree freedoms.
3. Understand and apply the knowledge of analysis on the basis of earthquake forces, wind forces and blast loading.

Course Outcomes

After completing the course, the students will be able to:

CO1. Acquire the ability to analyze single and multi-degrees of freedom system of structures.

CO2. Demonstrate in-depth knowledge of the discipline and build capability to apply that knowledge to structural dynamics

CO3. Orient the students to high value research on structural dynamics and earthquake engineering so that they get impetus to pursue lifelong learning.

CO4. Analyze earthquake generated forced on structures and evaluate their dynamical responses to earthquake.

CO5. Comprehend and apply technical knowledge and leadership skills to structural dynamics related to building dynamics, wind loads, blast loads research and consultancy problems

Course Content

Modules	Blooms level*	Number of hours
Module I:Single Degree of Freedom Systems Differential equation of motion - D' Alembert's principle - Free vibration and forced vibration response - damped and undamped - evaluation of damping constants - vibration of machine foundation - vibration isolation- vibration measuring instruments. Response to general loading - pulse excitation - Duhamel Integral - Numerical methods - Newmark method.	L1, L2, L3, L4, L5	15
Module II: Multi-Degree of Freedom and Continuous Systems Two- and three-degree systems - solution of eigen value problem – Stodola's method - orthogonality conditions - Modal superposition method. Vibration analysis of continuous systems - simply supported beams - Effect of shear and rotary inertia - Timoshenko beam - Effect of axial loads.	L1, L2, L3, L4, L5	9
Module III: Analysis for Seismic Forces Concept of response spectrum - estimation of design forces of multistory buildings using Bureau of Indian Standards (BIS) codes - earthquake analysis of base isolated buildings.	L1, L2, L3, L4, L5	9
Module IV:Analysis for Wind Forces Wind effects on structures - static and dynamic - analysis for wind loads using BIS codes - quasi static method and gust factor method.	L1, L3, L4, L5	8
Module V: Blast Loading Blast loading - over ground and underground structures - design parameters - relevant BIS codes, case study.	L1, L2, L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Mario Paz, Structural Dynamics - Theory and Computations, 6th Edition, Pearson Education, New Delhi, 2005.

- Chopra A.K., Dynamics of Structures, 5th Edition, Pearson Education, Indian Branch, New Delhi, 2007.
- Clough & Penzien, Dynamics of Structures, 4th Edition, McGraw Hill, International Edition, New York, 2008.
- S. K. Duggal, Earthquake Resistant Design of structures, Oxford University Press, 1st edition, UK, 2012.
- Pankaj Agarwal and Manish Shrikhande, Earthquake Resistant Design of structures, Prentice Hall of India Pvt. Ltd, New Delhi, 2009.
- C.V.R. Murty, Earthquake Tips – Learning Earthquake Design and Construction, IIT Kanpur, Kanpur, 2009.
- IS: 1893 (Part-1) -2002. "Criteria for Earthquake Resistant – Design of structures." B.I.S., New Delhi, 2002.
- IS:4326-1993, "Earthquake Resistant Design and Construction of Building", Code of Practice B.I.S., New Delhi, 1993.
- IS:13920-1993, "Ductile detailing of concrete structures subjected to seismic force" – Guidelines, B.I.S., New Delhi, 1993.

Reference Books

- T. Paulay and M.J.N. Priestly, Masory and Timber structures including earthquake Resistant Design –Anand S.Arya, Nemchand & Bros, Roorkee, 1999.
- Roy R Craig, Jr., Structural Dynamics, John Wiley & Sons, New York, 1981.
- Seismic Design of Reinforced Concrete and Masonry Building, John Wiley & Sons, New York, 2002.
- Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press, UK, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CO 1	1	2	2	3		--	--	--	--	--	--	1	1	2	1	2
CO 2	1	2	1	3	2	--	--	--	--	--	--	1	2	2	1	1
CO 3	1	2	---	3		--	--	--	--	--	--	1	1	2	1	2
CO 4	1	2	--	3		--	--	--	--	--	--	1	--	2	1	3
CO 5	2	3	--	1	2	--	--	--	--	--	--	1	1	2	1	2

1: strongly related, 2: moderately related and 3: weakly related

STE4202	ADVANCED STEEL DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Advanced Steel Design includes the design of steel members and their connections. Different methods of design will be briefly described before introducing the limit states of collapse and serviceability. It also includes the fundamentals of the integrated systems of steel bridges, bunkers, silos. The design will be done as per IS 800:2007.

Course Objectives

The objectives of the course are

1. Provide design concept for steel as a structural member using Limit state Design.
2. Impart knowledge about connections of the steel members.

Course Outcomes

After completing the course, the students will be able to:

CO1: Explain the various types of connections and calculate the strength of connections.
CO2: Describe the different types of connections (shear and moment).
CO3: Explain different types of loads on roof trusses and design the roof supporting members.
CO4: Design for various components of truss bridges.
CO5: Explain the design of bunkers and silos.

Course Content

Modules	Blooms level*	Number of hours
Module I: Connections Riveted connections, Bolted Connections, Load Transfer Mechanism, Failure of Bolted Joints, Specifications for Bolted Joints, Bearing ,Type Connections, Tensile Strength of Plate ,Strength and Efficiency of the Joint, Combined Shear and Tension, Slip ,Critical Connections, Praying Action, Design of Groove welds, Design of Fillet Welds, Design of Intermittent fillet welds, Failure of Welds.	L1, L2, L3	10
Module II: Beam-Column Connections Introduction, Beams-Column Connections, Connections Subjected	L1, L2,	10

to Eccentric Shear, Bolted Framed Connections, Bolted Seat Connections, Bolted Bracket Connections. Bolted Moment Connections, Welded Framed Connections, Welded Bracket Connections, Moment Resistant Connections.	L3	
Module III: Loads on Roof Structure. Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, Design of bracings.	L1, L2, L3	10
Module IV: Design of Truss Bridge Types of truss bridges, component parts of a truss bridge, economic proportions of trusses, self-weight of truss girders, design of bridge compression members, tension members; wind load on truss girder bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing.	L1, L2	10
Module V: Bunkers and Silos Design of Steel Bunkers and Silos: Introduction, Jaison's Theory Airy's Theory, Design of Parameters, Design Criteria, Analysis of Bins, Hopper Bottom, Design of Bins.	L1, L2, L3	08

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Duggal. S.K, Design of steel structures ,3rd Edition, Tata McGraw Hill, New Delhi, 2009.
- Subramanian.N, Design of Steel Structures, Oxford University Press, New Delhi, 2008.
- Negi,L S, Design Of Steel Structures, Tata McGraw Hill, New Delhi, 2003.

Reference Books

- Punmia, B C, Design of Steel Structures, Luxmi Publications, New Delhi, 2013.
- Dayaratnam.P, Design of Steel Structures, (Wheeler), New Delhi, 1998.
- Raghupathi.M, Design of Steel Structures, Tata McGraw Hill, New Delhi, 1985.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**1**	**2**	**2**	**1**	**1**	**2**
CO 2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**1**	**2**	**2**	**1**	**1**	**2**
CO 3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**1**	**1**	**2**
CO 4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**1-**	**1**	**2**	**1**	**1**	**2**
CO 5	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

STE4204	DESIGN OF INDUSTRIAL STRUCTURES	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The course includes the analysis & design industrial structures. The special types of designs such as silos, bunkers, cooling towers, large span roofs, etc. are also part of this course.

Course Objectives

The objectives of this course to:

1. Provide concept for planning of industrial structures and types of loads acting on the industrial structures.

2. Impart knowledge of the design concepts applied for industrial building design.

Course Outcomes

After completing the course, the students will be able to:

CO1: Explain the planning of industrial structures &carry out plastic design of structural elements.

CO2: Explain the analysis and design concepts of industrial buildings and storage structures.

CO3: Analyze and design of space structures

CO4: Analyse earthquake and wind generated forces on Aluminium Structures and evaluate their responses.

Course Content

Modules	Blooms level*	Number of hours
Module I: Planning of Industrial Structures Review of Plastic Design: Concept of minimum weight design. Design of Industrial Building Planning of industrial structures. Crane girders & columns, Analysis of trussed bents, Design of industrial frame.	L1, L2, L3	12
Module II: Design of Storage Structures Bunkers and silos. Pressure vessels and chimneys.	L1, L2 L3	10

Module III: Design of Space Structures Transmission towers, Steel domes, Pre-cast building components. Design using Light Gauge Sections: Structural use of pressed sections and light gauge sections, Aluminum as a material of construction for industrial structures and design of such structures, Tubular structures and Sandwich plate construction.	L1, L2, L3	13
Module IV: Aluminum Structures Introduction, Permissible stresses, Tension members, Compression members, Design of beams, Local buckling of compression elements, Riveted and bolted construction, Design of chimneys, Load analysis, Design of steel supporting chimney, Chimney foundation. Construction Practices: Shop practice in steel construction, Fabrication erection and production, Case study based. Structural aspects of machine foundations.	L1, L2, L3	13

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Ajmani, A. L. and Arya, A.S., Design of Steel Structures, Nem Chand and Brothers, New Delhi, 2000.
- Dunham, C.W., Planning of Industrial Structures, John Wiley and Sons, New Delhi, 2001.

Reference Books

- Gary, W., Steel Designer's Manual, Prentice Hall, New Delhi, 2008.
- Glower, F., Structural Pre-cast Concrete, Oxford Publishers, New Delhi, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PS0 4
CO 1	**1**	**2**	**2**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**1**	**2**
CO 2	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**1**	**2**
CO 3	**1**	**2**	**---**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**1**	**2**
CO 4	**1**	**2**	**--**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

STE4212	ADVANCED STRUCTURAL ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Course extends the basic stiffness method of analysis developed in the pre-requisite courses. Fundamental principles of the stiffness method of analysis, with automatic assembly of the stiffness matrix for rigid jointed plane frames and space structures, are presented in some detail. Elastic instability of frames and the design of continuous steel beams and portal frames using plastic methods will be undertaken.

Course Objectives

The objective of this course is to:

1. Equip students with fundamental principles of the stiffness method of analysis
2. Impart knowledge of matrix methods to analysis grids, trusses and frames.

Course Outcomes

After completing the course, the students will be able to:

CO1. Explain the basic concepts of matrix methods
CO2. Describe the concept of stiffness matrix and their application to beams.
CO3. Explain the analytical procedure for rigid frames using matrix methods.
CO4. Determine the displacements in the grids using matrix methods.
CO5. Explain the application of matrix approach on trusses.

Course Content

Modules	Blooms level*	Number of hours

Module I: Introduction to Matrix Method Introduction: Matrix Methods of Analysis of Structures, Degrees of freedom, Analysis of indeterminate structures: Force methods and Displacement Methods. Matrix concepts and Matrix analysis of structures: matrix, vectors, displacement and force transformation matrices, Element and structure flexibility matrices; equivalent joint loads; stiffness and flexibility approaches.	L1, L2, L3,	12
Module II: Stiffness Matrix The Matrix Displacement Approach: Beams- Introduction. Stiffness Matrix of a Bar Element subjected to Axial Force. Co-ordinate Transformations. Global Stiffness Matrix. Application to Pin-Jointed Frames. Stiffness Matrix of a Beam Element. Beam element stiffness. Application to Continuous Beams.	L1, L2, L3	10
Module III: Rigid Frames Matrix Analysis of Rigid Frames: Matrix displacement method vs slope deflection method, analysis of rigid frames with and without side sway, analysis of rigid framed for yielding of supports.	L1, L2, L3	8
Module IV: Grids Matrix Analysis of grillage or grid: Introduction, torsional stiffness of grid element and advantage of torsion release, Matrix Displacement Analysis of Grillage or Grid. Co-ordinate Transformations. Element Stiffness Matrix & its Application	L1, L2,	10
Module V: Trusses Matrix Analysis of Space Trusses & Frames: Co-ordinate Transformations. Application to Space Trusses & Space Frames, Analysis by conventional stiffness method (four degree of freedom per element) and reduced element stiffness method (single degree of freedom), Analysis by flexibility method	L1, L2, L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Pandit GS, Gupta SP, Structural Analysis: a matrix approach, Tata McGraw-Hill Publishing Co. New Delhi,2011
- Menon D Advanced Structural Analysis, Narosa Publishing House, New Delhi 2009.
- Kanchi, Matrix Structural Analysis, Wiley Eastern Ltd., New Delhi 1981.

Reference Books

- Jain AK, Advanced Structural Analysis, New Channel Brothers, New Delhi, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**1**	**2**	**2**	**1**	**1**	**2**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**1**	**2**	**2**	**1**	**1**	**2**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**1**	**1**	**2**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**1-**	**1**	**2**	**1**	**1**	**2**
CO5	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

STE4208	ADVANCED BRIDGE DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

Bridges are a very important part of a nation's transportation infrastructure. Proper planning, design and construction, as well maintenance, are of utmost importance. In general, engineers will benefit from exposure to sophisticated bridge typologies and construction practices, as well as the assessment of the existing bridges. This course will extend the concepts and methodologies given in bridge engineering courses to cover the design of medium- and long-span road bridges, which can be optimized in terms of load-carrying capacity, durability, and ease of construction and maintenance.

Course Objectives

The objective of this course is to:

1. Acquire knowledge about the purpose and design of the various kinds of bridges which are used in day-to-day life.
2. Study the loads, forces on bridges and design of several types of bridges.
3. Develop an understanding of and appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality, sizing of bridge elements, i.e. develop a clear understanding of conceptual design.
4. Exposure to the state-of-the-art practices in the international level expected to challenge the students to think beyond conventional design and implement optimized solutions that can compare with the best bridges in the world.

Course Outcomes

After completing the course, the students will be able to:

CO1: Apply knowledge of mathematics, science and engineering to understand the various types of bridges and its loadings and forces.

CO2: Design the bridges to meet desired needs such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

CO3: Design different types of RCC bridges, steel bridges, riveted and welded plate girder bridges and pre-stressed concrete bridges with the bearings and substructures.

CO4: Design and analysis of slab culverts, T-beam and slab bridges
CO5: Design and analysis of continuous, box girder and cantilever bridges

Course Content

Modules	Blooms level*	Number of hours
Module I: Concrete Bridges Introduction-types of Bridges-economic span length-Types of loading-Dead load live load-Impact Effect-Centrifugal force-wind loads-Lateral Loads-Longitudinal Forces-Seismic loads- Frictional resistance of expansion bearings-Secondary Stresses-Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements.	L1, L2, L3	10
Module II: Analysis and Design of Bridges Load distribution theories, analysis and design of slab culverts, tee beam and slab bridges.	L2, L3, L4, L5	9
Module III: Design of Continuous, Box Girder and Cantilever bridges Design principles of continuous bridges, box girder bridges, balanced cantilever bridges.	L2, L3, L4, L5, L6	9
Module IV: Design of Pre-Stressed Bridges: Flexural and torsional parameters – Courbon's theory – Distribution co-efficient by exact analysis – Design of girder section – maximum and minimum pre-stressing forces – Eccentricity – Live load and dead load shear forces – Cable Zone in girder – check for stresses at various sections – check for diagonal tension – Diaphragms – End block – short term and long term deflections.	L1, L2, L3, L4	10
Module V: Design and Analysis of Plate Girder Bridges and Their Foundation Design of riveted and welded plate girder bridges for highway and railway loading – wind effects – main section, splicing, curtailment, stiffeners – Different types of bearings – Design of bearings – Design of masonry and concrete piers and abutments – Types of bridge foundations – Design of foundations.	L1, L2, L3, L4, L5, L6	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Johnson Victor, D. Essentials of Bridge Engineering, Oxford and IBH Publishing Co. New Delhi, 1990
- Jagadeesh. T.R. and Jayaram. M. A. Design of Bridge Structures, Prentice Hall of India Pvt. Ltd. New Delhi, 2004.
- Raina V.K. Concrete Bridge Practice, Tata McGraw Hill Publishing Company, New Delhi, 1991.
- Ponnuswamy, S., Bridge Engineering, Tata McGraw Hill, New Delhi, 2008.

Reference Books

- Derrick Beckett, An introduction to Structural Design of Concrete Bridges, Surrey University Press, Henley Thomes, Oxford Shire, 1973.
- Taylor, F.W., Thomson, S.E., and Smulski E., Reinforced Concrete Bridges, John Wiley and Sons, New York, 1955.
- Bakht, B. and Jaegar, L.G., Bridge Analysis Simplified, McGraw Hill, New York, 1985.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	**1**	**2**	**2**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**1**	**3**	**2**
CO 2	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**3**	**1**
CO 3	**1**	**2**	**---**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**3**	**1**
CO 4	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**1**	**3**
CO	**1**	**2**	**---**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**3**	**1**

5																

1: strongly related, 2: moderately related and 3: weakly related

STE4211	**ADVANCED CONCRETE DESIGN**	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course advanced concrete design is to introduce engineering students to the advanced methods used for concrete structural design in designing the large complex structural elements. With this the students will be able to design and analyse the various components/ members of the reinforced concrete structure. The principle is based on the development of student's ability to analyse and design involve in the construction of reinforced concrete structural members. This course involves the fundamentals of mathematics, physics, engineering mechanics and strengthen the basics of RCC structure design course also, so that to help in experiencing complex structural elements in the real construction field.

Course Objectives

The objective of this course is to:

1. Comprehend the knowledge in advanced concept of reinforced concrete structural design of different complex RCC structure.

2. Develop analytical and design skill in the field of design large RCC members construction projects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyse and design the high-grade moment resisting complex structural RCC elements.

CO2: Apply various principal criteria, assumptions and design procedure followed in the concrete complex flat slab structural elements, their effect due to shear and moment distribution with columns.

CO3: Comprehend, Apply and Inculcate in dimensioning and designing of different types of load carrying sub-structure, their designing criteria and principles related to structural stability.

CO4: Develop the idea regarding the analysis and design of compression carrying member in different types of loading conditions which are mostly encountered in natural real scale construction.
CO5: Define the concept of yield-line theory of shear and moment carrying structural element which are mostly encountered in natural real situation regarding the behavior after yielding using different post-failure theories.

Course content

Modules	Blooms level*	Number of hours
Module I: Design of Deep Beams and Corbels Steps of Designing Deep Beams, Design by IS 456,Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels, Design of Procedure of Corbels	L1, L2, L3, L4, L5, L6	9
Module II: Design of Flat Slabs Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat Slabs-Check for one way and two-way shears - Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip	L1, L2, L3, L4, L5, L6	10
Module III: Design of Foundations Basic philosophy of foundation design, raft foundations, pile foundations & well foundation, combined footings.	L1, L2, L3, L4, L5, L6	9
Module IV: Design of Compression Members and Shear Walls Estimation of effective length of a column-Code requirement on Slenderness Limits, Design of Short Columns under Axial Compression, Design of Short Columns with Uniaxial Bending, Design of Short Columns under Biaxial Bending, Design of Slender Columns. Design of shear walls and reinforcement in walls.	L1, L2, L3, L4, L5, L6	10
Module V: Yield Line Theory Introduction, assumptions, location of yield lines, method of analysis, analysis of one way and two-way slabs, effect of top corner steel in a square slab, examples.	L1, L2, L3, L4, L5, L6	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- N. Krishna Raju, Pre-stressed concrete, Tata McGraw Hill, New Delhi, 2000
- T.Y. Lin, Ned H. Burns, Design of Pre-stressed Concrete Structures, John Wiley & Sons, New York, 2004.
- R. Rajagopalan, Pre-stressed Concrete, Narosa publishers, New Delhi, 2004.
- S.U. Pillai and D. Menon, Reinforced Concrete Design, Tata McGraw-Hill, 3rd Ed, New Delhi, 1999
- P.C. Varghese, Advanced Reinforced Concrete Design, Prentice Hall of India, 2nd Ed, New Delhi, 2000.
- B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Reinforced concrete structures, Vol.1, Laxmi Publications, New Delhi, 2004.

Reference Books

- IS 456: 2000 – Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standards, New Delhi, 2000.
- SP 16: 1987 – Handbook of Concrete reinforcement and Detailing, Bureau of Indian Standards, New Delhi, 1987.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**3**
CO 2	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**3**	**2**	**3**	**1**	**1**	**1-**	**1**	**3**
CO 3	**1**	**1**	**2**	**1**	**1**	**1**	**3**	**1**	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**3**
CO 4	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**3**

CO 5	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**1**	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly relate

STE4213	**FINITE ELEMENT METHOD**	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The Finite Element Method (FEM) is widely used in industry for analyzing and modelling structures and continua, whose physical behaviour is described by ordinary and partial differential equations. The FEM is particularly useful for engineering problems that are too complicated to be solved by classical analytical methods. The main objective of this course is to introduce the mathematical concepts of the FEM for obtaining an approximate solution of ordinary and partial differential equations.

Course Objectives

The objective of this course is to:

1. Deal real world problem and try to describe it with partial differential equations which might not have an exact solution.

2. Comprehend a complex problem to break down the problem into smaller elements (discretization) and apply over these smaller finite domains.

3. Formulated into matrix form, collected together and solved for unknown values using boundary conditions. The unknown values are then further used to approximate other quantities.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define the various complex areas of complex engineering problems and different constitutive relation.

CO2. Comprehend the energy relationship and finding numerical techniques by dividing the continuum in to elements to find the stress-strain relationship in elemental stiffness matrix. Realize the concept of nodes and elements.

CO3. Comprehend and the problems of two dimensional isoperimetric elements four noded quadrilateral elements. Enlighten the fundamental ideas of FEM for such elements.

CO4. Develop the finite element model concept for structures in assemblage of elements through direct stiffness method and special characteristics of stiffness matrix.
CO5. Comprehend and define the concept for the analysis of framed structures,2D truss element, 2D beam element, plate bending elements.

Course Contents

Modules	**Blooms level***	**Number of hours**
Module I: Introduction to FEM Basic idea of FEM. Applications and importance of FEM. Differential equilibrium equations - strain displacement relation - linear constitutive relation - special cases- Principle of stationary potential energy - application to finite element methods. Some numerical techniques in finite element analysis	L1, L2	9
Module II: Displacement Models Displacement models - convergence requirements. Natural coordinate systems – Shape function. Interpolation function- Linear and quadratic elements - Lagrange & Serendipity elements- Strain displacement matrix - element stiffness matrix and nodal load vector	L1, L2, L4	9
Module III: 2-D analysis and modeling Two dimensional isoparametric elements - Four noded quadrilateral elements – triangular elements- Computation of stiffness matrix for isoparametric elements - numerical integration (Gauss quadrature) - Convergence criteria for isoparametric elements.	L1, L2, L4	10
Module IV: Different methods in FEM Assemblage of elements –Direct stiffness method - Special characteristics of stiffness matrix - Boundary condition & reaction - Gauss elimination and LDLT decomposition- Basic steps in finite element analysis.	L1, L2, L3, L4, L5	10
Module V: Analysis of framed structures Analysis of framed Structures- 2D truss element - 2D beam element. Analysis of plate bending: Basic theory of plate bending - displacement functions - plate bending Elements. Plane stress and plane strain analysis: Triangular elements - Rectangular elements	L1, L2, L3, L4, L5, L6	10

Course Content

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Cook, R.D.,Malkus, D.S. and Plesha, M. E., Concepts and Applications of Finite Element Analysis , John Wiley & Sons, 2015.

- Zienkiewicz, O.C. , Finite element Methods, John Wiley & Sons, 2015.
- Krishnamoorthy, C.S. , Finite element analysis, theory and programming, Tata McGraw Hill, New Delhi, 2016.

References

- Patila, T.C. and Belugunudu, Introduction to Finite element Method, Prentice hall, New York, 2011.
- Reddy, J.N., Introduction to Finite element Method, Tata McGraw Hill, New Delhi, 2016.

Examination Scheme:

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**2**	**1**	**1**	**2**	**1**	**3**	**2**	**1**	**3**
CO 2	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**2**	**1**	**1**	**2**	**1**	**3**	**2**	**1**	**3**
CO 3	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**2**	**1**	**1**	**2**	**1**	**3**	**2**	**1**	**3**
CO 4	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**2**	**1**	**1**	**2**	**1**	**3**	**2**	**1**	**3**
CO 5	**1**	**1**	**1**	**1**	**1**	**1**	**3**	**2**	**1**	**1**	**2**	**1**	**3**	**2**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

CME4201	ADVANCES IN CONSTRUCTION PRACTICES AND MACHINERY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course covers selection of equipment, factors affecting selection of equipment and methods technical and economic; Construction engineering fundamentals; Methods and equipment for Earthmoving, Pile driving and dewatering. This course would help to use new and improved technology in construction and therefore be economically benefiting the builders and contractors.

Course Objectives

The objective of this course is to:

1. Comprehend the proper selection of construction equipment used in the field of Civil engineering construction sectors.
2. Development of ideas regarding construction methods and equipment used in Civil engineering.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Develop the knowledge based on selection of appropriate construction equipment as per their construction activity.

CO2: Describe the process of manufacturing of basic construction equipment.

CO3: Explain the concept of pile driving and dewatering system.

CO4: Comprehend the selection of construction equipment for the tunnel.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Selection of Equipment Selection of equipment-factors affecting- relative advantages and disadvantages-technical and economic aspects.	L1, L2, L3	12
Module II: Construction Engineering Fundamentals Analysis of production outputs and costs. Characteristics and performance of various equipment used in construction practices. Uses, advantages and disadvantages of various construction equipment	L1, L2, L3	12
Module III:Erection and Material Transport Equipment	L1, L2,	12

Erection and material transport equipment's- their performance advantages-pile driving-dewatering.Low Strain Dynamic Pile Testing/ Pile Integrity Testing (PIT),High Strain Dynamic Pile Testing (HSDT) / Pile Driving Monitoring	L3	
Module IV: Performance of Equipment Study of performance of equipment used for concrete construction including batching and mixing units-equipment used for tunneling.	L1, L2, L3	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Peurifoy,R.L., Ledbetter.W.B and schexnayder, Construction planning and equipment methods, 5th Edition, McGraw Hill, Singapore,1995.
- Sharma S.C. Construction equipment and management, Khanna publishers, New Delhi, 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**1**	**2**	**3**
CO 2	**1**	**1**	**1**	**1**	**2**	**-2**	**1**	**--**	**2**	**2**	**--**	**--**	**--**	**1**	**2**	**2**
CO 3	**1**	**2**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**
CO 4	**1**	**2**	**2**	**--**	**--**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

CME4203	BUILDING SERVICES & MAINTENANCE MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course discusses about components of urban forms and their planning, Functional planning of buildings, optimization of space: Spatial Synthesis graphical techniques. Engineering services in a building as a system are also the part of this course.

Course Objectives

The objective of this course is to:

1. Impart knowledge about the various components of the urban planning, the services related to the buildings such as MEP.
2. Provide the understanding of the building maintenance and its management.

Course Outcomes

After completing the course, the students will be able to:

CO1: Explain the various steps for planning of residential building.
CO2: Describe the applications of engineering services.
CO3: Explain the concept members of prefabrication systems in buildings.
CO4: Describe the maintenance processes for residential buildings economically.

Course Content

Modules	Blooms level*	Number of hours
Module I: Planning of Residential Building Components of urban forms and their planning. Concepts of neighborhood unit. Street system and layout in a neighborhood. Functional planning of buildings, optimization of space: Spatial Synthesis graphical techniques, heuristic procedures, formulation of linear and non-linear optimization problem. Space requirements and relationships for typical buildings, like residential offices, hospitals, etc.	L1, L2, L3	10

Module II: Engineering Services Standard fire, fire list, fire resistance, classification of buildings, means of escape, alarms, etc. Lightning protection of buildings, Engineering services in a building as a system. Lifts, escalators, cold and hot water systems, wastewater systems, and electrical systems	L1, L2	10
Module II: Prefabrication Prefabrication systems in residential buildings: Planning and modules and sizes of components in prefabrication, Earthquake resistant structures - Air-conditioning and heating - Acoustics and Sound insulation.	L1, L2, L3	8
Module IV: Maintenance Building Maintenance: Scheduled and contingency maintenance planning. M.I.S. for building maintenance. Maintenance standards. Economic maintenance decisions.	L1, L2	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- R. G. Hopkinson and J. D. Kay, The Lighting of buildings, Faber and Faber, London, 1969
- Hand book for Building Engineers in Metric systems, NBC, New Delhi, 1968
- Philips Lighting in Architecture Designs, McGraw Hill, New York, 1964
- Time saver Standards for Architecture Design Data, Callendar JH, McGraw Hill, New Delhi, 1974
- William H. Severns and Julian R. Fellows, Air conditioning and refrigeration, John Wily and sons, New Delhi, 2011

Reference Books

- Arora and Bindra, Building Construction, Dhanpat Rai, New Delhi, 2012.
- Hand Book of Housing Statistics, NBO, New Delhi, 2003.
- National Building Code of India, Bureau of Indian Standards,New Delhi, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**1**	**2**	**2**	**1**	**1**	**2**
CO 2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**1**	**2**	**2**	**1**	**1**	**2**
CO 3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**1**	**1**	**2**
CO 4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**1-**	**1**	**2**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

CME4204	SYSTEMS DESIGN AND VALUE ANALYSIS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course introduces the students to the concepts and skills of system analysis and design. It includes expanded coverage of data flow diagrams, data dictionary, and process specifications.

Course Objectives

The objective of this course is to:
1. To impart the knowledge about the system design procedure and the value savings during the construction.
2.Provide a solid foundation of systems principles and an understanding of how business function, while heightening students to the issue's analysts face daily.
3. Help the students in management of various resources.

Course Outcomes

After completing the course, the students will be able to:

CO1: Explain the principles and tools of systems analysis and design.
CO2: Solve a wide range of problems related to the analysis, design and construction of information systems, value analysis and job plans.
CO3: Explain the professional and ethical responsibilities of practicing the value management and valuation by understanding the need for quality.
CO4: Plan and undertake a major individual project, prepare and deliver coherent and structured verbal and written technical valuation reports.

Course Content

Modules	Blooms level*	Number of hours
Module I: Analysis and Appraisal Analysis synthesis, Appraisal, System design procedure, objectives and constraints, application to buildings.	L1, L2, L3	12

Module II: Introduction to Value Analysis 10 Commandments of value analysis; value analysis team; principles of value analysis, elements of a job plan viz. orientation, Information, presentation. Implementation follow up action, benefits of value analysis, various applications; assessing effectiveness of value analysis, function analysis, Life cycle costing: Life cycle costing – Forecasting of capital as well as operating & maintenance costs, time value, present worth analysis, DCF methods, ROR analysis, sensitivity analysis. Different methods of performing value engineering.	L1, L2, L3, L4, L5	12
Module III: Value Management and Valuation Job plan. Value savings during construction. Value management. Valuation: Types of value, purposes of valuation factors affecting value. Different methods of valuation for different types of assets such as land and building, horticulture, historical places.	L1, L2, L3, L4	12
Module IV: Valuation Report Valuation Report, contents, standard formats, Case study of any one Report.	L1, L2, L5, L6	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Keith F. Potts, Construction Cost Management: Learning from Case Studies, Taylor & Francis, UK, 2007.
- Hojjat Adeli, Asim Karim, Asim Salimul Karim, Construction Scheduling, Cost Optimization and Management, Taylor & Francis, UK, 2001.
- K. K. Chitkara, Construction Project Management: Planning, Scheduling and Controlling, Tata McGraw-Hill Education, New Delhi, 2002.
- P.T. Joglekar, Practical Information for Quantity Surveyors, Property valuers, Architects Engineers and Builders, Pune Vidyarthi Griha Prakashan, Pune, 2008.

Reference Books

- Panagiota E. Paraoulaki, Value Engineering and Its Application to the Construction Industry, Massachusetts Institute of Technology, Department of Civil and Environmental Engineering, Massachusetts, 2000.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO4**
CO 1	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**--**	**3**
CO 2	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**--**	**1**
CO 3	**1**	**2**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**1**	**3**
CO 4	**1**	**2**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

CME4211	PROCESS ANALYSIS & THEORY OF CONSTRAINTS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course is to familiarize students to the fundamentals of operational process analyses with a view to improving productivity and performance towards fulfilling the overall business goals. It is also to further enable them to learn the concepts, principles, and application of the theory of constraints approach in this regard.

Course Objectives

The objective of this course is to:

1. Ability to understand and gain knowledge about the process, its functions and objectives of analysis.

2. Acquire knowledge about the cycle, performance, productivity and benchmarking.

Course Outcomes

After completing the course, the students will be able to:

CO1: Identify the various processes and their functions as well as the constraints in organizational process.

CO2: Estimate and express the constraints.

CO3: Evaluate the performance after elevation of constraints.

CO4: Relate theory of constrains to project management and critical chain project management

Course Content

Modules	Blooms level*	Number of hours

Module I: Process Structure and Selection Process Management Orientation in Operations; Processes and their functions, importance, objectives of analysis, methods; Interface with other disciplines; Product-process matrix, Production Process structures, Service Process structures.	L1, L2, L3, L4	12
Module II: Examination of Processes & Benchmarking Examination of processes; Parameters of Examination, Lead-time, Set-up time, Throughput Cycle, Cycle time; Performance Measurement System, Cost, Quality, Flexibility, Capability; Productivity and Profitability Improvement; Benchmarking.	L1, L2, L3, L4	12
Module III: Understanding Theory of Constraints (TOC) TOC thinking process; Current Reality Tree, The Evaporating Cloud, Future Reality Tree, Prerequisite Tree, Transition Tree: Application of thinking process tools; TOC and economic decisions, throughout accounting measures for decision making.	L1, L2, L3, L4	12
Module IV: Operations Improvements with Theory of Constraints TOC applications in operations improvement; Relating TOC to Project Management, Critical Chain project management; Production Scheduling with Drum-Buffer-Rope method; TOC in supply chain management, Drum-Buffer-Rope distribution solution.	L3, L4, L5, L6	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Dettmer, W.H., Goldratt's Theory of Constraints, ASQ Quality press, Missouri U.S.A. 1997.
- Evans, J.R. and D.A. Collier, Operations Management, Cengage Learning, New Delhi 2007.
- Goldratt, E.M., Critical Chain, MA: North River Press, Great Barrington, 1997.
- Goldratt, E.M., The Goal II – It's Not Luck, Productivity & Quality Publishing, Chennai, 2008.
- Goldratt, E.M. and J. Cox, The Goal: A Process of Ongoing Improvement, Productivity Quality Publishing, Chennai, 2006.

Reference Books

- Goldratt, E.M. Theory of Constraints, MA: North River Press, Great Barrington, 2000.
- Heizer, J. and B. Render, Operations Management, Pearson Education, New Delhi, 2008.
- Keegan, R. and E. O'Kelley, Applied Benchmarking for Competitiveness, Jaico, Mumbai, 2008.
- Mukhopadhyay, S. K., Theory of Constraints, Jaico, Mumbai, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**1**	**2**	**1**	**2**	**--**	**1**
CO 2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**1**	**2**	**1**	**--**	**2**	**3**
CO 3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**1**	**2**	**--**	**1**
CO 4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**2**	**3**	**1**

1: strongly related, 2: moderately related and 3: weakly related

CME4207	RELIABILITY ANALYSIS IN CONSTRUCTION MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course is mainly focused to explain the theories and applications of reliability analysis of structural systems having uncertainty and/or exposed to random environment. The course introduces basic concepts of probability theory at the beginning which is followed by the Level-2 reliability methods. With these knowledges of reliability analysis in hand, the course then aims to explain the applications of these methods for code calibrations and reliability analysis under multiple failure modes (i.e. system reliability). Even the reliability-based design and structural detailing is discussed in this course.

Course Objectives

The objective of this course is to:
1. Ability to understand and learn the probability theories, the resistance distribution parameters and the reliability methods which can be put to use in construction engineering and management.
2. Explain the applications of various reliability methods for code calibrations and reliability analysis under multiple failure modes (i.e. system reliability).
3. Develop the skills of the students to take this subject for further research.
4. Help the practicing engineers to use the advanced design concepts in their profession, as major emphasis is given to the applications in this course.

Course Outcomes

After completing the course, the students will be able to:
CO1: Apply the statistical methods in construction and technology field.
CO2: Acquire knowledge about the concept of reliability, its methods and reliability-based design.
CO3: Use the mathematical models based on probabilistic and statistical methods, simulation in risk identification, analysis and mitigation of project risks.
CO4: Imbibe the knowledge and understanding of the system reliability, modeling of structural systems as well as the application of reliability analysis for R.C.C. and steel frames.

Course Content

Modules	Blooms level*	Number of hours
Module I: Probability Theory Mutually exclusive events, set theory, sample points and sample space, laws of probability, total probability theorem, Baye's rule, random variables-discrete and continuous, jointly distributed discrete variables, marginal distribution, conditional distribution, jointly distribution continuous variables, functions of random variables, moments and expectations, common probability distribution normal. Lognormal, Gamma and Beta distribution, external distribution	L1.L2, L3, L4	12
Module II: Resistance Distribution and Parameters Statistics of properties of concrete and steel, Statistics of strength of bricks and mortar, Characterization of variables, allowable stresses based on specified reliability. Monte Carlo Study of Reliability: Monte Carlo Method Inverse transformation technique. Application to columns beams and frames.	L2, L3, L4, L5	12
Module III: Reliability Methods Basic variables and failure surface, first order second moment methods, Hasofer and Lind's method, Non-normal distributions; determination of reliability index B of structural elements.	L2, L3, L4	12
Module IV: Reliability Based Design of Structural Systems Determination of partial safety checking formats. Development of reliability-based criteria, optimal safety factors, and calibration of IS 456 and IS 800. System reliability, modeling of structural systems, bounds on system reliability, automatic generation of a mechanism, generation of dominant mechanism, reliability analysis of R.C.C. and steel frames.	L2, L3, L4, L5, L6	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text books

- Ranganathan, R., Reliability Analysis and Design of Structures, Tata McGraw Hill, New Delhi, 1990.
- Rao, S.S. Reliability based Design, Tata McGraw Hill, New Delhi, 2013.
- Miller, Freund-Hall, Probability and Statistics for Engineers, Prentice India Ltd.,New Delhi, 2009

Reference Books

- Ghosh. D.I. A Primer of Reliability Theory, John Wiley, New York, 1989.
- Lewis, E.E., Introduction to Reliability Engineering, John Wiley, New York, 1987.
- Rausand, M., and A. Hoyland. System Reliability Theory: Models, Statistical Methods, and Applications. 2nd ed., John Wiley & Sons, New York, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**--**	**1**
CO 2	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**3**	**--**	**1**
CO 3	**1**	**2**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**3**	**1**
CO 4	**1**	**2**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**3**	**--**

1: strongly related, 2: moderately related and 3: weakly related

CME4212	PRE -ENGINEERED CONSTRUCTION TECHNOLOGY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course discusses about basics of pre-engineered building, their necessity and applications. The design of Pre-Engineered Buildings (PEB), design cycle are also part of this course. The course also includes design software and its uses in design of pre-engineered buildings.

Course Objectives

The objective of this course is to:

1. Impart knowledge about modular construction and design of the prefabricated elements
2. Provide the understanding of dimensioning and detailing of Pre-engineered construction.

Course Outcomes

After completing the course, the students will be able to:

CO1: Define pre-engineered buildings & differentiate it with conventional building.
CO2: Describe the design process of pre-engineered buildings.
CO3: Explain the concept of dimensioning and detailing in buildings.
CO4: Describe the maintenance processes for pre-engineered buildings economically.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction, definition of pre-engineered builds, need of prefabrication and pre engineering, advantages, applications, Concept of prefabrication, Pre-Engineered Buildings Vs Conventional Steel Buildings.	L1, L2, L3	12
Module II: PEB Introduction, advantages, Pre Engineered Buildings Vs. Conventional Steel Buildings, Design considerations, Design of Pre-Engineered Buildings (PEB), design cycle, frame geometry, frame	L1, L2	12

loading, design codes.		
Module II: Design Design criterion, dimensioning and detailing, design process, production, Case study based design.	L1, L2, L3	12
Module IV: Maintenance Planning and control (PPC), maintenance. Design software and its uses in design of pre-engineered buildings, Case study	L1, L2,	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- CBRI, Building materials and components,CBRI, India, 1990.
- Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., New York, 1994.

Reference Books

- Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, 1971.
- Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**1**	**2**	**2**	**1**	**1**	**2**
CO 2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**1**	**2**	**2**	**1**	**1**	**2**
CO 3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**1**	**1**	**2**
CO 4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**1-**	**1**	**2**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

CME4213	CONSTRUCTION PLANNING AND MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course revolves around the various activities encountered during the life cycle of a civil engineering project. It introduces the basic learning requirements for the civil engineer project manager and makes the appreciation for the qualitative nature of the construction project management. The philosophy of the course is more on system approach contrary to majority of mechanics-based subjects. Also, the need for the construction industry has been emphasized. Construction today is an all-embracing term, covering all the activities from conception to physical realization of a project. For the project to be completed on time and with correct measures, it is important to use various planning and management techniques in the construction industry. This course will help the students understand the CPM/PERT, construction methods and other estimations required in a construction project. Apart from this the students will also learn about the contracts. Now-a-day building information modeling (BIM), plays a very important role in integration of the information for various stakeholders at the same platform, reducing the time and cost of completion of a project and increasing the efficiency and productivity of the project. Building Information Modeling (BIM) proposes a relatively new approach of designing, documenting, constructing and even maintaining buildings. It has a significant impact on most business processes taking place in building firms. This course will introduce the students with the BIM concepts and theory behind the same.

Course Objectives

The objective of this course is to

1. Study and understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction projects.
2. Comprehend and apply the various tools of project planning and management software.
3. Train the students with the latest and the best in the rapidly changing fields of Construction Engineering, Technology and Management.
4. Continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry.
5. Introduce and familiarize the students with the upcoming technology in the construction industry i.e. building information modeling or management (BIM)

Course Outcomes

After completing the course, the students will be able to:

CO1: Analyze and apply theoretical and practical aspects of project management techniques, contracts as well as estimation and costing to achieve project goals.
CO2: Comprehend and applyorganizational and leadership capabilities for effective management of construction projects.
CO3: Apply knowledge and skills of modern construction practices and techniques.
CO4: Apply relevant software packages for planning, scheduling, executing and controlling of construction projects.

CO5: Comprehend, define and understand the building information modeling (BIM) or management concept.

Course Content

Modules	**Blooms level***	**Number of hours**
Module I: Introduction to Construction Planning Introduction Construction as industry and its challenges, Role of construction management, Methods of construction managements, Basic requirements of construction management: Learning structures. Construction planning-Processes of project planning, Construction facilities, Schedules, Layout of Plant utilities, Examples of real projects and its learning requirements.	L1, L2, L3, L4	10
Module II: Project Scheduling and Monitoring Project Scheduling: Processes of project scheduling, Network Scheduling Techniques, CPM/PERT, Introduction to network based project management techniques: Defining activities and their interdependence, drawing of network, time and resource estimations, use of network as scheduling techniques, use of network as control techniques i.e. project monitoring, Use of computer based models, progress control – project planning and scheduling techniques.	L1, L2, L3, L4	10
Module III: Resource Management, Disputes and Claims Management Principles of Project management, Resource Management and Inventory, Implementation of Project Planning Management, Analysis and design of planning and control system, Dispute and claims management.	L1, L2, L4, L5	10
Module IV: Contracts and Estimation & Costing Stages of awarding contract, types of contract, contract documents, arbitration and settlement of disputes, contract laws and handling	L1, L2, L3, L4	10

of contracts, commissioning of projects. Principles of estimation and analysis of rate.		
Module V: Introduction to Building Information Modeling Introduction to BIM, Components of BIM, brief history, BIM software platforms and interfaces, Challenges of Building Industry and the necessity of BIM utilization,BIM Standards and BIM Implementation plans, BIM Capability Maturity Model, Different dimensions in BIM. BIM Compatible software- Revit.	L1, L2, L3, L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Jha, K.N., Construction Project Management: Theory and Practices, 2nd edition, Pearson Education India, New Delhi, 2015.
- Chitkara, K.K., Construction Project Management: Planning, Scheduling and Control, McGrawHill Publishing Company, New Delhi, 1998.
- Gajaria G.T., Laws Relating to Building and Engineering, Contracts in India, Lexis Nexis, New Delhi, 2000.
- Patil. B.S, Civil Engineering Contracts and Estimates, Universities Press (India) Private Limited, New Delhi, 2006.
- Eastman, C., Paul T., Rafael S., and Kathleen L., BIM Handbook,A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors,New Jersey, John Wiley & Sons, 2011.
- Kyrgiel, E., Green BIM: Successful Sustainable Design with Building Information Modeling, Sybex, 2008.
- Smith, D K, and Michael T., Building Information Modeling, A Strategic Implementation Guide,New Jersey, John Wiley & Sons, 2009.

Reference Books

- Calin M. Popescu, Chotchai Charoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
- Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
- Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, New York, 1986.
- Callahan, M. T., Quackenbush, D. G., and Rowings, J. E., Construction Project Scheduling, McGraw Hill, New York, 1992.
- Cleland, D. I. and Ireland, L. R., Project Management: Strategic Design and Implementation, 4th Edition,McGraw Hill, New York, 2002.
- Jimmie Hinze, Construction Contracts, McGraw Hill, New York, 2001.

- Joy, P.K.; Total Project Management- The Indian Context, MacMillan India Ltd., New Delhi, 1992.
- Peurifoy, R.L. and Ledbetter, W.B.; Construction Planning, Equipment and Methods, McGraw Hill, Singapore, 1986.
- Kymmel, W. Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations, New York, Mc-Graw Hill, 2008.
- Eastman, C., Building Product Models: Computer Environments Supporting Design and Construction,Boca Raton, CRC Press, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO4**
CO 1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**1**	**2**	**1**	**1**	**3**	**2**
CO 2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**1**	**2**	**3**	**1**	**1**	**2**
CO 3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**1**	**3**	**1**
CO 4	**1**	**1**	**--**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**1**	**--**	**1**
CO 5	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**1**	**2**	**3**	**2**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

TRE4201	TRANSPORTATION PLANNING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course contains basic principle approach towards analysis of travel behavior of household\individual. It deals with planning the future transportation need and expansion of existing services. It also contains different land use transportation models.

Course Objectives

The objective of this course is to

2. Explain terminologies of transportation planning and analyse the practical problems related to traffic.
3. Develop the methodology of travel demand behaviour for transportation system.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the relation between travel demand and urbanization.
CO2: Comprehend and apply the different methods for deciding mode choices in different regions.
CO3: Explain and apply various methods to solve traffic problems.
CO4: Interpret different land use transportation models and apply solutions for transport problems.

Course Content

Modules	Blooms level*	Number of hours
Module I: Urban morphology Urbanization and travel demand – Urban activity systems and travel patterns – Systems approach – Trip based, and Activity based approach	L1, L2	10
Module II: Urban Transportation Planning Goals, Objectives and Constraints - Inventory, Model building,	L1, L2,	15

Forecasting and Evaluation - Study area delineation – Zoning - UTP survey Trip generation models – Trip classification - productions and attractions – Trip rate analysis - Multiple regression models - Category analysis - Trip distribution models – Growth factor models, Gravity model and Opportunity modes. Modal split models – Mode choice behavior – Trip end and trip interchange models - Probabilistic models - Utility functions - Logit models - Two stage model	L3	
Module III: Traffic assignment Transportation networks – Minimum Path Algorithms - Assignment methods – All or Nothing assignment, Capacity restrained assignment and Multi path assignment - Route-choice behavior.	L1, L2, L3	10
Module IV: Landuse transportation models Urban forms and structures - Location models - Accessibility – Landuse models - Lowry derivative models - Quick response techniques - Non-Transport solutions for transport problems. Preparation of alternative plans - Evaluation techniques - Plan implementation - Monitoring - Financing of Project – urban development planning policy - Case studies.	L1, L2, L3	13

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Chakraborty &Das, Principles of Transportation Engineering, PHI Learning, New Delhi, 2011.
- Papacostas, C.S, Transportation Engineering and Planning, 3rd edition, PHI, New Delhi, 2008.

References

- GeetamTiwari, Transportation Planning and Traffic Safety, Taylor & Francis, 2016
- O' Flaherty Coleman. A., Transport Planning and Traffic Engineering, Elsevier Ltd, Oxford shire, 2008.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	**1**	**--**	**2**	**--**	**--**	**--**	**3**	**--**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	**1**	**1**	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**-**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4214	ACCIDENT ANALYSIS & PREVENTION	L	T	P	C

Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

This course discusses about the basics of road safety, factors affecting and causes of accidents involving drivers & pedestrians. It deals with the 4 E's of prevention of accidents and basic concepts of vehicle safety, risk evaluation and human error control. Importance of guard rail and barrier along with the crashworthiness is also discussed.

Course Objectives

The objective of this course is to

1. Acquire knowledge and understanding of the road environment.
2. Identify the reasons for road accidents and scientific investigation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the factors improving road safety and different motor vehicle acts.
CO2: Describe the relation between speed & fuel conservation and driver training program.
CO3: Explain the parameters affecting road and vehicle safety.
CO4: Define TREM & warning symbols and design the tanker Lorries.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Road Transport: factors for improving safety on roads – causes of accidents due to drivers and pedestrians-design, selection, operation and maintenance of motor trucks-preventive maintenance-check lists-motor vehicles act – motor vehicle insurance and surveys.	L1, L2	10
Module II: **Driver and Safety** Driver safety programme – selection of drivers – driver training tacho-graph-driving test driver's responsibility-accident reporting and investigation procedures-fleet accident frequency-safe driving incentives-slogans in driver cabin motor vehicle transport workers	L1, L2	12

act-road transport act and rules – driver relaxation and rest pauses – speed and fuel conservation – emergency planning.		
Module III: **Road & Vehicle Safety** Traffic control lines and guide posts-guard rails and barriers – street lighting and illumination-overloading-concentration of driver. E's of Accidents Prevention: 1. Engineering – by altering the environment 2. Enforcement - by imposing laws 3. Encouragement - by the use of publicity campaigns 4. Education - by gaining and using knowledge. Introduction to vehicle safety, Basic concepts of vehicle safety, Risk evaluation, Human error control, Risk communication, Universal design, Crash testing, Crashworthiness, Design of Vehicle Structures for Crash Energy Management, Accident Reconstruction, Future vehicle safety.	L1, L2, L3	14
Module IV: **Transportation of Hazardous Goods:** Transport emergency card (TREM) – driver training-parking of tankers on the highways speed of the vehicle – warning symbols – design of the tanker lorries – earth chains-static electricity-responsibilities of driver – inspection and maintenance of vehicles-check list – decanting procedures – communication. Transport precautions-safety on manual mechanical handling equipment operations-safe driving-movement of cranes conveyors etc.	L1, L2, L3	12

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Popkes, C.A., Traffic Control and Road Accident Prevention, Chapman and Hall Limited, London, 1986
- Babkov, V.F, Road Conditions and Traffic Safety, MIR Publications, Moscow, 1986
- Evans, L, Traffic Safety & the Driver, Science Serving Society, Bloomfield MI, US, 1991.
- Evans, L, Traffic Safety, Science Serving Society, Bloomfield MI, US, 2004.

References

- Paul, D. B, Chou, C.C, Fileta, B.B, Khalil, T.B, King, A.I, Mahmood, H.F, Mertz, H.J, Wismans, J, Vehicle Crash Worthiness and Occupant Protection, American Iron and Steel Institute, Michigan 2004

- Huang, M., Vehicle Crash Mechanics, CRC Press, Boca Raton, New York, 2002.
- Peters, G.A. and Peters, B.J, Automotive Vehicle Safety, Taylor & Francis e-Library, 2003.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	--	3	--	--	1	--	-	3	-	-	1	-
CO2	1	--	1	--	--	--	3	--	2	-	-	3	-	-	1	-
CO3	1	1	1	--	1	--	--	--	--	--	-	3	-	-	1	-
CO4	1	1	1	2	1	--	--	--	--	--	--	3	-	-	1	-

1: strongly related, 2: moderately related and 3: weakly related

TRE4216	PAVEMENT MATERIALS & CONSTRUCTION	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	0	0	3

Pre-requisites/Exposure	
Co-requisites	

Catalogue Description

The course deals with the origin, classification, requirements, properties and tests on fine aggregates, coarse aggregates and bitumen. It includes weathering and durability of bituminous materials & mixes and its mix design. It also includes joint filler and sealer materials used in the requirement for CC pavement construction and design mix for CC pavement.

Course Objectives

The objective of this course is to

1. Explain the characteristics, properties and testing procedures of highway materials such as soil, aggregate and bitumen.
2. Design the bituminous mix and the mix for cement concrete pavement.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the classification, requirements, properties and tests on fine and coarse aggregates used in road construction.
CO2. Define properties, preparation, uses and tests on bituminous binders and figure out the dynamic modulus and fatigue behaviour of bituminous mixes.
CO3. Explain weathering and durability of bituminous mixes and design the bituminous mix for flexible pavement & rigid pavement.
CO4. Explain different construction methods of roads & identify different failures.

Course Content

Modules	Blooms level*	Number of hours
Module I: Subgrade Soil Soil composition and structure - Soil classification for engineering purposes - Origin, Classification, requirements, properties and tests on road aggregates.	L1, L2	8
Module II:Bitumen Origin, preparation, properties and tests, constitution of bituminous road binders, requirements - Bituminous Emulsions and Cutbacks Preparation, characteristics, uses and tests Bituminous Mixes Mechanical properties - Resilient modulus, dynamic modulus and	L1, L2, L4	10

fatigue characteristics of bituminous mixes.		
Module III: Design Mix of Bitumen& Cement Concrete Weathering and Durability of Bituminous Materials and Mixes - Performance based Bitumen Specifications - Superpave mix design method. Cement Concrete for Pavement Construction Requirements, design of mix for CC pavement, joint filler and sealer materials.	L1, L2, L3	10
Module IV: Pavement Construction and Maintenance Construction of earth roads, WBM roads, stabilized roads, bituminous pavements, cement concrete roads and joints in cement concrete roads - Types and causes of failures in flexible & rigid pavements.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Khanna & Justo, Highway Engineering, 10th ed., Nemchand& Brothers, Roorkee, 2018.
- RRL, DSIR, Bituminous Materials in Road Construction, HMSO Publication, 1955

References

- IS and IRC Publications on relevant topic.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**-**	**-**	**-**	**1**	**-**	**2**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**2**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**1**	**-**	**2**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4217	PAVEMENT MATERIALS & CONSTRUCTION	L	T	P	C

	LAB				
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure	Pavement Materials & Construction				
Co-requisites					

Catalogue description

In this Lab course the various tests are there for different types of pavement materials such as Soil, Aggregate and Bitumen. It also includes the tests which are conducted for the pavement evaluation and their maintenance.

Course Objective

The objective of the course is to

1. Assure the quality of the materials that are to be used for the construction of pavements such as Soil, aggregates and Bitumen.

2. Strengthen the pavement by conducting different tests for pavement evaluation and its maintenance.

Course Outcomes

On the completion of this course, the student will be able to:

CO1: Perform the tests on various type soils and apply the results in the practical life.
CO2: Perform different tests on Aggregates that are to be used in the construction of highways and assure the quality of aggregates.
CO3: Perform different tests on Bitumen that are to be used in the construction of highways and assure the quality of Bitumen.

Course Content

Modules	**Blooms level***	**Number of hours**
Module I: Tests on Soil 1. Determination of Optimum Moisture Content (OMC) and Maximum Dry Density. 2. Determination of California Bearing Ratio (CBR) value for Subgrade.	L3, L4	4
Module II: Tests on Aggregates 1. Impact Test and Abrasion Test of aggregates. 2. Elongation and Flakiness Index of aggregates.	L3, L4	6

3. Water Absorption Test of aggregates.		
Module III: Tests on Bitumen and Bituminous Mixes 1. Determination of Penetration value. 2. Determination of softening point value. 3. Determination of ductility. 4. Determination of viscosity. 5. Flash and Fire point Test. 6. Marshall Method of Mix Design	L3, L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

Text Books

- Khanna, S.K., Justo, C.E.G., and Veeraragavan, A., Highway Materials Laboratory Testing, Nem Chand & Brothers, Roorkee, 2013.
- Relevant IRC and AASHTO codes.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO2	**1**	**1**	**1**	**2**	**--**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO3	**1**	**2**	**1**	**--**	**1**	**3**	**2**	**-**	**--**	**--**	**-**	**-**	**-**	**2**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4218	GEOMETRIC DESIGN OF HIGHWAYS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course discusses about the geometric design of highways along with their elements. It deals with the design of vertical and horizontal alignment of the highways. It includes various interchanges and intersections along with their design features. The case studies on hill roads & snow bound roads are also discussed.

Course Objectives

The objective of this course is to

1. Explain the basic principles and techniques of geometric design of highways.
2. Design the alignment & intersections and evaluate earthwork requirements & safety considerations.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and design various elements of geometric design of the highways.
CO2: Explain the factors affecting route layout and calculate the different sight distances.
CO3: Design summit & valley curve along with cross sectional elements.
CO4: Explain the design principles of interchanges & intersections along with case studies on hill & snow bound roads.

Course Content

Modules	Blooms level*	Number of hours
Module I:Introduction Importance of geometric designand roadway function, Design controls: vehicles and drivers, speed, volume and access, carriage way, traffic separators, kerb, road margin.	L1, L2, L3,	8
Module II: **Route & Sight Distance** Route layout, environmental considerations, and context sensitive solutions; Sight distance, horizontal alignment, sight distance at	L1, L2, L3	9

intersection.		
Module III: **Alignment** Vertical alignment- – grades, crest and sag curves. Highway cross – sectional elements and their design for rural highways, Urban streets and hill roads	L1, L2, L3	8
Module IV: **Intersection** At grade intersections – principles of design, Channelization, mini round – about, layout of round – about, inter – Changes – major and minor interchanges, entrance and exit ramps, acceleration and deceleration lanes Earthwork, Safety assessment tools Case studies on hill roads and snow bound roads.	L1, L2, L3, L4	11

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Khanna & Justo, 'Highway Engineering', 10th ed., Nemchand& Brothers, Roorkee, 2018.
- John Mason (ed.), Urban Street Geometric Design Handbook, Institute of Transportation Engineers, 2008.
- AASHTO, Roadside Design Guide, 3rd Edition, 2006 (revision).
- Transportation Research Board, Access Management Manual, 2003.

References

- Transportation Research Board, Evaluating Intersection Improvements: An Engineering Study Guide, National Cooperative Highway Research Program (NCHRP). On-line at: http://www.trb.org/publications/nchrp/esg/esg.pdf,Report 4572001
- Transportation Research Board, A Guide to Best Practices for Achieving Context Sensitive Solutions, National Cooperative Highway Research Program (NCHRP) Report 480, 2002.
- AASHTO, Highway Safety Manual, 2010.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	-	-
CO2	1	--	1	--	--	--	3	--	2	-	-	-	-	1	-	-
CO3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	-	-
CO4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

TRE4219	GEOMETRIC DESIGN OF HIGHWAYS LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure	Geometric Design of Highway				
Co-requisites					

Catalogue description:

The lab course includes introduction to MX Road software and its feature. The application of MX Road software for geometric design of road and calculation of earthwork is also part of the course.

Course Objectives

The objective of this course is to

1. Familiarize the design features of road.
2. Design and analyse corridors of road.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the steps for importing different format of file.
CO2: Explain and design various features of road section.
CO3: Design complete storm water drainage system and Carry out Estimations of cut & fill from the drawing.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction to MX Road a) Importing AutoCAD file, CSV file b) Working with Points, Surface and strings	L1, L2, L3	6
Module II: Geometric Design a) Design Horizontal and Vertical Alignment b) Create profiles and cross section from any point within the road design.	L1, L2, L3	10
Module III: Corridor Design a) Design corridor and drainage system	L1, L2,	8

b) Estimation of cut & fill quantities from drawing.	L3	

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4210	TRANSPORTATION ECONOMICS & FINANCE	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with various methods to evaluate economic analysis of transportation projects like benefit cost ratio method, net present value method, internal rate of return method and their comparison. It includes various costs that are contributing to the economic evaluation of transportation projects like vehicle operating cost (VOC), accident cost, time travel cost & congestion cost. It also deals with the process of highway financing in India.

Course Objectives

The objective of this course is to

1. Evaluate economic analysis and analyse the finance & taxation for transportation projects.
2. Calculate and analyse different vehicle operating costs (VOC) involve in different highway projects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the need of economic evaluation and use different methods to evaluate the economic analysis of the highway.
CO2: Define the VOC involve in transportation project and interpret the various factors affecting the VOC.
CO3: Illustrate the value of travel time saving and evaluate the travel time for the passengers.
CO4: Determine the accident costs, congestion costs and explain the process of highway financing in India.

Course Content

Modules	Blooms	Number

	level*	of hours
Module I: Economic Evaluation of Transport Plans Need for economic evaluation, cost and benefits of transport projects, time horizon in economic assessment, basic principles of economic evaluation, interest rate, method of economic evaluation, benefit cost ratio method, first year rate of return, net present value method, internal rate of return method, comparison of various methods of economic evaluation.	L1, L2, L3	12
Module II: Vehicle Operating Costs Introduction, road user cost study in India, components of VOC, factors affecting VOC, fuel consumption relationship, spare parts consumption, maintenance and repairs, labour cost, tyre life, lubricants, utilization, and fixed costs.	L1, L2	12
ModuleIII: Valueof Travel Time Savings Introduction, classes of transport users enjoying travel time savings, methodology for monetary evaluation of passengers' travel time, review of work in India on passengers' travel time.	L1, L2	12
Module IV: Accident Costs Introduction, relevance of accident costing for a developing country, review of alternative methodologies for accident costing, Indian studies. **Traffic Congestion, Traffic Restraints and Road Pricing** Congestion as a factor in road traffic, traffic restraint, road pricing. **Highway Finance** Basic principles, distribution of highway cost, sources of revenue, highway financing in India.	L1, L2, L3	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Dr. Vinay Maitri and Dr. P.K Sarkar, Economics in Highway & Transport Planning, Standard publishes Distributors, 2010.
- David J Spurling, Introduction to Transport economics: Demand, Cost, Pricing & Adoption, Universal Publisher, 2010.

References

- Tae HoonOum, Transport Economics, Routledge, 2016.
- Bijan Vasigh and Ken Fleming, Introduction to Air Transport Economics, Routledge, Second Edition, 2013.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**2**	**-**	**-**	**1**	**-**	**-**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**-**	**2**	**-**	**-**	**1**	**-**	**-**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**1**	**-**	**-**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4211	PAVEMENT ANALYSIS AND DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course is focused on design of different pavement types along with the pavement management. It contains components of pavements, factors affecting design and performance. It includes empirical, semi-empirical and theoretical approaches for design and comparison between IRC & AASHTO method.

Course Objectives

The objective of this course is to

1. Explain various pavement types, factors affecting design, components and their failure.
2. Design the pavement for highway & Runway using different approaches and softwares.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define factors affecting the design of highway pavements and runway.
CO2: Explain different components of pavement and design both the surface and sub surface drainage systems for a highway.
CO3: Design flexible pavement for a highway by different methods like empirical, IRC and AASHTO methods.
CO4: Design rigid pavement for a highway by different methods like IRC and AASHTO methods.
CO5: Evaluate the condition of pavement both structurally and functionally.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction Types and component parts of pavements, Factors affecting design and performance of pavements. Highway and airport pavements, functions of pavement components	L1, L2	7

Module II: Pavement Design Factors Design wheel load, strength characteristics of pavement materials, climatic variations, traffic - load equivalence factors and equivalent wheel loads, aircraft loading, gear configuration and tyre pressure. Drainage – Estimation of flow, surface drainage, sub-surface drainage systems, design of sub-surface drainage structures	L1, L2, L3	10
Module III: Flexible Pavement Design Empirical, semi-empirical and theoretical approaches, design of highway and airport pavements by IRC, AASHTO Methods, applications of pavement design software	L1, L2, L3 and L4	12
Module IV: Rigid Pavement Design: Types of joints and their functions, joint spacing; design of CC pavement for roads, highways and airports as per IRC, AASHTO, design of joints. Design of continuously reinforced concrete pavements. Reliability; Use of software for rigid pavement design	L1, L2, L3, L4	12
Module V: Pavement Management & Maintenance Pavement failures, maintenance of highways, structural and functional condition evaluation of pavements: Characteristic Deflection by Benkelman Beam method, Unevenness by Bump Integrator method, pavement management system.	L1, L2, L6	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Khanna & Justo, 'Highway Engineering', 10th edition, Nemchand& Brothers, Roorkee, 2018.
- Yang. H. Huang, Pavement Analysis and Design, Second Edition, Prentice Hall Inc., New Delhi 2004.
- Relevant IRC Codes.

References

- Yoder and Witczak, Priniciples of Pavement Design, John Wiley and Sons, New Jersey, 1975.

- Rajib B. Mallick and Tahar El-Korchi, Pavement Engineering – Principles and Practice, CRC Press, Boca Raton, 2020.
- W.Ronald Hudson, Ralph Haas and Zeniswki , Modern Pavement Management, Krieger Pub Co, Florida, 1994.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	**-**	**-**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4215	ROAD SAFETY AUDIT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with the safety environment of the roads. Traffic accidents statistics of India and rest of the world is discussed along with the significance of road safety. It deals with the accident data collection and identification of black spots. The preparation of road safety audit report for urban roads and multi lane highways is also the part of the course.

Course Objectives

The objective of this course is to

1. Discuss measures for improving road safety education levels among the public.
2. Impart knowledge and understanding of the causes and consequences of accidents.

Course Outcomes

At the end of the course, the student will be able to:

CO1: Explain the significance road safety and traffic rules.

CO2: Identify the black spot from the accident data and explain the significance of site investigation.

CO3: Explain different stages of road safety audit and economic returns with safety audit.

CO4: Prepare a road safety audit report in the prescribed format for urban road and multi-lane highways.

Course Content

Modules	Blooms level*	Number of hours
Module I:Introduction to Road Safety Road traffic accidents scenario in India and in world. Road Safety and its importance. Traffic Rules and Driving Behavior. Characteristics of accidents, accidents vs. crash. E's of Accidents Prevention: 1. Engineering – by altering the environment 2. Enforcement - by imposing laws 3.	L1, L2	12

Encouragement - by the use of publicity campaigns 4. Education - by gaining and using knowledge. 5 P's of Road safety education: 1. Pre-school road safety education 2. Practical rather than theory education 3. Principles of own development as regards to road safety education 4. Presentations on road safety education 5. Place for road safety education in syllabus		
Module II: Accident Investigation & Monitoring Crash prevention approach, accident data selection, black spot analysis and improvement. Significance of site investigation, problem diagnosis: Before & After study, Carry out corridor analysis for identification of black spot.	L1, L2, L3	10
Module III: Introduction to Road Safety Audit Stages of road safety audit, audit of land use development, audit process, checklist for safety audit, format of audit reporting, relevance of audit in design and implementations stages, economic returns with safety audit, road safety tool kit, risk assessment and ranking audit recommendations, speed management, roadside hazard treatment, road signs and pavement markings.	L1, L2	12
Module IV: Advanced Road Safety Audit Traffic management during construction and pre-opening audit, principles of traffic management plans at work zones, temporary traffic control zones, traffic control devices, traffic management practices, pre-opening audit. Prepare a road safety audit report in the prescribed format for urban roads. Prepare a road safety audit report in the prescribed format for multi lane highway.	L1, L2, L3	14

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Babkov V.F., Road conditions and Traffic Safety, MIR publications, Moscow, 1975.
- K.W. Ogden, Safer Roads – A Guide to Road Safety Engg, Averbury Technical, Ashgate Publishing Ltd., Aldershot, England, 1996.
- Robert F.Baker, The Highway Risk Problem – Policy Issues in Highway Safety, John Wiley and Sons, New York, 1971.

References

- Indian Roads Congress, Highway Safety Code, IRC: SP-44:1996.
- Indian Roads Congress, Road Safety Audit Manual, IRC: SP-88-2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	**1**	**3**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	**1**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

EVE4201	ENVIRONMENTAL POLICIES AND LEGISLATION	L	T	P	C
Version 2020.1	Month, Year of approval:	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course is designed to acquaint the student with numerous ethical issues and perspectives confronting society and environmental scientists and their influence on the development of environmental policy and regulation. Existing and proposed policies and regulations are examined as to their ethical background.

Course Objective:

The objective of this course is to

1.Acquaint the students with the environmental issues, pollution and control and the measures taken for its protection along with the norms prevailing at international and national level.

Course Outcomes

On completion of this course, the students will be able to

CO1: Deal with the legal provisions of the water pollution act

CO2: Deal with the legal provisions of the air pollution act

CO3: Impart knowledge on of environment, pollution and various principles

CO4: Explain the concept of Hazardous Wastes act

Modules	Blooms level*	Number of hours
Module I : Water Pollution Act	**L1, L2, L3**	**12**

The water (prevention and control of pollution) Act- Definitions, Constitution of central and state boards, Constitution and composition of joint boards, functions, prevention and control of water pollution, Penalties, Central and state water laboratory, power of supersession, power to make rules. The water (P&CP) rules - power and duties of the chairman and member- secretary, Temporary association of persons with central board, Consulting engineer, Annual report, Report of central board analyst, central water lab,		
Module II: Air Pollution Act The Air (prevention and control of pollution) Act- Definition, powers and functions of boards, prevention and control of pollution, Penalties and procedure, Miscellaneous. The Air (P&CP) Rules- procedure of transaction of business of the board and its committees, Temporary Association of the board and its committees, Temporary association of the persons with the Central board, Annual Report of Central Board, persons with central boards.	**L1, L2 L3**	**12**
Module III: Environmental Act The Environmental (Protection) Act- Definition, General powers of the Central Govt., Prevention, Control and abatement of environmental pollution, miscellaneous. The E(P) Rules- recipient system, standards for emission or discharge of environmental pollutants, Prohibition and restriction on location of industries, Procedure for taking samples, notice and submission for analysis, functions of Env. Lab., furnishing information to authorities and agencies, prohibition and restriction on handling hazardous substances.	**L2 and L3**	**12**
Module IV: Hazardous Wastes Hazardous Wastes (Management and handling) Rules- Definition, esp, hazardous wastes, hazardous waste site. Transboundary movement, Responsibility of the occupier, grant of authorization, power to respond or cancel, packaging, labeling, transport, disposal or import, Accident reporting, appeal. Manufacture, storage and important of hazardous chemicals rules- Definitions- Mitigation of the major accident, safety reports.	**L2, L3 and L4**	**12**

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books & References:

1. The water (P& CP) Act and Rules.
2. The Air (P & CP) Rules.
3. The Env(Protection)Act and various rules.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	1	1	2	2	3	-	-	-	-	-	-	-	-	3	1	-
CO 2	1	3	1	3	3	-	-	-	-	-	-	-	-	3	1	-
CO 3	1	3	1	-	-	-	-	-	-	-	-	-	-	3	1	-
CO 4	1	3	-	-	3	-	-	-	-	-	-	-	-	3	1	-

1: strongly related, 2: moderately related and 3: weakly related

EVE4208	SOLID AND HAZARDOUS WASTE MANAGEMENT	L	T	P	C
Version 2020.1	Month, Year of approval:	3	1	0	4
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course is designed to provide students with an understanding of technical issues and the management of solid wastes. This module includes solid waste policy, both domestic and international, and then examines appropriate methods of storage, collection, transfer, treatment and disposal appropriate for industrialized and developing countries. The module also provides the opportunity to visit recycling facilities and disposal sites to better understand links between theory and practice.

Course Objectives

The objective of this course is to:

1. To impart knowledge and skills in the collection, storage, transport, treatment, disposal and recycling options for solid wastes including the related engineering principles, design criteria, methods and equipment's.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Understand the characteristics of different types of solid and hazardous wastes and the factors affecting variation

CO2: Define and explain important concepts in the field of solid waste management and suggest suitable technical solutions for treatment of municipal and industrial waste

CO3: Understand the role legislation and policy drivers play in stakeholders' response to the waste and apply the basic scientific principles for solving practical waste management challenges.

CO4: Design the different elements of waste management systems.

Course Contents

Modules	Blooms level*	Number of hours

Module I: Waste Management Scenario Legal and Organizational foundation: Definition of solid waste- waste generation in a technological society- major legislation, monitoring responsibilities, sources and types of solid waste- sampling and characterization- Determination of composition of MSW- storage and handling of solid waste- Future changes in waste composition. Collection and transport of solid waste: Collection of Solid waste: type of waste collection systems, analysis of collection system- alternative techniques for collection system.	**L1, L2, L3**	**12**
Module II: Collection & Transportation of wastes Separation and Processing and Transformation of Solid Waste: unit operations used for separation and processing, Materials Recovery facilities, Waste transformation through combustion and anaerobic composting, anaerobic methods for materials recovery and treatment- Recycling of pastic materials and metals. Energy recovery – Incinerators. Transfer and Transport: need for transfer operation, transport means and methods, transfer station types and design requirements. Landfills: Site selection, design and operation, drainage and leachate collection systems – requirements and technical solutions, designated waste landfill remediation – Integrated waste management facilities.	**L1, L2 L3**	**12**
Module III: Hazardous waste management Hazardous waste management: Definition and identification of hazardous wastes- sources and characteristics- hazardous wastes in Municipal Waste- Hazardous waste regulations – minimization of Hazardous Waste – compatibility, handling and storage of hazardous waste- collection and transport.	**L1, L2, L3**	**12**
Module IV: Hazardous waste treatment Hazardous waste treatment and design: Hazardous waste treatment technologies – Design and operation of facilities for physical, chemical and thermal treatment of hazardous waste – Biomedical waste disposal. Solidification, chemical fixation and encapsulation, incineration. Hazardous waste landfills: Site selection, design and operation – remediation of hazardous waste disposal sites.	**L1, L2, L3**	**12**

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- . George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, “Integrated Solid Waste Management, Mc-Graw Hill International edition, New York, 1993.

References:

- . CPHEEO, “Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi, 2014.
- William A. Worrell, P. Aarne Vesilind, Solid Waste Engineering, Cengage Learning, 2012.
- Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and "Environmental Resources Management, Hazardous waste Management", Mc-Graw Hill International edition, New York,2010.
- John Pitchtel,Waste Management Practices, CRC Press,Taylor and Francis Group,2014.
- Frank Kreith, George Tchobanoglous, Handbook of Solid Waste management, Mc Graw Hill, 2002.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO2	**1**	**3**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO3	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO4	**1**	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

EVE4211	WATER TREATMENT PLANT DESIGN AND OPERATION	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course introduces the students to know about the various water treatment processes, the design for their plants and how do they operate so that there is more availability of clean water which can be put to various uses. At the end of the course, students should have a thorough wastewater treatment processes treatment and disposal. They would be able to design various facilities for physical and chemical treatment of wastewater treatment system.

Course Objectives:

The objective of the course is to,

1. Become familiar with conventional and advanced physical and chemical processes used to purify water, wastewater and air emissions.
2. Understand the basic principles of design and operation of a variety of treatment processes;
3. Able to calculate basic process parameters such as needed disinfection contact times, sizing of sedimentation basins, filter flow rates, number of membrane modules needed for treatment of a given feed flow rate, etc.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe various wastewater treatment unit operations.

CO2: Explain the working principle and design of wastewater treatment units.

CO3: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO4: Apply the waste management process used in various industries.

CO5: Apply the waste disposal and management process in treatment system.

Course Contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Pollutants in water and wastewater – characteristics, Standards for performance. Significance of physico-chemical treatment – Selection criteria-types of reactor- reactor selection-batch-continuous type-kinetics	L1, L2 and L3	8
Module II UNIT OPERATIONS Principles of Screening – Mixing, Equalization – Sedimentation – Filtration – Modeling back washing – Evaporation – Incineration – gas transfer – mass transfer coefficient. Adsorption – Isotherms – Principles, kinetics, regeneration membrane separation, Reverse Osmosis, nano filtration, ultra-filtration and hyper filtration electrodialysis, distillation – stripping and crystallization – Recent Advances.	L2 and L3	10
Module III TREATMENT SYSTEM Principles of Chemical treatment – Coagulation flocculation – Precipitation – flotation solidification and stabilization – Disinfection, Ion exchange, Electrolytic methods, Solvent extraction – advanced oxidation /reduction – Recent Trends	L2, L3 and L4	10
Module IV DESIGN OF TREATMENT SYSTEM Selection of Treatment – Design of municipal water treatment plant units – Aerators – chemical feeding – Flocculation – clarifies – tube settling – filters – Rapid sand filters slow sand filter, pressure filter, Dual media inlets Displacement and gaseous type. Design of Industrial Water Treatment Units- Selection of process – Design of softeners – Demineralisers –Reverse osmosis plants –flow charts – Layouts –Hydraulic Profile PID, construction and O&M aspects – case studies, Residue and rejects management – Upgradation of existing plants – Recent Trends – Software application.	L2, L3 and L4	10
Module V ADVANCED TREATMENT SYSTEM Design of municipal wastewater treatment units-screens-detritors-grit chamber-settling tanks-sludge thickening-sludge dewatering systems-sludge drying beds - Design of Industrial Wastewater Treatment Units-Equalization- Neutralization-Chemical Feeding Devices-mixers-floatation units-oil skimmer- flow charts – Layouts –Hydraulic Profile PID construction and O&M aspects – case studies, Residue management – Upgradation of existing plants – Recent Trends – Software application.	L2, L3 and L4	10

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Metcalf and Eddy, "Wastewater Engineering- Treatment and reuse," Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Lee, C.C. and Shun dar Lin, Handbook of Environmental Engineering Calculations, Mc
- Graw Hill, New York, 1999.
- Hendricks, D. 'Water Treatment Unit Processes – Physical and Chemical' CRC Press, New York 2006
- Davis M.L., Cornwell D.A., "Introduction to Environmental Engineering", Tata McGraw Hill Education (P) Ltd., New Delhi.

Reference Books:

- Droste R.L., "Theory and Practice of Water and Wastewater Treatment", Wiley India (P) Ltd.
- Hammer M.J. and Hammer M.J., Jr., "Water and Wastewater Technology", PHI (P) Ltd., New Delhi.
- Qasim, S.R., Motley, E.M. and Zhu.G. Water works Engineering – Planning, Design and Operation, Prentice Hall, New Delhi, 2002.
- Peavy H.S., Rowe D.R., Tchobanoglous G., "Environmental Engineering", Tata McGraw Hill Education (P) Ltd., New Delhi.
- Venkateswarlu K.S., "Water Chemistry, Industrial and Power Station Water Treatment, New Age International Publishers, New Delhi.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO 2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO 3	--	--	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--

CO 5	**--**	**--**	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**	**1**	**3**	**--**

1: strongly related, 2: moderately related and 3: weakly related

EVE4212	**AIR POLLUTION AND CONTROL**	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course designed to improve the understanding of the different air pollution: monitoring, modelling and control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments.

Course Objectives:

The objective of the course is to,

1. Impart knowledge on the principles and design of control of particulate and gaseous air pollutant and its emerging trends.
2. Introduce the fundamentals of mathematical models for water and air quality prediction and the importance of model building.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Define general air pollution problems, meteorological definitions, air transport equations and pollution control matters and devices.

CO2: Explain the regulations pertinent to air pollutions (both indoor and outdoor environment).

CO3: Describe major problems in indoor air pollution control and regulations.

CO4: Apply the ability to learn from the mistakes ethically and increase the quality of design.

Course Contents

Modules	**Blooms level***	**Number of hours**
Module I INTRODUCTION TO AIR POLLUTION Structure and composition of Atmosphere – Sources and classification of air pollutants - Effects of air pollutants on human health, vegetation & animals, Materials & Structures – Effects of air	L1, L2 and L3	12

Pollutants on the atmosphere, Soil & Water bodies – Long- term effects on the planet – Global Climate Change, Ozone Holes – Ambient Air Quality and Emission Standards – Air Pollution Indices – Emission Inventories.		
Module II AIR QUALITY MONITORING Ambient and Stack Sampling and Analysis of Particulate and Gaseous Pollutants -Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Transport & Dispersion of Air Pollutants	L2 and L3	12
Module III MODELLING Air Quality Modeling. Necessity, application and limitation of air quality modelling. Dispersion Modeling, Photochemical Modeling and Receptor Modeling. Different air quality Dispersion models and their limitations.	L2, L3 and L4	12
Module IV CONTROL OF AIR POLLUTANTS Primary considerations in designing effective control strategy: Environmental, Engineering and Economic Factor - Factors to be considered while selecting control equipment's - Various mechanisms to control gaseous pollutants and particulate matter. Control Equipment design for particulate matter: Gravity chamber, Cyclone separator, Electrostatic precipitator, fabric filter, bag filter, Wet scrubber, Venturi-scrubber and absorption towers. Control Equipment design for gaseous pollutants: Absorption, Adsorption, Condensation and Incineration.	L2, L3 and L4	12

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Noel de Nevers, Air Pollution Control Engg., McGraw-Hill, New York, 2000.
- Lawrence Kwan, Norman C Perelra, Yung-Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.
- David H.F Liu, Bela G.Liptak, Air Pollution, Lewis Publishers, 2000.
- Singal, S.P., Noise Pollution and Control Strategy, Narosa Publishing House, New Delhi, 2005.
- Steven C. Chapra, Surface Water Quality Modeling, Tata McGraw-Hill Companies, Inc., New Delhi, 2008.
- Benedini, Marcello and Tsakiris, George, Water Quality Modelling for Rivers and Streams, Springer Netherlands, 2013.

- Zhen-Gang Ji, Hydrodynamics and Water Quality**:** Modeling Rivers, Lakes, and Estuaries, John Wiley & Sons, 2008.

Reference Books:

- Nelson Leonard Nemerow, Industrial waste Treatment, Elsevier, 2007.
- Paul L. Bishop, Pollution Prevention: - Fundamentals and Practice, McGraw-Hill International, 2000.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO 2	**2**	**1**	**--**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO 3	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO 4	**--**	**--**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

EVE4205	OPTIMIZATION OF WATER RESOURCES SYSTEM	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

The course aims to introduce fundamentals and need for optimization techniques in engineering problems. Various techniques such as Linear Programming, Geometric Programming, Dynamic Programming and Non-Linear Programming are taught to students to solve various environmental engineering problems for optimal solutions.

Course Objectives:

The objective of the course is to,

1. Become familiar with conventional and advanced physical and chemical processes used to purify water, wastewater and air emissions.
2. Understand the basic principles of design and operation of a variety of treatment processes;
3. Able to calculate basic process parameters such as needed disinfection contact times, sizing of sedimentation basins, filter flow rates, number of membrane modules needed for treatment of a given feed flow rate, etc.

Course Outcomes:

On completion of this course, the students will be able to
CO1. Define the distribution system.
CO2. Able to design simple water treatment units.
CO3. Get thorough idea about functions of water supply systems.
CO4. Get complete understanding of water quality standards.

Course Contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Engineering Applications of Optimization, Statement of an OptimizationProblem, Design Constraints, Constraint Surface, Objective Function, Optimization Techniques, Single-Variable Optimization, Multivariable Optimization with no Constraints, Multivariable Optimization with Equality Constraints, Multivariable Optimization with Inequality Constraints, Convex Programming Problem.	L1, L2 and L3	12
Module II OPTIMIZATION OF WATER RESOURCE SYSTEM Principles of Screening – Mixing, Equalization – Sedimentation – Filtration – Modeling back washing – Evaporation – Incineration – gas transfer – mass transfer coefficient. Adsorption – Isotherms – Principles, kinetics, regeneration membrane separation, Reverse Osmosis, nano filtration, ultra-filtration and hyper filtration electrodialysis, distillation – stripping and crystallization – Recent Advances.	L2 and L3	12
Module III DESIGNING OF WATER RESOURCE SYSTEM Numerical methods for nonlinear unconstrained and constrained problems, sensitivity analysis, Linear post optimal analysis,sensitivity analysis of discrete and distributed systems. Introduction to variational methods of sensitivity analysis, shape sensitivity.	L2, L3 and L4	12
Module IV PROGRAMMING OF TREATMENT SYSTEM Introduction to integer programming, dynamic programming, stochastic programming and geometric programming, Introduction to geneticalgorithm and simulated annealing.	L2, L3 and L4	12

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Douglas A.H., “Environmental System Optimization”, John Wiley and Sons, New York.

- Vedula S. and Mujumdar P.P., “Water Resources Systems: Modeling Techniques and Analysis”, TMH.

Reference Books:

- Deb, K., Optimization for engineering design: Algorithms and examples, PHI Pvt Ltd, 1998.
- Arora, J.S., Introduction to optimum design, McGraw Hill International editions, 1989.
- Rao S.S., “Engineering Optimization- Theory and Optimization”, New Age International Publishers
- Haith D.A., “Environmental System Optimization”, Wiley and Sons, New York.
- Geem Z.W., “Optimization In Civil and Environmental Engineering”, Old City Publishing, USA.
- Sieniutycz S and Jezowski J., “Energy Optimization In Process Systems”, Elsevier, U.K.
- Floudas A and Perdolas M., “Encyclopedia of Optimization- Volume 2”, Springer, United States.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO 2	**--**	**1**	**2**	**2**	**2**	**--**	**--**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**1**	**--**
CO 3	**--**	**--**	**3**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**1**	**--**
CO 4	**--**	**--**	**1**	**--**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

EVE4213	ENVIRONMENTAL CHEMISTRY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course emphasizes the method of protection of groundwater which is polluted by soil, dust, and the waste particles. It is useful for the protection of surface water from the contaminants through the process of sedimentation, bacteriological, and radiation.

Course Objectives:

The objective of the course is to,

1. Bring into focus those aspects of chemistry that are particularly valuable for solving environmental problems like water and wastewater analysis.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Gain a broad theoretical understanding of Environmental Chemistry and microbiology.

CO2: Get accustomed with the measurement and analysis of various water characteristics.

CO3: To knowledge about the biological characteristics of drinking water and determination of the same.

CO4: Contemporary issues and developments.

CO5: Gain a broad theoretical understanding of atmospheric chemistry and analytical principles.

Course Contents

Modules	Blooms level*	Number of hours
Module I PRINCIPLES OF PHYSICAL CHEMISTRY	L1, L2	10

Reversible reactions, equilibrium constant, Le-Chatelier principle. Reaction rate Order and molecularity, kinetic equations of different orders, reversible and consecutive reactions. Catalysis-type, characteristics, activation energy, mechanism of catalyst action, acid base catalysts. Photo catalysis. Adsorption-classification, adsorption of gases on solids, adsorption from solutions, ion exchange adsorption, applications, Longmuir theory	and L3	
Module II PRINCIPLES OF AQUATIC CHEMISTRY AND BIOCHEMSITRY Water resources, sea water- composition, Ph of sea water. Humic substances. Aquatic chemical reactions- microbial redox reaction, iron and manganese bacteria, nitrogen transformation bacteria. Enzymes-mechanism and factors influencing enzyme action. Biodegradation- biodegradation of carbohydrates, proteins, fats and oils and detergents. Colloidal state- stability, kinetic, optical and electrical properties	L2 and L3	10
Module III ENVIRONMENTAL CHEMICALS Chemical speciation – speciation of lead, mercury, arsenic and chromium. Structure and property- activity relationship, fate of organics in the environment – transformation reactionshydrolysis, elimination, oxidation, reduction and photochemical transformation. Risk evaluation of environmental chemicals, Toxic chemicals in the environment, impact on enzymes. Biochemical effects of arsenic, lead, mercury and pesticides	L2, L3 and L4	10
Module IV ATMOSPHERIC CHEMISTRY Structure of atmosphere, chemical and photochemical reactions in the atmosphere. Ozone chemistry- formation and depletion of ozone layer, oxides of nitrogen and sulphur. Acid rain mechanism of formation and effects. Photochemical smog, and sulfurous smog. Greenhouse effect/global warming, greenhouse gases, effects	L2 and L3	10
MODULE V FUNDAMENTALS OF ANALYTICAL PRINCIPLES Analysis of water and water quality parameters -concept of pH, measurement of acidity, alkalinity, hardness, residual chlorine, chlorides, DO, BOD, COD, fluoride and nitrogen. Introduction to spectral analysis, colorimetry, fluorimety, nephlometry, turbidimetry, absorption and emission spectral methods.		8

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Sawyer, C.N. and McCarty, P.L., and Parkin, G.F. Chemistry for Environmental Engineers, 4th Edition, McGraw Hill, New Delhi, 1994.
- Benefield, Judkins and Weand Process Chemistry for Water and Wastewater Treatment, Prentice Hall.

Reference Books:

- B.S Bhal, GD Tuli and Arun Bhal, Essentials of Physical Chemistry, S. Chand & Co Ltd.
- New Delhi, 2003
- Arun Kumar De, Environmental Chemistry, 5th ed, New Age International (P) Ltd, New Delhi
- Maier R. M., Pepper I. L., and Gerba C. P., Environmental Microbiology, Second Edition, Elsevier- AP, 2009.
- Pelczar, Jr, M.J., Chan, E.C.S., Krieg, R.N., and Pelczar M. F, Microbiology, 5thEdn., Tata McGraw-Hill Publishing Company Limited, New Delhi, 1996.
- Rittman B, McCarty P L McCarty P, Environmental Biotechnology: Principles and Applications, 2nd Edition, McGraw-Hill, 2000

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	--	--	1	--	--	--	--	--	--	--	--	--	2	--	1	-
CO 2	2	1	--	--	2	--	--	--	--	--	--	--	2	--	1	-
CO 3	1	--	--	--	--	--	--	--	--	--	--	--	2	--	1	-
CO 4	--	--	2	1	--	--	--	--	--	--	--	--	2	--	1	-
CO 5	2	--	--	--	--	1	--	--	--	1	--	--	2	--	1	-

1: strongly related, 2: moderately related and 3: weakly related

EVE4214	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

Application of basic chemistry and chemical evaluations to measure physical, chemical, and bacteriological parameters of water and wastewater. Laboratory methods and interpretation of results with regard to environmental engineering applications such as design and operation of water and wastewater treatment processes, and to the control of the quality of natural water.

Course Objectives:

1. Understand the common environmental problems and its determination principles relating to water and wastewater quality are performed.
2. This course will help students know which tests are appropriate for given environmental problems, statistically interpret laboratorial results and write technical reports, and apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions to real-world.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe the knowledge in mathematics, science and engineering.

CO2: Design and conduct experiments, interpret and analyze data, and report results.

CO3: Analyze the ability to design of Civil Engineering systems or a process that meets desired specifications and requirements related to all fields of Civil Engineering.

CO4: Explain the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams.

CO5: Explain to identify, formulate and solve environmental engineering problems.

Course Contents

Modules	Blooms level*	Number of hours
1. Introduction to Environmental Engineering laboratory	L1	1
2. Determination of pH of water	L1, L3 and L4	2
3. Determination of alkalinity	L1, L3 and L4	1
4. Determination of turbidity and the optimum coagulant dose	L1, L3 and L4	1
5. Determination of the optimum coagulant dose	L1, L3 and L4	1
6. Determination of hardness in water	L1, L3 and L4	1
7. Determination of chlorides in water	L1, L3 and L4	1
8. Determination of solids (total, dissolved, organic, inorganic and settleable) in water	L1, L3 and L4	1
9. Determination of available chlorine in bleaching powder and the chlorine dose required to treat the given water sample	L1, L3 and L4	1
10. Determination of coliforms in water	L1, L3 and L4	1
11. Demonstration of Instrumental methods of pollutant analysis	L1, L3 and L4	1

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**

5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- Garg, S.K., Environmental Engineering Vol. I & II, Khanna Publishers, New Delhi, 2000.
- Modi, P.N., Environmental Engineering Vol. I & II, Standard Book House, New Delhi, 2000.

Reference Books:

- Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**1**	**1**	**--**	**3**
CO2	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**1**	**1**	**--**	**3**
CO3	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**1**	**1**	**1**	**--**	**3**
CO4	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**1**	**--**	**3**
CO5	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**1**	**--**	**3**

1: strongly related, 2: moderately related and 3: weakly related

EVE4215	GIS AND REMOTE SENSING FOR LAND AND WATER MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course covers the remote sensing; Electromagnetic spectrum; Physics of remote sensing; Effects of atmosphere; Atmospheric windows, etc. Develop skills to use remote sensing for land cover classification, estimating evapotranspiration, water productivity, irrigation performance assessment & irrigation water accounting.

Objective:
The objective of the course is to,

1. Make the students understand the basics of emerging fields -remote sensing principles and Geographic Information System- so that they can utilize it for environmental system modeling

Course Outcomes

On completion of this course, the students will be able to:

CO1. Explain RS theory, technology, and typical applications of earth observation data

CO2. Understanding the basic principles of digital image processing & filtering

CO3. Determining the Geographic Information system

CO4. Understand the various techniques used for Data input and data editing-Input methods of GPS

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction to remote sensing – Electromagnetic spectrum – Physics of remote sensing – Effects of atmosphere – Atmospheric	L1, L2, L3	**12**

windows – Interaction of earth surface features with EMR – Spectral characteristics of vegetation, water, soil, etc. – Various types of platforms– Airborne and space-based platforms - Different types of aircraft – Manned and unmanned spacecraft used for data acquistion – Characteristics of different types of platforms – Characteristics of Remote Sensors –Multi spectral sensors – Multi Spectral Scanners – Microwave remote sensing- Factors affecting Microwave Measurement-Radar wave bands- SLAR and SAR.		
Module II: Sensors- Satellite system parameters- sensor parameters-spatial, spectral and radiometric resolution – False colour composite (FCC) – Multi spectral photographs – Thermal and microwave imaging system-Earth Resources satellite and Meteorological satellites Different types of data products and their characteristics – Image Interpretation - Basic principles of visual interpretation – Elements of image interpretation - Equipment for visual interpretation – Activities of image interpretation – Ground truth - Basic principles of digital image processing – filtering	L1, L2, L3	**12**
Module III : Geographic Information system – History and development of GIS – GIS definitions and Terminology -Architecture– System concepts – Coordinate systems – Standard GIS packages. Type of data – Spatial and non- spatial data – Data structure – Points – Lines – Polygon – Vector and raster – Files and data formats – Spatial data modeling – Raster GIS model and Vector GIS models. -GIS data file management and Database models	L1, L3, L4, L5	**12**
Module IV: Data input and data editing-Input methods –GPS as data capture-data editing. Spatial analysis – Data retrieval – Query – Simple analysis – Record – Buffering and Overlay – Vector data analysis – Raster data analysis – Modelling in GIS – Digital elevation model – DTM – Modelling Networks. Integration of RS and GIS – Need and Facilities for integration. Application of these to water resources and environmental engg-Cadestral records and LIS	L1, L3, L4, L5	**12**

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books/References:

- Lillesand T.M. and Kiefer R.W., Remote sensing and Image Interpretation, Second Edition, John Wiley and Sons, 1987.
- AnjiReddy, M. Remote Sensing and Geographical Information System, BSP Publications., 2001.
- Chang, K (2005). Introduction to Geographic Information Systems, *Tata Mc Graw Hills Edition, NewDelhi*.
- Manual of Remote Sensing, American Society of Photogrammetry and Remote Sensing, 1993.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO 2	**1**	**3**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO 3	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO 4	**1**	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

THIRD SEMESTER

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
CIV4335	Summer Internship Evaluation	-	-	-	6
CIV4337	Project-Dissertation-I	-	-	-	5
	Structural Engineering (Specialization) Elective-I (Any Two)				**8**
STE4308	Design of Tall Buildings	3	1	-	4
STE4312	Offshore Structures	4	-	-	4
STE4314	Pre-stressed Concrete Design	3	1	-	4
	Structural Engineering (Specialization) Elective-II (Any One)				**4**
STE4302	Advanced Concrete Technology	3	1	-	4
STE4307	Soil Structure Interaction	3	1	-	4
STE4315	Theory of Plates& Shells	3	1	-	4
	Structural Engineering (Specialization) Elective-III (Any One/ One Set)				**5**
STE4304	Advanced Construction Materials	3	1	-	4
STE4305	Advanced Construction Materials Lab	-	-	2	1
STE4309	Advanced Steel and Concrete Composite Structures	3	1	-	4
STE4310	Advanced Structural Engineering Lab	-	-	2	1
	Construction Technology & Management (Specialization) Elective-I (Any Two)				**8**
CME4301	Construction Economics and Finance	3	1	-	4
CME4307	GIS in Construction Engineering	3	1	-	4
CME4310	Construction Quality & Safety Management	3	1	-	4
	Construction Technology & Management (Specialization) Elective-II (Any One)				**4**

CME4308	Operations Strategy	3	1	-	4
CME4314	Contract Laws & Regulations	3	1	-	4
CME4315	Advanced Concrete Technology	3	1	-	4
	Construction Technology & Management (Specialization) **Elective-III (Any One/ One Set)**				**5**
CME4302	Highway Construction and Maintenance	3	1	-	4
CME4303	Highway Construction and Maintenance Lab	-	-	2	1
CME4304	Geotechnics in Construction	3	1	-	4
CME4305	Geotechnical Lab for Construction Engineers	-	-	2	1
CME4316	Soft Computing Techniques in Civil Engineering	3	1	-	4
CME4317	Soft Computing Techniques in Civil Engineering Lab	-	-	2	1
	Transportation Engineering (Specialization) **Elective-I (Any Two)**				**8**
TRE4305	Transportation Infrastructure Design	4	-	-	4
TRE4306	Airport Infrastructure Planning & Design	4	-	-	4
TRE4309	Bridge Engineering for Highways	4	-	-	4
	Transportation Engineering (Specialization) **Elective-II (Any One)**				**4**
TRE4303	Public Transportation System	3	1	-	4
TRE4307	Intelligent Transportation System	3	1	-	4
TRE4308	Railway Infrastructure Planning & Design	3	1	-	4
	Transportation Engineering (Specialization) **Elective-III (Any One/ One Set)**				**5**
TRE4301	GIS & Its Application in Transportation Engineering	4	-	-	4
TRE4302	GIS & Its Application in Transportation Engineering Lab	-	-	2	1
TRE4310	Traffic Engineering & Modeling	4	-	-	4
TRE4311	Traffic Engineering & Modeling Lab	-	-	2	1

	Environmental Engineering (Specialization) Elective-I (Any Two)				**8**
EVE4302	Industrial Wastewater Treatment and Design	3	1	-	4
EVE4303	Water Resource Planning and Management	3	1	-	4
EVE4309	Biological Process of Waste Water Treatment	3	1	-	4
	Environmental Engineering (Specialization) Elective-II (Any One)				**4**
EVE4310	Transport Phenomenon of Waste Water	4	-	-	4
EVE4311	Water Reclamation and Reuse	4	-	-	4
	Environmental Engineering (Specialization) Elective-III (Any One/ One Set)				**5**
EVE4312	Air and Water Quality Modelling	4	-	-	4
EVE4313	Air and Water Quality Modelling Lab	-	-	2	1
EVE4314	Advanced Wastewater Engineering	4	-	-	4
EVE4315	Advanced Wastewater Engineering Lab	-	-	2	1
	Open Electives				**4**
CSS4351	Interpersonal Communication	1	-	-	1
BEH4351	Leading Through Teams	1	-	-	1
	Foreign Business Language-III	2	-	-	2
LAN4351	French-III				
LAN4352	German-III				
LAN4353	Spanish-III				
LAN4354	Russian-III				
LAN4355	Chinese-III				
LAN4356	Portuguese-III				
LAN4357	Korean-III				
LAN4358	Japanese-III				
LAN4359	Hindi-III				
	TOTAL				**32**

STE4308	DESIGN OF TALL BUILDINGS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The main aim is to learn and develop *design* criteria and guidance for the seismic *design* and review oftall buildings. The design philosophies and the factors affecting the height and structural form of tall buildings is discussed elaborately in this course.

Course Objectives

The objective of this course is to:

1. Impart knowledge about the tall structures and the elements associated with the same.

2. Gain knowledge about the different loading conditions, loads applied and techniques involved in the design of tall structures.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the design philosophies, loadings and performance of various types of concretes used in tall buildings.

CO2: Define and describe the factors affecting the growth, height and structural form in high rise construction along with the various systems involved.

CO3: Model the various structural elements related to the tall structures.

CO4: Define and analyse the various movement of tall buildings and the effect on the same related to creep, shrinkage, prestressing, etc.

CO5: Evaluate different methods of analysis of frames in tall buildings.

Course Content

Modules	Blooms level*	Number of hours
Module I: Design philosophy, Loading, sequential loading, materials - high performance, concrete - Fibre reinforced Concrete - Light	L1, L2, L3, L4	9

weight concrete - design mixes. Gravity loading Wind loading Earthquake loading .		
Module II: Factors affecting growth, Height and Structural form. High rise behaviour, Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls, wall-frames, tubulars, cores, futrigger - braced and hybrid mega systems.	L1, L2, L3, L4	9
Module III: Modelling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist, computerized general three dimensional analysis.	L1, L2, L3, L4, L5, L6	10
Module IV: Sectional shapes, properties and resisting capacity, design, deflection, cracking, prestressing, shear flow, Design for differential movement, creep and shrinkage effects, temperature effects and fire resistance, durability aspect of structures	L1, L2, L3, L4, L5, L6	10
Module V: Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and PDelta analysis, Translational, Torsional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation.	L1, L2, L3, L4	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks:

- Bryan Stafford Smith and Alexcoull, Tall Building Structures - Analysis and Design, John Wiley and Sons, Inc., 1991.
- Taranath B.S., Structural Analysis and Design of Tall Buildings, McGraw Hill, New Delhi, 1988.
- Gupta.Y.P.,(Editor), Proceedings of National Seminar on High Rise Structures- Design and Construction Practices for Middle Level Cities, New Age International Limited, New Delhi,1995.

References:

- Lin T.Y and Stotes, B. D., Structural Concepts and systems for Architects and Engineers, John Wiley, 1988.
- Beedle.L.S., Advances in Tall Buildings, CBS Publishers and Distributors Delhi, 1986.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	**1**	**1**	**--**	**--**	**2**	**1**	**--**	**2**	**2**	**2**	**2**	**3**	**3**	**1**	**2**	**3**
CO2	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**1**	**2**	**3**	**3**	**1**	**2**	**3**
CO3	**1**	**1**	**--**	**--**	**--**	**2**	**--**	**2**	**2**	**1**	**2**	**3**	**3**	**1**	**2**	**3**
CO4	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**3**
CO5	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

STE4312	OFFSHORE STRUCTURES	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The Recent development and technological Advancement are moving into Offshore Structure. Unlike Ground Conditions, the Offshore Construction is Extreme. The course will give the introduction to the Offshore Structure and its components with major Loads acting on the Platform. How the Installation Process is carried out. The Introduction to Floating Structures gives the Idea about the construction in offshore industry.

Course Objectives

The objective of this course is to:

1. Define and comprehend offshore Structures, dedicated to the design, installation, management and maintenance of offshore and maritime structures
2. Evaluate the systems for the exploitation of fabrication techniques, structures assembling, conventional and renewable energies. In addition to the assessment and management of environmental.

Course Outcomes

On completion of this course, the students will be able to

CO1. Define the concept on Simple Deck configurations for Lift and float-over installations.

CO2. Comprehend importance of fixed and floating structures;

CO3. Discuss different loads on offshore structure ad their effect in environment

CO4. Evaluate and estimate the hydrostatic Stability-Elastic plate theory; plated structures; stiffened plates-Buckling of plates.

Course content

Modules	Blooms level*	Number of hours
Module I Jacket concepts, redundant framing arrangement; Launch and Lift jackets; Simple Deck configurations for Lift and float-over installations; In-service and Pre-service Loads and analysis Jackup Rigs: Configuration and operation of jackups; Simplified analysis; Spud can penetration and extraction; Spud can – pile interaction.	L1, L2, L4	10
Module II	L1, L2,	14

Fixed and floating structures; Spars and TLP's; Modular topsides and integrated topsides; deck levels and jacket configurations; Spar and TLP hull arrangements; Load out: Fabrication yard, grillage and foundation conditions; Fabrication sequence of Launch jacket, lift jackets, topsides and modules; Weighing and weight control; Skidded, Trailer and lifted Load out methods Lifting and launch schemes for jackets, upending and setting, on bottom stability; Float-over installations; Dynamics of barge – cargo system.	L3, L4	
Module III Loads on offshore Structure, Environmental Loads, Marine Growth, Force On Large Dia. members. Accidental Loads, durability aspect of offshore structures and design life of structures	L1, L2, L5, L6	12
Module IV Semi-submersible, TLPs, FPSOs, Spars and others-General concepts on estimation of loads and Hydrostatic Stability-Elastic plate theory; plated structures; stiffened plates-Buckling of plates; Semi-submersible; column.	L1, L2, L4, L5, L6	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Ltd Oilfield Publications , Floating Structures: A Guide for the Design and Analysis, Oilfield Pubns Inc., June 1998.
- James F. Wilson , Dynamics of Offshore Structures, Wileys, 2nd Edition, October 2002.

Reference

- El-Reedy, M.A., Offshore Structures: Design, Construction and Maintenance, 1st Edition, Gulf Professional Publishing, July 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**3**	**1**	**2**	**3**
CO 2	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**3**	**1**	**2**	**3**
CO 3	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**3**	**1**	**2**	**3**
CO 4	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**1**	**3**	**3**	**3**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

STE4314	PRESTRESSED CONCRETE DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course prestress concrete provides the knowledge of advanced concrete structure design in the Civil Engineering constructions. This subject pave the path in developing advanced science, mathematics, engineering solutions and technological advancement in a broader perspective leading to produce quality engineers and researchers in various ways. This programme based on concepts, analysis and design of prestressed concrete structural members and their behavior in the application of loadings. This unique combination paves the path to embroil students in modern high-grade structural engineering advancement in long term infrastructural growth in a sustainable manner in different Civil engineering project.

Course Objectives

The objective of this course is to:

1. Apply the advanced concept of structural concrete design that has come over the time to overcome the possibility of excessive cracks and deformation compare to normal RCC Structure.
2. Explain in skill gaining in the design of field of pre-stressed concrete members, behavior in adverse loading and their utility in large construction projects.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the basic requirements of pre-stressed structural design by understanding its principles and methods adopted in structural elements to overcome the weakness of concrete behavior.

CO2. Develop the idea of pre-stressing to analysis of pre-stressed concrete sections, its behavior in case of external loadings and also to understand the pre-stressing loading effects in members with time and different losses associated to this.

CO3. Describe the important behavior of pre-stressing structural units towards external loading and its effect on shear and torsion.

CO4. Analyze and design of pre-stressed structural members to estimate its execution in large span structural systems.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Materials for Pre-stressed Concrete and Pre-stressing Systems High strength concrete and high tensile steel – tensioning devices – pre-tensioning systems – post tensioning systems	L1, L2	12
Module II: Analysis of Pre-stress and Bending Stresses Analysis of pre-stress – resultant stresses at a sector – pressure line or thrust line and internal resisting couple – concept of load balancing – losses of pre-stress – deflection of beams.	L1, L2, L3, L4	12
Module III: Strength of Pre-stressed Concrete Sections in Flexure, Shear and Torsion Types of flexural failure – strain compatibility method – IS code procedure – design for limit state of shear and torsion, Design problems.	L1, L3, L4, L6	12
Module IV: Design of Pre-stressed Concrete Beams and Slabs Transfer of pre-stress in pre tensioned and post tensioned members – design of anchorage zone reinforcement – design of simple beams – cable profiles – design of slabs, design problems.	L1, L3, L4, L5	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- N. Krishna Raju, Pre-stressed concrete, Tata McGraw Hill, New Delhi, 2000.
- T.Y. Lin, Ned H. Burns, Design of Pre-stressed Concrete Structures, Wiley India Private Limited, New Delhi, 2004.
- R. Rajagopalan, Pre-stressed Concrete, Narosa publishers, New Delhi, 2004.

Reference Books

- P. Dayaratnam, Pre-stressed Concrete, Oxford & IBH, UK, 1982.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**1**	**2**	**-2**	**2**	**3**	**1**	**1**	**1**	**2**	**3**	**3**	**1**	**1**	**1**	**1**	**3**
CO 2	**1**	**1**	**1**	**2**	**3**	**1**	**1**	**1**	**2**	**3**	**3**	**1**	**1**	**1-**	**1**	**3**
CO 3	**1**	**1**	**1**	**2**	**3**	**1**	**1**	**1**	**2**	**3**	**3**	**1**	**1**	**1**	**1**	**2**
CO 4	**1**	**1**	**1**	**2**	**3**	**1**	**1**	**1**	**2**	**3**	**3**	**1**	**1**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

STE4302	ADVANCED CONCRETE TECHNOLOGY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course will define the concrete making material materials, their significance, uses, and their properties in different situations and deign based on standard specifications. This will also enable the students to understand the manufacturing process of concrete and the precautions, various properties of concrete and different types of concrete and their application. This course illustrates about the use of different industrial wastes for the production of sustainable concrete also gives the description for the high strength concrete production.

Course Objectives

The objective of this course is to

1. Comprehend the proper selection of construction materials used in the field of Civil engineering construction sectors by knowing the material's properties, availability, strength and durability.
2. Research development in the field of advancement construction materials and their proper selection as per need and performance requirements on different situations.

Course Outcomes

On completion of this course, the students will be able to

CO1: Judge the appropriate construction materials as per the construction activities concerned, knowing its performance, properties and criteria through different standardized tests.

CO2: Quantifying, processing and Performance of concrete works for its quality assurance as per the standard guidelines.

CO3: Describe the concrete behavior in fresh state and its behavior in different environmental condition and towards external loading agencies.

CO4: Comprehend the selection of advanced concrete material for sustainable constructional applications and incorporating repair and rehabilitation process of concrete material.

CO5: Selection and requirement of Form Work their importance in the field of construction.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Materials Concrete Making Materials: Cement- Bogues compounds – Hydration Process– Types of cement – Aggregates – Gradation Charts – Combined Aggregate-Alkali Silica Reaction -Admixtures – Chemical and Mineral admixtures.	L1, L2	10
Module II: Fresh and Hardened Concrete Fresh Concrete - workability tests on Concrete Setting times of Fresh Concrete - Segregation and bleeding. Hardened Concrete: Abram's law- Gel space ratios, Maturity Concept – Stress Behaviour – Creep and Shrinkage – Durability tests on concrete – Non-destructive testing of concrete.	L1, L2	10
Module III: High Strength and High Performance Concrete High Strength Concrete – Micro structure – Manufacturing and Properties- Design of HSC Using Erintroy Shaklok Method- Ultra High Strength Concrete. High Performance Concrete- Requirements and properties of High-Performance Concrete- Design Considerations.	L1, L2, L3, L4	9
Module IV: Special Concrete Self Compacting concrete- Introduction, Advantages, disadvantages, materials, mixed design procedure, tests, and standards, Rheology and workability of SCC, strength properties, applications – Polymer concrete – Fiber reinforced concrete –Reactive Powder concrete – Requirements and Guidelines – Advantages and Applications. Light weight concrete. Concrete mix design, Quality Control - Quality assurance - Quality audit- Mix Design method – BIS method, ACI method, DOE method.	L1, L2, L3, L4	10
Module V: Form Work Form work – materials – structural requirements – form work systems – connections – specifications – design of form work – shores – removal for forms – reshoring – failure of form work.	L1, L2, L3, L6	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Neville A.M., Properties of Concrete, Tata McGraw hill, New Delhi, 2013
- Shetty M.S., Concrete Technology, S Chand & Company, New Delhi, 1993.
- A.K. Sathakumar, Concrete Technology, Oxford Press, New Delhi, 2010
- Rajat Siddique, Special Structural concretes, Galgotia Publications, New Delhi, 2000
- P.K.Mehta, Concrete: Micro Structure, McGraw Hill Publication, New Delhi, 2009.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, New Delhi, 1995.

Reference Books

- Krishna Raju N., Design of Concrete Mixes, CBS publishers, New Delhi, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co., New Delhi, 1988.
- Murdock L.J., Concrete: Materials & Practice, Oxford University Press, Canada, 1991.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**3**	**3**	**3**	**3**	**1**	**32**	**3**	**3**	**3**	**3**	**1**	**1**	**1**	**2**	**3**
CO2	**1**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**2**	**3**	**1**	**1**	**1**	**-1**	**2**
CO3	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**1**	**2**	**3**	**3**	**1**	**1**	**2**	**1**	**3**
CO4	**1**	**2**	**1**	**2**	**2**	**1**	**3**	**1**	**1**	**3**	**2**	**1**	**1**	**2**	**1**	**2**
CO5	**1**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**2**	**3**	**1**	**1**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

STE4307	**SOIL STRUCTURE INTERACTION**	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

To impart knowledge about the critical study of the foundation design , its nature in accordance with the soil structure interaction and applying the techniques to analyze it.

Course Objectives

The objective of this course is to:

1. Impart knowledge about the importance and usage of soil structure interaction.
2. Understand the various methods and parameters involved in SSI.
3. Impart knowledge about the behavior of soil under various circumstances related to the changes in structural behavior.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe soil structure interaction, understand its importance and evaluate soil structure interaction problems.

CO2: Define, describe and evaluate the various parameters and methods related to soil structure interaction.

CO3: Analyse the responses and behavior of soil in different conditions.

CO4: Evaluate and analyse the soil structure interaction in retaining structures.

Course Content

Modules	**Blooms level***	**Number of hours**
Module I: Introduction, Importance and Applications of Soil Structure Interaction (SSI) Introduction to SSI, Importance of SSI, Applications and examples of SSI for structural engineer, Effects of structure roughness/smoothness on soil behaviour. General soil-structure interaction problems – Shallow Foundations, Sheet piles, Mat/Raft foundations etc., Contact pressures and soil-structure interaction for shallow Foundations, Fixed/Flexible Base.	L1, L2, L3, L4	12

Module II: Soil Structure Interaction Parameters Concept of sub grade modulus, effects/parameters influencing sub grade modulus, Flexible and Rigid Foundations – Rigidity calculations, Static and Dynamic Spring Constants – Winkler Model, Estimation of soil spring constants/stiffness for foundations design. SSI Models - Elastic Continuum, Winkler Model, Multi-Parameter Models, Hybrid Model. Structure Contact Interface.	L1, L2, L3, L4, L5, L6	12
Module III: Soil Behavior Arching in soils. Elastic and plastic analysis of stress distribution on yielding bases. Analysis of conduits/pipes in soils. Beams on elastic foundation concept, introduction to the solution of beam problems. Seismic Soil-Structure Interaction - Dynamic response of soil, strain-compatibility, and damping characteristics of soil-structure. Shake-table tests.	L1, L2, L3, L4	12
Module IV: SSI in Retaining Structures Curved failure surfaces, their utility and analytical/graphical predictions from Mohr-Coulomb envelope and circle of stresses. Earth pressure computations by friction circle method. Earth pressure distribution on walls with limited/restrained deformations, Dubravo's analysis. Earth pressures on sheet piles, braced excavations. Design of supporting system for excavations. Soil-Pile Behaviour: Introduction, axial and laterally loaded piles, load-displacement behaviour, Modified Ramberg Osgood Model, pile group, interaction effect in pile group, soil-pile modelling in FEM, Elastic continuum and elasto-plastic analysis of piles and pile groups. Non-linear load-deflection response.	L1, L2, L3, L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks:

- Bowels J.E., "Analytical and Computer Methods in Foundation", McGraw Hill Book Co., New York, 2013.
- Desai C.S. and Christian J.T., "Numerical Methods in Geotechnical Engineering" McGraw Hill Book Co. New York, 2000.
- Soil Structure Interaction, the real behaviour of structures, Institution of Structural Engineers, 1989.
- Structure Soil Interaction- State of Art Report, Institution of Structural Engineers, 1978.

References:

- Elastic Analysis of Soil Foundation Interaction, Developments in Geotechnical Engg.vol-17, Elsevier Scientific Publishing Co., 2000.
- Prakash, S., and Sharma, H. D., Pile Foundations in Engineering Practice. John Wiley & Sons, New York, 1990.

- Foundation Engineering Handbook, H.-Y. Fang, Editor, Van Nostrand Reinhold, 2nd Ed., New York, USA. 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**--**	**--**	**2**	**1**	**--**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**1**	**3**
CO 2	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**1**	**2**	**3**	**3**	**2**	**1**	**3**
CO 3	**1**	**1**	**--**	**--**	**--**	**2**	**--**	**2**	**2**	**1**	**2**	**3**	**3**	**2**	**1**	**3**
CO 4	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**2**	**3**	**3**	**2**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

STE4315	THEORY OF PLATES & SHELLS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course deals with the theory and design of thin shell structures, using the membrane and bending theories for plates of revolution and translation, and their applications. The course also introduces the finite element method for plate bending.

Course Objectives

The objective of this course is to:

1. Introduce the students to the classical structural mechanics approximations of plates discussing the various theories involved in the same which has as an effect on the elastic foundations as well.
2. Analysis and study the behavior and analysis of thin plates and the behavior of anisotropic and thick plates.
3. Formulate finite element equations for solution of the structural response of plate bending problems.
4. Study the behaviour of the plates with different geometry under various types of loads.

Course Outcomes

After completing the course, the students will be able to:

CO1: Achieve knowledge of design and development of problem-solving skills.
CO2: Understand the principles of analysis and design of plates.
CO3: Formulate finite element equations for solution of the structural response of plate bending problems.
CO4: Ability to use different theories to plate and use of different methods for stability analysis

Course Content

Modules	Blooms level*	Number of hours
Module I: Cylindrical and pure Bending Cylindrical Bending: Different kind of plates – Assumptions - Derivation of differential equation for cylindrical bending of long rectangular plates - Analysis of uniformly loaded rectangular plates with edges simply supported and fixed subjected to uniform load.	L1, L2, L3, L4	9

Pure Bending of Plates: Slope and curvature of slightly bent plates – Relations between moments and curvature - Particular cases of pure bending - Strain energy in pure bending –Energy methods like Ritz and Galerkin Methods to rectangular plates subjected to simple loadings.		
Module II:Thin Plates Small Deflection Theory of Thin Rectangular Plates: Assumptions – Derivation of governing differential equation for thin plates – Boundary conditions – simply supported plate under sinusoidal load – Navier's solution – Application to different cases – Levy's solution for various boundary conditions subjected to different loadings like uniform and hydrostatic pressure.	L1, L2, L3	12
Module III: Circular and Orthotropic Plates Circular Plates: Symmetrical loading – Relations between slope, deflection, moments and curvature– Governing differential equation – Uniformly loaded plates with clamped and simply supported edges– Central hole – bending by moments and shearing forces uniformly distributed. Orthotropic Plates: Introduction – Bending of anisotropic plates - Derivation of governing differential equation – Determination of Rigidities in various cases like R.C. slabs, corrugated sheet.	L1, L2, L3, L4	12
Module IV: Plates on Elastic Foundations and Buckling of Plates Governing differential equation – deflection of uniformly loaded - simply supported rectangular plate – Navier and Levy type solutions - Large plate loaded at equidistant points by concentrated forces P. Governing equation for Bending of plate under the combined action of in-plane loading and lateral loads – Buckling of rectangular plates by compressive forces acting in one and two directions in the middle plane of plate.	L1, L2, L3, L4	15

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Bairagi, N K, Plate Analysis, Khanna Publishers, New Delhi, 1996.
- Timoshenko.S.P., and Krieger S.W., Theory of Plates and Shells, McGraw Hill Book Company, New York, 2003.
- Chandrashekahara, K. Theory of Plates, University Press (India) Ltd., Hyderabad, 2001.
- Reddy J N, Theory and Analysis of Elastic Plates and Shells, McGraw Hill Book Company, New Delhi, 2006.

Reference Books

- Szilard, R., Theory and Analysis of Plates – classical and numerical methods, Prentice Hall Inc., Pittsburgh, 2004.
- Bulson.P.S., Stability of Flat Plates. American Elsevier Publisher. Co.,New York, 1969.
- Ansel C.Ugural, Stresses in plate and shells, McGraw Hill International Edition, New Delhi, 1999.
- Timoshenko, S.P. and Gere, J.M., Theory of Elastic Stability, McGraw-Hill Book Co, New Delhi, 1986.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	**1**	**2**	**2**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**	**3**
CO 2	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**3**	**1**
CO 3	**1**	**2**	**---**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**--**	**1**
CO 4	**1**	**2**	**--**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**--**	**1**

1: strongly related, 2: moderately related and 3: weakly related

STE4304	ADVANCED CONSTRUCTION MATERIALS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course will define the concrete making material materials, their significance, uses, and their properties in different situations and design based on standard specifications. This will also enable the students to understand the manufacturing process of concrete and the precautions, various properties of concrete and different types of concrete and their application. This course illustrates the use of different industrial wastes for the production of sustainable concrete also gives the description for the high strength concrete production. The course will also give an insight into forensic civil engineering and its importance.

Course Objectives

The objective of the course is to

1. Impart knowledge about the various construction materials that can be used in construction work ranging from the cement, aggregates, admixtures and other waste materials that can be put to use in construction.
2. Impart knowledge about the Forensic Structural Engineering

Course outcomes

After completing the course, the students will be able to:

CO1: Define, describe and evaluate the fresh concrete properties and other tests on concrete along with the analysis of mix design of concrete.

CO2: Comprehend the various industrial waste materials in concrete, their influence on the properties of concrete along with the understanding of the high strength concrete in detail.

CO3: Define, describe and evaluate the various foams, fibres and light-weight materials used in concrete making. Also, describe the properties and usage of fibre reinforced concrete and geopolymer concrete.

CO4: Defining and comprehending various materials such as bearings, adhesives, sealants, polymer concrete composites, etc.

CO5: Comprehend, describe and evaluate the importance and use of forensic engineering in the construction industry.

Course Content

Modules	Blooms level*	Number of hours
Module I: **Properties of Concrete** Fresh concrete and its rheology. Mechanical, deformational behavior and microstructure of hardened concrete. Creep and shrinkage. Testing of concrete. mix design and properties of concrete; High strength concrete; High density and lightweight	L1, L2, L3, L4	10

concretes; admixtures.		
Module II: Industrial Waste Materials Industrial waste materials in concrete, their influence on physical and mechanical properties and durability of concrete, Concreting under extreme weather conditions, High strength concrete. Changes in concrete with time, Corrosion of concrete in various environments. Corrosion of reinforcing steel. Ferro-cement, material and properties.	L1, L2, L3, L4	9
Module III: Various types of Concrete Foams and lightweight materials, fibre reinforced concrete. Types of fibres, workability, mechanical and physical properties of fibre reinforced concrete. Polymers in Civil Engineering, Polymers, geopolymer concrete, fibres and composites, Polymer concrete composites.	L1, L2, L3, L4	9
Module IV: Miscellaneous materials Fibre reinforced plastic in sandwich panels, modeling. Architectural use and aesthetics of composites. Adhesives and sealants. Structural elastomeric bearings and resilient seating. Moisture barriers, Polymer foams and polymers in Building	L1, L2, L3, L4	9
Module IV: Forensic Civil Engineering Introduction to forensic engineering, Importance of forensic engineering, Forensic investigations-tools and techniques, Failures types, causes and mechanisms, Structural failures, various structural failure mechanisms, causes of distress in structural members, removal of failures, retrofitting, rehabilitation, seismic failures, Diagnosis and Assessment of Distress: Visual inspection, non-destructive tests, ultrasonic pulse velocity method, rebound hammer technique, pull-out tests, Windsor probe test, crack detection techniques.	L1, L2, L3, L4	11

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- Neville A.M., Properties of Concrete, Tata McGraw hill, New Delhi, 2013
- Shetty M.S., Concrete Technology, S Chand & Company, New Delhi, 1993.
- A.K. Sathakumar, Concrete Technology, Oxford Press, New Delhi, 2010
- Rajat Siddique, Special Structural concretes, Galgotia Publications, New Delhi, 2000
- P.K.Mehta, Concrete: Micro Structure, McGraw Hill Publication, New Delhi, 2009.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, New Delhi, 1995.
- Ratay, R.T., Forensic Structural Engineering Handbook. Second Edition, McGraw-Hill New York, 2001.
- Dovkaminetzky, Design and Construction Failures, Galgotia Publication, New Delhi, 2009.

References:

- Krishna Raju N., Design of Concrete Mixes, CBS publishers, New Delhi, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co., New Delhi, 1988.
- Murdock L.J., Concrete: Materials & Practice, Oxford University Press, Canada, 1991.
- Douglas, J. and Ransom, B., Understanding Building Failures,, Taylor and Francis Group, 2007.
- Emmons, P.H., Concrete Repair and Maintenance, Galgotia Publications, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**3**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**1**	**3**	**1**	**2**	**3**
CO2	**1**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**2**	**3**	**1**	**3**	**1**	**2**	**3**
CO3	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**1**	**2**	**3**	**3**	**1**	**3**	**1**	**2**	**3**
CO4	**1**	**2**	**1**	**2**	**2**	**1**	**3**	**1**	**1**	**3**	**2**	**1**	**2**	**1**	**2**	**2**
CO5	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**1**	**2**	**3**	**3**	**1**	**2**	**1**	**2**	**2**

1: strongly related, 2: moderately related and 3: weakly related

STE4305	ADVANCED CONSTRUCTION MATERIALS LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this lab course the various tests are conducted on different types of basic construction materials such as aggregate, sand, cement, admixtures. It also includes the tests on concrete design mix, different tests related to fresh and hardened state concrete with both destructive and non-destructive tests.

Course Objective

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.
2. Strengthen the knowledge on construction materials, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance.

Course Outcomes

On the completion of this course, the student will be able to:

CO1. Perform the tests on various construction materials such as cement, aggregates, etc. to apply the results in the practical life.

CO2. Perform different tests such as workability and hardened concrete tests used in the construction for the quality assurance.

CO3. Convince on different tests required on concrete, its non-destructive test in its harden states.

CO4. Perform the various tests on lightweight materials used in concrete.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Tests on cement - Consistency, Setting times, Soundness, Compressive Strength; Tests on aggregates: Gradation Charts of Aggregates, Bulking of fine Aggregate, Aggregate Crushing and Impact value	L1, L2, L3, L5, L6	6
Module II: Workability Tests on Fresh self compacting concrete; Test the compressive strength of concrete cubes by adding the	L1, L2, L3, L5,	8

industrial waste products in replacement of cement/ aggregates, permeability and durability tests on concrete	L6	
Module III: Non Destructive Testing of Concrete: Rebound hammer test, Pull out test, Ultrasonic pulse velocity test.	L1, L2, L3, L5, L6	4
Module IV: Use of light weight materials in concrete, fibre reinforced concrete design, design of mixes for SCC (self compacting concrete)	L1, L2, L3, L5, L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

References

- Relevant Indian Standards, ASTM Standards, BIS, ISO.
- IS: 456, IS: 383, IS: 2386, IS: 516, IS: 10262, etc.
- IS: 13311- part 1- 1992, IS: 13311- part 2- 1992

- **Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**
- **Examination Scheme:**

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**1**	**1**	**--**	**1**	**3**	**1**	**2**	**3**
CO 2	**1**	**2**	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**1**	**2**	**3**
CO 3	**1**	**2**	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**1**	**2**	**3**
CO 4	**1**	**2**	**1**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

STE4309	ADVANCED STEEL AND CONCRETE COMPOSITE STRUCTURES	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

To impart knowledge and carry out the analysis and design of steel and concrete composite structural components. Steel and concrete composite structures are a structurally efficient, fast-to-erect and economically competitive solution for buildings. In this course, the general modelling principles and design criteria for these structures are discussed.

Course Objectives

The objective of this course is to:

1. Design composite beams, columns, trusses and box-girder bridges including the related connections.
2. Expose the students on case studies related to steel-concrete constructions of buildings

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the fibre reinforced composites and their allied materials.

CO2: Evaluate the behaviour of unidirectional lamina and transformation of stress strain and other parameters.

CO3: Evaluate and analyze the elastic behaviour of multidirectional laminates.

CO4: Evaluate and analyze the bending of laminated composite plates

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction: definition and characteristics, fibres, matrices, fibre reinforced composites, advantages and limitations, basic concepts and characteristics: isotropy, orthotropy, classification, limina and laminate, micromechanics and macromechanics, constituent materials and properties.	L1, L2, L3, L5	12
Module II: Elastic behaviour of unidirectional lamina: specially orthotropic and transversely isotropic material, relation between mathematical and engineering constants, stress strain relations for thin lamina, transformation of stress and strain,	L1, L2, L3	12

transformation of elastic parameters, transformation of stress-strain relations in terms of engineering constants.		
Module III: Elastic behaviour of multidirectional laminates, symmetric and balanced laminates, design considerations, computational procedure for finding engineering elastic properties, stress and failure analysis of multidirectional laminates.	L1, L2, L3,	12
Module IV: Bending of laminated composite plates, thin laminated plate theory, deflection of all edges simply supported rectangular symmetric cross-ply laminate, two opposite edges simply supported.	L1, L2, L3, L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks

- I.M. Daniel & O. Ishai, Engineering Mechanics of Composite Materials, Oxford Press, Oxford, 1999.
- S.W.Tsai & H.T.Hahn, Introduction to Composite Materials: Technomic Pub. Co. Inc., USA., 2000.
- Johnson R.P., Composite Structures of Steel and Concrete Beams, Slabs, Columns and Frames for Buildings, Vol. I, Blackwell Scientific Publications, 2004.

References

- Oehlers D.J. and Bradford M.A., Composite Steel and Concrete Structural Members, Fundamental behaviour, Pergamon press, Oxford, 1995.
- Owens G.W and Knowles. P, Steel Designers Manual, Steel Concrete Institute(UK), Oxford Blackwell Scientific Publications, 1992.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	**1**	**1**	**--**	**--**	**2**	**1**	**--**	**2**	**2**	**2**	**2**	**3**	**3**	**1**	**2**	**3**
CO2	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**1**	**2**	**3**	**3**	**1**	**2**	**3**
CO3	**1**	**1**	**--**	**--**	**--**	**2**	**--**	**2**	**2**	**1**	**2**	**3**	**3**	**1**	**2**	**3**
CO4	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**2**	**2**	**3**	**3**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

STE4310	ADVANCED STRUCTURAL ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	4	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course contains the basic and advanced testing procedures for the different materials in construction such as sand, aggregates, cement, concrete, etc. and analysis of building using software. The tests which are practically used at site in the construction field will be discussed in details in this course.

Course Objectives

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.

2. Strengthen the knowledge on construction materials, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance & Analysis of Buildings.

Course Outcomes

On the completion of this course, the student will be able to:

CO1. Perform different tests on cement, sand, aggregates used in the construction for the quality assurance.

CO2. Carry out the mix design for high strength concrete and evaluate the use of admixtures in concrete.

CO3. Convince on different tests required on concrete, its destructive and non-destructive test in its harden states.

CO4. Analyse and Design a building using Software.

Course Content

Modules	**Blooms level***	**Number of hours**
Module I: Basic tests for materials: cement, aggregates,flyash,GGBS etc.	L1, L2, L3, L5	6
Module II: Mix design for high strength concrete, use of admixture,Marsh Cone Test	L1, L2, L3	6
Module III: Non-destructive evaluation of strength of concrete/steel specimens Testing of beams for compressive strength, Testing of beams for flexural strength	L1, L2, L3,	6
Module IV: Analyse and Design a building using STAAD Pro/Etabs. Design of Industrial Roof Truss	L1, L2, L3, L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- P.C. Aitcin, High-Performance Concrete, E & FN SPON, 1998.
- E. Bray and R. K. Stanley, Non Destructive Evaluation, CRC Press, USA, 2002.

References:

- Relevant Indian Standards, ASTM Standards, BIS, ISO.
- IS: 456, IS: 383, IS: 2386, IS: 516, IS: 10262, etc.
- IS: 13311- part 1- 1992, IS: 13311- part 2- 1992.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO4
CO1	**1**	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**1**	**1**	**--**	**1**	**3**	**2**	**1**	**3**
CO2	**1**	**2**	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**2**	**1**	**3**
CO3	**1**	**2**	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**2**	**1**	**3**
CO4	**1**	**2**	**1**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**3**	**2**	**1**	**3**

1: strongly related, 2: moderately related and 3: weakly related

CME4301	CONSTRUCTION ECONOMICS AND FINANCE	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

For any construction project to be successful, it must be technically sound and the resulting benefits must exceed the cost associated with the project. This course basically aims at describing various aspects of engineering economics. The field of construction economics and finance deals with the systematic evaluation of cost and benefit associated with different projects. The topics in this course cover principles of engineering economy followed by basic methods for carrying out economic studies considering the time value of money. The other topics include the demonstration of different methods namely present, future and annual worth method, rate of return, break-even comparison, capitalized-cost and cost-benefit analysis for the comparison of alternatives. In addition, other topics those will be covered are different methods of depreciation, taxes, and cost analysis of construction equipment followed by cost estimating. Further, topics on financial management namely construction accounting, financial statements, financial ratios and working capital management are also included in this course.

Course Objectives

The objectives of this course are to:

1. Study the concepts of construction economic and finance such as comparing alternatives proposals, evaluating alternative investments, management of funds, and management of accounting.
2. Understanding the knowledge about the risks and uncertainties in capital budgeting to be applied in the practical aspects.
3. Study the elements of construction economics and few accounting methods.
4. Study the need for financial management and means of achieving the same.

Course outcomes

After completing the course, the students will be able to:

CO1:Comprehend and analyse the underlying principles and concepts in construction economics and finance.

CO2: Comprehend and acquire the management skills, techniques and abilities required for management of construction finances.

CO3: comprehend and evaluate by generating the management solutions for construction problems related to risks and finances.

CO4: Carry out appropriate project appraisals using appropriate methods available as well as design and implement appropriate project cost control systems

CO5: Use applied economics to make informed decisions on strategy both for developers and for construction firms/organizations.

Course Content

Modules	**Blooms level***	**Number of hours**
Module I: Introduction to Construction Economics and Depreciation Construction accounting, Income statement. Depreciation and amortization.	L1,L2,L3, L4	9
Module II: Time value of money and discounted cash flow Engineering economics, Time value of money, discounted cash flow, NPV, ROR, PI, Bases of comparison, Incremental rate of return, Benefit-cost analysis, Replacement analysis, Break even analysis.	L1,L2,L3, L4	10
Module III: Risk and Uncertainty management Risks and uncertainties and management decision in capital budgeting.	L1, L2, L3, L4	9
Module IV: Taxation and Inflation Taxation and inflation. Work pricing, cost elements of contract, bidding and award, revision due to unforeseen causes, escalation.	L1,L2,L3, L4	10
Module V: Project Appraisal and International finance Turnkey activities, Project appraisal and project yield. Working capital management, financial plan and multiple source of finance. International finance, Budgeting and budgetary control, Performance budgeting. appraisal through financial statements, Practical problems and case studies.	L1,L2,L3, L4, L5, L6	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Jha, K. N., Construction Project Management, Theory and Practice, Pearson, New Delhi, 2011.
- Peterson, S. J., Construction Accounting and Financial Management, Pearson Education, Upper Saddle River, New Jersey, 2005.
- Peurifoy, R. L., Schexnayder, C. J. and Shapira, A., Construction Planning, Equipment, and Methods, 7th ed., Tata McGraw-Hill, New Delhi, 2010.
- Newnan, D. G., Eschenbach, T. G. and Lavelle, J. P., Engineering Economic Analysis, Indian Edition, Oxford University Press, 2010.

- Schexnayder, C. J. and Mayo, R. E., Construction Management Fundamentals, International Edition, McGraw-Hill, 2003.
- Blank, L. T. and Tarquin, A. J., Engineering Economy, Fourth Edition, WCB/McGraw-Hill, 1998.
- Bose, D. C., Fundamentals of Financial management, 2nd ed., PHI, New Delhi, 2010.

References

- Harris, F. , McCaffer, R. and Edum-Fotwe, F., Modern Construction Management, 6th ed., Blackwell Publishing, 2006.
- Brigham, E.F. and Ehrhardt, M.C., Financial Management Theory and Practice, Cengage Learning, 2010.
- Burtonshaw-Gunn, S.A., Risk and Financial Management in Construction, Gower Publishing, Ltd., 2009
- Warneer Z. H., Urban Economics, Macmillan, New York, 1993
- Danny Myers, Construction economics: A new approach, Taylor and Francis publisher, 2004.
- Ofori, G, The construction industry aspects of its economics and management, Singapore University Press,1990.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**2**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**3**	**-**
CO 2	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**1**	**3**	**-**
CO 3	**1**	**2**	**---**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**	**3**	**-**
CO 4	**1**	**2**	**--**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**	**3**	**-**
CO 5	**2**	**3**	**--**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**1**	**3**	**-**

1: strongly related, 2: moderately related and 3: weakly related

CME4307	**GIS APPLICATIONS IN CONSTRUCTION ENGINEERING**	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course will help the students to understand and introduce the elements of GIS as applied to construction management and achieve an awareness on application techniques.

Course Objectives

The objective of the course is to

1. Comprehend the various types of data, data analysis methods and data quality requirements.
2. Develop the means of getting suitable data output and to use the data output for construction management using GIS tools.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the basic concepts of GIS, its components and types of maps.

CO2: Evaluate the different data in the GIS software.

CO3: Study and comprehend the topology related factors, modelling and other data interpretation.

CO4: Apply the knowledge of GIS into the field application.

Course Content

Modules	**Blooms level***	**Number of hours**
Module I: GIS Basic Concepts Definition - Components of GIS -Maps - Definition - Types of Maps - Characteristics of Maps -Map	L1, L2, L3	12

Projections -- Hardware, Software and Organizational Context.		
Module II: GIS software. Data Types - Spatial and Non-Spatial - Spatial Data - Points, Lines and areas- Non-spatial data - Nominal, Ordinal, Interval and Ratio - Digitizer - Scanner - Editing and Cleaning - Geo reference data. Raster and Vector Data Structure - Raster data storage - Run length, Chain and Block Coding - Vector Data Storage	L1, L2, L3	12
Module III: Topology – Topological Models - Arc Node Structure - Surface Data - DEM - Grid DEM and TIN structure- Applications of DEM. Reclassification - Measurement - Buffering - Overlaying - SQL for Queries - Neighborhood and zonal operations - Data Quality - Components of data quality - Sources of errors in GIS - Meta data. Output - Maps, Graphs, Charts, Plots, Reports - Printers – Plotters.	L1, L2, L3	12
Module IV: Fields of application - Natural Resource Management, construction management-Parcel based, AM/FM applications examples	L1, L2, L3, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text books

- Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, New Delhi, 1996.
- Anji Reddy, Remote Sensing and Geographical Information Systems , BS Publications, New Delhi, 2001.
- Srinivas M.G. (Edited by), Remote Sensing Applications, Narosa Publishing House, New Delhi, 2001.

References

- Burrough P.A., Principles of GIS for Land Resources Assessment, Oxford Publication, Oxford, 1998.
- Rhind, D., Understanding of GIS, The ARC / INFO Method, ESRI Press, New York, 1990.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CO 1	**1**	**2**	**2**	**3**	**-**	**--**	**3**	**--**	**3**	**3**	**3**	**1**	**3**	**1**	**2**	**3**
CO 2	**1**	**2**	**1**	**3**	**2**	**--**	**2**	**--**	**3**	**3**	**3**	**1**	**2**	**1**	**2**	**3**
CO 3	**1**	**2**	**---**	**3**	**-**	**2**	**3-**	**--**	**3**	**3**	**3**	**1**	**3**	**1**	**2**	**3**
CO 4	**1**	**2**	**--**	**3**	**-**	**--**	**--**	**--**	**3**	**3**	**3**	**1**	**3**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

CME4310	CONSTRUCTION QUALITY & SAFETY MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	-				
Co-requisites	-				

Catalogue Description

The course covers the construction quality management aspect related to Total quality management (TOC), various concepts of quality, etc. This course will help the students to understand the importance of quality in construction industry and the aspects of completing the projects on time. This will also impart knowledge about the safety measures required during construction work and the management of the same.

Course Objectives

The objective of this course is to:

1. Comprehend the importance of quality in construction industry related to various aspects of quality.
2. Development of idea related to specification, standardization, bid, environmental safety and management.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Define and describe the quality policy in Indian construction industry and their effect on economy.

CO2: Evaluate and comprehend the concept of quality and apply the procedure in the practical use.

CO3: Comprehend the quality assurance and control programmes to be utilized in practical applications.

CO4: Define and describe the various aspects of quality and various modes of analysis of the same.

CO5: Comprehend the ideas related to specification, standardization, bid, environmental safety and management.

Course Content

Modules	Blooms level*	Number of hours

Module I: Quality policy in construction industry-Consumer satisfaction- Ergonomics-Time of completion, Statistical tolerance.	L1, L2 and L3	10
Module II: Taguchi's concept of quality-contract and construction programming-inspection procedures.	L1, L2 and L3	10
Module III: Quality assurance/Quality control Programme and cost implication.	L1, L2, and L3	8
Module IV: Different aspects of quality-appraisals-failure mode analysis-stability methods and tools-Influence of drawings-detailing.	L1, L2 and L3	8
Module V: Specifications- standardization- Bid preparation-construction activity-Environmental safety-social and environmental factors.Basic construction safety: Hazards, human factors in construction safety, introduction to occupational health and safety, problem areas in construction safety, elements of an effective safety program, job-site safety assessment, safety planning, safety audit	L1, L2 and L3	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Clarkson H. Oglesby, Productivity improvement in construction, McGraw Hill, New York, 2000.
- James, J.O Brain, Construction inspection handbook-quality assurance and quality control, Van Nostrand, New York, 1989.

References

- Juran Frank, J.M.and Gryana,F.M. Quality planning and analysis ,Tata McGraw Hill, New Delhi, 1982.
- Kwaku A., Tenah and Jose M. Guevera, Fundamental of construction management and organization PHI, USA, 1995.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	**3**	**2**	**3**	**3**	**-**	**2**	**3**	**-**	**3**	**3**	**2**	**1**	**3**	**1**	**2**	**3**
CO 2	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**3**	**-**	**3**	**2**	**1**	**3**	**1**	**1**	**3**
CO 3	**3**	**2**	**-**	**3**	**-**	**2**	**-**	**-**	**3**	**3**	**2**	**1**	**3**	**1**	**1**	**3**
CO 4	**3**	**2**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**3**	**2**	**1**	**3**	**1**	**1**	**3**
CO 5	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**3**	**3**	**2**	**1**	**3**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

CME4308	OPERATIONS STRATEGY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/ Exposure					
Co-requisites					

Catalogue Description

In this course the concepts of planning, strategizing the management tools and techniques are discussed. A clear understanding of various practical aspects of operations strategy, selection of process and infrastructure development will be explained. The aim of this course is to make the students familiar with the changes required in the operational strategy with rapidly changing environment in workplace and to adapt oneself according the changes.

Course Objectives

The objective of this course is to:

1. Equip the students with concepts of developing and implementing the operation strategy.
2. Provide an outline for implementing the operation strategy and to calculate the various financial and accounting perspectives in restructuring any organization.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define, describe the role and importance of operation strategy, its dynamics and its implications on manufacturing industry.

CO2: Identify the principles and concepts of developing the operation strategy and its implications in infrastructure development.

CO3: Identifying the principles and concepts of Focused Manufacturing demonstrating the importance of human aspects and categorizing the advantages and disadvantages of technology in use.

CO4: Calculating and describing the various financial and accounting perspectives in improving, redefining and restructuring any organization.

Course Content

Modules	Blooms	Number

	level*	of hours
Module I: Introduction Introduction, Role and Objectives of Operations Strategy, Incorporating Operations Strategy in the Corporate Strategy, Dynamics of process-product life cycles, Defining a Operations Strategy in Overall Environment, Manufacturing Implications of Corporate Marketing Decisions.	L1, L2	12
Module II: Developing Operations Strategy Principles and Concepts of Developing a Operations Strategy, Process of Operations Strategy Formulation, Methodology of Developing Operations Strategy, Business Implication of Process Choice, Product Profiling, Manufacturing Audit Approach, Manufacturing Restructuring, Infrastructure Development.	L1, L2	12
Module III: Implementation Of Operations Strategy Principles and Concepts of Focused Manufacturing, Involvement of Human Aspects, Effect of Technology Advancement and Technology Management, Integration of Operations Strategy Planning and Technology Planning, Pre-requisites of Organized and Focused Manufacturing Strategy & Unit.	L1, L2, L3	12
Module IV: Redefining Operations Strategy Value of Response Time and Product Variety in Operations Strategy, Management of Quality, Planning and Controlling System, Accounting & Financial Perspectives and Manufacturing System, Improving Manufacturing Process by Redefining & Restructuring Process Positioning	L3, L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Hill, T., Operation Management, Palgrave Macmillan; Third edition, New York, 2012.
- Mittal, A., Strategic Management: Formulation, Implementation and Control, TMH, New Delhi, 2017.
- Slack, N., Operation Strategy, Financial Times/ Prentice Hall; 2 edition, New York, 1997

References

- Hayes, R.H, Strategic Operations: Competing Through Capabilities, Free Press, USA, 1996.
- Soni, S. K, Construction management and Equipment, S.K. Kataria and Sons, New Delhi, 2016.
- Nicholas, Competitive Manufacturing Management, Tata McGraw-Hill, New Delhi, 2008.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**2**	**-**
CO 2	**1**	**2**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**2**	**-**
CO 3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**2**	**1**	**2**	**-**
CO 4	**1**	**1**		**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**2**	**-**

1: strongly related, 2: moderately related and 3: weakly related

CME4314	CONTRACT LAWS & REGULATIONS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This programme is based on the contract laws, acts of laws, Types of contracts, Tenders, Types of tenders, tendering process, framing of documents, Arbitration, Law Enforcements, Laws related to land and revenue and Labour laws, etc. This course also delivers the requirements of overall insurance planning, financial safety of different civil engineering projects.

Course Objectives

The objective of this course is to:

1. Cover the different aspects of contract laws, norms based on Indian standard, International norms and it includes bidding, accepting – Evaluation of Tender from Technical, Contractual and Commercial Points
2. Emphasis on the fundamentals of Laws of taxation, land and properties dealing before the execution of any engineering projects.

Course Outcomes

On completion of this course, the students will able to:

CO1: Explain regarding Indian contract accts, International Contract Document – Standard Contract Document, etc.

CO2: Define the process of tendering, types of tendering, project estimation and implementation.

CO3: Derive the different act of laws and violation in the planning and implementation of projects.

CO4: Discuss about the tax system. Different types of tax plans, construction method related to land acquisition, property dealing etc.

CO5: Describe the insurance and security of employee in addition to labour laws as per Indian Standards.

Course Content

Modules	Blooms level*	Number of hours

Module 1: Contract Acts Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability–Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts	L1, L2	12
Module II: Tendering Process Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamil Nadu Transparency in Tenders Act	L1, L2	8
Module III: Laws and Norms Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs	L1, L2, L3	12
Module IV: Tax and Planning Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land –Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law –Agency Law – Local Government Laws for Approval – Statutory Regulations	L1, L2, L3	8
Module V: Insurance and Security Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamil Nadu Factory Act – Child Labour Act – Other Labour Laws	L1, L2, L3, L5	8

**Bloom's Level:*
L1: Knowledge; L2: Comprehension; L3: Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- The Indian Contract Act (9 of 1872 Bare Act), Professional Book Publishers, New Delhi 2006.
- The Arbitration and Conciliation Act (26 of 1996 act), Professional Book Publisher, New Delhi, 2006.
- Dr. R.K. Bangia, Law of contract Part I and Part II, Allahabad Law Agency, New Delhi, 2005.

- Dr. S.R. Myneni, Arbitration, Conciliation and Alternative Dispute Resolution Systems, Asia Law House Publishers, New Delhi, 2004.

Reference Books

- The Workmen's Compensation Act, (8 of 1923 Bare Act), Professional Book Publishers, New Delhi, 2005.
- Standard General Conditions for Domestic Contracts, Published by Ministry of Statistics and Program Implementation, Government of India, New Delhi, 2008.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**2**	**2**	**2**	**1**	**-3**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**3**
CO 2	**1**	**1**	**2**	**2**	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**3**
CO 3	**1**	**1**	**2**	**2**	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**2**
CO 4	**1**	**1**	**2**	**2**	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**2**
CO 5	**1**	**1**	**--**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**2**	**--**	**1**

1: strongly related, 2: moderately related and 3: weakly related

CME4315	ADVANCED CONCRETE TECHNOLOGY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

The course will define the concrete making material materials, their significance, uses, and their properties in different situations and deign based on standard specifications. This will also enable the students to understand the manufacturing process of concrete and the precautions, various properties of concrete and different types of concrete and their application. This course illustrates about the use of different industrial wastes for the production of sustainable concrete also gives the description for the high strength concrete production.

Course Objectives

The objective of this course is to

1. Comprehend the proper selection of construction materials used in the field of Civil engineering construction sectors by knowing the material's properties, availability, strength and durability.
2. Research development in the field of advancement construction materials and their proper selection as per need and performance requirements on different situations.

Course Outcomes

On completion of this course, the students will be able to

CO1 Judge the appropriate construction materials as per the construction activities concerned, knowing its performance, properties and criteria through different standardized tests.

CO2 Quantifying, processing and Performance of concrete works for its quality assurance as per the standard guidelines.

CO3. Describe the concrete behavior in fresh state and its behavior in different environmental condition and towards external loading agencies.

CO4. Comprehend the selection of advanced concrete material for sustainable constructional applications and incorporating repair and rehabilitation process of concrete material.

CO5 Selection and requirement of Form Work their importance in the field of construction.

Course Content

Modules	**Blooms level***	**Number of hours**
Module 1: Materials Concrete Making Materials: Cement- Bogues compounds – Hydration Process– Types of cement – Aggregates – Gradation Charts – Combined Aggregate-Alkali Silica Reaction -Admixtures – Chemical and Mineral admixtures.	L1, L2	10
Module II: Fresh and Hardened Concrete Fresh Concrete - workability tests on Concrete Setting times of Fresh Concrete - Segregation and bleeding. Hardened Concrete: Abram's law- Gel space ratios, Maturity Concept – Stress Behaviour – Creep and Shrinkage – Durability tests on concrete – Non-destructive testing of concrete.	L1, L2	10
Module III: High Strength and High Performance Concrete High Strength Concrete – Micro structure – Manufacturing and Properties- Design 0s HSC Using Erintroy Shaklok Method- Ultra High Strength Concrete. High Performance Concrete- Requirements and properties of High-Performance Concrete- Design Considerations.	L1, L2, L3, L4	9
Module IV: Special Concrete Special Concrete: Self Compacting concrete – Polymer concrete – Fiber reinforced concrete –Reactive Powder concrete – Requirements and Guidelines – Advantages and Applications. Light weight concrete. Concrete mix design, Quality Control - Quality assurance - Quality audit- Mix Design method – BIS method, ACI method, DOE method.	L1, L2, L3, L4	10
Module V: Form Work Form work – materials – structural requirements – form work systems – connections – specifications – design of form work – shores – removal for forms – reshoring – failure of form work.	L1, L2, L3, L6	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Neville A.M., Properties of Concrete, Tata McGraw hill, New Delhi, 2013
- Shetty M.S., Concrete Technology, S Chand & Company, New Delhi, 1993.
- A.K. Sathakumar, Concrete Technology, Oxford Press, New Delhi, 2010
- Rajat Siddique, Special Structural concretes, Galgotia Publications, New Delhi, 2000
- P.K.Mehta, Concrete: Micro Structure, McGraw Hill Publication, New Delhi, 2009.
- Gambhir M.L., Concrete Technology, Tata McGraw Hill, New Delhi, 1995.

Reference Books

- Krishna Raju N., Design of Concrete Mixes, CBS publishers, New Delhi, 1988.
- Raina V.K., Concrete for Construction-Facts & Practices, Tata McGraw Hill publishing co., New Delhi, 1988.
- Murdock L.J., Concrete: Materials & Practice, Oxford University Press, Canada, 1991.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**3**	**3**	**3**	**3**	**1**	**32**	**3**	**3**	**3**	**3**	**1**	**1**	**1**	**2**	**3**
CO2	**1**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**2**	**3**	**1**	**1**	**1**	**-1**	**2**
CO3	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**1**	**2**	**3**	**3**	**1**	**1**	**2**	**1**	**3**
CO4	**1**	**2**	**1**	**2**	**2**	**1**	**3**	**1**	**1**	**3**	**2**	**1**	**1**	**2**	**1**	**2**

CO5	**1**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**2**	**3**	**1**	**1**	**1**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

CME4302	HIGHWAY CONSTRUCTION AND MAINTENANCE	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course deals with the advanced knowledge of the transportation engineering. The aspects related to highway construction such as embankment construction, bituminous construction, rigid pavement construction (concrete road), hill road construction, etc. are dealt with in this course. The maintenance management related to highways have also been discussed elaborately in this course.

Course Objectives

The objectives of this course are:

1. Impart knowledge about the highway construction techniques related to embankment, flexible and rigid pavements as well as hill roads.

2. Understanding the maintenance management related to road construction.

Course outcomes

After completing the course, the students will be able to:

CO1:Define, describe and evaluate the construction of embankments along with their maintenance management.

CO2: Describe and analyze the bituminous construction techniques along with their maintenance management.

CO3: Describe and analyze the concrete road construction techniques along with their maintenance management.

CO4: Describe and analyze the hill road construction techniques along with their maintenance management.

Course Content

Modules	Blooms level*	Number of hours
Module I: Embankment Construction: Formation cutting in Soil and hard rock, Preparation of Subgrade, Ground improvement, Retaining and Breast walls on hill roads, Granular and Stabilized, Sub – bases / bases, Water Bound Macadam (WBM), Wet Mix Macadam (WMM), Cement treated bases, Dry Lean Concrete (DLC). Maintenance of each of the Bituminous construction.	L1, L2, L3, L4	12
Module II: Bituminous Constructions: Types of Bituminous Constructions, Interface Treatments, Bituminous Surfacing and wearing Courses for roads and bridge deck slabs and their maintenance , Selection of wearing Course under different Climatic and Traffic conditions, IRC specifications, Construction techniques and Quality Control.	L1, L2, L3, L4	12
Module III: Concrete road construction: Test on Concrete mixes, Construction equipment, Method of construction of joints in concrete pavements, Quality Control in Construction of Concrete pavements, Construction of Continuously reinforced, Prestressed, Steel Fibre Reinforced (SFRC) Pavements, IRC, MORT&H, ACI Specifications, AASHTO Specifications, Recycled pavements, Non – Conventional Pavements, Overlay Construction. Maintenance of paved and unpaved roads.	L1, L2, L3, L4	12
Module IV: Hill Roads Construction: Stability of Slopes, Landslides – Causes and Control measures, Construction of Bituminous and Cement Concrete roads at high altitudes, Hill road drainage, Construction and maintenance problems and remedial measures.	L1, L2, L3, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kadiyali, L. R., Traffic Engineering and Transportation Planning, Khanna Publishers, New Delhi, 2011.
- Pignataro, L. J., Traffic Engineering: Theory and Practice, Prentice Hall, Inc., New York, 1973.
- Roess, R. P., Prassas, E. S., and McShane, W. R., Traffic Engineering, 4th Edition, Prentice Hall, New York, 2010.

References

- Institute of Transportation Engineers, Traffic Engineering Hand Book, 4th Edition, Prentice Hall, New York, 1999.

- Khanna and Justo, Highway Engineering. Nem Chand & Bros, New Delhi, 2003.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**-**	**2**	**3**	**2**	**3**	**-**	**3**	**-**	**3**	**-**	**3**	**2**	**1**	**3**	**-**
CO 2	**1**	**2**	**-**	**3**	**-**	**2**	**-**	**3**	**-**	**-**	**3**	**3**	**2**	**1**	**3**	**-**
CO 3	**1**	**3**	**2**	**-**	**2**	**3**	**-**	**-**	**2**	**3**	**-**	**3**	**2**	**1**	**3**	**-**
CO 4	**1**	**-**	**2**	**3**	**-**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**2**	**1**	**3**	**-**

1: strongly related, 2: moderately related and 3: weakly related

CME4303	HIGHWAY CONSTRUCTION AND MAINTENANCE LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog description

In this lab course the various tests are conducted on different types of basic construction materials such as aggregate, sand, cement, admixtures. It also includes the tests on bituminous design mix, different tests related to fresh and hardened state concrete with both destructive and non-destructive tests.

Course Objective:

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.

2. Strengthen the knowledge on construction materials especially used in construction of roads and pavements, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance.

Course Outcomes:

On the completion of this course, the student will be able to:

CO1. Perform the tests on various construction materials to apply he results in the practical life.

CO2. Perform different tests on cement, sand, aggregates, bitumen and bituminous mixes used in the construction for the quality assurance.

CO3. Carry out the bituminous mix design

CO4. Evaluate and maintain the quality of materials based constructions and perform the tests to evaluate the pavements.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Laboratory tests on soils 1. Moisture Content Test 2. Proctor Test 3. CBR Test	L1, L2, L3, L5, L6	6
Module II: Tests on aggregate; Tests on bitumen 1. Crushing Value Test 2. Impact Value Test 3. Los Angeles Abrasion Test 4. Shape Test 5. Specific Gravity & Water Absorption Test 6. Penetration Test 7. Softening Point Test 8. Flash & Fire Test 9. Ductility Test 10. Viscosity Test	L1, L2, L3, L5, L6	6
Module III: Bituminous mix design 1. Marshall Method of Mix Design	L1, L2, L3, L5, L6	6
Module IV: Pavement evaluation tests 1. Bump Integrator Test 2. Benkelman Beam Test	L1, L2, L3, L5, L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Khanna, S. K., Justo, C. E. G., and Veeraragavan, A., Highway Material Testing, New Chand Publications, New Delhi, 2009.

References

- Relevant Indian Standards, ASTM Standards, BIS, ISO.
- IS: 456, IS: 383, IS: 2386, IS: 516, IS: 10262, etc.
- IS: 13311- part 1- 1992, IS: 13311- part 2- 1992

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**1**	**1**	**--**	**1**	**2**	**1**	**2**	**3**
CO2	**1**	**2**	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**2**	**1**	**2**	**3**
CO3	**1**	**2**	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**2**	**1**	**2**	**3**
CO4	**1**	**2**	**1**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**2**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

CME4304	GEOTECHNICS IN CONSTRUCTION	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/ Exposure					
Co-requisites					

Catalogue Description

This course deals with the advanced knowledge of the geotechnical engineering. The aspects related to the various constructions required in geotechnical engineering ranging from the foundations to various grouting processes and earth reinforcement.

Course Objectives

The objectives of this course are:

1. Impart knowledge about the geotechnical construction techniques.

2. Impart knowledge about the various constructions required in geotechnical engineering ranging from the foundations to various grouting processes and earth reinforcement.

Course outcomes

After completing the course, the students will be able to:

CO1: Define and describe the shallow foundation and the analysis of the same for practical use.

CO2: Evaluate and analyze the deep foundation especially the pile and pile cap design.

CO3: Define earth reinforcement techniques and comprehend the principals behind it for practical applications.

CO4: Apply the knowledge of grouting and other stabilizing techniques for practical applications.

Course Content

Modules	Blooms level*	Number of hours
Module I: Shallow Foundation: need of foundation engineering, shallow foundation, construction methods in shallow foundation , analysis of foundation, Foundation design in relation to ground movements - Foundation on recent refuse fills - Design of Foundation for seismic forces – Codal recommendations - Introduction to theory of vibration - Design of Block foundation – Codal Recommendations.	L1, L2, L3, L4	12
Module II: Deep foundation: design of pile foundation, pile cap analysis, pile – raft system basic interactive analysis – pile and pile groups subjected to vibrations – fundamental solutions. design of caissons.	L1, L2, L3, L4	12
Module III: Earth reinforcement – Principles and basis mechanism of reinforced earth-reinforced soil retaining structures-simple design, Synthetic and natural fibre based Geotextiles and their applications. Filtration, drainage, separation, erosion control – case studies.	L1, L2, L3, L4	12
Module IV: Grouting techniques – Types of grout – Suspension and solution grouts – Basic requirements of grout. Grouting equipment – principle of injection-injection methods – properties of treated ground-application of jet grouting-grout monitoring – Electro – chemical stabilization – Stabilization with cement, lime etc. – Stabilization of expansive clays.	L1, L2, L3, L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Donald P. Coduto, Foundation Design Principles and Practices - Prentice Hall, Inc., Englewood Cliffs, New Jersey, 1996.
- Winterkorn, H.F. and Fang, Y.F., Foundation Engineering Handbook, Van Nostrand Reinhold, New York, 1994.
- Peck, R.B., Hansen, W.E., and Thornburn, W.H., Foundation Engineering, John Wiley, 1974.
- Robert Wade Brown, Practical Foundation Engineering Handbook, McGraw Hill, New York, 1996.
- Bowles, J.E., Foundation Analysis and Design, McGraw Hill, New York, 1996.

References

- Tomlinson, M.J. Foundation Engineering, ELBS, Long man Group, UK Ltd., England, 1995.
- Swami Saran, Soil Dynamics and Machine Foundation, Galgottia Publications Pvt. Ltd., NewDelhi-110002, 1999.
- Vargheese, P.C. Limit State Design of Reinforced concrete, Prentice-Hall of India, 1994.

- Day, R.W., Geotechnical and Foundation Engineering, Design and Construction, McGrawHill 1999.
- Grigorian, Pile Foundation for Buildings and Structures in collapsible Soil, Oxford & IBH Publishing Co, Pvt. Ltd., New Delhi, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**-**	**2**	**3**	**2**	**3**	**-**	**3**	**-**	**3**	**-**	**3**	**2**	**1**	**3**	**-**
CO 2	**1**	**2**	**-**	**3**	**-**	**2**	**-**	**3**	**-**	**-**	**3**	**3**	**2**	**1**	**3**	**-**
CO 3	**1**	**3**	**2**	**-**	**2**	**3**	**-**	**-**	**2**	**3**	**-**	**3**	**2**	**1**	**3**	**-**
CO 4	**1**	**-**	**2**	**3**	**-**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**2**	**1**	**3**	**-**

1: strongly related, 2: moderately related and 3: weakly related

CME4305	GEOTECHNICAL LAB FOR CONSTRUCTION ENGINEERS	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

In this lab course the various tests are conducted on the soil and its engineering properties. The various tests related with the soil will be conducted such as CBR, direct shear, triaxial, pile load test, SPT, etc.

Course Objectives

The objective of the course is to

1. Assure the quality and properties of materials that are to be used for the construction such as; sand, aggregates, cements, admixtures.
2. Strengthen the knowledge on construction materials especially used in construction of roads and pavements, their utilization and related tests for concrete structure quality improvement, evaluation and its maintenance.

Course Outcomes

On the completion of this course, the student will be able to:

CO1. Perform the tests on soils to apply he results in the practical life.

CO2. Perform different tests such as triaxial test, direct shear test, CBR test, SPT test, etc. for the quality assurance.

CO3. Carry out the various consolidated and unconsolidated tests.

CO4. Evaluate and maintain the quality of materials-based constructions and perform the tests to evaluate the geotechnical aspects.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Review of index and engineering properties of soil	L1, L2, L3, L5, L6	6

Module II: CBR Test; Direct Shear Test - Drained direct shear test on Cohesionless Soil	L1, L2, L3, L5, L6	6
Module III: Triaxial Compression Test - Unconsolidated - Undrained Tests, Consolidated Undrained Tests with Pore pressure measurement, Consolidated Drained Tests	L1, L2, L3, L5, L6	6
Module IV: Standard Penetration Test, Plate load Test, Pile Load Test and Large Direct Shear Test.	L1, L2, L3, L5, L6	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Bishop, A. W. and Henkel, D. J., Measurement of Soil Properties in Triaxial Test, Edvard Arnald Ltd., New York, 1962.
- Head, K. H., Manual of Soil Laboratory Testing, CRC Press, New Delhi, 2006.

References

- Mittal, S. and Shukla, J. P., Soil Testing For Engineers, Khanna Pub., New Delhi, 2003.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**1**	**1**	**--**	**1**	**2**	**1**	**2**	**3**
CO2	**1**	**2**	**2**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**2**	**1**	**2**	**3**

CO3	**1**	**2**	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**2**	**1**	**2**	**3**
CO4	**1**	**2**	**1**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**--**	**1**	**2**	**1**	**2**	**3**

1: strongly related, 2: moderately related and 3: weakly related

CME4316	SOFTCOMPUTING TECHNIQUES IN CIVIL ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

Soft computing is the foundation of conceptual intelligence in machines. Unlike hard computing, soft computing is tolerant of imprecision, uncertainty, partial truth, and approximation. Soft computing algorithms are becoming important classes of efficient tools for developing intelligent systems and providing solutions to complicated civil engineering problems. Domains of applications include structural engineering, design, diagnostics, and health monitoring, hydraulic engineering, geotechnical engineering, transportation engineering, environmental engineering, coastal and ocean engineering and construction management. The course gives basic knowledge about the key algorithms and theory that form the foundation of machine learning and computational intelligence and a practical knowledge of machine learning algorithms and methods in civil engineering.

Course Objectives

The objective of this course is to:

1. Introduce the concept of soft computing in Civil Engineering.
2. Identify and select a suitable soft computing technique to solve the problem, construct a solution and implement a soft computing solution.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend the soft computing techniques and their application in civil engineering

CO2: Analyse various neural networks architectures and their practical applications.

CO3: Define the fuzzy logic modelling technique and its application.

CO4:Comprehend and Understand the genetic algorithm concepts and their applications in civil engineering.

CO5: Identify and select a suitable soft computing technique to solve the problem, construct a solution and implement a soft computing solution.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to Soft Computing Introduction, soft computing vs hard computing, requirement of soft computing, major areas of soft computing, applications of soft computing	L1, L2	4
Module II: Artificial Neural Networks(ANN) Biological neurons, basic models of ANN, learning, activation function, perceptron, learning rule, training and testing, back propagation, research paper study related to civil engineering.	L1, L2, L3, L4	11
Module III: Fuzzy Logic(FL) Fuzzy sets, properties, operations on Fuzzy sets, fuzzy relations, fuzzy membership functions, inference, methods of member value assignment, rank ordering, defuzzification, fuzzy inference systems, research paper study related to civil engineering.	L1, L2, L3, L4	11
Module IV: Genetic Algorithm (GA) Introduction to GA, operators in GA, coding, selection, cross over, mutation, stopping condition, Convergence of GA, Bit wise operation in GA, Multi-level Optimization, research paper study related to civil engineering.	L1, L2, L3, L4	11
Module V: Application of the techniques in Civil Engineering Collection of data, input of data, Weka software for ANN technique – basics theory related to software use and techniques.	L1, L2, L3, L4	11

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Sivanandam, S.N. and Deepa, S.N., Principles of Soft Computing, Wiley India, 2nd Edition, 2011.
- Ross, T.J. , Fuzzy Logic with engineering applications, Wiley India, 4th Edition, 2016.
- Sinha, N K and Gupta, M M , Soft Computing & Intelligent Systems: Theory & applications, Academic Press, Elsevier, 2009.

Reference Books

- Haykin, S., Neural Network and Machine Learning- A Comprehensive Foundation, Pearson Canada, 3rd Edition, 2011.
- Ross, T.J. , Fuzzy Logic with engineering applications, McGrawHill, New York, 2011.
- Affenzeller, M., Wagner, S., Winkler, S. and Beham, A. Genetic Algorithms and Genetic Programming: Modern Concepts and Practical Applications (Numerical Insights), Chapman and Hall/CRC; 1st edition, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**-**	**2**
CO2	**1**	**2**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**-**	**2**
CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**-**	**2**
CO4	**1**	**1**		**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**-**	**2**
CO5	**1**	**1**		**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**3**	**2**

1: strongly related, 2: moderately related and 3: weakly related

CME4317	SOFT COMPUTING TECHNIQUES IN CIVIL ENGINERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue description

Soft computing is the foundation of conceptual intelligence in machines. Unlike hard computing, soft computing is tolerant of imprecision, uncertainty, partial truth, and approximation. Soft computing algorithms are becoming important classes of efficient tools for developing intelligent systems and providing solutions to complicated civil engineering problems. Domains of applications include structural engineering, design, diagnostics, and health monitoring, hydraulic engineering, geotechnical engineering, transportation engineering, environmental engineering, coastal and ocean engineering and construction management. The course gives basic knowledge about the key algorithms and theory that form the foundation of machine learning and computational intelligence and a practical knowledge of machine learning algorithms and methods in civil engineering.

Course Objectives

The objective of this course is to:

1. Introduce the concept of soft computing in Civil Engineering by learning the softwares Weka and MATLAB.
2. Identify and select a suitable soft computing technique to solve the problem, construct a solution and implement a soft computing solution.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend ANN technique and creating a programme for the same related with the applications in civil engineering

CO2: Apply the ANN technique and analyse a modelusing the software.

CO3: Apply a suitable problem statement and solve the problem, construct a solution and implement a fuzzy logic toolbox.

CO4: Evaluate the utilization of MATLAB software for fuzzy logic analysis.

Course Content

List of Experiments	Blooms level*	Number of hours
Module I: Create a perceptron with appropriate no. of inputs and outputs. Train it using fixed increment learning algorithm until no change in weights is required. Output the final weights.	L1, L2, L3, L4, L5, L6	6
Module II: Create a model using back propagation method using Weka	L1, L2, L3, L4, L5, L6	6
Module III: Creating a small programme using MATLAB Fuzzy logic toolbox.	L1, L2, L3, L4, L5, L6	6
Module IV: Implementing MATLAB Fuzzy logic toolbox for a problem related to the application in the area of civil engineering	L1, L2, L3, L4, L5, L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Sivanandam, S.N. and Deepa, S.N., Principles of Soft Computing, Wiley India, 2nd Edition, 2011.
- Ross, T.J. , Fuzzy Logic with engineering applications, Wiley India, 4th Edition, 2016.
- Sinha, N K and Gupta, M M , Soft Computing & Intelligent Systems: Theory & applications, Academic Press, Elsevier, 2009.

Reference Books

- Haykin, S., Neural Network and Machine Learning- A Comprehensive Foundation, Pearson Canada, 3rd Edition, 2011.
- Ross, T.J. , Fuzzy Logic with engineering applications, McGrawHill, New York, 2011.
- Affenzeller, M., Wagner, S., Winkler, S. and Beham, A. Genetic Algorithms and Genetic Programming: Modern Concepts and Practical Applications (Numerical Insights), Chapman and Hall/CRC; 1st edition, 2009.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**-**	**2**
CO2	**1**	**2**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**-**	**2**
CO3	**1**	**2**	**3**	**3**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**1**	**3**	**-**	**2**
CO4	**1**	**1**		**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**-**	**2**

1: strongly related, 2: moderately related and 3: weakly related

TRE4305	TRANSPORTATION INFRASTRUCTURE DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with the geometric design provisions for various transportation facilities as per IRC guidelines. It includes design of different intersections and interchanges of expressways and high-speed corridors. It also includes the design of runways and taxiways as per the airport design standards along with design of surface and sub surface drainage facilities.

Course Objectives

The objective of this course is to

1. Explain the principles of geometric design for various transportation facilities.
2. Design the At-Grade and Grade separated intersections along with the design of drainage facilities.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design the expressway/high speed corridors along with their alignment.
CO2: Explain the principles of traffic operations along with the design of intersections.
CO3: Explain the different interchanges and geometric design for non-motorized traffic.
CO4: Design runways and taxiways along with the design of drainage facilities.

Course Content

Modules	Blooms level*	Number of hours
Module I **Introduction :** Geometric design provision for various transportation facilities as per IRC guidelines,geometric design of horizontal and vertical alignment, design of expressways/ high speedcorridors	L1, L2,L3	10
Module II **Design of at grade intersections :** Principles of design, channelization, roundabouts, staggered intersections	L1, L2, L3	10

Module III **Design of interchanges:**Major and minor interchanges, entrance and exit ramps, acceleration and deceleration lanes **Geometric design of facilities for non motorized traffic:** Bicycles and pedestrian facility design, slow carriageways	L1, L2, L3	14
Module IV **Introduction to Geometric design of air fields:** Airport design standards, runways, taxiways **Design of drainage facilities:** Importance, Principles, drainage of various geometric elements, surface and subsurfacedrainage	L1, L2,L3	14

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Khanna & Justo, Highway Engineering, 10th ed., Nemchand& Brothers, Roorkee, 2018.
- C. Jotin Khistya and B. Kent Lall, "Transportation Engineering", 5TH edition, Prentice Hall of India Private Limited, 2006.
- Khanna S.K., Arora M.G. and S.S. Jain; "Airport Planning and Design", Nem Chand & Brothers, Roorkee, 1999.
- Relevant IRC Codes.

References

- AASHTO, Roadside Design Guide, 3rd Edition, 2006 (revision).
- AASHTO, Highway Safety Manual, 2010.
- Transportation Research Board, Access Management Manual, 2003.
- Transportation Research Board, A Guide to Best Practices for Achieving Context Sensitive Solutions, National Cooperative Highway Research Program (NCHRP) Report 480, 2002.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4306	AIRPORT INFRASTRUCTURE, PLANNING AND DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with the airport planning and geometric design for runways and taxiways. It includes airport visibility such as day time markings and lightings for night time. It also includes mathematical models for airside capacity and delay and the importance of air traffic control. It includes the design of runways and taxiways as per the airport design standards along with design of surface and sub surface drainage facilities.

Course Objectives

The objective of this course is to

1. Familiarize various techniques related to airport planning and design.
2. Design run off, surface and sub surface drainage facilities.

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyze the air traffic demand and design the geometrical features of runways, taxiways and exit taxiways.
CO2: Design the airport pavements and analyze different markings and lightings for the terminal areas.
CO3: Design the mathematical models for airside capacity & delay and understands the concept of air traffic control.
CO4: Design runways along with the design of drainage facilities.

Course Content

Modules	Blooms level*	Number of hours
Module I Airport Planning: Airport master plan, aircraft characteristics related to airport planning, air traffic demand analysis, planning surveys, airport zoning.Geometric Design: Airport classification, runway and	L1, L2,L3	15

taxiway geometric standards,exit taxiways, separation and clearances.		
Module II Terminal Areas: Facilities, space requirement, number and size of gate positions,aircraft parking system. Visual Aids : Airport day time markings, airport lighting, visibility, visual aids Structural design of airport pavements: Design Factors, Design of flexible and rigid Pavements	L1, L2, L3	14
Module III Airside capacity and delay: mathematical models for capacity and delay, space timeconcept, models for mixed traffic. Air Traffic Control: Importance of flight rules, navigational aids, air traffic controls,obstruction and clearance requirements	L1, L2, L3	11
Module IV Airport Drainage : Design run-off, inlet size and location design, surface andsubsurface design	L1, L2,L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Robert Horonjeff and Francis X. McKelvey, "Planning & Design of Airports, McGraw Hill, Inc, 1993
- S. K. Khanna, M. G. Arora and S. S. Jain, "Airport Planning & Design", Nem Chand and Bros. Roorkee 2004
- Ashford, N. and Wright, P. H., "Airport Engineering", John Wiley & Sons, NY., 1992

References

- Khanna & Justo, Highway Engineering, 10th ed., Nemchand& Brothers, Roorkee, 2018.
- ICAO, "Aerodrome Design Manual", International Civil Aviation Organization, Montreal, Canada1983

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	2	-
CO2	1	--	1	--	--	--	3	--	2	2	-	-	-	1	2	-
CO3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	2	-
CO4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

TRE4309	BRIDGE ENGINEERING FOR HIGHWAYS	L	T	P	C

Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

Bridges are a very important part of a nation's transportation infrastructure. Proper planning, design and construction, as well maintenance, are of utmost importance. In general, engineers will benefit from exposure to sophisticated bridge typologies and construction practices, as well as the assessment of the existing bridges. The competency needed in this field has to be enhanced significantly and rapidly to respond to the requirements in large infrastructure projects being undertaken and planned in India. This course will extend the concepts and methodologies given in bridge engineering courses to cover the design of medium- and long-span road bridges, which can be optimized in terms of load-carrying capacity, durability, and ease of construction and maintenance. Good construction practices, site-specific issues and guidelines for drafting and enforcing specifications will also be covered.

Course Objectives

The objective of this course is to:

1. Analyze and design various types of bridges using various methods and also understand the various loads and forces combinations on the bridges.

2. Analyze and design the substructure of the bridges and also apply the various construction & maintenance methods in the field.

Course Outcomes

After completing the course, the students will be able to:

CO1: Apply knowledge of mathematics, science and engineering to understand the various types of bridges and its loadings and forces.

CO2: Design and analyze the bridge decks using different methods.

CO3: Analyze and design continuous and long span bridges using different methods.

CO4: Design and analyzesubstructure of the bridges which includes peirs, abutments and its foundations.

CO5: Design different connections and bearing and understand various practical methods of construction & maintenance of bridges.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction General: Bridge System, Considerations in alignment, Planning, Economic consideration, Aesthetics and selection of type of bridge (Review) Introduction-types of Bridges-economic span length-Types of loading-Dead load live load-Impact, Loading Standards: Standards followed in U.K., U.S.A. and Europe	L1, L2, L3	9
Module II: Analysis and Design of Bridges (Superstructure) Bridge deck analysis using different methods, Load distribution theories – Courbon specifications for loading, Geometrical proportioning etc. of road, rail-cum-road bridges, Indian Road Congress (IRC) and Indian Railway Loading standards and their comparison with loading, Hendry-Jaegar, Morris-Little (Orthotropic plate theories) methods, Stiffness method, Finite difference method, Folded Plate method, Finite strip method and Finite Element method (General treatment), Limit analysis, Design of bridge decks.	L2, L3, L4, L5	11
Module III: Design of Continuous & Long Span Bridges Introduction to IRC 112: Provisions of Earthquake Resistant Design of Bridges**,** Design principles of continuous bridges Long Span Bridges: General discussion of suspension and cable stayed bridges	L2, L3, L4, L5, L6	9
Module IV: Substructure Analysis and Design & Foundations: Piers, Abutments, Wing walls and other appurtenant structures, Well foundations and pile foundation, Design and construction and field problems	L1, L2, L3, L4	10
Module V: Connections & Construction & Maintenance Design of different connections, Bearings and joints Erection of bridge super structure, Maintenance, Rating and Strengthening of existing bridges	L1, L2, L3, L4, L5, L6	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Johnson Victor, D. Essentials of Bridge Engineering, Oxford and IBH Publishing Co. New Delhi, 1990
- Jagadeesh. T.R. and Jayaram. M. A. Design of Bridge Structures, Prentice Hall of India Pvt. Ltd. New Delhi, 2004.
- Raina V.K. Concrete Bridge Practice, Tata McGraw Hill Publishing Company, New Delhi, 1991.
- Ponnuswamy, S., Bridge Engineering, Tata McGraw Hill, New Delhi, 2008.

Reference Books

- Derrick Beckett, An introduction to Structural Design of Concrete Bridges, Surrey University Press, Henley Thomes, Oxford Shire, 1973.
- Taylor, F.W., Thomson, S.E., and Smulski E., Reinforced Concrete Bridges, John Wiley and Sons, New York, 1955.
- Bakht, B. and Jaegar, L.G., Bridge Analysis Simplified, McGraw Hill, New York, 1985.
- Relevant Road & Railway Codes for Bridges.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	**1**	**2**	**2**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**-**	**-**
CO 2	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**-**	**-**
CO 3	**1**	**2**	**---**	**3**		**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**-**	**-**
CO 4	**1**	**2**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**-**	**-**
CO 5	**1**	**2**	**---**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4303	**PUBLIC TRANSPORTATION SYSTEMS**	**L**	**T**	**P**	**C**

Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course discuss the evolution and role of urban public transportation modes, systems and services, focusing on bus and rail. It includes various topics including current practice and new methods for data collection and analysis, performance monitoring, road design, frequency determination, effect of pricing policy and service quality on ridership.

Course Objectives

The objective of this course is to

1. Provide knowledge regarding public transportation systems, their operation, planning and economics.
2. Familiarize with the problems of transit routing, scheduling, infrastructure facilities, fare structures and management.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describes the important concepts about public transportation systems.
CO2: Collect data about travel behaviour and analyzing the data for use in transport planning.
CO3: Explain and describes the various parameters of rapid transit systems.
CO4: Apply optimization technique for transport planning and pricing.

Course Content

Modules	Blooms level*	Number of hours
Module I: Modes of public transportation and application of each to urban travel needs.	L1, L2, L3	7
Module II: Transit system operations, para-transit systems, street transit systems, rapid transit systems, estimation of transit demand. Route development, properties of a good route set, determination of a good route set, stop location and stopping policy, schedule development, properties of a good schedule, determination of a good schedule.	L1, L2	16

ModuleIII: Capacity of rapid transit systems, line capacity of RTS, capacity of street transit systems. Transit corridor, identification and planning, mass transport management measures, integration of public transportation modes. Public transport infrastructure, case studies, multi mode transportation system.	L1, L2	16
Module IV: Planning for public transport, fares and subsidies. Intermediate public transport in Indian cities, types of IPT vehicles. Characteristics of IPT modes.	L1, L2, L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Traffic Engg. And Transport Planning by L.R.Kadiyali, Khanna Publishers, Delhi.
- Introduction to Transport Planning by Bruton, M.J., Hutchinson Technical Education, London.

References

- Principles of Transportation Engineering by Chakroborty & Das, Prentice Hall, India.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**2**	**-**	**-**	**-**	**1**	**-**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**-**	**2**	**-**	**-**	**-**	**1**	**-**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**-**	**1**	**-**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**2**	**-**	**-**	**-**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4307	**INTELLIGENT TRANSPORTATION SYSTEMS**	**L**	**T**	**P**	**C**

Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

Intelligent transportation systems represent the major transition in transportation in many dimensions. This course considers ITS as a lens through which one can view many transportation and societal issues. This course is intended to improve the effectiveness and efficiency of surface transportation systems through advanced technology in information system, communications and sensors.

Course Objectives

The objective of this course is to

1. Familiarize ITS conceptually as a macro traffic management systems.
2. Explain the enabling role of technology i.e. vehicular technology, infrastructure, information and communication technology and data processing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss the fundamentals of traffic flow theory in the management and operations of road traffic.

CO2: Describe the range of technology involved in the delivery of traveller information system.

CO3: Assess the range of options available for the management of freeway and arterial traffic.

CO4: Investigate and analyze current application and trend in developed and developing countries.

CO5: Investigate the contemporary issues in the application of advanced technology in transport.

Course Content

Modules	Blooms level*	Number of hours
Module I Introduction to ITS: History of ITS, ITS Legislation and Financing, User Services,Roles and Responsibilities ITS Components : Advanced Traveler Information Systems (ATIS), AdvancedTransportation Management Systems (ATMS), including network operations,incident detection; congestion pricing, tolling, Fleet-oriented ITS services,	L1, L2,L3	15

Module II AdvancedPublic Transportation Systems (APTS); BRT; Commercial Vehicle Operations(CVO); Intermodal Freight, including International Operations and Supply Chains;Automated Highway Systems (AHS), Sensors, Electronic Toll Collection (ETC),Dedicated Short Range Communication; Standards.	L1, L2, L3	14
Module III Communication and Related Techniques: Radio Propagation and Antennas forWireless Communications; Technologies and Applications of CommunicationPrinciples for Transportation. Information & Related Technologies : Intelligent Control Theory, TransportationInformation; Vehicle Monitoring & Dispatching System; Advanced Web PagesProgramming, Transportation Safety	L1, L2, L3	11
Module IV Traffic Control & Chip Design : Traffic Control; Traffic Control System Design onChip. Regionally –scaled ITS deployment, including regional architecture; organizationland institutional issues; standards; developed vs. developing countries; ITS andstrategic regional transportation planning; integrating infrastructure and operationsplanning.	L1, L2,L3	8
MODULE V Critical ITS issues, including (as time permits) ITS and security; safety; humanfactors; privacy; sustainability; funding (as contrasted with conventional infrastructure); technology deployment/R&D/policy; other institutional issues Conclusion, including regional ITS planning and architecture presentation; the futureof ITS		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Chowdhury, M. A. and Sadek, A. W., "Fundamentals of Intelligent Transportation Systems Planning", Artech House. 2003
- McQueen, B. and McQueen, J., "Intelligent Transportation System Architectures", Artech House. 2003.

References

- Ghosh, S. and Lee, T., "Intelligent Transportation System - New Principles & Architectures", CRC Press. 2000.
- Williams, B., "Intelligent Transportation Systems Standards", Artech House. 2008

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	**1**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	**1**	**-**	**2**	**1**	**-**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4308	RAILWAY INFRASTRUCTURE, PLANNING AND DESIGN	L	T	P	C

Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course deals with the geometric design provisions for railway engineering which includes horizontal & vertical alignment, track elements and turnouts & crossing. It includes track management system, and planning of railway activities and project management for railways. It also includes the computation of various costs related to railways and disaster management for the accidents in the railways.

Course Objectives

The objective of this course is to

1. Enhance the knowledge of Railway Engineering in the context of regional mass transportation systems.
2. Familiarize the techniques of planning, modelling and designing the transportation systems along with infrastructures required for Railways.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design the geometrics of railway and explain the different rail operations along with their management.
CO2: Explain the track maintenance management and social and economic effect on environment.
CO3: Understand the concept of high speed & magnetic levitation and different track characteristics.
CO4: Compute the different costs associated with the rail transport services such as construction 7 maintenance cost, fixed & variable cost etc..
CO5: Analyse the railway accidents & disaster management and understands the parameters affecting the rail demand.

Course Content

Modules	Blooms level*	Number of hours
Module I Railway Geometric Design: Alignment and Surveys, Geometry of Track, Horizontal& Vertical curves, Track elements, Turnouts & Crossings. Rail Operations Management: Crowd control Passenger Flow management; Timetabling & Inter-running, Managing a Heavy Capacity Light Rail system,Productivity Management, Outsourcing & contractor Management.	L1, L2,L3	10
Module II Track Maintenance Management: Items of track maintenance, Packing &Overhauling of racks, Maintenance Planning, Mechanical Tack Maintenance,directed maintenance of track, Modern Track Management System.Planning, Financial Management & Investment : Railways Social & Economicenvironment, competition & Impact on Railway Management, Feasibility Studies &method of Financing, Planning the railway activity, Project Management forRailways, Human Resources & their revalorization, Privatization of Railways.	L1, L2	12
Module III High Speed & Magnetic Leviation: High Speed trains: Application of high-speed,Impact of high-speed on reduction of rail travel time, Track Characteristics, Rollingstock for high speeds, Power supply at high-speeds, Tilting trains, Aero trains,Magnetic Leviation.	L1, L2, L3	8
Module IV Costing and Pricing of Rail Transport Services: Construction & Maintenance Cost,Fixed & Variable cost, Marginal Cost, Generalized cost, Cost of Operation ofRailway company, Ratifications of infrastructure: Principles, Objectives, Financialconsequences, commercial applications, of infrastructure Pricing, Infrastructurepricing models in some countries.	L1, L2,L3	8
Module V Railway Accidents and Disaster Management Suburban Railways Dedicated Freight Corridor – Construction parameters & Track Structure Forecast of Rail demand: Purposes, Needs, Methods for forecasting, Parameteraffecting, Various categories of rail demand, Qualitative methods, Statistical Projections, Econometric models, Gravity models, Fuzzy models, Time-Seriesmodels.	L1, L2, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Mundrey, J.S., "Railway Track Engineering", Tata McGraw Hill, New Delhi, 2007
- Profillidis, V.A., "Railway Management & Engineering", Ashgate Publishing Limited, England, 2006.
- Saxena S.C and Arora, S.P, "A Text book of Railway Engineering", Dhanpat Rai Publications, New Delhi, 2011.

References

- Robin H. and Harris, N., "Managing Railway Operations & Maintenance", University of Birmingham Press, 2007
- William, H., "Railroad Engineering", John Wiley & Sons, United States, 1982
- Chandra S. and Agarwal M.M, "Railway Engineering", Oxford University Press, United Kingdom, 2013.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	--	3	--	--	1	--	-	-	-	1	2	-
CO2	1	--	1	--	--	--	3	--	2	2	-	-	-	1	2	-
CO3	1	1	1	--	1	--	--	--	--	--	-	-	-	1	2	-
CO4	1	1	1	2	1	--	--	--	--	--	-	-	-	1	2	-
CO5	1	1	1	2	1	--	--	--	--	--	-	-	-	1	2	-

1: strongly related, 2: moderately related and 3: weakly related

TRE4301	GIS & ITS APPLICATION IN TRANSPORTATION ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course contains basic geographic perspectives on accessibility and transportation, topics covered in the course includes is GIS based visualization of transport network and flow, network data set construction and different methods for network analysis for transportation planning.

Course Objectives

The objective of this course is to

1. Discuss the elementary concept of GIS such as definitions, benefits and urban application of GIS.
2. Familiarize the practical application of GIS in transportation field through case studies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the basic concepts and terminologies of GIS.
CO2: Acquire, manipulate and save the data IN GIS.
CO3: Demonstrate the concept of transport geography into practice by means of network analysis in GIS.
CO4: Identify an appropriate GIS work flow for analyzing transport flows between demand point locations and supply facilities.

Course Content

Modules	Blooms level*	Number of hours
Module I: Introduction: Definition and components of GIS, Types of data, Mapping process, Coordinate systems, Transformations, Map projections, Geo-referencing, Standard GIS packages.	L1, L2, L3	10
Module II: Data Acquisition: Scanners, Digitizers, Digital representation of data,	L1, L2	12

Data structure-Raster and vector data, Data storage. Data Processing: Format conversion, Data Compression and reduction techniques run length coding, block coding, quadtree, Spatial and non- spatial data, Topology creation.		
ModuleIII: Data Management: Database Structure-Hierarchical, Network, Relational, Database Management Systems. Data Manipulation & Analysis: Reclassification and Aggregation, Analysis of spatial and non spatial data, Modelling in GIS.	L1, L2	10
Module IV: Implementing in Transportation: Database in terms of link, nodes, point of interest; GIS database design for transport planning, Traffic Analysis Zone (TAZ), Integration of field data with GIS data. GIS Applications (A) Transportation Systems: Accidents and safety analysis, Traffic & Transport analysis, Traffic monitoring systems, Transport infrastructures, environmental impact assessment, congestion management, In-vehicle navigation. (B) Transport Planning: Travel Demand Analysis, Network alignment, Dynamic vehicle routing and scheduling, interchange analysis, Multimodal network planning, Decision Support System for transport planning. Case Studies	L1, L2, L3	16

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- Baurrough, P.A. "Principles of Geographic Information Systems for Land Resources Assessment", Oxford University Press, 1986.
- Aromoff, S. "Geographic Information Systems: A Management Perspective", WDL Publications, 1991.
- Scholten & Stillwen, "GIS for Urban & Regional Planning", Kulwer Academie Publisher, 1990.
- DeMers, M.N. "Fundamentals of GIS", Johan Wiley & Sons, 2000.

References

- Clarke, K. "Getting Started with GIS", Prentice Hall, 2001.
- Lo, C.P. & Yenung, A. K.W. "Concept and Techniques of GIS", Prentice Hall of India, 2002.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	--	3	--	--	1	--	2	-	-	-	1	-
CO2	1	--	1	--	--	--	3	--	2	-	2	-	-	-	1	-
CO3	1	1	1	--	1	--	--	--	--	--	2	-	-	-	1	-
CO4	1	1	1	2	1	--	--	--	--	--	2	-	-	-	1	-

1: strongly related, 2: moderately related and 3: weakly related

TRE4302	GIS & ITS APPLICATION IN	L	T	P	C

	TRANSPORTATION ENGINEERING LAB				
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course contains basic geographic perspectives on accessibility and transportation, topics covered in the course includes is GIS based visualization of transport network and flow, network data set construction and different methods for network analysis for transportation planning.

Course Objectives

The objective of this course is to

1. Discuss the elementary concept of GIS such as definitions, benefits and urban application of GIS.
2. Familiarize the practical application of GIS in transportation field through case studies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate the concept of transport geography into practice by means of network analysis in GIS.

CO2: Identify an appropriate GIS work flow for analyzing transport flows between demand point locations and supply facilities.

Course Content

Modules	Blooms level*	Number of hours
Module I: ● Study of various types of maps, Maps reading, Measurement from Maps, Datum and Coordinate System. ● Study of various satellite images, Hard copy Digital Images, Colour and B&W Images and their characteristics. ● Scanning and digitization of maps. Creation of Point, Line and Polygon data.	L1, L2, L3	10

● Creation and Editing of spatial and non-spatial data.		
Module II: ● Basic functionalities of GIS - Buffer analysis, Union, Intersection, Assigning Weights, Computation of Length, Area and Perimeter. ● Creation of Digital Elevation Model in 3D, slope map. ● Spatial Modeling for Traffic and Accident studies. ● Spatial Modeling for Transport Planning in GIS.	L1, L2	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**2**	**-**	**-**	**-**	**1**	**-**
CO2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**-**	**2**	**-**	**-**	**-**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

TRE4310	TRAFFIC ENGINEERING &MODELING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

The course contains basic principles of traffic parameters and interrelationship between them. It also focuses on different techniques for collecting traffic volume, speed, parking and accident data. It includes the relationship between capacity & Level of service, traffic signal designing methods and transportation system management.

Course Objectives

The objective of this course is to

1. Impart knowledge about basic elements of traffic and their characteristics, interactions, impacts
2. Describe know-how of fundamental variables of traffic, techniques of measurements and analysis

Course Outcomes

On completion of this course, the students will be able to

CO1. Define the basic parameters of traffic and collect data using different methods.
CO2. Analyse parking and accident survey data.
CO3. Explain the relation between capacity, level of service and speed.
CO4. Explain and Design traffic signals and their operation.
CO5. Describe various methods of improving vehicular flow.

Course Content

Modules	Blooms level*	Number of hours
Module I: Traffic Studies (Part- I) Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Statistical Methods for speed data Analysis, Presentation of speed	L1, L2, L3	10

data. Delay Studies; Head ways and Gap Studies - Headway and Gap acceptance, Origin and Destination Studies		
Module II: Traffic Studies (Part-II) Parking Studies: parameters of parking, definitions, Parking inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data; Accident studies- Causative factors of Road accidents, Accident data collection: Accident analysis and modeling; Road Safety Auditing, Measures to increase Road safety.	L1, L2, L3, L4	9
Module III: Capacity and LOS Analysis Introduction to Traffic capacity, Analysis concepts, Level of Service, Basic definitions, Factors affecting Capacity and LOS, Capacity of Urban/Rural Highway, With or without access control, Basic freeway segments - Service flow rate of LOS, Lane width or Lateral clearance adjustment; Heavy vehicle adjustment; Driver population adjustment.	L1, L2, L3	11
Module IV: Signal Designing Fixed Time signals, Determination of Optimum Cycle length and Signal setting for Fixed Time signals, Warrants for Signals, Time Plan Design for Pre-Timed Control- Lane group analysis, Saturation flow rate, and Adjustment factors, Uniform and Incremental Delay, Vehicle Actuated Signals, Signal Coordination	L1, L2, L3	11
Module V: Transportation System Management Measures for Improving vehicular flow – one-way Streets, Signal Improvement, Transit Stop Relocation, Parking Management, Reversible lanes- Reducing Peak Period Traffic - Strategies for working hours, Congestion Pricing, Differential Toll Policies.	L1, L2	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books

- L.R. Kadiyali, Traffic Engineering and Transportation Planning, Khanna Publishers, New Delhi, 2012.

- Fred Mannering & Walter Kilareski, Principles of Highways Engineering and Traffic Analysis, John Wiley & Sons Publication, Sussex, 2004.
- Papacostas, C.S, Transportation Engineering and Planning, 3rd edition, PHI, New Delhi, 2008.

References

- Relevant IRC Codes
- Louis J.Pignataro, Traffic Engineering - Theory & Practice , Prentice Hall Publication, New Jersey, 1973.
- Highway Capacity Manual, Transportation Research Board, Washington, 2010.
- Indo Highway Capacity Manual, CSIR, New Delhi, 2020.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	--	3	--	--	1	--	2	2	-	-	1	-
CO2	1	--	1	--	--	--	3	--	2	-	2	2	-	-	1	-
CO3	1	1	1	--	1	--	--	--	--	--	2	2	-	-	1	-
CO4	1	1	1	2	1	--	--	--	--	--	2	2	-	-	1	-
CO5	1	-	2	-	3	-	1	1	-	-	-	2	-	-	1	-

1: strongly related, 2: moderately related and 3: weakly related

TRE4311	TRAFFIC ENGINEERING & MODELING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description

This lab course discusses about various data collection methods of traffic volume and speed studies. The travel behavior of individual and the need for new route is also part of the course.

Course Objectives

The objective of this course is to

1. Overview of different methods of data collection of fundamental variables of traffic.
2. Conduct various tests to collect field data of traffic.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and collect field traffic data using various methods.
CO2: Analyse the turning movements of vehicles at intersection and measure traffic noise and road lighting.
CO3: Identify travel behaviour of individuals by conducting roadside and household interviews.

Course Content

Modules	Blooms level*	Number of hours
Module I: Traffic Volume & Speed Studies a) Determine Parking volume, load and index. b) Determine the delay using moving observer method. c) Determine the spot speed and traffic volume.	L1, L2, L3	10
Module II: Intersection Studies a) Determine conflicting points at intersection.	L1, L2, L3, L4	6

b) Determine the availability & intensity of road lighting as per codal provisions.		
Module III: Traffic Survey a) Determine desire lines using Origin Destination Studies. b) Identify the travel behavior of household\individual using household interviews and user perception survey.	L1, L2, L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

- L.R. Kadiyali, Traffic Engineering and Transportation Planning, Khanna Publishers, New Delhi, 2012.
- Fred Mannering & Walter Kilareski, Principles of Highways Engineering and Traffic Analysis, John Wiley & Sons Publication, Sussex, 2004.

References

- Relevant IRC Codes.
- Highway Capacity Manual, Transportation Research Board, Washington, 2010.
- Indo Highway Capacity Manual, CSIR, New Delhi, 2020.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO4**
CO 1	**1**	**1**	**1**	**2**	**--**	**3**	**--**	**--**	**1**	**--**	**-**	**-**	**-**	**-**	**1**	**-**
CO 2	**1**	**--**	**1**	**--**	**--**	**--**	**3**	**--**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO 3	**1**	**1**	**1**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**-**	**-**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

EVE4302	INDUSTRIAL WASTEWATER TREATMENT AND DESIGN	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

Industrial Waste Engineering curriculum will provide the principles of industrial wastewater treatment, disposal and reuse in order to minimize pollution in a sustainable manner. The subject focuses on the principles and mechanisms of pollutant removal, the processes and design of conventional (primary, secondary and tertiary) and advanced (post-treatment) technologies applied in the treatment of industrial effluents.

Course Objectives:

The objective of the course is to,

1. Provide the knowledge on the wastewater characteristics from industries.
2. Define the principles of pollution prevention and mechanism of industrial processes, and suggest the suitable technologies for the treatment of wastewater from various industries.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe various industrial wastewater treatment unit operations.

CO2: Explain the working principle and design of industrial wastewater treatment units.

CO3: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO4: Apply the waste management process used in various industries.

CO5: Analyze unit operations and estimation of environmental impact assessment due to industrial pollutions in sustainable manner.

Modules	Blooms	Number

	level*	of hours
Module I INTRODUCTION Industrial activity and Environment – Sources and types of industrial wastewater – Industrial wastewater and environmental impacts – Industrial waste survey – Industrial wastewater generation rates, characterization and variables – Population equivalent – Toxicity of industrial effluents and Bioassay tests.	L1, L2 and L3	9
Module II INDUSTRIAL POLLUTION PREVENTION Prevention vs Control of Industrial Pollution – Benefits and Barriers – Source reduction techniques – Waste Audit – Evaluation of Pollution prevention options – Environmental statement as a tool for pollution prevention – Waste minimization.	L2 and L3	10
Module III INDUSTRIAL WASTEWATER TREATMENT Equalization - Neutralization – Oil separation – Flotation – Precipitation – Aerobic and anaerobic biological treatment – Wet Air Oxidation – Evaporation – Ion Exchange – Membrane Technologies.	L2, L3 and L4	10
Module IV WASTEWATER REUSE AND RESIDUAL MANAGEMENT Individual and Common Effluent Treatment Plants – Joint treatment of industrial wastewater - Quality requirements for Wastewater reuse – Industrial reuse – Disposal on water and land – Residuals of industrial wastewater treatment – Quantification and characteristics of Sludge – management.	L2, L3 and L4	10
Module V CASE STUDIES Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for Textiles – Tanneries – Pulp and paper – metal finishing – Oil Refining–Pharmaceuticals–Sugar and Distilleries.	L2, L3 and L4	9

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Eckenfelder, W.W., Industrial Water Pollution Control, McGraw-Hill, 1999.
- Arceivala, S.J., Wastewater Treatment for Pollution Control, Tata McGraw-Hill, New Delhi, 1998.

- Frank Woodard Industrial waste treatment Handbook, Butterworth Heinemann, New Delhi, 2001.
- World Bank Group Pollution Prevention and Abatement Handbook – Towards Cleaner Production, World Bank and UNEP, Washington D.C.1998.
- Lawrance K.Wang, Yung Tse Hung, Howard H.Lo and Constantine Yapijakis "Handbook of Industrial and Hazardous waste Treatment", Second Edition, 2004.
- Metcalf & Eddy/ AECOM, "water reuse Issues, Technologies and Applications", The Mc Graw- Hill companies, 2007.
- Industrial wastewater management, treatment & disposal, Water Environment, Federation Alexandria Virginia, Third Edition, 2008.

Reference Books:

Nelson Leonard Nemerow, "Industrial waste Treatment", Elsevier, 2007.

Wesley Eckenfelder W., "Industrial Water Pollution Control", Second Edition, Mc Graw Hill, 1989.

Paul L. Bishop Pollution Prevention: - Fundamentals and Practice, McGraw-Hill International, 2000.

J. Arceivala, Shyam. R. Asolekar, Waste water Treatment for pollution control and reuse by Soli, Tata Mcgraw Hill, 2007.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO 2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO 3	--	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 5	--	--	--	--	2	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

EVE4303	WATER RESOURCE PLANNING AND MANAGEMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course covers the reservoir planning; dams designs; draught analysis; linear programming, etc. The overall aim of the course is to develop the skills of the students to know how to plan, develop and manage water resources

Objective:
The objective of the course is to,

1. Comprehend how to develop suitable plans for water resource development and management.
2. Develop how to estimate sustainable yield of the water resources and how to determine the needed storage of water reservoirs.
3. Understand the principles of integrated water resources management.
4. Learn the optimization techniques in water resources planning and management

Course Outcomes

On completion of this course, the students will be able to:

CO1. Able to start developing master and strategic water resources planning.

CO2. Understanding the basic principles of dam design

CO3. Determining the direct and indirect losses of water resources

CO4. Understand the Monte Carlo simulation.

Course Contents

Modules	Blooms level*	Number of hours
Module I: Reservoir planning Reservoir planning, Management, Multi reservoir systems, Real time operation, River basin planning, water logging, soil salinity, salinity control	L1, L2, L3	**12**
Module II: Dams Design Design of Dams, Non gravity dams, Weirs and Barrages, Conjunctive use of Irrigation water, Quality of Irrigation water, Contaminants and their effects on various crops Rainwater Harvesting and Management – Different Types and Methods of	L1, L2, L3	**12**

Harvesting in urban and agricultural areas.		
Module III : Draught analysis Draught analysis, NCA classification, Direct and Indirect losses, Drought severity assessment, Drought Monitoring, Drought Management	L1, L3, L4, L5	**12**
Module IV: Programming Introduction to systems approach, Linear programming, Problem formulation, Solution by simplex method, Application to design and operation of reservoir, Non Linear Programming, Sensitivity analysis, Monte Carlo simulation.	L1, L3, L4, L5	**12**

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books/References:

1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd, 2004
2. Water Resources Systems, "Vedula & Mujumdar", McGrawHill, 2005.
3. Daniel P. Loucks "Water Resources systems Planning and Management (Studies and Reports in Hydrology) ", 2006

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	**1**	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO 2	**1**	**3**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO 3	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**
CO 4	**1**	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

EVE4309	BIOLOGICAL PROCESS OF WASTE WATER TREATMENT	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	3	1	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description:

This course introduces the students to the principles of biochemical processes in wastewater treatment and pollution control, with particular emphasis on municipal wastewater treatment. At the end of the course, students should have a thorough understanding of wastewater treatment processes as well as biosolids handling, treatment and disposal. They would be able to design various facilities for biological treatment of wastewater.

Course Objectives:

The objective of the course is to,

1.Provide the knowledge on the advances wastewater treatment.

2.Define the principles and design criteria of wastewater pollution and mechanism of industrial processes, and suggest the suitable technologies for the treatment of wastewater from various industries.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe various wastewater treatment unit operations.

CO2: Explain the working principle and design of wastewater treatment units.

CO3: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO4: Apply the waste management process used in various industries.

Course Contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Objectives of biological treatment – Role of microorganisms in waste water treatment – Types of biological processes for waste	L1, L2 and L3	12

water treatment – Different microbial metabolisms – Bacterial growth patterns – Microbiological treatment kinetics and flow regimes – Michaelis-Menten and Monod models – Rate of biomass growth with soluble substrates – Kinetic coefficients – Effect of temperature – Oxygen requirements – Biomass yield – Observed yield – Kinetic constants evaluation of biological treatment.		
Module II WASTEWATER PROCESS DESIGN Aerobic biological treatment – Attached growth and suspended growth treatment systems – Modeling suspended growth treatment process – Activated sludge process – Description – Various types – Methods of aeration – Microbiology – Process analysis – Process design considerations – Operational difficulties – Modifications. Sequencing Batch Reactor – Process description and operation. Trickling filter – Filter classifications – Microbiology – Process design considerations – Design of physical facilities – Recirculation – NRC Equation – Operational difficulties.	L2 and L3	12
Module III DESIGN OF TREATMENT SYSTEM Aerated lagoons – Types – Process design considerations. Stabilisation ponds – Classification – Design considerations. Sludge treatment and disposal – Characteristics of sludge – Sludge processing – Preliminary operations – Thickening – Stabilizatio - Aerobic digestion - Anaerobic digestion – Composting – Conditioning – Dewatering - Heat drying - Incineration- Wet air oxidation – Land application	L2, L3 and L4	12
Module IV CASE STUDIES Advanced biological treatment processes – Nitrogen removal – Nitrification and Denitrification -Stoichiometry – Process analysis – Operational and environmental variables. Economics of biological treatment – Constructional cost, capital cost, operational cost – Total cost.	L2, L3 and L4	12

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Metcalf and Eddy, “Wastewater Engineering- Treatment and reuse,” Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Davis M.L., Cornwell D.A., “Introduction to Environmental Engineering”, Tata McGraw Hill

- Education (P) Ltd., New Delhi.

Reference Books:

- Droste R.L., “Theory and Practice of Water and Wastewater Treatment”, Wiley India (P) Ltd.
- Hammer M.J. and Hammer M.J., Jr., “Water and Wastewater Technology”, PHI (P) Ltd., New Delhi.
- Benefield L.D. and Randall C.W., “ Biological Process Design for Waste water Treatment”, PHI
- Learning (P) Ltd., New Delhi.
- CPHEEO Manual.
- Peavy H.S., Rowe D.R., Tchobanoglous G., “Environmental Engineering”, Tata McGraw Hill
- Education (P) Ltd., New Delhi.
- Venkateswarlu K.S., “Water Chemistry, Industrial and Power Station Water Treatment, New Age International Publishers, New Delhi.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO 2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO 3	--	--	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

EVE4310	TRANSPORT PHENOMENON OF WASTE WATER	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course introduces the students to the principles of transport processes in wastewater treatment and pollution control, with particular emphasis on municipal wastewater treatment. At the end of the course, students should have a thorough understanding of wastewater treatment processes as well as treatment and disposal. They would be able to design various facilities for biological treatment of wastewater.

Course Objectives:

The objective of the course is to,

1. To educate the students in detailed design concepts related to water transmission mains, water distribution system, sewer networks and storm water drain and computer application on design.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Be able to select various pipe materials for water supply main, distribution network and sewer.

CO2: Be able to design water supply main, distribution network and sewer for various field conditions.

CO3: Troubleshooting in water and sewage transmission be able to use various computer software for the design of water and sewage network.

CO4: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO5: Apply the waste management process used in various industries.

Modules	Blooms level*	Number of hours
Module I GENERAL HYDRAULICS AND FLOW MEASUREMENT Fluid properties; fluid flow – continuity principle, energy principle and momentum principle; frictional head loss in free and pressure flow, minor heads losses, Carrying Capacity–Flow measurement.	L1, L2 and L3	8
Module II WATER TRANSMISSION AND DISTRIBUTION Need for Transport of water and wastewater-Planning of Water System – Selection of pipe materials, Water transmission main design- gravity and pumping main; Selection of Pumps- characteristics- economics; Specials, Jointing, laying and maintenance, water hammer analysis; water distribution pipe networks Design, analysis and optimization – appurtenances – corrosion prevention – minimization of water losses – leak detection Storage reservoirs.	L2 and L3	12
Module III WASTEWATER COLLECTION AND CONVEYANCE Planning factors – Design of sanitary sewer; partial flow in sewers, economics of sewer design; Wastewater pumps and pumping stations-sewer appurtenances; material, construction, inspection and maintenance of sewers; Design of sewer outfalls-mixing conditions; conveyance of corrosive wastewaters.	L2, L3 and L4	10
Module IV STORM WATER DRAINAGE Necessity- - combined and separate system; Estimation of storm water run-off Formulation of rainfall intensity duration and frequency relationships- Rational methods.	L2, L3 and L4	8
Module V CASE STUDIES AND SOFTWARE APPLICATIONS Use of computer software in water transmission, water distribution and sewer design – EPANET 2.0, LOOP version 4.0, SEWER, BRANCH, Canal ++ and GIS based software's.	L2, L3 and L4	7

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Metcalf and Eddy, "Wastewater Engineering- Treatment and reuse," Tata McGraw Hill Publishing Company Ltd., New Delhi.

- Davis M.L., Cornwell D.A., “Introduction to Environmental Engineering”, Tata McGraw Hill Education (P) Ltd., New Delhi.

Reference Books:

- Benefield L.D. and Randall C.W., “Biological Process Design for Waste water Treatment”, PHI Learning (P) Ltd., New Delhi.
- Bajwa, G.S. "Practical Handbook on Public Health Engineering", Deep Publishers, Shimla, 2003.
- Manual on water supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
- Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1993.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO 2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO 3	--	--	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 5	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

EVE4311	WATER RECLAMATION AND REUSE	L	T	P	C
Version 2020.1	Month, Year of approval:	4	0	0	4
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description

This course has emphasized on the use of treated wastewater for beneficial purposes including irrigation, industrial uses, and drinking water augmentation could significantly increase the nation's total available water resources.

Course Objective:
The objective of the course is to,

1. Impart knowledge about the potential reuse applications and sources of water for reuse.
2. Determining the feasibility and planning of water reuse systems as well as the management structure of reuse projects.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Explain the concept and principles of water reclamation

CO2: Describe various factors affecting water reclamation

CO3: Determining the feasibility and planning of water reuse systems as well as the Management structure of reuse projects

CO4: Understand the various techniques for water reclamation

Course Contents

Modules	Blooms level*	Number of hours
Module I: Water reclamation Introduction: definitions of terms related to water reclamation and reuse; potential uses of reclaimed water; benefits of water reuse; reasons for the growing use of reclaimed water; examples of water reuse in different parts of the world.	L1, L2, L3	**12**
Module II: Reuse Criteria Water Reclamation and Reuse Criteria: factors affecting the development of water reclamation and reuse criteria; elements/components of water reclamation and reuse criteria /	L1, L2, L3	**12**

guidelines; water reclamation and reuse criteria in different countries and assessment.		
Module III : Irrigation Agricultural and Landscape Irrigation, Industrial Water Reuse, Groundwater Recharge with Reclaimed Water, Recreational/Environmental Enhancement, Water Reclamation Inside Buildings.	L1, L3, L4, L5	**12**
Module IV: Treatment Treatment Requirements for Water Reuse: constituents of municipal andindustrial wastewater; health assessment of water reuse; treatment andreclamation technologies, Reuse and Disposal of Wastewater Sludges and Biosolids: characteristics andcomposition of wastewater sludge/biosolids; sludge/biosolids processing;reuse and disposal of sludge/biosolids; land application of biosolids:regulations and methods of application, Planning and Managing Water Reuse Projects: planning procedures;management and operation procedures.	L1, L3, L4, L5	**12**

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

1. Metcalf & Eddy, Inc. An AECOM Company, "Water Reuse: Issues, Technology and Applications" 1st Ed . 2007.
2. Metcalf & Eddy, Inc. "Wastewater Engineering: Treatment, Disposal, and Reuse, Chapters 13 & 14", Fourth edition, McGraw-Hill Companies, Inc., New York, NY, 2003.

References:

1. Water Pollution Control Federation "Water Reuse, Manual of Practice SM-3, Ch. 4", 2nd edition, Water Pollution Control Federation, Alexandria, 1989.
2. U.S. Environmental Protection Agency (EPA) "Guidelines for Water Reuse, Ch. Two", EPA/625/R-92/004, U.S. Environmental Protection Agency and U.S. Agency for International Development, Washington, DC, 1992.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3	PSO4
CO1	**1**	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**1**	**-**
CO2	**1**	**3**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**1**	**-**
CO3	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**1**	**-**
CO4	**1**	**3**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**1**	**-**

1: strongly related, 2: moderately related and 3: weakly related

EVE4312	AIR AND WATER QUALITY MODELLING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	2	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course designed to improve the understanding of the different pollution control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments i.e. air, water and soil.

Course Objectives:

The objective of the course is to,

1. Impart knowledge on the principles and design of control of particulate and gaseous air pollutant and its emerging trends.
2. Introduce the fundamentals of mathematical models for water and air quality prediction and the importance of model building.

Course Outcomes:

On completion of this course, the students will be able to
CO1: Define general air pollution problems, meteorological definitions, air transport equations and pollution control matters and devices.
CO2: Explain the regulations pertinent to air pollutions (both indoor and outdoor environment).
CO3: Describe major problems in indoor air pollution control and regulations.
CO4: Analyze the results of pollution data as a report and its observations.

Course contents

Modules	Blooms level*	Number of hours
Module I INTRODUCTION TO AIR POLLUTION Structure and composition of Atmosphere – Sources and classification of air pollutants - Effects of air pollutants on human health, vegetation & animals, Materials & Structures – Effects of air Pollutants on the atmosphere, Soil & Water bodies – Long- term effects on the planet – Global Climate Change, Ozone Holes –	L1, L2 and L3	12

Ambient Air Quality and Emission Standards – Air Pollution Indices – Emission Inventories.		
Module II AIR QUALITY MONITORING AND MODELLING Ambient and Stack Sampling and Analysis of Particulate and Gaseous Pollutants -Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Transport & Dispersion of Air Pollutants -Air Quality Modeling. Necessity, application and limitation of air quality modelling. Dispersion Modeling, Photochemical Modeling and Receptor Modeling. Different air quality Dispersion models and their limitations.	L2 and L3	12
Module III CONTROL OF AIR POLLUTANTS Primary considerations in designing effective control strategy: Environmental, Engineering and Economic Factor - Factors to be considered while selecting control equipment's - Various mechanisms to control gaseous pollutants and particulate matter. Control Equipment design for particulate matter: Gravity chamber, Cyclone separator, Electrostatic precipitator, fabric filter, bag filter, Wet scrubber, Venturi-scrubber and absorption towers. Control Equipment design for gaseous pollutants: Absorption, Adsorption, Condensation and Incineration.	L2, L3 and L4	12
Module IV SURFACE AND SUB-SURFACE WATER QUALITY MODELLING Water quality modeling of Streams, Lakes and impoundments and Estuaries – Water quality– model sensitivity – assessing model performance; Models for dissolved oxygen, pathogens and BOD-Streeter Phelps model for point and distributed sources - Modified Streeter Phelps equations -Toxicant modeling in flowing water - Groundwater flow and mass transport of solutes, Degradation of organic compounds, application of concepts to predict groundwater contaminant movement, seawater intrusion – basic concepts and modeling.	L2 and L3	12

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Noel de Nevers, Air Pollution Control Engg., McGraw-Hill, New York, 2000.
- Lawrence Kwan, Norman C Perelra, Yung-Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.

- David H.F Liu, Bela G.Liptak, Air Pollution, Lewis Publishers, 2000.
- Singal, S.P., Noise Pollution and Control Strategy, Narosa Publishing House, New Delhi, 2005.
- Steven C. Chapra, Surface Water Quality Modeling, Tata McGraw-Hill Companies, Inc., New Delhi, 2008.
- Benedini, Marcello and Tsakiris, George, Water Quality Modelling for Rivers and Streams, Springer Netherlands, 2013.
- Zhen-Gang Ji, Hydrodynamics and Water Quality**:** Modeling Rivers, Lakes, and Estuaries, John Wiley & Sons, 2008.

Reference Books:

- Nelson Leonard Nemerow, Industrial waste Treatment, Elsevier, 2007.
- Paul L. Bishop, Pollution Prevention: - Fundamentals and Practice, McGraw-Hill International, 2000.

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 2	2	1	--	--	2	--	--	--	--	--	--	--	--	1	3	--
CO 3	1	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO 4	--	--	2	1	--	--	--	--	--	--	--	--	--	1	3	--
CO 5	--	--	2	2	1	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

EVE4313	AIR POLLUTION LABORATORY	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	1	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

Application of basic air pollution problems, meteorological definitions, air transport equations and pollution control matters and devices. Laboratory methods and interpretation of results with regard to air quality engineering applications such as design and operation of air pollution treatment processes, and to the control of the quality of air both in indoor and outdoor environments.

Course Objectives:

1.This course will help students know which tests are appropriate for given air pollution problems, statistically interpret laboratorial results and write technical reports, and apply the laboratorial results to problem identification, quantification, and basic air pollution design and technical solutions to real-world.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe general air pollution problems, meteorological definitions, air transport equations and pollution control matters and devices

CO2: Design and conduct experiments, interpret and analyze data, and report results.

CO3: Able to familiar with regulations pertinent to air pollutions

CO4: Explain the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams.

CO5: Explain to identify, formulate and solve air pollution problems.

Modules	Blooms level*	Number of hours
1. Introduction to Air Pollution laboratory	L1	1
2. High Volume Sampler	L1, L3 and L4	2
3. Determination of respirable suspended particulate matter and weather monitoring	L1, L3 and L4	1
4. Indoor Air Quality monitoring	L1, L3 and L4	1
5. Sound level monitoring	L1, L3 and L4	1
6. Stack sampling	L1, L3 and L4	1
7. Flue gas analyzer	L1, L3 and L4	1
8. Determination of TVOC in indoor environments	L1, L3 and L4	1
9. Determination of thermal comfort parameters in indoor environments	L1, L3 and L4	1
10. Determination of bioaerosols	L1, L3 and L4	1
11. Demonstration of personal exposure	L1, L3 and L4	1

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- Garg, S.K., Environmental Engineering Vol. I & II, Khanna Publishers, New Delhi, 2000.
- Modi, P.N., Environmental Engineering Vol. I & II, Standard Book House, New Delhi, 2000.

Reference Books:

- Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**1**	**1**	**--**	**3**
CO2	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**1**	**1**	**--**	**3**
CO3	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**1**	**1**	**1**	**--**	**3**
CO4	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**1**	**--**	**3**
CO5	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**1**	**--**	**3**

1: strongly related, 2: moderately related and 3: weakly related

EVE4314	ADVANCED WASTEWATER ENGINEERING	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	4	0	2	5
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

This course introduces the students to the principles of biochemical processes in wastewater treatment and pollution control, with particular emphasis on municipal wastewater treatment. At the end of the course, students should have a thorough understanding of wastewater treatment processes as well as biosolids handling, treatment and disposal. They would be able to design various facilities for biological treatment of wastewater.

Course Objectives:

The objective of the course is to,

1.Provide the knowledge on the wastewater characteristics.

2.Define the principles and design criteria of wastewater pollution and mechanism of industrial processes, and suggest the suitable technologies for the treatment of wastewater from various industries.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe various wastewater treatment unit operations.

CO2: Explain the working principle and design of wastewater treatment units.

CO3: Comprehend the importance of guidelines based on Indian Standard code of practice for the design of wastewater treatment units for different industries.

CO4: Apply the waste management process used in various industries.

Modules	Blooms level*	Number of hours
Module I INTRODUCTION Anaerobic treatment- Fundamental concepts, Applications	L1, L2 and L3	10
Module II WASTEWATER PROCESS DESIGN Process Monitoring and Control, Anaerobic treatment of wastewaters in suspended growth and fixed film processes, Process design.	L2 and L3	12
Module III DESIGN OF TREATMENT SYSTEM UASB Process design for various types of wastewaters	L2, L3 and L4	14
Module IV CASE STUDIES Anaerobic sludge digestion, Selected case studies	L2, L3 and L4	12

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

- Nemerow N. L and Dasgupta A., Industrial and Hazardous Waste Treatment, Van Nostarnd Reinhold (New York).
- Arceivala S.J. and Asolekar S.R., Wastewater Treatment for Pollution Control and Reuse, Tata McGraw Hill.
- Eckenfelder, W. W., Industrial Water Pollution Control, McGraw-Hill.
- Nemerow, N. L., Zero Pollution for Industry: Waste Minimization through Industrial Complexes, John Wiley & Sons.
- Cites R W., Middlebrooks E J., Reed S C., Natural wastewater Treatment Systems, CRC Taylor and Francis.
- Patwardhan A.D., Industrial Wastewater Treatment, PHI Learning
- S.R. Qasim, Edward and Motley and Zhu, H., Water Works Engineering:Planning, Design and Operation, Prentice Hall, India.
- S. Vigneswaran and C. Visvanathan, Water Treatment Processes: Simple Options, CRC Press.

Reference Books:

- Metcalf & Eddy., Wastewater Engineering- Treatment and Reuse (Revised by G. Tchobanoglous, F. L. Burton and H. D. Stensel), Tata McGraw Hill.
- PeavyH. S.,Rowe D. R.,and Tchobanoglous G., Environmental Engineering, McGraw-Hill InternationalEdition.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	--
CO2	--	--	1	--	2	--	--	--	--	2	--	--	--	1	3	--
CO3	--	--	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	--	--	1	--	--	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

EVE4315	ADVANCED WASTEWATER ENGINEERING LAB	L	T	P	C
Version 2020.1	Date of Approval: 3rd June, 2020	1	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalogue Description:

Application of basic chemistry and chemical evaluations to measure physical, chemical, and bacteriological parameters of wastewater. Laboratory methods and interpretation of results with regard to environmental engineering applications such as design and operation of wastewater treatment processes, and to the control of the quality of natural water.

Course Objectives:

1. Understand the common environmental problems and its determination principles relating to water and wastewater quality are performed.
2. This course will help students know which tests are appropriate for given environmental problems, statistically interpret laboratorial results and write technical reports, and apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions to real-world.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Describe the knowledge in mathematics, science and engineering.

CO2: Design and conduct experiments, interpret and analyze data, and report results.

CO3: Analyze the ability to design of Civil Engineering systems or a process that meets desired specifications and requirements related to all fields of Civil Engineering.

CO4: Explain the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams.

CO5: Explain to identify, formulate and solve environmental engineering problems.

Modules	Blooms level*	Number of hours
1. Introduction to Advanced Wastewater Engineering laboratory	L1	1
2. Determination of D.O of wastewater	L1, L3 and L4	2
3. Determination of B.O.D of wastewater	L1, L3 and L4	1
4. Determination of C.O.D of wastewater	L1, L3 and L4	1
5. Jar Test	L1, L3 and L4	1
6. Determination of iron and fluoride	L1, L3 and L4	1
7. Determination of sulphates and sulphides in water	L1, L3 and L4	1
8. Determination of Residual Chlorine	L1, L3 and L4	1
9. Determination of Optimum Coagulant Dosage	L1, L3 and L4	1
10. Determination of Sludge Volume Index	L1, L3 and L4	1
11. Determination of Ammonia Nitrogen and Sulphates	L1, L3 and L4	1

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

- Garg, S.K., Environmental Engineering Vol. I & II, Khanna Publishers, New Delhi, 2000.
- Modi, P.N., Environmental Engineering Vol. I & II, Standard Book House, New Delhi, 2000.

Reference Books:

- Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**1**	**1**	**--**	**3**
CO2	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**1**	**1**	**--**	**3**
CO3	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**1**	**1**	**1**	**--**	**3**
CO4	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**1**	**--**	**3**
CO5	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**1**	**--**	**3**

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engg. & Technology

Master of Technology – Mechanical Engineering

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Technology
Mechanical Engineering SpecializationinThermalEngineering

ProgrammeOverview
Duration:2years

TheprogrammeforM.TechinThermalEngineeringprovidesdetailedknowledgeaboutthermodynamicanalysis,energymanagementofawidevarietyofthermalenergyconversionsystemsandtheirsub-systems.Handsonexperiencei.e.,experimentsconductedbythem,willhelpinanalysingtherealworldproblems.Itwillhelpinapplyingbasicandtechnicalknowledgeofthermalscienceandengineeringinpracticalusethroughobservation,assessments,analysis,henceforth,achievingadesiredresult.Atthesametime,thestudentswillbeabletousetheirknowledgeindifferentthermalengineeringdomainsmeetingtherealisticconstraintssuchaseconomic,environmental,social,health,safetyandsustainabilityissues.

ProgrammeOutcomes(POs)

OncompletionoftheM.TechinThermalEngineeringProgramme,thestudentswillbeableto:

PO1:Establishsounddomainknowledgeonwiderperspectivetobecomeprofessionallysuccessfulandapplyingthebasicconceptsofthermalengineeringbystudyinginter-disciplinarysubjects.

PO2:Identify,formulateandresolverealtimethermalengineeringproblemsincontextwithunderstandingvariouskeyaspectsofanalytics.

PO3:Recapitulateanddemonstratecapabilityforconceptualisingdesignaspectsofthermalsystemsorcomponentsandtheirinvestigationtopresentoptimumfeasiblesolutionsundertakingsafety,environmentalandotherrealtimeconstraints.

PO4:Representskilfulresearchcapabilitiesinordertoworkoutproblemsfromtheirinitialdevelopingstagetoliteraturereview,pedagogiesandconductingexperimentaldatacollectionandinterpretation.

PO5:Establishresearchperspectivestojudgmentallyinvestigatethermalengineeringproblemsforcreatingnovelandprevalentinformationfortheiroutcomes.

PO6:Exhibitanddemonstrateskillstoemploycurrentengineeringtools,softwareandequipmenttoanalyseandresolvecomplexthermalengineeringproblems.

PO7:Effectivelycommunicatetocomprehendandexpresseffectualreportsfollowingengineeringstandards.Thiswillprovidesustainabilityofvarioussystemsbyaninteractionwithcoreindustryprofessionals.

PO8:Skilfuldemonstrationofpresentingtheirworkunambiguouslybeforeresearchcommunity,andgiveandtakeclearcommands.

PO9:Demonstratecharactersofmanagerinconductingengineeringventuresandconcernedfinance,andorganizeworkforcetowardsaccomplishingtheirtargets.

PO10:Exhibitthequalitiesofgoodacademicianandengagingtheminindependentandphilosophical lifelonglearningsandtoworkonlaboratoryandmultidisciplinaryresponsibilities.

PO11:Providesanabilitytoacquireprofessionalandintellectualintegrity,professionalcodeofcond uct,ethicsofresearchandscholarship,considerationoftheimpactofrespectiveoutcomesonprofessi onalpracticesandanunderstandingofresponsibilitytocontributetothecommunityforsustainablede velopment.

PLO12:Studentsareexpectedtogainthetechnical,managerialandworkingrelationshipqualitiesfor theeducation/researchandusethisknowledgeforthehigherstudies/teachingandresearchwork.

MasterofTechnology
MechanicalEngineeringSpecializationinMachineDesign

ProgrammeOverview

Duration:2years

TheprogrammeforM.TechinMechanicalEngineering(MachineDesign)providesdetailedknowledgeaboutTheoryofElasticityandPlasticity,AdvancedVibrations,TribologyandBearingDesign,FractureMechanics,ExperimentalStressAnalysis,CompositeMaterials&Technology,andFiniteElementAnalysisofawidevarietyofmechanicalcomponents,systemsandtheirsub-systems.Itwillhelpinapplyingbasicandtechnicalknowledgeofmathematics,scienceandengineering.Withthehelpofexperimentsthatwillbeconducted,willhelptheminanalysingtherealworldproblemsbyusingtheirtheoreticalknowledgeandputtingitinpracticalusethroughobservation,assessments,analysis,henceforth,achievingadesiredresult.Atthesametime,thestudentwillbeabletousehis/herknowledgeindifferentdomainsmeetingtherealisticconstraintssuchaseconomic,environmental,social,health,safetyandsustainabilityissues.Aftersuccessfulcompletionofthedegree,thecandidatesbecomecapableofnurturingtheircareerindifferentfieldslikeacademics,researchunits,entrepreneurship,manufacturingplantsandvariousotherindustries.

ProgrammeOutcomes(POs)

OncompletionoftheM.Tech.inMachineDesignEngineeringprogramme,thestudentwillbeableto:

PO1:Knowledgeandunderstandingofmathematical,statisticalmethods,scientificprinciplesandequationisappliedtoengineeringdisciplineforfindoutthesolutionofproblemsandtosupporttheirunderstandingofrelevanthistorical,currentandfuturedevelopmentsandtechnologies.

PO2:Understandingofvariousengineeringprocess,engineeringprincipleandabletoidentifyandclassifythemonthebasisofcomponentsandmaterialsused.Tosolvetheproblemswiththehelpofanalyticalmethods,currentavailablesoftware,modellingtechniques,computationalmethods,operationresearchtechniques,toolmanufacturingprocesses,sensorapplicationetc.

PO3:Designatthislevelisthecreationanddevelopmentofaneconomicallyviableproduct,process.Designsolutionforproblemsincludingproduction,operation,maintenance,energysystemskeepinginviewtheeffectthatitwillhaveonitsstrength,environment,sustainability,aesthetics,ethical,health,safety,securityandriskissuesfollowingthecodesofpracticeandstandards.Applyingadvancedproblemsolvingskills,technicalknowledgethatisfittoevaluatetheoutcomeslikefailuretest,droptestandfurtherhelpingtheuserneeds.

PO4:Aframeworkistohelpyou *plan* yourstrategyfor monitoringand *evaluationofdesignprocess.*Aneffectivecommunicationistobeabletoconveytechnicalinformationorally,bywritingorintermsofdesignonpaperorusingcertainsoftwareandpresentation.

PO5:Knowledgeandunderstandingofmanagementtechniques,includingprojectmanagement,theneedforahighlevelofprofessionalandethicalconductinengineeringthatmaybeusedtoachieveengineeringobjectives.

PO6:Understandingofriskissuesonengineeringpractice,includinghealth&safety,environmentalandcommercialrisk,andofriskassessmentandriskmanagementtechniques.Applyingtheknowledgeincommercial,economicandsocialcontextofengineeringprocesses.

PLO7:Demonstratingtheengineeringsolutionsfordevelopmentandsustainabilityofvarioussystemsbyaninteractionwithcoreindustryprofessionals.

PO8:Applicationofengineeringpracticalknowledge,technicalliteraturetooperations,manufacturing,energysystems,automobileswhichwillfurtherhelpinunderstandingthevariouscharacteristicsofvariousmaterials,equipmentandprocessesusedforitssuccessfulrunning.

PO9:Abilitytoworkwithanytechnicaluncertaintyifraisedbyusingknowledgeofmultidisciplinarysectionswiththeaimofcontinuousimprovementinthetechnologyandtechniquesadopted.

PO10:Understandingthecodeofconduct,ethicalissueandlegalscenariotocarryonengineeringpracticesinanyindustry.

PO11:Applytheknowledgeofdesignengineeringsolutionforthedevelopmentofnewproductsandentrepreneurship.

PO12:Engagethestudentsinlifelonglearninginthebroadestcontextoftechnologicalchange.

MasterofTechnology

MechanicalEngineeringSpecializationinIndustrial andProductionEngineering

ProgramOutcomes(POs)

PO1:
Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems.
PO2:
Identify,formulate,reviewresearchliterature,andanalyzecomplexengineeringproblemsreaching substantiatedconclusionsusingfirstprinciplesofmathematics,naturalsciences,andengineeringsciences.
PO3:
Designsolutionsforcomplexengineeringproblemsanddesignsystemcomponentsorprocessesthat meetthespecifiedneedswithappropriateconsiderationforthepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations.
PO4: Useresearch-basedknowledgeandresearchmethodsincludingdesignofexperiments,analysisandinterpretation ofdata,andsynthesisoftheinformationtoprovidevalidconclusions.
PO5:
Abilitytoindependentlycarryoutresearch/investigationanddevelopmentworktosolvepracticalproblemsrelatedtoProductionandIndustrialEngineering.
PO6:
Applyreasoninginformedbythecontextualknowledgetoassesssocietal,health,safety,legalandculturalissuesandtheconsequentresponsibilitiesrelevanttotheprofessionalengineeringpractice.
PO7:
Understandtheimpactoftheprofessionalengineeringsolutionsinsocietalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment.
PO8:
Applyethicalprinciplesandcommittoprofessionalethicsandresponsibilitiesandnormsoftheengineeringpractice.
PO9:
Abilitytoapplyknowledge,techniques,skillsandmoderntoolsofmanufacturingtechnologytothesolutionofmanufacturingandindustrialengineeringproblems.
PO10:
Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunityandwithsocietyatlarge,suchas,beingabletocomprehendandwriteeffectivereportsanddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions.
PO11: Abilitytoapply creativity in designing manufacturing systems, components and processes.
PO12: Abilitytoapply Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the boardest context of technological change.

ProgramSpecificOutcomes(PSOs)
M.Tech.,MechanicalEngineering
Specializationin
Thermal/Design/IndustrialandProductionEngineering

PSO1: Applytheknowledgeofbasicsciencesandengineeringfundamentalstoformulate,analyseandprovidesolutionstotheproblemsrelatedtomechanicalengineeringandcommunicatethemeffectivelytotheconcerned.
PSO2:Designmechanicalsystemsinvariousfieldssuchasmachineelements,thermalandinterdisciplinaryfieldsbyusingvariousengineering/technologicaltoolstomeetthevolatileneedsoftheindustryandsocietyatlarge.
PSO3: ApplyknowledgeofCAD/CAM,artificialintelligence&roboticsinthefieldsofmanufacturingandmaterialmanagement.
PSO4: Applytheprinciplesofsoftcomputingskills,problemsolving,creativethinking,groupdynamics,teambuilding,leadershipskills,decisionmakingskills,self-developmentandinterpersonalskills,contributingtooverallpersonalityandcareerdevelopment.

PSO1		PSO2			PSO3		PSO4	
Applytheknowledgeofbasicsciencesandengineeringfundamentalstoformulate, analyseandprovidesolutionstotheproblemsrelatedtomechanicalengineeringandcommunicatethemeffectivelytotheconcerned.		Designmechanicalsystemsinvariousfieldssuchasmachineelements,thermalandinterdisciplinaryfieldsbyusingvariousengineering/technologicaltoolstomeetthevolatileneedsoftheindustryandsocietyatlarge.			ApplyknowledgeofCAD/CAM,artificialintelligence&roboticsinthefieldsofmanufacturingandmaterialmanagement.		Applytheprinciplesofsoftcomputingskills, problemsolving,creativethinking, groupdynamics,teambuilding,leadership skills,decisionmakingskills,self-developmentandinterpersonalskills,contributingtooverallpersonalityandcareerdevelopment.	
1	2	3	4	5	6	7	8	9
BasicScienceCourses	**EngineeringFundamentalCourses**	**Thermal&FluidEngineering**	**DesignEngineering**	**Interdisciplinarydomain**	**ManufacturingEngineering**	**ManagementCourses**	**NTCCCourses**	**Valueaddedcourses**
AppliedNumericalMethods	Refrigeration&Air-conditioning	AdvancedFluidMechanics	AdvancedSolidMechanics	OptimizationTechniques	AdvancedMachiningProcesses	EnergyManagement&Auditing	SummerInternshipEvaluation	BasicsofCommunication
	ProductDesign&Development	AdvancedHeat&MassTransfer	AdvancedComputerAidedDesign	DesignofExperiments	ComputerIntegratedManufacturing	Quality&ReliabilityManagement	Dissertation-I	Self-development&InterpersonalSkills
	Welding&AidedProcesses	ConceptofCombustion	AdvancedTribology	ResearchMethodology&TechnicalReportWriting	IndustrialRobotics	TotalQualityManagement&QualityAssurance	Dissertation-II	ForeignLanguages
		AdvancedComputationalFluidDynamics	ExperimentalStressAnalysis	Microfluidics&Nanofluidic	AdvancedComputerAidedManufacturing	ProductionPlanning&Control		BehaviouralCommunication&RelationshipManagement
		Cryogenics	FiniteElementMethod		Mechatronics	MaterialManagement		CorporateCommunication
		Turbomachines	AdvancedMechanicalDesign		ComputerAidedMetrology&Inspection			InterpersonalCommunication
			AdvancedMechanicalVibrations		MetalCutting&ToolDesign			Leadingthroughteams

MAE 4101	**Advanced Solid Mechanics**	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Simple stress, strain, beam, column, bending				
Co-requisites	Perform advanced analysis of solid components and understanding of the behavior of solids under two or three dimensional stress fields				

Catalog Description

In this course the concepts of stress and strain, Mohr's circle for 3-D state of stress, Mohr's stress plane of maximum shear, rectangular strain component are discussed in detail. The Advanced Solid Mechanics deals with unsymmetrical bending, shear center, torsion of circular, elliptical, equilateral triangular, rectangular bar, contact stresses and beams.

Course Objectives

The objective of this course is to

1. Equip the student with fundamental knowledge of transformation of stresses and strains in 3D.
2. Acquaint with the solution of advanced bending problems.
3. Develop understanding of torsion in bars of different cross-sectional areas.
4. Solve for stresses and deflections of beams under unsymmetrical loading and to locate the shear center of thin wall beams;

Course Outcomes

On completion of this course, the students will be able to

CO1. State Mohr's circle for 3-D state of stress.
CO2. Determination of principle axis and deflection of beams due to unsymmetrical bending
CO3. Explain torsion in bars of different area of cross-section
CO4. Explain contact stresses in spherical, cylindrical and curved surfaces in contact
CO5. Explain Beams and columns under various loading conditions

Modules	**Blooms level***	**Number of hours**
MODULE 1: Analysis of stress and strain Principal stresses, stress invariant, Mohr's circle for 3-D state of stress, Mohr's stress plane of maximum shear, rectangular strain component, principle axis of strain and principle strain, theory of failure.	L1, L2, L3, L4	10
MODULE 2: Unsymmetrical Bending and Shear centre Principle axis, parallel axis theorem for product of inertia, determination of principle axis, shear due to unsymmetrical bending, deflection of beams due to unsymmetrical bending, calculation of shear centre.	L1, L2, L3 and L4	10
MODULE 3: Torsion Torsion of general prismatic bar solid section, torsion of circular and elliptical bar, torsion of equilateral triangular bar, torsion of rectangular	L1, L2, L3 and L4	10

bar, torsion of thin walled tube, torsion of bar with thin rectangular section.		
MODULE 4: Contact Stresses Contact stresses due to spherical surfaces in contact, due to two parallel cylindrical rollers in contact, due to two curved surfaces of different radius.	L1, L3 and L4	8
MODULE 5: Beams and Columns Euler buckling load, beam column equations, beam column with a concentrated load, beam column with several concentrated load, continuous lateral load, beam couple with end couple.	L1, L3 and L4	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. L.S. Srinath, Advanced Mechanics of Solids, Tata McGraw Hill, 2009, New-Delhi
2. E. P. Popov, Engineering mechanics of Solid, Second edition, Prentice Hall, 1998
3. I.H. Shames, Introduction to Solid Mechanics, Printice Hall Inc., 1975

Reference Books

1. U.C. Jindal, Advanced Topics of Strength of Materials, Galgotia Publication, 2001
2. A.P. Boresi, R.J. Schmidt, O.M. Sidebottom, "Advanced Mechanics of Materials", 5th Edition, John Wiley&Sons, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	3	--
CO4	1	2	1	--	--	--	--	--	--	--	--	--	1	--	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

ME 4102	**Applied Numerical Methods**	**L**	**T**	**P**	**C**
VERSION	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/ Exposure	Basics of Physics, Basics of Mathematics				
Co-requisites					

Catalog Description

The purpose of this course is to provide students with the skill, knowledge and attitude required to determine approximate numerical solutions to mathematical problems, which cannot always be solved by conventional analytical technique. The course contents demonstrate the importance of selecting the right numerical technique for a particular application, analysis and interpretation the results.

Course Objectives

The objective of this course is to:

1. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
2. Apply numerical methods to obtain approximate solutions to mathematical problems.
3. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the Algebraic and Transcendental Equation and solve the problems using appropriate Numerical methods.

CO2: Describing the interpolation methods to find intermediate values in given graphical or tabulated data.

CO3: Describe and define the sets of linear simultaneous equations and solve the problems using Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods.

CO4: Describe and apply Trapezoidal and Simpson's Rule to solve given integration problems.

CO5: Define and describe Runga-Kutta method and Euler's Method to solve differential equations.

Modules	**Blooms level***	**Number of hours**
Module 1: Solution Of Algebraic And Transcendental Equation Newton-Raphson method including method of complex roots, Graeffe's root square method (Computer based algorithm and program for these methods)	L1, L2 and L3	7
Module 2: Interpolation And Approximation Lagrange's and Newton-divided difference formula, Newton interpolation formula for finite differences, Gauss's forward and backward interpolation formulae, Bessel's and Laplace-Everett's formulae, Cubic spline, least squares approximation using Chebyshev polynomial. Solution of partial differential equations of linear and non-linear nature with finite difference scheme and iteration techniques	L1, L2, L3	7
Module 3: Solution Of Linear Simultaneous Equation Cholesky's (Crout's) method, Gauss-Seidel iteration and relaxation methods, Solution of Eigen Value problems; Smallest, largest and	L1, L2, L3	8

intermediate Eigen values (Computer based algorithm and Programme for these methods)		
Module 4: Numerical Differentiation And Integraton Numerical differentiation using difference operators, Simpson's 1/3 and 3/8 rules, Boole's rule, Weddle's rule.	L1, L2, L3	6
Module 5: Solution Of Differential Equation Modified Euler's method, Runge-Kutta method of 2nd, 3rd and 4th orders, Predictor- Corrector method, Stability of Ordinary differential equation, Solution of Laplace's and Poisson's equations by Liebmann's method, Relaxation method.	L1, L2, L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. V. Rajaraman, Computer oriented Numerical Methods, PHI Learning, 1993.
2. Gerald &Whealey,Applied Numerical Analysis, Pearson Education, Limited, 2006.
3. Grewal B S, Numerical methods in Engineering and Science, Khanna Publishers, Delhi, 2014.

References Books

1. T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH,2006.
2. PradipNiyogi, "Numerical Analysis and Algorithms", TMH,2009.
3. Francis Scheld, " Numerical Analysis", TMH,2006.
4. Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education,2013.
5. Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing,2009.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	3
CO2	1	2	--	-	--	--	--	--	--	--	--	--	1	-	-	3
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-	3
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	-	-	3

CO5	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	-	**3**

1: strongly related, 2: moderately related and 3: weakly related

ME 4103	**ADVANCED FLUID MECHANICS**	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Basics of Fluids				
Co-requisites	-				

Catalog Description

This course introduces the principles required to solve advanced fluid mechanics problems. It addresses the modelling and analysis of viscous and inviscid fluids problems with an emphasis on real-world engineering applications and problem solving. To master this course, students should have a background in basic mathematical calculus and physics covering fluid mechanics.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of viscous and inviscid fluids.

2. Provide an overview of estimation of flow with large Reynold's number.

Course Outcomes

After completing the course, the students will be able to

CO1. Explain the concept of kinematics; apply various governing equations to solve fluid flow problems.
CO2. Define various viscous and in viscid fluids and apply Bernoulli equation to solve practical problems.
CO3. Describe various flows with respect to large Reynolds number.
CO4. Analyse and setting up the problems involving the concept of Navier stokes equations.

Modules	Blooms level*	Number of hours
Module 1 **Review of Kinematics**: Lagrangian, Eulerian Representation, Veracity, Special Motions,Review of Governing Equations, Integral Equations for a system, Local Equations in Lagrangian Formulation, Local Equations in Eulerian Formulation, Integral Equations for a Control Volume.	L1, L2 and L3	10
Module 2 **In viscid Fluids**: Control volume, application of continuity equation and momentum equation, Incompressible flow, Euler's Equation, Bernoulli's Equation, Crocco.sEquation, Vortices/Stream Function Formulation, Some Exact Solutions, Kelvin's Theorem, Helmholtz Theorem, D.Alembert.s Paradox, Fluid Mechanics Film Discussion	L1, L2,and L3	10
Module 3 **Viscous flow**: Review of Constitutive Equations, Linearly Viscous Compressible, and Linearly Viscous Incompressible. Exact solution, plane Poiseuille and Coquette flows; Hagen Ponselle flow through pipes.	L2 and L3	10
Module 4 flows with large Reynolds number: Flows with very large Reynolds number, elements of two-dimensional boundary layer theory; displacement thickness and momentum thickness, skin friction, Blassius solution for boundary layer on a flat plate without pressure gradient; the Karman-Polhausen integral method for obtaining approximate solutions. Drag on bodies; form drag and skin friction drag profile drag and its measurement. Taylor Vortices	L2, L3 and L4	10
Module 5 Approximations to Navies-Stokes Equations, Non-dimensionalization, Stokes Flow Uniform Flow Past a Sphere, Exact Solution, Uniform Flow Past A Circular Cylinder, Stokes Paradox, Extensions of Stokes theory, Thin Films, Lubrication Theory, Squeeze Films, Thin Films with Free Surfaces,Hele-Shaw Flow, Boundary Layer Theory. Stability of Fluid Motions, Compressible Fluid Flow, Derivation of basic equations, Fanno flow, Rayleigh flow, non-degenerate viscosities cases for global weak-solutions à la Leray, intermediate solutions à la Hoff and strong solutions in critical spaces à la Fujita-Kato.	L2, L3 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:
1. Fluid Mechanics and Its Applications Vijay Gupta & S.K. Gupta New Age International, 2004.
2. Fluid Mechanics and Machinery DR Durgaiah New Age International, 2002.
3. Engineering Fluid Mechanics J A Roberson and C T Crowe Jaico Publishing House, 2004.
4. Fluid Mechanics: Problems and Solutions Joseph H Spark, 1996.
5. Introduction to Fluid Mechanics A.F. James Prentice Hall of India, 1998.

References Books

1. White.F.M, Introduction to Fluid Mechanics, McGraw Hill, 2004.

2. Shames.I.H, Mechanics of Fluids, Tata McGraw Hill, 1998.

3. Douglas. J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006.

4. Streeter.V.L and Wylie.E.B, Fluid Mechanics, Tata McGraw Hill, 1998.

5. Massey.B.S, Mechanics of Fluids, Van Nostrand Reinhold Co., 2002

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

ME4104	**ADVANCED MACHINING PROCESSES**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Basics of manufacturing Engineering				
Co-requisites	-				

Catalog Description

In this course the concepts of advanced machining processes are discussed in detail. The main objective of this course is to learn about various unconventional machining processes, the various process parameters and their influence on performance and their applications. It also aims to learn the various non destructive testing (NDT) techniques and working procedures of various Non Destructive Testing (NDT) techniques.

Course Objectives

The objective of this course is

1. To familiarize the students with unconventional modern machine tools and manufacturing processes.

2. To prepare the students understand various non-conventional machining processes.
3. To prepare the students understand nondestructive testing (NDT) techniques and learn working procedures of various Non Destructive Testing (NDT) techniques.

Course Outcomes

On completion of this course, the students will be able to

CO1: Illustrate the fundamentals of various non-conventional machining processes, capabilities with their application areas.

CO2: Demonstrate the knowledge of mechanical metal removal processes.

CO3: Illustrate the concepts of various advances thermal machining processes.

CO4: Demonstrate the basic knowledge of chemical and electro-chemical metal removal processes

CO5: Demonstrate the basic knowledge of non-destructive testing with their applications.

Modules	**Blooms level***	**Number of hours**
Module 1: Introduction Concept of advanced machining processes, Sources of metal removal Classification on the basis of energy sources -Parameters influencing selection of process, Limitations of Conventional machining processes, Comparison of conventional and non-conventional machining, Need of advanced machining processes.	L1, L2 and L3	10
Module 2: Mechanical Type Metal Removal Processes Ultrasonic machining; Elements of the process, Tool design and economic considerations, Applications and limitations, Abrasive jet and Abrasive water jet machining principles; Mechanics of metal removal; Design of nozzles, applications, Abrasive finishing process, Magnetic abrasive finishing process	L1, L2 and L3	10
Module 3: Advanced Thermal Machining Processes Classification, General principles and applications of Electro discharge, Plasma arc, Ion beam, Laser beam, Electron beam machining, Mechanics of metal	L1, L2 and L3	10

removal in EDM, selection of EDM pulse generator, machining accuracy, surface finish and surface damage in EDM, Generation and control of electron beam for machining applications, advantages and limitations		
Module 4: Electro Chemical Metal Removal Processes Working principle, advantages, disadvantages and applications of Electrochemical, Chemical machining, Economy aspects of ECM, Electro-chemical deburring and honing, Hybrid Unconventional Machining Processes: Introduction to ECDM, ECAM and abrasive EDM etc.	L1, L2 and L3	9
Module 5: Non Destructive Testing Overview of the Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterization. Relative merits and limitations, Liquid Penetrate Testing – Principles, types and properties of liquid penetrates, developers, advantages and limitations of various methods, Testing Procedure. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetization methods, Ultrasonic Testing and radiography.	L1, L2 and L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

1. Advance Machining Processes V.K. Jain Allied Publishers Pvt. Ltd.; 1 edition 2007.

2. Modern Machining Processes P.C. Pandey, McGraw Hill Education; New edition 2017.

3. Manufacturing processes for engineering material spearson education; sixth edition, 2018

4.Charles, J. Hellier," Handbook of Nondestructive evaluation", McGraw Hill, New York 2001.

References:

1. Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa Publishing House, 2009.

2. Ravi Prakash, "Non-Destructive Testing Techniques", 1st revised edition, New Age International Publishers, 2010

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--`

1: strongly related, 2: moderately related and 3: weakly related

ME 4105	COMPUTER INTEGRATED MANUFACTURING	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

In this course the concepts of computer aided design, computer aided manufacturing and computer integrated manufacturing are discussed in detail. The concepts of computer aided process planning (CAPP), inventory control, manufacturing resource planning-II (MRP-II) & enterprise resource planning (ERP), group technology (GT), cellular manufacturing, automated guided vehicle system, flexible manufacturing system (FMS) and industrial robotics are also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with basic and essential concepts of computer aided design, computer aided manufacturing and computer integrated manufacturing.
2. To provide high caliber engineering students with an in-depth understanding of cellular manufacturing, flexible manufacturing system (FMS) and industrial robotics.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO1 - Define and describe the basic fundamentals of computer aided designing, computer aided manufacturing and computer integrated manufacturing.

CO2 – State, explain and demonstrate computer aided process planning, manufacturing resource planning and enterprise resource planning.

CO3 – Outline, interpret and apply concepts of group technology and cellular manufacturing.

CO4 – Define, explain and apply knowledge of flexible manufacturing systems and industrial robotics in industries.

Modules	Blooms level*	Number of hours
Module I **Introduction** Brief introduction to CAD and CAM, Manufacturing	L1 and	9

Planning, Manufacturing control, Concurrent Engineering, CIM concepts, elements of CIM system, Basic Elements of an Automated system , Levels of Automation, Lean Production and Just-In Time Production.	L2	
Module II **Computer Aided Process Planning:** Process planning, Computer Aided Process Planning (CAPP), Logical steps in Computer Aided Process Planning, Aggregate Production Planning and the Master Production Schedule, Material Requirement planning, Capacity Planning, Control Systems, Shop Floor Control, Inventory Control, Brief on Manufacturing Resource Planning-II (MRP-II) & Enterprise Resource Planning (ERP).	L1, L2, and L3	8
Module III **Cellular Manufacturing:** Group Technology (GT), Part Families, Parts Classification and coding, Simple Problems in Part Coding system, Production flow Analysis, Cellular Manufacturing, Composite part concept, Machine cell design and layout, Quantitative analysis in Cellular Manufacturing, Rank Order Clustering Method, Arranging of Machines in a GT cell , Hollier Method.	L1, L2 and L3	10
Module IV **Flexible manufacturing system (FMS):** Types of Flexibility, FMS, FMS Components, FMS Application & Benefits, FMS Planning and Control, Quantitative analysis in FMS, Automated Guided Vehicle System (AGVS), AGVS Application, Vehicle Guidance technology, Vehicle Management & Safety.	L1, L2 and L3	12
Module V **Industrial Robotics:** Robot Anatomy and Related Attributes, Classification of Robots, Robot Control systems, End Effectors, Sensors in Robotics, Robot Accuracy and Repeatability, Industrial Robot Applications.	L1, L2 and L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

Att: Attendance

Text books:

1. Mikell.P.Groover, Automation, Production Systems and Computer Integrated Manufacturing, Prentice Hall of India, 2008.
2. Radhakrishnan P, SubramanyanS.andRaju V., CAD/CAM/CIM, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000.

Reference books:

1. M. Groover, CAD/CAM Pearson Education; 1 edition, 2003.
2. S J Martin, Numerical control of Machine Tools, Butterworth-Heinemann, 1974.

3. P N Rao, CAD/CAM: Principles and Applications, Tata McGraw Hill Education; 3 editions, 2017.
4. Chang, Wysk& Wang, Computer Aided Manufacturing, Prentice Hall of India, 2005.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

ME4106	Advanced Fluid Mechanics Lab	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure	Basics of Fluids				
Co-requisites	-				

Catalog Description

This course introduces the principles required to solve advanced fluid mechanics problems. It addresses the modelling and analysis of viscous and inviscid fluids problems with an emphasis on real-world engineering applications and problem solving. To master this course, students should have a background in basic mathematical calculus and physics covering fluid mechanics.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of viscous and inviscid fluids.
2. Provide an overview of estimation of flow with large Reynold's number.

Course Outcomes

After completing the course, the students will be able to

CO1. Explain the concept of kinematics; apply various governing equations to solve fluid flow problems.
CO2. Define various viscous and Inviscid fluids and apply Bernoulli equation to solve practical problems.
CO3. Describe various flows with respect to large Reynolds number.
CO4. Analyse and setting up the problems involving the concept of Navier stoke equations.

List of Experiments	Blooms level*	Number of hours
Boundary layer flow over a flat plate.	L2 and L3	2
Shock boundary layer interaction studies using computational fluid dynamics	L2 and L3	2

Pressure distribution around a circular cylinder in high Reynolds number flow	L2 and L3	2
Measurement of fluid viscosity.	L2 and L3	2
Studying laminar-turbulent transition for flow in a tube	L2 and L3	2
Energy loss measurements in subcritical and supercritical open channel flow.	L2 and L3	2
Measurement of drag on a circular cylinder in high Reynolds number flow	L2 and L3	2
Determination of friction factor as a function of Reynolds number in pipe flow.	L2 and L3	2
Study Impact of Jet on vertical stationary and moving plate.	L2 and L3	2
Study impact of jet on flat and curved surfaces.	L2 and L3	2
To study the constructional details and draw the characteristic curves of Centrifugal and reciprocating pumps.	L2 and L3	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books:

1. Fluid Mechanics and Its Applications Vijay Gupta & S.K. Gupta New Age International, 2004.
2. Fluid Mechanics and Machinery DR Durgaiah New Age International, 2002.
3. Engineering Fluid Mechanics J A Roberson and C T Crowe Jaico Publishing House, 2004.
4. Fluid Mechanics: Problems and Solutions Joseph H Spark, 1996.
5. Introduction to Fluid Mechanics A.F. James Prentice Hall of India, 1998.

References Books

1. White.F.M, Introduction to Fluid Mechanics, McGraw Hill, 2004.

2. Shames.I.H, Mechanics of Fluids, Tata McGraw Hill, 1998.

3. Douglas. J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006.

4. Streeter.V.L and Wylie.E.B, Fluid Mechanics, Tata McGraw Hill, 1998.

5. Massey.B.S, Mechanics of Fluids, Van Nostrand Reinhold Co., 2002

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA			
A	**PR**	**LR**	**V**
5	10	10	5

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	--	--	--	--	--	--	--	--	--	--	1	-	--
CO2	1	-	--	--	--	--	--	--	--	--	--	--	1	-	--
CO3	1	3	--	--	--	--	--	--	--	--	--	--	1	-	--
CO4	1	2	3	--	--	--	--	--	--	--	--	--	1	-	--

1: strongly related, 2: moderately related and 3: weakly related

ME4107	**Advanced Machining Processes Lab**	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The main objective of the advanced machining processes lab is to demonstrate the basic principles in the area of advance manufacturing to the postgraduate students through a series of experiments. The students will learn about the laboratory methods and interpretation of results with regard to metal removal processes such as USM, WJM, EDM etc. and to give final shape and size to components. Students also learn about the various non destructive evaluation and testing methods.

Course Objectives:

- To understand the working of advanced machining processes and various non-destructive evaluation and testing methods.
- To make the students understand the different types of non-conventional manufacturing processes. This course will help students know which operations are appropriate for given specimen.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Apply the knowledge to calculate parameters involved in variousnon destructive testing methods.
CO2: Measure the cutting forces in turning, drilling and grinding operations.
CO3: Demonstrate the principle of variousnon destructive evaluation and testing methods.
CO4: Perform magnetic particle inspection test and liquid (dye) penetrate test on a given specimen.
CO5: Demonstrate the various ultrasonic machining processes.
CO6: Demonstrate the working of advanced manufacturing system.

Modules	**Blooms level***	**Number of hours**
1. To study the working of EDM.	L1, L2	1

	and L3	
2. To determine the effects of process variables of EDM on surface finish of parts.	L1, L2 and L3	2
3. To determine the effects of process variables on dimensional accuracy of parts in EDM process.	L1, L2 and L3	2
4. To measure the cutting forces in turning operation on lathe machine tool.	L1, L2 and L3	2
5. To measure the cutting forces in drilling operation on radial drilling machine tool.	L1, L2 and L3	2
6. To measure the cutting forces in grinding operation on surface grinding machine tool.	L1, L2 and L3	3
7. To study the working of Ultrasonic machining process.	L1, L2 and L3	1
8. To study the working of Advanced Manufacturing System.	L1, L2 and L3	1
9. To study and understand the various Non Destructive Evaluation and Testing methods.	L1, L2 and L3	2
10. To perform Magnetic Particle Inspection test on a given specimen.	L1, L2 and L3	2
11. To perform Liquid (Dye) Penetrate test on a given specimen.	L1, L2 and L3	2
12. To study Ultrasonic Inspection test on a given specimen.	L1, L2 and L3	2

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V –

Text Books:

1. Modern Machining Processes P.C. Pandey, McGraw Hill Education; New edition 2017.
2. Manufacturing processes for engineering materials pearson education; sixth edition, 2018

Reference Books:

1. Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa Publishing House, 2009.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO6	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Pre-requisites/Exposure	
Co-requisites	

Catalog Description

In this course the concepts of numerical control machines, computer numerical control machines axis designation, kinematic diagrams and automatic tool changers are discussed in detail. The concepts of machine control unit, G&M codes, manual part programming, interpolation cycles, simulation and machining operations on CNC's are also discussed in detail.

Course Objectives

The overall objective of this course is

1. To equip the students with basic and essential concepts of computer aided manufacturing (CAM) and computer numerical control (CNC) machines.
2.To provide high caliber engineering students with an in-depth understanding of G&M codes to write CNC programs, simulate and machining on CNC machines.

Course Outcomes:

At the end of course the students will be able to:

CO1 - Define and describe the CNC lathe kinematic diagram, major assemblies, sub assemblies, machine control system and axes designation.

CO2 - Define and describe the CNC milling machine kinematic diagram, major assemblies, sub assemblies, machine control system and axes designation.

CO3 - State and explain work holding and tool holding devices for the CNC lathe and CNC milling machine.

CO4 - Describe and apply G&M codes in manual part programming on CNC lathe.

CO5 - Describe and apply G&M codes in manual part programming on CNC milling machine.

Modules	**Blooms level***	**Number of hours**	
1. Make a sketch of CNC lathe showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional lathe and if it is considered as a CNC lathe, show the axes with designations.	L1 and L2	2	
2. Make a Kinematics diagram of CNC Lathe showing all machine sub-assemblies. Indicate bearing arrangements, ball screw arrangements with sizes, wherever available.	L1 and L2	2	
3. Make a sketch of CNC machining centre showing major assemblies and indicate the CNC axes with designations. Make a sketch of the conventional machining centre and, if it is considered as a CNC machining centre, show the axes with designations.	L1and L2	2	
4. Make a Kinematics diagram of CNC machining centre showing all machine sub-assemblies. Indicate bearing	L1 and	2	

arrangements, ball screw arrangements with sizes wherever available.	L2		
5. Study the CNC lathe. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function.	L1 and L2	2	
6. Study the CNC machining centre. Prepare a block diagram of controls. Identify location and type of transducers and indicate on an outline of the machine. Describe how they function.	L1 and L2	2	
7. Study the work holding and tool holding devices in the CNC lathe and draw up their specifications and capacities.	L1 and L2	2	
8. Study the work holding and tool holding devices in the CNC machining centre and draw up their specifications and capacities.	L1 and L2	2	
9. Prepare part programs for two specified components for CNC lathe by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine. Test the program in dry run and by tool path graphic simulation. Machine the component.	L2 and L3	2	
10. Prepare part programs for two specified components for CNC machining centre by manual part programming. First write the machining technology in full; then prepare part program and then enter in the machine. Test the program in dry run and by tool path graphic simulation. Machine the component.	L2 and L3	2	
11. To study 3D printing machine tool and its application in modern manufacturing industries	L1 and L2	1	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

1. Mikell P. Groover, "Automation, Production Systems and Computer-Integrated Manufacturing", 2nd Edition, Pentice Hall, 2001.
2. Rao, Kundra&Tiwari, "Computer aided Manufacturing" Tata McGraw Hill, 2007.
3. Numerical Control: by Koren, Khanna Publisher.

References Books:

1. Mikell P. Groover, Emory W. Zimmers, "CAD/CAM", Pearson Education, 2006.

2. P.N. Rao, “CAD/CAM Principles and Applications”, Tata McGraw Hill, 2006.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--
CO2	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--
CO3	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--
CO4	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--
CO5	1	2	3	--	--	3	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engineering & Technology | M.Tech. Mechanical Engineering |
Total Credits: 100 | 2 Years / 4 Semesters

Second Semester

For Thermal Engineering

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits

Engineering Science Courses					
ME4201	Optimization Techniques	3	1	-	4
ME4202	Design of Experiments	3	1	-	4
ME4203	Research Methodology & Technical Report Writing	2	-	-	2
Specialization Elective Courses (choose any three)					
THE4203	Advanced Heat and Mass Transfer	3	-	-	3
THE4206	Advanced Heat and Mass Transfer Lab	-	-	2	1
THE4211	Concept of Combustion	3	1	-	4
THE4212	Energy Management & Auditing	3	1	-	4
THE4213	Refrigeration &Air Conditioning	3	-	-	3
THE4214	Refrigeration &Air Conditioning Lab	-	-	2	1
Value Added Courses					
CSS4251	Corporate Communication	1	-	-	1
BEH4251	Behavioural Communication and Relationship Management	1	-	-	1
Foreign Language-II (As opted in 1st Semester)					
LAN4251	French-II	3	-	-	3
LAN4252	German-II				
LAN4253	Spanish-II				
LAN4254	Russian-II				
LAN4255	Chinese-II				
LAN4256	Portuguese-II				
LAN4257	Korean-II				
LAN4258	Japanese-II				
LAN4259	Hindi-II				
Total Credits					**27**

ME 4201	**OPTIMIZATION TECHNIQUES**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description

In this course the concepts of optimization techniques are discussed in detail. The main objective of this course is to provide the basic concepts of optimization techniques and to educate them on the advancements in optimization techniques. It also provides knowledge of multi-Objective Programming and Genetic algorithms.

Course Objectives

The objective of this course is

1. To familiarize the students with various tools of optimization for management of various resources.

2. To acquaint the students with various advance techniques of optimization like multi-Objective Programming and Genetic algorithms etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define optimization technique and explain its various techniques.

CO2: Apply the concept of classical optimization techniques for solving problems on single-variable and multi-variable optimization.

CO3: Apply non-linear programming and solve problems on one-dimensional optimization methods, unconstrained and constrained optimization techniques.

CO4: demonstrate the concept of other optimization techniques like geometric programming, dynamic programming, integer programming, stochastic programming, and solving problems.

CO5: Illustrate different types of advance topics in optimization

Modules	**Blooms level***	**Number of hours**
Module 1: Introduction Need of Optimization and Historical Development, Engineering Applications, Classification and Formulation of Optimization Problem	L1, L2 and L3	6
Module 2: Classical Optimization Techniques Single-Variable and Multi-Variable Optimization, With and Without Constraints, Kuhn-Tucker Conditions.	L1, L2 and L3	10

Module 3: Non-Linear Programming Introduction, One-Dimensional Optimization Methods, Unconstrained and Constrained Optimization Techniques; Elimination Methods, Exhaustive Search, Interval Halving, Fibonacci, Golden Section Methods; Random Search Methods, Hooke and Jeeves Method, Powell's Method; Indirect Search Methods: Steepest Descent, Fletcher-Reeves, Newton's Method, DFP, BFGS Method; Internal and External Penalty Approach.	L1, L2 and L3	12
Module 4:Other Optimization Techniques Introduction and Basic Concepts of Geometric Programming, Dynamic Programming, Integer Programming, Stochastic Programming, Their Applications	L1, L2 and L3	10
Module 5:Advance Topics in Optimization Multi-Objective Programming, Introduction to Genetic Algorithms, Simulated Annealing and ANN Based Optimization.	L1, L2 and L3	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

1. Engineering Optimization Theory and Practice by S.S. Rao, New Age International, 1996

2. Hillier and Lieberman "Introduction to Operations Research", TMH, 2000.

3. HamdyATaha, "Operations Research –An Introduction", Prentice Hall India, 2003.

References:

1. Philips, Ravindran and Solberg, "Operations Research", John Wiley, 2002.
2. Ronald L.Rardin, "Optimization in Operation Research" Pearson Education Pvt. Ltd. New Delhi, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3

CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

ME 4202	**Design of Experiments**	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Probability, Engineering statics, data analysis, hypothesis testing and ANOVA				
Co-requisites	Apply basic principles in the design of simple experiments.				

Catalog Description

In this course the concepts of experimental design, steps of experimental design, types of experimental design and six sigma are discussed in details. The design of experiments includes

completely randomized design, latin square design, factorial design, full factorial design, fractional factorial design, robust design and Taguchi's approach for experimental design.

Course Objectives

The objective of this course is to

1. Explain the issues and principles of Design of Experiments (DOE),
2. Providing an understanding of interactions among causative factors
3. Determining the levels at which to set the controllable factors.
4. Minimizing experimental error (noise) and improving the robustness of the design or process to variation.

Course Outcomes

On completion of this course, the students will be able to

CO1. Learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions..

CO2. Given a description of an experiment, determine whether it is a factorial experiment, a fractional factorial experiment, or neither

CO3. Determine whether the design appropriately deals with extraneous variables via controlling, blocking, randomization or replication.

CO4. Explain robust design and taguchi's approach for design of experiments.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Introduction A brief history of statistical design, Objectives for experimental designs. Basic design concepts. Steps and guidelines for the design of experiments, Some typical applications of experimental design, Types of experimental designs, Analysis of means, Experimental designs and six sigma, Problems	L1, L2 and L3	10
MODULE 2: Completely Randomized Design Model for a completely randomized design with a single factor. ANOM for a completely randomized design, ANOM with unequal variances, randomized block design, incomplete block designs, latin square design, Graeco – Latin square design.	L1, L2, L3 and L4	12

MODULE 3: Full Factorial and Fractional Factorial Designs with Two Levels Nature of factorial designs, deleterious effects of interactions, effect estimates the $\mathbf{2^3}$ Design, built-in –replication, role of expected mean squares in experimental design, **2k-1** Designs. Effect estimates and regression coefficients, **2k-2** Designs. basic concepts; design efficiency, John's **3/4** designs	L1, L2, L3 and L4	14
MODULE 4: Robust Design DOE and Taguchi approach; experimental design using orthogonal arrays; experimental design with two-level factors only; experimental designs with three and four level factors; ANOVA ; analysis using signal- to- noise ratios.	L1, L3 and L4	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas C. Montgomery , Design and Analysis of Experiments, Wiley International Student Edition (8), 2014.
2. Jiju Antony, Design of experiments for engineers and scientists, Elsevier, 2014
3. J P Holman, Experimental Methods for Engineers – (Southern Methodist University, USA) Tata McGraw Hill, 2001

Reference Books

1. Howard J. Seltman, Experimental design and Analysis; 2013
2. N.C. Barford (Imperial College of Sic & Tech), Experimental Measurements, Precision, Error and Truth –, Addison-Wesley Publication Company, London, 1967

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--

CO3	**2**	**1**	**1**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**
CO4	**1**	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**2**	**--**

1: strongly related, 2: moderately related and 3: weakly related

ME 4203	**RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING**	L	T	P	C
Version 2019.1	Date of Approval: 26 June,2020	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests,

regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

1. Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
2. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
3. It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Classify different research types; explain steps in research process and planning research pro posal.

CO2: Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3: Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4: Demonstrate technical and scientific report writing skills; describe plagiarism, patent laws and intellectual property rights.

Modules	**Blooms level***	**Number of hours**
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	4
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.	L1, L2, L3	5
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression	L1, L3, L4	10

analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.		
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
2. Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.
3. Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

1. Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
2. Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
3. Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3

1: strongly related, 2: moderately related and 3: weakly related

THE 4203	Advanced Heat and Mass Transfer	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Basics of Thermodynamics, Heat Transfer				
Co-requisites	-				

Catalog Description

This course introduces the principles required to solve heat transfer problems. It addresses the modelling and analysis of heat exchanger problems with an emphasis on real-world engineering applications and problem solving. To master this course, students should have a background in basic mathematical calculus, thermodynamics and heat transfer. These basic concepts of thermodynamics and heat transfer will be applied to formulate problems on conduction, convection, radiation, heat exchanger and mass transfer.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of conduction, convection, radiation and heat exchangers.
2. Provide an overview of various modes of mass transfer.

Course Outcomes

After completing the course, the students will be able to

CO1 Explain the basic concept of conduction, convection and radiation heat transfer, formulate and solve one dimensional conduction problems.

CO2 Apply empirical correlations for both forced and free convection for determine the value of convection heat transfer coefficient.

CO3 Explain and apply basic concepts of the radiation heat transfer for black and grey body.

CO4 Analyze the thermal analysis and sizing of Heat exchangers.

CO5 Explain various modes of mass transfer.

Modules	Blooms level*	Number of hours
Module1 CONDUCTION: **Introduction:** Conduction Rate Equation, Thermal Properties of Matter, Heat Diffusion Equation. **1-D Steady State Conduction**: The Plane Wall (Temperature Distribution, Thermal Resistance, The Composite Wall, Contact resistance), Alternative Conduction Analysis, Radial Systems, Conduction with Thermal energy Generation (Plane Wall, Radial Systems, Applications of Resistance Concepts), Heat Transfer from Extended Surfaces. Introduction to 2-D and 3-D Steady State Conduction	L1, L2 and L3	7
Module 2 CONVECTION: Governing Equations, Similarity Considerations, Laminar Free Convection on a Vertical Surface, Effect of Turbulence, Empirical Correlations: External Free Convection Flows (Vertical Plate, Inclined and Horizontal Plate, Long Horizontal Cylinder, Sphere), Free Convection within Parallel Plate Channels, Empirical Correlations, Combined Free and Forced Convection, Free Convection to Fluids in the Near-Critical region, Convection Mass Transfer	L1, L2,and L3	7
Module 3 Boiling and Condensation: Boiling Modes, Pool Boiling and Its Correlations, Forced Convection Boiling; *Condensation*: Physical Mechanisms, Laminar and Turbulent Film Condensation, Film Condensation on Radial systems and Horizontal Tubes, Drop-wise Condensation.	L2 and L3	8
Module 4 HEAT EXCHANGERS: Heat Exchanger Types, Overall Heat Transfer Coefficient, Heat Exchanger Analysis: Parallel Flow Heat Exchanger, Counterblow Heat exchanger, Special operating conditions; Effectiveness NTU Method	L2, L3 and L4	8

(Definitions, Effectiveness NTU Relations), Heat Exchanger Design and Performance Calculations using the Effectiveness NTU Method, Compact HeatExchangers,Finite Element Method for Heat exchangers.		
Module 5 RADIATION: PROCESSES AND PROPERTIES: Radiation - Processes and Properties: Fundamental Concepts, Emission from Real surfaces, Absorption, Reflection and Transmission by Real Surfaces (Absorptive, Reflectivity, Transmissivity, Special Considerations), Gray surface, Environmental Radiation. **Diffusion Mass Transfer**: Physical Origins and rate equations, Distillation, Absorption (and stripping), Humidification, Liquid liquidextraction, Adsorption, Diffusion and Drying	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Incropera, F.P. and DeWitt, D.P," Fundamentals of Heat and Mass Transfer", John Willy & Sons, New York, NY (2002)
2. Nag, P.K, "Heat and Mass Transfer", TMH 2002.
3. John R.Howell&Richrd O Buckius, "Fundamentals of Engg. Thermodynamics", McGraw Hill International, 2006.
4. Holman, J.P, "Heat Transfer",McGraw-Hill 9th edition, 1997.
5. Mills, A.F, "Basic Heat and Mass Transfer". Prentice-Hall, 1997

Reference Books

1. Thirumaleshwar, M, " Fundamentals of Heat and Mass Transfer", Pearson education (2006).
2. Ghoshdastidar, P.S, "Heat Transfer". Oxford University Press (2004).
3. Arora, Domkundwar, S. and Domkundwar, A, "A Course in Heat & Mass Transfer", DhanpatRai& Co.1998

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	--	-	--	--	2	--	--	--	--	3	1	-	-
CO2	1	3	3	-	--	-	-	--	--	--	--	3	1	-	-
CO3	1	3	3	-	-	-	--	--	--	--	--	-	1	-	-
CO4	1	3	3	--	-	-	-	-	--	--	--	-	1	-	-
CO5	1	1	-	3	-	-	2	-	-	-	-	3	1	-	3

1: strongly related, 2: moderately related and 3: weakly related

THE 4206	**ADVANCED HEAT & MASS TRANSFER LAB**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure	Thermodynamics				
Co-requisites	Nil				

Catalog Description

In this course study will be made on the practical aspects of conduction, convection and radiation. Experiments will be performed in the laboratory to find the thermal conductivity, convection heat transfer coefficient in case of natural and forced convection. This course is intended to provide an overview of practical aspects of heat exchanger analysis. The LMTD and effectiveness will be measured practically for parallel flow as well as counter flow heat exchanger.

Course Objectives

The objective of this course is to

1. Equip the students with practical concepts of conduction, convection and radiation.
2. To provide students with the necessary skills to conduct experiments on conduction and convection of heat; collect data, perform analysis and interpret results to draw valid conclusions through standard test procedures.
3. Demonstrate the concepts discussed in the Heat & Mass Transfer course.
4. Experimentally determine thermal conductivity and heat transfer.
5. Experimentally measure LMTD and effectiveness in case of parallel and counter flow heat exchanger.

Course Outcomes

On completion of this course, the students will be able to

CO1: Practically relate to concepts discussed in the Heat & Mass Transfer course; determine and Compare the thermal conductivity insulating material and temperature drop of a composite wall for different heat input values.
CO2: Calculate the mean emissivity and Stefan-Boltzmann's constant.
CO3: Differentiate between the heat transfer coefficients during natural and forced convection.
CO4: Outline and determine the temperature profiles of a pin fin heated at its bottom in natural convection and forced convection
CO5: Determine and compare LMTD and effectiveness of the heat exchanger during parallel and Counter current flow configuration.

Modules	Blooms level*	Number of hours
Module 1 Determination of Overall Heat Transfer Coefficient of a Composite wall. To demonstrate the super thermal conductivity of heat pipe.	L1, L2, L3	5
Module 2 To Study the variation of temperature of test plate with time to find the value of Stefan Boltzmann's constant. To study the importance and validity of engineering assumptions through the lumped heat capacity method.	L1, L2, L3 and L4	5
Module 3 To determine the heat transfer coefficient in natural / free convection from the given empirical equation and compare it with the experimental value obtained. To determine the heat transfer coefficient in forced convection from the given empirical equation and compare it with the experimental value obtained. To measure solar radiations using lux meter	L1, L2,L3 and L4	5
Module 4: To plot the temperature v/s time response of the three pipes (test pipe, copper pipe, and stainless pipe). To plot the temperature distribution along the length of test pipe, copper pipe, stainless pipe.	L1, L2 and L3	5
Module 5 Determination of LMDT and Effectiveness in a Parallel Flow and Counter Flow Heat Exchanger. To determine the overall heat transfer coefficient of the heat exchanger during parallel and counter current flow configuration.	L1, L2, L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4- Analysis; L5- Synthesis, L6- Evaluation

Text Books

1. Ozisik, M. N.,Heat Transfer – A Basic Approach, Mc Graw Hill, New York, 1985.
2. Treybal, R. E., "Mass transfer Operations", 3rd ed., MCGraw Hill, New York, 1980.

Reference Books

1. Cussler, E. L., "Diffusion – Mass Transfer in Fluid Systems", 3rd ed. Cambridge, 2009.

2. Bird, R. B., W. E. Stewart, and E. N. Lightfoot, Transport Phenomena", 2nd ed., John Wiley, New York, 2002.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.A- Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	-	--	--	--	--	--	--	--	--	--	--	1	-	-
CO2	1	-	-	-	--	--	--	--	--	--	--	--	--	1	-	-
CO3	1	2	-	-	-	--	--	--	--	--	--	--	--	1	-	-
CO4	1	3	-	--	--	--	--	--	--	--	--	--	--	1	-	-
CO5	1	2	-	--	--	--	--	--	--	--	--	--	--	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

THE4211	**Concepts of Combustion**	**L**	**T**	**P**	**C**
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure	Internal combustion engines				
Co-requisites					

Catalog Description

In this course the concept of combustion, its physical and chemical kinetics will be discussed in detail. The pre-mixed and diffusion flames will be studied in detail with the effects of emissions in the environment.

Course Objectives

The objective of this course is to:

1. Equip the students with physical and chemical kinetics of the combustion and its pre-mixed and diffused flame.
2. Provide an outline for the techniques to be used for controlling the harmful emissions from the combustion of fuel and its harmful effects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and describe the basic laws of physics, chemistry and thermodynamics and derive the various equations to support the combustion processes.

CO2: Define and describe the principles of pre-mixed flame and outline their characteristics.Applying the effects of physics and chemistry on the variables of flame.

CO3: Define and describe the principles of diffusional flame and outline their characteristics. Describe the combustion of carbon sphere.

CO4: Outline the harmful emissions from the combustion of fuel and its harmful effects.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Physics and Chemistry of Combustion Combustion, modes of combustion, Laws of thermodynamics, stoichiometry, Hess's law, adiabatic flame temperature, laws of transport phenomena, conservation, energy transport equation; Basic reaction kinetics: collision theory; elementary reactions: first, second, third and reverse order reactions, QSSA and PEA method.	L1, L2 and L3	14

MODULE 2: Premixed flame One-Dimensional combustion wave, laminar premixed flame, propogation method, stationary flame method, effects of chemistry and physics variables on burning velocity, flame quenching, flammability limits, flame stabilization, turbulent pre-mixed flame.	L1, L2, L3	13
MODULE 3: Diffusion flame Gaseous jet flame, liquid fuel combustion: droplet burning time, spray combustion model; Solid fuel combustion: diffusional theory for a single coal particle combustion, combustion of carbon sphere with CO burning gas phase.	L1, L2	12
MODULE 4: Combustion and Environment Atmosphere, chemicals from combustion: emissions of CO, CO_2, O_2, H_2O, NOx, N_2O, H-C, volatile organic, SO_2, sulphate aerosols, soot particles, emission control methods.	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Fundamentals of combustion by D.P.Mishra, PHI learning pvt. Ltd., 2010.
2. Fundamentals of Combustion Processes, Sara McAllister, Jyh-Yuan Chen, A. Carlos , Fernandez-Pello, Springer.

Reference Books

1. Fundamentals of Combustion Engineering by AchintyaMukhopadhyay, SwarnenduSen, 1st Edition (2019), CRC Press
2. Heywood.J, Internal combustion engine, Mc Graw Hill, 2017

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	3	-	--	-	-	--	--	--	--	3	1	-	-	-
CO2	1	3	3	-	-	-	--	--	--	--	--	-	1	-	-	-
CO3	1	3	3	--	-	-	-	-	--	--	--	-	1	-	-	-
CO4	1	1	-	3	-	-	2	-	-	-	-	3	1	-	3	-

1: strongly related, 2: moderately related and 3: weakly related

THE4212	**Energy Management & Auditing**	L	T	P	C
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure					
Co-requisites					

Catalog Description:

In this course the current energy scenario, energy conservation, audit and management is discussed. To calculate the energy efficiency and identify the areas deserving strict control to save energy.

Course Objectives:
The objective of this course is to

1. Equip the students with the in-depth knowledge of the functioning of energy management techniques and processes.
2. To provide basic calculations and methods for harnessing energy and also to identify the energy auditing methods adopted in many industries.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe, define and identify the energy management and energy conservation terminologies like supply, demand, economic analysis terminologies.

CO2: Define; describe the energy performance, energy acts and duties of auditors.

CO3: Explain, prepare and apply energy balance diagrams and energy action plans in an organization.

CO4: Identify and describe the ways in which energy is conserved in electrical and thermal equipment.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Energy Management Concept of energy management, energy demand and supply, economic analysis; Duties and responsibilities of energy managers. Energy Conservation: Basic concept, energy conservation in	L1, L2	8

Household, Transportation, Agricultural, service and Industrial sectors, Lighting, HAVC.		
MODULE 2: Energy Audit Definition, need and types of energy audit; Energy management (Audit) approach: energy cost, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirement; Fuel & energy substitution; Energy audit instruments; Energy conservation Act; Duties and responsibilities of energy manager and auditors	L1, L2	10
MODULE 3: Material energy balance Facility as an energy system; Method for preparing process flow; material and energy balance diagrams. Energy Action Planning: Key elements, force field analysis; Energy policy purpose, perspective, content, formulation, rectification.	L2, L3, L4	10
MODULE 4: Monitoring and Targeting Definition monitoring & targeting; Data and information analysis. Electrical Energy Management: energy conservation in motors, pumps and fan systems; energy efficient motors.	L1, L2	9
MODULE 5: Thermal energy management Energy conservation in boilers, steam turbine and industrial heating system; Application of FBC; Cogeneration and waste heat recovery; Thermal insulation; Heat exchangers and heat pump; Power plant's Renovation and modernization– Reactive power managementand energy management, Building Energy Management and its ISO standards.	L1, L2	11

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Murphy &Mckay, Energy Management, BSP Books Pvt. Ltd,2014.
2. Smith CB; Energy Management Principle, Pergamon Press, New York,2015.
3. Rajan GG, Optimising Energy Efficiency in Industry, TMH,2001.
4. Callaghan P O, Energy Management, McGraw-Hill Book Company,1993.
5. Amit Kumar Tyagi, Handbook on Energy Audit and Management, Tata Energy Research Institute,2001.

Reference Books:

1. Bureau of Energy Efficiency, Study material for energy Managers and Auditors: Paper I to V,2001.
2. Hamies; Energy Auditing and Conservation: Method, Measurement□, Hemisphere, Washington,2001.
3. Witty, Larry C, Industrial Enegy Management Utilisation, Hemisphere Publishers, Washington,2013.

4. Kreith&Goswami, Energy Management and Conservation Handbook, CRC Press,2016.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination
Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	--	--	--	-	-	-	-	1	3	--	--	1	-
CO2	--	3	-	--	3	-	--	3	--	--	2	2	--	--	1	3
CO3	--	--	-	--	2	--	--	2	3	-	3	2	--	--	1	-
CO4	--	-	2	--	2	3	--	--	--	-	2	3	--	--	1	-

1: strongly related, 2: moderately related and 3: weakly related

THE4213	**REFRIGERATIONANDAIRCONDITIONING**	**L**	**T**	**P**	**C**
Version1.1	DateofApproval:July14,2017	3	0	0	3
Pre-requisites/Exposure	BasicsofThermodynamics				
Co-requisites	-				

CatalogDescription

Theaimofthiscourseistoprovidethestudentswiththeunderstandingofthebasicprinciplesof Refrigeration andAirConditioningsuchthattheycouldbuildsimplemathematicalmodelsrepresentingtheconditionedspaceanditscomponentsusedtocontrolenvironmentalconditions.Theapplicationofthermodynamics,heattransfer,andfluidmechanicsincludesanunderstandingofrefrigerantsandrefrigerationsystems,psychometrics,humancomfortandairquality,calculationofheatingandcoolingloads,andheatandmasstransferprocessesandassociatedR&ACcomponentsandsystems.

CourseObjectives

Theobjectiveofthiscourseisto

Equipthestudentswithconceptsofairrefrigeration,vapourcompressionrefrigeration,differenttypeofrefrigerants,vapourabsorptionandsteamjetrefrigerationsystem.

ProvideanoverviewofPsychrometry,HVACsystemsanddifferentexpansionandcontroldevices.

CourseOutcomes

Aftercompletingthecourse,thestudentswillbeableto

CO1.Explainairrefrigeration,vapourcompressionrefrigeration,differenttypeof refrigerants,vapourabsorptionandsteamjetrefrigerationsystem.
CO2.DescribetheworkingofRefrigerantinmultistage,cascaderefrigeration.
CO3.Applytheknowledgeofpsychrometrytovariouspsychrometricprocesses.
CO4.EvaluatecoolingandheatingloadanddesignofHVACsystem.
CO5.DevelopanddesignRACsystemandevaluatedifferentexpansionandcontroldevices.

Modules	Bloom sle vel *	Nu mb erof hou rs
MODULE-1:Analysisofrefrigerationcycles AnalysisofvapourcompressionrefrigerationcycleSubcooledliquidandsuperheatedvapour refrigerationcycles,theireffectonperformance.CompoundcompressionMultivapour-Cascadesystem,VapourAbsorptionSystem:SimplevapourAbsorptionsystem-Actualvapourabsorptioncyclerpresentationonenthalpyconcentrationh-cdiagram,EnthalpyConcentrationDiagram,AircraftRefrigeration:ThermodynamicCycle –Differentsystems–Analysis–ComparisonUnConventionalRefrigeration,IndustrialRefrigeration:Chemicalandprocess industries,Diaryplants,PetroleumRefineries.	L1, L2 and L3	8
MODULE-2:Refrigerants Primaryandsecondaryrefrigerants.Designationofrefrigerants,Desirablepropertiesofrefrigerantssuchassolubilityinwaterandlubricatingoil.Materialcompatibility,Toxicity,Flammability,Thermodynamicpropertiesofrefrigerants,Inorganic,Halocarbonrefrigerants.Secondaryrefrigerants.Refrigerantsmixtures,NeedforAlternaterefrigerants–Retrofittingaspects.	L1, L2, and L3	8
MODULE-3:AppliedPsychrometry Psychrometricprocessesinairconditioningequipment,Mixing,Bypassfactor,Heatinganddehumidifyingcoils,Airwashers.Coolingbydryandwetcoils,Useofhygroscopicsolutioninairwashers,Adiabaticdehumidifiers.Humidifiers,Waterinjection.Steaminjection.	L2 and L3	7
MODULE4:ComfortAirConditioningandCoolingLoadCalculations: SensibleandLatentHeatLoads–sensibleheatfactor.UseofEffectiveandgrandsensibleheatfactor,RelationshipbetweenESHF,ADPandBF.RepresentationofAllFreshAir,Recirculatedair,BypassedAirandHighLatentHeatLoadsystemsonPsychrometricChart,AirConditioningSystems:Summer,winter,Hotanddryoutdoorconditions.	L2, L3 and L4	7

MODULE5:Selectionofoutsideandinsidedesignconditions: Thermodynamicsofhumanbody.Bodyregulationprocessagainstheatandcold.Comfort&Comfortchart,Effectivetemperature,Factorsgoverningoptimumeffectivetemperature,Designconsiderations.Airconditioningcontrolsystems:Basicelementsofthecontrolsystem,Temperature,Humidity&Pressurecontrols,Refrigeration,Roomthermostat.	L2, L3 and L4	6

**Bloom'sLevel:*
L1-Knowledge;L2-Comprehension;L3-Application;L4:Analysis;L5:Synthesis,L6:Evaluation

CO,POandPSOmapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO2	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO3	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO4	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO5	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**

1:stronglyrelated,2:moderatelyrelatedand3:weaklyrelated

ExaminationScheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage(%)	5	10	8	7	70

CT:ClassTest,HA:HomeAssignment,S/V/Q:Seminar/Viva/Quiz,EE:EndSemesterExamination;Att: Attendance

Text&References:

TextBook

RefrigerationandAirConditioning/C.PArora./TMG,2008
RefrigerationandAirConditioning/ManoharPrasad,2003
Refrigeration&AirConditioning/Arora&Domkundwar/DhanpatRai&Co.2010
Refrigeration&AirConditioning/RCArora/PHI/2012
Refrigeration&AirConditioning/S.C.Jain/ChandandCo.2016

ReferencesBook

PrinciplesofRefrigeration/Roy.J.Dossat1996
RefrigerationandAirConditioning/F.Stoecker&Jerold.W.Jones./MGHIntrl1982
HandBookofAirConditioningSystemDesign/Carrier,2006
ASHRAEHandBook/Volume1&2,2000

THE4214	**REFRIGERATION&AIRCONDITIONING LAB**	L	T	P	C
Version1.1	DateofApproval:08May,2019	0	0	2	1
Pre-requisites/Exposure	Thermodynamics				
Co-requisites	Nil				

CatalogDescription

Inthiscoursestudywillbemadeonthepracticalaspectsofrefrigeration&airconditioning.Experimentswill beperformedinthelaboratorytofindtheCOPofheatpumpandrefrigerationsystem.Thiscourseisintendedt oprovideanoverviewofpracticalaspectsofvapourcompressionrefrigerationsystemsandcompressors.

CourseObjectives

Theobjectiveofthiscourseisto

Equipthestudentswithpracticalconceptsofrefrigeration&airconditioning.
Toprovidestudentswiththenecessaryskillstoconductexperimentsonheatpumpandairrefrigerationsyste m;collectdata,performanalysisandinterpretresultstodrawvalidconclusionsthroughstandardtestprocedu res.
DemonstratetheconceptsdiscussedintheRefrigeration&Airconditioningcourse.
ExperimentallydetermineCOPofVapourabsorptionrefrigerationsystem.

CourseOutcomes
Oncompletionofthiscourse,thestudentswillbeableto

CO1:DetermineCOPofRefrigerationsystem,heatpumpandvapourcompressionrefrigerationsystem.
CO2:Demonstrateandexplainhermeticallysealedcompressor,effectofsuperheating.
CO3:Determineefficiencyofcompressor.
CO4:DeterminetotalHeatLoadforAir-Conditioningunit.

Modules	Bloomslevel*	Numberofhours
Module1 StudyandPerformanceofVaporCompressionRefrigerationCycle TofindPerformanceofrefrigerationtestrigbyusingdifferentexpansion devices TofindperformanceParametersofcoolingTowers	L1,L2,L3	6
Module2 TofindperformanceparametersofanIcePlant TofindperformanceparametersofVaporAbsorptionRefrigerationsystem PerformanceanalysisofVortextubeApparatus PerformanceanalysisofMechanicalheatpump .	L1,L2,L3	6
Module3 Performanceanalysisofairconditioninglawlimit Studyofpulldowncharacteristicsofdomesticrefrigerator.	L1,L2,L3	6
Module4: Studyofperformanceparametersusingventilationtrainer.	L1,L2andL3	6

**Bloom'sLevel:*
L1-Knowledge;L2-Comprehension;L3-Application;L4-Analysis;L5-Synthesis,L6-Evaluation

Text&References:

CPArora,RefrigerationandConditioning,TataMcGrawHill,2019.
ManoharPrasad,RefrigerationandConditioning,WileyEasternLimited,2018.
JordanandPriester,RefrigerationandConditioning,PrenticeHallofIndia,2019.
WFStoecker,RefrigerationandConditioning,McGrawHill,2017.
RefrigerationandairconditioningbyAhmadUlAmeen,PHIpublication,2014.
HandbookofairconditioningandRefrigerationbyShanK.Wang,TataMcGrawHill,2008.
RefrigerationandAirConditioningbyArora&Domkundwar,DhanpatRaiandSons,2013.

ModesofEvaluation:Quiz/Assignment/Seminar/WrittenExamination

ExaminationScheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note:IA–InternalAssessment,EE-ExternalExam,PR-Performance,LR–LabRecord,V–Viva.A-Attendance

CO,POandPSOmapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PS O 4
CO 1	1	3	-	--	--	--	--	--	--	--	--	--	1	2	--	-
CO 2	1	-	-	-	--	--	--	--	--	--	--	--	1	2	--	-
CO 3	1	2	-	-	-	--	--	--	--	--	--	--	1	2	--	-
CO 4	1	3	-	--	--	--	--	--	--	--	--	--	1	2	--	-

1:stronglyrelated,2:moderatelyrelatedand3:weaklyrelated

Third Semester
For Thermal Engineering

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Engineering Science Courses					
ME4301	Total Quality Management & Quality Assurance	3	1	-	4
Specialization Elective Courses (choose any three)					
THE4309	Advanced Computational Fluid Dynamics	3	-	-	3
THE4310	Advanced Computational Fluid Dynamics Lab	-	-	2	1
THE4311	Microfluidics&Nanofluidic	3	1	-	4
THE4304	Cryogenics	3	1	-	4
THE4312	Turbomachines	3	1	-	4
Summer Internship					
ME4335	Summer Internship Evaluation	-	-	-	6
Dissertation					
ME4337	Dissertation-I	-	-	-	5
Value Added Courses					
CSS4351	Interpersonal Communication	1	-	-	1
BEH4351	Leading through Teams	1	-	-	1
Foreign Language-III (As opted in 1st Semester)					
LAN4351	French-III	2	-	-	2
LAN4352	German-III				
LAN4353	Spanish-III				
LAN4354	Russian-III				
LAN4355	Chinese-III				
LAN4356	Portuguese-III				
LAN4357	Korean-III				
LAN4358	Japanese-III				
LAN4359	Hindi-III				
Total Credits					**31**

ME 4301	**TOTAL QUALITY MANAGEMENT & QUALITY ASSURANCE**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description
In this course the concepts of quality improvement in manufacturing are discussed in detail. Various quality management tools, improvement cycles, quality circles and audit procedures will be introduced. The concepts learnt will be applied to improve quality in manufacturing.

Course Objectives
The objective of this course is to

1. Equip the students with concepts of quality improvement in manufacturing.
2. Provide an overview of quality management tools, improvement cycles, quality circles and audit procedures.

Course Outcomes
On completion of this course, the students will be able to
CO1: Define components of quality, innovation, design and explain Product quality characteristics and dimensions.
CO2: Explain various key aspects of the quality system standards.
CO3: Describe total quality management tools, improvement cycle and quality organization.
CO4: Define quality assurance, inspection, quality circles and explain quality audits.

Modules	**Blooms level***	**Number of hours**
MODULE 1:The Foundations of Total Quality Management: Components of quality, The total quality management approach, Innovation, design and improvement, Product quality characteristics and service quality characteristics, Quality parameters and specific dimensions of quality.	L1and L2	8
MODULE 2:Key Aspects of the Quality System: Planning for quality**,** Flowcharting, Detailed flow process charts and flow diagrams**,** planning for just-in-time (JIT) management**,** System design and contents**,** System documentation, implementation and assessment.	L1 and L2	8
MODULE 3:TQM Tools and the Improvement Cycle: Measurement of quality, Costs of quality, Tools and techniques for quality improvement, Statistical process control, Quality improvement techniques in service industries, Specific techniques for design,	L1 and L2	10

reliability, maintenance and process improvement.		
MODULE 4:**The Quality Organization Within an Organization:** People and the organizational structure**,** Responsibilities and performance management**,** The relationship between the quality organization and top management**,** Culture change through teamwork for quality improvement**,** Implementing teamwork for quality improvement: the DRIVE model.	L1 and L2	10
MODULE 5:Internal Quality Audits: Scope of requirements and audit procedures**,** the audit programme and planning of quality audits**,**Verifying compliance with planned arrangements, determining the effectiveness of the system**,** reporting the results of quality audits**,** Follow-up audits Quality and Business Process Re-engineering:Beyond tools to total quality management**,** Stages in the development of quality and related activities: inspection, quality assurance**,** company-wide quality control**,** total quality management, Quality circles.	L1 and L2	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Prasad L M, "Principles and Practice of Management", S Chand& Company Ltd., New Delhi, 2008.
2. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India Delhi, 2015
3. Competitive Manufacturing Management by John M. Nicholas, Mcgraw Hill. Delhi, 2001.

Reference Books

1. Statistical Quality Control by M. Mahajan, DhanpatRai& Co. (P) Ltd, Delhi, 2018.
2. Reliability Engineering, by E.BalaGuruswamy, Tata McGraw Hill, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--

CO2	**1**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	**1**	--	--
CO3	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO4	**1**	--	--	--	**2**	--	--	--	--	--	--	--	--	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

THE 4309	**ADVANCED COMPUTATIONAL FLUID DYNAMICS**	L	T	P	C

Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Fluid Mechanics				
Co-requisites	Nil				

Catalog Description

Computational Fluid Dynamics (CFD) is a branch of fluid mechanics that uses algorithms to analyze and solve problems that involves fluid flow. This design tool has been developed over the years. The software simplifies complex simulations and can be applied in a varied range of transonic or turbulent flows, for biological, physical, chemical and medical applications. CFD is being increasingly employed by many industries either to reduce manufacturing design cycles or to provide an insight into existing technologies so that they may be analyzed and improved. Examples of such industries include power generation, aerospace, process industries, automotive, chemical engineering and construction.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of computational fluid dynamics and models of flow.
2. Provide an overview of continuity, momentum and energy equations and basic aspects of Discretization.

Course Outcomes

On completion of this course, the students will be able

CO1: To define and explain the concept of CFD and its applications; finite control volume; infinitesimal fluid element, substantial derivative, divergence of velocity.

CO2: To state and describe continuity, momentum and energy equations of fluid Dynamics.

CO3: To explain the classification of quasi linear partial differential equations and general behavior of the different classes of partial differential equations

CO4: To define and distinguish different aspects of Discretization and computational fluid Dynamics techniques.

CO5: To explain the concept of Pressure correction Technique & Incompressible Couette Flow

Modules	Blooms	Number

	level*	of hours
Module 1 Introduction Introduction to CFD, CFD as a research tool, CFD as a design tool, applications of CFD: automobile and engine applications; industrial manufacturing applications; civil engineering applications; environmental engineering applications, models of flow: finite control volume; infinitesimal fluid element, substantial derivative, divergence of velocity: its physical meaning**.**	L1, L2	7
Module 2 Governing Equations of Fluid Dynamics The continuity equation: model of finite control volume fixed in space; model of finite control volume moving with the fluid; model of infinitesimally small element fixed in space, model of infinitesimally moving with the flow, momentum equation, energy equation, summary of the governing equations for fluid dynamics with comments: equations for viscous and non viscous flow, physical boundary conditions	L1, L2	7
Module 3 Mathematical Behavior of partial differential equations Introduction, classification of quasi linear partial differential equations, a general method of determining the classification of partial differential equations: Eigen value method, general behavior of the different classes of partial differential equations: hyperbolic equations; steady in viscid supersonic flow; unsteady in viscid flow, parabolic equations: steady boundary layer flow, elliptic equations.	L1, L2	7
Module 4 Discretization& CFD Techniques Introduction, Introduction to finite differences, difference equations, Explicit and implicit approaches, errors and stability analysis, some simple CFD Techniques: Introduction, Lax Wendroff technique and Maccormack's technique, some comments: viscous flows, conservative form, space marching, Relaxation technique, Alternating Direction implicit technique.	L1, L2	7

Module 5 Pressure correction Technique & Incompressible Couette Flow Introduction, some comments on the incompressible Navier – Stokes equations, need for a staggered grid, philosophy of pressure correction method, pressure correction formula, boundary conditions, some computer graphic techniques used in CFD: xy plots, contour plots, vector and streamline plots, scatter plots, mesh plots, composite plots, Incompressible Couette Flow: introduction, physical problem and its exact analytical solution, numerical approach. Introduction to Finite element method in Computational fluid Dynamics	L1, L2	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4- Analysis; L5- Synthesis, L6- Evaluation

Text Books

1. Anderson, John D., Computational Fluid Dynamics: The basics with applications, Tata McGraw Hill, 2012, New-Delhi
2. Chung, T.J., Computational Fluid Dynamics, Cambridge University Press, 2002, UK.

Reference Books

1. Ferziger, Joel H. and Peric, Computational Methods for Fluid Dynamics, Springer, 2002, USA.
2. Blazek, Jiri**,** Computational Fluid Dynamics: Principles and Applications, Elseveir, 2005, UK.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO**

																4
CO1	**1**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO2	**1**	**-**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO3	**1**	**2**	**-**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO4	**1**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO5	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

THE 4310	**ADVANCED COMPUTATIONAL FLUID DYNAMICS LAB**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure	Fluid Mechanics, Computational Fluid Dynamics				
Co-requisites	Nil				

Catalog Description

In this coursestudy will be made on the Numerical solution of laminar and turbulent pipe flow problem in ANSYS Fluent. This course is intended to carry out numerical simulation for Plate Boundary Layer and Flow in a nozzle problem in ANSYS Fluent. Numerical simulation will be carried out for conduction as well as Steady flow past a cylinder and sphere problems.

Course Objectives

The objective of this course is to

1. Provide students with the necessary skills to carry out numerical simulation.
2. Equip the students with basic concepts of Ansys to develop numerical simulation for different types of problems.

Course Outcomes

On completion of this course, the students will be able

CO1: To develop the numerical solution to a laminar and turbulent pipe flow problem in ANSYS Fluent.

CO2: To develop the numerical solution to a Flat Plate Boundary Layer and Flow in a nozzle problem.

CO3: To develop numerical simulation of the Steady flow past a cylinder and sphere in ANSYS Fluent.

CO4: To develop numerical simulation of the flow over an airfoil and heat conduction problem in ANSYS Fluent.

CO5: To develop numerical simulation of the heat conduction through a composite wall and cylinder in ANSYS Fluent.

Modules	Blooms level*	Number of hours
Module 1 To develop the numerical solution to a laminar pipe flow problem in ANSYS Fluent. To develop the numerical solution to a turbulent pipe flow problem in ANSYS Fluent.	L1, L2 and L6	5

Module 2 To develop the numerical solution to Flat Plate Boundary Layer problem in ANSYS Fluent. To develop the numerical solution to Flow in a nozzle problem in ANSYS Fluent.	L1, L2 and L6	5
Module 3 To develop the numerical solution to Steady flow past a cylinder problem in ANSYS Fluent. To develop the numerical solution to Steady flow past a sphere problem in ANSYS Fluent.	L1, L2 and L6	5
Module 4: To develop the numerical solution to flow over an airfoil problem in ANSYS Fluent. To develop the numerical solution for heat conduction problemthrough a rectangular plate in ANSYS Fluent.	L1, L2 and L6	5
Module 5 To develop the numerical solution for heat conduction problemthrough a composite wall in ANSYS Fluent. To develop the numerical solution for heat conduction problemthrough a cylinder in ANSYS Fluent	L1, L2 and L6	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4- Analysis; L5- Synthesis, L6- Evaluation

Text Books

1. Anderson, John D., Computational Fluid Dynamics: The basics with applications, Tata McGraw Hill, 2012, New-Delhi
2. Chung, T.J., Computational Fluid Dynamics, Cambridge University Press, 2002, UK.

Reference Books

1. Ferziger, Joel H. and Peric, Computational Methods for Fluid Dynamics, Springer, 2002, USA.
2. Blazek, Jiri**,** Computational Fluid Dynamics: Principles and Applications, Elseveir, 2005, UK.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.A- Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	-	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	-	-	-	--	--	--	--	--	--	--	--	1	--	-	-
CO3	1	2	-	-	-	--	--	--	--	--	--	--	1	--	-	-
CO4	1	3	-	--	--	--	--	--	--	--	--	--	1	--	-	-
CO5	1	2	-	--	--	--	--	--	--	--	--	--	1	--	-	-

1: strongly related, 2: moderately related and 3: weakly related

THE4311	MICRO FLUIDICS & NANO FLUIDIC	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Fluid Mechanics				
Co-requisites	Nil				

Catalog Description

In this course studies will be made on General properties of micro and nano scale flows, fluid statistics, kinematics of a fluid velocity fluid. This course is intended to provide an overview of BasicPrinciples of Micro fluidics and Governing Equations. This course will be helpful in understanding the concepts of unidirectional flow, hydraulic circuit analysis. Also the studies will be made on the basic concepts of nano fluidics.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of micro Fluidics and nano fluidics.
2. Provide an overview of governing equations, unidirectional flow and hydraulic circuit analysis.

Course Outcomes

On completion of this course, the students will be able

CO1: To define and explain the basic concepts of micro and nano scale flows and micro fluidics.

CO2: To describe basic principles of micro fluidics and governing equations.

CO3: To explain unidirectional flow and hydraulic circuit analysis

CO4: To summarize the basic concepts of nano fluidics.

CO5: To define and distinguish micro fluidics and nano fluidics.

Modules	Blooms level*	Number of hours
Module 1 Introduction and Micro fluidics **Introduction**: General properties of micro and nano scale flows, fluid statistics, kinematics of a fluid velocity fluid, important geometric definitions: streamline, streak line, path line, and material line, strain rate and rotation rate tensors. **Micro fluidics**: Definition, objectives of micro fluidic systems, components of micro fluidic device: micro scale fuel handling system, sample loading and injection device, Electro osmotic pumping system, small volume transport, variable pressure delivery chamber, applications.	L1, L2	13
Module 2 Basic Principles of Micro fluidics and Governing Equations **Basic Principles:** Introduction, basic principles: laminar flow, Peclet number, pressure driven flow, electro osmotic flow, micro pumps: mechanical, non mechanical micro pumps, electro kinetic pump, MHD pump, Micro mixers: active and passive micro mixers, applications. **Governing Equations for incompressible flow** : Conservation of mass and momentum equations, constitutive relations, non Newtonian fluids, interfacial energy, contact angle, velocity and stress boundary conditions at interfaces, kinematic boundary conditions for continuity of normal velocity, dynamic boundary conditions for continuity of tangential velocity, flow regimes, Navier slip boundary condition.	L1, L2	13
Module 3 Unidirectional Flow and Hydraulic circuit Analysis **Unidirectional Flow:** Introduction, steady pressure and boundary driven	L1, L2	13

flow through long channels, coquette flow, physical interpretation, Reynolds number, Poiseuille flow, physical interpretation, startup and development of unidirectional flow **Hydraulic circuit Analysis**: Introduction, hydraulic circuit analysis, hydraulic circuit equivalent for micro channels, introduction to potential fluid flow, introduction to stokes flow		
Module 4 Nano fluidics Introduction to nano fluidics, advantages of nano fluidics, comparison of micro fluidics and nano fluidics, nano scale forces, phenomena in nano fluidics, applications of nano fluidics, lab on chip, gene expression studies	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4- Analysis; L5- Synthesis, L6- Evaluation

Text Books

1. Brian J Kirby, Micro and Nano Scale Fluid Mechanics, Cambridge University Press, 2010, New York.
2. ShauryaPrakash and JunghoonYeom,Nan fluidics and Micro fluidics: Systems and Applications, Elsevier Publications, 2014, UK.

Reference Books

1. Sushanta K. Mitra, Microfluidics and Nanofluidics Handbook: Fabrication, Implementation, and Applications, CRC Press, 2011, New York
2. C. Kleinstreue, Microfluidics and Nanofluidics: Theory and Selected Applications, John Wiley and Sons, 2013, USA

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO2	**1**	**-**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**

CO3	**1**	**2**	**-**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO4	**1**	**3**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**
CO5	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

THE-4304	**CRYOGENICS**	**L**	**T**	**P**	**C**
Version1.1	DateofApproval:Date,Month2017	**3**	**1**	**0**	**4**
Pre-requisites/Exposure	RAC				
Co-requisites					

CourseObjectives

Illustratethefundamentalprinciplesandapplicationsofdeeprefrigerationsystem

Presenttheproperties,applicationsandenvironmentalissuesofdifferentrefrigerants

CourseOutcomes

Oncompletionofthiscourse,thestudentswillbeableto

CO1.ToexplainanddescribetheeffectofNeon,hydrogenandheliumcomponentefficienciesonsystemperformance.

CO2.TodescribeandanalysestheGasseparationandpurificationprinciplesandplantcalculation

CO3.DescribetheidealandpracticalsystemsofCryogenicrefrigerationsystems

CO4.DescribetheIntroductiontovacuumtechnology,lowtemperaturepropertiesofmaterialsandapplicationofcryogenicsystems.

CO5.DescribetheSpacetechnology,Cryogenicindustry,BiologyandapplicationofMedicine.

Modules	Bloom slevel *	Numb erofho urs
MODULE1:**IntroductiontoCryogenicSystems:** MechanicalPropertiesatlowtemperatures.PropertiesofCryogenicFluids. GasLiquefaction:Minimumworkforliquefaction.Methodstoprotectlowtemperature.LiquefactionsystemsforgagesotherthanNeon.HydrogenandHelium.	L1,L2, L3	12
MODULE2:LiquefactionSystemsforNeon,HydrogenandHelium: ComponentsofLiquefactionsystems.Heatexchangers.Compressorsandexpanders. Expansionvalve,Lossesinrealmachines.	L1,L2, L3and L4	12
MODULE3:**GasSeparationandPurificationSystems:** Propertiesofmixtures,Principlesofmixtures,Principlesofgasseparation,Airseparationsystems.	L1,L2, L3	12
MODULE4:**CryogenicRefrigerationSystems**: WorkingMedium,Solids,Liquids,Gases,Cryogenicfluidstorage&transfer,Cryogenicstoragesystems,Insulation,LowTemperaturematerial,Fluidtransfermechanisms, Cryostat,CryoCoolers.	L1,L2, L3	12
MODULE5:**Applications:** Spacetechnology,In-FlightairseparationandcollectionofLOX,Gasindustry,Biology,Medicine,Electronics.		

**Bloom'sLevel: L1-Knowledge;L2-Comprehension;L3-Application;L4:Analysis;L5:Synthesis,L6:Evaluation*

TextBooks

Barron,R.,CryogenicSystems,McGraw-Hill,1966New-Delhi,India

Timmerhaus,K.D.andFlynn,T.M.,CryogenicProcessEngineering,PlenumPress,1989.

Scott,R.B.,CryogenicEngineering,D'Van-Nostrand1996,

ReferenceBooks

Vance,R.W.andDuke,W.M.,AppliedCryogenicEngineering,JohnWiley,1962.

Sitting,M.Cryogenic,D'Van-Nostrand,1963

Barron,R.,CryogenicSystems,McGraw-Hill,1966.

ModesofEvaluation:Quiz/Assignment/Seminar/WrittenExamination
ExaminationScheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage(%)	5	10	8	7	70

CT:ClassTest,HA:HomeAssignment,S/V/Q:Seminar/Viva/Quiz,EE:EndSemesterExamination;Att: Attendance

CO,POandPSOmapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO2	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO3	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO4	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO5	**1**	**1**											**1**	**2**	

1:stronglyrelated,2:moderatelyrelatedand3:weaklyrelated

THE4312	Turbomachines	L	T	P	C
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure	Internal combustion engines				
Co-requisites					

Catalog Description

In this course the concept of Thermo-fluid dynamics aspects of fluid flow, Kinematic relations and efficiencies of turbomachines, axial Turbines Centrifugal, Compressors and Fans, Radial Flow Turbines, and preliminary design fundamentals of turbo machineswill be discussed in detail. It will focus on applications in power generation, transport, refrigeration and the built environment.

Course Objectives

The objective of this course is to:

1. Equip the students with different types of turbomachines and their applications.

2. Provide an outline for thederivations to be used for finding out work done and efficiencies of various turbomachines.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define; describe turbo machines and its components. Categorize them on the basis of their working and outcome.

CO2: Derive turbine equations, construct velocity triangles and list the effect of blade discharge angle of performance parameters of turbo machines.

CO3: Define and describe and categorize the impulse and reaction turbines. Derive conditions for maximum utilization factor.

CO4: Classify the hydraulic turbines, derive and analyze its design parameters for maximum efficiency.

CO4: Categorize different types of pumps and compressors. Derive an expression for pressure ratio, work done and efficiency.

Modules	Blooms level*	Number of hours
MODULE 1: INTRODUCTION Introduction: Definition of turbo machine, parts of turbo machines, Comparison with positive displacement machines, Classification, Application of first and second law of thermodynamics to turbo machines, Efficiencies of turbo machines, Static and Stagnation states, overall isentropic efficiency, stage efficiency, Reheat factor for expansion process	L1, L2 and L4	8
MODULE 2: ENERGY EXCHANGE IN TURBO MACHINES Euler's turbine equation, Alternate form of Euler's turbine equation, Velocity triangles for different values of degree of reaction, Components of energy transfer, Degree of Reaction, utilization factor, Relation between degree of reaction and Utilization factor, Problems. Radial flow compressors and pumps – general analysis, Expression for degree of reaction, velocity triangles, Effect of blade discharge angle on energy transfer and degree of reaction, Effect of blade discharge angle on performance, degree of reaction, velocity triangles, Problems.	L1and L3	10
MODULE 3: STEAM TURBINES AND REACTION TURBINES Classification, Single stage impulse turbine, condition for maximum blade efficiency, stage efficiency, Need and methods of compounding, Multi-stage impulse turbine, expression for maximum utilization factor. Reaction turbine – Parsons's turbine, condition for maximum utilization factor, reaction staging. Problems.	L1, L2, L3 and L4	10
MODULE 4:HYDRAULIC TURBINES Classification, various efficiencies. Pelton turbine – velocity triangles, design parameters, Maximum efficiency. Francis turbine - velocity triangles, design parameters, Kaplan and Propeller turbines – velocity triangles, design parameters. Problems.AnsysTurboGrid.	L2, L3 and L4	12
MODULE 5: PUMPS AND COMPRESSORS Classification and parts of centrifugal pump, different heads and efficiencies of centrifugal pump, Minimum speed for starting the	L2 and L3	8

flow, Cavitation, Need for priming. Problems Centrifugal Compressors: Stage velocity triangles, slip factor, power input factor, Stage work, Pressure developed, efficiency and problems. Axial flow Compressors: Expression for pressure ratio developed in a stage, work done factor, efficiencies. Problems.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. An Introduction to Energy Conversion, Volume III, Turbo machinery, V. Kadambi and Manohar Prasad, New Age International Publishers, reprint 2008.
2. Turbines, Compressors & Fans, S. M. Yahya, Tata McGraw Hill Co. Ltd., 2nd edition, 2002 .
3. Turbomachines, B. U Pai , Wiley First Edition 2013.

Reference Books

1. Turbomachines, B. U Pai , Wiley First Edition 2013.
2. Fluid Mechanics & Thermodynamics of Turbo machines, S. L. Dixon, Elsevier (2005)

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	3	-	--	--	-	--	--	--	--	-	1	-	-	-
CO2	1	3	3	-	--	-	-	--	--	--	--	-	1	-	-	-
CO3	1	3	3	-	3	-	--	--	--	--	--	-	1	-	-	-
CO4	1	3	3	--	-	-	-	-	--	--	--	3	1	-	-	-
CO5	1	2	2	-	-	-	-	-	-	-	-	3	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engineering & Technology | M.Tech. Mechanical Engineering |
Total Credits: 100 | 2 Years / 4 Semesters

Fourth Semester

Common to all specializations

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Dissertation					
ME4437	Dissertation-II	-	-		15
Total Credits					**15**

Amity School of Engineering & Technology | M.Tech. Mechanical Engineering |
Total Credits: 100 | 2 Years / 4 Semesters

Second Semester

For Machine Design Engineering

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Engineering Science Courses					
ME4201	Optimization Techniques	3	1	-	4
ME4202	Design of Experiments	3	1	-	4
ME4203	Research Methodology & Technical Report Writing	2	-	-	2
Specialization Elective Courses (choose any three)					
MDE4211	Advanced Computer Aided Design	3	-	-	3
MDE4212	Advanced Computer Aided Design Lab	-	-	2	1
MDE4204	Advanced Tribology	3	1	-	4
MDE4205	Industrial Robotics	3	1	-	4
MDE4213	Experimental Stress Analysis	3	1	-	4
Value Added Courses					
CSS4251	Corporate Communication	1	-	-	1
BEH4251	Behavioural Communication and Relationship Management	1	-	-	1
Foreign Language-II (As opted in 1st Semester)					
LAN4251	French-II	3	-	-	3
LAN4252	German-II				
LAN4253	Spanish-II				
LAN4254	Russian-II				
LAN4255	Chinese-II				
LAN4256	Portuguese-II				
LAN4257	Korean-II				
LAN4258	Japanese-II				
LAN4259	Hindi-II				
Total Credits					**27**

ME 4201	OPTIMIZATION TECHNIQUES	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description

In this course the concepts of optimization techniques are discussed in detail. The main objective of this course is to provide the basic concepts of optimization techniques and to educate them on the advancements in optimization techniques. It also provides knowledge of multi-Objective Programming and Genetic algorithms.

Course Objectives

The objective of this course is

1. To familiarize the students with various tools of optimization for management of various resources.

2. To acquaint the students with various advance techniques of optimization like multi-Objective Programming and Genetic algorithms etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define optimization technique and explain its various techniques.

CO2: Apply the concept of classical optimization techniques for solving problems on single-variable and multi-variable optimization.

CO3: Apply non-linear programming and solve problems on one-dimensional optimization methods, unconstrained and constrained optimization techniques.

CO4: demonstrate the concept of other optimization techniques like geometric programming, dynamic programming, integer programming, stochastic programming, and solving problems.

CO5: Illustrate different types of advance topics in optimization.

Modules	Blooms level*	Number of hours
Module 1: Introduction Need of Optimization and Historical Development, Engineering Applications, Classification and Formulation of Optimization Problem	L1, L2 and L3	6
Module 2: Classical Optimization Techniques Single-Variable and Multi-Variable Optimization, With and Without Constraints, Kuhn-Tucker Conditions.	L1, L2 and L3	10
Module 3: Non-Linear Programming Introduction, One-Dimensional Optimization Methods, Unconstrained and Constrained Optimization Techniques; Elimination Methods, Exhaustive Search, Interval Halving, Fibonacci, Golden Section Methods; Random Search Methods, Hooke and Jeeves Method, Powell's Method; Indirect Search Methods: Steepest Descent, Fletcher-Reeves, Newton's Method, DFP, BFGS Method; Internal and External Penalty Approach.	L1, L2 and L3	12
Module 4: Other Optimization Techniques Introduction and Basic Concepts of Geometric Programming, Dynamic Programming, Integer Programming, Stochastic Programming, Their Applications	L1, L2 and L3	10
Module 5: Advance Topics in Optimization Multi-Objective Programming, Introduction to Genetic Algorithms, Simulated Annealing and ANN Based Optimization.	L1, L2 and L3	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

1.Engineering Optimization Theory and Practice by S.S. Rao, New Age International, 1996

2.Hillier and Lieberman "Introduction to Operations Research", TMH, 2000.

3.HamdyATaha, "Operations Research –An Introduction", Prentice Hall India, 2003.

References:

1.Philips, Ravindran and Solberg, “Operations Research”, John Wiley, 2002.

2.RonaldL.Rardin, “Optimization in Operation Research” Pearson Education Pvt. Ltd. New Delhi, 2005

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

ME 4202	Design of Experiments	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Probability, Engineering statics, data analysis, hypothesis testing and ANOVA				
Co-requisites	Apply basic principles in the design of simple experiments.				

Catalog Description

In this course the concepts of experimental design, steps of experimental design, types of experimental design and six sigma are discussed in details. The design of experiments includes completely randomized design, latin square design, factorial design, full factorial design, fractional factorial design, robust design and Taguchi's approach for experimental design.

Course Objectives

The objective of this course is to

1. Explain the issues and principles of Design of Experiments (DOE),
2. Providing an understanding of interactions among causative factors
3. Determining the levels at which to set the controllable factors.
4. Minimizing experimental error (noise) and improving the robustness of the design or process to variation.

Course Outcomes

On completion of this course, the students will be able to

CO1. Learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions..

CO2. Given a description of an experiment, determine whether it is a factorial experiment, a fractional factorial experiment, or neither

CO3. Determine whether the design appropriately deals with extraneous variables via controlling, blocking, randomization or replication.

CO4. Explain robust design and taguchi's approach for design of experiments.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction A brief history of statistical design, Objectives for experimental designs. Basic design concepts. Steps and guidelines for the design of experiments, Some typical applications of experimental design, Types of experimental designs, Analysis of means, Experimental designs and six sigma, Problems	L1, L2 and L3	10
MODULE 2: Completely Randomized Design Model for a completely randomized design with a single factor. ANOM for a completely randomized design, ANOM with unequal variances, randomized block design, incomplete block designs, latin square design, Graeco – Latin square design.	L1, L2, L3 and L4	12
MODULE 3: Full Factorial and Fractional Factorial Designs with Two Levels Nature of factorial designs, deleterious effects of interactions, effect estimates the $\mathbf{2^3}$ Design, built-in –replication, role of expected mean squares in experimental design, **2k-1** Designs. Effect estimates and regression coefficients, **2k-2** Designs. basic concepts; design efficiency, John's **3/4** designs	L1, L2, L3 and L4	14
MODULE 4: Robust Design DOE and Taguchi approach; experimental design using orthogonal arrays; experimental design with two-level factors only; experimental designs with three and four level factors; ANOVA ; analysis using signal- to- noise ratios.	L1, L3 and L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas C. Montgomery , Design and Analysis of Experiments, Wiley International Student Edition (8), 2014.
3 Jiju Antony, Design of experiments for engineers and scientists, Elsevier, 2014
4. J P Holman, Experimental Methods for Engineers – (Southern Methodist University, USA) Tata McGraw Hill

Reference Books

1. Howard J. Seltman, Experimental design and Analysis; 2013
2. N.C. Barford (Imperial College of Sic & Tech), Experimental Measurements, Precision, Error and Truth –, Addison-Wesley Publication Company, London.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO3	**2**	**1**	**1**	**3**	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO4	**1**	**2**	**1**	**2**	--	--	--	--	--	--	--	--	**1**	--	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

ME4203	**RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING**	L	T	P	C

Version 2019.1	Date of Approval: 08 May, 2019	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

1. Deals with types of research, significance and characteristics and planning a research proposal and to enhance scientific and technical writing and research skills.
2. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
3. It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Classify different research types; explain steps in research process and planning research pro posal.

CO2: Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3: Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4: Demonstrate technical and scientific report writing skills; describe plagiarism, patent laws and intellectual property rights.

Modules	**Blooms level***	**Number of hours**
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review,	L1, L2	4

web searching.		
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.	L1, L2, L3	5
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	10
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs. Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.	L1, L3, L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

4. Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
5. Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.
6. Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

4. Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
5. Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
6. Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3

1: strongly related, 2: moderately related and 3: weakly related

MDE 4211	**ADVANCED COMPUTER AIDED DESIGN**	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	CAD Modeling, Solid works				
Co-requisites	Nil				

Catalog Description

In this course the concepts of solid modeling in computer aided design are discussed in detail. This course includes transformation of point, line and projection of an object. Introduction to the principles of curve, surface and solid representations; mathematical representations of curves, surfaces, solids and application to mechanical design problems are discussed in details.

Course Objectives

The objective of this course is to

1. Learn about the geometric issues concerned solid modeling, geometric transformation and projection of object.
2. Impart the parametric fundamentals to create and manipulate geometric models using curves, surfaces and solids.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Describe the concept of solid modeling and explain the parametric equation in CAD

CO 2: Solve the problem on 2 D transformation and 3 D in CAD and explain the orthographic, axonometric, oblique and perspective projections

CO 3: Explain the topology of geometry and determine the equation of Hermit curve, Bezier curves and B-spline curves.

CO 4: Explain the geometric form of surface, blending function and determine the equation of bi-cubic surface, bezier surface and B-spline surfaces

CO 5: Describe the solid representation scheme and demonstrate the constructive solid geometry, sweep representation and cell decomposition in solids.

CO 6: Summaries the analytical properties of curve and surface.

Modules	**Blooms level***	**Number of hours**
MODULE 1:INTRODUCTION Introduction, Review of vectors & Matrices, Basics of geometric and solid modeling, explicit, implicit, intrinsic and parametric equations, coordinate systems	L1, L2 and L3	4
MODULE 2:TRANSFORMATIONS Introduction, transformation of points and line, 2-D translation, shearing, rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, orthographic, axonometric, oblique and perspective projections.	L1, L2 and L3	6
MODULE 3:CURVES	L1, L2	8

Geometry and topology, algebraic and geometric forms of straight lines, circles, conics, cubic splines, Ferguson curve, Hermit curve, Bezier curves and B-spline curves, NURBS, composite curves, tangents and normal, blending functions, reparametrization.	and L3	
MODULE 4:SURFACES Algebraic and geometric forms, tangents and twist vectors, normal, blending functions, reparametrization. Plane surface, sixteen point form, four curve form, ruled surface, surface of revolution, tabulated cylinder, lofted surface, bi-cubic surface, bezier surface, B-spline surfaces, Coons' patch, blending surface, offset surface, rational surface.	L1, L2 and L3	8
MODULE 5:SOLIDS Solid models and representation schemes, their properties, boundary representation, constructive solid geometry, sweep representation, cell decomposition, octree encoding, spatial occupancy enumeration.	L1, L2 and L3	7
MODULE 6:ANALYTICAL PROPERTIES Analytical properties (Intersection & development) of curves and surfaces	L1,L2 and L3	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Grover and Zimmer, CAD/CAM, Prentice Hall, 1984, New Delhi.
2. I. Zeid, CAD/CAM: Theory and Practice, McGraw Hill, 2009, New Delhi.
3. M.E. Mortenson, Geometric Modeling, Industrial Press, 2006.
4. Computer Aided Design by JayantaSarkar, CRC Press

Reference Books

1. Mikell Grover,CAD/CAM,Pearson Publication,2003,New Delhi
2. Michael E. Mortenson,Geometric Modelling,Wiley Publication,1997,USA
3. G.K.Vijayaraghavan & dr.S.Sundaravalli,Computer Aided Design,Lakshmi Publications,New Delhi.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO3	1	1	3	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO5	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO6	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

MDE 4212	ADVANCED COMPUTER AIDED DESIGN LAB	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	-	-	2	1
Pre-requisites/Exposure	CAD Modeling, Solid works				
Co-requisites	Nil				

Catalog Description

In this course the concepts of solid modeling in computer aided design are discussed in detail. This course includes the different types of features in part modeling, assembly of parts and projection of an object. Moreover the syllabus also covers the principles of curve, surface and solid representations; surfaces, solids and application to mechanical design

problems.

Course Objectives

The objective of this course is to

1. Learn about the geometric issues concerned solid modeling and projection of object.
2. Impart the parametric fundamentals to create and manipulate geometric models using curves, surfaces and solids.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Demonstrate the fundamentals of modeling software features and capabilities. Prepare the sketch of simple mechanical components. Explain different types of features in part modeling & assembly of parts.

CO 2: Identify the mass properties & sectional properties of part & assembly and validate the assembly with interference detection.

CO 3: Construct machine elements in sketcher, part and assembly mode such as crankshaft, connecting rod, piston etc.

CO 4: Develop codes for analytical and synthetic curves.

CO 5: Construct the model using surface modeling tool.

List of Experiment	**Blooms level***	**Number of hours**
1) Drawing sketches in the sketcher workbench, Constraints sketches and creating base features, Reference elements and sketch-based features.	L1, L2	2
2) Creating dress-up, hole features and Editing features.	L1, L2	2
3) To draw the detail view of the flange coupling and assemble the parts by using the CAD software and obtain its respective views.	L1, L2	2
4) To draw the detail view of the – crankshaft and assemble the parts by using the CAD software and obtain its respective views.	L1, L2 and L3	2
5) To draw the detail view of the connecting rod and assemble the parts by using the CAD software and obtain its respective views.	L1, L2	2

	and L3	
6) To draw the detail view of the piston and assemble the parts by using the CAD software and obtain its respective views.	L1,L2 and L3	2
7) Develop the computer program to generate the Bezier curve	L1,L2 and L3	2
8) Develop the computer program to generate the B-spline curve	L1,L2 and L3	2
9) Working with wireframe and surface design workbench.	L1,L2	2
10) To develop the mouse model by surface modeling using CAD software.	L1,L2 and L3	3
11) To develop the spoon model by surface modeling using CAD software.	L1,L2 and L3	3

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1) Grover and Zimmer, CAD/CAM, Prentice Hall, 1984, New Delhi.
2) Zeid, CAD/CAM: Theory and Practice, McGraw Hill, 2009, New Delhi.
3) M.E. Mortenson, Geometric Modeling, Industrial Press, 2006.
4) Computer Aided Design by JayantaSarkar, CRC Press.

Reference Books

1) Mikell Grover,CAD/CAM,Pearson Publication,2003,New Delhi
2) Michael E. Mortenson,Geometric Modelling,Wiley Publication,1997,USA
3) G.K.Vijayaraghavan & dr.S.Sundaravalli,Computer Aided Design,Lakshmi Publications,New Delhi.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO2	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO3	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO4	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**
CO5	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**

MDE 4204	**Advanced Tribology**	**L**	**T**	**P**	**C**
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure	Physics				
Co-requisites					

Catalog Description

Advanced Tribology is a cross-disciplinary course based on the basic principles of the science and engineering. The course focuses on theories of friction, wear, lubrication, basic model approaches of tribologicalelements/systems, and methods to simulate tribological processes.

Course Objectives

The objective of this course is to:

1. Introduce students with the field of Tribology i.e. friction, wear and lubrication.
2. Enhance students' awareness of Tribological issues in the design of machine components, such as rolling element bearing, journal bearing, thrust bearings, seals and braking system.

Course Outcomes

On completion of this course, the students will be able to
CO1: State and explain different types of engineering surfaces, their properties and measurement methods.
CO2: Describe and explain different contact between surfaces, Hertzian and Non-Hertzian contact. Explain different methods of measurement.
CO3: Define wear, lubrication and their type and will be able to explain different wear mechanism and lubrication regime.
CO4: Define, describe and analyze Hydrodynamic Journal Bearing, thrust bearing and air lubricated journal bearing.
CO5: Explain and describe the Nanotribology and its measurement methods.

Modules	**Bloom s level***	**Numbe r of hours**
MODULE 1: INTRODUCTION Introduction to Tribology and its historical background Industrial importance, Factors Influencing Tribological phenomena ENGINEERING SURFACES, PROPERTIES AND MEASURMENT Engineering surfaces -surface characterization computation of surface parameters. Surface measurement techniques. Apparent and real area of contact, Contact of engineering surfaces.	L1, L2 and L3	8
MODULE 2: SURFACE CONTACT Hertzian and Non-Hertzian contact. Contact pressure and deformation in non-conformal contacts. SURFACE CONTACT Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, Various laws and theory of friction. Stick slip friction behavior, frictional heating and temperature rise. Friction Measurement techniques.	L1, L2, L3	8
MODULE 3: WEAR Wear and Wear types. Mechanisms of wear -Adhesive, abrasive, corrosive, erosion, fatigue, fretting, etc., wear of metals and non-metals. Wear models – asperity contact, constant and variable wear rate, geometrical influence in wear models, wear damage. Wear in various mechanical components, wear controlling techniques.	L1, L2, L3	8
MODULE 4: LUBRICATION Introduction to Lubrication, Lubrication regimes, Lubricants and their properties. Solid Lubricants.	L1, L2, L3	7
MODULE 5: HYDRODYNAMIC BEARING Mechanism of pressure development, Classification, Idealized Journal Bearing, Pressure Distribution. ANTIFRICTION BEARING Ball and Roller Bearing, Geometry of ball bearing, Stresses and Deformation,	L1, L2, L3, L4	10

Lubrication of ball bearing. GAS LUBRICATED BEARING Introduction, Governing Equation, Finite Journal Bearings. .		
MODULE 6: NANOTRIBOLOGY Introduction to micro and NanoTribology. Measurement tools used in Nanotribology: SFA, STM, AFM Micro scale and Nanoscale Wear Nanofabrication/NanomachiningNanohydrodynamicsNanolubricationTribological issues in MEMS. .	L1, L2, L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. "Engineering Tribology" by PrasantaSahoo, PHI, 2005
2. "Engineering Tribology" by Stachowiak&Batchelor, Elsevier, 2013

References Books

1. "Nanotribology and Nanomechanics: An Introduction" by Bharat Bhushan, Springer, 2009
2. "Nanotribology" by Hsu & Ying, Springer, 2003

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	-	--	--	--	--	--	--	--	--	1	-	-	-
CO2	1	2	-	-	--	--	--	--	--	--	--	--	1	-	-	-
CO3	1	2	-	-	-	--	--	--	--	--	--	-	1	-	-	-
CO4	1	2	2	-	--	--	--	--	--	--	--	--	1	-	-	-
CO5	1	2	-	--	-	--	--	--	--	--	--	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

MDE4205	Industrial Robotics	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Kinematics of Machines				
Co-requisites	Nil				

Catalog Description

This subject covers the fundamental concept of Robotics used in industrial application including motors, controllers, and sensors etc. This course includes Robot anatomy,coordinate frames**,** manipulator control**,** Robot sensors, language, applications, kinematics and dynamic modeling etc.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Robotics, coordinate frames, mapping, Robot language sensors and applications.

2. Provide an overview of manipulator control, kinematic and dynamic modeling of different types of robot.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe evolution, history and progressive advancement in Robotics and explain fundamental of coordinate frame, mapping and transforms.

CO2. Explain the kinematic model and inverse kinematics of robot arm configuration.

CO3. Describe the manipulator differential motion and explain dynamic behavior of manipulator.

CO4. Explain the manipulators control and various sensors used in robot.

CO5. Explain various robot applications and methods of robot programming.

Modules	**Blooms level***	**Number of hours**
MODULE 1:INTRODUCTION TO ROBOTICS Evolution of Robots and Robotics, Laws of Robotics, Progressive advancement in Robots Robot anatomy, Human Arm Characteristics, Design and Control issue, Manipulation and Control, Programming Robots. COORDINATE FRAMES, MAPPING AND TRANSFORMS Coordinate Frames, Description of objects in space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation matrix.	L1, L2 and L3	8
MODULE 2:DIRECT KINEMATIC MODEL Mechanical structure and notations Kinematic modeling of the manipulate or Denavit Hardenberg Notation Manipulator Transformation Matrix THE INVERSE KINEMATIES Manipulator workspace, solvability of Inverse kinematics model, solution techniques, closed form solution.	L2 and L3	10
MODULE 3:MANIPULATOR DIFFERENTIAL MOTION AND STATICS Linear and angular velocity of a rigid body, relationship between transformation matrix and angular velocity, manipulator Jacobian, Jacobian Inverse, Jacobian Singularities, Static Analysis. DYNAMIC MODELING LargrangianMechanies, Two Degree of Freedom manipulator-Dynamic Model, Lagrange-Euler formulation Newton-Euler formulation, Inverse	L1, L2 and L3	10

Dynamics.		
MODULE 4:CONTROL OF MANIPULATORS Open and Close loop control, linear control schemes, linear second order SISO model of a manipulator joint. Joint Actuators, Computed Torque Control, force control of Robitics, Manipulators, Hybrid position/force control, Impedance Force/Torque Control. ROBOTIC SENSORS Sensors in Robitcs, classification of Robotic sensors, kinds of sensors used in robotics-Acoustic sensors optic, Pneumatic, force/Torque sensors.	L2 and L3	10
MODULE 5: ROBOT APPLICATIONS Industrial Applications-Material Handling, Processing Applications, Assembly applications, inspection application, Principles for Robot application and application planning, Robot safety, Non-Industrial Application. ROBOT LANGUAGES AND PROGRAMMING The Textual Robot Languages, Generations of Robot Programming Languages, Methods of Robot Programming.	L1, L2 and L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Robert J. Sehilling, Fundamental of Robotics, Prentice Hall of India.
2. Saeed B. Niku, Introduction to Robotics by Pearson Education Asia.

References Books

1. RachidManseur, Robot Modeling and kinematics, Luxmi Publications
2. Robotics and Control by R K Mittal Tata McGraw Hill Publishers

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	3	--
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	--	3	--
CO3	1	2	3	3	3	--	--	--	--	--	--	--	1	--	3	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	3	--
CO5	1	1	2	--	--	--	--	--	--	--	--	--	1	--	3	--

1: strongly related, 2: moderately related and 3: weakly related

MDE 4313	Experimental Stress Analysis	L	T	P	C
VERSION	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/ Exposure	Strength of Materials				
Co-requisites					

Catalog Description

The course introduces the physical principle used by various experimental techniques and also provides a guideline to select an experimental technique for a given application. The role of analytical, numerical, experimental methods in solving a problem in solid mechanics and different types of non-destructive methods are discussed.

Course Objectives

The objective of this course is to:

1. Recognize the various techniques available to measure the stress and Strains using different sources.

2. Realize the working of recording instruments and data logging methods

3. Distinguish the principles of photo elasticity in two dimensional stress analyses.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define, describe and analyze the measurements techniques, accuracy of measurement and error analysis.

CO2: Explain and describe the theory Mechanical Strain Gauges, Optical Strain Gauges, Electrical Strain Gauge and Acoustical Strain Gauge.

CO3: Acquire the knowledge on Brittle and Bi-Refrigerant coatings and analyze the working of strain gauges.

CO4: Describe and explain the overall concepts of stress/strain analysis by experimental means.

CO5: Explain and analyze the theory and practice of common experimental stress analysis Methods including Moir methods, non destructive testing.

Modules	Blooms level*	Number of hours
MODULE 1: MEASUREMENTS Principles of measurements, Range and Accuracy of measurements, Sensitivity of Measurements, Error Analysis	L1, L2 and L4	9
MODULE 2: EXTENSOMETERS Mechanical Strain Gauges, Optical Strain Gauges, Electrical Strain Gauge, Acoustical Strain Gauge.	L1, L2, L3	10
MODULE 3: ELECTRICAL RESISTANCE STRAIN GAUGES Principle of Operation and Requirements, Types and their uses, Materials for strain gage, Calibration and Temperature Compensation, Cross Sensitivity, Circuits for Static and Dynamic Strain Measurements, Strain Indicators , Rosette Analysis	L1, L2, L3, L4	11
MODULE 4: PHOTOELASTICITY Concepts of light, Photoelastic effects, stress optic law, Interpretation of fringe pattern, Compensation and Separation Techniques, Photoelastic materials	L1, L2, L3	8
MODULE 5: NON-DESTRUCTIVE TESTING Fundamental of NDT, Radiography, Magnetic Particle Inspection, Ultrasonic Testing, Fluorescent Penetrate Technique, Eddy Current Testing, Acoustic Emission Technique, Thermography , Fundamentals of brittle coating methods, Introduction to Moir Techniques, Holography.	L1, L2, L3, L4	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Experimental Stress Analysis by Dally, J. W. & Riley, W. F,2009.
2. Experimental Stress Analysis by L.N. Srinath,2013.

References Books

1. Strain Gauges by Lissner, H.R and Perry, C. C,2005..
2. Photo elastic Separation of Principle Stress by Drucker, D.C,2006.
3. Work on General B-D Photoelasticxity by Froncht, M. M, 2004.
4. Similarities between Stress & Flow Patterns by Hetenye, M,2013.

Modes of Evaluation: Quiz/Assignment/Seminar/Written Examination
Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	2	--	-	--	--	--	--	--	--	--	--	1	-	-	-
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	-	-	-
CO4	1	1	--	--	--	--	--	--	--	--	--	--	1	-	-	-
CO5	1	1	--	--	--	--	--	--	--	--	--	--	1	--	-	-

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engineering & Technology | M.Tech. Mechanical Engineering |
Total Credits: 100 | 2 Years / 4 Semesters

Third Semester
For Machine Design Engineering

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Engineering Science Courses					
ME4301	Total Quality Management & Quality Assurance	3	1	-	4
Specialization Elective Courses (choose any three)					
MDE4302	Advanced Mechanical Vibrations	3	-	-	3
MDE4307	Advanced Mechanical Vibrations Lab	-	-	2	1
MDE4303	Finite Elements Method	3	-	-	3
MDE4308	Finite Elements Method Lab	-	-	2	1
MDE4309	Product Design & Development	3	1	-	4
MDE4310	Advanced Mechanical Design	3	1	-	4
Summer Internship					
ME4335	Summer Internship Evaluation	-	-	-	6
Dissertation					
ME4337	Dissertation-I	-	-	-	5
Value Added Courses					
CSS4351	Interpersonal Communication	1	-	-	1
BEH4351	Leading through Teams	1	-	-	1
Foreign Language-III (As opted in 1st Semester)					
LAN4351	French-III	2	-	-	2
LAN4352	German-III				
LAN4353	Spanish-III				
LAN4354	Russian-III				
LAN4355	Chinese-III				
LAN4356	Portuguese-III				
LAN4357	Korean-III				
LAN4358	Japanese-III				

LAN4359	Hindi-III				
Total Credits					**31**

ME4301	**TOTAL QUALITY MANAGEMENT & QUALITY ASSURANCE**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description

In this course the concepts of quality improvement in manufacturing are discussed in detail. Various quality management tools, improvement cycles, quality circles and audit procedures will be introduced. The concepts learnt will be applied to improve quality in manufacturing.

Course Objectives

The objective of this course is to

3. Equip the students with concepts of quality improvement in manufacturing.
4. Provide an overview of quality management tools, improvement cycles, quality circles and audit procedures.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define components of quality, innovation, design and explain Product quality characteristics and dimensions.

CO2: Explain various key aspects of the quality system standards.

CO3: Describe total quality management tools, improvement cycle and quality organization.

CO4: Define quality assurance, inspection, quality circles and explain quality audits.

Modules	**Blooms level***	**Number of hours**
MODULE 1:The Foundations of Total Quality Management: Components of quality, The total quality management approach, Innovation, design and improvement, Product quality characteristics and service quality characteristics, Quality parameters and specific	L1and L2	8

dimensions of quality.		
MODULE 2:Key Aspects of the Quality System: Planning for quality**,** Flowcharting, Detailed flow process charts and flow diagrams**,** planning for just-in-time (JIT) management**,** System design and contents**,** System documentation, implementation and assessment.	L1 and L2	8
MODULE 3:TQM Tools and the Improvement Cycle: Measurement of quality, Costs of quality, Tools and techniques for quality improvement, Statistical process control, Quality improvement techniques in service industries, Specific techniques for design, reliability, maintenance and process improvement.	L1 and L2	10
MODULE 4: **The Quality Organization Within an Organization:** People and the organizational structure**,** Responsibilities and performance management**,** The relationship between the quality organization and top management**,** Culture change through teamwork for quality improvement**,** Implementing teamwork for quality improvement: the DRIVE model.	L1 and L2	10
MODULE 5:Internal Quality Audits: Scope of requirements and audit procedures**,** the audit programme and planning of quality audits**,** Verifying compliance with planned arrangements, determining the effectiveness of the system**,** reporting the results of quality audits**,** Follow-up audits Quality and Business Process Re-engineering:Beyond tools to total quality management**,** Stages in the development of quality and related activities: inspection, quality assurance**,** company-wide quality control**,** total quality management, Quality circles.	L1 and L2	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

4. Prasad L M, "Principles and Practice of Management", S Chand& Company Ltd., New Delhi, 2008.
5. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India Delhi, 2015
6. Competitive Manufacturing Management by John M. Nicholas, Mcgraw Hill. Delhi, 2001.

Reference Books

3. Statistical Quality Control by M. Mahajan, DhanpatRai& Co. (P) Ltd, Delhi, 2018.
4. Reliability Engineering, by E.BalaGuruswamy, Tata McGraw Hill, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**

Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO2	**1**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	**1**	--	--
CO3	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO4	**1**	--	--	--	**2**	--	--	--	--	--	--	--	--	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

MDE 4302	**ADVANCED MECHANICAL VIBRATIONS**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Physics, Engineering Mathematics				
Co-requisites					

Catalog Description

This subject will cover the fundamental concepts on the vibration of mechanical systems one degree of freedom, Lagrange's equations of motion and multiple degree of freedom systems. This course includes introduction to matrix methods, influence coefficient, forced vibration, principle mode of vibration, Rayleigh method, measuring instruments, isolation, torsional systems and balancing of machines.

Course Objectives

The objective of this course is to

1. Provide adequate knowledge to analyse one-degree and multi-degree of freedom systems of vibrations using different methods.
2. Find out natural frequencies and amplitude responses of different systems.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Explain and determine the equation of motion for free vibration and forced vibration for damped and undamped conditions

CO 2: Explain and determine the equation of motion continuous system i.e. rod, cable and beam.

CO3: Determine the equation of motion in reciprocating and rotary balancing of machine and explain the vibration isolation.

CO4: Explain vibration measuring instruments and its application and determine the equation of motion for vibration exciter.

CO 5: Describe and determine the equation of motion for non linear vibration by exact and approximate method.

Modules	Blooms level*	Number of hours
MODULE 1:**Introduction to vibrations** Brief introduction to vibrations, its causes, advantages and disadvantages, classification: un-damped and damped vibrations, single and two degree of freedom models. Introduction to lateral, torsional and bending vibrations. Harmonic and harmonic analysis. Free and harmonically excited vibrations. Vibrations under general forcing conditions.	L1, L2 and L3	7
MODULE 2:**Vibrations of continuous system** Transverse vibrations of a cable, longitudinal and torsional vibrations of a rod, lateral vibrations of a beam, vibrations of membranes. Rayleigh's method, Rayleigh-Ritz method.	L1, L2 and L3	7
MODULE 3:**Vibration Control** Introduction, vibration nomograph and vibration criteria, reduction of vibration at the source, balancing of rotating machines, whirling of rotating shafts, balancing of reciprocating engines, control of vibrations, control of natural frequencies, vibration isolation, vibration absorbers.	L1, L2 and L3	8
MODULE 4:**Vibration measurement and applications** Introduction, transducers, vibration pickups, frequency measuring instruments, vibration exciters, signal analysis, dynamic test of machines an structures, experimental modal analysis, machine condition monitoring and diagnosis.	L1, L2 and L3	7
MODULE 5:**Non linear vibration** Introduction, examples of non-linear vibration problems, exact methods, approximate analysis methods, subharmonic and superharmonic oscillations, systems with time-dependent coefficients (Mathieu equations), graphical methods, stability of equilibrium states, limit cycles, chaos.	L1, L2 and L3	7

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1) Mechanical Vibrations by S.S. Rao, Pear and on Publication.
2) Mechanical Vibration by Thomson, Print ice Hall.
3) Mechanical Vibration by Den Hartog, McGraw-Hill

Reference Books

1. S. Graham Kelly, “Mechanical Vibrations”, McGraw-Hill, New Delhi.
2. G K Grover, “Mechanical Vibrations”,NemChand, 1977,New Delhi
3. V P Singh, “Mechanical Vibrations”,DhanpatRai Publications.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	--	**1**	**3**	--
CO2	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**3**	--
CO3	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	**3**	--
CO4	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**3**	--
CO5	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**3**	--

1: strongly related, 2: moderately related and 3: weakly related

MDE 4307	Advanced Mechanical Vibrations Lab	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure	Physics, Engineering Mathematics				
Co-requisites	Nil				

Catalog Description

The vibration engineering lab will cover the fundamental concepts on the vibration of mechanical systems of free vibration for simple, compound pendulum and torsional vibration of rotor. An Interpretation of results is to find out the natural frequency of different mechanical systems.

Course Objectives

The objective of this course is to

1. Provide adequate knowledge to analyze one-degree and multi-degree of freedom systems of vibrations using different methods.
2. Find out natural frequencies and amplitude responses of different systems.

Course outcomes

On completion of this course, the students will be able to

CO 1: Explain and determine the natural frequency of torsional vibration and damping coefficient of free vibration.

CO 2: Explain the equation of motion of longitudinal vibration and determine the natural frequency of spring mass system.

CO3: Explain the Dunkerley,s rule and determine the natural frequency of beam.

CO4: Explain and determine the natural frequency of forced vibration of the system with its magnification factor

CO 5: Describe the beat motion analysis and determine the harmonic component of compressor and also measure the characteristics of coupled drive apparatus.

Experiment	Blooms level*	Number of hours
1. To study the Torsional vibration (undamped) of single rotor shaft system	L2,L3	1
2. To study the damped Torsional oscillations and determine the damping coefficient	L2,L3	1
3. To study the longitudinal vibration of spring and to determine the frequency theoretically and actually by experiment	L2,L3	1
4. To study the undamped free vibration of equivalent spring mass system.	L2,L3	1
5. To verify the Dunkerley,s rule on simply supported beam and compare it with actually by experiment .	L2,L3	1
6. To study the free vibrations of the system for different damper settings. Draw the decay Curve and determine the log decrement and damping factor. For also the natural frequency.	L2,L3	1
7. To determine analytically the natural frequency of the main system (fixed- fixed beam with motor fixed at its centre) and verity it by observation.	L2,L3	1
8. To study the forced vibrations of the system with damping. Plot magnification factor us frequency and phase angle us. Frequency curves. Also determine the damping factor.	L2,L3	1
9. Find the natural frequencies and modes of vibration of three-rotor system analytically and compare the same experimentally.	L2,L3	1
10. Investigation of the node and anti-node position for the cantilever beam.	L2,L3	1
11. To find the natural frequencies of the box supported on four experimentally and verify the same and analytically.	L2,L3	1
12. Find the period of beat motion analytically and check the same observation.	L2,L3	1
13. To determine harmonic components of Vibrations of a compressor bed.	L2,L3	1
14. Measurement of system characteristics of coupled drive apparatus in open loop-mode.	L2,L3	1

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

1) Mechanical Vibrations by S.S. Rao, Pear and on Publication.
2) Mechanical Vibration by Thomson, Print ice Hall.
3) Mechanical Vibration by Den Hartog, McGraw-Hill

Reference Books

1) S. Graham Kelly, "Mechanical Vibrations", McGraw-Hill, New Delhi.
2) G K Grover, "Mechanical Vibrations", NemChand, 1977,New Delhi
3) V P Singh, "Mechanical Vibrations", DhanpatRai Publications.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	**1**	**3**	--
CO2	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	**1**	**3**	--
CO3	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	**1**	**3**	--
CO4	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	**1**	**3**	--
CO5	**1**	--	--	--	--	--	--	--	--	--	--	**1**	--	**1**	**3**	--

1: strongly related, 2: moderately related and 3: weakly related

MDE4303	FINITE ELEMENT METHOD	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Applied Numerical Methods				
Co-requisites	Nil				

Catalog Description

In this course, the concepts of finite element method and solutions to structural, heat transfer and fluid flow problems are discussed in details.To master this course, students should have a background in basic knowledge of applied numerical methods.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of theory and characteristics of finite elements methods.
2. Provide an overview to learn and apply finite element solutions to structural, heat transfer and fluid flow problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe history, applications and comparison of FEM with other methods.

CO2. List and explain the methods to solve the boundary value problems and partial differential equations.

CO3. State and explain various finite element techniques to carry out finite element solution.

CO4. Explain and apply application of FEM to solid and structural mechanics problems.

CO5. Demonstrate and analyze application of FEM to heat transfer and fluid flow problems.

Modules	Blooms level*	Number of hours

MODULE 1:**Introduction to Finite Element Method:** Basic Concept, Historical background, Engineering applications, general description Comparison with other methods	L2	6
MODULE 2:**Integral Formulations And Variation Methods:** Need for weighted-integral forms, relevant mathematical concepts and formulae, weak formulation of boundary value problems, variation methods, Rayleigh-Ritz method, and weighted residual approach.	L1 and L2	6
MODULE 3:**Finité Elément Techniques:** Model boundary value problem, finite element discretization, element shapes, sizes and node locations, interpolation functions, derivation of element equations, connectivity, boundary conditions, FEM solution, post-processing, compatibility and completeness requirements, convergence criteria, higher order and isoparametric elements, natural coordinates, Langrange and Hermit polynomials.	L1 and L2	8
MODULE 4:**Applications To Solid and Structural Mechanics Problems:** External and internal equilibrium equations, one-dimensional stress-strain relations, plane stress and strain problems, axis-symmetric and three dimensional stress-strain problems, strain displacement relations, boundary conditions, compatibility equations, Analysis of trusses and frames	L2 and L3	8
MODULE 5: **Applications To Heat Transfer and Fluid flow Problems:** Applications in heat transfer: Finite element solution of one-dimensional, two-dimensional and three-dimensional steady state heat conduction problems by using Galerkin approach. Applications in fluid mechanics: Finite element solution of incompressible and compressible fluid film lubrication problems by using Galerkin approach.	L3 and L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. The Finite Element Method by Zienkiewicz, Tata McGraw Hill
2. The Finite Element Method for Engineers by Huebner, John Wiley

References Books

1. An Introduction to the Finite Element Method by J.N.Reddy, McGraw Hill
2. The Finite Element Method in Engineering by S.S. Rao, Pergamum Press

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	3	--	--	--	--	--	--	--	--	--	1	2	-	--
CO2	1	2	2	3	--	--	--	--	--	--	--	--	1	2	-	--
CO3	2	1	1	3	--	--	--	--	--	--	--	--	2	1	3	--
CO4	2	1	1	--	--	--	--	--	--	--	--	--	1	2	-	--
CO5	2	1	1	3	--	--	--	--	--	--	--	--	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related

MDE4308	**FINITE ELEMENT METHOD LAB**	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure	Applied Numerical Methods				

Co-requisites	Nil

Catalog Description

In this course, the concepts of finite element method and solutions to structural, heat transfer and fluid flow problems are discussed in details. To master this course, students should have a background in basic knowledge of applied numerical methods.

Course Objectives

The objective of this course is to

1. Equip the students with the concepts of theory and characteristics of finite elements methods.
2. Provide an overview to learn and apply finite element solutions to structural, heat transfer and fluid flow problems.

Course Outcomes

On completion of this course, the students will be able to

CO1. Predict the stresses in cantilever beam and stepped bar by applying FEA software.

CO2. Calculate the stresses in connecting rod, piston and crankshaft using FEA software.

CO3. Determine the mode shape using FEA software.

CO4. Solve and analyze the heat transfer problem through fin and composite wall.

CO5. Construct and analyze the fluid flow problem through pipe and nozzle.

Modules	Blooms level*	Number of hours
1. Stress analysis of a cantilever beam using FEA software.	L1,L2 and L3	1

2. Stress analysis of a stepped bar using FEA software.	L2 and L3	1
3. Stress analysis of connecting rod using FEA software.	L2 and L3	1
4. Stress analysis of piston using FEA software.	L2 and L3	1
5. Stress analysis of crankshaft using FEA software.	L2 and L3	1
6. To determine different mode shape in a structural member by modal analysis using FEA software.	L2 and L3	1
7. To develop numerical simulation for the heat conduction problem in a fin using FEA software.	L2 and L3	1
8. To develop numerical simulation for the heat conduction problem in a composite wall using FEA software.	L2 and L3	1
9. To develop numerical simulation for laminar/turbulent flow in a pipe using FEA software.	L2 and L3	1
10. To develop numerical simulation for laminar/turbulent flow in a nozzle using FEA software.	L2 and L3	1

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. The Finite Element Method by Zienkiewicz, Tata McGraw Hill
2. The Finite Element Method for Engineers by Huebner, John Wiley

References Books

1. An Introduction to the Finite Element Method by J.N.Reddy, McGraw Hill
2. The Finite Element Method in Engineering by S.S. Rao, Pergamum Press

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4

CO1	**1**	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**--**
CO2	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**--**
CO3	**1**	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**	**--**
CO4	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**
CO5	**1**	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

MDE4309	**Product Design and Development**	L	T	P	C
Version X.X	Date of Approval: 26 June,2020	3	1	0	4

Pre-requisites/Exposure	Nil
Co-requisites	Nil

Catalog Description

Product Design and Development is a project-based course that covers modern tools and methods for product design and development. Topics include identifying customer needs, concept generation, product architecture, industrial design, and design-for-manufacturing.

Course Objectives:

The objective of this course is to:

1. Equip the students with the basic concepts of product design and development process.
2. Provide an overview of applicability of product design and development in industrial applications

Course Outcomes:

On completion of this course, the students will be able to

CO1: Define and describe appropriate product lifecycle, product design, modern product development process and Morphology of design.

CO2: Describe and explain conceptual design and the design of manufacturing assemble.

CO3: Define and explain Value engineering and Value analysis.

CO4: Describe the application of ergonomics and explain the concurrent engineering and rapid prototyping.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Introduction: Classification/Specifications of Products, Product lifecycle, Product mix, Introduction to product design, Modern product development process, Innovative thinking Morphology of design	L1, L2 and L3	6
MODULE 2: Conceptual Design: Generation, selection& embodiment of concept, Product architecture, Industrial design: process, need, Robust Design: Taguchi Designs & DOE Design Optimization.	L1, L2, L3 and L4	6
MODULE 3: Design for Manufacturing Assembly: Methods of designing for Manufacturing and assembly, Designs for Maintainability, Designs for Environment, Product costing, legal factors and social issues, Engineering ethics and issues of society related to design of products.	L2 and L3	6
MODULE 4:	L1, L2	6

Value Engineering and Value Analysis. : Definition. Methodology, Case studies, Economic analysis: Qualitative &Quantitative**.**	and L3	
MODULE 5: Ergonomics/ Aesthetics: Gross human autonomy, Anthropometry, Man-Machine interaction. Concepts of size and texture color, Comfort criteria, Psychological and Physiological considerations Creativity Techniques: Creative thinking, conceptualization, brainstorming, primary design, drawing, simulation, detail design.	L1, L2 and L3	6
MODULE 6: Concurrent Engineering, Rapid prototyping, Tools for product design–Drafting/ Modeling software. CAM Interface, Patents and IP Acts. Overview, Disclosure preparation.	L2 and L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

References:

1. Karl T Ulrich, Steven D Eppinger,"Product Design & Development." Tata McGrawhill New Delhi 2003
2. N J M Roozenberg, J Ekels, N F M Roozenberg "Product Design Fundamentals and Methods." John Willey & Sons 1995

Text Books:

1. David G Ullman, "The Mechanical Design Process." McGrawhillInc Singapore 1992
2. Product Design and Manufacturing - A C Chitale and R C Gupta, PH1, - 3 rd Edition, 2003.
3. New Product Development - Timjones. Butterworth Heinmann -Oxford. UCI -1997

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**-**	**-**
CO2	**1**	**2**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**-**	**-**
CO3	**1**	**2**	**-**	**-**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**-**	**-**
CO4	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**-**	**-**
CO5	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

MDE4310	**ADVANCED MECHANICAL DESIGN**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Machine Design				
Co-requisites					

Catalog Description

This subject will cover the fundamental concepts of the design of mechanical systems and different types of failures present in the mechanical component. This course includes material selection, fundamental concepts, fracture, fatigue, creep and design for failure prevention required for the design of mechanical system.

Course Objectives

The objective of this course is to

1) Equip the students with concepts of mechanical design and behavior of mechanical components under fatigue and creep
2) Provide an overview of various failures present in mechanical system caused by different loading conditions

Course Outcomes

On completion of this course, the students will be able to

CO 1: Design the mechanical components by selecting a suitable material

CO 2: Describe the concept of static, impact and cyclic loading on mechanical system.

CO 3: Evaluate the fatigue life of mechanical components for ductile and brittle materials

CO4: Analyze and predict the fracture strength of mechanical components under different Fracture modes.

CO5: Design the mechanical components involving contacts avoiding the surface failures.

Modules	Blooms level*	Number of hours
Module 1 **Material selection for design:** Engineering Design process and the role of materials; materials classification and their properties; Materials Selection, Examples of material selection for typical applications, Elasticity, Plasticity, Bauschinger effect.	L1, L2 and L3	9
Module 2 **Review of fundamental concepts:** Overview of mechanical design, Free body diagram, Load analysis - 2D and 3D static load analysis, Case studies of static load analysis – Bicycle hand brake lever, Bicycle with pedal arm, Plier-wrench, Cyclic loading, Impact loading, Beam loading, Understanding of static failure for ductile and brittle materials, Comparison of experimental data with failure theories, Significance of the theories of failure, importance of factor of safety in design, Design case studies - Bracket, Bicycle hand brake lever, Bicycle with pedal arm, Plier-wrench.	L1, L2 and L3	9
Module 3 **Fatigue Failure theories:** Introduction to fatigue, Fatigue failure models,	L1, L2	11

Fatigue life, Estimation of theoretical fatigue strength, Correction factors to the theoretical fatigue strength, stress concentration, Cumulative damage and life exhaustion, effect of mean stress, Designing for fully reversed uniaxial stresses, Designing for fluctuating uniaxial stresses, Designing for multi-axial stresses in fatigue.	and L3	
Module 4 **Introduction to Fracture and Creep:** Fundamentals of Fracture mechanics, Mechanism of fracture - Cleavage fracture, Ductile fracture and Inter-granular fracture, Griffiths theory, Orowan theory, theoretical fracture strength, Irwin's fracture analysis, Linear Elastic Fracture Mechanics (LEFM) - Crack propagation with plasticity, Fracture toughness, hypothesis of LEFM, stress field in an isotropic material in the vicinity of crack tip, Elasto Plastic Fracture Mechanics (EPFM) - Crack opening displacement, J-Integral, Creep mechanisms, temperature dependence of creep.	L1, L2 and L3	10
Module 5 **Design for failure prevention:** Fracture mechanics in Design, Design case studies – Bicycle with pedal arm, Plier-wrench. Surface failures - Adhesive wear, Abrasive wear, Corrosion wear, Surface fatigue wear, Contacts - Spherical contact, Cylindrical contact and General contact, Failure modes and effects analysis (FMEA).	L1, L2 and L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6: Evaluation

Text Books:

1. Robert L Norton, Machine Design- an integrated approach, Pearson Education, Second edition, 2009.
2. Richard G. Budynas, J Keith Nisbett, Shigley's Mechanical Engineering Design, McGraw Hill, Ninth edition, 2011.
3. Marc Meyers and KrishanChawla, Mechanical Behavior of materials, Cambridge University Press, 2nd Edition, 2009.

References Books

1. WoléSoboyejo, Mechanical properties of engineered materials, Marcel Dekker, Inc., 2002.
2. Prashant Kumar, Elements of Fracture Mechanics, McGraw Hill Education (India) Private Limited, 2014.
3. Ashby, M.F., Materials Selection in Design, Butterworth-Heinemann, 4/e, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	3	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	--	1	3	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--
CO5	1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engineering & Technology | M.Tech. Mechanical Engineering |
Total Credits: 100 | 2 Years / 4 Semesters

Fourth Semester

Common to all specializations

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Dissertation					
ME4437	Dissertation-II	-	-		15
Total Credits					**15**

Amity School of Engineering & Technology | M.Tech. Mechanical Engineering |
Total Credits: 100 | 2 Years / 4 Semesters

Second Semester

For Industrial and Production Engineering

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Engineering Science Courses					
ME4201	Optimization Techniques	3	1	-	4
ME4202	Design of Experiments	3	1	-	4
ME4203	Research Methodology & Technical Report Writing	2	-	-	2
Specialization Elective Courses (choose any three)					
IPE4211	Advanced Computer Aided	3	-	-	3

	Manufacturing				
IPE4212	Advanced Computer Aided Manufacturing Lab	-	-	2	1
IPE4204	Mechatronics	3	-	-	3
IPE4213	Mechatronics Lab	-	-	2	1
IPE4205	Welding and Aided Processes	3	1	-	4
IPE4214	Quality and Reliability Management	3	1	-	4
Laboratory Courses					
Value Added Courses					
CSS4251	Corporate Communication	1	-	-	1
BEH4251	Behavioural Communication and Relationship Management	1	-	-	1
Foreign Language-II (As opted in 1st Semester)					
LAN4251	French-II	3	-	-	3
LAN4252	German-II				
LAN4253	Spanish-II				
LAN4254	Russian-II				
LAN4255	Chinese-II				
LAN4256	Portuguese-II				
LAN4257	Korean-II				
LAN4258	Japanese-II				
LAN4259	Hindi-II				
Total Credits					**27**

ME 4201	**OPTIMIZATION TECHNIQUES**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description

In this course the concepts of optimization techniques are discussed in detail. The main objective of this course is to provide the basic concepts of optimization techniques and to educate them on the advancements in optimization techniques. It also provides knowledge of multi-Objective Programming and Genetic algorithms.

Course Objectives

The objective of this course is

1. To familiarize the students with various tools of optimization for management of various resources.

2. To acquaint the students with various advance techniques of optimization like multi-Objective Programming and Genetic algorithms etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define optimization technique and explain its various techniques.

CO2: Apply the concept of classical optimization techniques for solving problems on single-variable and multi-variable optimization.

CO3: Apply non-linear programming and solve problems on one-dimensional optimization methods, unconstrained and constrained optimization techniques.

CO4: demonstrate the concept of other optimization techniques like geometric programming, dynamic programming, integer programming, stochastic programming, and solving problems.

CO5: Illustrate different types of advance topics in optimization.

Modules	**Blooms level***	**Number of hours**
Module 1: Introduction Need of Optimization and Historical Development, Engineering Applications, Classification and Formulation of Optimization Problem	L1, L2 and L3	6
Module 2: Classical Optimization Techniques Single-Variable and Multi-Variable Optimization, With and Without Constraints, Kuhn-Tucker Conditions.	L1, L2 and L3	10
Module 3: Non-Linear Programming Introduction, One-Dimensional Optimization Methods, Unconstrained and	L1, L2 and L3	12

Constrained Optimization Techniques; Elimination Methods, Exhaustive Search, Interval Halving, Fibonacci, Golden Section Methods; Random Search Methods, Hooke and Jeeves Method, Powell's Method; Indirect Search Methods: Steepest Descent, Fletcher-Reeves, Newton's Method, DFP, BFGS Method; Internal and External Penalty Approach.		
Module 4: Other Optimization Techniques Introduction and Basic Concepts of Geometric Programming, Dynamic Programming, Integer Programming, Stochastic Programming, Their Applications	L1, L2 and L3	10
Module 5: Advance Topics in Optimization Multi-Objective Programming, Introduction to Genetic Algorithms, Simulated Annealing and ANN Based Optimization.	L1, L2 and L3	10

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

1. Engineering Optimization Theory and Practice by S.S. Rao, New Age International, 1996

2.Hillier and Lieberman "Introduction to Operations Research", TMH, 2000.

3.HamdyATaha, "Operations Research –An Introduction", Prentice Hall India, 2003.

References:

1. Philips, Ravindran and Solberg, "Operations Research", John Wiley, 2002.
2. Ronald L.Rardin, "Optimization in Operation Research" Pearson Education Pvt. Ltd. New Delhi, 2005

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--

CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

ME 4202	**Design of Experiments**	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Probability, Engineering statics, data analysis, hypothesis testing and ANOVA				
Co-requisites	Apply basic principles in the design of simple experiments.				

Catalog Description

In this course the concepts of experimental design, steps of experimental design, types of experimental design and six sigma are discussed in details. The design of experiments includes completely randomized design, latin square design, factorial design, full factorial design, fractional factorial design, robust design and Taguchi's approach for experimental design.

Course Objectives

The objective of this course is to

1. Explain the issues and principles of Design of Experiments (DOE),
2. Providing an understanding of interactions among causative factors
3. Determining the levels at which to set the controllable factors.
4. Minimizing experimental error (noise) and improving the robustness of the design or process to variation.

Course Outcomes

On completion of this course, the students will be able to

CO1. Learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions..

CO2. Given a description of an experiment, determine whether it is a factorial experiment, a fractional factorial experiment, or neither

CO3. Determine whether the design appropriately deals with extraneous variables via controlling, blocking, randomization or replication.

CO4. Explain robust design and taguchi's approach for design of experiments.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Introduction A brief history of statistical design, Objectives for experimental designs. Basic design concepts. Steps and guidelines for the design of experiments, Some typical applications of experimental design, Types of experimental designs, Analysis of means, Experimental designs and six sigma, Problems	L1, L2 and L3	10
MODULE 2: Completely Randomized Design Model for a completely randomized design with a single factor. ANOM for a completely randomized design, ANOM with unequal variances, randomized block design, incomplete block designs, latin square design, Graeco – Latin square design.	L1, L2, L3 and L4	12
MODULE 3: Full Factorial and Fractional Factorial Designs with Two Levels Nature of factorial designs, deleterious effects of interactions, effect estimates the $\mathbf{2^3}$ Design, built-in –replication, role of expected mean squares in experimental design, **2k-1** Designs. Effect estimates and regression coefficients, **2k-2** Designs. basic concepts; design efficiency, John's **3/4** designs	L1, L2, L3 and L4	14

MODULE 4: Robust Design DOE and Taguchi approach; experimental design using orthogonal arrays; experimental design with two-level factors only; experimental designs with three and four level factors; ANOVA ; analysis using signal- to- noise ratios.	L1, L3 and L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Douglas C. Montgomery , Design and Analysis of Experiments, Wiley International Student Edition (8), 2014.
2. Jiju Antony, Design of experiments for engineers and scientists, Elsevier, 2014
3. J P Holman, Experimental Methods for Engineers – (Southern Methodist University, USA) Tata McGraw Hill

Reference Books

1.Howard J. Seltman, Experimental design and Analysis; 2013

2.N.C. Barford (Imperial College of Sic & Tech), Experimental Measurements, Precision, Error and Truth –, Addison-Wesley Publication Company, London.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO2	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO3	**2**	**1**	**1**	**3**	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO4	**1**	**2**	**1**	**2**	--	--	--	--	--	--	--	--	**1**	--	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

ME4203	**RESEARCH METHODOLOGY AND TECHNICAL REPORT WRITING**	L	T	P	C
Version 2019.1	Date of Approval: 08 May, 2019	2	0	0	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalogue Description

This course deals with types of research, significance and characteristics and planning a research proposal, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods. It deals with univariate, bivariate and multivariate analysis, measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: parametric tests and non-parametric tests, regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination. The course also deals with technical/scientific/research report writing: referencing and bibliography and footnotes. Publication of research papers, citations, intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Objectives

The objective of this course is to:

1. Deals with types of research, significance and characteristics and planning a research proposal And to enhance scientific and technical writing and research skills.
2. Impart knowledge about various stages of research process, statistical analysis and tools & their applications in decision making by hypothesis testing and regression analysis.
3. It also deals with intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.

Course Outcomes

On completion of this course, the students will be able to:

CO1: Classify different research types; explain steps in research process and planning research pro posal.

CO2: Describe sampling methods, sampling steps and design, carry out data processing and analysis.

CO3: Explain hypothesis testing, parametric and non-parametric tests, carry out regression analysis, curve fitting.

CO4: Demonstrate technical and scientific report writing skills; describe plagiarism, patent laws and intellectual property rights.

Modules	**Blooms level***	**Number of hours**
Module I: Introduction and Research Planning Introduction to research: Definition, motivation, need, objectives, significance and characteristics of research; types of research; steps in research process; planning a research proposal; literature review, web searching.	L1, L2	4
Module II: Sampling Methods Measurement scales, population and sample, parameter and statistic, sampling and data collection, sampling design: steps, types, sample size, sampling methods, data processing and analysis. Sampling surveys and questionnaire designing, primary and secondary data.	L1, L2, L3	5
Module III: Hypothesis Testing and Regression Analysis Univariate, bivariate and multivariate analysis, means-arithmetic, geometric and harmonic; measure of dispersion of data, standard deviation, variance, coefficient of variation and degree of freedom. Hypothesis testing: kinds errors in hypothesis testing, significance and confidence levels, parametric tests and non-parametric tests, one-tailed and two-tailed tests, analysis of variance. Regression analysis and curve fitting, method of least-squares, explained and unexplained variations, coefficient of correlation of determination.	L1, L3, L4	10
Module IV: Technical Report Writing and Plagiarism Technical/scientific/research report writing: structure and components of scientific reports, formats of dissertations, research report, report writing skills, report preparation, referencing and bibliography and footnotes. Publication of research papers, citations, making presentation-use of visual aids and PPTs.	L1, L3, L4	5

Intellectual property rights and copy rights, plagiarism, patent and patent laws, commercialization and ethical issues.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Blake, G. and Bly, R.W. The Elements of Technical Writing. MacMillan, New York, 1993.
2. Chawla, D and Sondhi, N. Research Methodology- Concepts and Cases. Vikas Publishing House PVT LTD. New Delhi, 2016.
3. Kothari, C.R. Research Methodology- Methods and Techniques, 2nd.ed. New Age International Publishers, New Delhi. 2008.

Reference Books:

1. Montomery, Douglas C, Design and Analysis of Experiments, 5th Ed, Wiley India.2005.
2. Panneerselvam, R.2009. Research Methodology, PHI Learning Pvt.Ltd., New Delhi, 2009
3. Ranjit Kumar 2009. Research Methodology- A step –by- step Guide for beginners; 2nd ed. Dorling Kindersley (India) Pvt. Ltd, Delhi, 2009.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	2	3	-	-	-	-	-	-	1	3	1	2	-
CO2	1	3	1	3	3	-	-	-	-	-	-	1	3	1	2	-
CO3	1	3	1	-	-	-	-	-	-	-	-	1	3	3	2	-
CO4	1	3	2	-	3	-	-	-	-	-	-	1	3	1	2	3

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE4211	ADVANCED COMPUTER AIDED MANUFACTURING	L	T	P	C
Version	Date of Approval: 26th June 2020	3	0	0	3
Pre-requisites/Exposure	Industrial Engineering, CAD				
Co-requisites					

Catalog Description:

In this course the concepts of numerical control machines, programmed automation, axis designation and automatic tool changers are discussed in detail. The concepts of machine control unit, G&M codes, manual part programming, processes planning, interpolation cycles, computer aided part programming, computer aided process planning, computer integrated manufacturing and artificial intelligence in manufacturing are also discussed in detail.

Course Objectives

The overall objective of this course is

1) To equip with various concepts and practices of computer aided manufacturing (CAM) and computer numerical control (CNC) machines.
2) To provide high calibre engineering students with an in-depth understanding of manual part programming and simulation on CNC machines.

Course Outcomes (COs):

At the end of the course, the student shall be able to:

CO1 - Define and describe the basic concepts of numerical control machines and systems.

CO2 – Explain and demonstrate about the computer numerical control, direct numerical control and adaptive control systems

CO3 – Outline, interpret and apply the manual part programming of various operations on CNC's.

CO4 – State and explain the manual process planning versus computer aided process planning.

CO5 –Outline and describe the computer integrated manufacturing and artificial intelligence in manufacturing.

Modules	Blooms level*	Number of hours
Module I Introduction: Introduction to Automation, Need and future of NC Systems and CAM,	L1and	5

Advantages and Disadvantages, Open and Closed loop systems, Historical developments and future trends. Future of NC Machines, Difference between ordinary and NC Machine tools, Methods for improving accuracy and productivity.	L2	
Module II Control of NC Systems: Types of CNC Machine Tools systems devices, e.g. encoders and interpolators, Features of CNC Systems, Direct Numerical Control (DNC), Standard Controllers and General Programming features available in CNC Systems, Computer Process monitoring and Control. Adaptive control systems.	L2 and L3	6
Module III NC Part Programming: Manual Programming for simple parts, e.g., turning, milling, drilling, etc., Computer aided NC Programming in APT language, use of canned cycles, Generation of NC Programmer through CAD/CAM systems, Design and implementation of post processors.	L1, L2 and L3	7
Module IV Computer Aided Process Planning: Introduction, Manual process planning vs. Computer aided process planning; Basics of variant and generative process are planning methods, Examples of automated process planning systems.	L1and L2	7
Module V Computer Integrated Manufacturing: Introduction, features and applications of CIM, key elements, advantages and disadvantages of CIM.	L1and L2	6
Module VI Artificial Intelligence in Manufacturing: Introduction, Elements of Expert Systems, Introduction to Neural Networks, Expert Systems application in manufacturing, Case studies.	L1and L2	5

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

1. S K Sinha (2011), CNC Programming, Galgotia Publications 9th edition.
2. P N Rao (2017), CAD/CAM : Principles and Applications, Tata McGraw Hill Education; 3 edition.

Reference Books:

1. S J Martin (1974), Numerical control of Machine Tools, Butterworth-Heinemann.
2. Chang, Wysk& Wang (2005), Computer Aided Manufacturing, Prentice Hall of India.
3. M. Groover (2003), CAD/CAM Pearson Education; 1 edition.
4. Radhakrishnan P, SubramanyanS.andRaju V. (2000), CAD/CAM/CIM, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000
5. Groover M.P. (2016), Automation, Production Systems, and Computer-Integrated Manufacturing", Pearsone Education 4th edition.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--

CO2	**1**	--	--	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--
CO3	**1**	--	--	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--
CO4	**1**	--	--	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--
CO5	**1**	--	--	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE4212	**ADVANCED COMPUTER AIDED MANUFACTURING LAB**	L	T	P	C
Version	Date of Approval: 26th June 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

In this course the concepts of numerical control machines, computer numerical control machines, automatic tool changers, axis designation and CAM software are discussed in detail. The concepts of machine control unit, G&M codes, manual part programming, interpolation cycles, computeraided part programming using CAM software, simulation, dry runand machining operations on CNC's are also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with basic and essential concepts of computer aided manufacturing (CAM) and computer numerical control (CNC) machines.
2. To provide high caliber engineering students with an in-depth understanding of G&M codes to write CNC programs, part programming using CAM software, simulation and machining on CNC machines.**Course Outcomes:**

At the end of course the students will be able to:

CO1 – State and explain the CNC lathe and CNC milling machine with their major assemblies, sub assemblies, machine control system and axes designation.

CO2 - Describe and apply G&M codes in manual part programming on CNC lathe and CNC milling machine.

CO3- Explain and apply computer aided programming for different turning operations with the help of CAM software on CNC lathe machine.

CO4 – Explain and apply computer aided programming for milling and drilling operations with the help of CAM software on CNC milling machine.

Modules	**Blooms level***	**Number of hours**
1. Practice programming on manual part programming.	L1, L2 and L3	2
2. To write the CNC programme for the given operation.	L2 and L3	2

3. To perform step-turning operation using CAM software on CNC lathe.	L2 and L3	2
4. To perform plain turning operation using CAM software on CNC lathe.	L2 and L3	2
5. To perform the side milling, face milling operation using CAM software on CNC milling machine.	L2 and L3	2
6. Simulation of manufacturing system using CAM Software	L2 and L3	2
7. Practice in APT based NC programming.	L2 and L3	2
8. To perform the drilling operation using CAM software on CNC milling machine.	L2 and L3	2

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books:

1. S K Sinha (2011), CNC Programming, Galgotia Publications 9th edition.
2. P N Rao (2017), CAD/CAM : Principles and Applications, Tata McGraw Hill Education; 3 edition.

Reference Books:

1. S J Martin (1974), Numerical control of Machine Tools, Butterworth-Heinemann.
2. Chang, Wysk& Wang (2005), Computer Aided Manufacturing, Prentice Hall of India.
3. M. Groover (2003), CAD/CAM Pearson Education; 1 edition.
4. Radhakrishnan P, SubramanyanS.andRaju V. (2000), CAD/CAM/CIM, 2nd Edition, New Age International (P) Ltd, New Delhi, 2000
5. Groover M.P. (2016), Automation, Production Systems, and Computer-Integrated Manufacturing", Pearsone Education 4th edition.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	--	1	2	--

CO4	**1**	**2**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE4204	**MECHATRONICS**	L	T	P	C
Version	Date of Approval: 26th June 2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

In this course the concepts of measurement systems, control systems, microprocessor, micro controller and mechatronics system are discussed in detail. The concepts of sensors and transducers, signal conditioning, multiplexers, pneumatic actuation systems, hydraulic actuation systems, mechanical actuation systems and electrical actuation systems are also discussed in detail.

Course Objectives:

The overall objective of this course is

1. To equip the students with mix skills of mechanical engineering, electronics engineering and computer engineering.
2. To provide high caliber engineering students with an in-depth understanding of pneumatic actuation systems, hydraulic actuation systems, mechanical actuation systems and electrical actuation systems.

Course Outcome (COs)

At the end of the course, the student shall be able to:

CO1 - Define and describe key elements of mechatronics systems and measurement systems.

CO2 – State, explain and apply sensors, sensors terminology and transducers.

CO3 –Outline, interpret and apply the concept of signal processing and interfacing systems.

CO4 –Define, describe and demonstrate pneumatic actuation systems and hydraulic actuation systems.

CO5 -Define, describe and demonstrate mechanical actuation systems and electrical actuation systems.

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Modules	**Blooms**	**Number**

	level*	of hours
Module I **Introduction:** Definitions, mechatronics system, measurement systems, control systems, microprocessor / micro controller based controllers, response of systems, mechatronics approach, applications: robot, CNC machine.	L1 and L2	6
Module II **Sensor Technology:** Sensor and transducers, terminology, displacement, position, proximity – encoders, velocity sensors – tacho-generators, force - strain gauges, pressure gauge, temperature – thermocouples, RTDs, thermistors, light sensors – photoelectric sensors, IR sensors, sensors selection.	L1, L2, and L3	6
Module III **Signal Conditioning:** Introduction, operational amplifier, protection, filtering, Wheatstone bridge, digital signals, multiplexers, data acquisition, digital signal processing, pulse – modulation, problems.	L1, L2 and L3	6
Module IV **Pneumatic & Hydraulic Actuation Systems:** Actuation systems, Pneumatic actuation systems, electro-pneumatic actuation systems, hydraulic actuation systems, electro-hydraulic actuation systems, directional control values, pressure control values, process control values, rotary actuators, problems.	L1, L2 and L3	6
Module V **Mechanical Actuation Systems:** Mechanical systems, types of motion, kinematics chains, cams, gear trains, belt and chain drives, bearings, mechanical aspects of motor selection, problems.	L1, L2 and L3	6
Module VI **Electrical Actuation Systems:** Electrical systems, mechanical switches, solid state switches, solenoids, D.C. motor, A.C. motors, stepper motors, problems.	L1, L2 and L3	6

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text Books:

1. W. Bolton (2010), Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering by published by Pearson Education Asia.
2. David G. Alciatore and Michael B. Histand (2012), Introduction to Mechatronics and Measurement Systems, Published by Tata McGraw-Hill Publishing company Limited, 3rd edition.
3. DevdasShetty and Richard A. Kolk (2011), Mechatronics System Design Published by Global Engineering, USA, 2nd edition.

Reference Books:

1. A. Smaili& F. Mrad (2008), Mechatronics: Integrated Technologies for Intelligent Machines published by Oxford University Press.
2. AppuuKuttan K. K.(2007), Introduction to Mechatronics Published by Oxford University Press.
3. Kamm Understanding Electro-Mechanical Engineering – An Introduction to Mechatronics by, Prentice-Hall of India

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

IPE4213	MECHATRONICS LAB	L	T	P	C
Version	Date of Approval: 26th June 2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course the concepts of sensors and transducers, signal conditioning, pneumatic actuation systems, hydraulic actuation systems, mechanical actuation systems and electrical actuation systems are also discussed in detail. The aim of this course is to make the students familiar with the basic of mechatronics.

Course Objectives:

1. Equip the students with practical concepts of pneumatic actuation systems and hydraulic actuation systems.
2. Understand the application of PLC by working models and experiments.

Course Outcomes (COs): After studying this course the students will be able to:

CO 1- Define the key elements of mechatronics system and measurement systems.
CO 2- Explain and demonstrate the pneumatic actuation systems.
CO 3- Explain and demonstrate the hydraulic actuation systems.
CO 4 – Show the uses of PLC.

List of Experiments	**Blooms level***	**Number of hours**
1. To extend and retract a double acting cylinder using 5/3 hand lever valve or 5/2 Two way Solenoid valve.	L1, L2 and L3	2
2. To study the sequencing of two double acting cylinders (Pneumatic).	L1, L2	2

	and L3	
3. To study the movement of double acting cylinder using the hand lever valve or solenoid operated valve.	L1, L2 and L3	2
4. To study the sequencing of two double acting cylinders (Hydraulic).	L1, L2 and L3	2
5. To study the movement of piston of cylinder using solenoid operated valve or programmable logic controller.	L1, L2 and L3	2
6. Mini Project	L2, L3 and L4	14

Text Books:

1) Bolton, W. (2010), *Mechatronics.* Delhi : Pearson.
2) Alciatore, D. G. and Histand, M. B. (2012), *Introduction to Mechatronics and Measurement Systems*, Delhi: Tata McGraw-Hill.
3) Shetty, D. and Kolk, R.A. (2011). *Mechatronics System Design* USA: Global Engineering.

Reference Books:

1) Smaili, A. and Mrad, F. (2008). *Mechatronics: Integrated Technologies for Intelligent Machines,* USA: Oxford University Press.
2) Appuukuttan, K. K.(2007). *Introduction to Mechatronics,* India: Oxford University Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO2	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO3	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO4	**1**	--	--	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

IPE4205	**Welding and Aided Processes**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

To study essential concepts for welding parameters and welding processes. To study various types of defect, advance welding processes. To study the various techniques of welding automation and Non destructive testing of welds.

Course Objectives:

The objective of this course is to

1. Equip the students with concept of welding processes, types of defect, advance welding processes and welding automation.
2. Provide an overview of Non destructive testing of welds.

Course Outcomes:

At the end of the course, students will demonstrate their ability to:

1. Define the welding processes, weld ability and welding defects.
2. Analyze methods of advanced welding processes like Ultrasonic welding.
3. Develop concept and techniques of welding automation.
4. Analyze the soldering and brazing process.
5. Define the Non destructive testing of welds.

Modules	**Blooms level***	**Number of hours**
MODULE 1: **Welding Metallurgy** Introduction: Classification of welding processes, Review of welding	L1, L2, and L3	08

processes like gas, arc and resistance welding. Weld bead geometry and shape factors, Weld dilution. Heat affected zone and its characteristics; Effects of alloying elements on weld ability, Weld ability of steels, stainless steel, cast iron, and aluminium.		
MODULE 2: **Weld Design & Quality Control:** Principles of sound weld design, Welding joint design, Welding defects; Testing of weldment, Material joining characteristics, Welding positions, Allowable strength of welds under steady loads, Weld throat thickness; Weld quality, Discontinuities in welds, their causes and remedies and quality conflicts. Numerical.	L1, L2, and L3	10
MODULE 3: **Advanced welding processes:** Introduction, main features and applications of Microwave welding, Friction welding, Electron beam welding, Plasma arc welding, Laser welding and Explosive welding.	L1, L2, and L3	08
MODULE 4: **Automation in Welding:** Introduction, Manual Welding, Semi-Automatic Welding, Automatic Welding, Welding Mechanization, Flexible Automated Welding, Robotic Welding, Types of Welding Robots, Robot Selection Mechanics, Joint tracking system,	L1, L2, and L3	08
MODULE 5: **Soldering:** Techniques of soldering, solders, phase diagram, composition, applications. **Brazing:** Wetting and spreading characteristics, surface tension and contact angle concepts, brazing fillers, role of flux and characteristics, atmospheres for brazing, adhesive bonding.	L1, L2, and L3	06
MODULE 6: **Non Destructive Testing of Welds:** Non Destructive Tests: their Advantages and Limitations, Comparison with Destructive Tests, Visual Examination, Dye Penetrate Inspection, Magnetic Particle Inspection, X-Rays and Gamma Rays Inspection and Ultrasonic Inspection of Welds. ASME Standards/ codes for welding.	L1, L2, and L3	08

Text Book

1. Parmer, R. S. *Welding Engineering and Technology.*Khanna Publishers, Delhi 2003.
2. Rao, P.N. *Manufacturing Technology (Foundry, Forming and Welding).* Tata McGraw, Delhi 2018.

Reference Book

1. Khanna, O.P. *Welding Technology.* DhanpatRai Publication, Delhi 2015.
2. Hoffman, D. J. and Dahle, K. R. *Welding.* Pearson Education, Delhi 2017.
3. Jain, R.K. Production Technology: Manufacturing Processes, Technology and Automation. KhannaPublishers,Delhi 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--
CO5	1	1	--	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

IPE4214	**QUALITY AND RELIABILITY MANAGEMENT**	L	T	P	C
Version	Date of Approval: 26th June 2020	3	1	0	4
Pre-requisites/Exposure	Quality Control				
Co-requisites	-				

Catalog Description

In this course approaches and techniques to assess and improve process and product quality, Reliability are discussed in detail. The basic concepts and techniques of modern reliability Engineering tools will be introduced. The concepts learnt will be applied to design methods Failure analysis and system safety.

Course Objectives

The objective of this course is to

1. Equip the students with problem oriented in depth knowledge of Quality and Reliability Engineering

2. Provide an overview of concepts, methods and application of Quality and Reliability Engineering.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe Quality Control, Quality Assurance and Quality Management.
CO2: Explain Tools and Techniques of quality management.
CO3: Explain reliability function and conditional reliability.
CO4: Describe system structure functions and reliability specification and system measurements.

Modules	Blooms level*	Number of hours
MODULE 1: Quality – Concept, Different Definitions and Dimensions, Inspection, Quality Control, Quality Assurance and Quality Management, Quality as Wining Strategy, Views of different Quality Gurus.	L1and L2	6
MODULE 2: Introduction, Definitions and Principles of Operation, Tools and Techniques, such as, Quality Circles, 5 S Practice, Total Quality Control (TQC), Total Employee Involvement (TEI), Problem Solving Process, Quality Function Deployment (QFD), Failure Mode and Effect analysis (FMEA), Fault Tree Analysis (FTA), Kizen, Poka-Yoke, QC Tools, PDCA Cycle, Quality Improvement Tools, TQM Implementation and Limitations.	L1and L2	8
MODULE 3: Definition of reliability – reliability vs. quality, the failure distribution, the reliability function, mean time to failure, Hazard rate function, bathtub curve, conditional reliability - constant failure rate model - time-dependent failure models - exponential and normal distribution.	L1 and L2	10
MODULE 4: Serial configuration, parallel configuration, combined series parallel systems, system structure function, minimal cuts and minimal paths – load sharing systems – standby systems – degraded systems, three state devices – physical reliability models - covariate models, static models , dynamic models, physics of failure models.	L1and L2	14
MODULE 5: Reliability specification and system measurements - reliability allocation - design methods failure analysis – system safety and fault tree analysis – analysis of down time – the repair time distribution, reliability under preventive maintenance, maintenance requirements.	L1and L2	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Prasad L M, "Principles and Practice of Management", S Chand& Company Ltd., New Delhi, 2008.
2. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India Delhi, 2015

3. Competitive Manufacturing Management by John M. Nicholas, Mcgraw Hill. Delhi, 2001.

Reference Books

1. Statistical Quality Control by M. Mahajan, DhanpatRai& Co. (P) Ltd, Delhi, 2018.
2. Reliability Engineering, by E.BalaGuruswamy, Tata McGraw Hill, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	3	1	--	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	1	3	3	--	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	--	--	3	2	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engineering & Technology | M.Tech. Mechanical Engineering |
Total Credits: 100 | 2 Years / 4 Semesters

Third Semester

For Industrial and Production Engineering

Course Code	Course Title	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Engineering Science Courses					
ME4301	Total Quality Management & Quality Assurance	3	1	-	4
Specialization Elective Courses (choose any three)					
IPE4302	Computer Aided Metrology and Inspection	3	-	-	3
IPE4307	Computer Aided Metrology and Inspection Lab	-	-	2	1
IPE4303	Metal Cutting & Tool Design	3	-	-	3
IPE4308	Metal Cutting & Tool Design Lab	-	-	2	1
IPE4304	Production Planning and Control	3	1	-	4
IPE4309	Material Management	3	1	-	4
Summer Internship					
ME4335	Summer Internship Evaluation	-	-	-	6
Dissertation					
ME4337	Dissertation-I	-	-	-	5
Value Added Courses					
CSS4351	Interpersonal Communication	1	-	-	1
BEH4351	Leading through Teams	1	-	-	1
Foreign Language-III (As opted in 1st Semester)					
LAN4351	French-III	2	-	-	2
LAN4352	German-III				
LAN4353	Spanish-III				
LAN4354	Russian-III				
LAN4355	Chinese-III				
LAN4356	Portuguese-III				
LAN4357	Korean-III				
LAN4358	Japanese-III				
LAN4359	Hindi-III				
Total Credits					**31**

ME4301	**TOTAL QUALITY MANAGEMENT & QUALITY ASSURANCE**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure					

Co-requisites	-

Catalog Description
In this course the concepts of quality improvement in manufacturing are discussed in detail. Various quality management tools, improvement cycles, quality circles and audit procedures will be introduced. The concepts learnt will be applied to improve quality in manufacturing.

Course Objectives
The objective of this course is to

1. Equip the students with concepts of quality improvement in manufacturing.
2. Provide an overview of quality management tools, improvement cycles, quality circles and audit procedures.

Course Outcomes
On completion of this course, the students will be able to
CO1: Define components of quality, innovation, design and explain Product quality characteristics and dimensions.
CO2: Explain various key aspects of the quality system standards.
CO3: Describe total quality management tools, improvement cycle and quality organization.
CO4: Define quality assurance, inspection, quality circles and explain quality audits.

Modules	**Blooms level***	**Number of hours**
MODULE 1: **The Foundations of Total Quality Management:** Components of quality, The total quality management approach, Innovation, design and improvement, Product quality characteristics and service quality characteristics, Quality parameters and specific dimensions of quality.	L1and L2	8
MODULE 2: **Key Aspects of the Quality System:** Planning for quality**,** Flowcharting, Detailed flow process charts and flow diagrams**,** planning for just-in-time (JIT) management**,** System design and contents**,** System documentation, implementation and assessment.	L1 and L2	8
MODULE 3: **TQM Tools and the Improvement Cycle**: Measurement of quality, Costs of quality, Tools and techniques for quality improvement, Statistical process control, Quality improvement techniques in service industries, Specific techniques for design, reliability, maintenance and process improvement.	L1 and L2	10
MODULE 4: **The Quality Organization Within an Organization:** People and the organizational structure**,** Responsibilities and performance	L1 and L2	10

management**,** The relationship between the quality organization and top management**,** Culture change through teamwork for quality improvement**,** Implementing teamwork for quality improvement: the DRIVE model.		
MODULE 5: **Internal Quality Audits:** Scope of requirements and audit procedures**,** the audit programme and planning of quality audits**,** Verifying compliance with planned arrangements, determining the effectiveness of the system**,** reporting the results of quality audits**,** Follow-up audits Quality and Business Process Re-engineering: Beyond tools to total quality management**,** Stages in the development of quality and related activities: inspection, quality assurance**,** company-wide quality control**,** total quality management, Quality circles.	L1 and L2	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Prasad L M, "Principles and Practice of Management", S Chand& Company Ltd., New Delhi, 2008.

2.Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India Delhi, 2015

3. Competitive Manufacturing Management by John M. Nicholas, Mcgraw Hill. Delhi, 2001.

Reference Books

1. Statistical Quality Control by M. Mahajan, DhanpatRai& Co. (P) Ltd, Delhi, 2018.

2. Reliability Engineering, by E.BalaGuruswamy, Tata McGraw Hill, 1994.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO2	**1**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	**1**	--	--
CO3	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	**1**	--	**2**	--
CO4	**1**	--	--	--	**2**	--	--	--	--	--	--	--	--	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE4302	**COMPUTER AIDED METROLOGY AND INSPECTION**	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure	Mechanical Measurements				
Co-requisites	-				

Catalog Description

In this course the concepts of errors in measurement, surface characteristics, measurement standards and gauging assembly are discussed in detail. Comparators, soft metrology and image processing techniques will be introduced. The concepts learnt will be applied to make mechanical measurements.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of metrology, comparators and measurement standards.
2. Provide an overview of tools and techniques used for measurement and coordinate measuring machine.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define concept of metrology and explain methods of improving accuracy in measurements.
CO2: Explain various standards of measurements and gausses.
CO3: Explain working of comparators.
CO4: Describe computer aided metrology and coordinate measuring machine.

Modules	**Blooms level***	**Number of hours**
MODULE 1: **Principles of measurement** **Metrological concepts** -Definition, objectives and concept of metrology, Concept of accuracy and precision, Inaccuracy due to thermal aspects, Detailed surface roughness concept, Surface and form metrology , flatness, roughness, waviness, Methods of improving accuracy & surface finish, Influence of vibrations on accuracy.	L1and L2	6
MODULE 2: **Standards for Measurement-** Line standards, End standards, wavelength standards, Subdivision of standards, Errors in measurement, Linear and angular measurement, Use of sine bar and bevel protractor for angular measurements, System of Limits, Fits and Tolerance, Principle of interchangeability, Gauging assembly, Classification of gauges, brief concept of design of gauges (Taylor's principles), Wear allowance on gauges, Types of gauges-plain plug gauge, ring gauge, snap gauge, limit gauge.	L1 and L2	7
MODULE 3: **Comparators**-Definition, Functions of Comparator, Classification of comparator, working of various mechanical comparators- Dial Indicator, Reed type Mechanical Comparator, Sigma Comparator, Advantages and	L1 and L2	8

disadvantages of mechanical comparators, Optical comparator.		
MODULE 4: **Computer Aided Metrology** Computer Aided Metrology - Principles and interfacing, soft metrology - Application of lasers in Precision measurements- laser interface, laser scanners, Image processing. Acoustical measurements, Digital techniques in mechanical measurements.	L1 and L2	7
MODULE 5: **Coordinate measurement machine (CMM)** Type of CMM & applications, non-contact CMM, contact CMM, Electro optical sensors for dimension, surface finish measurements. Tool maker's microscope- working and its applications. Profile projector- working and its applications.	L1 and L2	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi, 2009.
2. I.C. Gupta, "Engineering Metrology", DhanpatRai Publications, Delhi, 2019.
3. Metrology of Measurements by Bewoor and Kulkarni, Mcgraw Hill India, Delhi, 2017.

Reference Books

1. F.W. Galyer& C.R. Shotbolt, "Metrology for Engineers", ELBS edition, 2017.
2. Experimental Methods for Engineers by Holman, Mcgraw Hill India, Delhi, 2011.
3. Principles of Measurement Systems by Bentley, Pearson, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	2	--

CO4	**1**	--	--	--	**2**	--	--	--	--	--	--	--	--	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code : IPE4307	**COMPUTER AIDED METROLOGY AND INSPECTION LAB**	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:
The main objective of computer aided metrology and inspection lab is to demonstrate the basic concepts in the area of measurement to the postgraduate students through a series of experiments. Students learn about laboratory methods and interpretation of results with regard to errors in measurement, surface characteristics, measurement standards and gauging assembly.
The concepts learnt will be applied to make mechanical measurements.
Course Objectives:

1. Equip the students with concepts of metrology, comparators and measurement standards.
2. Provide an overview of tools and techniques used for measurement and coordinate measuring machine.

Course Outcomes:
On completion of this course, the students will be able to
CO1: Apply the knowledge of mathematics and manufacturing science to calculate angle of inclination and roundness using sine bar and dial gauge.
CO2: Determine surface irregularities and inclination angle of given specimen.
CO3: Describe and measure the geometry of a screw and roughness characteristics.
CO4: Measure inner diameter of hole by using bore indicator and explain use of contact sensors for surface finish measurements
CO5: Demonstrate the coordinate measurement machine and screw thread parameters.
CO6: Determine the screw thread parameters of a given specimen using Profile projector and diameter of the holes drilled in a plate.

Modules	**Blooms level***	**Number of hours**
1. To check the roundness of a circular bar with the help of dial gauge.	L1, L2 and L3	1
2. To check angle of inclined surface by using sine bar in combination with slip gauges.	L1, L2 and L3	1
3. To measure the surface irregularities of lathe guide ways by using dial indicator.	L1, L2 and L3	1
4. To measure the inclination angle by using different set of slip gauges and height gauges.	L1, L2 and L3	1
5. To study and measure the geometry of a screw using profile projector.	L1, L2 and L3	1
6. To machine a given surface on milling machine tool and study its roughness characteristics.	L1, L2 and L3	1
7. To measure inner diameter of hole by using bore indicator.	L1, L2 and L3	1
8. To study the contact sensors for surface finish measurements.	L1, L2 and L3	1
9. To study the coordinate measurement machine.	L1, L2 and L3	1
10. To measure the screw thread parameters of a given specimen using Tool Maker's Microscope.	L1, L2 and L3	1
11. To measure the screw thread parameters of a given specimen using	L1, L2	1

Profile projector.	and L3	
12. To determine the diameter of the holes drilled in a plate and to measure the center distance between them.	L1, L2 and L3	1

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text Books

1. R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi, 2009.
2. I.C. Gupta, "Engineering Metrology", DhanpatRai Publications, Delhi, 2019.
3. Metrology of Measurements by Bewoor and Kulkarni, Mcgraw Hill India, Delhi, 2017.

Reference Books

1. F.W. Galyer& C.R. Shotbolt, "Metrology for Engineers", ELBS edition, 2017.
2. Experimental Methods for Engineers by Holman, Mcgraw Hill India, Delhi, 2011.
3. Principles of Measurement Systems by Bentley, Pearson, 2005.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO6	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE- 4303	METAL CUTTING AND TOOL DESIGN	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	0	0	3
Pre-requisites/Exposure					
Co-requisites	-				

Catalog Description

In this course to study the essential concepts of metal cutting and tool design. To study concept and applications of modern machining processes. To study jig fixtures and economic analysis of Jigs and fixtures.To provide knowledge to the students on the principles that guides production of cutting tool materials and processes.

Course Objectives

The objective of this course is

1. To familiarize the students with shapes of machining tools and chip formation.
2. To prepare the students understand various machine tool design.
3. To prepare the students understand the concept of jig and fixture.

Course Outcomes

On completion of this course, the students will be able to

CO1: Illustrate the fundamentals of basic shapes of machining tools and explain different types of chip formation.

CO2: Explain the design ofsingle point and multi point cutting tools, analyze economics of metal machining.

CO3: Analyze parameters of grinding wheel

CO4: Explain and describe thedesign of press tools**.**

CO5: Develop the applications of jig and fixture for enhancing productivity.

Modules	**Blooms level***	**Number of hours**
Module 1: Basic shapes of machining tools: Wedge action, function of different angles of cutting tools, tool geometry and Nomenclatures-ASA, ORS, NRS systems. Geometry of twist dill & slab milling cutter, Mechanism of chip formation, modes of failure under stress, fracture & yielding mechanism, types of chips, factors involved in chip formation, shear plane, effect of cutting variables on chip reduction coefficient, chip formation in drilling and milling	L1, L2 and L3	5
Module 2: Design of single point and multi point cutting tools: Design of flat and circular form tools and tool holding devices. Design of multi point cutting tools: Milling cutter; Major types, design and manufacturing of	L1, L2 and L3	8

peripheral, end and face milling cutters. Forces and power estimation. Grinding of milling cutters. Broaches: Pull and Push types. Internal and External broaches, geometry and design and manufacturing of Pull type and push type broaches.		
Module 3: Parameters of Grinding wheel: Types of Grinding, Shapes and Size of a Grinding Wheel, Various Elements of a Grinding Wheel, Parameters of Grinding Operation, Grinding Fluids, Defects and Remedies in Grinding, Balancing of Grinding Wheel, Grinding of single point cutting tool, Tool materials, Vibration & chatter in machining. Economics of metal machining.	L1, L2 and L3	8
Module 4: **Design of Press tools:** Die set elements. Design of Die Set for simple components in blanking, Piercing, bending, drawing, forging and spinning. Plastic Toots: Plastic Dies for simple components.	L1, L2 and L3	7
Module 5: **Jigs & Fixtures:** Design principles and construction features. Type of locating pins. Requirements and choice of locating systems, Setting blocks, types of clamping devices and their basic elements. Quick action clamps and nuts, Hydraulic, magnetic, electrical and vacuum clamping. Types of drill jigs and their classification. Types of jig bushes, jig feet, Design of Fixtures for Turning, grinding, welding and milling. Economic analysis of Jigs and Fixtures.	L1, L2 and L3	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

1. Production Engineering Sciences, P.C. Pandey& C.K. Singh, "Standard Publisher Distributors, 2006.

2. Metal Cutting & Tool Design, B.J. Ranganath, Vikas Publishing House Pvt. Ltd.Second edition, 1999.

3. Manufacturing processes for engineering material spearson education; sixth edition, 2018

References:

1. Fundamentals of Metal Machining & Machine Tools, Geoffrey Boothroyd, Tata McGraw Hill Kogakusha Ltd.1987

2. Manufacturing Technology, P.N. Rao, Tata McGraw Hill Publication LtdIV edition, 1993

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	1	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--`

1: strongly related, 2: moderately related and 3: weakly related

Course Code: IPE 4308	Metal Cutting and Tool Design Lab	L	T	P	C
Version 2017.1	Date of Approval: 26 June,2020	0	0	2	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

The main objective of the metal cutting and tool design Laboratory is to demonstrate the basic principles in the area of metal cutting and tool designto the post graduate students through a series of experiments. The student will learn about the laboratory methods and interpretation of results with regard to metal removal processes and to give final shape and size to components students also learn about the jig & fixture and their applications.

Course Objectives:

1. To understand the working of metal cutting and tool design.
2. To prepare the students understand the concept of jig and fixture.
3. To provide knowledge to the students on the principles that guides production of cutting tool materials and processes.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Explain and define various cutting tool materials and their applications
CO2: Demonstrate on angles and parameters of various single point and multipoint cutting tools.
CO3: Analyze the formation of chip under different cutting conditions.
CO4: Demonstrate on the nomenclature of single point tool and twist drill geometry.
CO5: Demonstrate on resultant force act on the tool during turning operation.

Modules	**Blooms level***	**Number of hours**
1. To study various cutting tool materials and their applications	L1, L2 and L3	1
2. To identify various angles and parameters of various single point cutting tools.	L1, L2 and L3	2
3. To identify various angles and parameters of various multipoint cutting tools.	L1, L2 and L3	2
4. Measurement of cutting forces in oblique cutting	L1, L2 and L3	1
5. To analyse the formation of chip under different cutting conditions.	L1, L2, L3and L4	2
6. To perform blanking, Piercing, bending, and drawing operation on a given sheet metal specimen.	L1, L2 and L3	2
7. To study twist drill geometry.	L1, L2 and L3	1
8. To determine the resultant force act on the tool during turning operation and also estimate the force and thrust required to perform drilling operation.	L1, L2 and L3	1
9. Study of surface conditions during grinding process	L1, L2 and L3	1
10. Calculation of tool life during machining process	L1, L2 and L3	1
11. To study single point tool nomenclature using tool maker's microscope	L1, L2 and L3	1

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

Text Books:

1. Production Engineering Sciences, P.C. Pandey& C.K. Singh, "Standard Publisher Distributors, 2006.

2. Metal Cutting & Tool Design, B.J. Ranganath, Vikas Publishing House Pvt. Ltd.Second edition 1999.

Reference Books:

1. Manufacturing Technology, P.N. Rao, Tata McGraw Hill Publication LtdIV edition, 1993

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

Course Code IPE- 4304	PRODUCTION PLANNING AND CONTROL	L	T	P	C
Version 1.1	Date of Approval: 26 June,2020	3	1	0	4
Pre-requisites/Exposure	Basics of Industrial Engineering				
Co-requisites	-				

Catalog Description

In this course the concepts of production planning and control are discussed in detail. The main objective of this course is to understand the various components and functions of production planning and control such as, product planning, process planning, production scheduling, Inventory Control. To know the recent techniques of Production Planning Techniques like JIT, Kaizen, Kanban and pull system Kaizen and Six Sigma etc.

Course Objectives

The objective of this course is

1. To understanding the role of production and operations management in the overall business strategy of the firm.
2. To get familiarize the students with the application of production planning and control tools and techniques to the service sector as well as manufacturing firms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define production planning and control, explain objectives and functions of production planning and control.

CO2: Explain various production related activities.

CO3: Illustrate various inventory management procedures with the tools employed there in.

CO4: Explain the new techniques for evaluation of material and processes and various production related activities.

CO5: Demonstrate the role of routing, loading and scheduling in manufacturing and service.

CO6: Demonstrate role of JIT, Kaizen, and PDCA with their contribution towards production and planning and control.

Modules	**Blooms level***	**Number of hours**
Module 1: Introduction Objectives and benefits of planning and control, Functions of production planning and control, preplanning, Steps in production planning and control, plant layout, Types of production-job- batch and continuous-Product development.	L1, L2 and L3	4
Module 2: Product Development and Design Effect of competition on design, Long-range Planning, Company policy, product analysis, marketing aspects, the product characteristics, functional aspect, operational aspect, durability and dependability, Economic analysis, Profit and competitiveness, The three S's:- Standardization, Simplification and Specialization. Break Even Analysis.	L1, L2 and L3	7
Module 3: Inventory Control Definition, classification, objectives of inventory control, functions, economic order quantity various inventory models. Numerical on inventory control. Inventory carrying costs, factors affecting inventory costs. V.E.D. analysis, S-D-E	L1, L2 and L3	7

analysis, F-S-N analysis H-M-L analysis and ABC analysis. Safety stocks, their objectives safety stocks and service levels.		
Module 4: Evaluation of Material and Processes Introduction, value analysis, consideration of new techniques and materials, value analysis tests, material utilization of a product or assembly. Numerical problems on material utilization of a product. Value engineering job plan and various phases of job plan in systematic value engineering approach .	L1, L2 and L3	6
Module 5: Routing, Loading and Scheduling Introduction, Scheduling Procedure, Master Schedule, its objectives, Order scheduling, Loading by scheduled period, Dispatching, Job card, Job order. Commercial Loading & Scheduling Devices.	L1, L2 and L3	6
Module 6: Advance Production Planning Techniques Just in time in production system, Pull system vs Push system, Kanban and pull system, Benefits of JIT, Requirements for implementing JIT, Evaluation of JIT production. Introduction to Kaizen, Main Aspects of Kaizen, Kaizen and Six Sigma, Element and Factors of Kaizen, Hierarchy of Kaizen, The Plan-Do-Check-Act (PDCA) Cycle, Kaizen Implementation, Kaizen Tools and Standards – 7 Quality Control Tools.	L1, L2 and L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text & References:

Text:

1. Production Planning and control: Samuel Eilon, Collier Macmillan Ltd, 2006.
2. Production Planning and Control: K.C. Aggarwal and K.C. Jain, Khanna Publishers,1999.
3. Industrial Engineering and Operation Management by S.K. Sharma &Savita Sharma, 2017

References:

1. Production Planning and Control: Sharma, HariRraghu Rama, Deep & Deep Publications, 1998.

2. Production Planning and Control: NarasimhanSeetha-rama L. Prentice Hall India Learning Private Limited; 2 edition 1996.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	2	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	2	2	--	--	--	--	--	--	--	--	--	1	--	--
CO5	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--`
CO6	1	2	3	--	--	--	--	--	--	--	--	--	1	--	--`

1: strongly related, 2: moderately related and 3: weakly related

IPE4309	**Material Management**	L	T	P	C
Version	Date of Approval: 26th June 2020	3	1	0	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course basic concept of materials management like productivity, techniques of materials management, purchasing in production process and cost reduction techniques. Illustrate the material requirement planning process like JIT, production planning, economic analysis and break even analysis.

Course Objectives:
The objective of this course is to

1 Equip the students with concept of material management, material planning, purchasing, and cost reduction.

2. Provide an overview of order quantities.

Course Outcomes: Atthe end of the course, students will demonstrate their ability to:

1. Identify materials management techniques for productivityimprovement.
2. Apply the concept of materials planning with the theoretical concepts like break even analysis, JITetc.
3. Apply different concepts of Purchasing while purchasing a material for thecompany.
4. Demonstrate mathematical model the cost reduction techniques for reducing the cost & enhancing the profits of anorganization.

5. Apply inventory management techniques like EOQ for the efficient Inventory management of productionplant.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction: Introduction to material management and productivity, functions of material management, organization structures in material management, role of material management techniques in improved material productivity.	L1, L2 and L3	7
MODULE 2: Material planning: objectives, material requirement planning, manufacturing resource planning, JIT production planning, strategic material planning, material control: acceptance, sampling, inspection, make or buy decision, simple cost analysis, economic analysis, break even analysis, break-even point theory, whether to add or drop a product line store management and warehousing, product explosion.	L1, L2 and L3	7
MODULE 3: Purchasing: Importance of good purchasing system, organization of purchasing functions, purchase policy and procedures, responsibility and limitations, purchasing decisions, purchasing role in new product development, role of purchasing in cost reduction, negotiations and purchase, purchasing research: identification of right sources of supply, vendor rating, standardization, vendor certification plans, vendor and supply reliability, developing new source ofsupply.	L1, L2 and L3	7
MODULE 4:	L1, L2	7

Cost reduction: cost control v/s cost reduction, price analysis, material cost reduction techniques, variety reduction, cost reduction and value improvement, techniques of cost control, standard costing, cost effectiveness, cost analysis for material management, material flow cost control.	and L3	
MODULE 5: Order Quantities: Introduction, types of inventory, inventory control, inventory build –up, EOQ, various inventory models, inventory models with quantity discount, exchange curve concept, coverage analysis, optimal stocking and issuing policies, inventory management of perishable commodities, ABC – VED analysis, design of inventory distribution systems, surplus management, information system for inventory management, case studies.	L1, L2 and L3	8

Text Books

1. Chapman Stephen, N. and Arnold J. R. T. (2017).*Introduction to Materials Management.*Delhi: Pearson Education.
2. Gopalakrishnan, P. and Sundaresan, M. (1977).*Materials Management: An Integrated Approach.*Delhi : PHI

Reference Books:

1. Vrat, P. (2014). *Materials Management: An Integrated Systems Approach.* India: Springer.
2. Datta, A. K. (2008). *Materials Management: Procedures, Text and Cases.*Delhi : PHI.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--
CO5	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Engineering & Technology

Master of Computer Application

FLEXILEARN
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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Overview

Master of Computer Applications (MCA) is a two-year (four semesters) professional Master's Degree in Computer Applications. The programme is designed to meet the growing demand for qualified professionals in the field of Computer Applications. It is a postgraduate course that can be taken up after obtaining a Bachelor's Degree in any stream. The MCA programme is focused more toward Application Development and thus has more emphasis on latest programming language and tools to develop better and faster applications.

The curriculum is designed in such a way that it covers theoretical as well as practical courses of relevant areas. As the IT and the software industry are dynamic and fast growing, all the courses are designed keeping in view the requirements of industry.

During the summer break, after 2nd semester student has to undergo the industrial internship. The last semester includes major project.

The major part of the curriculum includes Design & Analysis of Algorithms, Application Software Development, Software Engineering, Software Project Management, Computer Communication & Networks, Mobile Computing, Cloud Computing, Soft Computing, Computer Graphics & Multimedia Systems Web Development, Data Mining and Warehousing, Artificial Intelligence, Machine Learning etc.

MCA students are often in demand for the famous multinational companies like TCS, Cognizant Technology Solutions, Infosys, Wipro, Google, IBM, Yahoo, Aricent etc.

After successful completion of MCA degree one can work as a Software Developer/Programmer, System Analysts, Systems Designers, Software Consultant, Technical Writer, Web Designer and Developer in any field related to IT in Private as well as Govt. sectors. One can also start his/her own venture.

Programme Objectives (PO's)

The graduates will

- **PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

- **PO2. Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

- **PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- **PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Programme Specific Objectives (PSO's)

PSO-1: Able to use fundamentals concept of software, hardware and networking to learn and apply advanced technologies.

PSO-2: Apply formal and practical methods of Software Development using the concepts of programming languages, database and design principles.

PSO-3: Able to use current technologies, skills and models of computing practices to solve industrial problems.

PSO-4: Exhibit team work with the ability of leadership, analytical reasoning for solving time critical problems and strong human values for responsible professional.

PSO1		PSO2			PSO3			PSO4	
Able to use fundamentals concept of software, hardware and networking to learn and apply advanced technologies.		Apply formal and practical methods of Software Development using the concepts of programming languages, database and design principles.			Able to use current technologies, skills and models of computing practices to solve industrial problems.			Exhibit team work with the ability of leadership, analytical reasoning for solving time critical problems and strong human values for responsible professional.	
Basic Hardware Networking Courses	**Basic Software Courses**	**Problem Solving & Software Development Courses**	**Programming Courses**	**Database Courses**	**Advance Programming/Software Management Courses**	**Advance Technology Courses**	**NTCC**	**Behavioral Science/Management Courses**	**Communication skills**
Data Communication & Computer Networks	Computer Fundaments and Computer Programming using C Language	Design & Analysis of Algorithm	Computer Fundaments and Computer Programming using C Language	Relational Database Management System	Software Project Management	Mobile Computing	Summer Internship	Leading through Teams	Interpersonal Communication
	Operating System	Software Engineering	Programming with Java		Android Programming	Artificial Intelligence	Major Project/Dissertation	Professional Excellence	Cross Cultural Communication
		Computer Graphics & Multimedia Systems	Programming with .NET Framework		Machine Learning using Python	Digital Image Processing		Business Management	Foreign Language
						Data Warehousing & Data Mining			
						Network Security & Cryptography			
						Soft Computing			
						Cloud Computing			
						Big Data			

	Computer Fundamentals and Programming in C	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	-	-	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure-oriented programming language i.e. C.

Course Objectives

The objective of this course is to

1. Equip the students with basic concepts of computer
2. Equip the students with concepts of Programming through C Language
3. Provide an overview of advanced programming concepts like Structure, Union and File Handling

Course Outcomes

On completion of this course, the students will be able to

After the completion of course, the students will be able to,

CO1: Understand the basic architecture of computer and software concepts.

CO2: Define the purpose and structure of C Program for programming; identify and distinguish various datatypes and operators; conditional and control statement; Apply if-else, Switch and loops to rewrite basic C program for problem solving.

CO3: Compare and contrast various Array types, its declaration and implementation; differentiate between Call by Value and Reference if Functions; apply the concepts to rewrite C Programs

CO4: Differentiate between various String Handling Functions; describe the concept of Pointers in C Language

CO5: Explain the concept of Structure and Union; apply the concept of File Handling to provide data storage support to the programs.

Modules	Blooms level*	Number of hours
Module I: Introduction Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their inter conversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit, logic gates.	L1, L2 and L3	7
Module II: Programming in C History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.	L2, L3 and L4	7
Module III: Fundamental Features in C C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.	L2, L3 and L4	7
Module IV: Arrays and Functions One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.	L2 and L3	7
Module V: Advanced features in C Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.Strings and C string library.Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.	L2, L3 and L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6:Evaluation

Text Books

1. P. S. Pradeep K. Sinha, Computer Fundamentals, BPB Publications, 2017.
2. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
3. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	--	--	**2**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO2	**1**	**1**	**2**	**2**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO3	**1**	**1**	**2**	**3**	--	--	--	--	--	--	--	--	**1**	--	**1**	--
CO4	**1**	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	**1**	--	**1**	--
CO5	**1**	**1**	**2**	**2**	**3**	--	--	--	--	--	--	--	**1**	--	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

	Programming In C Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

The primary objective of this course is to understand all the components of C, including the C language, the C Preprocessor, and the C Standard Library. An understanding of some advanced practical issues, including memory management, testing and debugging, complex declarations and expression evaluation, building and using libraries, and evaluating tradeoffs, such as size vs. speed and speed vs. complexity. The ability to write C code and create and manipulate logical programs.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Programming through C Language
2. Provide an overview of advanced programming concepts like Structure, Union and File Handling.

Course Outcomes

After the completion of course, the students will be able to,

CO 1:Demonstrate the use of various data types and operators in C programs; Solve various problems using conditional control statements (if-else, Switch case).

CO 2: Construct C programs related to problems involving the usage of loops, arrays and functions.

CO 3: Apply the concept of Pointers for efficient memory management and construct C programs using string handling functions.

CO 4: Demonstrate the use of Structure, Union and concept of File Handling to provide data storage support to the programs.

Modules	**Blooms level***	**Number of hours**
LABORATORY SESSSION 1 OPERATORS, EXPRESSIONS and DECISION MAKING	L3	5

1. Write a program to calculate simple interest and amount. 2. Write a program to swap two numbers using third variable. 3. Write a program to demonstrate Greatest of 3 nos and to print the given no in ascending order. 4. Write a program to check if the number is even or odd. 5. Write a program to perform arithmetic operations using Switch Case statement. 6. Write a program to calculate area of circle, rectangle, square and triangle using Switch Case statement.		
LABORATORY SESSSION 2 LOOPING 1. Write a program to find factorial of given no using do while statement. 2. Write a program to print prime numbers up to 'n'. 3. Write a program to sum of n natural no. 4. Write a program to print Fibonacci series. 5. Write a program to reverse a number. 6. Write a program to print the following pattern using for loop 1 2 2 3 3 3 4 4 4 4 7. Write a program to print the following pattern using for loop A A B A B C A B C D	L3	6
LABORATORY SESSSION 3 ARRAYS and FUNCTIONS 1. Write a program to read n num of students and 5 subjects marks. 2. Write a program to swap two numbers using call by value. 3. Write a program to convert all lower case to uppercase characters 4. Write a program to find the factorial of a number using recursion. 5. Write a program to print the add/product of two matrices of any order.	L3	5
LABORATORY SESSSION 4 POINTERS AND STRING 1. Write a program to perform operations on strings using string handling in-built functions (concatenation, reversal, copy etc.) 2. Write a program to swap two numbers using call by reference. 3. Write a program to perform dynamic memory allocation and deallocation. 4. Write a program to print elements of array using pointers.	L3	4
LABORATORY SESSSION 5 STRUCTURE,UNION & FILE HANDLING	L3	4

1. WAP program to display student information by initializing structures. 2. WAP program to find the total salary of employee and employee details using structure. 3. Write a program to store and display information using Union. 4. Program to write data into file and read data from file.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. E Balagurusamy, "Programming in ANSI C", Seventh Edition, Tata McGraw Hill Education private limited, July 2017.
2. Yashwant Kanetkar, "Let Us C", 16th Edition, BPB Publication, June 2017.

Reference Books

1. Brain W Kernighan and Dennis M Ricchie, "The C Programming Language", 2nd Edition, Pearson Publication, Jan 2015.
2. Byron Gottfried, "Programming with C", Third Edition, Tata McGraw Hill Education private limited, July 2017.
3. E Balagurusamy, "Computer Concepts & Programming in C", Seventh Edition, Tata McGraw Hill Education private limited, July 2011.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	--	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	1	2	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	1	2	3	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	1	2	2	3	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

	Data Structure	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

This course is an introduction to the use, design, and analysis of data structures in computer programs. The very commonly used data structures like arrays, stacks, queues, lists, trees, graphs, hashing and file structure will be discussed in detail. Sorting and hashing are important topics in the study of algorithms. They are also closely related to the design of data structures. Several algorithms to implement these techniques are included in the syllabus.

Course Objectives

The objective of this course is to

1. Equip the students with the basic concepts of data structures and algorithms
2. Provide the overview about searching and sorting techniques
3. Equip the students with basic concepts about stacks, queues, lists, trees, graphs and hashing

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic concepts of C language and various dynamic memory allocation techniques; Time and space complexities of algorithms.

CO2: Explain fundamental data structures and algorithms and summarize their typical uses, strengths, and weaknesses; Applications and various operations applied on arrays; Explain Stack and Queue data structure, various types of Queues; Applications of stack and queue. Compare and contrast link list with other linear data structure; Advantage, disadvantages, types and application link list.

CO3: Explain Binary search tree and its types; Applying in-order, pre-order and post order traversal to create the tree; application of tree in searching and storing huge amount of data; Explain different types of graphs and their representation in memory. Applying BFS and DFS graph traversal scheme to find shortest path; Determine minimum spanning tree using Kruskal's and Prim's method.

CO4: Compare and contrast hashing technique with other traditional searching techniques; differentiate among various file access methods.

CO5: Analyze and compare the complexity different searching and sorting algorithms. Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

Modules	**Blooms level***	**Number of hours**
MODULE 1: **BASIC CONCEPTS** Dynamic Memory Allocation & Deallocation (new & delete). Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis), Types of Data Structures- Linear & Non Linear Data Structures.	L1, L2 and L3	5
MODULE 2: **LINEAR DATA STRUCTURE** Arrays :Basic Concepts, Operations on Arrays. Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi Queue Definition & Concepts. Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority	L2, L3 and L4	7

Queue, Double Ended Queue, Applications of Queue Linked List: Singly Linked List, Doubly Linked list, Circular linked list, Operations on different types of Linked List: Insertion & deletion. Linked implementation of Stack & Queue using C++.		
MODULE 3: **NONLINEAR DATA STRUCTURE** Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (In-order, post-order, preorder), Threaded binary tree, Binary search trees: Insertion & deletion. Conversion of General Trees to Binary Trees, Applications of Trees.. AVL trees Graph-Basic Concepts. Matrix & Linked List Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Constructing A Spanning Tree(Prim Algorithm, Kruskal's Algorithm)	L2, L3 and L4	7
MODULE 4: **HASHING AND FILE STRUCTURES** Hashing: The symbol table, Hashing Functions, Collision Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods	L2, L3, L4and L5	6
MODULE 5: **SORTING & SEARCHING** Sorting – Bubble Sort, Selection Sort, Quick Sort, Merge Sort Searching – Sequential Search and Binary Search. Finding Complexities of Sorting and Searching Algorithms.	L2, L3 and L4	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Seymour Lipschutz , "Data Structures", Schaum outlines, Revised 1st Edition
2. R.L. Kruse, B.P. Leary, C.L. Tondo, "Data structure and program design in C", PHI
3. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", 1st Edition, Pearson Education, Reprint 2003.

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill Computer Science Series, Mc-Graw – Hill New York, 1984

2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest," Algorithms", Prentice-Hall India(1999).

3. Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, "Data Structures Using C and C++", 2nd Edition, Prentice-Hall India

1. Mark Allen Weiss,"Data Structures and Algorithm analysis in C++ ",Addison Wesley (3rd Indian Reprint 2000).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	2	1	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	2	1	--	--	--	--	--	--	--	--	--	1	1	2	3

1: strongly related, 2: moderately related and 3: weakly related

	Data Structure Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Hands on knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The course is designed to develop skills to design and analyze simple linear and non linear data structures like arrays, stacks, queues, lists, trees, and graphs. It strengthen the ability of the students to identify and apply the suitable data structure for the given real world problem. It enables them to gain knowledge in practical applications of data structures

Course Objectives

The objective of this course is to

1. Equip the students to apply knowledge of basic concepts of data structures in solving complex problems.

2. Provide demonstration of the data structure concepts like stacks, queues, lists, trees, graphs and various searching and sorting techniques

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of basic fundamentals of data structures in order to analyze the time and space efficiency of the data structure

CO2: Demonstrate the use and applications of Stack and Queue data structure along with various types of Queues.

CO3: Demonstrate and compare link list with other linear data structure; Advantage, disadvantages, types and application of link list.

CO4: Apply the knowledge of trees and heaps and demonstrate the application of tree in searching and storing huge amount of data. Demonstrate the usage of graphs and their applications of BFS and DFS to find shortest path

CO5: Apply algorithm for solving problems like sorting, searching,hasing, insertion and deletion of data.

Modules	Blooms level*	Number of hours
1. Sample programs of 1D and 2-D arrays (a) Write a program to insert an element at any position in an array (b) Write a program to perform addition of matrix for order 3*3 (c) Write a program to perform multiplication of matrix of any order	L1, L2 and L3	4
2. Sample Programs of stack and queues. (a) Write a program that perform the following function i) Create stack of integers. ii) PUSH operation on stack iii) POP operation on stack (b) Write a program that perform the following function i) Create Queue of integers. ii) Insert operation on Queue iii) Delete operation on Queue (c) Write a program that perform the following function i) Create Circular Queue of integers. ii) Insert operation on Circular Queue iii) Delete operation on Circular Queue	L2, L3	4
3. Sample Programs of Linked List **(a)** Write a C program that perform the following: i) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion **(b)** Write a C program that performs the following: a) Create a doubly linked list of integers. b) Delete a given integer from the above doubly linked list. c) Display the contents of the above list after deletion .	L2, L3 and L4	6
4. Sample Programs of trees (a) Write a C program that uses functions to perform the following: i) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in Postorder.	L2, L3, L4and L5	2
5. Sample programs on sorting and searching (a) Write C programs for implementing the Bubble Sort	L2, L3	6

(b) Write C programs for implementing the Selection Sort (c) Write C programs for implementing the Insertion Sort (d) Write a program to perform linear Search (e) Write a program to perform binary Search	and L4	
6. Sample programs on graphs (a) Write C programs for implementing the graph traversal algorithms: Depth first traversal (b) Write C programs for implementing the graph traversal algorithms: Breadth first traversal	L3, L4 and L6	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Seymour Lipschutz , "Data Structures", Schaum outlines, Revised 1st Edition

2. R.L. Kruse, B.P. Leary, C.L. Tondo, "Data structure and program design in C", PHI

3. A.V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", 1st Edition, Pearson Education, Reprint 2003.

Reference Books

1. J. P. Tremblay and P. G. Sorenson, Introduction to Data Structures with Applications, McGraw – Hill Computer Science Series, Mc-Graw – Hill New York, 1984

2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest," Algorithms", Prentice-Hall India(1999).

3. Yeddidyah Langsam, Moshe J.Augenstein, Aaron M. Tenen Baum, "Data Structures Using C and C++", 2nd Edition, Prentice-Hall India

4. Mark Allen Weiss,"Data Structures and Algorithm analysis in C++ ",Addison Wesley (3rd Indian Reprint 2000).

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	1	2	--
CO2	1	--	2	3	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	2	--	--
CO4	1	2	1	--	--	--	--	--	--	--	--	--	1	2	--	--
CO5	1	2	1	--	--	--	--	--	--	--	--	--	1	1	2	2
CO6	1	1	2	2	--	--	--	--	--	--	--	--	1	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

	Operating Systems	L	T	P	C
Version: 2020.1	Date of Approval:19, July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This course is aimed at providing the basic knowledge of the concepts involved in designing and working of an operating system, how it acts as a resource manager of the system as a whole, how various issues such as Memory conflicts, resource conflicts are resolved by an operating system and a study of various types of operating systems.

Course Objectives

The objective of this course is to

1. Equip the students with the knowledge about categories of operating systems and their functions.
2. Provide detailed knowledge about functions of operating system like process, memory and device management along with file system security and protection.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain operating systems and their evolution also differentiate among its various types.
CO2: Explain concepts of process and inter-process communication and synchronization. Identify solutions to detect, prevent and handle deadlocks occurring in the operating systems. Solve synchronization and CPU scheduling problems related to processes.
CO3: Define and explain concepts of memory management like fragmentation, paging and segmentation. Solve problems related to memory management using page replacement algorithms.
CO4: Describe the concepts of device management and list various disk allocation methods. Determine solutions for disk scheduling problems using available disk scheduling algorithms.
CO5: State the concept of file and file system security, also distinguish among various file allocation methods.

Modules	Blooms level*	Number of hours
MODULE 1: **INTRODUCTION** What is an Operating System, Types of Operating Systems, Simple Batch Systems, Multiprogramming Systems, Time-Sharing Systems, Parallel Systems, Distributed Systems, Real-time Systems, Operating System Structures: System Components, System Calls, Types of System Calls, System Programs, System Structure, Virtual Machines, Operating System debugging and Generation, System Boot	L1, L2 and L4	4
MODULE 2: **PROCESS MANAGEMENT** Process Concept, Process Scheduling, Operation on processes, Cooperating Processes, Interprocess Communication with Examples, Client-Server Systems, Background process, Overview of Multithreaded Programming, Multithreading Models, Process Scheduling:Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multi-Processor Scheduling, Thread Scheduling, Multi-Processor Scheduling	L1, L2 and L3	4
MODULE 3: **PROCESS COORDINATION** Synchronization: Critical section Problem, classic problems of synchronization, semaphores, monitors & its implementation. Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Deadlock Recovery	L1, L2 and L3	4
MODULE 4: **MEMORY MANAGEMENT** Background of Memory Management, Swapping, Contiguous Memory Allocation, Segmentation, Virtual Memory management concepts: Demand Paging, Page Replacement, Allocation of Frames, Thrashing	L1, L2 and L3	4
MODULE 5: **STORAGE MANAGEMENT** File System: File Concept, Access Methods, Directory and Disk Structure, File Sharing, Protection, File System Structure, Allocation Methods, Free Space Management, Secondary Storage Structure: Disk Scheduling, Swap Space Management, RAID Structure, I/O Systems: Overview and I/O	L1 and L2	4

Hardware		
MODULE 6: **PROTECTION AND SECURITY** System Protection: Goals ,Principles and Domain of Protection, Access Matrix**,** System Security: The security problem, Program Threats, System and Network Threats, Overview of Cryptography, User Authentication, Firewalls	L1 and L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Milenekovic, "Operating System Concepts", McGraw Hill
2. Silberschatz, P.B. Galvin "Operating System Concepts", John Willey & son

Reference Books

1. Dietel, "An introduction to operating system", Addision Wesley
2. Tannenbaum, "Operating system design and implementation", PHI
3. Operating System, A Modern Perspection, Gary Nutt, Pearson Edu. 2000
4. A. S Tanenbaum, Modern Operating System, 2nd Edition, PHI
5. Willam Stalling " Operating system" Pearson Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT1**	**HA**	**ATTD.**	**EE**
Weightage (%)	10	15	5	70

CT: Class Test, HA: Home Assignment, Attd: Attendance , EE: End Semester Examination

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO2	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO3	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO5	**1**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

	Operating System Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basic knowledge of Operating System				
Co-requisites					

Catalog Description

This course introduces the UNIX operating system commands, shell programming. Explores the use of operating system utilities such as vi text editors, filters, process handling etc.

Course Objectives

The objective of this course is to

1. Provide knowledge of working on Unix OS.
2. Provide sound foundation of writing Shell scripts.
3. Implement features like piping, filters and redirection.

Course Outcomes

On completion of this course, the students will be able to

CO1: To implement various UNIX commands.
CO2: To demonstrate the use of Vi Editor and other editors of UNIX.
CO3: To write simple Shell scripts.

Modules	**Blooms level***	**Number of hours**
1. UNIX structure, history, basic commands.	L1,L3	4
2. Working of Vi Editor and its commands.	L1,L3	4
Shell Script 1. Write a Shell Script that takes a search string and filename from the terminal & displays the results. 2. Write a Shell Script that takes pattern and filename as command line arguments and displays the results appropriately i.e. pattern found/pattern not found. 3. Write a Shell Script that accepts only three arguments from the	L1,L3	16

command line. The first argument is the pattern string, the second argument is the filename in which the pattern is to be searches and the third argument is the filename in which the result is to be stored. 4. Write a Shell Script which creates the following menu and prompts for choice from user and runs the chosen command. Today's date Process of user List of files Quit to UNIX 5. Write a Shell Script that computes the factorial of a given number 6. Write a Shell Script that changes the extension of a group of files from txt to doc 7. Write a Shell Script that accepts both filename and a set of patterns as positional parameters to a script. 8. Write a Shell Script which will redirect the output of the date command without the time into a file. 9. Write a Shell Script (using while loop) to execute endlessly (until terminated by user) a loop which displays contents of current directory, disk space status, sleep for 30 seconds and display the users currently logged in on the screen. 10. Write a Shell Script that receives two filenames as arguments. It should check whether content of the two files is same or not. If they are same, second file should be deleted. 11. If a number is input through the keyboard, WASS to calculate sum of its digits. 12. Write a Shell Script which takes a command line argument of Kms and by default converts that number into meters. Also provide options to convert km to dm and km to cm. 13. Write a Shell Script using for loop, which displays the message "Welcome to the UNIX System" 14. Write a Shell Script to change the filename of all files in a directory from lower-case to upper-case. 15. Write a Shell Script that examines each file in the current directory. Files whose names end in **old** are moved to a directory named **old files** and files whose names end in **.c** are moved to directory named **cprograms.** 16. Write a Shell Script which searches all files in the given directory (to be taken as command line argument) for the file having the title (to be taken as command line argument), as the first line in the file. a) Display the contents of the searched file. b) In the end, printthe the file is ###, where ### is small-sized if total no. of lines is <50 ### is medium-sized if total no. of lines between 50&100 ### is large-sized. 17. Write a shell script which reports names and sizes of all files in a		

directory (directory would be supplied as an argument to the shell script) whose size is exceeding 1000 bytes. The filenames should be printed in descending order of their sizes. The total number of such files should also be reported. 18. Write a shell script to calculate and print the first ***m*** Fibonacci numbers. 19. Write a shell script to compute the **GCD** and **LCM** of two numbers. 20. Write a shell script to generate all combinations of 1, 2 and 3 using for loop.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. **" Unix Concepts and application" Das Sumitabha Tata Mcgraw Hill**

Reference Books

1. **"Unix Programming Environment" The Kernighan and Pike Prentice – Hall of India**

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment,A- Attendance, LR – Lab Record, V – Viva, PR- Performance,

EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	Relational Database Management System	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Computer Fundamentals and Mathematics Set Theory				
Co-requisites	Nil				

Catalog Description

This course is design to get students familiar with the fundamentals & basic concepts in Data Base Management Systems and their use. The primary aim of the subject is to provide the students a deeper understanding of the relational database model by exposing the students to a variety of important issues of data base management, e.g., database design, physical storage, query optimization, database recovery, concurrency control, security and data integrity.

Course Objectives

The objective of this course is

- To make students familiar with the fundamental concepts of DBMS.
- Provide an overview of Normalization, concurrency techniques and database recovery with examples.

Course Outcomes

On completion of this course, the students will be able to

CO1. Differentiate between traditional data processing system and database management system and understand characteristics and applications of DBMS in real world.

CO2. Explain and use different data models such as Entity Relationship Model and Relational Model.

CO3. Solve queries using relational algebra, relational calculus and SQL.

CO4. Illustrate normalization concepts and apply them in real database applications.

CO5. Explain database concurrency techniques and recovery mechanisms.

Modules	Blooms level*	Number of hours
Module I: Introduction to DBMS Introduction to DBMS, Architecture of DBMS, Components of DBMS, Traditional data Models (Network, Hierarchical and Relational), Database Users, Database Languages, Schemas and Instances, Data Independence	L1, L2 and L6	6
Module II: Data Modeling Entity sets attributes and keys, Relationships (ER), Database modeling using entity, Weak and Strong entity types, Enhanced entity-relationship (EER), Entity Relationship Diagram Design of an E-R Database schema, Object modeling, Specialization and generalization	L1and L2	2
Module III: Relational Database Model Basic Definitions, Properties of Relational Model, Keys, Constraints, Integrity rules, Relational Algebra, Relational Calculus.	L1 and L3	4
Module IV: Relational Database Design Functional Dependencies, Normalization, Normal forms (1st, 2nd, 3rd, BCNF), Lossless decomposition, Join dependencies, 4th& 5th Normal form, Database Design and Implementation Process, Physical database design and Tuning.	L2, L3 and L4	5
Module V: Transaction Management and Concurrency Control Techniques Transaction concept, ACID properties, Schedules and recoverability, Serial and Non-serial schedules, Serializability, Concurrency Techniques: Locking Protocols, Timestamping Protocol, Multiversion Technique, Deadlock Concept - detection and resolution, 2 – Phase Locking.	L2, L3 and L4	4

Module VI: Backup and Recovery Database recovery techniques based on immediate and deferred update, Shadow pages and Write-ahead Logging.	L1 and L2	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Korth, Silberschatz, "Database System Concepts", TMH,4th Ed., 2000.
2. Elmsari and Navathe, "Fundamentals of Database Systems", A. Wesley, 6th Ed., 2004

Reference Books

1.Date C. J., "An Introduction to Database Systems", Narosa Publishing, 7th Ed., 2004

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	1	2	3	--	--	--	--	--	--	--	--	1	--	1	-
CO3	1	2	2	3	--	--	--	--	--	--	--	--	1	--	1	-
CO4	--	1	2	--	--	2	--	3	--	--	--	--	1	--	-	2
CO5	1	1	3	--	--	--	--	--	2	--	--	--	1	--	-	-

1: strongly related, 2: moderately related and 3: weakly related

	Relational Database Management System Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course is design to get students familiar with the basic concepts of SQL including DDL, DML and DCL statements. The course also explains the basic concepts of PL/SQL. Students will learn practical on Oracle software and hence can work on any RDBMS software.

Course Objectives

The objective of this course is

- To make students familiar with the concepts and working of SQL.
- Provide an overview of PL/SQL.

Course Outcomes

On completion of this course, the students will be able to

CO1. Illustrate SQL basic concepts like languages DDL, DML etc., data types and working.

CO2.Explain concepts of database creation, manipulation of data and data retrieval and apply them in real database applications.

CO3.Design and implement various data constraints on a database for a given problem.

CO4. Solve queries using concepts like joins, sub queries, aggregate functions, triggers etc.

CO5.Prepare PL/SQL blocks.

Modules	Blooms level*	Number of hours
Lab Session 1 Introduction of RDBMS, Oracle, SQL and data types.	L1 and L2	2
Lab Session 2 Basic concept of database creation and manipulation of data.	L1and L3	2
Lab Session 3 Working with SELECT query.	L1 and L3	2
Lab Session 4 To apply data constraints on a table-Primary Key, Not Null, Unique.	L1 and L3	2
Lab Session 5 Working with Foreign Key and Check Constraint.	L1 and L3	2
Lab Session 6 To implement the basic concept of Aggregate and Grouping Functions.	L1 and L3	2
Lab Session 7 To apply various set operators on data.	L1 and L3	2
Lab Session 8 Concept of Nested queries in database and its application in database.	L1 and L3	2
Lab Session 9 Implementation different types of JOINS in database.	L1 and L3	2
Lab Session 10 Basic concepts of Triggers and Procedures and related queries.	L1 and L3	2
Lab Session 11 Introduction to PL/SQL and basic syntax.	L1 and L3	2
Lab Session 12 Write programs in PL/SQL Using Control Structures.	L3	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Ivan Bayross , “SQL, PL/SQL the Programming Language of Oracle”, 4th Ed.,BPB Publications,2009.

2. Lynn Beighley, “Head First SQL”, 1st Ed., O′Reilly, 2007.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	--	-	-
CO2	1	-	2	--	--	3	--	--	--	--	--	2	--	--	1	-
CO3	1	-	1	--	--	3	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	---	1	1	--
CO5	1	-	2	--	--	--	--	--	2	--	--	--	--	1	--	-

1: strongly related, 2: moderately related and 3: weakly related

	Data Communication and Computer Networks	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Network				
Co-requisites	Nil				

Catalog Description

In this course the concepts of basic data communication and networking concepts are discussed in details. The concepts related to routing/switching hardware, security, distributed client/server applications and architecture, intranets and intranet servers and browsers, networks and network servers, LANs/WANs, internetworking technologies will be introduced. The studies will be made on impact of the OSI reference model for networking protocols, CSMA/CD, TCP/IP implementation, frame relay, FDDI, X-25, ISDN services This course will assist in developing the skills in basics of computer networks. The outcome of this course implicitly and explicitly affects the abilities to understand and analyze the networking concepts

Course Objectives

The objective of this course is to

- Equip the students with concepts of data communication and computer network.
- Provide an overview of networking OSI, TCP/IP models, devices, media, protocols and layer concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain OSI model, Layers in OSI model and TCP/IP protocol suit. Describe topologies with their advantages and disadvantages and transmission media.

CO2: Describe data transmission and data encoding schemes. Elaborate multiplexing and types of spread spectrum.

CO3: Demonstrate various switching techniques. Also explain Frame Relay, ATM, Error Detection Correction techniques, Flow Control- Stop and Wait mechanisms..

CO4: Describe the meaning of routers and issues in designing Routing Algorithms; Discuss logical addressing, Ipv4 and IPv6.

CO5: Describe Transport Services, TCP, UDP, SCTP. Explain Congestion control and Quality of Service.

Modules	**Blooms level***	**Number of hours**
MODULE 1: **Introduction** Computer Network, Advantages and Disadvantages of Computer Network, Communication system, Classification of networks, Network models- OSI model, Layers in OSI model, TCP/IP protocol suite, Transmission mode, LAN Architecture, LAN topologies-Bus, Tree, Ring, Star, Mesh, Wireless LAN, Transmission Media- Twisted pair cable, Coaxial cable, Optical Fiber, Wireless transmission media.	L1 and L2	6
MODULE 2: **Data Transmission:** Analog and Digital Signals, Periodic and Aperiodic Signals, Transmission impairments, Data rate limits-noiseless channel and noisy channel, Performance characteristics. **Data Encoding:** Digital data-digital signals, Digital data-Analog signals, Analog data- Digital signals, Analog data- Analog signals. **Multiplexing:** Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing. **Spread Spectrum:** Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS).	L1, L2	8
MODULE 3: **Data Link Layer** Switching- Circuit switching Vs Packet Switching, Virtual Circuits- Permanent Virtual Circuit Vs Switched Virtual Circuit, Frame Relay,	L1, L2	8

ATM, Error Detection and Correction, Flow Control- Stop and Wait, Sliding Window, Error Detection, Error Control, HDLC,PPP		
MODULE 4: **Network Layer** Routers, Routing Algorithms-Unicast routing algorithms-Distance vector routing, Link state routing, Path vector routing, multicast routing algorithms, Logical addressing- IPv4, IPv6, transition from IPv4 to IPv6, Address mapping, ICMP, IGMP.	L1, L2	8
Module V: **Transport layer** Transport Services, TCP, UDP, SCTP, Congestion control, Quality of Service (QoS).	L1, L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text :

1. B.Forouzan, Data Communications and Computer Networks, TH McGraw-Hill, 4th edition,2006.

References:

1. K. Feher , Wi reless Digi tal Communicat ion, Jochen Schiller, Mobile Communication, Pearson Education, PH 1995.

2. Data and Computer Communications, William Stallings Publisher:Prentice Hall, Seventh Edition, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**-**	**-**
CO2	**1**	**2**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**-**	**-**
CO3	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**-**	**--**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**-**	**-**
CO5	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**-**	**-**

1: strongly related, 2: moderately related and 3: weakly related

	Data Communication and Computer Networks Lab	L	T	P	C
Version: 2020.1	Date of Approval : 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of CISCO router				
Co-requisites	NIL				

Catalog Description

The course familiarizes with the equipment applications and protocols installed in enterprise networks, with a focus on switched networks, IP Telephony requirements, and security. It also introduces advanced routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP) and Open Shortest Path First (OSPF) Protocol. Hands-on exercises include configuration, installation, and troubleshooting.

Course Objectives

The objective of this course is to

1. Make the students understand configuration of routing protocols.
2. Provide a demonstration of troubleshooting of different protocols.

Course Outcomes

On completion of this course, the students will be able to

CO1. Apply the knowledge of CISCO router to understand its basic configuration, Enterprise network and implement inter-VLAN routing.

CO2. Demonstrate the configuration of OSPF and RIP protocol.

CO3. Demonstrate the configuration of EIGRP and BGP protocol.

CO4. Apply the knowledge of basic WAN connections using HDLC and PPP protocol.

CO5. Demonstrate the standard and extended ACL on router.

Modules	Blooms level*	Number of hours
1. Drawing an Enterprise Network for Amity University showing its different campuses across the country. 2. Configuring all the devices (PCs, Servers, Switches) to create a LAN within campuses of the Enterprise Network. 3. Configuring Virtual LANs (VLANs) in an Enterprise Network. 4. Configuring Trunking and Inter-VLAN Routing in an Enterprise Network.	L3, L5	4
5. Implementing RIP (Routing Information Protocol) to enable communication between different LANs. 6. Implementing OSPF (Open Shortest Path First) to enable communication between different LANs.	L3, L5	2
7. Implement EIGRP (Interior Routing Protocol) to establish connectivity within domestic campuses of the Enterprise Network. 8. Implement BGP (Border Gateway Protocol) and Redistribution to establish connectivity etween different campuses of the Enterprise Network.	L3, L5	2
9. Configuring WAN connectivity using protocols-HDLC and PPP. 10. Implementing Frame-Relay to configure WAN service provider cloud.	L3, L5	2
11. Configuring Standard and Extended ACLs on a Router. 12. Troubleshooting Switching, Routing and ACL issues.	L3, L5	2

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Data Communication and Networking by BehrouzForouzan,FourthEdition,TMH.
2. Computer Networks by A.S. Tanenbaum, Fifth Edition, Prentice Hall.

References Books

1. Data and Computer Communications by W. Stallings, Prentice Hall.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –InternalAssessment, EE- ExternalExam, PR- Performance, LR – Lab Record, V – Viva.

Software : Packet tracer.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	1	3	--	--
CO2	1	2	3	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	2	3	3	--	--	--	--	--	--	--	1	2	--	--
CO4	1	1	2	3	--	--	--	--	--	--	--	--	1	1	2	--
CO5	1	1	2	3	--	--	--	--	--	--	--	--	1	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

	Design & Analysis of Algorithm	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	1	-	4
Pre-requisites/Exposure	Basic knowledge of Data Structure				
Co-requisites	Nil				

Catalog Description

The designing of algorithm is an important component of computer science. The objective of this course is to make students aware of various techniques used to evaluate the efficiency of a particular algorithm. Students eventually should learn to design efficient algorithm for a particular problem.

Course Objectives

The objective of this course is to

1. Analyze the asymptotic performance of algorithms.
2. Introduce with major algorithms strategies and data structures.
3. Apply important algorithmic design paradigms and methods of analysis.
4. Provide efficient algorithms in technical design situations.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain use of asymptotic notations and analysis of various sorting techniques.

CO2: Explain the basic concepts of advanced data structures like Red Black Trees, Heapetc.

CO3: Describe principles of Greedy Algorithms and Dynamic Programming and apply the strategy to solve various problems to analyze the complexity of algorithm.

CO4: Explain basic concepts of graphs and apply various design strategies to solve graph related problems to analyze the complexity of algorithm.

CO5: Apply the various algorithms indifferent areas of Computer Science.

Modules	Blooms level*	Number of hours
Module I : Introduction Algorithms, Analysis of Algorithms, Design of Algorithms, Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences and their solution methods. Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort, Medians and order statistics	L1, L2 and L3	6
Module II : Advanced Data Structures Red Black Trees, Augmenting Data Structure, Binomial Heap, B-Tree, Fibonacci Heap, and Data Structure for Disjoint Sets, All kinds of Algorithms on these data structures, Dictionaries and priority Queues, mergeable heaps, concatenable queues	L2, L3 and L4	8
Module III : Advanced Design and Analysis Techniques Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis	L2, L3 and L4	8
Module IV : Graph Algorithms Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem	L1, L3	8
Module V: Advanced Topics Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials and FFT, Number Theoretic Algorithms	L1,L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evallluation

Text Books

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm"
2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication

Reference Books

1. Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
2. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"., Addison Wesley
3. D. E. Knuth, " The art of Computer Program, Addison Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO2	**1**	--	**2**	**3**	--	--	--	--	--	--	--	--	**1**	**1**	--	--
CO3	**1**	**2**	**3**	**3**	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--

1: strongly related, 2: moderately related and 3: weakly related

	Design & Analysis of Algorithm Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	C Programming				
Co-requisites	Basic knowledge of Data Structure				

Catalog Description

This course is intended to implement the various algorithm strategies for solving the problems using programming language.

Course Objectives

The objective of this course is to

- Equip the students with implementation of various algorithms.
- Provide sound foundation of design strategies for problem solving.
- Measure and compare the performance of different algorithms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement the concept of Divide and Conquer algorithms to solve various problems.

CO2: Demonstrate the use of Greedy Algorithms to solve various problems.

CO3: Apply the principle of Dynamic Programming to solve various problems.

CO4: Apply various design strategies to solve graph related problems.

Modules	Blooms level*	Number of hours
1. Programs on sorting algorithms using Divide and Conquer technique. • To implement Merge Sort. • To implement Quick Sort.	L1,L3	2
2. Programs on algorithm based on Greedy Method. • Implement Fractional knapsack. • Demonstrate the Activity Selection Problem.	L1,L3	4
3. Programs on algorithm based on Dynamic programming. • Implement 0/1 Knapsack problem. • Compute the minimum number of multiplication for given set of matrices using Matrix Chain Multiplication. • Compute the length of longest common subsequence for given sequences using LCS.	L1,L3	6
4. Programs on Graph Algorithms. • Print all the nodes reachable from a given starting node in a digraph using BFS method. • Check whether a given graph is connected or not using DFS Method. • Find minimum spanning tree of a given graph using Prim's algorithm. • Find minimum spanning tree of a given graph using Kruskal's algorithm. • Implement Single Source Shortest Path problem using Dijkstra's algorithm.	L1,L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm"
- E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication

Reference Books

- Sara Basse, A. V. Gelder, "Computer Algorithms," Addison Wesley
- J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms"., Addison Wesley
- D. E. Knuth, " The art of Computer Program, Addison Wesley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				EE
A	**PR**	**LR**	**V**	**70**
5	10	10	5	

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	--
CO2	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	--
CO3	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	--
CO4	1	--	1	--	--	--	--	--	--	--	--	--	--	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	Software Engineering	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of software development				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Software development are discussed in detail. Various models of SDLC are introduced along with its application. Students will be able to apply these concepts in real time software project development.

Course Objectives

The objective of this course is to

- Gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply current theories, models, and techniques that provide a basis for the software Lifecycle.

CO2: Enable the students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.

CO3:Be able to elicit, analyze and specify software requirements through a productive Working relationship with various stakeholders of a software development

CO4:Be able to evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of contemporary issues and emerging software engineering trends, models, tools, and techniques.

CO5:Work as an individual and as part of a multidisciplinary team to design, develop and deliver quality software

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM	L1, L2 and L4	5
MODULE 2: Software Metrics and Project PlanningSize Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management	L2, L3 and L6	7
MODULE 3: Software Requirement Analysis, design and coding Problem Analysis, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design Top-down and bottom-up Structured programming, Information hiding	L2, L3 and ,L5	8
MODULE 4: Software Reliability, Testing and Maintenance Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Software process, Functional testing: Boundary value analysis, Equivalence class testing,Structural testing: path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools, & Standards.Management of maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software RE-engineering	L2, L3 and L4,L6	10
MODULE 5: UML Introduction to UML,Use Case Diagrams, Class Diagram: State Diagram in UMLActivity Diagram in UMLSequence Diagram in UMLCollaboration Diagram in UML, Domain, Component Diagram and Deployment Diagram	L3,L4,L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. K. K. Aggarwal&Yogesh Singh, "Software Engineering", 2nd Ed, New Age International, 2005.
2. R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.

Reference Books:

- R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
- P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
- Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
- James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons.
- Sommerville, "Software Engineering", Addison Wesley, 1999.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	1	2	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	1	--	2	3	--	--	--	--	--	--	4	--	1	2	--	--
CO3	--	1	--	--	--	--	--	--	--	2	3	--	-	1	2	--
CO4	-	1	-	--	2	--	--	--	--	--	--	--	2	1	--	--
CO5	--	--	1	--	--	--	--	--	2	--	--	--	--	--	--	1

1: strongly related, 2: moderately related and 3: weakly related

	Computer Graphics & Multimedia Systems	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	NIL				

Catalog Description

This course presents basic principles for the design, use and understanding of computer graphics systems. This course includes various algorithms and their complexity to draw graphics objects. This course also teaches the students about different algorithms for 2D /3D transformation, clipping operations on objects, hidden surface removal and detection. This course is intended to describe technical characteristics and performance of multimedia system and terminals.

Course Objectives

The objective of this course is to

- Equip the students with mathematical concepts of graphics algorithm and their implementation to draw objects using C language.
- Provide an overview of various color filling algorithms, 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.
- Provide an overview of different multimedia technologies like audio and video including multimedia devices. The course also includes some practical sessions on these technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define various standards and components in development of computer graphics.

CO2: Explain generation of graphics primitives and analyse their problems and solutions.

CO3: Demonstrate solid filling using polygon fill algorithm with interior region testing methods.

CO4: Apply 2D geometric transformations on 2D graphics objects with their practical implementation.

CO5: Illustrate use of coordinate mapping and their transformation and analyse use of line and polygon clipping algorithms.

CO6: Apply 3D geometric transformations on 3D objects with their practical implementation and assess logic behind visible surface detection algorithms with practical implementation of 3D transformations.

CO7: Describe basic principles of multimedia systems, animation and graphics library functions used in animation design.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
Module I: Overview of Graphics System Application of computer graphics, Video Display Devices, Raster Scan Display, Random Scan Display, Input Devices, Graphic Software and graphics standards, Numerical based on Raster and Random scan display, Frame buffer, Display processor, picture construction technique in interactive computer graphics.	L1, L2 and L3	5
Module II: Output Primitives Scan conversion, Points and Lines, Line-Drawing Algorithm, Circle Generation Algorithms, Ellipse Generation Algorithm, Area fill algorithms for various graphics primitives: Scan line fill algorithm, boundary fill algorithm, flood fill algorithm, Polygon representation, various method of Polygon Inside test: Even-Odd method, winding number method, Various techniques for character generation.	L1, L2 and L3	5
Module III: Two Dimensional Geometric Transformations Basic Transformations, Composite Transformation, Translation, Rotation, Scaling, General Pivot-Point Rotation, General Fixed Point Scaling, General Scaling Directions, Reflection, Shear, Raster Methods for Transformations.	L2, L3 and L4	5
Module IV: Two-Dimensional Viewing Window to view Port Co-ordinate Transformation, Anti aliasing and filtering techniques, Clipping Operations, Cohen Sutherland Line Clipping algorithm, Sutherland Hodgeman Polygon Clipping algorithm, fractal geometry methods, fractal dimensions, Geometric construction of deterministic self-similar fractals, Iterated function system to generate fractals.	L2, L3 and L4	6
Module V: Three Dimensional Geometric and Modeling Transformations 3D viewing: 3 dimensional viewing parameters, Homogeneous coordinate	L2, L3	6

representation, Advantages and disadvantages of homogeneous coordinate system, Translation, Rotation, Scaling, Other 3DTransformations, Composite Transformation, and Projections: Parallel projections, perspective projections, and oblique projection.	and L4	
Module VI: Visible- Surface Detection Methods Bezier curves and Bezier surfaces, B-spline curves and surfaces, Overview of Visible Surface Detection Algorithm, Concept of light source, secular and diffuse reflection, Illumination through light source, Shadow and its types, Depth-Buffer Method, A Buffer Method, Scan-Line Method, Binary search partition method, painter's algorithm or depth sorting method.	L2, L3 and L4	6
Module VII: Introduction to multimedia Elementary image processing techniques, Introduction to Animation, software used in animation, Design of animation sequence, graphics library functions used in animation design.	L1, L2 and L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

- Computer Graphics, Donald Hearn, M Pauline Baker, 2nd Edition, PHI 1999
- Schaum Series**,** Computer Graphics

Reference Books

- Computer Graphics, N. Krishnamurthy, TMH

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT1**	**PR.**	**ATTD.**	**EE**
Weightage (%)	15	10	5	70

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**1**	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**3**	**--**
CO3	**1**	**1**	**1**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**2**	**2**	**--**
CO4	**1**	**1**	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**2**	**--**
CO5	**1**	**3**	**2**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**2**	**2**	**--**
CO6	**1**	**3**	**2**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**2**	
CO7	**1**	**3**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**--**	**--**	**--**

1: strongly related, 2: moderately related and 3: weakly related

	Computer Graphics & Multimedia Systems Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	-	-	2	1
Pre-requisites/Exposure	Basic Knowledge of C Programming				
Co-requisites	Nil				

Catalog Description

This course presents basic principles for the design, use and understanding of computer graphics and multimedia systems. This course includes various algorithms and their complexity to draw graphics objects. This course also teaches the students about different algorithms for 2D /3D transformation, clipping operations on objects, hidden surface removal and detection.

Course Objectives

The objective of this course is to

- Equip the students with mathematical concepts of graphics algorithm to draw objects using C language.
- Provide an overview of various 2D & 3D transformation, clipping operations, algorithms related to hidden surface detection and elimination and their implementation.

Course Outcomes

On completion of this course, the students will be able to

CO 1: Define various standards and components in development of computer graphics.

CO 2: Explain generation of graphics primitives and analyze their problems and solutions. Demonstrate solid filling using polygon fill algorithm with interior region testing methods.

CO 3: Apply 2D geometric transformations on 2D graphics objects with their practical implementation.

CO4: Illustrate use of coordinate mapping and their transformation and analyze use of line and polygon clipping algorithms.

CO 5: Apply 3D geometric transformations on 3D objects with their practical implementation and assess logic behind spline curves and surfaces.

Modules	Blooms level*	Number of hours
Module I: Introduction of Graphics 1. Demonstrate the use of graphics library functions to draw various graphics objects. 2. Demonstrate the use of graphics library functions to draw pie chart. 3. Demonstrate the use of graphics library functions to draw bar chart on screen.	L3,L5	2
Module II: Graphics Primitives 1. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when m<=1 and m>1. 2. Demonstrate the use of DDA line drawing algorithm to draw line on the screen when m<=1 and m>1. 3. Demonstrate the use of Breshenham's line drawing algorithm to draw line on the screen when m<=1 and m>1. 4. Demonstrate the use of circle drawing algorithm to draw circle on the screen. 5. Write a program to draw characters on screen using bitmap character generation method. 6. Write a program to fill a polygon using boundary fill algorithm. 7. Write a program to fill a polygon using flood fill algorithm.	L3,L5	6
Module III: Transformation 1. Write a program to translate a triangle where translation factors are tx=20 and ty=30. 2. Write a program to rotate a triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a square where scaling factors are Sx=2 and Sy=3. 4. Write a program to reflect a triangle about X axis. 5. Demonstrate combine 2D transformation after applying translation, rotation and scaling transformations. 6. Write a program to demonstrate fix point scaling where scaling factors are Sx=2 and Sy=3.	L3,L5	6
Module IV: Segment 1. Write a program to demonstrate line clipping algorithm to clip a line where line slop is m<=1. 2. Write a program to demonstrate window to viewport	L3,L5	4

transformation and liner mapping of the object coordinates in viewport where size of viewport is half to the size of window. 3. Write a program to clip a polygon using Sutherland hodgeman polygon clipping algorithm.		
Module V: 3-D Transformation and Visible surface detection 1. Write a program to translate a 3D triangle where translation factors are tx=20 and ty=30. 2. Write a program to rotate a 3D triangle in clock-wise and anti-clock-wise direction where rotation angle is 300. 3. Write a program to scale a 3D square where scaling factors are Sx=2 and Sy=3. 4. Demonstrate combine 3D transformation after applying translation, rotation and scaling transformations. 5. Write a program to draw Bezier curve and spline curve on the screen with 4 control points.	L3,L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Computer Graphics, Donald Hearn, M Pauline Baker, 2nd Edition, PHI 1999

2. Schaum Series**,** Computer Graphics

Reference Books

1. Computer Graphics, N. Krishnamurthy, TMH

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	1	--	--	--	--	--	--	--	--	--	1	2	--	--
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	2	1	--
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1	--
CO5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2	--

	Mobile Computing	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of Computer Networks				
Co-requisites	Nil				

Catalog Description

The objective of this consortium is to shape and expand a full-scale and sound mobile computing system market. To achieve this, cooperation is required of interests related to communication (network), computer hardware/software, system integrators (including service providers), and the media.

Course Objectives

The objective of this course is to

- Give a general overview of the cellular technology and the associated terms and discuss the generations of the mobile technologies starting from 1G to 3G techniques.

- Illustrate the GPRS and WAP model for 2G internet connectivity in detail.
- Elaborate the third-generation mobile services
- Describe the Global Mobile Satellite Systems in detail and basic architecture of Bluetooth technology and advanced topics in mobile computing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concepts mobile technology, computing and basic architecture of PCS and GSM.
CO2: Describe the mobile networking Infrastructure through 2G technologies (GSM, GPRS, WAP).
CO3: Explain the basic concepts of 3G technologies (WCDMA, CDMA 2000) and WLL.
CO4: Discuss the working of mobile satellite systems like IRIDIUM and GLOBALSTAR.
CO5: Explain the concepts of Bluetooth technology, its working and protocols, virtual networks and enterprise networks.

Modules	Blooms level*	Number of hours
Module I:Introduction to Personal Communications Services (PCS) PCS Architecture, Mobility management, Networks signaling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.	L1, L2 and L3	8
Module II: General Packet Radio Services (GPRS) &Wireless Application Protocol (WAP) GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).	L1 and L2	10
Module III:Third Generation (3G) Mobile Services Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.	L1 and L2	7
Module IV: Global Mobile Satellite Systems Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.	L1 and L2	7
Module V:Enterprise Networks Introduction to Virtual Networks, Blue tooth technology, Blue tooth	L1 and	4

Protocols. Advanced techniques in mobile computing.	L2	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evallllluation

Text Books

1. "Wireless and Mobile Networks Architectures", by Yi-Bing Lin &ImrichChlamtac, John Wiley & Sons, 2001.
2. "Mobile and Personal Communication systems and services", by Raj Pandya, Prentice Hall of India, 2001.

Reference Books

1. "Wireless Web Development", Ray Rischpater, Springer Publishing, 2000.
2. "The Wireless Application Protocol", by Sandeep Singhal, Pearson Education Asia, 2000.
3. "Third Generation Mobile Telecommunication systems", by P.Stavronlakis, Springer Publishers, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	--	3	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	--	1	--
CO3	1	2	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	2	--	--	--	--	--	--	--	--	--	--	1	--	1	--
CO5	1	2	--	--	--	--	--	--	--	--	--	--	1	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

	Programming With Java	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	-	3
Pre-requisites/Exposure	Hands on Knowledge of C Programming				
Co-requisites	Basic concepts of C Programming				

Catalog Description

The objective is to impart programming skills used in this object oriented language java.The course explores all the basic concepts of core java programming like object,classes,data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

1. Equip the students with the basic feature of contemporary java required in solving complex problems.
2. Provide a practical knowhow and implementation of java programming concepts like classes , objects, packages, swings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain concept of byte code and platform independence, demonstrate basic java based application development using operators, if-else, loops and arrays. Distinguish between various types of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects, inheritances, and packages.

CO2: Explain event delegation model and describe AWT class hierarchy; Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.

CO3: Describe hierarchy of exception classes and thread life cycle along with demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts.

CO4: Explain the JDBC architecture, ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology.

CO5: Explain the steps of user defined packages ; Explain the concept of swings, swing package. Demonstrate applications based on java applets and swings. Descibe Servlets, Servlet Life Cycle, Servlet based Applications, jdbc with servelets.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
Module I: Overview of Java Introduction to Java, Java features, An Overview of Java, Data Types, Variables, Arrays, Operators, and Control Statements, Introducing Classes, A Closer look at Methods and Classes, Inheritance, Packages and Interfaces, Exception Handling, Multithreaded Programming, I/O, and Applets, Creating threads, implementing threads, threads priorities, suspending, stopping & resuming threads, String Handling.	L1, L2 and L3	7
Module II: Java AWT and Swings Introducing the AWT: AWT Controls, Working with Windows, Layout Managers, and working with Swing, Event Handling Mechanism, Events, classes, sources of events, Networking, and Event Handling.	L1, L2 and L3	7
Module III: Collections and Generics What are Generics? A Generic Class with Two Type Parameters, The General Form of a Generic Class, Bounded Types, Creating a Generic Method, Generic Constructors, Generic Interfaces, Generic Class Hierarchies, Collections Overview, The Collection Interfaces, The Collection Classes, Accessing a Collection via an Iterator, The Random access Interface.	L2, L3 and L4	8
Module IV: JDBC Overview of JDBC architecture, ODBC and JDBC Drivers, Connecting to Database with the java.sql Package, Using JDBC Terminology.	L2, L3 and L4	7
Module V: JSP and servlets Introduction to Servlets, Servlet Life Cycle, Servlet based Applications, jdbc with servelets, session Management techniques in detail, JSP: Introduction to JSP, JSP implicit objects, JSP based Applications, Java. Net. Login & Logout Example, jdbc with jsp.	L2, L3 and L4	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1. Patrick Naughtan and Herbert Scheldt The Complete Reference, Java 2, TMH

Reference Books

1. Java 2 Unleashed (Techmedia – SAMS), Jamie Jaworski
2. Developing Java Servlets (Techmedia – SAMS), James Goodwill sing Java 1.2 Special Edition (PHI), Webber

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT1**	**PR.**	**ATTD.**	**EE**
Weightage (%)	15	10	5	70

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**2**	**1**	**3**	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	**2**	--	--
CO3	**1**	**3**	**3**	--	--	--	--	--	--	--	--	--	**2**	**2**	**1**	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	**2**	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	**1**	--	--

1: strongly related, 2: moderately related and 3: weakly related

	Programming with Java Lab	L	T	P	C
2017.1	__	0	-	4	2
Pre-requisites/Exposure	Hands on knowledge of C and C++ Programming				
Co-requisites	Basic concepts of OOP Programming				

Catalog Description

The objective is to impart programming skills used in this object oriented language java. The course explores all the basic concepts of core java programming like object, classes, data types, features, operators, control structures, interfaces, packages, applets, awt, swings and socket programming. The students are expected to learn it enough so that they can develop the basic applications as well as web solutions like creating applets etc.

Course Objectives

The objective of this course is to

- Equip the students with the basic feature of contemporary java required in solving complex problems.
- Provide a practical knowledge of implementation/demonstration of java programming concepts like classes, objects, packages, swings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate the basic java based application development using operators, if-else, loops and arrays.

CO2: Demonstrate the concept of inheritances, polymorphisms and other concepts and able to solve complex programming problems involving class objects.

CO3: Apply knowledge of event handling and AWT controls create some new dynamic graphical applications.

CO4: Demonstrate and design solutions for some simple and complex applications using exception and multithreading concepts, Database connectivity.

CO 5: Apply the knowledge of swing, io packages to implement various application programs. Demonstrate applications based on java applets and swings.

Modules	Blooms level*	Number of hours
1. Sample programs of basic java a) Write a program & execute to display “hello java” in java. b) Write a program & execute to demonstrate command line arguments in java. c) Write a program & execute to find maximum of command line arguments in java. d) Write a program & execute to find sum of two numbers in java, take input from user.	L1, L2 and L3	4
2. Sample programs of Inheritance, String classes, abstract function and interface a) Write a program & execute in java to perform area and volume calculations in java using concept of inheritance. b) Write a program & execute in java to demonstrate abstract class in java c) Write a program & execute in java to perform complex number arithmetic using class and object. d) Write a program & execute to make use of interface in java Write a program & execute in java to sort an array of strings using string class functions.	L2, L3 and L4	4
3. Sample programs of AWT and event handling a) Write your first applet in java b) Write a program & execute to find maximum of two numbers in java using applet. c) Write a program & execute to draw basic shapes in java using graphics d) Write a program & execute to handle various mouse events	L2, L3, L4 and L5	4
4. Sample programs of exception handling, multithreading and JDBC Connectivity	L2, L3	6

a) Write a program & execute to demonstrate threads in java b) Write a program & execute to demonstrate synchronization in threads in java. c) Write a program & execute to create your own exception and use it in java d) WAP to connecting a database using user-id and password. c) WAP to insert data into the database using the prepared statement	and L4	
5. Sample programs on java packages and Servlets a) Create your own package to create two simple functions in different/same classes and access them in and outside the package. b) Write a program to create servlets based applications. c) WAP for authentication, which validate the login-id and password by the servlet code d) WAP to include a HTML page into a JSP page,WAP to handle the JSPException	L2, L3 and L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

3. Computer Graphics, Donald Hearn, M Pauline Baker, 2nd Edition, PHI 1999

4. Schaum Series**,** Computer Graphics

Reference Books

2. Computer Graphics, N. Krishnamurthy, TMH

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	1	--	--	--	--	--	--	--	--	--	1	2	--	--
CO2	1	1	1	--	--	--	--	--	--	--	--	--	2	1	--	---
CO3	1	1	1	3	2	--	--	--	--	--	--	--	1	2	1	---
CO4	1	1	2	2	2	--	--	--	--	--	--	--	2	--	1	---
CO5	1	3	2	1	1	--	--	--	--	--	--	--	2	3	2	--

	Software Project Management	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Software Engineering Concepts				
Co-requisites	Nil				

Catalog Description

This course introduces the concepts to understand the fundamental principles of Software Project management & provides a good knowledge of responsibilities of project manager and how to handle these. It also discusses the different methods and techniques/tools used for project management.

Course Objectives

The objective of this course is to

- To understand the working and functioning of the process of the software development so that the project can be managed accordingly.
- To understand the engineering activities in the project life cycle
- To implement the management tools and quality standards

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe fundamental principles of Software project management

CO2: Identify the key activities in managing a software project

CO3: evaluate and relate different software processes, system models

CO4: Plan software projects, including risk and quality management

CO5: Utilize technology tools for communication, collaboration, information management, and decision support.

CO6: Apply software quality practices in software project.

Modules	**Blooms level***	**Number of hours**
MODULE 1: INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.	L1, L2	6
MODULE 2: STEPWISE PROJECT PLANNING Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan. .	L1, L2 and L3	8
MODULE 3: PROJECT EVALUATION & ESTIMATION Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods,	L3, L4,and L6	9

rapid application development, water fall-, V-process-, spiral- models, Prototyping, delivery. Albrecht function point analysis.		
MODULE 4: ACTIVITY PLANNING & RISK MANAGEMENT Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project , precedence networks. Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values**.**	L2, L3 and L5	10
MODULE 5: RESOURCE ALLOCATION & MONITORING THE CONTROL Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence. Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, and change control.	L2, L3 and L5	10
MODULE 6: SOFTWARE QUALITY Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality.	L2,L3 and L6	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH
2. Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH
3. Software Project Management, Walker Royce, 1998, Addison Wesley.

Reference Books

1. Nasib Singh Gill, "Software Engineering", Khanna Book Publishing Co. (P) Ltd.

2. Jumpstart to Software Quality Assurance by Vishnuvarthanan Moorthy - Smashwords , 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	--	--	--	--	--	--	--	--	--	--	1	-	--	-
CO2	-	1	2	-	--	--	--	--	--	--	--	--	--	2	--	--
CO3	--	-	1	2	-	--	--	--	--	--	--	--	--	2	--	----
CO4	-	1	-	2	--	--	--	--	--	--	--	--	--	--	3	--
CO5	-	-	-	--	--	--	--	--	--	1	1	2	----	--	--	4
CO6	--	-	-	-	-	-	-	2	-	-	-	-	--	--	--	4

1: strongly related, 2: moderately related and 3: weakly related

	Software Project Management Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Software Engineering Concepts				
Co-requisites	NIL				

Catalog Description

Study practical approaches for managing, planning, organizing and implementing Information Systems projects using modern management techniques. Complete hands-on projects requiring management of project resources, scope, time-line, cost, scheduling, human and other resources. Use Microsoft Project and other project monitoring tools. In this Lab course MS Project tool is used

Course Objectives

The objective of this course is to

- Demonstrate students to Manage the phases and infrastructure of IT projects
- Use project management software to control the design, implementation, closure, and evaluation of IT projects
- Estimate, plan, calculate, and adjust project variables

Course Outcomes

On completion of this course, the students will be able to

CO1: Create plans at the level of detail that is appropriate for software project

CO2: Create and manage tasks, costs, work, and resources in a software project

CO3: Track and monitor project performance throughout its life-cycle

CO4: Explain quality management and process improvement in the context of software development projects.

Modules/Topics Covered**	Blooms level*	Number of hours
1. Introduction of tool including creating project (a) Set file properties and calendar settings (b) Create Gantt Chart for SDLC process. (c) Create Pert chart for SDLC process .	L3, L4	8
2. Key activities of software Project Management (a) Create a Gantt chart of wedding planning event management which includes minimum of 12 activities.. (b) In the same Gantt chart split the tasks,copy ,move and paste tasks.	L3, L4	4
3. Checkpoints , milestones and Critical path concepts (a) Create Gantt Chart of all testing activities which includes checkpoints and milestones (b) In the same project review critical path.	L3, L4,L5	4
4. Work Breakdown Structure (a) Create Gantt chart of Agile approaches, also create work breakdown structure of same (b) Add different type of resources in same project (c) Perform the time estimations of tasks and set task dependencies.	L3, L5,L6	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

- Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH
- Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH
- Software Project Management, Walker Royce, 1998, Addison Wesley.

Reference Books

- Step By Step Microsoft Project 2010 by Carl S. Chatfield, Timothy D. Johnson,2002
- Jumpstart to Software Quality Assurance by Vishnuvarthanan Moorthy - Smashwords , 2013

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	1	2	3	--	--	--	--	--	--	4	--	1	--	--	--
CO2	1	--	3	--	2	--	--	--	3	--	2	--	--	1	2	--
CO3	--	--	--	1	2	--	--	--	--	3	--	--	--	1	2	--
CO4	-	2	--	--	--	--	--	--	--	--	1	--	--	--	1	3

1: strongly related, 2: moderately related and 3: related

	Artificial Intelligence	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge of Searching Techniques				
Co-requisites	Nil				

Catalog Description

In this course the concepts of basic principles, techniques, and applications of Artificial Intelligence are discussed in detail. As a precursor to the study of the course it provide an in depth understanding of basic areas of artificial intelligence, search techniques, knowledge representation, learning and their applications in design and implementation of intelligent agents for a variety of task. The concepts further enhances the understanding of key components of intelligent agents of moderate complexity in Prolog and evaluate their performance.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Artificial Intelligence, its application, importance and characteristics.
2. It Provide an overview of different concepts such as searching, knowledge, Learning, Robotics, Expert System and Prolog

1. Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Artificial Intelligence, its application, importance of Artificial Intelligence.

CO2: Analyze the different searching technique and understanding their applications.

CO 3: Explain the concept of knowledge representation, the different techniques, handling uncertainty in knowledge and making different types of decisions.

CO4: Explain the concept of Expert System and its application areas.

CO5: Explain the concept of NLP and the functionality of Robots

Modules	Blooms level*	Number of hours
MODULE 1: **Problem solving and Scope of AI***:* Introduction to Artificial Intelligence. AI-Applications- Games, theorem proving, natural language processing (NLP), vision and speech processing, robotics, expert systems. Solving Problems by Searching, beyond classical search, adversarial Search, constraint satisfaction problems	L1 and L2	8
MODULE 2: **Knowledge and Representation**: Logical Agents, First-Order Logic, Inference in First-Order Logic, Classical Planning, Planning and Acting in the Real World, Knowledge Representation. **Uncertain Knowledge and Reasoning-** Quantifying Uncertainty, Probabilistic Reasoning , Probabilistic Reasoning over Time , Making Simple Decisions, Making Complex Decisions.	L2, L3 and L4	14
MODULE 3: **Expert System:** Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI. **Learning:-**Learning from Examples, Knowledge in Learning, Learning Probabilistic Models, Reinforcement Learning.	L2, L3 and L4	10
MODULE 4: **Module IV: Communicating, Perceiving, and Acting** NLP-Natural Language Processing, Natural Language for Communication, Perception. **Robotics:-** Fundamentals of Robotics, Sensors and vision system, Robot Programming languages & systems	L3,L4 and L5	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Stuart Russell, Peter Norvig "Artificial Intelligence: A Modern Approach",3rd Edition,Pearson Publication,Edinburgh,2014.
2. E. Rich and K. Knight, "Artificial intelligence",3rd Edition, McGraw-Hill Education Publication,Delhi,2009

Reference Books:

1. P. H. Winston, "Artificial Intelligence",3rd Edition, Pearson Education Publication , 2002.
2. R. J. Schalkoff, "Artificial Intelligence – An Engineering Approach", 1st Edition,McGraw Hill Int. Ed. Publication, Singapore, 1992.

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	2	1	3	--
CO2	1	1	2	--	--	--	--	--	--	--	--	--	2	1	3	--
CO3	1	2	3	--	--	--	--	--	--	--	--	--	2	1	3	--
CO4	1	1	2	--	--	--	2	--	--	--	--	--	2	1	3	--
CO5	1	1	2	--	--	--	2	--	--	--	--	--	3	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

	Artificial Intelligence Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of C Concepts				
Co-requisites	NIL				

Catalog Description

In this Lab course Prolog programs are implemented and demonstrated. The Concepts that are covered would enable them to achieve the desired goal by creating facts and rules. Programs will be related to concepts of creating facts, facts with argument, backtracking, arithmetic operations in prolog, nesting condition, looping condition and List handling.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of Prolog to attain goal by creating and matching rules and facts developed in the knowledge base.
2. Provide a demonstration of Prolog programming concepts like facts with arguments,Backtracking

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of Prolog programming to provide solution to the given AI problem.

CO2: Demonstrate the use of List handling in Prolog by performing various functions which are based on finding the element, replacing an element and appending the two lists.

CO3: Apply the knowledge of Facts and Rules in Prolog to reach a particular goal by implementing different concepts such as facts with arguments, backtracking, and looping conditions.

Modules/Topics Covered**	Blooms level*	Number of hours
5. Sample Programs using Basic of Prolog Programming (d) Write a program to understand the basic structure of Prolog programming. (e) Write a program to create simple facts using prolog. (f) Demonstrate an application of facts with arguments by showcasing the use of facts to reach a particular goal.	L1,L3, L5	4
6. Sample Programs using Rules based Programming in Prolog (c) Create an rule based programs in Prolog (d) Write a program to implement the concept of backtracking which matches each rules with a query	L3, L5	4
7. Sample Programs to implement the concept of input/output operation in Prolog (c) Create a Prolog program which accept a user input and display back the result. (d) Design an application to fetch data in the form of numeric data and display the given result (e) Demonstrate the process of arithmetic operations in Prolog Programming. (f) Demonstrate the working of menu driven calculator to perform different arithmetic operations.	L3, L5	6
8. Sample Programs to implement the concept of nesting and looping condition in Prolog (d) Write a prolog program to demonstrate the looping condition by implementing the concept of finding out the factorial of a given number. (e) Write a prolog program to demonstrate the conditional statement in Prolog by implementing the concept of finding out the maximum of three numbers, to calculate the area of a cube.	L3, L5	6
9. Sample Programs using List Handling in Prolog	L3, L5	4

(a) Demonstrate the use of List handling in Prolog which include finding an element, replacing an element (b) Write a program to append two givsen list created in Prolog Programming.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books:

1. Stuart Russell, Peter Norvig "Artificial Intelligence: A Modern Approach",3rd Edition,Pearson Publication,Edinburgh,2014.
2. E. Rich and K. Knight, "Artificial intelligence",3rd Edition, McGraw-Hill Education Publication,Delhi,2009

Reference Books:

1. P. H. Winston, "Artificial Intelligence",3rd Edition, Pearson Education Publication , 2002.
2. R. J. Schalkoff, "Artificial Intelligence – An Engineering Approach", 1st Edition,McGraw Hill Int. Ed. Publication, Singapore, 1992.

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Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					**EE**
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO2	3	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	Seminar	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	0	3
Pre-requisites/Exposure	Basics of Networks				
Co-requisites	Nil				

Catalog Description

The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In this course the concepts of different new ideas will be explored by the seminar presentation.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies.
2. Equip students with Report writing and Presentation skills.

Course Outcomes

On completion of this course, the students will be able to

CO1: Make a report on relevant topic by the study of literatures.

CO2: Demonstrate the topic of seminar by use of power presentation.

CO3: Demonstrate the challenges and applications of the topic of the seminar.

Text Books

As per topic of seminar.

Reference Books

As per topic of seminar.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**IM**
Weightage (%)	20	20	30	30

V – Viva, PPT-Power Point Presentation, R – Report, IM-Internal Marks

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**2**	**1**	**2**	--	--	--	--	--	**2**	--	--	--	**2**	**2**	**2**	**2**
CO2	--	--	--	--	--	--	--	--	**2**	--	--	--	**2**	**2**	**1**	**2**
CO3	**2**	**2**	**2**	--	--	--	--	--	**2**	**1**	--	--	**2**	**2**	**2**	**2**

1: strongly related, 2: moderately related and 3: weakly related

	Data Warehousing and Data Mining	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge on Database				
Co-requisites	Nil				

Catalog Description

In this course the concepts of Data warehouse and Data Mining are discussed in detail. The different data mining techniques such as clustering, classification, association are introduced. As a precursor to the study of data warehouse its architecture, types of OLAP Servers, and usage of OLAP are studied in detail. The concepts further enhances the concept of different attributes supported by data mining process, application of data mining in marketing,banking,retail sector and other areas are analyzed. .

Course Objectives

The objective of this course is to

- Equip the students with concepts of data mining techniques namely classification, clustering and association.
- Provide an overview of data warehouse which include the usage of OLAP, its characteristics, OLAP architecture.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Datawarehouse, its characterstics, Metadata concepts and its importance, The schemas of Data warehouse with their application areas.

CO2: Explain the architectural components of data warehouse and the challenges the data warehousing is facing.

CO3: Explain the indexing of OLAP, the different OLAP operations performed on the data cube.

CO4: Explain the concept of different data mining techniques like association, clustering and classification and analyze these techniques on the different data sets.

CO5: Explain the concept of Web Mining and understanding the features of different types of database.

Modules	Blooms level*	Number of hours
MODULE 1: **Data Warehousing:** Data Warehouse definition & Characteristics, The need for data ware housing, Operational and Informational Data Stores, Difference between Data warehouse and DBMS, Benefits of Data warehousing, Data mart, Meta Data, Conceptual Modeling of Data Warehouses: star schemas, Snowflake, Fact Constellations with example each.	L1, L2 and L3	8
MODULE 2: **On Line Analytical Processing (OLAP)** Definition: OLAP, Difference between OLTP and OLAP, OLAP Server Architecture, OLAP Operations, Multi Relational & Multi Dimensional: MOLAP, ROLAP, OLAP Tools, Metadata Repository, Data Warehouse Back-End Tools and Utilities.	L2, L3 and L4	10
MODULE 3: **Data Mining** Introduction to Data Mining, Applications, Limitations, Techniques, Association Rules: Priori Algorithm, Direct Hashing and Pruning (DHP), Classification: Decision Tree, Split Algorithm based on Information Theory, Bayes Method.	L2, L3 and L4	10
Module 4: **Cluster Analysis: Concepts and Methods** Cluster Analysis: Features, Types of Cluster Analysis Methods: Partitional, Hierarchical, Density Based, Grid based Methods, , Web Data Mining, Search Engine, Case Study, Limitations.		8
Module 5: **Web Mining** Introduction, Classifying Web pages, extracting knowledge from the web.		6

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

1. Jiawei Han &Micheline Kamber,"Data Mining Concepts And Techniques",3rd Edition,Morgan Kaufmann Publication,An Imprint of Elsevier, 2015.
2. Vipin Kumar,Pang Ning "Introduction to Data Mining",3rd Edition,Pearson Publication,Chennai, 2016.
3. Mohammed,Wagner " Data Mining and Analysis", 4th Edition, Cambridge University Press,Brazil, 2018.

Reference Books:

1. Daneil,D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John wiley and Sons,Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**

CO1	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO2	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO3	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**--**	**--**
CO4	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**	**1**
CO5	**1**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**3**	**--**	**1**

1: strongly related, 2: moderately related and 3: weakly related

	Dataware Housing & Data Mining Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of Statistics Concepts				
Co-requisites	NIL				

Catalog Description

In this Lab course Data Mining programs are implemented and demonstrated using a Weka Tool. The Concepts that are covered would enable them to analyze the working of different data mining techniques namely clustering, association, regression. Programs will be related to concepts of understanding the architecture of data warehouse ,creating a knowledge base in Weka and apply preprocessing on the dataset, developing programs to specify the different types of attributes supported by Weka tool, Performing the implementation of clustering, association techniques.

Course Objectives

The objective of this course is to

- Make the students apply knowledge of Data Mining by analyzing the different data mining techniques.
- Provide a demonstration of Preprocessing technique on the data set by removing noisy data

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply the knowledge of Data Mining to gain analysis on different data sets and their related attributes.

CO2: Demonstrate the use of Data preprocessing technique by handling the data efficiently by removing noise and outliers from the given data sets.

CO3: To implement the different data mining concepts namely binning, histogram analysis, numeric transform and discretization.

CO4: Demonstrate the working of different data mining techniques namely clustering, association analysis, regression, classification techniques.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
1. To understand the basic feature of Data warehouse and Introduction to Weka Tool a) Understanding the concept of importance of data warehouse and its characteristics b) Applications of Data warehouse and 3-tier Architecture of Data warehouse c) Weka tool installation and basic introduction	L1,L2	4
2.Sample Programs to apply Pre-Processing technique on the data set a) Apply a pre-processing technique on the weather.arff dataset b) Create a student data set into arff format and then apply pre-processing on the data set.	L3, L4,L5	4
3. Sample Programs to implement the concept of Numeric transform and Discretization (a) Create a Weka program to apply a numeric transform on Iris dataset. (b) Design an application program to apply a feature selection method for game playing. arff dataset. (c) Write a program to implement the concept of Equal frequency and Equal width binning for the given dataset.	L3, L4,L5	6
4. Sample Programs to implement the concept of Training and Validating the dataset (a) Write a prolog program to demonstrate the concept of validation in Weka dataset.	L3,L4, L5	6

(b) Design an CSV dataset using Weka.		
5. Sample Programs to analyze the different data mining techniques a) Write a program to implement the concept of clustering in Weka. b) Write a program to apply Apriori technique on the dataset and to generate association rules. c) Write a program to apply classification technique on the given dataset.	L3, L4,L5	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books:

1. Jiawei Han &Micheline Kamber,"Data Mining Concepts And Techniques",3rd Edition,Morgan Kaufmann Publication,An Imprint of Elsevier, 2015.
2. Vipin Kumar,Pang Ning "Introduction to Data Mining",3rd Edition,Pearson Publication,Chennai, 2016.
3. Mohammed,Wagner " Data Mining and Analysis", 4th Edition, Cambridge University Press,Brazil, 2018.

Reference Books:

1. Daneil,D. Larose "Data Mining and Predictive Analytics", 2nd Edition, John wiley and Sons,Canada, 2015.
2. Paulraj "Data Warehousing Fundamental for IT Professional", 2nd Edition, John Wiley and Sons, Canada, 2010.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO2	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--	--	2	1	--	--
CO4	2	1	3	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	Programming with .NET Framework	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	4	0	0	4
Pre-requisites/Exposure	Basic Programming, HTML and CSS				
Co-requisites	Nil				

Catalog Description

.NET framework is most commonly used framework for developing various applications and it supports many languages. C#.NET is one of the most commonly used languages in the software industries. Students in this course will study to develop; Console and GUI based applications using C#.NET. The course also provides knowledge regarding Creating Dynamic Web Pages with the help of ASP.NET framework. Various topics included in this course impart the knowledge of ASP.NET framework concepts at implementation level. The major topic covered includes theme, state management, web controls, AJAX, database connectivity using ADO.NET, web services and deploying web applications.

Course Objectives

The objective of this course is to

Course Objectives

The objective of this course is to

- Equip the students with .NET framework and its programming constructs.
- Provide knowledge to develop to console based and GUI based applications using C#.NET language.
- Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
- Provide knowledge to develop, configure and deploy secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the components of .NET framework.

CO2: Use object-oriented concepts to write programs using C#.NET programming language.

CO3: Develop GUI based applications.

CO4: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO5: Establish database connectivity and perform various operations on database through ASP.NET web pages.

Modules	Blooms level*	Number of hours
MODULE I: **NET FRAMEWORK:** Overview of .NET and .NET Framework, .NET Compliant Languages, Common Language Specification (CLS),Common Type System (CTS),Framework Class Library (FCL),Base Class Library (BCL),Common Language Runtime (CLR) Visual Studio IDE, Microsoft Intermediate Language (MSIL), Understanding CLR and Execution of .NET Application, Components of CLR. **C#.NET BASICS**	L1, L2	4

C# Programming Language Features, Hello World Program, General Structure of a C# Program, Conceptual Overview of C#.Net, Data Types, Modifiers (Access Modifiers),Casting and Type Conversion, Boxing and Unboxing Modifiers, Selection Statements, Looping Statement, Array-Single Dimensional and Multi-Dimensional, Declaring Arrays, Initializing Arrays, Accessing Array Members, Arrays are Objects, Using for each with Arrays, Jagged Arrays		
MODULE II: **OOP:** Class, Interfaces: Defining and Implementing Single & Multiple Interfaces, Abstract Class, Delegates, Exception Handling, Reflection, Assembly, Types of Assemblies, Components of Assemblies. **COLLECTIONS:** Non-Generic Collection: Array List, Stack, Queue, Hash Table. Generic Collection: List, Dictionary, Queue, Stack.	L2 and L3	14
Module III: **WINDOWS FORMS** Create and populate Windows Forms, controls in a Windows Forms application, Menus in a Windows Forms application, Multiple Document Interface (MDI) applications, User input validation in a Windows Forms application **ASP.NET FRAMEWORK & WEB FORMS** Introduction to Microsoft ASP.NET, ASP.NET execution model, Themes, Creating an ASP.NET Web application user interface, Implementing event handlers by using code-behind files, Clint-side and Server-side controls, events, Using Controls, Validating Data, Navigating Between Forms , Custom and User Controls, Implementing Master Pages	L2 and L3	7
MODULE IV: **AJAX:** Introduction to AJAX, AJAX Toolkit, Partial page update using AJAX, Extending an ASP.NET Web Forms Application by Using the Ajax Control Toolkit. **STATE MANAGEMENT:** The Various Means to Manage State, Request object, Application object, Cache object, Session object, Server-side state management, using session for server-side and client-side state management. **XML WEB SERVICES:** Need of XML Web services, Understanding the Web Service Model, Creating an ASP.NET Web Service, Creating & Consuming Web Services with Visual Studio .NET.	L2 and L3	2

MODULE V: **ADO.NET** Architecture of ADO.NET: Connected, Disconnected, Sql Connection class, SqlCommand class, Data Reader class, Sql Data Adapter class, Data Set class, Data grid view with DML Operations like sorting, paging etc.	L2, L3 and L4	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Professional C#.NET 4.5 , Wrox Publications
- Stephen Walther, ASP.NET Unleashed, SAMS Publication

Reference Books

- Andrew Stellman and Jennifer Greene, Head First C#, O'Reilly
- E. Balagurusamy, Programming in C#.Net, Tata McGraw-Hill Publisher
- Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications
- Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
- Jesse Liberty, Dan Hurwitz, Programming ASP.NET, OReilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**3**	**--**	**--**
CO2	**2**	**2**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO3	**2**	**2**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**
CO4	**2**	**1**	**1**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**
CO5	**2**	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**
CO6	**2**	**2**	**2**	**2**	**1**	**---**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**1**	**--**

1: strongly related, 2: moderately related and 3: weakly related

	Programming with .NET Framework Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	-	-	4	2
Pre-requisites/Exposure	Basic Programming, HTML and CSS				
Co-requisites	Nil				

Catalog Description

.NET framework is most commonly used framework for developing various applications and it supports many languages. C#.NET is one of the most commonly used languages in the software industries. Students in this course will study to develop; Console and GUI based applications using C#.NET. The course also provides knowledge regarding Creating Dynamic Web Pages with the help of ASP.NET framework. Various topics included in this course impart the knowledge of ASP.NET framework concepts at implementation level. The major topic covered includes theme, state management, web controls, AJAX, database connectivity using ADO.NET, web services and deploying web applications.

Course Objectives

The objective of this course is to

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The objective of this course is to

- Equip the students with .NET framework and its programming constructs.
- Provide knowledge to develop to console based and GUI based applications using C#.NET language.
- Equip the students with concepts of ASP.NET web applications including State management, Web Controls and ADO.NET.
- Provide knowledge to develop, configure and deploy secure ASP.NET web applications using C#.NET programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the components of .NET framework.

CO2: Use object-oriented concepts to write programs using C#.NET programming language.

CO3: Develop GUI based applications.

CO4: Use various standard and advance web controls for developing ASP.NET dynamic web pages and also create custom controls.

CO5: Establish database connectivity and perform various operations on database through ASP.NET web pages.

Modules/Topics Covered**	**Blooms level***	**Number of hours**
Module-I: I/O, Selection and Looping Statements Sample Programs a) Program to get a number and display the number with its reverse b) Program to check inputted no. is prime or composite. 1. Array, Jagged Array, String & Command Line Arguments Sample Programs	L2, L3 and L4	4

a) Write a program to sort an array of n strings in ascending order. b) Program to find out sum of numbers passed through command line arguments. c) Program to Demonstrate Jagged Arrays d) Program to Search an element from an Array. e) Program to find the frequency of alphabet in a string.		
Module-II: Class & Properties, Overloading Sample Programs a) Define a class student with MarksofCS, MarksofJava, MarksofDBMS, name as its data member. Enter the marks, find average and percentage for that. Use appropriate properties. b) Define a class 'Number'and define overloaded method add () with one, two and three arguments to implement method overloading. c) Define a class with two datamembers: num1 as constant and num2 as readonly. Display the values of both on the console and state the difference between them. Constructor, Garbage Collector, Static Members Sample Programs a) Create a class distance have km and m as its data members and create various constructors to initialize the data members. b) Program to demonstrate static data members. Operator Overloading , Delegates Sample Programs a) Create a class ComplexNumber with two data members real and imaginary. Overload +,–,>,<, >=,<= and == operators for it. b) Program to implement delegate. Inheritance, Interface, Abstract class Dynamic Polymorphism Sample Programs a) Create a class Student and inherit two classes UgStudent and Pgstudent from it to illustrate the concept of inheritance. Use appropriate data members, constructors, methods and properties. b) Write a program to implement the concept of dynamic binding using appropriate classes. Exception Handling, Custom Exceptions Sample Programs a) Write a program to find out square root of number. Handel all exceptions that may occur in this program. b) Create a 'NegativeValueException' that should be raised when a function received negative value in parameter. Generic Class, Collections (Non Generic & Generic) Sample Programs a) Create a generic class with an array of n elements. Write the method to find out greatest and average of elements of array. b) Write a program to store the City name and its temperature. Access the temperature using city name. Use appropriate collection. Assembly, Reflection Sample Programs	L2, L3 and L4	6

a) Program to create and use private and shared assembly. b) Program to display methods of a class at runtime.		
Module-III: Developing GUI Applications & Controls Sample Programs a) Design a calculator and implement its operations. b) Program to move the contents of a list box to another list box. Also write code to add and delete elements from any list box. c) To display message box for confirmation while closing a form. ASP.NET Forms Sample Programs a) Design a Login Page, which displays a Welcome Page on successful Login and an error message in case of invalid Id/Passward. b) Design a form and apply themes (design time and dynamically). c) Design any web form and apply various validation controls. d) Create a web form which can work in Hindi and English language both. e) Design a web form to upload an image to server. f) Design a custom control, Numeric Textbox, which should accept only integer value for a particular range. The range should be customizable.	L2, L3 and L4	6
Module-IV: a) Implement state management for Login page which move to welcome page when credentials are correct. The welcome page displays a welcome message along with the user Id. b) Implement various state management methods using a suitable web form. c) Create a web service and demonstrate its use in any web application. d) Design a Web forma and implement partial refreshing using AJAX.	L2, L3 and L4	4
Module-V: a) Create a database table and design appropriate form for it. Implement basic operations like insert, delete and update using ADO.NET. b) Implement various methods of execution of SQL command. c) Display data in a Grid and perform basic database operations. d) Develop any web application to illustrate SQL Injection attack and redesign it to prevent the attack. e) Develop a web application to illustrate XSS attack and redesign it to prevent the attack	L2, L3 and L4	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Professional C#.NET 4.5 , Wrox Publications
- Stephen Walther, ASP.NET Unleashed, SAMS Publication

Reference Books

- Andrew Stellman and Jennifer Greene, Head First C#, O'Reilly
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- Matthew MacDonald, Beginning with ASP.NET 4.5 in C#, Apress Publications
- Imar Spaanjaars, Beginning with ASP.NET 4.5.1 in C# and VB, Worx Publication
- Jesse Liberty, Dan Hurwitz, Programming ASP.NET, OReilly.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**3**	--	--	--	--	--	--	--	--	--	--	--	**2**	**3**	--	--
CO2	**2**	**2**	**1**	**2**	**1**	--	--	--	--	--	--	--	--	**1**	**2**	--
CO3	**2**	**2**	**1**	**2**	**2**	--	--	--	--	--	--	--	--	**1**	**2**	--
CO4	**2**	**1**	**1**	**2**	**1**	--	--	--	--	--	--	--	--	**1**	**1**	--
CO5	**2**	**1**	**1**	**2**	**2**	--	--	--	--	--	--	--	--	**1**	**1**	--
CO6	**2**	**2**	**2**	**2**	**1**	---	--	--	--	--	--	--	--	**2**	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

	Network Security & Cryptography	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	1	0	4
Pre-requisites/Exposure	Basic Mathematics				
Co-requisites	Nil				

Catalog Description

In this course the concepts of cryptography and network security are discussed in detail. Substitution and transposition techniques, symmetric and asymmetric cryptographic algorithms, their applications, differences will be introduced. As a precursor to the study of cryptography studies will be made on impact of various network and web security protocols. The concepts learnt in the studies of cryptography & network security will be applied in the studies and analysis of authentication, integrity and security related protocols.

Course Objectives

The objective of this course is to

- Equip the students with concepts of cryptography & network security through problem solving and analytical approach.
- Provide an overview of various network attacks and related security mechanism , various algorithms for modular arithmetic, symmetric and asymmetric cryptography and web and network security

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain, describe and distinguish various security attacks; Describeand solve block and stream ciphers and its applications in cryptography; Solve problems based on substitution and transposition ciphers.

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CO2: Explain the basic mathematics of cryptography; Solve problems of groups, modular arithmetic ,gcd and inverse algorithm, chinese remainder theorem and its application in cryptography; Applying algorithms for solving problems in cryptography

CO3: Describing the concept of public key cryptosystems and its related algorithm; Explain and solve problems related to hash functions, digital signature and its applications in cryptography; Compare symmetric and asymmetric key cryptography.

CO4: Explain management, distribution ,secure exchange of keys and authentication certificate and its applications in real life. Explain , compare various authentication protocols used in cryptography and network security, also solve problems based on these protocols.

CO5: Explain various security protocols : IPSec, SSL,TLS,SET; Describing malicious softwares and illustrating various design approaches to Firewell

Modules	**Blooms level***	**Number of hours**
MODULE 1: Introduction to security attacks, services and mechanism, Classical encryption techniques: substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers. Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations,	L1, L2 and L3	9

Triple DES		
MODULE 2: Introduction to group, field, finite field of the form GF(p), modular arithmetic, prime and relativeprime numbers, Extended Euclidean Algorithm,Advanced Encryption Standard (AES) encryption and decryption, Fermat's and Euler's theorem, Primaliry testing, Chinese Remainder theorem, DiscreteLogarithmicProblem,Principals of public key crypto systems, RSA algorithm, security of RSA,ECC	L1,L2, L3	9
MODULE 3: Message Authentication Codes: Authentication requirements, authentication functions, messageauthentication code, hash functions, birthday attacks, security of hash functions, Secure hashalgorithm (SHA)Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signaturestandards (DSS).	L1,L2, L3 and L5	9
MODULE 4: Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos,Needham Schroeder protocol	L1, L2 and L3	9
MODULE 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, SSL, HTTPS,SET,3-D Secure , Viruses, Worms, Malware, Botnets, Firewall and its types.	L1, L2	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. William Stallings,"Cryptography & Network Security",4th Edition, Pearson Education,NewDelhi, 2017.
2. Behrouz A. Forouzan, "Cryptography & Network Security", 2ndEdition,Tata McgrawHills,New Delhi, 2015

Reference Books

1. Douglas R.Stinsons, “Cryptography Theory and Practice”, 3rd Edition, McMillan Publications, Londan, 2003
2. Atul Kahate, “Cryptography & Network Security”, 3rd Edition, Tata McgrawHills,New Delhi, 2017

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO2	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO3	**1**	**1**	**1**	**--**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**3**	**-**
CO5	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**3**	**-**

1: strongly related, 2: moderately related and 3: weakly related

	Soft Computing	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services. The field of Robotics is a multi disciplinary as robots are amazingly complex system comprising mechanical, electrical, electronic H/W and S/W and issues germane to all these

Course Objectives

The objective of this course is to

1. To provide an overview of problem solving skills methods using Soft Computing.
2. To serve as a foundation for the study of programming languages that is used to develop an Intelligence System

Course Outcomes

On completion of this course, the students will be able to

CO1. Understand the concept of artificial intelligence.

CO2. Differentiate between linear and non-linear problems and Learn various problem solving techniques using neural networks

CO3. Understand the concept of fuzzy logic and apply to various problems

CO4. Illustrate concepts of genetic algorithm

Modules	Blooms level*	Number of hours
Module I: Soft Computing Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures,	L1, L2	12

NLP.		
Module II: Neural Network Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA	L2, L3 and L4	10
Module III Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.	L2, L3 and L4	8
Module IV: Fuzzy Logic Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.	L2, L3 and L4	7
Module V: Genetic algorithm Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.	L2, L4	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- S, Rajasekaran& G.A. VijayalakshmiPai, Neural Networks, Fuzzy Logic & GeneticAlgorithms, Synthesis & applications, PHI Publication.

Reference Books :

- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Bose, Neural Network fundamental with Graph , Algo.&Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	3	--	--	--	--	--	--	2	--	1	-	1	-
CO2	1	--	1	2	--	--	--	--	--	--	--	--	1	-	1	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	1	-	1	-
CO4	1	--	--	2	--	--	--	--	--	--	--	--	1	-	1	-

1: strongly related, 2: moderately related and 3: weakly related

	Soft Computing Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

This lab course covers development and designing of implementing basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations. It aims to develop the

concepts and techniques and foster the students' abilities in designing and implementing soft computing based solutions for real-world and engineering problems.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Soft Computing which includes Neural networks, Fuzzy logic and genetic algorithms.
- Provide knowledge to develop Soft computing programs in Matlab.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain and apply concepts of MATLAB.

CO2: Implement various neural networks using MATLAB.

CO3: Illustrate use of fuzzy in real applications.

CO4: Apply genetic algorithm to basic problems.

Modules	Blooms level*	Number of hours
Fuzzy Logic a) Write a program in MATLAB to perform Union, Intersection and Complement operations. b) Write a program in MATLAB to implement De-Morgan's Law. c) Write a program in MATLAB to plot various membership functions. d) Generate XOR function using McCulloch-Pitts neural net by MATLAB program.	L1, L2,L3	4
Neural Network a) Write a MATLAB program for Hebb Net to classify two dimensional input patterns in bipolar with targets. b) Generate ANDNOT function using McCulloch-Pitts neural net by MATLAB program. c) Write a MATLAB program for Perceptron net for an AND function with bipolar inputs and targets. d) Write a M-file to calculate the weights for the following patterns using hetero-associative neural net for mapping e) Write an M-file to store the vector, find the weight matrix with no self-connection. Test this using a discrete Hopfield net.	L2,L3and L4	2

Genetic Algorithm a) Solve travelling salesman problem using Genetic algorithm. b) Solve clustering problem using GA. c) Solve classification using GA.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

Text Book.

- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
- Matthew MacDonald, Beginning with MATLAB, Apress Publications

Reference Books

- S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
- Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
- Kosko: Neural Network & Fuzzy System, PHI Publication
- Klir & Yuan, Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
- Hagen, Neural Network Design, Cengage Learning

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	2	2	1	--
CO2	2	1	--	--	--	--	--	--	--	--	--	--	2	2	1	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	Summer Internship Evaluation	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	0	5
Pre-requisites/Exposure	Basics of Networks				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file (**Internship File**). The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of new technologies.
2. Provide project management and presentation skills.

Course Outcomes

On completion of this course, the students will be able to

CO1: Make a report on relevant topic by the study of literatures.

CO2: Demonstrate the topic of summer project topic by use of power presentation.

CO3: Demonstrate the aim, challenges, applications, literatures, result and analysis of the topic of project report

CO4: Explain the meaning of references/Bibiliography.

Text Books

As per topic of summer internship project.

Reference Books

As per topic of summer internship project.

Examination Scheme:

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Components	**V**	**PPT**	**R**	**Exe**	**IM**
Weightage (%)	12	15	18	15	40

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, Exe-Execution, IM: Internal Marks by Guide

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**2**	--	--	--	--	--	--	--	--	--	-		**1**	**1**
CO2	**1**	**2**	**2**	-	--	--	--	--	--	--	--	--	-	-	**1**	**1**

CO3	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**1**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**2**

1: strongly related, 2: moderately related and 3: weakly related

	Android Programming	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Java Programming				
Co-requisites	Database concepts				

Catalog Description

This course introduces mobile application development for the Android platform. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Students will learn skills for creating and deploying Android applications.

Course Objectives

The objective of this course is to

1. To introduce Android platform and its architecture.
2. Provide the knowledge of mobile apps development.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe Android platform, Architecture and features.

CO2: Design User Interface and develop activity for Android App.

CO3: Design and implement Database Application and Content providers.

CO4: Use Intent, Broadcast receivers and Internet services in Android App.

CO5: Use Internet, multimedia, camera and Location based, SMS services etc, in Android App.

CO6: Manage, Develop and Implement Mobile app project.

Modules	Blooms Level	Number of hours
MODULE 1: Introduction to Android Introduction to Android Platform, Android Stack Android Versions and Installing Android SDK and updating SDK components, Eclipse, IDEs and ADT plug-in Using the Emulator, Android vs. Other mobile platforms **Your First Android Application:** Application Life Cycle, Application Components, Activity life cycle, Manifest File, Layout XML Code Strings, The R File, Java Source Code, Java based layout vs. xml based layout Eclipse Visual Layout Editor, Logging.	L1 and L2	4
MODULE 2: UI Design for Android Using different layouts – LinearLayout, TableLayout and others, Drawable Resources Resolution and density independence, Working with common widgets, Working with ListView and Adapters, Creating and using option menu, Working with preferences Working with Dialogs and Toasts, Working with Graphics and Animation, Intents ,Intent filters, Invoking activities by class name and URI, Sharing data using Extras Bundle and URI parameters,Working with Tabs and Fragments,	L1,L2and L3	8
MODULE 3: Files, Database & Working in Background Using File System, Introducing SQLite on Android, Database Connectivity, Cursors and content values, Using ContentProvider to share data,Understanding Security model, Introducing Service and its life cycle,Creating and starting a service, Types of services, Working with multi-threading and AsyncTask,Broadcast receivers,Triggering receivers with intents,Responding to system events using Broadcast receivers,Using Alarm.	L1, L2 and L3	8
MODULE 4: Using System Services and Web Services Using Location based Services,Telephony and SMS services,Bluetooth, Network and WiFi, Multimedia and Camera,Accessing Internet and Web Services from Android Applications.	L1, L2 and L3	6

MODULE 5: Project Understanding the requirement, Designing the interface and architecture, Best practices regarding application design and development, Writing code and testing it, Preparing application for Publishing, Publishing to Play Store and Physical device.	L3, L4 and L5	6

Bloom's Level:
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Android Programming: The Big Nerd Ranch Guide" By Bill Phillips & Brian Hardy, Big Nerd Ranch, Inc. Pearson Technology Group.
2. "Head First Android Development", By Anthony J.F. Griffiths and David Griffiths, Oreilly.

Reference Books

1. "Android Programming for Beginners", By John Horton,Packt Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2	PS O 3	PSO 4
CO 1	3	--	--	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 2	1	2	1	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 3	1	2	1	--	--	--	--	--	--	--	--	--	2	1	1	--
CO 4	1	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--
CO 5	1	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--
CO 6	1	1	1	2	--	--	--	--	--	--	--	--	--	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	Android Programming Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Java Programming				
Co-requisites	Nil				

Catalog Description

This lab course provides a platform to the students for understanding the basic concepts of Android. This practical background will help students to gain confidence in creating /developing Android Applications.

Course Objectives

The objective of this course is to

- Equip the students with concepts of Android Programming UI Design, Database connectivity, File System, System Services and Web Services
- Provide knowledge to develop secure Android Mobile applications.

Course Outcomes

On completion of this course, the students will be able to

On completion of this course, the students will be able to

CO1: Describe Android platform, Architecture and features.

CO2: Design User Interface and develop activity for Android App.

CO3: Design and implement Database Application and Content providers.

CO4: Use Intent, Broadcast receivers and Internet services in Android App.

CO5: Use Internet, multimedia, camera and Location based, SMS services etc, in Android App.

CO6: Manage, Develop and Implement Mobile app project.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Android g) Introduction to Android Operating System h) Hello world program using android i) Program to demonstrate Activity life cycle of android.	L1, L2 and L3	4
MODULE 2: UI Design for Android e) Working with different layouts – LinearLayout, TableLayout and others. programs related to Drawable Resources. f) Working with common widgets g) Working with ListView and Adapters, Creating and using option menu, Working with preferences h) Working with Dialogs and Toasts, i) Working with Graphics and Animation, Intents ,Intent filters,	L2 and L3	4
MODULE 3: Files, Database & Working in Background a) Database programming in android	L2 and L3	6
MODULE 4: Using System Services and Web Services a) Program related to Service and its life cycle b) ProgramsUsing Location based Services,Telephony and SMS services,Bluetooth, Network and WiFi, c) Programs related to Multimedia and Camera, a) Programs related to Accessing Internet and Web Services from Android Applications.	L2 and L3	4
MODULE 5: Project a) Small application to understand complete application development and management based on specific requirements.	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. "Android Programming: The Big Nerd Ranch Guide" By Bill Phillips & Brian Hardy, Big Nerd Ranch, Inc. Pearson Technology Group.
2. "Head First Android Development", By Anthony J.F. Griffiths and David Griffiths, Oreilly.

Reference Books

1. "Android Programming for Beginners", By John Horton,Packt Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PS O 1**	**PS O 2**	**PS O 3**	**PSO 4**
CO 1	**3**	--	--	--	--	--	--	--	--	--	--	--	**2**	**1**	**1**	--
CO 2	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**2**	**1**	**1**	--
CO 3	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**2**	**1**	**1**	--
CO 4	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**2**	**1**	**1**	--
CO 5	**1**	**2**	**1**	--	--	--	--	--	--	--	--	--	**2**	**1**	**1**	--
CO 6	**1**	**1**	**1**	**2**	--	--	--	--	--	--	--	--	**2**	**1**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

	Digital Image Processing	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Computer Graphics				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with visualization of real concept of Image processing. Concepts covered would enable students to define and differentiate among various types of image refinement. Further they would be able to gain insights about various Image restoration and modification technique.

Course Objectives

The objective of this course is to

Give provide knowledge of powerful collection of fundamental and advanced image processing tools on the desktop by taking advantage of the computational technology of Mathematics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain Digital Image Processing.

CO2: Apply Image Enhancement techniques in the Spatial Domain.

CO3: Use the concepts of Image Enhancement in the Frequency Domain.

CO4: Understand the architecture Image Compression.

CO5: Apply algorithms of Image Representation and Description and Object Recognization.

Modules	Blooms level*	Number of hours
MODULE 1: **Introduction and Digital Image Fundamentals** The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.	L1 and L2	4
MODULE 2: **Image Enhancement in the Spatial Domain** Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	L2 and L3	6
MODULE 3: **Image Enhancement in the Frequency Domain** Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphism Filtering.	L1 and L2	8
MODULE 4: **Image Compression** Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. **Image Segmentation** Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.	L2 and L3	10
MODULE 5: **Representation and Description** Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some	L2 and L3	8

basic Morphological Algorithms. **Object Recognition** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Rafael C. Conzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
2. A. K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

1. Rosefield Kak, "Digital Picture Processing",
2. W.K. Pratt, "Digital Image Processing",

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	--	--	--	--	--	--	--	--	--	--	--	**2**	**3**	--	--
CO2	**1**	**1**	**1**	**2**	**1**	--	--	--	--	--	--	--	**1**	**1**	**1**	--
CO3	**1**	**1**	**1**	**2**	**1**	--	--	--	--	--	--	--	**1**	**1**	**1**	--
CO4	**1**	**2**	**2**	--	**1**	--	--	--	--	--	--	--	**1**	**2**	**2**	--
CO5	**1**	**1**	**1**	**1**	**1**	--	--	--	--	--	--	--	**1**	**1**	**1**	--

1: strongly related, 2: moderately related and 3: weakly related

	Digital Image Processing Lab	L	T	P	C
Version 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basics of MATLAB				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of Image Processing along with visualization of real concept of Image processing. In this Lab course student will learn practicals of image processing using MATLAB programming.

Course Objectives

The objective of this course is to

1. Make the students apply knowledge of various Image processing techniques & pattern recognition required for solving complex problems.
2. Provide demonstration of different types of image processing techniques through MATAB toolbox.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquiring knowledge of Basics of High-end calculation software and need in Computer Science & engineering

CO2: Demonstrate the All preliminary functions in MATLAB

CO3: Apply the knowledge of all the basics function and toolbox knowledge of MATLAB

CO4: Demonstrate the Use of MATLAB in image Processing

Modules/Topics Covered**	Blooms level*	Number of hours
Introduction of MATLAB (g) Basic Variable deceleration & its operation (h) Function use & its application	L3, L5	4
Sample Programs in MATLAB a) Basic use of Matrix and Graph Plotting b) Different type of graph plotting with use of different -2 type of data	L3, L5	6
Sample Programs using MATLAB functions a) Create a basic program MATLAB using functions b) Use of basic function Image processing c) Practice on Basic function of Image processing tool box.	L3, L5	6
Programs of ANN functions a) Practice on Pattern Recognition functions in MATLAB b) Write a program for training a small network in MATLAB	L3, L5	6
Programs using ANN toolbox& Image processing toolbox a) Demonstrate the useof ANN tool box& Image processing toolbox and write a program after combining it.	L3, L5	2

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

** Sample Programs provided are not limited to these only, can include others as desired.

Text Books

1.Rafael C. Conzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education.
2.K. Jain, "Fundamental of Digital Image Processing", PHI.

References:

1.Rosefield Kak, "Digital Picture Processing",
2.W.K. Pratt, "Digital Image Processing",

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	--	--	--	--	--	--	--	--	--	--	**2**	--	--	--
CO2	**3**	**1**	--	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**2**	**1**	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO4	**1**	**3**	**2**	--	--	--	--	--	--	--	--	--	**2**	--	**2**	--
CO5	**1**	**3**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	BIG DATA	L	T	P	C
Version: 2020.1	Date of Approval:19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of DBMS				
Co-requisites	SQL				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

- To make students familiar with big data technologies.
- Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain importance, applications and challenges of Big Data Analytics.

CO2. Differentiate among various analytics technologies.

CO3. Demonstrate architecture of Hadoop and Mapreduce framework.

CO4. Illustrate Hadoop commands.

CO5. Introduce concepts of Hive, HBase and Pig.

Modules	Blooms level*	Number of hours
Module I: Introduction to Big Data Big Data : Definition, Sources, Importance & Applications, 5 V's of Big Data, Complexity of Big Data, Big data processing architecture, Big Data Analytics, Big data problems & challenges.	L1 and L2	5
Module II: Working with Hadoop Hadoop concepts : History, comparison with other systems : RDBMS, Grid computing, Cluster Computing, Cloud Computing, Hadoop Architecture, Hadoop Distributed file system : Data node, Name node, job tracker, task tracker, Moving data in and out of Hadoop, Common Hadoop shell commands.	L2and L5	4
Module III: Working with Map Reduce Map Reduce framework,Working of MapReduce: Job Scheduling, Shuffle and Sort, Task Execution, MapReduce Types, Formats and Features.	L1 and L3	8
Module IV: Working with Hive, HBase, PIG Working with Pig: Pig Latin, User Defined Functions and Operators Hive: Architecture, Comparison with traditional database, Hive QL-querying data, sorting & aggregation, joins & subqueries HBase : Fundamentals of HBase, HBase Versus RDBMS, Schema design	L2and L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Michael Minelli, Michehe Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Wiley CIO Series, 2013.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
3. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

Reference Books

1.Anil Maheshwari, "Big Data", McGraw Hill

2.Mayank Bhushan,"Big Data and Hadoop- Learn by Example", BPB Publications

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	2	--	--	--	--	--	--	--	--	--	1	--	2	-
CO2	1	2	--	3	3	--	--	--	--	--	--	--	1	--	2	-
CO3	1	--	1	2	--	--	--	--	--	--	--	--	1	--	2	-
CO4	1	1	2	--	--	2	--	--	--	--	3	--	-	--	1	3
CO5	1	--	1	--	1	3	--	--	--	--	3	--	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

	Big Data Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	2	1
Pre-requisites/Exposure	Basic Concepts of DBMS				
Co-requisites	Relational Algebra and Relational Calculus				

Catalog Description

This course brings together several key big data technologies used for storage, analysis and manipulation of data. It also introduces the students the key concepts of Hadoop framework, MapReduce, Pig, Hive, and No-SQL. Students will learn to work on Hadoop platform. The concepts learnt will make students capable of working on big data projects easier.

Course Objectives

The objective of this course is

- To make students familiar with big data technologies.
- Provide an overview of Hadoop architecture and its working with other open source technologies.

Course Outcomes

On completion of this course, the students will be able to

CO1. Install and configure Hadoop and various tools like Pig, Hive etc.

CO2.Explain concepts of files and directories in HDFS and apply them in real database applications.

CO3. Design and implement mapreduce programs for a given problem.

CO4. Solve queries using concepts of Hive and Pig.

CO5. Perform operations using HBase.

Modules	Blooms level*	Number of hours
Lab Session 1 1. Installation & Configuration steps of Hadoop	L1 and L2	2
Lab Session 2-3 1. Working with HDFS commands :mkdir, rmdir, rm, mv, ls, du, put, rm-r, cat, tail etc 2. Working with vi editor	L1and L3	4
Lab Session 4-5 1. Working with Java Map Reduce : Map Class, Reduce Class, Drier Class, map side joins, reduce side joins	L1 and L3	4
Lab Session 6-8 Working with Hive : Queries for Hive : Create table, describe database, describe table, describe extended table, describe formatted table, drop table, drop database, display table, where clause 1. Commands : Load Files on table : Load from HDFS, load from local 2. Command :CTAS Create table as select 3. Queries to create external tables 4. Working with commands like : Order by, group by, like, upper, lower, max, min	L1 and L3	4
Lab Session 9-10 1. Working with PIG : Order by, group by, co group, like, upper, lower,Joins, Union, Cartesian, Product, Pig Scripts	L1 and L3	6
Lab Session 11-12 Working with HBase : Start the hbase, data insert, modify, multiple version insertion, describe, delete truncate, drop etc. Working with Foreign Key and Check Constraint.	L1 and L3	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Jeffrey Aven, "SAMS Teach Yourself Hadoop in 24 Hours", 1st Ed., Pearson ,2017.
- Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	3	--	--	--	--	--	--	--	--	1	1	-
CO2	1	-	--	--	2	--	--	--	--	--	--	2	--	1	1	-
CO3	1	-	1	--	--	--	--	--	--	--	--	2	--	1	1	-
CO4	1	-	2	--	--	--	--	--	--	--	--	--	---	1	1	--
CO5	1	-	2	--	--	--	--	--	--	--	--	--	--	1	--	-

1: strongly related, 2: moderately related and 3: weakly related

	TERM PAPER	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	0	3
Pre-requisites/Exposure	Nil				
Co-requisites	Nil				

Catalog Description

Term paper evaluation course requires the students to study about the current technology topic in detail. The students have to read research papers, books and other study sources and finalize the topics for their presentation, Student has to prepare it in detail research paper mentioning all the content related to the topic. The evaluation is later done and a presentation is also to be prepared.

Course Objectives

The objective of this course is to

1. To increase the knowledge and the understanding of a particular phenomenon/topic.

2. To introduce student about how to write technical papers/research papers.

Course Outcomes

On completion of this course, the students will be able to

CO1: Study the literature and identify the current technical topic

CO2: Study the identified topic in detail

CO3:Prepare a detailed report including the introduction, architecture, advantages, disadvantages etc

CO4: Prepare a brief presentation of the concerned topic

Text Books

As per topic of summer internship project is chosen and discussion with guide.

Reference Books

As per topic of summer internship project is chosen and discussion with guide.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**IM**	**EM**
Weightage (%)	20	20	30	30	70

V – Viva, PPT-Power Point Presentation, R – Report, IP-Internal Marks, EM-External Marks

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**		**1**	**2**
CO2	**1**	**2**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**1**
CO3	**1**	**2**	**-**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**1**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

	Machine Learning using Python	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	3	-	-	3
Pre-requisites/Exposure	Basic Knowledge of Programming				
Co-requisites	Nil				

Catalog Description

Python is a general-purpose high level programming language that is being increasingly used in data science and in designing machine learning algorithms. This course provides an introduction to Python and its libraries like numpy, pandas, matplotlib and explains how it can be applied to develop machine learning algorithms that solve real world problems.

This course starts with Python language followed by machine learning and covers concepts of python and all important concepts such as exploratory data analysis, data preprocessing, data visualization and clustering, classification, regression and model performance evaluation etc. This course covers all three types of machine learning algorithms including Supervise, Unsupervised and Reinforcement learning.

Course Objectives

The objective of this course is to

- Equip the students with concepts of programming and problem solving and develop proficiency in creating applications using the Python Programming Language.
- Provide knowledge of various types of machine learning models, its algorithms and development of the models using Python programming language.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop programs in Python to develop algorithmic solutions to computational problems.

CO2: Manage data in python using available data structures such as string, list, and dictionaryand file handling operations.

CO3: Apply functions to decompose python program and develop modules and packages.

CO4: Preprocess and analyze data before applying suitable machine learning models.

CO5: Understand basic concepts and techniques of Machine Learning and apply machine learning algorithms to develop machine learning models for solving real word problems.

Modules	Blooms level*	Number of hours
Module-I **Python basis:**Installing Python; basic syntax, interactive shell, editing, saving, and running a script. The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation **Data handling:** String, Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.	L1, L2 and L3	6
Module-II **Files Handling**: manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). **Design with functions:** hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments. Program structure and design. Recursive functions. **Python Modules and Packages:**designing modules and package, Different ways to import Packages.	L1, L2 and L3	7

OOP: classes, objects, attributes and methods, persistent storage of objects , constructor, inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes, exception handling		
Module-III **Arrays and Matrices:** The NumPy Module, Creating Arrays and Matrices, Copying, Arithmetic Operations, Cross product & Dot product , Saving and Restoring, Matrix inversion, Vectorized Functions **Data Visualization:** The Matplotlib Module, Histograms, Bar charts Density Plots, Box Plots, Scatter Plots, Heat Maps etc. **DataFrames:** Pandas , Loading data from different sources, Concept of DataFrames,Working with Dataframes such as selecting, filtering, grouping, joining etc. Dealing with missing values	L2, L3 and L4	6
Module-IV **Introduction to Machine Learning**: Introduction, Applications, Framework for developing machine learning models **Supervised Learning:**Linear regression, Multiple linear regression, logistic regression, classification and regression trees,Support Vector Machines, K-nearest neighbors Preprocessing and Scaling , Different Kinds of Preprocessing ,Applying Data Transformations Overfitting, underfitting, bias-variance tradeoff.	L2, L3 and L4	7
Module-V **Unsupervised Learning**: Introduction to Clustering, k-means clustering Hierarchical clusting, Dimensionality Reduction, Feature Selection, PCA, factor analysis, manifold learning. **Reinforcement Learning**: Value iteration; policy iteration; TD learning; Q learning; actor-critic	L2, L3 and L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Pilgrim, Dive, "Introduction to Python", 3rd Edition, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist Learning with Python" 2nd Edition Green Tea Press,2002.
3. Manaranjan Pradhan and U Dinesh Kumar, "Machine Learning using Python" , Wiley Publication

Reference Books

1. John V. Guttag, "Introduction to Computation and Programming using Python", Prentice Hall of India, 2014.
2. Mark Lutz, "Learning Python: Powerful Object-Oriented Programming‖", Fifth Edition, O'Reilly, Shroff Publishers and Distributors, 2013.
3. Michale Bowles "Machine Learning in Python: Essential Techniques for Predictive Analysis" Wiley Publication.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
CO2	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
CO3	1	3	2	1	2	--	--	--	--	--	--	--	1	1	2	--
CO4	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	--
CO5	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	---

1: strongly related, 2: moderately related and 3: weakly related

IFT4426	Machine Learning using Python Lab	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	-	4	2
Pre-requisites/Exposure	Basic Knowledge of Programming				
Co-requisites	Nil				

Catalog Description

Python is a language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment, including a robust debugger and profiler. While it is easy for beginners to learn, it is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming, and graphical user interface-driven applications. The examples and problems used in this course are drawn from diverse areas such as text processing, simple graphics creation and image manipulation, HTML and web programming.

Course Objectives

The objective of this course is to

- Equip the students with concepts of programming and problem solving and develop proficiency in creating applications using the Python Programming Language.
- Provide an overview of various control statements, data structures, object oriented programming, packages related to image processing, graphics, event driven programming, socket applications.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain various operators and control structures in python and their uses to develop algorithmic solutions to simple computational problems.

CO2: Describe string, python packages and related functions for various file handling operations.

CO3: Apply functions to decompose python program and represent compound data using Python lists, tuples, and dictionaries.

CO4: Analyze graphics, image processing and object oriented programming concept to create applications and analyze exceptions during program execution.

CO5: Create GUI based applications using python packages and network client/server programming.

<table>
<tr><th>Modules</th><th>Blooms level*</th><th>Number of hours</th></tr>
<tr><td>

Module-I

1. Write a program to read and store the name of three different cities in three different variables and print all the contents of variables on the console.
2. Write a program to read the radius of a circle and print the area of circle.
3. Write a program to calculate the distance between two points using distance formula.
4. Write a program to reverse a four digit number using % and // operators.
5. Apply control statements of python to create following pattern.

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

6. Apply control statement in python to construct a program to prompt a user to read the marks of five different subjects. Calculate the total marks and percentage of the marks and display the message according to the range of percentage given table.

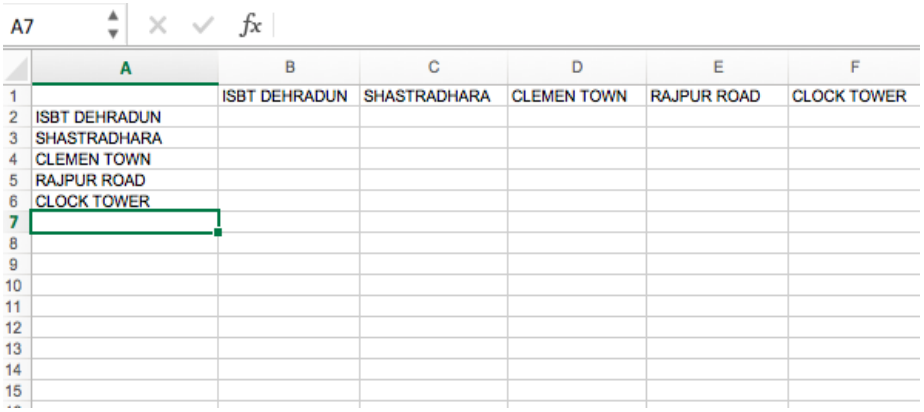
<table>
<tr><th>Percentage</th><th>Message</th></tr>
<tr><td>Per>=90</td><td>Distinction</td></tr>
<tr><td>Per>=80 && per<90</td><td>First Class</td></tr>
<tr><td>Per>=70 && per<80</td><td>Second Class</td></tr>
<tr><td>Per>=60 && per<70</td><td>Third Class</td></tr>
<tr><td>Per<60</td><td>Fail</td></tr>
</table>

</td><td>L3,L5</td><td>4</td></tr>
</table>

<table>
<tr>
<td>

Module-II

1. Write the function replacevowels(word) which removes all the vowels (‘a’,’e’,’i’,’o’,’u’) in a word and returns the remaining letters in the word.
2. Write a function Eliminate_Letter (Word, Letter) which takes a word and a letter as arguments and removes all the occurrence of that particular letter from the word. The function will return the remaining letters in the world.
3. Write a program to count number of characters from a file.
4. Generate 50 random numbers within a range 500 to 1000 and write them to file using function.
5. Write a program to insert a string like “1, 2, 3, 4” and print sum of all the numbers of the list using split function.
6. Write a program to write in excel file in following format using python.



</td>
<td>L3,L5</td>
<td>6</td>
</tr>
<tr>
<td>

Module-III

1. Creating 1-D, 2-D , 3-D numpy arrays and performing arithmetic on them.
2. Program on Boolean arrays and conditional selecting items from array.
3. Stacking and reshaping array
4. Selecting common items between two arrays
5. Plotting simple plots in matplotlib: line, scatter, boxplot, bar,
6. Working with various parameters available in plot function
7. Using magic commands in jupyter notebook
8. Working with series and data frames in pandas
9. Reading and writing CSV and excel files
10. Conditional selection and indexing in DataFrame
11. Adding and removing columns in DataFrame
12. Cleaning data columns using regular expressions

</td>
<td>L3,L5</td>
<td>6</td>
</tr>
</table>

Module-IV 1. Write python program for following image processing operations ➢ Convert image in to grayscale image ➢ Display size of image ➢ Rotate an image ➢ Paste one image on another image. ➢ Crop an image. 2. Implement logistic regression and knn classification on iris dataset using scikit-learn 3. Perform linear regression and multiple feature linear regression on any dataset using scikit-learn 4. Implement gradient descent algorithm to optimize linear regression and logistic regression algorithm 5. Apply various evaluation metrics on breast cancer data set from scikit learn after performing logistic regression. 6. In exercise 5 plot decision boundary using matplotlib 7. Implement RandomForest and Decision tree algorithms on external and internal data sets 8. Show use of Scalers techniques available in scikit-learn	L3,L5	4
Module V 1. Implement feature scaling in scikit learn 2. Implement PCA on breast cancer dataset using scikit learn 3. Draw two-dimensional scatter plot of the Breast Cancer dataset using the first twoprincipal components as done in exercise 2. 4. Apply TSNE algorithm to mnist dataset (manifold learning) 5. Implement MDP and Q-learning in python.	L3,L5	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Pilgrim, Dive, "Introduction to Python", 3rd Edition, Apress, 2009.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist Learning with Python" 2nd Edition Green Tea Press,2002.
3. Manaranjan Pradhan and U Dinesh Kumar, "Machine Learning using Python" , Wiley Publication

Reference Books

1. John V. Guttag, “Introduction to Computation and Programming using Python”, Prentice Hall of India, 2014.
2. Mark Lutz, “Learning Python: Powerful Object-Oriented Programming‖”, Fifth Edition, O‘Reilly, Shroff Publishers and Distributors, 2013.
3. Michale Bowles “Machine Learning in Python: Essential Techniques for Predictive Analysis” Wiley Publication.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

IA					EE
Components	**A**	**PR**	**LR**	**V**	**70**
Weightage (%)	5	10	10	5	

Note: IA –Internal Assessment, A – Attendance, PR – Performance, LR – Lab Record, V – Viva, EE- External Exam

CO, PO and PSO mapping

1: strongly related, 2: moderately related and 3: weakly related

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
CO2	1	3	2	2	--	--	--	--	--	--	--	--	1	1	2	--
CO3	1	3	2	1	2	--	--	--	--	--	--	--	1	1	2	--
CO4	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	--
CO5	1	1	1	1	1	2	--	--	--	--	--	--	1	--	1	---

		L	T	P	C
	Cloud Computing				

Version: 2020.1	Date of Approval: 19, July 2020	3	0	0	3
Pre-requisites/Exposure	Basics of Distributed Computing				
Co-requisites	NIL				

Catalog Description

This course gives students an insight into the basics of cloud computing along with virtualization. Concepts covered would enable students to define and differentiate among various distributed computing platforms. Further they would be able to gain insights about various cloud simulators like CloudSim, GreenCloud and VMWare for simulating cloud and virtualization based environments.

Course Objectives

The objective of this course is to

- Equip the students with the featuresand concepts of Virtualization and Cloud Computing.
- Provide basic knowhow about cloud implementation, deployment models or layers and about cloud simulators like CloudSim, GreenCloud and VMWare.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define and explain Cloud Computing with its characteristics, benefits and limitations.

CO2: List and distinguish among various cloud deployment models along with service delivery layers.

CO3: Explain concepts of Virtualization with its need and limitations, distinguish between types of hardware virtualization and list types of desktop virtualization.

CO4: Describe the architecture and demonstrate working mechanism for CloudSim and Green Cloud simulators.

CO5: Explain the basics of VMWare Simulator and demonstrate implementation of Virtual machines.

Modules	**Blooms level***	**Number of hours**

MODULE 1: CLOUD COMPUTING OVERVIEW Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling, Rapid elasticity, measured service, Roots of cloud computing, Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability, simplicity, vendors, security, Limitations	L1 and L2	8
MODULE 2: CLOUD ARCHITECTURE- LAYERS AND MODELS The cloud reference model: Architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features and benefits of IaaS, Service providers, challenges and risks in cloud adoption, Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing .	L1 and L2	8
MODULE 3: VIRTUALIZATION Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations, Characteristics of virtualized environments Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization. Desktop virtualization: Software virtualization – Memory virtualization – Storage virtualization – Data virtualization – Network virtualization	L1 and L2	10
MODULE 4: CLOUD SIMULATORS- CLOUDSIM AND GREENCLOUD Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud.	L2 and L3	12
MODULE 5: INTRODUCTION TO VMWARE SIMULATOR Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtualmachines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.	L2 and L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
- Mastering Cloud Computing- Foundations and Applications Programming - RajkumarBuyya , Christian Vecchiola and S. ThamaraiSelvi, Tata McGraw Hill, New Delhi, India, 2013
- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

Reference Books

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by RajkumarBuyya, James Broberg, AndrzejGoscinski, John Wiley & Sons, Inc. 2011

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	--	--	--	--	--	--	--	--	--	--	**1**	--	--	--
CO2	**1**	--	**2**	--	--	--	--	--	--	--	--	--	**1**	**2**	--	--
CO3	**3**	--	**1**	--	**2**	--	--	--	--	--	--	--	**1**	**3**	**2**	--
CO4	**3**	--	**2**	--	**1**	--	--	--	--	--	--	--	**1**	--	**2**	--
CO5	**3**	--	**2**	--	**1**	--	--	--	--	--	--	--	**1**	--	**2**	--

1: strongly related, 2: moderately related and 3: weakly related

	Major Project/ Dissertation	L	T	P	C
Version: 2020.1	Date of Approval: 19, July 2020	0	0	0	30
Pre-requisites/Exposure	Programming/Networking/Testing etc.				
Co-requisites	Nil				

Catalog Description

There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. In order to achieve these objectives, each student will maintain a file . The Report aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

Course Objectives

The objective of this course is to

1. Equip the students with new technologies and industrial requirements.
2. Equip students with Project Management, Documentation and Presentation skills.

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate skill and knowledge of current information and technological tools and techniques specific to the field of study.

CO2: Identify, analyze, and solve problems creatively through sustained critical investigation.

CO3: Use effectively oral, written and visual communication.

CO4: Understand Project management and team work skills.

Text Books

As per topic of major project.

Reference Books

As per topic of major project.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**V**	**PPT**	**R**	**Exe**	**IM**
Weightage (%)	16	8	12	14	50

V – Viva, PPT-Power Point Presentation, R – Report, IM-Internal Marks, Exe-Execution

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**1**	**1**	**1**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**--**	**1**	**2**

CO2	**2**	**2**	**2**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**-**	**-**	**1**	**2**
CO3	**2**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**	**-**	**-**	**1**	**2**
CO4	**1**	**2**	**3**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**--**	**-**	**-**	**1**	**1**

1: strongly related, 2: moderately related and 3: weakly related

MECHANICAL ENGINEERING

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
MAE2352	Thermodynamics	3	-	-	3
MAE2452	Fluid Power Systems	3	-	-	3
MAE2552	KOM	3	-	-	3
MAE2652	DOM	3	-	-	3
MAE2752	Meteorology	3	-	-	3
MAE2852	Project (Mechanical Engineering)	3	-	-	3
	TOTAL				**18**

MECHANICAL ENGINEERING

Syllabus

THERMODYNAMICS

Course Code: MAE2352 **Credit Units: 03**

Course Objective:
Objective of this course is to impart in depth understanding of the principles of thermodynamics and heat transfer. This course also helps students understand the application of basic fluid mechanics, thermodynamic, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of electrical, electronic, industrial, and related disciplines of engineering.

Course Contents:

Module I: Basic concepts
Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth Law of Thermodynamics, Work and heat, Flow work

Module II: First Law of Thermodynamics
Mechanical equivalent of heat, internal energy, Analysis of non-flow system, flow process and control volume, steady flow, energy equation, flow processes

Module III: Second Law of Thermodynamics and Entropy
Heat Engine, heat pump, Kelvin Planck and Clausius statement of Second Law of Thermodynamics, Perpetual motion machine, Reversible cycle- Carnot Cycle, Clausius inequality, entropy, Principle of entropy increase, concepts of availability, irreversibility.

Module IV: Air-Cycles
Carnot cycle, Otto cycle, Diesel cycle, Dual cycle, Stirling cycle, Erricsson cycle, Brayton cycle; Reversed Carnot cycle.

Module V: Properties of Steam
Use of steam tables, wet steam, superheat steam, different processes of vapour, Mollier Diagram.

Module VI: Reciprocating Air compressors
Single stage compressor, Isothermal efficiency, adiabatic efficiency, clearance volume, volumetric efficiency, and multi-stage compression with intercooling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- P.K. Nag, “Engineering Thermodynamics”, Tata McGraw Hill
- Incropera, “Engineering Thermodynamics”, John Willy

References:

- Engel, T. and Reid, P., Thermodynamics, Statistical Thermodynamics & Kinetics, Pearson Education, 2006
- Cengel & Boles, "Thermodynamics", Tata McGraw Hill.
- Sonntag/Vanhylene, Fundamentals of Thermodynamics, Wiley
- Rahul Gupta, Engineering Thermodynamics, Asian Books P. Ltd.
- Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications
- Onkar Singh, Applied Thermodynamics, New Age Publications.
- Dhomkundwar Kothandaraman, "A Course in Thermal Engineering", Dhanpat Rai Publications

FLUID POWER SYSTEMS

Course Code: MAE2452 **Credit Units: 03**

Course Objective:
Fluid power systems cover generation, transmission, and control applications of power by using pressurized fluids. This course imparts the knowledge of different fluid power systems (pneumatic and hydraulic) which are used in industries and hydropower plants.

Course Contents:

Module I: Introduction
Euler's equations for turbo machines; impulse and reaction forces due to fluid systems on stationery and moving system of vanes; jet propulsion.

Module II: Water Turbines
Classification: Pelton, Francis, Propeller and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing.

Module III: Pumps
Centrifugal pumps, velocity triangles, efficiency, turbine pumps, axial and mixed flow pumps.

Module IV: Performance of Fluid Machines
Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; use of models; cavitations and attendant problems in turbo machines; selection of turbines hydroelectric plants.

Module V: Hydraulic Power Transmission
Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations: hydraulic ram.

Module VI: Power Hydraulics
Positive pumps: gear, vane, screw, pump, variable delivery valves: flow control, pressure control, direction control, solenoid operated valve, hydraulic circuits, fluid coupling and torque converter.
Pneumatic Power: Basic principles, comparison of pneumatic and hydraulic Systems.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.

References:

- Dr. D.S. Kumar, "Fluid Mechanics & Fluid Power Engineering", S.K. Kataria & Sons,2001
- D.R. Malhotra & N.K. Malhotra, "The Fluid Mech. & Hydraulics", Satya Prakashan, 2001
- V.P. Gupta, Alam Singh, Manish Gupta, "Fluid Mechanics, Fluid Mechanics & Hydraulics", CBS Publishers; 1999.

BASICS OF KIMEMATICS OF MACHINE

Course Code: MAE2552 **Credit Units: 04**

Module-I
Introduction
Links-types, Kinematics pairs-classification, Constraints-types, Degrees of freedom of planar mechanism, Grubler's equation, linkage mechanisms, inversions of four bar chain, slider crank chain and double slider crank chain

Velocity in Mechanisms
Velocity of point in mechanism, relative velocity method, Velocities in four bar mechanism, slider crank mechanism and quick return motion mechanism, Rubbing velocity at a pin joint, Instantaneous center method, Types & location of instantaneous centers, Kennedy's theorem, Velocities in four bar mechanism & slider crank mechanism

Module-II
Acceleration in Mechanisms
Acceleration of a point on a link, Acceleration diagram, Coriolis component of acceleration, Crank and slotted lever mechanism, Klein's construction for Slider Crank mechanism and Four Bar mechanism, Analytical method for slider crank mechanism
Mechanisms with Lower Pairs
Pantograph, Exact straight line motion mechanisms-Peaucellier's, Hart and Scott Russell mechanisms, Approximate straight line motion mechanisms–Grass-Hopper, Watt and Tchebicheff mechanisms, Analysis of Hooke's joint, Davis and Ackermann steering gear mechanisms.

Module-III
FRICTION
Laws of friction, Friction on inclined plane, Efficiency on inclined plane, Friction in journal bearing-friction circle, Pivots and collar friction-uniform pressure and uniform wear, Belt and pulley drive, Length of open and cross belt drive, Ratio of driving tensions for flat belt drive, centrifugal tension, condition for maximum power transmission, V belt drive
Brakes & Dynamometers
Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers

Module-IV
CAMS
Cams and Followers - Classification & terminology, Cam profile by graphical methods with knife edge and radial roller follower for uniform velocity, simple harmonic and parabolic motion of followers, Analytical methods of cam design – tangent cam with roller follower and circular cams with flat faced follower

Module-V
Gears & Gear Trains
Classification & terminology, law of gearing, tooth forms & comparisons, Systems of gear teeth, Length of path of contact, contact ratio, interference & under cutting in involute gear teeth, minimum number of teeth on gear and pinion to avoid interference, simple, compound, reverted and planetary gear trains, Sun and planet gear.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Books and References:

1. Theory of Machines - Thomas Bevan
2. Theory of Machines and Mechanisms- Shigley
3. Theory of Machines and Mechanisms-Ghosh & Mallik
4. Theory of Machines and Mechanisms- Rao & Dukkipati
5. Theory of Machines-S.S. Rattan
6. Kinematics of Machines-Dr. Sadhu singh
7. Mechanics of Machines – V. Ramamurti
8. Theory of Machines – Khurmi & Gupta
9. Theory of Machines – R. K. Bansal
10. Theory of Machines – V. P. Singh
11. Theory of Machines – Malhotra & Gupta

BASICS OF DYNAMICS OF MACHINES

Course Code: MAE2652 **Credit Units: 04**

Module 1.
Static Force Analysis: Static force analysis of planer mechanisms, Free body diagrams, dynamic force analysis including inertia and frictional forces of planer mechanisms
Inertia forces: D-Alembert's Principle, Velocity and acceleration of piston, Torque exerted on the crank shaft when friction and inertia of moving parts are neglected, Forces on the reciprocating parts of an engine considering friction and inertia of moving parts, Turning moment on crank shaft, Dynamically equivalent system, Torque exerted on the crank shaft, considering the weight of the connecting rod.

Module 2.
Balancing of rotating masses: Balancing of single rotating mass, Balancing of several masses rotating in the same plane, Balancing of several masses rotating in different planes.

Balancing of reciprocating masses: Balancing of reciprocating engine, Partial balancing of primary force, Partial balancing of locomotives, Variation of tractive force, swaying couple, hammer blow, coupled locomotive, primary balance of multi-cylinder inline engine, Secondary balance of multi-cylinder in line engines, Method of direct and reverse cranks, V-engines balancing.

Module 3.
Governors: Types of Governor, Watt Governor, Porter governor, Proell Governor, Hartnell Governor, Wilson-Hartnell governor, Sensitivity, Stability, Isochronism, Hunting, Governor Effort and Power, controlling force

Module4.
Gyroscopic effect and Gyroscope: Spinning and precession, gyroscopic couple, Effect of gyroscopic couple on the stability of automotive vehicles: Stability of four wheelers, Stability of two wheelers, Gyroscopic effects on ships and aero planes.
Module 5.
Vibration: Vibration analysis of SDOF systems, natural, damped, forced vibrations, base-excited vibrations, transmissibility ratio

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- PL Ballaney, Theory of Machines,
- Hams Crone and Roggers, Theory of Machines
- Shigley, Theory of Machines
- J. Lal, Theory of Machines
- SS Rattan, Theory of Machines
- Ghosh and Mallick, Mechanisms and Machines, EWP publication.
- R.S. Khurmi, Theory of Machine, S. Chand.

METEOROLOGY

Course Code: MAE2752 **Credit Units: 03**

Course Objective:
The main objective of this course is to give the student: a basic understanding of the physical loss governing metrology and tolerance design. Gain and appreciation for the capabilities and applications of metrology through hands own experiences.

Course Contents:

Module I: Principles of measurement
Definition of Metrology, difference between precision and accuracy. Sources of errors: Controllable and Random Errors, Effects of Environment and Temperature, Effects of support, alignment errors.
Length Standards: Line standards, end standards and wavelength standards, transfer from line standards to end standards. Numerical based on line standards. Slip gauges – its use and care, methods of building different heights using different sets of slip gauges.
Limits, fits and tolerances: Various definitions, different types of fits and methods to provide these fits. Numerical to calculate the limits, fits and tolerances, ISO system of limits and fits; Gauges and its types, limit gauges – plug and ring gauges. Gauge Design – Taylor's Principle, wear allowance on gauges.

Module II: Comparators
Principles and working of Mechanical, Electrical, Optical and Pneumatic Comparators.
Angular Measurement: Sine Bar – different types of sine bars, use of sine bars in conjunction with slip gauges, Use of angle gauges, spirit level, errors in use of sine bars. Numericals. Principle and working of autocollimator.

Module III: Straightness and flatness
Definition of Straightness and Flatness error. Numericals based on determination of straightness error of straight edge with the help of spirit level and auto collimator
Screw Thread Measurement: Errors in threads, Measurement of elements of screw threads –major diameter, minor diameter, pitch, flank angle and effective diameter (Two and three wire methods). Effect of errors in pitch and flank angles
Gear Measurement: Measurement of tooth thickness – Gear tooth vernier caliper, Constant chord method, base tangent method and derivation of mathematical formulae for each method. Parkinson Gear Tester.

Module IV
Machine Tool Alignment: Machine tool tests and alignment tests on lathe. Alignment tests on milling machine. Alignment tests on a radial drilling machine, Interferometry.
Surface texture: Introduction, types of irregularities, Elements of surface
Texture, Measurement of surface finish, Examination of surface Roughness.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- R.K. Jain, "Engineering Metrology", Khanna Publishers, Delhi
- I.C. Gupta, "Engineering Metrology", Dhanpat Rai Publications, Delhi

References:
- F.W. Galyer & C.R. Shotbolt, "Metrology for Engineers", ELBS edition.

NANOTECHNOLOGY

Programme Structure-2017

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
NAT2152	Basics of Nanoscience	3	-	-	3
NAT2251	Properties of Nanomaterials	3	-	-	3
NAT2352	Vacuum Science & Clean Room Technology	2	-	2	3
NAT2452	Synthesis of Nanomaterials	2	-	2	3
NAT2552	Characterization Techniques	3	-	-	3
NAT2652	Industrial Applications of Nanomaterials	3	-	-	3
	TOTAL				**18**

NANOTECHNOLOGY

Syllabus - Semester First

BASICS OF NANOSCIENCE

Course Code: NAT2152 **Credit Units: 03**

Course Objective:
To enable the students to understand the science of nanomaterials.

Module I: Introduction to Quantum Mechanics & Crystal structure
De-Broglie hypothesis, Uncertainty Principle, Schrödinger Equation, Operator, Particle in a 1D box, Particle in a 3D box (qualitative) , Crystal structure, Crystal orientation, Crystal planes, Bravais lattice, Miller Indices, Atomic Packing Density, crystal symmetry ,ZnS, Diamond and NaCl crystal structure, Melting point, Coordination number, Atomic Bonding.

Module II: Introduction to Nanoscience
Emergence of Nanoscience with special reference to Feynman and Drexler, Role of particle size, Spatial and temporal scale, Exciton, Concept of confinement, strong and weak confinement with suitable examples, Development of quantum structures, Basic concept of quantum well, quantum wire and quantum dot. Density of states of 1D,2D & 3D structure, surface effect

Module III: Types of Nanomaterials
Nanoclusters, Solid solutions, Thin film, Nanocomposites (Metal Oxide and Polymer based), Core Shell Nanostructure, Buckyballs, Carbon nano tubes and, Zeolites minerals, Dendrimers, Micelles, Liposomes, Block Copolymers, Porous Materials, ,Metal Nanocrystals ,Semiconductor nanomaterials.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Material Science & Engineering – An Introduction by William D. Callister Jr.
- Grain growth and control of microstructure and lecture in polycrystalline materials by V. Lu. Novikov & Vladimi Novikov
- Nanoscale Materials- Liz Marzan & Kamat
- Introduction to Nanotechnology by Charles P. Poole, Jr., Frank J. Owens

Syllabus - Semester Second

PROPERTIES OF NANOMATERIALS

Course Code: NAT2251 **Credit Units: 03**

Course Objective:
To enable students to understand properties of bulk and nanomaterials

Course Contents:

Module I: Electronic & Magnetic
Classification of materials: Metal, Semiconductor, Insulator, Band structures, Brillouin zones, Mobility, resistivity, relaxation time, and recombination centers, Hall effect Quantum Hall effect. Quantum Tunneling , Coulomb Blockade, single electron transistor .
Origin of magnetic Moment in materials, Revisit to Different kind of magnetism in nature: Dia, para, ferro magnetic, Domain structure, antiferro, feri & superparamagnetism, nanomagnetic materials: Fe, Fe_3O_4, Ferrites, Ferro-fluids

Module II: Optical & Thermal
Photo-conductivity, Photovoltaic effect, optical absorption & transmission, photoluminescence, fluorescence, phosphorescence, electroluminescence, LED, Concept of phonon, thermal conductivity, specific heat, exothermic & endothermic heat, Thermoelectric effect, Thermoelectric material(TEM) properties .

Module III: Mechanical
Stress- Strain curve, True Stress True strain, Hardness, compressive & tensile strengths, Fracture toughness Fatigue, Creep and other elastic properties of materials, Deformation behavior of Nanomaterials

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Processing & properties of structural naonmaterials by Leon L. Shaw (editor)
- Chemistry of nanomaterials: Synthesis, properties and applications by CNR Rao et.al. Wiley VCH Verlag Gmbh & Co, Weinheim
- Nanostructure and Nanomaterials: Synthesis , Properties and Application by G. Cao, Imperial College Press, 2004

Syllabus - Semester Third

VACUUM SCIENCE AND CLEAN ROOM TECHNOLGY

Course Code: NAT2352 **Credit Units: 03**

Course Objective:
To enable students to understand vacuum science, their production, measurement, about clean room technology

Course Contents:

Module I: Vacuum Science and Technology
Vacuum and its different units, Kinetic Theory of Gases, Gas flow in vacuum systems, Physical Parameters at low pressure, classification of vacuum ranges, Application of Vacuum technology, Throughtput & pumping speed, flow rate & conductance in vacuum system

Module II: Production & Measurement of Vacuum
Types of Vacuum Pumps (Rotary, diffusion, Turbo, Cryo & Ion) - Basic Principles and applications, Production of low, medium high and ultra high vacuum, Vacuum gauges , Leak detection techniques

Module III: Clean Room Technology
Clean rooms:Introduction, needs and Types, Basics of clean room standards, design of clean room & clean air devices, High efficiency air filtration, Clean room disciplines, Cleaning of clean room, Quality control, Industrial and Scientific application of clean room

Examination Scheme:

Components	**CT**	**HA**	**A**	**S/V/Q**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Vacuum Science and Technology, VV Rao, TB Ghosh, K L Chopra- Allied Publishers Pvt. Ltd.
- Handbook of Vacuum Science and Technology, Dorothy M. Hoffman, Academic Press, An Imprint of Elsevier
- Clean Room Technology:Fundamental of Design, testing & operation by William Whyte; John – Wiley & Sons 2002

Syllabus - Semester Fourth

SYNTHESIS OF NANOMATERIALS

Course Code : NAT2452 **Credit Units: 03**

Course Objective:
To enable students to understand the different methods of synthesis of nonmaterial.

Course Contents:

Module I: Physical Methods:
Physcal Vapour Deposition (PVD), Inert gas condensation, Arc discharge, DC sputtering, Ion sputtering, RF & Magnetron sputtering ,Pulse Laser Deposition (PLD), Ball Milling, Molecular beam epitaxy, Electro-deposition,

Module II: Chemical Methods:
Metal nanocrystals by reduction, Sol- gel, Solvothermal synthesis, Photochemical synthesis, Electrochemical synthesis, Nanocrystals of semiconductors and other materials by arrested precipitation, Thermolysis routes, Liquid-liquid interface.

Module III: Self assembly and Lithography
Self assembly, Process of self assembly, colloids, Introduction to Lithography, E-beam Lithography.

Examination Scheme:

Components	**CT**	**HA**	**A**	**S/V/Q**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Handbook of nanoscience, Eng. & Technology by W. Gaddand, D. Bernner, S.L. Solnki & G.J. Infrate (Eds) , CRC press 2002
- Nanostructure and Nanomaterials: Synthesis , Properties and Application by G. Cao, Imperial College Press, 2004
- Nanoscience & Technology: Novel structure and phenomea by Ping Sheng (Editor)
- Nano Engineering in Science & Technology : An introduction to the world of nano design by Michael Rieth.

Syllabus - Semester Fifth

CHARACTERIZATION TECHNIQUES

Course Code: NAT2552 **Credit Units: 03**

Course Objective:
To enable students to understand the instrumental techniques for characterization of nanomaterials

Course Contents:

Module I: Structural characterization techniques
X-ray diffraction (XRD) technique, particle size determination using XRD, Applications of XRD, Electron diffraction and its application, neutron diffraction and its applications

Module II: Optical and Electron Microscopy
Introduction to Optical microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy, Scanning Tunneling Microscopy

Module III: Spectroscopic Techniques
UV visible spectroscopy, Infrared Spectroscopy and Fourier Transform Infrared Spectroscopy, Raman Spectroscopy, Photoluminescence (PL), Photoelectron Spectroscopy (X-Ray Photoelectron Spectroscopy, Auger Electron Spectroscopy & Ultra Violet Photoelectron Spectroscopy)

Examination Scheme:

Components	**CT**	**HA**	**A**	**S/V/Q**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Elements of X-ray diffraction, B D Cullity- Addison-Wesley Publishing Company, Inc.
- Encyclopedia of Materials Characterization, C. Richard Brundle and Charles A. Evans, Jr
- Web based different sources
- Willard, Merritt, Dean, Settle - Instrumental Methods of Analysis, 7th edition

Syllabus - Semester Sixth

INDUSRIAL APPLICATION OF NANOMATERIALS

Course Code: NAT2652 **Credit Units: 03**

Course Objective:
To enable students to understand the applications of nano materials and associated technology in industrial sector.

Course Contents:

Module I: Nano-Electronic Technologies
Nano capacitors, Quantum tunneling, Single electron transistors, Coulomb blockade, Nano lithography, Data storage, Nano-photonics, Nano electronic and Magnetic devices, Spintronic, Carbon based materials: Carbon Nano-tube (CNC), Graphene. Sensors & Nano-sensors.

Module II: Accelerator Technologies
Introduction to Accelerators, Accelerating cavities and RF measurement, Superconducting materials, Niobium, Niobium-copper and other advance composite materials, NbN, NbAlGa, Mg3B.

Module III: Sustainable energy technologies
Solar energy, Hydrogen energy and Nano-materials, Carbon nanotube fuel cells, Hydrogen storage, Thermoelectricity, Re-chargeable batteries, Energy savings, Nano-lubricants, Nano-composites and Nano-catalysts.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Bharat Bhushan: .Handbook of Nanotechnology, Springer
- Jurgen Schulte: Nanotechnology: Global Strategies, Industry Trends and Applications Graham
- T Smith: Industrial Metrology, Bing Zhou: Nanotechnology in Catalysis
- Luisa Filipponi and Duncan Sutherland: Nanotechnologies: principles, applications, implications and hands on activities
- José A.Rodríguez and Marcos Fernández-García: Synthesis, properties and applications of oxide nanoparticles wiley
- Mick Wilson: Nanotechnology: Basic Science and Emerging Technologies, Chapman and hall/CRC Press
- http://www.nano.gov/you/nanotechnology-benefits

RENEWABLE ENERGY

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
SAE2151	Renewable Energy Conversion Systems	3	-	-	3
SAE2251	Introduction to Solar Thermal Engineering	2	-	2	3
SAE2351	Introduction to Solar Photovoltaic	2	-	2	3
SAE2451	Energy from Wastes	3	-	-	3
SAE2551	Renewable Energy for Heat Applications	3	-	-	3
SAE2651	Energy Audit and Energy Management	3	-	-	3
	TOTAL				**18**

RENEWABLE ENERGY

Syllabus

RENEWABLE ENERGY CONVERSION SYSTEMS

Course Code: SAE2151 **Credit Units: 03**

Course Objective:
Course provides introduction to different renewable energy sources.
Analyze the full range of renewable energy supplies needed for modern economies. Course will include power from sunshine, wind, and biomass.

Course Content

Module I
Current Energy Scenario, Principles of renewable energy, fundamentals, scientific principles of renewable energy, technical implications, social implications.

Module II
Solar radiation: Extraterrestrial solar radiation, components of radiation, geometry of earth and sun, geometry of collector and solar beam, measurements of solar radiation
Solar water heating system, solar air heaters, solar concentrators

Module III
Photovoltaic generation: Introduction, silicon p-n junction, photon absorption, solar radiation input, photovoltaic circuit properties and loads, limits to cell efficiency

Module IV
Principles of Ocean thermal energy conversion, Principles of Geothermal energy conversion, suitable sites and criteria, Advantages and disadvantages

Examination Scheme:

Components	CT	Assignment	V/Q	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- Renewable energy resources – J. W. Twidell
- Renewable energy engineering and technology-edited by V. V.N. Kishore
- Directory, Indian Windpower 2004, CECL, Bhopal.

INTRODUCTION TO SOLAR THERMAL ENGINEERING

Course Code: SAE2251 **Credit Units: 03**

Course Objective:
To cover areas related with the fundamentals of solar energy, various solar collectors, and Applications.

Course Contents:

Module I: Introduction
Solar spectrum, solar radiation, instruments (pyrheliometers, pyranometers), solar radiation on horizontal surface (estimation of average solar radiation, estimation of clear sky radiation), solar thermal energy conversion.

Module II: Flat plate collector
Flat plate collector (FPC) (glazing material, collector plates), classification (evacuated tubular collectors, Types of FPCs), testing of collectors,

Module III: Solar Concentrator
Characteristic parameters, classification, types of concentrators (tracking concentrator, non-tracking concentrators), geometrical optics in concentrators, working principle of concentrating collectors.

Module IV: Applications
Solar air heater, solar crop drying, solar cooker, solar water heating systems, heating of swimming pool by solar energy.

Solar Thermal Lab Experiments

1. Study a flat plate collector to know its components & function.
2. Determine the thermal efficiency of a with flat plate collector
3. Determine the thermal efficiency of an evacuated tube collector
4. Study the components of Concentrating Parabolic Collector and its function.
5. Determine thermal performance of a box type solar cooker with load

Examination Scheme:

	IA				EE	
Components	**CT**	**Assignment**	**LR**	**Attendance**	**Theory**	**Practical**
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Record.

Text & References:

- Solar Energy: Fundamentals, design, modeling and applications, Authored by G. N. Tiwari
- Renewable Energy Engineering and Technology, Edited by V.V. N. Kishore

INTRODUCTION TO SOLAR PHOTOVOLTAIC

Course Code: SAE2351 **Credit Units: 03**

Course Objective:
This course covers the basic principles of Solar Photovoltaic energy systems, Grid and Off-grid connected PV systems and PV economics

Course Contents:

Module I: Basics of Solar Photovoltaics
Principle of photovoltaic conversion Photovoltaic generation: Introduction, silicon p-n junction, photon absorption, solar radiation input, photovoltaic circuit properties and loads

Module II: Review of Semiconductor Properties of Solar PV systems
Crystal structures and orientations, forbidden energy gaps, dynamics of electrons and holes, carrier density, carrier transport, generation and recombination of carriers due to light, direct and in-direct band gap semiconductors, basic device physics, p-n junction diode, solar cell output parameters.

Module III: Solar Photovoltaic energy conversion and utilization
Photovoltaic power generation systems,Off-grid systems,Grid connected systems, Organic solar cells, Electrochemical energy storage: Batteries

Module IV: Economic Benefits of Solar PV systems
Solar energy benefits, environmental benefits, solar energy cost and economic impact, understanding the cost of solar energy, economics of installing solar panel

Solar Photovoltaic Lab Experiments
1. Measure the V-I characteristics of a Photovoltaic cell
2. To study the illumination characteristics, power load characteristics, areal characteristics of a solar cell.
3. Measure the V-I characteristics of a Photovoltaic Panel subjected to variable load
4. To study the effect of angle of the panel on V-I characteristic of a Photovoltaic Panel
5. Measure the V-I characteristics of a Photovoltaic Panels connected in series and parallel without load.
6. Measure the V-I characteristics of a Photovoltaic Panels connected in series and parallel with load.

Examination Scheme:

	IA				EE	
Components	**CT**	**Assignment**	**LR**	**Attendance**	**Theory**	**Practical**
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Rec

Text & References:

- G.N.TiwariSolar Energy, Fundamentals design, modeling and Applications. Narosa, 2002
- Martin A. Green, Solar Cells-Operating Principles, Technology, and System Applications M.
- S. Tyagi, Introduction to Semiconductor Materials and Devices

ENERGY FROM WASTES

Course Code: SAE2451 **Credit Units: 03**

Course Objective: The objectives of this course are as follows:

a) To provide a thorough understanding of various renewable feedstocks, their availability and attributes for biofuels production.
b) To provide a thorough understanding of the broad concept of second and third generation biofuel production from biomass and other low-cost agri-residues and biowastes.
c) To provide students with tools and knowledge necessary for biofuel facility operations.
d) To teach our students to analyze and design processes for biofuel production.

Course Content

Module-I: Biomass
Properties of biomass, sources of biomass, photosynthesis, broad classification, agro and forestry residues utilization through conversion routes:biological, chemical and thermochemical

Module-II: Bio conversion mechanism
Bioconversion mechanism, source of waste undergoing bio-treatment,energetic and rate processes of major biological significance

Module-III: Thermochemical Conversion
Thermochemical conversion of biomass, energy balance, conversion to solid, liquid and gaseous fuels

Module-IV: Chemical Conversion
Chemical conversion process, hydrolysis, pretreatments and hydrogenation, solvent, extraction of hydrocarbons

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage%	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- Biomass for renewable energy, fuels and chemicals by Donald L. Klass
- Biorenewable Resources: Engineering New Products from Agriculture. Robert C. Brown. Wiley-Blackwell Publishing (2003).
- Renewable Energy Resources: Basic principles & applications. G.N.Tiwari and M.K.Ghosal

RENEWABLE ENERGY FOR HEAT APPLICATIONS

Course Code: SAE2551 **Credits Units: 03**

Course Objective:
At the end of the course the students should be able to: Understand the factors that influence the use of solar radiation as an energy source; know the various active and passive technologies that are available for collecting solar energy; have the ability to apply design principles to selection of an appropriate solar energy installation to meet requirements.

Course Contents:

Module I: Passive Solar Heating Systems
Choosing the Type of Passive System, Advantages and Disadvantages of Passive Solar Systems, Direct Gain Systems, Thermal storage, Sizing Thermal Storage.

Module II: Active Solar Heating Systems
Space Heating- Liquid and Air Systems, System Design Principles, Sizing of Collectors and Thermal Storage. Domestic Hot Water Heating- Thermo-siphoned and Pumped Circulation Systems, Domestic Hot Water Heating Loads,

Module III: Green Buildings
Introduction, factors affecting climate, Climatic zones and their characteristics, Implications of climate on building design, Principles of energy conscious buildings, Building Envelope, Passive Heating, Passive Cooling, Daylighting, Building Materials

Examination Scheme:

Components	CT(2)	Assignment	V(1)	Attendance	EE(1)
Weightage (%)	15	5	5	5	70

Text & References:

- Principle of Solar Engineering" by D. Yogi Goswami, Frank Kreith and Jan F. Kreider, 2nd ed. Taylor & Francis, 2000, ISBN-10: 1-56032-714-6, ISBN -13:978-156032-714-1.
- Fundamentals of Heat and Mass Transfer" by Frank P. Incropera and David P. DeWitt, John Wiley & Sons, Inc., 6th Ed., 2006
- Solar Heating and Cooling" by John F. Kreider and Frank Kreith, 2nd ed., Hemisphere Publishing Corp, 1982
- The Passive Solar Energy Book" by Edward Mazria, Rodale Press, 1979
- Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors" National Renewable Energy Laboratory, 1994,
- Modeling Daylight Availability and Irradiance Components from Direct and Global Irradiance" by R. Perez, P. Ineichen, R. Seals, J. Michalsky and R. Stewart, Solar Energy 44 (5) pp. 271-289
- 2009 ASHRAE Handbook – Fundamentals (Inch-Pound Edition), American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (Stevens E-book on line)

ENERGY AUDIT AND ENERGY MANAGEMENT

Course Code: SAE2651 **Credit Units: 03**

Course Objective:
This course covers the basic principles of energy management, energy auditing ,economics of Renewable energy systems.

Course Contents:

Module I: Renewable Energy Economics
Energy scenario, environmental policies, energy policies, economics of energy infrastructure, rural renewable energy economics.

Module II: Energy Audit
Energy Audit concepts, Elements, Measurements, Mass and energy balances, Evaluation of energy conserving opportunities, case study.

Module III: Economic Benefits of Solar Energy
Solar energy benefits, environmental benefits, solar energy cost and economic impact, understanding the cost of solar energy, economics of installing solar panel

Module IV: Solar Industrial Economics
Solar power plants, integration with industrial process, integration with grid, storage of energy, economics.

ExaminationScheme:

Components	**CT(2)**	**Assignment**	**V(1)**	**Attendance**	**EE(1)**
Weightage (%)	15	5	5	5	70

Text & References:

1. Renewable Energy: Power For A Sustainale Future, Second Ed. Edited By Godfrey Boyle

2. Solar Engineering Of Thermal Processes - J. A. Duffie, W. A. Beckman, Solar Energy Laboratory Lecture Notes

UNMANNED AERIAL VEHICLES

Programme Structure-2021

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
ASE2352	Introduction to UAVs and Applications	2	1	-	3
ASE2452	Principles of UAV's Flight	2	1	-	3
ASE2552	Aerial Imagery: Hardware and Software	2	1	-	3
ASE2652	Embedded Systems for UAVs	2	1	-	3
ASE2752	Research Project-I Drone Development	-	-	-	3
ASE2852	Research Project-II Drone Troubleshooting, Testing and Deployment	-	-	-	3
	TOTAL				**18**

Prerequisites

- The course is offered to both engineering and non-engineering students. Knowledge of Intermediate (Class 12) level science is a prerequisite to comprehend the contents of this course.
- The course can be taken up by the students of B. Tech. (Aerospace Engineering) as it will increase their knowledge and employability in this domain.

S. No.	Course	Course Prerequisites
1	Introduction to UAVs and Applications	Basic Physics, Mathematics
2	Principles of UAV's Flight	Basic Physics, Mathematics, Introduction to UAVs and Applications
3	Aerial Imagery: Hardware and Software	Basic Physics, Mathematics
4	Embedded Systems for UAVs	Basic Physics, Mathematics, Basics of Computer Languages
5	Research Project 1- Drone Development	Courses of Semester 1-4
6	Research Project 2- Drone Troubleshooting, Testing and Deployment	Courses of Semester 1-5

UNMANNED AERIAL VEHICLES

Syllabus

ASE2352	Introduction to UAVs and Applications	L	T	P	C
Version 2021-1	Date of Approval: June 2021	2	1	0	3
Pre-requisites/ Exposure	Basic Physics, Mathematics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of various kinds of UAVs and their classifications based on various aspects. Knowledge of basic physics is crucial to comprehend the contents of this course. This course also provides introductory knowledge to the students about various components and systems of UAVs which serve as a foundation for better understanding of the advanced course.

Course Objectives

The objective of this course is to

- Provide introductory knowledge to the students regarding the basic science and principles as applicable to UAVs and their structure.
- Provide education to the students about the construction, payload, and safe operations of UAVs.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain, and categorize amongst various kinds of UAVs, their classifications and application areas.

CO2. List, explain, and describe basics of flight, structure, and control of UAVs.

CO3. List, explain, categorize, and apply the basic concepts of payloads and payload controls of UAVs.

CO4. List, explain, and apply the fundamental concepts of safe operation of UAVs.

CO5. Explain and apply the engineering fundamentals and principles to practical design and testing UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction to UAVs Overview of UAVs and their Systems; Examples of UAV Systems; Nano UAVs; Micro UAVs, Small UAVs; Medium UAVs; Large UAVs; Different types of drones and their applications.	L1, L2, L4	6
Module 2: Concepts of Flight and UAV Construction and Control Basics of flight: lift, drag, thrust and weight balance. Basic structure and loads; construction materials; propulsion systems for UAVs; modes of control; UAV piloting; remote piloting; autopilot-assisted control; complete autonomous flights.	L1, L2, L3	6
Module 3: Payloads and Payload Control Types of payloads; payload capacity and control, imaging sensors; target detection, recognition, and identification; atmospheric, radiological, and	L1, L2, L4	6

environmental monitoring; armed utility UAVs, controlling payloads; signal relay payloads.		
Module 4: Safe UAV Operations Regulating authority; homeland regulatory agencies and foreign regulatory agencies, general safety regulations and guidelines; restricted airspace; risk assessment; severity classifications; risk mitigation; do's and don'ts of UAV flying.	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Tutorial/Laboratory/Field Experiences			
1	Drone Systems and Assembly	L2, L3, L5	6
2	Demo Flying, Test Flight	L2, L3, L5	6

Text & Reference Books:

Text:

- P. Fahlstorm, T. Gleason, "Introduction to UAV Systems", 4th Edition, John Wiley & Sons, Inc., 2012.
- "DGCA RPAS Guidance Manual", Director General of Civil Aviation, Revision-1, 2019.
- Handbook of Unmanned Aerial Vehicles, Editors: Valavanis, K., Vachtsevanos, George J. (Eds.), Springer, 2015

Reference:

- K. P. Valavanis, G. J. Vachtsevanos, "Handbook of Unmanned Aerial Vehicles", 1st Edition, Springer, 2015.
- R. E. Weibel, R. J. Hansman, "Safety Considerations for Operation of Unmanned Aerial Vehicles in the National Airspace System", Report No. ICAT-2005-1, MIT International Center for Air Transportation, 2005.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO4	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO5	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2

1: strongly related, 2: moderately related and 3: weakly related

ASE2452	Principles of UAV's Flight	L	T	P	C
Version 2021-1	Date of Approval: June 2021	2	1	0	3
Pre-requisites/ Exposure	Basic Physics, Mathematics, Introduction to UAVsand Applications				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of aerodynamics, propulsion, stability and control of the UAVs. Knowledge of basic physics and engineering mechanics is crucial to comprehend the contents of this course. This course also provides essential knowledge to the students about the efficient and stable flight of the UAVs.

Course Objectives

The objective of this course is to

- Provide fundamental knowledge to the students regarding the aerodynamics and propulsion systems of the UAVs.
- Provide education to the students about the stability and control of UAVs.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain, and apply the governing equations to the operation of UAVs.
CO2. List, explain, and describe basics of UAVs aerodynamics.
CO3. List, explain, and apply the basic concepts of propulsion and propulsion systems to UAVs.
CO4. List, explain, and apply the fundamental concepts of stability and control of UAVs.
CO5. Explain and apply the engineering fundamentals and principles to design and test UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Introduction Introduction to incompressible flow, Continuity, momentum, energy and other governing equations; pitot-static tube, pressure coefficient, Mach number their significance.	L1, L2, L4	6
Module 2: UAV Aerodynamics Symmetric and cambered airfoils; Airfoil nomenclature and characteristics; aerodynamic forces and moments; calculations for airfoil lift and drag; center of pressure; aerodynamic center; Modern low-speed airfoils; characteristics of low speed airfoils; Finite and infinite wings; Flow Separation; Stall.	L1, L2, L3	6
Module 3: Propulsion Systems Propulsive thrust; nomenclature and geometry; thrust to weight ratio; types and classifications; propeller and basic principles; different type of propellers; propeller safety; propeller lift and angle of attack; propeller pitch; fixed pitch propellers; propeller materials; propeller installations and operation; battery of a drone; motors; different types of engines; fuel, hybrid, fuel cells; solar powered UAVs.	L1, L2, L4	6
Module 4: Stability and Control Overview of standard atmosphere; static and dynamic stability; principal axes and rotation of aerial systems; equilibrium; flight control and control surfaces;	L1, L2, L3	6

their significance and autopilot usage.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Tutorial/Laboratory/Field Experiences			
1	Simulator-based flying training	L2, L3, L5	6
2	Drone pilot training on field	L2, L3, L5	6

Text & Reference Books:

Text:

- Anderson, J. D., Jr., "Fundamentals of Aerodynamics", 2nd Edition, McGraw Hill, 1990.
- Houghton, E. L. and Carpenter, P. W., "Aerodynamics of Engineering Students", 4th Edition, CBS Publishers & Distributors, 2005.
- Kermode, A. C., "Mechanics of Flight", 10th Edition, Pearson Education, 2006.

Reference:

- Bertin, J. G. and Cummings, R. M., "Aerodynamics for Engineers", 6th Edition, Pearson, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO4	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO5	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2

1: strongly related, 2: moderately related and 3: weakly related

ASE2552	Aerial Imagery: Hardware and Software	L	T	P	C
Version 2021-1	Date of Approval: June 2021	2	1	0	3
Pre-requisites/ Exposure	Basic Physics, Basic Electronics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of aerial imagery, remote sensing and AI using UAVs. Knowledge of basic physics and basic electronics is crucial to comprehend the contents of this course. This course also provides essential knowledge to the students about the efficient and effective aerial imagery and remote observations using UAVs and image processing using software.

Course Objectives

The objective of this course is to

- Provide fundamental knowledge to the students regarding the basics of imagery and remote sensing using UAVs.
- Provide education and practice to the students about image processing, AI and global positioning.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain, and apply the basics of aerial imagery using UAVs.

CO2. List, explain, and apply the basics of image processing using fundamental principles and relevant software.

CO3. List, explain, and apply the basic concepts of remote sensing, GIS and GPs in operation of UAVs.

CO4. List, explain, and apply the fundamental concepts of image enhancement and AI.

CO5. Explain and apply the engineering fundamentals and principles to practical applications of remote sensing using UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module 1: Basics of Aerial Imagery Introduction to aerial image acquisition; types of cameras; payload weight; consumption of battery with different payloads; manual and autonomous capture of pictures and videos by UAVs; limitation with aerial photography; image distortion; FOV; lighting; understanding of aerial views and flight planning.	L1, L2, L4	5
Module 2: Introduction to Image Processing Various steps involved in image processing; concepts of digital image; some basic relationships like neighborhoods; connectivity; distance measure between pixels; histogram: definition; decision of contrast based on histogram; operations based on histograms like image stretching.	L1, L2, L3	5
Module 3: Remote Sensing, GIS and GPS Introduction to remote sensing technology; satellite vs drone imagery; Geographical Information System; Global Positioning System; Introduction to measurement and measuring systems; functional elements of a measuring system; errors and uncertainty in measurements; methods of minimization of the errors.	L1, L2, L4	5
Module 4: Image Enhancement, Morphology and Segmentation	L1, L2,	5

Image enhancement techniques (spatial and frequency domain); Morphological operations; Image segmentation techniques.	L3	
Module 5. Artificial Intelligence General introduction to AI; application of AI for guidance & control; image processing.	L1, L2, L3	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Tutorial/Laboratory/Field Experiences			
1	Analysis of aerial images of various terrains	L2, L3, L5	4
2	Image processing using suitable software applications	L2, L3, L5	4
3	Analysis of GIS and GPS mark embedded aerial images	L2, L3, L5	4

Text & References:

Text:

- Drone Photography Basics: Your Guide to the Camera in the Sky, Justin Moore, SBN:9781682034088, 1682034089, Page count:128, Published:2019, Format:Paperback, Publisher: Amherst Media,
- Remote Sensing Technology, Imaging, Image Processing, Geographical Information System, Global Positioning System, acquiring information for civil & military applications
- Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson Reprint, 2001.

Reference:

- Drone Photography: Art and techniques, Jake Sugden · 2020, ISBN:9781785006906, 1785006908 24th February 2020, Format:E-book, Publisher: Crowood
- Anil K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall of India, New Delhi, 2001.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO4	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO5	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2

1: strongly related, 2: moderately related and 3: weakly related

ASE2652	Embedded Systems for UAVs	L	T	P	C
Version 2021-1	Date of Approval: June 2021	2	1	0	3
Pre-requisites/ Exposure	Basic of Computer, Basic Electronics				
Co-requisites					

Course Catalog

This course provides basic knowledge and understanding of digital electronics and embedded systems in application in UAVs. Knowledge of computer fundamentals and basic electronics is crucial to comprehend the contents of this course. This course also provides essential knowledge to the students about the involvement of sensors and actuators and IOT in the application of UAVs.

Course Objectives

The objective of this course is to

- Provide fundamental knowledge to the students regarding the basics of digital electronics and control boards for UAV applications.
- Provide education and practice to the students about Sensors, actuators and IoT as applicable in UAV operations.

Course Outcomes

On completion of this course, the students will be able to

CO1. List, explain, and apply the basics of digital electronics in UAV applications.
CO2. List, explain, and apply the basics of embedded systems and programming of control boards.
CO3. List, explain, and apply the basic concepts of sensors and actuators interfacing in UAVs.
CO4. List, explain, and apply the fundamental concepts of using IoT in UAV applications.
CO5. Explain and apply the engineering fundamentals and principles to practical applications of embedded systems in UAVs.

Course Content

Modules	Blooms level*	Number of hours
Module1: Basics of Digital Electronics Introduction to digital electronics; logic gates; basic laws and theorems of Boolean algebra; introduction to combinational circuits; concept of memory cell and introduction to Flip-flops.	L1, L2, L4	6
Module 2: Introduction to Arduino, Raspberry Pi Introduction to embedded systems; introduction to various Arduino boards; introduction to Arduino IDE; 3DR PixHawk; introduction to Python programming language; introduction to Raspberry Pi development boards.	L1, L2, L3	6
Module 3: Interfacing with Sensors and Actuators Interfacing of temperature sensor; LIDAR; pressure sensors; humidity sensor; vision sensor with Arduino/Raspberry Pi; Interfacing of various actuators like DC motor; servo motor; stepper motor; ESC programming.	L1, L2, L4	6
Module 4: Introduction to IOT IoT definition; characteristics; IoT functional blocks; physical design of IoT; implementation of IoT with Arduino and Raspberry Pi; cloud computing; fog computing;surveillance applications; other IoT applications.	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Tutorial/Laboratory/Field Experiences			
1	Programming Arduino/Raspberry Pi	L2, L3, L5	3
2	Sensor/Actuator interfacing	L2, L3, L5	3
3	Design of IoT applications	L2, L3, L5	3
4	Drone programming and control	L2, L3, L5	3

Text & References:

Text:

- R.P. Jain, "Modern Digital Electronics", 2nd Edition, Tata Mcgraw Hill, 2003
- D. Norris, Arduino and Raspberry Pi Sensor Projects for the Evil Genius, McGraw-Hill Education, 2014
- V.Madisetti and A.Bahga, "Internet of Things (A Hands-onApproach)", 1st Edition, VPT, 2014

Reference:

- M. Mano, "Digital Design", 2nd Edition, Pearson Education,2007.
- S. Monk, Hacking Electronics: Learning Electronics with Arduino and Raspberry Pi, 2nd Edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class Test, S/V/Q: Seminar/Viva/Quiz, HA: Home Assignment, EE: End Semester Examination

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO2	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO3	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO4	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2
CO5	1	3	3	-	-	-	-	-	2	2	3	3	1	1	1	2

1: strongly related, 2: moderately related and 3: weakly related

ASE2752	Research Project-I Drone Development	L	T	P	C
Version 2021-1	Date of Approval: June 2021	0	0	0	3
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The minor project provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The research project 1 is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out research project 1 build a foundation and aptitude in students to conduct meaningful research towards a practical outcome. The research project 1 aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

- Provide practical training on small-scale projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
- Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

CO1. Relate and apply the acquired classroom knowledge with technical and real-time environment.

CO2. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.

CO3. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.

CO4. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

- **Title Page -** Format will be given by coordinator/supervisor.
- **Declaration by the Students -** This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate -** This is page number (ii). It is given by the Institute.The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate -** This is a certificate, which the company gives to the students.
- **Contents -** This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement -** This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
- **Abstract and Keywords -** This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
- The keywords (maximum 6) are a hint that what is contained in the report.
- **Company Profile -** A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
- **Chapters-** Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography -** This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Internal and Final Assessment (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

ASE2852	Research Project-II Drone Troubleshooting, Testing and Deployment	L	T	P	C
Version 2021-1	Date of Approval: June 2021	0	0	0	3
Pre-requisites/ Exposure					
Co-requisites					

Course Catalog

The minor project provides the student with an opportunity to apply knowledge and skills learned in the classroom in carrying out a project. The research project 1 is an in-house training on real-time project or on latest software. The experience and skills that come with carrying out research project 1 build a foundation and aptitude in students to conduct meaningful research towards a practical outcome. The research project 1 aims to impart necessary training to the students that is a value addition for their employability.

Course Objectives

The objective of this course is to

- Provide practical training on small-scale projects that will increase the capability of the students to work individually or in teams on actual problems in industry.
- Provide students with capabilities to design systems, analyze results, write technical reports and engage in life-long learning practices.

Course Outcomes

On completion of this course, the students will be able to

CO5. Relate and apply the acquired classroom knowledge with technical and real-time environment.

CO6. Relate and demonstrate capabilities to create and review technological solutions to complex engineering problems of relevant domains.

CO7. Apply the acquired knowledge to demonstrate the skills to create and compile technical reports pertaining to a given project.

CO8. Demonstrate the skills to work ethically and professionally in a team and engage in life-long learning.

Course Content

Guidelines

In order to achieve the objectives:

- Each student will be allotted a supervisor for proper guidance.
- Student will first submit details of company, external guide, project title to coordinator/supervisor as per given schedule.
- For internal assessment purpose, students will submit an industry feedback and a progress report.
- Student will maintain a file (Internship File/Project Report) which he/she will submit after completion of internship. Further, coordinator will provide Non-Teaching Credit Course project guidelines and sample to help in preparation of file. The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The file will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- Spiral Binding

- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.

Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.

Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 40-70 pages.

3. Report Layout: The report should contain the following components

- Front Page
- Declaration
- Student Certificate (University)
- Certificate(Company)
- Acknowledgement
- Abstract
- Contents
- List of Figures
- List of Tables
- Company Profile (optional)
- Chapters
- Appendices(optional)
- References / Bibliography

The above components are described below:

- **Title Page -** Format will be given by coordinator/supervisor.
- **Declaration by the Students -** This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
- **Certificate -** This is page number (ii). It is given by the Institute.The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
- **Company Certificate -** This is a certificate, which the company gives to the students.
- **Contents -** This is page number (iii). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
- **Acknowledgement -** This is page number (iv). Keep this brief and avoid using informal language. This page must be signed by the candidate.
- **Abstract and Keywords -** This is page number (v). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
- The keywords (maximum 6) are a hint that what is contained in the report.
- **Company Profile -** A Company Profile corresponds to a file with company-specific data. Company data can be stored there and included in a booking when needed.
- **Chapters-** Introduction, Literature Review/Background Study etc. as given by coordinator/supervisor.
- **References / Bibliography -** This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Modes of Evaluation: Viva/Progress Report/Presentation/Final Report

Continuous Internal Assessment	Final Assessment
50 Marks	50 Marks

Examination Scheme

Internal and Final Assessment (50)													
S. No.	Name of the Student	Project Title	Guide	Co-guide	Well defined problem, objectives and methodology (5)	Individual Contribution by the student to the project work (5)	Subject Knowledge / skill related to project work (10)	Presentation skills (5)	Thesis Report (7)	Presentation (6)	Execution (6)	Viva Voce (6)	Total (50)

CO, PO, PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
CO2	2	2	-	1	3	-	-	-	-	-	-	-	1	1	1	-
CO3	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	1

1: strongly related, 2: moderately related and 3: weakly related

Amity School of Earth & Environment Science

Bachelor of Science - Earth Science (Honors)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Science - Earth Science (Honors)

Syllabus - First Semester

Course: Basics of Earth System Sciences **Credit : 3**

Semester: I **Course code :ESC2101**

Course objective: The purpose of the course is to develop a holistic understanding of the earth as a system. It attempts to illustrate the reasons for why things happen in nature the way they happen and how much humans have adapted and influenced the natural processes. It will give holistic understanding of linkages in system with a perspective of space and time in earth system.

Module I:

The Universe: Concepts and origin; TheSolar System and origin of planets;Terrestrial and Jovian planets; Meteorites and Asteroids; Earth in the Solar system: Origin, Size, Shape, Mass, Density, Rotational and Revolution Parameters; Age and history of the earth's surface and Geological time scale.

ModuleII:

Distribution of elements in the solar system and in the Earth; Chemical differentiation and composition of the Earth; Earth's magnetic field; Structure and Composition of Earth's interior and surface;General concepts about geochemical cycles; Processes of soil formation, Types of soils, Soil degradation and changing land use pattern.

Module III:

Concept of Plate Tectonics; Sea-floor spreading and Continental Drift; Geodynamic elements of Earth: Mid Oceanic Ridges, trenches, transform faults and island arcs; Origin of oceans, continents, mountains and rift valleys; Plate tectonics & seismicity; Volcanoes: types, products and distribution.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Holme's Principles of Physical Geology. 1992. Chapman & Hall.
2. Emiliani, C, 1992. Planet Earth, Cosmology, Geology and the Evolution of Life and Environment. Cambridge University Press.

Course: Earth Surface Features & Processes **Credit : 3**

Semester: I **Course code :ESC2102**

Course objective: The objective of the course is to make the students acquainted with the various processes operating on the earth and how the interactions leads to the evolution of different geomorphological features and landscape. This course gives an idea of natural process in line with human approach of growth and development and how a mutual balancecaters the human need in best possible ways.

Module I:

Introduction to earth surface processes; Basic concepts of geomorphology and its historical development; Terrestrial relief and scales in geomorphology; nature and scope;; Normal cycle of Erosion;Overview of landscape evolution models.

Module II:

Weathering and erosional processes; Geological work by Geological Agents; Fluvial, Glacial, Aeolian, Coastal and Karst landforms with special reference to Indian context

Hill Slope Stability and Mass movements; Classification, causes and prevention; Tectonics, climate and drainage network development.

Module III:

Overview of Indian geomorphology; Aeolian, Coastal, River valley etc. and their significance.

Extraterrestrial landforms and their formational processes.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Bloom, A.L. 1998. Geomorphology: A systematic Analysis of Late Cenozoic Landforms (3rd Edition), Pearson Education, Inc.
2. Singh, S. 1998. Geomorphology. PrayagPustakBhavan, Allahabad.
3. Kale, VS. and Gupta, A. 2001. Introduction to Geomorphology. Orient Longman Ltd.
4. Easterbrook, D.J. 1992. Surface processes and landforms. McMillan Publ.
5. Thornbury

Course: Physics I **Credit : 2**

Semester: I **Course code : ESC2109**

Course objective: The course is designed to develop an understanding of basics of physics which is intricately related to various sub-branches of earth sciences. This course will provide theoretical foundations of different geological processes including structural geology, stratigraphy, geo-tectonics, mass wasting, petrology, crystallography and mineralogy.

Module I:

Elasticity: Hooke′s Law, elastic constants, bending of beam, bending moment, Cantilever depression at the loaded end of a cantilever, determination of Young′s modulus by non-uniform bending; Viscosity: viscosity of a liquid, viscous force, co-efficient of viscosity of a liquid, Poiseuille′s formula, comparison of viscosities of two liquids by graduated burette method; Surface Tension: surface tension, excess of pressure inside a curved surface, Synclatic system, Surface Tension and interfacial surface tension by the method of drops.

Heat:Specific heat, Newton's law of cooling, determination of specific heat of a liquid using Newton's law of cooling; Emissivity and Emissive Power; J.K. Effect, Positive &Negative Effect, Temperature of Inversion; Super conductors, Type I and II, Meisner Effect, Helium I & II

Module II:

Electricity and magnetism: Potentiometer, Principle, Calibration of low range voltmeter, Measurement of internal resistance of cell, measurement of an unknown resistance.

Magnetism: Moment and pole strength of a magnet, Deflection magnetometer, Tan C position, Vibration magnetometer, Theory, Period of Oscillation, Determination of M and BH using the deflection magnetometer in Tan C position and the vibration magnetometer.

ModuleIII:

Physical optics: Interference; Air Wedge, Description Test for optical flatness of glass plate, determination of diameter of a thin wire by air wedge; Diffraction; Theory of transmission grating, Normal Incidence, Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence; Polarisation; Optical activity, Specific rotatory power; Polarimeter.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.

Course: Chemistry I **Credit : 2**

Semester: I **Course code :ESC 2110**

Course objective: To develop the ability to predict the structures, certain properties and reactivity of the elements and their simpler ionic and covalent compounds. The students would also enhance their understanding of atomic structure and periodicity which would be beneficial in various branches of earth sciences.

Module I:

Atomic Structure: Bohr's theory, wave mechanics: de Broglie equation; Heisenberg's uncertainty principle; Basic idea of Quantum Mechanics Schrodinger's wave equation, quantum numbers and their significance; Pauli's exclusion principle; Hund's rule of maximum multiplicity; Aufbau's principle and its limitations; variation of orbital energy with atomic number.

Module II

Structure and Bonding: Hybridization Ionic Bonding : lattice energy and solvation energy, stability and solubility of ionic compounds, Derivation of Born-Lande equation, Born-Haber cycle and its applications, polarizing power and polarizability, Fajan'srules,ionic character in covalent compounds, bond moment, dipole moment, percentage ionic character.Van-der Waals interactions, hydrogen bonding.

Module III

Chemical Thermodynamics: Objectives and limitations, state and types of system, thermodynamic properties and equilibrium; Laws of Thermodynamics: Concepts of internal energy and enthalpy; entropy, Gibbs free energy and Helmoltz free energy; Concepts in Thermochemistry. Ionic Equilibria: Strong, moderate and weak electrolytes, ionization constant and ionic product of water, pH, ionization of weak acids and bases.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Lee, J.D. *Concise Inorganic Chemistry*, ELBS, 1991.

2. Douglas, B.E. and Mc Daniel, D.H., *Concepts & Models of Inorganic Chemistry*, Oxford, 1970

3. Atkins, P.W. & Paula, J. *Physical Chemistry*, Oxford Press, 2006.

4. Day, M.C. and Selbin, J. *Theoretical Inorganic Chemistry*, ACS Publications 1962.

Course: Mathematics I **Credit : 2**

Semester: I **Course code :ESC2105**

Course objective: To make the students well versed with the fundamental concepts in mathematics, which will be essential to understand different physical, mechanical process of earth process with respect to space and time

Module I

Algebra:Partial Fractions; Binomial, Exponential and logarithmic Series (without Proof); Summation; Simple problems.

Theory of equations:Polynomial Equations with real Coefficients; Irrational roots and Complex roots; Transformation of equation by increasing or decreasing roots by a constant; Reciprocal equations; Newton's method to find a root approximately; Simple problems.

Module II

Matrices:Symmetric; Skew-Symmetric; Orthogonal and Moduleary matrices; Rank of a matrix; Consistency of equations; Eigen roots and eigen vectors; Cayley-Hamilton theorem (without proof); Verification and computation of inverse matrix.

Trigonometry:Expansions of sinn θ, cosn θ, sinnθ, cosnθ, tannθ; Expansions of sinθ, cosθ, tanθ in terms of θ; Hyperbolic and inverse hyperbolic functions; Logarithms of complex numbers.

Module III

Differential calculus:n-th derivatives; Leibnitz theorem (without proof) and applications; Jacobians; Concepts of polar co-ordinates; Curvature and radius of curvature in Cartesian co-ordinates.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1.P.Duraipandian and S.Udayabaskaran,(1997) Allied Mathematics,Vol. I &II.Muhil Publishers, Chennai.
2. P.Balasubramanian and K.G.Subramanian,(1997) Ancillary Mathematics. Vol.I& II. Tata McGraw Hill,
3. S.P.Rajagopalan and R.Sattanathan, (2005) Allied Mathematics.Vol. I &II.Vikas Publications, New Delhi.
4. P.R.Vittal (2003) Allied Mathematics. Marghan Publications, Chennai
5. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd., New Delhi-55.

Course: Biology **Credit : 2**

Semester: I **Course code :ESC2111**

Course objective: Biology is essential to understand geological processes as it provides several vital clues about tracking process in past. This course is meant to provide basic understanding of different forms of life and their organization which is pre-requisite for paleontology. The major thrust will be on the taxonomical classification of the plant and animal kingdom.

Module I:

Introduction: Origin of life and their adaptation to various kinds of environments; Theories of evolution: Darwinism, Neo-Darwinism, Lamarckism and Neo-Lamarckism; Mode of speciation; Fossils and their significance; Zoogeographical and Phyto-geographical outline only.

Module II:

Taxonomic Hierarchy: Taxonomic category and groups; Concepts of species, genus and family; Nomenclature: Principles and rules, Ranks and names; Type method; Principle of priority and its limitations; Biological classification: Five Kingdom system; Basics of Plant & Animal Kingdom

Module III:

Structural Organization in Plants and Animals: Structuralorganization in animals; Salient features and classification of Non-chordates, Classification of Mammal outline; Salient features and classification of plants.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Ganguly,H.CandKar,A.K.:*College Botany,* Vol.II, (New Central Book Agency)
2. Mayr and Ashlok: *Principles of Systematic Zoology*
3. Minkoff: *Evolutionary Biology*
4. Ayala: *Population and Evolutionary Genetics*
5. Jones,S.B.&Luchsinger, A.B: *Plant Systematics,* (McGrawHill)
6. Datta,S.C.: *Systematic Botany,*(Wiley Eastern)

Course: Chemistry Laboratory **Credit : 1**

Semester: I **Course code :ESC2107**

Course Content:

1.Titrimetric Analysis

(i) Calibration and use of apparatus

(ii) Preparation of solutions of different Molarity/Normality of titrants

2. Acid- Base Titrations

(i) Estimation of carbonate and hydroxide present together in mixture.

(ii) Estimation of carbonate and bicarbonate present together in a mixture.

(iii) Estimation of free alkali present in different soaps/detergents

3. Oxidation- Reduction Titrimetry

(i) Estimation of Fe(II) and oxalic acid using standardized $KMnO_4$ solution.

(ii) Estimation of oxalic acid and sodium oxalate in a given mixture.

(iii) Estimation of Fe (II) with $K_2Cr_2O_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Course: Field Survey I **Credit : 2**

Semester: I **Course code :ESC2108**

Course Content:

1. To make the students acquainted with topographical sheets and working on GPS
2. Identification of geomorphological features in a terrain.
3. Introduction to Clinometers compass and its uses.

Examination Scheme:

IA				**EE**	
FV	**PR**	**LR**	**V**	**PR**	**V**
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record, V – Viva.

SEMESTER-II

Course: Crystallography & Mineralogy **Credit :3**

Semester: II **Course code : ESC2201**

Course objective: The course will develop an understanding of the science behind the fundamental chemical, geometrical and physical relationship of matter. This course highlights the chemical and optical fundamentals to decipher structural symmetry of minerals and their optical properties.

Module I:

Crystallography: Brief idea of space lattice; Definition and morphology of crystal and crystal notation; Symmetry elements; Parameter, indices and symbols, Laws of Crystallography; Stereographic Projection; Derivation of 32 classes of crystal; Study of following crystal systems: Isometric System, Tetragonal System, Hexagonal System, Orthogonal System, Monoclinic System, Triclinic System.

Module II:

Mineralogy: Definition and physical properties of Minerals; ions, bonds and their types, coordination number, Isomorphism, Polymorphism and Pseudomorphism; Structure of silicates; A detailed study of important rock forming mineral groups with reference to their composition, structure, physical and optical properties.

Module III:

Optical Mineralogy: Elementary concepts of light; Propagation of light through minerals, Principles of optical mineralogy;Introduction to Nicol Prism, Petrological Microscope and its functions;Crystal habits and twinning, laws of twinning, polarization, double refraction; Isotropism and Anisotropism; Important optical properties:Relief, Pleochroism, Pleochroic, Haloes, Extinction and Extinction angle, Birefringence, Interference colours; Behaviour of convergent polarized light in Uniaxial and Biaxial Minerals.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**

Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. W. D. Nesse, (2000), Introduction to Mineralogy, Oxford University Press, ISBN 0-19-510691-1
2. Cornelis Klein and Barbara Dutrow, The manual of Mineral Science, Wiley Publication 2007.
3. P. F. Kerr Optical Mineralogy,1959
4. Rutley
5. NesseW.D. , Introduction to Optical mineralogy, 2008
6. Deer, W. A. , Howie, R. A. and Zussman, J., An introduction to the rock forming minerals, ELBS publication,1962-1963.
7. Dana

Course: Physics II **Credit : 2**

Semester: II **Course code : ESC2211**

Course objective: This course is designed to develop an understanding of physics at successively deeper levels with a greater insight into the topics such as wave mechanics, nuclear and energy physics alongwith crystallography and fibre optics.

Module I: Wave mechanics

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

Module II: Nuclear and Energy physics

Rutherford's Experiment – Stability of nucleus.The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions. Artificial Transmutation

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy –Biological effects of radiation – control of radiation hazards.

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

Module III: Mechanics and Fluid Mechanics

Galilean invariance and Newton′s Laws of motion; Conservation of momentum and energy;work energy theorem; Conservation of angular momentum, torque, Motion of a particle in central force field; Kepler′s Laws

Fluid Flow,Archimedes' Principle; Ideal fluid in motion, Equation of continuity, Darcy's Law, Bernoulli's Theorem, The flow of real fluids; Waves and Oscillations; Wave equation; Doppler effect, physics of hearing.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1.Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).

Course: Chemistry II **Credit : 2**

Semester: II **Course code : ESC2212**

Course objective:

To develop the ability to predict the structures, certain properties and reactivity of the elements with emphasis on inorganic compounds and complexes which would be beneficial in various branches of earth sciences.

Module I

Complexes of s- and p- block elements; Hydrides and their classification (ionic, covalent and interstitial);Structure and variations in properties with respect to stability; Bio-Inorganic Chemistry: A brief introduction to bio-inorganic chemistry; Role of metal ions present in biological systems with special reference to Na^+, K^+,Mg^{2+} ions: Na/K pump; role of Mg^{2+} ions in energy production transmission of impulses along nerve fibers and chlorophyll; Role of Ca^{2+}ions in blood clotting, muscle contraction, stabilization of protein structures and structural role.

Module II

Kinetic Theory of Gases: Collision and mean free path of molecules; Effects of temperature and pressure; Viscosity, relation between mean free path and coefficient of viscosity; Temperature and pressure dependence of coefficient of viscosity; Degrees of freedom of motion, Principle of equipartition of energy.

Chemical Toxicity: Toxicity of As, Cd, Pb. Hg, CO, NOx, Sox, H_2S;Sources of contamination; Causes of toxicity.

Module III

Liquids: Surface tension and Viscosity and their determination; Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only); Systems of Variable Composition and Solutions Partial molar quantities and their physical significance; Chemical potential,Free Energy and entropy of mixing of ideal gases; Thermodynamics of Ideal Solutions.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Atkins, P.W. & Paula, J. *Physical Chemistry*, Oxford Press, 2006.
2. Day, M.C. and Selbin, J. *Theoretical Inorganic Chemistry*, ACS Publications 1962.

Course: Mathematics II **Credit : 2**

Semester: II **Course code : ESC2206**

Course objective: To make the students explore the basic concepts of mathematics and statistics which are relevant for branches of earth sciences.

Module I

Integral Calculus**:** Bernoulli's formula for integration by parts; Reduction formulae for: $\int x^m e^{ax} dx$,$\int \sin^n x dx$, $\int \cos^n x dx$ (with proof & problems), $\pi/2 \int \sin^m x \cos^n x \, dx$ (no proof, problems only); properties of definite 0 integrals and simple problems.

Application of Integration**:** Evaluation of double, triple integrals; Simple applications to area, volume; Fourier series for functions in $(0, 2\pi)$ and $(-\pi, \pi)$.

Module II

Statistics: Frequency and distribution; Arithmetic mean, Median, Partition values, Mode, Variance and standard deviation; Curve fitting; Principle of least square; Linear regression.

Module III

Probability: Introduction to Probability; Addition and multiplication theorem of Probability; Random variables and Probability distribution; Expected values; Binomial distribution; Poisson distribution & Normal distribution and their application.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. P. Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I &II.Muhil Publishers, Chennai
2. Shaum's Series "outlines of Statistics:

Course: Structural Geology **Credit : 3**

Semester: II **Course code : ESC2210**

Course objective: This course deals with the study of the three dimensional distribution of rock Modules with respect to their deformational history. The study will make the students understand the structural evolution of a particular region and the important events which occurred in the regional geological past.

Module I:

Definition and objectives; Effects of topography on structural features; Topographic and structural maps; Scale of the map; Survey methods; Contouring and Plotting, Measurement of slope heights, aspects and gradients; Global Position System.Exercise of localization of points, estimation of slope and real distance in the map, Isolines, elevation points; Landform identification and construction of elevation profiles from maps

Module II:

Stresses in rocks, factors controlling rock deformations;Stratification and bedding; Attitude of beds; Outcrops and outcrop patterns, Outliers and inliers; Dip & strike: Significance of top-bottom criteria in structural geology;

Module III:

Definition, Classification, Causes, Recognition, Economic importance and Geologic significance of Folds and Faults;Unconformities, Joints;Lineation, Foliation, Rock cleavage:Definition and types.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Davis, GR. 1984. Structural Geology of Rocks and Region. John Wiley
2. Weijermars, R. 1997. Structural Geology and Map Interpretation, Alboran Science Publishing.

3. Billings, M.P. 1987. Structural Geology, 4th edition, Prentice-Hall.
4. Hatcher, Jr., R.D. 1995. Structural Geology - Principles, Concepts and Problems, Merrill Publishing Company.
5. Ghosh, SK. 1993. Structural geology: fundamentals and modern developments, Pergamon Press, London

Course: Earth Sciences Laboratory I **Credit : 2**

Semester: II **Course code :ESC2208**

Course Content:

Crystallography:

1. Study of elements of symmetry of normal classes of six crystal systems.
2. Study of Clinographic Projection
3. Stereographic projection of face poles of crystals.

Mineralogy:

4. Study of physical properties of various common and important minerals in hand specimen – i.e. Silicates, Sulfides, Oxides, Hydroxides, Halides, Carbonates, Phosphates etc.

Optical Mineralogy:

5. Optical identification of common rock forming minerals - Quartz, Plagioclase, Microcline, Muscovite, Biotite, Fluorite, Olivine, Garnet. Tourmaline, Staurolite, Kyanite, Sillimanite, Hypersthene, Augite, Diopside, Hornblende, Tremolite-Actinolite. Corundum, Beryl, Calcite, Barite.

Structural Geology

6. Drawing profile sections and interpretation of geological maps of different complexities.
7. Exercises of stereographic projections of mesoscopic structural data (planar, linear, folded etc.).

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Course: Field Survey II **Credit : 2**

Semester: II **Course code :ESC2209**

Course Content:

1. To identify the mineral assemblage on an outcrop through hand lens and physical properties.
2. To identify and relate the various structural features in the field and prepare a geological map.
3. Clinometers compass and its uses

Examination Scheme:

IA				**EE**	
FV	**PR**	**LR**	**V**	**PR**	**V**
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record, V – Viva.

SEMESTER- III

Course: Igneous Petrology **Credit : 3**

Semester: III **Course code : ESC2301**

Course objective: A basic course in earth sciences which deals with the origin, composition, distribution and structure of the rocks that have an origin from magma. The study of igneous rocks is important because they make up the bulk of the earth's crust in the geological time period.

Module I

Introduction to petrology; its significance, distinguishing features of three types of rocks; concept of intrusion and extrusion; Magma: Definition, generation and crystallization and diversification of magma, Tectonic setting and igneous activities; Bowen's reaction principle and its petrological significance.

Module II

Structure, textures and classification of igneous rocks; Concept of mode and norm; Phase rule and phase diagrams – binary and ternary systems.

Module III

Petrogenesis of granite, alkaline rocks; Basalt, Anorthosite and Ultramafic rocks; Petrographic description of the following rock types: Granite, Rhyolite, Syenite, Nepheline-syenite, Monzonite, Granodiorite, Diorite, Pegmatite, Anorthosite, Gabbro, Dolerite, Basalt, Peridotite, Pyroxenite, Norite, Dunite, Trachyte and Andesite.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. John D. Winter 2001. An Introduction to Igneous and Metamorphic Petrology. Prentice Hall Inc
2. Loren A. Raymond 2002. Petrology: The study of Igneous, Sedimentary and Metamorphic rocks. McGraw Hill .New York
3. Bose M.K. 1997. Igneous Petrology. World Press
4. Cox, K.G. Bel, J.D. and Pankthrust, R.J. 2002. The interpretation of Igneous rocks. Allen and Unwin, London
5. Pankthrust, 2000. Igneous and Metamorphic rocks. Prentice Hall.
6. Phillpots, A.R., and Ague, S.J., 2009. Principles of igneous and metamorphic petrology (2^{nd}Edn.) Cambridge.

Course: Sedimentology **Credit : 2**

Semester: III **Course code : ESC2302**

Course objective: This course is a branch of petrology, dealing with the study of modern sediments and the processes resulting in their deposition. Sedimentary rocks are particularly significant because of the vast extent on the earth's surface and their close linkages to the geological past.

Module I

Basic concepts of Sedimentary Petrology and Sedimentology; Description and classification of Sedimentary rocks, Sedimentary Environments and facies, Weathering and sedimentary flux; Fluid flow and its types, Sediment transport and deposition; Submarine weathering, soils and paleosols; Application of Sedimentary Petrology.

Module II

Textures of clastic and non-clastic sedimentary rocks; Structures of sedimentary rocks;Lithification and Diagenesis; Provenance; Texture, composition, classification, origin and occurrence of Siliciclastic rocks: Conglomerates, Sandstones, Mudrocks; Introduction to coal and petroleum.

Module III

Non-siliciclastic rocks: Carbonate rocks, controls of carbonate deposition, limestone, dolomite and Dolomitisation; Chert and siliceous sediments; Phosphorites, carbonaceous sediments, iron rich sediments and evaporates; Petrographic description of the major rock types: Conglomerate, Breccia, Sandstones, Arkose, Greywacke, Limestone, Dolomite, Shale.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Prothoreo and Schwab, 2004, Sedimentary Geology, Freeman and Co. New York, 557p
2. Sam Boggs, 1995, Principles of Sedimentology and Statigraphy, Printice Hall, New Jersey, 765p .
3. Maurice E. Tucker, 2006, Sedimenary Petrology, Blackwell Publishing, 262p.
4. Collinson, J.D. and Thompson, D.B. 1988, Sedimentary structures, Unwin-Hyman, London, 207p.
5. Lindholm, R.C., 1987, A practical approach to sedimenmtology, Allen and Unwin, London
6. Pettijohn, F.J. 1975, Sedimentary rocks, Harper and Row Publ. New Delhi

Course: Metamorphic Petrology **Credit : 2**

Semester: III **Course code : ESC2303**

Course objective: This course would highlight the relationship of rocks with the field relations and local tectonic environment, especially how the impact of heat and pressure causes profound physical and chemical change in a rock to change their form.

Module I

Introduction to Metamorphic Petrology; Factors controlling metamorphism; Types of metamorphism: contact, regional, fault zone metamorphism, impact metamorphism;Limitations of metamorphism; Diagenesis, Anataxis, Palingenesis

Module II

Concept of Zones, Facies, Grades andIsograds; Metamorphic differentiation, prograde, retrograde, and poly-metamorphism;Metamorphic fluids and Metasomatism; Paired metamorphic belts, Index minerals; Thermal and Regional metamorphism of argillaceous, calcareous and basic igneous rocks.

Module III

Origin of Migmatites; Petrographic notes on the following metamorphic rocks: Slate, Phyllite, Schists, Gneisses, Amphibolites, Marble, Quartzites, Hornfels, Charnockite, Khondalite, Eclogite, Kodurite and Skarns.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Yardley, B W D. 1990. An introduction to metamorphic petrology. ELBS publication.
2. Bucher K. and Martin F. 2002. Petrogenesis of Metamorphic rocks. Springer-Verlag Publication.
3. Best, M.G. 2002. Igneous and metamorphic petrology. Wiley publication.

4. Vernon R. H. and Clarke G. L. 2008. Principles of metamorphic Petrology. Cambridge publication.
5. Spears F. 1993. Metamorphic Phase Equilibria and Pressure-Temperature-Time Paths. AGU publication
6. John D. Winter 2001. An Introduction to Igneous and Metamorphic Petrology. Prentice Hall Inc

Course: Atmospheric Sciences **Credit : 2**

Semester: III **Course code : ESC2304**

Course objective: The purpose of the course is to give a holistic understanding of the various processes and effects of the atmosphere on the other systems and vice versa. This will make the students aware with the fundamental concepts of the climate system and the changes taking place therein.

Module I

Atmosphere: Structure and composition, vertical profile of temperature and pressure, microphysical processes in the atmosphere; Atmospheric physics: Earth's heat budgetand radiative forcing; Fundamental forces: Pressure gradient force, centrifugal force, gravity force, Coriolis force; Buy Ballot law; Aurora Boreolis and Aurora Australis.

Module II

Introduction to components of climate science**;** Feedback mechanisms; Atmospheric thermodynamics, greenhouse gases and climate forcing; Heat transfer in ocean.

Module III

Paleoclimatology: Introduction and Measurement techniques; Aerosol in atmosphere, properties; carbonaceous aerosols; radioactive effects of Atmospheric aerosols; Direct and Indirect effects of aerosol particles. Indian monsoon and its variability, western disturbances, Indian Ocean Dipole; El Niño-Southern Oscillation.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Barbara J., Pitts F. and Pitts J.N., Jr (2000) Chemistry of the Upper and Lower Atmosphere- Theory, Experiments and Applications Academic Press, San Diego.
2. Marshall J. and Plumb R.A. (2001) Atmosphere, Ocean and Climate, *Elsevier*, Amsterdam.
3. Oliver J.E. and HidoreJ.J. (2008) *Climatology: An Atmospheric Science*, Prentice Hall.
4. Seinfeld J.H. and PandisS.N. (2006) Atmospheric Chemistry and Physics-from Air Pollution to Climate Change, John Wiley and Sons, INC.
5. Barry, R. G., 2003. Atmosphere, weather and climate. Routledge Press, UK

Course: Marine Sciences **Credit : 2**

Semester: II **Course code : ESC2309**

Course objective: The aim of this course is to make the students aware of the various factors that play an important role in determining the physical and chemical characteristics of the marine water and the associated marine biota.

Module I

Introduction to Hydrological cycle; Origin and chemical composition of sea water; geomorphologyand Relief of ocean floor;Vertical and horizontal distribution of temperature and salinity

Module II

Concepts of Eustasy; Ekman rule; Land-Air-Sea interactions; Oceanic current system and effect of Coriolis forces; waves and tides; Ocean currents, Global distribution ofmajor ocean currents; Climate change and ocean; Sea level changes and its impact on coastal areas

Module III

Coastal erosion and stabilization; Delta and estuaries; Coastal zone regulation and management;Concept of Ocean Ecosystem.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Gross,M.G., 1977. *Oceanography: A view of the Earth*, Prentice Hall.
2. Haq and Boersma, 1978. *Introduction to Marine Micropaleontology*, Elsevier.
3. Tolmazin,D., 1985. *Elements of Dynamic Oceanography*, Allen and Unwin.

Course: Earth Sciences Laboratory II **Credit : 2**

Semester: III **Course code :ESC2307**

Course Content:

Igneous Petrology:

1. Megascopic and microscopic (textural and mineralogical) study of majorExtrusive and Intrusive igneous rocks.

Metamorphic Petrology:

1. Megascopic and microscopic study (textural and mineralogical) of low and medium to high grade metamorphic rocks:

Sedimentology:

1. Exercises on sedimentary structures and their palaeo-environmental significance,
2. Petrography of clastic and non-clastic rocks through handspecimens and thin sections.

1. **Examination Scheme:**

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Course: Field Survey III **Credit : 3**

Semester: III **Course code :ESC2308**

Course Content:

1. To identify rocks and mineral assemblages in an outcrop through rock hammer, pocket knife, a hand lens or a magnifying glass or dropper bottle of hydrochloric acid.
2. To acquaint the students with the geomorphological features.
3. Mapping and identification of structural features in the field.

Examination Scheme:

IA				**EE**	
FV	**PR**	**LR**	**V**	**PR**	**V**
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record, V – Viva.

SEMESTER IV

Course: Economic Geology **Credit : 2**

Semester: IV **Course code : ESC2405**

Course objective: This course will emphasize on the earth materials primarily used for economic and/or industrial purposes. This branch of earth sciences is extremely significant as it used in geochemistry, mineralogy, geophysics, petrology, structural geology etc. Economic geology is of utmost concern for environmentalists, engineers and conservationists

Module I

Definition and types of ore and minerals and their origin; Bateman's classification; Principles and processes of ore genesis; Endogenous processes: magmatic concentration, contact metasomatic, hydrothermal, skarns, greisens and pegmatites deposits; Exogenous processes: sedimentary ore deposits, Chemical and bacterial precipitation, Colloidal deposition.

Module II

Weathering products and Residual Deposits: Oxidation and Supergene Enrichment; Evaporite deposits, Metamorphism as ore forming processes; Metallic ores: origin, geological occurrences, geographical distribution and uses of the mineral deposits of –Fe, Cr, W, Sn, Zn Pb, Au, Al, Mg and Co and atomic minerals; Nonmetallic and industrial rocks and minerals, their nature and distribution in space and time in India: refractory, chemical, fertilizer, cement and gemstone industry including building stones.

Module III

Economic importance of the following geological formations of India: Precambrians of Dharwars and Singhbhum, Cuddapah, Vindhyan, Gondwana, Jurassic of Kutch, Cretaceous of South India, Siwaliks and Tertiary of Assam.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Reading:

1. Jensen and Bateman: Economic Mineral Deposits.

2. Sen and Guha: A Handbook of Economic Geology.

3. Banerjee: Mineral Resources of India.

4. Sharma and Ram: Introduction to India's Economic Minerals.

5. Deb: Industrial Minerals and Rocks of India.

Course: Geochemistry **Credit : 3**

Semester: IV **Course code : ESC2406**

Course objective: This course would provide various aspects of chemistry, with major thrust on the relative abundance, distribution and cycling of earth′s chemical elements and their isotopes. This will also lay a foundation for analytical and conceptual concepts which would further be helpful for research in specialized areas much significant of earth sciences.

Module I

States of matter and atomic environment of elements: Geochemical classification of elements, the composition of different earth reservoirs; Radioactivity: conservation of mass, isotopic and elemental fractionation, concept of radiogenic isotopes in geochronology and isotopic tracers, dating by radioactive nuclides: Carbon 14, Beryllium 10, K-Ar method.

Module II

Introduction to properties of elements: Element transport: advection, diffusion; Chromatography; Aqueous geochemistry: Basic conceptsof Carbonate chemistry, speciation in solutions, toxicity of heavy metals, precipitation and dissolution of minerals, solubility of minerals: clays, hydroxides, carbonates, sulfides.

Module III

Mineral reactions: Diagenesis and hydrothermal reactions; Geochemical characteristics of Earth solar system; Meteors, meteorites and meteoroids: occurrence and significance;Geochemical behavior of selected elements like Si, Al, K, Na.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Mason, B (1986). Principles of Geochemistry. 3rd Edition, Wiley New York.
2. Walther John, v., 2009 Essentials of geochemistry, student edition. Jones and Bartlett Publishers
3. Albarede, F, 2003. An introduction to geochemistry. Cambridge University Press

Course: Remote Sensing and GIS **Credit : 3**

Semester: IV **Course code :ESC2410**

Course objective: This course will develop the skills of students in the field of GIS and remote sensing. It will also give the basic concepts of remote sensing and principles associated with image acquisition and image processing. The role of GIS as a tool in environmental management and knowledge of GPS will be facilitated. This course will also look into the application of remote sensing/GIS in database generation and environmental management.

Module I

Remote sensing: Introduction, scope and components; Electromagnetic spectrum, its characteristics and interaction with environment; Platforms & Sensors, Albedo, Atmospheric Windows; Aerial photography, Elements of Visual Image Interpretation, Spectral Signature, Digital image processing; Optical remote sensing, microwave remote sensing; Photogrammetry: Introduction, stereoscopic vision; Concept of Digital Elevation Model.

Module II

Map: definition, types, scale and projection; coordinate systems, survey of India (SOI) topographical maps; Geographic Information System: Introduction, definition and terminologies; Components and fundamental operations of GIS; Data structure, raster and vector data structures; Data input methods; Accuracy, precision and resolution, Global positioning systems (GPS):Basics, satellite generation, positioning services, GPS details and integration, GIS and image processing software.

Module III

Techniques and applications of remote sensing in water resource management, Land Use land cover mapping, forest cover/ type mapping, habitat analysis, biodiversity characterization; Use of GIS and remote sensing in environmental monitoringand early warning system.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Lillisand, Thomas, Ralph W. Kiefer and Jonathan Chipman. 2007. Remote Sensingand Image Interpretation. Wiley India.
2. Jensen, John R. 2004. Introductory Digital Image Processing: A Remote SensingPerspective.Prentice Hall.
3. Burrough, P.A. and McDonnell, R.A. (1998) Principles of geographical information systems. Oxford University Press, Oxford, 327 pp.
4. Jensen J.R. (2000) Remote Sensing of the Environment: An Earth Resource Perspective, Prentice Hall, ISBN 0-13-489733-1.

Course: Geophysics **Credit : 2**

Semester: IV **Course code :ESC2412**

Course objective: The course is developed to give an insight about the physics of earth and the study of earth using quantitative physical methods.

Module I

Interrelationship between geology and geophysics; General and Exploration geophysics; Basic principles of geophysical exploration; Different types of geophysical methods.Role of geological and geophysical data in explaining geodynamical features of the earth.:

Module II

Geophysical Methods: Gravity, magnetic, Electrical, Seismic- their principles and applications; Concepts and Usage of corrections in geophysical data; Geophysical field operations - Different types of surveys, grid and route surveys, profiling and sounding techniques, scales of survey, presentation of geophysical data.

Module III

Application of Geophysical methods - Regional geophysics, oil and gas geophysics, ore geophysics, groundwater geophysics, engineering geophysics; Geophysical anomalies: correction to measured quantities, geophysical, anomaly, regional and residual (local) anomalies, factors controlling anomaly, depth of exploration; Integrated geophysical methods - Ambiguities in geophysical interpretation; Planning and execution of geophysical surveys.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. The Solid Earth: An Introduction to Global Geophysics (2nd ed. 2005) by CMR Fowler, Cambridge University Press.

2. Applied Geophysics by Telford W.M., Geldart L.P. and Sheriff R.E., Cambridge University Press.
3. Milton B. Dobrin (1988): Introduction to Geophysical Prospecting 3rd Ed. McGraw Hill, 630p. ISBN: 0070171955.
4. William Lowrie (1997): Fundamentals of Geophysics. Cambridge University Press, 354p. ISBN-0 521 63454 7.
5. Edwin S. Robinson (1988): Basic Exploration Geophysics. John Wiley & Sons, 562p. ISBN-0-471-87941-x.

Course: Palaeontology **Credit : 2**

Semester: V **Course code : ESC2413**

Course objective: The students would develop an understanding of the origin and evolution of the past life which is a vital in giving information about Earth′s organic and inorganic past.

Module I

Introduction to Fossils and Index Fossils, Fossilization Processes (Taphonomy)and Modes of Preservation; Concept of Species, Species problem in palaeontology, Fossil nomenclature and methods of description, code of systematic nomenclature; Theory of organic evolution and the fossil record; Palaeoecology: Principles and methods;Palaeobiogeography and palaeoclimate.

Module II

Invertebrate Palaeontology: Morphology, classification and geological history of the following groups: Gastropoda, Lamellibranchia, Brachiopoda, Cephalopoda, Trilobita and Echinoidea;Classification of trace fossils and their utility in palaeo-environmental reconstructions; Vertebrate Palaeontology:Origin of vertebrates; Vertebrate fossil record from Gondwana formations, Deccan volcanic province, Palaeogene and Neogene sequences of India and their evolutionary and palaeobiogeographic significance.

Module III

Palaeobotany: Early plant life;Colonization of land; Carboniferous coal forests; Gondwana flora and role of climate in its evolution; Micropaleontology: Microfossils and their importance.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Clarkson, E.N.K.1998. Invertebrate Palaeontology and Evolution, George Allen &Unwin.

2. Raup, D.M. and Stanley, S. M. 1971. Principles of Palaeontology, W.H. Freeman and Company.
3. Benton, M. 1997. Basic Palaeontology: An introductory text, D.Harker, Addision Wisely Longman.
4. Prothero, D.R. 1998. Bringing fossils to life – An introduction toPalaeobiology, McGraw Hill.
5. Willis, K.J. &McElwain, J.C. 2002. The evolution of plants, Oxford University Press.
6. Brenchley, P. J., and Harper, D. A. T. 1998. Palaeoecology: Ecosystems, Environments and Evolution. By Chapman and Hall.

Course: Earth Science Laboratory III **Credit : 2**

Semester: IV **Course code :ESC2408**

Course Content:

1. Study of Topographic Sheets, map sheets, thematic maps,
2. Study of aerial photographs delineating geomorphic features, rock types and structural features
3. Processing of satellite data and delineation of rock types and mapping of soil, vegetation, water and geologic structure.
4. Element of Image Interpretation, Image enhancement, Image registration and Geo-referencing.
5. Image classifications for land use/ land cover using ERDAS, PCI GeomaticaandENVI.
6. GIS Software, introduction to open sourceGIS
7. Preparation and interpretation of water table contour maps and depth to water level contour maps.
8. Study, preparation and analysis of hydrographs for differing groundwater conditions.
9. Water potential zones of India (map study) including saline water zones.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Course: Field Survey IV **Credit : 3**

Semester: IV **Course code :ESC2409**

Course Content:

1. Detailed hand on exposure with GPS (Global Positioning System) and its working.
2. Correlation of satellite image with toposheet and ground verification in a terrain and preparation of a geological map.
3. Geological reporting of field including all major parameters and their important significance.

Examination Scheme:

IA				**EE**	
FV	**PR**	**LR**	**V**	**PR**	**V**
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record, V – Viva.

SEMESTER- V

Course: Exploration Geology **Credit : 2**

Semester: V **Course code :ESC2503**

Course objective: Basic knowledge of the occurrence of the resources along with the techniques and statistical analysis associated with for mineral exploration.

Module I:

Resource reserve definitions and classification; Mineral resources in industries: Historical and present perspective; A brief overview of classification of mineral deposits with respect to processes of formation in relation to exploration strategies.

Module II:

Principles of mineral exploration; Prospecting and exploration- conceptualization; Methodology and stages; Sampling, subsurface sampling including pitting, trenching and drilling, core and non-core drilling, planning of bore holes and location of boreholes on ground; Core-logging; Geochemical exploration: Principles; Nature of samples; Anomaly, strength of anomaly and controlling factors; primary and secondary dispersion;Coefficient of aqueous migration.

Geobotanical survey: Indicators and survey techniques.

Module III:

Introduction to geophysical methods of exploration: Principles of reserve estimation, density and bulk density, factors affecting reliability of reserve estimation, reserve estimation based on geometrical models (square, rectangular, triangular and polygon blocks);Regular and irregular grid patterns;Stage of mineral exploration; Statistics and error estimation.

Suggested Readings:

1. McKinstry, H.E. 1962. Mining Geology (2nd Ed.) Asia Publishing House.
2. Clark, G.B. 1967. Elements of Mining. 3rd Ed. John Wiley & Sons.
3. Arogyaswami, R.P.N. 1996 Courses in Mining Geology. 4th Ed. Oxford-IBH.

Course: Hydrogeology **Credit : 2**

Semester: IV **Course code :ESC2511**

Course objective: The course is designed to make the students aware about the peculiarities of the availability and movement of sub-surface and surface water. The various geological characteristics of ground water and surface water will be dealt with.

Module I:

Scope and significance of hydrogeology Hydrological cycle (Precipitation, Evapo-transpiration, Runoff, and infiltration); Sub-surface movement of water, flow in saturated and unsaturated zones; Vertical distribution of sub-surface water; Origin and age of groundwater.

Module II:

Sub surface hydrogeology: Types, characteristics, classification of aquifers,Porous and Fractured aquifers; Groundwater occurrence in igneous, metamorphic and sedimentary rocks;Darcy's law and its application;Theory and dynamics of groundwater flow,Phreatic and Piezometric level, Analysis of Piezometric surface, Groundwater level fluctuations; Aquifer′s hydraulic parameters; Groundwater provinces of India.

Module III:

Elementary well hydraulics, surface and sub-surface exploration of groundwater, drilling and construction of wells, pumping tests and analysis of test data for evaluation of aquifer parameters; Physical and chemical properties of water and water quality; Water balance studies: basic concept, development and management of groundwater resources; Surface and subsurface water interaction; Sea water intrusion in coastal aquifers.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Todd, D.K. 2006. Groundwater hydrology, 2nd Ed., John Wiley & Sons, N.Y.
2. Davis, S.N. and De Weist, R.J.M. 1966. Hydrogeology, John Wiley & Sons Inc., N.Y.
3. KaranthK.R., 1987, Groundwater: Assessment, Development and management, Tata McGraw-Hill Pub. Co. Ltd.
4. Fetter, C.W. 2001. Applied Hydrogeology, Prentice Hall Inc., N.J

Course: Stratigraphy of India **Credit : 3**

Semester: V **Course code :ESC2509**

Course objective: The students would explore study of strata (rock layers) and stratification (layering) in sedimentary and layered igneous rocks. This course further gives an elementary idea about the diverse arrangement and deposition of rocks and formations in Indian sub-continent with respect to the geological past. It would also elaborate regional geology and tectonic evolution of India.

Module I:

Basic Concepts and Historical developments in Stratigraphy; Stratigraphic principles and correlation; Stratigraphic nomenclature;Faciesconceptand Walther's Law; Principles and methods of lithostratigraphy, Biostratigraphy and Chronostratigraphy; Magnetostratigraphy and Chemostratigraphy; Sequence Stratigraphy.

ModuleII

Physiographic and tectonic subdivisions of India; regional geology and tectonic evolution of cratons; Geology of Proterozoic,Cuddapah and Vindhyan sedimentary basins; Precambrian/Cambrian boundary.

Module III

Palaeozoic succession of Kashmir and its correlatives from Spiti and Zanskar; Stratigraphy and structure of Gondwana basins; Himalayan region;Marinemesozoic formations with reference to the Triassic deposits; Jurassic rocks of Kutch and Jaisalmer basins; Distribution and age of mesozoic volcanic provinces of India; Deccan Traps, Panjal Traps, Rajmahal Traps, Sylhet Traps; Stratigraphic boundary problems with special reference to P / T and K / T boundaries in India.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Krishnan, M.S. 1982. Geology of India and Burma, CBS Publishers, Delhi
2. Pascoe, E.H. 1968. A manual of the Geology of India and Burma (Vol.I-IV), Govt. Of India Press, Delhi.
3. Doyle, P. & Bennett, M.R. 1996. Unlocking the Stratigraphic Record. John Wiley
4. Ramakrishnan, M. &Vaidyanadhan, R. 2008. Geology of India Volumes 1 & 2, Geological society of India, Bangalore.
5. Valdiya, K.S. 2010. The making of India, Macmillan India Pvt. Ltd.

Course: Engineering Geology **Credit : 2**

Semester: V **Course code :ESC2510**

Course objective: The course deals with the study of geological structures and their role in engineering structures and projects. Students are expected to develop an insight about the role of a geologist in such engineering projects.

Module I

Introduction to the concept of geology vis-à-vis engineering; Role of geology in planning, design and construction of major man-made structural features; Elementary concepts of rock and soil mechanics.

Module II

Site selection and investigation; Types of structures, classification and their effect on civil engineering projects and Geological mapping; Geological and geotechnical investigations for dams, reservoirs and spillways, tunnels, underground caverns, bridges, highways, shorelines.

Module III

Environmental considerations related to civil engineering projects; Construction materials; Geological hazards (landslides and earthquakes), their significance, causes and preventive/remedial measures; Recent trends in engineering geology.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Krynin, D.P. and Judd W.R. 1957. Principles of Engineering Geology and Geotechnique, McGrawHill (CBS Publ).
2. Johnson, R.B. and DeGraf, J.V. 1988. Principles of Engineering Geology, John Wiley & Sons, N.Y.
3. Goodman, R.E., 1993. Engineering Geology: Rock in Engineering constructions. Jonh Wiley & Sons, N.Y.
4. Waltham, T., 2009. Foundations of Engineering Geology (3rdEdn.) Taylor & Francis.

Course: Earth Sciences Laboratory IV **Credit : 2**

Semester: IV **Course code :ESC2507**

Course Content:

1. Selection of sites using topographic maps for dams, tunnels, bridges, highways and similar civil structures.
2. Index Tests for soil, rocks and debris.
3. Evaluation of shear strength parameters.
4. Study of fossils showing various modes of fossilization.
5. Thin section study of fossils to understand important parameters.
6. Study of diagnostic morphological characters through hand specimens of fossils.
7. Study of distribution important metallic, non-metallic deposits in India.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Course: Field Survey V **Credit : 3**

Semester: V **Course code :ESC2508**

Course Content:

1. Detailed hand on exposure with GPS (Global Positioning System) and its working.
2. Correlation of satellite image with toposheet and ground verification in a terrain and preparation of a geological map.
3. Geological reporting of field including all major parameters and their important significance.

Examination Scheme:

IA				**EE**	
FV	**PR**	**LR**	**V**	**PR**	**V**
20	10	10	10	25	25

Note: IA –Internal Assessment, EE- External Exam, FV-Field Visit, PR- Presentatione, LR – Lab Record, V – Viva.

SEMESTER- VI

Course: Coal and Petroleum Geology **Credit : 3**

Semester: VI **Course code :ESC2603**

Course objective: This course will deal with the geological aspects related to coal and petroleum. This is of utmost significance keeping in view the high employability opportunities associated with this branch of earth science.

Module I:

Coal; Origin, types, ranks and uses; Coalification process; Coal Petrology: Lithotypes, Microlithotypes and macerals: Physical, chemical and optical properties; Maceral analysis: Mineral and organic matter in coal;; Coal exploration and estimation of coal reserves; Applications of coal geology in hydrocarbon exploration; coal petrography of different coalfields of India.

Coalbed methane: Elementary idea about generation of methane in coal bedsand exploration

Module II:

Natural occurrence, Chemical composition and physical properties of crudes in nature; Origin of petroleum, maturation of kerogen; Biogenic and thermal effect; Reservoir rocks: General attributes and petrophysical properties; Migration of oil and gas: Geologic framework and factors controlling hydrocarbon migration; migration routes and barriers.

Module III:

Hydrocarbon traps: Definition, theory and classification of hydrocarbon traps - structural, stratigraphic and combination; Time of trap formation and hydrocarbon accumulation; Cap rocks: Definition and general properties; Formation water characteristics as oil exploration leads; Plate tectonics and global distribution of hydrocarbon reserves; Classification of Indian basins and petroleum geology of oilfields of India: Assam, Bengal, Cauvery, Krishna-Godavari, Cambay and Bombay offshore basins.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

1. Coal Geology: Larry Thomas, 2002, Wiley and Sons.
2. Coal: it′s composition, analysis, utilisation and valuation.: E.E.Somermier 2008, McGrawHill
3. Petroleum Geology: F.K.North, 1986, Allen and Unwin
4. Petroleum Formation and Occurrence: B.P.Tissot and D.H.Welte 1978, Publisher: Springer-Verlag
5. Elements of petroleum Geology: R.C.Shelley 1998, Academic press.

Course: Hazard Assessment and Risk Management **Credit : 2**

Semester: VI **Course code :ESC2604**

Course objective: This paper introduces the students to various environmental hazards, their causes, nature, preparedness and assessment of loss. It teaches them to model hazards and familiarizes them with methods of management of disasters and consequently risk zonation.

Module I

Hazards and Disasters: Geological, Hydro-meteorological, Biological, Technological and human induced hazards/disaster: Types, causes, factors, consequences; Climate change and disaster; hazard, risk, vulnerability; Impacts of disasters: health, physical and socio-economic; Natural hazard profile of India.

Module II

Hazard assessment: A brief review of the hazard identification and assessment models.

Disaster preparedness: Preventive measures, Early warning system; Mitigation: Disaster Risk Reduction (DRR), Emergency Operation plan (EOP); Response and recovery.

Module III

Applications of science, technology and engineering in disaster management including geo-informatics; Role of government (local, state and national), non-government and multilateral agencies; Recent advancements in disaster management practices. Case studies related to the seismic, industrial and meteorological hazards.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. Bell, F.G., 1999. Geological Hazards, Routledge, London.

2. Bryant, E., 1985. Natural Hazards, Cambridge University Press.

3. Patwardhan, A.M., 1999. The Dynamic Earth System.Prentice Hall.

4. Smith, K., 1992. Environmental Hazards.Routledge, London.

5. Subramaniam, v., 2001. Textbook in Environmental Science, Narosa International.

WORKSHOP/ CONFERENCE/ TRAINING PROGRAMME

Course: Workshop/Conference/Training **Credit : 01**

Semester: VI **Course Code :ESC2633**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.

2. The participants are expected to explore the topic in advance and take active part in the discussions held

3. Attending and participating in all activities of the workshop

4. Group Activities have to be undertaken by students as guided by the trainer.

5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.

6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

DISSERTATION

Course: Dissertation | **Credit : 09**
Semester: VI | Course Code : ESC2637

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is a professional problem-solving activity and is equally significant as any other aspect of the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricula where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department.

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

CLIMATE SCIENCE

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
AST2151	Basics of Climate Science	3	-	-	3
AST2251	Introduction to Earth System Science Editing	3	-	-	3
AST2351	Cloud Microphysics and Chemistry	3	-	-	3
AST2451	Climate Change: Impact, Vulnerability and Adaption Foundations	3	-	-	3
AST2551	Primer of Oceanography Psychology	3	-	-	3
AST2651	Fundamentals of Climate Variability and Modeling	3	-	-	3
	TOTAL				**18**

CLIMATE SCIENCE

Syllabus - Semester First

BASICS OF CLIMATE SCIENCE

Course Code: AST2151 **Credit Units: 03**

Course Objectives:
The aim of this course is to provide the students a basic understanding about the climate system: its attributes, underlying processes, and the drivers of climate change. Knowledge of various components of climatic system, and their interactions with atmosphere/hydrosphere/lithosphere would further create interest amongst the students about the climate system modelling and climatic vulnerability. This course emphasizes the scientific basis for anthropogenic climate change. Students will learn the physics behind the climate system, how climate has changed in the past and reasons why contemporary climate change is different, the scientific basis for anthropogenic climate change theory and how scientists use models to predict future climate. The course will also provide an overview of the physical, ecological, biological, social and economic impacts of climate change. Finally, students will examine various mitigation and adaptation strategies which society can employ in a warmer world.

Course Contents:

Module I: Introduction to Climate Science and its Components
Fundamentals of meteorology; Vertical profiles of temperature, wind, pressure, water vapor, and microphysical processes in the atmosphere; Climate system and interaction among components (atmosphere, oceans, sea, ice and land surface) of climate system and feedback mechanisms; Atmospheric thermodynamics, radiation in the atmosphere, Greenhouse gases and climate forcing; Overview of weather systems: Extreme weather events and Western disturbance.

Module II: Remote Sensing Techniques
Types of remote sensing; Different remote sensing platforms; Principles of Remote Sensing; Radiometer, Lidar, Radar, Sodar, Sonar, Land-atmosphere-ocean satellites; Calibration and validation methods.

Module III: Climatology and Meteorology
Radiation budget and balance; Solar constant; Lapse rate and stability; Water cycle and role in weather; Mechanism of wind development; Fundamental forces (pressure gradient, centrifugal, gravity, Coriolis); Surface winds and upper air circulations; Jet streams; Planetary circulations.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References:

- Marshall J. and plumb R.A.(2001) Atmosphere, Ocean and Climate, Elsevier, Amsterdam
- Climate Change Science: An analysis of some ket questions- National Academy Press, Washington, DC,2001.
- Oliver J.E. and Hidore J.J.(2008) Climatology:An Atmospheric Science, Prentice - Hall
- Atmospheric Thermodynamics by Bohren and Albrecht.
- IPCC(2001 and 2007) Working group I report" The physical basis of climate change"
- Remote Sensing : Principles and Interpretation, by Floyd F. Sabins, 3rd edition (August 1996).
- W H Freeman & Co.; ISBN: 0716724421.
- Remote Sensing and Image Interpretation, by Thomas M. Lillesand, Ralph W. Kiefer, 4th
- edition (October 1999) , John Wiley & Sons; ISBN: 0471255157.
- Remote Sensing : Models and Methods for Image Processing, by Robert A. Schowengerdt, 2nd edition (July 1997), Academic Pr; ISBN: 0126289816.
- Principles of Paleoclimtology, Ed. Thomas M. Cronin, Columbia University, USA.

Syllabus - Semester Second

INTRODUCTION TO EARTH SYSTEM SCIENCE

Course Code: AST2251 **Credit Units: 03**

Course Objectives:
This course embraces chemistry, biology, mathematics and applied sciences in transcending disciplinary boundaries to treat the Earth as an integrated system. Thus, it imparts knowledge to the students with basic understanding of the physico-chemical, biological and human interactions that determine the past, current and future states of the Earth. Earth system science seeks to integrate various fields of academic study to understand the Earth as a system. It considers interaction between the atmosphere, hydrosphere, lithosphere, biosphere and heliosphere.

Further, the Earth System Science program provides students with a fundamental understanding of the oceanographic, atmospheric, and terrestrial sciences. This program of study prepares students for careers in science, research, or technical fields. Students learn to apply basic sciences (physics, chemistry, mathematics, and biology) to understand the major processes and systems governing the Earth's climate, biogeochemical cycles, and global change. Central to the B.S. program is an understanding of relevant scientific literature, methods to collect/analyze data, and interpret results in the context of scientific theory. Students will learn to work collaboratively to understand and address complex problems and communicate scientific knowledge. Through the core course work, students will learn to explain the current and projected future state of the Earth system in the context of past climate change and current human activities.

Course Contents:

Module I: Fundamental Processes in Earth and Environmental Studies
An introduction to the physical environment, biological systems, and human-environmental interactions, Physical principles such as fluid transport and reaction rates using environmental examples as well as principles of populations, ecosystems, carrying capacity, and sustainable use of resources.

Module II: Hurricanes, Tsunamis and other Catastrophes
Introduction to the basic science and state of predictability of various natural catastrophic events such as hurricanes, tsunamis and volcanoes, future climate catastrophes including severe droughts, abrupt climate change, thermohaline circulation collapse and sea level rise.

Module III: Remote Sensing and Geographic Information System (GIS) for Earth System Science
Principles behind remote sensing, and the types of satellite data available for study of the oceans, land, and atmosphere, GIS Brief History, Techniques and Technology, Uncertainties, Spatial Analysis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References:

- The Blue Planet: An Introduction to Earth System Science, 3rd Edition, Brian J. inner, Barbara W. Murck, December 2010, ©201
- Maliene V, Grigonis V, Palevičius V, Griffiths S (2011). "Geographic information system: Old principles with new capabilities". *Urban Design International* 16 (1). pp. 1–6. doi:10.1057/udi.2010.25.
- Goodchild, Michael F (2010). "Twenty years of progress: GIScience in 2010". *Journal of Spatial Information Science*. doi:10.5311/JOSIS.2010.1.2
- Fu, P., and J. Sun. 2010. *Web GIS: Principles and Applications*.ESRI Press.Redlands, CA. ISBN 1-58948-245-X.
- Tim Foresman 1997 The History of GIS (Geographic Information Systems): Perspectives from the Pioneers. (Prentice Hall Series in Geographic Information Science) Prentice Hall PTR; 1st edition (November 10, 1997), 416 p.
- Coppock, J. T., and D. W. Rhind, (1991).The history of GIS. Geographical Information Systems: principles and applications. Ed. David J. Maguire, Michael F. Goodchild and David W. Rhind. Essex: Longman Scientific & Technical, 1991. 1: 21–43."The history of GIS.".Retrieved 2013-12-20.

Syllabus - Semester Third

CLOUD MICROPHYSICS AND CHEMISTRY

Course Code: AST2351 **Credit Units: 03**

Course Objectives:
This course focuses on understanding how transformation of aerosol particles to droplets or ice crystals, heterogeneous chemistry and acid rain, physics of aerosol and cloud element motion, the interaction of particles with water vapor, chemical composition of particles and the effect on cloud formation processes, and the effect of cloud processing on aerosol chemistry, geo-engineering, weather modification and volcanic effects. Thus, it provides the students an insight into one of the important complex drivers of the local/regional/continental/hemispheric/global climate system.

Course Contents

Module I: Basic Cloud Physics
Water vapour and its thermodynamic effects, mixing and convection, formation of cloud droplets, formation and growth of ice crystals, aerosol sources and sizes, condensation and growth of cloud droplets: curvature, Kelvin, solute effects, cloud growth and precipitation, rain, snow and hail processes.

Module II: Microphysical Processes in warm and cold clouds
Cloud condensation nuclei, microstructures of warm clouds, growth of cloud droplets in warm clouds, growth by condensation and collision-coalescence, microphysics of cold clouds, growth by collection, modification of warm and cold clouds, lightning and thunder.

Module III: Cloud and Precipitation Chemistry
Transport of particles and gases, nucleation scavenging, dissolution of gases in clouds droplets, precipitation scavenging, chemical composition of rain, production of aerosols by clouds.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- Atmospheric Science-An Introductory Survey, 2nd Edition, Eds. John M. Wallace and Peter V. Hobbs, University of Washington, 2006, Elsevier Inc.
- The Physics of Clouds, Ed. B.J. Mason, Oxford University Press, Oxford, 1971.
- A Short Course in Physics, Eds. R.R. Rogers and M.K. Yau, 3rd Edition, 1989, Pergamon Press, Oxford.

Syllabus - Semester Fourth

CLIMATE CHANGE: IMPACT, VULNERABILITY AND ADAPTATION

Course Code: AST2451 **Credit Units: 03**

Course Objectives:
This course provides the students with an introduction to the vulnerability of climate change and potential adaptation options of natural as well as social systems. A critical view will be laid on the 'attribution problem', the prioritization of adaptation means, mal-adaptations, the implementation problem, ethical views and conflicts with development goals. Win-win-situations and trade-offs between the latter and climate change adaptation is part of this course too.

Course Contents

Module I: Introduction to the Impacts of Climate Change
Fundamentals of climate system and climate change, brief summary of Inter-Governmental Panel of Climate and Climate Change (IPCC) reports, future directions for mitigation processes.

Module II: Vulnerability
Introduction to the concept, ecological and social systems, coastal vulnerability, methods of evaluation of vulnerability and impacts.

Module III: Adaptation
Introduction to the concept, indicators of adaptation, options and limits of adaptation, food and energy security, autonomous versus planned adaptation, adaptation capacity.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- McMichael, A.J., Cambell-Lendrum, D.H., Corvalan, C.F., Ebi, K.L., Githeko, A.K., Scheraga, J.D., Woodward, A. (Eds.) 2003, Climate change and human helth –Risks and Responses, Geneva, World Health Organization.
- Reckien, D., Hofmann, S., Kit, O., 2009: Qualitative Climate Change Impact Networks for Hyderabad/India. Report from the Project: Hyderabad as a megacity of tomorrow: Climate and energy in a complex transition towards sustainable Hyderabad- Mitigation and adaptation strategies by changing institutions, Governance structures, life styles and consumption patterns. Institute for Climate Research, 2009.
- Roy, J., 2006: The economics of Climate change. A review of studies in the context of South Asia with a special focus on India.
- Jerneck, A., Olsson, L., 2008: Adaptation and the poor, development, resilience and transition, Climate Polity, 8, 170-182.

Syllabus - Semester Fifth

PRIMER OF OCEANOGRAPHY

Course Code: AST2551 **Credit Units: 03**

Course Objectives:
Ocean-related science is relevant to many contemporary environmental issues and problems and central to understanding earth-system evolution, dynamics, climate and sustainability. This course offers a very flexible curriculum that serves students with a broad range of educational and career interests including environmental management and regulation, environmental law. The topics selected for this course, are expected to provide the students with a broad conception of the world's oceans; evaluation of its potential contributions to solution of problems presently confronting mankind.

Course Contents
Module I: Ocean Properties
Introduction to Oceans, physical and chemical properties of ocean water, composition of sea water, salinity and density.
Module II: Physical Oceanography
Thermal expansion of sea water, viscosity, surface tension, heat conduction, adiabatic temperature changes, optical properties, temperature-salinity relationship,
Module III: Bathymetry, Eco Systems and Pollution
Basic definition, oceanic life and ecosystems, measurement techniques, bathymetric chart, fish-zone detection, marine pollution.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- Baker D.J. 1981. Ocean instruments and experiment design. In Evolution of PhysicalOceanography: Scientific Surveys in Honor of Henry Stommel. Edited by B. A.Warrenand C. Wunsch. 396–433. Cambridge: Massachusetts Institute of Technology Press.
- Bennett A.F. 1992. Inverse Methods in Physical Oceanography. Cambridge: UniversityPress.
- Philander S.G. 1990. El Ni˜no, La Ni˜na, and the Southern Oscillation. Academic Press.
- Ahn, YH; Hong, GH; Neelamani, S; Philip, L and Shanmugam, P (2006) Assessment of Levels of coastal marine pollution of Chennai city, southern India. Water Resource Management, 21(7), 1187-1206.
- Daoji, L and Dag, D (2004) Ocean pollution from land-based sources: East China sea. AMBIO – A Journal of the Human Environment, 33(1/2), 107-113.
- Laws, Edward A (2000) Aquatic Pollution John Wiley and Sons. ISBN 978-0-471-34875-7
- Slater, D (2007) Affluence and effluents. Sierra 92(6), 27
- UNEP/GPA (2006) The State of the Marine Environment: Trends and processes United Nations Environment Programme, Global Programme of Action, The Hague. 2006ISBN 92-807-2708-7.
- UNEP (2007) Land-based Pollution in the South China Sea. UNEP/GEF/SCS Technical Publication No 10.

Syllabus - Semester Sixth

FUNDAMENTALS OF CLIMATE VARIABILITY AND MODELLING

Course Code: AST2651 **Credit Units: 03**

Course Objectives:
This course essentially deals with fundamentals of climate variability and its modelling. This knowledge to the students makes them familiar with different types of climate models available not only for prediction purposes but also to undertake sensitivity tests and to simulate the future climate scenarios both regionally and globally.

Course Details

Module I: Climate Variability
Natural variability versus anthropogenic forcing to climate system, climate sensitivity, Greenhouse gases and global warming,

Module II: Climate Drivers
Climate Global distributions of temperature, precipitation, precipitation, climate classification, Natural and external forcings to climate variability,

Module III: Basics of Climate Modelling
Simple energy balance climate models, introduction to coupled ocean-atmosphere models, simple models for predicting climate change and impact assessment.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; CT-Class Test; S/V/Q-Seminar/Quiz/Viva; HA-Home Assignment; EE-End Semester Examination

References

- Climate Change and Climate Modelling, Ed. J. David Neelin, 2011.
- An Introduction to Three-dimensional Climate Modelling, Eds. Warren M. Washington and Clarie L. Parkinson, 2005.

ENVIRONMENTAL HEALTH & CLIMATE

Programme Structure-2021

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
AST2152	Linkages between Environment & Health	3	-	-	3
AST2252	Climate Change and Implications on Public Health	3	-	-	3
AST2352	Diseases in Contemporary Society	3	-	-	3
AST2452	Air, Water and Soil Pollution, Environmental Health Professions	3	-	-	3
AST2552	Ground-based and Satellite Remote Sensing	3	-	-	3
AST2652	Instrumentation Lab	-	-	6	3
	TOTAL				**18**

Background

The program describes health issues, originated by air/water/soil pollution, scientific understanding of causes and possible approaches to mitigate and control the major environmental health problems in automobile/industry sectors of developing countries. Finally, the course addresses the pathways that connect pollution, human health and climate change at local/regional/global scale. Topics illustrate how the human body reacts with environmental pollutants; physicochemical, dynamical and biological agents of environmental contamination; vectors for dissemination (air, water, soil); solid and hazardous waste; susceptible populations; biomarkers, risk analysis and climate change; the scientific basis for policy decisions; and emerging global environmental health problems. This course also emphasizes the feedback mechanisms and pathways that interplay between air pollution, human health and climate parameters over different environments in a cohort hybrid seamless model, emphasizing integrated approach.

Objectives

Advancing Environmental Health and Climate (EHC) encompasses the study of all levels of biological organization, biochemical pathways, population at all stages across the lifespan, and climate change. EHC uses a rich, diverse, and constantly evolving set of outdoor/indoor observational, experimental, computational, and clinical approaches to explore the impacts of varying levels of exposure and susceptibility to such exposure. The support of novel, cutting-edge research approaches, high risk for high reward, and mitigation methods is an important element of the advancing EHC theme in this program.

ENVIRONMENTAL HEALTH & CLIMATE

Syllabus - Semester First

LINKAGES BETWEEN ENVIRONMENT & HEALTH

Course Code: AST2152 **Credit Units: 03**

Course Objectives: To teach students the essential concepts on environment-related health problems, such as asthma and neurological damage from lead exposure, affect children disproportionately. A number of efforts are under way around the nation to educate children about the concepts and principles of environmental health with the goal of expanding science education, empowering children to avoid some adverse environmental exposures, and helping them to grow in to informed citizens who can assess and affect important public health issues.

Course Contents

Module-I: Environment and Public Health
The environment at risk: Converging paradigms for environmental health theory and practice; Understanding linkages between Environment and Public Health: Effect of quality of air, water and soil on health. The Bhopal disaster and its aftermath: are views.

Module II: Human Health Exposure Effects
Ecosystems and Human well-being: Synthesis; Human exposure assessment; Introduction to Bio-monitoring and bio-markers; Exposure assessment; Perspective on Individual health: Nutritional, socio-cultural and developmental aspects, Dietary diversity for good health; Human developmental indices for public health.

Module III: Human Health Risks Assessment
Introduction to environmental hazards and their effects on human health and ecosystems; Health effects of chemical exposure. Known's and unknowns on burden of disease due to chemicals: A systematic review; Cancer-Causing Substances in the Environment. Quantifying selected major risks to health: Selected Occupational risks.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Text books/ References

- Adhikari, S.K., 2019: *A Textbook of Environmental Health*, 1st Edition, ISBN: 9789937710305, Samiksha Publication, 420p.
- Bradford, B. and Gwynne, M.A., 2012: *Down to Earth: Community Perspectives on Health, Development and the Environment*, Kumarian Press Library of Management forDevelopment,ISBN-13:978-1565490505.
- World Health Organization and *United Nations, 2017: Environment Programme Health Environment: Managing the Linkages for Sustainable Development* (Synthesis Report(WHO))1st Edition, ISBN-13: 978-9241563727.
- Kaufmann, R.K. and Cleveland, C.J., 2018: *Earth and Environmental Sciences*, ISBN:978-1-63097-030-7.

Syllabus - Semester Second

CLIMATE CHANGE AND IMPLICATIONS ON PUBLIC HEALTH

Course Code: AST2252 **Credit Units: 03**

Course Objectives: This course intends to educate students about basic principles behind the climate change and public health. Emphasis will be given to how the changes in weather and climate parameters, especially the episodic events influence human health and vice versa.

Course Contents

Module-I: Human Influence on Climate
Global warming- Agricultural practices (chemical agriculture) and Industrial technologies (use of non-biodegradable materials like plastics, aerosols, refrigerants, pesticides); Manifestations of climate change on Public Health-Burning of fossil fuels, automobile emissions and acid rain.

Module-II: Local/ Regional Climate Feedbacks on Human Health
Changes in the greenhouse gas concentrations and other drivers that alter the global climate and bring about myriad human health consequences. Environmental consequences of climate change, such as extreme heat waves, rising sea-levels, changes in precipitation, resulting in flooding and droughts, intense hurricanes, and degraded air quality, affect directly and indirectly the physical, social, and psychological health of humans.

Module-III: Cohort Studies of Weather/ Climate and Health Relationship
Changes in precipitation: availability and quantity of water, underlying extreme weather events such as intense hurricanes and flooding. Climate change: a driver of disease migration, as well as exacerbate health effects resulting from their lease of toxic air pollutants invulnerable populations such as children, the elderly, and those with asthma or cardiovascular disease, Cohort Studies.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Textbooks/ References

- Levy, B.S.and Patz,J.,2015:*ClimateChangeandPublicHealth*,OxfordUniversityPress,405p.
- J. McMichael, D.H. Campbell-Lendrum, C.F.Corvalan, K.L.Ebi, A.Githeko, J.D.Scheraga, A.Woodwar,2015: *Climate Change and Human Health: Risks and Reponses*.
- Patz,J.andLevy,B.S.,2017:*ClimateChangeandAirPollution:TheImpactonHumanHealthin Developed and Developing Countries*, 428p.
- Ebi,K.L.andMenne,B.2006:*ClimateChangeandAdaptationStrategiesforHumanHealth*,
- Ebi,K.L.andMenne,B.,2011:*ModelingtheHealthRisksofClimateChange:WorkshopSummary*
- Ebi,K.L.andMenne,B.2013:*ClimateChangeandHumanWell-Being:GlobalChallengesand Opportunities*

Syllabus - Semester Third

DISEASES IN CONTEMPORARY SOCIETY

Course Code: AST2352 **Credit Units: 03**

Course Objectives: This course deals with different types of diseases including communicable ones that are primarily caused by particulate and gaseous pollutants. Several pollutants and corresponding health problems will be delineated. Necessary precautions required to be taken for reducing the health problems will be explained.

Course Contents

Module-I: Health-Susceptibility Relationship
Need for good health-factors affecting health; Types of diseases-deficiency, infection, pollution diseases-allergies, epidemiological, cardiovascular, COPD including non-smokers and cancer; Personal hygiene-food - balanced diet; Food habits and cleanliness; food adulterants, avoiding smoking, drugs and alcohol, Physiology.

Module-II: Biomarkers and Different Diseases
Stem cells and Immune cells, DNA/RNA, Biological Processes, Spirometry, Communicable diseases: Mode of transmission epidemic and endemic diseases; Management of hygiene in public places - Railway stations, Bus stands and other public places; Infectious diseases: Role of sanitation and poverty case studies on TB, diarrhea, malaria, viral diseases. Non-communicable diseases: Role of Life style and built environment; Diabetes and Hypertension.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Textbooks/ References

- Broer,T.,2014: Putting an ameto it: diagnosis in contemporary society, *Disease Control Prioritiesin Developing Countries.*2nd edition,352p.
- Weather all, D., Greenwood, B., Chee, H.L. and Wasi, P., 2015: *Science and Technology for Disease Control: Past, Present, and Future.*
- Barkan,S.E., 2017: *Health, Illness, and Society: An Introduction to Medical Sociology*, Rowman & Little field Publishers, ISBN: 9781442234994.

Syllabus - Semester Fourth

AIR, WATER AND SOIL POLLUTION, ENVIRONMENTAL HEALTH PROFESSIONS

Course Code: AST2452 **Credit Units: 03**

Course Objectives: This course will provide students with an understanding and appreciation of the complex interactions between microbial air, water and soil quality and human health. The broad objectives of this course cover (i) impact of both primary and secondary (gas-to-particle conversion) particles on morbidity and mortality of human health and pre-mature deaths, (ii) howthequalityofwaterisaffectedbynatural,seasonal,accidental,intentionalandman-madeactivities, (ii) how the contaminated water increases the burden of human diseases with particular emphasis on infectious diseases, (iii) Industrial processes including mining and manufacturing that lead to cause of soil pollution.

Course Contents

Module-I: Interface Between Indoor and Outdoor Pollution
Indoor and outdoor air pollutants; sources and effects of pollutants in the atmospheric environment; Particulate matter and atmospheric visibility; Atmospheric diffusion theories and types of dispersion models; Lapse rates and various types of stability classification; Wind profile; Wind roses; Mixing depth.

Module-II: Air Pollution and Emission Inventory
General characteristics of the stack plumes; Dispersion of pollutants in the atmosphere and solution of advection diffusion equation with Gaussian distribution for point, line and area sources; plume rise; dispersion parameters and various methods of their evaluation; Atmospheric Removal processes and residence time; Effect of buildings and topography on dispersion; Similarity theory and profiles in the surface layer; Air Quality and Emission standards, their measurements and statistics; Air quality and environmental health.

Module-III: Water Pollution and Purification
Understanding of the significance of the environment for human health; Human population pressures and pollution dynamics; Common terms and definitions in water quality; Aquatic resources of the world & Sources of drinking water -Common contaminants of drinking water and linkages to disease; Non-point source pollution.

Module-IV: Soil Pollution-Causes and Mitigation
Soil contamination from abandoned industrial sites; Ants in to the environment, Improper disposal of house hold waste; Garbage and personal waste that leaks from sewer systems; pollution due to aged waste decompose; pollution due to plastic products like water bottles, bags and diapers. Risings use of chemicals in agriculture; toxic soil issues from industries and agricultural activities; contributions from pesticides and fertilizers, Increase in toxicity and reduction in fertility.

Examination Scheme

Components	CT	CT/H/P/V/Q	CT	A	EE
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Textbooks/ References

- Maynard,R.,Stephen,H.,Koren,Samel,J.(Editors)1999:*AirPollutionandHealth*,ISBN:978012352358, AcademicPress, 1065p.
- Daniel,V.,2 014: *Fundamentals of Air Pollution*,5th Edition,ISBN:9780124017337, Academic Press, 996p.
- Robert, F.P. Phalen, Phalen,R.N.Robert N.Phalen, 2013:*Introduction to Air Pollution Science: A Public health Perspective*, 331p
- Blumenthal, D. S., and Ruttenber, A. J. (1995). Introduction to environmental health. Second Edition. New York: Springer.
- Friis, Robert H. 2007:Essentials of Environmental Health. Jones and Bartlett, MA,390 p.
- Frumkin, Howard 2005 Environmental Health: From Global to Local, Jossey-Bass, San Francisco, CA, 1108 p.
- Gasana J., 2003, Essentials of Environmental Health Management. Aglob Publishing, Hallandale Beach, FL.749p.
- Yassi, A.,Kjellstrom, T., deKok,T., Guidotti,T.L.(2001).Basic environmental health. New York: Oxford University Press.

Syllabus - Semester Fifth

GROUND-BASED AND SATELLITE REMOTE SENSING

Course Code: AST2552 **Credit Units: 03**

Course Objectives: The course will make the students aware about various passive and active remote sensing sensors and techniques used now-a-days for observing the weather and climate system. The lectures will focus on the fundamentals of retrievals of various geophysical parameters and interpretation of remote sensing data.

Course Contents

Module-I: Aerial Mapping
Introduction & history to Aerial Photography; vantage points, vertical & oblique aerial photography; Planning; Elements of visual image interpretation; Geometry of aerial photography, photogrammetry; Relief displacement; Stereos copy; Parallax.

Module-II: Multi-Platform Remote Sensing
Definition, history; Electromagnetic radiation, atmospheric windows, atmospheric bands; Orbits sun-synchronous, geo-synchronous; Resolution spectral, spatial, radiometric, temporal; Multispectral & Hyper spectral remote sensing; Satellite remote sensing missions; Active &Passive remote sensing, RADAR, LIDAR; Applications – soil, water, vegetation, air, urban landscape.

Module-III: Geographical Information System (GIS)
Introduction to GIS, Management of data, GIS as DBMS, Data types – vector & raster, Data manipulation and analysis; Components of GIS; Structure of GIS; Digital Elevation Models; Triangulated Irregular Network; GIS applications; Global Positioning System.

Examination Scheme

Components	**CT**	**CT/H/P/V/Q**	**CT**	**A**	**EE**
Weightage(%)	7	10	8	5	70

CT: Class Test, H: Home Assignment, P/V/Q: Presentation/Viva/Quiz, A: Attendance, EE: End Semester Examination

Suggested Textbooks/ References:

- Kenneth Bowman(Editor), *Satellite Meteorology and Atmospheric Remote Sensing: An Introduction 1st Edition*, Ping Yang (Author), 2015, Wiley-VCH Publishers
- B C Panda, *Remote Sensing: Principles and Applications*, 2008.

Syllabus - Semester Sixth

INSTRUMENTATION LAB

Course Code: AST2652 **Credit Units: 03**

Course Objectives: This course essentially deals with different experimental methods, data acquisition and retrieval algorithms being used in environmental pollution, Health risks and Climate Change studies. Special emphasis will be given to the students to get familiarized with latest advancements in ground-based and satellite remote sensing techniques.

Course Content

High Volume Sampler; AAS (Atomic Absorption Spectroscopy); ICPMS (Inductively Coupled Plasma Mass Spectrometry); HPLC (High-Performance Liquid Chromatography); GC/IC (Gas and Ion Chromatography),Sun-Sky Radiometers; Real-Time EC-OC Analyzers; RADAR, LIDAR, SODAR and SONAR; Satellite Remote Sensing Techniques.

Examination Scheme

IA				**EE**	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA–Internal Assessment, EE-External Exam, PR-Performance, LR-Lab Record, V– Viva.

Suggested Textbooks/ References

- Bernstein, D.M. et al., 1976: A High-Volume Sampler for the Determination of Particle Size Distributions in Ambient Air, *Journal of the Air Pollution Control Association*, 26(11),DOI:10.1080/00022470.1976.10470362.
- Tsao, R. and Yang, R., 2003: Optimization of a new mobile phase to know the complex and real poly phenolic composition: towards a total phenolic index using high- performance liquid chromatography, *Journal of Chromatography*, 1018,29-40.
- Kumar, S., Devara, P.C.S., Dani, K.K., Sonbawne, S.M. and Saha, S.K., 2011:Sun- sky radiometer derived column -integrated aerosoloptical and physical properties over atropical urban station during 2004–2009,*Journal of Geophysical Research (Atmospheres)*,doi.org/ 10.1029/ 2010 JD014944
- Brown, S. et al., 2019: Review of Sunset OC/EC instrument measurements during the EPA's Sunset evaluation Project, *Atmosphere*, 10,287.
- Armando, D., Anabela, C. and Teresa, R-S., 2017: *Soil Pollution*, 1st Edition, ISBN: 9780128498729, AcademicPress, 327p.

ENVIRONMENTAL MANAGEMENT

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (16)
ENV2151	Environmental Studies-I *	2	0	0	2
ENV2251	Environmental Studies-II *	2	0	0	2
ENV2152	Environmental Studies *	4	0	0	4
ENV2252	Environmental Studies *	4	0	0	4
ENV2351	Environmental Pollution and Waste Management	3	0	0	3
ENV2451	Environmental Management and Industrial Safety	3	0	0	3
ENV2551	Environmental Economics and Globalization	3	0	0	3
ENV2651	Sustainable Development Practices	3	0	0	3

(* Environmental Studies is mandatory for all undergraduate courses and is taught in three different schemes during first year)

ENVIRONMENTAL MANAGEMENT

Syllabus - Semester First

ENVIRONMENTAL STUDIES-I

Course Code: ENV2151 **Credit Units: 02**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References:

- Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha, E., The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India.
- Brunner, R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
- Cunningham, W.P., Cooper, T.H., Gorhani, E.& Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- De, A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R).
- Gleick, H.P., 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford University Press, 473p.
- Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
- Heywood, V.H.& Waston, R.T., 1995, Global Biodiversity Assessment, Cambridge University Press, 1140p.
- Jadhav, H.& Bhosale, V.M., 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M., 1996, Environmental Science Systems &Solutions, Web enhanced edition, 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB).
- Miller, T.G., Jr. Environmental Science, Wadsworth Publishing Co. (TB).
- Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
- Rao, M N. & Datta, A.K., 1987,Waste Water treatment, Oxford & IBH Publ. Co. Pvt. Ltd., 345p.
- Sharma, B.K., 2001, Environmental Chemistry. Geol Publ. House, Meerut.
- Survey of the Environment, The Hindu (M).
- Townsend, C., Harper, J., and Michael Begon, Essentials of Ecology, Blackwell Science.
- Trivedi, R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).

Syllabus - Semester Second

ENVIRONMENTAL STUDIES-II

Course Code: ENV2251 **Credit Units: 02**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: Environnemental Pollution
Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.
Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module II: Social Issues and the Environment
From unsustainable to sustainable development, Urban problems related to energy
Water conservation, rain water harvesting, and watershed management
Resettlement and rehabilitation of people, its problems and concerns, case studies
Environmental ethics: issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module III: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes, Environment and human health
Human Rights, Value education, HIV/ AIDS, Women and child welfare
Role of information technology in environment and human health, Case studies

Module IV: Field Work
Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain
Visit to a local polluted site – urban / rural / industrial / agricultural
Study of common plants, insects, and birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References:

- Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha, E., The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India (R).
- Brunner, R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
- Cunningham, W.P., Cooper, T.H., Gorhani, E.& Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- De, A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R).
- Gleick, H.P., 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p.
- Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
- Heywood, V.H.& Waston, R.T., 1995, Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H.& Bhosale, V.M., 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M., 1996, Environmental Science Systems &Solutions, Web enhanced edition, 639p.
- Mhaskar, A.K., Matter Hazardous, Techno-Science Publication (TB).
- Miller, T.G., Jr. Environmental Science, Wadsworth Publishing Co. (TB).
- Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
- Rao, M.N. & Datta, A.K., 1987,Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma, B.K., 2001, Environmental Chemistry. Geol Publ. House, Meerut.
- Survey of the Environment, The Hindu (M).
- Townsend, C., Harper, J., and Michael Begon, Essentials of Ecology, Blackwell Science.
- Trivedi, R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).
- Trivedi, R.K. and Goel,P.K., Introduction to air pollution, Techno-Science Publication (TB).
- Wanger, K.D., 1998, Environnemental Management,W.B. Saunders Co. Philadelphia, USA 499p.

Syllabus - Semester First / Second

ENVIRONMENTAL STUDIES

Course Code: ENV2152 / ENV2252 **Credit Units: 04**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of

biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Module V: Environnemental Pollution
Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.
Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module VI: Social Issues and the Environment
From unsustainable to sustainable development, Urban problems related to energy
Water conservation, rain water harvesting, and watershed management
Resettlement and rehabilitation of people, its problems and concerns, case studies
Environmental ethics: issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module VII: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes, Environment and human health
Human Rights, Value education, HIV/ AIDS, Women and child welfare
Role of information technology in environment and human health, Case studies

Module VIII: Field Work
Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain
Visit to a local polluted site – urban / rural / industrial / agricultural
Study of common plants, insects, and birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text &References:

- Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha, E., The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India (R).
- Brunner, R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
- Cunningham, W.P., Cooper, T.H., Gorhani, E.& Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- De, A.K., Environmental Chemistry, Wiley Eastern Ltd.
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- Gleick, H.P., 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p.
- Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
- Heywood, V.H.& Waston, R.T., 1995, Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H.& Bhosale, V.M., 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M., 1996, Environmental Science Systems &Solutions, Web enhanced edition, 639p.
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- Miller, T.G., Jr. Environmental Science, Wadsworth Publishing Co. (TB).
- Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
- Rao, M.N. & Datta, A.K., 1987,Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma, B.K., 2001, Environmental Chemistry. Geol Publ. House, Meerut.
- Survey of the Environment, The Hindu (M).
- Townsend, C., Harper, J., and Michael Begon, Essentials of Ecology, Blackwell Science.
- Trivedi, R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).
- Trivedi, R.K. and Goel,P.K., Introduction to air pollution, Techno-Science Publication (TB).
- Wanger, K.D., 1998, Environnemental Management,W.B. Saunders Co. Philadelphia, USA 499p.

Syllabus - Semester Third

ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT

Course Code: ENV2351 **Credit Units: 3**

Course Objective:
The growing pressure on natural resources and the progressive increase in the production of waste poses serious challenges for our society. Waste production and management play a central role in environmental policy. The production of industrial and urban waste has exploded during the last ten years. From a modern viewpoint, waste is to be considered a lost resource and, hence, it is a manufacturing cost variable that must be optimized with both direct costs and the cost to society in mind. Since it is not possible to avoid the production of waste, the main objective in order of importance is to try to reduce it to a minimum.

Course Contents:
Module I: Water pollution – sources, types, and effect of water pollutants, water quality standards, algal bloom, eutrophication, biomagnification/ bioaccumulation, water pollution control - primary, secondary and tertiary wastewater treatment; **Soil Pollution** – soil pollutants – types, sources, effects, and control.

Module II: Air pollution – structure and composition of atmosphere, classification, sources and effects of air pollutants, air pollution control - particulate and gaseous emission control methods; acid rain, green house effect, global warming, ozone depletion, smog, climate change, **Noise Pollution** – sources, effects, and control.

Module III: Waste management: Methods of waste collection, storage, and transportation, treatment and disposal techniques for solid waste: landfill operation and maintenance, composting: advantages and limitations, vermin-composting, autoclaving, incineration, biogas plant, techniques for hazardous waste treatment and safe disposal, nuclear and e-waste management, Government agencies and programs: NCEPC, MoEFCC, CPCB and SPCB's.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination.

Syllabus - Semester Fourth

ENVIRONMENTAL MANAGEMENT AND INDUSTRIAL SAFETY

Course Code: ENV2451 **Credit Units: 03**

Course Objective:
The course will give an overview of the safety and environmental issues in the industry. It will provide detailed understanding of the methods and techniques to resolve these key issues for making production and processing cleaner and safer. This course would educate students to identify and assess hazards in any stage of operation, to quantify and manage them as well. This course will also highlight lessons learnt from the past accidents. The aims of this course are: to create awareness for quality of life protection, health and environmental safety, occupational hazards.

Course Contents:
Module I: Public health: definition, need for good health, factors affecting health, communicable diseases, mode of transmission (epidemic and endemic diseases), management of hygiene in public places, occupational health hazards and safety (physical, chemical and biological), health protection measures for workers- health education, first aid, management of medical emergencies.

Module II: Industrial safety and management techniques: industrial safety standards and regulations, accidents – definition, prevention and control, risk analysis and assessment, safety cost and expenses.

Module III: Safety management system - environmental management systems (EMS) ISO 14000 and 14001, OSHA and NIOSH, compensation act, public liability insurance act, mining act, good manufacturing practices (GMP) and good laboratory management practices (GLP).

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Syllabus - Semester Fifth

ENVIRONMENTAL ECONOMICS AND GLOBALIZATION

Course Code: ENV2551 **Credit Units: 03**

Course Objective:
Environmental issues such as pollution, climate change and the conservation of biodiversity are currently in the headlines of economic debate. Economic analysis of the environment is challenging precisely because environmental value is not always conveniently revealed in a market, and thus is subject to inappropriate use. The major topics addressed in this field of study are: the causes of environmental degradation, the need to re-establish the disciplinary ties between ecology and economics, the difficulties associated with assigning ownership right to environmental resources, the trade-off between environmental degradation and economic goods and services, assessing the monetary value of environmental damage etc.

Course Content:

Module I: Introduction: definition and scope of environmental economics, economics and environment, environment inter-linkages, market failure and externality, accounting for the environment.

Module II: Resource economics: natural resources: types and classification, economics of natural resources exploitation, market structure and the exploitation of non-renewable resources, methods of valuation of environmental costs and benefits.

Module III: Economics & Environmental Management: WTO and international trade, environmental trade barriers, natural resource accounting, environmental communication, GRI reports, green marketing, eco-labeling, pollution control: basic approach to environmental policy and management, pollution tax: effluent charges and subsidies.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Syllabus - Semester Sixth

SUSTAINABLE DEVELOPMENT PRACTICES

Course Code: ENV2651 **Credit Units: 03**

Course Objective
Finding approaches to development that balance economic and social progress, address cultural differences, and respect ecological values and limits is the key to sustainable development. Moving towards this goal requires fundamental changes in human attitudes and behavior in our personal lives, in our community activities, and in our places of work. The success in this regard is critically dependent on education and training. This course will imbue students with respect for the conservation and sustainable use of resources, social equity, and appropriate development along with competencies to practice sustainable tasks at the workplace of today and tomorrow.

Course Content:

Module I: Introduction: Environment, sustainable development and globalization, millennium development goals, regional perspectives, challenges and environmental issues in India, sustainable development and Indian development policies, local environmental management and legislation.

Module II: Climate change and sustainable development: Climate change and sustainable development, climate change and forest management, sustainable consumption, strategies and issues, international environmental agreements and climate change, international environmental agreements and climate change.

Module III: Writing on environment: Environmentalism, environmental journalism and activism, media for environment, conventions and science article styles, fact-checking with sources, research and publication, green peace movement, UNEP, UNCED, WBCSD, WWF, WRI, GRI, and World Bank.

Examination Scheme:

Components	**D**	**P**	**A**	**EE**
Weightage(%)	15	10	5	70

D: Dissertation, P: Publication, A: Attendance EE: End Semester Examination

ENVIRONMENTAL MANAGEMENT

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (16)
ENV2151	Environmental Studies-I *	2	-	-	2
ENV2251	Environmental Studies-II *	2	-	-	2
ENV2152/ ENV2252	Environmental Studies *	4	-	-	4

(* Environmental Studies is mandatory for all undergraduate courses and is taught in three different schemes during first year)

ENVIRONMENTAL MANAGEMENT

Syllabus - Semester First

ENVIRONMENTAL STUDIES-I

Course Code: ENV2151 **Credit Units: 02**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References:

- Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha, E., The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India.
- Brunner, R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
- Cunningham, W.P., Cooper, T.H., Gorhani, E.& Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- De, A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R).
- Gleick, H.P., 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security, Stockholm Env. Institute, Oxford University Press, 473p.
- Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
- Heywood, V.H.& Waston, R.T., 1995, Global Biodiversity Assessment, Cambridge University Press, 1140p.
- Jadhav, H.& Bhosale, V.M., 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M., 1996, Environmental Science Systems &Solutions, Web enhanced edition, 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB).
- Miller, T.G., Jr. Environmental Science, Wadsworth Publishing Co. (TB).
- Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
- Rao, M N. & Datta, A.K., 1987,Waste Water treatment, Oxford & IBH Publ. Co. Pvt. Ltd., 345p.
- Sharma, B.K., 2001, Environmental Chemistry. Geol Publ. House, Meerut.
- Survey of the Environment, The Hindu (M).
- Townsend, C., Harper, J., and Michael Begon, Essentials of Ecology, Blackwell Science.
- Trivedi, R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).

Syllabus - Semester Second

ENVIRONMENTAL STUDIES-II

Course Code: ENV2251 **Credit Units: 02**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: Environnemental Pollution
Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.
Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module II: Social Issues and the Environment
From unsustainable to sustainable development, Urban problems related to energy
Water conservation, rain water harvesting, and watershed management
Resettlement and rehabilitation of people, its problems and concerns, case studies
Environmental ethics: issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module III: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes, Environment and human health
Human Rights, Value education, HIV/ AIDS, Women and child welfare
Role of information technology in environment and human health, Case studies

Module IV: Field Work
Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain
Visit to a local polluted site – urban / rural / industrial / agricultural
Study of common plants, insects, and birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

Text & References:

- Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha, E., The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India (R).
- Brunner, R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
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- De, A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R).
- Gleick, H.P., 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p.
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- Trivedi, R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R).
- Trivedi, R.K. and Goel,P.K., Introduction to air pollution, Techno-Science Publication (TB).
- Wanger, K.D., 1998, Environnemental Management,W.B. Saunders Co. Philadelphia, USA 499p.

Syllabus - Semester First / Second

ENVIRONMENTAL STUDIES

Course Code: ENV2152 / ENV2252 **Credit Units: 04**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour, growth, development, and maturity of living organisms. At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential for handling environmental disasters and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness

Module II: Natural Resources - Renewable and non-renewable resources
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem: Structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids, introduction, types, characteristic features, structure and function of the following ecosystems:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of

biodiversity, threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, endangered and endemic species of India, conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Module V: Environnemental Pollution
Definition, causes, effects, and control measures of: air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, and nuclear pollution.
Solid waste management: causes, effects and control measures of urban and industrial wastes, role of an individual in prevention of pollution, pollution case studies, disaster management: floods, earthquake, cyclone, and landslides.

Module VI: Social Issues and the Environment
From unsustainable to sustainable development, Urban problems related to energy
Water conservation, rain water harvesting, and watershed management
Resettlement and rehabilitation of people, its problems and concerns, case studies
Environmental ethics: issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

Module VII: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes, Environment and human health
Human Rights, Value education, HIV/ AIDS, Women and child welfare
Role of information technology in environment and human health, Case studies

Module VIII: Field Work
Visit to a local area to document environmental assets-river/ forest/ grassland/ hill/ mountain
Visit to a local polluted site – urban / rural / industrial / agricultural
Study of common plants, insects, and birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance, EE: End Semester Examination

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- Clark, R.S., Marine Pollution, Clanderson Press Oxford (TB).
- Cunningham, W.P., Cooper, T.H., Gorhani, E.& Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- De, A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R).

- Gleick, H.P., 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p.
- Hawkins, R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
- Heywood, V.H.& Waston, R.T., 1995, Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
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- Miller, T.G., Jr. Environmental Science, Wadsworth Publishing Co. (TB).
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- Rao, M.N. & Datta, A.K., 1987,Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Science - Environmental Science & Management

Syllabus - First Semester

Course: Ecology and Ecosystem Dynamics **Credit : 3**
Semester: I **Course code : ENV4101**

Course objective: The course will lead the students through different levels of the living world starting from ecological principles, parameters and analytics to organisms, continuing through populations and introducing finally communities and ecological succession. Structure, function, and process of ecological sciences are main components of this course.

Module I: Ecosystem: Earth as a life support system, components and organization, limiting factors, Laws of limiting factors – Liebig's law of minimum, Shelford's law of tolerance, adaptation, habitat and niche, Keystone species; population parameters - structure, growth regulation, interactions between populations, life history strategies (r and k species), concept of carrying capacity; Growth Model (Prey-Predator, Lotka- Voltera, Leslie's matrix model); Soil: types, composition, and formation, soil origin, texture, horizons and profile, soils of the world and India.

Module II: Ecosystem analysis: Synecology, species area relations, methods of sampling, community coefficients, association analysis, ecological succession, succession models and concept of climax; Human population dynamics, Human ecology.

Module III: Framework of ecosystem: Structure and function of ecosystems, productivity, decomposition, energy flow, ecological efficiency, global pattern of productivity, biogeochemical cycling (pool, fluxes, and residence time), major biomes of India and the world, ecosystem services: scope, application, model, and case studies.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Odum, Eugene P., and Gary W. Barrett. 2007. Fundamentals of Ecology, 5th edition, Thomson Brooks /Cole
2. Primack, Richard B. 2010.Essentials of Conservation Biology, 5th edition. Sinauer Associates, Sunderland, Ma, USA
3. Ecology and field biology - R.L.Smith
4. Begon, M., Townsend, C. R., and Harper, J. L. *Ecology from Individuals to Ecosystems.* Wiley-Blackwell, USA. 2005.

Course: Earth System Sciences **Credit : 3**
Semester: I **Course code : ENV4102**

Course objective: The purpose of the course is to develop a holistic understanding of earth as a system. It attempts to illustrate the reasons for why things happen in nature, the way they happen and how humans have adapted and influenced the natural processes. The course will have application in ecosystem management, conservation and understanding of environmental hazards through in-depth understanding of earth processes. It provides vital inputs to grasp the concept of sustainable development in context of global and regional level.

Module I: The Universe: concepts and origin of solar system and planets, shape and size of the Earth - structure and composition of Earth's interior and surface, plate-tectonic processes**,** weathering and erosional processes, Earth processes, geological cycle, tectonic cycle, and rock cycle.

Module II: Marine environment: Coastal environment, coastal erosion, and stabilization, relief of the ocean floor, origin, and chemical composition of sea water, vertical and horizontal distribution of temp and salinity, waves and tides, ocean currents, Global distribution of major ocean currents, sea level change and its impact on coastal areas.

Module III: Physiography of India: Environmental setting of India**:** Structure and relief, drainage system, and watersheds, Rainfall patterns, floods and droughts. India's agriculture (Types, cropping pattern, green revolution and food security), land use planning in India.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination

Books Suggested:

1. Carla Montgomery (2011) Environmental Geology, McGrew Hill, Ryerson
2. Edward A.Keller (9th edition) Environmental Geology, Prentice Hall, USA9th
3. Tom Garrison (2011) Essential of Oceanography, Brooks/Cole CENGAGE learning.
4. Press F. &Siever R. Understanding Earth 9th edition, W. H. Freeman; 4 edition (July 17,2003)

Course: Environmental Biology **Credit : 2**
Semester: I **Course code : ENV4103**

Course objective: The purpose of the course is to focus on the contribution of microbial ecology in the management, restoration, and sustainability of the biosphere. The role of microbial communities in ecosystem both in natural and managed ecosystems, and their influence on environmental quality and sustainability will be discussed in detail. The objective of the course would be to review the role of microbial communities and their processes in order to conserve and restore the ecosystem

Module I: Environmental Biochemistry: Proteins - biologically important proteins, biological functions of proteins, Nucleic acids – DNA, RNA, biological functions of nucleic acids, biochemical degradation of pollutants, bioconversion of pollutants.

Module II: Environmental Microbiology: Microbes in agriculture - biological nitrogen fixation, bio-fertilizers, mycorrhiza; Food microbiology - micro-organisms in food production, food poisoning and its prevention; Classification, characteristics, occurrence and ecological significance of microorganisms, photoautotrophs, chemoautotrophs, chemolithotrophs, organotrophs; Soil microorganisms and their interactions, microbial toxins, Microbial diseases of plants and their effects on the ecosystem.

Module III: Microbial Process & Applications: Microflora of atmosphere - sampling techniques, identification of aeroallergens, airborne diseases, and allergies, microbes, and pollution abatement, Environmental biotechnology: introduction, genetic engineering, and its applications, Gene-Bank, Tissue culture, Fermentation, Enzyme technology.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Fundamentals of Ecology: E. P. Odum
2. Botany: A. C. Dutta; Oxford University Press, Calcutta
3. Aquatic Ecosystems: Kumar, APH Publications
4. Microbiology 6th Ed: Purohit, Agrobios
5. Global environmental Biotechnology: D. L. Wise
6. Methods in Biotechnology: Hans Peter Schmauder

Course: Chemistry of Environment **Credit : 3**
Semester: I **Course code : ENV4109**

Course objective: The course is designed to make the student understand various aspects of chemistry which are significant to environmental science and get knowledge of various analytical techniques required for research. An understanding about various types of pollution, their control measures and emerging trends will also be achieved. The course will also give an idea about impact of pollution on the environment and health.

Module I: Environmental Chemistry: Concept and scope, Gibb's free energy, chemical potential, phase equilibrium, stochiometry, acid base reactions, Solubility and solubility product, The carbonate system, solutions: normality, molality, and molarity.

Module II: Air and Water Chemistry: Properties of water**,** water quality parameters: Physical, Chemical & Biological parameters, composition of seawater and physico -chemical speciation in oceans, pesticides in water; Chemical composition of atmosphere; Photochemistry of atmosphere; Chemistry of particulate matter, ozone, aerosols, photochemical smog, and acid rain.

Module III: Soil and Toxic Chemicals Chemistry: Chemical composition of Soil; Cation exchange capacity of soil, acid-base, and ion-exchange reactions in soil; Acidity, Salinity and Alkalinity in Soil; Biochemical aspects of arsenic, cadmium, lead, mercury, carbon monoxide, O_3, PAN, pesticides, insecticides**,** and MIC, carcinogens in the air, PAH's, PCB's, dioxins, and dibenzo furans; Chemistry of hydrocarbon decay and green chemistry.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Masters G.M. (2004) Introduction to Environmental Engineering and Science, 2nd Edition, PearsonEducation.
2. Buell P. and Girard J. (2002) Chemistry Fundamentals: An Environmental Perspective (2nd edition), Jones & Bartlett Publishers.
3. Cunningham W.P. and Cunningham M.A. (2007) Principles of Environmental Science: Inquiry and Applications, TataMcGraw-Hill.
4. Miller G.T. (2001) Environmental Science, (eighth edition),Brooks/Cole.
5. Pepper I.L., GerbaC.P. andBrusseauM.L. (2006) Environmental and Pollution Science, (2nd edition) AcademicPress.
6. Fundamentals of Environmental Chemistry:-Stanley E.Manahan.

Course: Environmental Physics & Energy **Credit : 3**
Semester: I **Course code : ENV4110**

Course objective: The aim of this course is to facilitate the students with the concepts of energy and various renewable and non-renewable resources. A general idea of the production and utilization scenario with respect to energy resources and its impact on environment will be dealt with. The significance of energy in Indian scenario and possible alternatives would be overviewed with a brief study of policy prospective of energy sectors.

Module I: Environmental Physics: Thermodynamics: Energy, Entropy laws, Heat Transfer, Thermal conductivity, diffusivity; Fourier's equation for heat conduction - its solution for rectilinear and radial (spherical and cylindrical) flow of heat, Matter and Energy Exchange, Basic assumptions of kinetic theory, Ideal gas approximation, deduction of perfect gas laws, Black- Body Radiation, Energy Budget of Earth and associated processes.

Module II: Non Renewable Energy Sources: Fossil fuels (coal, oil and natural gases): Classification, reserve and geographical distribution; Environmental impact of production and consumption of fossil fuels; Hydrocarbons: formation, reserves, production, refining, and transport of petroleum products.

Module III: New/ renewable Energy Sources: Production, consumption, and potential, Solar Spectrum, solar thermal energy, solar photovoltaic, hydroelectricity, tidal power, wind energy, geothermal energy, OTEC, fuel cell (hydrogen fuel cell, metal hydrate fuel cell, and microbial fuel cell), Biomass and Bio fuels; Nuclear energy: chemistry, feasible material, nuclear reactors, nuclear fuel cycle, and environmental issues, current potential, achievements, and future prospects of renewable energy, Energy conservation policies.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Tiwari, G.N. and M. K. Ghosal. 2005. Renewable Energy Resources: Basic Principles and Application, Narosa Publishing.
2. Ginley, David S., and David Cahen. 2011. Fundamentals of Materials for Energy and Environmental Sustainability. Cambridge.
3. Master, Gilbert M. 2004.Renewables and Efficient Electric Power Systems. John Wiley and Sons.
4. Boyle, Godfrey. 2004. Renewable Energy, 2nd Edition. Oxford University Press.
5. Twidell, I. John and Tony Weir. 2007. Renewable Energy Resources. Taylor and Francis Group.

Course: Basic Mathematics **Credit : 2**
Semester: I **Course code : ENV4111**

Course objective: The basic purpose of the course is to teach basic mathematics for its application in a broad range of environmental science subfields. Derivatives and integrals, ordinary and partial differential equations, and linear and non- linear algebraic equations are the various topics to be taught.

Module I: Algebra: Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation -Simple problems; Theory of equations: Polynomial Equations with real Coefficients - Irrational roots, Complex roots, Transformation of equation by increasing or decreasing roots by a constant, Reciprocal equations, Newton's method to find a root approximately, Simple problems.

Module II: Matrices: Symmetric, Skew-Symmetric, Orthogonal, and Unitary matrices, Rank of a matrix, Consistency of equations, Eigen roots and eigen vectors, Cayley-Hamilton theorem (without proof), Verification and computation of inverse matrix; Trigonometry: Expansions of sin θ, cos θ, tan θ in terms of θ, Hyperbolic and inverse hyperbolic functions, Logarithms of complex numbers.

Module III: Differential Calculus: n-th derivatives: Leibnitz theorem (without proof) and applications, Jacobians, Concepts of polar co-ordinates, Curvature, and radius of curvature in Cartesian co-ordinates.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Mackenzie A. (2005) Mathematics and Statistics for Life Scientists, Taylor & Francis, New York.
2. Parkhurst D.F. (2006) Introduction to Applied Mathematics for Environmental Science, Springer, New York.

Course: Analytical Laboratory I **Credit : 3**
Semester: I **Course code : ENV4107**

1. Determination of minimum size of quadrat for community study.
2. Determination of density, frequency, abundance, and dominance of plant species using quadrat method.
3. Calculation of the Importance Value Index (IVI) of species.
4. Study of ecological adaptation of Hydrophytes and Xerophytes
5. Determination of hardness (Ca, Mg, and total) and alkalinity of water.
6. Determination of total dissolved solids (TDS) in waste water
7. Determination of residual chlorine in water sample.
8. Determination of Dissolved Oxygen (DO) of wastewater.
9. Determination of Biological Oxygen Demand (BOD) of waste water.
10. Determination of Chemical Oxygen Demand (COD) of waste water.
11. Visit of wastewater treatment plant to understand various unit operations.

Books Suggested:

1. Misra, R. (1968) Ecology Workbook, Oxford &IBH Publications Co., New Delhi.
2. American Public Health Association (2012) Standard Methods for Examination of Water and Wastewater, APHA, AWWA, WPCF, American Public Health Association Inc., Springfield, New York.
3. Maiti, S.K. (2003) Hand Book of Methods in Environmental Studies, Vol. I & II, ABD Publishers, Jaipur.

Course: Term Paper/ Seminar **Credit : 1**
Semester: I **Course code : ENV4131**

Objectives:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper/ seminar is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking examination and analysis of various aspects of environmental issues at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper/ seminar is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

a) Choosing the topic: contemporary issue and will be given by the department
b) Finding relevant materials
c) Presentation: before the commencement of Semester examinations
d) Response to queries
e) Submission of the write-up

Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Examination Scheme:

Organisation and Relevance of Content	Literature Review	Bibliography	Presentation	Response to the Queries	Total
30	10	10	40	10	100

Course: Pollution Control and Management **Credit : 3**
Semester: II **Course code : ENV4201**

Course objective: The course aims at giving detailed knowledge about different pollution control and management strategies. The course will also deals with the sources of pollution in air, soil, water, soil, and also noise and their impact on the environment and health.

Module I: Air Pollution and Control: Air pollution: types of pollutants, sources and effects, ambient air quality standards, wind rose; control methods and devices: particulate matter control: wall collection devices, gravity settlers, centrifugal separators, electrostatic precipitators, dividing collection devices: surface filters, depth filters, scrubbers; gaseous contaminants control: absorption, adsorption, combustion, and condensation; Basic air pollution modeling i.e. Gaussian Plume Model and Box Model.

Module II: Waste Water Treatment: Water pollution: types of pollutants, sources, and effects, water quality parameters and standards, segregation, neutralization; Physical methods: sedimentation, coagulation and flocculation, filtration, and sludge dewatering; Chemical methods: disinfection, removal of hardness, fluoride, arsenic, chromium, iron, and manganese, removal of nitrogen and phosphorus; biochemical methods: aerobic and anaerobic treatment, septic tank, Imhoff tank, oxidation ponds, and aerobic lagoons; Water reuse and recycle.

Module III: Soil and Noise Pollution Control: Soil contaminants, organic and inorganic (including heavy metals): sources and fate, control and abatement of contamination, bioremediation by microorganisms, phytoremediation, and factors affecting uptake of contaminants, Noise pollution: sources and effects, SEL, $L_{Aeq, T}$, L_{90}, L_{10}, SIL, noise control: source reduction, control along the source-receiver pathway, receiver protection, assessing, and predicting noise.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Manahan S.E. (2000) Fundamentals of Environmental Chemistry, CRC Press.
2. Brady N.C. (2007) The Nature and Properties of Soil, Thirteenth edition, Prentice-Hall India.
3. Ecrenfelder W. (1990) Industrial Pollution Control, McGraw Hill Int. Ed.
4. Pepper I.L., Gerba C.P. and Brusseau M.L. (2006) Environmental and Pollution Science, Academic Press.
5. Harrison R.M. (2001) Pollution: Causes, Effects and Control, Fourth Edition, Royal Society of Chemistry.
6. Nevers N.D. (2000) Air Pollution Control Engineering, McGraw Hill Int.

Course: Environmental Analysis: Tools and Techniques **Credit : 3**
Semester: II **Course code : ENV4204**

Course objective: The purpose of the course is to develop analytical skills required for environmental monitoring. The students will become familiar with various physical, chemical and biological parameters involved in water, air and soil research. They would also be able to follow various standard protocols used in environmental analysis. With the theoretical knowledge they would also be able to develop their skills to use contemporary tools and techniques required for environmental impact assessment.

Module I: Introduction: Sampling techniques, basic concept of quantitative analysis (Titrimetry, Gravimetry, and Colourimetry); Measurement of Concentration: Principles of Spectrophotometry, Lambert-Beer relationship, atomic spectroscopy; Microscopy; simple, compound, and electron microscope; Electrophoresis and Chromatography.

Module II: Air Pollution Analysis: Ambient air sampling and monitoring: aerosols (SPM and RSPM) and gaseous pollutants, hydrocarbons (HCs), Polycyclic Aromatic Hydrocarbon (PAHs) and Volatile Organic Compounds (VOCs).

Module III: Instrumental Methods of Analysis: Gas chromatography (GC), Atomic absorption/ emission spectrophotometry, Gas liquid chromatography (GLC), High performance liquid chromatography (HPLC), X-ray fluorescence, X-ray diffraction, and flame photometry, Fourier Transform Infrared Spectroscopy (FTIR).

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. APHA (1980), Standard Methods for the Examination of Water and Wastewater Published by American Public Health Association, 15thed.
2. Laboratory Analytical Techniques Series (LATS), published by CPCB.

Course: Atmospheric Science and Climate Change **Credit : 3**
Semester: II **Course code : ENV4209**

Course objective: This course would make the students familiar with the dynamics of earth and the factors governing the climate-weather system. Knowledge of various components of climatic system and their interaction with atmosphere/ hydrosphere/ lithosphere would further create curiosity among the students about the climate system modeling and climatic vulnerability. Focus will be given on mitigation and adaptive measures at international and national platform.

Module I: Climatology and Global Climate System: Atmosphere: structure and composition, vertical profile of temperature and pressure; Components of climate system and their interactions; Radiation budget, solar constant, lapse rate, and stability, Fundamental forces (pressure gradient, centrifugal, gravity, and coriolis), surface wind and upper air circulation: jet stream, planetary circulations; western disturbances, Indian ocean dipole, El Niño-Southern Oscillation, madden-julian oscillation and Indian monsoon.

Module II: Climate Change: Natural variability vs. anthropogenic forcing to climate system, climate sensitivity, paleoclimatology and measurement techniques (tree rings and ice core analysis), climate system modeling (circulation models), green house gases and global warming, concept of vulnerability, sectoral vulnerabilities, impacts, and adaptation.

Module III: Contemporary Issues: International efforts and India's national policy framework for climate change CDM project cycle and modalities, procedures and global carbon market (carbon trade); CO_2 sequestration; Linking climate change mitigation and adaptation.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. James R.H. An Introduction to Dynamic Meteorology, International Geophysics Series.
2. IPCC (2001 & 2007) Working Group I Report "The Physical Basis of Climate change"
3. Atmospheric Thermodynamics by Bohrenand Albrecht.
4. Marshall J. and Plumb R.A. (2001) Atmosphere, Ocean and Climate, Elsevier, Amsterdam.
5. Oliver J.E. and HidoreJ.J. (2008) Climatology: An Atmospheric Science, Prentice Hall.
6. Peake S. and Smith J. (2009) Climate Change from Science to Sustainability, Oxford Publications.
7. Cole B., 7th Ed. (2002) Meteorology Today: An Introduction to Weather, Climate, and the Environment–Ahrens, CD.

Course: Geoinformatics for Environmental Management **Credit : 3**
Semester: II **Course code : ENV4210**

Course objective: This course will develop the skills of students in the field of GIS and remote sensing. It will also give the basic concepts of remote sensing and principles associated with image acquisition and image processing. The role of GIS as a tool in environmental management and knowledge of GPS will be facilitated. This course will also look into the application of remote sensing/GIS in database generation and environmental management.

Module I: Fundamentals of Remote Sensing: Introduction, scope and components of remote sensing; Electromagnetic spectrum, its characteristics and interaction with atmosphere and earth's surface, Platforms and Sensors, Spectral Signature, Albedo, Atmospheric Window, Aerial photography, Multispectral remote sensing, Elements of visual image interpretation, Digital Image Processing: Rectification, enhancements, Classification: unsupervised, supervised, hybrid, and accuracy assessment; Concept of Digital Elevation Model; microwave remote sensing.

Module II: Geographic Information System (GIS): Map: definition, types, scale, and projections; Introduction, definition and components of Geographic information system; Functional elements: Data in GIS, Raster and Vector data structure, Data input methods: keyboard entry, manual digitizing, scanning and automatic digitizing, accuracy, precision, and resolution, consistency, completeness. Basics, satellite generation, positioning services, GPS details, integration, and coordinate systems.

Module III: Remote Sensing and GIS - application in environmental management: Techniques and applications of remote sensing in Water resource management, Land use land cover mapping, Forest cover/ type mapping, Habitat analysis, Biodiversity characterization, Environmental monitoring, Geo-hazard assessment), National initiatives (NNRMS/NRDMS and ISRO-DOS).

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Dutta A (2001) Biodiversity and Ecosystem Conservation. Kalyani Publisher, Kolkata.
2. JhaLK (1997) Natural Resource Management. APH Publishing Corporation, New Delhi.
3. Nalini KS (1993) Environmental Resources and Management, Anmol Publishers. Owen OS & Chiras DD (1995) Natural Resources Conservation. Prentice Hall India.

Course: Statistical Tools and Research Methodology **Credit : 2**
Semester: II **Course code : ENV4211**

Course objective: The course aims to address the issues related to acquisition and analysis of environmental data and use of statistics in solving them. The students will have an insight into extracting information and analysis of data through various statistical tools and techniques. A preliminary introduction to fundamental concepts of research would make them understand the intricacies of writing and proposing research ideas and hypotheses.

Module I: Introduction: Basic elements and tools of statistical analysis, measurement of central tendency, measures of dispersion: absolute and relative measures, range, standard deviation, variance, quartile deviation, coefficient of variability, skewness, kurtosis, probability: probability distribution functions and their applications, data sampling, sampling locations, times, distributions and types, sampling theory.

Module II: Statistical Methods: Hypothesis testing, significance and correlation, correlation coefficients, linear models and regressions: multiple regressions, distribution- normal, t and chi square test, test of hypothesis and significance, analysis of variance, computer-based modeling: linear, regression, validation and forecasting, difference among means: F-test: 1 way ANOVA, F-test: 2 ways ANOVA.

Module III: System Analysis & Research Methodology: Introduction to research ethics and plagiarism; Mathematical models-deterministic and stochastic, generation of environmental data, stochastic processes in environment, approaches to development of model, validation and forecasting, Perspective of research, sample proposals, framing a statement of the problem (objective), literature survey, methodology of research.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. John J. Schiller, Seymour Lipschutz, Schaum's Outline of Probability and Statistics, 4th Edition, Tata McGraw-HillEducation.
2. Manly (2001) Statistics for environmental science and management, Chapman and Hall /CRC.
3. Wayne, R. Ott (1995). Environmental Statistics and Data Analysis, CRCPress.
4. ShaeferS.J. and Theodore L. (2007) Probability and Statistics Applications for Environmental Science, CRC Press, Boca Raton,FL.
5. Csuros M. (1997) Environmental Sampling and Analysis, Lab Manual, Lewis Publishers, Boca Raton,FL.
6. Strunk W. and White E.B. (1999). The Elements of Style, Longman; 4thEdition.

Course: Analytical Laboratory II **Credit : 3**
Semester: II **Course code : ENV4212**

1. Study of toposheet for geographic information and spatial data types.
2. Description of base map with attributes and image data.
3. Data entry and preparations (input, editing and attributing)
4. Element of Image Interpretation, Image enhancement, Image registration and Georeferencing.
5. Image classifications for land use/ land cover using ERDAS, PCI Geomatica and ENVI.
6. GIS Software, introduction to open source GIS
7. Thin layer paper chromatography analysis of organic compounds.
8. Determination of SPM and RSPM in ambient air by high volume sampler.
9. Monitoring of Air Quality Parameters using Sun Photometer.
10. Sampling and measurement of black carbon in the ambient air.
11. Soil analysis: pH, organic carbon, moisture, water holding capacity, and nutrients.

Book Suggeated:

1. Shryock, H.S. (1976) *Themethods and Materials of Demography*, Academic Press, New York.
2. Gurumani, N. (2006) *Research Methodology for Biological Sciences*, MJP Publishers, Chennai.

Course: Term Paper/ Seminar **Credit : 1**
Semester: II **Course code : ENV4231**

Objectives:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper/ seminar is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking examination and analysis of various aspects of environmental issues at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper/ seminar is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

a) Choosing the topic: contemporary issue and will be given by the department
b) Finding relevant materials
c) Presentation: before the commencement of Semester examinations
d) Response to queries
e) Submission of the write-up

Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Examination Scheme:

Organisation and Relevance of Content	Literature Review	Bibliography	Presentation	Response to the Queries	Total
30	10	10	40	10	100

Course: Project (Field Survey) **Credit : 2**
Semester: II **Course code : ENV4232**

Objectives:

The aim of the project is to provide the students with an opportunity to explore the natural environment for enhancing their knowledge and understanding about various components of environment, human interaction and impact. The project may involve field visits to various places i.e. forested area, natural landscape, pond, lake, river, dam, wastewater treatment plant etc. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report. The student will need to submit a report in the end.

Guidelines for Report:

a) Title: It will be given by student
b) Introduction: about the particular site/habitat.
c) Observations and significance
d) Presentation and queries
e) Submission of the report

Presentation of the report will be of 15 min maximum (10 min presentation and rest question answer session)

Examination Scheme:

Organisation and relevance of content	Introduction	Bibliography	Presentation	Response to the queries	Total
30	10	10	40	10	100

Course: Environmental Conservation & Sustainable Development Credit : 3
Semester: III Course code : ENV4301

Course objective: The paper aims at providing insight into human dimension of development and management of natural resources. It will develop an understanding of biodiversity in the context of ecosystem dynamics, ecosystem functioning and provision of ecosystem services alongwith an introduction to basic conservation methodologies. An approach towards the challenges encountered for sustainability would also be looked at to enable the students' focus on complex relationships between social, economic and environmental processes.

Module I: Resource conservation : Natural resources: classification, concept, global vs regional issues and challenges of Forest, Grasslands & Mangroves, Water resources, Mineral and Energy resources, Food resources, Land & Soil resources: Coastal zone management, coral reefs. Natural Resource Management: concept, approaches and challenges, Traditional knowledge and Natural resource conservation.

Module II: Biodiversity: Biodiversity: Definition, levels, gradients, distribution; global & regional, ecosystem services, Indicators, Measurements & Hotspots of Biodiversity, Biodiversity loss: global and regional scenario, threats, Biodiversity conservation & restoration: historical prospects, Red data book and IUCN categorization, methods and tools, national and global efforts.

Module III: Sustainable development : Sustainable Development: definition, historical prospects, principals, measurements and Millennium Development Goal (MDGs), Sustainable Development Goal (SDGs), Challenges and responses to sustainable development: global and regional issues and efforts.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. World Commission on Environment and Development (1987) Our Common Future, Oxford, OUP.
2. An Introduction to Sustainable Development (2008) by Peter P. Rogers, Kazi F. Jalal, John A. Boyd., Glen Education Foundation. Inc. USA
3. Primack R.B. (2006) Essentials of Conservation Biology (4th ed.), Sinauer Associates, Sunderland.
4. Ecological Diversity and Measurement by Magurran, A.E. Princeton University Press. New Jersey.
5. Millennium Ecosystem Assessment Report, 2005.
6. The Living planet index.
7. UN Millennium Project (2005) Innovation: Applying Knowledge in Development, Science, Technology and Innovation Task Force Report.
8. Contemporary research publication on relevant area of subject for greater understanding updated time to time.

Course: Water Resources Management **Credit : 3**
Semester: III **Course code : ENV4313**

Course objective: The course is designed to make the students aware about the availability and assessment of water resources along with various terminologies associated. An understanding about the need to conserve water has to be made. An approach to watershed development and various principles, common guidelines and policies will be overviewed.

Module I: Water in ecosystem World water inventory, hydrologic cycle, precipitation and runoff: global water balance and Indian scenario, , aquifers (confined and unconfined), quality and quantity of ground water and its usefulness in water supply; Rainwater harvesting; Agriculture and environmental impacts of Irrigation System; crop water management; agro-climatic zonation and crop planning (reference to India).

Module II: Watershed management: Wetlands: Management and Conservation; Ramsar convention, objectives and strategy. Concepts and principles of Watershed Management, water budgeting, land-use and land-cover classification, resource appraisal, water and soil conservation measures: (a) drain-line treatment; (b) area treatment, watershed as unit of sustainable development, selection of plant species for plantation, organic farming and organic fertilizers, watershed development in India.

Module III: Water conservation, conflicts and challenges: Water crisis, water footprint, atmosphere continuum (SPAC), water use efficiency (WUE), water auditing, water treatment, recycling and reuse, water sharing and conflicts, current water issues in India: Narmada Dam, Tehri, Almetti Dam, Sardar Sarovar, Interlinking of rivers and river basin management.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Patra K.C. (2011) Hydrology and Water Resources Engineering, Narosa Publishing House.
2. Subramanya K. (2004) Engineering Hydrology, Tata McGraw-Hill, New Delhi.
3. Sharda V.N., Sikka A.K. and Juyal G.P. (2006) Participatory Integrated Watershed Management: A Field Manual, Central Soil and Water Conservation Research and Training Institute, 218, Kaulagarh Road, Dehradun.
4. Tideman E.M. (1999) Watershed Management–Guidelines for Indian Conditions, Omega Scientific Publishers, New Delhi.
5. Black P.E. (1996) Watershed Hydrology, Lewis Publishers.
6. Developing the Environment Problems and Management – C.J. Barrow.
7. Jain S.K., Agarwal P.K.and SinghV.P. (2007) Hydrology and Water Resources of India, Springer, The Netherlands.
8. Common Guidelines for Watershed Development Projects (2008) Government of India.

Course: Eco-toxicology, Health and Safety **Credit : 3**
Semester: III **Course code : ENV4314**

Course objective: Development of knowledge and skills to reinforce the attitudes and behaviors required for safe and environmentally sound work habits. Another aspect of eco-toxicology would deal with effects of various toxic materials posing adverse environmental health. A brief overview of industrial hazards and safety management will keep the students updated about occupational health.

Module I: Overview of Environmental Health: Public exposure from industrial sources, hazards by industry, major chemical contaminants at workplace, industrial environmental accidents, Hospital Waste Management.

Module II: Eco-toxicology: Toxicity: case studies (F, As, Hg etc.), entry, movement and fate (biotransformation, bioaccumulation and biomagnifications) of pollutants in ecosystems, natural toxins: animal toxins, snake venoms, plant toxins, metals, pesticides, POPs: portals of entry and toxic effects, chromosome damage, gene mutation, factors influencing toxicity, environmental carcinogenesis: chemical carcinogenesis, organic carcinogens, metal carcinogens, occupational cancer, toxicity testing, test organisms used in bioassays, coliform bacteria count and MPN method, dose response curves, LC_{50},LD_{50}.

Module III: Industrial Safety: Public health, personal hygiene, food adulterants, diseases (deficiency, infection, pollution, occupational and communicable) prevention and control, management of hygiene in public places, occupational health and safety, hazards - physical, chemical and biological, industrial safety standards and regulations, accidents - prevention and control, good manufacturing practices (GMP) and good laboratory management practices (GLP), OSHA & NIOSHA.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Handbook of Environmental Health and Safety – principle and practices (Vol. II):H.Koren; Lewis Publishers
2. Basic Environmental Health (2001): AnnaleeYassi, TordKjellstr"om, Theo de Kok, TeeGuidotti.
3. Environmental Health: Monroe T.Morgan.
4. Newman, M.C, Lawrence, C.A., and Unger. M.A., 2002. Ecotoxicology: Fundamentals of Ecotoxicology, 2nd Ed., CRC
5. Press, Boca Raton,Florida.
6. Walker, C.H., Hopkin, S.P., Sibly, R.M., and Peakall, D.B. 2001. Principles of Ecotoxicology. 2nd Ed. Taylor &Francis,London.
7. Stanely E. Manahan.1992.Toxicological chemistry. LewisPublishers

Course: Waste Management & Valorization **Credit : 2**
Semester: III **Course code : ENV4315**

Course objective: The course would comprise of general introduction and various components of solid waste. It would cover the characterization, collection, treatment and disposal techniques and related environmental issues. Students would be conceptualized with the onsite vs. offsite waste management as well as integrated waste management.

Module I: Introduction: Sources and characterization of solid and hazardous wastes, hazard identification, risk characterization, and exposure assessment. health and environmental impacts of solid and hazardous waste management, integrated waste management strategy: reduce, recover/ reuse and recycling.

Module II: Waste Management: Methods of waste collection, storage and transportation, treatment and disposal techniques for solid waste - landfill operation and maintenance, Leachate collection and treatment , composting, (advantages and limitation), vermin-composting, incineration, Pyrolysis, biogas plant**,** , Techniques of hazardous waste treatment and safe disposal, Nuclear and e-waste management.

Module III: Waste Valorization from Residues: Biomass & Bio-fuels**:** Environmental & economic aspects; Bio-fuels from agro residues, Clean technologies concepts for the biological conversion of wastes- aerobic and anaerobic;

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Batstone R., Smith J.E. (Jr.) and Wilson D. (1989),The Safe Disposal of Hazardous Wastes-the Special Needs and Problems of Developing Countries, The World Bank Technical Paper No. 93, Vol. I, II and III, Washington, DC, TheWorldBank.
2. Central Public Health and Environmental Engineering Organization (CPHEEO) (2000) Manual on Municipal Solid Waste Management, New Delhi, Controller ofPublications.
3. Freeman H.M. (1988) Standard Handbook of Hazardous Waste Treatment and Disposal, New York,McGraw-Hill.
4. SW-846 (1980) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Washington, DC, USEPA, Available at http://www.epa.gov/epawaste/ hazard/testmethods/sw846/index.htm.
5. Tchobanoglous G., TheisenH. and Vigil S. (1993) Integrated Solid Waste Management: Engineering Principles and Management Issues, New York,McGraw-Hill.
6. Vesilind P.A., Worrell W.A. and Reinhart D.R. (2001) Solid Waste Engineering, Australia,CL-Engineering.
7. Ramachandra, T. V. (2011) Management of Municipal Solid Waste. TERI Press, NewDelhi

Course: Analytical Laboratory III **Credit : 3**
Semester: III **Course code : ENV4316**

1. Use of microscope: bacterial morphology and staining methods.
2. Biological examination of water: algae and bacteria
3. Isolation of fungi from environmental samples
4. Standard plate count
5. Bacterial water quality: Measuring quality of water by using coli form organisms (MPN method and membranefilter).
6. Estimation of sugars, proteins,lipids.
7. Water analysis: Maximum Probable Number (of Bacteria), E.coli
8. Experiments related to Microbiological analysis of waste water MPN, Total and Faecal coliforms [in potable water], and other organisms.
9. Process and analysis of biological composting and vermicomposting.

Book Suggested:

1. Gurumani, N. (2006) *Research Methodology for Biological Sciences*, MJP Publishers, Chennai.
2. Jacobson-Kram, D. (2006) *Toxicological Testing Handbook: Principles, Applications and Data Interpretation.* Taylor & Francis, New York.
3. Gurumani, N. (2006) *An introduction to Biostatistics*, MJP Publishers, Chennai.
4. Murugesan, A.G. and Rajakumari. C. (2006) *Environmental Science and Biotechnology*, MJP Publishers, Chennai.

Course: Environmental Economics **Credit : 2**
Semester: III **Course code : ENV4317**

Course objective: Economics and environment must be completely integrated in decision making and law making processes and there should be an effort to increase understanding of intriguing policy problems. Environmental and resource economics makes use of ideas and tools developed in other branches of economics to make significant contribution to valuation techniques, design of policy instruments for pollution control and management of commons.

Module I: Introduction: Integration of environment and economics, basics of welfare economics: producer and consumer surplus, stock pollutants, market failure, pareto optimality, cost-benefit analysis and valuation: discounting, principles and estimation of cost-benefit, methods of valuation: physical linkage, hypothetical behavioral and stated preferences methods, observed behavioral or revealed preferences methods, selected concepts in econometrics.

Module II: Resource Economics: Renewable and non-renewable resources, the resource allocation problem and management. Hotelling's rule, exhaustible energy resources, risk and uncertainty; Economics of forestry, fisheries, minerals and climate economics.

Module III: Economics & Environmental Policy: Command and control versus incentives and subsidies - available policy options, regulating pollution through standards: pigouvian fees and marketable permits, porter's hypothesis, economic growth and the environment: environmental kuznets' curve.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Bhattacharya, R.N. (Ed.), 2001, Environmental Economics: An Indian Perspective,O.U.P.
2. Kadekodi, G.K., (Ed.), 2004, Environmental Economics &Practice,O.U.P.
3. Harris, J.M. 2006. Environmental and Natural Resource Economics: A Contemporary Approach, 2nd edition. HoughtonMifflin.
4. Conrad J.M. (1999) Resource Economics, Cambridge UniversityPress.

Hanley N., ShogrenJ.F. and White B. (1997) Environmental Economics in Theory and Practice, Oxford and London, Oxford University Press and Macmillan.

Course: Term Paper/ Seminar (Research Article) **Credit : 1**
Semester: III **Course code : ENV4331**

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students.

The aim of the term paper/seminar is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking examination and analysis of various aspects of environmental issues at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper/ seminar is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

A workshop is primarily an activity based academic event where the students practically obtain hands on experience on any aspect of their learning. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes

- Waste to energy
- Green building
- Disaster management
- Renewable energy
- Climate change and adaptation
- Remote sensing and GIS
- Wild life management
- Sustainable practices

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for term paper/ seminar:

- Choosing the topic: contemporary issue/ relevant study material will be given by the department
- The participants are expected to explore the topic in advance and take active part in the discussions
- Presentation: before the commencement of Semester examinations
- Group Activities have to be undertaken by students as guided by the trainer in a workshop.
- Response to queries
- Submitting a write up of at least 500 words about the learning outcome from the workshop/term paper.

Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Business Planning
- Quiz
- Quality analysis &characterization
- Identification and preparation of materials

Examination Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Response to the queries	Total
30	10	10	40	10	100

Course: Summer Internship Evaluation +Project Formulation **Credit : 6**
Semester: III **Course code : ENV4335**

Methodology:

Practical training is based on the theoretical subjects studied by the students. It can be arranged within the college or in any related industrial unit/ research organization. The students shall get a chance for practical exposure to various industrial processes, technical and experimental research skills. In case of on campus training the students will be given specific tasks which may be experimental or observation and analysis based i.e. analysis of water, air and soil, biodiversity analysis, short term project, data generation and analysis etc. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of the same. The summer internship may further lead to Major project formulation for lastsemester.

Examination Scheme

Feedback from	Training Report	Viva	Presentation	Total
10	30	30	30	100

Course: Environmental Biotechnology **Credit : 3**
Semester: III **Course code : ENV4309**

Course objective: Environmental biotechnology utilizes microorganisms to exploit biotic resources for environmental management practices. This management includes treatment of contaminated water and wastewater, clean up of industrial waste streams, and remediation of soils contaminated with hazardous and toxic chemicals and application of biotechnology in improvement of environment quality. Environmental biotechnology is essential to society and truly important as a technical discipline.

Module I: Bioremediation and metagenomics: Bioremediation: concept and types (natural and engineered): bio- attenuation, ex-situ and in-situ, bio-augmentation and bio-stimulation, advantages and disadvantages, bioremediation to control pollution e.g. solid waste, sewage, industrial effluents, heavy metals, radioactive substances and oil spill, Metagenomics: environmental and community genomics, the study of genetic material recovered directly from environmental samples and future applications in bioremediation, Genetically modified organisms (GMO's) and bio- safety.

Module II: Industrial biotechnology: Maintenance of stock cultures, culture collection centers/microbial gene banks, inoculum build-up, industrial substrates, design of a bioreactor, batch and continuous fermentation and solid-substrate fermentations, immobilization technologies, microbial production of food (SCP), essential prerequisites for organisms to be used as SCP and as food and feed supplements, microbial transformation, accumulation and concentration of metals, metal leaching, extraction and future prospects, biosensors.

Module III: Applied biotechnology: Practical aspects of genetic engineering with microorganisms from extreme environment: use of extremophilic microorganisms in waste treatment and methane production from agro industrial wastes, enzyme production: cellulase, proteases, amylases, alcohol and acetic acid production, biocomposting and biomining, alternate fuels: biofuels, sources and production.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. M.H. Fulekar (2005) Environmental Biotechnology Oxford IBH Publishing cooperation.
2. Industrial Microbiology - Casida, Wiley Eastern publishers, 1994.
3. Biodegradation and Bioremediation- Martin Alexander.
4. Biotechnology-A new industrial revolution Prentis S. Orbis Publishing Ltd., London.
5. Microbiology Davis, B>D., Dulbecco, R., Eisen, H.N and Ginsberg, H.S. Harper and Row Publishers, Singapore.
6. Environmental Microbiology, 2000, Maier, R.M. Pepper, I.L and Gerba, C.P. Academic Press.

Course: Environmental Geology **Credit : 3**
Semester: III **Course code : ENV4310**

Course objective: The course is designed to provide a clear knowledge of Earth as a system and the basic concepts influencing the processes and dynamics of Earth. It will also give an understanding of geological processes vis-à-vis the human influences and its implications.

Module I: Earth Processes and Dynamics: Distribution of elements in the solar system and the Earth, chemical differentiation and composition of the Earth, Structure and composition of earth's interior and surface, rocks and minerals and associated processes, Geological time scale.

Module II: Earth Tectonics and Dynamics: Concept of plate tectonics, sea-floor spreading and continental drift, geodynamic elements of Earth: Mid Oceanic Ridges, trenches, transform faults and island arcs, origin of oceans, continents, mountains and rift valleys, earthquake and earthquake belts, volcanoes: types, products and distribution.

Module III: Processes of Soil Formation: Types of soil, soil degradation and changing land use pattern, concepts of natural ecosystems on the Earth and their mutual inter-relations and interactions (atmosphere, hydrosphere, lithosphere and biosphere), Impact assessment of water availability, quality and contamination of surface water and groundwater, atmosphere and air pollution, soil contamination due to urbanization, industrialization and mining, basic tenets of environmental laws.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Seismotectonic Atlas. 2000. GSI Publication.
2. Kellar, E. A. 2000. Environmental Geology. Prentice Hall, N. Jersey.
3. Merritts, D., de Wet, A. and Menking, K. 1998. Environmental Geology: an earth system science approach. W.H. Freeman & Co., N.Y.
4. Strahler, A.N. and Strahler, A.H. 1973. (Revised Ed.) Environmental Geoscience: interaction between natural systems and man. Hamilton Pub, USA.

Course: Green Energy **Credit : 3**
Semester: III **Course code : ENV4311**

Course objective: The purpose of this course is to provide a survey of the most important renewable energy resources, and the technologies for harnessing these within the framework of a broad range of simple to state-of the art advanced energy systems. After completion of the course, students will be able to describe the fundamentals and main characteristics of renewable energy sources and their differences compared to fossil fuels.

Module I: Green Energy and Sustainable Development: Clean/ green energy technologies, sustainable development, international agreements/conventions on energy and sustainability: UNFCC, nuclear energy: fission reactors, fission power and environment, fuel cells: hydrogen fuel cell, metal hydrate fuel cell, microbial fuel cell, renewable energy sources: solar, geothermal, tidal and wind energy, hydropower, ocean thermal energy conversion (OTEC),energy use pattern: India and global, renewable energy management in India.

Module II: Solar Energy: Solar radiation: measurement and prediction, solar collectors: flat plate and concentrating collectors, solar heating of buildings, solar still, solar water heaters, solar driers, conversion of heat to mechanical energy, solar thermal power generation systems, solar photovoltaic: principle, types of solar cells and fabrication, photovoltaic applications: battery charger, domestic lighting, street lighting, water pumping and power generation.

Module III: Energy From Waste – bio-chemical conversion: Anaerobic digestion of sewage and municipal wastes, direct combustion of MSW-refuse derived solid fuel, industrial waste, agro residues, anaerobic digestion, biogas production, land fill gas generation and utilization, present status of technologies for conversion of waste into energy, design of waste to energy plants for cities, small townships and villages.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Municipal Solid Waste to Energy Conversion Processes: Economic, Technical, and Renewable Comparisons, by Gary C. Young, ISBN: 9780470539675, Publisher: John Wiley & Sons, Publication Date: June2010.
2. Recovering Energy from Waste Various Aspects Editors: Velma I. Grover and Vaneeta Grover, ISBN 978-1- 57808-200-1;2002
3. G. Evans, Biowaste and Biological Waste Treatment, 2005
4. Biogas from waste and renewable resources, by Dieter D. And Angelika S. Wiley-VchPublication2010.

Course: Waste Water Treatment **Credit : 3**
Semester: III **Course code : ENV4312**

Course objective:

Module I: Water Pollutants: Types and sources, generation and collection of wastewater, sewerage systems, quantities of sanitary wastes and storm water, carrying capacity of rivers.

Module II: Wastewater Characteristics: Waste quality parameters: physical, chemical and biological, water borne diseases, primary, secondary and tertiary treatment, physical unit processes: screening, commutation, grit removal, equalization, coagulation-flocculation, sedimentation, and disinfection.

Module III: Biological Wastewater Treatment Systems: Aerobic processes - activated sludge process and its modifications, trickling filter, RBC, anaerobic processes: suspended growth, attached growth, fluidized bed and sludge blanket systems, natural wastewater treatment systems: ponds and lagoons, phytoremediation, wetlands and root-zone systems, operation and design aspects.

Module IV: Advanced Wastewater Treatment: Iron and manganese removal, colour and odour removal, activated carbon treatment, ion exchange, electro-dialysis, reverse osmosis and flouride management, nitrogen and phosphorus removal, heavy metals removal, oil and refractory organics removal, micro-screening, ultra-filtration, centrifugation, wastewater disposal standards, sludge digestion and handling, disposal of effluent and sludge.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Waste water engineering, treatment and reuse by Metcalf and eddy, fifth edition, Tata McGraw Hill.
2. Garg, S.K., Environmental Engineering, Vol. I, Khanna Publications, 2001, New Delhi.
3. Garg, S.K., Environmental Engineering, Vol. II, Khanna Publications, 2001, New Delhi.
4. Mark J. Hammer and Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd., 1998, New Delhi.

Course: Environmental Law & Environmental Impact Assessment Credit : 3
Semester: IV Course code : ENV4401

Course objective: The students will have an overview of Environment Impact Assessment and newer approaches related to it. This course aims to acquaint the students with an in-depth knowledge of laws and policies concerned with environmental protection. A brief outline of the efforts being done through global summits and laws implemented at national level would make the students familiar with basic knowledge of environmental law issues.

Module I: Environmental Protection & International Efforts: National Environmental Policy, provisions for environment protection in constitution of India; Ecomark; major environmental movements in India and role of NGOs. United Nations Bodies for environmental protection; Introduction to Stockholm Conference on Human Environment (1972), Nairobi Declaration, Montreal Protocol(1987), Basel Convention (1989 and 1992), Earth summit at Rio de Janeiro (1992), Kyoto Protocol (1997), Earth summit at Johannesburg (2002), CBD, Paris Agreement

Module II: Environmental Laws: Air Pollution Act (1981), Water Pollution Act(1974), Environmental (Protection) Act (1986), Hazardous Wastes Management and Handling Rules(1989), Municipal Solid Waste (Management and Handling Rules) (2000), Public Liability Insurance Act (1991) and Rules(1991), Coastal Regulation Zones (CRZ) Rules (2011),Wildlife (Protection) Act(1972),Forest (Conservation) Act(1980), Biological Diversity Act(2002).

Module III: Environmental impact assessment (EIA): Introduction & Significance of EIA; Environmental impact statement (EIS), environmental management: (EMP& EMS), ISO standards; scope and types of environmental audit, environmental management plan (EMP), eco-management and audit scheme (EMAS); safety management system; Life Cycle Analysis (LCA) and its components.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Global Biodiversity - W.R. L.IUCN
2. Shyam Divan and Armin Rosencranz, 2005,Environmental Law and Policy in India, Oxford University Press, Delhi
3. Leelakrishnan. P, 2008, Environmental Law Case Book. Lexis Nexis, Butterworths.
4. Shastri S C, 2008, Environmental Law, (2nd Edn.), Eastern Book Company, Lucknow.
5. Singh Gurdip, 2004, Environmental Law in India, Mcmillan and Co.
6. ShantakumarS,2005 Introduction to Environmental Law, (2nd Edn.), Wadhwa and Company, Nagpur
7. Sahasranaman P B, 2008 Handbook of Environmental Law in India, Oxford University Press(India).

Course: Urban Ecosystem and Industrial Ecology **Credit : 2**
Semester: IV **Course code : ENV4402**

Course objective: The purpose of this course is to have an understanding of concepts and processes governing urbanization and its impact on natural resources. Students will also be given an exposure about urban space as well as industrial systems and the strategies to emulate ecological systems for minimizing the waste production in urban and industrial processes. The course would also discuss key issues involved with eco-industrial development and some cases from India.

Module I: Urbanization: Global and regional scenario of urbanization: factors and impact, population dynamics and push-pull factors, vegetative distributions in cities (green spaces), land use and GIS, urban green habitat, ecosystem services for cities. Hydrological effects of urbanization (water demand/wet land/ water conservation/waste water); climate resilient cities for sustainable urban habitat, integrating urban and environmental planning framework

Module II: Concepts of Industrial Ecology: origin, definition, environment and the anthrosphere, industrial systems, material resources, societal factors and environmental equity, Systems analysis, industrial metabolism, biological analogies; perspective on industrial ecology from India and other developing countries such as China and Brazil, with case studies.

Module III: Issues of Eco-industrial Development: Components of an industrial ecosystem (Kalundborg example), industrial symbiosis, role of government, community, developers, management, evaluating the success of eco-industrial development, life cycle analysis and assessment: life cycle of products, processes and facilities.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Bourg D. and Erkman S., (edited) Perspectives on Industrial Ecology, 46(2) (hardback).
2. Jari N., Jürgen H.B., Guntenspergen G., Nancy E.M., Elmqvist T. and James P. (ed) (2011) Urban Ecology: Patterns, Processes and Applications, Oxford University Press, New York, US.
3. Allen A. and You N. (2002) Sustainable Urbanization: Bridging the Green and Brown Agendas, University College London, UK.
4. Erkman S. and Rama swamy R. (2003) Applied Industrial Ecology – A New Platform for Planning Sustainable Societies, AICRA Publishers, Bangalore, India.

Course: Natural Hazards and Disaster Management **Credit : 2**
Semester: IV **Course code : ENV4403**

Course objective: This paper introduces the students to various environmental hazards, their causes, nature, preparedness and assessment of loss. It teaches them to model hazards and familiarizes with methods of management of disasters and consequently risk zonation.

Module I: Introduction: Disaster: nature and causes, climate change and disaster, hazard, risk, vulnerability, impacts of disasters: health, physical and socio-economic.; Natural hazard profile of India.

Module II: Natural and Human Induced Hazards: Hazards: classification, causes, impact and prediction; floods and droughts; drought and its management-causes and impacts, water conservation practices for deserts, mass wasting/ landslides; avalanche; nature and causes of volcanoes. Human induced hazards: hazards due to dams/ reservoirs, nuclear power plants, industrial and occupational hazards, tropical cyclones and tsunami, sea level change and its impact on coastal areas.

Module III: Disaster Management Cycle: disaster preparedness: preventive measures, early warning system; Mitigation: disaster risk reduction (DRR), the emergency operation plan (EOP); Response and recovery; Applications of science, technology and engineering in disaster management.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Books Suggested:

1. Valdiya K. S. (1987).Environmental Geology (Indian Context). Tata-McGraw-Hill, New Delhi.
2. Keller Edward A. (1996).Environmental Geology. Prentice-Hall, NJ.
3. Kates, B.I& White, G.F The Environment as Hazards, oxford, New York, 1978.
4. H.K. Gupta (Ed) Disaster Management, Universities Press, India, 2003.
5. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003.
6. R.K. Bhandani: An overview on Natural &Manmade Disaster & their Reduction, CSIR, New Delhi.
7. M.C. Gupta Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi,2001.

Course: Term Paper/ Seminar (Research Article) **Credit : 1**
Semester: IV **Course code : ENV4431**

Objectives:

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper/ seminar is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking examination and analysis of various aspects of environmental issues at a level commensurate with the learning outcomes of the various courses taken up by them in the ongoing semester.

A term paper/ seminar is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

a) Choosing the topic: contemporary issue and will be given by the department
b) Finding relevant materials
c) Presentation: before the commencement of Semester examinations
d) Response to queries
e) Submission of the write-up

Presentation of the seminar will be of 30 min maximum (25 min presentation and rest question answer session)

Examination Scheme:

Organisation and Relevance of Content	Literature Review	Bibliography	Presentation	Response to the Queries	Total
30	10	10	40	10	100

Course : Research based Project Work **Credit: 12**
Semester: IV **Course code: ENV4437**

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is a professional problem-solving activity and is equally significant as any other aspect of the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricula where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department.

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;

- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the layout of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgement(s)**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of theproject, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in detail including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes

in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather; it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/ contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

- **Conclusion(s) &Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for state daims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

- **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

- **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

For research article:

Voravuthikunchai, S.P., Lortheeranuwat, A., Ninrprom, T., Popaya, W., Pongpaichit, S., Supawita, T., Photocatalytic treatment of tannery wastewater for the removal of toxic compounds, Journal of Environmental Science and Technology,8 (1): 116-117 (2002).

For book:

Kowalski, M., Biological wastewater treatment for pulp and paper industry, Wastewater Treatment (Eds. P.S. Nutman IBP), **7**: 63-67 (1976).

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

Amity Institute of Biotechnology

Bachelor of Science (Honors) Biological Science

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

PLANT DIVERSITY-I

Course Code: BLS2101 **Credit Units-03**

Course Objective: The objective of this course is to familiarize the students with the classification, morphology, reproduction and economic importance of various groups of lower plants which will provide the basic knowledge for the employment of these plants to study plant diversity.

Module -I
Cyanobacteria: General features, Classification, Distribution, Cell structure, Envelope, cell wall, Heterocyst, Nutrition, Water bloom, Reproduction and economic importance. Type of *Nostoc.*

Module -II
Algae: General features, Classification, Distribution, Range of thallus organization, Reproduction, Life Cycle and Economic importance with special reference to *Volvox, Oedogonium, Chara, Ectocarpus, Vaucheria* and *Polysiphonia.*

Module -III
Fungi: General features, Classification, Range of thallus organization, Reproduction, Parasexual cycle and Economic importance with special reference to Slime molds, *Albugo, Phytophthora, Penicillium, Saccharomyces, and Puccinia*. Selected plant Diseases caused by fungi: White rust of Crucifers, Late blight of Potato, Black stem Rust of wheat.

Module - IV
Lichens: General features, Classification, Habitat, Distribution, Thallus organization, Structure, Nutrition, Asexual and sexual reproduction, Ecological significance and Economic importance.

Module -V:
Bryophytes: Amphibians of plant kingdom, General features, Classification, Habitat, Distribution, Thallus organization, Structure, Reproduction and Economic importance with special reference to *Marchantia, Anthoceros* and *Funaria.*

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

Text & References:

- College Botany Vol. I and II, Ganguli and Kar
- A Text Book of Botany, V. Singh, P.C. Pande & D.K. Jain
- The Algae, V. J. Chapman and D. J. Chapman.
- Introductory Phycology, H. D. Kumar.
- A Text Book of Algae, H. D. Kumar and H.N. Singh.
- Introductory Mycology, Alexopaulos and Mims
- Cryptogamic Botany, G. M. Smith.
- A Text book of Algae, B. R. Vashishtha
- Bryophytes, N. S. Parihar
- Pteridophytes, N. S. Parihar
- An Introduction to Pteridophytes, A. Rashid.

ANIMAL DIVERSITY-I

Course Code: BLS2102 **Credit Units-03**

Course objective- Patterns of current Biodiversity, including the description of its taxonomic structure and the proposal of phylogenetic and phylogeographic hypothesis which describe de geographic distribution of genetic variability and the historical relationships among organisms and their geographic ranges, are identified as key-lines across all world scientific programs in response to the basic principle.

Module –I

Introduction and classification of Invertebrates Principles of taxonomy and relationship with systematics. General characters and criteria for classification of invertebrates. An outline classification of non-chrodates.

Module –II Phylum Protozoa

General characters and classification of Protozoans. Type study of *Parameciumcaudatum* and *Plasmodium vivax*. Locomotion and reproduction in Protozoa. Protozoa and human diseases.

Module –III Sub kingdom Metazoa and phylum Porifera

Organization of metazoa including symmetry, metamerism and body cavity or coelom. Theories of origin of metazoa. General characters and classification of phylum Porifera. Type study of *Sycon* with reference to reproduction and development. Canal system and skeleton in Sponges.

Module -IV Phylum Coelenterata and Platyhelminthes

General characters and classification of Coelenterates. Type study of *Aurelia.* Polymorphism. Corals and coral reefs. General characters and classification of phylum Platyhelminthes. Type study of *Taenia solium.*

Module V- Phylum Nematoda and Annelida

General characters and classification of nematodes. Type study of *Ascaris lumbricoides.* Nematodes and human diseases. *Coenorhabditis elegans* and its application in research. General characters and classification of phylum Annelida. Type study of *Pheretima posthuma*. Nephridial system in annelids.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

Text & References:

- Ganguli, B.B., Sinha, A.K. and Adhikari, S., 2001, Biology of Animals, (Vol. I and III), New Central Book Agency, Calcutta.
- Kotpal, R.L., 1990, Modern Text Book of Zoology, Invertebrates, 8th Edition, Rastogi Publication, Meerut.
- Jordan, E.L., P.S. Varma, 2001, Invertebrate Zoology, S. Chand & Co., New Delhi.

CHEMISTRY-I

Course Code: BLS2103 **Credit Units-03**

Course Objective:
The objective of this course is to educate the students about molecules, their energy to form bonds, metallurgy of elements, kinetic theory of gases, Vander walls equation and also enzymatic catalysis

Course Contents:

INORGANIC

Module I
Chemical bonds and molecules, Shapes of simple molecules, bond energy, bond length, resonance and Hydrogen bond.

Module II
Radioactivity**:** Natural and artificial, group displacement law, half life period, binding energy, nuclear reaction equations, isotopes, tracers, radio dating, Application of radioactivity.

Module III
Periodic table**:** Modern periodic table, periodicity in properties of elements, atomic radii, ionic and covalent radii, ionization energies, electron affinity, electro-negativity.

Module IV
Metallurgy of S block elements (Na, K, Be, Mg, Ca)

PHYSICAL

Module V
Gases: Kinetic theory of gases, Vander Waal's equation, critical constants, Liquefaction of gases.

Module VI
Chemical-Kinetics: Velocity of a reaction, Law of mass action; determination of rate constants for first and second order reactions, collision theory of bimolecular reactions.
Catalysis: Promoters and Poisons, Enzyme catalysis.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

Text & References:

- Engineering Chemistry Jain & Jain
- Engineering Chemistry Sunita Rattan
- Engineering Chemistry Shashi Chawla
- Organic Mechanism, Morrison and Boyd
- Physical Chemistry, Puri Sharma and Pathania
- Organic Chemistry Vol-I , IL Finar
- Organic Chemistry Vol-II, IL Finar
- Physical Chemistry, Atkins Peter, Paula Julio

PHYSICS – I

Course Code: BLS2104 **Credit Units-03**

Course Objective: An important objective of the course is to develop an understanding of 'core physics' at successively deeper levels, each stage revealing new phenomena and greater insight into the properties of matter. Heat, electricity and magnetism, Sound waves and optics

Course Contents:

Module I: Properties of matter

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending. Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Rigidity Modulus – Determination of rigidity modulus by Torsional oscillation (without masses). Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula – Comparison of viscosities of two liquids by graduated burette method. Surface Tension: Surface Tension – Excess of pressure inside a curved surface – Synclatic system – Surface Tension and interfacial surface tension by the method of drops.

Module II: Heat

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.

Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

Module III: Electricity and magnetism

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance. Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and BH using the deflection magnetometer in Tan C position and the vibration magnetometer.

Module IV: Sound and acoustics of building

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire. Ultrasonics – Production by Piezo – electric method – properties and uses. Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

Module V: Geometrical optics and physical optics

Defects of Images (Lens): Spherical aberration – minimizing spherical aberration by using two thin lenses in contact – chromatic aberration – Achromatic combination of two thin lenses in contact.

Physical Optics: Interference – Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Polarisation: Optical activity – Specific rotatory power – Polarimeter – Determination of specific rotatory power of a solution using the polarimeter.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).

MATHEMATICS-I

Course Code: BLS2105 **Credit Units-03**

Course Objective:- The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Module I: Set Theory
Set and their representations, finite and infinite sets, subsets, type of sets, operations on sets and their algebraic properties, Venn diagram, ordered pair, Cartesian product, Relation, application.

Module II: Permutations and Combination
The factorial introduction, fundamental principle of counting, permutation as arrangement, practical problems on permutations, permutation under certain conditions. Combinations, practical problems on combinations, combinational identities.

Module III: Binomial Theorem
Binomial theorem for any positive integral exponent (without proof), general and middle term, Binomial theorem for any index, some applications.

Module IV: Probability
Random experiment and associated sample space, events, definition of probability of event, algebra of events, and addition and multiplication theorem on probability (without proof). Conditional probability, Independent event, Baye's theorem (without proof).

Module V: Probability Distribution
Binomial, Poisson and Normal distribution

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination

Text & References:

Text:

- Fundamental of Biostatistics, Bernard Rosner, Oxford University Press
- Mathematical Statistics, H.C. Saxena, S. Chand & Company
- Introduction to Probability Theory, P.G. Hoel, Houghton Mifflin College
- Introduction to Statistical Theory, P.G. Hoel, S.C. Port, C.J. Schiller, R.A. Srinivasan, A. Srivasan, McGraw-Hill Trade
- Schaum's Outline of Probability, Random Variables and Random Processes, H.P. Hsu, McGraw-Hill Trade
- Statistics of Extremes, E.J. Gumbel, Columbia University Press

PLANT & ANIMAL DIVERSITY LAB-I

Course Code: BLS2106 **Credit Units-02**

Module I: Algae & Fungi
Study of Algal types with the help of permanent slides and also by preparing suitable slides as prescribed in the theory course. (Chlamydomonas,,Chara, Sargassum, Polysiphonia,) Study of Fungal types with the help of permanent slides and also by preparing suitable slides as prescribed in the theory course. (Eurotium, Morchella, Agaricus)

Module II: Bryophytes &Pteridophytes
Study of Bryophytes like Riccia, Marchantia ,Anthoceros pteridophytes like Selanginella, Equisetum, and Marsilea with the help of permanent slides and also by cutting sections and making suitable preparations with the help of permanent slides and also by cutting sections and making suitable preparations.

Module III
Histological study of important animal tissues. Estimation of enzyme activity from animal tissues. Study of toxicity on invitro model. Culture and maintenance of animal cell lines. Invitro expression of proteins in animal cell lines.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

CHEMISTRY LAB - I

Course Code: BLS2107 **Credit Units: 01**

Course Contents:

INORGANIC CHEMISTRY

Module I
Volumetric analysis: Oxidation-reduction titration using $KMnO_4$ and $K_2Cr_2O_7$

Module II
Iodometry titrations: Estimation of sodium thiosulphate & potassium dichromate.

Module III
Preparation of the following inorganic compounds: Prussion blue from iron fillings, chrome alum, cuprous chloride and potassium trioxal atrochromate.

PHYSICAL CHEMISTRY

Module IV
Determination of surface tension and viscosity of liquids

Module V
Heat of neutralisation of a strong acid and a strong base.

Module VI
Solubility curve of KNO_3 or benzoic acid.

PHYSICS LAB - I

Course Code: BLS2108 **Credit Units-01**

Course Contents:

1. Youngs modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

PLANT DIVERSITY-II

Course Code: BLS2201 **Credit Units: 03**

Course Objective:
The objective of this course is to a acquaint the students with the details of classification of gymnosperms and angiosperms, taxonomy of angiosperms, anatomy, embryology, ecology and plant pathology which will make a strong foundation so that students can explore this knowledge for further biotechnological studies and research.

Course Contents:
Module I:
Gymnosperms General characteristics, affinities and classification of Gymnosperms morphology and development reproductive structures of the following taxa-*Cycas, Pinu*..

Module II
Taxonomy of Angiosperms
Classification of angiosperms as proposed by Bentham and Hooker and Hutchinson, merits, demerits and comparison Binomial Nomenclature

Module III
Economic importance of family: ,Cucurbitaceae Apiaceae, Apocynaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae, and Poaceae.

Module IV
Embryology
Structure of anther, microsporogenesis and development of the male gametophyte. Structure of Ovule, megasporogenesis and development of the female gametophyte e.

Module V
Plant Pathology
General Symptoms of fungal, bacterial and viral diseases and their control. Disease cycles of the following diseases, Loose smut of wheat, Rust of wheat, Late blight of potato

Module VI
Plant Anatomy
Meristems. Anatomy of root, stem and leaf, Root-stem transition, structure and function of cambium in root and stem.

Module VI
Ecology Ecosystem– abiotic and biotic factors, food chain, food web, ecological pyramids. Energy flow and productivity. Ecological niche and Ecological succession
Examination Scheme:

Components	H/S	A	CT	EE
Weightage (%)	10	5	15	70

ANIMAL DIVERSITY-II

Course code: BLS2202 **Credit Units: 03**

Objectives
This paper will provide the conceptual knowledge about Vertebrates, which includes from Pisces to Mammals. This paper will be helpful to understand the variations from one class to another. The knowledge gained from this subject will be helpful for students to realise the significance of animal sciences towards its applications in modern biotechnology.

Course Contents:

Module I:
Origin and features of Chordates and Vertebrates. Salient features and outline classification of Phylum Chordata upto order with suitable examples. General Characters and affinities of Hemichordata, Cephalochordata & Urochordata.

Module II:
Pisces: Salient features of class Pisces. Respiration and Gills, Osmoregulation, Fish scales. Induced breeding and seed production of economically important fishes.

Module III:
Amphibia: Salient Features of Class Amphibia, Circulation, Respiration, Reproduction and Hibernation.

Module IV:
Reptiles: Salient features of Class Reptilia, Poisonous and non- poisonous snakes, Poison apparatus and biting mechanism of snakes. Snake venom:
Module V:
Aves: Salient features of Class Aves. Flight adaptations, aerodynamics of flight and migration in birds.

Module VI:
Mammals: Salient features of Prototheria, Metatheria and Eutheria. Rabbit as model for Class Mammalia.

Examination Scheme:

Components	H/S	A	CT	EE
Weightage (%)	10	5	15	70

References:
1. Jordan E.L. and P.S. Verma 1995. Chordata Zoology and Elements of Animal Physiology. S. Chand and Co., New Delhi.
2. Kotpal R.L. 1992. Vertebrata, Rastogi Publications, Meerut.
3. Nigam.H.C. 1983 Zoology of Chordates, Vishal publications, Jalandhar.
4. Waterman, Allyn J. et al.1971, Chordate Structure and functions. Mac.Millan and Co., New York.

CHEMISTRY - II

Course Code: BLS2203 **Credit Units: 03**

Course Objective:
The students will acquire knowledge about the compounds of carbon mainly hydrocarbon. They will be acquainted with the methods of qualitative and quantitative analysis of elements of hydrocarbons and methods of preparation of these compounds. They will get knowledge about the behavior of chemical and physical reactions along with electrolysis process.

Course Contents:

ORGANIC CHEMISTRY

Module I
Organic chemistry as chemistry of carbon compounds, Methods of purification, tests of purity: qualitative and quantitative elemental analysis, determination of molecular masses: calculation of Empirical and Molecular formula, Structural formula. Tetrahedral concept of carbon compounds; nomenclature of organic compounds; Isomerism; stereo-isomerism, geometrical and optical isomerism.

Module II
Petroleum: Fractionation, cracking and synthetic petrol.
General methods of preparation and properties of alkanes, alkenes, alkynes, Halogen substituted alkanes (CH_2CI_2 , $CHCI_3$, CCI_4, CHI_3), Electrophilic substitutions. General study of Cycloalkanes

Module III
- Grignard reagent; preparation and uses,
- Alcohol; ethanol, propanol, glycerol
- Monocarboxylic acids and their simple derivatives, descriptive studies of dicarboxylic acids, viz. malic, oxalic, tartaric, maleic,

General methods of preparation of aliphatic aldehydes and ketones,
Keto-enol tautomerism; aceto-acetic ester and malonic ester.

PHYSICAL CHEMISTRY

Module IV
Chemical equilibrium: Reversible reactions, equilibrium law, equilibrium constant, factors influencing equilibrium states.

Module V
Eletrochemistry: Electrolysis, laws of electrolysis, ionisation constant, specific, equivalent and molecular conductance, common ion effect; Hydrogen ion concentration, pH value, Theory of acid base indicators, buffer solutions, hydrolysis of salts and solubility product simple calculations based on these concepts.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- A text book of Organic Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.
- Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.

References:

- Advanced Organic Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.
- Organic Chemistry Vol.I & II, I.L. Finar
- Fundamentals of Organic Chemistry, Nafis Haider, S. Chand & Co. Ltd.
- Organic Chemistry Vol. I, II & III, Dr. Jagdamba Singh, L.D.S. Yadav, Pragati Prakashan.
- Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.
- Simplified course in Physical Chemistry, Madan & Tuli, S. Chand & Co. Ltd.
- Atkin's Physical Chemistry, Atkin, Oxford Press.
- Physical Chemistry, Vemulapalli, Printice Hall of India

PHYSICS-II

Course Code: BLS2204 **Credit Units: 03**

Course Objective: An important objective of the course is to develop an understanding of physics at successively deeper levels with a greater insight into the topics such as wave mechanics and nuclear and energy physics along with electronics.

Course Contents:

Module I: Wave mechanics

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

Module II: Nuclear physics

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.
Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy –Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.
Biological effects of radiation – control of radiation hazards.

Module III: Energy physics

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

Module IV: Crystallography and fiber optics

Crystallography : The crystal structure – Unit Cell – Miller indices – Reciprocal Vectors – Properties of Reciprocal Lattice – Bragg's Law.
Fibre Optics: Principle – classification of optical fibres – fiber optic communication system block diagram.

Module V: Electronics

Electronics : Zener diode – Characteristics – Voltage regulation using zener diode – LED – uses of LED.
Digital Electronics : AND, OR, NOT, NAND and NOR gates – NAND and NOR as universal building blocks – Fabrication of a Integrated circuit by monolithic technology – Advantages and limitations of an integrated circuit – LSI, MSI and VLSI.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5th Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.
11. Introduction to Fiber optics by K. Thyagarajan and Ajay Ghatak, Cambridge, University Press (1999).
12. Instrumental Methods of Chemical Analysis – B.K. Sharma - Goel publication
13. Gini Courter and Annette Marquis, Microsoft Office 2000, BPB Publications, New Delhi, 1999.
14. Julia Kelly, Using Microsoft Excel 2000, Prentice-Hall of India, New Delhi, 1999.
15. Robert de Lavie, A spreadsheet workbook for Quantitative Chemical Analysis, McGraw-Hill, Inc. New Delhi, 1997.
16. K.V. Raman, Computers in Chemistry, Tata McGraw-Hill Ltd., New Delhi, 1993.
17. V.K. Srivastava and K.K. Srivastava, Introduction to Chromatography: Theory and Practice, S. Chand and company, New Delhi, 1987.

MATHEMATICS-II

Course Code: BLS2205 **Credit Units: 03**

Course objective: To make the students explore the basic concepts of mathematics and statistics which are relevant for branches of earth sciences.

Unit I

Integral Calculus**:** Bernoulli's formula for integration by parts; Reduction formulae for: $\int x^m e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$ (with proof & problems), $\pi/2 \int \sin^m x \cos^n x\, dx$ (no proof, problems only); properties of definite 0 integrals and simple problems.

Application of Integration**:** Evaluation of double, triple integrals; Simple applications to area, volume; Fourier series for functions in $(0, 2\pi)$ and $(-\pi, \pi)$.

Unit II

Statistics: Frequency and distribution; Arithmetic mean, Median, Partition values, Mode, Variance and standard deviation; Curve fitting; Principle of least square; Linear regression.

Unit III

Probability: Introduction to Probability; Addition and multiplication theorem of Probability; Random variables and Probability distribution; Expected values; Binomial distribution; Poisson distribution & Normal distribution and their application.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. P. Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I &II.Muhil Publishers, Chennai

2. Shaum's Series "outlines of Statistics:

ANIMAL DIVERSITY LAB-II

Course Code: BLS2206 **Credit Units: 01**

Course objective: Course objective is o provide the knowledge about plant science that should be useful to understand and apply different concepts about the diversity and complexity of animals.

Course Contents:

Module I:
Study of different types of scales in fishes, permanent preparations of scales. Internal ear Different types of important edible fishes of India.

Module II:
Study of *Rana tigrina*, physiological systems through model.

Module III:
Hyoid apparatus of home lizard, Demonstration of biting mechanism by using model.

Module IV:
Development of chick up to formation of primitive streak.

Module V:
Mice: Arterial system and reproductive system.

PLANT DIVERSITY LAB-II

Course code: BLS2206 **Credit Unit: 1**

Course objective:
Course objective is o provide the knowledge about plant science that should be useful to understand and apply different concepts about the diversity and complexity of plants.

Course Contents:

Module I:
Gymnosperms Study of the Gymnosperms like *Cycas, and Pinus* by cutting sections and making suitable temporary preparations.

Module II:
Taxonomy Detailed description and identification of locally available plants of the families as prescribed in theory course.

Module III:
Plant Anatomy Anatomy of normal dicot and monocot roots, stems & leaves.

Module IV:
Embryology Study of permanent slides of the:
a) T.S. anther, pollen, germinating pollen
b) L.S. ovule types
c) Endosperm
d) Embryos
e) L.S. caryopsis
f) Dissection of embryo

Module V:
Plant Pathology Examination of local diseased plants representing bacterial, viral, fungal parasites. Study of symptoms caused by parasites, study of selected diseased specimen (mentioned under theory) through specimens, temporary presentations.

Module VI:
Ecology Measurement of temperature (Soil). Demonstration of Soil texture, carbonate, sulphate, pH. , soil moisture percentage. A comparative study of plants (with external and internal characters) to water availability.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

CHEMISTRY LAB-II

Course Code: BLS2207 **Credit Units: 01**

Module I

Qualitative analysis of inorganic mixtures, containing not more than four ionic species (excluding insoluble substances) out of the following:

Pb^{2+}, Hg^{2+}, Hg_2^{2+}, Ag^{1+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, As^{3+}, Sn^{2+}, Sn^{4+}, Fe^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}, NH_4^{1+}, K^{1+}, CO_3^{2-}, S^{2-}, SO_3^{2-}, NO_2^{1-}, CH_3COO^{1-}, F^{1-}, Cl^{1-}, Br^{1-}, I^{1-}, NO_3^{1-}, SO_4^{2-}, $C_2O_4^{2-}$, PO_4^{3-}, BO_3^{3-}.

Module II

Purification of Organic compounds by crystallization (from water or alcohol) and distillation.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

PHYSICS LAB-II

Course Code: BLS2208 **Credit Units: 01**

Course Contents:

1. Spectrometer Grating – Minimum Deviation – Mercury Lines.
2. Spectrometer – Refractive Index of a liquid – Hollow Prism.
3. Potentiometer – Calibration of High Range Ammeter.
4. Potentiometer – Calibration of Low Range Voltmeter.
5. Determination of M and BH using Deflection Magnetometer in Tan C position and vibration magnetometer.
6. Figure of merit and voltage sensitiveness of table galvanometer.
7. Construction of AND, OR gates using diodes and NOT by transistors.
8. Zener diode – Voltage Regulation.
9. NAND / NOR as universal gate.
10. Demorgan's theorem verification.

Any other experiments can be carried out in class.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Third Semester

PLANT ANATOMY

Course Code: BLS2301 **Credit Units-02**

Module I
The Plant cell: protoplast ,ergastic substances the cell wall; protoplast

Module-II
The Plant tissues: meristematic tissues; Shoot apical meristem; Root apical meristem; Permanent tissues; Dermal tisse system(epidermis),Groud tissue system: parenchyma Collenchyma, sclerenchyma

Module-III
The Plant tissues: Permanent tissues Vascular tissue system xylem and
Phloem; Lateral meristem: Vascular cambium

Module IV
Secondary growth; Anomalous secondary growth; Phellogen and formation of periderm Secretory structures; Ecological effect on plant

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

ANIMAL ANATOMY

Course Code: BLS2302 **Credit Units : 02**

Module I
Basic organization and principle chemical processes of the cells and tissues.

Module II
The structural and functional relationships among the bones, articulations and muscles and the role of these systems in the maintenance of homeostasis.

Module III
The regulatory system of the body (nervous and endocrine), how they interact with each other and their role in the maintenance of homeostasis.

Module IV
The anatomy and physiology of body systems whose principal function is to maintain homeostasis. These systems include the circulatory, lymphatic, respiratory, urinary, and digestive.

Module V
The anatomy and physiology of the male and female reproductive systems and how these systems produce new individuals

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

CELL BIOLOGY

Course Code: BLS2303 **Credit Units: 03**

Course Objective:
Cell Biology and genetics plays a central role to connect the different fields of biotechnology, which is highly interdisciplinary. They incorporates elements of biology, maths, physics and chemistry with combination of computers and electronics. The objective of the present course is to understand the structure and function of the cellular and subcellular components of cells and tissues with the help of these recent techniques. Students are also exposed to phenomenon that regulates cell death and etiology of cancerous cells.

Course Contents:
Module II: Cell Organelles
Structure of nuclear envelope, nuclear pore,
Targeting proteins to endoplasmic reticulum, Protein sorting and export from Golgi apparatus; Protein import into Mitochondria, Import and sorting of chloroplast protein

Module III
Structure and organization of actins filaments; Actins, myosin muscle contraction, Microtubule-structure and assembly

Module IV
Modes of cell signaling, G-protein coupled receptors; cAMP pathway of signal transduction; cGMP, phospholipids and calcium ions, Ras, Raf, MAP kinase pathway, Apoptosis – role of caspases

Module V: Cell Cycle
Phases of eukaryotic cell cycle; Cell cycle regulation, checkpoints in cell cycle; regulators of cell cycle inhibitors of cell cycle, stem cells – properties and medical application

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Essential Cell Biology : An Introduction to the Molecular Biology of the Cell, B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Roff, K. Robert, P. Walter and K. Roberts, Garland Publishing Company
- Cell and Molecular Biology, DeRobertis, B .I. Publication Pvt. Ltd
- Principles of Genetics, E J Gardner, John Wiley & Sons Inc.

References:
- Cell in Development and Inheritance, E.B. Wilson, Macmillan
- Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
- Molecular Cell Biology, H. Lodish, A.Berk, S.L. Zipursky, P. Matsudaura, D. Baltimore and J. Danell, W.H. Preeman and Company.
- Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
- Principles of Genetics, D.P. Snustad & M.J. Simmons, John Wiley and Sons Inc

GENETICS

Course Code BLS2304 **Credit Units: 03**

Course Objective:
The objective of the course is to focus on the basic principles of genetics incorporating the concepts of classical, molecular and population genetics. Compilation is required for recent advances in genetic principles for strong foundation in Biotechnology.
Course Contents:

Module I
The science of genetics -introduction, history, classical and molecular genetics, role of genetics in medicine, agriculture and society.

Module II: Mendelism
Mendelian inheritance and its applications, Mendelian principles in human genetics and in agriculture.
Extension of Mendelism - Allelic variations, influence of environment on expression, penetrance and expressivity, epistasis, pleiotropy. Chromosomal basis of inheritance; sex linkage,, crossing over and chromosome mapping in eukaryotes.

Module III
Numerical changes and structural changes in chromosomes with emphasis on human disease/syndromes/plant breeding and genetic counseling.

Module IV
Mutation and mutagenic agents, types of mutations, economic importance of mutation

Module V
Concept of gene – classical and modern, psendoallelism, position effect, intragenic crossing over & complementation (cistron, recon & nutron) Benzer's work on r II locus in T_2 bacteriophage

Module VI: Genetics of Population
Hardy- Weinburg Law and its deviations

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Genetics, P.K. Gupta, Rastogi Publication
- Concepts of Genetics (Sixth Edition), William S. Klug and Michael R, Cummings, Pearson Education

References:

- Genetics, M.W. Strickberger, Prentice Hall College Division
- Genetics, P.J.Russell, Benjamin/Cummings
- Principles of Genetics, E J Gardner, John Wiley & Sons Inc.
- Genetics, R. Goodenough, International Thomson Publishing
- Introduction to Genetic Analysis, A.J. F. Griffiths, W.H. Freeman and Company
- Principles of Genetics, D.P. Snustad & M.J. Simmons, John Wiley and Sons Inc.
- Molecular Biology of the Gene (Fifth Edition), J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison – Wiesley Publishing

PLANT ANATOMY LAB

Course Code BLS2305 **Credit Units: 01**

Module-I
Microscopy, Photography, and Plant Diversity

Module-II
Experimental study of Plant Cells; Cell Walls and Pits; Shoot Apical Meristem; Shoot Apical Meristem

Module-III
Experimental study of Xylum, Phloem; Vascular Cambium and Wood

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ANIMAL ANATOMY LAB

Course Code: BLS2305 **Credit Units : 01**

Module-I
Study of permanent slides (mammalian tissues)

1. T. S. of long bone
2. Study of smooth, skeletal and cardiac muscle
3. T. S. of spleen
4. T.S. of thyroid gland
5. T. S. of pancreas
6. T.S. of adrenal gland

Module II
Preparation of stains

1. Ehrlich's Alum Haemotoxylin
2. Deafield's Harmatoxyin
3. Acetocarmine
4. Eosin

Modue III
Temporary mounting of buccal mucosa, skeletalmuscle, blood smear.

Module IV
Histological preparation : Fixation to section cutting and staining of a suitable mammalian tissue

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

CELL BIOLOGY AND GENETICS LAB

Course Code: BLS2306 **Credit Units : 01**

Course Contents:

Module I
Cell fractionation and separation of cell organelles by ultra centrifugation

Module II
Isolation of chloroplast from spinach

Module III
Isolation of mitochondria

Module IV
1. Study of gene interaction.
2. Study of bacterial conjugation.
3. Study of bacterial transduction.
4. Study of physical and chemical mutagens on growth of E. coli.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: BLS2332 **Credit Units: 04**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Syllabus - Fourth Semester

PLANT PHYSIOLOGY

Course Code: BLS2401 **Credit Units: 02**

Course Objective:
Course objective to provide the knowledge about plant physiology that should be useful to understand and apply different concepts of biotechnology

Course Contents:

Module I
Water relation, Ion and solute transport, Mineral nutrition and deficiency, Translocation in the phloem, Transpiration.

Module II
Photosynthesis, photochemical reaction, photophosphorelation and carbon fixation pathways: C3, C4 and CAM pathways.

Module III
Respiration, electron transport chain, oxidative phosphorylation, photorespiration, chemiosmotic theory and ATP synthesis.

Module IV
Plant growth and development, growth regulators (physiological effect), photoperiodism and flowering, vernalization and senescence.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Salisburry & Ross
- Teiz & Ziger
- Devlin & Withan

ANIMAL PHYSIOLOGY

Course code: BLS2402 **Credit Unit: 2**

Course Objective:
Course objective to provide the knowledge about animal physiology that should be useful to understand and apply different concepts of biotechnology

Course Contents:
Module I: Physiology of Digestive System
Composition and function of saliva, Mechanical and chemical digestion, Functions of pancreatic juices and biles, Absorption and distribution of food

Module II: Physiology of Cardiovascular System
Blood, Blood Groups and Blood Transfusion, Blood Clotting, Hemodynamics, Cardiac Cycle and its regulation,

Module III: Physiology of Neuromuscular System
Contraction and relaxation of muscle, Sarcomere, Cori's cycle, Organization of Nervous System, Neuron, Nerve Impulse, Synaptic Transmission, Neurotransmitters.

Module IV: Endocrine Physiology and Unrinogential System
Endocrine gland in mammals, general account of thyroid, parathyroid, pituitary, pancreatic islets, nephron, glomerular filteration, hormonal regulation of spermatogenesis, ovulation, fertilization and pregnancy.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Guyton, A.C. and Hall, J.E. Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. / W.B. Saunders Company.
- Tortora, G.J. and Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons, Inc.
- Ganong, H, Review of Medial Physiology 14th edition, Appleton &Lange Publisher, New York
- Shier, D., Butler, J. and Lewis, R., Hole's Human Anatomy and Physiology, (10th Edition) 2003. WCB/McGraw Hill, Boston.

MICROBIOLOGY

Course Code: BLS2403 **Credit Units: 03**

Course Objective:
To acquaint the students about the microbiology and role of various microorganisms in different biotechnological applications, various techniques for their cultivation and control

Course Contents:

Module I: Introduction and historical perspective
Discovery of microbial world, Concept of pure culture, Theory and practice of sterilization; Isolation of microorganisms, staining methods, microscopy, preservation of microbial cultures

Module II
Microbial Physiology: cell structure and function. Microbial growth: Growth curve, Enumeration of cells by direct and indirect methods, Microbial fermentations, Microbial Stress Responses**.**

Module III
Evolutionary microbiology and microbial diversity: Microbial evolution and systematics, prokaryotic diversity: bacteria and archea, eukaryotic microorganisms (structure of algae and fungi), microbial community analysis (overview), classical and molecular taxonomy.

Virology: Viruses and virions, growth and quantification, viral replication, viroids and prions, Bacterial, plant and animal viruses**,**

Module IV
Microbial Ecology Methods in microbial ecology (culture dependent and culture independent techniques), microbial habitats and nutrient cycling (Carbon, sulphur and nitrogen cycles), plant-microbes, animal-microbes interactions. Soil microorganisms associated with vascular plants, bioremediation and biodegradation.

Module V
Applied microbiology: Biocatalysts, microbial metabolites, wine production, single cell proteins, microbial transformation of steroids, role of microbes in food industry, production of dairy products (fermented milks and cheese), Role of microbes in Agriculture (biofertilizers, biopesticides), Waste water treatment.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Brock Biology of Microorganisms by Madigan, Martinko, Stahl, Clark, Publisher : 13th Edition, Prentice Hall
- General Microbiology by R.Y. Stainer et al. Publisher : McMillan
- Microbiology, Prescott and Dunn, C.B.S. Publishers

BIOSTATS & BIOINFORMATICS

Course Code: BLS2404 **Credit Units: 03**

Course Objective:
Course objective is to provide the knowledge that should be useful to understand different concepts of molecular properties of basic life molecules like proteins nucleic acids and their relative structure and function across the genus or kingdom

Module I:
Introduction to Molecular modeling, data bases for proteins and DNA – PDB and MMDB, structure file formats, visualizing structural information, advance structure modeling, Internal and external co-ordinate system, cartesian and cylindrical polar co-ordinate system, Potential energy calculations using semiempirical potential energy function,

Module II:
Software and Programmes for sequence comparision and analysis, Phylogenetics analysis software, Molecular Structure drawing tool,

Module III:
Molecular modeling/Docking, Molecular mechanics and dynamics, Knowledge base structure prediction, Molecular Design, structure similarity searching; Secondary structure prediction in proteins, prediction of buried residues in proteins

Module IV
Application of molecular modeling & computational biology/Bioinformatics in Agriculture, Human health, Environment, Biotechnology, Molecular Biology, Neurobiology, Drug Designing, Veterinary Science.

Module V: Introduction to the following Statistical terms
Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications.
Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.
Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means.
Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chisquare test, Coefficient of contingency, Yates' correction for continuity.
Analysis of Variance: One way and Two way (only Examples)

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.

***References*:**

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press.
- Biocomputing hypertext coursebook at http://www.techfak.unibielefeld.de/bcd/Curric/welcome.html/
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F. Ouellette, Wiley-interscience.
- Computational Modeling of Genetic and Biochemical Networks, J.M. Bower and H. Bolouri, MIT Press
- Computational Molecular Biology: An Algorithmic Approach, P.A. Pevzner, MIT Press
- Computer Methods for Macromolecular Sequence Analysis, R.F. Doolittle, J.N, Abelson, M.I. Simon, Academic press
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Introduction to Bioinformatics, T. Attwood and D. Parry-Smith, Prentice Hall
- Introduction to Computational Biology: Maps, Sequences and Genomes, M. Waterman, Chapman and Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. V. Heijne and G.V. Heijne, Academic Press
- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.
- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.

ECOLOGY & EVOLUTION

Course Code BLS2405 **Credit Units : 03**

Course Objective:
The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:
Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness

Module II: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems
Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem
Structure and function of an ecosystem
Producers, consumers and decomposers
Energy flow in the ecosystem
Ecological succession
Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity
Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels
India as a mega-diversity nation
Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution
Definition Causes, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution.
Pollution case studies.
Disaster management: floods, earthquake, cyclone and landslides.

Module VI: Social Issues and the Environment
From unsustainable to sustainable development
Urban problems and related to energy
Water conservation, rain water harvesting, watershed management
Resettlement and rehabilitation of people; its problems and concerns. Case studies.
Environmental ethics: Issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation
Consumerism and waste products
Environmental Protection Act
Air (Prevention and Control of Pollution) Act
Water (Prevention and control of Pollution) Act
Wildlife Protection Act
Forest Conservation Act
Issues involved in enforcement of environmental legislation
Public awareness

Module VII: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes
Environment and human health
Human Rights
Value Education
HIV / AIDS

Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

Module VIII: Field Work
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.
Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
Study of common plants, insects, birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	15	5	5	5	70

Text & References:

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

PLANT PHYSIOLOGY LAB

Course Code: BLS2406 **Credit Units: 01**

Plant Physiology

- Effects of plant growth hormones on rooting and shooting.
- Estimation of salicylic acid as secondary signaling molecule in plants
- Separation of photosynthetic pigments through thin layer chromatography
- Determination of Respiration Quotient (RQ)

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ANIMAL PHYSIOLOGY LAB

Course Code: BLS2406 **Credit Units: 01**

Animal Physiology

- Enumeration of red blood cells using hemocytometer.
- Estimation of haemoglobin using Sahli's hemoglobinometer.
- Preparation of haemin and hemochromogen crystals.
- Enumeration of total and differential count of white blood cells.
- Effect of pH on amylase activity from saliva.
- Biochemical analysis: carbohydrate, proteins and fats.
- Estimation of serum bilirubin (direct and indirect method).

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

MICROBIOLOGY LAB

Course Code: BLS2407 **Credit Units: 01**

Course Contents:

- Laboratory safety and instrument handling, General rules and regulations, Aseptic techniques, preparation of culture media for cultivation of specific microorganisms.
  Observation of permanent slides (*E.coli, Yeast, Sarcina, Streptococcus, Acid fast staining*)

- Isolation and enumeration of microorganisms from air, water and rhizosphere (actinomycetes, bacteria and fungi), serial dilution and viable plate counting methods, Use of differential, selective and enriched media.

- Staining techniques: Simple staining, differential Gram staining, endospore staining, lactophenol cotton blue staining for fungi

- Growth curve measurement of bacterial population by turbidometry

- Biochemical tests – Triple Sugar Iron test (TSI) , Indole test. Methyl red test. Voges proskaeur test, Citrate utilization test (IMViC), starch hydroysis, casein hydrolysis, catalase test

- Water microbiology- presumptive, confirmed and complete test for water potability.

Examination Scheme:

IA			**EE**			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Microbiology: A laboratory Manual, Seventh Edition, by: Cappuccino and Sherman
- Microbes in Action, Fourth Edition:by Harry W. Seeley, Cornell University; Paul J. Vandemark, late of Cornell University; John J. Lee,

Syllabus - Fifth Semester

MOLECULAR BIOLOGY

Course Code: BLS2501 **Credit Units: 03**

Course Objective:
The objective of the course is to provide a clear understanding of DNA (genetic material) so that they can manipulate it and understand basic tools and techniques involved in its manipulation. Strong foundation in molecular biology enables the students to familiarize themselves with Genetic engineering technology.

Course Contents:
Module I: DNA replication and repair
DNA structure, DNA replication; DNA repair mechanism,

Module II: Transcription of DNA
Transcription in prokaryotes and eukaryotes, RNA polymerase – Composition and function; transcription mechanism; transcription factor and their role, inhibition of RNA synthesis

Module III: Processing of RNA
Procession of ribosomal and transfer RNA"s processing of mRNA-5'cap formation; 3' polyadenylation ; RNA splicing , RNA editing , RNA degradation.

Module IV: Translation
Translation mechanism in prokaryotes and eukaryotes; ribosomes, initiation of translation, elongation, termination, amino acid activation; inhibitors, post translation modification of protein

Module V: Regulation of gene expression
Regulation in prokaryotes – repressors and negative control, positive control, role of c AMP, **Ampreceptor** protein, lac, tryp, His and ara operons, Regulation in Eukaryotes=promoters and enhancers, transcriptional regulatory protein, transcriptional activators, eukaryotic repressor.

Module VI: Gene Silencing
Antisense molecules; Biochemistry of ribozyme,
Hammer head, hairpin ribozymes. Application of antisense and ribozymes in genetic engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Concepts of Genetics, W.S. Klug, and M.R. Cummings 2004, Pearson Education

References:

- Genome, T.A. Brown, John Willey & Sons Inc.
- Molecular Biology of the Cell by Alberts Bruce, Bray Demos, and Watson James D.
- Gene VIII, Benjamin Lewin 2005, Oxford University Press
- Molecular Cell Biology, H. Lodish, A. Berk, S. Zipursky, P Matsundaira, D. Baltimore and J.E. Barnell, W.H. Freeman and Company.
- Molecular Cloning: A Laboratory Manual (3-Vilcume set), J. Sambrook, E.F. Fritsch and T. Maniatis, Cold spring Harbor Laboratory Press.
- Molecular Biology of the Gene, J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison-Wesley Publishing.
- Introduction to Practical Molecular Biology, P.D. Dabre, John Wiley and Sons Inc

BIOCHEMISTRY

Course Code: BLS2502 **Credit Units : 03**

Course Contents:

Module I: Chemical basis of Life
Composition of living matter; properties of water, properties of biomolecules in aqueous environment; biomolecular interactions; bioenergetics

Module II: Carbohydrates
Structure and functions of carbohydrates; carbohydrate metabolism: glycolysis, Kreb's cycle, phosphogluconate pathway, glyoxlate pathway, pentose phosphate pathway, Cori cycle, Gluconeogenesis and glycogenolysis and its regulation. Oxidative phosphorylation. Major metabolic disorders of carbohydrate metabolism: diabetes.

Module III: Amino acids and Proteins
Structure and functions of amino acid and proteins; Overview of amino acid biosynthesis, Major metabolic disorders of amino acid metabolism, biological Nitrogen fixation; structure and functions of vitamin derivative co-factors;.

Module IV: Lipids
Structure and functions of lipids and derivative lipids: glycerols, fatty acids, waxes, phospholipids, aphingolipids, lipoproteins. Biosynthesis and oxidation of fatty acids; Cholesterol synthesis; formation of ketone bodies.

Module V: Nucleotide Metabolism
Structure and functions of nucleic acids DNA and RNA. De novo and salvage pathways for synthesis of pyrimidine and purine nucleotides; purine degradation, pyrimidine breakdown; Major metabolic disorders of nucleotide metabolism Gout, Lesch-nuhan syndrome, immuno deficiency)

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Principles of Biochemistry, Latest Edition, A.L. Lehninger, D.L. Nelson, M.M. Cox. , Worth Publishing
- Biochemistry By Mathews, Van Holde ,
- Text book of Biochemistry by Devlin.
- Textbook of Biochemistry by Metzler

IMMUNOLOGY

Corse Code: BLS2503 **Credit Units: 03**

Course Objective:
Role of antibody engineering in biomedical applications and the importance of immuno genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I
Historical perspective of immune system and immunity; Innate and specific immunity, Humoral immunity, Cell-mediated immunity

Module II
Antibody structure in relation to function and antigen-binding; Types of antibodies and their structures: isotypes, allotypes, idiotypes; Genetic basis of antibody diversity

Module III
The organs and cells of the immune system; Histocompatibility: structure of MHC class I, II & III antigens & their mode of antigen presentation, MHC restriction; Antigens & antigenicity;

Module IV
Measurement of antigen – antibody interaction: agglutination, immunodiffusion, immuno-electrophoresis, ELISA, RIE, production of monoclonal antibodies.

Module V
Complement system; Autoimmunity; Hypersensitivity

Module VI:
Hybridoma Technology; Introduction to transplantation immunology, Introduction to Cancer immunology, Vaccines (attenuated and recombinant);

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text:
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Freeman

References:
- Immunology, Roitt, Mosby – Yearbook Inc.
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.

BIO-ANALYTICAL AND BIOPHYSICAL TECHNIQUES

Course Code: BLS2504 **Credit Units: 02**

Course Objective:
The students will be exposed to basic concepts related with techniques and instrumentation widely used in Biotechnology.

Course Contents:

Module I: Buffers & Sample preparation
Preparation of solutions, concept of pH and buffer, types of buffers and their preparation, pH meter. Cell Disruption techniques, ultra filtration, dialysis and reverse osmosis.

Module II: Centrifugation
Principle of centrifugation, rotors, different types of centrifuges, ultra centrifugation.

Module III: Microscopy
Principles of microscopy, types of microscopy Bright field, Dark field, phase contrast and fluorescence microscopy. Electron microscopy: Transmission and scanning electron microscopy.

Module IV: Radioisotope techniques
Study of radioisotopes in biological samples, proportional and GM counter, scintillation counters, autoradiography.

Module V: Electrophoresis & Chromatography
SDS-PAGE, isoelectric focusing, two-dimensional electrophoresis; Paper, TLC, gel filtration, ion-exchange chromatography, affinity chromatography, HPLC and GLC

Module VI: Spectroscopy
UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:
- Advanced Instrumentation, Data Interprtation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wiley and Sons Ltd.

BIOMATERIALS

Course Code: BLS2505 **Credit Units : 02**

Module I
Introduction to biomaterials: definition, classification, properties and requirements

Module -II
• Biomaterials used in medicine: ceramics, polymers, metals, composites
• Bone tissue engineering scaffolds

Module -III
Applications of biomaterials in medicine
• Sterilisation
• Surface modification of biomaterials
• Medical imaging
• Bioreactors
• Medical Device/ Advanced Therapy Medicinal Product
• Good Manufacturing Practice facilities

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

MOLECULALR BIOLOGY LAB

Course Code: BLS2506 **Credit Units: 01**

Course Contents:

1. Isolation of genomic DNA.
2. Isolation of plasmid DNA.
3. Isolation of eukaryotic total RNA.
4. Study of in vitro transcription.
5. Invitro study of translation

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

IMMUNOLOGY LAB

Course Code: BLS2507 **Credit Units: 01**

Module I
Blood film preparation and identification of cells.

Module II
Isolation of serum, Purification of lgG through affinity chromatography

Module III
Lymphoid organs and their microscopic organization.

Module IV
WIDAL Test

Module V
Radial Immuno Diffusion Test; Ouchterlony Double diffusion Test

Module VI: ELISA
Dot, Sandwich

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

BIOCHEMISTRY AND BIOANALYTICAL LAB

Course Code: BLS2508 **Credit Units: 01**

Module I: Solutions and buffers
Preparation of molar, normal and % (w/v) solutions. preparation of buffers of different pH and molar strength.

Module II: Carbohydrates
Extraction and estimation of carbohydrates from given plant/animal materials: determination of total sugars by Anthrone method Separation of sugars by thin layer chromatography

Module III: Proteins
Extraction of total proteins; Estimation of proteins by Lowery/ Bradford Method; Elctrophoretic (SDS-PAGE) separation of isolated proteins

Module IV: Lipids
Extraction of total lipids; estimation of phospholipids/glycolipids; thin layer chromatographic separation of lipids

Module IV: Nucleic Acid
Extraction and estimation of DNA and RNA by UV-spectrophotometer

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:
- Practical book of Biochemistry by Plummer
- Practical book of Biochemistry by S.K. Sawhney and Randhir Singh

SUMMER INTERSHIP PROJECT (EVALUATION)

Course Code: BLS2535 **Credit Units: 04**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Syllabus - Sixth Semester

RECOMBINANT DNA TECHNOLLOGY

Course Code: BLS2601 **Credit Units: 03**

Course Objective:
A complete understanding of molecular techniques can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Course Contents:

Module I
Restriction endonuclease, methyltransferase, ligase, polymerase, kinase, phosphatase, nuclease, transferase, reverse transcriptase.

Module II
Cloning vectors: Plasmids, bacteriophages (Lambda and M13), phagemids, cosmids, artificial chromosomes (YAC, BAC). expression vectors (Bacteria and yeast); Basic cloning strategy and screening clones; Gene libraries

Module III
Blotting techniques and hybridization: Southern, Northern and Western blotting techniques. Radioactive and non-radioactive probes.

Module IV
Principles of PCR, types of PCRs and its applications

Module V
DNA sequencing (Maxam Gilbert, Sanger's and automated), protein engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc.
- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company.

References:

- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press.
- Molecular and Cellular Cells Methods in Biology and Medicine, P.B Kaufman, W. Wu, D. Kim and C.J. Cseke, CRC Press.
- Milestones in Biotechnology: Classic Papers on Genetic Engineering, J.A. Bavies and W.S. Reznikoff, Butterworth Heinemann.
- Gene Expression Technology, D.V. Goeddel in Methods in Methods in Enzymology, Academic Press Inc.
- DNA Cloning: A Practical Approach, D.M. Glover and B.D. Hames, IRL Press.
- Molecular Cloning: A Laboratory Manual, J. Sambrook, E.F. Fritsch and T. Maniatis, Cold Spring Harbor Laboratory Press.

GENOMICS AND PROTEOMICS

Course Code: BLS2602 **Credit Units: 03**

Course Objective:
The course helps in developing a detailed understanding of eukaryotic genome complexity and organization. Current research on the molecular basis of the control of gene expression in eukaryotic system has developed a detailed understanding of techniques of gene diagnostics and DNA profile to acquire the fundamentals of genomics and Proteomics.

Course Contents:

GENOMICS

Module I: Genome Evolution
Origin of genomes, functional genomics. Forward genetics

Module II: Structural Genomics
Chromosome structure and Genome organization, Genome sequencing methods, Gene identification Genome annotation methods

Module III: Comparative Genomics
Phylogeny, COGS [Cluster of orthologues genes], paralogues and gene displacement.

Module IV: Functional Genomics
ESTs, SAGE, DNA Microarrays, Application of Microarrays, Real Time PCR

Module V: Genotyping Background and Applications.
Genetic and physical mapping: Introduction to molecular markers-RFLP, RAPD, AFLP, SSRs. Genetic and physical maps, FISH for genome analysis, DNA fingerprinting; Single nucleotide polymorphisms, RNA interference, antisense RNA, siRNA, miRNA, ; Human Genome Project.

PROTEOMICS

Module VI
Basics of Proteomics: Protein preparation and Separation, 2D Gel Electrophoresis,
mass spectrometry, post translation modification.
Protein-Protein Interaction, Protein Microarray, Application of Microarray in proteome analysis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette,
- John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs, T. Lengauer, John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press
- DNA Microarrays: A Practical Approach, M. Schlena, Oxford University Press.
- Genomes II, T.A. Brown
- Biotechnology and Genomics by P.K.Gupta

References:

- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology : Principles and Practice, Arthur M. Lesk
- DNA : Structure and Function, Richard R. Sinden
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller
- Gene Cloning and DNA Analysis – An introduction (Fourth Edition), T.A. Brown
- Genes & Genomes, Maxine Singer and Paul Berg
- Essential of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Functional Genomics – A Practical Approach, S.P. Hunt and R. Livesey, Oxford University Press
- Proteomics, T. Palzkill, Kluwer Academic Publishers
- Statistical Genomics: Linkage, Mapping and QTL Analysis, B. Liu, CRC Press.

Genome II by T.A.Brown

IPR, BIOSAFETY AND BIOETHICS

COURSE CODE: BLS2603 **Credit Units: 02**

Course Objective:
The objectives of the course are to explain the biosafety and bioethics. Students will study and assess biosafety, and bioethics related to genetically engineered plant, animal and microbial products.

Course Contents:
Module I: Biotechnology and Intellectual Property Rights
Biotechnology and the Law- Objective, Evolution, Basic Structure of Gene Techniques, Applications, Commercial Potential of Biotech Inventions, Rationale for Intellectual Property Protection. Patenting Biotechnology Inventions-Objective, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions. Plant Varieties Protection-Objectives, Justification, International Position, Plant Varieties Protection in India Protection of Geographical Indications Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Protection of Traditional Knowledge- Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Prospecting and Bio-Piracy, Alternative ways, Protectability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library.

Module II: Biosafety
Definition and requirement; biosafety in relation to human health, environment, transgenic research and applications, biosafety laws, guidelines and conventions, biosafety regulation: principles and practices in microbial and biomedical labs, guidelines for research involving DNA molecule ; Regulation bodies at National and International level

Module III: Bioethics
Defination of bioethics, importance of bioethics, Bioethics in plant, animal and microbial genetic engineering, Ethical issues in healthcare, Biopiracy and ethical conflicts Legal and socioeco'nomic impact of the products and techniques in Biotechnology,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- *Coyles information highway handbook;* A Practical File on the New Information Order, American Library Association, 2000.
- *American Indian Cultural & Research Journal (UCLA)*

References:
- Refer to Periodicals, Industry directories, Articles and report in journals on the regulatory issues,
- "Biotechnology" series by Rehm & Reed.

APPLIED BIOLOGY

Course Code: BLS2604 **Credit Units: 03**

Course Contents:

Module I

Introduction to fermentation, the fermentation industry, Production process batch and Continuous system of cultivation, Solid-state fermentation

Module II

Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III

Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV

Production of fermented dairy products

Module V

Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Industrial Microbiology – Cassida

References:

- Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescot & Duhn.

RECOMBINANT DNA TECHNOLOGY LAB

Course Code: BLS2605 **Credit Units: 01**

Course Objective:
The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I
Study of cloning

Module II
Study of PCR

Module III
Study of Southern hybridization

Module IV
Study of RAPD

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

APPLIED BIOLOGY LAB

Course Code: BLS2606 **Credit Units: 01**

Course Contents:

Module I
Conventional filtration and membrane based filtration

Module II
Protein precipitation and recovery

Module III
Aqueous two-phase separation

Module IV
Ion exchange chromatography

Module V
Gel Permeation chromatography

Module VI
Electrophoresis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:
Text:
- Practical Biochemistry, Sawhney and Singh

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Chromatographic and Membrane Processes in Biotechnology, C.A. Costa and J.S. Cabral, Kluwer Academic Publisher
- Protein Purification, M.R. Lodisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

PLANT SCIENCES-I

Course Code: BTH2101 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize the students with the classification, morphology, reproduction and economic importance of various groups of lower plants which will provide the basic knowledge for the employment of these plants to study plant biotechnology.

Course Contents:
Module I
General accounts of plant diversity, theory of evolution and classification of plants , concept of species, three domains of life- Archaea, Bacteria and Eukaryota. Evolutionary relationship among the three domain with an example.

Module II
Outline classification of algae (Based on classical and molecular concepts), occurrence, types of cell structure ,thallus organization (both fresh water algae and marine algae) and mode of reproduction in algae. Alternation of generation
Important features of life cycle of *Nostoc*, *Anabaena*, *Chlamydomonas*,*OedogoniumChara*, *Sargassum, and Polysiphonia*
Algae as sourceof food, nutritional supplements, chemical, drug, fertilizer and biofuels.

Module III
General characters and classification of fungi, modes of nutrition, diversity in cell structure and mode of reproduction.
Life cycle of*Phytopthora,Aspergillus,PucciniaAgaricus and Alternaria*.
Importance of fungi as food, medicine and its role as pathogen.
Lichens and Mycorrhiza : salient features and economic importance.

Module IV
Interrelationship and diversity in Bryophytes, classification, structure of thallus (Gametophytes and sporophytes), alternation of generation.
Life cycle of *Marchantia*, and *Anthoceros*
Economic importance of Bryophytes and their role as ecological indicators.

Module V
Morphological diversity and classification of pteriodophytes, reproduction and salient feature of *Selaginella,Equisetum*and *Marsilea* .
Heterospory and evolution of seed habit, telome theory, stellar evolution. Phylogeny and evolution of eusporangiates and leptosporangiates.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- College Botany Vol. I and II, Ganguli and Kar: New Central Book Agency.
- A Text Book of Botany, V. Singh, P.C. Pande& D.K. Jain: Rastogi Publication.
- The Algae, V. J. Chapman and D. J. Chapman.: Macmillan, London.
- Introductory Phycology, H. D. Kumar:East West Press Pvt. Ltd.
- A Text Book of Algae, H. D. Kumar and H.N. Singh.: McMillan International
- Introductory Mycology, Alexopaulos, Mims and Blackwell: John Wiley and Sons Inc.
- Cryptogamic Botany, G. M. Smith. McGraw Hill
- A Text book of Algae, B. R. Vashishtha S. Chand and Co. Pvt. Ltd.
- Bryophytes, N. S. Parihar Central Book Depot.
- Pteridophytes, N. S. PariharCentral Book Depot.

ANIMAL SCIENCES-I

Course Code: BTH2102 **Credit Units: 03**

Course Objective:
The main objective of this course is to introduce characteristics and variation among different phylum of Invertebrates from Protozoa to Echinodermata.

Course Contents:
Module I: Diversity among Invertebrates
Binomial classification of invertebrates and salient features of each phylum.

Module II: Lower Invertebrates
General characteristics of Protozoa.Amoeba as a model to study protozoan characters.Parasitic amoeba.
General characteristics of Porifera.Sycon as a model to study poriferan characters.Study of canal system and spicule formation among sponges.
General characteristics of Coelentrata.Hydra as a model to study morphology, anatomy and locomotion, reproduction.Polymorphism in siphonophora.
General characteristics of Helminths. Reproduction, life-cycle and parasitism of Taenia (Tape worm)

Module III: Higher Invertebrates
General characteristics of Annelida. Earth worm: Morphology, anatomy, nervous system,locomotion, reproduction and physiology..
General characteristics of Arthropoda.Life cycle of Cockroach : Morphology, appendages, respiration, nervous system, circulation, excretion.
General characteristics of Mollusca.Pila:
General characteristics of Echinodermata.Life cycle of Starfish: Water vascular system,

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Jordan, E.K. and Verma, P.S., Invertebrate Zoology. S. Chand & Co. New Delhi.
- Kotpal, R.L., Refer to the series on Protozoa, porifera, Coelentrta, Annelida, Arthropoda, Mollusca, Echinodermata. Rastogi Publication, Merrut.
- Parker, T.J. and Haswell, W.A., Text Book of Zoology Vol 1. AZT BS Publisher, New Delhi.
- Borradile, L.A. and Potts, F.A., Invertebrate Zoology, Cambridge Press, UK.
- Dhami, P.S. and Dhami, J.K., Invertebrate Zoology, S Chand & Co. New Delhi.

COMPUTER APPLICATIONS

Course Code: BTH2103 **Credit Units: 03**

Course Objective:
To provide computer skills and knowledge for commerce students, and to make them complacent with the use of new tools of IT

Course Contents:
Module I
General features of a Computer. Generation of computers. Personal Computer, Workstation, Mainframe Computer and super Computers.Computer applications – data processing, information processing, Application areas of computer.
Module II
Computer organization.Central processing module. Computer memory- primary memory and secondary memory.Secondary storage devices – magnetic and optical media. Input and output modules. OMR, OCR, MICR, scanner, mouse, Modem.
Module III
Computer hardware and software. Machine language and high level language. Application software. Computer program. Operating system. Computer virus, Antivirus and Computer security, Windows OS and its features.
Computer arithmetic. Binary, octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of database and its applications.

Module IV
Introduction to MS office Packages- Ms-Word – Editing a Document – Move and Copy text – Formatting text and paragraph – Finding and Replacing text and spelling checking – Using tabs, Tables, and other features, Enhancing document – using mail merge and other features.
Introduction to Worksheet- Getting started with excel – Editing Cells and using commands and functions – Moving And Coping, Inserting and Deleting Rows and Columns – Getting help and formatting a worksheet – Printing the worksheet – Creating Charts – using formulae and functions in excel.
Introduction to Power Point Presentation
Module V
Computer Networks & Internet Technology

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination
Text & References:

- Craig Stinson "Running Microsoft Windows-98" – Microsoft press.
- Joshua C. Nossiter. " Using Excel – 5 for Windows"
- "Working with Word" – Aptech Computer Education
- "Power Point Presentation" – Aptech Computer Education.
- Malhotra, Computer Applications in Business
- Rajaraman V, Analysis and Design of Information System, Prentice Hall of India, New Delhi
- Murdick, RG and Ross, JE Information Systems for Modern Management
- Kanter, J, Management Oriented MIS, Prentice Hall of India
- Bhattacharya SK, Management Planning and Information Systems

PLANT SCIENCES- I LAB

Course Code: BTH2104 **Credit Units: 01**

Course Contents:

Module I
Microscopic study of C*hlamydomonas, Volvox, Spirogyra, Chara*and*Polysiphonia*(Fresh preparations and permanent slides)

Module II
Fresh microscopic preparation of *Aspergillus* and *Agaricus.*

Module III
Microscopic study of fresh preparations of Riccia, Marchantia and Anthoceros.

Module IV
Microscopic study of fresh preparations of *Selaginella,Equisetum* and *Marsilea*.

Study algal diversity of pond water.

Module VII
Study of soil fungal diversity.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ANIMAL SCIENCES-I LAB

Course Code: BTH2105 **Credit Units: 01**

Course Contents:

1) Preparation of slides of amoeba, paramecium.

2) Dissection of earthworm and digestive system of earth worm

3) Dissection of cockroach and glycerin preparation of mouth parts.

4) Dissection of Pila.

5) Use specimens and permanent slides.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

COMPUTER APPLICATIONS LAB

Course Code: BTH2106 **Credit Units: 01**

Course Contents:

1. Introduction to computers and its peripherals
2. Introduction to Word and its application
3. Introduction to Excel and its application
4. Introduction to Powerpoint and its application
5. Introduction to paint and its application
6. Introduction to internet and its application

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

MICROBIAL BIOTECHNOLOGY

Course Code: BTH2107 **Credit Units: 03**

Course Objective:
The basic knowledge of Microbiology gained in the previous semester would the applied in the various disciplines like evolution, Immunology & Industrial fermentation**.**

Course Contents:
Module I
Microbial nutrition and growth -The definition of growth, growth curve, measurement of growth and growth yields, synchronous growth, culture collection and maintenance of cultures.

Module II
Microbial evolution, systematics and taxonomy - new approaches to bacterial taxonomy,

Module III
Host-parasite relationship (Normal micro flora of skin, oral cavity, gastrointestinal tract), types of toxins (Exo,endo, entero) and their mode of actions,

Module IV
Microbes in extreme environments: Archae as the earliest forms, thermophiles, pychrophiles, halophiles, alkalophiles, acidophiles, hyperthermophiles.

Module V
Introduction to industrially important microbes and microbial fermentative products (Production of antibiotics with special reference to penciliin& streptomycin, enzymes, biotransformation of steroids), food products from microbes (Dairy & SCP etc)

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text:
- The Microbial World, Roger Y. Stanier, Prentice Hall
- Microbiology, Prescott and Dunn, C.B.S. Publishers

References:
- General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L.Wheelis and P.R. Painter, Macmillian
- Microbiology VI Edition, M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill
- Principles of Microbiology, R.M. Atlas, Wm C. Brown Publisher.
- The microbes – An Introduction to their Nature and Importance, P.V. Vandenmark and B.L. Batzing, Benjamin Cummings.
- Microbiology, Tortora, Funke and Chase, Benzamin& Cummings
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International

FOOD BIOTECHNOLOGY

Course Code: BTH2108 **Credit Units: 03**

Course Objective:
This course will provide a broad grounding in concepts, techniques and issues involved in food products and their processing.

Course Contents:

Module I: Introduction
Scope and importance of food industry; Concept of 'functional food'; Advances and trends, ethical issues, quality control, legislation, FDA & FPO (India), RDT and other technologies involved in development of food products; GM food and GM crops.

Module II: Techniques used in Food Industry
Sterilization, isolation, screening and strain improvement, cell harvesting and disruption, recovery and purification, production of organic acids – citric acid, lactic acid and acetic acid;

Module III: Dairy Biotechnology
Starter cultures, prebiotics, probiotics – their use as flavor enhancers and disease/ infection combats, applications in production of cheese, butter, ice-cream, yoghurt; Modified milk proteins.

Module IV:Microbial, Plant and Animal Biotechnology
Production of SCP (Single cell protein), production of baker's yeast, brewing industry, applications of transgenic plants in food production, transgenic fish, and transgenic poultry.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

***Text*:**
- Food Biotechnology - 2. 1988. R.D. King and P.S.J. Cheetham (Eds.). Elsevier Applied Science, NY.

***References*:**
- Introduction to Food Biotechnology. Green, Perry Johnson. 2002. CRC Press, Boca Raton, Florida.
- Food Biotechnology-Techniques and Applications. Gauri S. Mittal. 1992. Technomic Publishing Co., Inc., Lancaster, PA.

AGRICULTURE BIOTECHNOLOGY

Course Code: BTH2109 **Credit Units: 03**

Course Objective:
The agriculture plant biotechnology course basically meant for understanding the basic techniques of plant tissue culture and genetic engineering in plants along with the latest ongoing research on the different aspects of plants and its products to redefine agriculture priorities and produce human resource with academic, scientific and technical expertise along with management or business experience.

MODULE I Plant Regeneration Technologies
Introduction and historical perspective, organ culture, cell suspension, organogenesis, somatic embryogenesis, micropropagation, anther and ovary culture-haploid production, embryo culture and rescue, protoplast culture, somatic hybridization and cybrids.

MODULE II Transgenic Plants Technology
Genetic Transformation, Methods for gene transfer in plants, Molecular mechanism of *Agrobacterium* mediated transformation. Selectable markers, Reporter gene and Promoters used in plant transformation vectors.

MODULE III Industrial and Agricultural Application
Biotic stress tolerance;insect, pest and pathogen resistance. Abiotic stress tolerance; salt, water and drought tolerance. Herbicide tolerance. Molecular farming

Examination Scheme:

Components	**H/S**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

References

1. Plant Biotechnology: The Genetic Manipulation of Plants. A. Slater, N. W. Scott and M. R. Fower.2008. Oxford University Press
2. Recent Advances in Plant Biotechnology: AraKirakosyan and Peter B. Kaufan. 2009. Springer
3. Plant Tissue Culture: Theory and Practice. S.S. Bhojwani and M.K.Razdan. Elsevier Health Science
4. An Introduction to Plant Tissue Culture. M.K. Razdan. Oxford and IBH Publishing.

TERM PAPER

Course Code: BTH2131 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:
1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of materials
a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper
a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing &preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
f) Show evidence of what an author has said.
g) Avoid misrepresentation through restatement.
h) Save unnecessary writing when ideas have been well expressed by the original author.
i) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document].Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTH2132 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTH2133 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the trainer in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the trainer.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus – Second Semester

PLANT SCIENCES-II

Course Code: BTH2201 **Credit Units: 03**

Course Objective:
The objective of this course is to a acquaint the students with the details of classification of gymnosperms and angiosperms, taxonomy of angiosperms, anatomy, embryology, ecology and plant pathology which will make a strong foundation so that students can explore this knowledge for further biotechnological studies and research.

Course Contents:
Module I:
Gymnosperms General characteristics, affinities and classification of Gymnosperms morphology and development reproductive structures of the following taxa-*Cycas, Pinu*

Module II
Taxonomy of Angiosperms
Classification of angiosperms as proposed by Bentham and Hooker and Hutchinson, merits, demerits and comparison Binomial Nomenclature

Module III
Economic importance of family: Cucurbitaceae Apiaceae, Apocynaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae, and Poaceae.

Module IV
Embryology
Structure of anther, microsporogenesis and development of the male gametophyte.Structure of Ovule, megasporogenesis and development of the female gametophyte e.

Module V
Plant Pathology
General Symptoms of fungal, bacterial and viral diseases and their control.Disease cycles of the following diseases, Loose smut of wheat, Rust of wheat, Late blight of potato

Module VI
Plant Anatomy
Meristems.Anatomy of root, stem and leaf, Root-stem transition, structure and function of cambium in root and stem.

Module VI
Ecology Ecosystem– abiotic and biotic factors, food chain, food web, ecological pyramids. Energy flow and productivity. Ecological niche and Ecological succession
Examination Scheme:

Components	H/S	A	CT	EE
Weightage (%)	10	5	15	70

ANIMAL SCIENCES-II

Course code: BTH2202 **Credit Units-03**

Objectives
This paper will provide the conceptual knowledge about Vertebrates, which includes from Pisces to Mammals. This paper will be helpful to understand the variations from one class to another. The knowledge gained from this subject will be helpful for students to realise the significance of animal sciences towards its applications in modern biotechnology.

Course Contents:

Module I:
Origin and features of Chordates and Vertebrates. Salient features and outline classification of Phylum Chordataupto order with suitable examples. General Characters and affinities of Hemichordata, Cephalochordata & Urochordata.

Module II:
Pisces: Salient features of class Pisces. Respiration and Gills, Osmoregulation, Fish scales. Induced breeding and seed production of economically important fishes.

Module III:
Amphibia: Salient Features of Class Amphibia, Circulation, Respiration, Reproduction and Hibernation.

Module IV:
Reptiles: Salient features of Class Reptilia, Poisonous and non- poisonous snakes, Poison apparatus and biting mechanism of snakes. Snake venom:
Module V:
Aves: Salient features of Class Aves. Flight adaptations, aerodynamics of flight and migration in birds.

Module VI:
Mammals: Salient features of Prototheria, Metatheria and Eutheria. Rabbit as model for Class Mammalia.

Examination Scheme:

Components	**H/S**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

References:
1. Jordan E.L. and P.S. Verma 1995. Chordata Zoology and Elements of Animal Physiology. S. Chand and Co., New Delhi.
2. Kotpal R.L. 1992. Vertebrata, Rastogi Publications, Meerut.
3. Nigam.H.C. 1983 Zoology of Chordates, Vishal publications, Jalandhar.
4. Waterman, Allyn J. et al.1971, Chordate Structure and functions. Mac.Millan and Co., New York.

ANIMAL PHYSIOLOGY

Course code: BTH2203 **Credit Units: 02**

Course Objective:
Course objective to provide the knowledge about animal physiology that should be useful to understand and apply different concepts of biotechnology.

Course Contents:
Module I: Physiology of Digestive System
Composition and function of saliva, Mechanical and chemical digestion, Functions of pancreatic juices and biles, Absorption and distribution of food

Module II: Physiology of Cardiovascular System
Blood, Blood Groups and Blood Transfusion, Blood Clotting, Hemodynamics, Cardiac Cycle and its regulation,

Module III:Physiology of Neuromuscular System
Contraction and relaxation of muscle, Sarcomere, Cori's cycle, Organization of Nervous System, Neuron,
Nerve Impulse, Synaptic Transmission, Neurotransmitters.

Module IV: Endocrine Physiology and Unrinogential System
Endocrine gland in mammals, general account of thyroid, parathyroid, pituitary, pancreatic islets, nephron, Glomerular filteration, hormonal regulation of spermatogenesis, ovulation, fertilization and pregnancy.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Guyton, A.C. and Hall, J.E. Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. / W.B. Saunders Company.
- Tortora, G.J. and Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons, Inc.
- Ganong, H, Review of Medial Physiology 14th edition, Appleton &Lange Publisher, New York
- Shier, D., Butler, J. and Lewis, R., Hole's Human Anatomy and Physiology, (10th Edition) 2003. WCB/McGraw Hill, Boston.

PLANT PHYSIOLOGY

Course code: BTH2204 **Credit Units: 02**

Course Objective:
Course objective to provide the knowledge about plant physiology that should be useful to understand and apply different concepts of biotechnology

Course Contents:

Module I
Water relation, Ion and solute transport, Mineral nutrition and deficiency, Translocation in the phloem, Transpiration.

Module II
Photosynthesis, photochemical reaction, photopho sphorelation and carbon fixation pathways: C3, C4 and CAM pathways.

Module III
Respiration, electron transport chain, oxidative phosphorylation, photorespiration, chemiosmotic theory and ATP synthesis.

Module IV
Plant growth and development, growth regulators (physiological effect), photoperiodism and flowering, vernalization and senescence.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Salisburry& Ross
- Teiz&Ziger
- Devlin &Withan

PLANT SCIENCES-II LAB

Course code: BTH2205 **Credit Units: 01**

Course objective:
Course objective is o provide the knowledge about plant science that should be useful to understand and apply different concepts about the diversity and complexity of plants.

Course Contents:

Module I:
Gymnosperms Study of the Gymnosperms like*Cycas, and Pinus* by cutting sections and making suitable temporary preparations.

Module II:
Taxonomy *Detailed description and identification of locally available plants of the families as prescribed in theory course.*

Module III:
Plant Anatomy Anatomy of normal dicot and monocot roots, stems & leaves.

Module IV:
Embryology Study of permanent slides of the:
a) T.S. anther, pollen, germinating pollen
b) L.S. ovule types
c) Endosperm
d) Embryos
e) L.S. caryopsis
f) Dissection of embryo

Module V:
Plant Pathology Examination of local diseased plants representing bacterial, viral, fungal parasites. Study of symptoms caused by parasites, study of selected diseased specimen (mentioned under theory) through specimens, temporary presentations.

Module VI:
Ecology Measurement of temperature (Soil).Demonstration of Soil texture, carbonate, sulphate, pH., soil moisture percentage.A comparative study of plants (with external and internal characters) to water availability.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ANIMAL SCIENCES-II LAB

Course Code: BTH2206 **Credit Units: 01**

Course objective: Course objective is o provide the knowledge about plant science that should be useful to understand and apply different concepts about the diversity and complexity of animals.

Course Contents:

Module I:
Study of different types of scales in fishes, permanent preparations of scales. Internal ear Different types of important edible fishes of India

Module II:
Study of *Ranatigrina*, physiological systems through model

Module III:
Hyoid apparatus of home lizard, Demonstration of biting mechanism by using model

Module IV:
Development of chick up to formation of primitive streak

Module V:
Mice: Arterial system and reproductive system.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

PLANT PHYSIOLOGY LAB

Course Code: BTH2207 **Credit Units: 01**

Plant Physiology

- Effects of plant growth hormones on rooting and shooting.
- Estimation of salicylic acid as secondary signaling molecule in plants
- Separation of photosynthetic pigments through thin layer chromatography
- Determination of Respiration Quotient (RQ)

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ANIMAL PHYSIOLOGY LAB

Course Code: BTH2208 **Credit Units: 01**

Animal Physiology

- Enumeration of red blood cells using hemo cytometer.
- Estimation of haemoglobin using Sahli'shemoglobinometer.
- Preparation of haemin and hemochromogen crystals.
- Enumeration of total and differential count of white blood cells.
- Effect of pH on amylase activity from saliva.
- Biochemical analysis: carbohydrate, proteins and fats.
- Estimation of serum bilirubin (direct and indirect method).

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

MOLECULAR MODELING

Course Code: BTH2209 **Credit Units: 03**

Course Objective:
Course objective is to provide the knowledge that should be useful to understand different concepts of molecular properties of basic life molecules like proteins nucleic acids and their relative structure and function across the genus orkingdom

Module I:
Introduction to Molecular modeling, data bases for proteins and DNA – PDB and MMDB, structure file formats, visualizing structural information, advance structure modeling, Internal and external co-ordinate system, cartesian and cylindrical polar co-ordinate system, Potential energy calculations using semiempirical potential energy function,

Module II:
Software and Programmes for sequence comparision and analysis, Phylogenetics analysis software, Molecular Structure drawing tool,

Module III:
Molecular modeling/Docking, Molecular mechanics and dynamics, Knowledge base structure prediction, Molecular Design, structure similarity searching; Secondary structure prediction in proteins, prediction of buried residues in proteins

Module IV
Application of molecular modeling & computational biology/Bioinformatics in Agriculture, Human health, Environment, Biotechnology, Molecular Biology, Neurobiology, Drug Designing, Veterinary Science.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.

***References*:**

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press.
- Biocomputing hypertext coursebook at http://www.techfak.unibielefeld.de/bcd/Curric/welcome.html/
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F. Ouellette, Wiley-interscience.
- Computational Modeling of Genetic and Biochemical Networks, J.M. Bower and H. Bolouri, MIT Press
- Computational Molecular Biology: An Algorithmic Approach, P.A. Pevzner, MIT Press

- Computer Methods for Macromolecular Sequence Analysis, R.F. Doolittle, J.N, Abelson, M.I. Simon, Academic press
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Introduction to Bioinformatics, T. Attwood and D. Parry-Smith, Prentice Hall
- Introduction to Computational Biology: Maps, Sequences and Genomes, M. Waterman, Chapman and Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. V. Heijne and G.V. Heijne, Academic Press

BIO-SAFETY & BIOETHICS

Course Code: BTH2210 **Credit Units: 03**

Course Objective:
The objectives of the course are to explain the biosafety and bioethics. Students will study and assess biosafety, and bioethics related to genetically engineered plant, animal and microbial products.

Course Contents:

Module I: Biosafety
Definition and requirement; biosafety in relation to human health, environment, transgenic research and applications, biosafety laws, guidelines and conventions, biosafety regulation: principles and practices in microbial and biomedical labs, guidelines for research involving DNA molecule ; Regulation bodies at National and International level

Module II Bioethics
Defination of bioethics, importance of bioethics, Bioethics in plant, animal and microbial genetic engineering, Ethical issues in healthcare, Biopiracy and ethical conflicts Legal and socioeco'nomic impact of the products and techniques in Biotechnology,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- *Coyles information highway handbook;* A Practical File on the New Information Order, American Library Association, 2000.
- *American Indian Cultural & Research Journal (UCLA)*

References:
- Refer to Periodicals, Industry directories, Articles and report in journals on the regulatory issues,
- "Biotechnology" series by Rehm& Reed.

BIOINFORMATICS

Course Code: BTH2211 **Credit Units: 03**

Course Objective:
The course involves a basic understanding of computer and bioinformatics tools and skills in the field of biology.

Course Contents:
Module I: Computers
General introduction (characteristics, capabilities, generations), software, hardware : organization of hardware (input devices, memory, control unit arithmetic logic unit, output devices); software : (System software; application software, languages -low level, high level), interpreter, compiler, data processing; batch, on-line, real-time (examples from bioindustries; e.g. application of computers in co-ordination of solute concentration, ph, temperature, etc., of a fermenter in operation); internet application.

Module II: Basic Bioinformatics
Introduction to Internet, Search Engines (Google, Yahoo, Entrezetc)

Module III: Biological Databases
Sequence databases (EMBL, GenBank, DDBJ, -UNIPROT, PIR, TrEMBL), Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Cluster databases-An Introduction, Specialised databases (KEGG, etc), Database technologies (Flat-file), Structural databases (PDB)

Module IV:
Trees-splits and metrices on trees, tree interpretation, Distance – additive, ultrameric and nonadditive distances, tree building methods, phylogenetic analysis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Computer Science, J.G. Brookshear, Pearson, Addison Wesley
- Introduction to Bioinformation – T.Attawood

References:
- A book on C by Kelley : Programming in C, Addison-Wesley Publishing
- Introduction to C++ for Engineers and Scientists, Prentice-Hall
- Schaum's Outline of Introduction of Computer Science, P. Cushman and R. Mata-Toledo, McGraw Hill Trade
- Bioinformatics – Managing Scientific Data, Zoe' Lacroix and Terence Critchlow
- Bioinformatics – Sequence, Structure and Databanks, Des Higgins & Willie Taylor
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag

TERM PAPER

Course Code: BTH2231 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of materials

d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
e) Begin by making a list of subject-headings under which you might expect the subject to be listed.
f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

d) Get facts, not just opinions. Compare the facts with author's conclusion.
e) In research studies, notice the methods and procedures, results & conclusions.
f) Check cross references.

4. Outlining the paper

c) Review notes to find main sub-divisions of the subject.
d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing &Preparing the final Paper

j) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
k) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
l) Check for proper spelling, phrasing and sentence construction.
m) Check for proper form on footnotes, quotes, and punctuation.
n) Check to see that quotations serve one of the following purposes:
o) Show evidence of what an author has said.
p) Avoid misrepresentation through restatement.
q) Save unnecessary writing when ideas have been well expressed by the original author.
r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

e) summary of question posed
f) summary of findings
g) summary of main limitations of the study at hand
h) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document].Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTH2232 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTH2233 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the trainer in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the trainer.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus – Third Semester

BIOCHEMISTRY

Course Code: BTH2301 **Credit Units: 03**

Course Objective:
The course is aimed to impart an in-depth understanding into the dynamic processes with which various biomolecules undergo in a living system The understanding of above has its ramifications in medicine, nutrition, agriculture, fermentation and natural products chemistry.

Course Contents:
Module I: Chemical basis of Life
Composition of living matter; properties of water, properties of biomolecules in aqueous environment; biomolecular interactions; bioenergetics.

Module II: Carbohydrates
Structure and functions of carbohydrates; carbohydrate metabolism: glycolysis, Kreb'scycle, phosphogluconate pathway, glyoxlate pathway, pentose phosphate pathway, Cori cycle, Gluconeogenesis and glycogenolysis and its regulation. Oxidative phosphorylation. Major metabolic disorders of carbohydrate metabolism: diabetes.

Module III: Amino acids and Proteins
Structure and functions of amino acid and proteins; Overview of amino acid biosynthesis, Major metabolic disorders of amino acid metabolism, biological Nitrogen fixation; structure and functions of vitamin derivative co-factors;.

Module IV: Lipids
Structure and functions of lipids and derivative lipids: glycerols, fatty acids, waxes, phospholipids, aphingolipids, lipoproteins. Biosynthesis and oxidation of fatty acids; Cholesterol synthesis; formation of ketone bodies.

Module V: Nucleotide Metabolism
Structure and functions of nucleic acids DNA and RNA. De novo and salvage pathways for synthesis of pyrimidine and purine nucleotides; purine degradation, pyrimidine breakdown; Major metabolic disorders of nucleotide metabolism Gout, Lesch-nuhan syndrome, immuno deficiency)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
- Principles of Biochemistry, Latest Edition, A.L. Lehninger, D.L. Nelson, M.M. Cox. , Worth Publishing
- Biochemistry By Mathews, Van Holde ,
- Text book of Biochemistry by Devlin.
- Textbook of Biochemistry by Metzler

MICROBIOLOGY

Course Code: BTH2302 **Credit Units: 03**

Course Objective:
To acquaint the students about the microbiology and role of various microorganisms in different biotechnological applications, various techniques for their cultivation and control.

Course Contents:

Module I: Introduction and historical perspective
Discovery of microbial world, Concept of pure culture, Theory and practice of sterilization; Isolation of microorganisms, staining methods, microscopy, preservation of microbial cultures

Module II
Microbial Physiology: cell structure and function. Microbial growth: Growth curve, Enumeration of cells by direct and indirect methods, Microbial fermentations, Microbial Stress Responses**.**

Module III
Evolutionary microbiology and microbial diversity: Microbial evolution and systematics, prokaryotic diversity: bacteria and archea, eukaryotic microorganisms (structure of algae and fungi), microbial community analysis (overview), classical and molecular taxonomy.

Virology: Viruses and virions, growth and quantification, viral replication, viroids and prions, Bacterial, plant and animal viruses**,**

Module IV
Microbial Ecology Methods in microbial ecology (culture dependent and culture independent techniques), microbial habitats and nutrient cycling (Carbon, sulphur and nitrogen cycles), plant-microbes, animal-microbes interactions. Soil microorganisms associated with vascular plants, bioremediation and biodegradation.

Module V
Applied microbiology: Biocatalysts, microbial metabolites, wine production, single cell proteins, microbial transformation of steroids, role of microbes in food industry, production of dairy products (fermented milks and cheese), Role of microbes in Agriculture (biofertilizers, biopesticides), Waste water treatment.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Brock Biology of Microorganisms by Madigan, Martinko, Stahl, Clark, Publisher : 13th Edition, Prentice Hall
- General Microbiology by R.Y. Stainer et al. Publisher : McMillan
- Microbiology, Prescott and Dunn, C.B.S. Publishers

ENZYMOLOGY

Course Code: BTH2303 **Credit Units: 03**

Course Objective:
The course aims to provide an understanding of the principles and application of proteins, secondary metabolites and enzyme biochemistry in therapeutic applications and clinical diagnosis. The theoretical understanding of biochemical systems would certainly help to interpret the results of laboratory experiments.

Course Contents:
Module I: Enzymes
Introduction and scope, Nomenclature, Mechanism of Catalysis. Specificity of enzyme action, monomeric and oligomeric enzymes, Enzyme inhibition.

Module II Enzyme Kinetics
Single substrate steady state kinetics; MichaelisMenten equation, Linear plots, Inhibitors and activators; Multisubstrate systems; Allosteric enzymes

Module III
Immobilization of Enzymes; Advantages, Carriers, adsorption, covalent coupling, cross-linking and entrapment methods, Micro-environmental effects.

Module VI: Biotechnological applications of enzymes
Large scale production and purification of enzymes, enzyme utilization in industry, enzymes and recombinant DNA technology

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Biotechnological Innovations in Chemical Synthesis, R.C.B. Currell, V.D. Mieras, Biotol Partners Staff, Butterworth Heinemann.
- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis, R.A. Copeland, John Wiley and Sons Inc.

References:
- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner
- Enzyme Kinetics: Behavior and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, I.H. Segel, Wiley-Interscience
- Industrial Enzymes & their applications, H. Uhlig, John Wiley and Sons Inc.

GENETICS & CELL BIOLOGY

Course Code: BTH2304 **Credit Units: 03**

Course Objective:
Cell Biology and genetics plays a central role to connect the different fields of biotechnology, which is highly interdisciplinary. They incorporates elements of biology, maths, physics and chemistry with combination of computers and electronics. The objective of the present course is to understand the structure and function of the cellular and subcellular components of cells and tissues with the help of these recent techniques. Students are also exposed to phenomenon that regulates cell death and etiology of cancerous cells.

Course Contents:

Module I
Mendilian principles on inheritance; Chromosome theory of inheritance, linkage and crossing over
Extrachromosomal inheritance; Chromosomal aberration and polyploidy
Concept of gene –position effect, complementation (cistron, recon &muton) Population genetics- Hardy-Weinbergs selection, k and r selection

Module II: Cell Organelles
Structure of nuclear envelope, nuclear pore,
Targeting proteins to endoplasmic reticulum, Protein sorting and export from Golgi apparatus; Protein import into Mitochondria, Import and sorting of chloroplast protein

Module III
Structure and organization of actins filaments; Actins, myosin muscle contraction, Microtubule-structure and assembly,

Module IV
Modes of cell signaling, G-protein coupled receptors; cAMP pathway of signal transduction; cGMP, phospholipids and calcium ions, Ras, Raf, MAP kinase pathway, Apoptosis – role of caspases.

Module V: Cell Cycle
Phases of eukaryotic cell cycle; Cell cycle regulation, checkpoints in cell cycle; regulators of cell cycle inhibitors of cell cycle, stem cells – properties and medical application.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

***Text*:**
- Essential Cell Biology : An Introduction to the Molecular Biology of the Cell, B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Roff, K. Robert, P. Walter and K. Roberts, Garland Publishing Company
- Cell and Molecular Biology, DeRobertis, B .I. Publication Pvt. Ltd
- Principles of Genetics, E J Gardner, John Wiley & Sons Inc.

References:
- Cell in Development and Inheritance, E.B. Wilson, Macmillan
- Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
- Molecular Cell Biology, H. Lodish, A.Berk, S.L. Zipursky, P. Matsudaura, D. Baltimore and J. Danell, W.H. Preeman and Company.
- Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
- Principles of Genetics, D.P. Snustad& M.J. Simmons, John Wiley and Sons Inc

BIOCHEMISTRY LAB

Course Code: BTH2305 **Credit Units: 01**

Course Contents:

Module I: Solutions and buffers
Preparation of molar, normal and % (w/v) solutions preparation of buffers of different pH and molar strength.

Module II: Carbohydrates
Extraction and estimation of carbohydrates from given plant/animal materials: determination of total sugars by Anthrone method Separation of sugars by thin layer chromatography

Module III: Proteins
Extraction of total proteins; Estimation of proteins by Lowery/ Bradford Method; Elctrophoretic (SDS-PAGE) separation of isolated proteins

Module IV: Lipids
Extraction of total lipids; estimation of phospholipids/glycolipids; thin layer chromatographic separation of lipids

Module IV: Nucleic Acid
Extraction and estimation of DNA and RNA by UV-spectrophotometer

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Practical book of Biochemistry by Plummer
- Practical book of Biochemistry by S.K. Sawhney and Randhir Singh

MICROBIOLOGY LAB

Course Code: BTH2306 **Credit Units: 01**

Course Contents:

- Laboratory safety and instrument handling, General rules and regulations, Aseptic techniques, preparation of culture media for cultivation of specific microorganisms.
  Observation of permanent slides (*E.coli, Yeast, Sarcina, Streptococcus, Acid fast staining*)

- Isolation and enumeration of microorganisms from air, water and rhizosphere (actinomycetes, bacteria and fungi), serial dilution and viable plate counting methods, Use of differential, selective and enriched media.

- Staining techniques: Simple staining, differential Gram staining, endospore staining, lactophenol cotton blue staining for fungi

- Growth curve measurement of bacterial population by turbidometry

- Biochemical tests – Triple Sugar Iron test (TSI) ,Indole test. Methyl red test. Vogesproskaeur test, Citrate utilization test (IMViC), starch hydroysis, casein hydrolysis, catalase test

- Water microbiology- presumptive, confirmed and complete test for water potability.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Microbiology: A laboratory Manual, Seventh Edition, by: Cappuccino and Sherman
- Microbes in Action, Fourth Edition:by Harry W. Seeley, Cornell University; Paul J. Vandemark, late of Cornell University; John J. Lee,

ENZYMOLOGY LAB

Course Code: BTH2307 **Credit Units: 01**

Course Objective:
The laboratory will help the students to isolate enzymes from different sources, enzyme assays and studying their kinetic parameters which have immense importance in industrial processes.

Course Contents:

Module I
Isolation of enzymes from plant and microbial sources.

Module II
Enzyme assay; activity and specific activity – determination of amylase, nitrate reductase, cellulase, protease.

Module III
Purification of Enzyme by ammonium sulphate fractionation.

Module IV: Enzyme Kinetics
Effect of varying substrate concentration on enzyme activity, determination of Michaelis-Menten constant (K_m) and Maximum Velocity ($V_{max.}$) using Lineweaver-Burk plot.

Module V
Effect of Temperature and pH on enzyme activity.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner.

GENETICS & CELL BIOLOGY LAB

Course Code: BTH2308 **Credit Units: 01**

Course Contents:

Module I
Cell fractionation and separation of cell organelles by ultra centrifugation.

Module II
Isolation of chloroplast from spinach

Module III
Isolation of mitochondria.

Module IV
Study of apoptosis by TUNEL method.
Site directed mutagenesis
Mutation detection and analysis
Mitosis
Meiosis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ITELLECTUAL PROPERTY RIGHTS

Course Code: BTH2309 **Credit Units: 03**

Course Objective:
The aim of this course is to develop the understanding of relevance, business impact and protection of Intellectual property along with the types of Intellectual Property Rights; Patents, Copyrights, Trademarks, Industrial Designs, Geographical Indications and International Conventions, Biosafety and Bioethics

Course Contents:

Module I
General Overview of Intellectual Property Rights, WIPO, WTO, Trade Related Intellectual Property Rights.

Module II
Patent - Basic requirements of Patentability, Patentable Subject Matter, Procedure for Obtaining Patent, Provisional and Complete Specification

Module III
Copyright - Objectives of copyright, Rights conferred by registration of copyright, Infringement of copyright

Module IV
Trademarks-Basic Principles of Trademark, Rights conferred by Registration of Trademark, Infringement of Trademark

Module V
Geographical Indications-Objectives of Geographical Indications, Rights conferred, Infringement of Geographical Indications, International Position, Indian Position, Bioprospecting and Biopiracy.

Module VI
Biosafety and Bioethics Management-Key to environmentally responsible use of biotechnology. Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text:
- Intellectual Property Rights by Brigitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Sciences Industries by Graham Dutfield, Ashgate Publishing

References:
- WIPO Intellectual Property Handbook
- Intellectual Property Rights by William Rodelph Cornish, David Clewelyn
- Journals and Current magazines

PHARMACEUTICAL BIOTECHNOLOGY

Course Code: BTH2310 **Credit Units: 03**

Course Objective:
The objective of this course to apply the basic concepts in the specific field of Pharmaceutical Biotechnology Industry. The student will gain insight into the working of a pharma industry, various classes of biotech products and the regulations governing production and marketing of pharmaceutical products.

Course Contents:

Module I
Introduction and History, Drug Discovery Process, Methods of Drug Discovery and development.

Module II
Physicochemical Properties, Effects of route of administration, Drug Targets, Pharmacokinetics and pharmacodynamics of drugs, Drug Toxicity.

Module III
DNA vaccines, Vaccines & Monoclonal antibody based pharmaceuticals, Antibiotics,Characterisation and Bioanalytical aspects of Recombinant proteins as pharmaceutical drugs**.**

Module IV
Formulation of Biotechnological Products, Drug Delivery, Examples of some Biotecnhological products in clinical development

Module V: Regulations
Role of FDA, ICH Guidelines, cGMP, The Regulation of Pharmaceutical Biotechnological Products and Ethical Issues.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text:
- Pharmaceutical Biotechnology - by Oliver. Kayser, Rainer Helmut Müller Series: Pharmaceutical Biotechnology , Vol. 9 Pearlman, Rodney; Wang, Y. John (Eds.) 1996.

References:
- Development and Manufacture of Protein Pharmaceuticals Series: Pharmaceutical Biotechnology , Vol. 14Nail, Steve L.; Akers, Michael J. (Eds.) 2002
- Pharmaceutical Biotechnology: Fundamentals and Applications, Third Edition, Editor Daan J.A. Crommelin, Robert D Sindelar.
- Pharmaceutical Biotechnology, Vyas, S. P., CBS Publishers & Distributors, 2002, Delhi

CLINICAL BIOTECHNOLOGY

Course Code: BTH2311 **Credit Units: 03**

Course Objective:
To develop an understanding of role of biochemistry and molecular biology in the diagnosis and clinical management of disease

Course Contents:
Module I
Clinical significance of biochemical tests and their role in the diagnosis and monitoring of disease, Clinical characteristic of disease. Role of clinical biochemistry in detection, diagnosis of diseases

Module II
Genetic disease, example of genetic diseases. transplantation/gene therapy.

Module III
Clinically important taxonomic grouping of bacteria, etiology, transmission;Epidemics, pandemics and endemics disease. Control measure of microbial diseases. Hygiene regulations.

Module IV
Manipulation of reproduction and development for application in medicine, agriculture, aquaculture and conservation.

Module V
Management of Clinical Data.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Marshall, W J, Clinical Chemistry, 3rd edition, Mosby, 1997.
- Harper's Biochemistry K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw Hill/ Appleton and Lange

***References*:**
- Sudbery, P. Human molecular genetics. Addison Wesley Longman (1998)
- Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, M.M. Cox. , Worth Publishing
- Principles of Physical Biochemistry, K.E. Van Holde, W.C. Johnson, Prentice Hall
- Tools of Biochemistry, T.G. Cooper, John Wiley and Sons Inc.
- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner
- Biochemistry (Fifth Edition), LubertStryer
- Physical Biochemistry, David Freifeider
- Annual Review of Biochemistry (1995-2004)
- Enzyme Kinetics: Behaviour and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, I.H. Segel, Wiley-Interscience
- Industrial Enzymes & their applications, H. Uhlig., John Wiley and Sons Inc.

TERM PAPER

Course Code: BTH2331 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of materials

g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
h) Begin by making a list of subject-headings under which you might expect the subject to be listed.
i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

g) Get facts, not just opinions. Compare the facts with author's conclusion.
h) In research studies, notice the methods and procedures, results & conclusions.
i) Check cross references.

4. Outlining the paper

e) Review notes to find main sub-divisions of the subject.
f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing &Preparing the final Paper

s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
u) Check for proper spelling, phrasing and sentence construction.
v) Check for proper form on footnotes, quotes, and punctuation.
w) Check to see that quotations serve one of the following purposes:
x) Show evidence of what an author has said.
y) Avoid misrepresentation through restatement.
z) Save unnecessary writing when ideas have been well expressed by the original author.
aa) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

i) summary of question posed
j) summary of findings
k) summary of main limitations of the study at hand
l) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document].Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTH2332 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTH2333 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus – Fourth Semester

MOLECULAR BIOLOGY

Course Code: BTH2401 **Credit Units: 03**

Course Objective:
The objective of the course is to provide a clear understanding of DNA (genetic material) so that they can manipulate it and understand basic tools and techniques involved in its manipulation. Strong foundation in molecular biology enables the students to familiarize themselves with Genetic engineering technology.

Course Contents:

Module I: DNA replication and repair
DNA structure, DNA replication; DNA repair mechanism,

Module II: Transcription of DNA
Transcription in prokaryotes and eukaryotes, RNA polymerase – Composition and function; transcription mechanism; transcription factor and their role, inhibition of RNA synthesis

Module III: Processing of RNA
Procession of ribosomal and transfer RNA"s processing of mRNA-5'cap formation; 3' polyadenylation ; RNA splicing , RNA editing , RNA degradation.

Module IV: Translation
Translation mechanism in prokaryotes and eukaryotes; ribosomes, initiation of translation, elongation, termination, amino acid activation; inhibitors, post translation modification of protein.

Module V: Regulation of gene expression
Regulation in prokaryotes – repressors and negative control, positive control, role of c AMP, **Ampreceptor**protein, lac, tryp, His and ara operons, Regulation in Eukaryotes=promoters and enhancers, transcriptional regulatory protein, transcriptional activators, eukaryotic repressor.

Module VI: Gene Silencing
Antisense molecules; Biochemistry of ribozyme,
Hammer head, hairpin ribozymes. Application of antisense and ribozymes in genetic engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Concepts of Genetics, W.S. Klug, and M.R. Cummings 2004, Pearson Education

References:

- Genome, T.A. Brown, John Willey & Sons Inc.
- Molecular Biology of the Cell by Alberts Bruce, Bray Demos, and Watson James D.
- Gene VIII, Benjamin Lewin 2005, Oxford University Press
- Molecular Cell Biology, H. Lodish, A. Berk, S. Zipursky, P Matsundaira, D. Baltimore and J.E. Barnell, W.H. Freeman and Company.
- Molecular Cloning: A Laboratory Manual (3-Vilcume set), J. Sambrook, E.F. Fritsch and T. Maniatis, Cold spring Harbor Laboratory Press.
- Molecular Biology of the Gene, J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison-Wesley Publishing.
- Introduction to Practical Molecular Biology, P.D. Dabre, John Wiley and Sons Inc.

INTRODUCTORY IMMUNOLOGY

Course Code: BTH2402 **Credit Units: 03**

Course Objective:
Role of antibody engineering in biomedical applications and the importance of immuno genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I
Historical perspective of immune system and immunity; Innate and specific immunity, Humoral immunity, Cell-mediated immunity

Module II
Antibody structure in relation to function and antigen-binding; Types of antibodies and their structures: isotypes, allotypes, idiotypes; Genetic basis of antibody diversity

Module III
The organs and cells of the immune system; Histocompatibility: structure of MHC class I, II & III antigens & their mode of antigen presentation, MHC restriction; Antigens & antigenicity;

Module IV
Measurement of antigen – antibody interaction: agglutination, immunodiffusion, immuno-electrophoresis, ELISA, RIE, production of monoclonal antibodies.

Module V
Complement system; Autoimmunity; Hypersensitivity

Module VI:
Hybridoma Technology; Introduction to transplantation immunology, Introduction to Cancer immunology, Vaccines (attenuated and recombinant);

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Freeman

References:
- Immunology, Roitt, Mosby – Yearbook Inc.
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.

INSTRUMENTATION & BIOANALYTICAL TECHNIQUES

Course Code: BTH2403 **Credit Units: 02**

Course Objective:
The students will be exposed to basic concepts related with techniques and instrumentation widely used in Biotechnology.

Course Contents:
Module I: Buffers & Sample preparation
Preparation of solutions, concept of pH and buffer, types of buffers and their preparation, pH meter.Cell Disruption techniques, ultra filtration, dialysis and reverse osmosis.

Module II: Centrifugation
Principle of centrifugation, rotors, different types of centrifuges, ultra centrifugation

Module III: Microscopy
Principles of microscopy, types of microscopy Bright field, Dark field, phase contrast and fluorescence microscopy. Electron microscopy: Transmission and scanning electron microscopy.

Module IV: Radioisotope techniques
Study of radioisotopes in biological samples, proportional and GM counter, scintillation counters, autoradiography.

Module V:Electrophoresis & Chromatography
SDS-PAGE, isoelectric focusing, two-dimensional electrophoresis; Paper, TLC, gel filtration, ion-exchange chromatography, affinity chromatography, HPLC and GLC

Module VI: Spectroscopy
UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:
- Advanced Instrumentation, Data Interprtation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wiley and Sons Ltd.

RESEARCH METHODOLOGY

Course Code: BTH2404 **Credit Units: 02**

Course Objective:
To develop understanding of information and library science research issues in the domain of bioinformatics through review of journal articles, invited talks, and critical group discussions of methods. The main objectives for this course are to develop: familiarity with information and library science-oriented problems in the biomedical sciences, an understanding of research methods in the biomedical domain, critical thinking and evaluation skills and presentation and summarization skills.

Course Contents:
Module I
Introduction: Science, Scientific research. Role of a researcher in different stages of a project, Routes to research funding (academic and commercial)

Module II
Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature.

Module III: Sampling techniques
Types of sampling, Steps in sampling; Advantages and limitations of sampling. Collection of Data;; Statistics in Research.

Module IV
Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Module V
Case studies of areas of current research. Formulating a research plan and its presentation

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Statistical Methods By S.P. Gupta

***References*:**
- Research Methodology Methods and Techniques by C.R. Kothari
- Statistics(Theory and Practice) by B.N. Gupta
- Research Methodology Methods and statistical Techniques by Santosh Gupta
- Scientific journals and magazines

IN SILICO ANALYSIS OF BIOMOLECULES

Course Code: BTH2405 **Credit Units: 02**

Course Objective: The objective is to describe relational data models and database management systems with an emphasis on biologically important techniques to store various data on DNA sequencing structures genetic mapping etc.

Course Content:

Module I: Introduction and overview

The NCBI data model; sequence databases, sequence retrieval, sequence file formats, submitting DNA and protein sequences. Types of biological databases, Databases and rapid sequence analysis

Module II: Sequence alignment

Global and local alignments, Pairwise and multiple alignment, programs and methods for sequence alignment, pattern searching programs, family and superfamily representation, structural inference, dynamic programming algorithms, alignment by hidden Markov models,

Module III: Phylogenetic prediction

Phylogenetic analysis, parsimony, tree evaluation, maximum likelihood trees, analysis software.

Module IV: Predictive methods using DNA and protein sequences

ESTs – databases, clustering, gene discovery and identification, and functional classification.
Protein identification, physical properties, motifs and patterns, structure,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F Quellette, Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.

MOLECULAR BIOLOGY LAB

Course Code: BTH2406 **Credit Units: 01**

Course Contents:

1. Isolation of genomic DNA.
2. Isolation of plasmid DNA.
3. Isolation of eukaryotic total RNA.
4. Study of in vitro transcription.
5. Invitro study of translation

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

INTRODUCTORY IMMUNOLOGY LAB

Course Code: BTH2407 **Credit Units: 01**

Course Contents:

Module I
Blood film preparation and identification of cells.
Module II
Isolation of serum, Purification of lgG through affinity chromatography

Module III
Lymphoid organs and their microscopic organization.

Module IV
WIDAL Test

Module V
Radial Immuno Diffusion Test;Ouchterlony Double diffusion Test

Module VI: ELISA
Dot, Sandwich

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

IN SILICO ANALYSIS OF BIOMOLECULES LAB

Course Code: BTH2408 **Credit Units: 01**

Course Contents:

1. Basics of sequence analysis Retrieving a sequence-nucleic acid/Protein
2. Local and Global Alignment- concepts Pair wise sequence alignment
3. Multiple sequence alignment
4. Dynamic Programming – Smith Watermann Algorithm Needleman Wunsch Algorithm
5. Motif and pattern searching
6. Phylogentic prediction and analysis
7. Structure predication
8. Finding transcription regulatory signals
9. Docking

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

NANO BIOTECHNOLOGY

Course Code: BTH2409 **Credit Units: 03**

Course Objective:
Nanotechnology is one of the most important emerging fields in today's scenario and holds tremendous potential in the field of Biotechnology. The objective of this course is to introduce this emerging field to the students so that they can apply this to develop new drug delievery systems and biomarkers.

Course Contents:

Module I: Introduction to Nanotechnology
Overview of nanotechnology developments, different nanostructured materials, properties related to nanostructured surfaces, atomic theory and bonding, quantum theory, electromagnetic properties of matter, molecular structure and macromolecules, intramolecular and intermolecular forces, solubility and solvation, thermodynamics and fluid behaviour.

Module II: Nanostructured Materials
Choice of nanomaterials, carbon nanotubes and nanowires, Physical characteristics of nanomaterials and nanostructured surfaces, quantum dots, nanostructured thin films, pattern sufaces, composites, mangnetic nanoparticles, scaffolds, gels and drug delivery systems.

Module III: Nanobiostructure Systems – Drug Delivery
The assembly of drug delivery systems, preparation and assembley of pharmaceutical molecule into nanometric material within the parameters of GLP and health and safety standards.

Module IV: Nanobiostructure Systems - Biosensor
The functional assembling of the components of a nanostructured biosensor, putting together a bioreceptor and putting together nanometric support and a signal transduction system.Assembly and production of a nanobiosensor.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
- Molecular Engineering of Nanosystems by Edward A. Rietman.
- Nanobiotech- Concepts, Applications and Perspectives, Christot, Chad Mirkin.
- Nanoscale Science and technology, Robert W Kelsall, Mark Geoghegan, Ian W Hamley.
- Nano surface chemistry, Morton Rosoff.

FORENSIC BIOTECHNOLOGY

Course Code: BTH2410 **Credit Units: 03**

Course Objective:
An introduction to forensic science and application of biotechnology in Forensic sciences can be understood by studying the various modules of this paper.

Course Contents:
Module I
History and Development of Forensic Science, Definition of Forensic Science, Scope of Forensic Science, Need of Forensic Science, Basic Principles of Forensic Science, Tools and Techniques of Forensic Science.
Module II
Organizational setup of Forensic Science Laboratories, CFSL, FSL, GEQD, FPB, NICFS, Central Detective Training School, NCRB (Maintenance of Crime Records), NPA Mobile Forensic Science Laboratory, Branch of Forensic Science,

Module III
Modus Operandi and MOB and its role in Criminal Investigation, Methods of Investigation: Narco analysis; Hypnosis etc. Limitations and legal aspects.
Brain fingerprinting, Criminal Profiling, Profile of the victim and culprit, investigative strategy, crime scene characteristics, criminal behavior on the internet, limitations.

Module IV
Education of Forensic Science, Role of Media, Human Rights & Criminal Justice System.
Ethics in Forensic Science, Duties of Forensic Scientist, History and Development of Finger Print as Science for Personal Identification,Type of Finger Prints, Classification of Finger Prints
Presentation of Expert Evidence: Data, Reports, Evidence in the Court.
Module VII:
MLP, SLP technology, PCR technology in crime detection, STR and databases, mitochondrial DNA and Y chromosome analysis in forensic science, DNA chip technology, role of molecular biology and biotechnology in crime detection.

Text & References:

- Nanda, B.B. and Tewari, R.K. (2001) : Forensic Science in India : A visionfor the twenty first century Select Publisher, New Delhi.
- James, S.H and Nordby, J.J. (2003) Forensic Science : An introduction toscientific and investigative techniques CRC Press,
- Barnett (2001): Ethics in Forensic Science.
- O'Hara &Osterburg : Introduction to Criminalistics, 1949, The MacMillanCo., 1964.
- Osterburg: Crime Laboratory.
- Saferstien: Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc.USA.
- Saferstein: Criminalistics, 1976, Prentice Hall Inc., USA.
- Nickolas : Scientific Criminal Investigation
- Deforest, Gansellen& Lee: Introduction to Criminalistics.
- Sharma, B.R. : Forensic Science in Criminal Investigaion and Trials, CentralLaw Agency, Allahabad, 1974.
- Kirk : Criminal Investigation, 1953, Interscience Publisher Inc. New York.
- Molecular Biology and Biotechnology, 4thEdn, J.M Walker and R. Rapley, Panima Books

GENETICALLY MODIFIED ORGANISM

Course Code: BTH2411 **Credit Units: 03**

Course Contents:

Module I

Microbial genetic engineering, genetically modified microbes of industrial importance.

Module II

Plants genetic engineering, Transgenic crop with new traits-herbicide tolerance, insect and disease resistance, Therapeutic proteins and compounds; Molecular farming of biopharmaceuticals.

Module III

Animal genetic engineering; Transgenic animals with new traits, transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutic etc.

Module IV

Detection and diagnosis of genetically modified organisms.

Text & References:

- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers Principles of Microbiology, R.M. Atlas, WMC. Brown Publisher
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P.McGarvy and V. Yusibov, Springer Verlag.
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication

TERM PAPER

Course Code: BTH2431 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of materials
j) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
k) Begin by making a list of subject-headings under which you might expect the subject to be listed.
l) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
j) Get facts, not just opinions. Compare the facts with author's conclusion.
k) In research studies, notice the methods and procedures, results & conclusions.
l) Check cross references.

4. Outlining the paper
g) Review notes to find main sub-divisions of the subject.
h) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion
Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing &Preparing the final Paper

bb) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
cc) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
dd) Check for proper spelling, phrasing and sentence construction.
ee) Check for proper form on footnotes, quotes, and punctuation.
ff) Check to see that quotations serve one of the following purposes:
gg) Show evidence of what an author has said.
hh) Avoid misrepresentation through restatement.
ii) Save unnecessary writing when ideas have been well expressed by the original author.
jj) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion&Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

m) summary of question posed
n) summary of findings
o) summary of main limitations of the study at hand
p) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document].Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTH2432 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTH2433 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus – Fifth Semester

ANIMAL BIOTECHNOLOGY

Course Code: BTH2501 **Credit Units: 02**

Course Contents:

Module I

Historical perspectives, sterilization methods, Culture techniques, plasma clot, raft methods, agar gel, grid method, organ engineering.

Module II

Cell culture substrates, cultural media, natural and artificial media, initiation and maintenance of cell cultures, cell culture products, cryopreservation techniques, immobilized cultures

Module III

In vitro fertilization and embryo transfer

Module IV

Somatic cell hybridization, hybridoma technology

Module V

Bioethical issues related to animal biotechnology,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References

- Cell Culture LabFAx, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication

PLANT BIOTECHNOLOGY

Course Code: BTH2502 **Credit Units: 02**

Course Objective:
The application of Plant Biotechnology covers major areas related to commercial applications. Regeneration of plants through *in vitro* techniques offers a practical strategy for micro propagation. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I
Historical perspective of plant tissue culture. Tissue culture lab and organization, Sterilization techniques; Types of nutrient media and media composition; Role of phytohormones; Cell culture techniques- cell, tissue, organ cultures, callus culture, suspension culture ; Culture techniques Callus culture, cell culture and protoplast cultures.

Module II
Organogenesis and somatic embryogenesis. Micropopogation, pathogen free plant production; haploids, Somaclonal variation

Module III
Plant transformation vectors; Gene transfer techniques; Transgenic plants transgene integration and expression

Module IV
Transgenic crop expressing new traits-herbicide tolerance, insect and disease resistance, Therapeutic proteins;oral vaccines;

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P.McGarvy and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Adacemic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences

STEM CELL AND GENE THERAPY

Course Code: BTH2503 **Credit Units: 03**

Course Objective:
The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:
Module I
Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module II:
Introduction to Gene Therapy, History and evolution of Gene therapy, optimal disease targets, Failures and successes with gene therapy and future prospects, Gene transfer methods

Module III
Innate and Acquired Immune Response to Cell and Gene Therapy,

Module IV

Cell, Disease, and Genetic Perspectives for Gene Therapy, Promise of Stem Cell-Based Therapies, Stem Cells and Diabetes, Stem Cells and heart Repair

Module V
Regulatory and Ethical Considerations of Cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer,

***References*:**
- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Understanding Biotechnology by AluízioBorém, Fabrício R. Santos, David E. Bowen, Prentice Hall
- Cell Therapy: Stem Cell Transplantation, Gene Therapy, and Cellular Immunotherapy (Cancer: Clinical Science in Practice) George Morstyn, William Sheridan, Cambridge University Press,

MARINE BIOTECHNOLOGY

Course Code: BTH2504 **CreditUnits: 03**

Course Contents:

Module I

The marine ecosystem and its functioning: intertidal, estuarine, salt marsh, mangrove, coral reef, coastal & deep sea ecosystems. Marine viruses, Bacteria and their significance Hydrothermal vents; Marine Biodiversity: defining, measurement and conservation strategies.

Module II

Nutrients cycling: carbon, nitrogen sulphur& phosphorus.
Global climate changes: impact on species diversity & productivity, oceans as a carbon sink, effects on corals bleaching. Biological rhythms.

Module III

Important Marine Products: Bioactive compounds from marine organisms, GFP, RFP characteristics and their applications; Green mussel adhesive protein, Chitosan and its applications

Module IV

Probiotic bacteria and their importance in aquaculture; Vaccines in aquaculture: Fish ,shrimps& prawns; Marine food analysis-spoilage, quality control; Techniques for identification of bacterial & viral pathogens in aquaculture and Remedies.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Biodiversity (2004) Borua, P.K
- Text book of Marine Ecology (1989). Nair N.B. &Thampy, D.M.
- Drugs from sea. (2000). Fusetani, N.
- Microbiology of deep sea hydrothermal vents. (1995). Karl, D.M.
- The search from bioactive compounds from microorganisms. (1992). Omum, S.
- Recent Advances in Marine Biotechnology. Vol.2 (1998) Fingerman, M., Nagabushanam, R., Thompson, M.
- Recent Advances in Marine Biotechnology Volume 3 – Milton fingerman et al., 1999.
- Environmental Biotechnology – Gareth M.Evams et al., 2003
- Biotechnology, Recombinant DNA Technology, Environmental Biotechnology – S.Mahesh et al., 2003.

BIOSENSORS

Course Code: BTH2505 **Credit Units: 03**

Course Objective:
On completion of the module students should Be able to Appreciate the basic configuration and distinction among biosensor systems, To gain an understanding of general biosensor principles and terms, To be able to design, model, simulate, fabricate, and test a biosensor, To gain an overall knowledge of biosensor types, applications, requirements, and capabilities to allow improved interaction with physicians, clinicians, and biomedical engineers, and to enable the student to conduct biomedical engineering research.

Course Contents:

Module I: Biosensors
Definition, History, Properties of biosensors, Design features of Biosensors, The Biological Component, SignalTransduction: Amperometric Biosensors, Potentiometric Biosensors, Detection of H+ cation, Detections ofNH^{4+}cation, Detection of CN- anion, Calorimetric biosensors, Optical Biosensors, Measuring the change inlight reflectance, Measuring luminescence, Pizo-electric biosensors, Immunosensors, Commercial examples of biosensors. Biosensors markets- Opportunities and obstacles.

Module II: Biomedical sensors
Sensors and transducers: an overview, measurement systems, Classification of Biomedical sensors andtransducers, who do we need Biomedical sensors and Transducers? Important Design considerations and systemcalibration, the future of Biosensors and Transducers, Sensing Layer: The importance of computers in sensors and Transducer technology, Recent Engineering Solutions to Health care using Biosensors and Transducers, Modern health care solutions.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Affinity Biosensors: Techniques and Protocol by K.R. Rogers and A. Mulchandani, Humana Press.
- Biosensors and their Applications by V.C. Yang and T.T. Ngo, Plenum Publishing Corporation.
- Chemical Sensors and Biosensors by B.R. Eggins, John Wiley and Sons Inc.

References:

- Sensors and Sensing in Biology and Engineering by F.G. Barth, wt al, Springer Verlag.
- Biosensors by Minh Canh. Tran
- Biosensors: Theory and Applications by Donald G. Buerk
- Enzyme and Microbial Biosensors: : Techniques and Protocols - by Kim R. Rogers, Ashok Mulchandani
- Biosensors in Environmental Monitoring - by Ursula Bilitewski, Anthony P. F. Turner.
- Biosensors: Micro electrochemical Devices - by Marc J. C. Lambrechts
- Biosensors with Fiberoptics - by Donald Lee Wise, Lemuel B. Wingard
- Biosensors and Their Applications - by That Tjien Ngo, Victor Chi-Min Yang
- Thermal Biosensors, Bioactivity, Bioaffinity -by Prakash K. Bhatia
- Novel Approaches in Biosensors and Rapid Diagnostic Assays - by ZviLiron, Avraham Bromberg, Morly Fisher
- Biosensors - by Anthony E. G. Cass.

MODERN KILLER DISEASES

Course Code: BTH2506 **Credit Units: 03**

Course Contents:

Module I
Definition of disease, Modern and ancient human diseases: AIDS, Cancer, hepatitis, influenza, diphtheria, Botulism, tetanus, diarrhoea, Malaria, tuberculosis Rabies diseases

Module II
Mode of infection, mechanism of infection of important human disease and their symptoms

Module III
Available therapies to killer diseases

Module III
Bottlenecks in development of therapy of killer diseases

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

BIOFUEL AND GREEN BIOTECHNOLOGY

Course Code: BTH2507 **Credit Units: 03**

Course Objective:
This course will acquaint the students with bioenergy resources, their properties, preparation, processing alongwith the details of equipments utilized for the purpose.

Course Contents:
Module I: Biomass Sources, Characteristics & Preparation: Biomass Sources and Classification
Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses for fermentation ethanol; Sources and processing of oils and fats for liquid fuels- Energy plantations - Preparation of woody biomass; Drying, Storage and Handling of Biomass.

Module II: Biogas Technology
Feedstock for biogas production, biodegradable organic matter,Operating parameters for biogas production, Dry and wet fermentation

Module III: Bio-Ethanol and Bio-Diesel Technology
Production of Fuel Ethanol by Fermentation of Sugars.Trans-esterification of Oils to Produce Bio-Diesel.

Module IV: Pyrolysis and Gasification of Biomass
Thermo-chemical conversion of ligno-cellulose biomass - Pyrolysis of biomass,Thermo-chemical gasification principles

Module V: Combustion of Biomass and Cogeneration Systems
Combustion of Woody Biomass, Cogeneration in Biomass Processing Industries.Use of biogases for cogeneration.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
***Text*:**

- Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes, A. Chakravarthy, Oxford & IBH publishing Co., New Delhi, 1989.

***References*:**

- Biogas Systems: Principles and Applications, K.M. Mital, New Age International Publishers (p) Ltd., 1996.
- Biomass Energy Systems, P. VenkataRamana and S.N. Srinivas, Tata Energy Research Institute, New Delhi, 1996.
- Fuels from Biomass and Wastes, D.L. Klass and G.M. Emert, Ann Arbor Science publ. Inc. Michigan, 1985.
- Bio-gas Technology, Khandelwal K.C. and Mahdi, Tata McGraw-Hill pub. Co. Ltd., New Delhi
- Advances in bio-gas Technology, O.P. Chawla, I.C.A.R., New Delhi. 1970.

ARTIFICIAL NEURAL NETWORKS

Course Code: BTH2508 **Credit Units: 03**

Course Objective:
This course will enable the students to gain knowledge about a relatively newer area of science. The course is designed to model the different technical properties, applications, besides the closely related aspects of artificial neural networks.

Course Contents:

Module I
Historical background, Why is learning hard?

Module II
Memorization, generalization and function approximation, Linear Associators, Perceptrons and Capacity, Multilayer neural networks, Maximum Likelihood and Gradient Descent learning, Stochastic gradient descent for supervised learning.

Module III
The back propagation algorithm, Aspects of Learning Theory and Generalization, Bias vs. variance, Overtraining, pruning and regularization, VC dimension and how much data is enough?

Module IV
Neural networks and analog VLSI, Selected Applications

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Neural Networks: A Comprehensive Foundation by S. Haykin, Prentice Hall.

References:
- Neutral Networks for Pattern Recognition by C. Bishop, Oxford University Press.

TERM PAPER

Course Code: BTH2531 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of materials
m) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
n) Begin by making a list of subject-headings under which you might expect the subject to be listed.
o) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.
m) Get facts, not just opinions. Compare the facts with author's conclusion.
n) In research studies, notice the methods and procedures, results & conclusions.
o) Check cross references.

4. Outlining the paper
i) Review notes to find main sub-divisions of the subject.
j) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:
a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion
Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing &Preparing the final Paper

kk) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

ll) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

mm) Check for proper spelling, phrasing and sentence construction.

nn) Check for proper form on footnotes, quotes, and punctuation.

oo) Check to see that quotations serve one of the following purposes:

pp) Show evidence of what an author has said.

qq) Avoid misrepresentation through restatement.

rr) Save unnecessary writing when ideas have been well expressed by the original author.

ss) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

q) summary of question posed

r) summary of findings

s) summary of main limitations of the study at hand

t) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document].Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTH2532 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTH2533 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

RECOMBINANT DNA TECHNOLOGY

Course Code: BTH2601 **Credit Units: 03**

Course Objective:
A complete understanding of molecular techniques can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Course Contents:

Module I
Restriction endonuclease, methyltransferase, ligase, polymerase, kinase, phosphatase, nuclease, transferase, reverse transcriptase.

Module II
Cloning vectors:Plasmids, bacteriophages (Lambda and M13), phagemids, cosmids, artificial chromosomes (YAC, BAC).expression vectors (Bacteria and yeast); Basic cloning strategy and screening clones; Gene libraries

Module III
Blotting techniques and hybridization:Southern, Northern and Western blotting techniques.Radioactive and non-radioactive probes.

Module IV
Principles of PCR, types of PCRsand its applications

Module V
DNA sequencing (Maxam Gilbert, Sanger's and automated), protein engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc.
- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company.

References:

- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press.
- Molecular and Cellular Cells Methods in Biology and Medicine, P.B Kaufman, W. Wu, D. Kim and C.J. Cseke, CRC Press.
- Milestones in Biotechnology: Classic Papers on Genetic Engineering, J.A. Bavies and W.S. Reznikoff, Butterworth Heinemann.
- Gene Expression Technology, D.V. Goeddel in Methods in Methods in Enzymology, Academic Press Inc.
- DNA Cloning: A Practical Approach, D.M. Glover and B.D. Hames, IRL Press.
- Molecular Cloning: A Laboratory Manual, J. Sambrook, E.F. Fritsch and T. Maniatis, Cold Spring HarborLaboratory Press.

GENOMICS AND PROTEOMICS

Course Code: BTH2602 **Credit Units: 02**

Course Objective:
The course helps in developing a detailed understanding of eukaryotic genome complexity and organization. Current research on the molecular basis of the control of gene expression in eukaryotic system has developed a detailed understanding of techniques of gene diagnostics and DNA profile to acquire the fundamentals of genomics and Proteomics.

Course Contents:

GENOMICS

Module I: Genome Evolution
Origin of genomes, functional genomics. Forward genetics

Module II: Structural Genomics
Chromosome structure and Genome organization, Genome sequencing methods, Gene identification Genome annotation methods

Module III: Comparative Genomics
Phylogeny, COGS [Cluster of orthologues genes], paralogues and gene displacement.

Module IV: Functional Genomics
ESTs, SAGE, DNA Microarrays, Application of Microarrays, Real Time PCR

Module V: Genotyping Background and Applications.
Genetic and physical mapping: Introduction to molecular markers-RFLP, RAPD, AFLP, SSRs. Genetic and physical maps, FISH for genome analysis, DNA fingerprinting; Single nucleotide polymorphisms, RNA interference, antisense RNA, siRNA, miRNA, ; Human Genome Project.

PROTEOMICS

Module VI
Basics of Proteomics: Protein preparation and Separation, 2D Gel Electrophoresis,
mass spectrometry, post translation modification.
Protein-Protein Interaction, Protein Microarray, Application of Microarray in proteome analysis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette,
- John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs, T. Lengauer, John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press
- DNA Microarrays: A Practical Approach, M. Schlena, Oxford University Press.
- Genomes II, T.A. Brown
- Biotechnology and Genomics by P.K.Gupta

References:

- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology : Principles and Practice, Arthur M. Lesk
- DNA : Structure and Function, Richard R. Sinden
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller
- Gene Cloning and DNA Analysis – An introduction (Fourth Edition), T.A. Brown
- Genes & Genomes, Maxine Singer and Paul Berg
- Essential of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Functional Genomics – A Practical Approach, S.P. Hunt and R. Livesey, Oxford University Press
- Proteomics, T. Palzkill, Kluwer Academic Publishers
- Statistical Genomics: Linkage, Mapping and QTL Analysis, B. Liu, CRC Press.
- Genome II by T.A.Brown

INDUSTRIAL BIOTECHNOLOGY

Course Code: BTH2603 **Credit Units: 03**

Course Objective:
The objective of this course is to use microorganism to produce various compounds of commercial interest. The student will be exposed to various techniques available for large scale cultivation of microorganisms.

Course Contents:

Module I
Introduction to fermentation, the fermentation industry, Production process batch and Continuous system of cultivation, Solid-state fermentation

Module II
Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III
Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV
Production of fermented dairy products

Module V
Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Industrial Microbiology – Cassida

References:
- Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescot&Duhn.

STRESS BIOLOGY

Course Code: BTH2604 **Credit Units: 03**

Course Contents:

Module I
Introduction to stress biology; Types of stresses; Molecular biology of stress responses

Module II
Microbial Stress Responses.

Module III
Biotic and abiotic stress response mechanisms in Plants

Module IV
Biotic and abiotic stress response mechanisms in Animals.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- HeribertHirt**.** Plant Stress Biology: From Genomics to Systems Biology. Wiley-Blackwell (2009).
- K.V. Madhava Rao, A.S. Raghavendra, Janardhan Reddy (2005). Physiology and Molecular Biology of Stress Tolerance in Plants. Springer.
- Gary Moberg, Joy A. Mench. The Biology of Animal Stress: Basic Principles and Implications for Animal Welfare. CABI Publishing.
- Jose M. Requena. Stress Response in Microbiology. Publisher: Caister Academic Press:

RECOMBINANT DNA TECHNOLOGY LAB

Course Code: BTH2605 **Credit Units: 02**

Course Objective:
The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I
Studyof cloning

Module II
Study of PCR

Module III
Study of Southern hybridization

Module IV
Study of RAPD

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

BIOSAFETY MANAGEMENT

Course Code: BTH2606 **Credit Units: 03**

Course Objective:
Course addresses management and engineering design concepts required for process safety in chemical and biotechnology systems, with pharmaceutical manufacturing applications. Content focuses on sound engineering principles and practices as they apply to industrial situations, project design, risk mitigation, process and equipment integrity, and engineering codes and standards.

Course Contents:

Module I: Hazards
Chemical hazards classification. Radiation hazards and control of exposure to radiation. Types of fire and fire prevention methods. Mechanical hazards. Electrical hazards

Module II: Psychology and Hygiene
Industrial psychology Industrial hygiene. Safety in plant site selection and plant layout. Industrial lighting and ventilation.Industrial noise.

Module III: Occupational diseases and control
Occupational diseases and prevention methods. Safe housekeeping, Instrumentation for safe operation. Personal protective equipments.Safety in chemical operations and processes.

Module IV: Management
Safety organization – safety committee – safety education and training.Management process. Philosophy and need for Industrial safety. Role of Government in Industrial safety.

Module V: Laws
Factory Act. ESI Act, Environmental Act. Workment - comperation Act. Advantages of adopting safety laws.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Guide for Safety in the Chemical laboratory second edition, Manufacturing Chemists Allocation. Van vostrand Reinhold Company, New York.
- Safety and Accident Prevention in Chemical Operation 2nd Edn., H.H. Fawcett & W.S .Wood Wiley Interscience,

References:
- Industrial Safety and Laws by Indian School of Labour Education, Madras.

DRUG DESIGN AND DEVELOPMENT

Course Code: BTH2607 **Credit Units: 03**

Course Objective:
The above course will be aimed to identify and design drugs that could be potentially useful in the identification of the candidate drugs, which have efficacy in cell culture or animal models, and thus the most effective compounds could be employed based on the above results for being moved through preclinical studies to clinical trials.

Course Contents:

Module I: Drug targets classification
DNA, RNA, Enzymes involved in nucleic acid metabolism, Signal transduction across membrane GPCR, small molecule receptors, neuropeptide receptors, ion channels.

Module II: Target discovery and validation strategies
New target discovery, biological activity, types of screening, natural products, General overview of validation techniques.

Module III: Structure-based design
Drug design to discovery and development, drug metabolism, toxicity and pharmacokinetics, problems and drawbacks on drug discovery and development.

Module IV: Basic concepts of Drug Delivery
Basic terminologies in drug delivery and drug targeting, Concepts of Bio availability, Process of drug absorption, Drug delivery considerations for the new biotherapeutics
Introduction to routes of administration of drugs

Module V: Delivery of Genetic material
New generation technologies in genetic drug delivery, Nanotechnology, Genetically engineered cell implants in drug deliver.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Drug Delivery and Targeting, A.M. Hillery, A.W. Lloyd and J. Swarbrick, Harwood Academic Publisher
- Pharmaceutical Dosage Forms and Drug Delivery Systems, H.C. Ansel, L.V. allen and N.G. Popovich, Lippincott Williams and Wilkins Publisher
- Introduction to Biophysical Methods for Protein and Nucleic Acid Research, J.A. Glasel and M.P. Deutscher, Academic Press.
- Principles of Drug Action, W.B. Pratt and P. Taylor, Churchill Livingston.
- Principles of Medicinal Chemistry, W.O. Foye, T.L. Lemke, and D.A. Williams, Williams and Wilkins

- Side Effects and Drug Design, E.J. Lien, Marcel Dekker.
- The Anticancer Drugs, W.B. Pratt, R.W. Ruddon, W.D. Ensminger, and J. Maybaum, Oxford University Press.
- Drug Delivery: Engineering Principles for Drug Therapy (Topics in Chemical Engineering), W.M. Saltzman, Oxford University Press.
- Handbook of Biodegradable Polymers (Drug Targeting and Delivery), A.J. Domb, J. Kost and D.M. Wiseman, Dunitz Martin Ltd.

BIOPROCESS TECHNOLOGY

Course Code: BTH2608 **Credit Units: 03**

Course Objective:
The objective of the course is to apply the principles of biochemical engineering in large scale cultivation of microorganism for production of important products.

Course Contents:

Module I
Basic principle in bioprocess technology. Advantage of bioprocess over chemical process. Media formulation, Cell culture techniques; Inoculum development and aseptic transfers.

Module II
Process technology for the production of primary metabolites, eg.biomass, ethanol, acetone-butanol, citric acid, amino acids, polysaccharides and plastics.

Ethanol: production by batch, continuous and cell recycle adopted by various technologies practiced in Indian distilleries using molasses and grains. Computation of fermentation efficiency, distillation efficiency and overall efficiency of ethanol production, recovery, uses, glucose effect etc. Power alcohol – definition, uses, merits and demerits of various technologies for its production.

Amino Acid: Genetic Control of metabolic pathway.
Lysine: Indirect and direct fermentation – mechanism of ph of metabolic block in accumulation of L-lysine by inhibition and repression mechanism.
Biomass: Bakers and distillers yeast production using various raw materials, "bios" factors for growth, Crabtree effect, harvesting, different forms and uses.
What are mushroom, different forms of common mushroom production from agro based raw materials and uses. Biofertilizers, biocompost and biopesticides

Module III
Production of secondary metabolites – penicillin, cephalosporins, streptomycin, tetracycline etc. Metabolites from plant and animal cell culture
Penicillin: Classification, various penicillin as precursor and 'R' – side chain, penicillinase, 6-APA, penicillin production, harvest and recovery, uses of various forms etc.
Streptomycin: chemical structure, production, harvest and recovery, use by-product of streptomycin fermentation etc.
Tetracycline: chemical structure, production, harvest and recovery, use by-product of tetracycline fermentation etc.

Module IV
Microbial production of industrial enzymes – glucose isomerase, penicillin acylase, cellulase, amylase, lipase, protease etc.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Biochemical Engineering- Kinetics, Mass Transport, Reactors and Gene Expression, W F Weith, John Wiley and Sons Inc
- Biochemical Engineering, S Aiba, A E Humphery and N F Millis, University of Tokyo Press
- Bioprocess Engineering Basic Concepts, M.L. Shuler and F. Kargi, Prentice Hall
- Bioprocess Engineering, B.K. Lydersen, K.L. Nelson, B.K. Lyderson and N. D'Elia, John Wiley and Sons Inc.
- Bioprocess Engineering Principles, P Doran, Academic Press
- Biotechnology. A Textbook of Industrial Microbiology, W. Crueger and a. Crueger, Sinauer Associates.
- Principles of Fermentation Technology, P.F. Stanbury and A. Whitaker, Pergamon Press
- Process Engineering in Biotechnolgy, A T Jackson , Prentice Hall

TERM PAPER

Course Code: BTH2631 **Credit Units: 02**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject
The subject chosen should not be too general.

2. Finding Sources of materials

- The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
- Begin by making a list of subject-headings under which you might expect the subject to be listed.
- The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes
Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

p) Get facts, not just opinions. Compare the facts with author's conclusion.
q) In research studies, notice the methods and procedures, results & conclusions.
r) Check cross references.

4. Outlining the paper

k) Review notes to find main sub-divisions of the subject.
l) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft
Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & preparing the final Paper

tt) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

uu) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

vv) Check for proper spelling, phrasing and sentence construction.

ww) Check for proper form on footnotes, quotes, and punctuation.

xx) Check to see that quotations serve one of the following purposes:

yy) Show evidence of what an author has said.

zz) Avoid misrepresentation through restatement.

aaa) Save unnecessary writing when ideas have been well expressed by the original author.

bbb) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

u) summary of question posed

v) summary of findings

w) summary of main limitations of the study at hand

x) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document].Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTH2632 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

***4)* Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTH2633 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps: Relevant study material and references will be provided by the trainer in advance. The participants are expected to explore the topic in advance and take active part in the discussions held. Attending and participating in all activities of the workshop. Group Activities have to be undertaken by students as guided by the trainer. Evaluation of workshop activities would be done through test and quiz at the end of the workshop. Submitting a write up of atleast 500 words about the learning outcome of the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Bachelor of Technology - Biotechnology

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AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus – First Semester

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: BTE2104 **Credit Units: 03**

Course Objective:
The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O.

Module III: Fundamental Features in C
C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions
One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.
Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References:

- *Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.*
- *J. B Dixit, "Fundamentals of Computers and Programming in 'C'.*
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

ELECTRICAL SCIENCE

Course Code: BTE2106 **Credit Units: 03**

Course Objective:
The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities
Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems
Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem, Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits
Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers
Basic Transformer Operation principle, Construction, Voltage relations, current relations, Linear circuit models, open circuit test, short circuit test, Transformer Efficiency.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology: Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

PROGRAMMING IN C LAB

Course Code: BTE2108 **Credit Units: 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ELECTRICAL SCIENCE LAB

Course Code: BTE2110 **Credit Units: 01**

List of Experiments:

- To verify KVL & KCL in the given network.
- To verify Superposition Theorem.
- To verify Maximum Power Transfer Theorem.
- To verify Reciprocity Theorem.
- To determine and verify RTh, VTh, RN, IN in a given network.
- To perform open circuit & short circuit test on a single-phase transformer.
- To study transient response of a given RLC Circuit.
- To perform regulation, ratio & polarity test on a single-phase transformer.
- To measure power & power factor in a three phase circuit by two wattmeter method.
- To measure power & power factor in a three phase load using three ammeter& three voltmeter method.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ENGINEERING MATHEMATICS-I

Course Code: BTE2111 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Differential Calculus
Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus
Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations
Formation of ODEs, Definition of order, degree & solutions, ODE of first order: Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of nth order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Module IV: Vector Calculus
Scalar and Vector Field, Derivative of a Vector, Gradient, Directional Derivative, Divergence and Curl and their Physical Significance, Arc Length, Tangent, Directional Derivative, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Representation of Surfaces, Tangent Plane and Surface Normal, Surface Integral, Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
Text:
- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:
- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

ENGINEERING CHEMISTRY

Course Code: BTE2112 **Credit Units: 02**

Course Objective:
Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water,
Hardness and its determination (EDTA method only), Alkalinity,
Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embrittlement & corrosion: causes & prevention,
Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment
Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels
Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter, Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance.
Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance
IR: Principle, Instrumentation, Application
UV: Principle, Instrumentation, Application
NMR: Principle, Instrumentation, Application

Module IV: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication; Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point.
Selection of Lubricants.

Module V: Corrosion
Introduction, Mechanism of dry and wet corrosion,
Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline.Passivity.
Factors influencing corrosion.Corrosion control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

- Engineering Chemistry- Jain and Jain
- Engineering Chemistry- Sunita Rattan
- Engineering Chemistry-Shashi Chawla

References:

- Engineering Chemistry –Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ENGINEERING CHEMISTRY LAB

Course Code: BTE2113 **Credit Units: 01**

Course Contents:

List of Experiments:(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.
2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.
3. To determine the type and extent of alkalinity of given water sample.
4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.
5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.
6. (a) To determine the surface tension of a given liquid by drop number method.

(b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.
8. (a) To find the cell constant of conductivity cell.

(b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically

9. Determination of Dissolved oxygen in the given water sample.

10 To determine the total residual chlorine in water.

11 Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12 Determination of viscosity of given oil by means of Redwood viscometer I.

13 To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14 To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus – Second Semester

OBJECT ORIENTED PROGRAMMING IN C++

Course Code: BTE2203 **Credit Units: 03**

Course Objective:
The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

Module I: Introduction
Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages.Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: Classes and Objects
Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.

Module III: Inheritance
Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes.

Module IV: Polymorphism
Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module V: Strings, Files and Exception Handling
Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Text & References:
Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, “Object Oriented Programming with C++”, BPB Publication, 1999.
- Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication, 2002.
- Yashwant Kanethkar, “Object Oriented Programming using C++”, BPB, 2004

OBJECT ORIENTED PROGRAMMING IN C++ LAB

Course Code: BTE2205 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab

ENGINEERING GRAPHICS LAB

Course Code: BTE2206 **Credit Units: 01**

Course Objective:
This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI:Development of Surface
Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL Tanta, Mechanical Drawing, “Dhanpat Rai”

ENGINEERING MATHEMATICS-II

Course Code: BTE2207 **Credit Units: 04**

Course Objective:
The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:
Module I: Linear Algebra
Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series
Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis
De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.
Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)} dx$.

Module IV: Statistics and Probability
Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	15	20	20	20	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series.

ENGINEERING PHYSICS

Course Code: BTE2208 **Credit Units: 03**

Course Objective:
Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:
Module I: Oscillations & Waves
Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance
Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.
Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light
Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .
Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.
Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics
Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.
Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

ENGINEERING PHYSICS LAB

Course Code: BTE2209 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

LIFE SCIENCES

Course Code: BTE2210 **Credit Units: 03**

Course Objective:
The objective of the course is to provide students an understanding of the very basic molecules of life-DNA,RNA, proteins and how these molecules, when form further complex molecules like carbohydrates, vitamins and lipids, then functioning of body takes place. Since technology is advancing in every field, emphasis is also given on the understanding of application of some biotechnological concepts used in our daily life like biofuels, biofertilizers. An introduction to the origin of earth, the environment-air, water and land, origin of life on Earth, how life evolved from a single cell, some environmental problems and measures to be taken to combat them.

Course Contents:
Module I: Cell Biology
Organization of cell (Inorganic-Water and Ions; Organic-Proteins, Lipids and Carbohydrates constituents) Physical structure of the cell-Brief introduction to the Cell Membrane, Cytoplasm and its Organelles (Nucleus, Mitochondria, Golgi, Endoplasmic Reticulum, Lysosomes, Peroxisomes, Ribosomes, Chloroplasts)**,** Cell cycle.

Module II: Introduction to Cell Physiology
Transport of substances through the cell membrane- Osmosis, Diffusion and its types, Active transport (Sodium-potassium pump) and Passive transport, Membrane potential, Measuring Membrane Potential, Action Potential

Module III: Environmental Biotechnology
Biosensors, Biochips and Biofilms, GMO's and Biofertilizers
Biofuels
Gene Therapy, Stem cell and Nanobiomolecules
Bio Informatics- Introduction and Applications

Module IV: Ecology & Environment
Ecosystem- Structure and functions, Food chain, Food web, Energy flow, Ecological pyramids
Energy sources- Conventional (Coal, Petrol, Natural gas) and Non-conventional (Solar, Wind, Geothermal, Hydro and Biomass)
Pollution- Air, Water, Land, Thermal and Nuclear
Conferences and Protocols- Stockholm, Montreal, Rio-de-Janerio, Kyoto
Environmental issues- Green House Effect, Global Warming and Warning, El-Nino, Acid Rain, Sustainable Development, Environmental Disasters (Earthquake, Floods, Drought and Cyclones)

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Fundamentals of Environmental Chemistry, G.S.Sodhi, Narosa Publishers.
- Introduction to Environmental Pollution, B.K Sharma, H.Kaur, Goel Publishers.
- Biochemistry Styrier.
- Cell Biology, C B Pawar.
- Biochemistry, Lehninger.

Syllabus – Third Semester

CELL BIOLOGY & GENETICS

Course Code: BTE2301 **Credit Units: 03**

Course Objective

Cell biology connects different fields of biotechnology by incorporating elements of biology, maths, physics and chemistry. The objective of the course is to understand the structure and function of ellular and sub cellular components of cells and tissues. It also focuses on the understanding of basic principles of genetics, incorporating the concepts of classical, molecular and population genetics. Compilation is required for recent advances in genetic principles for strong foundation in Biotechnology.

Course Contents

Module I

Cell theory, pre-cellular evolution, prokaryotic and eukaryotic cells. Cell cycle: molecular events, cell division, mitosis and meiosis.

Module II

Cellular organelles - structure and function of cell wall, plasma membrane nucleus, Mitochondria, Chloroplast, Nucleus, lysosomes, peroxisomes, golgi bodies, and transport across membranes. Cell locomotion- cytoskeleton, structure and function of cilia and flagella.

Module III

Cellular signaling –general mechanism of signaling and structures of the various types of receptors. Types of cancer, etiology of cancer, metastasis, cytological role of p53 and p21 genes in cancer development. Apoptosis.

Module IV

Genetics: classical and molecular genetics, Mendelian principles of inheritance, human genetics. Extension of Mendelism: Allelic variations, influence of environment on expression, penetrance and expressivity, epistasis, pleiotropy. Chromosomal basis of inheritance; linkage, crossing over and chromosome mapping.

Module V

Mutation and mutagenic agents, types of mutations. Numerical and structural changes in chromosomes with emphasis on human syndromes/plant breeding and genetic counseling. Economic importance of mutation

Module VI

Classical and modern concept of gene, pseudoallelism, position effect, intragenic crossing over & complementation (cistron, recon & nutron) Benzer's work on rII locus in T_2 bacteriophage. Genetics of Population: Hardy- Weinburg Law and its deviations.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
- Cell and Molecular Biology, DeRobertis, B.I. Publication Pvt. Ltd.
- Genetics, P.K. Gupta, Rastogi Publication
- Concepts of Genetics (Sixth Edition), William S. Klug and Michael R, Cummings, Pearson Education

References:

- Cell in Development and Inheritance, E.B. Wilson, Macmilian
- Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
- Essential Cell Biology : An Introduction to the Molecular Biology of the Cell, B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Roff, K. Robert, P. Walter and K. Roberts, Garland Publishing Company
- Molecular Cell Biology, H.Lodish, A.Berk, S.L. Zipursky, P. Matsudaura, D. Baltimore and J. Danell, W.H. Preeman and Company.
- Genetics, M.W. Strickberger, Prentice Hall College Division
- Genetics, P.J.Russell, Benjamin/Cummings
- Principles of Genetics, E J Gardner, John Wiley & Sons Inc.
- Genetics, R. Goodenough, International Thomson Publishing
- Introduction to Genetic Analysis, A.J. F. Griffiths, W.H. Freeman and Company
- Principles of Genetics, D.P. Snustad& M.J. Simmons, John Wiley and Sons Inc.
- Molecular Biology of the Gene (Fifth Edition), J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison – Wiesley Publishing

BIOCHEMISTRY

Course Code: BTE2302 **Credit Units: 03**

Course Objective

The course aims on understanding of the relationships between structure and function in the major classes of biopolymers. It augurs understanding on central metabolic process and the role of enzymes in modulating pathways. The theoretical background of biochemical systems helps to interpret the results of laboratory experiments.

Course Contents

Module I

Properties of water; acids, bases and buffers; covalent and Non-covalent interactions in biological systems; Bioenergetics: First and second law, concept of free energy and chemical equilibrium, ATP-ADP cycle. Cellular energy transactions: role of mitochondria and chloroplast

Module II

Carbohydrates: Sugars and Polysaccharides; Carbohydrate metabolism: glycolysis and its regulation, Glycogen breakdown, synthesis, Regulation; Citric acid cycle and its regulation, amphibolic nature of Citric acid cycle; Electron transport System, oxidative phosphorylation and control of ATP production; Gluconeogenesis, glyoxylate pathway, Pentose phosphate pathway.

Module III

Lipids: classification, structure and function. Lipids and biological membranes, lipoproteins, Phospholipids, Sphingolipids, Glycolipids; Lipid metabolism: digestion, absorption and transport; fatty acid metabolism: β-oxidation, biosynthesis and regulation; ketone bodies; Cholesterol and Arachidonic Acid metabolism.

Module IV

Amino acids: classification, chemical and physical properties. Amino acid metabolism: deamination, urea cycle, biosynthesis and breakdown non-essential amino acids (asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, proline, serine, Tyrosine); Specialized Products of Amino Acids.

Module V

Proteins: structure and function. Glycoproteins: structure and function. *Vitamins and Coenzymes*: structure and function of water soluble vitamins. Enzymes: Introduction to kinetic and catalytic mechanisms; Regulation of enzyme activity; Effects of physical parameters on enzyme activity, enzyme inhibitors: types of inhibition.

Module VI

Nucleic acids: nitrogenous bases, nucleotides, structure and properties of nucleic acids. Nitrogen fixation; Nucleotide Metabolism: metabolism of purines and pyrimidine, biosynthesis of nucleotide, coenzymes (NAD, NADP, FAD, FMN); Catabolism of heam and clinical significance of bilirubin.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Harper's Biochemistry, K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw-Hill/Appleton and Lange.
- Biochemistry, L. Stryer, W.H. Freeman and Company
- Tools of Biochemistry, T.G. Cooper, John Wiley and Sons Inc.

References:

- Cellular Biophysics I & II, Thomas F. Weiss 1995, MIT Press
- Biochemical calculations, I.H. Segal. Publisher, John Wiley and Sons
- Biochemistry, C.K. Mathews, K.E. Van Holde and K.G. Ahern, Benjamin / Cummings.
- Devlin's Textbook of Biochemistry with Clinical correlations, John Wiley and Sons Inc.
- Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, M.M. Cox, Worth Publishing

BIOSTATISTICS

Course Code: BTE2303 **Credit Units: 03**

Course Objective:
The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice.

Course Contents:

Module I
Statistics and Biostatistics: Preliminary concepts; Measures of Central Tendency: Mean, Median, Mode Measures of Dispersion: Range, Standard deviation, Variance

Module II: Probability
Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module III: Continuous Distribution
Normal Distribution, Properties of Normal distribution

Module IV: Correlation
Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples.

Module V: Regression
Definition, Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line

Module VI: Introduction to the following Statistical terms
Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications.
Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.
Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means.
Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chisquare test, Coefficient of contingency, Yates' correction for continuity.
Analysis of Variance: One way and Two way (only Examples)

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.

References:

- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.

DATABASE MANAGEMENT SYSTEM

Course Code: BTE2304 **Credit Units: 02**

Course Objective:
It enables the students to access biological information networks and databases in order to understand the different techniques of biotechnology to build detection systems especially in the prevention and treatment of human diseases.

Course Contents:

Module I: Overview and historical perspective
File systems vs. DBMS, advantages of DBMS

Module II: Describing and storing data in DBMS
Levels of abstraction and data independence; Data models and their comparison; Entity relationship model -concepts, design, keys and features; Relational model -introduction, structure of the relational databases, integrity constraints, Relational algebra and calculus -selection and projection, set operations, renaming, Joins, Division etc.

Module III: SQL and Perl

Module IV: Database design
Functional dependencies, Normal forms; Concurrency control and database discovery -concept of transaction: atomicity, consistency, isolation and durability, transactions and schedules, concurrent execution of transactions, Lock based concurrency control, Database recovery

Module V: Current trends
Distributed databases and multimedia databases;

Module VI: Data warehousing and Data Mining

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Data Mining: Concept and techniques, J. Han and M. Kamber, Morgan Kaufman.
- Database Management, P.C. Desai.

References:
- Introduction to Database Systems, C.J. Date, Addison Wesley Publishing.
- Data Mining, A.K. Pujari, Sangam Books Ltd.
- Principles of Database and Knowledge Based systems, J.D. Ullman, Computer Science Press.
- The Data Warehouse Lifecycle Toolkit, John Wiley and Sons Inc.
- The Data Warehouse Toolkit, R. Kimball et al, John Wiley and Sons Inc.

CHEMICAL BIOLOGY

Course Code: BTE2305 **Credit Units: 02**

Course Objective:
Chemical biology is that branch of life science, which deals with the study and manipulation of biological systems through the application of chemical techniques and tools. It differs from the more traditional disciplines of chemistry and biology in its emphasis on integrating a wider series of experimental techniques, ranging from synthetic organic chemistry, to biochemistry, to structural, molecular, and cellular biology. Chemical biology has historical and philosophical roots in medicinal chemistry, supramolecular chemistry (particularly host-guest chemistry), bioorganic chemistry, pharmacology, genetics, biochemistry and metabolic engineering.

Course Contents:

Module I: Principles of chemical biology
Classification & chemistry of carbohydrates, proteins and nucleic acids. Chemical method to synthesise peptides, polynucleotides,.Cellular Receptors for drug action, strategies for identifying the cellular target of physiologically active natural products (paclitaxel, vancomycin).

Module II: Chemical reactions in living systems
Classification of Enzymes, Introduction to enzyme chemistry: Redox reactions (1), Group transfer reactions, Isomerases, Carboxylation and decarboxylation, Types of chemical reactions important in organic synthesise: Eliminations, additions, condensation (Aldol condensation) and Substitutions, and Rearrangements (Claisen Reactions).

Module III: Structural chemical biology
Purine biosynthesis, thiamine biosynthesis, vitamin E biosynthesis, Steroids (Cholesterol), porphyrin biosynthesise.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Chemical Biology by H. Gobind Khorana
- Chemical Biology: A practical course, Herbert Waldmann, Petra Janning, Wiley-VCH
- Foundations of Chemical Biology, C.M. Dobson, J.A. Gerrard, A.J. Pratt, Oxford Chemistry Primers
- Innovations in Chemical Biology, Sener Bilge, Springer
- Chemical biology by Stuart L. Shreiber, Tarun Kapoor, Gunther Wess, Wiley-VCH.

References:

- A General Method for Discovering Inhibitors of Protein−DNA Interactions Using Photonic Crystal Biosensors *Chem. Biol.*, 2008, *3* (7), pp 437–448.
- Optimization of non-natural nucleotides for selective incorporation opposite damaged DNA Org. Biomol. Chem., 2007, 5, 3623 – 3630.

BIOCHEMISTRY LAB

Course Code: BTE2306 **Credit Units: 02**

Course Contents

Module I
Colorimetric determination of pK and sugars (Molischs test, iodine test, Saliwanoff test, Fehlings test, Benedicts test, Bials test).

Module II
Biochemical estimation Cholestrol, free fatty acids, iodine number.

Module III
Biochemical estimation of proteins (Ninhydrin test, Biuret test, Xanthoprotein test)

Module IV
Biochemical estimation of DNA and RNA, Quantitative determination of DNA and RNA by UV spectrophotometer, Determination of melting temperature of DNA from thermal denaturation characteristics.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

CELL BIOLOGY & GENETICS LAB

Course Code: BTE2307 **Credit Units: 02**

Course Contents

Module I
Microscopy: Light microscopy, Bright field, Phase contrast.

Module II
Study of chromoplasts, chloroplast in plant cell; Mitosis and Meiosis

Module III
Study of permanent slides of types of cancer; Study of apoptosis

Module IV
Study of gene interaction; chromosomal translocation in Rhoeo discolor

Module V
Study of bacterial conjugation and bacterial transduction

Module IV
Study of physical and chemical mutagens on growth of *E. coli*; PTC test

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

DATABASE MANAGEMENT SYSTEMS LAB

Course Code: BTE2308 **Credit Units: 01**

Course Contents:

Module I
Database creation using DDL and DML.

Module II
Defining the primary and secondary keys.

Module III
Implementation of selection, projection and joins (internal and external) with SQL and Perl .

Module IV
Normalization of databases with SQL and Perl

Module V
Implementation of transactions and schedules.

Module VI
Detection of association rules and knowledge recovery.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner

INDUSTRIAL BIOTECHNOLOGY

Course Code: BTE2309 **Credit Units: 02**

Course Objective:
The objective of this course is to use microorganism to produce various compounds of commercial interest. The student will be exposed to various techniques available for large scale cultivation of microorganisms.

Course Contents:

Module I
Introduction to fermentation, the fermentation industry, Production process batch and Continuous system of cultivation, Solid-state fermentation

Module II
Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III
Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV
Production of fermented dairy products

Module V
Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Industrial Microbiology – Cassida

References:
- Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescot & Duhn.

FERMENTATION TECHNOLOGY

Course Code: BTE2310 **Credit Units: 02**

Objective of the course is for the acquaintance of large scale cultivation of microbes for production of industrially important products.

Course Contents

Module I: Fermentation Technology-An Overview
Development and overview of fermentation processes, strain development, media design and optimization, commercial media for fermentation

Module II: Bioproduct Production
Production of Organic acids: citric acid, acetic acid, lactic acid
Production of ethanol
Production of Antibiotics: penicillins, tetracyclins, chloramphenicol
Production of Recombinant products
Production of Industrial enzymes: cellulase, amylase, protease
Production of vitamins: B_{12}, riboflavin, fermented dairy products.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & references:
Text:
- Principles of Fermentation Technology by P.F. Stanbury, A. Whitaker, and S.J. Hall, Aditya Books (P) LTD.
- ***Industrial Microbiology by L.E.Casida, JR. New Age International (P) LTD.***
- ***Biotechnology, A Text book of Industrial Microbiology, W. Crueger and A. Crueger, Sinauer Association.***

References:
- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Biochemical Engineering Fundamentals, J.E. Bailey and D.F. Ollis, McGraw-Hill
- Protein Purification, M.R. Ladisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society

DRUG DESIGN AND DEVELOPMENT

Course Code: BTE2311 **Credit Units: 02**

Course Objective:
The above course will be aimed to identify and design drugs that could be potentially useful in the identification of the candidate drugs, which have efficacy in cell culture or animal models, and thus the most effective compounds could be employed based on the above results for being moved through preclinical studies to clinical trials.

Course Contents:

Module I: Drug targets classification
DNA, RNA, post-translational, processing enzymes, metabolic enzymes involved in nucleic acid synthesis, G-protein coupled receptors (monomeric transmembrane proteins), small molecule receptors, neuropeptide receptors, ion channels (monomeric multi-transmembrane) proteins, ligand-gated ion channels (oligomeric transmembrane proteins), transporters (multi-transmembrane proteins).

Module II: Target discovery and validation strategies
Genomics (new target discovery), biological activity directed and other types of screening, natural products, combinatorial chemistry; General overview of validation techniques.

Module III: Structure-based design
Drug design to discovery and development, drug metabolism, toxicity and pharmacokinetics, toxicology considerations, problems and drawbacks on drug discovery and development.
'de novo' design methodologies : indirect drug design, pharmacophore development and receptor mapping, combinatorial libraries and new strategies and recent technologies in drug design.

Module IV: Basic concepts of Drug Delivery
Introductory lecture (1-2), Concepts of Bio availability, Process of drug absorption, Pharmacokinetic processes, Timing for optimal therapy, Drug delivery considerations for the new biotherapeutics
Basic terminologies in drug delivery and drug targeting, Drug release, Drug targeting, Doses forms, Various routes of administration of drugs (just introduction), Strategies for enhanced therapeutic efficacies (Basic principles)

Module V: Delivery of Genetic material
Basic principles of gene expression, Viral and nonviral vectors in gene delivery, Clinical applications of gene therapy and antisense therapy
New generation technologies in Drug delivery and targeting
Nanotechnology / Nanobiotechnology, Use of biosensors and challenge of chronopharmacology, Microchips and controlled drug delivery, genetically engineered cell implants in drug deliver.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Drug Delivery and Targeting, A.M. Hillery, A.W. Lloyd and J. Swarbrick, Harwood Academic Publisher
- Pharmaceutical Dosage Forms and Drug Delivery Systems, H.C. Ansel, L.V. allen and N.G. Popovich, Lippincott Williams and Wilkins Publisher

***References*:**

- Introduction to Biophysical Methods for Protein and Nucleic Acid Research, J.A. Glasel and M.P. Deutscher, Academic Press.
- Principles of Drug Action, W.B. Pratt and P. Taylor, Churchill Livingston.
- Principles of Medicinal Chemistry, W.O. Foye, T.L. Lemke, and D.A. Williams, Williams and Wilkins
- Side Effects and Drug Design, E.J. Lien, Marcel Dekker.
- The Anticancer Drugs, W.B. Pratt, R.W. Ruddon, W.D. Ensminger, and J. Maybaum, Oxford University Press.

RECOMBINANT DNA TECHNOLOGY

Course Code: BTE2312 **Credit Units: 02**

Course Objective:
A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR for the cloning and expression of genes can be obtained through the course.

Course Contents:

Module I
Purification of DNA from bacterial, plant and animal cells, manipulation of purified DNA.

Module II
Introduction of DNA into living cells

Module III
Introduction to gene cloning and its uses, tools and techniques: plasmids and other vectors, DNA, RNA, cDNA.

Module IV
Production of proteins from cloned genes: gene cloning in medicine (Pharmaceutical agents such as insulin, growth hormones, recombinant vaccines), gene therapy for genetic diseases.

Module V
Analysis of DNA by Southern blotting, Analysis of RNA by Northern blotting, Analysis of proteins by Western blot techniques, Dot blots and slot blots, RFLP, AFLP.
PCR: Basic principles and its modification application and uses.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Gene cloning and DNA analysis by T.A. Brown

References:

- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc
- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press
- Molecular Biology of gene by Watson, Baker, Bell, Gann, Levine, Losick
- DNA Science by Micklos Freyer
- Principles of Gene manipulation and Genomics by Primrose and Twyman

TERM PAPER

Course Code: BTE2331 **Credit Units: 02**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section

may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTE2332 **Credit Units: 02**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:
- Suitability of the topic.
- Relevance of the topic

- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTE2333 **Credit Units: 02**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the trainer in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the trainer.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Syllabus – Fourth Semester

MICROBIOLOGY

Course Code: BTE2401 **Credit Units: 03**

Course Objective:
The course imparts the knowledge of different types of microorganisms that are invisible to our naked eyes. Discovery origin and evaluation of different forms of bacteria, fungi, protozoa and viruses constitute the basics of biotechnology.

Course Contents:

Module I
Introduction and historical perspective - Discovery of the microbial world, controversy over spontaneous generation, role of microorganisms in transformation of organic matter and in the causation of diseases, development of pure culture methods. Methods in Microbiology -Principles of microbial nutrition, Culture media, Theory and practice of sterilization, pure culture techniques.

Module II
Prokaryotic structure and function - functional anatomy of bacteria: cell envelope, cell wall, cytoplasmic membrane, capsule, surface appendages, cytoplasm and cytoplasmic inclusions. Growth - The definition of growth, mathematical expression of growth, growth curve, measurement of growth, synchronous growth, continuous culture, culture collection and maintenance of cultures.

Module III
Systematics and taxonomy - new approaches to bacterial taxonomy, classification including ribotyping, ribosomal RNA sequencing, characteristics of primary domains, taxonomy, nomenclature and Bergey's manual.

Module IV
Metabolic Diversity among microorganisms - photosynthesis in microorganisms, role of bacteriochlorophylls, carotenoids and phycobilins, Chemolithotrophy, hydrogrn-iron-nitrite-oxidizing bacteria, nitrate and sulphate reduction, methanogenesis and acetogenesis, Fermentations, nitrogen fixation, plant microbe interactions (mycorrhizae).

Module V: Archaea
Archae as earliest life forms, thermophiles, psychrophiles, halophiles, alkalophiles, acidophiles, hyperthermophiles Viruses: Bacterial, animal; structure of viruses; Reproduction and life cycle of RNA and DNA viruses; Viroids and prions. Algae and Fungi: Classification and Reproduction.

Module VI
Host-parasite relationship - Normal micro flora of skin, oral cavity, gastrointestinal tract, Respiratory infections; entry of pathogens into the host, types of toxins (Exo, endo, entro) and their mode of actions, Microbial pathogenesis -Disease reservoirs; Epidemiological terminologies; Infectious disease transmission; Sexually transmitted disease including AIDS, Food and water- borne diseases; pathogenic fungi.

Module VII
Chemotherapy/antibiotics -Antimicrobial agents, sulfa drugs, antibiotics -penicillin and cephalosporins, broad spectrum antibiotics, antifungal antibiotics; mode of action.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L.Wheelis and P.R. Painter, Macmillian
- Microbiology VI Edition, M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill Microbiology by Prescott
- The microbes – An Introduction to their Nature and Importance, P.V. Vandenmark and B.L. Batzing, Benjamin Cummings.

References:

- The Microbial World, Roger Y. Stanier, Prentice Hall
- Microbiology, Tortora, Funke and Chase, Benzamin & Cummings
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers Principles of Microbiology, R.M. Atlas, WMC. Brown Publisher.

DATA STRUCTURE AND ALGORITHMS

Course Code: BTE2402 **Credit Units: 02**

Course Objective:
It helps the students to utilize the information acquired through electronic media to access biological information network and data bases in order to understand biological functions and then to evaluate genetic diseases, their causes and risks related to human kind.

Course Contents:

Module I: Introduction

Module II: Programming strategies
Objects and ADTs with example, Constructors and destructors, Data structure, methods, Pre and post conditions, C conventions, Error handling, Some programming language notes.

Module III: Data structures
Arrays; lists; stacks and stack frames; Recursion -Recursive functions with example of factorial, Queue, Degeue.

Module IV: Searching
Sequential and binary search, Trees, binary search tree, complexity.

Module V: Queues
Priority queues and heaps

Module VI: Sorting
Bubble, Heap, Quick, Bin, Radix

Module VII: Searching revisited
Red-Black trees, AVL trees, general n-ary trees, hash tables; Hashing and collision resolution

Module VIII: Dynamic algorithm
Fibonacci numbers, bionomial coefficients, optimal binary search trees, matrix chain multiplication, longest common subsequence, optimal triangulation.

Module IX: Graphs
Minimum spanning tree and Djkstra's algorithm

Module X: Huffman encoding, FFT, Hard or intractable problems
Eulerian or Hamiltonian paths, Travelling salesman problem.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Data Structures and Algorithms, A.V. Aho, J.E. Hopcroft and J. Ullman, Addison-Wesley Publishing
- Database Design, Development and Deployment with Student CD, P. Rob and E. Semaan, McGraw-Hill/Irwin
- Schaum's Outline of Data Structures with C++, J.R. Hubbard, McGraw Hill Trade.

References:

- Database system concepts, A. Silberschatz, P.B. Galvin and G. Gagne, John Wiley and Sons Inc.
- Introduction to Data Structures and Application, J. Tremblay and P.G. Sorensen, McGraw Hill College Division

ENZYMOLOGY AND ENZYME TECHNOLOGY

Course Code: BTE2403 **Credit Units: 03**

Course Objective:
The course aims to provide an understanding of the principles and application of proteins, secondary metabolites and enzyme biochemistry in therapeutic applications and clinical diagnosis. The theoretical understanding of biochemical systems would certainly help to interpret the results of laboratory experiments.

Course Contents:

Module I: Enzymes
Introduction and scope, Nomenclature, Mechanism of Catalysis.

Module II: Enzyme Kinetics
Single substrate steady state kinetics; Michaelis Menten equation, Linear plots, King-Altman's method; Inhibitors and activators; Multisubstrate systems; ping-pong mechanism, Alberty equation, Sigmoidal kinetics and Allosteric enzymes

Module III
Immobilization of Enzymes; Advantages, Carriers, adsorption, covalent coupling, cross-linking and entrapment methods, Micro-environmental effects.

Module IV: Enzyme reactors
Reactors for batch/continuous enzymatic processing, choice of reactor type; idealized enzyme reactor systems, Mass transfer in enzyme reactors: Steady state analysis of mass transfer and biochemical reaction in enzyme reaction.

Module V: Bioprocess Design
Physical parameters, reactor operational stability, Immobilized cells.

Module VI: Challenges and future trends
Enzyme catalysis in organic media; catalytic antibodies and non protein biomolecules as catalysts, biocatalysts from extreme thermophilic and hyper thermophilic Archae and Bacteria.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:

- Biotechnological Innovations in Chemical Synthesis, R.C.B. Currell, V.D. Mieras, Biotol Partners Staff, Butterworth Heinemann.
- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis, R.A. Copeland, John Wiley and Sons Inc.

References:

- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner.
- Enzyme Kinetics: Behaviour and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, I.H. Segel, Wiley-Interscience.
- Industrial Enzymes & their applications, H. Uhlig, John Wiley and Sons Inc.

CHEMICAL ENGINEERING PRINCIPLES

Course Code: BTE2404 **Credit Units: 02**

Course Objective:
The knowledge gained through chemical reaction engineering and material and energy balances will help the students to understand the tools and techniques of biotechnology.

Course Contents:

Module I: Material and Energy Balances
Units and dimensions, Dimensional analysis; Simple problems on material balance calculations involving unit processes and reactive systems; Available electron balances.
Basic energy concepts -enthalpy changes in chemical/biochemical reactions and in non-reactive processes, Energy balance calculations, Use of Steam tables; Heat of reaction and energy balance for microbial processes.

Module II: Chemical reaction engineering
Kinetics of homogenous reactions: Concepts of reaction rate, order of reaction and molecularity, Analysis of batch reactors for kinetic interpretation of data and isothermal reactor design for single and multiple reactions, Design equations for CSTR and plug flow reactors.

Module III: Instrumentation and process control
Principles of measurement: error, accuracy and sensitivity; Measurement of flow, pressure, temperature, level, pH, viscosity and chemical composition.
Basic concepts of feedback control, control loop and its elements, Dynamic behaviour of first, second and higher order physical systems, controller hardware, choice of controllers and settings. Introduction to advanced control systems: feed forward, cascade and ratio control.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Basic Principles and Calculations in Chemical Engineering, D.M. Himmelblau, Prentice Hall
- Basic Principles of Chemical Engineering, E.I. Shaheen, Houghton Mifflin

References:
- Chemical Process Control, An introduction to Theory and Practice, G. Stephanopoulos, Prentice Hall Inc.
- Chemical Reaction Engineering, O. Levenspiel, John Wiley and Sons Inc.
- Elementary Principles of Chemical Processes, R.M. Felder and R.W. Rousseau, John Wiley and Sons Inc.
- Fundamentals of Chemical Reaction Engineering, C.D. Holland and R.G. Anthony, Prentice Hall Inc.
- Process Modelling, Simulation and Control for Chemical Engineers, W.L. Luyben, McGraw Hill

METHODS AND INSTRUMENTATION IN BIOTECHNOLOGY

Course Code: BTE2405 **Credit Units: 03**

Course Objective:
The students will be exposed to techniques and instruments that are used in biotech industries.

Course Contents:

Module I: Electrophoresis
Gel electrophoresis, SDS-PAGE, isoelectric focusing, two-dimensional electrophoresis, immuno electrophoresis, capillary electrophoresis

Module II: Chromatography
Paper, TLC, gel filtration, ion-exchange chromatography, affinity chromatography, HPLC and GLC

Module III: Spectroscopy
UV and visible spectroscopy, Infrared and Atomic absorption spectroscopy, fluorescence spectroscopy, Mass Spectrometry, MALDITOF, Nuclear Magnetic Resonance and Electron Spin Resonance spectroscopy,

Module IV
X-ray diffraction and X-ray Crystallography

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:
- Advanced Instrumentation, Data Interprtation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wi

MICROBIOLOGY LAB

Course Code: BTE2406 **Credit Units: 02**

Course Contents:

1. Preparation of solid and liquid media.
2. Isolation and maintenance of organisms by plating, streaking and serial dilution.
3. Preparation of slant cultures.
4. Growth curve measurement of bacterial population by turbidometry.
5. Measurement of bacterial population by dilution method.
6. Effect of temperature, pH, carbon and nitrogen sources on growth of bacteria.
7. Microscopic examination of bacteria by gram staining.
8. Endospore staining.
9. Capsule staining.
10. Isolation and identification of Rhizobium from root nodules.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

DATA STRUCTURE & ALGORITHMS LAB

Course Code: BTE2407 **Credit Units: 01**

Course Contents:

Module I
Stack implementation through arrays, link list

Module II
Programs for recursion functions

Module III
Implementation of queues and leap structures

Module IV
Application of binary trees in pre-order, post-order and in-order evaluation

Module V
A VL tree implementation

Module VI
Optimal matrix multiplication

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ENZYMOLOGY AND ENZYME TECHNOLOGY LAB

Course Code: BTE2408 **Credit Units: 01**

Course Objective:
The laboratory will help the students to isolate enzymes from different sources, enzyme assays and studying their kinetic parameters which have immense importance in industrial processes.

Course Contents:

Module I
Isolation of enzymes from plant and microbial sources.

Module II
Enzyme assay; activity and specific activity – determination of amylase, nitrate reductase, cellulase, protease.

Module III
Purification of Enzyme by ammonium sulphate fractionation.

Module IV
Enzyme Kinetics: Effect of varying substrate concentration on enzyme activity, determination of Michaelis-Menten constant (K_m) and Maximum Velocity ($V_{max.}$) using Lineweaver-Burk plot.

Module V
Effect of Temperature and pH on enzyme activity.

Module VI
Enzyme immobilization

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

Text:
- ***Practical Biochemistry, Sawhney and Singh***

References:
- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker

METHODS AND INSTRUMENTATION IN BIOTECHNOLOGY LAB

Course Code: BTE2409 **Credit Units: 01**

Course Contents:

Module I
Cell disruption techniques

Module II
Centrifugation – low speed and high speed.

Module III
Spectrophotometer techniques

Module IV
Chromatography –Paper Chromatography and Thin Layer Chromatography

Module V
Electrophoresis –SDS Page and Agarose gel electrophoresis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

MARINE BIOTECHNOLOGY

Course Code: BTE2410 **Credit Units: 02**

Course Objective
The students will be exposed to basic concepts related to marine life. Also the subject deals with the scope and application of marine biota in biotechnology.

Course Contents

Module I
The marine ecosystem and its functioning: intertidal, estuarine, salt marsh, mangrove, coral reef, coastal & deep sea ecosystems. Marine viruses, Bacteria and their significance; Hydrothermal vents; Marine Biodiversity: defining, measurement and conservation strategies.

Module II
Nutrients cycling: carbon, nitrogen sulphur & phosphorus.
Global climate changes: impact on species diversity & productivity, oceans as a carbon sink, effects on corals bleaching. Biological rhythms.

Module III
Important Marine Products: Bioactive compounds from marine organisms, GFP, RFP characteristics and their applications; Green mussel adhesive protein, Chitosan and its applications

Module IV
Probiotic bacteria and their importance in aquaculture; Vaccines in aquaculture: Fish, shrimps & prawns; Marine food analysis-spoilage, quality control; Techniques for identification of bacterial & viral pathogens in aquaculture and Remedies.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Biodiversity (2004) Borua, P.K
- Text book of Marine Ecology (1989). Nair N.B. & Thampy, D.M.
- Drugs from sea. (2000). Fusetani, N.
- Microbiology of deep sea hydrothermal vents. (1995). Karl, D.M.
- The search from bioactive compounds from microorganisms. (1992). Omum, S.
- Recent Advances in Marine Biotechnology. Vol.2 (1998) Fingerman, M., Nagabushanam, R., Thompson, M.
- Recent Advances in Marine Biotechnology Volume 3 – Milton fingerman et al., 1999.
- Environmental Biotechnology – Gareth M.Evams et al., 2003
- Biotechnology, Recombinant DNA Technology, Environmental Biotechnology – S.Mahesh et al., 2003.

VACCINE DEVELOPMENT

Course Code: BTE2411 **Credit Units: 02**

Course Objective
The students will be exposed to basic concepts related with development of vaccines.

Course Contents

Module I
History of Vaccine Development
Definition of Vaccine
Evolution of Vaccines

Module II
Process development for vaccines
Manufacturing of vaccines
Various aspects of vaccines, process development and manufacturing

Module III
Clinical development of vaccines
Clinical end-point: Evolution of vaccines
General specifications and pharmaceuticals release criteria for the existing vaccines
Cold chain management of vaccines
Current vaccine research

Examination Scheme:

Components	**H/S**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

Text & Reference
- Vaccines, 4th Edition by Stanley A. Plotkin, Elsevier publication
- Vaccines and Immunotherapy by Stanley J. Cryz Elsevier science publishing co.
- Journal articles and reviews

AGRICULTURAL BIOTECHNOLOGY

Course code: BTE2412 **Credit Units: 02**

Course Objective:
The agriculture plant biotechnology course basically meant for understanding the basic techniques of plant tissue culture and genetic engineering in plants along with the latest ongoing research on the different aspects of plants and its products to redefine agriculture priorities and produce human resource with academic, scientific and technical expertise along with management or business experience.

MODULE I Plant Regeneration Technologies
Introduction and historical perspective, organ culture, cell suspension, organogenesis, somatic embryogenesis, micropropagation, anther and ovary culture-haploid production, embryo culture and rescue, protoplast culture, somatic hybridization and cybrids.

MODULE II Transgenic Plants Technology
Genetic Transformation, Methods for gene transfer in plants, Molecular mechanism of *Agrobacterium* mediated transformation. Selectable markers, Reporter gene and Promoters used in plant transformation vectors.

MODULE III Industrial and Agricultural Application
Biotic stress tolerance; insect, pest and pathogen resistance. Abiotic stress tolerance; salt, water and drought tolerance. Herbicide tolerance. Molecular farming

Examination Scheme:

Components	**H/S**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

References

1. Plant Biotechnology: The Genetic Manipulation of Plants. A. Slater, N. W. Scott and M. R. Fower.2008. Oxford University Press
2. Recent Advances in Plant Biotechnology: Ara Kirakosyan and Peter B. Kaufan. 2009. Springer
3. Plant Tissue Culture: Theory and Practice. S.S. Bhojwani and M.K.Razdan. Elsevier Health Science
4. An Introduction to Plant Tissue Culture. M.K. Razdan. Oxford and IBH Publishing.

NATURAL PRODUCTS AND MEDICINAL CHEMISTRY

Course Code: BTE2413 **Credit Units: 02**

Course Objective: The students will be exposed to basic concepts related with natural products and medicinal chemistry and its biological application.

Course Contents:

Natural Products

Module I
Introductory bio-organic chemistry: enzymatic transformations, co-factors, examples from carbohydrate chemistry.

Module II
Isoprenoids, Terpenes and Flavonoids: biosynthetic origins of the group, survey of classes, electron-deficient rearrangements, chemical synthesis, steroids; Alkaloids: shikimate pathway to aromatic amino acids, pyridoxyl phosphate mediated transformations in alkaloid biosynthesis

Medicinal Chemistry

Module III
Drug processing in mammals
The molecular basis of drug action
The multiphore conceptualization of drugs
Messenger and non-messenger target systems

Examination Scheme:

Components	**H/S**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

Text & References:

- G.A. Poulton and C. Spino, “Natural Products Chemistry”, available as a Chemistry 433 Course Pack in the Bookstore.
- J. Mann, “Chemical Aspects of Biosynthesis”, Oxford Science, 1994, QP517 B57M36 and P.M. Dewick, “Medicinal Natural Products: a Biosynthetic Approach, 1997
- Introduction to Natural Products, 2004 by Albert T. Sneden
- Medicinal Chemistry by Graham Pat

STEM CELL TECHNOLOGY

Course Code: BTE2414 **Credit Units: 02**

Course Objective: The objective of this paper is to familiarize the students with stem cell technology and its applications for betterment of the society. The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I
Definition, properties, proliferation, culture of stem cells, medical applications of stem cells, ethical and legal issues in use of stem cells.

Module II
Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module III
Gene Therapy: Introduction, History and evolution of Gene therapy, optimal disease targets, Failures and successes with gene therapy and future prospects,Genetic Perspectives for Gene Therapy, **Gene Delivery** methods: Viral vectors and Non-viral Vectors

Module IV
Regulatory and Ethical Considerations of stem cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer,

***References*:**
- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Understanding Biotechnology by Aluízio Borém, Fabrício R. Santos, David E. Bowen, Prentice Hall

TERM PAPER

Course Code: BTE2431 **Credit Units: 02**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
e) Begin by making a list of subject-headings under which you might expect the subject to be listed.
f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

d) Get facts, not just opinions. Compare the facts with author's conclusion.
e) In research studies, notice the methods and procedures, results & conclusions.
f) Check cross references.

4. Outlining the paper

c) Review notes to find main sub-divisions of the subject.
d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

g) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/

details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

h) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
i) Check for proper spelling, phrasing and sentence construction.
j) Check for proper form on footnotes, quotes, and punctuation.
k) Check to see that quotations serve one of the following purposes:
   (iv) Show evidence of what an author has said.
   (v) Avoid misrepresentation through restatement.
   (vi) Save unnecessary writing when ideas have been well expressed by the original author.
l) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

e) summary of question posed
f) summary of findings
g) summary of main limitations of the study at hand
h) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTE2432 **Credit Units: 02**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

***4)* Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTE2433 **Credit Units: 02**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the trainer in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the trainer.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus – Fifth Semester

MOLECULAR BIOLOGY

Course Code: BTE2501 **Credit Units: 03**

Course Objective:
The aim is to extend understanding of the molecular mechanisms via which genetic information is stored, expressed and transmitted among generations.

Course Contents:

Module I: DNA Replication and repair
Mechanism of Prokaryotic and Eukaryotic DNA replication, Enzymes and accessory proteins involved in DNA replication, DNA repair Mechanism.

Module II: Transcription
Prokaryotic transcription, Eukaryotic transcription, RNA polymerase, General and specific transcription factors, Regulatory elements.

Module III: Modifications in RNA
5'-cap formation, transcription termination, 3 '-end processing and polyadenylation, Splicing, Editing, Nuclear export of mRNA and mRNA stability.

Module IV: Translation
Prokaryotic and Eukaryotic translation, the translation Machinery; Mechanisms of initiation, elongation and termination, regulation of translation, co-and post-translational modifications of proteins.

Module V: Regulation of Gene Expression in prokaryotic and eukaryotic systems
Lac operon, Ara operan, regulation in Eukaryotes

Module VI: Antisense and Ribozyme technology
Molecular mechanism of antisense molecules, inhibition of spilicing, polyadenylation and translation, disruption of RNA structure and capping, Biochemistry of Ribozyme; Hammerhead, hairpin and other ribozymes, strategies for designing ribozymes, applications of antisense and ribozyme technologies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Concepts of Genetics, W.S. Klug, and M.R. Cummings 2004, Pearson Education
- Genome, T.A. Brown, John Willey & Sons Inc.
- Molecular Biology of the Cell. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Publishing
- Gene VIII, Benjamin Lewin 2005, Oxford University Press

References:

- Molecular Cell Biology, H. Lodish, A.Berk, S. Zipursky, P Matsundaira, D.Baltimore and J.E. Barnell, W.H. Freeman and Company.
- Molecular Cloning: A Laboratory Manual (3-Vilcume set), J. Sambrook, E.F. Fritsch and T. Maniatis, Cold spring Harbor Laboratory Press.
- Molecular Biology of the Gene, J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison-Wesley Publishing.

ANIMAL BIOTECHNOLOGY

Course Code: BTE2502 **Credit Units: 03**

Course Objective:
The application of Animal Biotechnology covers major areas related to commercial applications. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I
Historical perspectives, sterilization methods, organ culture - culture techniques, plasma clot, raft methods, agar gel, grid method, organ engineering.

Module II
Cell culture substrates, cultural media, natural and artificial media, initiation and maintenance of cell cultures, cell culture products, cryopreservation techniques, immobilized cultures

Module III
In vitro fertilization and embryo transfer

Module IV
Somatic cell hybridization, hybridoma technology

Module V
Animal genetic engineering -vectors, gene transfer methods - microinjection, virus mediated and other methods of gene transfer

Module VI
Transgenic animals with new traits, transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutic etc.

Module VII
Bioethical issues related to animal biotechnology,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References

- Cell Culture LabFAx, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication

PLANT BIOTECHNOLOGY

Course Code: BTE2503 **Credit Units: 03**

Course Objective:
The application of Plant Biotechnology covers major areas related to commercial applications. Regeneration of plants through *in vitro* techniques offers a practical strategy for micro propagation. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:
Module I
Historical perspective of plant tissue culture.
Tissue culture lab and organization
Sterilisation techniques
Types of nutrient media and media composition
Plant regeneration pathways
Role of phytohormones
Cell culture techniques- cell, tissue, organ cultures, callus culture, suspension culture
Culture techniques Callus culture, cell culture and protoplast cultures.

Module II
Organogenesis and somatic embryogenesis.
Applications of plant tissue and cell culture.
Micropopogation, pathogen free plants. production haploids,
Somaclonal variation.preservation of germplasm.

Module III
Genetic engineering in plants, - transformation vectors
Gene transfer techniques-vector meditated and vector less gene transfer.
Transgenic plants trans gene integration and expression
Module IV
Transgenic crop with new traits-herbicide tolerance, insect and disease resistance,
Therapeutic proteins and compounds
Oral vaccines
Production of secondary metabolites via tissue culture
Bioethics of plant genetic engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P.McGarvy and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Adacemic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences

BIOINFORMATICS

Course Code: BTE2504 **Credit Units: 03**

Course Objective:
The course involves a basic understanding of computer and bioinformatics tools and skills in the field of biology.

Course Contents:
Module I: Introduction and overview
The NCBI data model; sequence databases, sequence retrieval, sequence file formats, submitting DNA and protein sequences; classification of biological databases

Module II: Biological Databases
Sequence databases (EMBL, GenBank, DDBJ, -UNIPROT, PIR, TrEMBL), Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Cluster databases-An Introduction, Specialised databases (KEGG, etc), Database technologies (Flat-file), Structural databases (PDB)

Module III: Sequence alignment
Global and local alignments, statistical significance of alignments, scoring matrices and gap penalties, position specific scoring matrices, programs and methods for Pairwise and multiple alignment, pattern searching programs, family and superfamily representation - Pfam, hidden Markov models

Module IV: Phylogenetic prediction
Phylogenetic analysis, Evolutionary Models, Character and distance based Tree building methods; tree evaluation, phylogenetic analysis, parsimony, maximum likelihood trees; Trees-splits and metrices on trees, tree interpretation, Distance – additive, ultrameric and nonadditive distances.

Module V: Predictive methods using DNA and protein sequences
ESTs: construction, databases, clustering, gene discovery and identification, and functional classification. Protein identification tools, physical properties, motifs and patterns, structure, folding classes, structure classification databases – Scop and Cath;

Module VI: Structure databases
Structural databases - PDB and MMDB, structure file formats, Secondary and tertiary structure prediction methods in proteins, Internal and external co-ordinate system, software to visualize secondary and tertiary structural information in protein.

Module VII: Comparative genome analysis
Reconstruction of metabolic pathways; Genome analysis, genome anatomy, genome rearrangements with inversions, signed inversions, gene identification, gene expression, expression analysis, gene identification and functional classification.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Computer Science, J.G. Brookshear, Pearson, Addison Wesley
- Introduction to Bioinformation – T.Attawood
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F Quellette, Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag

MOLECULAR BIOLOGY LAB

Course Code: BTE2505 **Credit Units: 01**

Course Contents:

Module I
Preparation of DNA: genomic, Plasmid

Module II
Isolation of RNA

Module III
RFLP analysis

Module IV
Gel filtration

Module V
Preparation of Competent Cells

Module VI
Restriction Digestion and Ligation of DNA

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ANIMAL BIOTECHNOLOGY LAB

Course Code: BTE2506 **CreditUnits: 02**

Course Contents:

1. Preparation, standardization and sterilization of culture media
2. Inoculation of specific tissues for callusing
3. Inoculation and maintenance of cell lines
4. Study of toxicity on cell lines

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

PLANT BIOTECHNOLOGY LAB

Course Code: BTE2507 **Credit Units: 02**

Course Contents:

Module I
Sterilization of glasswares and equipments.
Preparation of cotton plugs and culture media
Preparation of stocks for culture media
Preparation of culture media

Module II
Preparation and sterilization of different explants
Inoculation of explants on culture media

Module III
Study of viability of seeds
Embryo culture

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

BIOINFORMATICS LAB

Course Code: BTE2508 **Credit Units: 01**

List of Experiments/Exercises

1. Basics of sequence analysis Retrieving a sequence-nucleic acid/Protein
2. Local and Global Alignment- concepts Pair wise sequence alignment
3. Multiple sequence alignment
4. DOT Matrix Analysis
5. Analysis Using Scoring Matrices
6. Dynamic Programming – Smith Watermann Algorithm Needleman Wunsch Algorithm
7. Protein identification, physical properties, motifs and patterns, structure, folding classes, structure classification
8. ESTs – databases, clustering, gene discovery and identification, and functional classification.
9. Molecular Structure drawing tool, Molecular modeling/Docking.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner.

SUMMER INTERNSHIP EVALUATION-I

Course Code: BTE2535 **Credit Units: 03**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infec*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	**100**

BIOFUEL AND GREEN BIOTECHNOLOGY

Course Code: BTE2509 **Credit Units: 02**

Course Objective:
This course will acquaint the students with bioenergy resources, their properties, preparation, processing along with the details of equipments utilized for the purpose.

Course Contents:

Module I: Biomass Sources, Characteristics & Preparation: Biomass Sources and Classification
Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses for fermentation ethanol; Sources and processing of oils and fats for liquid fuels- Energy plantations - Preparation of woody biomass; Drying, Storage and Handling of Biomass.

Module II: Biogas Technology
Feedstock for biogas production, biodegradable organic matter, Operating parameters for biogas production, Dry and wet fermentation

Module III: Bio-Ethanol and Bio-Diesel Technology
Production of Fuel Ethanol by Fermentation of Sugars. Trans-esterification of Oils to Produce Bio-Diesel.
•

Module IV: Pyrolysis and Gasification of Biomass
Thermo-chemical conversion of ligno-cellulose biomass - Pyrolysis of biomass,Thermo-chemical gasification principles

Module V: Combustion of Biomass and Cogeneration Systems
Combustion of Woody Biomass, Cogeneration in Biomass Processing Industries. Use of biogases for cogeneration.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes, A. Chakravarthy, Oxford & IBH publishing Co., New Delhi, 1989.

***References*:**
- Biogas Systems: Principles and Applications, K.M. Mital, New Age International Publishers (p) Ltd., 1996.
- Biomass Energy Systems, P. Venkata Ramana and S.N. Srinivas, Tata Energy Research Institute, New Delhi, 1996.
- Fuels from Biomass and Wastes, D.L. Klass and G.M. Emert, Ann Arbor Science publ. Inc. Michigan, 1985.
- Bio-gas Technology, Khandelwal K.C. and Mahdi, Tata McGraw-Hill pub. Co. Ltd., New Delhi
- Advances in bio-gas Technology, O.P. Chawla, I.C.A.R., New Delhi. 1970.

STEM CELLS AND TISSUE ENGINEERING

Course Code: BTE2510 **Credit Units: 02**

Course Objective:
The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I
Stem Cell biology; types; embryonic stem cell, Adult stem cell and potential benefits of stem cell technology, Bone marrow transplants, Immunotherapy, Autoimmune Diseases and Promise of Stem Cell-Based Therapies, Stem Cells and Diabetes, Stem Cells and heart Repair

Module II
Gene Therapy: Introduction, History and evolution of Gene therapy, optimal disease targets, Failures and successes of gene therapy and future prospects; Gene Therapy and Immune System: Genetic Immunization, Innate and Acquired Immune Response to Gene Therapy

Module III
Gene Delivery methods; Viral vectors: Adenoviral, Adeno-associated virus (AAV), Retroviral, Lentiviral, Herpes Virus; Non-viral Vectors and Physical Methods & Combinatorial methods. Genetic perspectives for Gene Therapy, Gene Therapy for Cancer and Vascular Disorders, Nervous System.

Module IV
Regulatory and Ethical Considerations of Cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

***Text*:**
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer,

***References*:**
- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Understanding Biotechnology by Aluízio Borém, Fabrício R. Santos, David E. Bowen, Prentice Hall
- Cell Therapy: Stem Cell Transplantation, Gene Therapy, and Cellular Immunotherapy (Cancer: Clinical Science in Practice) George Morstyn, William Sheridan, Cambridge University Press,

JAVA-I

Course Code: BTE2511 **Credit Units: 02**

Course Objective:
The objective is to introduce students to a modern programming language and help them gain sufficient fluency to undertake research projects with a programming component; to lay the foundations for more advanced study of object-oriented languages
Emphasis is on to understand the basic concepts of programming; to learn the syntax and semantics of Java; to be able to use a program development environment

Course Contents:

Module I
Introduction to Java - Features, Inheritance, Strings, Packages, Interfaces; Multi- Threading, Applet Programming: AWT- Components, Menus, Layout manager, etc., Event Handling,, Java Packages - java.util, -java.io; exception handling,

Module II
Collection API - Arrays, Collection Interfaces, Concrete Collections, The Collections Framework, Legacy Collections

Module III
Swing

Module IV
- JDBC
- Introduction to Client Server Application
- Java Drivers
- java.sql Package
- Installing and setting up JDBC
- Basic JDBC Programming concepts
- Populating a database
- Executing Queries
- Scrollable and Updateable Result Sets

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Complete reference by Herbert Schildt TataMcGraw Hill
- Programming with java A Primer by Balagurusamy Publisher: TataMcGraw Hill
- Core Java 2 – Volume I – Fundamentals *by Cay S. Horstmann and Gary Cornell* published by Sun Microsystems Press, A Prentice Hall Title
- Thinking in Java – *by Bruce Eckel* published by Prentice Hall Computer Books

TERM PAPER

Course Code: BTE2531 **Credit Units: 02**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

h) Begin by making a list of subject-headings under which you might expect the subject to be listed.

i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

g) Get facts, not just opinions. Compare the facts with author's conclusion.

h) In research studies, notice the methods and procedures, results & conclusions.

i) Check cross references.

4. Outlining the paper

e) Review notes to find main sub-divisions of the subject.

f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

m) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section

may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

n) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
o) Check for proper spelling, phrasing and sentence construction.
p) Check for proper form on footnotes, quotes, and punctuation.
q) Check to see that quotations serve one of the following purposes:
   (vii) Show evidence of what an author has said.
   (viii) Avoid misrepresentation through restatement.
   (ix) Save unnecessary writing when ideas have been well expressed by the original author.
r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

i) summary of question posed
j) summary of findings
k) summary of main limitations of the study at hand
l) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTE2532 **Credit Units: 02**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:
- Suitability of the topic.

- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTE2533 **Credit Units: 02**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the trainer in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the trainer.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Syllabus – Sixth Semester

RECOMBINANT DNA TECHNOLOGY

Course Code: BTE2601 **Credit Units: 03**

Course Objective:
A complete understanding of molecular techniques can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Course Contents:
Module I: Enzymes used in RDT
Restriction endonuclease, methyltransferase, ligase, polymerase, kinase, phosphatase, nuclease, transferase, reverse transcriptase.

Module II: Cloning vectors
Plasmids, bacteriophages (Lambda and M13), phagemids, cosmids, artificial chromosomes (YAC, BAC). expression vectors (Bacteria and yeast), vector engineering (fusion tags, antibiotic markers), codon optimization, host engineering

Module III: Blotting techniques and hybridization
Southern, Northern and Western blotting techniques. Radioactive and non-radioactive probes.

Module IV: Nucleic acid amplification and its applications
Principles of PCR, designing of primers

Module V: Cloning Techniques
Basic cloning experiment: Design of cloning strategy and stepwise experimental procedure, Complementation, colony and plaque hybridization, restriction, PCR, plus-minus screening, immunoscreening.

Module VI: DNA Libraries
Purpose of constructing DNA libraries. Construction of cDNA and genomic libraries.

Module VII: Sequencing of DNA
DNA sequencing (Maxam Gilbert, Sanger's and automated), protein engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:

- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc.
- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company.

References:

- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press.
- Molecular and Cellular Cells Methods in Biology and Medicine, P.B Kaufman, W. Wu, D. Kim and C.J. Cseke, CRC Press.
- Milestones in Biotechnology: Classic Papers on Genetic Engineering, J.A. Bavies and W.S. Reznikoff, Butterworth Heinemann.
- Gene Expression Technology, D.V. Goeddel in Methods in Methods in Enzymology, Academic Press Inc.
- DNA Cloning: A Practical Approach, D.M. Glover and B.D. Hames, IRL Press.
- Molecular Cloning: A Laboratory Manual, J. Sambrook, E.F. Fritsch and T. Maniatis, Cold Spring Harbor Laboratory Press.

BIOPROCESS TECHNOLOGY

Course Code: BTE2602 **Credit Units: 03**

Course Objective:
The objective of the course is to apply the principles of biochemical engineering in large scale cultivation of microorganism for production of important products.

Course Contents:

Module I
Advantage of bioprocess over chemical process. Basic principle in bioprocess technology. Media formulation, Cell culture techniques; Inoculum development and aseptic transfers. Different types of pumps, valves, and line materials, piping conventions etc. used in Biochemical Process

Module II
Process technology for the production of primary metabolites, eg. biomass, ethanol, acetone-butanol, citric acid, amino acids, polysaccharides and plastics.

Ethanol: production by batch, continuous and cell recycle adopted by various technologies practiced in Indian distilleries using molasses and grains. Computation of fermentation efficiency, distillation efficiency and overall efficiency of ethanol production, recovery, uses, glucose effect etc. Power alcohol – definition, uses, merits and demerits of various technologies for its production.

Amino Acid: Genetic Control of metabolic pathway.
Lysine: Indirect and direct fermentation – mechanism of ph of metabolic block in accumulation of L-lysine by inhibition and repression mechanism.

Biomass: Bakers and distillers yeast production using various raw materials, "bios" factors for growth, Crabtree effect, harvesting, different forms and uses.
What are mushroom, different forms of common mushroom production from agro based raw materials and uses. Biofertilizers, biocompost and biopesticides

Module III
Production of secondary metabolites – penicillin, cephalosporins, streptomycin, tetracycline etc. Metabolites from plant and animal cell culture
Penicillin: Classification, various penicillin as precursor and 'R' – side chain, penicillinase, 6-APA, penicillin production, harvest and recovery, uses of various forms etc.
Streptomycin: chemical structure, production, harvest and recovery, use by-product of streptomycin fermentation etc.
Tetracycline: chemical structure, production, harvest and recovery, use by-product of tetracycline fermentation etc.

Module IV
Microbial production of industrial enzymes – glucose isomerase, penicillin acylase, cellulase, amylase, lipase, protease etc.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Biochemical Engineering- Kinetics, Mass Transport, Reactors and Gene Expression, W F Weith, John Wiley and Sons Inc
- Biochemical Engineering, S Aiba, A E Humphery and N F Millis, University of Tokyo Press
- Bioprocess Engineering Basic Concepts, M.L. Shuler and F. Kargi, Prentice Hall
- Bioprocess Engineering, B.K. Lydersen, K.L. Nelson, B.K. Lyderson and N. D'Elia, John Wiley and Sons Inc.
- Bioprocess Engineering Principles, P Doran, Academic Press
- Biotechnology. A Textbook of Industrial Microbiology, W. Crueger and a. Crueger, Sinauer Associates.
- Principles of Fermentation Technology, P.F. Stanbury and A. Whitaker, Pergamon Press
- Process Engineering in Biotechnolgy, A T Jackson, Prentice Hall

IMMUNOLOGY AND IMMUNOTECHNOLOGY

Course Code: BTE2603 **Credit Units: 03**

Course Objective:
Role of antibody engineering in biomedical applications and the importance of immuno genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I: Introduction
Phylogeny of Immune System, Innate and acquired immunity, clonal nature of Immune Response.
Organization and structure of lymphoid organs Nature and Biology of antigens and super antigens Antibody structure and function; Types of immunity- innate, acquired, active and passive.

Module II: Major Histocompatibilty
MHC, BCR and TCR, generation of antibody diversity, Complement system

Module III: Cells of the immune system
Hematopoiesis and differentiation, lymphocyte trafficking, B-Lymphocytes, T -Lymphocytes, macrophages, dendritic cells, natural killer, lymphokines and lymphokine activated killer cells, eosinophils, neutrophils and mast cells

Module IV: Regulation of immune response
Antigen processing and presentation, activation of B and T lymphocytes, cytokines and their role in immune regulation, T cell regulation and MHC restriction, immunological tolerance

Module V: Cell mediated toxicity
Mechanism of T cell and NK cell mediated lysis and macrophage mediated cytotoxicity.

Module VI: Hypersensitivity

Module VII: Autoimmunity

Module VIII: Tumor immunology, Immunity to infectious agents

Module IX: Transplantation Immunology

Module X: Synthetic vaccines
Vaccines: General consideration, ideotype network hypothesis, Synthetic vaccines

Module XI: Hnmunological Techniques
Immuno diffusion, immuno-electrophoresis, ELISA, RIA, fluorescence activated cell sorter

Module XII: Hybridoma technology and its applications
Fusion of myeloma cells with lymphocytes

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:

- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

FUNDAMENTALS OF BIOCHEMICAL ENGINEERING

Course Code: BTE2604 **Credit Units: 02**

Course Objective:
The course material on the kinetics of microbial growth, substrate utilization and product formation etc. may help the students to understand the various principles involved in instrumentation and control of bioprocess.

Course Contents:

Module I
Kinetics of microbial growth, substrate utilization and product formation.

Module II
Sterilization of air and medium.

Module III
Batch, continuous, cell recycle and fed batch reactors; mass and energy balance in microbial processes, Bioreactor design, Different types of bioreactors, their parts and functions. Different types of valves.

Module IV
Mass transfer in Biological reactions; Scale-up principles; Instrumentation and control of bioprocesses.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Biochemical Engineering- Kinetics, Mass Transport, Reactors and Gene Expression, W F Weith, John Wiley and Sons Inc
- Biochemical Engineering, S Aiba, A E Humphery and N F Millis, University of Tokyo Press
- Biochemical Engineering Fundamentals, J E Baily and D F Oillis, McGraw Hill
- Bioprocess Engineering Principles, P Doran, Academic Press

References:
- Chemical Engineering, J M Coulson, and J F Richardson, Butterwirth Heinemann
- Fermentation and Biochemical Engineering Handbook: Principles, Process Design, and Equipment, HC Vogel, CL Todaro, CC Todaro, Noyes Data Corporation/Noyes Publications
- Process Engineering in Biotechnology, A T Jackson, Prentice Hall

RECOMBINANT DNA TECHNOLOGY LAB

Course Code: BTE2605 **Credit Units: 02**

Course Objective:
The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I
Study of cloning (GFP CLONING)

Module II
Study of PCR

Module III
Study of Southern hybridiosation

Module IV
Study of RAPD

Module V
Site directed mutagenesis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

BIOPROCESS TECHNOLOGY LAB

Course Code: BTE2606 **Credit Units: 02**

Course Contents:

Module I
Isolation of industrially important micro organisms for microbial processes.

Module II
Determination of Thermal Death Point and Thermal death time of micro organisms for design of a sterilizer

Module III
Determination of growth curve of a supplied micro organism and also determine substrate degradation profile and to compute specific growth rate and growth yield from the data obtained.

Module IV
Comparative studies of ethanol production using different substrates.

Module V
Production of single cell protein

Module VI
Production and estimation of alkaline protease

Module VII
Sauer Krant fermentation

Module VIII
Use of alginate for cell immobilization

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

IMMUNOLOGY AND IMMUNOTECHNOLOGY LAB

Course Code: BTE2607 **Credit Units: 01**

Course Contents:

Module I
Blood film preparation and identification of cells.

Module II
Identification of blood group.

Module III
Isolation of serum.

Module IV
Lymphoid organs and their microscopic organization.

Module V
WIDAL Test

Module VI
Radial Immuno Diffusion Test

Module VII
Ouchterlony Double diffusion Test

Module VIII: Elisa
DOT, SANDWICH

Module IX
Purification of lgG through affinity chromatography

Module X
Immunohistochemistry

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

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PHARMACEUTICAL BIOTECHNOLOGY

Course Code: BTE2608 **Credit Units: 02**

Course Objective:
The main objectives are to cover representative pharmaceutical dosage forms, and general issues of formulation, production, quality requirements, validation and uses and to gain an understanding of the challenges associated with quality pharmaceutical manufacturing

Course Contents:

Module I
Introduction to Physical Pharmaceutics - Metrology and Calculations,

Module II
Molecular structure, properties and States of Matter, Solutions, Phase Equilibra, Micromeritic and Powder Rheology, Surface and Interfacial Phenomena, Dispersion Systems, Diffusion & Dissolution, Kinetics and
drug stability, Viscosity & Rheology

Module III
Polymer Science and Applications, Formulations and Development, Packaging

Module IV
Introduction to Industrial Processing, Transport Phenomena (Fluid Flow, Heat Transfer and Mass Transfer)

Module V
Particulate Technology (Particle Size, Size reduction, Size Separation, Powder Flow and Compaction), Unit Operations (Mixing, Evaporation, Filtration, Centrifugation, Extraction, Distillation, and Drying)

Module VI
Materials of Pharmaceutical Plant Construction, Good Manufacturing Practice (GMP's) Guidelines

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Bentley's Pharmaceutics by E A Rawlins
- Pharmaceutical Sciences by Remington

References:
- Physical Pharmacy by Alfred Martin.
- Cooper and Gunn's Tutorial Pharmacy

MOLECULAR MODELLING

Course Code: BTE2609 **Credit Units: 02**

Course Objective:
The students should be able to understand and work on the following topics: various levels of structural organizations in bio-molecules; representation of the 2D and 3D structures: coordinate systems & modeling; bioinformatics approaches for structure analysis and structure predictions; conformations & analysis of macromolecules.

Course Contents

Module I
Internal and external co-ordinate system; Generation of co-ordinates of biopolymers in Cartesian and cylindrical polar co-ordinate System.

Module II: Anatomy of Biomolecules
Proteins: Ramachandran plot; Secondary structures; Motifs; Domains; Tertiary and quaternary structures; Fold recognition; Methods for Comparison of 3D structures; DNA: A, B, Z DNA, DNA bending etc.; RNA structure; Structure of Ribosome

Module III: Analysis of Structural data banks
Protein Data Bank, Cambridge small molecular crystal structure data bank; Calculation of conformational energy for bio-macromolecules; Developing the energy functions & Force fields; Charge calculation methods

Module IV: Molecular optimization techniques
Newton Rahpson, Conjugate Gradient, Genetic algorithms, simulated annealing applied to Biomolecules.

Module V
Methods to predict three dimensional structures of nucleic acids, rRNA, tRNA, and proteins

Module VI
Molecular mechanics & dynamics of oligopeptides, proteins, nucleotides and small molecules; Conformational Searches; Simulation of molecular mechanics and dynamics; Simulations of Free Energy changes; Electrostatics of Biomolecules

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Conformations of Biopolymers, Vol. 2. Edited by G.N.Ramachandran.
- Ramachandran, G.N. and Sasisekharan, V. (1968) Conformation of polypeptides and proteins. Adv. Prot. Chem., 23, 283.
- Creighton, T. E. (Ed.); Protein Structure: A Practical Approach (1989).
- Creighton, T.E.: Proteins: Structure And Molecular Properties. 2nd Edition. New York. W. H. Freeman and Company, (1993).
- Creighton: Protein Folding, (1992).
- JA McCammon & S.Hervey: Molecular Dynamics of Protein & Nucleic acids, (1989).
- Sternberg, M.J.E.: Protein structure prediction: a practical approach, (1996)
- Pain, R.G.: Mechanisms of protein folding, (1994)
- Leach.A.R: Molecular modelling: principles and applications

ARTIFICIAL NEURAL NETWORKS

Course Code: BTE2610 **Credit Units: 02**

Course Objective:
This course will enable the students to gain knowledge about a relatively newer area of science. The course is designed to model the different technical properties, applications, besides the closely related aspects of artificial neural networks.

Course Contents:

Module I
Historical background, Why is learning hard?

Module II
Memorization, generalization and function approximation, Linear Associators, Perceptrons and Capacity, Multilayer neural networks, Maximum Likelihood and Gradient Descent learning, Stochastic gradient descent for supervised learning.

Module III
The back propagation algorithm, Aspects of Learning Theory and Generalization, Bias vs. variance, Overtraining, pruning and regularization, VC dimension and how much data is enough?.

Module IV
Neural networks and analog VLSI, Selected Applications.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Neural Networks: A Comprehensive Foundation by S. Haykin, Prentice Hall.

References:
- Neutral Networks for Pattern Recognition by C. Bishop, Oxford University Press.

JAVA-II

Course Code: BTE2611 **Credit Units: 02**

Course Objective
The objective is to introduce students to a serverside programming language and help them gain sufficient fluency to undertake research projects with a programming component; to lay the foundations for study of web technologies and different tools used for the same.
Emphasis is on to understand the basic concepts of web programming; to learn the syntax and semantics of Servlet and JSP; to be able to use a server side program development environment

Course Contents

Module I
HTML and JavaScript, Creating and processing HTML forms

Module II
Java Servlets
Introduction to Server Side Application Development
Basics of Servlet Programming
Web Container
Session Tracking
Servlet Context

Module III: JSP
Advantage of JSP technology (Comparision with ASP / Servlet)
JSP Architecture, JSP Access Model
JSP Syntax Basic (Directions, Declarations, Expression, Scriplets, Comments)
JSP Implicit Object, Object Scope
Synchronization Issue
Exception Handling
Session Management

Module IV: Java Network Programming
Connecting to a server
Implementing Servers in Java
URL Connections
Reading and Posting data
Security and the Network
Java Beans

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Complete reference by Herbert Schildt TataMcGraw Hill
- Professional Java XML Programming with Servlets and JSP by Alexander Nakhimovsky and Tom Myers published by Wrox Press Ltd.
- More Servlets and Java Server Pages by Marty Hall published by Sun Microsystems Press, A Prentice Hall Title.
- Special Edition – Using Java Server Pages and Servlets by Mark Wutka published by Que

TERM PAPER

Course Code: BTE2631 **Credit Units: 02**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

j) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

k) Begin by making a list of subject-headings under which you might expect the subject to be listed.

l) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

j) Get facts, not just opinions. Compare the facts with author's conclusion.

k) In research studies, notice the methods and procedures, results & conclusions.

l) Check cross references.

4. Outlining the paper

g) Review notes to find main sub-divisions of the subject.

h) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section

may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

t) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
u) Check for proper spelling, phrasing and sentence construction.
v) Check for proper form on footnotes, quotes, and punctuation.
w) Check to see that quotations serve one of the following purposes:
   (x) Show evidence of what an author has said.
   (xi) Avoid misrepresentation through restatement.
   (xii) Save unnecessary writing when ideas have been well expressed by the original author.
x) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

m) summary of question posed
n) summary of findings
o) summary of main limitations of the study at hand
p) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTE2632 **Credit Units: 02**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:
- Suitability of the topic.
- Relevance of the topic

- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTE2633 **Credit Units: 02**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the trainer in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the trainer.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Syllabus – Seventh Semester

GENOMICS AND PROTEOMICS

Course Code: BTE2701 **Credit Units: 03**

Course Objective:
The course helps in developing a detailed understanding of eukaryotic genome complexity and organization. Current research on the molecular basis of the control of gene expression in eukaryotic system has developed a detailed understanding of techniques of gene diagnostics and DNA profile to acquire the fundamentals of genomics and Proteomics.

Course Contents:

Module I: Genome Evolution
Origin of genomes, Acquisition of new genes, Noncoding DNA and Genome Evolution, Human Genome Project., Forward genetics (Phenotype to gene structure) and Reverse genetics (Gene structure to phenotype). DNA sequencing – chemical and enzymatic methods

Module II: Structural Genomics
Structural Genomics: Study of 3D- Structure of Protein
Protein Structure, Basics of High Throughput Determination of Protein Structure, Protein Structure Initiative Project, Computational Protein Structure Modeling, Protein Structure and Function.

Module III: Comparative Genomics
Phylogeny, COGS [Cluster of orthologues genes], Introduction to System Biology, Metabolic Reconstruction, The Basic Principles and Methodology. Gene Identification Methods.

Module IV: Functional Genomics
cDNA Microarrays, Oligonucleotide Microarray Chips, Application of Microarrays with examples, Microarray Data Analysis; Real Time PCR.

Module V: Genotyping Background and Applications of Genomics
Genetic and physical mapping, Introduction to molecular markers, DNA fingerprinting, Single nucleotide polymorphisms, RNA interference, antisense RNA, siRNA, MiRNA.

PROTEOMICS

Module VI: Fundamentals of Proteomics
Introduction to Proteomics, 2D Gel Electrophoresis
Protein Identification and Analysis:

a. Protein preparation and Separation
b. Protein Identification by mass spectrometry and its applications.
c. Identification of post translation modification
d. Current concepts of peptide sequencing with MS-MS methods, MALDI-TOF mass spectrometry and nanospray MS

Protein Expression Mapping, Unstructured Proteins.
High-throughput cloning of ORFs, Chromatography
Protein- Protein Interaction Mapping. Its application in health and disease.
Protein Chip/Array. Experimental design and its application. Application of Microarray in proteome analysis.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette, John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs, T. Lengauer, John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press
- DNA Microarrays: A Practical Approach, M. Schlena, Oxford University Press.
- Genomes II, T.A. Brown
- Biotechnology and Genomics by P.K.Gupta

References:

- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology : Principles and Practice, Arthur M. Lesk
- DNA : Structure and Function, Richard R. Sinden
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller
- Gene Cloning and DNA Analysis – An introduction (Fourth Edition), T.A. Brown
- Genes & Genomes, Maxine Singer and Paul Berg
- Essential of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Functional Genomics – A Practical Approach, S.P. Hunt and R. Livesey, Oxford University Press
- Proteomics, T. Palzkill, Kluwer Academic Publishers
- Statistical Genomics: Linkage, Mapping and QTL Analysis, B. Liu, CRC Press.
- Genome II by T.A.Brown

IPR, BIOSAFETY & BIOETHICS

Course Code: BTE2702 **Credit Units: 02**

Course Objective

The aim of this course is to develop the understanding of relevance, business Impact and protection of Intellectual Property along with the types of Intellectual Property Rights: Patents, Trademarks, Copyrights, Industrial Designs, Geographical Indications and International Conventions, Biosafety and Bioethics

Course Contents

Module I: Basic Principles and Acquisition of Intellectual Property Rights

Basic Principles of Patent Law, Patent Application procedure, Drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark and Design Rights, International Background of Intellectual Property

Module II: Ownership and Enforcement of Intellectual Property Rights

Patents-Objectives, Rights, Assignments, Defences in case of Infringement. Copyright-Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defences for infringement. Trademarks-Objectives, Rights, Protection of goodwill, Infringement, Passing off, Defences. Designs-Objectives, Rights, Assignments, Infringements, Defences of Design Infringement, Enforcement of Intellectual Property Rights - Civil Remedies, Criminal Remedies, Border Security measures, Practical Aspects of Licensing - Benefits, Determinative factors, important clauses, licensing clauses.

Module III: Information Technology Related Intellectual Property Rights

Computer Software and Intellectual Property-Objective, Copyright Protection, Reproducing, Defences, Patent Protection, Database and Data Protection-Objective, Need for Protection, UK Data Protection Act, 1998, US Safe Harbor Principle, Enforcement. Protection of Semi-conductor Chips-Objectives Justification of protection, Criteria, Subject-matter of Protection, WIPO Treaty, Trips, SCPA. Domain Name Protection-Objectives, domain name and Intellectual Property, Registration of domain names, disputes under Intellectual Property Rights, Jurisdictional Issues, International Perspective.

Module IV: Biotechnology and Intellectual Property Rights

Biotechnology and the Law- Objective, Evolution, Basic Structure of Gene Techniques, Applications, Commercial Potential of Biotech Inventions, Rationale for Intellectual Property Protection. Patenting Biotechnology Inventions-Objective, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions. Plant Varieties Protection-Objectives, Justification, International Position, Plant Varieties Protection in India Protection of Geographical Indications Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Module V

Protection of Traditional Knowledge- Objective, Concept of Traditional Knowledge, Holders, Issues concerning, Bio-Prospecting and Bio-Piracy, Alternative ways, Protectability, need for a Sui-Generis regime, Traditional Knowledge on the International Arena, at WTO, at National level, Traditional Knowledge Digital Library.

Module VI

Biosafety and Bioethics Management-Key to environmentally responsible use of biotechnology. Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text

- Intellectual Property Rights by Birgitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Science Industries by Graham Dutfield, Ashgate Publishing

References

- WIPO Intellectual Property Handbook
- Intellectual Property by William Rodelph Cornish, David Clewelyn
- Globalising Intellectual Property Rights by Duncan Matthews
- Journals and Current magazines

RESEARCH METHODOLOGY AND REPORT WRITING

Course Code: BTE2703 **Credit Units: 02**

Course Objective

To develop understanding of information and library science research issues in the domain of bioinformatics through review of journal articles, invited talks, and critical group discussions of methods. The main objectives for this course are to develop: familiarity with information and library science-oriented problems in the biomedical sciences, an understanding of research methods in the biomedical domain, critical thinking and evaluation skills and presentation and summarization skills.

Course Contents

Module I

Introduction: Science, Scientific Field and Biological research. Role of a researcher in different stages of a project, Routes to research funding (academic and commercial)

Module II

Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature.

Module III: Sampling techniques

Sampling theory – types of sampling – Steps in sampling – Sampling and Non-sampling error – Sample size – Advantages and limitations of sampling. Collection of Data: Primary Data – Meaning – Data Collection methods – Secondary data – Meaning - Relevance's, Limitations and cautions. Statistics in Research.

Module IV

Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Module V

Case studies of areas of current research. Formulating a research plan and its presentation

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Statistical Methods By S.P. Gupta

***References*:**

- Research Methodology Methods and Techniques by C.R. Kothari
- Statistics(Theory and Practice) by B.N. Gupta
- Research Methodology Methods and statistical Techniques by Santosh Gupta
- Scientific journals and magazines

GENOMICS AND PROTEOMICS LAB

Course Code: BTE2704 **Credit Units: 02**

Course Contents:

Module I
Three dimensional Structures – In silico study – large molecular complexes RNA polymerase II, ribosome, unstructured proteins

Module II
DNA sequencing methods

Module III
Gene finding tools and Genome annotation

Module IV
Comparison of two given genomes

Module V
Analysis of 2D – IEF data

Module VI
Microarray and Microarray data analysis

Module VII
Inference of protein function from structure

Module VIII
Inference of protein function and structure

Module IX
Two-hybrid methods

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

SUMMER INTERNSHIP EVALUATION-II

Course Code: BTE2735 **Credit Units: 03**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infec*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	**100**

BIOPROCESS PLANT DESIGNING

Course Code: BTE2705 **Credit Units: 02**

Course Objective:
The objective of this paper is to include not only the application of chemical engineering principles/unit operations to bioprocess systems but also to include the principles of disciplines of mechanical, electrical and industrial engineering to design a completely economically optimal process using living or subcomponent of cells.

Course Contents:

Module I
Introduction; general design information; Mass and energy balance; Flow sheeting; Piping and instrumentation; Materials of construction for bioprocess plants; Mechanical design of process equipment; Vessels for biotechnology application; Design of fermenters; Design considerations for maintaining sterility of process streams processing equipment; Selection and specification of equipment for handling fluids and solids; Selection, specification, design of heat and mass transfer equipment used in bioprocess industries; Design of facilities for cleaning of process equipment used in biochemical industries; Utilities for biotechnology production plants; Process economics; Bioprocess validation; Safety considerations; Case studies.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Applied Process Design for Chemical and Petrochemical Plants, E.E. Ludwig, Butterworth-Heinemann
- Chemical Engineering, R.K. Sinnott, J.M. Coulson and J.F. Richardsons, Butterworth-Heinemann
- Chemical Engineers Handbook, R.H. Perry and D.W. Green, McGraw-Hill
- Manufacturing Facilities Design and Material Handling, F.E. Meyers and M.P. Stephens, Prentice Hall
- Plant Design and Economics for Chemical Engineers, M. Peters and K. Timmerhaus, McGraw-Hill
- Process Plant Layout and Piping Design, E. Bausbacher and R. Hunt, Prentice Hall PTR.

MOLECULAR MEDICINE AND DIAGNOSIS

Course Code: BTE2706 **Credit Units: 02**

Course Contents:

Module I
Human Health and Diseases

Module II
Human Diseases – morbidity, mortality, impact on social development

Module III
Mechanism of disease development, Genetic susceptibility, Identification of targets for diagnosis and therapy: Acquired diseases, cardiovascular diseases, Neurological diseases, Hematology, Cancer

Module IV
Epidemiology of disorders

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (August 15, 2000) ISBN-10: 0896037983
- Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon Sales Rank: #287831 in Books
- Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank
- Principles of Biostatistics by Marcello Pagano , Kimberlee Gauvreau
- Essentials of Epidemiology in Public Health, Second Edition by Ann Aschengrau, George R., III Seage
- Designing Clinical Research: An Epidemiologic Approach, by Stephen B. Hulley, Steven R. Cummings
- Journal articles and reviews

.

APPLICATIONS OF PLANT BIOTECHNOLOGY

Course Code: BTE2707 **Credit Units: 02**

Course Content:

Module I
Homozygous Plant Production through Ovule, Anther & Pollen Culture, Embryo Rescue & Embryo Culture, Endosperm Culture & Production of Seedless Plants, Apomixis & Experimental Polyembryony

Module II
AFLP – Variety Identification & Fingerprinting; Molecular Farming; Marker Assisted Technology; Use of Bioreactors in Plant Production & Scale-up; Basic Aspects of Application-case studies; Metabolic Engineering

Module III
Biotic & Abiotic Stress
Secondary Metabolites
Edible Vaccines and PHBV
Diagnostic Kits & Virus Indexing

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P.McGarvy and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Adacemic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences
- Biotechnology: Theory and techniques of Plant Biotechnology, Animal cell culture and Immunobiotechnology vols 1 and 2 by Jack K Chirikjian
- Plant Biotechnology and its applications in Plant tissue cultureby Ashwani Kumar and Shikha Roy
- Plant Biotechnology: The Genetic Manipulation of Plants. A. Slater, N. W. Scott and M. R. Fower. 2008. Oxford University Press
- Recent Advances in Plant Biotechnology: Ara Kirakosyan and Peter B. Kaufan. 2009. Springer

BIO-ENERGY ENGINEERING

Course Code: BTE2708 **Credit Units: 02**

Course Objective:
The goal is to introduce students to biotechnology and tools that enable engineers and process scientists to connect innovations in industrial microorganisms and bioprocess unit operations to the engineering fundamentals, fundamentals of systems biology, and biological tools for design, modeling and evaluation of manufacturing facilities for the production of biofuels, bioproducts and biotherapeutics using a case study approach combined with computer modeling.

Course Contents:

Module I: Biomass Sources, Characteristics & Preparation
Biomass Sources and Classification. – Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses and other sources for fermentation ethanol-Sources and processing of oils and fats for liquid fuels- Energy plantations
-Preparation of woody biomass: Size reduction, Briquetting of loose biomass, Drying, Storage and Handling of Biomass.

Module II: Biogas, Technology
Feedstock for biogas production, Aqueous wastes containing biodegradable organic matter, animal residues-. Microbial and biochemical aspects- Operating parameters for biogas production Kinetics and mechanism - Dry and wet fermentation. Digesters for rural application-High rate digesters for industrial waste water treatment.

Module III: Bio-Ethanol and Bio-Diesel Technology
Production of Fuel Ethanol by Fermentation of Sugars. Gasohol as a Substitute for Leaded Petrol. - Trans-Esterification of Oils to Produce Bio-Diesel.

Module IV: Pyrolysis and Gasification of Biomass
Thermo-chemical conversion of ligno-cellulose biomass – Biomass processing for liquid fuel production - Pyrolysis of biomass-Pyrolysis regime, effect of particle size, temperature, and products obtained.
Thermo-chemical gasification principles: Effect of pressure, temperature and of introducing steam and oxygen. Design and operation of Fixed and Fluidized Bed Gasifiers.

Module V: Combustion of Biomass and Cogeneration Systems
Combustion of Woody Biomass: Theory, Calculations and Design of Equipments. Cogeneration in Biomass Processing Industries. Case Studies: Combustion of Rice Husk, Use of Bagasse for Cogeneration.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Fuels from Biomass and Wastes by D.L. Klass and G.M. Emert, Ann Arbor Science pub. Inc. Michigan,
- Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes by A. Chakraverthy, Oxford & IBH publishing Co., New Delhi,

References:

- Biogas Systems: Principles and Applications by K.M. Mital, New Age International Publishers (p) Ltd.,
- Biomass Energy Systems, by P. Venkata Ramana and S.N. Srinivas, Tata Energy Research Institute, New Delhi, 1996.
- Bio-gas Technology by Khandelwal K.C. and Mahdi, Tata McGraw-Hill pub. Co. Ltd., New Delhi
- Advances in bio-gas Technology by O.P. Chawla, I.C.A.R., New Delhi. 1970.

TERM PAPER

Course Code: BTE2731 **Credit Units: 02**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

m) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

n) Begin by making a list of subject-headings under which you might expect the subject to be listed.

o) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

m) Get facts, not just opinions. Compare the facts with author's conclusion.

n) In research studies, notice the methods and procedures, results & conclusions.

o) Check cross references.

4. Outlining the paper

i) Review notes to find main sub-divisions of the subject.

j) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

y) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
z) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
aa) Check for proper spelling, phrasing and sentence construction.
bb) Check for proper form on footnotes, quotes, and punctuation.
cc) Check to see that quotations serve one of the following purposes:
    (xiii) Show evidence of what an author has said.
    (xiv) Avoid misrepresentation through restatement.
    (xv) Save unnecessary writing when ideas have been well expressed by the original author.
dd) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

q) summary of question posed
r) summary of findings
s) summary of main limitations of the study at hand
t) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

PROJECT

Course Code: BTE2732 **Credit Units: 02**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:** (using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP / CERTIFICATION

Course Code: BTE2733 **Credit Units: 02**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the trainer in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the trainer.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus – Eighth Semester

PROJECT/ DISSERTATION

Course Code: BTE2837 **Credit Units: 17**

Course Objective:
The students are expected to utilize their scheduled periods by undertaking the project that would be completed during the semester

Every student shall undertake a major Project. The major Project shall be undertaken in some biotechnology industry or laboratory of repute. Each student shall be assigned to a faculty who shall continuously monitor the progress of the Project in the concerned laboratory or industry. The faculty, in consultation with the concerned scientist of the industry/laboratory, shall decide the topic of the project. At the conclusion of the project the student shall submit a seminar and a dissertation. The dissertation shall be evaluated by the internal faculty/examiner. The student then shall have to appear for the viva voce examination.

GUIDELINES FOR PROJECT FILE
Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include
- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout
The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

- Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book

Kowalski, M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation:	100
Viva Voce:	100
Total:	**200**

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Curriculum & Scheme of Examination

2021

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Curriculum & Scheme of Examination

BIOCHEMISTRY

Course Code: BTH4101 **Credit Units: 03**

Course Objective:
The objectives of this course are to build upon undergraduate level knowledge of biochemical principles with specific emphasis on different metabolic pathways. The course shall make the students aware of various disease pathologies within the context of each topic.

Student Learning Outcomes
On completion of this course, students should be able to:

- Gain fundamental knowledge inbiochemistry;
- Understand the molecular basis of various pathological conditions from the perspective of biochemicalreactions.

Course Contents:

Module I: Chemical basis of Life
Chemical basis of life: Miller-Urey experiment, abiotic formation of amino acid oligomers, composition of living matter; Water – properties of water, essential role of water for life on earth pH, buffer, maintenance of blood pH and pH of gastric juice, pH optima of different enzymes (pepsin, trypsin and alkaline phosphatase), ionization and hydrophobicity, emergent properties of biomolecules in water, biomolecular hierarchy, macromolecules, molecular assemblies.

Module II: Protein structure
Structure-function relationships: amino acids – structure and functional group properties, peptides and covalent structure of proteins, elucidation of primary and higher order structures, Ramachandran plot, evolution of protein structure, protein degradation and introduction to molecular pathways controlling protein degradation, structure-function relationships in model proteins like ribonuclease A, myoglobin, hemoglobin, chymotrypsin etc.; basic principles of protein purification; tools to characterize expressed proteins; Protein folding: Anfinsen's Dogma, Levinthal paradox, cooperativity in protein folding, free energy landscape of protein folding and pathways of protein folding, molten globule state, chaperons, diseases associated with protein folding, introduction to molecular dynamic simulation.

Module III: Enzyme kinetics
Enzyme catalysis – general principles of catalysis; quantitation of enzyme activity and efficiency; enzyme characterization and Michaelis-Menten kinetics; relevance of enzymes in metabolic regulation, activation, inhibition and covalent modification; single substrate enzymes; concept of catalytic antibodies; catalytic strategies with specific examples of proteases, carbonic anhydrases, restriction enzymes and nucleoside monophosphate kinase; regulatory strategies with specific example of hemoglobin; isozymes; role of covalent modification in enzymatic activity; zymogens.

Module IV: Glycobiology
Sugars-mono,di,andpolysaccharideswithspecificreferencetoglycogen,amylose and cellulose, glycosylation of other biomolecules - glycoproteins and glycolipids; lipids - structure and properties of important members of storage and membrane lipids;lipoproteins.

Module V: Structure and functionsofDNA &RNAandlipids
Self-assembly of lipids, micelle, biomembrane organization - sidedness and function; membrane bound proteins - structure, properties and function; transport phenomena; nucleosides, nucleotides, nucleic acids

- structure, a historical perspective leading up to the proposition of DNA double helical structure; difference in RNA and DNA structure and their importance in evolution of DNA as the genetic material.

Module VI: Bioenergetics

Bioenergetics-basic principles; equilibria and concept of free energy; coupled interconnecting reactions in metabolism; oxidation of carbon fuels; recurring motifs in metabolism; Introduction to GPCR, Inositol/DAG//PKC and Ca++ signaling pathways; glycolysis and gluconeogenesis; reciprocal regulations and non-carbohydrate sources of glucose; Citric acid cycle, entry to citric acid cycle, citric acid cycle as a source of biosynthetic precursors; Oxidative phosphorylation; importance of electron transfer in oxidative phosphorylation; F1-F0 ATP Synthase; shuttles across mitochondria; regulation of oxidative phosphorylation; Photosynthesis – chloroplasts and two photosystems; proton gradient across thylakoid membrane; Calvin cycle and pentosephosphate pathway; glycogen metabolism, reciprocal control of glycogen synthesis and breakdown, roles of epinephrine and glucagon and insulin in glycogen metabolism; Fatty acid metabolism; protein turnover and amino acid catabolism; nucleotide biosynthesis; biosynthesis of membrane lipids and sterols with specific emphasis on cholesterol metabolism and mevalonate pathway; elucidation of metabolic pathways; logic and integration of central metabolism; entry/ exit of various biomolecules from central pathways; principles of metabolic regulation; steps for regulation

Module VII: Role of vitamins &cofactors in metabolism

Calvincycleandpentosephosphatepathway;glycogenmetabolism,reciprocalcontrol of glycogen synthesis and breakdown, roles of epinephrine and glucagon and insulin in glycogen metabolism; Fatty acid metabolism; protein turnover and amino acid catabolism; nucleotide biosynthesis; biosynthesis of membrane lipids and sterols with specific emphasis on cholesterol metabolism and mevalonate pathway; elucidation of metabolicpathways;logicandintegrationofcentralmetabolism;entry/exitofvarious biomolecules from central pathways; principles of metabolic regulation; steps for regulation; target of rapamycin (TOR) & Autophagy regulation in relation to C & N metabolism, starvation responses and insulinsignaling.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Stryer, L. (2015). Biochemistry. (8th ed.) New York: Freeman.
2. Lehninger, A. L. (2012). Principles of Biochemistry (6th ed.). New York, NY: Worth.
3. Voet, D., & Voet, J. G. (2016). Biochemistry (5th ed.). Hoboken, NJ: J. Wiley & Sons.
4. Dobson, C. M. (2003). Protein Folding and Misfolding. Nature, 426(6968), 884-890. doi:10.1038/nature02261.
5. Richards, F. M. (1991). The Protein Folding Problem. Scientific American, 264(1), 54-63. doi:10.1038/scientificamerican0191-54

MICROBIOLOGY

Course Code: BTH4103 **Credit Units: 02**

Course Objectives

The objectives of this course are to introduce field of microbiology with special emphasis on microbial diversity, morphology, physiology and nutrition; methods for control of microbes and host-microbeinteractions.

Learning Outcomes

Students should be able to:

- Identify major categories of microorganisms and analyze theirclassification, diversity, and ubiquity;
- Identify and demonstrate structural, physiological, genetic similarities and differences of major categories of microorganisms;
- Identify and demonstrate how to control microbial growth;
- Demonstrate and evaluate interactions between microbes, hosts and environment.

Course Contents:

Module 1 Microbial characteristics

Introduction to microbiology and microbes, history & scope of microbiology, morphology,structure,growthandnutritionofbacteria,bacterialgrowthcurve,bacterial culturemethods;bacterialgenetics:mutationandrecombinationinbacteria,plasmids, transformation,transductionandconjugation;antimicrobialresistance.

Module 2 Microbial diversity

Microbial taxonomy and evolution of diversity, classification of microorganisms, criteria for classification; classification of bacteria; Cyanobacteria, acetic acid bacteria, Pseudomonads, lactic and propionic acid bacteria, endospore forming bacteria Mycobacteria and Mycoplasma. Archaea: Halophiles, Methanogens, Hyperthermophilic archae, Thermoplasm; eukarya: algae, fungi, slime molds and protozoa; extremophiles and unculturable microbes.

Module 3 Control of microorganisms

Sterilization, disinfection and antisepsis: physical and chemical methods for control of microorganisms, antibiotics, antiviral and antifungal drugs, biological control of microorganisms.

Module 4 Virology

Virus and bacteriophages, general properties of viruses, viral structure, taxonomy of virus, viral replication, cultivation and identification of viruses; sub-viral particles – viroids and prions.

Module 5 Host-microbes interaction

Host-pathogen interaction, ecological impact of microbes; symbiosis (Nitrogen fixation and ruminant symbiosis); microbes and nutrient cycles; microbial communication system; bacterial quorum sensing; microbial fuel cells; prebiotics and probiotics.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Pelczar, M. J., Reid, R. D., & Chan, E. C. (2001). Microbiology (5th ed.). New York: McGraw-Hill.
2. Willey, J. M., Sherwood, L., Woolverton, C. J., Prescott, L. M., & Willey, J. M. (2011).Prescott's Microbiology. New York: McGraw-Hill.
3. Matthai, W., Berg, C. Y., & Black, J. G. (2005). Microbiology, Principles and Explorations. Boston, MA: John Wiley & Sons.

GENETICS

Course Code: BTH4104 **Credit Units: 02**

Course Objectives

The objectives of this course are to take students through basics of genetics and classical genetics covering prokaryotic/ phage genetics to yeast and higher eukaryotic domains. On covering all classical concepts of Mendelian genetics across these life-forms, students will be exposed to concepts of population genetics, quantitative genetics encompassing complex traits, clinical genetics and genetics of evolution.

Learning Outcomes

On successful completion of this course, student will be able :

- Describe fundamental molecular principles of genetics;
- Understand relationship between phenotype and genotype in human genetic traits;
- Describe the basics of genetic mapping;
- Understand how gene expression is regulated

Course Contents:

Module 1Geneticsofbacteria and bacteriophages

Concept of a gene in pre-DNA era; mapping of genes in bacterial and phage chromosomes by classical genetic crosses; fine structure analysis of a gene; genetic complementation and other genetic crosses using phenotypic markers; phenotype to genotype connectivity prior to DNA-based understanding of gene.

Module 2Yeast genetics

Meiotic crosses, tetrad analyses, non-Mendelian and Mendelian ratios, gene conversion, models of genetic recombination, yeast mating type switch; dominant and recessive genes/mutations, suppressor or modifier screens, complementation groups, transposon mutagenesis, synthetic lethality, genetic epistasis.

Module 3 Drosophila genetics as a model of higher eukaryotes

Monohybrid & dihybrid crosses, back-crosses, test-crosses, analyses of autosomal and sex linkages, screening of mutations based on phenotypes and mapping the same, hypomorphy, genetic mosaics, genetic epistasis in context of developmental mechanism.

Module 4 Population genetics and genetics of evolution

Introduction to the elements of population genetics: genetic variation, genetic drift, neutral evolution; mutation selection, balancing selection, Fishers theorem, Hardy- Weinberg equilibrium, linkage disequilibrium; in-breeding depression & mating systems; population bottlenecks, migrations, Bayesian statistics; adaptive landscape, spatial variation & genetic fitness.

Module 5 Quantitative genetics of complex traits (QTLs)

Complex traits, mapping QTLs, yeast genomics to understand biology of QTLs.

Module 6 Plant genetics

Lawsofsegregationinplantcrosses,inbreeding,selfing,heterosis,maintenanceof genetic purity, genepyramiding.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Hartl, D. L., & Jones, E. W. (1998). Genetics: Principles and Analysis. Sudbury, MA: Jones and Bartlett.
2. Pierce, B. A. (2005). Genetics: a Conceptual Approach. New York: W.H. Freeman.
3. Tamarin, R. H., & Leavitt, R. W. (1991). Principles of Genetics. Dubuque, IA: Wm. C. Brown.
4. Smith, J. M. (1998). Evolutionary Genetics. Oxford: Oxford University Press.

CELL AND MOLECULAR BIOLOGY

Course Code: BTH4111 **Credit Units: 03**

Course Objective:
The objectives of this course are to sensitize the students to the fact that as we go down the scale of magnitude from cells to organelles to molecules, the understanding of various biological processes becomes deeper and inclusive.

Learning Outcomes
Student should be equipped to understand three fundamental aspects in biological phenomenon: a) what to seek; b) how to seek; c) why to seek?

Course Contents:

Module 1 Dynamic organization of cell

Universal features of cells; cell chemistry and biosynthesis: chemical organization of cells; internal organization of the cell - cell membranes: structure of cell membranes and concepts related to compartmentalization in eukaryotic cells; intracellular organelles: endoplasmic reticulum and Golgi apparatus, lysosomes and peroxisomes, ribosomes,cellularcytoskeleton,mitochondria,chloroplastsandcellenergetics;nuclear compartment: nucleus, nucleolus and chromosomes.

Module 2 Chromatin structure and dynamics

Chromatin organization - histone and DNA interactome: structure and assembly of eukaryotic and prokaryotic DNA polymerases, DNA-replication, repair and recombination; chromatin control: gene transcription and silencing bychromatin-
Writers,-Readers and –Erasers; Transcriptional control: Structure and assembly of eukaryotic and prokaryotic RNA Polymerases, promoters and enhancers, transcription factors as activators and repressors, trancriptional initiation, elongation and termination; post-transcriptional control: splicing and addition of cap and tail, mRNA flow through nuclear envelope into cytoplasm, breakdown of selective and specific mRNAs through interference by small non-coding RNAs (miRNAs and siRNAs), protein translation machinery, ribosomes-composition and assembly; universal genetic codes, degeneracy of codons, Wobble hypothesis; Iso-accepting tRNA; mechanism of initiation, elongation and termination; co- and post-translational modifications, mitochondrial genetic code translation product cleavage, modification and activation.

Module 3 Cellular signalling, transport and trafficking

Molecular mechanisms of membrane transport, nuclear transport, transport across mitochondriaandchloroplasts;intracellularvesiculartraffickingfromendoplasmic reticulum through Golgi apparatus to lysosomes/ cellexterior.

Module 4 Cellular processes

Cell cycle and its regulation; cell division: mitosis, meiosis and cytokinesis; cell differentiation: stem cells, their differentiation into different cell types and organization into specialized tissues; cell-ECM and cell-cell interactions; cell receptors and trans-membranesignalling;cellmotilityandmigration;celldeath:differentmodesofcelldeath and their regulation.

Module 5 Manipulating and studying cells

Isolationofcellsandbasicsofcellculture;observingcellsunderamicroscope,different typesofmicroscopy;analyzingandmanipulatingDNA,RNAandproteins.

Module 6 Genome instability and cell transformation

Mutations,proto-oncogenes,oncogenesandtumoursuppressorgenes,physical,chemical and biological mutagens; types of mutations; intra-genic and inter-genic suppression; transpositions- transposable genetic elements in prokaryotes and eukaryotes, role of transposons in genome; viral and cellular oncogenes; tumor suppressor genes; structure, function and mechanism of action; activation and suppression of tumor suppressor genes; oncogenes as transcriptionalactivators

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2008). Molecular Biology of the Cell (5th Ed.). New York: Garland Science.

Lodish, H. F. (2016). Molecular Cell Biology (8th Ed.). New York: W.H. Freeman.

2. Krebs, J. E., Lewin, B., Kilpatrick, S. T., & Goldstein, E. S. (2014). Lewin's Genes XI. Burlington, MA: Jones & Bartlett Learning.
3. Cooper, G. M., & Hausman, R. E. (2013). The Cell: a Molecular Approach (6th Ed.). Washington: ASM ; Sunderland.
4. Hardin, J., Bertoni, G., Kleinsmith, L. J., & Becker, W. M. (2012). Becker's World of the Cell. Boston (8th Ed.). Benjamin Cummings.
5. Watson, J. D. (2008). Molecular Biology of the Gene (5th ed.). Menlo Park, CA: Benjamin/Cummings.

PLANT AND ANIMAL BIOTECHNOLOGY

Course Code: BTH4111 **Credit Units: 03**

Course Objectives

The objectives of this course are to introduce students to the principles, practices and application of animal biotechnology, plant tissue culture, plant and animal genomics, genetic transformation and molecular breeding of plants and animals

Learning Outcomes

Students should be able to gain fundamental knowledge in animal and plant biotechnology and their applications

Course Contents:

Module 1 Plant tissue culture and animal cell culture

Plant tissue culture: historical perspective; totipotency; organogenesis; Somatic embryogenesis; establishment of cultures – callus culture, cell suspension culture, media preparation – nutrients and plant hormones; sterilization techniques; applications of tissue culture - micropropagation; somaclonal variation; androgenesis and its applications in genetics and plant breeding; germplasm conservation and cryopreservation; synthetic seed production; protoplast culture and somatic hybridization - protoplast isolation; culture and usage; somatic hybridization - methods and applications; cybrids and somatic cell genetics; plant cell cultures for secondary metabolite production. Animal cell culture: brief history of animal cell culture; cell culture media and reagents; culture of mammalian cells, tissues and organs; primary culture, secondary culture, continuous cell lines, suspension cultures; application of animal cell culture for virus isolation and in vitro testing of drugs, testing of toxicity of environmental pollutants in cell culture, application of cell culture technology in production of human and animal viral vaccines and pharmaceutical proteins.

Module 2 Plant genetic manipulation

Geneticengineering:*Agrobacterium*-plantinteraction;virulence;TiandRiplasmids; opines and their significance; T-DNA transfer; disarmed Ti plasmid; Genetic transformation - *Agrobacterium*-mediated gene delivery; cointegrate and binary vectors and their utility; direct gene transfer - PEG-mediated, electroporation, particle bombardment and alternative methods; screenable and selectablemarkers; characterization of transgenics; chloroplast transformation; marker-free methodologies; advanced methodologies - cisgenesis, intragenesis and genome editing; molecular pharming - concept of plants as biofactories, production of industrial enzymes and pharmaceutically important compounds.

Module 3 Animal reproductive biotechnology and vaccinology

Animal reproductive biotechnology: structure of sperms and ovum; cryopreservation of sperms and ova of livestock; artificial insemination; super ovulation, embryo recovery and *in vitro* fertilization; culture of embryos; cryopreservation of embryos; embryo transfer technology; transgenic manipulation of animal embryos; applications of transgenic animal technology; animal cloning - basic concept, cloning for conservation for conservation endangered species; Vaccinology: history of development of vaccines, introduction to the concept of vaccines, conventional methods of animal vaccine production, recombinant approaches to vaccine production, modern vaccines.

Module 4 Plant and animal genomics

Overview of genomics – definition, complexity and classification; need for genomics level analysis; methods of analyzing genome at various levels – DNA, RNA, protein, metabolites and phenotype; genome projects and bioinformatics resources for genome research – databases; overview of forward and reverse genetics for assigning function for genes.

Module 5 Molecular mapping and marker assisted selection

Molecular markers - hybridization and PCR based markers RFLP, RAPD, STS, SSR, AFLP, SNP markers; DNA fingerprinting-principles and applications; introduction to mapping of genes/QTLs; marker-assisted selection - strategies for Introducing genes of biotic and abiotic stress resistance in plants: genetic basis for disease resistance in animals; molecular diagnostics of pathogens in plants and animals; detection of meat adulteration using DNA based methods.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Chawla, H. S. (2000). Introduction to Plant Biotechnology. Enfield, NH: Science.
2. Razdan, M. K. (2003). Introduction to Plant Tissue Culture. Enfield, NH: Science.
3. Slater, A., Scott, N. W., & Fowler, M. R. (2008). Plant Biotechnology: an Introduction to Genetic Engineering. Oxford: Oxford University Press.
4. Buchanan, B. B., Gruissem, W., & Jones, R. L. (2015). Biochemistry & Molecular Biology of Plants. Chichester, West Sussex: John Wiley & Sons.
5. Umesha, S. (2013). Plant Biotechnology. The Energy And Resources.
6. Glick, B. R., & Pasternak, J. J. (2010). Molecular Biotechnology: Principles and Applications of Recombinant DNA. Washington, D.C.: ASM Press.
7. Brown, T. A. (2006). Gene Cloning and DNA Analysis: an Introduction. Oxford: Blackwell Pub.
8. Primrose, S. B., & Twyman, R. M. (2006). Principles of Gene Manipulation and Genomics. Malden, MA: Blackwell Pub.
9. Slater, A., Scott, N. W., & Fowler, M. R. (2003). Plant Biotechnology: The Genetic Manipulation of Plants. Oxford: Oxford University Press.
10. Gordon, I. (2005). Reproductive Techniques in Farm Animals. Oxford: CAB International.
11. Levine, M. M. (2004). New Generation Vaccines. New York: M. Dekker.
12. Pörtner, R. (2007). Animal Cell Biotechnology: Methods and Protocols. Totowa, NJ: Humana Press.

BASICS OF MATHEMATICS AND STATISTICS

Course Code: BTH4113 **Credit Units: 02**

Course Objectives

The objective of this course is to give conceptual exposure of essential contents of mathematics and statistics to students

Learning Outcomes

On completion of this course, students should be able to :

- Gain broad understanding in mathematics and statistics;
- Recognize importance and value of mathematical and statistical thinking, training, and approach to problem solving, on a diverse variety of disciplines.

Course Contents:

Module 1 Algebra

Linear equations, functions: slopes-intercepts, forms of two-variable linear equations; constructing linear models in biological systems; quadratic equations (solving, graphing, features of, interpreting quadratic models etc.), introduction to polynomials, graphs of binomials and polynomials; Symmetry of polynomial functions, basics of trigonometric functions, Pythagorean theory, graphing and constructing sinusoidal functions, imaginary numbers, complex numbers, adding-subtracting-multiplying complex numbers, basics of vectors, introduction to matrices.

Module 2 Calculus

Differential calculus (limits, derivatives), integral calculus (integrals, sequences and series etc.).

Module 3 Mathematical models in biology

Population dynamics; oscillations, circadian rhythms, developmental patterns, symmetry in biological systems, fractal geometries, size-limits & scaling in biology, modeling chemical reaction networks and metabolic networks.

Module 4 Statistics

Probability: counting, conditional probability, discrete and continuous random variables; Error propagation; Populations and samples, expectation, parametric tests of statistical significance, nonparametric hypothesis tests, linear regression, correlation & causality, analysis of variance, factorial experiment design

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Stroud, K. A., & Booth, D. J. (2009). Foundation Mathematics. New York, NY: Palgrave Macmillan.
2. Aitken, M., Broadhursts, B., & Haldky, S. (2009) Mathematics for Biological Scientists. Garland Science.

3. Billingsley, P. (1986). Probability and Measure. New York: Wiley.
4. Rosner, B. (2000). Fundamentals of Biostatistics. Boston, MA: Duxbury Press.
5. Daniel, W. W. (1987). Biostatistics, a Foundation for Analysis in the Health Sciences. New York: Wiley.

BASICS OF CHEMISTRY AND PHYSICS

Course Code: BTH4114 **Credit Units: 02**

Course Objectives

The objectives of this course are to cover all essentials required to appreciate physico-chemical principles underlying biological processes

Learning Outcomes

Students should be able to have a firm foundation in fundamentals and application of current chemical and physical scientific theories.

Course Contents:

Module 1 Basic physics for biologists

Physical quantities and their dynamics: definitions and dimensions; vectors & scalars, displacement, velocity, acceleration, kinematic formulas, angular momentum, torque etc. force, power, work, energy (kinetic & potential/electric charge separation, electromagnetic spectrum, photons etc.); springs & Hookes laws; elastic and inelastic collisions; Newton's law of motions (centripetal and centrifugal forces etc.); simple harmonic motions, mechanical waves, Doppler effect, wave interference, amplitude, period, frequency & wavelength; diffusion, dissipation, random walks, and directed motions in biological systems; low Reynolds number - world of Biology, buoyant forces, Bernoulli's equation, viscosity, turbulence, surface tension, adhesion; laws

of thermodynamics: Maxwell Boltzmann distribution, conduction, convection and radiation, internal energy, entropy, temperature and free energy, Maxwell's demon (entropic forces at work in biology, chemical assemblies, self-assembled systems, role of ATP); Coulomb's law, conductors and insulators, electric potential energy of charges, nerve impulses, voltage gated channels, ionic conductance; Ohms law (basic electrical

quantities: current, voltage & power), electrolyte conductivity, capacitors and capacitance, dielectrics; various machines in biology i.e. enzymes, allostery and molecular motors (molecules to cells and organisms).

Module 2 Basic chemistry for biologists

Basic constituents of matter - elements, atoms, isotopes, atomic weights, atomic numbers, basics of mass spectrometry, molecules, Avogadro number, molarity, gas constant, molecular weights, structural and molecular formulae, ions and polyatomic ions; chemical reactions, reaction stoichiometry, rates of reaction, rate constants, order of reactions, Arrhenious equation, Maxwell Boltzmann distributions, rate- determining steps, catalysis, free-energy, entropy and enthalpy changes during reactions; kinetic versus thermodynamic controls of a reaction, reaction equilibrium

(equilibrium constant); light and matter interactions (optical spectroscopy, fluorescence, bioluminescence, paramagnetism and diamagnetism, photoelectron spectroscopy; chemical bonds (ionic, covalent, Van der Walls forces); electronegativity, polarity;

VSEPR theory and molecular geometry, dipole moment, orbital hybridizations; states of matter - vapor pressure, phase diagrams, surface tension, boiling and melting points, solubility, capillary action, suspensions, colloids and solutions; acids, bases and pH -

Arrhenious theory, pH, ionic product of water, weak acids and bases, conjugate acid-base pairs, buffers and buffering action etc; chemical thermodynamics - internal energy, heat and temperature, enthalpy (bond enthalpy and reaction enthalpy), entropy, Gibbs free energy of ATP driven reactions, spontaneity versus driven reactions in biology; redox reactions and electrochemistry -

oxidation-reduction reactions, standard cell potentials, Nernst equation, resting membrane potentials, electron transport chains (ETC) in biology, coupling of oxidative phosphorylations to ETC; theories of ATP production and dissipation across biological membranes; bond rotations and molecular conformations - Newman projections, conformational analysis of alkanes, alkenes and alkynes; functional groups, optically asymmetric carbon centers, amino acids, proteins, rotational freedoms

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Baaquie, B. E. (2000). Laws of Physics: a Primer. Singapore: National University of Singapore.
2. Matthews, C. P., & Shearer, J. S. (1897). Problems and Questions in Physics. New York: Macmillan Company.
3. Halliday, D., Resnick, R., & Walker, J. (1993). Fundamentals of Physics. New York: Wiley.
4. Ebbing, D. D., & Wrighton, M. S. (1990). General Chemistry. Boston: Houghton Mifflin.
5. Averill, B., & Eldredge, P. (2007). Chemistry: Principles, Patterns, and Applications. San Francisco: Benjamin Cummings.
6. Mahan, B. H. (1965). University Chemistry. Reading, MA: Addison-Wesley Pub.
7. Cantor, C. R., & Schimmel, P. R. (2004). Biophysical Chemistry. San Francisco: W.H. Freeman.

MICROBIOLOGY LAB

Course Code: BTH4109 **Credit Units: 02**

Course Objectives
The objective of this laboratory course is to provide practical skills on basic microbiological techniques

Learning Outcomes
- Students should be able to:
- Isolate, characterize and identify common bacterial organisms;
- Determine bacterial load of differentsamples;
- Perform antimicrobial sensitivity tests;
- Preserve bacterial cultures

Course Contents:

Sterilization, disinfection and safety in microbiologicallaboratory.
Preparation of media for cultivation of bacteria.
Isolation of bacteria in pure culture by streak plate method.
Study of colony and growth characteristics of some common bacteria:
Bacillus, E. coli, Staphylococcus, Streptococcus, etc.
Preparation of bacterial smear and Gram's staining.
Enumeration of bacteria: standard plate count.
Antimicrobial sensitivity test and demonstration of drug resistance.
Maintenance of stock cultures: slants, stabs and glycerol stock cultures
Determination of phenol co-efficient of antimicrobial agents.
Determination of Minimum Inhibitory Concentration (MIC)

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
15	10	05	35	15	10	10

Text & References:

1. Cappuccino, J. G., & Welsh, C. (2016). Microbiology: a Laboratory Manual. Benjamin-Cummings Publishing Company.
2. Collins, C. H., Lyne, P. M., Grange, J. M., & Falkinham III, J. (2004). Collins and Lyne's Microbiological Methods (8th ed.). Arnolds.
3. Tille, P. M., & Forbes, B. A. Bailey & Scott's Diagnostic Microbiology.

BIOCHEMISTRY & ANALYTICAL TECHNIQUES LAB

Course Code: BTH4115 **Credit Units: 04**

Course Objectives
The objective of this laboratory course is to introduce students to experiments in biochemistry. The course is designed to teach students the utility of set of experimental methods in biochemistry in a problem oriented manner.

Learning Outcomes
On completion of this course, students should be able to:
To elaborate concepts of biochemistry with easy to run experiments;
To familiarize with basic laboratory instruments and understand the
principle of measurements using those instruments with experiments in biochemistry.

Course Contents:

Preparingvariousstocksolutionsandworkingsolutionsthatwillbeneeded for the course.
To prepare an Acetic-Na Acetate Buffer and validate the Henderson-Hassel bach equation.
To determine an unknown protein concentration by plotting a standard graph of BSA using UV-Vis Spectrophotometer and validating the Beer- Lambert's Law.
Titration of Amino Acids and separation of aliphatic, aromatic and polar amino acids by thin layer chromatography.
Purification and characterization of an enzyme from a recombinant source (such as Alkaline Phosphatase or Lactate Dehydrogenase or any enzyme of the institution's choice).
Preparation of cell-free lysates
Ammonium Sulfate precipitation
Ion-exchange Chromatography
Gel Filtration
Affinity Chromatography
Dialysis of the purified protein solution against 60% glycerol as ademonstration of storage method
Generating a Purification Table (protein concentration, amount of total protein; Computing specific activity of the enzyme preparation at each stage of purification)
Assessing purity of samples from each step of purification by SDS-PAGE Gel Electrophoresis
Enzyme Kinetic Parameters: Km, Vmax and Kcat
Experimental verification that absorption at OD260 is more for denatured DNAas compared to native double stranded DNA. reversal of the same following DNA renaturation. Kinetics of DNA renaturation as a function of DNA size.
Identification of an unknown sample as DNA, RNA or protein using available laboratory tools. (Optional Experiments)
Biophysical methods (Circular Dichroism Spectroscopy, Fluorescence Spectroscopy).
Determination of mass of small molecules and fragmentation patterns by Mass Spectrometry.

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

PLANT AND ANIMAL BIOTECHNOLOGY LAB

Course Code: BTH4116 **Credit Units: 04**

Course Objectives
The objectives of this course are to provide hands-on training in basic experiments of plant and animal biotechnology.

Learning Outcomes
On completion of course, students should be able to gain basic skills in plant and animal biotechnology.

Course Contents:

Plant Biotechnology
Prepare culture media with various supplements for plant tissue culture.
Prepare explants of Valleriana wallichii for inoculation under aseptic conditions.
Attempt in vitro andro and gynogenesis in plants (Datura stramonium).
Isolate plant protoplast by enzymatic and mechanical methods and attempt fusion by PEG (available material).
Culture Agrobacterium tumefaciens and attempt transformation of any dicot species.
Generate an RAPD and ISSR profile of Eremurus persicus and Valleriana wallichii.
Prepare karyotypes and study the morphology of somatic chromosomes of Allium cepa, A. sativum, A. tuberosum and compare them on the basis of karyotypes.
Pollen mother cell meiosis and recombination index of select species
(one achiasmate, and the other chiasmate) and correlate with generation of variation.
Undertake plant genomic DNA isolation by CTAB method and its quantitation by visual as well as spectrophotometeric methods.
Perform PCR amplification of 'n' number of genotypes of a species for studying the genetic variation among the individuals of a species using random primers.
Study genetic fingerprinting profiles of plants and calculate polymorphic information content.
Syllabus
Animal Biotechnology
Count cells of an animal tissue and check their viability.
Prepare culture media with various supplements for plant and animal tissue culture.
Prepare single cell suspension from spleen and thymus.
Monitor and measure doubling time of animal cells.
Chromosome preparations from cultured animal cells.
Isolate DNA from animal tissue by SDS method.
Attempt animal cell fusion using PEG

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

SEMESTER-II

IMMUNOLOGY

Course Code: BTH4115 **Credit Units: 03**

Course Objectives

The objectives of this course are to learn about structural features of components of immune system as well as their function. The major emphasis of this course will be on development of immune system and mechanisms by which our body elicits immune response. This will be imperative for students as it will help them to predict about nature of immune response that develops against bacterial, viral or parasitic infection, and prove it by designing new experiments.

Learning Outcomes

On completion of this course, students should be able to:
Evaluate usefulness of immunology
in different pharmaceutical companies;
Identify proper research lab working in area of their own interests;
Apply their knowledge and design immunological experiments to demonstrate innate, humoral or cytotoxic T lymphocyte responses and figure out kind of immune responses in the setting of infection (viral or bacterial).

Course Contents:

Module 1 Immunology: fundamental concepts and overview of the immune system

Components of innate and acquired immunity; phagocytosis; complement and inflammatory responses; pathogen recognition receptors (PRR) and pathogen associated molecular pattern (PAMP); innate immune response; mucosal immunity; antigens: immunogens, haptens; Major Histocompatibility Complex: MHC genes, MHC and immune responsiveness and disease susceptibility, Organs of immune system, primary and secondary lymphoid organs.

Module 2 Immune responses generatedbyBandT lymphocytes

Immunoglobulins-basicstructure,classes&subclassesofimmunoglobulins,antigenic determinants; multigene organization of immunoglobulin genes; B-cell receptor; Immunoglobulin superfamily; principles of cell signaling; basis of self & non-self discrimination; kinetics of immune response, memory; B cell maturation, activation and differentiation; generation of antibody diversity; T-cell maturation, activation and differentiation and T-cell receptors; functional T Cell subsets; cell-mediated immune responses, ADCC; cytokines: properties, receptors and therapeutic uses; antigen processing and presentation- endogenous antigens, exogenous antigens, non-peptide bacterial antigens and super-antigens; cell-cell co-operation, Hapten-carriersystem

Module 3 Antigen-antibody interactions

Precipitation, agglutination and complement mediated immune reactions; advanced immunological techniques: RIA, ELISA, Western blotting, ELISPOT assay, immunofluorescence microscopy, flow cytometry and immunoelectron microscopy; surface plasmon resonance, biosensor assays for assessing ligand –receptor interaction; CMI techniques: lymphoproliferation assay, mixed lymphocyte reaction, cell cytotoxicity assays, apoptosis, microarrays, transgenic mice, gene knock outs.

Module 4 Vaccinology

Active and passive immunization; live, killed, attenuated, subunit vaccines; vaccine technology: role and properties of adjuvants, recombinant DNA and protein based vaccines, plant basedvaccines,reversevaccinology;peptidevaccines,conjugatevaccines; antibody genes and antibody engineering: chimeric, generation of monoclonal antibodies, hybrid monoclonal antibodies; catalytic antibodies and generation of immunoglobulin gene libraries, idiotypic vaccines and marker vaccines, viral-like particles (VLPs), dendriticcellbasedvaccines,vaccineagainstcancer,Tcellbasedvaccine,ediblevaccine and therapeutic vaccine

Module 5 Clinical immunology

Immunity to infection : bacteria, viral, fungal and parasitic infections (with examples from each group); hypersensitivity: Type I-IV; autoimmunity; types of autoimmune diseases; mechanism and role of CD4+ T cells; MHC and TCR in autoimmunity; treatment of autoimmune diseases; transplantation: immunological basis of graft rejection; clinical transplantation and immunosuppressive therapy; tumor immunology: tumor antigens; immune response to tumors and tumor evasion of the immune system, cancer immunotherapy; immunodeficiency: primary immunodeficiencies, acquired or secondary immunodeficiencies, autoimmune disorder, anaphylactic shock, immunosenescence, immune exhaustion in chronic viral infection, immune tolerance, NK cells in chronic viral infection and malignancy.

Module 6 Immunogenetics

Major histocompatibility complex genes and their role in autoimmune and infectious diseases, HLA typing, human major histocompatibility complex (MHC), Complement genes of the human major histocompatibility complex: implication for linkage disequilibrium and disease associations, genetic studies of rheumatoid arthritis, systemic lupus erythematosus and multiple sclerosis, genetics of human immunoglobulin, immunogenetics of spontaneous control of HIV, KIR complex.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Kindt,T.J.,Goldsby,R.A.,Osborne,B.A.,&Kuby,J.(2006).KubyImmunology. New York: W.H.Freeman.
2. Brostoff,J.,Seaddin,J.K.,Male,D.,&Roitt,I.M.(2002).ClinicalImmunology. London: Gower Medical Pub.
3. Murphy,K.,Travers,P.,Walport,M.,&Janeway,C.(2012).Janeway's Immunobiology. New York: GarlandScience.
4. Paul,W.E.(2012).FundamentalImmunology.NewYork:RavenPress.
5. Goding,J.W.(1996).MonoclonalAntibodies:PrinciplesandPractice:Production and Application of Monoclonal Antibodies in Cell Biology, Biochemistry, and Immunology. London: AcademicPress.
6. Parham, P. (2005). The Immune System. New York: Garland Science.

GENETIC ENGINEERING

Course Code: BTH4115 **Credit Units: 03**

Course Objectives

The objectives of this course are to teach students with various approaches to conducting genetic engineering and their applications in biological research as well as in biotechnology industries. Genetic engineering is a technology that has been developed based on our fundamental understanding of the principles of molecular biology and this is reflected in the contents of this course.

Learning Outcomes

Given the impact of genetic engineering in modern society, the students should be endowed with strong theoretical knowledge of this technology. In conjunction with the practicals in molecularbiology & genetic engineering, the students should be able to take up biological research as well as placement in the relevant biotech industry.

Course Contents:

Module 1 Introduction and tools for genetic engineering

Impact of genetic engineering in modern society; general requirements for performing a genetic engineering experiment; restriction endonucleases and methylases; DNA ligase, Klenow enzyme, T4 DNA polymerase, polynucleotide kinase, alkaline phosphatase; cohesive and blunt end ligation; linkers; adaptors; homopolymeric tailing; labelling
of DNA: nick translation, random priming, radioactive and non-radioactive probes, hybridization techniques: northern, southern, south-western and far-western and colony hybridization, fluorescence in situ hybridization.

Module 2 Different types of vectors

Plasmids; Bacteriophages; M13 mp vectors; PUC19 and Bluescript vectors, hagemids; Lambda vectors; Insertion and Replacement vectors; Cosmids; Artificial chromosome vectors (YACs; BACs); Principles for maximizing gene expression expression vectors; pMal; GST; pET-based vectors; Protein purification; His-tag; GST-tag; MBP-tag etc.; Intein-based vectors; Inclusion bodies; methodologies to reduce formation of inclusion bodies; mammalian expression and replicating vectors; Baculovirus and Pichia vectors system, plant based vectors, Ti and Ri as vectors, yeast vectors, shuttle vectors.

Module 3 Different types of PCR techniques

Principles of PCR: primer design; fidelity of thermostable enzymes; DNA polymerases; types of PCR – multiplex, nested; reverse-transcription PCR, real time PCR, touchdown PCR, hot start PCR, colony PCR, asymmetric PCR, cloning of PCR products;
T-vectors; proof reading enzymes; PCR based site specific mutagenesis; PCR in molecular diagnostics; viral and bacterial detection; sequencing methods; enzymatic DNA sequencing; chemical sequencing of DNA; automated DNA sequencing; RNA sequencing; chemical synthesis of oligonucleotides; mutation detection: SSCP, DGGE, RFLP.

Module 4 Gene manipulation and protein-DNA interaction

Insertion of foreign DNA into host cells; transformation, electroporation, transfection; construction of libraries; isolation of mRNA and total RNA; reverse transcriptase and cDNA synthesis; cDNA and genomic libraries; construction of microarrays – genomic arrays, cDNA arrays and oligo arrays; study of protein-DNA interactions: electrophoretic mobility shift assay; DNase footprinting; methyl interference assay, chromatin immunoprecipitation; protein-protein interactions using yeast two-hybrid system;
phage display.

Module 5 Gene silencing and genome editing technologies

Gene silencing techniques; introduction to siRNA; siRNA technology; Micro RNA; construction of siRNA vectors; principle and application of gene silencing; gene knockouts and gene therapy; creation of transgenic plants; debate over GM crops; introduction to methods of genetic manipulation in different model systems e.g. fruit flies (Drosophila), worms (C. elegans), frogs (Xenopus), fish (zebra fish) and chick; Transgenics - gene replacement; gene targeting; creation of transgenic and knock-out mice; disease model; introduction to genome editing by CRISPR-CAS with specific emphasis on Chinese and American clinical trials

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Old, R. W., Primrose, S. B., & Twyman, R. M.(2001). Principles of Gene Manipulation: an Introduction to Genetic Engineering. Oxford: Blackwell Scientific Publications.
2. Green, M. R., & Sambrook, J. (2012). Molecular Cloning: a Laboratory Manual. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press.
3. Brown, T. A. (2006). Genomes (3rd ed.). New York: Garland Science Pub.
4. Selected papers from scientific journals, particularly Nature & Science.
5. Technical Literature from Stratagene, Promega, Novagen, New England Biolab etc.

BIOINFORMATICS

Course Code: BTH4211 **Credit Units: 03**

Course Objectives
The objectives of this course are to provide theory and practical experience of the use of common computational tools and databases which facilitate investigation of molecular biology and evolution-related concepts.

Learning Outcomes

Student should be able to :
Develop an understanding of basic theory of these computationaltools;
Gain working knowledge of these computational tools andmethods;
Appreciate their relevance for investigating specificcontemporary biologicalquestions; Critically analyse and interpretresults of theirstudy.

Course Contents:
Module 1 Bioinformatics basics
Bioinformatics basics: Computers in biology and medicine; Introduction to UnixandLinuxsystemsandbasiccommands;Databaseconcepts;Proteinandnucleicacid databases; Structural databases; Biological XML DTD's; pattern matching algorithm basics;databasesandsearchtools:biologicalbackgroundforsequenceanalysis;Identificationofproteinsequence fromDNAsequence;searchingofdatabasessimilarsequence;NCBI;publiclyavailabletools;resourcesatEBI;resourcesonweb;database miningtools.

Module 2 DNA sequence analysis
DNA sequence analysis: gene bank sequence database; submitting DNA sequences to databases and database searching; sequence alignment; pairwise alignment techniques; motif discovery and gene prediction; local structural variants of DNA, their relevance in molecular level processes, and their identification; assembly of data from genome sequencing

Module 3 Multiple sequence analysis
Multiple sequence analysis; multiple sequence alignment; flexible sequence similarity searching with the FASTA3 program package; use of CLUSTALW and CLUSTALX for multiple sequence alignment; submitting DNA protein sequence to databases: where and how to submit, SEQUIN, genome centres; submitting aligned sets of sequences, updating submitted sequences, methods of phylogenetic analysis

Module 4 Protein modelling
Protein modelling: introduction; force field methods; energy, buried and exposed residues; side chains and neighbours; fixed regions; hydrogen bonds; mapping properties onto surfaces; fitting monomers; RMS fit of conformers; assigning secondary structures; sequence alignment- methods, evaluation, scoring; protein completion: backbone construction and side chain addition; small peptide methodology; software accessibility; building peptides; protein displays; substructure manipulations, annealing.

Module 5 Protein structure prediction and virtual library

Protein structure prediction: protein folding and model generation; secondary structure prediction; analyzing secondary structures; protein loop searching; loop generating methods; homology modelling: potential applications, description, methodology, homologous sequence identification; align structures, align model sequence;construction of variable and conserved regions; threading techniques; topology fingerprint approach for prediction; evaluation of alternate models; structure prediction on a mystery sequence; structure aided sequence techniques of structure prediction; structural profiles, alignment algorithms, mutation tables, prediction, validation, sequence based methods of structure prediction, prediction using inverse folding, fold prediction; significance analysis, scoring techniques, sequence-sequence scoring; protein function prediction; elements of in silico drug design; Virtual library: Searching PubMed, current content, science citation index and current awareness services, electronic journals, grants and funding information.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Lesk,A.M.(2002).IntroductiontoBioinformatics.Oxford:OxfordUniversityPress.
2. Mount,D.W.(2001).Bioinformatics:SequenceandGenomeAnalysis.ColdSpring Harbor, NY: Cold Spring Harbor LaboratoryPress.
3. Baxevanis,A.D.,&Ouellette,B.F.(2001).Bioinformatics:aPracticalGuidetothe AnalysisofGenesandProteins.NewYork:Wiley-Interscience.
4. Pevsner,J.(2015).BioinformaticsandFunctionalGenomics.Hoboken, NJ.:Wiley-Blackwell.
5. Bourne,P.E.,&Gu,J.(2009).StructuralBioinformatics.Hoboken,NJ:Wiley-Liss.

Lesk,A.M.(2004).IntroductiontoProteinScience:Architecture,Function,and Genomics. Oxford: Oxford UniversityPress

GENOMICS AND PROTEOMICS

Course Code: BTH4212 **Credit Units: 02**

Course Objectives
The objectives of this course is to provide introductory knowledge concerning genomics, proteomics and their applications.

Learning Outcomes
Students should be able to acquire knowledge and understanding of
fundamentals of genomics and proteomics, transcriptomics and metabolomics and their applications in various applied areas of biology.

Course Contents:

Module 1 Basics of genomicsand proteomics
Brief overview of prokaryotic and eukaryotic genome organization; extra-chromosomal DNA: bacterial plasmids, mitochondria and chloroplast.

Module 2 Genome mapping
Genetic and physical maps; markers for genetic mapping; methods and techniques used for gene mapping, physical mapping, linkage analysis, cytogenetic techniques, FISH technique in gene mapping, somatic cell hybridization, radiation hybrid maps, in situ hybridization, comparative gene mapping.

Module 3 Genome sequencing projects
Human Genome Project, genome sequencing projects for microbes, plants and animals, accessing and retrieving genome project information from the web.

Module 4 Comparative genomics
Identification and classification of organisms using molecular markers- 16S rRNA typing/sequencing, SNPs; use of genomes to understand evolution of eukaryotes, track emerging diseases and design new drugs; determining gene location in genome sequence.

Module 5 Proteomics.
Aims, strategies and challenges in proteomics; proteomics technologies: 2D-PAGE, isoelectric focusing, mass spectrometry, MALDI-TOF, yeast 2-hybrid system, proteome databases.

Module 6 Functional genomics and proteomics
Transcriptome analysis for identification and functional annotation of gene, Contig assembly, chromosome walking and characterization of chromosomes, mining functional genes in genome, gene function- forward and reverse genetics, gene ethics; protein- protein and protein-DNA interactions; protein chips and functional proteomics; clinical and biomedical applications of proteomics; introduction to metabolomics, lipidomics, metagenomics and systems biology.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Primrose,S.B.,Twyman,R.M.,Primrose,S.B.,&Primrose,S.B.(2006). Principles of Gene Manipulation and Genomics. Malden, MA: Blackwell Pub.
2. Liebler,D.C.(2002).IntroductiontoProteomics:ToolsfortheNewBiology. Totowa, NJ: Humana Press.
3. Campbell,A.M.,&Heyer,L.J.(2003).DiscoveringGenomics,Proteomics,and Bioinformatics. San Francisco: BenjaminCummings.

MOLECULAR DIAGNOSTICS

Course Code: BTH4213 **Credit Units: 02**

Course Objectives
The objectives of this course are to sensitize students about recent advances in molecular biology and various facets of molecular medicine which has potential to profoundly alter many aspects of modern medicine including pre- or post-natal analysis of genetic diseases and identification of individuals predisposed to disease ranging from common cold to cancer.

Learning Outcomes
Students should be able to understand various facets of molecular procedures and basics of genomics, proteomics and metabolomics that could be employed in early diagnosis and prognosis of human diseases.

Course Contents:

Module 1 Genome biology in health and disease
DNA,RNA,Protein:Anoverview;chromosomalstructure&mutations;DNApolymor- phism: human identity; clinical variability and genetically determined adverse reactions to drugs.

Module 2 Genome: resolution, detection & analysis
PCR: Real-time; ARMS; Multiplex; ISH; FISH; ISA; RFLP; DHPLC; DGGE; CSCE; SSCP;Nucleicacidsequencing:newgenerationsofautomatedsequencers;Microarraychips;EST;SAGE;micro arraydatanormalization&analysis;molecularmarkers:16SrRNA typing;Diagnosticproteomics:SELDI-TOF-MS;Bioinformaticsdataacquisition
& analysis.

Module 3 Diagnostic metabolomics
Metaboliteprofileforbiomarkerdetectionthebodyfluids/tissuesinvariousmetabolic disordersbymakingusingLCMS&NMRtechnologicalplatforms.

Module 4 Detectionandidentity ofmicrobialdiseases
Direct detection and identification of pathogenic-organisms that are slow growing or currentlylackingasystemofinvitrocultivationaswellasgenotypicmarkersofmicrobial resistance to specificantibiotics.

Module 5 Detection of inherited diseases
Exemplified by two inherited diseases for which molecular diagnosis has provided a dramaticimprovementofqualityofmedicalcare:FragileXSyndrome:Paradigmofnew mutational mechanism of unstable triplet repeats, von-Hippel Lindau disease: recent acquisition in growing number of familial cancersyndromes

Module 6 Molecular oncology
Detection of recognized genetic aberrations in clinical samples from cancer patients; types of cancer-causing alterations revealed by next-generation sequencing of clinical isolates; predictive biomarkers for personalized onco-therapy of human diseases such as chronic myeloid leukemia, colon, breast, lung cancer and melanoma as well as matching targeted therapies with patients and preventing toxicity of standard systemic therapies.

Module 7 Quality assurance and control Quality oversight; regulations and approved testing.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Campbell,A.M.,&Heyer,L.J.(2006).DiscoveringGenomics,Proteomics, and Bioinformatics. San Francisco: BenjaminCummings.

2. Brooker,R.J.(2009).Genetics:Analysis&Principles.NewYork,NY:McGraw-Hill.

3. Glick, B. R., Pasternak, J. J., & Patten, C. L. (2010). Molecular Biotechnology: PrinciplesandApplicationsofRecombinantDNA.Washington,DC:ASMPress.

4. Coleman,W.B.,&Tsongalis,G.J.(2010).MolecularDiagnostics:fortheClinical Laboratorian. Totowa, NJ: HumanaPress

RESEARCH METHODOLOGY AND SCIENTIFIC COMMUNICATION SKILLS

Course Code: BTH4214 **Credit Units: 02**

Course Objectives
The objectives of this course are to give background on history of science, emphasizing methodologies used to do research, use framework of these

Learning Outcomes
Students should be able to: Understand history and methodologies of scientific research, applying theset o recent published papers; Understand and practice scientific reading, writing and presentations;
Appreciate scientific ethics through case studies

Course Contents:

Module 1 History of science and science methodologies
Empirical science; scientific method; manipulative experiments and controls; deductive and inductive reasoning; descriptive science; reductionist vs holistic biology.

Module 2 Preparation for research
Choosing a mentor, lab and research question; maintaining a lab notebook

Module 3 Process of communication
Concept of effective communication- setting clear goals for communication; determining outcomes and results; initiating communication; avoiding breakdowns while communicating; creating value in conversation; barriers to effective communication; non-verbal communication-interpreting non-verbal cues; importance of body language, power of effective listening; recognizing cultural differences;Presentationskills-formal presentation skills; preparing and presenting using over-head projector, PowerPoint; defending interrogation; scientific poster preparation & presentation; participating in group discussions; Computing skills for scientific research - web browsing for information search; search engines and their mechanism of searching; hidden Web and its importance in scientific research; internet as a medium of interaction between scientists; effective email strategy using the right tone and conciseness.

Module 4 Scientific communication
Technical writing skills - types of reports; layout of a formal report; scientific writing skills - importance of communicating science; problems while writing a scientific document; plagiarism, software for plagiarism; scientific publication writing: elements of a scientific paper including abstract, introduction, materials & methods, results, discussion, references; drafting titles and framing abstracts; publishing scientific papers- peer review process and problems, recent developments such as open access and non-blindreview;plagiarism;characteristicsofeffectivetechnicalcommunication;scientific presentations; ethical issues; scientific misconduct

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Valiela,I.(2001).DoingScience:Design,Analysis,andCommunicationofScientific Research. Oxford: Oxford UniversityPress.
- OnBeingaScientist:aGuidetoResponsibleConductinResearch.(2009). Washington, D.C.: National AcademiesPress.
- Gopen,G.D.,&Smith,J.A.TheScienceofScientificWriting.AmericanScientist, 78 (Nov-Dec 1990),550-558.
- Mohan,K.,&Singh,N.P.(2010).SpeakingEnglishEffectively.Delhi:Macmillan India.
- Movie:NaturallyObsessed,TheMakingofaScientist.

IMMUNOLOGY

Course Code: BTH4212 **Credit Units: 04**

Course Objectives

The objectives of this laboratory course are to develop an understanding about practical aspects of components of immune system as well as their function. Basic as well as advanced methods will be taught to detect different antigen and antibody interactions, isolation ofdifferent lymphocyte cells *etc.* and how they can be used in respective researchwork.

Learning Outcomes

Students should be able to:

Evaluateusefulnessofimmunologyindifferent pharmaceuticalcompanies;Identify proper research labworking in area of their owninterests;Apply their knowledge and design immunological experiments to demonstrate innate, humoral or cytotoxic T lymphocyte responsesand figure out kind of immune responses in setting of infection (viral or bacterial) by looking at cytokine profile.

Course Contents:

Selection of animals, preparation of antigens, immunization and methods of blood collection, serum separationandstorage.
Antibody titre by ELISAmethod.
Double diffusion, Immuno-electrophoresis and Radial Immunodiffusion.
Complement fixation test.
IsolationandpurificationofIgGfromserumorIgYfrom chicken egg.
SDS-PAGE, Immunoblotting, Dot blot assays.
BloodsmearidentificationofleucocytesbyGiemsastain.
Separation of leucocytes by dextran method.
DemonstrationofPhagocytosisoflatexbeadsandtheircryopreservation.
SeparationofmononuclearcellsbyFicoll-Hypaqueandtheircryopreservation.
Demonstration of ELI SPOT.
Demonstration ofFACS.

MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Course Code: BTH4215 **Credit Units: 04**

Course Objectives
The objectives of this courseware to provide students with experimental knowledge of molecular biology and genetic engineering.

Learning Outcomes
Students should be able to gain hands- on experience in gene cloning, protein expression and purification. This experience would enable them to begin a career in industry that engages in genetic engineering as well as in research laboratories conducting fundamental research.

Course Contents:
Concept oflacoperon:
Lactose induction ofB-galactosidase.
Glucose Repression.
Diauxic growth curve of E.coli
UV mutagenesis to isolate amino acid auxotroph
Phage titre with epsilon phage/M13
Genetic Transfer-Conjugation, gene mapping
Plasmid DNA isolation and DNA quantitation
Restriction Enzyme digestion of plasmid DNA
Agarose gel electrophoresis
PolymeraseChainReactionandanalysisbyagarose gel electrophoresis
Vector and Insert Ligation
Preparation of competent cells
Transformation of E.coli with standard plasmids, Calculation of
transformation efficiency
ConfirmationoftheinsertbyColonyPCRand Restriction mapping
Expressionofrecombinantprotein,conceptofsolubleproteinsand inclusion body formation in E.coli, SDS-Page analysis
Purification of His-Tagged protein on Ni-NTAcolumns
Random Primer labelling
Southern hybridization.

Text & References:
Green, M. R., & Sambrook, J. (2012). Molecular Cloning: a Laboratory Manual.Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press.

THIRD SEMESTER
BIOPROCESS ENGINEERING &TECHNOLOGY

Course Code: BTH4320 **Credit Units: 03**

Course Objectives
The objectives of this course are to educate students about the fundamental concepts of bioprocess technology and its related applications, thus preparing them to meet the challenges of the new and emerging areas of biotechnology industry.

Learning Outcomes
Students should be able to:
- Appreciate relevance of microorganisms from industrial context;
- Carry out stoichiometric calculations and specify models of their growth;
- Give an account of design and operations of various fermenters;
- Present unit operations together with the fundamental principles for basic methods in production technique for bio-based products;
- Calculate yield and production rates in a biological production process, and also interpret data;
- Calculate the need for oxygen andoxygen transfer;
- Criticallyanalyzeanybioprocess from market point of view;
- Give an account of important microbial/enzymatic industrial processes in food and fuel industry.

Course Contents:

Module 1 Basic principles of biochemical engineering
Isolation, screening and maintenance of industrially important microbes; microbial growth and death kinetics (an example from each group, particularly with reference to industrially useful microorganisms); strain improvement for increased yield and other desirable characteristics.

Module 2 Stoichiometry and models of microbial growth
Elementalbalanceequations;metaboliccoupling–ATPandNAD+;yieldcoefficients; unstructured models of microbial growth; structured models of microbial growth

Module 3 Bioreactor design and analysis
Batch and continuous fermenters; modifying batch and continuous reactors: chemostat with recycle, multistage chemostat systems, fed-batch operations; conventional fermentation v/s biotransformation; immobilized cell systems; large scale animal and plant cell cultivation; fermentation economics; upstream processing: media formulation and optimization; sterilization; aeration, agitation and heat transfer in bioprocess; scale up and scale down; measurement and control of bioprocess parameters

Module 4 Downstream processing and product recovery
Separation of insoluble products - filtration, centrifugation, sedimentation, flocculation; Cell disruption; separation of soluble products: liquid-liquid extraction, precipitation, chromatographic techniques, reverse osmosis, ultra and micro filtration, electrophoresis; final purification: drying; crystallization; storage and packaging.

Module 5 Fermentation economics
Isolation of micro-organisms of potential industrial interest; strain improvement; market analysis; equipment and plant costs; media; sterilization, heating and cooling; aeration and agitation; bath-process cycle times and continuous cultures; recovery costs; water usage and recycling; effluent treatment and disposal.

Module 6 Applications of enzyme technology in food processing
Mechanism of enzyme function and reactions in process techniques; enzymatic bioconversions e.g. starch and sugar conversion processes; high-fructose corn syrup; unesterified fat; hydrolysed protein etc. and their downstream processing; baking by amylases, deoxygenation and desugaring by glucoses oxidase, beer mashing and chill proofing; cheese making by proteases and various other enzyme catalytic actions in food processing.

Module 7 Applications of micro- biotechnology in food process operations and production, biofuels and biorefinery
Fermented foods and beverages; food ingredients and additives prepared by fermentation and their purification; fermentation as a method of preparing and preserving foods; microbes and their use in pickling, producing colours and flavours, alcoholic beverages and other products; process wastes-whey, molasses, starch substrates and other food wastes for bioconversion to useful products; bacteriocins from lactic acid bacteria – production and applications in food preservation; biofuels and biorefinery

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Shuler,M.L.,&Kargi,F. (2002).BioprocessEngineering:BasicConcepts.
Upper Saddle River, NJ: Prentice Hall.
2. Stanbury,P.F.,&Whitaker,A.(2010).PrinciplesofFermentationTechnology.Oxford: PergamonPress.
3. Blanch,H.W.,&Clark,D.S.(1997).BiochemicalEngineering.NewYork:M.Dekker.
4. Bailey,J.E.,&Ollis,D.F.(1986).BiochemicalEngineeringFundamentals.NewYork: McGraw-Hill.
5. El-Mansi,M.,&Bryce,C. F. (2007).FermentationMicrobiologyandBiotechnology.
Boca Raton: CRC/Taylor & Francis

EMERGING TECHNOLOGIES

Course Code: BTH4321 **Credit Units: 02**

Course Objectives
This course is broad-based in nature encompassingseveral new technologies that current experimental researchers areemployingto probe complex system biologyquestionsinlife-sciences.The objectivesofthis coursearetoteachbasics of the new principles to students so as to appreciate current-day research tool-kit better.

Course Contents:

Module 1 Optical microscopy methods
Basic Microscopy: Light Microscopy: lenses and microscopes, resolution: Rayleigh's Approach, Darkfield; Phase Contrast; Differential Interference Contrast; fluorescence and fluorescence microscopy: what is fluorescence, what makes a molecule fluorescent, fluorescence microscope; optical arrangement, light source; filter sets: excitation filter, dichroic mirror, and barrier, optical layout for image capture; CCD cameras; back illumination, binning; recording color; three CCD elements with dichroic beam splitters, boosting the signal.
Advanced Microscopy: Confocal microscope: scanning optical microscope, confocal principle, resolution and point spread function, light source: gas lasers & solid-state, primary beam splitter; beam scanning, pinhole and signal channel configurations, detectors; pixels and voxels; contrast, spatial sampling: temporal sampling: signal-to- noise ratio, multichannel images. nonlinear microscopy: multiphoton microscopy; principles of two-photon fluorescence, advantages of two-photon excitation, tandem scanning (spinning disk) microscopes, deconvolving confocal images; image processing, three-dimensional reconstruction; advanced fluorescence techniques: FLIM, FRET,
and FCS, Fluorescence Lifetime, Fluorescence Resonant Energy Transfer (FRET), Fluorescence Correlation Spectroscopy (FCS), Evanescent Wave Microscopy; Near-Field and Evanescent Waves, Total Internal Reflection Microscopy; Near-Field Microscopy; Beyond the Diffraction Limit: Stimulated Emission Depletion (STED), Super-Resolution Summary, Super-Resolution Imaging with Stochastic Optical Reconstruction Microscopy (STORM) and Photoactivated Localization Microscopy (PALM).

Module 2 Mass spectroscopy
Ionizationtechniques;massanalyzers/overviewMS;FT-ICRandOrbitrap,fragmentation ofpeptides;proteomics,nanoLC-MS;Phosphoproteomics;interactionproteomics,mass spectroscopy in structural biology; imaging mass spectrometry

Module 3 Systems biology
High throughput screens in cellular systems, target identification, validation of experimental methods to generate the omics data, bioinformatics analyses, mathematical modeling and designing testable predictions.

Module 4 Structural biology
X-raydiffractionmethods,solution&solid-stateNMR,cryo-electronmicroscopy,small- angle X-ray scattering, Atomic force microscopy.

Module 5 CRISPR-CAS
History of its discovery, elucidation of the mechanism including introduction to all themolecularplayers,developmentofapplicationsforinvivogenomeengineeringfor geneticstudies,promiseofthetechnologyasanext generationtherapeuticmethod

Module 6 Nanobodies

Introduction to nanobodies, combining nanobody with phage-display method for development of antibody against native proteins, nanobody as a tool for protein structure-function studies, use of nanobodies for molecular imaging, catabolic antibodies using nanobodies

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Campbell,I.D.(2012).BiophysicalTechniques.Oxford:OxfordUniversityPress.
2. Serdyuk,I.N.,Zaccai,N.R.,&Zaccai,G.(2007).MethodsinMolecularBiophysics: Structure,Dynamics,Function.Cambridge:CambridgeUniversityPress.
3. Phillips,R.,Kondev,J.,&Theriot,J.(2009).PhysicalBiologyoftheCell.NewYork: GarlandScience.
4. Nelson,P.C.,Radosavljević,M.,&Bromberg,S.(2004).BiologicalPhysics:Energy, Information, Life. New York: W.H.Freeman.
5. Huang, B., Bates, M., & Zhuang, X. (2009). Super-Resolution Fluorescence Microscopy.AnnualReviewofBiochemistry,78(1),993-1016.doi:10.1146/annurev. biochem.77.061906.092014.
6. Mohanraju,P.,Makarova,K.S.,Zetsche,B.,Zhang,F.,Koonin,E.V.,&Oost,J.V. (2016).DiverseEvolutionaryRootsandMechanisticVariationsoftheCRISPR-Cas Systems. Science, 353(6299).doi:10.1126/science.aad5147.

7.Lander,E.(2016).TheHeroesofCRISPR.Cell,164(1-2),18-28.doi:10.1016/j. cell.2015.12.041.

8. Ledford,H.(2016).TheUnsungHeroesofCRISPR.Nature,535(7612),342-344. doi:10.1038/535342a.
9. Jinek,M.,Chylinski,K.,Fonfara,I.,Hauer,M.,Doudna,J.A.,&Charpentier,E. (2012). A Programmable Dual-RNA-Guided DNA Endonuclease in Adaptive BacterialImmunity.Science,337(6096),816-821.doi:10.1126/science.1225829.
10. Hamers-Casterman, C., Atarhouch, T., Muyldermans, S., Robinson, G., Hammers, C.,Songa,E.B.,Hammers,R.(1993).NaturallyOccurringAntibodiesDevoidofLight Chains. Nature, 363(6428), 446-448.doi:10.1038/363446a0.
11. Sidhu,S.S.,&Koide,S.(2007).PhageDisplayforEngineeringandAnalyzing ProteinInteractionInterfaces.CurrentOpinioninStructuralBiology,17(4),481-487. doi:10.1016/j.sbi.2007.08.007.
12. Steyaert,J.,&Kobilka,B.K.(2011).NanobodyStabilizationofGProtein-Coupled ReceptorConformationalStates.CurrentOpinioninStructuralBiology, 21(4), 567-572. doi:10.1016/j.sbi.2011.06.011.
13. Vincke,C.,&Muyldermans,S.(2012).IntroductiontoHeavyChainAntibodiesand DerivedNanobodies.SingleDomainAntibodies,15-26.doi:10.1007/978-1-61779- 968-6_2.
14. Verheesen,P.,&Laeremans,T.(2012).SelectionbyPhageDisplayofSingle DomainAntibodiesSpecifictoAntigensintheirNativeConformation.Single Domain Antibodies, 81-104.doi:10.1007/978-1-61779-968-6_6.
15. Li,J.,Xia,L.,Su,Y.,Liu,H.,Xia,X.,Lu,Q.Reheman,K.(2012).MolecularImprint ofEnzymeActiveSitebyCamelNanobodies.JournalofBiologicalChemistryJ.Biol. Chem., 287(17), 13713-13721.doi:10.1074/jbc.m111.336370.
16. Sohier,J.,Laurent,C.,Chevigné,A.,Pardon,E.,Srinivasan,V.,Wernery, U.Galleni, M. (2013). Allosteric Inhibition of VIM Metallo-β-Lactamases by a Camelid Nanobody. Biochemical Journal, 450(3), 477-486. doi:10.1042/bj20121305.
17. Chakravarty,R.,Goel,S.,&Cai,W.(2014).Nanobody:The“MagicBullet”for MolecularImaging?Theranostics,4(4),386-398.doi:10.7150/thno.8006.

CRITICAL ANALYSIS OF CLASSICAL PAPERS

Course Code: BTH4322 **Credit Units: 03**

Course Objectives
The objectives of this course are to familiarize students with classic literature to make them appreciate how ground- breaking discoveries were made without, necessarily, use of high-endtechnologies.

Learning Outcomes
Students should be able to train in the exercise of hypothesis building and methods of addressing the hypothesis with readily available technology.
How does the Course Module work? Students may be divided in groups and each group may be responsible for one classicalpaper.Eachweektheremaybea1.5hourpresentationcumdiscussionforeachofthepapers.Attheendofthe semestereachstudentwillbeaskedtowriteamini-review(2-3pageslong)onanyoneclassicalpaper,otherthanthe one he/she presented/discussed**.**

A list of sixteen classic papers and some suggested reference materials:

Course Contents:
Molecular Biology
Studies on the chemical nature of the substance inducing transformation of Pneumococcaltypes:Inductionoftransformationbyadesoxyribonucleic acid fraction isolated from Pneumococcus type III.
Avery OT, Macleod CM, McCarty M.; J Exp Med. 1944 Feb 1;79(2):137-58. Note: This paper demonstrates that DNA is the transforming Principle originally described by Fredrick Griffith.
Independent functions of viral protein and nucleic acid in growth of bacteriophage HersheyADandChaseM.; JGenPhysiol.1952May;36(1):39-56.
Note: Note: This paper demonstrates that DNA, and not protein, component of phages enter bacterial cells.
Molecularstructureofnucleicacids;astructurefordeoxyribosenucleicacid
WatsonJDandCrickFH;Nature.1953Apr25;171(4356):737-8
Note: In this one page paper Watson and Crick first described the structure of DNA double helix
Study help - Watson_Crick_Nature_1953_annotated
Transposable mating type genes inSaccharomyces cerevisiae
James Hicks, Jeffrey N. Strathern & Amar J.S. Klar; Nature 282, 478-483,1979
Note:Thispaperprovidedevidencefor‘cassettehypothesis’ofyeastmatingtype switches i.e. interconversion of mating types in yeast (S. cerevisiae) occurs by DNArearrangement.
Messelson&StahlexperimentdemonstratingsemI-conservativereplicationofDNA. Meselson M and Stahl FW.; Proc Natl Acad Sci U S A. 1958 Jul 15;44(7):671-82 Note:Theexperimentdemonstratingsemi-conservativemodeofDNAreplicationis referred to as "the most beautiful experiment inbiology"
Invivoalterationoftelomeresequencesandsenescencecausedby mutatedTetrahymena telomerase RNAs
Guo-LiangYu,JohnD.Bradley,LauraD.Attardi&ElizabethH.Blackburn; Nature 344, 126-132,1990
Note: This paper demonstrates that the telomerase contains the template for telomere synthesis

Syllabus
Cell Biology
1. A protein-conducting channel in the endoplasmicreticulumSimonSMANDBlobelG.;Cell.1991May3;65(3):371-80
Note: This paper demonstrates the existence of a protein conducting channel Study help - A brief history of Signal Hypothesis

Syllabus
Developmental Biology/ Genetics

2. Identification of 23 complementation groups required for post-translational events in the yeast secretorypathway
Novick P, Field C, Schekman R.; Cell. 1980 Aug;21(1):205-15
Note: In this ground-breaking paper Randy Schekman's group used a mutagenesis screen for fast sedimenting yeast mutants to identify genes involved in cell secretion
3. Ayeastmutantdefectiveatanearlystageinimportofsecretoryproteinprecursors into the endoplasmic reticulum
Deshaies RJ and Schekman R.; J Cell Biol. 1987 Aug;105(2):633-45
Note: Using another yeast mutation screen Schekman lab identifies Sec61, a component of ER protein Conducting Channel (PCC)
Suggested reference paper - A biochemical assay for identification of PCC.
4. Reconstitution of the Transport of Protein between Successive Compartments of the Golgi
5. BalchWE,DunphyWG,BraellWA,RothmanJE.;Cell.1984Dec;39(2Pt1):405-16 Note: This paper describes setting up of an in vitro reconstituted system for transportbetweengolgistackswhicheventuallypavedthewayforidentificationof mostofthemolecularplayersinvolvedinthesestepsincludingNSF,SNAPetc.
6. Acompleteimmunoglobulingeneiscreatedbysomatic recombination
BrackC,HiramaM,Lenhard-SchullerR,TonegawaS.;Cell.1978Sep;15(1):1-14 Note: This study demonstrates DNA level molecular details of somatic rearrangement of immunoglobulin gene sequences leading to the generation of functionally competent antibody generating gene following recombination.
7. Anovelmultigenefamilymayencodeodorantreceptors:amolecularbasisfor odorrecognition
Buck L and Axel R; Cell. 1991 Apr 5;65(1):175-87
Note:Thispapersuggeststhatdifferentchemicalodorantsassociatewith different cell-specific expression of a transmembrane receptor in Drosophila olfactory epitheliumwherealargefamilyofodoratreceptorsis expressed.
8. Kinesin walks hand-over-hand
YildizA,TomishigeM,ValeRD,SelvinPR.;Science.2004Jan30;303(5658):676-8 Note: This paper shows that kinesin motor works as a two-headed dimeric motor walking hand-over-hand rather than like an inchworm on microtubule tract using the energy of ATPhydrolysis.

Syllabus
Developmental Biology/ Genetics

1. Mutationsaffectingsegmentnumberandpolarityin Drosophila
Christiane Nusslein-Volhard and Eric Weischaus; Nature 287, 795-801, 1980 Note:Thissinglemutagenesisscreenidentifiedmajorityofthedevelopmentally importantgenesnotonlyinfliesbutinothermetazoansaswell.
2. Informationfor the dorsal—ventralpatternoftheDrosophilaembryos stored as maternalmRNA
Anderson KV and Nüsslein-Volhard C; Nature. 1984 Sep 20-26;311(5983):223-7 Note: This landmark paper demonstrated that early dorsal-ventral pattern information is stored as maternal mRNA in flies and devised the method of identifying genes encoding such genes
3. Hedgehog signalling in the mouse requires intraflagellar transport proteins
HuangfuD,LiuA,RakemanAS,MurciaNS,NiswanderL,AndersonKV.; Nature. 2003 Nov6;426(6962):83-7
Note: One of the architects of original fly mutagenesis screens conducted a mouse mutagenes screen which identified a gene Kif3a as a major component of hedgehog signaling pathway. Eventually this discovery revolutionizes our understanding of mechanisms of action of signaling pathways by demonstrating central role of
cillia in it.
Suggested Reference paper - Design and execution of a embryonic lethal mutation screen in mouse.

BIO-ENTREPRENEURSHIP, INTELLECTUAL PROPERTY RIGHTS, BIOSAFETY AND BIOETHICS

Course Code: BTH4111 **Credit Units: 03**

Course Objectives

Bio-entrepreneurship, an interdisciplinary course, revolves around the central theme of how to manage and develop life science companies and projects. The objectives of this course are to teach students about concepts of entrepreneurship including identifying a winning business opportunity, gathering funding and launching a business, growing and Nurturing the organization and harvesting the rewards.

The other objectives are To understand basic knowledge, policies, requirements, and laws of IPR, Biosafety, and Bio-ethics.

Learning Outcomes

Students should be able to gain entrepreneurial skills, understand the various operations involved in venture creation, identify scope for entrepreneurship in biosciences and utilize the schemes promoted through knowledge centres and various agencies. Understand the rationale for and against IPR and especially patients; Understand why India has adopted an IPR Policy and be familiar with broad outline of patent regulations; Understand different types of IPR.

Course Contents:

Module1 Innovation and entrepreneurship in bio-business

Introduction and scope in Bio-entrepreneurship, Types of bio-industries and competitive dynamicsbetweenthesub-industriesofthebiosector(e.g.pharmaceuticalsvs.Industrial biotech),Strategyandoperationsofbio-sectorfirms:Factorsshapingopportunitiesfor innovation and entrepreneurship in bio-sectors, and the business implications of those opportunities, Alternatives faced by emerging bio-firms and the relevant toolsforstrategicdecision,Entrepreneurshipdevelopmentprogramsofpublicandprivateagencies(MSME, DBT,BIRAC,MakeInIndia),strategicdimensionsofpatenting&commercialization strategies.

Module2 Bio markets - business strategy and marketing

Negotiating the road from lab to the market (strategies and processes of negotiation with financiers, government and regulatory authorities), Pricing strategy, Challenges in marketing in bio business (market conditions & segments; developing distribution channels, the nature, analysis and management of customer needs), Basic contract principles, different types of agreement and contract terms typically found in joint venture and development agreements, Dispute resolution skills.

Module3 Finance and accounting

Business plan preparation including statutory and legal requirements, Business feasibility study, financial management issues of procurement of capital and management of costs, Collaborations & partnership, Information technology.

Module4 Technology management

Technology–assessment,development&upgradation,Managingtechnologytransfer, Qualitycontrol&transferofforeigntechnologies,KnowledgecentersandTechnology transfer agencies, Understanding of regulatory compliances and procedures (CDSCO, NBA, GCP, GLA,GMP

Module5

Introduction to IPR

Introduction to intellectual property; types of IP: patents, trademarks, copyright & related rights, industrial design, traditional knowledge, geographical indications, protection of new GMOs; International framework for the protection of IP; IP as a factor inR&D;IPsofrelevancetobiotechnologyandfewcasestudies;introductiontohistoryof GATT, WTO, WIPO and TRIPS; plant variety protection and farmers rights act; concept of 'prior art': invention in context of "prior art"; patent databases - country-wise patent searches(USPTO,EPO,India);analysis andreport formation.

Module6 Patenting

Basics of patents: types of patents; Indian Patent Act 1970; recent amendments; WIPO Treaties; Budapest Treaty; Patent Cooperation Treaty (PCT) and implications; procedure forfilingaPCTapplication;roleofaCountryPatentOffice;filingofapatentapplication; precautions before patenting-disclosure/non-disclosure - patent application-forms
and guidelines including those of National Bio-diversity Authority (NBA) and other regulatory bodies, fee structure, time frames; types of patent applications: provisional and complete specifications; PCT and conventional patent applications; international patenting-requirement, procedures and costs; financial assistance for patenting- introductiontoexistingschemes;publicationofpatents-gazetteofIndia,statusinEurope and US; patent infringement- meaning, scope, litigation, case studies and examples; commercialization of patented innovations; licensing – outright sale, licensing, royalty; patenting by research students and scientists-university/organizational rules in India and abroad, collaborative research - backward and forward IP; benefit/credit sharing among parties/community, commercial (financial) and non-commercial incentives.

Module 7 Biosafety

Biosafety and Biosecurity - introduction; historical background; introduction to biologicalsafetycabinets;primarycontainmentforbiohazards;biosafetylevels;GRAS organisms,biosafetylevelsofspecificmicroorganisms;recommendedbiosafetylevels forinfectiousagentsandinfectedanimals;definitionofGMOs&LMOs;principlesof safety assessment of transgenic plants – sequential steps in risk assessment; concepts offamiliarityandsubstantialequivalence;risk–environmentalriskassessmentand
food and feed safety assessment; problem formulation – protection goals,compilation ofrelevantinformation,riskcharacterizationanddevelopmentofanalysisplan;risk
assessment of transgenic crops *vs* cisgenic plants or products derived from RNAi, genome editing tools.

Module 8 Nationaland international regulations

International regulations – Cartagena protocol, OECD consensus documents and Codex Alimentarius; Indian regulations – EPA act and rules, guidance documents, regulatoryframework–RCGM,GEAC,IBSCandotherregulatorybodies;Draftbill ofBiotechnologyRegulatoryauthorityofIndia-containments–biosafetylevelsand
category of rDNA experiments; field trails – biosafety research trials – standard operating procedures - guidelines of state governments; GM labeling – Food Safety and Standards Authority of India (FSSAI).

Module 9 Bioethics

Introduction, ethical conflicts in biological sciences - interference with nature, bioethics in health care - patient confidentiality, informed consent, euthanasia, artificialreproductivetechnologies,prenataldiagnosis,geneticscreening,genetherapy, transplantation. Bioethics in research – cloning and stem cell research, Humanand

animal experimentation, animal rights/welfare, Agricultural biotechnology - Genetically engineered food, environmental risk, labeling and public opinion. Sharing benefits and protecting future generations - Protection of environment and biodiversity – biopiracy.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Ganguli,P.(2001).IntellectualPropertyRights:UnleashingtheKnowledgeEconomy. New Delhi: Tata McGraw-Hill Pub.
2. NationalIPRPolicy,DepartmentofIndustrialPolicy&Promotion,Ministryof Commerce,GoI
3. CompleteReferencetoIntellectualPropertyRightsLaws.(2007). Snow White PublicationOct.
4. Kuhse,H.(2010).Bioethics:anAnthology.Malden,MA:Blackwell.
5. OfficeoftheControllerGeneralofPatents,Design&Trademarks;Departmentof Industrial Policy & Promotion; Ministry of Commerce & Industry; Government of India.http://www.ipindia.nic.in/
6. KarenF. GreifandJon F.Merz,CurrentControversiesintheBiologicalSciences -Case Studies of Policy Challenges from New Technologies, MIT Press
7. World Trade Organisation.http://www.wto.org
8. World Intellectual Property Organisation.http://www.wipo.int
9. International Union for the Protection of New Varieties of Plants.http://www.upov.int
10. National Portal of India.http://www.archive.india.gov.in
11. National Biodiversity Authority.http://www.nbaindia.org
12. RecombinantDNASafetyGuidelines,1990DepartmentofBiotechnology,Ministry ofScienceandTechnology,Govt.ofIndia.Retrievedfromhttp://www.envfor.nic.in/ divisions/csurv/geac/annex-5.pdf
13. Wolt,J.D.,Keese,P.,Raybould,A.,Fitzpatrick,J. W.,Burachik,M.,Gray,A.,Wu, F.(2009).ProblemFormulationintheEnvironmentalRiskAssessmentforGenetically ModifiedPlants.TransgenicResearch,19(3),425-436.doi:10.1007/s11248-009-9321-9

14. Craig,W.,Tepfer,M.,Degrassi,G.,&Ripandelli,D.(2008).AnOverviewofGeneral FeaturesofRiskAssessmentsofGeneticallyModifiedCrops.Euphytica, 164(3), 853-880. doi:10.1007/s10681-007-9643-8

BIOPROCESS ENGINEERING & TECHNOLOGY LAB

Course Code: BTH4111 **Credit Units: 03**

Course Objectives
The objectives of this laboratory course are to provide hands-on training to students in upstream and downstream unit operations

Learning Outcomes
Students should be able to:
- Investigate, design and conduct experiments, analyze and interpret data, and apply the laboratory skills to solve complex bioprocess engineering problems; Apply skills and knowledge gained will be useful in solving problems typical of bio industries and research

Course Contents:
1. Basic Microbiologytechniques
a) Scaleupfromfrozenvialtoagarplatetoshakeflaskculture.
b) Instrumentation: Microplate reader, spectrophotometer,microscopy.
c) Isolation of microorganisms from soil samples.
2. Experimental set-up
a) Assembly of bioreactor and sterilization.
b) Growth kinetics.
c) Substrate and product inhibition.
d) Measurement of residual substrates.
3. Data Analysis
a) Introduction to Metabolic Flux Analysis(MFA).
4. Fermentation
a) Batch.
b) Fed-batch.
c) Continuous.
5. Unit operations
a) Micro filtration: Separation of cells from broth.
b) Bio separations: Various chromatographic techniques and extractions.
6. Bioanalytic
a) AnalyticaltechniqueslikeHPLC,FPLC,GC,GC-MSetc.formeasurement of amounts of products/substrates.

Text & References:
1. Shuler,M.L.,&Kargi,F.(2002).BioprocessEngineering:BasicConcepts.Upper Saddle River, NJ: Prentice Hall.
2. Stanbury,P.F.,&Whitaker,A.(2010).PrinciplesofFermentationTechnology. Oxford: PergamonPress.
3. Blanch,H. W., &Clark,D.S.(1997).BiochemicalEngineering.NewYork: M. Dekker.
4. Bailey,J.E.,&Ollis,D.F.(1986).BiochemicalEngineeringFundamentals.NewYork: McGraw-Hill.
5. ElMansi,M.,&Bryce,C.F.(2007).FermentationMicrobiologyandBiotechnology. Boca Raton: CRC/Taylor &Francis.

BIOINFORMATICS LAB

Course Code: BTH4111 **Credit Units: 03**

Course Objectives

The aim of this course is to provide practical training in bioinformatic methods including accessing major public sequence databases, use of different computational tools to find sequences, analysis of protein and nucleic acid sequences by various software packages

Learning Outcomes

On completion of this course, students should be able to: Describe contents and properties of most important bioinformatics databases;

- Perform text- and sequence-based searches and analyze and discuss results in light of molecular biological knowledge;
- Explain major steps in pairwise and multiple sequence alignment, explain principle and execute pairwise sequence alignment by dynamic programming;P redict secondary and tertiary structures of protein sequences

Course Contents:

Using NCBI and Uniprot webresources.
Introduction and use of various genomedatabases.
Sequenceinformationresource:UsingNCBI,EMBL,Genbank,Entrez,Swissprot/ TrEMBL,UniProt.
SimilaritysearchesusingtoolslikeBLASTandinterpretationofresults.
Multiple sequence alignment usingClustalW.
Phylogenetic analysis of protein and nucleotidesequences.
Use of gene prediction methods (GRAIL, Genscan,Glimmer).
Using RNA structure predictiontools.
Use of various primer designing and restriction site predictiontools.
Use of different protein structure prediction databases (PDB,SCOP, CATH).
Construction and study of protein structures usingDeepview/PyMol.
Homology modelling ofproteins.
Useoftoolsformutationandanalysisoftheenergyminimizationof proteinstructures.
Use of miRNA prediction, designing and target predictiontools.

Course Code: BTH4111 **Credit Units: 03**

Course Objectives

The objectives of this course are to prepare the students to adapt to the research environment and understand how projectsareexecutedinaresearch laboratory.Itwillalsoenablestudentsto learn practical aspects of research and trainstudents intheartofanalysis andthesis writing.

Learning Outcomes

Students should be able to learn how to select and defend a topic of their research, how to effectively plan, execute, evaluate and discuss their experiments. Students should be able to demonstrate considerable improvement in the following areas:

- In-depth knowledge of the chosen area ofresearch.
- Capability to critically and systematicallyintegrateknowledge to identify issues that must be addressed within framework of specificthesis.
- Competence in researchdesign and Planning.

Syllabus

Planning & performing experiments

Based on the project proposal submitted in earlier semester, students should be able to plan, and engage in, an independent and sustained critical investigation and evaluate a chosen research topic relevant to biological sciences and society. They should be able to systematically identify relevant theory and concepts, relate these to appropriate method- ologies and evidence, apply appropriate techniques and draw appropriate conclusions. Senior researchers should be able to train the students such that they can work independently and are able to understand the aim of each experiment performed by them. They should also be able to understand the possible outcomes of each experiment.

Syllabus

Thesis writing

At the end of their project, thesis has to be written giving all the details such as aim, methodology, results, discussion and future work related to their project. Students may aim to get their research findings published in a peer-reviewed journal. If the research findings have application-oriented outcomes, the students may file patent application

BIOLOGICAL IMAGING

Course Code: BTH4216 **Credit Units: 02**

Course Objectives

The objectives of this course are to provide complete overview of state-of-art live-cell imaging techniques using microscopes currently available in literature.Live-
cell imaging techniques allow real-time examination of almost every aspect of cellular function under normal and experimental conditions. With live-cell imaging experiments, main challenges are to keep cells alive and healthy over a period of time. The growing number of live-cell imaging techniques means one can obtain greater amounts of information without stressing out cells

Student Learning Outcomes

On completion of this course, students shall be able to gain a complete overview of super-resolution field from fundamentals to state-of-art methods and applications in biomedical research. The students shall learn the comparative advantages and disadvantages of each technique, covers all key techniques in field of biomedical science. The students shall also learn how to use new tools to increase resolution in sub-nanometer-scaleimages of living cells and tissue, which leads to new information about molecules, pathways and dynamics and state-of-the-art examples of applications using microscopes.

Course Contents:

Module1 Wide field fluorescent microscopy

One of the most basic techniques for live-cell imaging is widefield fluorescent microscopy. Standard inverted research grade microscopes can yield valuable results if you are imaging adherent cells, large regions of interest (such as organelles) or very thin tissue sections (less than 5 micrometer). In widefield, a CCD camera is usually used to capture images and the epi-fluorescence illumination source can be a mercury lamp, xenon lamp, LED's, etc. Each of light sources require carefully matched interference filters for specific excitation and emission wavelengths of your fluorophore of interest. With widefield microscopy, your specimen is only exposed to excitation light for relatively short time periods as the full aperture of emission light is collected by the objectives. Widefield fluorescence microscopy can be used in combination with other common contrast techniques such as phase contrast and differential interference contract (DIC) microscopy. This combination is useful when performing live-cell imaging to examine general cell morphology or viability while also imaging regions of interest within cells.

Module II Confocal laser scanning microscopy (CLSM)

CLSM has ability to eliminate out-of-focus light and information. It is also possible to obtain optical serial sections from thicker specimens. A conjugate pinhole in optical path of confocal microscope prevents fluorescence from outside of focal plane from being collected by photomultiplier detector or imaged by camera. In CLSM, a single pinhole (and single focused laser spot) is scanned across specimen by scanning system. This spot forms a reflected epi-fluorescence image back on original pinhole. When specimen is in focus, fluorescent light from it passes through pinhole to detector. Any out-of-focus light is defocused at pinhole and very little of this signal passes through to detector meaning that background fluorescence is greatly reduced. The pinhole acts as a spatial filter for emission light from the specimen.

Module III Spinningdiscconfocal microscopy(SDCM

Thismethodutilisesa'NipkowDisc'whichisamechanicalopaquediscwhichhas
a series of thousands of drilled or etched pinholes arranged in a spiral pattern.Each

illuminated pinhole on disc is imaged by microscope objective to a diffraction-limited spot on region of interest on specimen. The emission from fluorophores passes back though Nipkow disc pinholes and can be observed and captured by a CCD camera. The effect of spinning disc is that many thousands of points on specimen are simultaneously illuminated. Using SDCM to examine a specimen means that real-time imaging (30-frames-per-secondorfaster)canbeachieved,whichisextremelyusefulifyouare lookingatdynamicchangeswithinlivingcellsoverawidespectrumoftime-scales.

Module IV Light-sheet fluorescence microscopy (LSFM, or SPIM)

Thismethodenablesonetoperformlive-cellimagingonwholeembryos,tissuesand cell spheroids *in vivo* in a gentle manner with high temporal resolution and inthree dimensions. One is able to track cell movement over extended periods of time and follow development of organs and tissues on a cellular level. The next evolution of light-sheet fluorescence microscopy, termed lattice light-sheet microscopy as developed by Eric Betzig (Nobel Prize Laureate 2014 for PALM super-resolution microscopy) will even allow live-cell imaging with super-resolved *in vivo* cellular localization capabilities.

Module V Super-resolved fluorescence microscopy

Super-Resolution in a Standard Microscope: From Fast Fluorescence Imaging to Molecular Diffusion Laws in Live Cells; Photoswitching Fluorophores in Super- Resolution Fluorescence Microscopy; Image Analysis for Single-Molecule Localization Microscopy Deconvolution of Nanoscopic Images; Super-Resolution Fluorescence Microscopy of the Nanoscale Organization in cells; Correlative Live-Cell and Super- Resolution Microscopy and Its Biological Applications; SAX Microscopy and Its Application to Imaging of 3D-Cultured Cells; Quantitative Super-Resolution Microscopy for Cancer Biology and Medicine.

Module VI Re-scan confocal microscopy

Structured Illumination Microscopy; Correlative Nanoscopy: AFM Super-Resolution (STED/STORM) ; Stochastic Optical Fluctuation Imaging.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Rajagopal Vadivambal, Digvir S. Jayas. (2015). Bio-Imaging: Principles, Techniques, and Applications. ISBN 9781466593671 - CAT# K20618.
2. Alberto Diaspro, Marc A. M. J. van Zandvoort. (2016). Super-Resolution Imaging in Biomedicine. ISBN 9781482244342 - CAT# K23483.
3. Taatjes, Douglas, Roth, Jürgen (Eds.). (2012). Cell Imaging Techniques Methods and Protocols. ISBN 978-1-62703-056-4.

COMPUTATIONAL BIOLOGY

Course Code: BTH4216 **Credit Units: 02**

Course Objectives

The objective of this course is to provide students with theory and practical experience of essentials to aidforgenomic, proteomic and metabolomics courses and drug designprogram.

Student Learning Outcomes

On completion of this course, the students are expected to:

- Develop an understanding of the basic theory of these computational tools;
- Develop required database extraction, integration, coding for computational tools and methods necessary for all Omics;
- Create hypothesis for investigating specific contemporary biological questions, provide help to experiment with or develop appropriate tools;
- Critically analyze and interpret results of their study with respect to whole systems.

Course Contents:

Module I Introduction to computational biology basics and biological databases

Computers in biology and medicine; Overview of biological databases, nucleic acid & protein databases, primary, secondary, functional, composite, structural classification database, Sequence formats & storage, Access databases, Extract and create sub databases, limitations of existing databases.

Module II Pairwise and multiple sequence alignments

Local alignment, Global alignment, Scoring matrices - PAM, BLOSUM, Gaps and penalties, Dot plots. Dynamic programming approach: Needleman and Wunsch Algorithm, Smith and Waterman Algorithm, Hidden Markov Model: Viterbi Algorithm. Heuristic approach: BLAST, FASTA. Building Profiles, Profile based functional identification.

Module III Genome analysis

Polymorphisms in DNA sequence, Introduction to Next Generation Sequencing technologies,WholeGenomeAssemblyandchallenges,Sequencingandanalysisoflarge genomes, Gene prediction, Functional annotation, Comparative genomics, Probabilistic functional gene networks, Human genome project, Genomics and cropimprovement.StudyavailableGWAS,ENCODE,HUGOprojects,extractandbuildsubdatabases; VisualizationtoolsincludingArtemisandVistaforgenomecomparison;Functional genomics casestudies.

Module IV Structure visualization

Retrieving and drawing structures, Macromolecule viewing platforms, Structure validation and correction, Structure optimization, Analysis of ligand-protein interactions; Tools such as PyMol or VMD.

Module V Molecular modelling

Significance and need, force field methods, energy, buried and exposed residues; side chains and neighbours; fixed regions; hydrogen bonds; mapping properties onto surfaces; RMS fit of conformers and protein chains, assigning secondary structures; sequence alignment: methods, evaluation, scoring; protein curation: backbone construction and side chain addition; different types of protein chain modelling: ab initio, homology, hybrid, loop; Template recognition and alignments; Modelling

parameters and considerations; Model analysis and validation; Model optimization; Substructure manipulations, annealing, protein folding and model generation; loop generating methods; loop analysis; Analysis of active sites using different methods in studying protein–protein interactions.

Module VI Structure-based drug development

Moleculardocking:Typesandprinciples,Semi-flexibledocking,Flexibledocking;Ligand and protein preparation, Macromolecule and ligand optimization, Ligand conformations, Clustering, Analysis of docking results and validation with known information. Extra- precisiondockingplatforms,UseofSmall-moleculelibraries,Naturalcompoundlibraries for virtual high throughputscreenings.

Module VII Ligand-based drug development

Quantitative structure activity relationships; Introduction to chemical descriptors like 2D, 3D and Group-based; Radar plots and contribution plots and Activity predictions, Pharmacophore modeling, Pharmacophore-based screenings of compound library, analysis and experimental validation.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Mount, D. W. (2001). Bioinformatics: Sequence and Genome Analysis. Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press.
2. Bourne, P. E., & Gu, J. (2009). Structural Bioinformatics. Hoboken, NJ: Wiley-Liss.
3. Lesk, A. M. (2004). Introduction to Protein Science: Architecture, Function, and Genomics. Oxford: Oxford University Press.
4. Campbell, M & Heyer, L. J. (2006), Discovering Genomics, Proteomics and Bioinformatics, Pearson Education
5. Oprea, T. (2005). Chemoinformatics in Drug Discovery, Volume 23. Wiley Online Library.
6. Gasteiger, J. & Engel,T. (2003), Chemoinformatics: a Textbook, Wiley Online Library.

DRUG DISCOVERYAND DEVELOPMENT

Course Code: BTH4218 **Credit Units: 02**

Course Objectives

This course will give abroad over view of research and development carried out in industrial setup towards drug discovery

Student Learning Outcomes

On completion of this course, students should be able to understand basics of R&D in drug discovery and should be able to apply knowledge gained in respective fields of pharmaceutical industry.

Course Contents:

Module I: Target identification and molecular modelling

Identification of target or drug leads associated with a particular disease by a number of different techniques including combinations of molecular modeling, combinatorial libraries and high-throughput screening (HTS); Conceptualizing the automation of theHTS process and the importance of bioinformatics and data processing in identification of lead compounds; Rational drug design, based on understanding the three-dimensional structures and physicochemical properties of drugs and receptors; Modelling drug/ receptor interactions with the emphasis on molecular mechanisms, molecular dynamics simulations and homology modelling; Conformational sampling, macromolecular folding, structural bioinformatics, receptor-based and ligand-based design and docking methods, in silico screening of libraries, semi-empirical and ab-initio methods, QSAR methods, molecular diversity, design of combinatorial libraries of drug-like molecules, macromolecular and chemical databases.

Module II: Lead optimization

Identification of relevant groups on a molecule that interact with a receptor and are responsible for biological activity; Understanding structure activity relationship; Structure modification to increase potency and therapeutic index; Concept of quantitative drug design using Quantitative structure–activity relationship models (QSAR models) based on the fact that the biological properties of a compound are a function of its physicochemical parameters such as solubility, lipophilicity, electronic effects,ionization,stereochemistry,*etc.*;Bioanalyticalassaydevelopmentinsupportof *invitro*and*invivo*studies(LC/MS/MS,GC/MSandELISA).

Module III: Preclinical development

Principles of drug absorption, drug metabolism and distribution - intestinal absorption, metabolic stability, drug-drug interactions, plasma protein binding assays, metabolite profilestudies,Principlesoftoxicology,Experimentaldesignforpreclinicalandclinical PK/PD/TKstudies,Selectionofanimalmodel;RegulatoryguidelinesforpreclinicalPK/ PD/TKstudies;ScopeofGLP,SOPforconductofclinical&nonclinicaltesting,control on animal house, report preparation and documentation Integration of non-clinical and preclinicaldatatoaiddesignofclinicalstudies.

Module IV: Drug manufacturing

Requirements of GMP implementation, Documentation of GMP practices, CoA, Regulatory certification of GMP, Quality control and Quality assurance, concept and philosophy of TQM, ICH and ISO 9000; ICH guidelines for Manufacturing, Understanding Impurity Qualification Data, Stability Studies.

Module V: Clinical trial design

Objectives of Phase I, II, III and IV clinical studies, Clinical study design, enrollment, sites and documentation, Clinical safety studies: Adverse events and adverse drug reactions, Clinical PK, pharmacology, drug-drug interaction studies, Statistical analysis and documentation.

Module VI: Fundamentals of regulatory affairs and bioethics

GlobalRegulatoryAffairsanddifferentstepsinvolved,RegulatoryObjectives,Regulatory Agencies; FDA guidelines on IND and NDA submissions, Studies required for IND and NDA submissions for oncology, HIV, cardiovascular indications, On-label *vs.* off-label druguseGCPandRequirementsofGCPCompliance,EthicalissuesandCompliance to current ethical guidelines, Ethical Committees and their set up, Animal Ethical issues and compliance.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Krogsgaard-Larsen et al. Textbook of Drug Design and Discovery. 4th Edition. CRC Press.
2. Kuhse, H. (2010). Bioethics: an Anthology. Malden, MA: Blackwell.
3. Nally, J. D. (2006) GMP for Pharmaceuticals. 6th edition. CRC Press
4. Brody, T. (2016) Clinical Trials: Study Design, Endpoints and Biomarkers, Drug Safety, and FDA and ICH Guidelines. Academic Press.

ENVIRONMENTAL BIOTECHNOLOGY

Course Code: BTH4204 **Credit Units: 02**

Course Objectives

This course aims to introduce fundamentals of Environmental Biotechnology. The course will introduce major groups of micro organisms tools in biotechnology and their most important environmental applications. The environmental applications of biotechnology will be presented in detail and will be supported by examples from the national and international literature.

Student Learning Outcomes

On completion of course, students will be able to understand use of basic microbiological, molecular and analytical methods, which are extensively used in environmental biotechnology.

Course Contents:

Module I: Introduction to environment.

Introduction to environment; pollution and its control; pollution indicators; waste management: domestic, industrial, solid and hazardous wastes; strain improvement; Biodiversity and its conservation; Role of microorganisms in geochemical cycles; microbial energy metabolism, microbial growth kinetics and elementary chemostat theory, relevant microbiological processes, microbial ecology.

Module II: Bioremediation

Bioremediation: Fundamentals, methods and strategies of application (biostimulation, bioaugmentation)–examples,bioremediationofmetals(Cr,As,Se,Hg),radionuclides (U,Te),organicpollutants(PAHs,PCBs,Pesticides,TNT*etc*.),technologicalaspectsof bioremediation (*in situ, exsitu*).

Module III: Role of microorgan- isms in bioremediation

Application of bacteria and fungi in bioremediation: White rot fungi *vs* specialized degradingbacteria:examples,usesandadvantages*vs*disadvantages;Phytoremediation: Fundamentals and description of major methods of application (phytoaccumulation, phytovolatilization, rhizo-filtrationphyto-stabilization).

Module IV: Biotechnology and agriculture

Bioinsecticides: Bacillus thuringiensis, Baculoviruses, uses, genetic modifications and aspects of safety in their use; Biofungicides: Description of mode of actions and mechanisms (e.g. Trichoderma, Pseudomonas fluorescens); Biofertilizers: Symbiotic systems between plants – microorganisms (nitrogen fixing symbiosis, mycorrhiza fungi symbiosis), Plant growth promoting rhizobacteria (PGPR) – uses, practical aspects and problems in application.

Module V: Biofuels

EnvironmentalBiotechnologyandbiofuels:biogas;bioethanol;biodiesel;biohydrogen; Description of the industrial processes involved, microorganisms and biotechnological interventions for optimization of production; Microbiologically enhanced oil recovery (MEOR); Bioleachingofmetals; Production of bioplastics; Production of biosurfactants: bioemulsifiers; Paperproduction: use of xylanases and whiterotfungi.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. G. M. Evans and J. C. Furlong (2003), Environmental Biotechnology: Theory and Applications, Wiley Publishers.
2. B. Ritmann and P. L. McCarty, (2000), Environmental Biotechnology: Principle & Applications, 2nd Ed., McGraw Hill Science.
3. Scragg A., (2005) Environmental Biotechnology. Pearson Education Limited.
4. J. S. Devinny, M. A. Deshusses and T. S. Webster, (1998), Biofiltration for Air Pollution Control, CRC Press.
5. H. J. Rehm and G. Reed, (2001), Biotechnology – A Multi-volume Comprehensive Treatise, Vol. 11, 2nd Ed., VCH Publishers Inc.
6. H. S. Peavy, D. R. Rowe and G. Tchobanoglous, (2013), Environmental Engineering, McGraw-Hill Inc.

MICROBIAL TECHNOLOGY

Course Code: BTH4325 **Credit Units: 02**

Course Objectives

The objectives of this course are to introduce students to developments/ advances made in field of microbial technology for use in human welfare and solving problems of the society

Student Learning Outcomes

On completion of this course, students would develop deeper understanding of the microbial technology and its applications.

Course Contents:

Module I: Introduction to microbial technology

Microbial technology in human welfare; Isolation and screening of microbes important for industry – advances in methodology and its application; Advanced genome and epigenome editing tools (*e.g.*, engineered zinc finger proteins, TALEs/TALENs, andthe CRISPR/Cas9 system as nucleases for genome editing, transcription factors for epigenome editing, and other emerging tools) for manipulation of useful microbes/ strainsandtheirapplications;Strainimprovementtoincreaseyieldofselectedmolecules, *e.g.*, antibiotics, enzymes, biofuels.

Module II: Environmental applications of microbial technology

Environmental application of microbes; Ore leaching; Biodegradation - biomass recycle and removal; Bioremediation - toxic waste removal and soil remediation; Global Biogeochemical cycles; Environment sensing (sensor organisms/ biological sensors); International and National guidelines regarding use of genetically modified organisms in environment, food and pharmaceuticals.

Module III: Pharmaceutical applications of microbial technology

Recombinant protein and pharmaceuticals production in microbes – common bottlenecks and issues (technical/operational, commercial and ethical); Attributes required in industrial microbes (*Streptomyces* sp., Yeast) to be used as efficient cloning and expression hosts (biologicals production); Generating diversity and introduction of desirable properties in industrially important microbes (*Streptomyces*/Yeast); Microbial cell factories; Downstream processing approaches used in industrial production process (*Streptomyces* sp., Yeast).

Module IV: Food applications of microbial technology

Application of microbes and microbial processes in food and healthcare industries - food processing and food preservation, antibiotics and enzymes production, microbes in targeted delivery application – drugs and vaccines (bacterial and viral vectors); Non- recombinant ways of introducing desirable properties in Generally recognized as safe (GRAS)microbestobeusedinfood(*e.g.*,Yeast)-exploitingtheexistingnaturaldiversity or the artificially introduced diversity through conventional acceptable techniques (mutagenesis,protoplastfusion,breeding,genomeshuffling,directedevolution*etc*.).

Module V: Advances in microbial technology

Microbial genomics for discovery of novel enzymes, drugs/ antibiotics; Limits of microbial genomics with respect to use in human welfare; Metagenomics andmeta-transcriptomics – their potential, methods to study and applications/use (animal and plant health, environmental clean-up, global nutrient cycles & global sustainability, understanding evolution), Global metagenomics

initiative - surveys/projects and outcome, metagenomic library construction and functional screening in suitable hosts – tools and techniques for discovery/identification of novel enzymes, drugs
(*e.g.*, protease, antibiotic) *etc*

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

1. Lee, Y. K. (2013). Microbial Biotechnology: Principles and Applications. Hackensack, NJ: World Scientific.
2. Moo-Young, M. (2011). Comprehensive Biotechnology. Amsterdam: Elsevier
3. Nelson, K. E. (2015). Encyclopedia of Metagenomics. Genes, Genomes and Metagenomes: Basics, Methods, Databases and Tools. Boston, MA: Springer US.
4. The New Science of Metagenomics Revealing the Secrets of Our Microbial Planet. (2007). Washington, D.C.: National Academies Press.
5. Journals: (a) Nature, (b) Nature Biotechnology, (c) Applied microbiology and biotechnology, (d) Trends in Biotechnology, (e) Trends in Microbiology,
(f) Current opinion in Microbiology, (g) Biotechnology Advances,
(h) Genome Research)

PROTEIN ENGINEERING

Course Code: BTH4326 **Credit Units: 02**

Course Objectives

The aim of this course is to introduce methods and strategies commonly used in protein engineering.

Student Learning Outcomes

On completion of this course, students should be able to:

- Analyse structure and construction of proteins by computer-based methods;
- Describe structure and classification of proteins;
- Analyse purity and stability of proteins and explain how to store them in best way;
- Explain how proteins can be used for different industrial and academic purposes such as structure determination, organic synthesis and drug design.

Course Contents:

Module I: Introduction to protein engineering

Protein engineering – definition, applications; Features or characteristics of proteins that can be engineered (definition and methods of study) – affinity and specificity; Spectroscopic properties; Stability to changes in parameters as pH, temperature and amino acid sequence, aggregation propensities, *etc.* Protein engineering with unnatural amino acids and its applications.

Module II: Stability of protein structure

Methods of measuring stability of a protein; Spectroscopic methods to study physicochemical properties of proteins: far-UV and near-UV CD; Fluorescence; UV absorbance; ORD; Hydrodynamic properties–viscosity, hydrogen-deuterium exchange; Brief introduction to NMR spectroscopy – emphasis on parameters that can be measured/obtained from NMR and their interpretation.

Module III: Applications

Forces stabilizing proteins – Van der waals, electrostatic, hydrogen bonding and weakly polar interactions, hydrophobic effects; Entropy – enthalpy compensation; Experimental methods of protein engineering: directed evolution like gene site saturation mutagenesis; Module shuffling; Guided protein recombination, *etc.*, Optimization and high throughput screening methodologies like GigaMetrix, High throughput microplate screens *etc.*, Application to devices with bacteriorhodopsin as an example; Engineering antibody affinity by yeast surface display; Applications to vaccines, Peptidomimetics and its use in drug discovery.

Module IV: Computational approaches

Computational approaches to protein engineering: sequence and 3D structure analysis, Data mining, Ramachandran map, Mechanism of stabilization of proteins from psychrophiles and thermophiles *vis-à-vis* those from mesophiles; Proteindesign, Directed evolution for protein engineering and itspotential.

Module V: Case studies
Case Studies

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. Edited by T E Creighton, (1997), Protein Structure: a Practical Approach, 2nd Edition, Oxford university press.
2. Cleland and Craik, (2006), Protein Engineering, Principles and Practice, Vol 7, Springer Netherlands.
3. Mueller and Arndt, Protein Engineering Protocols, 1st Edition, Humana Press.
4. Ed. Robertson DE, Noel JP, (2004), Protein Engineering Methods in Enzymology, 388, Elsevier Academic Press.
5. J Kyte; (2006), Structure in Protein Chemistry, 2nd Edition, Garland publishers

NANO- BIOTECHNOLOGY

Course Code: BTH4314 **Credit Units: 02**

Course Objectives

The course aims at providing a general and broad introduction to multi-disciplinary field of nanotechnology. It will familiarize students with the combination of the top-down approach of microelectronics and micromechanics with the bottom- up approach of chemistry/biochemistry; a development that is creating new and exciting cross-disciplinary research fields and technologies. The course will also give an insight into complete systems where nanotechnology can be used to improve our everyday life.

Student Learning Outcomes

On successful completion of this course, students should be able to describe basic science behind the properties of materials at nanometre scale, and the principles behind advanced experimental and computational techniques for studying nanomaterials.

Course Contents:

Module I Introduction to nanobiotechnology

Introduction to Nanobiotechnology; Concepts, historical perspective; Different formatsofnanomaterialsandapplicationswithexampleforspecificcases;Cellular Nanostructures; Nanopores; Biomolecular motors; Bio-inspired Nanostructures, Synthesis and characterization of differentnanomaterials.

Module II Nano – films

Thinfilms;Colloidalnanostructures;SelfAssembly,Nanovesicles;Nanospheres; Nanocapsules and theircharacterisation.

Module III Nano – particles

Nanoparticles for drug delivery, concepts, optimization of nanoparticle properties for suitability of administration through various routes of delivery, advantages, strategies for cellular internalization and long circulation, strategies for enhanced permeation through various anatomical barriers.

Module IV Applications of nano – particles

Nanoparticles for diagnostics and imaging (theranostics); concepts of smartstimuli responsive nanoparticles, implications in cancer therapy, nanodevices forbiosensor development.

Module V Nano – materials

Nanomaterials for catalysis, development and characterization of nanobiocatalysts, application of nanoscaffolds in synthesis, applications of nanobiocatalysis in the production of drugs and drug intermediates.

Module VI Nano – toxicity

Introduction to Safety of nanomaterials, Basics of nanotoxicity, Models and assays for Nanotoxicity assessment; Fate of nanomaterials in different stratas of environment; Ecotoxicity models and assays; Life Cycle Assessment, containment.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

1. GeroDecher, Joseph B. Schlenoff, (2003); Multilayer Thin Films: Sequential Assembly of Nanocomposite Materials, Wiley-VCH Verlag GmbH & Co. KGaA
2. David S. Goodsell, (2004); Bionanotechnology: Lessons from Nature; Wiley-Liss
3. Neelina H. Malsch (2005), Biomedical Nanotechnology, CRC Press
4. Greg T. Hermanson, (2013); Bioconjugate Techniques, (3rd Edition); Elsevier
5. Recent review papers in the area of Nanomedicine

VACCINES

Course Code: BTH4327 **Credit Units: 02**

Course Objectives

This course will provide students with an overview of current developments in different areas of vaccines.

Learning Outcomes

By the end of this course, students should be able to:

- Understand fundamental concepts of human immune system and basic immunology;
- Differentiate and understand immune responses in relation to infection and vaccination;
- Understand requirement and designing of different types of vaccines;
- Understand importance of conventional and new emerging vaccine technologies.

Course Contents:

Module 1 Fundamentals of immune system

Overview of Immune system; Human Immune system: Effectors of immune system; Innate & Adaptive Immunity; Activation of the Innate Immunity; Adaptive Immunity; T and B cells in adaptive immunity; Immune response in infection; Correlates of protection.

Module 2 Immune response to infection

Protective immune response in bacterial; viral and parasitic infections; Primary and Secondary immune responses during infection; Antigen presentation and Role of Antigen presenting cells: Dendriticcells in immune response; Innate immune response Humoral (antibody mediated) responses; Cell mediated responses: role of CD4+ and CD8+ T cells; Memory responses: Memory and effector T and B cells, Generation and Maintenance of memory T and Bcells

Module 3 Immune response to vaccination

Vaccination and immune response; Adjuvants in Vaccination; Modulation of immune responses: Induction of Th1 and Th2 responses by using appropriate adjuvants and antigendeliverysystems-Microbialadjuvants, LiposomalandMicroparticlesas delivery systems; Chemokines and cytokines; Role of soluble mediators in vaccination; Oral immunization and Mucosal Immunity**.**

Module 4 Vaccine types& Design

Historyofvaccines,Conventionalvaccines;Bacterialvaccines;ViralVaccines;Vaccines based on routes of administration: parenteral, oral, mucosal; Live attenuated and inactivated vaccine; Subunit Vaccines and Toxoids; Peptide Vaccine.

Module 5 Vaccine technologies

New Vaccine Technologies; Rationally designed Vaccines;DNAVaccination;Mucosal vaccination; New approaches for vaccine delivery; Engineering virus vectors for vaccination;Vaccinesfortargeteddelivery(VaccineDeliverysystems);Diseasespecific vaccine design: Tuberculosis Vaccine; Malaria Vaccine; HIV/AIDS vaccine; New emerging diseases and vaccine needs (Ebola,Zika).

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Textbooks and References:

1. Janeway,C.A.,Travers,P.,Walport,M.,&Shlomchik,M.J.(2005). ImmunoBiology:theImmuneSysteminHealthandDisease.USA:GarlandSciencePub.
2. Kindt,T.J.,Osborne,B.A.,Goldsby,R.A.,&Kuby,J.(2013).KubyImmunology. New York: W.H.Freeman.
3. Kaufmann,S.H.(2004).NovelVaccinationStrategies.Weinheim:Wiley-VCH.
4. JournalArticles(relevantissues)from:AnnualReviewofImmunology,AnnualReviewofMicrobiology,CurrentOpinioninImmunology,NatureImmunology

RNA BIOLOGY

Course Code: BTH4219 **Credit Units: 02**

Course Objectives

A) Learn basic tenets of RNA Biology
B) Explore emerging topics in RNA Biology including CRISPR/Cas9, differential RNA processing and stability, RNA Epi-transcriptomics, and functions of diverse classes of non-coding RNAs

Learning Outcomes

On successful completion of this course, students should be able to This course will focus on recent research in RNA biology: differential RNA processing and stability (splicing, polyadenylation, and turnover), the functional significance of various classes of non-coding RNAs (microRNAs, lncRNAs, cRNAs, ceRNAs, eRNAs, etc…), the CRISPR/Cas9 system, and RNA epi-transcriptomics (RNA methylation and terminal uridylation). Class lectures and discussions will be predominantly.

Course Contents:

Module1 Introduction to RNA biology

Introduction to RNA Biology and the Course Objectives, RNA Processing and Turnover, RNA and Translation, RNA Editing, Modifications and the Epi-transcriptome. The functions of Noncoding RNAs; the Long and the Short of it.

Module2 RNA therapeutics

RNA-based approaches to target identification and validation: Microarray, miRNAs; RNAi and CRISPR functional screens
2. RNA Therapeutic approaches: Gene therapy issues, Antisense, Ribozymes
3. RNA Therapeutic approaches: Aptamers, Riboswitches
4. RNA Therapeutic approaches: RNAi
5. RNA Therapeutic approaches: CRISPR, Combination therapies, Nano-formulations
6. RNA Therapeutic Efficacy considerations: Chemical modifications, Delivery challenges

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Textbooks and References:

1. Molecular Biology of RNA by David Elliot & Michael Ladomery, Oxford Press, second edition, ISBN 978-0-19-967139-7.

ADVANCED PLANT GENOMICS

Course Code: BTH4319 **Credit Units: 02**

Course Objectives

This course is intended to familiarize students with latest integrated techniques including genomic and transcriptomic tools used mainly in the research sector including crop and agricultural biotechnology. This is intended to be an advanced course for the students who already attended basic plant biology and physiology courses which already cover photosynthesis, hormone signalling, nitrogen fixation, biotic and abiotic stress etc.

Learning outcomes:

After finishing this course, students will be able to :
Understand latest trends of agricultural industries and be industry ready, undertake research.

Course Contents

Module 1 Introduction

Problems in plant manipulation, polyploidy, problems in tissue culture, self and out crossing plants. Different mutant platforms in plants; tDNA insertion populations, Tnt1 insertion populations, FNB populations, EMS populations. Methods of mutant identification; mapping population, TAIL PCR, inverse PCR, reciprocal crossing.

Module 2 Methods of gene expression studies

Microarray and Next generation sequencing platforms. Methods of genome sequencing in plants, and mapping.

Module 3 Identification of beneficial genes.

Comparative genomics, genome browsers, gene expression atlas, GWAS studies. Forward and reverse genetics approaches of gene identification.

Module 4 Methods of plant manipulation

Gene delivery methods, gateway cloning, Ghent vector repository, stable transgenics Vs composite plants, Gene editing by Zn nucleases, TALENS, Crispr-Cas9 system. Plant breeding vs transgenics. Marker assisted breeding

Module 5 Case study

Recent examples of transgenic plants being used in agricultural sector.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Textbooks and References:

1. Plant Genomics: Methods and Protocols. Editors: Somers, Daryl J., Langridge, Peter, Gustafson, J.P. (Eds.), Springer Nature.
2. Applied plant genomics and Biotechnology. Editors: Palmiro Poltronieri and Yiguo Hong. (Elsevier)

CANCER BIOLOGY

Course Code: BTH4328 **Credit Units: 02**

Course Objectives

The Cancer Biology elective course will provide knowledge of critical aspects in human cancer biology for better understanding of its development, diagnostics methods as well as clinical/experimental therapeutics available for cancer therapy.

This course provides students with a broad overview of diverse fields of oncology, covering historical perspectives to cutting-edge approaches. The course will span several aspects of cancer research including its genetics, molecular and cellular biology, cancer micro-environment and its physiology, as well as classical vs experimental therapies available for tumor treatment. This course should specially be appealing to students who are interested in studying cancer research for their future career paths.

Learning outcomes:
On completion of this course, students should be able to:
- Describe tumor progression and important 'hallmarks' of cancer
- Understanding of the molecular and cellular origins of cancer
- Key signaling pathways in cancer development and progression
- knowledge of current perspectives about cancer research and current therapies.

Course Contents:

Module1 Introduction
Cancer hallmarks, Carcinogenesis, Oncogenes and tumor viruses, Tumor suppressor genes.
Module2 Cancer signaling
Signal transduction programs in cancer, De-regulation of the cell cycle/cell growth in cancer, Genomic instability and DNA repair in cancer, Apoptosis (p53), autophagy and cancer metabolism
Module3 Cell biology of cancer
The cancer microenvironment – hypoxia, inflammation, angiogenesis and stromal- cancer interactions, Invasion and Metastasis.
Module4 Diagnostics of cancer
Tumor immunology and immunotherapy, Cancer diagnostics – biomarkers, Cancer therapies, Translational research

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Examination Scheme for theoretical subjects:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Examination Scheme for Lab-based subjects:

c			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Assessment Scheme for Projects/Dissertation:

Project Report	50
Viva Voce	50
Total	100

Assessment Scheme for Seminars

Relevance	15
Delivery	25
Understanding	35
Organization of content	25
Total	100

Examination Scheme for 'Critical analysis of classical papers':

Continuous assessment	Mid Term Viva	Attendance	Review writing	Presentation
50	10	05	30	15

Amity Institute of Biotechnology

Master of Science - Data Science

FLEXILEARN

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

INTRODUCTION TO DATA SCIENCE

Course Code: DSC4101 **Credit Units-04**

Course Contents:

Module 1: Introduction to Data Science
Introduction to Data Science, Key components in Data Science , Use cases from different application domains such as Banking, Retail, Telecom, Life Science and Healthcare, etc

Module 2: Data Science Life Cycle
Data Science life cycle , The roles in a Data Science stream, Challenges involved in Data Science, Ethics in Data Science

Module 3: Characteristics of Data
Characteristics of Data – Big data introduction, Structured, Semi-structured and Unstructured data, data at rest, data in motion, etc, Good data versus bad data

Module 4: Challenges in handling large data
Challenges in handling large data sets

Module 5: Types of Data Analysis
Types of Data Analysis – Descriptive, Exploratory, Predictive, Inferential, Steps in Data Analysis

Module 6: Data Science Tools
Tools used in Data storage, Databases, Data Analysis, Data Visualization

Module 7: Job profiles in Data Sciecne
Different job profiles their roles and Skillset requirements for each of them

Module 8: Programming tools require for Data Science
Different programming tools required for Data Science.

Module 9 : Overview of Machine learning for Data Science
Overview of Machine learning with the help of cases in Data Science

Module 10 : Case studies of Data Science
Discuss different case studies of Data Science domain.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- An Introduction to Data Science, Jeffrey Stanton, Syracuse University
- A Simple Introduction to DATA SCIENCE, Lars Nielsen, Noreen Burlingame
- Introduction to Data Science, DAN POTTER,CARSTEN BINNING,ELI UPFAL

MACHINE LEARNING-I

Course Code: DSC4102 **Credit Units-03**

Course Contents:

Module 1: An Introduction to Machine Learning:
Introduction to machine learning, What is ML, Types of ML, Applications used for ML, AI vs ML, Essential for ML and AI.

Module 2: Techniques of Machine Learning:
Introduction to Supervised, unsupervised, semi-supervised, and reinforced machine learning techniques

Module 3: Introduction to Supervised Learning:
Training, validation, test data, and Over fitting and complexity

Module 4: Managing and understanding data:
Data description, Data processing, Dimension Reduction.

Module 5: Data Preprocessing:
Comprehend the meaning, process, and importance of data preparation, feature engineering and scaling of datasets.

Module 6: Evaluating model performance:
Measures performance for the classification problem. Discuss different performance measures.

Module 7: Resampling methods:
Discuss different cross validation techniques. Leave-One-Out Cross-Validation, k-Fold Cross Validation

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Programming Collective Intelligence by Toby Segaran
- Machine Learning for Hackers by Drew Conway and John Myles
- Machine Learning by Tom M. Mitchell
- Pattern Recognition and Machine Learning by Christopher M. Bishop (Author)
- Machine Learning Yearning by Andrew NG
- The Elements of Statistical Learning by Trevor Hastie , Robert Tibshirani , Jerome Friedman

STATISTICS & EXPLORATORY DATA ANALYSIS

Course Code: DSC4103 **Credit Units-03**

Course Contents:

Module 1: Descriptive Statistics

Statistics: Preliminary concepts; Measures of Central Tendency: Mean, Median, Mode
Measures of Dispersion: Range, Standard deviation, Variance, Covariance, Graphical Representation of Statistics: Histograms, Bar plots, Scatter plots etc.

Module 2: Probability

Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module 3: Continuous Distribution

Normal Distribution, Properties of Normal distribution

Module 4: Correlation

Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples.

Module 5: Introduction to the Inferential Statistics

Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications.
Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.
Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means.
Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chisquare test, Coefficient of contingency, Yates' correction for continuity.
Analysis of Variance: One way and Two way (only Examples)

Module 6: Introduction to Model Building:

Basics of Model building, Definition of a Model, Point estimation, Confidence intervals, Testing

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- A first course in Probability, Sheldon Ross
- An introduction to Probability and Statistics, Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.

DATABASE MANAGEMENT SYSTEM-I

Course Code: DSC4104 **Credit Units-02**

Course Contents:

- SQL (Structured Query Language)
- Data Definition Language (DDL): Create, Alter and Drop commands
- Data Manipulation Language (DML): Select, Insert, Update, and Delete commands, Basic SQL queries, Integrity constraints on tables,
- Data Control Language Commands(DCL): Grant and Revoke
- SQL Functions
- SQL querying to do operations such as identifying nulls, special characters, blank rows/columns, and run distributions, run data summaries, merge tables, get unique counts
- SQL Joins, Aggregate functions and GROUP BY, Nested queries and sub queries. GROUP BY CLAUSE along basic aggregations such as SUM, COUNT, AVG RANK(), ROWNUM() & DENSE_RANK. UNION and UNION ALL CASE statement
- Introduction to Advanced SQL concepts: Indexes, Sequence, Clusters, Views, Cursors and Triggers, Embedded SQL
- Introduction to SQLITE
- Introduction to NoSQL and its capabilities
- Contrast MySQL with NOSQL
- Introduction to SQLITE
- Introduction to POSTGRESQL

Examination Scheme:

IA			**EE**			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Database System Concepts, Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
- An Introduction to Database Systems, C J Date
- Fundamentals of Databases – Elmasri and Navathe.
- Database Management Systems – Raghu Ramakrishna, Johannes Gehrke

PROGRAMMING TOOL BOX I-R

Course Code: DSC4105 **Credit Units-01**

Course Contents:

Module 1: An Introduction to R
Overview of R programming, applications, usage and comparative study with other softwares and introduction to R for Data Science

Module 2: Setting up R environment and packages
Setting up R environment and install packages and supporting libraries in R

Module 3: Basics of R
Manage your data and work-space, Save your work, How to use R, Data structure in R, Data creation and curation and special function using R

Module 4: File Handling
Reading different file format using R, file handling and processing, writing output file.

Module 5: Graphics using R
Graphics device, Basic plot function, scatter plot, 3-D scatter plot, pairplots, Lineplot, Matplot, Matpoints, Bar plot, Histogram plot, Density plot, Dot plot, Pie chart, Venn diagram, Grid graphics, Lattice, ggplot2, Interactive plotting, combine multiple plots in same graphics screen, save graphics to a file.

Module 6: Programming using R
Conditional Executions, Comparison Operators, Logical Operators, Control Structures, If statements, Ifelse statements, Loops, For loop, While loop, Apply loop family, Other loops,

Module 7: Functions
Define and Call functions, Syntax Rules for functions, Control utilities for functions, Writing own function

Module 8: Advance R
Advance R functions and Regular expressions, Object oriented programming, Building R package

Module 9: Case study

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- A Handbook of Statistical analysis using R, Brain Everitt and Torsten Hothorn
- The art of R programming, Norman Matloff
- Data Analysis and Graphics using R, W. John Braun
- R Graphics, Paul murrell
- R for Data Science, Garrett Grolemund and Hadley Wickham
- Linear Models with R, Julian J. Faraway

PROGRAMMING TOOL BOX II-PYTHON

Course Code: DSC4106 **Credit Units-01**

Course Contents:

Python Programming

Module 1: Introduction to Python :
Overview of Python, applications, usage and comparative study with other softwares.

Module 2: Basics of Python :
Syntax, Data Types, Variables, Operators, Input/output, Flow of Control (Modules, Branching)

Module 3: Basic Programming with Python :
If, If- else, Nested if-else, Looping, For, While, Nested loops, Control Structure, Break, Continue, Pass,

Module 4: Data Structures of Python :
Strings and Tuples, Accessing Strings, Basic Operations, String slices, Working with Lists, Introduction, Accessing list, Operations, Function and Methods, Files, Modules, Dictionaries, Functions and Functional Programming, Declaring and calling Functions, Declare, assign and retrieve values from Lists, Introducing Tuples, Accessing tuples

Module 5: Advanced Python :
Object Oriented, OOPs concept, Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, Operations Exception, Exception Handling, Except clause, Try finally clause, User Defined Exceptions

Module 6: Python Libraries :
Introduction to Machine learning packages like NUMPY, SCIPY, PANDAS etc.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Think Python by Allen B. Downey
- Introducing Python by Bill Lubanovic
- Hello World by Warner Sande and Carter Sande
- Learning Python , 5th Edition , Mark Lutz
- Python For Data Analysis by W Mckinney

BIG DATA TOOLS & TECHNOLOGIES-I

Course Code: DSC4107 **Credit Units-01**

Course Contents:

Module 1: Introduction to Big Data
Big Data and its Importance, V's of Big Data, Drivers for Big Data, Introduction to Big Data Analytics, Big Data Analytics applications.

Module 2: Introduction to Hadoop
Hadoop Introduction, Hadoop key characteristics, Hadoop Core Components, Hadoop Ecosystem, Hadoop Services, Different Hadoop Modes, Hadoop's Parallel World – Data discovery

Module 3: Understanding Hadoop
Hadoop Installation, Hadoop Cluster Setup, Storing Data in Hadoop, HDFS Commands (Basics, Intermediate and Advanced), Processing your data with Map Reduce, Customizing Map Reduce Execution, Building Reliable MapReduce Apps, Run test example using Map reduce, Distributed Cache, Map side join vs Reduce Side Join, Running Hadoop applications

Module 4: Processing Big Data
Integrating disparate data stores, Mapping data to the programming framework, Connecting and extracting data from storage, Transforming data for processing, Subdividing data in preparation for Hadoop Map Reduce.

Module 5: Hadoop Map Reduce
Employing Hadoop Map Reduce,Creating the components of Hadoop Map Reduce jobs, Distributing data processing across server farms, Executing Hadoop Map Reduce jobs, Monitoring the progress of job flows, The Building Blocks of Hadoop Map Reduce, Distinguishing Hadoop daemons, Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Big Data and Analytics, Seema Acharya , Subhashini Chellappan
- Professional Hadoop Solution, Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich

INTRODUCTION TO LINUX

Course Code: DSC4108 **Credit Units-01**

Course Contents:

Module 1: Operating System:
Introduction: Windows and Unix/Linux, Definition; Concepts; Function of Operating System; Batch Processing; Multiprogrammed Batch System; Time Sharing System; Parallel System; Distributed System; Real Time System.

Module 2: Process & Memory Management:
Process; Process State(New, Running, Waiting, Ready, Termination); Process Control Block; Process Scheduling (Round Robin Scheduling, Priority Scheduling, Multiple Queues, Shortest Job Scheduling); Operations on Process; Basic Management of Memory; Swapping Virtual Memory; Paging.

Module 3: Input/Output Management:
I/O Devices; Device Controllers; I/O Software; Device Drivers; Deadlock; Resources; Principles of Dead Lock; Detection and Recovery; Deadlock Prevention; Deadlock Avoidance.

Module 4: UNIX/LINUX Operating Systems:
Introduction; Concepts; Layers of UNIX; Role of System Administrator and Ordinary User; Tree Structure of UNIX; Root File System; /bin Directory; /dev Directory; /bin Directory; /etc Directory; /lib Directory; /proc Directory; /mnt Directory; /root Directory; /sbin Directory; /tmp Directory; /var Directory; Relative Path; Absolute Path; Creation of Directory; Creating file; removing file; Listing Files and Directories copying file; renaming file; Changing File Permission; Changing Director Permission; Changing Group; Changing Owner; Pipe; Filters; pwd command; date command; head command; tail command less command; more command; grep command; VI Editor (Creating a new File; Inserting Text in File; Deleting Text in File; Copy , Cut & Paste Text; Save File).

Module 5: Shell Programming:
Variables(Configuration Variable & Environmental Variable); Operators(Arithmetic Operator, Logical Operator, Relational Operator); Instruction(Sequence Control Instruction, Selection Control Instruction, Repetition or Loop Instruction); echo command; read command; outtput command.

Module 6: System Monitoring:
System monitoring, process information, log files, run level, system recovery, Memory management

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Ramesh Bangia. 2015. Learning Unix. BPB Publication.
- Peter Baer Galvin. 2016. Operating System Concepts. BPB Publication
- Stuart E. Madnick. 2001. Operating System. Tata Mac Graw Hill.
- Kenneth H. Roshan. 2007. The complete reference Unix Tata Mac Graw Hill..
- D. M. Dhamethire. , 2011. System Programming and Operating Systems. Tata Mac Graw Hill.
- Kirrgcox. 2001. Red Hat Linux by. Printice Hill India.
- Andrew S. Talenbaum. 2008. Modern Operating system. Printice Hill India.
- Sumetabha Das. 2013. Unix (Concept and Application). Tata Mac Graw Hill.

MACHINE LEARNING-I LAB

Course Code: DSC4109 **Credit Units-01**

Course Contents:

Module 1: Supervised Learning:
Splitting the data into Training and test data, Understanding Overfitting and complexity with case studies

Module 2: Managing and understanding data:
Understanding Data description, Data processing, Dimension Reduction through case studies

Module 3: Data Preprocessing:
Understanding data preparation, feature engineering and scaling, datasets, dimensionality reduction through case studies

Module 4: Evaluating model performance: Calculation of Measures performance for the classification problem.

Module 5: Cross Validation techniques: Case studies of Leave-One-Out Cross-Validation, k-Fold Cross Validation and other cross validation techniques

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Programming Collective Intelligence by Toby Segaran
- Machine Learning for Hackers by Drew Conway and John Myles
- Machine Learning by Tom M. Mitchell
- Pattern Recognition and Machine Learning by Christopher M. Bishop (Author)
- Machine Learning Yearning by Andrew NG
- The Elements of Statistical Learning by Trevor Hastie, Robert Tibshirani , Jerome Friedman

STATISTICS & EXPLORATORY DATA ANALYSIS LAB

Course Code: DSC4110 **Credit Units-01**

Course Contents:

Module 1: Descriptive Statistics
Calculation and interpretation of Descriptive Statistics

Module 2: Probability
Understanding the preliminary concepts of probability through case studies

Module 3: Continuous Distribution
Generation of statistical distributions

Module 4: Correlation
Calculation of correlation understanding and interpreting correlation through case studies

Module 5: Introduction to the Inferential Statistics
Understanding inferential statics through case studies

Module 6: Introduction to Model Building:
Understanding Basics of Model building, Definition of a Model, Point estimation, Confidence intervals, Testing through case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- A first course in Probability, Sheldon Ross
- An introduction to Probability and Statistics, Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.

Syllabus - Second Semester

MACHINE LEARNING-II

Course Code: DSC4201 **Credit Units-03**

Course Contents:

Module 1: Basic concepts to calculate distance and similiraties
Discuss different methods to calculate distance and similrities including euclidean distance, squared euclidean distance, Manhattan distance, Cosine distance, Chebyshev distance, Canberra distance, Minikowski distance, correlation distance, partial correlation distance, mutual information and rank correlation coefficients

Module 2: Introduction to unsupervised learning
Discuss theory and concepts behind unsupervised learning

Module 3: Clustering:
Finding grouping of data. Hierarchical clustering,k-means and K-medoid clustering algorithm

Module 4: Application to Machine Learning:
Classification using Nearest Neighbors, Naive Bayes, Support Vector Machine, Market basket analysis using Association Rules

Module 5: Case study
Solve a case study on real world data and apply machine learning concepts.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Advanced Lectures on Machine Learning. Springer-Verlag. Bousquet, O.; von Luxburg, U.; Raetsch, G., eds.
- "Unsupervised Learning and Clustering". Pattern classification (2nd ed.). Wiley. Duda, Richard O.; Hart, Peter E.; Stork, David G.
- The Elements of Statistical Learning: Data mining, Inference, and Prediction. New York: Springer. Hastie, Trevor; Tibshirani, Robert.
- Unsupervised Learning: Foundations of Neural Computation. MIT Press.Hinton, Geoffrey; Sejnowski, Terrence J., eds.

REGRESSION THEORY & ANALYSIS

Course Code: DSC4202 **Credit Units-03**

Course Contents:

Module 1: Simple linear regression: Estimation of the Parameters, Hypothesis Testing on the Slope and Intercept, Interval Estimation in Simple Linear Regression, Prediction of New Observations, Coefficient of Determination

Module 2: Multiple regression: Estimation of Parameters, Hypothesis Testing, Confidence Intervals, Prediction

Module 3: Model Adequacy testing: Residual Analysis, PRESS statistic, Lack of Fit

Module 4: Transformations: Variance stabilising transformations, Transformations to linearise the model, Methods to select a transformation, Weighted least squares, Regression and random effect

Module 5: Multicollinearity: Sources, Effects, Diagnostics, Methods of dealing with Multicollinearity

Module 6: Validation of regression models: Techniques for validation

Module 7: Introduction to non linear regression and GLM: Non linear least squares, Transformations, Parameter estimation, Logistic and poisson regression

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Introduction to Linear Regression Analysis, by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining
- Introduction to Regression Analysis, M. Golberg and H.A Cho
- Applied Regression Analysis, Norman R. Draper and Harry Smith

DATA STRUCTURE & ALGORITHM DESIGN

Course Code: DSC4203 **Credit Units-03**

Course Contents:

Module I: Introduction

Module II: Programming strategies
Objects and ADTs with example, Constructors and destructors, Data structure, methods, Pre and post conditions, C conventions, Error handling, Some programming language notes.

Module III: Data structures
Arrays; lists; stacks and stack frames; Recursion -Recursive functions with example of factorial, Queue, Degeue.

Module IV: Searching
Sequential and binary search, Trees, binary search tree, complexity.

Module V: Queues
Priority queues and heaps

Module VI: Sorting
Bubble, Heap, Quick, Bin, Radix

Module VII: Searching revisited
Red-Black trees, AVL trees, general n-ary trees, hash tables; Hashing and collision resolution

Module VIII: Dynamic algorithm
Fibonacci numbers, bionomial coefficients, optimal binary search trees, matrix chain multiplication, longest common subsequence, optimal triangulation.

Module IX: Graphs
Minimum spanning tree and Djkstra's algorithm

Module X: Huffman encoding, FFT, Hard or intractable problems
Eulerian or Hamiltonian paths, Travelling salesman problem.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Data Structures and Algorithms, A.V. Aho, J.E. Hopcroft and J. Ullman, Addison-Wesley Publishing
- Database Design, Development and Deployment with Student CD, P. Rob and E. Semaan, McGraw-Hill/Irwin
- Schaum's Outline of Data Structures with C++, J.R. Hubbard, McGraw Hill Trade.

References:

- Database system concepts, A. Silberschatz, P.B. Galvin and G. Gagne, John Wiley and Sons Inc.
- Introduction to Data Structures and Application, J. Tremblay and P.G. Sorensen, McGraw Hill College Division

DATABASE MANAGEMENT SYSTEM-II

Course Code: DSC4204 **Credit Units-02**

Course Contents:

Module 1: MongoDB
A Database for the internet, MongoDB's key features, MongoDB's core server and tools, Why MongoDB? , History of MongoDB, Diving into the MongoDB shell, Creating and Querying with indexes, Basic Administration, Writing Program using MongoDB

Module 2: Application Development in MongoDB
Document oriented data, Constructing queries, Aggregation, Update ,atomic operations and deletes, E-commerce updates, Atomic document processing

Module 3: MongoDB Mastery
Indexing and query optimization, Text Search, Wired Tiger and pluggable storage, Replication, Scaling your system with Sharding, Deployment and Administration

Module 4: Apache Cassandra
Big Data and Apache Cassandra, Importance of Cassandra, Cassandra as a Distributed Database, Cassandra and High Availability, Cassandra and Replication Mechanism, Cassandra's Elastic Scalability, Tune able consistency (Strict Consistency , Casual Consistency , Weak Consistency , Brewer's CAP Theorem ,Cassandra as a Schema Free Database, Where should we use Cassandra , Who and why using the Cassandra

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- MongoDB: The definitive guide by Kristina Chodorow, Michael Dirolf
- Cassandra: The Definitive Guide, Eben Hewitt
- MangoDB in Action, Kyle Banker, Peter Bakkum, Shaun Verch, Douglas Garrett, Tim Hawkins

SPARK

Course Code: DSC4205 **Credit Units-01**

Course Contents:

Module 1: Introduction to Apache Spark
Introduction to Apache Spark, Features of Apache Spark, Apache Spark Stack, Introduction to RDD's, RDD's Transformation, What is good and Bad in Map Reduce , Why to use Apache Spark

Module 2: Spark: A Hadoop Replacement?
Java, Scala, or Python? , Scala, Packages, Data Types, Classes, Calling Functions, Operators, Control Structures

Module 3: A Quick Intro to Spark
Starting the shell, Data Sources, Testing Spark, Spark Monitor, Comparing Hadoop Map Reduce to Spark, Writing Standalone program with Spark

Module 4: Spark SQL
Basic Concepts, Using Spark SQL with RDDs

Module 5: Spark Streaming
Basic Concepts, Creating Your First Stream with Scala, Creating Your First Stream with Java

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Spark in Action, Marko Bonaci, Peter Zecevic
- Spark Cookbook, Rishi Yadav
- Machine Learning for Big Data , Jason Bell
- Spark : The Definitive Guide, Matei Zaharia, Bill Chambers

DATA VISUALIZATION

Course Code: DSC4206 **Credit Units-01**

Course Contents:

Module 1: Introduction to data visualization:
Introduction to data visualization. Explore and manipulate all graphical parameter.Drawing graphs such as scatterplot, stripchart, histogram, boxplot, violoin chart, bar chart, dot plot, line graph, line plot, multiplot, stacked bar chart, pie diagram, venn diagram, pair plot.Explore 3d chart, motion chart, interactive charts.Discuss selecting appropriate chart for strategy presentation.Save graphs in various formats.Discuss different ways to combine multiple figures. Discuss margin and graph size.

Module 2: Introduction to Tableau:
Creating Visual Analytics with Tableau Desktop, Connecting to your data, Building your first visualization, Creating Calculations to enhance your data, using maps to improve insight, developing an Ad Hoc Analysis Environment, Tips Tricks and Time Savers, Bringing it all together with dashboards. Installing Tableau Server, Using Tableau server to facilitate fact based team collaboration, Automating Server with Tableau's command line tools, Use case for rapid fire visual analytics, other Tools. Explore various case studies to visualize the data.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:
- Tableau your data, Daniel G Murray
- Introduction to ggplot2, Babraham bioinformatics.

BIG DATA TOOLS & TECHNOLOGIES-II

Course Code: DSC4207 **Credit Units-01**

Course Contents:

Module 1: Fundamental of Apache Pig
What is Pig?, Introduction to Pig Data Flow Engine, Pig and Map Reduce in Detail, When should Pig Used?, Pig and Hadoop Cluster, Pig Interpreter and Map Reduce, Pig Relations and Data Types, Pig example in Detail, Debugging and Generating Example in Apache Pig

Pig philosophy and architecture, Pig installation, Grunt shell, Loading data, Exploring Pig Latin commands, Pig Transformations functions, Joins in Pig, Hands on Exercises

Module 2: Fundamental of Apache Hive
What is Hive?, Architecture of Hive, Hive Services, Hive Clients, How Hive Differs from Traditional RDBMS, Introduction to HiveQL, Data Types and File Formats in Hive, File Encoding , Common problems while working with Hive

Hive architecture, Hive installation, Hive vs. RDBMS, HiveQL and the Hive shell, Data types and schemas, Creating tables (external vs. managed), Creating Partitions, Creating Views, UDF function in java in Hive, Using hive to create diff types of format

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Programming PiG, Wiley Publication, Alan Gates
- Programming Hive, Wiley Publication, Jason Rutherglen, Dean Wamplor & Edward Capriolo

MACHINE LEARNING-II LAB

Course Code: DSC4208 **Credit Units-01**

Course Contents:

Module 1: Basic concepts to calculate distance and similiraties
Discuss different methods to calculate distance and similrities including euclidean distance, squared euclidean distance, Manhattan distance, Cosine distance, Chebyshev distance, Canberra distance, Minikowski distance, correlation distance, partial correlation distance, mutual information and rank correlation coefficients

Module 2: Clustering:
Finding grouping of data. Hierarchical clustering,k-means and K-medoid clustering algorithm

Module 3: Application to Machine Learning:
Solve a case study on real world data and apply machine learning concepts. Classification using Nearest Neighbors, Naive Bayes, Support Vector Machine, Market basket analysis using Association Rules

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Advanced Lectures on Machine Learning. Springer-Verlag. Bousquet, O.; von Luxburg, U.; Raetsch, G., eds.
- "Unsupervised Learning and Clustering". Pattern classification (2nd ed.). Wiley. Duda, Richard O.; Hart, Peter E.; Stork, David G.
- The Elements of Statistical Learning: Data mining, Inference, and Prediction. New York: Springer. Hastie, Trevor; Tibshirani, Robert.
- Unsupervised Learning: Foundations of Neural Computation. MIT Press.Hinton, Geoffrey; Sejnowski, Terrence J., eds.

REGRESSION THEORY & ANALYSIS LAB

Course Code: DSC4209 **Credit Units-01**

Course Contents:

Module 1: Simple linear regression:
Estimation of the Parameters, Hypothesis Testing on the Slope and Intercept, Interval Estimation in Simple Linear Regression, Prediction of New Observations, Coefficient of Determination through case studies

Module 2: Multiple regression:
Estimation of Parameters, Hypothesis Testing, Confidence Intervals, Prediction through case studies

Module 3: Model Adequacy testing:
ResidualAnalysis, PRESS statistic, Lack of Fit through case studies

Module 4: Multicollinearity:
Sources, Effects, Diagnostics, Methods of dealing with Multicollinearity through case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Introduction to Linear Regression Analysis, by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining
- Introduction to Regression Analysis, M. Golberg and H.A Cho
- Applied Regression Analysis, Norman R. Draper and Harry Smith

DATA STRUCTURE & ALGORITHM DESIGN LAB

Course Code: DSC4210 **Credit Units-01**

Course Contents:

Module I
Stack implementation through arrays, link list

Module II
Programs for recursion functions

Module III
Implementation of queues and leap structures

Module IV
Application of binary trees in pre-order, post-order and in-order evaluation

Module V
A VL tree implementation

Module VI
Optimal matrix multiplication

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

Text:
- Data Structures and Algorithms, A.V. Aho, J.E. Hopcroft and J. Ullman, Addison-Wesley Publishing
- Database Design, Development and Deployment with Student CD, P. Rob and E. Semaan, McGraw-Hill/Irwin
- Schaum's Outline of Data Structures with C++, J.R. Hubbard, McGraw Hill Trade.

References:
- Database system concepts, A. Silberschatz, P.B. Galvin and G. Gagne, John Wiley and Sons Inc.
- Introduction to Data Structures and Application, J. Tremblay and P.G. Sorensen, McGraw Hill College Division

PATTERN RECOGNITION

Course Code: DSC4211 **Credit Units-01**

Course Contents:

Statistical Pattern Recognition

Introduction, Gaussian model, discriminant functions, classifier performance, risk and errors; supervised learning using parametric and nonparametric approaches: ML estimation, Bayesian parameter estimation approach, Parzen Windows, k-nn estimation; Unsupervised learning and clustering: the clustering concept, c-means algorithm, learning vector quantization, clustering strategies, a hierarchical clustering procedure.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- R.Schalkoff, Pattern Recognition: Statistical, Structural and Neural Approaches, John Wiley & Sons, NY, 1992.
- Duda R O and P E Hart, Patten classification and scene analysis, John Wiley & Sons, NY 1973
- K.S.Fu, Syntactic pattern recognition and applications, Prentice Hall, NJ, 1982
- T.Pavlidis, Structural pattern recognition, Springer-Verlag, NY, 1977
- D.H.Ballad and C.M.Brown, Algorithms for computer vision, Prentice Hall, 1982

NEXT GENERATION SEQUENCING ANALYSIS

Course Code: DSC4212 **Credit Units-01**

Course Contents:

Module 1: Introduction to NGS and NGS Technologies
Introduction to sequencing technologies from a data analysts view, Concept, Applications of sequencing technologies in Whole genome assembly; Gene expression analysis; Genome annotation; Gene regulation analysis; Variation studies

Module 2: NGS data analysis: Preprocessing
Introduction to NGS data analysis, Raw sequence files (FASTQ format), Preprocessing of raw reads: quality control (FastQC), adapter clipping, quality trimming, Introduction to read mapping (Alignment methods, Mapping heuristics), Read alignment to a reference genome (BWA, Bowtie2, TopHat), Mapping output (SAM/BAM format), Usage of important NGS toolkits (samtools, BEDtools), Mapping statistics, Visualization of mapped reads (IGV, UCSC)

Module 3: NGS data analysis: Variant calling
DNA variant calling and Filtering DNA variants using GATK pipeline

Module 4: NGS data analysis: Gene Expression Analysis
Genomics and transcriptome assembly, Differential Expression analysis, Quantification of expression,

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Exploring Personal Genomics, 1st Edition, Joel T. Dudley, Konrad J. Karczewski, ISBN-13: 978-0199644490, Oxford University Press, 2013
- High-Throughput Next Generation Sequencing, Methods and Applications,Editors: Kwon, Young Min, Ricke, Steven C. (Eds.), ISBN 978-1-61779-089-8, Springer, 2011
- Next Generation Sequencing Technologies and Challenges in Sequence Assembly, El-Metwally, M.Sc, Sara, Ouda, Osama M., Helmy, Mohamed, ISBN 978-1-4939-0715-1, Springer 2014

ASSOCIATION RULE MINING

Course Code: DSC4213 **Credit Units-01**

Course Contents:

Where Is Association Learning Used? , Web Usage Mining, Beer and Diapers, How Association Rules Learning Works, Support, Confidence, Lift, Conviction, Defining the process, Algorithms(Apriori, FP-Growth), Mining the Baskets- Market basket analysis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Machine Learning for Big Data HANDS-ON FOR DEVELOPERS AND TECHNICAL PROFESSIONALS- Jason Bell

Syllabus - Third Semester

GENERALIZED & LINEAR MODELING

Course Code: DSC4301 **Credit Units-03**

Course Contents:

Module 1: Introduction to Generalized Linear Models:
Linear model, Non linear model, GLM

Module 2: Linear Regression Models:
Multiple regression model, Parameter estimation, Maximum likelihood, Model adequacy checking, Weighted least squares

Module 3: Nonlinear Regression Models:
Linear and Non linear regression models, transforming a linear model, Parameter estimation

Module 4: Logistic and Poisson Regression Models:
Logistic regression, Poison regression, Overdispersion

Module 5: The Generalized Linear Model: Exponential family, Likelihood equations, Quasi likelihood, Gamma family, The power function, Generalized Estimating Equation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Generalised Linear Models: With Applications in Engineering and the Sciences by Raymond H. Mysers, Douglas C. Montgomery, G. Geoffrey Vining, Timothy J. Robinson
- Data Analysis Using Regression and Multilevel/ Hierarchical Models, Andew Gelman and Jennifer Hill
- Categorical data analysis, Ala Agresti

DEEP LEARNING & NEURAL NETWORKS

Course Code: DSC4302 **Credit Units-03**

Course Contents:

Module 1: Introduction to deep learning:
Conceptual overview of neural network, Supervised Learning with Neural Networks, Deep neural network, Why is Deep Learning a Buzz word

Module 2: Neural Networks Basics:
Binary Classification, Logistic Regression Cost Function, Gradient Descent, Derivatives, More Derivative Examples, Computation graph, Derivatives with a Computation Graph, Logistic Regression Gradient Descent, Gradient Descent on m Examples, Vectorization, More Vectorization Examples, Vectorizing Logistic Regression, Vectorizing Logistic Regression's Gradient Output, Explanation of logistic regression cost function

Module 3: Shallow neural networks:
Neural Networks Overview, Neural Network Representation, Computing a Neural Network's Output, Vectorizing across multiple examples, Explanation for Vectorized Implementation, Activation functions, Why do you need non-linear activation functions?, Derivatives of activation functions, Gradient descent for Neural Networks, Backpropagation intuition, Random Initialization

Module 4: Deep Neural Networks:
Deep L-layer neural network, Forward Propagation in a Deep Network, Getting your matrix dimensions right, Why deep representations?, Building blocks of deep neural networks, Forward and Backward Propagation, Parameters vs Hyperparameters, What does this have to do with the brain?

Module 5: Case study using real world data.
Building a neural network model and generating predictions from the model.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Deep learning: adaptive computation and machine learning, Bengio, Yoshua, Courville, Aaron, Goodfellow, Ian J
- Deep Learning: A Practitioner's Approach, J. Patterson, A. Gibson
- Neural Networks and Deep Learning: A Textbook, Charu C. Aggarwal
- Neural Networks and Deep Learning, Michael Nielsen.

TIME SERIES

Course Code: DSC4303 **Credit Units-03**

Course Contents:

Module 1: Autoregressive-moving average models ARIMA
Moving average models MA(q). Condition of invertability. Autoregressive models AR(p). Yull-Worker equations. Stationarity conditions. Autoregressive-moving average models ARMA (p,q).

Module 2: Coefficient estimation in ARIMA processes.
Coefficients estimation in autoregressive models. Coefficient estimation in ARMA (p) processes. Quality of adjustment of time series models. AIC information criterion. BIC information criterion. "Portmonto"-statistics.

Module 3: Forecasting in the framework of Box-Jenkins model
Forecasting, trend and seasonality in Box-Jenkins model.

Module 4: Non-stationary time series
Non-stationary time series. Time series with non-stationary variance. Non-stationary mean. ARIMA (p,d,q) models. The use of Box-Jenkins methodology to determination of order of integration.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Enders W. Applied Econometric Time Series. John Wiley & Sons, Inc., 1995
- Mills, T.C. The Econometric Modelling of Financial Time Series. Cambridge University Press, 1999
- Andrew C. Harvey. Time Series Models. Harvester wheatsheaf, 1993.

GRAPH & SOCIAL NETWORK ANALYSIS

Course Code: DSC4304 **Credit Units-03**

Course Contents:

Module 1: Introduction to graph theory
Use of graph theory to construct different types of networks : Undirected, directed graphs, Cyclic, Directed acyclic graphs, trees, weighted graphs, bipartite graph, Study data structures of the graphs. Adjacency matrix, adjacency list.

Module 2: Study different network models
Small world phenomena, Scale free network, Erdös-Rényi model for random graphs, Watts and Strogatz model, Barabasi-Albert model

Module 3: Stduy network properties
Degree distribution, power law, graph density, graph isomorphism, path length, diameter, clique, shortest distance, clustering coefficient, network motifs, network centralities and node ranking, degree centrality, closeness centrality, betweenness centrality, eigenvector centrality, ecentricity centracility, subgraph centrality, matching index,

Module 4: Network randomization
Randomization with Erdös-Rényi model, Randomization with node degree conservation, Permutation of node labels

Module 5: Introduction to social network
Introduction to social network data, Different data format, Paths and Connectivity-Graphs to represent social relations. Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.

Module 6: Data and Text Mining In Social Media
Data mining in nutshell, Social media, Motivations for data mining in social media, Data mining methods for social media. Social networking sites: illustrative examples. Text Mining: Keyword search, query semantics and answer ranking, Classification algorithms, Clustering algorithms.

Module 7: Community Detection in Social Networks
Introduction, Communities in context, core methods and algorithm for community detection, Quality functions, Agglomerative/Divisive algorithms, discuss different approached for clustering.

Module 8: Case study using real world data.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Networks, Crowds and Markets by David Easley and Jon Kleinberg, Cambridge University Press, 2010
- Social and Economic Networks by Matthew O. Jackson, Princeton University Press, 2010.
- Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
- Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
- Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.
- Jure Leskovec, AnandRajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2 edition, 2014.
- Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1 edition, 1994.

NATURAL LANGUAGE PROCESSING

Course Code: DSC4305 **Credit Units-02**

Course Contents:

Module 1: Introduction to text mining
Introduction, Challenges of Text Processing, Character-Set Dependence, Language Dependence, Corpus Dependence, Application Dependence

Module 2: Exploring Text Data For Preliminary Ideas
A case study for a brief introduction, Examine multiple document corpus of text, Creation of text corpus, Text pre-processing, Stemming, Word tokenisation, Word vectorisation, Word embedding

Module 3: Natural Language Processing:
Sentiment Analysis, Word Frequency in text data, Wordclouds for visualizing sentiments with a case study, Wordclouds for Visualizing text data, Tidy wordclouds, Topic modelling a document

Module 4: Text Data and Machine Learning
Clustering for text data, Clustering tweets, Regression on text data, Introduction to RTextTools, More on RTextTools, Word2Vec approach, The Doc2Vec approach, Doc2Vec approach for predicting a binary outcome, Doc2Vec approach for multi-class classification

Module 5: Sentiment Analysis
What is sentiment, What is sentiment analysis, Scope of sentiment analysis: Document level, Sentence level, Sub-sentence level, Types of sentiment analysis, Word embeddings, Word associations or Text similarities, Building dictionaries, Summarise text, Polarity calculation, Algorithms for sentiment analysis: Rule based, Automatic Hybrid

Module 6: Case study using real world data.
Identify Spam-ham Emails or sms classification.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- HANDBOOK OF NATURAL LANGUAGE PROCESSING Ralf Herbrich and Thore Graepel
- Text Mining with R by Julia Silge and David Robinson.
- Natural Language Processing with Python by Steven Bird, Ewan Klein and Edward Loper.
- Taming Text by Grant Ingersoll, Thomas Morton and Drew Farris.
- Foundations of Statistical Natural Language Processing by Christopher Manning and Hinrich Schütze.

GRAPH & SOCIAL NETWORK ANALYSIS LAB

Course Code: DSC4306 **Credit Units-01**

Course Contents:

Module 1: Study Tools for graphs and network study :
Case studies will be implement by using any programming language such as R or python. Learn other tools like Cytoscape and Gephi, and igraph

Module 2: Introduction to graph theory
Input graph data : Read different network format, load network data, Construct network from matrix, Adjacency matrix. Input different types of networks : Undirected, directed graphs, Cyclic, Directed acyclic graphs, trees, weighted graphs, bipartite graph. Study data structures of the graphs. Adjacency matrix, adjacency list.

Module 3: Study different network models
Small world phenomena, Scale free network, Erdös-Rényi model for random graphs, Watts and Strogatz model, Barabasi-Albert model

Module 4: Stduy network properties
Degree distribution, power law, graph density, graph isomorphism, path length, diameter, clique, shortest distance, clustering coefficient, network motifs, network centralities and node ranking, degree centrality, closeness centrality, betweenness centrality, eigenvector centrality, ecentricity centracility, subgraph centrality, matching index,

Module 5: Network randomization
Randomization with Erdös-Rényi model, Randomization with node degree conservation, Permutation of node labels

Module 6: Introduction to social network
Introduction to social network data, Different data format, Paths and Connectivity-Graphs to represent social relations. Working with network data- Network Datasets-Strong and weak ties - Closure, Structural Holes, and Social Capital.

Module 7: Data and Text Mining In Social Media
Data mining in nutshell, Social media, Motivations for data mining in social media, Data mining methods for social media. Social networking sites: illustrative examples. Text Mining: Keyword search, query semantics and answer ranking, Classification algorithms, Clustering algorithms.

Module 8: Community Detection in Social Networks
Introduction, Communities in context, core methods and algorithm for community detection, Quality functions, Agglomerative/Divisive algorithms, discuss different approached for clustering.

Module 9: Case study using real world data.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Networks, Crowds and Markets by David Easley and Jon Kleinberg, Cambridge University Press, 2010
- Social and Economic Networks by Matthew O. Jackson, Princeton University Press, 2010.
- Easley and Kleinberg, "Networks, Crowds, and Markets: Reasoning about a highly connected world", Cambridge Univ. Press, 2010.
- Charu C. Aggarwal, "Social Network Data Analytics", Springer, 2011.
- Robert A. Hanneman and Mark Riddle, "Introduction to social network methods", University of California, 2005.
- Jure Leskovec, AnandRajaraman, and Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2 edition, 2014.
- Wasserman, S., & Faust, K, "Social Network Analysis: Methods and Applications", Cambridge University Press; 1 edition, 1994.

BIG DATA TOOLS & TECHNOLOGIES-III

Course Code: DSC4307 **Credit Units-01**

Course Contents:

Module 1: Apache Sqoop (SQL to Hadoop)
Sqoop Tutorial, How does Sqoop Work, Sqoop JDBCDriver and Connectors ,Sqoop Importing Data Various Options to Import Data (Table Import , Binary Data Import ,Speedup the Import ,Filtering Import, Full Database Import ,Introduction to Sqoop

Module 2: Apache Flume
Data Acquisition: Apache Flume Introduction, Apache Flume Components, POSIX and HDFS File Write, Flume Events, Interceptors, Channel Selectors, Sink Processor

Module 3: Advanced Apache Flume
Sample Twitter Feed Configuration, Flume Channel (Memory Channel, File Channel),Sinks and Sink Processors, Sources, Channel Selectors, Interceptors

Module 4: HBase Introduction
Fundamentals of HBase, Usage Scenario of HBase, Use of HBase in Search Engine, HBase Data Model (Table and Row, Column Family and Column Qualifier, Cell and its Versioning, Regions and Region Server), HBase Designing Tables, HBase Data Coordinates, Versions and HBase Operation (Get/Scan, Put, Delete)

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Apache Sqoop Cookbook, Kathleen Ting , Jarek Jarcec Cecho
- Using Flume: Flexible, Scalable and Reliable Data Streaming, Hari Shreedharan
- Hbase The Definitive Guide, Lars George
- Apache Hadoop Yarn, Arun Murthy

GENERALIZED & LINEAR MODELING LAB

Course Code: DSC4308 **Credit Units-01**

Course Contents:

Module 1: Linear Regression Models:
Multiple regression model, Parameter estimation, Maximum likelihood, Model adequacy checking, Weighted least squares with case studies

Module 2: Nonlinear Regression Models:
Linear and Non linear regression models, transforming a linear model, Parameter estimation with case studies

Module 3: Logistic and Poisson Regression Models:
Logistic regression, Poison regression, Overdispersion with case studies

Module 4: The Generalized Linear Model: Exponential family, Likelihood equations, Quasi likelihood, Gamma family, The power function, Generalized Estimating Equation with case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Generalised Linear Models: With Applications in Engineering and the Sciences by Raymond H. Mysers, Douglas C. Montgomery, G. Geoffrey Vining, Timothy J. Robinson
- Data Analysis Using Regression and Multilevel/ Hierarchical Models, Andew Gelman and Jennifer Hill
- Categorical data analysis, Ala Agresti

TIME SERIES LAB

Course Code: DSC4309 **Credit Units-01**

Course Contents:

Module 1: Autoregressive-moving average models ARMA
Moving average models MA(q). Condition of invertability. Autoregressive models AR. Yull-Worker equations. Stationarity conditions. Autoregressive-moving average models ARMA with case studies

Module 2: Coefficient estimation in ARMA processes. Box-Jenkins' approach
Coefficients estimation in autoregressive models. Coefficient estimation in ARMA processes. Quality of adjustment of time series models. AIC information criterion. BIC information criterion. "Portmonto"-statistics. Box-Jenkins methodology to identification of stationary time series models with case studies

Module 3: Forecasting in the framework of Box-Jenkins model
Forecasting, trend and seasonality in Box-Jenkins model with case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Enders W. Applied Econometric Time Series. John Wiley & Sons, Inc., 1995
- Mills, T.C. The Econometric Modelling of Financial Time Series. Cambridge University Press, 1999
- Andrew C. Harvey. Time Series Models. Harvester wheatsheaf, 1993.
- Andrew C. Harvey. The Econometric Analysis of Time Series. Philip Allan, 1990.Machine Learning I

DEEP LEARNING & NEURAL NETWORKS LAB

Course Code: DSC4310 **Credit Units-01**

Course Contents:

Module 1: Neural Networks Basics:
Calculation of Logistic Regression Cost Function, Implementation of Gradient Descent, Derivatives, More Derivative Examples, Computation graph, Derivatives with a Computation Graph, Logistic Regression Gradient Descent, Gradient Descent using case studies

Module 2: Shallow neural networks:
Neural Network Representation, Computing a Neural Network's Output, Vectorizing across multiple examples, Calculation of Activation functions, non-linear activation functions, Derivatives of activation functions, Gradient descent for Neural Networks, Backpropagation intuition, Random Initialization using case studies

Module 3: Deep Neural Networks:
Developing a Deep L-layer neural network, Forward Propagation in a Deep Network, Getting your matrix dimensions right, Understanding Building blocks of deep neural networks, Forward and Backward Propagation, Parameters vs Hyperparameters using case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Deep learning: adaptive computation and machine learning by Bengio, Yoshua, Courville, Aaron, Goodfellow, Ian J
- Deep Learning: A Practitioner's Approach by J. Patterson, A. Gibson
- Neural Networks and Deep Learning: A Textbook by Charu C. Aggarwal
- Neural Networks and Deep Learning by Michael Nielsen

WEATHER PREDICTION

Course Code: DSC4311 **Credit Units-01**

Course Contents:

Weather Analysis, Collect dataset, Make model, Apply Machine Learning algorithm to predict weather, Compare the output form the Weather forecasting model and the data from the observation station, Use data science tools to find out when the prediction model may not accurate, predict the extreme weather, Develop visualization program for easy understanding.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Weather Analysis and Forecasting, Patrick Santurette

DISEASE CLASSIFICATION

Course Code: DSC4312 **Credit Units-01**

Course Contents:

Disease classification, Importance of disease classification, Datasets used for classification problem, Data processing steps, Disease classification using machine learning algorithm, Estimate prediction parameter for the classification schema

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- James, Gareth, Daniela Witten, Trevor Hastie, and Robert Tibshirani. 2013. An Introduction to
- Statistical Learning: With Applications in R. New York: Springer
- Lantz, B. 2013. Machine learning with R. Packt Publishing, Birmingham
- Maindonald J, Braun J. Data Analysis and Graphics Using R. Cambridge University Press: Cambridge, 2003
- Crawley MJ, (2005) Statistics: an introduction using R. Volume 1. 1st edition. New York: John Wiley & Sons.
- Seefeld, K. & Linder, E. (2007), Statistics Using R with Biological Examples . Department of
- Mathematics & Statistics, University of New Hampshire, Durham, NH, USA.
- Vinod, H.D. (Ed.) (2010). Advances in social science research using R, Springer, ISBN 978-1-4419-1763-8, New York

CUSTOMER BEHAVIOR ANALYSIS

Course Code: DSC4313 **Credit Units-01**

Course Contents:

Introduction: What is "customer analytics" and why do we do it?, Specific Loyalty Matrix tools & biases.

Getting Started: A Brief review of what needs to be done before serious analysis can start, Sourcing business requirements, Sourcing raw data, Profiling raw data, Data quality control & remediation.

Explorative Data Analysis (EDA) and Basic Statistics

Mining, Modeling, Segmentation & Prediction: Decision Tree method, Clustering method and Association Model

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Behavioral Research Data Analysis with R- Yuelin Li, Jonathon Baron

SUMMER INTERNSHIP EVALUATION

Course Code: DSC4335 **Credit Units: 08**

Guidelines:
There are certain phases of every Intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision-making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

In order to achieve these objectives:

- **Each student will be allotted a supervisor** for proper guidance.
- **Student will first submit synopsis in the format given by coordinator/supervisor.**
- Student will maintain a file (**Internship File/Project Report**). **Further, coordinator will provide NTCC project guidelines and sample to help in preparation of file.** The Internship File aims to encourage students to keep a personal record of their learning and achievement throughout the Programme. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The File will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization.

The **layout guidelines** for the Project Report

1. File should be in the following specification

- A4 size paper
- **Font**

For normal text Font Type and Size must be- Times New Roman, 12 pt. The minimum font size of materials within a table or a figure can be 10 point.

- **Margins**

A margin of 3.75 cm (1½ inch) is to be given on the binding edge while on the other sides it is to be 2.5 cm (1 inch). The text of the report, including headings, figures, tables, and notes, but excluding page numbers, must be accommodated within the page area.

- **Line Spacing**

The line spacing in the main text must be between one-and-a-half (1.5). Single line spacing should be given for figure captions, table titles, figure legends, and footnotes. Equations, tables, figures, and quotations should be set off from the main text with adequate space (not less than the normal line spacing adopted for the main text). Two consecutive paragraphs should be separated by a spacing which must be larger than the line spacing adopted for the text.

- **Tables and Figures**

Each sketch, drawing, graph and photograph should have a figure number and title below the figure etc. Numbering should be sequential, chapter wise. For instance, if there are 24 figures chapter 3 spread

over all of its sections the figure numbers run from Figure 3.1 through Figure 3.24. In figures experimental data should typically be represented by centered symbols, and theoretical data by continuous curves.
Each table should have a table number and caption above the table. Numbering should be sequential, chapter wise, as in the case of Figure numbers. For instance, if there are 18 tables in chapter 3 the table numbers run from Figure 3.1 through Figure 3.18.
Make sure that figures and tables are complete in other respects such as legends, references (if any) and coordinate labels with units. Each figure and table must be explicitly referred to in the text and located where its first reference occurs, preferably after the reference.

- **Drawings**

All engineering drawings must conform to relevant Standards and should include a title block. If drawings are large they should be included at the back of the report in a separate pocket. In case drawings are made using CAD packages, a CD ROM should be included which contains all the files and details of the packages used.

- **Equations**

The numbering of equations should be sequential, chapter wise. Numbered equations must be explicitly referred to in the text.

2. Report Size: The maximum number of pages of the Report should be preferably between 50-80 pages.

3. Report Layout: The report should contain the following components
Front Page
Table of Content
Acknowledgement
Student Certificate
Company Profile (optional)
Introduction
Main Body
References / Bibliography

The File will include ***five sections*** in the order described below. The content and comprehensiveness of the main body and appendices of the report should include the following:
1. **The Title Page**--Title - An Internship Experience Report For (Your Name), name of internship organization, name of the Supervisor/Guide and his/her designation, date started and completed, and number of credits for which the report is submitted.
2. **Declaration by the Students-**This is page number (i), the beginning of the small case Roman numeral page numbers. The student has to give a declaration to the effect that the data used for the work, the work depicted in the report, and the written material contained in the report are not copied from others and that due permission has been taken from, and due credit has been given to, the sources whenever they are used.
3. Certificate-This is page number (ii). The certificate will be signed by the Faculty Supervisor(s) before the viva-voce after verifying the format and by the Head of the Department after review with the Supervisor(s).
4. Acknowledgements-This is page number (iii). Keep this brief and avoid using informal language. This page must be signed by the candidate.
5. Abstract and **Keywords-**This is page number (iv). The abstract (preferably one page) should contain the context/relevance of the problem at hand, a description of what was done and a gist of the significant observations/results.
The keywords (maximum 6) are a hint that what is contained in the report.

7. Contents-This is page number (v). The table of Contents should be titled just *Contents* (not Table of Contents). Try to fit it into one or two pages.
8. **Introduction**--short, but should include how and why you obtained the internship experience position and the relationship it has to your professional and career goals.
9. **Main Body**--should include but not be limited to daily tasks performed. Major projects contributed to, dates, hours on task, observations and feelings, meetings attended and their purposes, listing of tools and materials and their suppliers, and photographs if possible of projects, buildings and co-workers.
10. **References / Bibliography** --This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

ASSESSMENT OF THE INTERNSHIP FILE

Continuous Internal Assessment		**Final Assessment**
40 Marks		60 Marks

Continuous Internal Assessment consists of topic relevance, progress report and synopsis marks. Final Assessment includes viva, presentation and report marks.

Examination Scheme:

Components	**V**	**S**	**R**	**PR**	**FP**
Weightage (%)	20	20	20	20	20

V – Viva, S – Synopsis, FP – Final Presentation, R – Report, PR-Progress Report

Syllabus - Fourth Semester

DISSERTATION/ PROJECT REPORT/ PRESENTATION/ VIVA VOCE

Course Code: DSC4437 **Credit Units: 20**

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation

While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:	40%
(Based on Abstract, Regularity,	
Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	20
Conceptual Framework,	05
Objectives & Methodology and	05
Implications & Conclusions	10
Viva & Presentation	20

Amity Institute of Biotechnology

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus – First Semester

BIOCHEMISTRY AND METABOLIC REGULATION

Course Code: BTE4101 **Credit Units: 02**

Course Objective:
The primary focus of this course is metabolic regulation of carbohydrates, lipids and nitrogenous compounds. It is also aimed to expose the students to the technological applications in understanding the process of photosynthesis, and production of secondary metabolites through metabolic engineering. It is expected that the knowledge consolidated would help them to explore further into these areas by undertaking advanced research and studies.

Course Contents:

Module I
Carbohydrate and lipid metabolism: Glycolysis, Kreb's cycle, Electron Transport chain (ETS), energetics and regulation of these pathways, HMP pathway and its importance, gluconeogenesis, mechanism of oxidative phosphorylation (Chemiosmotic theory), fatty acid oxidation and their metabolic routes to carbon, biosynthesis of lipids (fatty acids and sterols), glycogen metabolism.

Module II
Protein and nucleotide metabolism: oxidative deamination, decarboxylation and transamination reactions, Urea cycle, overview of biosynthetic families of amino acids, denovo synthesis, breakdown and regulation of purine and pyrimidine nucleotides, salvage pathways of nucleotide synthesis; biosynthesis of nucleotide co-enzymes NAD, NADP, FAD and FMN .

Module III
Integration of cellular metabolism and hormonal regulation: Action of major hormones (insulin, glucagons, epinephrine) responses to metabolic stress; starvation, metabolic disorders (phenylketonuria, arthritis) and role of antifolates in chemotherapy.

Module IV:
Regulatory aspects of photosynthesis: Mechanism of light interacting with photo pigments, energy transfer and transduction process during photosynthesis, artificial light harvesting system and application in carbon sequestration , Engineering of Rubisco enzyme for photosynthetic process optimization.

Module V Secondary plant metabolism
Importance of secondary metabolites, classification, terpenes, mevalonic acid pathway, phenolic compounds and alkaloids. Application of metabolic engineering in production of any two class of secondary metabolites. Contribution of metabolic engineering principles in promoting Green Chemistry.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Biochemistry by A. Lehninger revised by Nelson and Cox.
- Biochemistry by Mathews, Van Holde and Ahern. IIIrd Edition.

References:

- "Biochemistry" by White, Handler and R.B. Smith 7th Ed. 1983
- Biochemistry" by L.Stryer Third Edition.
- Biochemistry by Voet and Voet.
- Fundamentals of Biochemistry by Conn and Stumph.
- Biochemistry and Molecular Biology of Plants by Bob. B. Buchnan, ASPB Publication

GENETICS AND MOLECULAR BIOLOGY

Course Code: BTE4102 **Credit Units: 03**

Course objective

Knowledge of genetics is fundamental to any field of biotechnology. Molecular biology has brought new dimension to the discipline of genetics in every sense of the word. The course is structured to achieve a balance somewhere between genetics and molecular biology for the student to get a "feel" for what are these overlapping disciplines all about

Course Contents:

Module I

Historical developments in genetics leading to evolution of molecular biology.DNA as genetic material, structure of DNA and RNA, complimentarity, phosphodiester bond, denaturation and reassociation. Basic methods used in studying nucleic acids.

DNA replication, DNA polymerases, modes of replication ,mechanism of replication in *E.coli*, synthesis of leading and lagging strands, DNA replication in eukaryotes.

Module II

Mendels laws of inheritance, alleles and multiple alleles, pedigree analysis in humans, gene interaction, epistasis , mitosis and meiosis, chromosomal basis of inheritance, cell cycle, sex determination in *Drosophila* and humans, sex chromosomes and sex linked inheritance. Dosage compensation.

Module III

Concept of linkage and gene mapping in eukaryotes. Molecular markers and their utility in genetic mapping , , molecular basis of recombination .

Evolution of gene concept.Fine structure mapping, Benzers T4, rII system, complementation and recombination.Bacterial genetics – conjugation and transduction.

Module IV

Genome organization in prokaryotes and eukaryotes (nuclear, chloroplast and mitochondria), genes and pseudogenes, repeated sequences. Transposable elements – transposons, retotransposons C value paradox.

Chromosome structure: heterochromatin ,euchromatin, histone proteins, histone code.

Chromosomal rearrangements, aneuploidy, chromosomal human diosorders.

Module V

Transcription: Gene structure: promoter and coding sequences, regulatory and transcription units, RNA polymerases, basic mechanism of transcription (initiation, elongation and termination) in prokaryotes and eukaryotes, tRNAs, rRNA.

Salient fatures of genetic code.

Translation – initiation, elongation and termination.

Module VI

Regulation of gene expression, Prokaryotes negative and positive regulation, attenuation.

Eukaryotes: Transcription factors, activators and enhancers.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Griffiths A.J.F, Wessler S.R, Carroll S.B and Doebley J. 2012. Introduction to Genetic Analysis. W.H. Freeman and Co., NewYork
- Snustad D.R and Simmons M.J. 2010. Principles of Genetics. John Wiley and Sons.
- Jocelyn E.K, Elliott S.G and Stephen T.K. 2011. Lewins Genes X. Jones and Barlett Pub., USA
- Watson J.D, Tania A.B, Stephen P.B, Alexander G, Michael L and Richard L. 2007. Molecular Biology of the Gene. Benjamin Cummings

INSTRUMENTATION AND RESEARCH METHODOLOGY

Course Code: BTE4103 **Credit Units: 02**

Course Objective:
To provide knowledge on key features and applications of the equipment particularly used in molecular biology, protein engineering and analysis of the structure of bio-molecules. An introductory session will be conducted on the basic instruments used in biotechnology, keeping in mind the requirements of the students who have not done B.Tech Biotechnology. Research methodology is aimed to expose and inculcate the research spirit among the students. The course is expected to impart in depth understanding of various steps of research such as formulation of research problem, construction of research design, data collection and generation of a research report. It will also develop the skill of scientific writing.

Course Contents:

Module I: Instruments used in Molecular biology
PCR system; Quantitative and real time PCR, Nucleotide sequencing of DNA (DNA sequencer), Flow cytometer, Microarrays and DNA chips, Gel-Documentation and Image analysis systems, Radioimmunoassay, ELISA

Module II: Cell Disruption Techniques
Chemical and Physical cell disruption techniques: homogenizers, sonicators, permeabilization techniques

Module III: Characterization of Molecules
Mass spectrometry, MALDI, ESI-MS; Nuclear Magnetic Resonance spectroscopy, ^{1}H NMR, ^{13}C NMR, MRI; X-ray Crystallography and analysis of data to predict a protein structure

Module IV
Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature

Module V
Formulation of research plan, report, Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Statistical Methods By S.P. Gupta

References:

Instrumentation

- Principles and Techniques of Biochemistry and molecular Biology, Edited by Keith Wilson & John Walker, Cambridge Publication, 6th Edition
- Biophysical Chemistry By David Friefelder
- Introduction to protein structure, Carl Branden and Tooze, 2nd Edition, Garland Science Publishing, 1998
- Spectrophotometric identification of organic compounds, Robert M. Silverstein and Francis X. Webstar, John Willey and sons, Canada Ltd 1997
- Research Methodology
- Research Methodology Methods and Techniques by C.R. Kothari
- Statistics(Theory and Practice) by B.N. Gupta
- Research Methodology Methods and statistical Techniques by Santosh Gupta

MICROBIAL TECHNOLOGY

Course Code: BTE4104 **Credit Units: 02**

Course Objective:
An introduction to microorganisms, their morphology, reproduction, cultivation, metabolism, genetics, ecology of microorganisms and their relationships to health and environment

Course Contents:

Module I
General concept of Microbial biotechnology, Concept of pure culture, Theory and practice of sterilization; isolation of industrially important microorganisms

Module II
Microbial Physiology and Metabolic diversity Nutritional requirements of major groups of microbes, nutritional uptake; transport across the membranes and cell wall; Growth curve and growth parameters, measurement of growth (biomass, turbidity, dry weight, protein content); environmental factors affecting microbial growth, Phototrophy, chemolithotrophy, anaerobic way of life, Microbial fermentation.

Module III
Industrial Microbiology : Principles of exploitation of microorganisms, primary and secondary metabolism, microbes in the production of: Antibiotics: Penicillin, streptomycin; Enzymes: proteases, amylases, Organic acids: Citric acid, acetic acid; Vitamins: Vit B12, B2; Amino acids: Glutamic acid, Lysine; Alkaloids; Alcohol, beer, wine, sake; Polysaccharides; microbial transformation of steroids.

Module IV
Food Microbiology: Food and dairy products (fermented milks, cheese, bread and yogurt), Mushroom cultivation, SCP, their uses and contamination; preservation and spoilage of fruits vegetables, meat and poultry products.

Module V
Bioremediation and Biodegradation: Microbial degradation of natural substances (cellulose, xylan, lignin, chitin and keratin), Microbial degradation of xenobiotics; Biodeterioration: microbial deterioration of paper, textile, wood, paint; Bioremediation of heavy metals; Microbes in sugar, leather, paper and pulp industry; Biomagnification.
Agricultural microbiology: Role of microbes in biogeochemical cycling, role of microorgamisms in crop improvement, Biofertilizers and biopesticides, Biopolymers and bioplastics.

Module V
Microbiology of waste disposal: Microbes in solid waste and solid waste management; Sewage treatment systems (primary, secondary, tertiary and disinfection); Disinfection of potable water supplies; Indicators organism for water safety; Microbial assessment of water quality.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Biotechnology: Rehm and Reid.
- Industrial Microbioplogy – A.H.Patel
- Industrial Microbiology – Casida
- Brock Biology of Microorganisms by Madigan, Martinko, jackparker, Publisher : Prentice Hall

BIOSTATISTICS

Course Code: BTE4105 **Credit Units: 02**

Course Objective:
The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques.

Course Contents:
Module I: Descriptive statistics
Measures of Central Tendency (Mean, Median, Mode), Measures of dispersion (Range, Mean Deviation, Standard Deviation, Quartile Deviation), combined mean and variance, covariance, Graphs (Bar Chart, Pie Chart, Box Plot, Histogram, Ogive, scatter plot)

Module II
Concepts of Probability (Addition and Multiplication Theorem) Bayes theorem, Binomial, Poisson and Normal distribution. Correlation and linear regression, method of least squares. Sampling theory (Probablity and non probability)

Module III: Inferential statistics
Formulation of Hypothesis (One-tailed & Two-tailed), Type I and Type II errors, power of a test, Significance of a test, P-value testing, Hypothesis testing (students T-test, F-test, Chi-square test). Analysis of variance (ANOVA)

Module IV
Applications of statistical methods using statistical software SPSS or Excel

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.

References:
- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee .Publisher: Elsevier.
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Statistical Methodology, S.P Gupta. Publisher: S.Chand& Co.
- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. VisweswaraRao. Publisher: Jaypee Brothers.
- Fundamentals of Mathematical Statistics, S.C Gupta and V.K Kapoor. Publisher: S. Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers.
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics by H.C. Saxena and V.K. Kapoor. Publisher: S. Chand & Co

BIOCHEMISTRY AND METABOLIC REGULATION LAB

Course Code: BTE4106 **Credit Units: 01**

Course Contents:

Module I: Solutions and buffers
Preparation of molar, normal and % (w/v) solutions. Calibration of pH meter and preparation of buffers of different pH and molar strength.

Module II: Carbohydrates
Extraction and estimation of carbohydrates from given plant/animal materials: determination of total sugars by Anthrone method
Separation of sugars by thin layer chromatography

Module III: Proteins
Extraction of total proteins by TCA precipitation; Estimation of proteins by Lowery and Bradford Methods; Elctrophoretic (PAGE and SDS-PAGE) separation of isolated proteins

Module IV: Lipids
Extraction of total lipids by Folch's method; estimation of phospholipids and glycolipids; thin layer chromatographic separation of lipids

Module V: Nucleic Acid
Extraction of DNA from germinating seeds or other plant tissues; quantitative estimation of nucleic acid by diphenylamine (DPA) method; quantitative estimation of RNA by Orcinol method; characterization of isolated nucleic acid by agarose gel electrophoresis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:
- Practical book of Biochemistry by Plummer
- Practical book of Biochemistry by S.K. Sawhney and Randhir Singh

GENETICS AND MOLECULAR BIOLOGY LAB

Course Code: BTE4107 **Credit Units: 02**

Course Contents:

- To make squash preparations of pre-treated metaphase chromosomes, and PMCs to view diplotene, diakinesis, metaphase I and anaphase I
- To study through photographs normal and deviant cytogenetic mechanisms
- Study of Mendel's laws, and deviations from Mendelian ratios using seed samples in the ratios of 9:7, 9:4:3, 13:3, 15:1, 12:3:1. Use Chi-Square Test for Testing the ratios
- Isolation of chloroplasts by sucrose gradient. Photographs of Restriction site variation of chloroplast DNA
- Isolation and purification of total plant and animal genomic DNA
- Determine quality and quantity of the isolated DNA
- Isolation of bacterial and plasmid DNA
- Restriction digestion profile through agarose gel electrophoresis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

MICROBIAL TECHNOLOGY LAB

Course Code: BTE4108 **Credit Units: 01**

Course Contents:

Module I
Isolation and enumeration of microorganisms from rhizosphere, Staining techniques: Simple staining, differential Gram staining, endospore staining, lactophenol cotton blue staining for fungi

Module II
Growth curve measurement of bacterial population by turbidometry

Module III
Water microbiology- presumptive, confirmed and complete test for water potability.

Module IV
Antibiotic drug sensivity by Kirby-Baurer method and Broth-Dilution method,
Isolation of antibiotic producing microorganisms and determination of antimicrobial activity of isolates.

Module V
Preparation of sauerkraut, methylene blue reductase test, microbial analysis of food products.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Microbiology: A laboratory Manual, Seventh Edition, by: Cappuccino and Sherman
- Microbes in Action, Fourth Edition:by Harry W. Seeley, Cornell University; Paul J. Vandemark, late of CornellUniversity; John J. Lee, City College of New York

ANIMAL BIOTECHNOLOGY

Course Code: BTE4111 **Credit Units: 02**

Course Objective:
To introduce significance of animal tissue culture and transgenesis.

Course Contents:

Module I: Animal Cell and Tissue Culture: Principles and Applications
Types of Media, Types of Cell Culture-Primary and Secondary, Cell Transformation, Cryopreservation, Contamination.

Module II: Transgenesis
Principles and Applications of Gene Transfer Technology Methods of Gene Transfer, Vectors: SV-40, Retroviral Vector, Adenoviral Vector, Adeno-associated viral vector, Vaccinia Virus vector, Methods for Gene Delivery: Chemical Method, Physical Method. Screening and selection of Transfected cells.

Module III: Mouse as A Model for Transgenesis
Transgenic Mouse as a model to study Human Diseases.Strategies for production of Genetically Altered Mice, Transgenic Animals, Animals as Bioreactors.

Module IV: Animal Cloning and *in vitro* Fertilization
Cloning of Animal, *in vitro* fertilization and ethical issues.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Freshney RI. Culture of Animal Cells. John Willey & Sons Inc, USA
- Brown TA. Genome. John Willey & Sons Inc, USA.
- Lewin B. Gene VIII, Oxford University Press, USA.
- 4) Sambrook, J., Fritsch E.F., and Maniatis, T. Molecular Cloning: A Laboratory Manual. Cold Spring Harbor Laboratory Press, USA

PLANT CELL, TISSUE & ORGAN CULTURE

Course Code: BTE4112 **Credit Units: 02**

Course Objective:
The objective of this course is to acquaint the students with technological aspects of plant tissue culture which have direct applications in agriculture, crop improvement and industrial processes.

Course Contents:

Module I
Introduction and potential application of plant cell, tissue and organ culture techniques. Common pathways of plant regeneration and organogenesis.Organ culture, anther and pollen culture. Ovary, ovule and embryo culture (direct and indirect embryogenesis).Callus suspension culture. Protoplast, isolation, culture and fusion.Suspension cultures.Production of hybrids and cybrids.

Module II
Plant genetic transformation (Direct and indirect methods).Regeneration methodologies and recovery of transgenics.

Module III
Somaclonal and Gametoclonal Variations. Induction & Utilization of Somatic Variants; somaclonal variation, its genetic basis and application in crop improvement

Module IV
Types of plant cell reactors. Comparison of reactor performances.Novel design concepts.Elicitation and immobilization techniques.Reactors for production of secondary metabolites, peptide hormones, antigens and therapeutic molecules. Cell lines (BY2) and their development and uses. Artificial seeds and their automated production

Module V
Germplasm Preservation (Short and long term).Ex situ conservation.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, CambridgeUniversity Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P. McGarvy and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the production of Food Ingredients bt T-J Fu, G. Singh and W.R. Curtis. Kluwer Adacemic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences

ANIMAL BIOTECHNOLOGY LAB

Course Code: BTE4113 **Credit Units: 01**

Course Contents:

1) Media Preparation and sterilization.

2) Cryopreservation of animal cells.

3) Thawing of frozen cell to initiate new culture.

4) Prepration of growth curve for
   i) Suspension cells
   ii) Adherent Cells

5) Drug toxicity testing and therapeutic index in
   i) Primary cells
   ii) Tumor cells.

6) Transient over-expression of a gene in
   i) Adherent cells
   ii) Suspension cells

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Freshney RI. Culture of Animal Cells. John Willey & Sons Inc, USA
- Brown TA. Genome. John Willey & Sons Inc, USA.
- Lewin B. Gene VIII, Oxford University Press, USA.
- Sambrook, J., Fritsch E.F., and Maniatis, T. Molecular Cloning: A Laboratory Manual. Cold Spring Harbor Laboratory Press, USA

PLANT CELL, TISSUE & ORGAN CULTURE LAB

Course Code: BTE4114 **Credit Units: 01**

Course Contents:

Module I
To Study the effects of various plant growth regulators on different explants.

Module II
Anther and Embryo culture

Module III
Protoplast isolation and culture

Module IV
Test of seed viability

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Syllabus – Second Semester

RECOMBINANT DNA TECHNOLOGY

Course Code: BTE4201 **Credit Units: 02**

Course Objective:
A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR, cloning and expression of genes can be obtained through this course.

Course Contents:
Module I: Concept of gene
Concept of gene, prokaryotic and eukaryotic control elements and their analysis, random, Restriction enzymes, DNA polymerase, DNA modifying enzymes and their use.

Module II: Plasmids, M13 Single stranded DNA Phage, bacteriophage lambda, lysogeny and lytic cycle and their genetic switches. DNA cloning and expression vectors – plasmids, lambda, insertional and replacement vectors, cosmids, YAC, BAC, PAC.

Module III: Construction of genomic and cDNA library .Genomic DNA, mRNA isolation, cDNA synthesis. Methods for identification of recombinant clones.

Module IV:DNA sequencing, genome mapping and sequencing, next generation sequencing, polymerase chain reaction (PCR) and its application, bioinformatics and database analysis.

Module V: Analysis of gene expression: Northern blotting, RT – PCR, Real time (Q) PCR and microarray analysis. Isolation of recombinant DNA clones, gene transfection / transformation in cells and tissues, knock out / in mice, animal cloning and their applications. Genome – wide high through – put analysis and its application.

Module VI : Transposon mediated and site – directed mutagenesis and its applications, Expression of recombinant proteins in *E.coli* and its applications, RNA interference, applications in disease diagnosis, gene therapy, vaccine production, transgenic plants and animals.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text and references:

- Gene cloning and analysis: An Introduction by T. A Brown, Blackwell Publishing
- Principles of gene manipulation: An introduction to genetic engineering by R.W Old and S.B Primrose, Blackwell Publishing.

BIOINFORMATICS & COMPUTATIONAL BIOLOGY

Course code: BTE4202 **Credit Units: 02**

Course Objective:
This course will enable the students to achieve skills in Bioinformatics & Computational Biology that are essential for application in Biotechnology.

Course Contents:
Module I: Introduction to Bioinformatics
Overview of Bioinformatics and computational biology. Importance of databases - EMBL – NCBI nucleic acid sequence databases - protein sequence databases (SwissProt) - structure databases (PDB) - bibliographic databases

Module II: Sequence Alignment Methods
Sequence analysis of biological data - methods of alignment - methods for optimal alignments; using gap penalties and scoring matrices- multiple sequence alignment – introduction - tools for MSA (MUSCLE, T-coffee) - application of multiple sequence alignment. Similarity Searching Tools: BLAST and FASTA, Theory and Algorithms, variants of BLAST and FASTA, PSI-BLAST and PHI BLAST, Statistical Significance.

Module III: Molecular Phylogenetics and Methods
The concept of evolutionary tree, terminology of phylogenetics, introduction to evolutionary models, Types of phylogenetic trees (rooted vs. unrooted trees).Phylogenetic analysis algorithms: UPGMA, Neighbors-Relation, Neighbor-Joining, maximum Parsimony, maximum likelihood. Tree evaluation methods: Bootstrapping,Randomized and jack-knifing methods, Phylogenetic analysis software: PHYLIP, MEGA, and PhyML.

Module IV: Predictive methods using DNA and protein sequences
Concepts of motif, pattern and profile, Gene Identification methods, Gene predictions strategies – Prokarytotic and Eukaryotic, Identification and characterization of proteins, Protein structure prediction methods: Secondary and tertiary approaches.

Module V: Introduction to Chemoinformatics, Molecular modelling& Drug designing
Chemical similarity search methods, Designing focused chemical libraries, Comparative protein modelling, Molecular docking and virtual high-throughput screening, Search algorithms, Scoring methods, Challenges in Molecular docking, Introduction of receptor flexibility through multiple receptor conformations (MRC docking), Hit-to-lead optimization, Introductory concept of Activity Cliffs.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Essentials of Genomics and Bioinformaticsby C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis by D.W. Mount, Cold Spring Harbor Laboratory Press.

- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by A.D. Baxevanis and B.F.F Ouellette, Wiley – interscience.
- Introduction to Bioinformatics By Arthur Lesk
- Bioinformatics for Biologists By PavelPevzner and Ron Shamir
- An Introduction to Chemoinformatics By Andrew R. Leach
- Molecular Modelling: Principles and Applications (2nd Edition) By Andrew Leach
- Chemoinformatics Concepts, Methods, and Tools for Drug Discovery By Jürgen Bajorath
- Systems Biology: Principles, Methods, and Concepts By A.K. Konopka

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D. Gusfield, Cambridge University Press
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by G. Von Heijne and G. Von Heijne, Academic Press.
- Computational Molecular Biology: An Algorithmic Approach by P.A. Pevzner, MIT Press
- Computer Methods for Macromolecular Sequence Analysis by R.F. Doolittle, J.N, Abelson, M.I. Simon, Academic press
- Essentials of Genomics and Bioinformatics C.W. Sensen, John Wiley and Sons Inc.
- Introduction to Computational Biology: Maps, Sequences and Genomes by M. Waterman, Chapman and Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by G. V. Heijne and G.V. Heijne, Academic Press
- Inferring Phylogenies by Joseph Felsenstein
- Molecular Evolution and Phylogenetics Masatoshi Nei and Sudhir Kumar

BIOCHEMICAL ENGINEERING

Course Code:BTE4203 **Credit Units: 02**

Course Objective:
The course material on the types of bioreactor, mass and energy balance, aeration and agitation, scale-up principles etc. may help the students to understand the various principles involved in instrumentation and control and scale-up of bioprocess.

Course Contents:

Module I
Concepts of Mass Balance and Energy Balance, Kinetics of microbial growth and Batch Fermentation processes and Maintenance coefficient. Fed batch fermentation.

Module II
Design considerations for maintaining sterility of the fermentation medium for various temperature-time profiles for Batch and Continuous Processes, Residence Time Concept, Design Calculation.

Module III
Aeration and Agitation in Bioreactors: Mass Transfer Theories, Bubble aeration and Mechanical agitation, Correlation between Mass transfer coefficients and Operating variables.

Module IV
Comparison ofbatch and continuous fermentation, Cell recycle, Two stage continuous Culture . Principles of scale up, Criteria of scale up

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References

- ***Text:***
- Biochemical Engineering, S Aiba, A E Humphery and N F Millis, University of Tokyo Press
- Biochemical Engineering Fundamentals, J E Baily and D F Oillis, McGraw Hill
- Bioprocess Engineering Principles, P Doran, Academic Press
- Bioprocess Engineering Basic concept, Michel L Shuler , PHI Publication

References:

- Chemical Engineering, J M Coulson, and J F Richardson, Butterwirth Heinemann
- Fermentation and Biochemical Engineering Handbook: Principles, Process Design, and Equipment, HC Vogel, CL Todaro, CC Todaro, Noyes Data Corporation/Noyes Publications
- Process Engineering in Biotechnology, A T Jackson, Prentice Hall

ENVIRONMENTAL BIOTECHNOLOGY

Course Code:BTE4204 **Credit Units: 02**

COURSE OBJECTIVE
To introduce the students to regenerate clean environment using biotechnology as the key tool and also provide them the insight for various eco-friendly approaches and technologies along with the concept of sustainable development

COURSE CONTENTS

Module-I:
Greenhouse effect, Global Warming, Global Ozone Problem, Acid Rain, Eutrophication and Biomagnification

Module-II:
Renewable and Non-Renewable energy resources
Clean fuel technology and Biofuels- Bioethanol, Biogas, Biodiesel, Algal fuels.

Module-III:
Waste Water Engineering: Treatment of municipal waste water and industrial effluents with special focus on biological and advanced water treatments
Solid Waste Management

Module-IV:
Bioremediation and Biodegradation ofmajor environmental pollutants- release of genetically engineered microbes in environment.
Biomineralisation- Use of microbial technology for mining of metals from ores

Module-V:
Biofertilizers, Biopesticides and IPM, Vermicomposting
Bioassessment of environmental quality- Bioindicators and Biosensors

Module-VI
EIA and Environmental Audit
Related case studies at national and global level

Examination Scheme

Components	CT	Attendance	Assignment/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References
Text
- Textbook of Biotechnology, RC Dubey/ PK Gupta
- Environmental Biotechnology, Pradipta Kumar Mohapatra
- Biotechnology- Expanding Horizons, BD Singh
- Introduction to Environmental Biotechnology, Milton Wainwright

References

- Waste Water Engineering, Metcalf and Eddy
- Environmental Biotechnology- Concepts and Applications, Hans-Joachim Jordening and Jesef Winter
- Environmental Microbiology- Methods and Protocol, Alicia L, Ragout De Spencer, John FT Spencer
- Principles of Environmental Engineering, Gilbert Masters
- Agricultural biotechnology, SS Purohit
- Environmental Science- Working with the Earth, G Tyler Miller Jr

IPR AND BIOETHICS

Course Code:BTE4205 **Credit Units: 02**

Course Objective:
The objectives of the course are to explain the fundamental principles of IPR and issues related to IP and examine information policy issues from different perspectives. Students will study and assess policy groups, intellectual property rights, access to information and research policy issues that usually include plant, animal and microbial genetic engineering products.

Course Contents:

Module I: Introduction
Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property and Objectives of Intellectual Property Rights, origin and evolution of IPR, tangible and intangible property; concept and classification of intellectual property: Copyrights and related rights, Patent, Industrial Design, Trademarks and Geographical indications, Rights of traditional Knowledge and Protection of Plant varieties

Module II: IPR
International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT) – TRIPS Agreement. Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

Module III: Patent
Basic criterion for patentability, patentable subjects, patentable inventions, patent acquisition, infringement of patent, discovery Vs invention, product patenting Vs process patenting, special issue in biotechnology patent, Patent laws in Indian and international perspective, Patent Application procedure, patent Claim and specifications, Case study: Basmati case, Neem controversy, Turmeric Case

Module IV: Biosafety
Definition and requirement; biosafety in relation to human health, environment, transgenic research and applications, biosafety laws, guidelines and conventions, biosafety regulation: principles and practices in microbial and biomedical labs, guidelines for research involving DNA molecule ; Regulation bodies at National and International level

Module V Bioethics
Legal and socioeco'nomic impact of the products and techniques in Biotechnology, Bioethics in plant, animal and microbial genetic engineering, Ethical issues in healthcare, Biopiracy and ethical conflicts

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Intellectual Property Rights by PaulGoldstein
- Intellectual Property Rights by K. R. G. Nair, Ashok Kumar, K. R. G. Nair
- Kilner, John, et.al, eds., *Cutting-Edge Bioethics*. Eerdmans 2002.

References:

• Refer to Periodicals, Industry directories, Articles and report in journals on the regulatory issues,
• "Biotechnology" series by Rehm& Reed.

MOLECULAR CELL BIOLOGY

Course Code:BTE4206 **Credit Units: 03**

Course Objective:
The object of the present course is to develop basic knowledge and skills in cell and molecular biology and to understand the structure and function of the cellular and sub cellular components of cells and tissues with the help of recent techniques. This course will help students to get an understanding of cell function at the molecular level including the fundamentals of DNA They will become aware of the complexity and harmony of the cell. Applications of cellular and molecular biology in Biotechnology will also be presented.

Course Contents:
Module-I: Membrane structure : Chemical and physical properties of cell membranes and their major components, significance of these properties to membrane structure, integral and peripheral membrane proteins, biosynthesis of membrane and secreted proteins.
Structure of nuclear envelope, nuclear pore, complex. transport across nuclear envelope; regulation of nuclear import

Module-II: Cell Trafficking : Targeting proteins to endoplasmic reticulum, signal recognition parcticle, signal recognition particle receptor, protein folding and processing in ER protein export from ER; Protein sorting and export from Golgi Apparatus; SNARE hypothesis; Protein import into Mitochondria, mitochondrial genome; Import and sorting of chloroplast protein.
Targeting of proteins to membranes, mechanisms for transport of small molecules across the membrane, including simple diffusion, facilitative diffusion, primary and secondary active transport, action of ionophores ; transport across nuclear envelope; regulation of nuclear import

Module-III: Cell division and regulation of cell cycle : control of the cell cycle and the proteins involved; know the role of the cyclins and cyclin-dependent kinases, cell cycle checkpoints, methods for synchronizing the cell cycle in cell populations.

Module-IV: Intracellular Signaling - Modes of cell signaling, steroid hormone receptors, peptide hormones and growth factor, plant hormones, G-protein coupled receptors; receptor –protein tyrosine kinase , c- AMP pathway of signal transduction ; c GMP, phospholipids and calcium ions , Ras, Raf , MAP kinase pathway , JAK –STAT pathway , Apoptosis –role of caspases.

Module-V: Cancer Biology
Types of cancer; development of cancer**,** cells; Oncogenes, protooncogenes , function of oncogene products , tumor suppressor genes , function of tumor suppression gene products, role of oncogene and tumor suppressor gene in development, molecular diagnosis of cancer.

Examination Scheme

Components	CT	Attendance	Assignment/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text and references:

- Molecular Cell Biology by Bruce Albert
- Molecular Biology by Lodish Darnell and Baltimore
- Molecular Biology of the gene by Watson et al 4th ed.
- Genes VIII by Benjamin Lewis

RECOMBINANT DNA TECHNOLOGY LAB

Course Code:BTE4207 **Credit Units: 02**

- Preparation and transformation of competent cells
- Study of restriction digestion.
- Study of ligation.
- Study of southern blotting.
- Study of Western blotting
- Study of RFLP
- Study of PCR.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

BIOINFORMATICS & COMPUTATIONAL BIOLOGY LAB

Course Code: BTE4208 **Credit Units: 02**

Course Contents:

Module I: Databases and file formats

Biological databases: NCBI, EMBL, DDBJ, PIR, PDB, SwissProt, KEGG, UNIgene, Ensembl, STRING, GEO. Sequence file formats: GenBank, FASTA, EMBL, PDB format

Module II: Sequence Analysis

DotPlot Analysis: DOTPLOT, DOTTER.DOTMATCHER.
Pairwise Sequence Alignment programs: LALIGN, EMBOSS NEEDLE, EMBOSS Water.
Multiple Sequence Alignment programs: Clustalw, Cobalt, Muscle, T-Coffee.
Similarity Searching: BLAST, Variants of Blast.

Module III: Phylogenetic Analysis

Phylogenetic analysis softwares: Phylip, Mega.

Module IV: Predictive softwares

Primer Designing: PRIMER3
Gene Identification Programs: Genscan, ORF finder. Fgenesh, Glimmer
Protein Identification and characterization: Protparam , Peptide cutter.
Motif and Patterns program: Prosite, InterProScan, Pfam.

Module V: Proteins and Comparative Modeling

Modellingsoftwares: Swiss Model workspace, Modeller,
Model Evaluation: PRocheck.
Docking Software: Hex

Module VI: Network Analysis

Network Anaysis Software: Cytoscape, Complex pathway Simulator.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

ENVIRONMENTAL BIOTECHNOLOGY LAB

Course Code: BTE4209 **Credit Units: 01**

Course Objective:
The present course aims to develop the practical understanding of use of various processes and microbes in environmental monitoring and clean up. Hence will provide an insight to envisage the different environmental problems and their solutions

Course Contents:

Module I
Foliar symptomological study of air pollution- chlorosis and necrosis

Module II
Physical and Chemical analysis of water and soil.
BOD, COD, DO determination in water samples

Module III
Isolation and characterization of microbes in contaminated soil and water
And to determine their bioremediation efficiency.

Module IV
Vermicomposting

Module V
Estimation and comparison of pigment content and sugar content in leaves due to air pollution with control.

Examination Scheme:

IA (30)			EE (70)			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner.

MOLECULAR CELL BIOLOGY LAB

Course Code: BTE4210 **Credit Units: 01**

Course objective:

- Isolation of cell organelles by centrifugation.
- Study of membrane potential in isolated mitochondria.
- Study of cell viability / death assay by use of trypanblue, MTT assay and wright staining.
- Study of apoptosis through analysis of DNA fragmentation patterns in mitochondria

Examination Scheme:

IA (30)			EE (70)			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner.

IMMUNOLOGY

Course Code: BTE4211 **Credit Units: 02**

Course Objectives:
Aim of this course is to provide in-depth information of immune-system and its implication for health and diseases. Knowledge about the principles and applications of immune-assay to evaluate the immune-status.

Course Contents:
Module I
Introduction:
Overview of immune system: Types of immunity clonal nature of immune response; Organization and structure of lymphoid organs; Hematopoiesis and differentiation; Cells of the Immune System

Module II
Antigen and Antibody:
Antigens: Types, Responses and Characteristics, Immunoglobulin: structure, function, antibody diversity and its mechanism, Therapeutic applications of antibodies.

Module III
Mechanism of Immune-response:
Complement system, Major histocompatibility complex, Lymphocyte Biology: Development, differentiation and activation of lymphocytes, Cytokines and Cell Signaling, Homeostatic Regulation of Immune Responses.

Module IV
Immune-system in Health and Disease:
Transplantation Immunology, Tumor Immunology, Infection and Infectious Disease, Hypersensitivity,Immune System Disorders; Immunotherapy, Vaccines

Module V
Immunoassays:
Methods of antibody production and their use in Immunoassays; Immunodiffusion, Immunoelectrophoresis and Immunohistochemistry; ELISA,-principle, types and applications; Flow cytometry

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Kuby Immunology 6th Edition, by Thomas J. Kindt, Barbara A. Osborne, Richard A. Goldsby, WH Freeman Publishers (2006).
- Basic Immunology 4th Edition, by A.K. Abbas and A.H. Lichtman, Elsevier Publishers (2012)
- Fundamental Immunology, Edited by W. Paul, Lippincot Williams and Wilkins Publishers (2008)

IMMUNOLOGY LAB

Course Code: BTE4212 **Credit Units: 02**

Course Contents

- Agglutination – Blood typing/ Blood group study
- Blood Smear Preparation; Serum isolation; identification of different immune cells in the blood
- WIDAL
- Antigen/antibody purification by affinity chromatography
- Immunodiffusion: SRID and DRID
- Immunoelectrophoresis
- Immunohistochemisty
- ELISA: DOT ELISA, Straight ELISA; Sandwich ELISA

Examination Scheme:

Components	**H/S**	**Q**	**CT2**	**EE**
Weightage (%)	15	5	20	60

TERM PAPER

Course Code: BTE4231 **Credit Units: 01**

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing & preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1. Title page
2. Table of contents
3. Introduction
4. Review
5. Discussion & Conclusion
6. References
7. Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book
Chandler, D. (1994), Semiotics for beginners [HTML document].Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations
Möhl, S. (1996), AlltagssituationeniminterkulturellenVergleich: Realisierung von Kritik und AblehnungimDeutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

Syllabus – Third Semester

ENZYME TECHNOLOGY

Course Code: BTE4301 **Credit Unit: 02**

Course Objective
The course objective covers an understanding of the principles and application of protein, secondary metabolites and enzyme biochemistry applicable to industrial bioprocesses, process design, and operation strategies of various enzyme reactors.

Course Contents:

Module I: Introduction to Enzymes
Structure and general properties of enzymes; Mechanism of Enzyme Action; Concept of active site and Energetics of enzyme-substrate complex formation, Activation energy; Specificity of enzyme action; Cofactors; Monomeric and Oligomeric enzymes.

Module II: Kinetics of single-substrate enzyme catalysed reactions
Derivation and significance of Michaelis-Menten rate expression; Linear plots; King-Altman's method; Turnover number; Effect of temperature and pH on enzyme activity and stability; Inhibition kinetics.

Module III: Kinetics of Multisubstrate enzyme catalysed reactions
Multisubstrate enzyme kinetics: Ping-pong and Ordered (Sequential and Random) mechanisms; Alberty equation; Co-operativity; Sigmoidal kinetics; Allosteric enzymes; Isozyme and Multienzyme complex.

Module IV: Enzyme Immobilization and Bioreactors
Techniques for enzyme Immobilization-adsorption, matrix entrapment, encapsulation, cross-linking, covalent binding; Characteristics of Immobilized systems; Design of Enzyme Reactors-Packed-bed, Fluidized-bed, Membrane reactors; CSTRs.

Module V: Applications of enzymes and future trends
Enzymes applications-Industrial, Analytical, Medicaland Environmental; Enzyme based biosensors; Enzyme Inhibitors as therapeutic agents; Extremozymes, Abzymes, Ribozymes, Hybrid enzymes, Inteins.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Enzyme Technology by M.F. Chaplin and C. Bucke, CambridgeUniversity Press
- Enzyme Biochemistry, Biotechnology, Clinical Chemistry by Trevor Palmer
- Fundamentals of enzymology by Nicolas C. price and Lewis stevens, Oxford University Press
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis by R.A. Copeland, John Wiley and Sons Inc.
- Enzyme Kinetics: Behaviour and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, by I.H. Segel, Wiley-Interscience
- Biotechnological Innovations in Chemical Synthesis, R.C.B. Currell, V.D. Mieras, Biotol Partners Staff, Butterworth Heinemann.
- Biochemical engineering fundamentals, second edition. James E Bailey, David F., Ollis, McGraw Hill Intl. Edition
- Industrial Enzymes and their applications by H. Uhlig, John Wiley and Sons Inc

GENOMICS AND PROTEOMICS

Course code: BTE4302 **Credit Units: 02**

Course Objectives:
The course covers the basic principles that underlying the structure, function, expression and evolution of diverse genomes and proteomes, by assessing contents of genomic /proteomic characterization and bioinformatics analysis. This course introduces a comprehensive overview of analytical platforms, computational tools; experimental design, analysis methods and databases intended to study DNA/protein sequences, characterization, gene expression and genome evolution, remodeling as well as the implications of this research.

Course Contents:
Module I - Introduction & Structural Genomics
Concepts of Genes and Genomes, Genome size, Sequence complexity, genome organization in diverse organisms (eukaryotes, prokaryotes, virus), and organelle genomes, genome evolution.
Structural features of the genome - Organization of single-copy sequences, Repetitive sequences (Tandem repeats, Copy Number variations, duplications, Transposable elements)

Module II – Resources of Genome Study
Structuring genomic resources – Subdividing genomes, DNA markers, Genetic and Physical mapping, Mapping populations. Genome Sequencing (eukaryotic and prokaryotic) – methods (chemical, chain termination) and strategies (WGS, H-WGS, de novo), Human genome project (findings and impact).Next Generation Sequencing technologies (Pyrosequencing, Virtual terminator sequencing, Ion torrent, nanopore). Genome finishing – Annotation of genome (structural and functional- de novo, homology based).

Module III – Comparative and Functional Genomics
Overview of sequence analysis – methods, databases, genome browsers (NCBI, UCSC, ENSEMBL).Homologs, paralogs, orthologs, synteny, colinearity and gene displacement.Implications of comparative genomics – molecular evolution and multigene family evolution. Forward and reverse genetics (Tools and Methods – mutagenesis, knock outs/ knock ins, RNAi, morpholino), genome wide expression analysis. Concept of Epigenomics, Concepts of genome evolution (finding signatures of function, remodeling and applications).

Module IV – Transcriptomics and Gene Expression
mRNA/ protein expression profiles, Transcriptomes (tools and resources), Gene expression profiling / gene regulation (traditional to high throughput techniques- Northern, Subtractive hybridization, SAGE, Microarray).

Module V – Proteomics: Fundamentals and Interactomics
Proteomics Techniques (sequence based and hybridization based techniques - 2D Gel Electrophoresis, HPLC, Mass Spectrometry, Protein/ peptide arrays), Quantitative and Qualitative proteomics, Mining Proteomes, Computational approaches for studying proteomes.
Protein Mapping (expression and interaction mapping) techniques (Two hybrid methods and variations, Phage display, Co-IP, Mass Spectrometry, labeled and unlabeled tagging), Data Analysis using bioinformatics tools, Protein – (Protein/ligand) interaction networks.

Module VI – Proteomics: Structure-omics and Cellular Proteomics

High throughput proteome analysis (2D GE & MS, Microarray & MS; SAGE & Microarray), 3 D structure determination (X-ray and NMR, PDB, Pfam, Modeller, SMART), structure to functional analysis (Fold comparison, Threadding, Functional sites, homology and ab initio modeling)

High throughput cloning, Activity and functional characterization, Post-translational modifications, Concepts of protein engineering, Proteomic workflows.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette, John Wiley and Sons Inc.
- Bioinformatics: From Genomes to Drugs, T. Lengauer, John Wiley and Sons Inc.
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, ColdSpringHarbor Laboratory Press
- DNA Microarrays: A Practical Approach, M. Schlena, OxfordUniversity Press.
- Genomes II, T.A. Brown
- Introduction to Proteomics : Tools for the new biology, Daniel C. Liebler, Humana Press

References:

- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology : Principles and Practice, Arthur M. Lesk
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller
- Genes & Genomes, Maxine Singer and Paul Berg
- Essential of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons Inc.
- Functional Genomics – A Practical Approach, S.P. Hunt and R. Livesey, OxfordUniversity Press
- Statistical Genomics: Linkage, Mapping and QTL Analysis, B. Liu, CRC Press.
- Introduction to Proteomics: Principles and applications, Nawin C. Mishra, Wiley Press 2010.
- Protein and Proteomics: A laboratory manual, Richard J Simpson, CSHL, 2003.

STRUCTURAL BIOLOGY

Course Code: BTE4303 **Credit Units: 02**

Course Objective:
The course aims to provide an understanding of the canonical and non-canonical structure of the nucleic acids and the detail structure of proteins, enzymes etc. Detailed structural analysis will also give an idea about the mode of recognition of different biomolecules, nature of interaction and their role in therapy and nanotechnology.

Course Contents:
Module I: Canonical and Non-canonical Structure of Nucleic acids:
Canonical Structure: Structure of Nucleic acids, Detail structure of Double-Stranded DNA, Major and Minor groove, Chemical differences in DNA and RNA, Wobble base-pairing, DNA-drug interaction.
Non-canonical Structures: DNA polymorphism (A-DNA, B-DNA, Z-DNA), Parallel DNA, base flipping. Repeat elements (inverted repeat, mirror repeat and direct repeat) and cruciform structures, Intramolecular and Intermolecular Triplex DNA and its role in therapeutics, Intramolecular and intermolecular four-stranded DNA (G-quadruplex and i-motif), Telomeric DNAs of different eukaryotic species, role of telomere in cancer and aging, G-quadruplex as a therapeutic target, G-wire, role of G-quadruplex and i-motif in nanotechnology.

Module II: Protein structure and function: Primary structure of protein, Ramachandran plot, secondary structure of protein (alpha helix, 3_{10} helix, π-helix,β-sheet, loops, turns), sequence and structural motifs (helix-turn-helix, helix-loop-helix, leucine zipper, Greek key motif etc.), tertiary and quaternary structure of proteins.

Module III: Effect of physical and chemical parameters on structure and stability of Nucleic acids and proteins: Effect of cations, pH, temperature and chemical agents on the structure and stability of nucleic acids and protein, concept of thermodynamic parameters (free energy, enthalpy and entropy).

Module IV: BiomolecularInteractions:DNA-protein interaction, DNA-drug interactions, protein-protein interactions (hemoglobin, myoglobin, G-protein coupled receptors).

Module V: Characterization of Nucleic Acid Structure and Protein by biophysical and biochemical approach: Structural analysis by UV-VIS spectroscopy, Circular Dichroism, NMR and X-ray crystallography, thermal stability of Nucleic acid structure and protein by thermal denaturation curves, Principles of Isothermal Calorimetry (ITC), Differential Scanning calorimetry (DSC), Fluorescence Spectroscopy.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- DNA Structure and Function by Richard R. Sinden, (Copyright 1994 edition by Academic Press)
- Protein Structure and function by Carl Braden and John Tooze (Copyright 1991, 1999 by Garland Publishing).
- Exploring Proteins: a student's guide to experimental skills and methods by Nicholas C. Price and Jacqueline Nairn (latest edition by Oxford University Press)

DOWNSTREAM PROCESSING & FERMENTATON TECHNOLOGY

Course Code: BTE4304 **Credit Unit: 02**

Course Objective:
The syllabus will help the students to characterize the Bioproducts of biotechnological importance and to get expertise in their downstream processing.

Course Contents:
Module I: Fermentation Technology-An Overview
Development and overview of fermentation processes, strain development, media design and optimization, commercial media for fermentation

Module II: Bioproduct Production
Production of Ethanol, Antibiotics, Recombinant products,Citric acid, Industrial enzymes

Module III: Downstream Processing-An Overview
Importance of downstream processing in biotechnology; characteristics of bio-products and fermentation broth

Module IV: **BioproductIsolation**
Cell disruption; Filtration; Centrifugation; Precipitation

Module V: Purification
Membrane Based Separation; Chromatographic methods of separation based on size, charge and biological affinity, 1D, 2D gel electrophoresis

Module VI: Polishing
Crystallization; Drying and Formulations; Case studies

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text:
- Industrial Microbiology by L.E.Casida, JR.New Age International (P) LTD.
- Biotechnology, A Text book of Industrial Microbiology, W. Crueger and A. Crueger, Sinauer Association.
- Bioseparations: Downstream Processing for Biotechnology, P.A. Belter et al, John Wiley & Sons Inc.
- Downstream Processing, J.P. Hamel, J.B. Hunter and S.K. Sikdar, American Chemical Society

References:
- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Biochemical Engineering Fundamentals, J.E. Bailey and D.F. Ollis, McGraw-Hill
- Biotreatment, Downstream Processing and Modelling (Advances in Biochemical Engineering/ Biotechnology, Vol 56), T. Schepler et al, Springer Verlag
- Protein Purification, MR Ladisch, RC Wilson, CC Painton, SE Builder, American Chemical Society
- Principles of Fermentation Technology by P.F. Stanbury, A. Whitaker, and S.J. Hall, Aditya Books (P) LTD.

ENZYME TECHNOLOGY LAB

Course Code: BTE4305 **Credit Units: 02**

Course Contents:

Module I:
Isolation of enzymes from various sources

Module II:
Determination of specific activity of lipase, phosphatase, cellulase, protease and amylase

Module III:
Determination of Temperature and pH optima of an enzyme catalyzed reaction

Module IV:
Determination of Michaelis-Menten constant (K_m) and Maximum Velocity (V_{max}) of an enzyme catalyzed reaction using Linear plot method; Turnover number; catalytic efficiency

Module V:
Effect of various additives on enzyme activity

Module VI:
Enzyme immobilization and its effect on activity

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:
Text:

- Practical Biochemistry by Sawhney and Singh

References:

- Practical Biochemistry, Principles & Techniques by Keith Wilson and John Walker

GENOMICS AND PROTEOMICS LAB

Course Code: BTE4306 **Credit Units: 02**

Course Objectives:
The course will familiarize students with the tools and principles of contemporary genomics and proteomics. Bioinformatics resources relevant to genome / proteome investigations will be provided for a sound working knowledge of current genomics and proteomics technology and approaches.

Course Contents:
Module I – An Introduction to Genome Browsers –
NCBI and UCSC – General features; Important Sequence formats – Raw, Fasta and EMBL; Sequence retrieval methods – Whole Genomes (command line and browser), Gene or position search (browser)

Module II - Sequence annotation
Restriction site annotation; Repeat Annotation of sequence Repeat Masker; ORF annotation – using ORF finder; Gene Prediction – using Gene Scan and Glimmer; Primer designing using Primer 3

Module III – Homology Search, Sequence conservation and Phylogeny
Homology Search – BLAST and its variants, BLAT; Multiple Sequence Alignment – Clustal W and ClustalX; Phylogeny and molecular evolution – MEGA

Module IV: Integration of bioinformatics workflow
NCBI Genome biology workbench

Module V: Proteome analysis
EXPASY Server, RCSB Protein data banks, BLASTp
Primary structure analysis tools (Translate and reverse translate, Codon Usage, FindPept, FindMOD, pI/Mw computing, Multident, ProtParam, Peptide cutter, Mascot)
Secondary structure analysis tools (hydropathy plots, motif searches, conserved domains, PROSITE, InterPro Scan, PfamHMM, SMART, threading); Tertiary structure analysis tools (JMOL/ Pymol / Rasmol), MODELLER; Phylogenetic profiling

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & Web References:
- Bioinformatics: A practical guide to the analysis of genes and proteins, A.D. Baxevanis and B.F.F. Ouellette, John Wiley and Sons Inc.
- NCBI tools
- EMBLtools
- Ensembl tools

STRUCTURAL BIOLOGY LAB

Course Code: BTE4307 **Credit Units: 01**

Course Contents:

- Calculation of extinction coefficient of olgonucleotides either manually or using the software.
- Quantification of genomic DNA, oligonucleotides and proteins by UV-VIS Spectroscopy.
- Effect of cations (monovalent or divalent) and pH on genomic DNA, oligonucleotides and proteins by UV-VIS Spectroscopy.
- Study of DNA-ligand (spermine, ethidium bromide, proflavin etc.) interactions using UV-VIS spectroscopy and PAGE.
- Electrophoretic shift assays to check molecularity of the structures with short designed synthetic nucleotide sequences.
- Protein Folding using SDS-PAGE.
- Effect of physical and chemical factors on protein structure.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

FERMENTATION BIOTECHNOLOGY & DOWNSTREAM PROCESSING LAB

Course Code: BTE4308 **Credit Unit: 02**

Fermentation Biotechnology

Module I:
Isolation of industrially important microorganisms for microbial processes

Module II:
Determination of growth curve of supplied microorganisms and determination of substrate degradation profile and computation of specific growth rate and growth yield form the data obtained

Module III:
Comparative studies of ethanol production using different substrates; Production of enzyme

Downstream Processing

Module I:
Product Isolation

Module II:
Protein precipitation and recovery

Module III:
Membrane-based separation

Module IV:
Ion exchange chromatography

Module V:
Gel Permeation chromatography

Module VI:
Poly-acrylamide Gel Electrophoresis (PAGE)

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

INDUSTRIAL MANAGEMENT

Course Code: BTE4309 **Credit Unit: 03**

Course Objective:
The course is designed to provide students the ability to understand Industrial Business, it's markets and relevant industrial management strategies. The course will equip students the knowledge to cope up changing environment due the advent of technology & other influences. It will also cover the Safety laws & Acts required in managing industrial business. Also it will make students to understand the nature and role of Industrial business, characteristics of business markets, implementation of relevant industrial strategies and developing comprehensive insight for Entrepreneurship Development.

Course Contents:
Module I: Introduction to Industrial Management
Introduction to the Concept of industrial Management, Planning and decision making in industrial management process, Application and scope of Industrial Management, Understanding Industrial Market need, Want & demand management, Industrial Relations, Role & Responsibility of Industrial Manager.

Module II: Understanding Safety &Legal Framework in Industrial management
Factory Act, ESI Act, Environmental Act, Workmentcomperation Act, Need for industrial safety. Role of Government in industrial safety, Safety organization - safety committee - safety education and training, Advantages of adopting safety laws.

Module III: Understanding Industrial Markets, Goods & Customers and Industrial Buying Behavior: Introduction to the industrial goods, Types of industrial goods, Identifying sources for resource suppliers, Industrial customers, Industrial demand, purchasing practices of Industrial customers, Concept of business buying behavior.

Module IV: Introduction to Entrepreneurial Development
Introduction to the concept of Entrepreneurship & characteristics of entrepreneurship, Entrepreneurial process Stages in Entrepreneurial process, Entrepreneurial competencies, Entrepreneurship in India, Barriers in Entrepreneurship, Types of ownership suitable for business. Woman Entrepreneur, Challenges faced by women entrepreneurs.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text:
- Essentials of Management, H. Koontz, H. Weihrich and C. O'Donnell, McGraw-Hill/Irwin
- Guide for safety in the chemical laboratory second edition. Manufacturing Chemists Allocation. Van vostandard Reinhold Company, New York.
- Safety and Accident Prevention in Chemical Operation 2nd edition, H.H. Fawcett & W.S. Wood Wiley Interscience

References:
- T.R. Banga : Industrial Engineering and Management
- Industrial Management by C.L. Mahajan; SalujaParkashan, New Delhi.
- Industrial Marketing management by M Govindarajan, , Vikas publications
- Entrepreneurship by Rajeev Roy, Oxford

IMMUNOTECHNOLOGY

Course Code: BTE4310 **Credit Units: 03**

Course Objective:
Aim of this course is to provide in-depth information of immune-system and its implication for health and diseases. Knowledge about the principles and applications of immune-assay to evaluate the immune-status

Course Contents:
Module-I
Introduction to Immunotechnology
Antigen and Antibody: Tools for immunodiagnostics, Kinetics of immune response, Principles of Immunization

Module II
Immunization and Antigen and Antibody
Immuno-chemistry of Antigens - immunogenicity, Antigenicity; Haptens, Toxins-Toxiods, Hapten-carrier system; Production of Polyclonal and Monoclonal Antibodies- Hybridoma Technology, Antibody interaction, affinity, cross reactivity, specificity; Immunoassays- RIA, ELISA, Western blotting, ELISPOT assay, immunofluorescence, Other applications; Antibody engineering, phase display library.

Module III
CMI and Imaging Techniques
Principle of Immunofluorescence Microscopy, Flurochromes, Staining techniques for live cell imaging and fixed cells, Flow cytometry, Lymphoproliferation, Cell Cytotoxicity, mixed lymphocyte reaction, Apoptosis, Cytokine expression, In vivo cell tracking techniques.

Module IV
Vaccine Technology
Active and Passive Immunization, Rationale for vaccine design, Kinds of vaccines live, killed, attenuated, Sub unit vaccines, Recombinant DNA vaccine, Peptide vaccines, conjugate vaccines; Role and properties of adjuvants.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Texts/References
1. F.C. Hay, O.M.R. Westwood, Practical Immunology, 4th Edition-, Blackwell Publishing, 2002
2. S. Hockfield, S. Carlson, C. Evans, P. Levitt, J. Pintar, L. Silberstein. Selected Methods for Antibody and NucleicAcid probes, Volume1, Cold Spring Harbor Laboratory Press,1993.
3. Ed Harlow, David Lane, Antibodies Laboratory Manual, Cold Spring Harbor, Laboratory Press, 1988.

AGRI-FOOD BIOTECHNOLOGY

Course code: BTE4311 **Credit Units: 03**

Course Contents:

Module I: Introduction
Scope and importance of food industry; RDT and other technologies involved in development of food products; Concept of 'functional food'; Advances and trends, ethical issues, quality control, legislation, FDA & FPO (India), patenting processes and products, consumer acceptance scenario for GM food products and GM crops.

Module II: Techniques used in Food Industry
Sterilization, isolation, screening and strain improvement, cell harvesting and disruption, recovery and purification, production of organic acids – citric acid, lactic acid and acetic acid; Gene cloning, production of recombinant proteins e.g. chymosin

Module III: Dairy Biotechnology
Starter cultures, prebiotics, probiotics – their use as flavor enhancers and disease/ infection combats, applications in production of cheese, butter, ice-cream, yoghurt; applications in biomedical research, e.g. recombinant LABs as vaccines; Modified milk proteins.

Module IV: Microbial, Plant and Animal Biotechnology
Production of SCP (Single cell protein), production of baker's yeast, brewing industry, applications of transgenic plants in food production, transgenic fist, and transgenic poultry.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Food Biotechnology - 2. 1988. R.D. King and P.S.J. Cheetham (Eds.). Elsevier Applied Science, NY.

***References*:**

- Introduction to Food Biotechnology. Green, Perry Johnson. 2002. CRC Press, Boca Raton, Florida.
- Food Biotechnology-Techniques and Applications. Gauri S. Mittal. 1992. Technomic Publishing Co., Inc., Lancaster, PA.

BIOFUELS & GREEN TECHNOLOGY

Course code: BTE4312 **Credit Units: 03**

Course Objective:
This course will acquaint the students with bioenergy resources, their properties, preparation, processing along with the details of equipments utilized for the purpose.

Course Contents:

Module I: Biomass Sources, Characteristics & Preparation: Biomass Sources and Classification
Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses for fermentation ethanol; Sources and processing of oils and fats for liquid fuels- Energy plantations - Preparation of woody biomass; Drying, Storage and Handling of Biomass.

Module II: Biogas Technology
Feedstock for biogas production, biodegradable organic matter, Operating parameters for biogas production, Dry and wet fermentation

Module III: Bio-Ethanol and Bio-Diesel Technology
Production of Fuel Ethanol by Fermentation of Sugars.Trans-esterification of Oils to Produce Bio-Diesel.

Module IV: Pyrolysis and Gasification of Biomass
Thermo-chemical conversion of ligno-cellulose biomass - Pyrolysis of biomass,Thermo-chemical gasification principles

Module V: Combustion of Biomass and Cogeneration Systems
Combustion of Woody Biomass, Cogeneration in Biomass Processing Industries.Use of biogases for cogeneration.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
***Text*:**

- Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes, A. Chakravarthy, Oxford & IBH publishing Co., New Delhi, 1989.

***References*:**

- Biogas Systems: Principles and Applications, K.M. Mital, New Age International Publishers (p) Ltd., 1996.
- Biomass Energy Systems, P. VenkataRamana and S.N. Srinivas, Tata Energy Research Institute, New Delhi, 1996.
- Fuels from Biomass and Wastes, D.L. Klass and G.M. Emert, Ann Arbor Science publ. Inc. Michigan, 1985.
- Bio-gas Technology, Khandelwal K.C. and Mahdi, Tata McGraw-Hill pub. Co. Ltd., New Delhi
- Advances in bio-gas Technology, O.P. Chawla, I.C.A.R., New Delhi. 1970.

STEM CELLS & GENE THERAPY

Course Code: BTE4313 **Credit Units: 03**

Course Objective:
The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I
Introduction to Gene Therapy, History and evolution of Gene therapy, optimal disease targets, Failures and successes with gene therapy and future prospects

Module II: Gene Delivery
Adenoviral Vectors, Adeno-associated virus (AAV) Vectors, Non-viral Vectors and Physical Methods, Retroviral and Lentiviral Vectors, Herpes Virus Vectors & Combinatorial methods, Gene transfer methods

Module III
Innate and Acquired Immune Response to Cell and Gene Therapy, Gene Therapy and the Immune System: Genetic Immunization

Module IV
Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module V
Cell, Disease, and Genetic Perspectives for Gene Therapy, Cell and Gene Therapy of the Nervous System, Cancer Gene Therapy, Cell and Gene Therapy for Vascular Disorders, Bone marrow transplants, Cancer Gene Therapy, Immunotherapy, Autoimmune Diseases and the Promise of Stem Cell-Based Therapies, Stem Cells and Diabetes, Stem Cells and heart Repair

Module VI
Regulatory and Ethical Considerations of Cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer,

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Understanding Biotechnology by AluízioBorém, Fabrício R. Santos, David E. Bowen, Prentice Hall
- Cell Therapy: Stem Cell Transplantation, Gene Therapy, and Cellular Immunotherapy (Cancer: Clinical Science in Practice) George Morstyn, William Sheridan, Cambridge University Press,

DRUG DESIGN & PHARMACEUTICAL BIOTECHNOLOGY

Course code: BTE4314 **Credit Units: 03**

Course Objective:
The above course will be aimed to identify targets and design drugs that could be potentially useful in the identification of the candidate drugs, which have efficacy in cell culture or animal models. The student will gain basic concepts in the specific field of Pharmaceutical Biotechnology Industry and insight into the working of a pharma industry, various classes of biotech products and the regulations governing production and marketing of pharmaceutical products.

Course Contents:

Module I: Drug targets classification, discovery & validation strategies
Introduction to drug discovery & development; Target classification: DNA, RNA, post-translational, processing enzymes, metabolic enzymes involved in nucleic acid synthesis, G-protein coupled receptors, small molecule receptors, neuropeptide receptors, ion channels proteins, ligand-gated ion channels, transporters; Genomics (new target discovery), biological activity directed and other types of screening, natural products, combinatorial chemistry; General overview of validation techniques.

Module II: Structure-based design
Physicochemical properties of drugs, metabolism, toxicity and pharmacokinetics, toxicology considerations, problems and drawbacks on drug discovery and development.
'de novo' design methodologies: indirect drug design, pharmacophore development and receptor mapping, combinatorial libraries**.** DNA vaccines, Vaccines & Monoclonal antibody based pharmaceuticals, Antibiotics, Characterization.

Module III: Basic concepts of Drug Delivery
Concepts of Bio availability, drug absorption, pharmacodynamic&Pharmacokinetic processes, Timing for optimal therapy, Drug delivery considerations for the new biotherapeutics. Basic terminologies in drug delivery and drug targeting, Drug release, Drug targeting, Doses forms, Routes of drug administration, Basic strategies for enhanced therapeutic efficacies

Module IV: Delivery of Genetic material
Basic principles of gene expression, Viral and nonviral vectors in gene delivery, Clinical applications of gene therapy and antisense therapy; Bioanalytical aspects of Recombinant proteins as pharmaceutical drugs**:** Formulation of Biotechnological Products and their role in clinical development
Nanotechnology, Use of biosensors and challenge of chronopharmacology, Microchips and controlled drug delivery, Genetically engineered cell implants in drug deliver.

Module V: Regulations
Role of FDA, ICH Guidelines, cGMP, The Regulation of Pharmaceutical Biotechnological Products and Ethical Issues.
Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Drug Delivery and Targeting, A.M. Hillery, A.W. Lloyd and J. Swarbrick, Harwood Academic Publisher
- Pharmaceutical Dosage Forms and Drug Delivery Systems, H.C. Ansel, L.V. allen and N.G. Popovich, Lippincott Williams and Wilkins Publisher
- Pharmaceutical Biotechnology- by Oliver. Kayser, Rainer Helmut Müller Series: Pharmaceutical Biotechnology, Vol. 9 Pearlman, Rodney; Wang, Y. John (Eds.) 1996,

***References*:**

- Introduction to Biophysical Methods for Protein and Nucleic Acid Research, J.A. Glasel and M.P. Deutscher, Academic Press.
- Principles of Drug Action, W.B. Pratt and P. Taylor, Churchill Livingston.
- Principles of Medicinal Chemistry, W.O. Foye, T.L. Lemke, and D.A. Williams, Williams and Wilkins
- Side Effects and Drug Design, E.J. Lien, Marcel Dekker.
- The Anticancer Drugs, W.B. Pratt, R.W. Ruddon, W.D. Ensminger, and J. Maybaum, Oxford University Press.
- Drug Delivery: Engineering Principles for Drug Therapy (Topics in Chemical Engineering), W.M. Saltzman, Oxford University Press.
- Handbook of Biodegradable Polymers (Drug Targeting and Delivery), A.J. Domb, J. Kost and D.M. Wiseman, Dunitz Martin Ltd.
- Development and Manufacture of Protein Pharmaceuticals Series: Pharmaceutical Biotechnology , Vol. 14Nail, Steve L.; Akers, Michael J. (Eds.) 2002
- Pharmaceutical Biotechnology: Fundamentals and Applications, Third Edition, Editor Daan J.A. Crommelin, Robert D Sindelar.
- Pharmaceutical Biotechnology, Vyas, S. P., CBS Publishers & Distributors, 2002, Delhi

NANOBIOTECHNOLOGY

Course code: BTE4315 **Credit Units: 03**

Course Objective:
To evolve a detail understanding into the application of nanotechnology in the field of biological sciences.

Course Contents:

Module I
Biosensors as Precursors of Bioelectronics, Functionlization of Sensing Substrates, Biochip, Nanosensors-Miniaturization of Biosensors, Nanomaterial Based Biosensors.

Module II
Electron Transfer of Biomolecules, Nanoparticle-Biomaterial Hybrid Systems for Sensing and Electronic Devices

Module III
DNA Templated Electronics, Sequence –specific molecular lithography, Single Biomolecule Manipulation for Bioelectronics, DNA as a semiconductor.

Module IV
Applications of nanobiotechnology in medical diagnostics and other biomedical field.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

***Text*:**
- Smart Biosensor Technology, George K. Knopf, Amarjeet S. Bassi, CRC press, 2006

***References*:**
- Bioelectronics: From Theory to ApplicationsWillner, Itamar / Katz, Eugenii (eds.) Wiley-VCH, 2005
- Electrochemical Methods Fundamentals and Applications, 2nd Edition, by Allen J. Bard and Larry R. Faulkner
- Analytical Electrochemistry, by Joseph Wang

SUMMER INTERNSHIP EVALUATION

Course Code: BTE4335 **Credit Units: 06**

GUIDELINES FOR SUMMER TRAINING

The main objective of summer training is to familiarize students to laboratory environment and make them learn to handle equipments and softwares, design experiments and analyze the results. The student will be supervised by one or more faculty members and he or she will be required to submit a synopsis. While writing a synopsis emphasis should be given to make it publishable. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student. Initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- TITLE PAGE
- CERTIFICATE
- ACKNOWLEDGEMENT
- ABBREVIATIONS
- CONTENTS WITH PAGE NUMBERS
- CHAPTER –
  a. INTRODUCTION
  b. REVIEW OF LITERATURE
  c. MATERIALS & METHODS
  d. RESULTS & DISCUSSION
  e. SUMMARY AND CONCLUSION
  f. REFERENCES
  g. APPENDIX (OPTIONAL)
- 1 inch Margin on left side & 1”each on other sides.
- Single side of the paper to be used.
- Times New Roman.

Font Size

- 12 (Bold for headings)
- 12 (Normal for Matter)
- 14 (for Chapter Names)
- 1.5 line spacing
- Numbering on the right hand Top of the page
- Numbers on pages before chapters to be done in Roman at the bottom of the page

References
This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article
Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli* O157: H7. *ClinMicrobiol Infect*, **8** (suppl 1): 116–117.

For Book
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

- Scientific names in Italics
- Cover Page containing - Title, Students Name, Supervisors Name, University, Name (along with logo), Course name & year of Submission in the prescribed format
- 2 copies to be submitted

ASSESSMENT OF THE PROJECT FILE
Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.. Evaluation will compose of two components - Project report assessment and Viva - voce. Project report assessment will be done by the two internal faculty members in respective fields. A committee of three faculty members will conduct Viva-voce.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project will be assessed as per evaluation format.

Examination Scheme:

Project Report	50
Viva Voce	50
Total	**100**

Syllabus – Fourth Semester

DISSERTATION/ PROJECT

Course Code: BTE4437 **Credit Units: 20**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➢ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➢ **Abstract**

A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➢ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➢ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli* O157: H7. *ClinMicrobiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski, M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	**100**

Amity Institute of Biotechnology

Post Graduate Diploma in Data Science

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

INTRODUCTION TO DATA SCIENCE

Course Code: DSC3101 **Credit Units-04**

Course Contents:

Module 1: Introduction to Data Science
Introduction to Data Science, Key components in Data Science , Use cases from different application domains such as Banking, Retail, Telecom, Life Science and Healthcare, etc

Module 2: Data Science Life Cycle
Data Science life cycle , The roles in a Data Science stream, Challenges involved in Data Science, Ethics in Data Science

Module 3: Characteristics of Data
Characteristics of Data – Big data introduction, Structured, Semi-structured and Unstructured data, data at rest, data in motion, etc, Good data versus bad data

Module 4: Challenges in handling large data
Challenges in handling large data sets

Module 5: Types of Data Analysis
Types of Data Analysis – Descriptive, Exploratory, Predictive, Inferential, Steps in Data Analysis

Module 6: Data Science Tools
Tools used in Data storage, Databases, Data Analysis, Data Visualization

Module 7: Job profiles in Data Science
Different job profiles their roles and Skill set requirements for each of them

Module 8: Programming tools require for Data Science
Different programming tools required for Data Science.

Module 9 : Overview of Machine learning for Data Science
Overview of Machine learning with the help of cases in Data Science

Module 10 : Case studies of Data Science
Discuss different case studies of Data Science domain.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- An Introduction to Data Science, Jeffrey Stanton, Syracuse University
- A Simple Introduction to DATA SCIENCE, Lars Nielsen, Noreen Burlingame
- Introduction to Data Science, DAN POTTER,CARSTEN BINNING,ELI UPFAL

MACHINE LEARNING-I

Course Code: DSC3102 **Credit Units-03**

Course Contents:

Module 1: An Introduction to Machine Learning:
Introduction to machine learning, What is ML, Types of ML, Applications used for ML, AI vs ML, Essential for ML and AI.

Module 2: Techniques of Machine Learning:
Introduction to Supervised, unsupervised, semi-supervised, and reinforced machine learning techniques

Module 3: Introduction to Supervised Learning:
Training, validation, test data, and Over fitting and complexity

Module 4: Managing and understanding data:
Data description, Data processing, Dimension Reduction.

Module 5: Data Preprocessing:
Comprehend the meaning, process, and importance of data preparation, feature engineering and scaling of datasets.

Module 6: Evaluating model performance:
Measures performance for the classification problem. Discuss different performance measures.

Module 7: Resampling methods:
Discuss different cross validation techniques. Leave-One-Out Cross-Validation, k-Fold Cross Validation

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Programming Collective Intelligence by Toby Segaran
- Machine Learning for Hackers by Drew Conway and John Myles
- Machine Learning by Tom M. Mitchell
- Pattern Recognition and Machine Learning by Christopher M. Bishop (Author)
- Machine Learning Yearning by Andrew NG
- The Elements of Statistical Learning by Trevor Hastie , Robert Tibshirani , Jerome Friedman

STATISTICS & EXPLORATORY DATA ANALYSIS

Course Code: DSC3103 **Credit Units-03**

Course Contents:

Module 1: Descriptive Statistics

Statistics: Preliminary concepts; Measures of Central Tendency: Mean, Median, Mode
Measures of Dispersion: Range, Standard deviation, Variance, Covariance, Graphical Representation of Statistics: Histograms, Bar plots, Scatter plots etc.

Module 2: Probability

Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module 3: Continuous Distribution

Normal Distribution, Properties of Normal distribution

Module 4: Correlation

Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples.

Module 5: Introduction to the Inferential Statistics

Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications.
Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.
Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means.
Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chisquare test, Coefficient of contingency, Yates' correction for continuity.
Analysis of Variance: One way and Two way (only Examples)

Module 6: Introduction to Model Building:

Basics of Model building, Definition of a Model, Point estimation, Confidence intervals, Testing

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- A first course in Probability, Sheldon Ross
- An introduction to Probability and Statistics, Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.

DATABASE MANAGEMENT SYSTEM-I

Course Code: DSC3104 **Credit Units-02**

Course Contents:

- SQL (Structured Query Language)
- Data Definition Language (DDL): Create, Alter and Drop commands
- Data Manipulation Language (DML): Select, Insert, Update, and Delete commands, Basic SQL queries, Integrity constraints on tables,
- Data Control Language Commands(DCL): Grant and Revoke
- SQL Functions
- SQL querying to do operations such as identifying nulls, special characters, blank rows/columns, and run distributions, run data summaries, merge tables, get unique counts
- SQL Joins, Aggregate functions and GROUP BY, Nested queries and sub queries. GROUP BY CLAUSE along basic aggregations such as SUM, COUNT, AVG RANK(), ROWNUM() & DENSE_RANK. UNION and UNION ALL CASE statement
- Introduction to Advanced SQL concepts: Indexes, Sequence, Clusters, Views, Cursors and Triggers, Embedded SQL
- Introduction to SQLITE
- Introduction to NoSQL and its capabilities
- Contrast MySQL with NOSQL
- Introduction to SQLITE
- Introduction to POSTGRESQL

Examination Scheme:

IA			**EE**			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Database System Concepts, Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
- An Introduction to Database Systems, C J Date
- Fundamentals of Databases – Elmasri and Navathe.
- Database Management Systems – Raghu Ramakrishna, Johannes Gehrke

PROGRAMMING TOOL BOX I-R

Course Code: DSC3105 **Credit Units-01**

Course Contents:

Module 1: An Introduction to R
Overview of R programming, applications, usage and comparative study with other softwares and introduction to R for Data Science

Module 2: Setting up R environment and packages
Setting up R environment and install packages and supporting libraries in R

Module 3: Basics of R
Manage your data and work-space, Save your work, How to use R, Data structure in R, Data creation and curation and special function using R

Module 4: File Handling
Reading different file format using R, file handling and processing, writing output file.

Module 5: Graphics using R
Graphics device, Basic plot function, scatter plot, 3-D scatter plot, pairplots, Lineplot, Matplot, Matpoints, Bar plot, Histogram plot, Density plot, Dot plot, Pie chart, Venn diagram, Grid graphics, Lattice, ggplot2, Interactive plotting, combine multiple plots in same graphics screen, save graphics to a file.

Module 6: Programming using R
Conditional Executions, Comparison Operators, Logical Operators, Control Structures, If statements, Ifelse statements, Loops, For loop, While loop, Apply loop family, Other loops,

Module 7: Functions
Define and Call functions, Syntax Rules for functions, Control utilities for functions, Writing own function

Module 8: Advance R
Advance R functions and Regular expressions, Object oriented programming, Building R package

Module 9: Case study

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- A Handbook of Statistical analysis using R, Brain Everitt and Torsten Hothorn
- The art of R programming, Norman Matloff
- Data Analysis and Graphics using R, W. John Braun
- R Graphics, Paul murrell
- R for Data Science, Garrett Grolemund and Hadley Wickham
- Linear Models with R, Julian J. Faraway

PROGRAMMING TOOL BOX II-PYTHON

Course Code: DSC3106 **Credit Units-01**

Course Contents:

Python Programming

Module 1: Introduction to Python :
Overview of Python, applications, usage and comparative study with other softwares.

Module 2: Basics of Python :
Syntax, Data Types, Variables, Operators, Input/output, Flow of Control (Modules, Branching)

Module 3: Basic Programming with Python :
If, If- else, Nested if-else, Looping, For, While, Nested loops, Control Structure, Break, Continue, Pass,

Module 4: Data Structures of Python :
Strings and Tuples, Accessing Strings, Basic Operations, String slices, Working with Lists, Introduction, Accessing list, Operations, Function and Methods, Files, Modules, Dictionaries, Functions and Functional Programming, Declaring and calling Functions, Declare, assign and retrieve values from Lists, Introducing Tuples, Accessing tuples

Module 5: Advanced Python :
Object Oriented, OOPs concept, Class and object, Attributes, Inheritance, Overloading, Overriding, Data hiding, Operations Exception, Exception Handling, Except clause, Try finally clause, User Defined Exceptions

Module 6: Python Libraries :
Introduction to Machine learning packages like NUMPY, SCIPY, PANDAS etc.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Think Python by Allen B. Downey
- Introducing Python by Bill Lubanovic
- Hello World by Warner Sande and Carter Sande
- Learning Python , 5th Edition , Mark Lutz
- Python For Data Analysis by W Mckinney

BIG DATA TOOLS & TECHNOLOGIES-I

Course Code: DSC3107 **Credit Units-01**

Course Contents:

Module 1: Introduction to Big Data
Big Data and its Importance, V's of Big Data, Drivers for Big Data, Introduction to Big Data Analytics, Big Data Analytics applications.

Module 2: Introduction to Hadoop
Hadoop Introduction, Hadoop key characteristics, Hadoop Core Components, Hadoop Ecosystem, Hadoop Services, Different Hadoop Modes, Hadoop's Parallel World – Data discovery

Module 3: Understanding Hadoop
Hadoop Installation, Hadoop Cluster Setup, Storing Data in Hadoop, HDFS Commands (Basics, Intermediate and Advanced), Processing your data with Map Reduce, Customizing Map Reduce Execution, Building Reliable MapReduce Apps, Run test example using Map reduce, Distributed Cache, Map side join vs Reduce Side Join, Running Hadoop applications

Module 4: Processing Big Data
Integrating disparate data stores, Mapping data to the programming framework, Connecting and extracting data from storage, Transforming data for processing, Subdividing data in preparation for Hadoop Map Reduce.

Module 5: Hadoop Map Reduce
Employing Hadoop Map Reduce,Creating the components of Hadoop Map Reduce jobs, Distributing data processing across server farms, Executing Hadoop Map Reduce jobs, Monitoring the progress of job flows, The Building Blocks of Hadoop Map Reduce, Distinguishing Hadoop daemons, Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Big Data and Analytics, Seema Acharya , Subhashini Chellappan
- Professional Hadoop Solution, Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich

INTRODUCTION TO LINUX

Course Code: DSC3108 **Credit Units-01**

Course Contents:

Module 1: Operating System:
Introduction: Windows and Unix/Linux, Definition; Concepts; Function of Operating System; Batch Processing; Multiprogrammed Batch System; Time Sharing System; Parallel System; Distributed System; Real Time System.

Module 2: Process & Memory Management:
Process; Process State(New, Running, Waiting, Ready, Termination); Process Control Block; Process Scheduling (Round Robin Scheduling, Priority Scheduling, Multiple Queues, Shortest Job Scheduling); Operations on Process; Basic Management of Memory; Swapping Virtual Memory; Paging.

Module 3: Input/Output Management:
I/O Devices; Device Controllers; I/O Software; Device Drivers; Deadlock; Resources; Principles of Dead Lock; Detection and Recovery; Deadlock Prevention; Deadlock Avoidance.

Module 4: UNIX/LINUX Operating Systems:
Introduction; Concepts; Layers of UNIX; Role of System Administrator and Ordinary User; Tree Structure of UNIX; Root File System; /bin Directory; /dev Directory; /bin Directory; /etc Directory; /lib Directory; /proc Directory; /mnt Directory; /root Directory; /sbin Directory; /tmp Directory; /var Directory; Relative Path; Absolute Path; Creation of Directory; Creating file; removing file; Listing Files and Directories copying file; renaming file; Changing File Permission; Changing Director Permission; Changing Group; Changing Owner; Pipe; Filters; pwd command; date command; head command; tail command less command; more command; grep command; VI Editor (Creating a new File; Inserting Text in File; Deleting Text in File; Copy , Cut & Paste Text; Save File).

Module 5: Shell Programming:
Variables(Configuration Variable & Environmental Variable); Operators(Arithmetic Operator, Logical Operator, Relational Operator); Instruction(Sequence Control Instruction, Selection Control Instruction, Repetition or Loop Instruction); echo command; read command; outtput command.

Module 6: System Monitoring:
System monitoring, process information, log files, run level, system recovery, Memory management

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Ramesh Bangia. 2015. Learning Unix. BPB Publication.
- Peter Baer Galvin. 2016. Operating System Concepts. BPB Publication
- Stuart E. Madnick. 2001. Operating System. Tata Mac Graw Hill.
- Kenneth H. Roshan. 2007. The complete reference Unix Tata Mac Graw Hill..
- D. M. Dhamethire. , 2011. System Programming and Operating Systems. Tata Mac Graw Hill.
- Kirrgcox. 2001. Red Hat Linux by. Printice Hill India.
- Andrew S. Talenbaum. 2008. Modern Operating system. Printice Hill India.
- Sumetabha Das. 2013. Unix (Concept and Application). Tata Mac Graw Hill.

MACHINE LEARNING-I LAB

Course Code: DSC3109 **Credit Units-01**

Course Contents:

Module 1: Supervised Learning:
Splitting the data into Training and test data, Understanding Overfitting and complexity with case studies

Module 2: Managing and understanding data:
Understanding Data description, Data processing, Dimension Reduction through case studies

Module 3: Data Preprocessing:
Understanding data preparation, feature engineering and scaling, datasets, dimensionality reduction through case studies

Module 4: Evaluating model performance: Calculation of Measures performance for the classification problem.

Module 5: Cross Validation techniques: Case studies of Leave-One-Out Cross-Validation, k-Fold Cross Validation and other cross validation techniques

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Programming Collective Intelligence by Toby Segaran
- Machine Learning for Hackers by Drew Conway and John Myles
- Machine Learning by Tom M. Mitchell
- Pattern Recognition and Machine Learning by Christopher M. Bishop (Author)
- Machine Learning Yearning by Andrew NG
- The Elements of Statistical Learning by Trevor Hastie, Robert Tibshirani , Jerome Friedman

STATISTICS & EXPLORATORY DATA ANALYSIS LAB

Course Code: DSC3110 **Credit Units-01**

Course Contents:

Module 1: Descriptive Statistics
Calculation and interpretation of Descriptive Statistics

Module 2: Probability
Understanding the preliminary concepts of probability through case studies

Module 3: Continuous Distribution
Generation of statistical distributions

Module 4: Correlation
Calculation of correlation understanding and interpreting correlation through case studies

Module 5: Introduction to the Inferential Statistics
Understanding inferential statics through case studies

Module 6: Introduction to Model Building:
Understanding Basics of Model building, Definition of a Model, Point estimation, Confidence intervals, Testing through case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- A first course in Probability, Sheldon Ross
- An introduction to Probability and Statistics, Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.

Syllabus - Second Semester

MACHINE LEARNING-II

Course Code: DSC3201 **Credit Units-03**

Course Contents:

Module 1: Basic concepts to calculate distance and similiraties
Discuss different methods to calculate distance and similrities including euclidean distance, squared euclidean distance, Manhattan distance, Cosine distance, Chebyshev distance, Canberra distance, Minikowski distance, correlation distance, partial correlation distance, mutual information and rank correlation coefficients

Module 2: Introduction to unsupervised learning
Discuss theory and concepts behind unsupervised learning

Module 3: Clustering:
Finding grouping of data. Hierarchical clustering,k-means and K-medoid clustering algorithm

Module 4: Application to Machine Learning:
Classification using Nearest Neighbors, Naive Bayes, Support Vector Machine, Market basket analysis using Association Rules

Module 5: Case study
Solve a case study on real world data and apply machine learning concepts.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Advanced Lectures on Machine Learning. Springer-Verlag. Bousquet, O.; von Luxburg, U.; Raetsch, G., eds.
- "Unsupervised Learning and Clustering". Pattern classification (2nd ed.). Wiley. Duda, Richard O.; Hart, Peter E.; Stork, David G.
- The Elements of Statistical Learning: Data mining, Inference, and Prediction. New York: Springer. Hastie, Trevor; Tibshirani, Robert.
- Unsupervised Learning: Foundations of Neural Computation. MIT Press.Hinton, Geoffrey; Sejnowski, Terrence J., eds.

REGRESSION THEORY & ANALYSIS

Course Code: DSC3202 **Credit Units-03**

Course Contents:

Module 1: Simple linear regression: Estimation of the Parameters, Hypothesis Testing on the Slope and Intercept, Interval Estimation in Simple Linear Regression, Prediction of New Observations, Coefficient of Determination

Module 2: Multiple regression: Estimation of Parameters, Hypothesis Testing, Confidence Intervals, Prediction

Module 3: Model Adequacy testing: Residual Analysis, PRESS statistic, Lack of Fit

Module 4: Transformations: Variance stabilising transformations, Transformations to linearise the model, Methods to select a transformation, Weighted least squares, Regression and random effect

Module 5: Multicollinearity: Sources, Effects, Diagnostics, Methods of dealing with Multicollinearity

Module 6: Validation of regression models: Techniques for validation

Module 7: Introduction to non linear regression and GLM: Non linear least squares, Transformations, Parameter estimation, Logistic and poisson regression

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Introduction to Linear Regression Analysis, by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining
- Introduction to Regression Analysis, M. Golberg and H.A Cho
- Applied Regression Analysis, Norman R. Draper and Harry Smith

DATA STRUCTURE & ALGORITHM DESIGN

Course Code: DSC3203 **Credit Units-03**

Course Contents:

Module I: Introduction

Module II: Programming strategies
Objects and ADTs with example, Constructors and destructors, Data structure, methods, Pre and post conditions, C conventions, Error handling, Some programming language notes.

Module III: Data structures
Arrays; lists; stacks and stack frames; Recursion -Recursive functions with example of factorial, Queue, Degeue.

Module IV: Searching
Sequential and binary search, Trees, binary search tree, complexity.

Module V: Queues
Priority queues and heaps

Module VI: Sorting
Bubble, Heap, Quick, Bin, Radix

Module VII: Searching revisited
Red-Black trees, AVL trees, general n-ary trees, hash tables; Hashing and collision resolution

Module VIII: Dynamic algorithm
Fibonacci numbers, bionomial coefficients, optimal binary search trees, matrix chain multiplication, longest common subsequence, optimal triangulation.

Module IX: Graphs
Minimum spanning tree and Djkstra's algorithm

Module X: Huffman encoding, FFT, Hard or intractable problems
Eulerian or Hamiltonian paths, Travelling salesman problem.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Data Structures and Algorithms, A.V. Aho, J.E. Hopcroft and J. Ullman, Addison-Wesley Publishing
- Database Design, Development and Deployment with Student CD, P. Rob and E. Semaan, McGraw-Hill/Irwin
- Schaum's Outline of Data Structures with C++, J.R. Hubbard, McGraw Hill Trade.

References:

- Database system concepts, A. Silberschatz, P.B. Galvin and G. Gagne, John Wiley and Sons Inc.
- Introduction to Data Structures and Application, J. Tremblay and P.G. Sorensen, McGraw Hill College Division

DATABASE MANAGEMENT SYSTEM-II

Course Code: DSC3204 **Credit Units-02**

Course Contents:

Module 1: MongoDB
A Database for the internet, MongoDB's key features, MongoDB's core server and tools, Why MongoDB? , History of MongoDB, Diving into the MongoDB shell, Creating and Querying with indexes, Basic Administration, Writing Program using MongoDB

Module 2: Application Development in MongoDB
Document oriented data, Constructing queries, Aggregation, Update ,atomic operations and deletes, E-commerce updates, Atomic document processing

Module 3: MongoDB Mastery
Indexing and query optimization, Text Search, Wired Tiger and pluggable storage, Replication, Scaling your system with Sharding, Deployment and Administration

Module 4: Apache Cassandra
Big Data and Apache Cassandra, Importance of Cassandra, Cassandra as a Distributed Database, Cassandra and High Availability, Cassandra and Replication Mechanism, Cassandra's Elastic Scalability, Tune able consistency (Strict Consistency , Casual Consistency , Weak Consistency , Brewer's CAP Theorem ,Cassandra as a Schema Free Database, Where should we use Cassandra , Who and why using the Cassandra

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- MongoDB: The definitive guide by Kristina Chodorow, Michael Dirolf
- Cassandra: The Definitive Guide, Eben Hewitt
- MangoDB in Action, Kyle Banker, Peter Bakkum, Shaun Verch, Douglas Garrett, Tim Hawkins

SPARK

Course Code: DSC3205 **Credit Units-01**

Course Contents:

Module 1: Introduction to Apache Spark
Introduction to Apache Spark, Features of Apache Spark, Apache Spark Stack, Introduction to RDD's, RDD's Transformation, What is good and Bad in Map Reduce , Why to use Apache Spark

Module 2: Spark: A Hadoop Replacement?
Java, Scala, or Python? , Scala, Packages, Data Types, Classes, Calling Functions, Operators, Control Structures

Module 3: A Quick Intro to Spark
Starting the shell, Data Sources, Testing Spark, Spark Monitor, Comparing Hadoop Map Reduce to Spark, Writing Standalone program with Spark

Module 4: Spark SQL
Basic Concepts, Using Spark SQL with RDDs

Module 5: Spark Streaming
Basic Concepts, Creating Your First Stream with Scala, Creating Your First Stream with Java

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Spark in Action, Marko Bonaci, Peter Zecevic
- Spark Cookbook, Rishi Yadav
- Machine Learning for Big Data , Jason Bell
- Spark : The Definitive Guide, Matei Zaharia, Bill Chambers

DATA VISUALIZATION

Course Code: DSC3206 **Credit Units-01**

Course Contents:

Module 1: Introduction to data visualization:
Introduction to data visualization. Explore and manipulate all graphical parameter.Drawing graphs such as scatterplot, stripchart, histogram, boxplot, violoin chart, bar chart, dot plot, line graph, line plot, multiplot, stacked bar chart, pie diagram, venn diagram, pair plot.Explore 3d chart, motion chart, interactive charts.Discuss selecting appropriate chart for strategy presentation.Save graphs in various formats.Discuss different ways to combine multiple figures. Discuss margin and graph size.

Module 2: Introduction to Tableau:
Creating Visual Analytics with Tableau Desktop, Connecting to your data, Building your first visualization, Creating Calculations to enhance your data, using maps to improve insight, developing an Ad Hoc Analysis Environment, Tips Tricks and Time Savers, Bringing it all together with dashboards. Installing Tableau Server, Using Tableau server to facilitate fact based team collaboration, Automating Server with Tableau's command line tools, Use case for rapid fire visual analytics, other Tools. Explore various case studies to visualize the data.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:
- Tableau your data, Daniel G Murray
- Introduction to ggplot2, Babraham bioinformatics.

BIG DATA TOOLS & TECHNOLOGIES-II

Course Code: DSC3207 **Credit Units-01**

Course Contents:

Module 1: Fundamental of Apache Pig
What is Pig?, Introduction to Pig Data Flow Engine, Pig and Map Reduce in Detail, When should Pig Used?, Pig and Hadoop Cluster, Pig Interpreter and Map Reduce, Pig Relations and Data Types, Pig example in Detail, Debugging and Generating Example in Apache Pig

Pig philosophy and architecture, Pig installation, Grunt shell, Loading data, Exploring Pig Latin commands, Pig Transformations functions, Joins in Pig, Hands on Exercises

Module 2: Fundamental of Apache Hive
What is Hive?, Architecture of Hive, Hive Services, Hive Clients, How Hive Differs from Traditional RDBMS, Introduction to HiveQL, Data Types and File Formats in Hive, File Encoding , Common problems while working with Hive

Hive architecture, Hive installation, Hive vs. RDBMS, HiveQL and the Hive shell, Data types and schemas, Creating tables (external vs. managed), Creating Partitions, Creating Views, UDF function in java in Hive, Using hive to create diff types of format

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Programming PiG, Wiley Publication, Alan Gates
- Programming Hive, Wiley Publication, Jason Rutherglen, Dean Wamplor & Edward Capriolo

MACHINE LEARNING-II LAB

Course Code: DSC3208 **Credit Units-01**

Course Contents:

Module 1: Basic concepts to calculate distance and similiraties
Discuss different methods to calculate distance and similrities including euclidean distance, squared euclidean distance, Manhattan distance, Cosine distance, Chebyshev distance, Canberra distance, Minikowski distance, correlation distance, partial correlation distance, mutual information and rank correlation coefficients

Module 2: Clustering:
Finding grouping of data. Hierarchical clustering,k-means and K-medoid clustering algorithm

Module 3: Application to Machine Learning:
Solve a case study on real world data and apply machine learning concepts. Classification using Nearest Neighbors, Naive Bayes, Support Vector Machine, Market basket analysis using Association Rules

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Advanced Lectures on Machine Learning. Springer-Verlag. Bousquet, O.; von Luxburg, U.; Raetsch, G., eds.
- "Unsupervised Learning and Clustering". Pattern classification (2nd ed.). Wiley. Duda, Richard O.; Hart, Peter E.; Stork, David G.
- The Elements of Statistical Learning: Data mining, Inference, and Prediction. New York: Springer. Hastie, Trevor; Tibshirani, Robert.
- Unsupervised Learning: Foundations of Neural Computation. MIT Press.Hinton, Geoffrey; Sejnowski, Terrence J., eds.

REGRESSION THEORY & ANALYSIS LAB

Course Code: DSC3209 **Credit Units-01**

Course Contents:

Module 1: Simple linear regression:
Estimation of the Parameters, Hypothesis Testing on the Slope and Intercept, Interval Estimation in Simple Linear Regression, Prediction of New Observations, Coefficient of Determination through case studies

Module 2: Multiple regression:
Estimation of Parameters, Hypothesis Testing, Confidence Intervals, Prediction through case studies

Module 3: Model Adequacy testing:
ResidualAnalysis, PRESS statistic, Lack of Fit through case studies

Module 4: Multicollinearity:
Sources, Effects, Diagnostics, Methods of dealing with Multicollinearity through case studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Introduction to Linear Regression Analysis, by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining
- Introduction to Regression Analysis, M. Golberg and H.A Cho
- Applied Regression Analysis, Norman R. Draper and Harry Smith

DATA STRUCTURE & ALGORITHM DESIGN LAB

Course Code: DSC3210 **Credit Units-01**

Course Contents:

Module I
Stack implementation through arrays, link list

Module II
Programs for recursion functions

Module III
Implementation of queues and leap structures

Module IV
Application of binary trees in pre-order, post-order and in-order evaluation

Module V
A VL tree implementation

Module VI
Optimal matrix multiplication

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

Text:
- Data Structures and Algorithms, A.V. Aho, J.E. Hopcroft and J. Ullman, Addison-Wesley Publishing
- Database Design, Development and Deployment with Student CD, P. Rob and E. Semaan, McGraw-Hill/Irwin
- Schaum's Outline of Data Structures with C++, J.R. Hubbard, McGraw Hill Trade.

References:
- Database system concepts, A. Silberschatz, P.B. Galvin and G. Gagne, John Wiley and Sons Inc.
- Introduction to Data Structures and Application, J. Tremblay and P.G. Sorensen, McGraw Hill College Division

PATTERN RECOGNITION

Course Code: DSC3211 **Credit Units-01**

Course Contents:

Statistical Pattern Recognition

Introduction, Gaussian model, discriminant functions, classifier performance, risk and errors; supervised learning using parametric and nonparametric approaches: ML estimation, Bayesian parameter estimation approach, Parzen Windows, k-nn estimation; Unsupervised learning and clustering: the clustering concept, c-means algorithm, learning vector quantization, clustering strategies, a hierarchical clustering procedure.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- R.Schalkoff, Pattern Recognition: Statistical, Structural and Neural Approaches, John Wiley & Sons, NY, 1992.
- Duda R O and P E Hart, Patten classification and scene analysis, John Wiley & Sons, NY 1973
- K.S.Fu, Syntactic pattern recognition and applications, Prentice Hall, NJ, 1982
- T.Pavlidis, Structural pattern recognition, Springer-Verlag, NY, 1977
- D.H.Ballad and C.M.Brown, Algorithms for computer vision, Prentice Hall, 1982

NEXT GENERATION SEQUENCING ANALYSIS

Course Code: DSC3212 **Credit Units-01**

Course Contents:

Module 1: Introduction to NGS and NGS Technologies
Introduction to sequencing technologies from a data analysts view, Concept, Applications of sequencing technologies in Whole genome assembly; Gene expression analysis; Genome annotation; Gene regulation analysis; Variation studies

Module 2: NGS data analysis: Preprocessing
Introduction to NGS data analysis, Raw sequence files (FASTQ format), Preprocessing of raw reads: quality control (FastQC), adapter clipping, quality trimming, Introduction to read mapping (Alignment methods, Mapping heuristics), Read alignment to a reference genome (BWA, Bowtie2, TopHat), Mapping output (SAM/BAM format), Usage of important NGS toolkits (samtools, BEDtools), Mapping statistics, Visualization of mapped reads (IGV, UCSC)

Module 3: NGS data analysis: Variant calling
DNA variant calling and Filtering DNA variants using GATK pipeline

Module 4: NGS data analysis: Gene Expression Analysis
Genomics and transcriptome assembly, Differential Expression analysis, Quantification of expression,

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Exploring Personal Genomics, 1st Edition, Joel T. Dudley, Konrad J. Karczewski, ISBN-13: 978-0199644490, Oxford University Press, 2013
- High-Throughput Next Generation Sequencing, Methods and Applications,Editors: Kwon, Young Min, Ricke, Steven C. (Eds.), ISBN 978-1-61779-089-8, Springer, 2011
- Next Generation Sequencing Technologies and Challenges in Sequence Assembly, El-Metwally, M.Sc, Sara, Ouda, Osama M., Helmy, Mohamed, ISBN 978-1-4939-0715-1, Springer 2014

ASSOCIATION RULE MINING

Course Code: DSC3213 **Credit Units-01**

Course Contents:

Where Is Association Learning Used? , Web Usage Mining, Beer and Diapers, How Association Rules Learning Works, Support, Confidence, Lift, Conviction, Defining the process, Algorithms(Apriori, FP-Growth), Mining the Baskets- Market basket analysis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:

- Machine Learning for Big Data HANDS-ON FOR DEVELOPERS AND TECHNICAL PROFESSIONALS- Jason Bell

PROJECT

Course Code: DSC3237 **Credit Units: 08**

GUIDELINES FOR DISSERTATION

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

A short account of the activities that were undertaken as part of the project;

A statement about the extent to which the project has achieved its stated goals.

A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;

Any activities planned but not yet completed as part of the DISSERTION, or as a future initiative directly resulting from the project;

Any problems that have arisen that may be useful to document for future reference.

- **Report Layout**

The report should contain the following components:

- **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

- **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, **8** (suppl 1): 116–117.

For book

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE DISSERTATION FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Dissertation	50
Viva Voce	50
Total	**100**

Selecting the Dissertation Topic
It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:
- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation
This will entail following:
- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline
It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.
- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records

This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format

All students must follow the following rules in submitting their dissertation.

- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words)
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation

- A4 size Paper

- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).
2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:	40%
(Based on Abstract, Regularity,	
Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	20
Conceptual Framework,	05
Objectives & Methodology and	05
Implications & Conclusions	10
Viva & Presentation	20

Amity School of Applied Sciences

Bachelor of Science (Chemistry) (Honors)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

B.Sc (Honors) Chemistry (Total Credits 150)

Syllabus- First Semester

INORGANIC CHEMISTRY-I

Course Code: CHY2101 **Credit Units: 03**

Course Objective: This will cover the fundamental concepts of inorganic chemistry at the undergraduate level. The main objective is to prepare students for the study of the basic inorganic chemistry, particularly in areas covered by the topics listed below.

Course Contents:

Module I: Atomic Structure

Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's uncertainty principle and its significance, Schrodinger's wave equation, significance of ψ and ψ^2. Quantum numbers and their significance.Normal and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions. Radial and angular distribution curves. Shapes of *s*, *p*, *d* and *f* orbitals. Contour boundary and probability diagrams. Pauli's exclusion principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number.

Module II: Periodicity of Elements:

s, *p*, *d*, *f* block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to *s* &*p*- block.

(a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.

(b) Atomic radii (van der Waals)

(c) Ionic and crystal radii.

(d) Covalent radii (octahedral and tetrahedral)

(e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.

(f) Electron gain enthalpy, trends of electron gain enthalpy.

(g) Electronegativity, Pauling's/Mulliken's/Allred Rachow's/Mulliken-Jaffe's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity.Sanderson's electron density ratio.

Module III: Acids and Bases:

Arrhenius Theory, Bronsted- Lowry concept of acid-base reaction, solvated proton, relative strength of acids, types of acid-base reactions, levelling solvents, Lewis acid-base concept, Classification of Lewis acids, Hard and Soft Acids and Bases (HSAB) Application of HSAB principle.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Lee, J.D. *Concise Inorganic Chemistry*, ELBS, 1991.
2. Douglas, B.E. and Mc Daniel, D.H., *Concepts & Models of Inorganic Chemistry*, Oxford, 1970
3. Atkins, P.W. & Paula, J. *Physical Chemistry*, Oxford Press, 2006.
4. Day, M.C. and Selbin, J. *Theoretical Inorganic Chemistry*, ACS Publications 1962.

ORGANIC CHEMISTRY-I

Course Code: CHY2102 **Credit Units: 03**

Course Objective: The main objective is to prepare students for the study of some fundamentals of the organic chemistry like reaction mechanism, Concept of nucleophile, electrophile, types of reagent used in synthesis of organic compounds, stereochemistry and the structure of various hydrocarbons and their derivatives.

Course Contents:

Module I: Structure and Bonding

Hybridizations, Bond lengths and bond angles, bond energy, Localized and delocalized chemical bond, van-der Waals interactions, inclusion compounds, clatherates, charge transfer complex, resonance, hyperconjugation, aromaticity, inductive , mesomeric, elecromeric and field effects, hydrogen bonding.

Module II: Types of Reagents

Electrophiles and nucleophiles.Types of organic reactions.Energy consideration. Reactive intermediates-carbocations, carbanions, free radicals and carbenes. Methods of determination of reaction mechanism.

Module III: Mechanism of Organic reactionsand Stereochemistry

Curved arrow notations, drawing electron movement with arrows, half headed and double headed arrow, homolytic and heterolytic bond cleavage,relative and absolute configurations, sequence rules, D &L, R & S systems of nomenclature, Newman projection and Saw horse formulae, Fischer and Flying wedge formulae.concept of isomerism, types of isomerism, optical isomerism, elements of symmetry, molecular chirallity, enantiomers, stereogenic centres, Eliel and Epling modification, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, distereoisomers, mesocompounds, resolution of enantiomers, inversion, retention and racemization.

Module IV: Alkanes and alkenes

IUPAC nomenclature, classification, isomerism in alkanes, sources and methods of preparation (with special reference to Wurtz, Kolbe,CoreyHouse reactions and decaroxylation of carboxylic acids).Physical properties and chemical reactions of alkanes.Mechanism of free radical halogination of alkanes.

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions.Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti hydroxylation (oxidation).

1, 2- and 1, 4- addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene. Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistry of NaturalProducts*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. & Wilen, S. H. *Stereochemistry of Organic Compounds*; Wiley: London, 1994.
5. Stereochemistry by D Nasipuri or PS Kalsi

PHYSICS-I

Course Code: CHY2106 **Credit Units: 02**

Course Objective: An important objective of the course is to develop an understanding of 'core physics' at successively deeper levels, each stage revealing new phenomena and greater insight into the properties of matter. Heat, electricity and magnetism, Sound waves and optics

Course Contents:

Module I: Properties of matter

Elasticity: Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending. Torsion: Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Rigidity Modulus – Determination of rigidity modulus by Torsional oscillation (without masses). Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula – Comparison of viscosities of two liquids by graduated burette method. Surface Tension: Surface Tension – Excess of pressure inside a curved surface – Synclatic system – Surface Tension and interfacial surface tension by the method of drops.

Module II: Heat

Heat: Specific heat – Properties of heat, Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power

Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Liquification of gases

Module III: Electricity and Magnetism

Coulomb's Law, Electric Field, Electric Flux, Gauss's law of Electrostatics, Magnetic field; The magnetic dipole; Current and the magnetic field; Gauss's law Ampere's Law- Motion of charged particle in an EM field,Faraday's Laws of Electromagnetic Induction- Maxwell's equation (no derivation).

Module IV: Physical optics

Physical Optics:

Coherence - Interference

Diffraction: Types of diffraction-Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source

Polarisation: Optical activity – Specific rotation – Polarimeter

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).

APPLIED MATHEMATICS-I

Course Code: **CHY2105** **Credit Units: 02**

Course Objective: To Explore the Fundamental Concepts of Mathematics

Course Contents:

Module I: Algebra
Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) -Summation -Simple problems.

Module II: Theory of equations
Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

Module III: MATRICES
Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Rank of a matrix -Consistency of equations - Eigen roots and eigen vectors - Cayley-Hamilton theorem (without proof)-Verification and computation of inverse matrix.

Module IV: Differential calculus
Introduction, Fundamental formulae, rules of differentiation, Differentiation of logarithmic functions, parametric functions, implicit functions, n-th derivatives - Leibnitz theorem (without proof) and applications – Jacobians

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:
1.P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II.Muhil Publishers, Chennai.
2. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol.I & II.Tata McGraw Hill, New Delhi.
3. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
4. P.R.Vittal (2003) *Allied Mathematics* . Marghan Publications, Chennai
5. P.Kandasamy, K.Thilagavathy, (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.

INORGANIC CHEMISTRY LAB-I

Course Code: CHY2103 **Credit Units: 01**

Course Contents:

[I] Titrimetric Analysis

(i) Calibration and use of apparatus

(i) Preparation of solutions of different Molarity/Normality of titrants

[II] Acid- Base Titrations

(i) Estimation of carbonate and hydroxide present together in mixture.

(ii) Estimation of carbonate and bicarbonate present together in a mixture.

(ii) Estimation of free alkali present in different soaps/detergents

[III] Oxidation- Reduction Titrimetry

(i) Estimation of Fe(II) and oxalic acid using standardized $KMnO_4$ solution.

(ii) Estimation of oxalic acid and sodium oxalate in a given mixture.

(iii) Estimation of Fe(II) with $K_2Cr_2O_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ORGANIC CHEMISTRY LAB-I

Course Code: CHY2104 **Credit Units: 01**

Course Contents:

1. Calibration of the thermometer.
2. Purification of organic compounds by crystallization using the following solvents: Water, Alcohol, Alcohol-Water & Charcoal
3. Purification by Distillation, Decolouration and Sublimation.
4. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)
5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
6. Determination of boiling point of liquid compounds. (Boiling point lower than and more than 100° C by distillation and capillary method)
7. Chromatography
   a. Separation of a mixture of two amino acids by ascending and horizontal paper chromatography.
   b. Separation of a mixture of two sugars by ascending paper chromatography.

c.Separation of a mixture of o- and p-nitrophenol or o- and p-aminophenol by thin layer chromatography (TLC)

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICS LAB-I

Course Code: CHY2107 **Credit Units: 01**

Course Contents:

1. Youngs modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton's Law of Cooling.
7. Sonometer – Determining A.C. Frequency (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton's Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.

Any other experiment carried out in the class.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus- Second Semester

PHYSICAL CHEMISTRY-I

Course Code: CHY2201 **Credit Units: 03**

Course Objective: Objective of the course is to make students well aware of different states of matters and their properties along with some fundamentals of energy like average kinetic energy, law of equipartition of energy and heat capacity

Course Contents:

Module I: Gaseous state

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity.

Deviations from ideal gas behaviour, compressibility factor *Z*, and its variation with pressure for different gases. Causes of deviation from ideal behaviour.van der Waals equation of state, its derivation and application in explaining real gas behaviour, virial equation of state; van der Waals equation expressed in virial form and calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

Module II: Liquid state:

Qualitative treatment of the structure of the liquid state; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity.Temperature variation of viscosity of liquids and comparison with that of gases.

Module III: Solid state:

Nature of the solid state, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals.

Module IV: Velocities

Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 8th Ed., OxfordUniversity Press (2006).
2. Ball, D. W. *Physical Chemistry* Thomson Press, India (2007).
3. Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa (2004).
4. Mortimer, R. G. *Physical Chemistry* 3rd Ed. Elsevier: NOIDA, UP (2009).

ANALYTICAL CHEMISTRY

Course Code: CHY2202 **Credit Units: 03**

Course Objective: To help the student to develop the habit of accurate manipulation and an attitude ofcritical thinking and to learn the basic analytical methods and appreciate what is involved in an analysis.

Course Contents:

Module I:

Data analysis – theory of errors – idea of significant figures and its importance with examples – precision – accuracy – methods of expressing accuracy . Error analysis – minimizing errors – method of expressing precision – average deviation –standard deviation.

Module II: Separation and purification techniques

General purification techniques

Purification of solid organic compounds, recrystallisation, use of miscible solvents, use of drying agents and their properties, sublimation.Purification of liquids. Experimental techniques of distillation, fractional distillation, distillation under reduced pressure. Extraction, use of immiscible solvents, solvent extraction.Chemical methods of purification and test of purity.

Chromatography

Principle and application of adsorption, partition chromatography, Column chromatography, Thin Layer Chromatography, Paper chromatography, Ion exchange chromatography, Gas Chromatography.

Module III: Titrimetric methods of analysis

General Introduction: General principle. Types of titrations.Requirements for titrimetric analysis. Concentration systems: Molarity, formality, normality, wt% ppm, milliequivalence and millimoles-problems. Primary and secondary standards, criteria for primary standards, preparation of standard solutions, standardization of solutions.Limitation of volumetric analysis, endpoint and equivalence point.

Acid-base Equilibria: pH of strong and weak acid solutions. Buffer solutions.Henderson equations.Preparation of acidic and basic buffers.Relative strength of acids and bases from Ka and Kb values.Neutralisation-titration curve, theory of indicators, choice of indicators.Use of phenolphthalein and methyl orange.

Complexometric titrations: Stability of complexes, titration involving EDTA. Metal ion indicators and characteristics.

Module IV: Solubility equilibria

General Separation Techniques: Solubility and solubility products, expressions for solubility products. Determination of solubility from solubility products.

Precipitation titrations: Argentometric titrations, indicators for precipitation titrations involving silver. Determination of chloride by Volhard's method.Adsorption indicators.

Gravimetric methods of analysis: Separation by precipitation, factors affecting solubility, gravimetric factor. Purity of precipitates, von Weiman ratio.Co-precipitation, post precipitation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. D.A. Skoog, D.M. West and F.J. Holler, *Analytical Chemistry: An Introduction*, 5th edition, Saunders college publishing, Philadelphia, 1990.
2. R. Gopalan, *Analytical Chemistry*, S. Chand and Co., New Delhi
3. *Elementary Organic Spectroscopy: Principles and Chemical Applications*, S.Chand and company Ltd., Ram Nagar, New Delhi, 1990.

4. V.K. Srivastava, K.K. Srivastava, *Introduction to Chromatography: Theory and Practice*, S. Chand and company, New Delhi, 1987.
5. A.K. Srivastava, P.C. Jain, *Chemical Analysis: An Instrumental Approach* for B.Sc. Hons. and M.Sc. Classes, S. Chand and company Ltd., Ram Nagar, New Delhi.
6. Analytical Chemistry - S.M. Khopkar - New Age International.
7. Instrumental Methods of Chemical Analysis – Chatwal - Anand-Himalaya Publishing house - (2000).

PHYSICS-II

Course Code: CHY2206 **Credit Units: 02**

Course Objective: An important objective of the course is to develop an understanding of physics at successively deeper levels with a greater insight into the topics such as wave mechanics and nuclear and energy physics along with electronics.

Course Contents:

Module I: Wave mechanics

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

Module II: Nuclear physics

Rutherford's Experiment – Stability of nucleus.The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions. Artificial Transmutation

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy –Biological effects of radiation – control of radiation hazards.

Module III: Energy physics

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

Module IV: Fiber optics & Electronics

Fibre Optics: Principle – classification of optical fibres – fiber optic communication system block diagram.

Electronics : Zener diode – Characteristics – Voltage regulation using zener diode – LED – uses of LED.

Digital Electronics: AND, OR, NOT, NAND and NOR gates – NAND and NOR as universal building blocks – Fabrication of a Integrated circuit by monolithic technology – Advantages and limitations of an integrated circuit – LSI, MSI and VLSI.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Modern Physics – R. Murugesan S. Chand & Co. (2004).
5. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
6. Renewable & Sustainable energy sources – Agarwal.
7. Introduction to Fiber optics by K. Thyagarajan and Ajay Ghatak, Cambridge, University Press (1999).

APPLIED MATHEMATICS-II

Course Code: CHY2205 **Credit Units: 02**

Course Objective: To Explore the Fundamental Concepts of Mathematics

Course Contents:

Module I: Integral Calculus

Introduction, fundamental formulae, method of integration, by parts, partial fraction, Bernoulli's formula for integration by parts - Reduction formulae for: $\int x^m e^{ax} dx$, $\int \sin^n x dx$, $\int \cos^n x dx$ (with proof & problems), $\int \sin^m x \cos^n x\, dx$ (no proof, problems only), properties of definite integrals and simple problems.

Module II: Application of Integration

Evaluation of double, triple integrals, Simple applications to area, volume, Fourier series for functions in $(0, 2\pi)$ and $(-\pi, \pi)$.

Module III: Laplace Transforms

Laplace Transformations of standard functions and simple properties, Inverse Laplace transforms, Applications to solutions of linear differential equations of order 1 and 2, simple problems

Module IV: Vector Analysis

Scalar point functions - Vector point functions, Gradient,divergence, curl, Directional derivatives, Unit to normal to a surface, Line and surface integrals, Gauss, Stoke's and Green's theorems(without proofs), Simple problem based on these Theorems.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II. Muhil Publishers, Chennai
2. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol.I & II.Tata McGraw Hill, New Delhi.
3. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
4. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
5. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.

PHYSICAL CHEMISTRY LAB-I

Course Code: CHY2203 **Credit Units: 01**

Course Contents:

(I) **Surface tension measurements** (use of organic solvents excluded).

a) Determine the surface tension by (i) drop number (ii) drop weight method.

b) Study the variation of surface tension of detergent solutions with concentration

(II) **Viscosity measurement using Ostwald's viscometer** (use of organic solventsexcluded).

(a) Study the effect of the addition of solutes such as (i) polymer (ii) ethanol (iii) sodium chloride on the viscosity of water at room temperature.

(b) Study the effect of variation of viscosity of an aqueous solution with the concentration of solute.

(III) **pH measurements**

(a) Measurement of pH of different solutions using pH-meter.

(b) Preparation of buffer solutions

(i) Sodium acetate-acetic acid

(ii) Ammonium chloride-ammonium hydroxide

(c)Measurement of the pH of buffer solutions and comparison of the values

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

ANALYTICAL CHEMISTRY LAB

Course Code: CHY2204 **Credit Units: 01**

Course Contents:

Module I: Separation Techniques

1. Chromatography: (a) Separation of mixtures

(i) Paper chromatographic separation of Fe^{3+}, Al^{3+}, and Cr^{3+}

(ii) Separate and identify the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Report the Rf values.

(b) Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their Rf values.

(c) Chromatographic separation of the active ingredients of plants, flowers and juices by TLC

2. Solvent Extractions:

To separate a mixture of Ni^{2+}& Fe^{3+} by complexing with DMG and extracting the Ni^{2+} DMG complex in chloroform, and determine its concentration with spectrophotometry.

3. Determine the pH of given aerated drinks fruit juices, shampoos and soaps.

4. Analysis of soil:

(i) Determination of pH of soil.

(ii) Total soluble salt

(iii) Estimation of calcium, magnesium, phosphate, nitrate

6. Ion exchange:

(i) Determination of exchange capacity of cation exchange resins and anion exchange resins.

(ii) Separation of metal ions from their binary mixture.

(iii)Separation of amino acids from organic acids by ion exchange chromatography.

7. Determination of pKa values of indicator using spectrophotometry.

8.Determination of dissolved oxygen in water.

9. Determination of chemical oxygen demand (COD).

10. Determination of Biological oxygen demand (BOD).

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICS LAB-II

Course Code: CHY2207 **Credit Units: 01**

Course Contents:

1. Spectrometer Grating – Minimum Deviation – Mercury Lines.

2. Spectrometer – Refractive Index of a liquid – Hollow Prism.

3. Potentiometer – Calibration of High Range Ammeter.

4. Potentiometer – Calibration of Low Range Voltmeter.

5. Determination of M and BH using Deflection Magnetometer in Tan C position and vibration magnetometer.

6. Figure of merit and voltage sensitiveness of table galvanometer.

7. Construction of AND, OR gates using diodes and NOT by transistors.

8. Zener diode – Voltage Regulation.

9. NAND / NOR as universal gate.

10. Demorgan's theorem verification.

Any other experiments can be carried out in class.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus- Third Semester

INORGANIC CHEMISTRY-II

Course Code: CHY2301 **Credit Units: 03**

Course Objective: Objective of the course is to make students well aware of different types of bonds leading to formation of various compounds and various theories explaining bond formation.

Course Contents:

Module I: lonic & Covalent bond

General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals.Born-Lande equation with derivation and importance of Kapustinskii expression for lattice energy.Madelung constant, Born-Haber cycle and its application, Solvation energy, Lewis structure.Covalent character in ionic compounds, polarizing power and polarizability.Fajan's rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference.

Module II: Bond Theory

Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons, multiple bonding (σ and π bond approach), and bond lengths. Valence Bond theory (Heitler-London approach) & its limitations, Energetics of hybridization, equivalent and non-equivalent hybrid orbitals.Bent's rule, Resonance and resonance energy, Molecular orbital theory.Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, C_2, B_2, F_2, CO, NO and their ions; HCl, BeF_2, CO_2, (idea of s-p mixing and orbital interaction to be given). Formal charge

Module III: Metallic Bond:

Qualitative idea of valence bond and band theories.Semiconductors and insulators, defects in solids.

Module IV: Weak Chemical forces:

van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Huheey, J.E. *Inorganic Chemistry*, Prentice Hall 1993
2. Douglas, B.E. and Mc Daniel, D.H., *Concepts & Models of Inorganic Chemistry*, Oxford1970
3. Lee, J.D. *Concise Inorganic Chemistry*, ELBS (1991)
4. Shriver & Atkins, *Inorganic Chemistry*, Third Edition, Oxford Press 1994.
5. H.W. Porterfield, *Inorganic Chemistry*, Second Edition, Academic Press, 2005.

ORGANIC CHEMISTRY-II

Course Code: CHY2302 **Credit Units: 03**

Course Objective: Course objective is to teach students concept of aromaticity and various reactions of aromatic as well as non aromatic compounds. This course also imparts the knowledge of different functional groups and the way how to incorporate the desired functionality in a given compound.

Course Contents:

Module I: Arenes and Aromaticity

Nomenclature of benzene derivative, Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure. MO picture.Aromaticity the Huckel rule, aromatic ions. Aromatic electrophilic substitution general pattern of the mechanism, role of (a and n complexes) Mechanism of nitration, halogenations, sulphonation, mercuration and Friedel-Crafts reaction Energy profile diagrams. Activating and deactivating substituents. orientation and ortho/para ratio. Side chain reactions of benzene derivatives.Birch reduction. Methods of formation and chemical reactions of alkylbenzenes, alkynylbenzenes and biphenylAromaticity: Huckel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples (Pinacol- Pinacolone rearrangement). Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups.

Module II: Chemistry of Halogenated hydrocarbons:

Alkyl halides: Methods of preparation, nucleophilic substitution reactions – SN_1, SN_2 and SN_i mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs elimination.

Aryl halides: Preparation, including preparation from diazonium salts. nucleophilic aromatic substitution; SNAr, Benzyne mechanism

Relative reactivity of Alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

Organometallic compounds of Mg and Li – Use in synthesis of organic compounds. Synthesis and uses of DDT and BHC, Freon.

Module III: Alcohols, Phenols, Ethers and epoxide:

Alcohols: preparation, properties and relative reactivity of 1^0 2^0, 3^0 alcohols, Bouvaelt-Blanc Reduction; Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer – Tiemann and Kolbe's – Schmidt Reactions, Fries and Claisen rearrangements with Mechanism.Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and $LiAlH_4$

Module IV: Cycloalkanes & their conformational analysis

Types of cycloalkanes nomenclature, methods of preparations and relative stability, Baeyer strain and Pitzer strain theory and its limitations, ring strain in cyclopropane and cyclobutanes. Theory of stainless rings chemical reactions, Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Recommended Texts:

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

PHYSICAL CHEMISTRY-II

Course Code: CHY2303 **Credit Units: 03**

Course Objective: Course gives an overview of Ionic and chemical equillibiria in solution and gaseous state. This course also imparts basic knowledge regarding various properties of solution such as relative lowering of vapour pressure, elevation of boiling point, Depression of freezing point and osmotic pressure

Course Contents:

Module I: Ionic equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di- and tri- protic acids (exact treatment).Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body.Solubility and solubility product of sparingly soluble salts – applications of solubility product principle. Qualitative treatment of acid – base titration curves (calculation of pH at various stages). Theory of acid – base indicators; selection of indicators and their limitations.Multistage equilibria in polyelectrolyte systems; hydrolysis and hydrolysis constants.

Module II: Chemical equilibrium:

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibriain ideal gases, concept of fugacity.Thermodynamic derivation of relation between Gibbs freeenergy of reaction and reaction quotient,Coupling of exothemic and endothermic reactions,Equilibrium constants and their quantitative dependence on temperature, pressure andconcentration. Free energy of mixing and spontaneity; thermodynamic derivation of relationsbetween the various equilibrium constants *Kp, Kc* and *Kx*. Le Chatelier principle (quantitativetreatment); equilibrium between ideal gases and a pure condensed phase.

Module III: Solutions and colligative properties:

Dilute solutions, Raoult's and Henry's Laws and their applications, Excess thermodynamic functions.Thermodynamic derivation using chemical potential to derive relations between the fourcolligative properties. Applications incalculating molar masses of normal, dissociated and associated solutes in solution.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Recommended Texts:

1. Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 8th Ed., OxfordUniversity Press (2006).
2. Ball, D. W. *Physical Chemistry* Thomson Press, India (2007).
3. Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa (2004).
4. Mortimer, R. G. *Physical Chemistry* 3rd Ed. Elsevier: NOIDA, UP (2009).

BIOCHEMISTRY

Course Code: CHY2304 **Credit Units: 03**

Course Objective: The course is designed to equip students with a broad understanding of the chemical and molecular events involved in biological processes. It provides a foundation for careers in medicine, biotechnology, or research in all branches of the biological sciences. The general objective is to ensure that the students learn the necessary chemical and physical chemical background of naturally occurring compounds such as carbohydrate, proteins, lipids, nucleic acids and amino acids.

Course Contents:

Module I:

Chemistry of Carbohydrates: Definition and Classification of carbohydrates, Open chain, cyclic structure of monosaccharides (Haworth formula) for glucose and fructose.Disaccharides-sucrose and lactose.Physical properties-mutarotation and Killiani Fischer synthesis and Ruff degradation. synthesis.Chemical properties-Oxidation, reduction, osazone formation.Disaccharide-sucrose and lactose-occurrence, structure; Physical and chemical properties. Polysaccharides: starch and cellulose-occurrence, structure, physical and chemical properties.

Module II:

Chemistry of aminoacids: Definition and classification of aminoacids, common properties of aminoacids, amphoteric nature, isoelectric point, iselectric pH and Zwitter ion. Reaction with ninhydrin, 1-fluoro-2, 4-dinitronitrobenzene (FDNB) and Sieg Fried—s carbamino reaction.

Module III:

Chemistry of Proteins: Classifications-shape and size, solubility and physical properties and functional properties. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary. N-terminal determination-Edman-s and Dansyl chloride method.C-terminal determination-Van-Slyke reaction, Phosgene reaction.

Module IV:

Chemistry of Lipids: Definition, classification and functions. Occurrence, chemistry and biological functions-simple lipids: tertiary compound lipids (e.g. phospholipids), derived lipids: steroids (e.g. cholesterol). Saturated fatty acids: arachidic acid. Unsaturated fatty acids: linolenic acid, Physical property-emulsification.Chemical properties-saponification, rancidity, definition of acid number, saponification number, iodine number and Reichert-Meissl number.Bile acid and bile salt functions.

Module V:

Chemistry of Nucleic acids: Definition, nucleoside, nucleotide and polynucleotide, Double helical model of DNA and its biological functions. Structure of RNA: tRNA, mRNA and rRNA-occurrence, chemistry and its biological functions. Differences between DNA and RNA properties: cot curve and cot value, Tm, hypo and hyper chromicity.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text &References :

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.
2. Harper—s Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books. 25th edition.
3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.
6. Biomolecules-C. Kannan , MJP Publishers,Chennai-5.

INORGANIC CHEMISTRY LAB-II

Course Code: CHY2305 **Credit Units: 01**

Course Objective: To provide training and experience in practical aspects of inorganic chemistry including preparation of some important inorganic compounds and estimation of some ions like Cu(II) ion etc

Course Contents:

Module I: Iodo / Iodimetric Titrations

(i) Estimation of Cu (II) and $K_2Cr_2O_7$ Using sodium thiosulphate solution (Iodimetrically).

(ii) Estimation of (i) arsenite and (ii) antimony in tartar-emetic iodimetrically

(iii) Estimation of available chlorine in bleaching powder iodometrically.

Module II: Inorganic preparations

(i) Cuprous Chloride, Cu_2Cl_2

(ii) Preparation of Manganese (III) phosphate, $MnPO_4.H_2O$

(iii) Preparation of Aluminium Potassium sulphate $KAl(SO_4)_2.12H_2O$ (Potash alum) or Chrome alum.

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Recommended Texts:

1. Vogel, A.I. A text book of quantitative Inorganic Analysis, ELBS. 1978.

ORGANIC CHEMISTRY LAB-II

Course Code: CHY2306 **Credit Units: 01**

Course Objective: To provide experience in practical aspects of qualitative analysis of unknown organic compounds and detection of functional groups present.

.**Course Contents:**

1. Systematic analysis of extra elements in the given unknown compounds
2. Tests for following functional groups and unsaturation.
3. Qualitative analysis of the following types of unknown organic compounds
    a. Carboxylic acids
    b. Phenols
    c. Alcohols
    d. Aldehydes
    e. Ketones
    f. Esters
        a. Carbohydrates
        b. Primary, secondary and tertiary amines
        c. Nitro compounds
        d. Amides
        e. Aryl halides
        f. Hydrocarbons

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICAL CHEMISTRY LAB-II

Course Code: CHY2307 **Credit Units: 01**

Course Objective: To provide training in practical aspects of physical chemistry including determination of heat capacity, enthalpy of ionization, enthalpy of hydration of given compound. The course also involves determination of basicity/proticity of a polyprotic acid by the thermochemical method.

Course Contents:
(I) Thermochemistry
(a) Determination of heat capacity of a calorimeter for different volumes using change ofenthalpy data of a known system (method of back calculation of heat capacity ofcalorimeter from known enthalpy of solution or enthalpy of neutralization).
(b) Determination of heat capacity of the calorimeter and enthalpy of neutralization ofhydrochloric acid with sodium hydroxide.
(c) Calculation of the enthalpy of ionization of ethanoic acid.
(d) Determination of heat capacity of the calorimeter and integral enthalpy (endothermicand exothermic) solution of salts.
(e) Determination of basicity/proticity of a polyprotic acid by the thermochemicalmethod in terms of the changes of temperatures observed in the graph of temperatureversus time for different additions of a base. Also calculate the enthalpy ofneutralization of the first step.
(f) Determination of enthalpy of hydration of copper sulphate.
(g) Study of the solubility of benzoic acid in water and determination of ΔH.

(II) Indexing of given powder diffraction pattern of a cubic crystalline system.
(III) To determine the enthalpy of neutralization of a weak acid/ weekbase versus base/ strong acid and determine the enthalpy ofionization of the weak acid base.
(IV) Determination of critical solution temperature and composition of the phenol-watersystem and to study the effect of impurities on it.

(V) Phase equilibria: Construction of the phase diagram of (i) simple eutectic and (ii)congruently melting systems, using cooling curves and ignition tube methods.

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Any other experiment carried out in the class.
Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

INDUSTRIAL CHEMISTRY

Course Code: CHY2308 **Credit Units: 03**

Course Objective: To enable a student to understand the generation of energy from various types of fuels and various manufacturing methods and types of glass, sugar, cement and soap & detergent.

Course Contents:

Module I: Industrial fuels

Energy: Sources: non-renewable, classification of fuels: solid, liquid and gaseous, Calorific value of fuels and its determination.

Solid fuels: Coal: types – properties and uses – lignite, sub-bituminous coal, bituminous coal andanthracite Coking and non-coking coal.

Liquid fuels: Refining of crude petroleum and uses of fractions, Hydrodesulphurisation, Cracking: thermal and catalytic (fixed bed and fluidised bed cataylsis), Octane number, Cetane number.

Gaseous fuels: Natural gas and gobar gas: production, composition and uses, Gobar electric cell.

Module II: Glass industry

Introduction, classification of glass, basic raw materials of glass, manufacturing processes including chemical reactions, some special glasses: optical glass, coloured glass, fibre glass, laminate glass, safety glass, photosensitive glass, photochromatic glass, lead glass, borosilicate glass and glass wool.

Module III: Cement industry

Types of cement, manufacture of Portland cement, composition, setting and hardening of cement, Mortars and concrete, gypsum, plaster of paris, estimation of silica, alumina, calcium oxide and sulphates in Portland cement.

Module IV: Soaps and synthetic detergents

Manufacture of detergent, types of detergents, anionic, cationic, nonionic and amphoteric detergents, manufacture of soap, Liquid soap**.**

Module V: Sugar industry

Double sulphitation process, Refining and grading of sugar, Saccharin: synthesis and useas a sugar substitute – aspartame, Ethanol: manufacture from molasses by fermentation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. R. Norris Shreve and A. Joseph ,*Chemical process industries*, 4th ed.; Mc graw – hill Kogakusha, ltd: 1977.
2. George t. Austin. *Shreve's chemical process industries*, 5th ed.; Mc graw – hill: 1984.
3 P. C. Jain and M. Jain, *Engineering chemistry*, 10th ed.; Dhanpat Rai and sons, 1993.
4. P. Kamaraj, R. Jeyalakshmi and V. Narayanan, *Chemistry in engineering and technology*; sudhandhira publications, 2001.
5. J.C. Kuriakose and J. Rajaram, *Chemistry in engineering and technology. Vol 2.; M*c Graw-hill: new delhi, 1988.
6. Jugal Kishore Agrawal, *Practicals in Engineering Chemistry*; Oxford and IBH Publishing Co., New Delhi, 1976.
7. Organic Chemistry Vol.2 IL Finar 5th Edn. Longmans 1975
8.Industrial Chemistry by BK Sharma, Goel Publishing house Meerut.

BIOINORGANIC CHEMISTRY

Course Code: CHY2309 **Credit Units: 03**

Course Objective: Course objective is to give students an understanding of which metals are found in biological systems and why. To enable students to learn about the structure and function of several enzymes that activates small molecules. To make students learn about the goals and methods of chemists that aim to mimic biological systems. Course also describes selected organometallic and inorganic complexes that do a good job of mimicking biological catalysis.

Course Contents:

Module I: Scope of Bioinorganic Chemistry

Inorganic elements in biological systems, cells, biologically important compounds amino acids,proteins, nucleotides, carbohydrates and lipids, basic bioenergetics, classification of enzymes.Biochemistry: Distribution, biological roles, active transport of cations across membranes, the sodium pump, biology of calcium carriers, role in muscle contraction, enzyme stabilization,blood clotting and biological calcification

Module II: Metalloporphyrins

Structure and optical spectra; heme proteins: magnetic susceptibility and electronic spectra; hemoglobin and myoglobin: molecular structures, thermodynamics and kinetics of oxygenation, electronic and spatial structures, synthetic oxygen carriers, model systems; iron enzymes, peroxidase, catalase and cytochrome P-450

Module III: Metalloenzymes

Copper enzymes, superoxide dismutase, cytochrome oxidase and ceruloplasmin; Coenzymes; Molybdenum enzyme: xanthine oxidase; Zinc enzymes: carbonic anhydrase, carboxy peptidase and interchangeability of zinc and cobalt in enzymes; Vitamin B12 and B12 coenzymes; Iron storage, transport, biomineralization and siderophores, ferritin and transferrins.

Module IV: Metals in Medicine

Metal deficiency and disease; toxicity of mercury, cadmium, lead, beryllium, selenium and arsenic; biological defence mechanisms; chelation therapy; metals used for diagnosis and chemotherapy,platinum complexes as anticancer drugs, Pt-DNA binding, complexes of gold, copper,zinc, mercury, arsenic and antimony as drugs.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. S. J. Lippard & J. M. Berg. *Principles of Bioorganic Chemistry*, Panima Publ. Corpn. (2005).
2. E.-I. Ochiai. *Bioinorganic Chemistry – An Introduction*, Allyn and Bacon Inc. (1977).
3. M. N. Hughes. *The Inorganic Chemistry of Biological Processes*, Wiley (1981).
4. R.P. Hanzlik. *Inorganic Aspects of Biological and Organic Chemistry*, Academic Press (1976)
5. H. Kraatz & N. Metzler-Nolte (Eds.). *Concepts and Models in Bioinorganic Chemistry*, Wiley (2006).
6. I. Bertini, H. B. Gray, S. J. Dippard & J. S. Valentine, *Bioinorganic Chemistry*, Viva Books Pvt. Ltd. (2004).
7. A.W. Addison, W.R. Cullen, D. Dolphin & B.R. James (eds.). *Biological Aspects of Inorganic Chemistry*, John Wiley (1977).
8. R.J.P. Williams & J.R.R.F. Dasilva. *New Trends in Bioinorganic Chemistry*, Academic Press(1978).
9. A. E. Martel. *Inorganic Chemistry in Biology and Medicine*, ACS Symp. Series, ACS (1980).
10. S. J. Lippard. *Progress in Inorganic Chemistry: Bioinorganic Chemistry*, Vol. 38, John Wiley, (1990).
11. N. Kaim & B. Schwederski. *Bioinorganic Chemistry: Inorganic Elements in the Chenistry of Life*, John Wiley (1994).

Syllabus- Fourth Semester

INORGANIC CHEMISTRY-III

Course Code: CHY2401 **Credit Units: 03**

Course Objective: Objective of the course is to make students well aware of chemistry of s,p and d block elements, their properties, stable oxidation state and the important compounds derived from these elements, their properties, structure and preparation.

Course Contents:

Module I : Chemistry of *s* and *p* block elements:

General properties of s and p block elements. Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Complex formation tendency of *s* and *p* block elements, Hydrides and their classification ionic, covalent and interstitial.

Module II:

Study of the following compounds with emphasis on structure, bonding, preparation,properties and uses.

Basic beryllium acetate and nitrate, Boric acid and borates, boron nitrides, borohydrides (diborane) carboranes and graphitic compounds, silanes, Oxides and oxoacids of nitrogen, Phosphorus and chlorine. Peroxoacids of sulphur, interhalogen compounds, polyhalide ions, pseudohalogens,

Module III: Chemistry of Elements of First Transition Series

Characteristic properties & electronic configuration of d-block elements, Properties of first transition series,their Binary compounds (Carbides, Oxides and Sulphides), Extraction of Ni, Cu, Au.

Module IV: Transition elements

Chemistry of Elements of Second and Third Transition Series: General characteristics, comparative treatment with their 3d analogues in respect of ionic radii, oxidation states. magnetic behaviour, spectral properties.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Texts:

1. Greenwood, N.N. and Earnshaw, *Chemistry of the Elements*, Butterworth-Heinemann. 1997.
2. Lee, J.D. *Concise Inorganic Chemistry*, ELBS (1991).
3. Canham, G.R. and Overton, T., *Descriptive Inorganic Chemistry*, Freeman &Co.2006
4. Cotton, F.A. and Wilkinson, G, *Advanced Inorganic Chemistry*, Wiley, VCH, 1999.

ORGANIC CHEMISTRY-III

Course Code: CHY2402 **Credit Units: 03**

Course Objective: The main objective is to prepare students for the study of important reactions in organic chemistry along with the chemistry of carboxylic acids and amines and their derivatives.

Course Contents:

Module I: Carbonyl Compounds:

Structure, reactivity and preparation; Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisan-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and Benzil-Benzilic acid rearrangements, haloform reaction and Baeyer Villiger oxidation, α-substitution reactions, oxidations and reductions (Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$, MPV, PDC and PGC); Addition reactions of unsaturated carbonyl compounds: Michael addition.

Module II: Active methylene compounds

Keto-enol tautomerism,Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

Module III: Carboxylic Acids and their Derivatives:

Preparation, physical properties and reactions of monocarboxylic acids:Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic/phthalic, lactic, malic, tartaric, citric, maleic and fumaric acids.Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study ofnucleophilic sustitution at acyl group - Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann-bromamide degradation
and Curtius rearrangement

Module IV: Nitrogen Containing Functional Groups

Preparation and important reactions of nitro and compounds, nitriles and isonitriles Amines: Effect of substituent and solvent on basicity; Preparation and properties: Gabriel phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction; Distinction between 1^0, 2^0 and 3^0 amines with Hinsberg reagent and nitrous acid;Diazonium Salts: Preparation and their synthetic applications.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).

PHYSICAL CHEMISTRY-III

Course Code: CHY2403 **Credit Units: 03**

Course Objective: Course gives students an overview of thermodynamics involved in various processes in our surrounding, relation between heat and energy, different laws of thermodynamics, thermochemistry, different variable influencing state of a system and their interrelation.

Course Contents:

Module I: Chemical thermodynamics:

Intensive and extensive variables; state and path functions; isolated, closed and open systems;zeroth law of thermodynamics.*First law:* Concept of heat, *q*, work, *w*, internal energy *U* and statement of first law; enthalpy, *H*,relation between heat capacities, calculations of *q*, *w*, *U* and *H* for reversible, irreversible andfree expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.

Module II:Thermochemistry*:* Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature(Kirchoff's equations) and pressure on enthalpy of reactions, Adiabatic flame temperature, explosion temperature.

Module III: Second and Third Law of thermodynamics

Second Law: Concept of entropy; thermodynamic scale of temperature, statement of the secondlaw of thermodynamics; molecular and statistical interpretation of entropy, Calculation ofentropy change for reversible and irreversible processes.*Third Law:* Statement of third law, concept of residual entropy, calculation of absolute entropyof molecules.

ModuleIV:Free Energy Functions:

Gibbs and Helmholtz energy, variation of *S*, *G*, *A* with*T*, *V*, *P*; Free energy change and spontaneity. Relation between Joule-Thomson efectt inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state.

Module V: Systems of variable composition:

Partial molar properties, dependence of thermodynamic parameters on composition; Gibbs-Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 8th Ed., Oxford UniversityPress (2006).
2. Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa (2004).
3. Engel, T. & Reid, P. *Thermodynamics, Statistical Thermodynamics, & Kinetics*Pearson Education, Inc: New Delhi (2007).
4. McQuarrie, D. A. & Simon, J. D. *Molecular Thermodynamics* Viva Books Pvt. Ltd.:New Delhi (2004).

POLYMER CHEMISTRY

Course Code: CHY2404 **Credit Units: 03**

Course Objective: To know about the types of polymers, polymerization techniques and commercial polymers.

Course Contents:

Module I:

Polymers: Basic Concept, classification of polymers on the basis of structures and applications. Distinction among plastics, elastomers, and fibers, Homo and hetero polymers, copolymers, properties of polymers, glass transition temp. (T_g) - definition, factors affecting T_g, Relationship between Tg and molecular weight.

Module II:

Molecular Weight of polymers, Number average, weight average, sedimentation and viscosity, average molecular weights, Molecular weights and degree of polymerization.Reactions - Hydrolysis, Hydrogenation, addition, substitution, cross linking - vulcanization and cyclisation.

Module III:

Polymerization techniques: Bulk, solution, suspension & emulsion polymerization, melt polycondensation, Polymer processing, calendaring, die casting, rotational casting.

Module IV:

Chemistry of commercial polymers- General methods of preparation, properties and uses of the following - Teflon, polyethylene, polystyrene, polyesters, poly amides, polycarbonates and PVC.

Module V:

Advances in polymers; Bio-Polymers, biomaterials, polymers in medical field, High temperature and fire resistant polymers – synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes and polysulphates.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Text Book of Polymer Science, Bill meyer F.W. Jr. John Wiley & Sons 1984.
2. Polymer Science, Gowarikar. V.R. Viswanathan, N.V. Jayader Sreedhar.
3. Wiley Eastern Ltd., New Delhi, 2005
4. Polymer Chemistry, Sharma.B.K Goel Publishing House, Meerut- 1989.
5. Polymer Chemistry. Arora M.G. Vadar M.S. - Anmol publications (p) Ltd., New Delhi 1989.
7. Polymer Chemistry - An introduction - M.P. Stevens, oxford.

INORGANIC CHEMISTRY LAB-III

Course Code: CHY2405 **Credit Units: 01**

Course Objective: To provide training and experience in practical aspects of inorganic chemistry including estimation of Ca/Mg by complexometric titration and Cl^- ion determination.

Course Contents:

(a) Complexometric Titrations:

(i) Complexometric estimation of (i) Mg^{2+} (ii) Zn^{2+} using EDTA

(ii) Estimation of total hardnesss of water samples

(iii) Estimation of Ca^{2+} in solution by (substitution method) using Erio-chrome black-T as indicator.

(ii) Estimation of Ca/Mg in drugs and Biological samples.

(b) Argentometry

Estimation of Cl^- (i) By Mohr's method, (ii) By Vohlard's method, (iii) By Fajan's method.

(c) Paper Chromatographic separation of Ni (II) and Co(II); Cu(II) and Cd (II)

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Recommended Texts:

1. Vogel, A.I. A text book of quantitative Inorganic Analysis, ELBS. 1978.

ORGANIC CHEMISTRY LAB-III

Course Code: CHY2406 **Credit Units: 01**

Course Objective: To provide experience in separation techniques of mixture of organic compounds by means of thin layer chromatography and paper chromatography. Also it gives students a hands on experience involving preparation of synthetically important organic compounds.

Course Contents:

1. **Thin Layer Chromatography**:

   Determination of R_f values and identification of organic compounds.

   a. Separation of green leaf pigments (spinach leaves may be used)
   b. Preparation and separation of 2,4 - dinitrophenylhydrazones of acetone, 2-butanone, hexane-2 and 3-one using toluene and light petroleum (40:60) as solvent system.
   c. Separation of a mixture of dyes using cyclohexane and ethylacetate (8.5:1.5) as solvent system.

2. **Paper Chromatography**: **Ascending and Circular**

   a. Determination of R_f values and identification of organic compounds.
   b. Separation of a mixture of phenylalanine and glycine. Alanine and aspartic acid. Leucine and glutamic acid. Spray reagent-ninhydrin.
   c. Separation of a mixture of D, L-alanine, glycine and L-Leucine using n-butanol:acetic acid : water (4:1:5) Spray reagent-ninhydrin.
   d. Separation of monosaccharides- A mixture of D-galactose and D-fructose using n-butanol:acetone:water (4:1:5) Spray reagent aniline hydrogen phthalate.

3. Organic preparations

   a. Acetylation of amines and phenols
   b. Benzolyation of amines and phenols by Schotten-Baumann reaction
   c. Hydrolysis of amides and esters to obtain benzoic acid.
   d. 2,4-DNP, semicarbazone and oxime derivative of carbonyl compound
   e. Nitration of nitrobenzene, chlorobenzene & bromobenzene
   f. Oxidation of the benzaldehyde, benzyl alcohol acetophenone tobenzoic

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICAL CHEMISTRY LAB-III

Course Code: CHY2407 **Credit Units: 01**

Course Objective:

To provide training which involves determination of important property of fluids like surface tension , viscosity**.** It also enables student to compare strength of two acids and also to perform the potentiometric titration.

Course Contents:

1.To determine the velocity constant (specific reaction rate) of hydrolysis of methylacetate/ethyl acetate catalyzed by hydrogen ions at room temperature.

2. To compare the strength of HCl and H_2 SO_4 by studying the kinetics of hydrolysis of ester.

3. To study kinetically the reaction rate of decomposition of iodide by H_2O_2.

4. Determination of surface tension/percentage composition of given organic mixture usingsurface tension method.

5. Determination of viscosity/percentage composition of given organic mixture usingviscosity method.

(I) Study the equilibrium of at least one of the following reactions by the distributionmethod:

(i) $I_2(aq) + I^- \rightarrow I_3^-(aq)$

(ii) $Cu^{2+}(aq) + nNH_3 \rightarrow Cu(NH_3)_n^{2+}$

(II) Perform the following potentiometric titrations (at least two):

(i) Strong acid with strong base (ii) weak acid with strong base and (iii) dibasic acidwith strong base

(III) Potentiometric titration of Mohr's salt with potassium dichromate.

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

GREEN CHEMISTRY

Course Code: CHY2408 **Credit Units: 03**

Course Objective: To know the basics of Green Chemistry and its developments.

Course Contents:

Module I: Introduction

Need for green chemistry – principles of green chemistry – atom economy – definition with example (ibuprofen synthesis) – green oxidant – hydrogen peroxide.

Microwave assisted organic synthesis – apparatus required – examples of MAOS (synthesis of fused anthroquinones, acetalization of a byproduct of sugar industry, 1, 3-dipolar cycloaddition of nitrones to fluorinated dipolarophiles, Leukart reductive amination of ketones) – advantages and disadvantages of MAOS.

Organic reactions by sonication method – apparatus required – examples of sonochemical reactions (Heck, Hundsdiecker and Wittig reactions).

Module II: Green Reactions

Acetylation of primary amine, base catalyzed aldol condensation (synthesis of dibenzalpropanone), halogen addition to C=C bond (bromination of trans-stilbene), [4+2] cycloaddition reaction (Diels-Alder reaction between furan and maleic acid).

Rearrangement reaction (benzyl-benzilic acid rearrangement), coenzyme catalyzed benzoin condensation (thiamine hydrochloride catalyzed synthesis of enzoin, Pechmann condensation for coumarin synthesis (clay catalyzed solid state synthesis of 7-hydroxy-4-methylcoumarin).

Electrophilic aromatic substitution reactions (nitration of phenol, bromination of acetanilide) – green oxidation reactions (synthesis of adipic acid, preparation of manganese (III) acetylacetonate) – zeolite catalyzed Friedel-Crafts acylation.

Module III: Green Solvents

Ionic liquids: simple preparation – types – properties and application – ionic liquids in organic reactions (Heck reaction, Suzuki reactions, epoxidation), industrial (battery) and analytical chemistry (matrices for MALDI-TOF MS, gas chromatography stationary phases – advantages and disadvantages.

Super critical CO2 – preparation, properties and applications (decaffeination, dry cleaning) – environmental impact.

Diels-Alder reaction in water – catalysis in water (aerobic oxidation of alcohols catalyzed by Pd(II) / bathophenanthroline).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. Green Chemistry: Environmental Friendly Alternatives, Rs. Sanghi and M.M.Srinivatava, Narosa Publishing House, New Delhi.
2. Green Chemistry, V.K. Ahluwalia, Narosa, New Delhi (2011).
3. Methods and Reagents for Green Chemistry, P. Tundo, A. Perosa and F. Zechini, John Wiley & Sons Inc., New Jercy, (2007).

AGRICULTURE CHEMISTRY

Course Code: CHY2409 **Credit Units: 03**

Course Objective: To give the students the importance of Agricultural chemistry and an exposure to find, analyse and find a suitable method to cultivate and promote agricultural methods.

Course Contents:

Module I: Soil Chemistry

Introduction: Formation of Soil. Classification of soil and properties of soil - soil Acidity - Causes of acidity - soil alkalinity - determination of soil pH - Buffering of soils - Amending the soil - Reclamation of acid soil - Liming agents.

Module II: Soil Fertility and Productivity

Organic Manures - Farmyard Manure - Compost - Oil cakes - Bone meal - Meat meal - Fish meal - Blood meal and green Manures - Fertilizers - Classification of fertilizers - Requisites of a good fertilizers - Nitrogenous fertilizers - Phosphatic fertilizers - super Phosphate of lime - Triple super phosphate - NPK fertilizers - ill effects of fertilizers - effect of mixed fertilizers on soil pH - Micronutrients - role of micronutrients sources - Need for nutrient balance - Soil management and Micronutrients needs.

Module III: Pesticides

Classification of Insecticides - Stomach poisons - Contact poisons and Fumigants - Insecticides - Organic Insecticides - DDT - Gammexane - Malathion - Parathion - Fungicides - Herbicides - Rodenticides - Pesticides in India - Adverse environmental effects of pesticides.

Module IV: Plant growth regulators

3-Indole acetic acid, Naphthalene Acetic Acid, Ethepon (2-chloroethyl phosphoric acid), Alar (succinin acid-2, 2-dimethyhydrzine) their function, Plant hormones: Gibberlin, Cyclocel, Phosphon, Defoliants

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. Industrial Chemistry by B.K. Sharma. Goel Publishing House, Meerut.
2. Applied Chemistry by K.Bagavathi - Sundari, MJP Publishers.
3. Fundamental concept of Applied Chemistry by Jayashree Ghosh, S. Chand & Company Ltd.,
4. Chemical treatment of hides a leather by J. Partridge Noyes, Park Ridge,N.J.
5. Agricultural Chemistry Vol I & Vol II edited by B.A. Yagodin - New Century books (P) Ltd.,
6. The nature and properties of soils - IX Edition - Nyle.C.Bready - S.Chand. and Company Ltd.,
7. Soils and soil fertility - Louis M.Thompson - and Frederick. R.Troch - Tata Mc. Graw hill.
8. Text book of Soil Science - T.D. Biswas and S.K. Mukerijee - II Edition.
9. Soil Science - A.Sankara.
10. Nature and properties of soils - Harry, O. Buckman.

TERM PAPER

Course Code: CHY2431 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for term paper (List is indicative, not exhaustive)

- Inorganic chemistry
- Organic chemistry
- Physical chemistry
- Green chemistry
- Agricultre chemistry

Evaluation Scheme

Organisation and relevance of content	**Literature Review**	**Bibliography**	**Presentation**	**Total**
30	30	20	20	100

PROJECT

Course Code: CHY2432 **Credit Units: 03**
Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information/data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

- **a)*Introduction:*** This will cover the background, rationale/need/justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)*Conceptual Framework/National and International Scenario*:** (relating to the topic of the Project).
- **c) *Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
- **d)*Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
STEP III : Collection of information and data relating to the topic and analysis of the same.
STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings,
Chapter 4: Conclusion and Recommendations,
Chapter 5: Bibliography.

STEP V: The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation/Institution, if the student undertakes the Project Work in any Organisation/Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He/she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	**Power Point Presentation & Viva**
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... ..

submitted by me for the partial fulfilment of the degree of B.Sc. Honours in Chemistry is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:

Date:

WORKSHOP

Course Code: CHY2433 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nuclear Chemistry
- Modern trend in Inorganic Chemistry
- Modern trend in Organic Chemistry
- Modern trend in Physical Chemistry
- Nanotechnology and its application
- Polymer Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry
- Green Chemistry

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Quiz
- Quality analysis& characterization
- Identification and preparation of materials

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus- Fifth Semester

INORGANIC CHEMISTRY-IV

Course Code: CHY2501 **Credit Units: 03**

Course Objective: Objective of the course is to make students well aware of chemistry of lanthanides and actinides, properties of noble gases, non aqueous solvents and Inorganic polymers.

Course Contents:

Module I: Chemistry of Lanthanide Elements

Electronic configuration, oxidation states and ionic radii and lanthanide contraction & its consequences, complex formation, colour, spectral and magnetic properties, occurrence and isolation of lanthanide compounds.

Module Il: Chemistry of Actinides

General features, electronic configuration, oxidation states and chemistry of actinides, chemistry of separation of Np, Pu, and Am from U, similarities between the later actinides and the later lanthanides.

Module III: Noble gases:

Occurrence & uses, rationalization of inertness of noble gases, Clathrates, preparation and properties of XeF_2 and XeF_4, XeF_6; Nature of bonding in noble gas compounds (Valence bond treatment and MO treatment for XeF_2). Molecular shapes of noble gas compounds (VSEPR theory).

Module IV: Radioactivity

Discovery of radioactivity, α, β and γ radiations, the radioactive series, radioactive decay, modes of decay, the n/p ratio, odd even rule, artificial radioactivity, transmutation of elements, the G.M counter.

Positions of radioactive elements in periodic table, trans-uranides and trans-actinides, super heavy elements; nomenclature & predicted chemistry, Liquid-drop model, electron shell model, nuclear reactions, fission and fusion.

Module V: Non-aqueous Solvents

Physical properties of solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Greenwood, N.N. and Earnshaw, *Chemistry of the Elements*, Butterworth-Heinemann. 1997.
2. Lee, J.D. *Concise Inorganic Chemistry*, ELBS (1991).
3. Canham, G.R. and Overton, T., *Descriptive Inorganic Chemistry*, Freeman &Co.2006
4. Cotton, F.A. and Wilkinson, G, *Advanced Inorganic Chemistry*, Wiley, VCH, 1999.

ORGANIC CHEMISTRY-IV

Course Code: CHY2502 **Credit Units: 03**

Course Objective: The main objective is to transfer knowledge to students regarding some selected compounds comprising organometallic compounds, sulfur compounds, heterocyclic compounds and polynuclear aromatic hydrocarbons.

Course Contents:

Module I: Organometallic Compounds

Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions, Organozinc compounds: formation, chemical reactions and their limitations. Organolithlum compounds: formation, chemical reactions and their limitations.

Module II: Sulphur containing compounds

Preparation and reactions of thiols, thioethers and sulphonic acids.

Module III: Heterocyclic Compounds

Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine.Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution.Mechanism of nucleophilic substitution reactions in pyridine derivatives.

Comparison of basicity of pyridine, piperidine and pyrrole.Introduction to condensed five and six membered heteroeycles.Preparation and reactions of Indole, quinoline and isoquinolme with special reference to Fischer indole synthesis and Bischler-Napieral.Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

Module IV: Polynuclear Hydrocarbons

Reactions of naphthalene phenanthrene and anthracene Structure, Preparation and structure elucidation and important derivatives of naphthalene and anthracene, Polynuclear hydrocarbons.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Texts:

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt.Ltd. (Pearson Education).
2. Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
3. Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistry ofNatural Products*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

PHYSICAL CHEMISTRY-IV

Course Code: CHY2503 **Credit Units: 03**

Course Objective: Course gives students indepth knowledge of rate of reactions under topic chemical kinetics. Also it enables students to know about colloids and euillibiria between different phases of one component systems such as water, CO_2 and sulfur.

Course Contents:

Module I :Colloidal State

Definition of colloids, classification of colloids, Solids in liquids (sols): properties- Kinetic, optical and electrical; stability of colloids, protective action, Hardy-Schulz law, gold number. Liquidsin liquids (emulsions) types of emulsions, preparation.Emulsifier. Liquids in solids (gels):classification, preparation and properties, inhibition, genera applications of colloids.

Module II: Chemical Kinetics I

Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction concentration, temperature, pressure, solvent, light, catalyst concentration dependence of rates, mathematical characteristics of simple chemical reactions- zero. order, pseudo order, half life and mean life Determination of the order of reaction differential method, method of integration, method of half life period and isolation method.

Module III: Chemical Kinetics-II

Experimental methods of chemical kinetics-conductometric, potentiometic, optical methods,polarimetry and spectrophotometer. Theories of chemical kinetics: effect of temperature on rateof reaction, Arrhenius equation, concept of activation energy. Simple collision theory based onhard sphere model, transition state theory (equilibrium hypothesis) Expression for the rateconstant based on equilibr ium constant and thermodynamic aspects.

Module IV: Phase Equilibrium

Statement and meaning of the terms - phase, component and degree of freedom, derivation of Gibbs phase rule, ***phase equilibria of one component system*** - water, CO_2 and sulphur system.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Texts:

1.Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 8th Ed., Oxford UniversityPress (2006).
2.Ball, D. W. *Physical Chemistry* Thomson Press, India (2007).
3.Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa (2004).
4.Mortimer, R. G. *Physical Chemistry* 3rd Ed. Elsevier: NOIDA, UP (2009).

INORGANIC CHEMISTRY LAB-IV

Course Code: CHY2504 **Credit Units: 01**

Course Objective: To provide training and experience in practical aspects of **inorganic chemistry** including preparation of some important inorganic compounds and estimation of some ions like Cu (II) ion, Ni(II) ion etc

Course Contents:

(a) Quantitative Analysis: The following quantitative estimations are to be carriedout.

(i) Estimation of nickel(II) using Dimethylglyoxime as the precipitant.

(ii) Estimation of copper as CuSCN

(iii) Estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$ through (i)Heterogeneous and (ii) Homogeneous media.

(iv) Estimation of Al (III) by precipitating with oxine and weighing as $Al(oxine)_3$ (aluminium oxinate).

(b) Inorganic Preparations

(i) Tetraammine copper (II) sulphate, $[Cu(NH_3)_4]SO_4H_2O$

(ii) Potassium trisoxalatochromate (III), $K_3[Cr(C_2O_4)_3]$

(iii) Cis and trans $K[Cr(C_2O_4)_2\ (H_2O2)]$ Potassium dioxalatodiaquachromate

(iv) Pentaammine carbonato Cobalt(III) ion

(c) Spectrophotometric estimation of Ferrous ions by using 1,10 phenanthroline

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Recommended Texts:

1. Vogel, A.I. A text book of Quantitative Analysis, ELBS 1986.

ORGANIC CHEMISTRY LAB-IV

Course Code: CHY2505 **Credit Units: 01**

Course Objective:

To provide practical experience in organic preparation of azobenzene, benzpinacol and some other selected valuable organic compounds.

Course Contents:

Module 1:*Organic Preparations*

1. Diels-Alder reaction between anthracene and maleic anhydride
2. Reduction: nitrobenzene to azobenzene (TLC of the mixture), m-dinitrobenzene tom-nitroaniline
3. S-benzylisothiuranum salts of any one water soluble and one water insoluble acid:acetic acid, phenyl acetic acid, oxalic acid, benzoic acid, phthalic acid
4. Photochemical reduction of benzophenone to benzopinacol
5. Benzoin condensation of benzaldehyde (using thiamine hydrochloride)
6. Condensation of p-toluidine with benzaldehyde/salicylaldehyde/2-hydroxy-3-methoxy benzadehyde to get Schiff's base (solventless condensation)

Estimation of:

1. Phenol and aniline by bromination with potassium bromate-potassium bromide method
2. Glycine by formylation method
3. Saponification value of an oil/fat

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICAL CHEMISTRY LAB-IV

Course Code: CHY2506 **Credit Units: 01**

(I) To study changes in conductance in the following systems
(i) strong acid-strong base
(ii) weak acid-strong base and
(iii) mixture of strong acid and weak acid-strong base
(II) Study the kinetics of the following reactions.
1. Initial rate method: Iodide-persulphate reaction
2. Integrated rate method:
(a) Acid hydrolysis of methyl acetate with hydrochloric acid, volumetrically or conductometrically.
(b) Iodide-persulphate reaction
(c) Saponification of ethyl acetate.

Any other experiment carried out in the class.

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

FOOD & NUTRITION CHEMISTRY

Course Code: CHY2507 **Credit Units: 03**

Course Objective: To obtain knowledge about different foods, their nutritive values and food preservation.

Course Contents:

Module I:

Cereals definition - Classification, Processing - Structure of Cereals - Composition and nutritive value. Pulses definition - Classification - Processing - Structure of Pulses - Composition and nutritive value - Toxic Constituents in pulses - medicinal value of cereals and pulses.

Sugar and related products.Sugar Structure and Properties.Nutritive value - Sugar composition in different food items. Sugar related product - Classification & nutritive value. Artificial sweeteners - example - advantages and disadvantages.

Module II:

Vegetables - classification - composition & nutritive values - Fruits- Classification - Composition & nutritive values.

Fungi and algae as food - enzymatic browning and non enzymatic browning - Nutritive value of some common foods - milk, egg, soyabeans

Module III:

Beverages - definition and examples - Classification of beverages Fruit beverages - Milk based beverages - malted beverages - examples. Alcoholic and non alcoholic beverages - examples.Appetizers - definition - classification - examples - Water - functions and deficiency.

Module IV:

Food Preservatives - definition - classification - Food Spoilage - definition - Prevention.Methods of preservation - classification - Low and high temperature - preservatives examples - Dehydration - osmotic pressure - food irradiation.

Module V:

Food additives - Definition – classification - their functions - chemical substance.Packaging of foods - classification-Materials used for packaging.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. Food Science - III Edition - B. Sri Lakshmi, New Age International Publisher, 2005.
2. Food Chemistry - Lilian Hoagland Meyer CBS Publishers & Distributors, 2004.
3. Food Science, Nutrition and Health - Brian.A.Fox, Allan G.Cameron Edward Arnold, London.
4. Fundamentals of Foods and Nutrition - Mudambi. R.Sumathi, and Raja gopal, M.V. – Wiley Eastern Ltd., Madras.
5. Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd.,Bangalore.

QUANTUM CHEMISTRY

Course Code: CHY2508 **Credit Units: 03**

Course Objective: To obtain knowledge about quantum mechanics and LCAO-MO treatment of single electron system hydrogen.

Course Contents:

Module I:

Postulates of quantum mechanics, quantum mechanical operators, Schrodinger equation and its application to free particle and "particle-in-a-box" (rigorous treatment), quantization of energy levels, zero-point energy and Heisenberg Uncertainty principle; wave functions, probability distribution functions, nodal properties, Extension to two and three dimensional boxes, separation of variables, degeneracy.

Module II:

Angular momentum: Commutation rules, quantization of square of total angular momentum and z-component, Qualitative treatment of hydrogen atom and hydrogen-like ions: setting up of Schrodinger equation in spherical polar coordinates, radial part, quantization of energy (only final energy expression), radial distribution functions of 1*s*, 2*s*, 2*p*, 3*s*, 3*p* and 3*d* orbitals. Average and most probable distances of electron from nucleus.

Module III:

Covalent bonding, valence bond and molecular orbital approaches, LCAO-MO treatment of H^{2+}.Bonding and antibonding orbitals, Qualitative extension to H_2.

Comparison of LCAO-MO and VB treatments of H_2 and their limitations.Refinements of the two approaches (Configuration Interaction for MO, ionic terms in VB).Qualitative description of LCAO-MO treatment of homonuclear and heteronuclear diatomic molecules (HF, LiH). Localised and non-localised molecular orbitals treatment of triatomic (BeH_2, H_2O) molecules. Qualitative MO theory and its application to AH_2 type molecules. Simple Huckel Molecular Orbital (HMO) theory and its application to simple polyenes (ethene, butadiene).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & Reference:

1. Banwell, C. N. & McCash, E. M. *Fundamentals of Molecular Spectroscopy* 4th Ed.Tata McGraw-Hill: New Delhi (2006).
2. Chandra, A. K. *Introductory Quantum Chemistry* Tata McGraw-Hill (2001).
3. House, J. E. *Fundamentals of Quantum Chemistry* 2nd Ed. Elsevier: USA (2004).
4. Lowe, J. P. & Peterson, K. *Quantum Chemistry* Academic Press (2005).

TECHNICAL WRITING IN SCIENCE-I

Course Code: CHY2509 **Credit Units: 02**

Course Objective:

Students will be introduce to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Module I:

Writing Skills; Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing.

Module II:

Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.

Module III: Documentation Process

Understanding Audience/Readers, Collecting and Organizing information, Drafting information verbally and visually, Producing Information.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. M. Frank. Writing as thinking: *A guided process approach, Englewood Cliffs,* Prentice HallReagents.
2. L. Hamp-Lyons and B. Heasely: Study Writing; *A course in written English.* For academicand professional purposes, Cambridge Univ. Press.
3. R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the Englishlanguage*, Longman, London.
4. Daniel G. Riordan & Steven A. Panley: *"Technical Report Writing Today"* - Biztaantra.
5. Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition(2004).
6. *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004)

TERM PAPER

Course Code: CHY2531 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of chemistry and applied chemistry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inorganic chemistry
- Organic chemistry
- Physical chemistry
- Green chemistry
- Agricultre chemistry
- Food and Nutrition Chemistry
- Quantum Chemistry

Evaluation Scheme

Organisation and relevance of content	**Literature Review**	**Bibliography**	**Presentation**	**Total**
30	30	20	20	100

WORKSHOP

Course Code: CHY2533 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nuclear Chemistry
- Modern trend in Inorganic Chemistry
- Modern trend in Organic Chemistry
- Modern trend in Physical Chemistry
- Nanotechnology and its application
- Polymer Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry
- Green Chemistry
- Environmental Chemistry

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

7. Relevant study material and references will be provided by the trainer in advance.
8. The participants are expected to explore the topic in advance and take active part in the discussions held
9. Attending and Participating in all activities of the workshop
10. Group Activities have to be undertaken by students as guided by the trainer.
11. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
12. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Quiz
- Quality analysis & characterization
- Identification and preparation of materials

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus- Sixth Semester

INORGANIC CHEMISTRY-V

Course Code: CHY2601 **Credit Units: 03**

Course Objective: Objective of the course is to make students well aware of chemistry of coordination complexes, theories of Metal ligand bonding in coordination complexes, Spectral and magnetic properties of complexes.

Course Contents:

Module I : Coordination Chemistry

IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelate effect, polynuclear complexes, Labile and inert complexes. Werner's theory, valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding. Crystal field theory, measurement of 10 Dq, CFSE in weak and strong fields, pairing energies, factors effecting the magnitude of 10 Dq. Octahedral vs. tetrahedral coordination, tetragonal distortions from octahedral geometry Jahn-Teller theorem, square planar geometry. Qualitative aspect of Ligand field and MO Theory.

Module II : Metal ligand bonding in transition metal complexes

Limitations of valence bond theory, an elementary idea of crystal field thery, Crystal field splitting in octahedral, tetrahedral and squareplanner complexes, factors affecting the Crystal field parameters.

Module III : Thermodynamics and kinetic aspects of metal complexes

A brief out line of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planner complexes.

Module IV : Magnetic properties of transition metal complexes

Types of magnetic behaviour, Methods of determining magnetic susceptibility, spin (only formula) LS coupling, correlation of μs (spin only) and μeffective values. Orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Module V: Electron spectra of transition metal complexes

Types of electronic transitions, selection rules for d-d transition, spectroscopic ground states, spectrochemical series, Orgel energy level diagram for d1-d9 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Texts:

1. Purecell, K.F. and Kotz, J.C., *Inorganic Chemistry* W.B. Saunders Co. 1977.
2. Basolo, F, and Pearson, R.C., *Mechanisms of Inorganic Chemistry*, John Wiley &Sons, NY, 1967.
3. Greenwood, N.N. & Earnshaw A., *Chemistry of the Elements*, Butterworth-Heinemann,1997.

ORGANIC CHEMISTRY-V

Course Code: CHY2602 **Credit Units: 03**

Course Objective: The main objective of the course is to make students aware of important class of organic compounds having applications in day to day life such as alkaloids, terpenes, dyes and synthetic polymers.

Course Contents:

Module I: Alkaloids

Natural occurrence, General structural features, Isolation and their physiological action, Hoffmann's exhaustive methylation, Emde's modification, Structure elucidation and synthesis ofHygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine,and Reserpine.

Module II: Terpenes

Occurrence, classification, isoprene rule; Elucidation of stucture and synthesis of Citral, Neraland α- terpineol

Module III: Dyes

Classification, Colour and constitution; Mordant and Vat Dyes; Chemistry of dyeing;Synthesis and applications of: Azo dyes – Methyl Orange and Congo Red (mechanism of DiazoCoupling); Triphenyl Methane Dyes - Malachite Green, Rosaniline and Crystal Violet; PhthaleinDyes – Phenolphthalein and Fluorescein;Natural dyes –structure elucidation and synthesis of Alizarin and Indigotin;Edible Dyes with examples.

Module IV: Synthetic Polymers

Addition or chain-growth polymerization, Free radical vinyl polymerization, ionic vinyl olymerization, Ziegler-Natta polymerization and vinyl polymers, Condensation or step growth polymerization.Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins andpolyurethanes.Natural and synthetic rubbers.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Recommended Texts:

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistry of Natural Products*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

PHYSICAL CHEMISTRY-V

Course Code: CHY2603 **Credit Units: 03**

Course Objective: Course gives students indepth knowledge of electrochemistry dealing with faraday's law of electrolysis, concept of electrochemical cells and redox potential, feasibility of a reaction. The course also provides knowledge about topics such as conductance, surface chemistry and photochemistry.

Course Contents:

Module I: Electrochemistry

Quantitative aspects of Faraday's laws of electrolysis, rules of oxidation/reduction of ions basedon half-cell potentials, applications of electrolysis in metallurgy and industry.Chemical cells, reversible and irreversible cells with examples.Electromotive force of a cell andits measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells.Application of EMF measurements in determining (i) free energy,enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, usinghydrogen, quinone-hydroquinone, liquid junction potential; determination of activity coefficients andtransport numbers.Qualitative discussion of potentiometric titrations (acid-base, redox,precipitation).

Module II : Conductance

Arrhenius theory of electrolytic dissociation,Conductivity, equivalent and molar conductivityand their variation with dilution for weak and strong electrolytes.Molar conductivity at infinitedilution.Kohlrausch law of independent migration of ions.Debye-Huckel-Onsager equation,Debye-Falkenhagen effect, Walden's rules, Ionic velocities, mobilities and their determinations, transport numbers and their relation toionic mobilities, determination of transport numbers using Hittorf and Moving Boundarymethods. Applications of conductance measurement: (i) degree of dissociation of weakelectrolytes, (ii) ionic product of water (iii) solubility and solubility product of sparingly solublesalts, (iv) conductometric titrations, and (v) hydrolysis constants of salts.

Module III: Surface chemistry and catalysis: Physical adsorption, chemisorption, adsorption isotherms. nature of adsorbed state.Types of catalyst, specificity and selectivity, mechanisms of catalyzed reactions atsolid surfaces; effect of particle size and efficiency of nanoparticles as catalysts.Enzymecatalysis, Michaelis-Menten mechanism, acid-base catalysis.

Module IV: Photochemistry

Laws, of photochemistry, quantum yield, examples of low and high quantum yields, photochemical equilibrium and the differential rate ofphotochemical reactions, photosensitised reactions, quenching.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Recommended Texts:

1. Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 8th Ed., Oxford University Press (2006).
2. Ball, D. W. *Physical Chemistry* Thomson Press, India (2007).
3. Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa (2004).
4. Laidler, K. J. *Chemical Kinetics* Pearson Education: New Delhi (2004).

SPECTROSCOPY

Course Code: CHY2604 **Credit Units: 03**
Course Objective: To impart knowledge about different spectroscopic techniques
Course Contents:
Module I:
Definition of spectrum - Electromagnetic radiation - quantization of different forms of energies in molecules (translational, rotational, vibrational and electronic).
Microwave Spectroscopy - theory of microwave spectroscopy - selection rule - Calculation of moment of inertia and bond length of diatomic molecules.

Module II: UV - Visible Spectroscopy
Absorption laws. Calculations involving Beer Lambert's law - instrumentation - photo colorimeter and spectrophotometer- block diagrams with description of components - theory - types of electronic transitions - chromophore and auxochromes - Absorption bands and intensity -factors governing absorption maximum and intensity.

Module III:I.R. Spectroscopy
Principle - modes of vibration of diatomic, triatomic linear (CO_2) and nonlinear triatomic molecules (H_2O) - stretching and bending vibrations - selection rules. Expression for vibrational frequency (derivation not needed), instrumentation - sampling techniques.Applications of IR Spectroscopy – interpretation of the spectra of alcohols, aldehydes, ketones and esters – aliphatic and aromatic.Hydrogen bonding.

Module IV: Raman Spectroscopy
Rayleigh and Raman scattering, stokes and antistokes lines. Differences between Raman and I.R.Spectroscopy.Rotational Raman spectra of Noncentrosymmetric molecules (HCl). Mutual exclusion principle (CO2 and N2O)

Module IV: NMR Spectroscopy
Basic principles of Proton Magnetic Resonance, chemical shift and factors influencing it, equivalent and non equivalent protons.; Spin – Spin coupling and coupling constant; Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpetation of NMR spectra of simple compounds. Applications of IR, UV and NMR for identification of simple organic molecules.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:
1. Elements of Analytical Chemistry - R. Gopalan, P.S. Subramanian, K. Rengarajan - S. Chand and sons (1997).
2. Analytical Chemistry - S.M. Khopkar - New Age International.
3. Instrumental Methods of Chemical Analysis - Chatwaal - Anand -Himalaya Publishing House - (2000).
4. Analytical Chemistry S. .Usharani, Macmillan.
5. Instrumental Methods of Analysis - Willard Merit Dean and Settle – Saunders College Publication.
6. Physicochemical Techniques of Analysis - P.B. Janarthanam-Vol- I & II - Asian Publishing.
7. Instrumental Methods of Chemical Analysis – B.K. Sharma - Goel Publications.
8. Spectroscopy by P.S. Kalsi

BASICS OF COMPUTER PROGRAMMING IN CAND ITS APPLICATIONS IN CHEMISTRY

Course Code: CHY2605 **Credit Units: 02**

Course Objective: To introduce the basics of computers and to learn C language and its applications in solving problems in Chemistry.

Course Contents:

Module I:

Basic computer organization, processor and memory – main memory, secondary storage devices and storage hierarchy. Software – relationship between hardware and software – types of software. Planning the computer program – algorithm and flowcharts.Basics of operating systems.

Module II:

Computer languages – machine language, assembly language, assembler, compiler, interpreter and programming languages - C language – introduction, C compiler, operating systems and preprocessor directives - variables, constants, operators, input and output functions.

Module III:

Applications in Chemistry – calculation of the radius of the first Bohr orbit for an electron, calculation of half-life time for an integral order reaction, calculation of molarity, molality and normality of a solution, calculation of pressure of ideal or Vanderwaal's gas, Calculation of electronegativity of an element using Pauling's relation.

Module IV:

Applications in Chemistry - Calculation of empirical formulae of hydro carbon, calculation of reduced mass of a few diatomic molecules, determination of the wave numbers of spectral lines of hydrogen atom, calculation of work of expansion in adiabatic process, calculation of pH, solubility product and bond energy using Born - Lande equation, calculation of standard deviation and correlation coefficient.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. K.V. Raman, Computers in Chemistry, 8th Edition, Tata McGraw Hill, 2005.
2. Venugopal and Prasad, Programming with C, 11th Edition, 1971.
3. E. Balaguruswamy, Programming in C, 2nd Edition, 1989

INORGANIC CHEMISTRY LAB-V

Course Code: CHY2606 **Credit Units: 01**

Course Objective: To provide students an experience in qualitative analysis of various cations and anions in a given mixture.

Course Contents:

Qualitative analysis:

Using H2S /PTC/ Thioacetamide or any other reagent. Identification of cations and simple anions in a mixture of salts containing not more than six ions (Three cations and three anions)interfering anions using semimicro scheme of analysis. If combination of cations or anions isgiven in the mixture, insoluble should be avoided. Spot tests should be carried out for finalidentifications wherever feasible.

Cation : Pb^{2+}, Bi^{3+} Cu^{2+}, Cd^{2+}, As^{3+}, Sb^{3+}, Sn^{2+} or Sn^{4+}, Fe^{2+} OR Fe^{3+}, Al^{3+}, Cr^{3+},Co^{2+}, Ni^{2+}, Zn^{2+}, Mn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}, NH^{4+}, K^{+}

Anion : CO_3^{2-}, SO_3^{2-}, CO_3^{2-}, SO_3^{2-}, S^{2-}, NO_2^{-}, CH_3COO-, NO_3^{-}, Cl^{-}, Br^{-}, I^{-}, SO_4^{2-}, PO_4^{3-}, BO_3^{3-}, F^{-}, $C_2O_2^{-4}$

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Recommended Texts:

1. Vogel, A.I. A text book of Quantitative Analysis, ELBS 1986.

ORGANIC CHEMISTRY LAB-V

Course Code: CHY2607 **Credit Units: 01**

Course Objective:

To provide experience in practical aspects of qualitative analysis of given organic mixture and detection of functional groups present.

Course Contents:

Qualitative analysis of organic mixture containing two solid component using water, NaOH,$NaHCO_3$ for separation, prepare suitable derivative.

Identification of the functional groups, C-C and C-N triple bonds, sp3, sp2 and sp hybridized C-Hbonds by IR spectroscopy, NMR spectroscopy (IR & NMR spectra to be provided).

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICAL CHEMISTRY LAB-V

Course Code: CHY2608 **Credit Units: 01**

Course Objective:

To provide training in practical aspects of **physical chemistry** including determination of transition temperature of given compound, verification of Lambert- Beer law, Onsagar equation, Kaulraush law.

Course Contents:

(I) Transition Temperature

- Determination of the transition temperature of the given substance by thermometric method(e.g.$MnCl_2.4H_2O/SrBr_{2.}.H_2O$).

(II) Spectroscopy

• Verification of Lambert-Beer's Law
• Determination of pK (indicator) for phenolphthalein or methyl red
• Study the formation of a complex between ferric and thiocyanate (or salicylate) ions.
• Study the kinetics of interaction of crystal violet with sodium hydroxide colourimetrically.

• Record the UV spectrum of p-nitrophenol (in 1:4 ethanol:water mixture). Repeat afteradding a small crystal of NaOH. Comment on the difference, if any.
• Record the U.V. spectrum of a given compound (acetone) in cyclohexane
(a) Plot transmittance *versus* wavelength.
(b) Plot absorbance *versus* wavelength.

(III) Potentiometric titration

- Find out base strength by titrating against with strong acid potentiometrically.

(IV) Electrochemistry

- Prove Debye Huckel Onsagar Equations
- Prove Kaulraush law, Calculate equivalent conductance of acetic acid at infinite dilution

Any other experiment carried out in the class can be included.

***MSDS – Compilation of MSDS of chemicals used by students in each experiments is compulsory.**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PROGRAMMING IN C LAB

Course Code: CHY2609 **Credit Units: 01**

Course Contents:

- DOS commands
- Creation of batch files
- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

MATERIAL CHEMISTRY

Course Code: CHY2610 **Credit Units: 03**

Course Objective: To introduce and give an insight into the fascinating area of solid state chemistry and material science. This will enable the students in pursuing higher studies.

Course Contents:

Module I: Structures of solids

Introduction to solids – crystalline and amorphous. Unit cell, Bravais lattices and X-ray structure determination (NaCl and KCl only) – powder and single crystal- methods and applications-identification of the cubic lattice and indexing of the X-ray diffraction lines.

Radius ratio rules – coordination number. Packing arrangement -different structure types in solids – rock salt, zinc blende, wurtzite, fluorite and antifluorite, spinel and inverse-spinel and perovskite structures.

Module II: Preparative methods and characterization

Solid state reactions – ceramic method, sol-gel, hydrothermal, high pressure, zone refining, CVD, Czochralski and Bridgman and Stockbarger methods.

Physical methods – thermogravimetric and differential thermal analysis and scanning electron microscopy (only introduction and application).

Module III: Electrical and optical properties

Defects in solid state – point defects – Frenkel and Schottky defects and non-stoichiometric defects.

Conductors – variation of conductivity with temperature – semiconductors – p and n types, pn- junction, photoconduction, photo voltaic cell and photogalvanic cell – solar energy conversion, organic semiconductors.

Piezoelectric, pyro-electric and ferroelectrics (introduction and application).Photoluminescence.

Module IV: Magnetic properties

Magnetic properties – classification - diamagnetic, paramagnetic, antiferromagnetic, ferro and ferri magnetic — magnetic susceptibility.Variation with temperature – Curie-Wiess law, Curie temperature and Neel temperature.Permanent and temporary magnets.

Module V: Special materials

Superconductivity – introduction, Meissner effect – mention of Bardeen, Cooper and Schrieffer theory and Cooper pairs – examples of superconducting oxides, Chevrel phases– applications of superconducting materials.

Ionic conductors – sodium-□ □ alumina, sodium-sulphur battery. Intercalation – layered compounds – graphitic compounds. Special applications of solid state materials.High energy battery, lithium cells.

Liquid crystals: nematic, cholesteric and smectic types and applications**.**

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. Solid State Chemistry-An Introduction by Lesley Smart and Elaine Moore, Chapman Hall,London, 1992.
2. Solid State Chemistry by M. G. Arora, Anmol Publications, New Delhi, 2001.
3. Materials Science by P. K. Palanisamy, Scitech Publications, Chennai, 2003.
4. Modern Inorganic Chemistry by W. L. Jolly, Mc Graw Hill Book company, NY, 1989.
5. Inorganic Chemistry by D. F. Shriver and P. W. Atkins, Longford, Oxford university press,1990.
6. Introductory Solid State Physics by H. P. Meyers, Viva Books Private Limited, 1998.
7. Solid State Chemistry and its applications by A. R. West, John-Wiley and sons,1987.
8. Modern aspects of Inorganic Chemistry by H. J. Emelius and A. G. Sharpe, Universal Bookstall,1989.
9. Ionic crystals, Lattice defects and nonstoichiometry, N. N. Greenwood, Butterworths,London, 1968.
10. Solid State Physics by Charles Kittel, John-Wiley and sons

NANOCHEMISTRY

Course Code: CHY2611 **Credit Units: 03**

Course Objective:

To introduce the basics of nanotechnology and to learn the instrumental techniques used in characterization of nano materials.

Course Contents:

Module I: Basics of Nanochemistry

Introduction – definition – length scales – importance of nanoscale and its technology – self assembly of materials – nanowires, nanorods and quantum dots.

Module II: Nano Particles

Techniques to synthesize nanoparticles – top down and bottom up approaches – common growth methods – characterization of nanoparticles – applications and toxic effects of nanomaterials.

Module III: Synthetic Techniques

Introduction – types of nanoparticles – preparation, properties and uses of gold, silicon, silver, zinc oxide, iron oxide, alumina and titania nanoparticles.

Module IV: Nano Materials

Preparation, properties and applications of carbon nanotubes, nanorods, nano fibre and nanoclay.

Module V: Instrumental Techniques

Basic principles of electron microscopes – scanning electron microscopes (SEM) – transmission electron microscopes (TEM) – scanning probe microscopy – atomic force microscopy (AFM) – scanning tunneling electron microscope (STEM), DLS, TGA, DSC.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. Nanotechnology, S.Shanmugam, MJP Publishers, Chennai (2010).

2. A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.

3. Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).

4. The Chemistry of Nanomaterial: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).

5. Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).

6. Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).

7. Nanobiotechnology, S. Balaji, MJP Publishers, Chennai. (2010).

8. Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hill, New Delhi (2007).
9. The Chemistry of Nanomaterial: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).

10. Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).

11. Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).

TECHNICAL WRITING IN SCIENCE-II

Course Code: CHY2612 **Credit Units: 02**

Course Objective:

Students will be introducing to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Course Contents:

Module I: Technical Writing Process

Document development process, Estimating Technical Documentation, Documentation Planning, Selection of Tools, Information Architecture, Templates and Page design, Audience Profiling.

Module II:

Journal paper writing: Abstract for paper and poster, different kind of journal for chemistry, impact factors of journals, ISBN number, Citation, H-index.

Module III:

Analytical report, Project Management in Technical Communication, Project writing, project proposal writing.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text & References:

1. M. Frank. Writing as thinking: *A guided process approach, Englewood Cliffs,* Prentice Hall Reagents.
2. L. Hamp-Lyons and B. Heasely: Study Writing; *A course in written English.* For academic and professional purposes, Cambridge Univ. Press.
3. R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
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5. Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
6. *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004).

TERM PAPER

Course Code: CHY2631 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of chemistry and its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Inorganic chemistry
- Organic chemistry
- Physical chemistry
- Green chemistry
- Agricultre chemistry
- Nanochemistry

Evaluation Scheme

Organisation and relevance of content	**Literature Review**	**Bibliography**	**Presentation**	**Total**
30	30	20	20	100

PROJECT

Course Code: CHY2632 **Credit Units: 03**
Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

- **a)*Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)*Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).
- **c) *Presentation of Data,Analysis and Findings*:**(using the tools and techniques mentioned in the methodology).
- **d)*Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III : Collection of information and data relating to the topic and analysis of the same.
STEP IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Chapter 5: Bibliography
STEP V : The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	**Power Point Presentation & Viva**
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... ..

submitted by me for the partial fulfilment of the degree of B.Sc. Honours in Chemistry is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:

Date:

WORKSHOP

Course Code:CHY2633 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nuclear Chemistry• Modern trend in Inorganic Chemistry
- Modern trend in Physical Chemistry• Modern trend in Organic Chemistry
- Nanotechnology and its applications• Green Chemistry
- Polymer Chemistry• Environmental Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Business Planning
- Quiz
- Quality analysis & characterization
- Identification and preparation of materials

Evaluation Scheme:

Attendance	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the case/ Assignment/ Write up**	**Total**
10	**30**	**30**	**30**	**100**

Amity School of Applied Sciences

Bachelor of Science (Forensic Science) (Honors)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Programme Overview
Duration: 3 years

Bachelor of Science (B.Sc.) degree program is designed to introduce the students to modern methods and principles. The students are exposed to applied laboratory techniques, critical thinking, independent and team learning and are provided with research opportunities. Related educational materials are used to support teachers in the classroom and promote hands-on learning experiences for students.

Students of all the undergraduate degree Programmes at the time of graduation will be able to:

PO1 **Scientific knowledge:** Acquire the knowledge with facts and figures related to various subjects in such as Physics, Chemistry, Mathematics, Forensic Science etc.

PO2 **Modern tool usage:** Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments.

PO3 **Problem analysis:** Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using fundamental principles, and the scientific theories.

PO4 **Effective communication:** Develop various communication skills such as reading, listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively.

PO5 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms

PO6 **Individual and Team work:** Demonstrate the capability to work both independently and in cooperation with others

Learning Outcomes: After completing the program the student will be able to:

PSO1 Develop an understanding and appreciation for the scope of Forensic Sciences.

PSO2 Develop knowledge of the functions and services provided by the Forensic Laboratories and utilization of basic sciences for forensic investigations

PSO3 Develop comprehensive knowledge on Crime scene reconstruction and significance of various biological, physical and chemical evidences for forensic investigations.

PSO4 Provide knowledge on Procedures and scopes of Fingerprints Examination, serology, anthropology, DNA Fingerprinting, toxicology and cyber forensic etc.

PSO5 Introduce students about the Sociological and Psychological aspects of crime and Criminal behavior and presentation of evidences in court of law.

Syllabus - First Semester

INTRODUCTION TO FORENSIC SCIENCE

Course Code: FCH2102 **Credit Units: 02**

Course Objective: The course focuses on the following objectives-

1. Developing an understanding and appreciation for the scope of Forensic Sciences.
2. Develop an understanding on historical development, Mobile Forensic Units and Expert's testimony.
3. Develop brief knowledge of the functions and services provided by the Forensic Laboratories

Course Contents:
Module I: Brief Description of Forensic Science Definition, Description, Principles, Concept, Needs and scope. History of Forensic Science and Forensic Science Labs; Progressive development and transformation of Forensic Science Labs.
Module II: Forensic Science Laboratories Main Authority, Organizational structure of Forensic Science Laboratory – Roles and responsibilities, Sections/ Divisions, Services provided, Process of report writing and submission to court. Mobile Forensic Science Laboratory – their distribution in India, functions, need and utility. Calibration of testing laboratories (ISO).
Module III: Evidence Applicability in Court Definition, Various types of evidences, Laws of evidence, Expert's testimony and admissibility of scientific evidence in Court of Law.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Bodziak, W., Footwear Impression Evidence (2nd Edn.) CRC Press, Boca Raton, Florida, 2000.
2. DeForest, P., Gaensslen, R., and Lee, H., Forensic Science; an Introduction to Criminalistics, McGraw Hill, New York, 1983.
3. Fisher, B., Techniques of Crime Scene Investigation (6th Edn.) CRC Press, Boca Raton, Florida, 2000.
4. James, S. H. And Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
5. James, S., and Eskerc, W., Interpretation of Blood Stain Evidence at Crime Scenes, (2nd Edn) CRC Press, Boca Raton, Florida, 1999.
6. Saferstein, Richard, Criminalistics, An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
7. Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rd Edn) Universal Law Publishing Co. Ltd. New Delhi, 2001.

FUNDAMENTALS OF CRIME SCENE INVESTIGATION

Course Code: FCH2103 **Credit Units: 02**

Course Objective: The course focuses on the following objectives-

1. Developing an understanding and application of Crime scene Investigation.
2. Develop an understanding on concepts of crime scene and its types.
3. Give a brief description on various techniques used for recording of the crime scene.
4. Develop comprehensive knowledge on Crime scene reconstruction and significance of physical evidences.

Course Contents:
Module I: Crime Scene and its Management Defining a crime and crime scene, Importance of crime scene, Problems associated with crime scenes (indoor and outdoor), Location and processing of Crime Scene. Introduction to Crime Scene Management, Handling clues and evidences.
Module II: Types of Crime Scenes Types of Crime Scenes, Primary, Secondary crime scene, Mobile, Indoor and Outdoor crime scenes; Searching techniques used for locating physical evidences at scene of crime.
Module III: Recording and Documentation of Crime Scene Crime Scene Documentation, Barrication of Crime Scene, Crime Scene Photography, Videography, Sketching, Notes Making.
Module IV: Crime Scene Reconstruction Procedure and requirement for Crime Scene Reconstruction, Modus operandi, Expert team constitution for different crime scenes, Roles of Investigating Officer.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Bodziak, W., Footwear Impression Evidence (2nd Edn.) CRC Press, Boca Raton, Florida, 2000.
2. DeForest, P., Gaensslen, R., and Lee, H., Forensic Science; An Introduction to Criminalistics, McGraw Hill, New York, 1983.
3. Fisher, B., Techniques of Crime Scene Investigation (6th Edn.) CRC Press, Boca Raton, Florida, 2000.
4. James, S. H. And Nordby, J. J. (Eds) Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
5. James, S., and Eskerc, W., Interpretation of Blood Stain Evidence at Crime Scenes, (2nd Edn) CRC Press.

BIOLOGY

Course Code: FCH2104 **Credit Units: 02**

Course Objective:
The given course is designed to:
1. Provide the knowledge about the fundamentals of biology.
2. To provide understanding of cell biology.
3. To develop the comprehensive understanding of study of the human anatomy and physiology, biochemistry and aspect of Genetics.

Course Contents:
Module I: The Cell Structural unit of life, History of cell, Organization of Prokaryotic and eukaryotic Cell. Cell cycle, mitosis and meiosis.
Module II: Molecules of Life Proteins - structure, properties and functions. Carbohydrates - structure, properties and functions. Lipids – structure, properties and functions. Types of micronutrients and macronutrients in the body.
Module III: Basic Genetics and Nucleic Acids Mendel's Laws, Exceptions to Mendel's Laws, DNA – Structure, Watson and Crick Model, RNA– Structure, Functions (in brief).
Module IV: Chromosome and Mutation Discovery, morphology and structural organization. Types of chromosomes; Supernumerary chromosomes. Mutations: Definition, Types: spontaneous and induced, Mutagens.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. I.E. Celis Cell biology Academic Press 2nd Edition.
2. Robertis and Robertis Cell and Microbiology 8th Edition.
3. M.S. Leffel, A.D. Donnenberg and N.R. Rose Handbook of Human Immunology CRC press, 1997
4. Essentials of Human Genetics by S.M. Bhatnagar et al (1999) IV edition. Orient Longman.
5. Basic Human Genetics by E.J. Manage and A.P. Manage (1997 India Reprint) Rastogi Publications, Meerut.
6. Mendelian inheritance in Man: Catalogues of Autosomal recessive and x-linked phenotypes. [12teditions – 1998] by McKusick, V.A. Johns Hopkins university press, Baltimore.
7. Principles and Practice of Medical Genetics, by Emery, A.E.H and D.L. Rimoin (Eds_ (1990-2nd edition) Churchill Livingstone, Edinburgh.
8. Human Genetics by S.D. Gangane (2nd edition-Reprint 2001), B.L Churchill Livingstone Pvt. Ltd., New Delhi.
9. Genetics in Medicine by M.W. Thompson et al, 5th Edition, W.B. Sounders Company, London.

APPLIED MATHEMATICS

Course Code: FCH2105 **Credit Units: 02**

Course Objective:
The objective of this course is to provide an introduction to the fundamentals and concepts of basic mathematics vectors and matrices, differentiation, and integration. This course aims to assist the students to develop confidence in handling mathematical concepts and techniques and to understand the principles and Concept of differential Calculus and integral calculus.

Course Contents:
Module I: Matrices and Determinants Definition of Matrix, Sub matrix, types of Matrices such as Symmetric and Asymmetric, Square, Diagonal Matrices, Singular and Non-singular matrices, Addition, Subtraction, Multiplication of Matrices, Determinant of Square Matrix, Rank of a matrix -Consistency of equations - Eigen roots and Eigen vectors - Cayley-Hamilton theorem (without proof)- Verification and computation of inverse matrix.
Module II: Differentiation Differentiation of standard functions: Polynomial, Rational, Exponential, Logarithmic and Trigonometric functions, Product rule, Quotient rule, Successive Differentiation (up to Second order).
Module III: Integration Integration of functions, Method of change of variables and Method of substitution for Integrals, Definite Integrals and their properties. Practical applications of integrals.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

- NCERT MATHEMATICS – PART I- II, Textbook for Class XII
- R.B. Babat, Linear algebra and linear model, Hindustan book agency
- Advanced Engineering Mathematics By Erwin Kreyszig
- K. Hoffman and R. Kunze, Linear algebra, second edition, Prentice Hall India Learning Private Limited
- P. Duraipandian and S. Udayabaskaran, (1997) *Allied Mathematics*, Vol. I andII.Muhil Publishers, Chennai.
- P. Kandasamy, K. Thilagavathy (2003) Allied Mathematics Vol-I, II S. Chandand company Ltd., New Delhi-55.

CRIME SCENE INVESTIGATION LAB

Course Code: FCH2106 **Credit Units: 02**

Course Objective: - The students will understand and perform experiments related to:

1. Investigation of crime scene.
2. Sketching of outdoor/ indoor scene of crime
3. Packaging and forwarding of Evidences

Course Contents:
1. Investigation and sketching of indoor scene of crime.
2. Investigation and sketching of outdoor scene of crime.
3. Crime Scene Photography: indoor, outdoor.
4. Notes making.
5. Searching of crime scene.
6. Parts of camera.
7. Packaging and forwarding.
8. Envelop making and Druggist fold method.
9. Sealing procedure.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V/Quiz**	**PR**	**V**
5	10	05	5+5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition.
2. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009.
3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015.
4. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals.

HUMAN ANATOMY AND PHYSIOLOGY

Course Code: FCH2107 **Credit Units: 03**

Course Objective: To Explore the Fundamental Concepts of Human anatomy and Physiology.

Course Contents:
Module I: **Tissue** Epithelial Tissue, Connective Tissue, Muscle Tissue (Skeleton, Smooth and Cardiac muscles: Anatomy and Physiology), Nervous tissue (Neuroglia, Neuron, Membrane potential, Synapse, Neurotransmitters and Receptors), Skeleton tissue (Bones and Cartilages, Ligament, Tendon, Joints), Covering and Lining Membranes **Respiratory System** Anatomy; Nose and Paranasal Sinuses, Pharynx, Larynx, Trachea, Bronchi and Subdivisions, Lungs and Pleurae: Mechanics of Breathing; Pressure Relationships in the Thoracic Cavity, Pulmonary Ventilation, Physical Factors Influencing Pulmonary Ventilation, Respiratory Volumes and Pulmonary Function: Gas Exchanges Between the Blood, Lungs, and Tissues; Basic Properties of Gases, Composition of Alveolar Gas, External Respiration, Internal Respiration: Transport of Respiratory Gases by Blood Oxygen Transport, Carbon Dioxide, Bohr effect, Haldane Effect, Chloride shift, Control of Respiration
Module II: **Cardio Vascular System** Heart Anatomy; Coverings of the Heart, Auricles, Ventricles, Heart Valves; Pathway of Blood Through the Heart, Blood Pressure, Blood vessels and structure(Arterial System, Capillaries, Venous System), Systemic Arteries and Veins **Excretory System** Kidney Anatomy, Cortical nephrons, Juxtaglomerular, Juxtaglomerular Complex (JGC) Kidney Physiology: Mechanisms of Urine Formation (Glomerular Filtration, Tubular Reabsorption, Tubular Secretion, Countercurrent mechanism, Urine Transport, Storage, and Elimination
Module III: **Nervous System** **Central Nervous System;** The Brain, Ventricles, Cerebral Hemispheres, Diencephalon Brain Stem, Cerebellum, Meninges, Cerebrospinal Fluid (CSF), Blood Brain Barrier The Spinal Cord **Peripheral Nervous System and Reflex Activity;** Sensory receptor and activity, transmission lines: Nerves and associated ganglia, Cranial nerves, Spinal nerves, Motor endings and activity **Autonomic Nervous System;** Parasympathetic, Sympathetic, Neurotransmitters and Receptor, The Effects of Drugs.
Module IV: **Digestive System** Overview of the Digestive System, Peritoneum, Histology of the Alimentary Canal (Mucosa, Submucosa, Muscularis externa, Serosa), Enteric Nervous System of the Alimentary Canal: Mouth, Tongue, Salivary Glands, Teeth, Pharynx, Esophagus, Stomach, Small Intestine, Liver and Gallbladder, Pancreas, Regulation of Bile and Pancreatic Secretion and Entry into the Small Intestine, Large Intestine, Bacterial Flora: Physiology of digestion and absorption
Module V: **Endocrine System** Chemistry and Mechanism of Hormone, The Pituitary Gland and Hypothalamus and associated hormones, The Thyroid Gland and Parathyroid gland; Thyroid Hormone (TH), Calcitonin, Parathyroid hormone (PTH), The Adrenal Gland and associated hormones, Pineal

gland, Pancreas **Fluid, Electrolyte and Acid-Base Balance** Body Fluids, Water Balance and ECF osmolality, Electrolyte Balance, Acid-Base Balance.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Elaine N. Marieb, Katja Hoehn, Human Anatomy and Physiology, 9th edition
2. M.A. Miller, L.C. Leavell, and Kiber Grey's Stackpole's Anatomy and Physiology, 16th edition
3. Arthur C. Guyton, John E. Hall, Textbook of Medical Physiology, 12th edition
4. R. L. Dravce, K.L. Vogl, and AWM Mitchell Grey's Anatomy for students 2005, Elsevier. Inc.

CHEMISTRY-I (BASIC)

Course Code: FCH2109 **Credit Units: 03**

Course Objective: - The objectives of the course are:

1. To focus on building a conceptual understanding of fundamental chemical principles
2. Including properties of atoms, molecules, states of matter, and chemical reactions.

Course Contents:
Module I: Atomic Structure Dalton's atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses. Mole concept and molar mass: molarity, normality, molality, percentage composition, empirical and molecular formula, de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, quantum numbers, shapes of s, p, d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements, effective nuclear charge, Slater's rules.
Module II: Periodic Properties Periodic law and the present form of periodic table, Atomic and ionic radii, ionization energy, electron affinity and electronegativity – definition, trends in periodic table (in s, p, d and f block elements). Comparative study of the elements including, diagonal relationships. **Concept of Acids and Bases** Arrhenius, Bronsted – Lowry and Lewis concepts of acids and bases, relative strength of acids and bases, Concept of Hard and Soft Acids and Bases.
Module III: Organic Chemistry General introduction, Classification of hydrocarbons: Alkanes, Alkenes, Alkynes, Aromatic hydrocarbons. IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions. Reactive intermediates: carbocations, carbanions, free radicals. Localized and delocalized chemical bond, resonance effect and its applications. **Arenes and Aromaticity** Nomenclature of benzene derivatives. Aromatic nucleus and side chain. Aromaticity: the Huckel rule, aromatic ions, aromatic, anti - aromatic and non - aromatic compounds.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1. J. R. Partington 1969 A History of Chemistry, Volume 2, , Macmillan.
2. Eding Darrel D, 1970 Introductory Chemistry.
3. Odian George, 1990 General, Organic And Biological Chemistry.

Syllabus- Second Semester

PHYSICAL EVIDENCES IN FORENSIC SCIENCE

Course Code: FCH2201 **Credit Units: 02**

Course Objective: The course focuses on following objectives-

1. Developing an understanding and application of Forensic Science and significance of various physical evidences.
2. Develop an understanding on Expert's testimony.
3. Develop comprehensive knowledge on Procedure and examination in the Court of Law.

Course Contents:
Module I: Introduction and Handling of Physical Evidences Definition, Types and significance of Physical Evidences, Collection, Packaging, Preservation and Forwarding of evidences: Biological (urine, blood, semen, saliva, hair), Chemicals, poisons, firearms, fingerprints and tool marks.
Module II: Crime and Suspect Linking a Crime Scene with the suspect through field notes, witnesses and interrogation, Reconstruction of crime scene and associative/ corroborative evidences.
Module III: Analysis of Physical evidences Examinations, report making, chain of custody, report closing. Search and seizure, privilege against self – incrimination, Subpoenas deposition, Miranda rights, Condemned of court, FIR, Types of cognizable and non-cognizable offences.
Module IV: Examination in the Court Direct examination, cross – examination and re-examination of Prosecution lawyer and Defence lawyer and Court presentation, Law of evidence: testimonial and real evidence.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1. Bodziak, W., Footwear Impression Evidence (2nd Ed.) CRC Press, Boca Raton, Florida, 2000.
2. DeForest, P., Gaensslen, R., and Lee, H., Forensic Science; An Introduction to Criminalistics, McGraw Hill, New York, 1983.
3. Fisher, B., Techniques of Crime Scene Investigation (6thEdn.) CRC Press, Boca Raton, Florida, 2000.
4. James, S. H. And Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
5. James, S., and Eskerc, W., Interpretation of Blood Stain Evidence at Crime Scenes, (2ndEdn) CRC Press, Boca Raton, Florida. 1999.

FINGERPRINT SCIENCE

Course Code: FCH2202 **Credit Units: 03**

Course Objective: The course focuses on following objectives-

1. Developing an understanding and appreciation for the scope of Fingerprints Examination.
2. Develop an understanding on various methods of development of Fingerprints.
3. Develop comprehensive knowledge on fingerprint patterns, fingerprint classification, the various methods of fingerprint development- physical and chemical.

Course Contents:
Module I: History and Development of Fingerprinting Origin and History of fingerprints, Principles of Fingerprint identification, Searching, location and significance of fingerprints in criminal investigation.
Module II: Introduction of Fingerprint and its characteristics Biological significance of skin pattern, Types of fingerprints, Fingerprint characteristics: class and individual, Collection, lifting and preservation of fingerprints, Photography of latent fingerprints and presentation of fingerprint evidence in court.
Module III: Classification of Fingerprints Henry's system of classification, Batley's Single Digit classification, Extension of Henry's system of classification. Primary, secondary, sub-secondary, major, Second sub-secondary, key and final classifications
Module IV: Fingerprint Developmental techniques Methods of lifting and developing latent fingerprints – Physical methods - Powder method (Black, silver, florescent, red, yellow), Iodine fuming etc. Chemical methods - Ninhydrin, Silver nitrate method.
Module V: Automated Fingerprint Identification System Introduction, history, instrumentation, processing and applications, need and scopes of AFIS.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1. Nath, S., Fingerprint Identification, CRC Press, 2nd edition, 2002.
2. Champhod, C., Fingerprint and other ridge skin impressions, CRC Press, 2004.
3. Bridges, B. C., Vollmar, A. Monir, M., Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting, Expert Testimony Opinion Evidence, The University Book Agency, Allahbad, 2000.
4. James, S. H. and Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigation Techniques, CRC Press, London, 2003.
5. Nanda, B. B., and Tewari, R. K., Forensic Science in India. Select Publishers, New Delhi, 2001.
6. Saferstein, Richard, Criminalistics, An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
7. Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi, 2001.

METRIC SYSTEM AND PHYSICAL PROPERTIES OF EVIDENCES

Course Code: FCH2203 **Credit Units: 03**

Course Objective: The Objective of this course is to introduce the students to the characteristics and properties of different evidences like glass, soil, paint, hair and fibre, which are normally encountered at the scene of crime.

Course Contents:
Module I: Metric System Introduction to metric system, Introduction to prevalent physical evidences (soil, glass, fibre, hair and liquids).
Module II: Glass Examination Glass: Composition (organic and inorganic elements), Analytical and chemical examination, Comparing glass fragments, glass fractures.
Module III: Forensic Paint Examination Introduction to paint chemistry, types of paints and their composition, forensic examination of paints (household and automobile).
Module IV: Soil Examination Composition of soil (organic and inorganic), Properties (Colour, density, size distribution of soil particles), Collection and preservations of soil, Mineral and chemical analysis of soil, Density gradient techniques. Definition, composition, types, physical and chemical analysis of concrete and cement.
Module V: Introduction to Various Marks Definition, nature, types, significance and examination of tool marks, tyre marks, skid marks, tread marks. Definition, nature, types, significance and examination of foot and shoeprints, gait pattern and footprint casting.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Heard, B. J., Handbook of Firearm and Ballistics, Wiley and Sons, Chichester, England, 1997.
2. James, S. H., and Nordby, J. J., Forensic Science; an Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
3. Saferstein, Richard, Criminalistics, an Introduction of Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
4. Sharma, B.R., Forensic Science in Criminal Investigation and Trials (3rd Ed) Universal Law Publishing Co. Ltd., New Delhi, 2001.

CHEMISTRY-II (INORGANIC)

Course Code: FCH2209 **Credit Units: 03**

Course Objective: - The objectives of the course:

1. To focus on building a conceptual understanding of fundamental chemical principles
2. Including properties of atoms, molecules, states of matter, and chemical reactions.

Course Contents:

Module I: Chemistry of s-block Elements

Ionic bond, Covalent bond, Coordinate bond. Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, ICl^- and H_2O. Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions (BeF_2, BF_3, CH_4, PF_5, SF_6, IF_7 SO^{2-}, ClO^-). MO theory of heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

Module II: Chemistry of p-block Elements

Boron family (13th group): Diborane – properties and structure (as an example of electron – deficient compound and multicentre bonding), Borazene – chemical properties and structure.

Carbon Family (14th group): Allotropy of carbon, Catenation, p_π– d_π bonding (an idea), carbides, fluorocarbons– general methods of preparations, properties and uses.

Nitrogen Family (15th group): Oxides – structures of oxides of N, P. oxyacids – structure and relative acid strengths of oxyacids of Nitrogen and phosphorus.

Oxygen Family (16th group): Oxyacids of sulphur – structures and acidic strength.

Halogen Family (17th group): Basic properties of halogen, hydro and oxyacids of chlorine – structure and comparison of acid strength.

Noble Gases (18th group): Basic properties of noble gases, physical properties and structure of important compounds of Xenon.

Module III: Chemistry of d-block Elements

Definition of transition elements, position in the periodic table, General characteristics and properties of d-block elements, Comparison of properties of 3d elements with 4d and 5d elements with reference only to ionic radii, oxidation state, magnetic and spectral properties.

Coordination Compounds

Werner's coordination theory, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes. Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field splitting in octahedral and tetrahedral complexes, factors affecting the crystal-field parameters.

Module IV: Chemistry of f-block Elements

Lanthanides: General features and Electronic structure, oxidation states and ionic radii and lanthanide contraction.

Actinides: General features and chemistry of actinides, actinide contraction. Comparison of properties of Lanthanides and Actinides and with transition elements. Elementary idea about the transuranic elements.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

FINGERPRINTING LAB

Course Code: FCH2207 **Credit Units: 01**

Course Objective: - The students will understand and perform experiments related to:

1. Packaging and forwarding of physical evidences.
2. Identifying fingerprints, their patterns, footprints and preparing fingerprint chart.

Course Contents:
1. Prepare fingerprint card and identify the patterns. 2. Tape lifting of fingerprint. 3. Casting of foot prints/ fingerprint. 4. Ninhydrin method for fingerprint development. 5. Iodine fuming method for fingerprint development. 6. Silver nitrate method for fingerprint development.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009.
2. A. I. Vogel, Textbook of Practical organic Chemistry including Qualitative organic analysis.
3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015.
4. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals.

METRIC SYSTEM LAB

Course Code : FCH2208 **Credit Units :01**

Course Objective: - The students will understand and perform experiments relating to:

1. Analysis of physical evidences
2. Identifying different Physical evidences on the basis of their physical properties.
3. Determine pH, density and refractive index of various physical evidences

Course Contents:
1. Analysis of Glass. 2. Examination of Paint chips. 3. Examination of Glass fragments (Density Gradient, Refractive Index method). 4. Examination of Soil (pH, Size distribution and Density Gradient method) 5. Examination of Fibers. 6. Examination of Cement and Concrete.

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Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009.
2. A. I. Vogel, Textbook of Practical organic Chemistry including Qualitative organic analysis.
3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015.
4. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals.

PHYSICS-I

Course Code: FCH2210 **Credit Units: 02**

Course Objective: - The objectives of the course:

1. To focus on building a conceptual understanding of fundamental principles of physics.
2. To understands basics of physics and their applications in Forensic Science.

Course Contents:
Module I: Force and Motion Definition of motion, position and displacement, average velocity, instantaneous velocity, average speed, acceleration, acceleration of freely falling body, projectile motion, Newton's laws, force, mass, friction, properties of friction, drag force and terminal speed, linear and circular motion.
Module II: Kinetic energy and work Energy, kinetic energy, work, work done by gravitational force, work done by spring force, power, work and potential energy, conservation of energy, work energy theorem.
Module III: Atomic Physics Bohr atomic model, quantum numbers, Pauli's exclusion principle, hydrogen spectrum, series (Lyman, Balmer, Paschen, Bracket and pfund), vector atom model.
Module IV: Waves Types of waves, transverse and longitudinal waves, electromagnetic waves and electromagnetic spectrum, wavelength and frequency, speed of travelling wave, wave equation, sound waves, speed of sound, intensity and sound level, Doppler effect, shock waves, X Rays (continuous and characteristic), Spectra- Absorption and emission. Bragg's Law and X-ray diffraction.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester, A: Attendance

Text and References:

1. Amato, Joseph (December 1996). "The introductory calculus-based physics textbook". Physics Today 49 (12): 46–51.
2. Thomas Brody (1993.) "The Philosophy Behind Physics" pp 18–24 (Chapter 2)
3. Glimm, James; Jaffe, Arthur (1987), 'Quantum physics: a functional integral point of view'(2nd ed.), New York, [NY.]: Springer.

Syllabus - Third Semester

FORENSIC SEROLOGY

Course Code: FCH2302 **Credit Units: 03**

Course Objective: This course will cover:

1. Complete and thorough knowledge regarding the various aspects of forensic serology
2. Blood and its detailed study for identification
3. Importance of body fluids and their forensic significance

Course Contents:
Module 1:Blood and its Properties Nature of blood, collection, preservation and packing of blood evidence, procedures and precautions. ABO system, Rh system and MN system; Techniques for the determination of blood groups.
Module 2: Chemical and microscopic Tests used in Blood Analysis Identification of bloodstains by Microscopic methods, Catalytic tests, Crystal tests.
Module 3: Species of Origin and Grouping of Bloodstains Application of Spectrophotometric method, Chromatographic and Immunological methods (Ring, Precipitin, Ouchterlony, reverse agglutination, normal/mixed agglutination).
Module 4: Introduction and analysis of Body Fluids Introduction to various body fluids, their nature and characteristics and Forensic analysis of Semen, Saliva, Urine, Sweat etc.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text References

1. Eckert, W.G., and James S.H., Interpretation of bloodstain evidence at crime scene, CRC Press, Florida, 1989.
2. James, S.H. and Nordby, J.J. (Eds.), Forensic Science - An introduction to Scientific and investigative Techniques, CRC Press, London, 2003.
3. Saferstein, R. (1998). Criminalistics, An Introduction to Forensic Science, 6th Ed. 6th Ed. Prentice –Hall
4. Kirk, P.L., Introduction in crime investigation (2nd), John Willey and, New York, 1974.

QUESTIONED DOCUMENTS-I

Course Code: FCH2312 **Credit Units: 3**

Course Objective: The course focuses on the following objectives-
1. Developing an understanding and appreciation for the scope of Handwriting Identification and Examination.
2. Develop an understanding of handwriting and their characteristics, principles of identification.
3. Give a brief description on various methods of their detection and examination.
4. Develop comprehensive knowledge on typewritten documents, common styles and their examination.

Course Contents:
Module I: Introduction to Questioned Documents Definition: Documents, questioned documents and the type of cases encountered. Importance, nature and problems of documents, location, collection, handling and presentation of documents, adequacy of exemplars and standards.
Module II: General Equipment for Examination Hand lens, Camera, Compound Microscope, Stereo microscope, TLC, Transmitted light source, UV-IR radiation chamber and Oblique Light source, ESDA, VSC.
Module III: Handwriting Characteristics Identification – principle, individual handwriting characteristics, external, internal and physical factors affecting handwriting or signature of a person.
Module IV: Signatures Authentic signatures, forged signatures, disguised signatures, traced signatures, and their characteristics
Module V: Typewritten and Computer Generated Documents Comparison of typewritten documents, common types of styles, detection of altered typewritten documents. Working of photocopiers and printers, scanners, examination of photocopies/ Xerox, printouts and scanned documents.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester, A: Attendance

Text and References:

1. Albert, S. Osborn, Questioned Documents, Second Ed., Universal Law Publishing, Delhi, 1998.
2. Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.
3. Kelly, J. S. Lindblom, B. S. (2006). *Science, Handwriting Examination and the Courts. Scientific Examinations of Questioned Documents*, 2nd edition, CRC Press, Taylor and Francis group.
4. Huber, A. R. Headrick, A. M. (1999). *The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals*, CRC Press, Boca Raton London.
5. James, S. H. And Nordby, J. J. (Eds), Forensic Science; An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
6. Saferstein, Richard, Criminalistics - An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.

RESEARCH METHODOLOGY AND STATISTICS

Course Code: FCH2313 **Credit Units: 03**

Course Objective: This course objective is to introduce the student with the:

1. The research process: conceiving, designing, conducting and analyzing.
2. Methods of statistical description and analysis.
3. Ethical issues about research.
4. Graphical presentation of data.

Course Contents:
Module I: Introduction Definition, concept and research in science and forensic science.
Module II: Methods of Research Introduction to Research Methodology; Experimental research and non – experimental research design. Observation, questionnaires, interview, schedules, case study methods, types of data, graphical representation of data, parts of statistical table.
Module III: Introduction to Statistics Introduction to statistics; one tailed test, two tailed test, parametric (f-test, z-test, t- test, chi square test) and non-parametric statistics (sign test, rank test).
Module IV: Descriptive Statistics Measures of central tendency: Mean, Mode, Median. Measures of dispersion: Range, Variance, Skewness Kurtosis, Quartile. Simple correlation methods (Karl Pearson method) and regression on two lines.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1. Broota, K.D., Experimental designs in psychological research, Wiley eastern, New York, 1992.
2. Guilford, Statistics in Psychology and Education, McGraw hill, New York, 1986.
3. Katz and Kahn, Research in Behavioural Sciences, Methuen, USA, 1979.
4. Kerlinger, F., Foundations of Behavioural Research, Surjeet Publications, Delhi, 1983.
5. Rajamanickam, M., Statistical Methods in Psychological and Educational Research, Concept Publishing Co. New Delhi, India, 1983.
6. Smith, Jonathan, A. (Ed.), Qualitative Psychology: A Practical Guide to Research Methods, Sage Publications, 2003.
7. Woodworth and Schlosberg, Experimental Psychology, Methuen and co. ltd, London, 1971.

CHEMISTRY-III (PHYSICAL)

Course Code: FCH2314 **Credit Units: 03**

Course Objective: - The objectives of the course:

1) To focus on building a conceptual understanding of fundamental chemical principles.
2) Including properties of atoms, molecules, states of matter, and chemical reactions.

Course Contents:
Module I: States of Matter **Solid:** Crystal, types of crystals, Crystal defects, Braggs Law. Metallic bond and its characteristics. Liquid crystals: Difference between solids, liquids and liquid crystals, types of liquid crystals. Applications of liquid crystals. **Liquid:** Properties of liquids – surface tension, viscosity and their determination. **Gaseous States:** Deviation of Real gases from ideal behaviour. Derivation of Vander Waal's Equation of State, Explanation of behaviour of real gases using Vander Waal's equation. **Critical Phenomenon:** Critical temperature, Critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Vander Waal's equation, relationship between critical constants and Vander Waal"s constants. Liquifaction of gases.
Module II: Kinetics and Chemical Equilibrium Rate of reaction, rate equation, factors effecting the rate of reaction, Order of reaction, integrated rate expression for zero order, first order, Half life of reaction, Methods of determination of order of reaction, Arrhenius equation. **Chemical Equilibrium:** Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium.
Module III: Electrochemistry Electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance, equivalent conductance and relation among them, their vartion with concentration. Kohlarausch's Law, calculation of molar ionic conductance and effect of viscosity temperature and pressure on it. Application of Kohlarausch's Law in calculation of conductance of weak electrolytes at infinite dilution. Applications of conductivity measurements: determination of degree of dissociation, determination of K_a of acids, determination of solubility product of sparingly soluble salts, conductometric titrations. Definition of pH and pK_a, Buffer solution, Buffer action.
Module IV: Thermodynamics Definition of thermodynamic terms: system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. Law of thermodynamics: Zeroth, First, Second and Third law of thermodynamics. Nernst heat theorem. Criteria for thermodynamic equilibrium and spontaneity of a process in terms of thermodynamic functions.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

FORENSIC SEROLOGY LAB

Course Code: FCH2311 **Credit Units: 01**

Course Objective: The students will understand and perform experiments relating to:
1. Analysis of blood, biological fluids and alcohol.
2. Thin layer chromatography for poisons.

Course Contents:
1. Analyse different blood groups from the blood found at crime scene. 2. Perform catalytic test for blood 3. Perform crystal tests for blood. 4. Analyse biological fluid (saliva). 5. Analyse biological fluid (urine). 6. Analyse alcohol, acetone, chloroform **7.** Separate metallic poison by thin layer chromatography (Arsenic, mercury, bismuth, Antimony).

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
2. Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
3. Vogel Textbook of Practical organic Chemistry including Qualitative organic analysis By
4. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
5. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals
6. Isolation and identification of Drugs by E.G.C. Clark.

CRIME SCENARIO IN INDIA

Course Code: FCH2308 **Credit Units: 03**

Course Objective: The main objective of the course is to introduce students about the Sociological aspects of crime and Criminal behavior.

Course Contents:
Module I: Introduction to Criminology Introduction to Criminology – nature, need and function, Basics of Criminology, Historical development and scope of criminology in India.
Module II: **Crime and Sociology** Sociological aspects of crime and criminals in society; Theories- Environmental, Sociological, Geographical, Biological.
Module III: Types of Crime Types of crime, Causes of crime – property crimes, public order crimes, violent crimes, professional crime, cybercrimes, juvenile delinquency. Categories of crime: cognizable non cognizable crime, bailable and non bailable crime.
Module IV: India- Crime Scenario Society-Criminal interaction and various types of crimes in India.
Module V: Criminal Behavior Theories (classical and non-classical) and literature studies, criminal inheritance and factors responsible for crime (personal, environmental, peer group, neighbourhood).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester, A: Attendance

Text and References

1. Henry Lee's Crime Scene Handbook.
2. Crime Scene Processing and Laboratory Work Book by Patric Jones
3. Introduction to Forensic Science in Crime Investigation By Dr. (Mrs.) Rukmani Krishnamurthy
4. Crime Scene Management with Special Emphasis on National level Crime Cases by Dr. Rukmani Krishnamurthy under publishing
5. Compute Crime and Computer Forensic by Dr. R.K. Tiwari.

CYBER FORENSICS

Course Code: FCH2315 **Credit Units: 03**

Course Objective: The main objective of the course is to introduce students about the basic fundamentals of digital forensics and the examination of digital evidences.

Course Contents:
Module I: Basics of Digital Forensic Basics of digital forensic, computer forensic, introduction to cyber forensic, Computer organization, Components of computers – Input and Output devices, CPU Memory Hierarchy and types of Memory (RAM and ROM and their types) external storage devices Application Software and System Software, Introduction to IT act, Ethical hacking
Module II: Data Representations Integers, real, binary, octal, hexadecimal and their conversions Logic gates – Negation, OR, AND, XOR etc. and their combinations
Module III: Introduction to Operating System Basics of Operating System, memory structure, concurrency, scheduling, synchronization and memory management, process description and control Introduction to Operating System (Batch Operating System, Distributed Operating System, etc.) Introduction to Windows and Linux operating System
Module IV: Introduction to Digital Evidences Collection, preservation of evidences, forensic imaging, data retrieval, mobile forensic, techniques in digital forensic.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Compute Crime and Computer Forensic by Dr. R.K. Tiwari
2. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy
3. Cyber Law in India by Farooq Ahmad- Pioneer Books
4. Information Technology Law and Practice by Vakul Sharma- Universal Law Publishing Co. Pvt. Ltd.
5. The Indian Cyber Law by Suresh T. Vishwanathan- Bharat Law House New Delhi
6. Guide to Cyber and E- Commerce Laws by P.M. Bukshi and R.K. Suri- Bharat Law House, New Delhi
7. Guide to Cyber Laws by Rodney D. Ryder- Wadhwa and Company, Nagpur
8. The Information technology Act, 2000- Bare Act- Professional Book Publishers, New Delhi.

Syllabus - Fourth Semester

QUESTIONED DOCUMENTS-II

Course Code: FCH2412 **Credit Units: 3**

Course Objective: The course focuses on following objectives-
1. Developing an understanding and appreciation for the scope of Questioned Documents.
2. Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountered.
3. Brief description on general equipment used in examination of Questioned Documents

Course Contents:
Module I: Types of Questioned Documents Forgery and its characteristics, erasures, obliteration, alteration and addition.
Module II: Detection of Alterations Detection and deciphering of indented writing, charred documents, invisible and secret writings
Module III: Ink Examination and Paper Comparison Composition of major classes of inks (carbon ink, fountain ink etc.), analysis of writing inks and ink dating, pencil lead examination and age of documents, Physical characteristics of paper, watermark examination, fibre analysis, chemical and trace elements analysis.
Module IV: Report Writing and Case Presentation Comparison with standards: admitted and specimen samples, report writing, Presentation of report in questioned document examination cases in Court of Law.
Module V: Security Documents and Their Examinations Introduction of security documents, Types of security documents, Examination of Passports and fake currency notes, Latest introduced security features for identification of genuine bank notes (new series) of 50, 100, 200, 500, 2000 rupees.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester, A: Attendance

Text and References:

1. Albert, S. Osborn, Questioned Documents, Second Ed., Universal Law Publishing, Delhi, 1998.
2. Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.
3. Kelly, J. S. Lindblom, B. S. (2006).*Science, Handwriting Examination and the Courts. Scientific Examinations of Questioned Documents*, 2nd edition, CRC Press, Taylor and Francis group.
4. Huber, A. R. Headrick, A. M. (1999). *The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals*, CRC Press, Boca Raton London.
5. James, S. H. And Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003..

FUNDAMENTALS OF FORENSIC PHOTOGRAPHY

Course Code: FCH2402 **Credit Units: 03**

Course Objective: This course is designed to:
1. Provide foundation knowledge of photography
2. Develop an understanding and application of Photography in Forensic Science and CSI

Course Contents:
Module I: Introduction Introduction to forensic photography, required equipments for photography, Importance of Forensic photography in a crime scene investigation, indoor and outdoor crime scenes photography.
Module II: Types of Photography Surveillance photography – Cameras, Type and accessions for surveillance photography, Aerial photography, Underwater photography, Videography.
Module III: Photo Prints Various methods for developing photographs, chemical processing, negative development, Films-introduction and types.
Module IV: Photography and Crime Scene Photographic aspects of physical injuries, Use of photography in reconstruction the scene of crime (Indoor and outdoor) and its presentation in the Court of Law.
Module V: Guidance Documentation and High-tech Photography for Crime Scene Image magnification, UV and IR illumination in Photography, Photography of Art factual evidences (Bloodstain, fingerprint, imprints, and micro evidence), High-speed photography, legal aspects of visual evidence.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester, A: Attendance

Text and References:

1. Redsicker, D. R., The Practical methodology of Forensic Photography, CRC Press, London, 1994.
2. Henry Horeustein; Colour Photography -A working Manual, Little Brown Co. Boston (1995)
3. B.H.E. Jacobson, Ray GG Attridge; The Manual of Photography, Focal Press, London (1988)
4. Jahne B; Digital Image Processing, Heidelberg Springer (1996)
5. H.L. Blitzer and J. Jacobia; Forensic Digital Imaging and Photography, Academic Press (2002)
6. David R. Redsicker; The Practical Methodology of Forensic Photography- 2nd Ed. CRC Press LLC (2001)
7. R.E. Jacobson, S.F. Ray, G.G. Attridge, N.R. Oxford; The Manual of Photography- Photographic and Digital Imaging, 9th Ed., Focal Press (2000)

FORENSIC ANTHROPOLOGY

Course Code: FCH2403 **Credit Units: 03**

Course Objective:

The given course is designed to:

1. Provide the knowledge about the basics about physical anthropology
2. Develop comprehensive understanding of different techniques of determining the identity of unknown remains.
3. Provide the understanding of process of forensic facial reconstruction and its utilization in personal identification

Course Contents:
Module I: Introduction to Forensic Anthropology Definition, scope and application of Forensic Anthropology and related sciences, importance and need, issues related to personal identification.
Module II: Identification from Bones Attribution of Sex, Estimation of Age (humerus, radius, ulna, fibula, tibia, femur, pelvic bone, foot and hand).
Module III: Height and Race Determination Race and height determination from long bones and their medico legal implication. Establishment of Partial and Complete identity of skeletal material and dead bodies.
Module IV: Identification from Human Skull Morphology of human skull, determining the age, race and sex of the skull and its medicolegal implications.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1. Krogman, W. M. and M. Y.Iscan: Human Skeleton in Forensic Medicine.
2. Modi: A Text Book of Medical Jurisprudence and Toxicology.
3. Nath, S.: Forensic Anthropology
4. Stewart, T. D.: Essentials of Forensic Anthropology.

CHEMISTRY-IV (ORGANIC)

Course Code: FCH2413 **Credit Units: 03**

Course Objective: - The objectives of the course:

1) To focus on building a conceptual understanding of fundamental chemical principles.
2) Including properties of atoms, molecules, states of matter, and chemical reactions.

Course Contents:
Module I: Stereochemistry of Organic Compounds Concept and classification of isomerism. Optical isomerism, elements of symmetry, molecular chirality, enantiomers, optical activity, chiral and achiral molecules with two stereogenic centres, diastereomers. Newmann and Fischer projection. Relative and absolute configuration, sequence rules, R and S systems of nomenclature. Geometric isomerism, determination of configuration of geometric isomers. E and Z system of nomenclature.
Module II: **Alkyl and Aryl Halides:** Nomenclature and classes of alkyl halides, Mechanisms and stereochemistry of nucleophilic substitution reactions of alkyl halides, S_N2 and S_N1 reactions. Addition-elimination and elimination-addition mechanisms of nucleophilic aromatic substitution reactions of aryl halides. **Alcohols:** Nomenclature, methods of preparation. Hydrogen bonding and acidic nature. **Dihydric alcohols:** Nomenclature, methods of preparation and its chemical reactions. **Phenols:** Nomenclature, structure and bonding. Preparation of phenols, Comparative acidic strengths of alcohols and phenols.
Module III: **Aldehydes and Ketones:** Nomenclature, methods of preparation of aldehydes and ketones. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin and aldol, condensations. Wittig reaction and Mannich reaction. **Carboxylic Acids and Acid Derivatives:** Nomenclature, structure and bonding, acidity of carboxylic acids, effects of substituents on acid strength. HVZ reaction. Mechanism of decarboxylation. Relative stability of acyl derivatives. Interconversion of acid derivatives by nucleophilic acyl substitution. Mechanisms of esterification and hydrolysis (acidic and basic).
Module IV: **Amines:** Structure and nomenclature of amines. Separation of a mixture of different amines. Structural features affecting basicity of amines. Gabriel-phthalimide reaction, Hofmann bromamide reaction. Electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1) J. R. Partington 1969 A History of Chemistry, Volume 2, Macmillan.

FORENSIC ANTHROPOLOGY LAB

Course Code: FCH2410 **Credit Units: 01**

Course Objective: - The students will understand and perform experiments related to:
1. Determination of age, sex and stature from skull
2. Determination of age, sex and stature from long bones of human body

Course Contents:
1. Identification of human skeleton system. 2. Identification of various bones (Pelvic and Skull bones). 3. Estimation of height using long bones. 4. Determination of sex from skull, pelvis and mandibular bone. 5. Determination of age using skull.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
2. Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
3. A. I. Vogel Textbook of Practical organic Chemistry including Qualitative organic analysis
4. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
5. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals Isolation and identification of Drugs by E.G.C. Clark

QUESTIONED DOCUMENTS LAB

Course Code: FCH2414 **Credit Units: 01**

Course Objective: - The students will understand and perform experiments related to:
1. Examination of handwriting
2. Examination of security documents
3. Comparison of bite marks and will visit mortuary

Course Contents:
1. Handwriting analysis based on class and individual characteristics.
2. Examination of documents under different light sources- transmitted, oblique, UV.
3. Identification of genuine and fake currencies
4. Identification features of security documents
5. Visit for autopsy
6. Identification of Bite marks.

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
2. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015

WILDLIFE FORENSICS

Course Code: FCH2415 **Credit Units: 03**

Course Objective: During the course the students will be able to

1. Learn the fundamentals of wildlife forensics
2. Explain the diversity and utility of variety of animal evidences
3. Explain the benefits of risk management and the structure of ISO 31000:2009 standard

Course Contents:
Module I:Introduction to Wildlife Forensics Introduction to Wildlife Forensics, basic elements of wildlife forensics, application of forensics in wildlife crimes, basic analytical techniques in wildlife forensics.
Module II: Evidence Examination Identification of some endangered species of plants and animals, Wildlife life protection Act, examination of pug marks, horn, skin, fur and hair, nail and teeth, wood etc. Important case studies, ethical issues in wildlife forensics.
Module III: Introduction to Risk Management and its benefits Introduction Risk Management, Risk Management in organizations and risk ownership, Risk Management standards – Benefits of Risk Management.
Module IV: ISO 31000 - Elements of Risk Management ISO 31000 overview, PDCA cycle - Elements and Purpose, Principles of Risk Management, Relationship between Principles, Framework and Process, Understanding the components of the Risk framework, Designing the Framework with Mandate and Commitment.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text References:

1. Simple Tools and Techniques for Enterprise Risk Management Author: Robert J. Chapman. Publisher: John Wiley and Sons (2011) India Risk Report - 2013 - FICCI + Pinkerton
2. Risk Management: A Driver of Enterprise Value in the Emerging Environment -2011- KPMG ISO 31000 - Risk management— Principles and guidelines
3. A corporate governance, risk management and compliance (GRC) handbook -Authors: Richard M Steinberg Publishers: John Wiley and Sons
4. Richard Saferstein; Forensic Science Hand Book; Ed.; Prentice – Hall, Englewood Cliff, New jersey; (1982) Biology Methods manual,

PHYSICS-II

Course Code: FCH2416 **Credit Units: 03**

Course Objective: During the course the students will be able to

1. Learn the fundamentals of physics
2. Apply the phenomena of physics to forensic investigations in cases of accident, reconstruction, firearm ballistics

Course Contents:
Module I: Newton's Laws of Motion Interpretation and applications of Newton's laws of motion (I, II, III), Linear and circular motion, Newtonian mechanics, Friction, properties of friction, Pseudo forces.
Module II: Elasticity and Fluid Dynamics Elastic properties of matter, elastic constants and their interrelations. Fluid dynamics, equation of continuity, Bernoulli's equation, stream line and turbulent flow, lines of flow in air foil, Poiseuille's equation.
Module III: Study of Sound Velocity of sound, noise and sound intensity measurement, echo, reverberation, Sabine's Formula, absorption coefficient, acoustics of buildings and factors affecting acoustics of buildings. Sound distribution in an auditorium, introduction to ultrasonic, production of ultrasonic waves, applications of ultrasonics.
Module IV: Study of Light Refraction through thin layers, thick lens, thin lens and lens combinations, aberrations, interference in thin films, fringes in wedge shaped films, Newton's rings, total internal reflection, Diffraction and polarization, simple table spectrophotometer.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Allied Physics – R. Murugesan S. Chand and Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand and Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand and Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand and Co. (2004).

TERM PAPER

Course Code: FCH2431 **Credit Units: 03**

Objectives

The objective of this course is to examine the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice in Forensic science. The study will be related to learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related to the forensic science and the topic will be given by the faculty of department.
2. The presentation of the term paper is scheduled to be held before the commencement of semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

a. Forensic Toxicology
b. Forensic Anthropology
c. Physical chemistry
d. Handwriting and Typewriting Analysis
e. Crime Scene Investigation
f. Criminology, Criminal Law and Police Administration

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT

Course Code: FCH2432 **Credit Units: 03**

Objectives:

The aim of the project is to provide the students with an opportunity to further enhance their intellectual and personal development in the chosen field by undertaking a significant practical experience. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme:

Chapter 1: Introduction
Chapter 2: Conceptual Framework/ National/International Scenario
Chapter 3: Presentation, Analysis and Findings
Chapter 4: Conclusion and Recommendations
Chapter 5: Bibliography

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgements: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

- **a)** ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)** ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
- **c)** ***Presentation of Data, Analysis and Findings*** **:**(using the tools and techniques mentioned in the methodology).
- **d)** ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I: Selection of the topic for the project by taking following points into consideration:

I. Suitability of the topic.
II. Relevance of the topic
III. Time available at the disposal.
IV. Feasibility of data collection within the given time limit.

V. Challenges involved in the data collection (time and cost involved in the data collection, possibility of getting responses, etc.)

STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III: Collection of information and data relating to the topic and analysis of the same.

STEP IV: Writing the report dividing it into suitable chapters, viz.

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National and International Scenario,
Chapter 3: Analysis and Findings
Chapter 4: Conclusion and Recommendations.
Chapter 5: Bibliography

STEP V: The following documents are to be attached with the Final Project Report.

I. Approval letter from the supervisor (Annexure-IA)
II. Student's declaration (Annexure-IB)
III. Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

1. Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
2. Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
3. Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
4. No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
5. Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	**Power Point Presentation and Viva**
75 marks	25 marks

Annexure-I B

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters).....
Submitted by me for the partial fulfilment of the degree of B.Sc. in Forensic science is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.
I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student

Name

Registration No.

Place:
Date:

WORKSHOP/CERTIFICATION

Course Code: FCH2433 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

1. Crime Scene Investigation
2. Forensic Toxicology
3. Forensic Anthropology
4. Handwriting and Typewriting Analysis
5. Crime Scene Investigation
6. Criminology, Criminal Law and Police Administration
7. Fingerprint Science
8. Forensic Serology
9. DNA Fingerprinting
10. Wounds and its Medico-Legal Aspects

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

1. Case Study
2. Simulation
3. Quiz
4. Quality analysis and characterization
5. Identification and preparation of materials

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus- Fifth Semester

DNA FINGERPRINTING

Course Code: FCH2502 **Credit Units: 03**

Course Objective: The objectives of the course are to:
1. Provide basic understanding of genetics in forensic science
2. Provide students with technical skills and competencies in DNA fingerprinting techniques

Course Contents:
Module I: Introduction to DNA Fingerprinting Definition, Importance of DNA Fingerprinting in Forensic Science, Structure of DNA, RNA, Chromosome, Nuclear DNA and Mitochondria DNA.
Module II: DNA Isolation Techniques Collection and types of evidences for DNA fingerprinting. Different types of DNA Isolation techniques (Organic, Inorganic and Mechanical, FTA cards), DNA isolation from different evidences (tissue, hair, bone, blood and seminal stains).
Module III: Techniques for DNA Fingerprinting Electrophoresis, Northern and Southern blotting. Polymerase Chain Reaction (Denaturation, annealing and extension, detection of PCR products), Limitations of PCR.
Module IV: Types of DNA Fingerprinting Techniques Mini-satellites and Micro-satellites, VNTR and RFLP, AFLP, STRs, SNP and Genotyping.
Module V: Practical Application of DNA Fingerprinting Paternity testing and Personal identification. DNA databank, Limitations of DNA Fingerprinting. Legality of DNA Fingerprinting in India. Next generation sequencing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Norah Rudin and Keith Inman (2nd Edition) An Introduction to Forensic DNA Analysis, CRC Press, New York, 2002.
2. Sharma, B. R. (3rd Edition) Forensic Science in Criminal Investigation and Trials, Universal Law Publishing Co. Ltd. New Delhi, 2001.
3. John M. Butler (1st Edition) Fundamentals of Forensic DNA Typing, Academic Press, 2005.

INSTRUMENTATION – BIOLOGICAL

Course Code: FCH2505 **Credit Units: 01**

Course Objective: The objectives of the course are to:

1. Provide student with practical understanding of the various instrumentation and their utility in analysis of samples.
2. Provide skills about control systems, instrumentation equipment and troubleshooting of equipments used in the forensic science laboratory.

Course Contents:
Module I: Centrifugation Techniques Basic principles of sedimentation, various types of centrifuges, Density gradient centrifugation, Preparative centrifugation, Analysis of sub-cellular fractions, Ultracentrifuge-Refrigerated Centrifuges
Module II: Electrophoretic Techniques General principles, Factors affecting electrophoresis, Types of electrophoresis, Low voltage electrophoresis, High voltage electrophoresis, Agarose, Polyacrylamide gel electrophoresis, Isoelectric focusing (IEF), Isoelectrophoresis, Preparative electrophoresis, Horizontal and Vertical Electrophoresis
Module III: Immuno-Chemical Technique Gel immuno-diffusion, Immuno-electrophoresis, Radio Immuno Assay (RIA), ELISA, Fluorescence Immuno assay

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Baker, D.R., Capillary – Electrophoresis, New York, 1995.
2. Chapmen, J.R., Practical Organic Mass spectrometry, A Guide for Chemical and Biochemical Analysis, Wiley, New York, 1993.
3. D.R Lide, Handbook of Chemistry and Physics C.R.C. 75th ed. CRC Press Washington D.C., 1994.
4. Dollisth, F.R., W.G. Fateleyand F.F. Bentley, Characteristic Roman frequencies of organic compounds, Wiley, New York 1974.
5. Friebolin, H. Berik, One and Two Dimensional NMR spectroscopy, Weinheim Germany, VCH 1991.
6. G.H. Stout and L.H. Jensten, X-ray Structure Determination – A practical Guide; 2ndEdn. Wiley, New York, 1989.

MICROSCOPY

Course Code: FCH2513 **Credit Units: 02**

Course Objective: The objectives of the course are to:
1. Provide the basic knowledge about working of microscopy
2. Develop comprehensive understanding of different microscopes and their uses in examination of forensic exhibits.

Course Contents:
Module I: Introduction Definition of microscopy, brief historical development of microscopes, Scope of microscopy in Forensic Science.
Module II: Optics Elementary theory of light, interaction of light with matter, its properties, electromagnetic spectrum, various types of lenses, image formation, magnification, resolution, abbreations.
Module III: Optical Microscopes Basic working principle, components and forensic applications of Simple microscope, Compound microscope, Comparison microscope and Stereomicroscope.
Module IV: Electron Microscopes Basic working principle, instrumentation and forensic applications of Scanning Electron Microscope and Transmission Electron Microscope.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rd Ed) Universal Law Publishing Co. Ltd. New Delhi, 2001.
2. Saferstein, R., Forensic Science Handbook, Prentice Hall, New Jersey, 1982.

CHEMISTRY-V (TOXICOLOGY)

Course Code: FCH2514 **Credit Units: 03**

Course Objective: - The objectives of the course are:

1. The students understand the various types of drugs and toxic substances encountered in an investigation.
2. The varied toxicological signs and symptoms of different toxins on the body when administered.
3. To ensure that the students understand the nature of the toxicological investigations undertaken in forensic laboratories.

Course Contents:
Module I: Toxicology Introduction, History of toxicology and poisons, Definition, dosage, administration of poisons, Classification of poisons on analytical basis and medical basis.
Module II: Drugs of Abuse Introduction, definition, drugs, abuse, classification of drugs, Sedatives, Narcotics, Drug Addiction and their signs and symptoms, Drugs related Crime. Analysis hierarchy of seized drugs, examination, Clandestine laboratories, Stimulants and Hallucinogens, their symptoms, mode of action, dosage, examination.
Module III: Toxicology of Alcohol Ethyl Alcohol, Methyl alcohol: Nature, administration, symptoms, post-mortem findings, isolation, detection and estimation, medico-legal findings. The fate of ethyl alcohol in the body, alcohol in the circulatory system, breath test instruments, field sobriety testing, analysis of blood for alcohol.
Module IV: Corrosives and Insecticides Introduction, classifications of acids and bases. Nature, administration, symptoms, post-mortem findings, isolation, detection and estimation, medico-legal findings. Organophosphorus compounds, Organochloro Compounds and Carbamates- Nature, administration, symptoms, post-mortem findings, isolation, detection, estimation and medico-legal findings.
Module V: Instrumentation for Drug analysis Functions and roles of toxicologists in a forensic science lab; Introduction to different techniques used in toxicology; Basic principle of chromatography and forensic applications (Thin Layer Chromatography (TLC), Gas Chromatography (GC) and High pressure liquid chromatography (HPLC)) (in brief).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester A: Attendance

Text and References:

1. Benjamin, D. M., Forensic Pharmacology. In Forensic Science Handbook (vol – 3), Saferstein, R. (Ed.), Prentice-Hall, Englewood Cliffs, New Jersey, 1993.

DNA FINGERPRINTING LAB

Course Code: FCH2511 **Credit Units: 01**

Course Objective: The students will understand and perform experiments relating to:

1. DNA properties, extraction and quantification
2. DNA Isolation techniques

Course Contents:
1. DNA extraction (plants/ blood) 2. Centrifugation technique 3. Agrose gel electrophoresis 4. Immunodiffusion 5. Spectrophotometry

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
2. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
3. Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
4. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
5. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals
6. G.H. Stout and L.H. Jensten, X-ray Structure Determination – A practical Guide; 2nd Edn. Wiley, New York, 1989

FORENSIC TOXICOLOGY LAB

Course Code: FCH2515 **Credit Units: 01**

Course Objective: The students will understand and perform experiments relating to:
1. Analysis of various metallic, vegetable, volatile and non-volatile poisons.
2. Perform TLC of poisons, drugs, and inks.

Course Contents:
1. Analysis of metallic poisons. 2. Analysis of volatile poisons. 3. Analysis of corrosive poisons. 4. TLC of common drugs. 5. Spot test for insecticides and pesticides.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
2. A. I. Vogel Textbook of Practical organic Chemistry including Qualitative organic analysis
3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
4. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals
5. Isolation and identification of Drugs by E.G.C. Clark.

ARSON AND EXPLOSIVE

Course Code: FCH2516 **Credit Units: 03**

Course Objective: The objectives of the course are to:

1. Provide the scientific knowledge and understanding needed in Fire and Explosion
2. Provide illustrations of fire investigation through a wide range of fire and explosion investigation case studies.

Course Contents:
Module I: Arson Introduction, laws related to arson, Definition, Forensic importance and prerequisites for the cause of Arson cases; Arson investigation - collecting arson evidence.
Module II: Laboratory Examination of Arson Evidence Identification of flammable liquids, Identification of solid chemical incendiary, Reconstruction of incendiary devices.
Module III: Explosives Introduction to explosives, definition, High explosives and low explosives, difference and classification.
Module IV: Laboratory Examination of Bomb and Explosive Evidence Identifying the explosives, Black and smokeless powder identification, dynamite identification, identifying other explosives, reconstructing the destructive devices.
Module V: Identification of RDX and PETN Systematic approach to analysis of post-blast residues, Microscopic examination of the explosives and use of TLC, HPLC and MS to detect RDX and PETN.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. James, S. H. and Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigation Techniques, CRC Press, London, 2003.
2. Saferstein, R., Forensic Science Handbook, Prentice Hall, New Jersey, 1982.
3. Saferstein, Richard, Criminalistics - An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
4. Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rd Ed) Universal Law Publishing Co. Ltd. New Delhi, 2001.

QUALITY MANAGEMENT AND ETHICS

Course Code: FCH2517 **Credit Units: 03**

Course Objective: The objectives of the course:

1. To focus on building a conceptual understanding of quality management in forensic science laboratories.
2. To understand the concept and value of ethics in forensic science.

Course Contents:
Module I: Quality Management System Quality, Total Quality, Quality assurance, Quality control, Quality Planning, Quality Audit: Internal and External Audit, Accreditation, NABL, ISO, IEC, BIS. **Quality Management of Laboratories:** General requirements for the competence of testing and calibration laboratories – Introduction, Scope, Management requirements: Organization, Quality System, Document Control.
Module II: Quality Control Process **Management Requirements:** Organizational, document control, subcontracting of tests and calibrations control of Non conforming testing / calibration work, corrective and preventive actions, Management Review. **Technical Requirements:** Test and calibration methods and their validation, measurements, standards and reference material, traceability, sampling. **Good Laboratory Practices (GLP):** Fundamental principles of GLP, Organizational Setup, Resources, Raw data and data collection, SOPs, Archives.
Module III: Ethics **Ethics:** Definition, concept of ethics, Ethics in science, Development of a Code of Ethics for Forensic Science. **Ethics in Forensic Science:** Duties of Forensic Scientist, Qualification of Forensic Scientist. Ethical duties of attorney and experts. Ethics in testimony. Criminal investigation ethics. Ethics in laboratory and in crime scene investigation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1. Barnett P.D. (2001), Ethics in Forensic Science: Professional Standards for the Practice of Criminalistics, CRC press.

TECHNICAL WRITING IN SCIENCE-I

Course Code: FCH2509 **Credit Units: 02**

Course Objective:
Students will be introduced to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Contents:
Module I: Writing Skills Writing Skills; Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing.
Module II: Technical Writing Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.
Module III: Documentation Process Understanding Audience/Readers, Collecting and Organizing information, drafting information verbally and visually, Producing Information.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
Att: Attendance

Text and References:
1. M. Frank. Writing as thinking: *A guided process approach, Englewood Cliffs,* Prentice Hall Reagents.
2. L. Hamp-Lyons and B. Heasely: Study Writing; *A course in written English.* For academic and professional purposes, Cambridge Univ. Press.
3. R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
4. Daniel G. Riordan and Steven A. Panley: *"Technical Report Writing Today"* - Biztaantra.
5. Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
6. *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004)

TERM PAPER

Course Code: FCH2531 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of chemistry and applied chemistry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

1. Crime Scene Investigation
2. Forensic Toxicology
3. Forensic Anthropology
4. Handwriting and Typewriting Analysis
5. Crime Scene Investigation
6. Criminology, Criminal Law and Police Administration
7. Fingerprint Science
8. Forensic Serology
9. DNA Fingerprinting
10. Wounds and its Medico-Legal Aspects

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

WORKSHOP

Course Code: FCH2533 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

1. Forensic Science
2. Crime Scene Investigation
3. Microscopy
4. Forensic Toxicology
5. Forensic Anthropology
6. Handwriting and Typewriting Analysis
7. Crime Scene Investigation
8. Criminology, Criminal Law and Police Administration
9. Fingerprint Science
10. Forensic Photography
11. Forensic Serology
12. DNA Fingerprinting
13. Wounds and its Medico-Legal Aspects

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

1. Case Study
2. Simulation
3. Quiz
4. Quality analysis and characterization
5. Identification and preparation of materials

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus- Sixth Semester

FORENSIC MEDICINE

Course Code: FCH2616 **Credit Units: 03**

Course Objectives: The student will understand

1. About the scope of different types of injuries, causes and manner of death and their medico legal significance
2. About the utility of the injury assessment in medico legal cases

Course Contents:
Module I: Autopsy Ante and Post-mortem examinations; external examination; internal examination; collection, preservation and packaging of viscera Assessing and determining the time and cause of Death, Study of burned bones and bone fragments.
Module II: Introduction to Wounds Introduction to wounds; definition, Mechanism of wound production and healing, Determining the age of the injury, and its medico - legal aspects.
Module III: Injuries due to Blunt and Sharp Forces Abrasions, Bruises, Lacerations; causes, dimensions, ante – mortem and post – mortem injuries and its medico - legal aspects, Incised, Stab, Punctured wounds - causes, dimensions, ante – mortem and post – mortem injuries ante – mortem and post – mortem injuries.
Module IV: Miscellaneous Injuries Injuries due to heat, cold, chemicals and radiation and their medicolegal significance.
Module V:Bite Marks Types of bite marks; collection and preservation of DNA samples, forensic importance of bite marks; identification.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

References:

1. Modi's Medical Jurisprudence and Toxicology,23rd Edition, by K. Mathiharan andAmrit K. Patnaik, Third reprint, 2009, LexisNexis, Butterworth, New Delhi
2. Essentials of forensic medicine, Dr. K. S. Narayan Reddy.
3. Forensic Medicine and toxicology, JB Mukherjee, Vol I and II.
4. Keith Simpson's , Forensic Medicine
5. Gleister's Medical Jurispridence and Toxicology, Churchill Livingstone Dental Anatomy Atlas, Whitaker

BALLISTICS

Course Code: FCH2617 **Credit Units: 03**

Course Objective: The objectives of the course:

1. To understand the role of ballistics in Forensic Science
2. Classification of firearms, determination of the range of firing, methods of laboratory examination of fired cartridges and fire arms.
3. The students will also learn to reconstruct the sequence of events in cases involving firearms.

Course Contents:
Module I: Ballistics Definition, Indian Arms Act, Forensic Importance; Nature of firearms, parts of firearms, classification of firearms.
Module II: Ammunition Types, bullet comparisons, cartridge case examination, class and individual characteristics of identification.
Module III: Range of Fire Muzzle pattern, scorching, blackening, tattooing, wad distribution, pellet patterns, GSR analysis, and primer residues.
Module IV: Analysis and Reconstruction Reconstruction of the sequence of events in a shooting case, accidental firing. Presentation of evidence in the court.
Module V: Firearm Injuries Entrance wound, exit wound and internal wound, evaluation of firearm injuries.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1. James, S. H. And Nordby, J. J. (Ed), Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
2. Modi, A Text Book of Medical Jurisprudence and Toxicology.
3. Saferstein, Richard, Criminalistics - An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
4. Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi, 2001.

CRIMINOLOGY, CRIMINAL LAW AND POLICE ADMINISTRATION

Course Code: FCH2613 **Credit Units: 03**

Course Objective: The course focuses on following objectives-

1. Developing an understanding and appreciation for the scope of Criminology and criminal laws.
2. Develop an understanding on concepts of crime, types of crime and criminal behavior.
3. Brief description on Juvenile delinquency, types, classification and factors responsible.
4. Develop comprehensive knowledge on Role of Police with regard to criminals, society and custodial crimes.

Course Contents:
Module I: Criminology and Criminal Behavior Definition: Crime, Criminal and Criminology; Criminology: Scope, Methods and Techniques, Classification of criminals, Crimes: Organized, White–Collar crimes/Occupational crimes, Murders, Sexual offences, Terrorism, Serial Crimes, Crime against women and children.
Module II: Types of Offences Bailable and non-bailable offences, cognizable and non-cognizable offences, warrant and summon, custodial circumstances, victim offender relationship**.**
Module III: Juvenile Delinquency Definition, Types of Juvenile Delinquents, Classification of Juvenile Delinquents, Factors in Juvenile Delinquency, Custody of juvenile delinquents, Juvenile courts procedure, Rehablitation Preventive Programmes.
Module IV: Punishment Concept of punishment, Kinds of punishments, Humanitarian approach to concept of punishment, capital punishment in India, Introduction to criminal Laws: IEA, IPC and CrPC.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text and References:

1. Ellis, L. and Walsh, Anthony, Criminology – A Global Perspective, Allyn and Bacon, Boston, 2000.
2. Morris, E. K., and Braukman, C. J. (Eds.), Behavioral Approaches to Crime and Delinquency-A Hand book of Application, Research and Concepts, Plennum Press, New York, 1987.
3. Abaadinsky, H., Organised Crime (2nd Edn.), Nelson – Hall, Chicago, 1998.
4. Adler, F., Mueller, G. O. W. and Laufer, W. S., Criminology, McGraw – Hill, Boston, 1991.
5. Maguire, M.: Morgan, R and Reiner, R., The Oxford Handbook of Criminology (3rd Edn.), Oxford University Press, Oxford, 2002.
6. Ahuja, R., Criminology, Rawat Publication, ND, 2000.
7. Bajpai, G. S., Development without Disorders. Vishwavidyala, Prakashan, Sagar (M. P.), 2002.

CHEMISTRY-VI (PHYSICAL AND CHEMICAL)

Course Code: FCH2618 **Credit Units: 03**

Course Objective: The objectives of the course is to provide student with practical understanding of the various instrumentation and control systems, instrumentation equipment and troubleshooting skills used in the forensic science laboratory.

Course Contents:
Module I : Introduction Concept of molarity, molality, normality, formality and mole fraction.
Module II: Spectrophotometry Electromagnetic spectrum, Sources of Radiation, their utility and limitations, difference between Atomic spectrum and Molecular spectrum.
Module III: UV-Visible spectrophotometry and AAS Types of sources and stability, wavelength selection, filters-cells and sampling devices, detectors, resolution, qualitative and quantitative methods for detection. Atomic absorption spectrometry: Principle, Instrumentation and techniques, interference in AAS, background correction methods, quantitative analysis.
Module IV: Chromatographic Techniques I Definition and Concept of Chromatography, Classification of Chromatography. Basic principle, theory, Instrumentation and Forensic Applications of Paper chromatography, Thin layer chromatography and HPTLC.
Module V: Chromatography Techniques II Basic principle, theory, Instrumentation and Forensic Applications of Gas chromatography and HPLC.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Jacobson, B.H.E., Ray, Sidney, Attridge G. G., The Manual of Photography; Focal Press, London, 1988.
2. Baker, D.R., Capillary – Electrophoresis, New York, 1995.
3. Chapmen, J.R., Practical Organic Mass spectrometry, A Guide for Chemical and Biochemical Analysis, Wiley, New York, 1993.
4. Lide, D.R., Handbook of Chemistry and Physics C.R.C. 75th ed. CRC Press Washington D.C., 1994.
5. Dollisth, F.R., Fateley, W. G. and Bentley, F. F., Characteristic Roman frequencies of organic compounds, Wiley, New York, 1974.
6. Friebolin, H. Berik, One and Two Dimensional NMR spectroscopy; Weinheim Germany, VCH 1991.
7. Stout G.H., andJensten, L.H., X-ray Structure Determination – A practical Guide, 2nd Ed., Wiley, New York, 1989.

BALLISTICS LAB

Course Code: FCH2619 **Credit Units: 01**

Course Objective: - The students will understand and perform experiments related to:

1. Analysis of GSR
2. Identifying parts of firearm, explosives

Course Contents:
1. Spot test for 2. Identification of parts of firearms 3. Filter test for petroleum products 4. TLC for flammable liquids

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
2. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
3. Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
4. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
5. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical and Training Manuals
6. G.H. Stout and L.H. Jensten, X-ray Structure Determination – A practical Guide; 2ndEdn. Wiley, New York, 1989

FORENSIC PSYCHOLOGY

Course Code: FCH2610 **Credit Units: 03**

Course Objective: The objective is to introduce students to fundamental principles involved in research and practice within Forensic Psychology. Students are introduced to the structure of the criminal justice system.

Course Contents:
Module I: The Science of Psychology Concepts of psychology - Definition of psychology, goals of psychology Different perspectives in Psychology - Modern perspectives, Humanistic, Behaviouristic, Cognitive, Psychodynamic.
Module II: Consciousness Consciousness - Definition of consciousness, states of consciousness Altered state of consciousness - Dreams, awake states including day dreaming Rhythms of consciousness (Circadian rhythms) Sleep – stages of sleep, Dreams – Content, REM sleep and non-REM sleep.
Module III: Theories of Personality and Perception Understanding personality: Definition, stressing uniqueness, enduring characteristics, temperament. Approaches – Psychodynamic (Freud, Jung and Adler), Humanistic (Rogers and Maslow) Dispositional approaches – Type (Jung. Type A and B, Rotter and Big – 5 and Trait (Catelli) Behavioural Approaches - Locus of control and Social learning theory. Assessment of personality – Questionnaires, Rating scales and Projective tests, biological model assessment of personality Basic concepts in perception, Gestalt Principles, assessment attention and perception.
Module IV: Psychological Disorders Psychological disorders (Alcohol/Substance Abuse, Anxiety Disorders, adult Attention Deficit, Bipolar Disorder, and Depression). Altered states – Hypnosis, Meaning, Hypnotic Phenomena, Hypnotic stages Attention and awareness - Attention: Definition, characteristics, selective attention and divided attention.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;
A: Attendance

Text and References:

1. Broota, K.D., Experimental designs in psychological research, Wiley eastern, New York, 1992.
2. Guilford, Statistics in Psychology and Education, McGraw hill, New York, 1986.

PHYSICS-III

Course Code: FCH2620 **Credit Units: 3**

Course Objective: It provide students the skill necessary to enter the profession with an eye towards accident, reconstruction, firearm ballistic and related investigative tasks.

Course Contents:
Module I: Laser and Fiber Optics Production of LASER, Types of LASER, Properties and applications of LASER, Optical fibres, Propagation of light through optical fibre, Angle of acceptance and numerical aperture, losses, Solar cells.
Module II: Radio Activity Review of nuclear composition, nuclear properties and half-life, Radioactive decay schemes Applications of Radio Isotopes, Radiometric dating.
Module III: Electronics Circuits and Digital Electronics Basics of LR, CR, LCR circuits, Rectifier circuits, Timer circuits, Transistor and its characteristics, Introduction to OPAM, remote sensing and controlling, Photo-sensors, Logic gates and their applications, Flip- flops and counters.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:

1. Allied Physics – R. Murugesan S. Chand and Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand and Co. (1999).
5. Modern Physics – R. Murugesan S. Chand and Co. (2004).
6. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
7. Introduction to Fiber optics by K. Thyagarajan and Ajay Ghatak, Cambridge, University Press (1999).

TECHNICAL WRITING IN SCIENCE-II

Course Code: FCH2612 **Credit Units: 02**

Course Objective:
Students will be introduced to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Course Contents:
Module I: Technical Writing Process Document development process, Estimating Technical Documentation, Documentation Planning, Selection of Tools, Information Architecture, Templates and Page design, Audience Profiling.
Module II: Article Writing Journal paper writing: Abstract for paper and poster, different kind of journal for chemistry, impact factors of journals, ISBN number, Citation, H-index.
Module III: Project Writing Analytical report, Project Management in Technical Communication, Project writing, project proposal writing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text and References:
1. M. Frank. Writing as thinking: *A guided process approach, Englewood Cliffs,* Prentice Hall Reagents.
2. L. Hamp-Lyons and B. Heasely: Study Writing; *A course in written English.* For academic and professional purposes, Cambridge Univ. Press.
3. R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
4. Daniel G. Riordan and Steven A. Panley: *"Technical Report Writing Today"* - Biztaantra.
5. Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
6. *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004).

TERM PAPER

Course Code: FCH2631 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of chemistry and its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

1. Forensic Toxicology
2. Forensic Anthropology
3. Handwriting and Typewriting Analysis
4. Forensic Taphonomy
5. Crime Scene Investigation
6. Criminology, Criminal Law and Police Administration
7. Fingerprint Science
8. Forensic Serology
9. DNA Fingerprinting
10. Wounds and its Medico-Legal Aspects

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

MINOR PROJECT

Course Code: FCH2632 **Credit Units: 03**

Objectives:

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis and Findings -- 25 marks
Chapter 4: Conclusion and Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

- **a)** ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)** ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
- **c)** ***Presentation of Data, Analysis and Findings*** **:**(using the tools and techniques mentioned in the methodology).
- **d)** ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I: Selection of the topic for the project by taking following points into consideration:
1. Suitability of the topic.
2. Relevance of the topic
3. Time available at the disposal.
4. Feasibility of data collection within the given time limit.

Challenges involved in the data collection (time and cost involved in the data collection, possibility of getting responses, etc.)

STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

STEP III: Collection of information and data relating to the topic and analysis of the same.

STEP IV: Writing the report dividing it into suitable chapters, viz.

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National and International Scenario,
Chapter 3: Analysis and Findings
Chapter 4: Conclusion and Recommendations.
Chapter 5: Bibliography
STEP V: The following documents are to be attached with the Final Project Report.
Approval letter from the supervisor (Annexure-IA)
Student's declaration (Annexure-IB)
Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

1. Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
2. Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
3. Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
4. No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
5. Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	**Power Point Presentation and Viva**
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters)..... submitted by me for the partial fulfilment of the degree of B.Sc. Honours in Forensic science is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:

Signature of Student
Name
Registration No.

Place:
Date:

WORKSHOP

Course Code: FCH2633 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

1. Forensic Toxicology
2. Forensic Anthropology
3. Handwriting and Typewriting Analysis
4. Forensic Taphonomy
5. Crime Scene Investigation
6. Criminology, Criminal Law and Police Administration
7. Fingerprint Science
8. Forensic Serology
9. DNA Fingerprinting
10. Wounds and its Medico-Legal Aspects
11. Forensic science and judicial process
12. Polygraph and Lie Detector
13. Cybercrimes and their Tracking

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

1. Case Study
2. Simulation
3. Business Planning
4. Quiz
5. Quality analysis and characterization
6. Identification and preparation of materials

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Amity School of Applied Sciences

Bachelor of Science (Mathematics) (Honors)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Programme Overview

Duration: 3 years

B.Sc. Mathematics (Honours) is a 3 year full time program which includes a curriculum which is one of the best curriculums followed in this stream. Here are some of the important subjects present in B.Sc. Mathematics course - Calculus, probability,Statistics ,Algebra, RealAnalysis, Linear Differential Equation,Group Theory,Matrices, Geometry,Fourier Analysis,Metric Space,Ring Theory,Computer Application , Complex Analysis,Linear Algebra,Numerical Methods,Comunication skills.

For a B.Sc (Hons) Mathematics degree a student has to earn 150 Credits. These credits can be earned through the following categories of courses:
1. Compulsory courses- Every semester a student compulsorily takes these courses. All together these account for 95 credits. These also include one compulsory Summer workshop/SAP
2. Concentration Electives- These are courses in related areas like Statistics which a student takes to get a deeper understanding . A student can choose his subjects from a list of subjects available to him/her. However a ***minimum cohort of 10 students*** in a subject is mandatory to run a course.A student earns 9 credits through the concentration electives.

3. Open Electives- These are courses being offered across the university by any of the schools. The following open electives are compulsory for all students of B.Sc.
i) Foreign Language (Total 12 Credits)
ii) Courses in Behavioural Science (1 Credit per semester)
iii) Courses in Communication Skill (1 Credit per semester)
iv) Environmental Studies (2 Credits in the first and second semester each)

In addition to the above courses the student can choose from a list of courses being offered by other schools/ centres of excellence. A student has to earn 3 credits per semester from these courses. These courses have been grouped into various tracks and if a student earns 15-18 credits from courses in a particular track then the student is eligible to get a minor in that track area. For example if a student follows the Animation track and chooses one course each semester for 5 semesters from that track at the end of the program , the student will get a B.Sc. degree with a minor in animation.

Students of all the undergraduate degree Programmes at the time of graduation will be able to:

PO1 **Scientific knowledge:** Acquire the knowledge with facts and figures related to various subjects in such as Physics, Chemistry, Mathematics, etc.

PO2 **Modern tool usage:** Acquire the skills in handling scientific language, planning and performing in lab experiments.

PO3 **Problem analysis:**Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using fundamental principles, and the scientific theories.

PO4 **Effective communication:**Develop various communication skills such as reading, listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively.

PO5 **Ethics:**Apply ethical principles and commit to professional ethics and responsibilities and norms

PO6 **Individual and Team work:**Demonstrate the capability to work both independently and in cooperation with others

Program Learning Outcomes: After completing the program the student will be able to:

PSO1: Identify basic manipulative skills in algebra, geometry, trigonometry, and beginning calculus.

PSO2:Apply the underlying unifying structures of mathematics (i.e. sets, relations and functions, logical structure) and the relationships among them
.

PSO3:. Develop proficiency in writing proofs.

PSO4: Communicate mathematical ideas both orally and in writing.

PSO5: Investigate and apply mathematical problems and solutions in a variety of contexts related to science, technology, business and industry, and illustrate these solutions using symbolic, numeric, or graphical methods.

Syllabus- First Semester

DIFFERENTIAL CALCULUS

Course Code: MTH2101 **Credit Units: 04**

Course Objective:

The objective of this course is to introduce the concepts of successive differentiation, higher order differentiation, partial differentiation and their applications; fundamentals of curve tracing.

Course Contents:

Module-I: Review,

Successive Differentiation, Expansions of functions,Functions of one variable,Inverse function, Limit (ε - δ Definition), Continuity and Differentiability of a function, Successive Differentiation, nth Differential coefficient of functions, Leibnitz Theorem; Taylor's and Maclaurin's series expansions for one variable.

Module-II: Curvature and Asymptotes: Curvature, Radius of curvature; Cartesian, Polar and pedal formula for radius of curvature. Asymptotes of algebraic curves, Methods of finding asymptotes, Parallel asymptotes to axes.

Module-III: Singular Points and Curve Tracing:

Regular points and Singular Points of a curve, Point of inflection, Double Points, Cusp, Node and conjugate points, Curve tracing for Cartesian and polar coordinates.

Module-IV: Partial Differentiation:

Partial differentiation and problems, Euler's theorem and its proof, Few corollaries on Euler's theorem for higher order derivatives, Taylor's expansion of a function in two variables, Jacobian and its properties, Maxima and minima of a function in two variables, Method of Lagrange's multipliers.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

Recommended Books:

1. J Edwards, Differential Calculus for Beginners, Nabu Press 2011
2. G. C. Sharma, Manohar Ray, S. S. Seth: Differential Calculus, Shiva Lal Agarwal and Co., Agra
3. T. M. Apostol: Calculus, John Willey and Sons, New York
4. S. Lang: A First Course in Calculus, Addison Wesley Publishing Co., Philippines, 1973
5. Gorakh Prasad: Differential Calculus, Pothishala Publication, Allahabad, 2015.

CLASSICAL ALGEBRA

Course Code: MTH2107 **Credit Units: 04**

Course Objective:
The classical algebra course contains a treatment of the Euclidean Algorithm in its classical forms for integers and for polynomial rings over a field. The objective of this course is to develop a sound knowledge of the real number system and to provide the necessary understanding and competency in basic algebra concepts and skills.

Course Contents:

Module-I: Algebraic system of real number, complex number introduced as a system of ordered pairs of real numbers, De-Moivre's theorem and its applications.

Module-II: Statements of well ordering principle, first principle of mathematical induction, second principle of mathematical induction. Proofs of some simple mathematical results by induction. Divisibility of integers. The division algorithm ($a = gb + r$, $b \neq 0$, $0 \leq r < b$). The greatest common divisor (g.c.d.) of two integers a and b. Existence and uniqueness of (a, b). Relatively prime integers. The equation $ax + by = c$ has integral solution if (a, b) divides c. (a , b, c are integers). Prime integers. Euclid's first theorem: Euclid's second theorem, Unique factorization theorem. Congruences, Linear Congruences, Statement of Chinese Remainder Theorem and simple problems. Theorem of Fermat, Multiplicative function $\phi(n)$.

Module-III: Polynomials with real coefficients: Fundamental theorem of Classical Algebra (statement only). The n-th degree polynomial equation has exactly n roots. Nature of roots of an equation (surd or complex roots occur in pairs). Statements of Descartes rule of signs and of Sturm's Theorem and their applications. Multiple roots. Relation between roots and coefficients, Transformation of equations.

Module-IV: Symmetrical Function, Newton's Method, Cardan's method of solving a cubic equation. Ferrari's method of solving a bi-quadratic equation. Descrete's Method for solution of biquadratic equation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE-**End Semester Examination

References:

1.Weisstein, Eric. Linear Alebra" From MathWorld A Wolfram Web Resource. Wolfram. Retrieved 16 April 2012.

2 Vitulli, Marie. A Brief History of Linear Algebra and Matrix Theory". Department of Mathematics. University of Oregon. Retrieved 2012-01-24.

3 Anton, Howard (2005), Elementary Linear Algebra (Applications Version) (9th ed.), Wiley International

INTEGRAL CALCULUS

Course Code: MTH2108 **Credit Units: 04**

Course Objective:

The objective is to introduce fundamentals of integration and their application to calculate area or curves, volume and surfaces of solids of revolution; how to use Beta and Gamma functions to deal with multiple integrals.

Course Contents:

Module-I: Review and Definite Integrals: Elementary integration (standard forms and integration by parts), Integration of rational and Irrational algebraic functions, Integration of trigonometric functions.

Definite integrals: Integral as a limit of sum, Properties of Definite integrals; Summation of series by
integration.

Module-II: Application of Definite Integrals: Area of curves (quadrature) (includes both cartesian and polar representation), Length of Curves (rectification) (includes cartesian, polar, and parametric representation), Volume and surfaces of solids of revolution.

Module-III: Multiple Integrals: Evaluation of Double integrals, Double integral in polar coordinates, Change of variables, Change of order of integration in Double integrals, Evaluation of Triple integrals.

Module-IV: Functions Defined by Infinite Integrals: Beta function, Properties and various forms, Gamma function, Recurrence formula and other relations, Relation between Beta and Gamma function. Evaluation of integrals using Beta and Gamma functions. Dirichlets theorem and its Liovelles extension.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1 J Edwards, Integral Calculus For Beginners, Arihant Publications; First edition (2016)

2 G. C. Sharma, Manohar Ray, S. S. Seth: Differential Calculus, Shiva Lal Agarwal and Co., Agra

3 T. M. Apostol: Calculus, John Willey and Sons, New York

4 S. Lang: A First Course in Calculus, Addison Wesley Publishing Co., Philippines, 1973

5 Gorakh Prasad: Integral Calculus, Pothishala Publication, Allahabad, 2015.

PHYSICS

Course Code: MTH2110 **Credit Units: 04**

Course Objective: An important objective of the course is to develop an understanding of 'core physics' at successively deeper levels, each stage revealing new phenomena and greater insight into the properties of matter. Heat, electricity and magnetism, Sound waves and optics

Course Contents:

Module I: Properties of matter

Elasticity: Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion: Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Rigidity Modulus – Determination of rigidity modulus by Torsional oscillation (without masses).

Module II: Heat

Heat: Specific heat – Properties of heat, Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power

Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Liquification of gases

Module III:

Electric Charges, Fields

Basics of vector calculus (Gradient, divergence, curl and their physical significance; Gauss and Stokes theorem); Electric Charge, Principle of Superposition, Electric Flux, Gauss's law, Electric Field for Spherical, Plane and Cylindrical Distribution of Charges (applications of Gauss law), Differential form of Gauss's Law.

Electric current

Electric Currents: Charge Transport and Current Density, Equation of Continuity, Ohm's Law in vector form.

Module IV:

Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, Different conditions of damping of harmonic oscillations. Forced harmonic oscillations, Resonance, Impedance LC circuit, LCR circuit.

Wave motion in one dimension, Transverse and longitudinal waves, progressive harmonic waves and their energy, Transverse waves on a string, longitudinal waves on a rod, Stationary waves.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Engineering Physics– Shatendra Sharma and Jyotsna Sharma, Pearson Publishers 2018.
2. Applied Physics –K. Thangaraj, D. Jayaraman Popular Book Department, Chennai.
3. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).

4. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
5. N. K. Bajaj, waves and oscillations Mcgrew Hill. Publishers.
6. Modern Physics – R. Murugesan S. Chand & Co. (2004).

Syllabus- Second Semester

ORDINARY DIFFERENTIAL EQUATIONS

Course Code: MTH2205 **Credit Units: 04**

Course Objective:

Study of differential equations is essential for understanding many physical and natural phenomena. After completing the course, students will be able to solve various type of ordinary differential equations. arising from changes in physical world.

Course Contents:

Module-I: Review & Equations of First order and First degree differential equations: Formation of Differential equations, Order and Degree of Differential Equations, Complete primitive (general solution,particular solution and singular solutions). Differential equations of first order and first degree, Separation of variables, Homogeneous Equations, Equations of the form $dydx = ax+by+ca1x+b1y+c1$, Linear Equations, Equation reducible to the linear form, Exact differential equations, Equations reducible to exact form by using integrating factors.

Module-II: Equation of First order but not of first degree & Trajectories: Equation of First order but not of first degree, Various cases and various methods of solution, Clairauts form, Singular solutions, Trajectory, Orthogonal Trajectory, Self-Orthogonal family of Curves.

Module-III: Linear Differential Equations with constant coefficients: Linear equations with constant coefficients, Complementary function, Particular integral, Working rule for finding solution for various cases, Homogeneous linear differential equations, Equations reducible to homogeneous form.

Module-IV: Simultaneous Differential Equations & Linear Equations of Second Order with variable coefficients: Simultaneous differential equations, Differential equations of the form dx/P = dy/Q = dz/R where P, Q, R are functions of x, y, z. Linear Equations of second order with variable coefficients, following methods: (a) the complete solution in terms of a known integral, (b) finding one integral in C.F. by inspection, (c) removal of first derivative, (d) method of variation of parameters.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1 Earl A. Coddington and Norman Levinson: Theory of Ordinary Differential Equations, Tata McGraw-Hill Publishing Company (1998).

2 Shepley L. Ross: Differential Equations, Wiley (1984).

3 Ravi P. Agarwal: Ordinary and Partial Differential Equations, Springer, 1993.

4 L. Elsgolts: Differential Equations and Calculus of Variations, Mir Publishers, 1970.

5 M D Raisinghania: Ordinary & Partial Differential Equation, S. Chand Publishing; Nineteen edition, 2017.

GROUPS AND RING THEORY

Course Code: MTH2209 **Credit Units: 04**

Course Objective:
The objective of the course is to introduce fundamental theorems and applications relevant to the study of
Group, rings and fields, and analyze rigorous mathematical proofs of statements related to groups, rings and fields.

Course Contents:

Module-I: Basics and Review: Sets, Subsets, Operations on sets, Index set and family of sets, Relations, Equivalence relations and partitions, Mappings. Infinite sets and cardinality, Congruence modulo-n., Laws of composition.

Module-II: Groups: Binary operation and Algebraic structure, Groups, Subgroups, Generators of a group, Permutation groups, Cyclic groups, Coset decomposition, Lagrange theorem and its consequences, Homomorphism and Isomorphism, Normal subgroups, Quotient group, Cayleys theorem.

Module-III: Groups Contd.: Fundamental theorems on homomorphism and isomorphism, Automorphism and inner automorphism, Automorphism groups and their computation, Normaliser and center of group, Group actions, Stabilizers and orbits, Finite groups, Commutor subgroups.

Module-IV: Rings & Ideals: Rings, Various types of rings, Rings with Moduley, Rings without zero divisors, Properties of rings, Sub rings, Characteristic of a ring. Ideals, Quotient rings, Principal ideals, Maximal ideals, Prime ideals, Principal ideal domains.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE-**End Semester Examination

References:

1 I.N. Herstein : Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975

2 P.B. Bhattacharya, S.K. Jain and S.R. Nagpal : Basic Abstract Algebra (2nd edition), 1994.

3Vivek Sahai and Vikas Bist : Algebra, Narosa Publishing House, 1999.

4 Joseph A. Gallian: Abstract Algebra, Narosa Publishing, 2011

VECTOR CALCULUS

Course Code: MTH2212 **Credit Units: 03**

Course Objective:

The course is designed to introduce fundamentals of vector calculus. A student learns how to appreciate the concepts of calculus being implemented on vector fields.

Course Contents:
Module-I: Scalar and vector product of three vectors, product of four vectors. Reciprocal vectors. Vector differentiation. Scalar Valued point functions, vector valued point functions, derivative along a curve, directional derivatives.
Module-II: Gradient of a scalar point function, geometrical interpretation of gradϕ, character of gradient as a point function. Divergence and curl of vector point function, characters of Div *f* and curl *f* as point function, examples. Gradient, divergence and curl of sums and product and their related vector identities.
Laplacian operator.
Module-III: Orthogonal curvilinear coordinates Conditions for orthogonality fundamental triad of mutually orthogonal Module vectors. Gradient, Divergence, Curl and Laplacian operators in terms of orthogonal curvilinear coordinates, Cylindrical co-ordinates and Spherical coordinates.
Module-IV: Vector integration; Line integral, Surface integral, Volume integral. Theorems of Gauss, Green & Stokes and problems based on these theorems.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

□ □ Murrary R. Spiegal, Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York, 1963.

2 Murrary R. Spiegal, Vector Analysis, Schaum Publishing Company, New York, 1959.

3 N. Saran and S.N. Nigam, Introduction to Vector Analysis, Pothishala Pvt. Ltd., Allahabad.

4. Shanti Narayna, A Text Book of Vector Calculus. S. Chand & Co., New Delhi, 1987.

COMPUTER FUNDAMENTALS

Course Code: MTH2214

L-T-P: 0-0-2 **Credit Units: 02**

Course Objective:

This course is aimed to provide a fundamental understanding of computer science for the students in their early stages of academic career. The syllabus includes the basic concepts of memory, processing units, input and output devices, primary arithmetic and number conversions. At the end of the program the students will be able to understand the fundamentals of WORD, Power Point and Excel.

Course Contents:

Module I

Introduction to computer, history, Characteristics of computers, Basic Computer Organization, Computer Hardware Components Input, Output, Storage units, Central Processing Unit and memory, Input Devices (Keyboard, Mouse, Joystick), Output devices (Monitors, Printers, Multimedia projectors). Number System-Binary, Hexadecimal, Octal, and Decimal. Conversion from one number system to another.

Module II

Introduction to WORD Processor: Typing text, Closing and saving the text, Text editing, Spell Check, Common formatting functions-Working with Alignment, Working with Indentation, Working with Highlight, Working with Font. FIND & REPLACE, formatting the paragraph, special symbols, Bullets & Numbering, Tables, INSERTING CLIPART & WORDART, Picture & Drawing Tool Bar, HEADER & FOOTER

Module III

Introduction-Opening new presentation, Parts of PowerPoint window, Opening saving and closing presentations, Features of PowerPoint, Background design, Word art, Clip art, Drawings, 3D settings. Inserting and deleting slides, arranging slides, slides show, Animations, Sound, Views, types of views. Creating custom presentations

Module IV

Introduction to Excel: parts of EXCEL window, opening closing of workbooks, editing data, Copying the Data, Moving the Data, Formatting the Data, Formatting Tool bar, Drawing in Excel, Drawing Tool bar, Formatting and editing the Worksheet., Format cells window, Inserting Row and Column, Deleting Row and Column, Inserting Worksheet, Deleting Worksheet, Renaming Worksheet, Formulas in Excel, Creating simple formulas, Functions, Date Arithmetic, Working with Charts, Types of Charts, Inserting Charts, Formatting the Charts.

List of Practical:

1) Type a Leave Letter in Word Using format/style/ modify format/text, set text to reasonably large such as 18-pt.
2) Set up one table, with shading and a minimum of 3 rows and 3 columns. List your at least 10 favorite holiday destinations in the table.
3) Create a Small advertisement by inserting some pictures
4) Create a document with header and footer. Insert your institute name as header.
5) Create a document having two columns with page number.
6) Create a Power point presentation of your college (Minimum 10 Slides)
7) Insert college pictures in the slides (Minimum 5 slides)
8) Apply different transitions to all slides
9) Create a Power point presentation with animation and audio sounds
10) A demo presentation either on WORD or Power Point
11) Formatting the Date cell
12) Create an Excel sheet for students mark sheet of 5 subjects. Calculate the average, total, pass/ fail using functions and formulas

13) Create a bar chart in Excel for year wise students enroll in your course.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Text & References:

Text:

- Fundamentals of IT, Satish Jain, BPB Publication
- Fundamentals of Computer Science, V. Rajaraman, PHI.
- Fundamentals of Information Technology, D S Yadav, New Age Publication
- Computer Fundamentals, V Raja Raman

References:

- Computer Today, S. K. Basandra, Galgotia Publications

CHEMISTRY-I

Course Code: MTH2213 **Credit Units: 03**

Course Objective:
To develop the ability to predict the structures and certain properties and reactivities of the elements and of many of their simpler ionic and covalent compounds. To achieve this predictive capability will require the student to enhance their understanding of atomic structure and periodicity. These concepts are directly applicable to organic and physical chemistry.

Course Contents:

Module I: Atomic Structure
Dalton's atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses. Mole concept and molar mass: molarity, normality, molality, percentage composition, empirical and molecular formula. Structure of atom, isotopes and isobars. Different Atomic models and their limitations.

Module II: Periodicity of Elements
Significance of periodic table, periodic law and the present form of periodic table, periodic trends in properties of elements. *s*, *p*, *d*, *f* block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to *s* & *p*-block:
(a) Effective nuclear charge, shielding or screening effect, variation of effective nuclear charge in periodic table.
(b) Atomic radii (van der Waals)
(c) Ionic and crystal radii
(d) Covalent radii (octahedral and tetrahedral)
(e) Ionization enthalpy, Electron gain enthalpy and Electronegativity .

Module III: Organic Mechanism
Electron Displacement Effects: Inductive Effect; Mesomeric Effect; Electromeric Effects; Fission of covalent bonds; Intermediates of Organic reactions; Carbonium , Carbanion, Free Radical and Carbene; Types of organic reactions; Substitution , Elimination, Addition.

Module IV: Chemical Equilibrium
Introduction ; Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants; Acid-Base Concept; HSAB Principle, Weak acid and Weak base and their salts; Solubility Product; pH and pOH, Buffer Solution, Buffer Action

Module V: Introduction of Analytical Techniques
Introduction of Gravimetric analysis and Volumetric analysis, introduction to chromatography and purification of sample

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Lee, J.D. *Concise Inorganic Chemistry*, ELBS, 1991.
2. Douglas, B.E. and Mc Daniel, D.H., *Concepts & Models of Inorganic Chemistry*, Oxford, 1970
3. Atkins, P.W. & Paula, J. *Physical Chemistry*, Oxford Press, 2006.
4. Day, M.C. and Selbin, J. *Theoretical Inorganic Chemistry*, ACS Publications 1962.
5. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

PARTIAL DIFFERENTIAL EQUATIONS

Course Code: MTH2303 **Credit Units: 04**

Course Objective:

Student will be introduce to fundamentals of partial differential equations; the major classification of PDEs, and solving linear PDEs using classical methods.

Course Contents:

Module-I: Definition of Partial differential equation, order of partial differential equation, Formation of partial differential equations (a) by elimination of arbitrary constants (b) by elimination of arbitrary function, Linear and Quasilinear first-order PDEs. Complete solution, particular solution, singular solution, general solution. Lagranges method to solve linear PDEs.

Module-II: Linear homogeneous & non-homegeneous PDE with constant coefficient: Homogeneous Equations: Rules for finding complementary function, few shortcut methods to find particular integral for standard form of functions, and few general methods for specific forms.

Non-Homogeneous Equations: Rules for finding complementary function, few shortcut methods to find
particular integral for standard form of functions, and few general methods for specific forms; equations
reducible to PDEs with constant coefficients.

Module-III: Linear Differential equations with variable coefficients: Partial differential equations reducible to equations with constant coefficients, Reducible linear PDEs with variable coefficients, Solution of reducible Linear PDEs with variable coefficients, Monge's method, Monge's method for solving $Rr + Ss + Tt = V$, Monge's Method for solving $Rr + Ss + Tt + U(rt - s2) = V$.

Module-IV: Classification of second order PDEs and representative equations: Classification of PDEs of second order, Boundary value problems, the principle of superposition, method
of separation of variables, its application to solve wave equation, D'Alembert's solution of wave equation
in various cases. Solution of heat equation in one dimension in various cases, and solution of Laplace
equation in Cartesian coordinates and its conversion into polar coordinates

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1.D. A. Murray, Introductory Course in Differential Equations, Orient Longman (India), 1967 .

2 H. T. H Piaggio, Elementary Treatise on Differential Equations and their Applications, C.B.S. Publisher and Distributors, Delhi 1985.

3 M.D. Raisinghania, Ordinary and Partial Differential Equations, S Chand, 18th Edition, 2005.

4 Schaums Outline series of Partial Differential equations.

STATISTICS

Course Code: MTH2321 **Credit Units: 04**

Course Objective:

To introduce the fundamentals of probability theory and random processes. The main objective of this course is to acquaint students with some basic concepts in Statistics. They will be introduced to some elementary statistical methods of analysis of data.

Course Contents:

Module-I: Measures of Central Tendency Arithmetic Mean (A.M.) Definition, Mode, Median, Partition Values: Quartiles, Deciles and Percentiles, Box Plot, Percentile ranks. Means of transformed data , Geometric Mean (G.M.) Definition, merits and demerits, Harmonic Mean (H.M.), Weighted Mean: Weighted A.M., G.M. and H.M. Measures of Dispersion, Range, Mean deviation Mean square deviation, Variance and standard Deviation, Combined variance (derivation for 2 groups), Combined standard deviation, generalization for n groups. Moments.

Module-II: Skewness and Kurtosis, Bowley's coefficient of skewness, Karl Pearson's coefficient of skewness, Measures of skewness based on moments, Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions. Measures of kurtosis based on moments, Correlation Covariance between two variables, Karl Pearson's coefficient of correlation (r), Spearman's rank correlation coefficient, Spearman's rank correlation coefficient (derivation of formula in case of without ties). Regression, fitting of lines of regression by the least squares method.

Module-III: Probability Theory: Random experiments, sample point and sample space, event, algebra of events. Definition of Probability classical and relative frequency approach to probability; probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function.

Module-IV: Special Discrete and Continuous Distributions: Introduction Binomial, Poisson distributions Normal distribution.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1 S. C. Gupta & V. K. Kapoor, Fundamental of Mathematical Statistics, 9 th Edition, Sultan Chand & Sons, New Delhi, 1994.

2 P. R. Vittal, Mathematical Statistics, Margham Publications, Chennai, 2002

3 Sheldon Ross, Introduction to Probability Models (9th Edition), Academic Press, Indian Reprint, 2007.

INTRODUCTION TO C PROGRAMMING

Course Code: MTH2318 **Credit Units – 02(2-0-0)**

Course Objective:

The objective of this course is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of C programming.

Course Contents:

Module-I: Computers fundamentals:- definition, block diagram, diagram with components and characteristics, classification of computers History of C: Introduction of C, Basic structure of C program, Concept of problem solving, program design, debugging, Types of errors in programming, Number systems, Binary, octal, hexadecimal and their inter conversions.

Module-II: Element used in C, Header file, key words, identifiers, concept of variables, constants and data types in C, Input/output function, arithmetic, relational and bitwise operator, increment and decrement operator, unary operator, type casting, operator hierarchy, Conditional operator

Module-III: Decision making with if statement, else statement, if-else statement, nesting if, switch and break, go to statement. Decision making statement concepts of loops like while loop, do while loop, for loop, nested for loops, jumps in loop.

Module-IV: Functions: - use of inbuilt function, user defined functions, arrays:- one dimensional and n dimensional array, initialization of array, iterative programs using arrays, uses of array with combination of decision making operator, Function prototype, Return values and their types, function argument, recursion, Strings, array of strings.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE-**End Semester Examination

References:

1E Balagurusamy, ANSI C, McGraw Hill Education India Private Limited; Seventh edition (2017).

2Yashwant Kanetkar, Let us C, BPB Publications, 2nd Edition, 2001.

3 Herbert Schildt, C: The complete reference, Osbourne Mcgraw Hill, 4th Edition, 2002.

4 V. RajaRaman, Computer Programming in C, Prentice Hall of India, 1995.

5 Kernighan & Ritchie, C Programming Language, The (Ansi C Version), PHI, 2nd Edition.

INTRODUCTION TO C PROGRAMMING LAB

Course Code: MTH2319 **Credit Units: 02(0-0-4)**
Software Required: Turbo C
Course Contents:
1 Basic programming to understand the working of C
2 Programs using if, else if statements
3 Programs using nested if-else statements
4Programs using switch case
5Programs using loops like while and do while
6Pattern programs using loops and multiple loops
7 Simple programs with the help of function
8 Simple programs involving array and strings

Examination Scheme:
Internal Assessment

Components	Attendance	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End –Term Exam

Components	**Performance**	**Viva**
Weightage (%)	35	35

References:

1 E Balagurusamy, ANSI C, McGraw Hill Education India Private Limited; Seventh edition (2017).
2 Yashwant Kanetkar, Let us C, BPB Publications, 2nd Edition, 2001.
3Herbert Schildt, C: The complete reference, Osbourne Mcgraw Hill, 4th Edition, 2002.
4 V. RajaRaman, Computer Programming in C, Prentice Hall of India, 1995.
5 Kernighan & Ritchie, C Programming Language, The (Ansi C Version), PHI, 2nd Edition

ANALYTICAL GEOMETRY

Course Code: MTH2320 **Credit Units: 04**

Course Objective:

The analytical geometry basically deals with objects like a polygonal line, a polygon, a polyhedron. Some curvilinear forms are also considered: a circle, a cylinder, a cone, a sphere, a ball. The objective of this course is to provide a numeric description of these geometric objects and their properties.

Course Contents:

Module-I: Vectors: Three dimensional vectors: direction cosines, resolution of vectors, section formula, dot and cross products, triple products, geometrical and physical applications. Planes: Equation of a plane, normal to a plane, distance from a point to a plane, parallel planes, planes through the intersection of two
planes, planes bisecting the angle between two planes, planes through three given non-collinear points, geometrical applications.

Module-II: Lines: equation of a straight line in different forms; condition for a line to lie on a plane; condition for two lines to intersect; skew lines; equation and magnitude of the shortest distance between two skew lines.

Module-III: Sphere, Cone, Cylinder: Equation of a sphere, tangent plane and normal at a point of the sphere, orthogonal spheres, equation of a cone with guiding curve a circle, ellipse etc., equation of a right circular cylinder.

Module-IV: Quadric surfaces: Ellipsoid, hyperboloid of one sheet and two sheets, Elliptic paraboloid. Surface of revolution, ellipsoid of revolution, paraboloid of revolution

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE-**End Semester Examination

References:

1Thomas, B.G., and Finny R.L.: Calculus and Analytical geometry, Pearson education Asia, Addison Wesley; 9 edition (August 14, 1995).

2 Jonathan B. Cabero, et al : Analytic Geometry, National Book Store, Inc, 2012.

3 B. S. Grewal: Higher Engg. Mathematics, Khanna Publishers, 44th Edition, 2014.

REAL ANALYSIS-I

Course Code: MTH2322 **Credit Units: 04**

Course Objective:

To introduce students to the fundamentals of mathematical analysis. At the end of this course, students should: understand the axiomatic foundation of the real number system, understand the concepts of limits, continuity, compactness, differentiability, and integrability.

Course Contents:

Module-I: Boundedness of the set of real numbers; least upper bound, greatest lower bound of a set, neighborhoods, interior points, isolated points, limit points, open sets, closed set, interior of a set, closure of a set in real numbers and their properties. Bolzano-Weiestrass theorem, Open covers, Compact sets and Heine-Borel Theorem.

Module-II: Sequence: Real Sequences and their convergence, Theorem on limits of sequence, Bounded and monotonic sequences, Cauchys sequence, Cauchy general principle of convergence, Subsequences, Subsequential limits. Infinite series: Convergence and divergence of Infinite Series, Comparison Tests of positive terms Infinite series, Cauchys general principle of Convergence of series, Convergence and divergence of geometric series.

Module-III: Infinite series: D-Alembert's ratio test, Raabe's test, Logarithmic test, de Morgan and Bertrand's test, Cauchy's Nth root test, Gauss Test, Cauchy's integral test, Cauchy's condensation test.

Module-IV: Alternating series, Leibnitz's test, absolute and conditional convergence, Arbitrary series: abel's lemma, Abel's test, Dirichlet's test, Insertion and removal of parenthesis, rearrangement of terms in a series, Dirichlet's theorem, Riemann's Re-arrangement theorem, Pringsheims theorem (statement only), Multiplication of series, Cauchy product of series, (definitions and examples only) Convergence and absolute convergence of infinite products.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1R. R. Goldberg, Real Analysis. Oxford & I. B. H. Publishing Co., New Delhi 1970.

2 Gabriel Klambauel, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975

3 T. M. Apostol, Mathematical Analysis, Narosa Publishing House. New Delhi, 1985.

4 P. K. Jain and S. K. Kaushik, An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.

5S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd., Allahabad.

6 Shanti Narayan, A Course in Mathematical Analysis, S.Chand and Company, New Delhi

7 Murray, R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co., New York

NUMERICAL METHODS

Course Code: MTH2413 **Credit Units: 03**

Course Objective:

This course aims to introduce various techniques for finding approximate numerical solutions to mathematical problems for which exact or analytical solutions are either unavailable or practically inappropriate to use.

Course Contents:

Module-I: Solution of system of linear equations:

Direct methods: Cramer's rule, Matrix inverse method, Gauss elimination and Gauss-Jordan method.

Iterative methods: Jacobi's method, Gauss-Seidal method

Module-II: Solution of Transcendental equations: Initial approximation of the roots, Bisection method, Method of false position, secant method, iteration method, Newton-Raphson method and its convergence.

Module-III: Finite differences and interpolation: finite difference operators, their properties and their interrelations, finite difference tables, Newton's forward and Newton's backward interpolation formula, various central difference formulae including Stirling's formula, Bessel's formula. Divided differences: Operators and difference table, Newton's divided difference formula, Lagrange's interpolation formula.

Module-IV: Numerical differentiation and integration: Differentiation using Newtons forward and backward formula, Newton-Cotes quadrature formula - derivations & comparison of Trapezoidal rule, Simpsons 1/3 and 3/8 rules. Numerical solution of first order differential equations: Euler's method, modified Euler's method, Runge-Kutta IInd order and IVth order methods.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1An Introduction to Numerical Analysis by Endre Suli, David F. Mayers, Cambridge University Press, 2003

2 Applied Numerical Analysis by C. F. Gerald, Pearson Education, 2009

3 Elements of Numerical Analysis by R. S. Gupta, Macmillan India Ltd, 2009

4 Numerical methods in Engineering & Science by B. S. Grewal, Khanna Publishers, 2013

5 Numerical methods for Scientific and Engineering Computation by Jain, Iyengar, Jain, New Age International Publishers, 2004

NUMERICAL METHODS LAB

Course Code: MTH2414 **Credit Units: 01**

Course Objective:

To understand the implementation of methods learnt in the course Numerical Methods using C programming.

Course Contents:

1. Write a program to solve the system of equations $Ax = b$ using Gauss elimination method.
2. Write a program to solve the system of equations $Ax = b$ using Jacobi Iteration method.
3. Write a program to solve the system of equations $Ax = b$ using Gauss-Seidel method.
4. Write a program to find an initial approximation to solve transcendental equation of the form $f(x) = 0$.
5. Write a program to find the roots of an equation $f(x) = 0$ using Bisection method.
6. Write a program to find the roots of an equation $f(x) = 0$ using Iteration method.
7. Write a program to find the roots of f (x) = 0 using Newton Raphson method.
8. Write a program to find the roots of f (x) = 0 using Secant method.
9. Write a program to find the integral of a function using Trapezoidal rule.
10. Write a program to find the integral of a function using Simpson's 1/3rd and 3/8th rule

Examination Scheme:

Internal Assesment

Components	Attendance	Performance	Lab Record
Weightage (%)	5	10	10

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

References:

1 Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.

2 MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014.

3 Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press, 2016.

LINEAR ALGEBRA

Course Code: MTH2415 **Credit Units: 04**

Course Objective:

Linear algebra is the study of vector spaces and certain operators on vector spaces called linear transformations. The course aims to introduce the fundamentals of linear algebra, and matrix theory.

Course Contents:

Module-I: System of Linear Equations Row Reduction and Echelon forms. Using elementary row operations to solve $Ax = b$ system, solution sets of linear system, Application of linear system. linear
independence. Introduction to linear transformation. matrix of linear transformation. Cramer's Rule for solving system of Linear equations.

Module-II: Matrix Theory: Inverse of a matrix using row operations, Characterizations of Invertible matrix, Gaussian Elimination Method and Matrix Formulation. Polynomial of Matrices, Cayley -Hamilton Theorem, Diagonalization, Eigenvalues and Eigenvectors, their geometrical interpretation, characteristic and minimal polynomials of Matrices.

Module-III: Vector Spaces: Vector spaces over a field, subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence and independence. Basis and dimension, Existence theorem for bases in the finite dimensional case. Invariance of the number of vectors in a basis, Existence of complementary subspace of any subspace of a finite-dimensional vector space. Dimensions of sums of subspaces. Quotient space and its dimension.

Module-IV: Linear transformations: Algebra of linear transformations. change of basis and similarity. Kernel and image of a linear transformation. The rank-nullity theorem. Change of basis, isomorphism. Matrices and Linear Mapping.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1David C. Lay, Steven R. Lay, Judi J. McDonald, Linear Algebra and Its Applications, Pearson; 5 edition (2015).

2 K. Ho_man and R. Kunze, Linear algebra, second edition, Prentice Hall India Learning Private Limited.

3 Kuldeep Singh, Linear Algebra: Step by Step, Oxford University Press; 1 edition, 2013.

4 Gilbert Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press; Fifth Edition edition, 2016.

5 Seymour Lipschutz, Marc Lipson, Schaum's Outline of Linear Algebra, 5th Edition, 2012.

COMPLEX ANALYSIS

Course Code: MTH2420 **Credit Units: 04**

Course Objective:

The main objective of Complex Analysis is to study the development of functions of one complex variable. Students will be introduced to the Cauchy-Riemann Equations, Cauchy's Theorem, Cauchy's Integral Formula, the Maximum Modulus Principle, Liouville's Theorem, the Residue Theorem, Rouche's Theorem, Riemann Mapping Theorem. They will also learn few applications of these concepts.

Course Contents:

Module-I: Complex Numbers: De-Moivres Theorem and its applications, Exponential, Sine, Cosine and Logarithm of a complex number. Definition of az ($a \neq 0$), Inverse circular and hyperbolicfunctions.

Module-II: Review of complex plane, sequences and series, analytic polynomials, analytic functions, Cauchy-Riemann equations, analyticity in an arbitrary open set, functions ez, sin z and cos z.

Module-III: Power series, Line integrals and their properties, closed curve theorem for entire functions, Cauchy integral formula and Taylor expansions for entire functions, Liouvilles theorem, types of singularities, poles, residues and application of residues to evaluate real integrals.

Module-IV: Uniqueness theorem, denitions and examples of conformal mappings, bilinear transformations, Fourier series, Fourier expansion for complex functions.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1Gamelin, T. W., Complex Analysis, Springer-Verlag, 2001.

2Lang, S., Complex Analysis, Springer Verlag, 2003.

3 R.V. Churchill and J.W. Brown, Complex Variables and Applications, 5th edition, McGraw Hill, 1990.

4 Conway, J. B., Functions of one complex variable, Narosa Publishing, 2000.

5 Priestly, H. A., Introduction to Complex Analysis Claredon Press, Orford, 1990.

6 Mark J. Ablewitz and A.S.Fokas, Complex Variables: Introduction & Applications, Cambridge University Press, South Asian Edition, 1998.

7 Liang-shin Hann & Bernard Epstein, Classical Complex Analysis, Jones and Bartlett Publishers International, London, 1996.

8 J. E. Marsden and M. J. Hoffman, Basic complex analysis, 3rd Edn., W. H. Freeman, 1999.

REAL ANALYSIS-II

Course Code: MTH2421 **Credit Units: 04**

Course Objective:

At the end of this course, students: understand the axiomatic foundation of limit ,continuity, differentiation ,integration of real valued function and convergence of improper integrals.

Course Contents:

Module –I

Limits of functions ,sequential criterion for limits, Limit theorems, Infinite limits & limits at infinity. Continuous functions, sequential criterion for continuity & discontinuity. Algebra of continuous functions. Continuous functions on closed intervals,, intermediate value theorem, Uniform continuity .

Module –II

Differentiability of a function at a point & in an interval, algebra of differentiable functions. Increasing and decreasing functions,. Rolle's theorem, Mean value theorem, Cauchy's mean value theorem, Darboux's theorem. Applications of mean value theorem to inequalities.

Module-III: Riemann integral, Integrability of continuous and monotonic functions, The Fundamental theorem of integral calculus. Mean value theorems of integral calculus.

Module-IV: Improper integrals and their convergence, Comparison tests, Abel's and Dirichlet's tests, Frullani's integral, Integral as a function of a parameter. Continuity, Differentiability and integrability of an integral of a function of a parameter.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1 S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd., Allahabad

2 R. R. Goldberg, Real Analysis. Oxford & I. B. H. Publishing Co., New Delhi 1970.

3 Gabriel Klambauel, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975

4 T. M. Apostol, Matheematical Analysis, Narosa Publishing House. New Delhi, 1985.

5 P. K. Jain and S. K. Kaushik, An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.

6 Shanti Narayan, A Course in Mathematical Analysis, S.Chand and Company, New Delhi

7 Murray, R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co., New York

MECHANICS

Course Code: MTH2503 **Credit Units: 04**

Course Objective:

Mechanics is the study of forces that act on bodies and the resultant motion that those bodies experience. The course is devoted to introduce physical principles and techniques to solve mechanics problems through the integrated application of mathematical, scientific tools.

Course Contents:

Module-I: Basic Concept of Mechanics: Fundamental laws of Newtonian mechanics, Motion of particle, Components of velocity and acceleration (cartesian, radial and transverse, tangential and normal). Projectile motion, Conservative and non conservative forces, Work and Energy, Conservative field and potential energy, Principle of conservation of linear momentum, Angular momentum and energy for a particle. D' Alembert's principle.

Module-II: Moments, Moment of a force about a point and a line, Parallel forces, Couple, theorem of Varignon, Necessary conditions for equilibrium (moment), Coplanar forces, Reduction of a general plane force system, Parallel force system in two and three dimensions, Forces acting at a point, Triangle law of forces and Polygon law of forces, Lami's theorem.

Module-III: Motion under the inverse square law, Newton's law of gravitation and planetary orbits. Kepler's laws of motion deducted from Newton's laws of gravitation and vice-versa. Motion of the mass centre and motion relative to mass centre. Classification of orbits, Motion of artificial satellites, Orbits and their eccentricity.

Module IV: Simple Harmonic motion, Differential equation of S.H.M. Phase relationship between velocity, displacement, acceleration & energy. Derivation of differential equation of motion for SHM starting from Hookes' law; Damped oscillations. Derivation of decaying amplitude: over damping, Critical damping and under damping, Forced and coupled oscillations.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References:

1. I.H. Shames and G. Krishna Mohan Rao, Engineering Mechanics: Statics and Dynamics (4th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2013.

2. R.C. Hibbeler and Ashok Gupta, Engineering Mechanics: Statics and Dynamics (11th Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.
3. D.S. Kumar Engineering Mechanics: Statics and Dynamics, S. K. Kataria Publishers of Engineering and Computer books,2018.

4. D.S. Mathur Revised by P.S. Hemne Mechanics, S. Chand & Company Pvt.. Ltd. 2017

OPERATIONS RESEARCH

Course Code: MTH2504 **Credit Units: 04**

Course Objective:

Operations research has many applications in science, engineering, economics, and industry. The goal of the course is to teach how to formulate, analyze, and solve mathematical models using appropriate optimization tools.

Course Contents:

Module-I: Basic Deification, Nature and Significance of OR, feature of OR Approach Application and Scope of OR, Linear Programming problems, mathematical formulation of LPP, case studies, Advantages and Limitations of Linear Programming, Application Areas of Linear Programming, definition of feasible, Infeasible Solution, Basic feasible solution. Solution of LPP by Graphical methods, unbounded, alternative and no feasible solution, convex set, convex hull, examples on convex sets, fundamental theorem of LPP.

Module-II: Standard form of LPP, slack & surplus variable, Simplex methods, Big M Method, Two phase method, solved problems on unbounded, alternative and no feasible solution, degeneracy. Duality in Linear Programming Problem, importance of duality, formulation of dual problems, theorems on Duality, Sensitivity Analysis.

Module-III: Assignment Problems, Hungarian method for optimal solution, solving unbalance problems, travelling salesman problems. Transportation Problem, formulation, finding basic feasible solution by- Northwest Corner Method, Least Cost Method and by Vogels Approximation Method, Optimality test: MODI method, Unbalanced Supply and Demand, Degeneracy Problem, Alternative Optional Solution, Maximization Transportation Problem.

Module-IV Sequencing problem, solution of sequencing problems, processing n jobs through 2 machines, processing n-jobs through 3 machines, processing 2-jobs through m-machine, Game theory: Competitive game, rectangular game, saddle points, minimax (maximin) method of optimal solution, value of game, Solution of game with saddle point. Rectangular games without saddle point, mixed strategy for 2 x 2 games.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

Reference :

1 Taha, H.A., \Operations Research: An Introduction", MacMillan Pub Co., NY, 9th Ed. (Reprint), 2013.

2 Mohan, C. and Deep, K., \Optimization Techniques", New Age India Pvt. Ltd, New Delhi, 2009.

3 Ravindran, A., Phillips, D.T. and Solberg, J.J., \Operations Research: Principles and Practice", John Wiley and Sons, NY, 2nd Ed. (Reprint), 2012.

4 Hillier, F. S., and G. J. Lieberman, \Introduction to Operations Research", 2nd ed., Holden-Day, San Francisco, 1974.

5 Kanthi Swarup, P.K.Gupta and Man Mohan, \Operations Research". Sultan Chand and Sons New Delhi, Fourteenth Edition -2008

SCIENTIFIC COMPUTING

Course Code: MTH2520 **Credit Units: 2(0-0-4)**

Course Objective:

MATLAB is a scientific computing tool which covers almost all area of science and engineering. Students will be using MATLAB environment to solve various types of mathematical problems.

Course Contents:

Fundamentals of Linear Algebra, Numerical Analysis, Differential Equations and their application using MATLAB

1. Generating arrays and matrices and their manipulations
2. Introduction on few builtin functions
3. 2D and 3D plots, multiple plots using figure and subplot commands
4. Annotation of plots
5. Simple script files and editing them
6. Introduction of function files
7. Introducing notion of sub-functions and nested functions
8. Solving IVPs using ode45 and other solvers
9. Solving system of linear equations using builtin functions

Internal Assessment

Components	A	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

Endterm Exam

Components	Performance	Viva
Weightage (%)	35	35

References:

1 Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.

2 MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014.

3 Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press, 2016

Summer Workshop

Course Code: MTH2535 **Credit Units: 06**

Workshop will be conducted for Two-week (six hours per day). The course will be intended to provide appropriate exposure aimed at developing key skills for enhancing employability and preparedness for higher education. The focus will be on the following:

- Technical softwares/tools related to scientific computing and statistics. (first week).
- Report writing, Presentation etc. (first week).
- Reinforce fundamental concepts of core subjects like algebra/analysis/differential equations through intensive sessions. (second week)

Evaluation scheme:

1. The students will have to appear for class-test(s) during the workshop.
2. During summer break, students have to work on the assignment(s) given to them.
3. The assignment(s) will have to be submitted within two weeks of commencement of new semester followed by viva-voce.
4. The evaluation will be done by the committee comprising of faculty members who served as resource persons in the workshop.

Components	Attendance	Assignment(s)	Class test(s)	Viva-voce
Weightage (%)	5	35	30	30

*Evaluation scheme for SAP will be provided by office of International Affairs of the University.

FUZZY SETS & FUZZY LOGIC

Course Code: MTH2518

Credits: 3

Course Objective:

The course covers the study of fuzzy description logics as formalism for representing and reasoning with–vague or imprecise knowledge. We will study several variants of fuzzy DLs that differentiate from each other by their expressivity and their fuzzy semantics.

Course Contents:

Module I Background of Fuzzy sets, Crisp sets - operations on crisp sets to functions, Fuzzy sets, fuzzy set operations, Properties of fuzzy sets, Expansion of Fuzzy set; Interval value Fuzzy set, Type-2 Fuzzy set, L-Fuzzy set, Level-2 Fuzzy set. Membership functions, Features of the membership function.

Module II alpha cut set, additional properties of alpha cut, Support, Core and height of alpha cut set, Cardinality of fuzzy set, First and second decomposition theorem, Functions of fuzzy sets-extension principle, Cartesian product, Extension principle on Cartesian product.

Module III Crisp relations-cardinality of crisp relations, Operations on crisp relations, Properties of crisp relations, Compositions, Fuzzy relations-cardinality of fuzzy relations, Operations on fuzzy relations, Properties of fuzzy relations, max-min composition, fuzzy equivalence relations, transitive max-min closure, Projections and Cylindrical Extensions, Fuzzy Relation Equations.

Module IV Classical Logic and fuzzy logic: Classical predicate logic-tautologies, Contradictions, Equivalence, Exclusive or an exclusive nor, Logical proofs, Deductive Inferences, Fuzzy logic, Fuzzy proposition and its types, Fuzzy quantifiers, Equivalence and logical proofs, Modifiers, inference from conditional and qualified fuzzy proposition.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References

• T. J. Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill, Hightstown, NJ, 1995.

• A. Kaufmann and M. M. Gupta, Introduction to Fuzzy Arithmetic Theory and Application, Van Nostrand Reinhold, New York, 1991.

• G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, Upper Saddle River, NJ, 1995.

MATHEMATICAL MODELLING

Course Code :MTH2515 **Credits: 4**

Course Objective:

Mathematical modeling is a process of formulating a real world problem into mathematical terms and analyze them. The course is designed to learn mathematical tools such as difference equations, differential equations, concepts from probability theory to formulate and analyze real world problems.

Course Contents:

Module I Linear Growth and Decay Models Non-Linear Growth and Decay Models Compartment Models Dynamic problems Geometrical problems.

Module II Population Dynamics Epidemics "Compartment Models Economics Medicine, Arms Race, Battles and International Tradeâ€"Dynamics.

Module III Planetary Motions "Circular Motion and Motion of Satellites "Mathematical Modelling through Linear Differential Equations of Second Order "Miscellaneous Mathematical Models.

Module IV Simple Models " Basic Theory of Linear Difference Equations with Constant Coefficients Economics and Finance â€"Population Dynamics and Genetics - Probability Theory.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References

- Mathematical Modeling, J.N. Kapur, Wiley Eastern Limited, New Delhi, 1988.
- J.N. Kapur, Mathematical Models in biology and Medicine, EWP, New Delhi, 1985.
- M.M Gibbons, A Concrete Approach to Mathematical Modelling, John Wiley and Sons

R PROGRAMMING AND SAS

Course Code: MTH2519 **Credits: 4**

Course Objective:

To introduce programming concepts of R-programming, and how to use R for effective data analysis. Students will also get an exposure to SAS, a software commonly used by statisticians.

Course Contents:

Module I Overview of R, R data types and objects, reading and writing data, accessing R packages, writing R functions, debugging, profiling R code, and commenting R code.

Module II Control structures, functions, scoping rules, dates and times, Loop functions, organizing R code.

Module II SAS: Introduction to SAS System & Architecture, import and export raw data files, manipulate and transform data, combine SAS data sets, create basic detail and summary reports using SAS procedures identify and correct data.

Module IV Leave and Continue Statements, Where Statement, If â€“ Then Else statement; Goto, Stop and Error statements; Output statement, Put statement; Do Loops; modifying and combining data sets; updating master data set; display manager commands; SAS functions; an introduction to arrays and array processing; overview of methods for combining SAS data sets.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References

• Grolemund, Garrett, Hands-On Programming with R, Shroff Publishers & Distributers Private Limited - Mumbai (2014)

• Mark Gardener, Beginning R: The Statistical Programming Language, Wiley (2013).

• Andrie de Vries, Joris Meys, R Programming For Dummies, Wiley Second edition (2016)

• Lora D. Delwiche, Susan J. Slaughter, The Little SAS Book: A Primer, SAS Institute; 4th edition, 2008.

• Ron P. Cody, Jeffrey K. Smith, Applied Statistics and the SAS Programming Language, Pearson; 5 edition, 2005.

DIGITAL ELECTRONICS

Course Code: MTH2521 **Credit Units: 03**

Course Objective:
This course is an introduction to the basic principles of digital electronics. At the conclusion of this course, the student will be able to quantitatively identify the fundamentals of Digital signals and circuits, including number systems, logic gates, logic and arithmetic subsystems, and integrated circuits. The student will construct, analyze combinational logic circuits & sequential circuits; create a truth table for standard digital logic gates. Student will also be able to understand about digital to analog conversion with logic gates, adders- sub tractors etc. The student will be able to analyze and design simple logic circuits using tools such as Karnaugh Mapping minimization, and will be able to draw logic diagrams.

Course Contents:

Module I: Number System and Logic gates
Representation of Numbers: Decimal, Binary, Octal, Hexadecimal Number Systems and Conversion of the bases. Logical Operators: NOT, AND, OR, NAND, NOR, EX-OR, EX-NOR, Truth tables of Logical Operations, Duality Principle, De Morgan's theorems Simplification of logical Function using laws.

Module II: Circuits and Expressions
Standard forms for Logical Expressions - Sum of Products, Product of Sums, Standard SOPs, Standard POSs, Conversion SOPs to POSs, and POSs to SOPs. Combinational Circuits: Series Combination, Parallel Combination, Logical Circuits, Applications: Combinational Circuits, and Switching Circuits.

Module III: Digital Circuits
Analog & Digital Signals, Logical Functions: Min-terms and Max-terms, Algebraic Methods and Laws, Karnaugh Maps. Simplification of Arithmetic Circuits Expressions; Half- Adders and Full -Adders**,** Half –Subtractor and Full- Subtractor.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Text:
- R.P Jain, Mordern Digital Electronics

References:
- Malvino & Leach, Digital Electronics
- Floyd, Digital Fundamentals
- M.M Mano, Digital Logic and Computer Design
- Gothman ,Digital Electronics

Syllabus- Sixth Semester

METRIC SPACE

Course Code: MTH2621 **Credits: 4**

Course Objective:

Upon successful completion of this course, the student will be able to identify the three properties of a metric or distance, define the basic terms and concepts in metric space topology, classify and explain open and closed sets, adherent points, convergent and Cauchy convergent sequences, complete spaces , compactness and connectedness etc.; and prove logically theorems in metric space topology using the definitions of basic terms and properties of metric spaces.

Course Contents:

Module I Metric spaces: definition and examples. Sequences in metric spaces, Cauchy sequences. Complete Metric Spaces. Open and closed balls, neighbourhood, open set, interior of a set, Limit point of a set, closed set, diameter of a set, Cantor's Theorem, Subspaces, dense sets, separable spaces.

Module 2 Continuous mappings, sequential criterion and other characterizations of continuity, Uniform continuity, Homeomorphism, Contraction mappings, Banach Fixed point Theorem

Module 3 Connectedness, connected subsets of R, connectedness and continuous mappings.

Module 4.Compactness, compactness and boundedness, continuous functions on compact spaces.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References:

1 S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd., Allahabad

2 R. R. Goldberg, Real Analysis. Oxford & I. B. H. Publishing Co., New Delhi 1970.

3 Gabriel Klambauel, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975

4 T. M. Apostol, Matheematical Analysis, Narosa Publishing House. New Delhi, 1985.

Delhi

7 Murray, R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co., New York

SPECIAL FUNCTIONS AND INTEGRAL TRANSFORMS

Course Code: MTH2615 **Credits: 4**

Course Objective:

The main objective of this course is to familiarize students with a range of mathematical methods which includes series solution and transforms to solve various types of ordinary differential equations.

Course Contents:

Module I Series solution of differential equations â€“ Power series method, Definitions of Beta and Gamma functions. Bessel equation and its solution: Bessel functions and their properties- Convergence, recurrence, Relations and generating functions, Orthogonality of Bessel functions.

Module II Legendre and Hermite differentials equations and their solutions: Legendre and Hermite functions and their properties-Recurrence Relations and generating functions. Orhogonality of Legendre and Hermite polynomials. Rodrigues' Formula for Legendre & Hermite Polynomials, Laplace Integral Representation of Legendre polynomial.

Module III Laplace Transforms â€“ Existence theorem for Laplace transforms, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals, Differentiation and integration of Laplace transforms, Convolution theorem, Inverse Laplace transforms, convolution theorem, Inverse Laplace transforms of derivatives and integrals, solution of ordinary differential equations using Laplace transform.

Module IV Fourier transforms: Linearity property, Shifting, Modulation, Convolution Theorem, Fourier Transform of Derivatives, Relations between Fourier transform and Laplace transform, Parseval's identity for Fourier transforms, solution of differential Equations using Fourier Transforms.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

Recommended Books:

1. Erwin Kreyszing, Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999
2. Lokenath Debnath, Integral Transforms and Their Applications, CRC Press, 1995.
3. W.W. Bell, Special Functions for Scientists and Engineers, (Dover Books on Mathematics) Paperback, 2004.
4. I.N. Sneddon, The use of integral transform, McGraw Hill, 1972.
5. Murray R. Spiegel, Laplace transform, Schaum's Series, 1965.

DISCRETE MATHEMATICS

Course Code: MTH2620 **Credits: 3**

Course Objective:

The objective of the introduce the fundamentals of Discrete Mathematics which includes Mathematical Logic, Boolean algebra and its Applications, Switching circuit & Logic Gates, Graphs and Trees. The students shall also be introduced to computational and algorithmic aspects of Mathematical Logic, Boolean Algebra, Graphs and Trees in the field of Computer sciences and its applications.

Course Contents:

Module I **Propositional Logic** Proposition, Propositional Calculus- Propositional Variables and Compound Propositions, Basic Logical Operations: -Conjunction, Disjunction, Negation, Conditional, Bi-conditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid Arguments, Tautologies, Contradiction, Contingency.

Module II **Boolean Algebra:** Boolean Algebra, Various Boolean Identities, Boolean Function, Boolean forms and their Equivalence. Min-term Boolean forms, Sum of product Canonical forms. Minimization of Boolean functions, Algebraic Method, The Karnaugh Map method.

Module III **Graphs:** Graph, Finite graph, Infinite graph, connected graph, disconnected graph, Null graph, Sub-graph, Incidence edge, Adjacency of vertex, Degree, Directed Graph, Walk, Path, Circuit, Wheel, complete graphs, biâ€ • partite graphs, Matrix Representation of graphs. Hand -shaking Lemma.

Module IV **Trees:** Trees, Properties of trees, Rooted tree, Binary tree, Cut-sets, Spanning Trees, Minimum Spanning Trees, Kruskal's algorithm.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

Recommended Books:

1. J. P. Trembley & R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1997.
2. J. L. Gersting, Mathematical Structure for Computer Science (3rd ed.), Computer Science Press, 2006.
3. Seymour Lipschutz, Finite Mathematics, McGraw-Hill Book Co. New â€"York, 1966.
4. J. E. Hopcroft and J.D. Ullman, Introduction to Automata Theory Languages & Computation, Narosa Publishing House, Delhi, 1995.
5. C. L. Liu, Elements of Discrete Mathematics, Tata McGraw-Hill Publishing Co. Ltd, New Delhi, 2012.
6. N. Deo, Graph Theory with Applications to Engineering and Computer Sciences, Prentice Hall of India, New Delhi, 1979.

FINANCIAL MATHEMATICS

Course Code: MTH2603 **Credits: 3**

Course Objective:

The course introduces fundamental concepts of Financial Mathematics such as cash flows, present value, future value, yield and probability that form the basis for further advanced learning.

Course Contents:

Module I Random Variable Discrete and Continuous, Probability Distributions Binomial, Poisson and Normal, Basics of Stochastic Process, Markov Process, Martingales.

Module II Derivative Securities, time value of money, Cash flow, money market, coupon bonds, Money market account.

Module III Forward and futures contracts Forward price formula, value of a forward contract,. Futures contract, Futures pricing. Swaps, value of commodity swaps.

Module IV Theory of option pricing Put-Call parity, behaviour of option prices with respect to variables, Pay-off curves, Single period and multi period binomial lattice model for option pricing, existence of risk neutral probability measure, pricing American options: A binomial lattice model, notion of complete markets, the CRR model, Black- Scholes formula for dividend paying stock, the Greeks. Portfolio optimization â€“Risk and return of an asset, two assets portfolio optimization, multi asset portfolio optimization, Capital Asset Pricing Model (CAPM)“ as a pricing formula, as a factor model.

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References

1. S. Chandra, S. Dharmaraja, Aparna Mehra, R. Khemchandani, An Introduction to Financial Mathematics, Narosa Publishing House Pvt. Ltd, 2013.
2. Financial Economics: Advanced Financial Mathematics, Louis J. Lombardi, 2008.
3. M. Baxter, A. Rennie, Financial Calculus. An Introduction to derivative pricing” Cambridge University Press, 1996.
4. J. Cvitanic and F. Zapatero, Introduction to the Economics and Mathematics of Financial Markets, MIT Press, 2003.
5. J. Medi, Stochastic processes, New Age International, 1994.

FUNCTIONAL ANALYSIS

Subject Code-MTH2618 **Credits: 3**

Course Objective:

The course introduces basic concepts of functional analysis and the concepts associated with the dual of a linear space. Student will learn the basic properties of norm (Banach) and inner product (Hilbert) spaces as well as fundamentals of linear operator theory.

Course Contents:

Module I **Review:** Metric Space Further Examples of Metric Spaces Open Set, Closed Set, Neighborhood Convergence, Cauchy Sequence, Completeness Examples. Completeness Proofs Completion of Metric Spaces. Vector Space. Further Properties of Vector spaces

Module II Normed linear spaces, Banach spaces Further Properties of Normed Spaces. Finite Dimensional Normed Spaces and Subspaces. Compactness and Finite Dimension continuous linear transformations, equivalent norms Bounded and Continuous Linear Operators. Linear Functionals. Linear Operators and Functionals on Finite Dimensional Spaces, Normed Spaces, the Hahn-Banach theorem and its consequences. Normed Spaces of Operators. Dual S.

Module III Conjugate space and second conjugate space. The open mapping Theorem, The closed graph theorem, The conjugate of an operator, The uniform boundedness principle. Inner product Space. Further properties of inner product space. Definition and examples and simple properties of Hilbert spaces.

Module IV Orthogonal complements, The projection theorem, orthogonal sets Orthonarmal sets and Sequence. The Bessels inequality, Fourier expansion and Parseval's equation, separable Hilbert spaces, Riesz's theorem.Strong and weak convergence.convrgence of sequence of operators and functional. Application of Summability of sequence. Numerical integration and weak convergence.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References

1. Simons, G. F., Introduction to Topology and Modern Analysis, McGraw Hill, 2004.
2. Ponnusamy S., Foundation of Functional Analysis, Narosa Publication, 2002.
3. Jain P. K. and Ahuja O. P., Functional Analysis, New Age International Publishers, 2010.
4. Nair, M. T., Functional Analysis: A First Course, PHI Pvt. Ltd, 2004.
5. Conway, J. B., A Course in Functional Analysis, Springer - Verlag, New York, 1990.
6. Lahiri, B. K., Elements of functional Analysis, The World Press Pvt. Ltd., Calcutta, 1994.
7. Kreyszig, E., Introductory Functional analysis with Applications, John Wiley & sons, New York, 1978

NUMBER THEORY

Subject Code- MTH2611 **Credits: 03**

Course Objective:

Elementary Number Theory is the study of the basic structure and properties of integers. Learning Number Theory helps improving one's ability of mathematical thinking. The course is designed to introduce the fundamentals of number theory.

Course Contents:

Module I Divisibility, Euclidean algorithm, Linear Diophantine equations, Prime numbers, Fundamental theorem of arithmetic, Prime number theorem (statement only).

Module II Congruences, solutions of linear congruences, Chinese Remainder Theorem, Euler totient function, Euler-Fermat theorem, Wilson's theorem, non-linear congruences, Hensel's lemma, primitive roots and power residues.

Module III Quadratic residues, quadratic reciprocity, the Jacobi symbols. The greatest integer function, Arithmetic functions, Mobius function and Mobius inversion formula.

Module IV Finite continued fractions, infinite continued fractions, approximation to irrational numbers. Introduction to cryptography, public key cryptography, RSA.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

References

1. Niven, I., Zuckerman, S.H., Montgomery, L.H., An Introduction to the Theory of Numbers, John Wiley and Sons. New York, 1991
2. Dan Flath, Introduction to Number Theory, Wiley, 1988)
3. K. Ireland, M. Rosen. A Classical Introduction to Modern Number Theory, Springer Verlage, 1990.
4. N. Koblitz. Course in Number Theory and Cryptography, Springer, 1994.

INTRODUCTION TO STATISTICAL INFERENCE

Subject Code-MTH2619 **Credits: 4**

Course Objective:

The course aims at providing an introduction to statistical inference and its application to predictive statistical models.

Course Contents:

Module I Parameter and statistic, sampling distribution and standard error of estimate. Point and interval estimation, Unbiasedness, Efficiency, Consistency and Sufficiency.

Module II Null and alternative hypotheses, Simple and composite hypotheses, Critical region, Level of significance, One tailed and two tailed tests, Types of errors, Neyman-Pearson Lemma.

Module III Testing and interval estimation of a single mean, single proportion, difference between two means and two proportions. Fisherâ€™s Z-transformation.

Module IV Definition of Chi-square statistic, Chi-square tests for goodness of fit and independence of attributes. Definition of Student's 't' and Snedcor's F-statistics. Testing for the mean and variance of univariate normal distributions, Testing of equality of means and variances of two univariate normal distributions. Related confidence intervals. Analysis of variance (ANOVA) for one-way and two-way classified data.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE:End Semester Exam, A: Attendance

Recommended Books:

1. A.M. Mood, F.A. Graybill and D.C. Boes, Introduction to the theory of Statistics, McGraw Hill, 1974.
2. A.M. Goon, M.K. Gupta, and B. Das Gupta, Fundamentals of Statistics, Vol-II, 1991.
3. R.V. Hogg and A.T. Craig, Introduction to Mathematical Statistics, Pearson; 7 edition, 2012.
4. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2002.

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - FirstSemester

MECHANICS

Course Code: PHY2101 **Credit Units:03**

Course Objective:

This course has been so framed that the students are exposed to the topics of conservation laws, dynamics of rigid bodies and inverse-square law of forces in the framework of Newtonian Mechanics. Special theory of relativity is also included here.

Course Contents:

Module I: Conservation Laws

Conservation of Energy, Conservative forces, Internal forces and conservation of linear momentum, Centre of mass, systems with variable mass, Space-Vehicle Problem. Conservation of Angular Momentum, Internal torques, Angular Momentum about the Centre of mass, Rotational invariance.

Module II: Elastic and Inelastic Scattering
Types of scattering and conservation laws, Laboratory and centre of mass systems, collision of particles which stick together, General elastic collision of particles of different masses.

Module III: Inverse-Square-Law of Forces
Force between a Point Mass and Spherical shell. Force between a Point Mass and Solid Sphere, Gravitational and Electrostatic self-energy. Gravitational energy of the Galaxy and of uniform sphere; Orbits and their eccentricity, Two-body problem – reduced mass.

Module IV: Galilean transformations and Einstein‟s special theory of relativity
Frames of reference, Inertial and non-inertial frames, Galilean transformation and Galilean relativity Basic postulates of special relativity, Lorentz transformations, Simultaneity and causality in relativity. Length contraction, Time dilation, Twin paradox, Velocity Transformation.Relativistic momentum, Relativistic Energy, Transformation of Momentum and Energy, Equivalence of Mass and Energy.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Mathematical Methods for Physics and Engineering: K.F. Riley, M.P. Hobson and S.J.Bence (Cambridge University Press)(1998).
- Mechanics (Berkeley) Physics Course I : Charles Kittle, Walter D. Knight, M. Alvin and A. Ruderman (Tata McGraw Hill)(1981).
- Mechanics : H.S. Hans and S.P. Puri (Tata McGraw Hill)(2003).
- Introduction to Classical Mechanics : R.G. Takwale&P.S.Puranik (Tata-McGraw-Hill) (2000)
- Introduction to Special Theory of Relativity - R. Resnick (WileyEastern).
- The Feynman Lectures on Physics, Vol I (Addison –Wesley).

WAVES & OSCILLATIONS

Course Code: PHY2102 **Credit Units:03**

Course Objective:

This course aims at exposing the students to Harmonics Oscillations and applications in our everyday life.

Course Contents:

Module I: Simple Harmonic Free Vibrations

Simple harmonic motion, energy of a SHO, Compound pendulum, Electrical Oscillations, Plasma Vibrations, Lattice Vibrations, Transverse Vibrations of a mass on a string, composition of two perpendicular SHMs of same period and of periods in ratio 1:2, Anharmonic Oscillations.

Module II: Damped Simple Harmonic Vibrations

Decay of free Vibrations due to damping, types of damping, Determination of damping coefficients – Logarithmic decrement, relaxation time and Q-factor. Electromagnetic damping, collision damping – Ionosphere and metals.

Module III: Forced Vibrations and Resonance

A forced oscillator, Transient and Steady State Oscillations, velocity versus driving force frequency, Resonance, power supplied to forced oscillator by the driving force.Q-factor of a forced oscillator, Electrical, nuclear and nuclear-magnetic resonances.

Module IV: Coupled Oscillations

Stiffness coupled oscillators, Normal coordinates and modes of vibrations. Normal frequencies, Forced vibrations and resonance for coupled oscillators, Masses on string-coupledoscillators.

Module V: Waves in Physical Media

Wave motion in one dimension, Transverse and longitudinal waves, progressive harmonic waves and their energy, Transverse waves on a string, longitudinal waves on a rod, Electrical transmission lines, characteristic impedance of a string and a transmission line, waves in an absorbing medium, spherical waves.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Text Book of Vibrations and Waves : S.P. Puri (Macmillan India)(2004)
- The Physics of Vibrations and Waves : H.J. Pain (Wiley and ELBS,1976)
- Waves and Oscillations - Rathin N. Chaudhury (New AgePubl.).
- Waves- J R Crawford (Tata McGrawHill)

APPLIED MATHEMATICS-I

Course Code: PHY2105 **Credit Units:03**

Course Objective:

Calculuswasfirstinventedtomeetthemathematicalneedsofscientistsofthesixteenthandseventeenth centuries,needsthatmainlymechanicalinnature.Nowadaysitisatoolusedalmosteverywhereinthemodern worldtodescribechangeandmotion. Itsuseiswidespreadinscience,engineering,medicine,business,industry, andmanyotherfields.Calculusalsoprovidesimportanttoolsinunderstandingfunctionsandhasledtothe developmentofnewareasofmathematicsincludingrealandcomplexanalysis,topology,andnon-euclidean geometry.Theobjectiveofthiscourseistointroducethefundamentalideasofthedifferentialandintegral calculusoffunctionsofoneormorevariable.

Course Contents:

ModuleI: Derivative and its applicationDifferentiation, Successive differentiation, nth derivative, Leib- nitz rule of differentiation, Taylors theorem with remainder, Maclaruin theorem, Taylor and Maclaurin series, asymptotes, curvature, radius of curvature, curve tracing for Cartesian curves.

Module II:Partial derivative and its applications

Partial derivative, first order partial derivative, higher orderpartialderivative,Homogeneousfunctions,Euler'stheoremforhomogeneousfunctionanditscorol- laries, total derivative, partial derivative of composite function, Jacobian, Taylor &Maclaurin series for twovariables,MaximaandMinimafortwovariables,MethodofLagrange'smultipliersandproblems.

ModuleIIIDoubleandtripleintegrals,Changeoforderofintegration,Changeofvariables,Applicationof integrationtolengths,Surface,areasandVolumesCartesianandPolarcoordinates.BetaandGamma functions,Dirichletsintegralanditsapplications.

ModuleIVOder,degreeofODEandsomebasicconceptssuchaslinearityandnonlinearity,generalsolution andparticularsolution,formationofODEs,Firstorderdifferentialequation:variableseparablemethod, homogeneousmethod,anditsvariants,Linear,firstorderdifferentialEquation,Lineardifferentialequation ofsecondorderwithconstantcoefficients:Complementaryfunctionandparticularintegralforsome standard functions.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	15	5	5	70

Reference Books:

1. E. Kreyszig, Advanced Engineering Mathematics, 10th Edition, John-Wiley & Sons, 2011.
2. B.V.Ramana,HigherEngineeringMathematics:TataMcGrahHillPublishingCompany;NewDelhi; Year:2007
3. R.K.Jain& S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2017.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd edition (2014).
5. N.P Bali, Engineering Mathematics-I, Luxmi publication (p) ltd.

APPLIED CHEMISTRY-I

CourseCode:PHY2106 **Credit Units:02**

Course Objective:

To develop the ability to predict the structures and certain properties and reactivities of the elements and of many of their simpler ionic and covalent compounds. To achieve this predictive capability will require the student to enhance their understanding of atomic structure and periodicity. These concepts are directly applicable to organic and biochemistry, and also to many aspects of biology, materials science, and environmental science.

Course Contents:

Module I: Atomic Structure

Bohr‟s theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg‟s uncertainty principle and its significance, Schrodinger‟s wave equation, significance of ψ and ψ^2. Quantum numbers and their significance.Normal and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions. Radial and angular distribution curves. Shapes of *s*, *p*, *d* and *f* orbitals. Contour boundary and probability diagrams. Pauli‟s exclusion principle, Hund‟s rule of maximum multiplicity, Aufbau‟s principle and its limitations, Variation of orbital energy with atomic number.

Module II: Periodicity of Elements

s, *p*, *d*, *f* block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to *s* &*p*- block:
(a) Effective nuclear charge, shielding or screening effect, variation of effective nuclear chargein periodictable.
(b) Atomic radii (van derWaals)
(c) Ionic and crystalradii
(d) Covalent radii (octahedral andtetrahedral)
(e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionizationenergy. Applications of ionizationenthalpy.
(f) Electron gain enthalpy, trends of electron gainenthalpy.
(g) Electronegativity, Pauling‟s/ Mulliken‟s and Mulliken-Jaffe‟s electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity. Sanderson‟s electron densityratio.

Module III: Acids and Bases

Arrhenius concept, Bronsted- Lowry concept of acid-base reaction, solvated proton, relative strength of acids, types of acid-base reactions, levelling solvents, Lewis acid-base concept, Classification of Lewis acids, Hard and Soft Acids and Bases (HSAB), Application of HSAB principle.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Lee, J.D. *Concise Inorganic Chemistry*, ELBS,1991.
2. Douglas, B.E. and Mc Daniel, D.H., *Concepts & Models of Inorganic Chemistry*, Oxford,1970
3. Atkins, P.W. & Paula, J. *Physical Chemistry*, Oxford Press,2006.
4. Day, M.C. and Selbin, J. *Theoretical Inorganic Chemistry*, ACS Publications1962.

PROPERTIES OF MATTER

CourseCode:PHY2108 **Credit Units:03**

Course Objective:

This course has been designed in such a way that it gives an insight to the student about the general properties of Matter and enables them to apply this knowledge to practical life where each and every thing in surrounding is made up of matter only. Therefore this course is an essential part of Physics Study. The course contains information about all types of modulus of Elasticity and also deals with peculiar properties of fluids viz. surface tension and viscosity and their applications.

Module I: Elasticity:

Hooke's Law Stress - Strain Diagram - Elastic moduli - Relation between elastic constants - Poisson's Ratio - Expressions for Poisson's ratio in terms of elastic constants - Work done in stretching and twisting a wire - Twisting couple on a cylinder- Rigidity modulus by static torsion - Torsional pendulum - Rigidity modulus and moment of inertia.

Module II: Bending of beams:

Cantilever - Expression for bending moment - Expression for depression - Cantilever oscillations - Expression for time period - Experiment to find Young's modulus - Non uniform bending - Experiment to determine Young's modulus by Koenig's method - Uniform bending - Expression for elevation - Experiment to determine Young's modulus usingmicroscope.

Module III: Fluids:

Surface Tension: Definition and dimensions of surface tension - Excess of pressure over curved surfaces - Application to spherical and cylindrical drops and bubbles - Variation of Surface tension with temperature - Jaegar's method.

Viscosity: Co-efficient of viscosity and its dimensions - Rate of flow of liquid in a capillary tube - Poiseuilles' formula - Experiment to determine co-efficient of viscosity of a liquid - Variation of viscosity of a liquid with temperature - Applications of viscosity.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Mechanics and General Properties of Matter by P.K. Chakrabarthy - Books & Allied (P) Ltd., 2001.
- General properties of Matter by Newman andSearle
- Properties of Matter by C. J.Smith
- Elements of Properties of Matter by Mathur D.S., Shyamlal Charitable Trust, New Delhi, 1993.

APPLIED CHEMISTRY LAB-I

CourseCode:PHY2107 **Credit Units:01**

Course Contents:

[I] Titrimetric Analysis

(i) Calibration and use ofapparatus
(ii) Preparation of solutions of different Molarity/Normality oftitrants

[II] Acid- Base Titrations
(i) Estimation of carbonate and hydroxide present together inmixture.
(ii) Estimation of carbonate and bicarbonate present together in amixture.
(iii) Estimation of free alkali present in differentsoaps/detergents

[III] Oxidation- Reduction Titrimetry
(i) Estimation of Fe(II) and oxalic acid using standardized $KMnO_4$solution.
(ii) Estimation of oxalic acid and sodium oxalate in a givenmixture.
(iii) Estimation of Fe (II) with $K_2Cr_2O_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICS LAB-I

Course Code: PHY2104 **Credit Units:02**

Course Contents:

- To determine the Moment of Inertia of aFlywheel.
- TodeterminetheModulusofRigidityofaWirebyMaxwell‟sneedle.
- To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille‟s method).
- Determination of moment of inertia of metallic cylinder / rectangular bar about an axis passing through its C.G.and to determine the rigidity modulus of the material of the suspensionwire.
- To determine the wavelength of a monochromatic light by Newton's ringmethod.
- Measurement of the slit width and the separation between the slits of a double slit by observing the diffraction and interferencefringes.
- To calibrate a polarimeter and hence to determine the concentration of sugarsolution.
- To determine the refractive index of material of Prism usingSpectrometer.
- To determine the wavelength of spectral lines of Mercury lamp using diffractiongrating.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

THERMODYNAMICS

Course Code: PHY2201 **Credit Units: 03**

Course Objective:
This course aims at exposing the students to basic laws of thermodynamics and its applications in everyday life.

Course Contents:
Module I: Kinetic Theory
Postulates of Kinetic theory, Mean free path and Pressure of an ideal gas, Boyle's law and Charles law of ideal gases.Maxwell's speed distribution, Mean free path, Elementary treatment of transport phenomena, Brownian motion.

Module II: Transmission of Heat
Modes of heat transmission, Conduction in solids: Lee's disc method, Convection of heat. Radiation: Black body, Black body radiation, Stefan-Boltzmann law, Stefan's constant, Newton's law of cooling, Kirchhoff's law of thermal radiation, solar constant, temperature of the Sun, solar spectrum, distribution of energy in the spectrum of a black body, Planck's quantum theory of radiation (qualitative)

Module III: Laws of Thermodynamics
Zeroth law of thermodynamics, concept of temperature, Absolute temperature.Thermodynamic processes (isothermal, adiabatic and isobaric), P-V diagram and Work done in a thermodynamic process.Ist law of thermodynamics, Reversible and irreversible processes, Examples irreversibility, Carnot's cycle and Carnot's theorem. Second law of thermodynamics, various statements of second law, Concept of Entropy, Entropy change in reversible and irreversible processes.Entropy and disorder, Principle of increase of entropy, Entropy and unavailable energy, Entropy of ideal gases, Entropy as a thermodynamic variable, S-T diagram, Maxwell' relations.

Module IV: Low Temperature
Third law of thermodynamics, Nernst heat theorem. Cooling produced by adiabatic stretching, adiabatic compression, Liquefaction of gases by Joule-Thomson expansion: thermodynamic analysis, Production of low temperature by adiabatic demagnetization, First order phase transitions: ClausiusClapeyron equation, Phase transition, Coexistence of phases, Triple point.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Atten

Text & References:
A Treatise on Heat: M.N. Saha and B.N. Srivastava (Indian Press, Allahabad, 1972).

Thermal Physics: C. Kittel& H. Kroemer (CBS Pub.) (1987).

Thermal Physics: S.C. Garg, R.M.Bansal&C.K.Ghosh (Tata McGraw Hill) (2000).

Thermal Physics: B.K. Agarwal.

A Treatise on Heat: M.N. Saha and B.N. Srivastava.

Heat and Thermodynamics: BrijLal and N. Subramanyam.

OPTICS

Course Code: PHY2202 **Credit Units:03**

Course Objective: This course aims at exposing the students to basic laws of optics and its applications in real world.

Course Contents:

Module I: Geometric Optics and its applications:

Ray optics, Plane and spherical Mirrors, Lens, image formation, Lens formula.Microscope and Telescope.

Module II: Interference

Young's experiment, coherent sources, phase and path differences, Theory of interference fringes,Fresnel'sbiprism, sheet thickness determination, interference in thin films due to reflected and transmitted lights,Maxima and minima in intensities, Colours of thin films, Newton's rings and its various aspects, Non-reflecting films.

Module III: Diffraction

Introduction, rectilinear propagation, Fresnel and Fraunhofer diffraction, Diffraction at circular aperture and straight edge and their discussion.Fraunhofer diffraction at a single slit and a double slit. Fraunhofer diffraction at N slits and its discussion. Plane diffraction grating and its theory, Dispersive power of grating, Resolving power of optical instruments, Rayleigh criterion, Resolving power telescope, microscope, prism and diffraction grating. Phase contrast microscope.

Module IV: Polarization:

Introduction, Polarization by reflection, Brewester's law, Polarization by refraction, Malus's law, Double retraction, Nicol Prism and its use, elliptically and Circularly polarized light, quarter and half-wave plates, production and detection of plane, circularly and elliptically polarized light, optical activity, specific rotation, Half-shade polarimeter.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;A: Attendance

Text & References:

- A Textbook of Optics: N. Subrahmanyam and B. Lal (S. Chand &Co.,N. Delhi,1987).
- Physical Optics: B. K. Mathur and T. P.Pandya.
- Geometrical and Physical Optics:Longhurst.
- Introduction to Modern Optics: G. R.Fowels.
- Optics: P. K.Srivastav.

MATHEMATICAL PHYSICS-I

CourseCode:PHY2203 **Credit Units:03**

Course Objective:

This course aims at exposing the students to basic Mathematics which will be useful for them to solve the problems of Physics.

Course Contents:

Module I: Vector Calculus

Dot and cross product of vectors, Gradient, divergence and curl, their physical significance, Laplacian, vector identities, Line integral, surface integral and volume integral, Gauss divergence theorem, Stokestheorem.

Module II: Fourier Series:

Fourier Series: Periodic functions, Fourier series, Euler‟s formulae, Even functions, Half range series, Change of interval and functions having arbitrary period, practical harmonics analysis.

Module III: Differential Equations

Differential equations with examples from Physics, their degree and order, Linear Differential equations, solution of $1^{st}$and 2^{nd}order differential equations.Standard integrals and their applications in Physics.

Module IV: Curvilinear coordinates:

Orthogonal curvilinear coordinates, line element, gradient, divergence and curl in curvilinear coordinates, Cartesian coordinate system, Polar coordinates, Cylindrical coordinate system, Spherical polar coordinate system.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Mathematical Methods in the Physical Sciences :M.L.Boas (Wiley)(2002).
- Introduction to Mathematical Physics : C. Harper (Prentice Hall of India)(2004).
- Vector Analysis - M. R. Spiegel, (Schaum's Outline Series) (TataMcGraw-Hill).
- Mathematical Physics – P.K. Chattopadhyay (WileyEastern).

APPLIED MATHEMATICS-II

CourseCode:PHY2205 **Credit Units:03**

Course Objective:

Linear algebra is the study of vector spaces and certain operators on vector spaces (called linear transformations). This is an important branch of mathematics which provides the tools and methods essential for studying many mathematical structures that arise within mathematics and sciences (such as the solution spaces of problems in mathematics, engineering, the natural sciences, and social sciences). The purpose of this course is to help students learn these tools and methods in a rigorous manner; develop mathematical skills needed to apply these to the problems arising within their field of study; gain increased understanding of how the concepts they learned in this and the previous mathematics courses apply to various real worldproblems.

Course Contents:

Module-I: Matrices and it Applications

Matrix, Inverse of matrix by Gauss Jordan method, Rank of matrix, Row echelon form, Normal form, Matrix representations of linear system (homogeneous and non-homogeneous), Consistency of linear system, Solution of linear system (homogeneous and non-homogeneous). Eigen values, Eigen vectors, Cayley Hamilton theorem and its application, Diagonalform.

Module-II: Vector Spaces

Vector space and its examples, Subspaces, Linear combination, Span, Basis and Dimensions of vector space, Linear independence, Linear dependence, Sum and intersection of subspaces; Direct sum of subspaces

Module-III: Linear Transformations

Linear transformation and its examples, Properties of linear transformations.Matrix representation of linear transformation, Kernel and range of linear transformation.Non slandered basis general vector space, transition matrix and similarity, Application of linear transformation.

Module-IV: Group Theory

Monoid, semi group, group, Abelian group, finite group, order of subgroup, subgroup, cyclic group, generator of group, permutation group, simple group, syllow‟s theorems, general linear group GL(2, R), SL(2,R) group.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	15	5	5	70

References

- Joseph A. Gallian, Contemporary abstract algebra, seventhedition.
- Jim Heffron, Linear Algegra,http://joshua.smcvt.edu/linearalgebra
- K. Hoffman and R. Kunze, Linear Algebra, 4th edition.
- N. Herstein, Abstract algebra, 3rd edition.
- K Vasishtha, Matrices, Krishna Prakashan Media (p)ltd.
- N. P. Bali, Engineering Mathematics, Semester-II, Luxmi Publication (p)ltd.
- V. Krishnamurthy, V. P. Mainra, J. L. Arora-An Introduction to LinearAlgebra
- D. T. Finkbeiner -Introduction to Matrices and LinearTransformation
- Shanti Narayan : A Course of Mathematical Analysis; New S. Chand & Co. Pvt.LId.

APPLIED CHEMISTRY-II

Course Code: PHY2206 **Credit Units:02**

Course Objective:

To prepare students for the study of some fundamentals of the organic chemistry like reaction mechanism, Concept of nucleophile, electrophile, types of reagent used in synthesis of organic compounds, stereochemistry and the structure of various hydrocarbons and their derivatives.

Course Contents:

Module I: Structure and Bonding

Hybridizations, bond lengths and bond angles, bond energy, localized and delocalized chemical bond, van-der Waals interactions, inclusion compounds, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

Module II: Types of Reagents

Electrophiles and nucleophiles, Reactive intermediates: carbocations, carbanions, free radicals and carbenes, Curved arrow notations, drawing electron movement with arrows, half headed and double headed arrow, homolytic and heterolytic bond cleavage, Types of organic reactions, Mechanism of Organic reactions, Energy consideration, Methods of determination of reaction mechanism.

Module III: Stereochemistry

Concept of isomerism, types of isomerism, elements of symmetry, molecular chirallity, chiral and achiral molecules with two stereogeniccentres, optical isomerism, enantiomers, distereoisomers, mesocompounds, resolution, retention, inverstion and racemization. Relative and absolute configurations, sequence rules, D & L, R & S systems of nomenclature.Newman projection and Saw horse formulae, Fischer and Flying wedge formulae.

Module IV: Alkanes, alkenes and alkynes

IUPAC nomenclature, classification, isomerism in alkanes, alkenes and alkynes: sources and methods of preparation. Saytzeff and Hofmann eliminations.Electrophilic additions and Nucleophilic additions with their mechanisms (Markownikoff/ Anti Markownikoff addition.

Module V: Cycloalkanes & their conformational analysis

Types of cycloalkanes nomenclature, methods of preparations and relative stability, Baeyer strain theory and its limitations, ring strain in cyclopropane and cyclobutanes. Theory of stainless rings chemical reactions, Energy diagrams of cyclohexane: Chair, Boat asnd Twist boat forms.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).
- Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistry of NaturalProducts*), Dorling Kindersley (India) Pvt. Ltd. (PearsonEducation).
- Eliel, E. L. &Wilen, S. H. *Stereochemistry of Organic Compounds*; Wiley: London,1994.

APPLIED CHEMISTRY LAB-II

CourseCode:PHY2207 **Credit Units:01**

Course Contents:

1. Checking the calibration of thethermometer.
2. Purification of organic compounds by crystallization using the following solvents: Water, Alcohol, Alcohol-Water &Charcoal
3. Purification by Distillation, Decolouration andSublimation.
4. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting pointapparatus)
5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.
6. Chromatography
   a. Separation of a mixture of two amino acids by ascending and horizontal paperchromatography.
   b. Separation of a mixture of two sugars by ascending paperchromatography.
   c. Separation of a mixture of o- and p-nitrophenol or o- and p-aminophenol by thin layer chromatography(TLC)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICS LAB-II

Course Code: PHY2204 **Credit Units:02**

Course Contents:

1. TodeterminetheCoefficientofThermalConductivityofCopperbySearle‟sapparatus.
2. TodeterminetheCoefficientofThermalConductivityofCopperbyAngstrom‟sMethod.
3. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton‟s discmethod.
4. To investigate the Motion of CoupledOscillators.
5. TodeterminetheFrequencyofanElectricallyMaintainedTuningForkbyMelde‟sExperiment.
6. To verify λ^2 – T Law by Melde‟sExperiment.
7. To study the variation of Thermo-Emf of a Thermocouple with Difference of temperature of its TwoJunctions.
8. To determine the value of acceleration (g) due togravity.
9. To determine the frequency of tuning fork usingsonometer.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus – Third Semester

ELECTRICITY & MAGNETISM

CourseCode: PHY2301 **Credit Units:03**

Course Objective:

The aim of this course is to teach the students basics of electronics and electric current after making them comfortable with the mathematical tools involved in the study of electricity and magnetism.

Course Contents:

Module-I: Electric Charges, Fields and Potential

Basics of vector calculus (Gradient, divergence, curl and their physical significance; Gauss and Stokes theorem);Electric Charge, Quantization and Conservation of Electric Charge,Coulomb's Law,ElectricField, Principle of Superposition, Electric Flux, Gauss's law, Electric Field for Spherical, Plane and Cylindrical Distribution of Charges (applications of Gauss law), Differential form of Gauss's Law; Electric Potential; Line Integral of the Electric Field, Potential Difference and Potential Function, Electric Field from the Potential, Electric Field and Potential of Dipole; Potential for Charge Distributions: Equipotential Surfaces, Potential due to Charged Wire and Charged Disc, Energy Associated with Electric Field; Conservative Nature of ElectricForce.

Module-II: Electric Fields in Materials:

Review of capacitors, Dielectric Material in an Electric Field, Polarisation, Gauss's Law in Dielectric Medium, Displacement Vector, Boundary Conditions on **D** and **E;** Dielectric Material between Capacitor Plates, Energy stored in a capacitor having dielectric medium.

Module-III: Electric current and its magnetic effects:

Electric Currents: Charge Transport and Current Density, Equation of Continuity, Ohm's Law in vectorform.

Magnetic Field: Definition, Divergence of Magnetic Field, Ampere's Law and its Applications to Straight Wire, Solenoid and Toroid; Force on a Charged Particle Moving in Electric and Magnetic Fields, Current Loop and Magnetic Dipoles, Magnetic Dipole Moment.

Module-IV: Electromagnetic induction:

Electromagnetic Induction: Faraday's Laws of Electromagnetic Induction, Lenz's Law, Motional E.M.F., Self and Mutual Inductance, Self Inductance for Solenoid, Mutual Inductance of Coupled Solenoids, Energy Stored in the Magnetic Field; Transformer as an application of EMI.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Electricity and Magnetism (Berkley, Phys. Course 2): E.M. Purcell (Tata McGraw Hill) (1981).
- Elements of Electromagnetics :M.N.O.sadiku (Oxford University Press) (2001).
- Electricity and Magnetism: A.S. Mahajan& A.A. Rangwala (Tata- McGraw Hill)(1988).
- Electricity and Magnetism: A.N. Matveev(Mir)

CLASSICAL MECHANICS

Course Code: PHY2309 **Credit Units: 03**

Course Objective:
This course aims at exposing the students to let them understand the basics of Classical and Quantum Mechanics

Course Contents:

Module I: Lagrangian formulation of classical mechanics
Mechanics of a system of particles; constraints; Generalised coordinates, constraints and degrees of freedom; D'Alembart's principle; Lagrange's equation for conservative systems (from D'Alembert's principle; variational principle not required) and its application to simple cases; Generalised momentum.

Module II: Mechanics problems using Lagrangian formulation
Central force problem: Two body problem; reduced mass; motion under central force; constants of motion; Virial theorem; Kepler's laws of planetary motion.
Rigid body dynamics: Angular momentum and kinetic energy of motion about a point; Tensors; Momentum of inertia tensor.

ModuleI III: Hamiltonian formulation of classical mechanics and old quantum theory
Legendre transformation and Hamilton's equations of motion; Idea of cyclic coordinates, its relation with conservation principles, Variational principle and least action; canonical equations; poisson bracket; Hamilton Jacoby theory.

Module IV: Limitations of Classical Mechanics
Blackbody radiation, the photoelectric effect, the Franck-Hertz experiment, the correspondence principle, the Bohr Atom, Compton effect, reduced mass correction, De Broglie hypothesis, Wave particle duality, Group and Particle velocity, Wave packets, Experiments supporting wave particle duality.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;A: Attendance

Text & References:

- Classical Mechanics – J. Goldstein (Narosa Publ. House).
- Introduction to Classical Mechanics - R. G. Takwale and P. S. Puranik (Tata McGraw-Hill).
- Classical Mechanics – N. C. Rana and P. S. Joag (Tata McGraw-Hill).
- Introductory Quantum Mechanics - S. N. Ghoshal (Calcutta Book House).
- A Textbook of Quantum Mechanics – P. M. Mathews and K. Venkatesan.

ANALOG ELECTRONICS

Course Code: PHY2303 **Credit Units:03**

Course Objective:

This course aims at exposing the students to Semiconductors, Circuits and Transistors and its applications.

Course Contents:

Module I: Junction Diodes and their Applications

Formation of PN junction, Depletion region, Junction capacitance (Transition and diffusion capacitance, Energy level diagrams and built in potential, diffusion and drift velocity of carriers, Diode equation, V-I characteristics, temperature dependence,
Applications Half-wave Rectifiers & Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency.Low pass filter and High pass filter, Qualitative idea of C, L and π - Filters. Zener Diode and Voltage Regulation. Photo Diode, Tunnel Diode, LED, Varactor Diode, Tunnel diodes
AC and DC Power Supplies

Module II: Circuit Analysis

Kirchhoff's Laws (KCL and KVL), Mesh and Node analysis of dc and ac Circuits, Superposition theorem, Thevenin's and Norton's theorem, reciprocity theorem, Linear resistive 2- ports and interconnections, Z, Y, L, S,T, H' and H" representations/Parameters, Wheatstone Bridge and its Applications to Wein Bridge and Anderson Bridge

Module III: Transistors

PNP and NPN junction transistors, transistor current components, CB, CC and CE Configurations, transfer characteristics, Transistor as switch and applications, Transistor biasing, fixed bias, emitter- stabilised biasing, Voltage-divider biasing, FET and BJT Junction Field Effect Transistor (JFET), JFET V-I Characteristics, Application of FET as voltage variable resistor. Advantages of FET over BJT. MOSFET: construction, working & Application

Examination Scheme:

Components	A	CT	S/V/	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Semiconductor Electronics by A. K. Sharma, New Age International Publisher(1996)
- Semiconductor Device- Physics and Technology by S. M. Sze, Wiley(1985)
- Introduction to Semiconductor Devices by M. S.Tyagi
- Integrated Electronics : J. Millman and C.C.Halkias (Tata McgrawHill)
- Linear and Non-linear Circuits: Chua, Desoer andKuh.
- Electronic Devices and Circuits : A. Mottershead (Prentice Hall)

MATHEMATICAL PHYSICS-II

CourseCode:PHY2308 **Credit Units:03**

Course Objective:

This course aims at exposing the students to some part of Mathematics useful for them to solve typical problems ofPhysics.

Course Contents:

Module I: Complex analysis

Complex numbers: Complex numbers, Argand diagram, Modulus and argument, addition and multiplication, Exponential and circular functions of complex variables, De Movire‟s theorem, Real and imaginary parts of circular and hyperbolic functions, Logarithmic function of a complex variable.

Module II: Complex analysis

Functionsofcomplexvariables:functionofcomplexvariables,limit,condinuityanddifferentiability of a complex function, complex integration, simply connected region, Cauchy integral theorem, Cauchy integralformula,Taylor‟theorem,Laurent‟stheorem,Residues,Poles,singularity,methodof finding residues, residuetheorem.

Module III: Fourier and Laplace Transform:

Fourier series; Partial sums; Fourier integral and transforms; Fast Fourier Transforms, Laplace transform (LT); First and second shifting theorems; Inverse LT by partial fractions; LT of derivative and integral of a function**.**

Module IV: Partial Differential Equations

Generating solution of wave equation in 1 dimension, transverse vibration of stretched string, Oscillation of hanging chain, wave equation in 2 and 3 dimensions, vibrations of rectangular and circular membrane derivation of the equation of heat conduction, heat flow in 1, 2 and 3 dimensional rectangular systems of finite boundaries, temperature inside circular plate.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- IntroductiontoMathematicalPhysics-C.Harper(Prentice-HallofIndia).
- MathematicalMethods-M.C.PotterandJ.Goldberg(Prentice-HallofIndia).
- VectorAnalysis-M.R.Spiegel,(Schaum'sOutlineSeries)(TataMcGraw-Hill).
- TatwiyaPadarthaBidyarBhumika – S. Sengupta, Asok Ghosh and D. P. Roychaudhuri (W.B State Book Board(WBSBB).
- MathematicalPhysics–P.K.Chattopadhyay(WileyEaste)

PHYSICS LAB-III

Course Code: PHY2304 **Credit Units:02**

Course Contents:

1. To determine a Low Resistance by Carey Foster‟sBridge.
2. To determine a Low Resistance by aPotentiometer.
3. To determine High Resistance by Leakage of a Capacitor.4.To investigate the Motion of CoupledOscillators.
4. To study the response curve of a Series LCR circuit and determine its (a)Resonant
5. Frequency, (b) Impedance at Resonance and (c) Quality Factor Q, and (d) BandWidth.
6. To study the response curve of a Parallel LCR circuit and determine its (a)Anti-
7. Resonant Frequency and (b) Quality FactorQ.
8. To study (a) Half-wave Rectifier and (b) Full-wave BridgeRectifier.
9. To study the Forward and Reverse characteristics of a Zener Diode and to study its use as a VoltageRegulator.
10. To study the CE Characteristics of a PNPTransistor.
11. To study the characteristics curves of PN junction diode in forward and reversedbias.
12. To study the Frequency Response of Voltage Gain of a RC-CoupledAmplifier.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

COMPUTER PROGRAMMING IN C

CourseCode:PHY2306 **Credit Units:03**

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e.C.

Course Contents:

Module I: Introduction

Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary, octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C

History of C, Introduction of C, Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formattingI/O.

Module III: Fundamental Features in C

C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module IV: Arrays and Functions

One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations .Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion.

Module V: Advanced features in C

Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. File Handling.

Examination Scheme:

Components	**A**	**CT**	**C**	**H**	**EE**
Weightage (%)	5	15	5	5	70

References:

- "ANSI C" by EBalagurusamy
- YashwantKanetkar, "Let us C", BPB Publications, 2nd Edition,2001.
- Herbert Schildt, "C: The complete reference", OsbourneMcgraw Hill, 4th Edition,2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India,1995.
- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- J.BDixit,"FundamentalsofComputersandProgrammingin,,C".
- P.K. Sinha and PritiSinha, "Computer Fundamentals", BPBpublication.

TERM PAPER& WORKSHOP

Course Code: PHY2331 **Credit Units:03**

This course will comprise of two components viz Term Paper Workshop.

Component I: Term Paper

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing asubject
- Finding sources ofmaterials
- Collecting thenotes
- Outlining thepaper
- Writing the firstdraft
- Editing & preparing the finalpaper

1. Choosing aSubject

The subject chosen should not be too general.

2. Finding Sources ofmaterials

d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point ofview.

e) Begin by making a list of subject-headings under which you might expect the subject to belisted.

f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting thenotes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

d) Get facts, not just opinions. Compare the facts with author'sconclusion.

e) In research studies, notice the methods and procedures, results &conclusions.

f) Check crossreferences.

4. Outlining thepaper

c) Review notes to find main sub-divisions of thesubject.

d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going backand sorting again for main divisions, to see if another general pattern ispossible.

5. Writing the firstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement ofpurpose

b) main body of thepaper

c) statement of summary andconclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the finalPaper

j) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of everysection.

k) Read the paper to ensure that the language is not awkward, and that it "flows"properly.

l) Check for proper spelling, phrasing and sentenceconstruction.

m) Check for proper form on footnotes, quotes, andpunctuation.
n) Check to see that quotations serve one of the followingpurposes:
o) Show evidence of what an author hassaid.
p) Avoid misrepresentation throughrestatement.
q) Save unnecessary writing when ideas have been well expressed by the originalauthor.
r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Titlepage
- Table ofcontents
- Introduction
- Review
- Discussion&Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of questionposed
- summary offindings
- summary of main limitations of the study athand
- details of possibilities for related futureresearch

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), AlltagssituationeniminterkulturellenVergleich: Realisierung von Kritik und AblehnungimDeutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Component II: Workshop

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of thefaculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nanotechnology
- RenewableEnergy
- DataAnalytics
- Spintronics
- Superconductivity
- Bio-fuels
- Biophysics
- QuantumComputation
- PlasmaPhysics
- Cryogenics

- CleanEnergy

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

- The procedure for earning credits from workshop consists of the followingsteps:
- Relevant study material and references will be provided by the trainer inadvance.
- The participants are expected to explore the topic in advance and take active part in the discussionsheld
- Attending and Participating in all activities of theworkshop
- Group Activities have to be undertaken by students as guided by thetrainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Examination Scheme:

Term Paper (70)			**Workshop (30)**		
Organization & Relevance	**Literature Review & Bibliography**	**Comprehensive Viva**	**Attendance**	**Active Participation**	**Seminar / Quiz**
25	**25**	**20**	**5**	**10**	**15**

Syllabus – Fourth Semester

QUANTUM MECHANICS

CourseCode: PHY2410 **Credit Units:03**

Course Objective:

This course aims at exposing the students to Quantum Mechanics and its applications in Physics.

Course Contents:

Module I: Origin of Quantum Mechanics

Limitations of Classical Physics, Particle properties of waves: Black Body Radiation and Planck's Quantum hypothesis, Photoelectric effect, Compton Effect, Wave properties of particles: De-Broglie waves, physically acceptable wave functions, Probabilistic interpretation, Wave equation, phase and group velocity, Particle diffraction, Davisson and Germer experiment, Heisenberg uncertainty principle, Applications of uncertainty principle.

Module II: Schrodinger equation and general formalism of Quantum Mechanics

Schrodinger‟s time dependent equation, Linearity and superposition, Expectation values, Schrodinger‟s time independent equation, Stationary states, Hilbert space, normalization and orthonormality, Eigen functions and eigen values, quantum mechanical Operators, Hermititan Operators, Angular momentum operators and their commutation relations, eigenvalues and eigenfunctions of L^2 and L_z, Introduction to Bra and ket notation

Module III: Simple applications of Quantum Mechanics

Free particle, Particle in one dimensional and three dimensional box , Potential step. boundary conditions, bound and unbound states, Reflection and transmission coefficients for a rectangular barrier in one dimension, Tunnel effect, alpha decay, Linear harmonic oscillator (qualitative), The hydrogen atom problem (qualitative).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Quantum Mechanics: J.L. Powell, B. Crasemann (Narosa PublishingHouse).
- Introduction to Quantum Mechanics, 2 nd edition, D.J. Griffiths(Pearson)
- Modern quantum mechanics; J. J.Sakurai.
- Quantum Mechanics – A. K. Ghatak and S. Lokenathan (Macmillan,Delhi).
- A Textbook of Quantum Mechanics – P. M. Mathews and K. Venkatesan (Tata McGraw Hill).
- Concepts of Modern Physics: Arthur Beiser (Tata McgrawHill)

ELECTRODYNAMICS

Course Code: PHY2407 **Credit Units:03**

Course Objective:

This aim of this course is to broaden your view and deepen your understanding of time dependent electromagnetic phenomena. Students will develop a fairly complete picture of electromagnetism waves and radiations and their interaction with matter.

Course Contents:

Module I: Electric Field in Matter (Electrostatic and Potentials)

Divergence and Curl of Electrostatic Field, Scalar Potential, Poission‟s and Laplace equation in Cartesian Coordinates, Boundary conditions on E, Uniqueness of solution, Classical image problem (Point Charge in front of a plane)

Module II: Magnetic Field in Matter

The Divergence and Curl of a magnetic field; Magnetic Vector Potential; Magnetization; Diamagnetic, Paramagnetic and Ferromagnetic materials; Field of a magnetized Object; bound current; Ampere‟s law in Magnetizedmaterials.

Module III: Electromagnetic Field

Revisit of Basic Electromagnetic Laws and Maxwell equations; Displacement current, Continuity Equation, Revisition of Vector and scalar potentials, Gauge transformations, Lorentz and Coulomb gauge; Potential and Field of a movingcharge.

Module IV: Electrodynamics and Relativity

Magnetism as a relativistic phenomenon; Lorentz Transformation; Transformation of electric and magnetic field

Poynting's Theorem and Poynting vector; Energy density; Electromagnetic Wave equations in free space (one dimension)

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Electromagnetic by B. B.Laud.
- Classical Electricity and Magnetism by Panofsky andPhillips.
- Electromagnetic Theory and Electrodynamics by SatyaPrakash.
- Electromagnetic fields and Waves by V. V.Sarwate.
- Electrodynamics by Gupta S. L., Singh S. P. andKumar.

STATISTICAL MECHANICS

Course Code: PHY2408 **Credit Units: 03**

Course Objective:

This course introduces assumptions, principles and practice of statistical mechanics and its firm understanding in an absolute prerequisite for successfully applying the techniques to real problems.

Course Contents:

Module I: Thermodynamics in connection to statistical mechanics

Contact between statistics and thermodynamics,Thermodynamic equilibrium, Thermodynamic potentials. Entropy and thermodynamic probability, Maxwell-Boltzmann distribution law, , Thermodynamic functions of an ideal gas, Classical entropy expression, Gibbs paradox,entropy of mixing, correct Boltzmann's counting, law of equipartition of energy, applications to specific heat and its limitations.

Module II: Classical and Quantum Theory of Radiation:

Elements of ensemble theory, micro-canonical, canonical and grand canonical ensemble, partition function, fluctuations, Planck's law of black body radiation, deduction of Wien's radiation formula,Rayleigh-Jeans law, Stefan-Boltzmann law and Wien's displacement law from Planck's law,

Module III:Bose-Einstein Statistics

B-E distribution law, B-E condensate, difference between B-E condensation and normal condensation, thermodynamic functions of an ideal weakly degenerate gas,strongly degenerate Bose gas, Bose-Einstein condensation properties of liquid He(qualitative description), Fields of sound waves, Einstein and Debye theory of specific heat

Module IV:Fermi- Dirac Statistics

Fermi-Dirac distribution law, Fermi energy, Fermi Temperature, thermodynamic functions of an ideal weakly degenerate Fermi gas, strongly degenerate Fermi gas, electron gas in a metal, specific heat of metals, white dwarf stars, Chandrasekhar mass limit.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Statistical Physics, Thermodynamics and Kinetic Theory: V.S. Bhatia (Vishal Publ., Jalandhar, 2003)
- Statistical Mechanics by K. Huang
- Statistical Mechanics by R. K. Patharia
- Statistical Mechanics by B. K. Aggarwal and M. Eisner
- Statistical Physics by Landaou and Lifshitz.

DIGITAL ELECTRONICS

Course Code: PHY2411 **Credit Units:03**

Course Objective:

This course aims at exposing the students to Digital Electronics and Communication.

Course Contents:

Module I: Digital Circuits & Combinational Logic

Difference Between Analog and Digital Circuits. Binary Numbers. Octal and Hexadecimal Numbers, Conversion of Decimal to Binary and other numbers and Vice Versa,

Logic systems, Circuits for OR, AND, NOT gates, transistor switching times, Exclusive OR gate, Verification and design of AND, OR, NOT and XOR gates using NAND gates & NOR gates, Boolean algebra: De Morgan's Theorems. Simplification of Logic Circuit using Boolean Algebra. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.
Arithmetic Circuits:Binary Addition. Binary Subtraction using 2's Complement Method, Half Adders, Full Adders and Subtractors

Module II:

Flip-Flops, Counters, Shift Registers and Converters:
TTL ICs (binary decoder, 7segment decoder, Schmitt trigger), 7-segment display driver.
Memories: RAM and ROM

Sequential Circuits: RS, D, and JK Flip-Flops. Level Clocked and Edge Triggered Flip-Flops. Preset and Clear Operations. Race-around Conditions in JK Flip-Flops. Master-Slave JK Flip-Flop
Shift registers: Serial and parallel shifting of data, A/D converter, D/A converter.

Module III:Analog Circuits

Integrated Circuits (Qualitative Treatment only) Active and Passive components.Advantages and Drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (Basic Idea and Definitions Only). Examples of Linear and Digital ICs.

Operational Amplifiers (Use Black Box approach): Revision of basic characteristics of Op-Amps. Characteristics of an Ideal Op-Amp.Feedback in Amplifiers.Open-loop and Closed-loop Gain.Frequency Response.CMRR. Virtual ground and its Application

Module IV: Communication
Modulation: Need for modulation- Types of modulation- Amplitude, Frequency, Phase and Pulse code modulation. Radio wave propagation, Ionosphere, Effect of Ionosphere on Radio waves, Skip distance and Maximum Usable Frequency, Radio transmitter and receiver, TV receiver, Satellite communication, Modem, Demodulation. Introduction to Microprocessor.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Pulse, Digital and Switching Waveforms : J. Millman and H. Taub (Tata McgrawHill)
- Electronic Devices and Circuits: A. Mottershead (PrenticeHall).
- Digital principles and applications By Donald P. Leach & Albert Paul Malvino, (Glencoe)

- Digital Fundamentals, 3rd Edition by Thomas L. Floyd (Universal Book Stall, India).
- Op-Amps and Linear Integrated Circuits by R. A. Gayakwad (Pearson Education Asia)
- Electronics Fundamental and Application: D. Chattopadhyay and P.C.Rakshit.

PHYSICS LAB-IV

Course Code: PHY2404 **Credit Units:02**

Course Contents:

1. To investigate the use of an op-amp as anIntegrator.
2. To investigate the use of an op-amp as aDifferentiator.
3. To study Amplitude Modulation usingTransistor.
4. To study Pulse Width / Pulse Position and Pulse Amplitude Modulation usingICs.
5. To verify the basic logic gates using logic gate trainerkit.
6. To design and verify the following digital circuits using basicgates:
   i) S-R flip-flops , ii) J-Kflip-flops.
7. To execute half adders and full adders with basic gates and hence to verify addition of binary numbers.
8. To determine the value of e/m by Thomson's method.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

LASER PHYSICS

Course Code: PHY2406 **Credit Units:03**

Course Objective:

This course aims at students to give them basic understanding of Laser and its applications.

Course Contents: Module

I: Introduction

Introduction, mono chromaticity, temporal and spatial coherence, Einstein‟s coefficients, momentum transfer, possibility of light amplification, kinetics of optical absorption, shape and width of spectral lines, line broadening mechanism, natural, collision and Doppler broadening.

Module II: Laser Pumping and Resonators

Resonators, modes of a resonator, number of modes per unit volume, open resonators, confocal resonator (qualitative), quality factor, losses inside the cavity, threshold condition, Quantum yield.

Module III: Dynamics of the Laser Processes

Rate equations for two, three and four level systems, production of a giant pulse – Q switching, giant pulse dynamics, laser amplifiers, mode-locking, hole burning, distributed feedback lasers.

Module IV: Types of Lasers

He-Ne laser, Nitrogen Laser, CO2 laser, Ruby laser, features of semiconductor lasers, intrinsic semiconductor lasers, doped semiconductors, condition for laser action, Advances in semiconductor lasers, injection lasers, dye lasers.

Module V: Applications

Holography, non-linear optics: harmonic generation, second harmonic generation, phase matching and optical mixing, brief qualitative description of some experiments of fundamental importance.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Lasers and Non-linear Optics: B.B. Laud. (WileyEastern).
- Principles of Lasers: O. Svelto (PlenumPress).
- AnIntroductiontoLasersandtheirapplications:D.C.O‟Shea,W.RussellandW.T.Rhodes (Addition–Wesley).
- Laser Theory and Applications :Thyagarajan and A. Ghatak(MacMillan)

SPECIAL THEORY OF RELATIVITY

Course Code: PHY2412 **Credit Units: 03**

Course Objective:

This course aims at exposing the students to Newton's law of motion, the Galilean transformations and Einstein's special theory of relativity in proper perspective so that they can use its formulation in later courses.

Course Contents:

Module I: Galilean relativity

Newton's laws of motion, Frames of reference, Inertial and non-inertial frames, Galilean transformation and Galilean relativity.

Module II: Lorentz Transformations

Michelson-Morley Experiment, Basic postulates of special relativity, Lorentz transformations, Simultaneity and causality in relativity. Length contraction, Time dilation, Twin paradox, Velocity Transformation, Space-like and time-like intervals, Aberration of light, Doppler effect.

Module III: Relativistic Dynamics

Conservation of Momentum, Relativistic momentum, Relativistic energy,Transformation of Momentum and Energy, Equivalence of Mass and Energy. Particles with zero Rest-mass, Transformation of force, Four vectors.

Module IV: Problems in Relativistic Dynamics

Acceleration of Charged Particle in a constant longitudinal electric field, Acceleration by a Transverse Electric field, charged particle in a magnetic field, centre of mass system. Energy available from Moving charge,

Principle of Equivalence**:** Inertial and Gravitational Mass, Gravitational Mass of photons, Gravitational Red-Shift, Equivalence.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Relativity: The Special and the General Theory: Albert Einstein.
- Theory of Relativity :W.Pauli
- Introduction to Special Theory of Relativity :SomnathDatta
- Introduction to Special Theory of Relativity - R. Resnick (Wiley Eastern).
- The Feynman Lectures on Physics, Vol I (Addison – Wesley).

TERM PAPER & WORKSHOP

Course Code: PHY2431 **Credit Units:03**

This course will comprise of two components viz Term Paper Workshop.

Component I: Term Paper

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing asubject
- Finding sources ofmaterials
- Collecting thenotes
- Outlining thepaper
- Writing the firstdraft
- Editing & preparing the finalpaper

7. Choosing aSubject

The subject chosen should not be too general.

8. Finding Sources ofmaterials

g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point ofview.

h) Begin by making a list of subject-headings under which you might expect the subject to belisted.

i) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

9. Collecting thenotes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

g) Get facts, not just opinions. Compare the facts with author'sconclusion.

h) In research studies, notice the methods and procedures, results &conclusions.

i) Check crossreferences.

10. Outlining thepaper

e) Review notes to find main sub-divisions of thesubject.

f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going backand sorting again for main divisions, to see if another general pattern ispossible.

11. Writing the firstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

d) statement ofpurpose

e) main body of thepaper

f) statement of summary andconclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

12. Editing & Preparing the finalPaper

s) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of everysection.

t) Read the paper to ensure that the language is not awkward, and that it "flows"properly.

u) Check for proper spelling, phrasing and sentenceconstruction.

v) Check for proper form on footnotes, quotes, andpunctuation.
w) Check to see that quotations serve one of the followingpurposes:
x) Show evidence of what an author hassaid.
y) Avoid misrepresentation throughrestatement.
z) Save unnecessary writing when ideas have been well expressed by the originalauthor.
aa) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Titlepage
- Table ofcontents
- Introduction
- Review
- Discussion&Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of questionposed
- summary offindings
- summary of main limitations of the study athand
- details of possibilities for related futureresearch

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), AlltagssituationeniminterkulturellenVergleich: Realisierung von Kritik und AblehnungimDeutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Component II: Workshop

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of thefaculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nanotechnology
- RenewableEnergy
- DataAnalytics
- Spintronics
- Superconductivity
- Bio-fuels
- Biophysics
- QuantumComputation

- PlasmaPhysics
- Cryogenics
- CleanEnergy

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

- The procedure for earning credits from workshop consists of the followingsteps:
- Relevant study material and references will be provided by the trainer inadvance.
- The participants are expected to explore the topic in advance and take active part in the discussionsheld
- Attending and Participating in all activities of theworkshop
- Group Activities have to be undertaken by students as guided by thetrainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Examination Scheme:

Term Paper (70)			**Workshop (30)**		
Organization & Relevance	**Literature Review & Bibliography**	**Comprehensive Viva**	**Attendance**	**Active Participation**	**Seminar / Quiz**
25	**25**	**20**	**5**	**10**	**15**

Syllabus – Fifth Semester

NUCLEAR & PARTICLE PHYSICS

Course Code: PHY2503 **Credit Units:03**

Course Objective: The course aims to introduce students to the fundamental concepts of nuclear and sub-nuclear physics and introduction to the physics behind particle detectors.

Course Contents:

Module I: Nuclear Properties

Constituents of nucleus, Non-existence of electrons in nucleus, Nuclear mass and binding energy, features of binding energy versus mass number curve, nuclear radius, angular momentum and parity, qualitative discussion of two-body nuclear forces, nuclear moments, magnetic dipole moment and electric quadrupole moment,

Module II: Radioactive Decays

Modes of decay of radioactive nuclides and decay Laws, Beta decays: β^{-}, β^{+} and electron capture decays, , Parity violation in βdecay. Alpha decay: Stability of heavy nuclei against break up, Geiger-Nuttal law, barrier penetration as applied to alpha decay, Gamma transitions: Excited levels, Radio carbon dating, Nuclear Power generation (Fission& Fusion Process) & Nuclear Reactor (if time permits)

Module III Nuclear Reactions and Nuclear Models

Types of nuclear reactions, reactions cross section, conservation laws, Kinematics of nuclear reaction, Q-value and its physical significance, compound nucleus. Liquid drop model, semi-empirical mass formula, condition of stability, evidence for nuclear magic numbers, Shell model, energy level scheme (Introductory).

Module IV: Elementary Particles, their Properties and reactions

Historical introduction, Cosmology, fermions and bosons, particles and antiparticles, Classification of elementary particles, types of interactions, electromagnetic, weak, strong interactions, gravitational interactions, Quantum numbers and conservation laws, isospin, charge conjugation, Yukawa theory, Introduction to quarks and qualitative discussion of the quark model and 3 generation of Quarks qualitatively).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Basic ideas and Concepts in Nuclear Physics by K.Hyde
- Introduction to Nuclear Physics : H.A.Enge
- Nuclear Physics : I. Kaplan (AddisonWesley)
- Nuclei and Particles by E.Segre
- Introduction to High energy Physics by D.H.Perkins
- Elementary Particles by I.S.Hughe

SOLID STATE PHYSICS

Course Code: PHY2506 **Credit Units:03**

Course Objective:

This aim of this course is to increase understanding of Physics principles as applied to solid state materials and to enhance problem solving and critical thinking skills.

Course Contents:

Module I: Crystal Structure

Crystalline and amorphous solids, Translational symmetry.Elementary ideas about crystal structure, lattice and bases, unit cell, Reciprocal lattice, fundamental types of lattices, Miller indices, lattice planes, simple cubic, f.c.c. and b.c.c. lattices.Laue and Bragg equations.Determination of crystal structure with X-rays.Bragg diffraction. Crystal Stuctures: sc, fcc, bcc, hcp, diamond, NaCl, CsCl&Zns.

Module II: Bonding of solids

Different types of bonding- ionic, covalent, metallic, Van der Waals and hydrogen bond, their properties.

Module III: Band theory of solids

Elementary Band theory of solids, Periodic potential and Bloch theorem, Kronig-Penny model, energy band structure. Band structure in conductors, direct and indirect semiconductors and insulators (qualitative discussions), Free electron theory of metals, effective mass, drift current, mobility and conductivity, Weidman-Franz law, Heavy fermions, Hall Effect in metals and Semiconductors: Phenomenology and implication (Qualitative Discussion Only)

Module IV: Dielectric properties of materials and Lattice Vibrations

Polarization.Local Electric Field at an Atom.Depolarization Field.Dielectric Constant.Electric Susceptibility.Polarizability.Classical Theory of Electric Polarizability.ClausiusMosotti Equation.Normal and Anomalous Dispersion.

Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons.Qualitative Description of the Phonon Spectrum in Solids.Einstein and Debye Theories of Specific Heat of Solids.T^3 Law.

Module V: Magnetic properties of materials

Dia, para and ferro-magnetic properties of solids.Langevin‟s theory of diamagnetism and paramagnetism.Quantum theory of paramagnetism, Curie‟s law.Ferromagnetism, Spontaneous magnetization and domain structure; temperature dependence of spontaneous magnetization; Curie-Weiss law, Explanation of hysteresis.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Introduction to Solid State Physics: C. Kittel (Wiley, VIIed.)
- Introduction to Solids : L.V. Azaroff (Tata McGrawHill)
- Solid State Physics : A.J. Dekker(Prentice-Hall)
- Elements of Materials Science and Engineering: L.H. Van Vlack(Addison-Wesley)

ATOMIC & MOLECULAR PHYSICS

Course Code: PHY2510 **Credit Units:03**

Course Objective:

The aim of the course is to provide theoretical and practical knowledge on the many powerful methods provided by modern atomic- and molecular spectroscopy regarding basic studies as well as practicalapplications.

Course Contents:

Module I: Atomic Spectrum

Atomic structure, Hydrogen spectra, Bohr‟s model of one electron atom, Bohr-Sommerfield model, Good quantum numbers, Stern-Gerlach experiment and spin as an intrinsic quantum number. Incompatibility of spin with classical ideas.Fine structure.Study of fine structure by Michelson interferometer.

Module II: Vector atom model and many electron atoms

Magnetic moment of the electron, Landau‟s g factor.Vector model – space quantization. L-S and j-j coupling scheme, Spectroscopic terms of many electron atoms in the ground state, Zeeman effect and its explanation using vector atom model. Stark effect, selection rules for Zeeman and stark effect. L-S and j-j coupling- Interaction with electromagnetic radiation and with static fields.

Module III: Molecular Structure and Spectroscopy

Types of molecular spectra (Basics ideas), experimental study, Theory of pure rotational spectra, theory of rotational vibrational spectra, the Born-Oppenheimer approximation, Molecular rotations and vibrations, Molecular electronic transitions, Diatomic molecules–rotational and vibrational energy levels. Raman effect and its application to molecular spectroscopy (qualitative discussion). Molecular orbitaltheory.

Module IV:X-rays:

Production of X-rays, characteristic and continuous spectrum of X-rays, Mosley‟s law and its applications, difference between optical and X-ray spectra.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Physics of Atoms and Molecules – B. H. Bransden and C. J. Joachain(PearsonEducation).
- Atomic and Nuclear Physics – S. K. Sharma (PearsonEducation).
- Optics and Atomic Physics – B. P. Khandelwal (SiblalAgarwala).

APPLIED MATHEMATICS-III

Course Code: PHY2508 **Credit Units:03**

Course Objective:

This course is aimed to provide a fundamental understanding of Computer Oriented Numerical Analysis for the students in their early stages of academic career. Several concepts such as Solution of Leniar Algebraic Equations, Solution of Algebraic and Transcendental equations, Interpolation, Curve fitting, etc. will be introduced to students. After this course, you will be able to understand fundamental concepts of Numerical Analysis, which will prove highly beneficial to them in understanding more complicated topics of computer science.

Course Contents:

Module I: **Introduction & Numerical Solution to ODE**

Introductionto Numerical Analysis, Application Area of N.A., Basic Definition,TaylorSeries Method,Euler‟sMethod,ModifiedEuler‟sMethod,RungaKuttaMethod

Module II: **Solution of Algebraic and Transcendental Equations**
Introduction, Bisection Method, regular False Method, Iteration Method, Newton Raphson Method, Generalized Secant Raphson Method.

Module III: **Interpolation and Curve Fitting**
Basic Definition, Forward Differences, backward Differences, Central Differences, Newton Forward Differences Formula, Newton‟s Divided Difference Formula, Lagrange‟s Method. Curve Fitting Techniques

Module IV: Numerical Differentiation & Integration
Numerical Differentiation based on Interpolation Formula, Numerical Integration, Trapezoidal Rules, Simpson‟s 1/3 rule, Simpson‟s 3/8 Rule

Module V: Statistical Computation
Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines.

Examination Scheme:

Components	**CT1**	**A/C/Q**	**Attd**	**EE**
Weightage (%)	10	15	5	70

Text & References:

Text:

- Numerical Analysis V. RajaRaman
- Numerical Methods by B.S.Garewal

References:

- Numerical Solutions M.K. Jain & R.K.Jain

APPLIED MATHEMATICS-III LAB

Course Code: PHY2509 **Credit Unit:01**

Software Required: Turbo C++

1. Write a program to find the roots of an equation f (x) = 0 using Bisectionmethod.
2. Write a program to find the simple/multiple roots of f (x) = 0 using Newton – Raphsonmethod.
3. Write a program to find the roots of f(x) = 0 using Secantmethod.
4. Write a program to find the integral of a function using Trapezoidalrule.
5. Write a program to find the integral of a function using Simpson‟s 1/3rd and 3/8th rule using switch case.
6. Write a program to find the integral of a function using adaptive Simpsonmethod
7. Write a program to solve the system of equations Ax = b in tridiagonal form using Thomas Algorithm.
8. Write a program to solve the system of equations Ax = b using Gauss eliminationmethod.
9. Write a program to solve the system of equations Ax = b using Jacobi Iterationmethod.
10. Write a program to solve the system of equations Ax = b using Gauss-Seidelmethod
11. Write a program to find the largest (or smallest) Eigen value and corresponding Eigen vector of a square matrix using power (or inverse power)method.
12. Write a program to solve first and second order ordinary differential equations (initial value problem) using Runge-Kutta fourth ordermethod.
13. Write a program to solve first order ordinary differential equations (initial value problem) using adaptive Runge-Kuttamethod.
14. Write a program to solve second order ordinary differential equations (boundary value problem) using shooting method based on adaptive Runge-Kutta method and Newton-Raphsonmethod.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICS LAB-V

CourseCode:PHY2504 **Credit Units:02**

Course Contents:

1. To measure the Resistivity of a Ge Crystal with Temperature by Four-Probe Method (from room temperature to 200 ^{0} C) and to determine the Band Gap Eg forit.
2. To determine the Hall Coefficient aSemiconductor.
3. To study the Hysteresis loop (B-H) of ferromagneticmaterial.
4. To measure the Magnetic susceptibility of Solids andLiquids.
5. To determine the band gap energy of a given semiconductor by four-probemethod.
6. To study the characteristics of Photovoltaiccell.
7. To measure the dielectric constant of a ferroelectric material as a function oftemperature.
8. To measure magnetic susceptibility of a solution of a paramagnetic salt in water for 3 different concentrations by using Quincke'smethod.

Any other experiment carried out in the class.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

SUMMER PROJECT EVALUATION

CourseCode:PHY2535 **Credit Units:03**

Objectives:

Practical training is based on the theoretical subjects studied by subjects. It can be arranged within the college or any in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on campus training the students will be given specific tasks of synthesizing / testing / analysis / characterization. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of thesame.

Chapter Scheme and distribution of marks Report (Probable):

Chapter 1: Introduction –5 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 10 marks
Chapter 3: Presentation, Analysis & Findings -- 15 marks
Chapter 4: Conclusion & Recommendations -- 5 marks
Chapter 5: Bibliography -- 05 marks

Evaluation Scheme:

Continuous Evaluation (Feedback from Industry/ Faculty in charge)	Report	Presentation and Viva	Total
25	40	35	100

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of theUniversity.

2) Acknowledgement: Variousorganizationsandindividualswhomighthaveprovidedassistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their pagenumbers.

4) Body of the Report: The body of the report should have these four logicaldivisions

a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and ChapterPlanning.

b) ***Conceptual Framework / National and International Scenario*:** (relating to the topic of the Project).

c) ***Presentation of Data, Analysis and Findings*:** (using the tools and techniques mentioned in the methodology).

d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to beprovided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a projectreport.

6) Annexures: Questionnaires (if any), relevant reports,etc.

(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of thetopic.
- Relevance of thetopic
- Time available at thedisposal.
- Feasibility of data collection within the given timelimit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses,etc.)

Step II :Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III : Collection of information and data relating to the topic and analysis of the same.

Step IV : Writing the report dividing it into suitable chapters, viz.,

Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

StepV: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor(Annexure-IA)
2) Student‟s declaration(Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation /Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines statedbelow.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hardbound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as “Absent” in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per UniversityRules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her ProjectReport.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to thecandidate.

INTRODUCTION TO MATLAB

CourseCode: PHY2512 **Credit Units:03**

Course Objective: MATLAB is a scientific computing tool which can be used to solve many real life problems coming from various areas of science and engineering. The course introduces the basics of MATLAB; how to effectively use few commonly used builtin functions; hands on experience on MATLAB programming and its applications to various practical problems.

Course Contents:

Module-I: Introduction to MATLAB: vector and matrix generation, subscripting and the colon notation, matrix and array operations and their manipulations, introduction to some inbuilt functions. m-files: scripts and functions, editing, saving m-files.

Module-II: Two & three-dimensional graphics: basic plots, change in axes and annotation in a figure, multiple plots in a figure, saving and printing figures, mesh plots, surface plots and their variants.

Module-III: Relational and logical operators: flow control using various statements and loops including If-End statement, If-Else-End statement, nested If-Else-End statement, For-End and While-End loops with Break commands.

Module-IV: Applications of MATLAB: Solving a linear system of equations, calculus of polynomials using inbuilt functions, solving equations in one variable, solving ordinary differential equations using inbuilt functions.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;A: Attendance

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by RudraPratap, Oxford University Press, 2016.

SEMICONDUCTOR PHYSICS

Course Code: PHY2513 **Credit Units:03**

Course Objective:

Course Description: This course illustrates the basics of semiconductor theory with emphasis on the formation of energy bands in semiconductors. Applications in terms of studying the device structure and working principle of LEDs, photodiodes and tunnel diodes. Also, the basic structure and working principle of MOS devices is given in addition to the energy band diagram in a metal-semiconductor contact.

Course Content:

Module I:Formation of Energy bands

Formation of Energy bands, Electron effective mass, concept of holes, Density of states function, Fermi-Dirac probability function and distribution, Equilibrium distribution of electrons and holes in intrinsic semiconductors, the no and po equations, intrinsic Fermi level position, dopant energy levels, Equilibrium distribution of electrons and holes in extrinsic semiconductors, Degenerated/Non-degenerated semiconductors.

Module II: Semiconductor Physics

Drift current density, Mobility Effect, Conductivity, Diffusion Current Density, Total Current Density, the Einstein relation, The Hall Effect, Carrier Generation and Recombination, Continuity Equations, time dependent diffusion equation, Basics of ambipolar effect and its transport equation, Haynes-Shockley Experiment.

Module III: Diodes

Visible and Infrared LEDs (Device structure and Working principle), photoconductor and photodiode (device structure and working principle), PN junction solar cells, Tunnel diodes, Impatt diodes and its static and dynamic characteristics, negative differential resistance, Transferred Electron devices (TED): TED device operation; Quantum effect devices (QED): Resonance tunnel diode.

Module IV: Metal-semiconductor contact

MOSFET structure and principle of operation, current-voltage characteristics, MOS structure and its energy band diagram, Depletion layer thickness, work function differences, Flat band voltage - charge distribution, capacitance-voltage characteristics and frequency effects,.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Reference Books:

1. Semiconductor Physics and Devices (Third Edition) by Donald A. Neamen (the McGraw-Hill companies)
2. Semiconductor devices Physics and Technology (2nd Edition) by S. M. Sze (Wiley Student Edition)
3. Integrated Electronics: Analog and Digital Circuits and Systems, Jacob Millman and Christos C. Halkias, Tata McGraw-Hill.
4. Hand Book of Electronics, Gupta & Kumar, PragatiPrakashan.

TERM PAPER & WORKSHOP

Course Code: PHY2531 **Credit Units:03**

This course will comprise of two components viz Term Paper Workshop.

Component I: Term Paper

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing asubject
- Finding sources ofmaterials
- Collecting thenotes
- Outlining thepaper
- Writing the firstdraft
- Editing & preparing the finalpaper

13. Choosing aSubject

The subject chosen should not be too general.

14. Finding Sources ofmaterials

j) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point ofview.

k) Begin by making a list of subject-headings under which you might expect the subject to belisted.

l) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

15. Collecting thenotes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

j) Get facts, not just opinions. Compare the facts with author'sconclusion.

k) In research studies, notice the methods and procedures, results &conclusions.

l) Check crossreferences.

16. Outlining thepaper

g) Review notes to find main sub-divisions of thesubject.

h) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going backand sorting again for main divisions, to see if another general pattern ispossible.

17. Writing the firstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

g) statement ofpurpose

h) main body of thepaper

i) statement of summary andconclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

18. Editing & Preparing the finalPaper

bb) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of everysection.

cc) Read the paper to ensure that the language is not awkward, and that it "flows"properly.

dd) Check for proper spelling, phrasing and sentenceconstruction.
ee) Check for proper form on footnotes, quotes, andpunctuation.
ff) Check to see that quotations serve one of the followingpurposes:
gg) Show evidence of what an author hassaid.
hh) Avoid misrepresentation throughrestatement.
ii) Save unnecessary writing when ideas have been well expressed by the originalauthor.
jj) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Titlepage
- Table ofcontents
- Introduction
- Review
- Discussion&Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of questionposed
- summary offindings
- summary of main limitations of the study athand
- details of possibilities for related futureresearch

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), AlltagssituationeniminterkulturellenVergleich: Realisierung von Kritik und AblehnungimDeutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Component II: Workshop

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of thefaculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nanotechnology
- RenewableEnergy
- DataAnalytics
- Spintronics
- Superconductivity
- Bio-fuels
- Biophysics

- QuantumComputation
- PlasmaPhysics
- Cryogenics
- CleanEnergy

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

- The procedure for earning credits from workshop consists of the followingsteps:
- Relevant study material and references will be provided by the trainer inadvance.
- The participants are expected to explore the topic in advance and take active part in the discussionsheld
- Attending and Participating in all activities of theworkshop
- Group Activities have to be undertaken by students as guided by thetrainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Examination Scheme:

Term Paper (70)			**Workshop (30)**		
Organization & Relevance	**Literature Review & Bibliography**	**Comprehensive Viva**	**Attendance**	**Active Participation**	**Seminar / Quiz**
25	**25**	**20**	**5**	**10**	**15**

INTRODUCTION TO NANOTECHNOLOGY

Course Code: PHY2606 **Credit Units:03**

Course Objective:

This course aims at students to get acquainted with introductory knowledge of Nanotechnology.

Course Contents:

Module I: Introduction

Nanoscience and Nanotechnology, Classification of nanostructured materials, Nanoparticles, Quantum wire,Quantum well ,Quantum dots, Carbon nanotubes, Graphene, Nanowires, Ultra thin films-multilayered materials, Length scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Technological advantages of Nanomaterials

Module II: Preparation Methods

Bottom-up synthesis, Top-down approach: Mechanical milling, Sputtering, Evaporation.Material processing by Sol – Gel method, Chemical Vapour deposition and Physical Vapour deposition ,Microwave Synthesis of materials, Principles of SEM, TEM and AFM.

Module III: Characterization Techniques

X-ray diffraction technique, Scanning Electron Microscopy, Tunneling Electron Microscopy,Surface Analysis Techniques- AFM, SPM STM,ESCA.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- T. Pradeep, NANO The Essential, understanding Nanoscience and Nanotechnology, Tata McGraw-Hil Publishing Company Limited,2007.
- Charles P.Poole Jr., Introduction to Nanotechnology, John Willey & Sons,2003.
- Nanotechnology by Mark Ratner and Daniel Ratner, PearsonEducation.
- Nanomaterials by A.K. Bandyopadhyay; New Age InternationalPublishers.

ACCELERATORS AND DETECTORS

CourseCode:PHY2607 **Credit Units:03**

Course Objective:

Module I: Interaction of radiation and charged particles with matter

Introduction to radiations, Ionizing and nonionizing radiation, Energy loss of electrons and positrons, Positron annihilation in condensed media, Stopping power and range of heavier charged particles, derivation of Bethe-Bloch formula, interaction of gamma rays with matter, neutron classifications, sources of neutrons, neutron detectors.

Module II: Nuclear radiation detection

Gas-filled detectors, proportional and Geiger-Muller counters, Scintillation detectors, solid-state detectors, Cherenkov effect, specialized detectors, solid state nuclear track detectors, Wilson Cloud Chamber, bubble chambers, nuclear emulsions,

Module III: Accelerators

Van de Graaff Accelerator, Linear accelerators, cyclic accelerators, Cyclotron, Betatron, Synchrocyclotron, ion sources, CERN Super Proton Synchrotron (SPS). Large Hadron Collider (LHC)

Applications in Research (material physics research, medical applications (Syncrotron radiation sources and neutron spallation sources) and radiation protection

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Edward J.N. Wilson “Ann introduction to Paricle Accelerators”, Oxford University Press,2003.
- James Rosenzweig “Fundamantal of Beam Physisc”, Oxford UniversityPress,2001.
- P N Cooper “Introduction to Nuclear Radiation Detectors”, Cambridge University press, 1986.
- Kapoor S S and Ramamurthy V S “Nuclear Radiation Detectors”, Wiley Eastern, new Delhi, 1986.
- Knoll G. F., Radiation Detection and Measurement, John Wiley & Sons(1989).
- Krane K. S., Introductory Nuclear Physics, John Wiley & Sons(1975).
- Singuru R. M., Introduction to experimental nuclear physics, Wiley Eastern Publications (1987)

MATHEMATICAL PHYSICS-III

Course Code: PHY2609 **Credit Units:03**

Module I: Special Functions

Series solution of linear second order ordinary differential equations singular points of second order differential equations and their importance, series,Methods (Frobenius), Legendre, Bessel, Hermite and Laguerre differential Equations, Legendre, Hermite and Laguerre polynomials, Rodrigues formula generating functions, recurrence relations, orthogonality, Series expansion of a function in terms of a complete set of Legendre functions, Bessel functions: first and second kind, generating function, recurrence formulae, zeros of Bessel functions and orthogonality, Fraunhoffer diffraction integral for circularaperture.

Module II: Infinite series

Fundamental concepts, convergence tests, alternating series, algebra of series, power series, Taylor series.

Module III: Probability

Introduction to probability, Sample space, Probability Axioms, Random variables, probability distribution of Random variables, Discrete and continuous random variables, Functions of a Random variables

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;A: Attendance

Text & References:

- Introduction to Mathematical Physics : C. Harper (Prentice Hall of India)(2004)
- TatwiyaPadarthaBidyarBhumika – S. Sengupta, Asok Ghosh and D. P. Roychaudhuri (W.B State Book Board(WBSBB).
- MathematicalPhysics–P.K.Chattopadhyay(WileyEaste)
- A First Course in Probability and Statistics By B. L. S. PrakasaRao

INSTRUMENTATION TECHNIQUES

Course Code: PHY2610 **Credit Units: 03**

Course Objective:

This course aims at exposing the students to the instrumentation of the some of the main experimental techniques used in Physics

Course Contents:

Module I: Error analysis and Vacuum technology

Description of error analysis, reporting and usage of uncertainties, Propagation of uncertainties, Error analysis: Instrumental and statistical uncertainties, propagation of errors, Estimation of Mean and Errors, Least Square Fitting, Calibration.

Introduction to Vacuum Systems, Kinetic Theory of Gases, Production of Vacuums, Vacuum Pumps – Rotary, Diffusion, Terbomolecular, Pressure Measurement, Leak Detection, Specimen handling.

Module II: Instrumentation of Diffraction and Microscopic Techniques

X-ray Sources – Crookes Tubes, Coolidge Tubes, Filters, mono-chromator crystals, Multi-layered monochromators and mirrors, Detectors-Photographic film, Gas detectors, Solid detectors, Diffractometers-The Debye-Scherrer and Hull diffractometer, Bragg-Brentano diffractometers, An introduction to surface diffractometry.

Scanning Electron Microscope Instrumentation- Electron Beam Parameters, Electron. Optical Parameters- Beam Energy, Beam Diameter, Beam Current, Beam Solid Angle. SEM Imaging Modes- High Current Mode, Resolution Mode, Low Voltage Modes.

Module III: Instrumentation of Spectroscopic Techniques

Gas Discharge Lamps, Spectral Lamps and Shapes of Spectral Lines-Low Pressure Spectral Lamps, Shape of Spectral Lines.

Optical Filters, Polarizers and Phase Plates.Monochromators – Prism Monochromator, Grating Monochromators

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Atten

Text & References:

1. John R. Taylor, An introduction to error analysis: a study of uncertainties in physical measurements, University Science Books California). 1997.
2. P E J Flewitt, RK Wild, Physical Methods for Materials Characterization, IOP Publishing 2003.
3. R. Guinebretière, X-ray Diffraction by Polycrystalline Materials, LAVOISIER 2006.
4. Joseph I Goldstein, Scanning Electron Microscopy and X-ray Microanalysis, Springer 2018.
5. Hans Kuzmany, Solid- State Spectroscopy an Introduction, Springer 2009.

LOW TEMPERATURE PHYSICS AND SUPERCONDUCTIVITY

Course Code: PHY2605 **Credit Units:03**

Course Objective:

The aim of this course is to get acquainted the students with physics of ultra low temperatures, physics of materials at zero resistance and their applications in our realworld.

Course Contents:

Module I: Superconductivity

Basic properties of superconductors, thermodynamics, superconductors in magnetic fields The London equations, electromagnetic properties, penetration depth, Ginzburg-Landau theory, coherence length, type I and type II superconductors, BCS theory, second quantization, Cooper- pairing, energy gap Tunneling, Josephson effects and SIS tunneling, High Tc superconductors, structure, d-wave symmetry, phase diagrams, Coexistence of superconductivity and Magnetism Overview of applications, squids, microwave devices, powerapplications.

Module II: Superfluidity

Two – Fluid Model, Bose – Einstein Condensation, Macroscopic Quantum State, Properties of liquid helium-4, Phenomena near The Lambda Point, phase diagrams, Superfluidity,Superfluid phenomena, rollin film, fountain effect, second sound Exitations and vortices in superfluids,Properties of liquid helium-3, the phase diagram, Symmetry properties of superfluid helium-3, Macroscopic Quantum Interference – Josephson Effect, Normal Fluid Density – Quasiparticle Scattering , Collective Excitations, Sound Propagation.

Module III: Cryogenics

Thermal and electrical properties for different materials at low temperature, Thermodynamic Properties, Liquefaction of gases. Regenerative principle Cooling methods above 1K, Joule-Thompson, Gifford-McMahon, evaporation cooling, Cooling methods below 1K, dilution & refrigeration, Methods of liquefaction of gases (Laser Cooling, Cascade process, Linde‟s process, and adiabatic demagnetization process) – Measurement of cryogenic temperatures.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Basic Superfluids by TonyGuenault
- Superfluidity and Superconductivity:David R. Tilley,John Tilley (Ph.D.)
- Amorphous solids: low-temperature properties:William AndrewPhillips
- An introduction to liquid helium:JohnWilks,David SheridanBetts.

INTRODUCTION TO ASTRONOMY

Course Code: PHY2611 **Credit Units:03**

Course Objective: This course aims at students to get acquainted with big bang picture, dark energy and cosmology.

Course Contents:

Module I: Distance measurement and overview:

Spectrum of EM radiation, Atmospheric absorption, various types of telescopes, Overview of Astronomy, magnitude, distances, various methods to measure distances.

Module II: Sun and the Stars
Sun as a star, Structure of the Sun, types of stars, Color magnitude diagram, main sequence stars, evolution of stars.White dwarf, neutron star and black holes.

Module III: Galaxies and Extragalactic Astronomy
Milky way galaxy, dynamics of stars, types of galaxies, Hubble classification, the local group, clusters of galaxies.

Module IV: Cosmology
The big bang picture, cosmic microwave background, early universe, basic ideas and observations behind dark matter and dark energy, Structure formation in the universe.

Examination Scheme:

Components	**A**	**CT**	**S/V/**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- The Physical Universe: An introduction to Astronomy by Frank H.Shu
- Astrophysical concepts by HarwitMartin
- Astrophysics for Physicists by ArnabRaiChoudhuri

TERM PAPER & WORKSHOP

Course Code: PHY2631 **Credit Units:03**

This course will comprise of two components viz Term Paper Workshop.

Component I: Term Paper

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing asubject
- Finding sources ofmaterials
- Collecting thenotes
- Outlining thepaper
- Writing the firstdraft
- Editing & preparing the finalpaper

19. Choosing aSubject

The subject chosen should not be too general.

20. Finding Sources ofmaterials

m) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point ofview.

n) Begin by making a list of subject-headings under which you might expect the subject to belisted.

o) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

21. Collecting thenotes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

m) Get facts, not just opinions. Compare the facts with author'sconclusion.

n) In research studies, notice the methods and procedures, results &conclusions.

o) Check crossreferences.

22. Outlining thepaper

i) Review notes to find main sub-divisions of thesubject.

j) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going backand sorting again for main divisions, to see if another general pattern ispossible.

23. Writing the firstdraft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

j) statement ofpurpose

k) main body of thepaper

l) statement of summary andconclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

24. Editing & Preparing the finalPaper

kk) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of everysection.

ll) Read the paper to ensure that the language is not awkward, and that it "flows"properly.

mm) Check for proper spelling, phrasing and sentenceconstruction.

nn) Check for proper form on footnotes, quotes, andpunctuation.

oo) Check to see that quotations serve one of the followingpurposes:

pp) Show evidence of what an author hassaid.

qq) Avoid misrepresentation throughrestatement.

rr) Save unnecessary writing when ideas have been well expressed by the originalauthor.

ss) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Titlepage
- Table ofcontents
- Introduction
- Review
- Discussion&Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of questionposed
- summary offindings
- summary of main limitations of the study athand
- details of possibilities for related futureresearch

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document].German as a Foreign Language Journal [online] 1.Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document].Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), AlltagssituationeniminterkulturellenVergleich: Realisierung von Kritik und AblehnungimDeutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Component II: Workshop

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of thefaculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nanotechnology
- RenewableEnergy
- DataAnalytics
- Spintronics
- Superconductivity
- Bio-fuels
- Biophysics
- QuantumComputation
- PlasmaPhysics
- Cryogenics
- CleanEnergy

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

- The procedure for earning credits from workshop consists of the followingsteps:
- Relevant study material and references will be provided by the trainer inadvance.
- The participants are expected to explore the topic in advance and take active part in the discussionsheld
- Attending and Participating in all activities of theworkshop
- Group Activities have to be undertaken by students as guided by thetrainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Examination Scheme:

Term Paper (70)			**Workshop (30)**		
Organization & Relevance	**Literature Review & Bibliography**	**Comprehensive Viva**	**Attendance**	**Active Participation**	**Seminar / Quiz**
25	**25**	**20**	**5**	**10**	**15**

COMPUTER FORENSICS & CYBER SECURITY

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
FCH2151	Computer Forensics	2	-	2	3
FCH2251	Ethics, Policies and the IT Act	2	1	-	3
FCH2351	Behavioral Biometrics	2	1	-	3
FCH2451	Implementation Practical on MATLAB	-	-	6	3
FCH2551	Cyber Security	2	-	2	3
FCH2651	Incident Response Management	2	1	-	3
	TOTAL				**18**

Syllabus - Semester First

COMPUTER FORENSICS

Course Code: FCH2151 **Credit Units: 3**

Course Objective:

- To correctly define and cite appropriate instances for the application of computer forensics Correctly collect and analyze computer forensic evidence
- Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics

Course Content:

Module-I: Cyber Crime and computer crime

Introduction to Digital Forensics, Definition and types of cybercrimes, electronic evidence and handling, electronic media, collection, searching and storage of electronic media, introduction to internet crimes, hacking and cracking, credit card and ATM frauds, web technology, cryptography, emerging digital crimes and modules.

Module-II: Basics of Computer

Computer organisation, components of computer- input and output devices, CPU, Memory hierarchy, types of memory, storage devices, system softwares, application softwares, basics of computer languages.

Module-III: Computer Forensics

Definition and Cardinal Rules, Data Acquisition and Authentication Process, Windows Systems-FAT12, FAT16, FAT32 and NTFS, UNIX file Systems, mac file systems, computer artifacts, Internet Artifacts, OS Artifacts and their forensic applications

Module-IV: Forensic Tools and Processing of Electronic Evidence

Introduction to Forensic Tools, Usage of Slack space, tools for Disk Imaging, Data Recovery, Vulnerability Assessment Tools, Encase and FTK tools, Anti Forensics and probable counters, retrieving information, process of computer forensics and digital investigations, processing of digital evidence, digital images, damaged SIM and data recovery, multimedia evidence, retrieving deleted data: desktops, laptops and mobiles, retrieving data from slack space, renamed file, ghosting, compressed files.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- C. Altheide& H. Carvey Digital Forensics with Open Source Tools, Syngress, 2011. ISBN: 9781597495868.
- Selected readings from various sources as assigned
- Online Course management System: https://esu.desire2learn.com/

COMPUTER FORENSIC PRACTICAL

List of Exercises

- Live Case Studies
- Open Source Forensic Tools
- Disk Forensics and Data Recovery
- Steganography
- Key loggers
- Network monitors
- Flowchart management
- UML diagrams
- eCommerce on websites

Syllabus - Semester Second

ETHICS, POLICIES AND THE IT ACT

Course Code: FCH2251 **Credit Units: 3**

Course Objective:
To understand the ethics and laws by which cyberspace is governed in our country and worldwide.

Course Contents:
Module-I:
Basics of Law and Technology, Introduction to Indian Laws, Scope and Jurisprudence, Digital Signatures, E Commerce-an Introduction, possible crime scenarios, law coverage, data interchange, mobile communication development, smart card and expert systems

Module-II:
Indian Laws, Information Technology Act 2000, Indian Evidence Act, India Technology Amendment Act 2008, Indian Penal Code , Computer Security Act 1987, National Information Infrastructure Protection Act 1996, Fraud Act 1997, Children Online Protection Act 1998, Computer Fraud and Abuse Act 2001

Module-III:
Intellectual Property, IP Theft, Copyright, Trademark, Privacy and Censorship, Introduction to Cyber Ethics, rights over intellectual property

Module-IV:
Introduction to International Laws, International Cyber Laws, Policy and Compliance, Corporate IT Policy Formulations, Compliance Auditing

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- CYBER LAW-The Indian Perspective, PawanDuggal (2009)
- 7 Years of Indian Cyber Laws, RohasNagpal (2008)
- Doctrine of IT Act of India, Government of India Publication (2000)

Syllabus - Semester Third

BEHAVIORAL BIOMETRICS

Course Code: FCH2351 **Credit Units: 3**

Course Objective

- To understand techniques used for building speech recognition systems
- To understand the components, issues and approaches for constructing spoken dialogue systems
- To learn the syntax and semantics of speech recognition.
- To have an awareness on the current state-of-the-art in speech recognition
- Know the basic parameters of human gait
- Characterize normal human gait
- Identify type of gait disorder and pathologies
- Know the methods of gait analysis and stability and postural control assessment used in clinical practice

Course Content:

Module-I: BIOMETRICS FUNDAMENTALS
Introduction – Benefits of biometric security – Verification and identification Basic working of biometric matching – Accuracy – False match rate – False non-match rate – Failure to enroll rate – Derived metrics – Layered biometric solutions.

Module-II: SPEECH RECOGNITION
Introduction-Regular Expressions and automata-Words and transducers-N-grams Part of speech tagging-Hidden Markov and Entropy models, Speech-Phonetics-Speech synthesis-Automatic speech recognition-Speech Recognition advanced topics-Computational Phonology

Module-III: SPEECH PARSING&SEMANTICS OF SPEECH RECOGNITION
Formal grammar of English-Syntactic parsing-Statistical parsing-Features and Unification-Language and complexity, Semantics and Pragmatics-The representation of meaning-Computational Semantics-Lexical semantics- Computational lexical semantics-Computational discourse

Module-IV: GAIT PATTERN ANALYSIS
Fundamentals of Gait Analysis , Fundamentals of Gait Analysis, Gait Analysis: Considerations and Terminology , Motion Analysis Systems , Ground Reaction Forces , Introduction to EMG ,Motion Analysis , Normal Gait: Ankle & Foot Complex , Normal Gait: Knee Joint , Normal Gait: Hip Joint ,Normal Gait: Control of the whole body center of mass, Pathological Gait Voice Scan - Features – Components Operation (Steps) – Competing voice Scan (facial) technologies – Strength and weakness.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

References:

- Daniel Jurafsky and James Martin "Speech and Language Processing", 2nd edition, Prentice- Hall, 2008.
- Xuedong Huang, Alex Acero and Hsiao-Wuen Hon, "Spoken Language Processing", Prentice- Hall, May 2001.
- Paul Taylor,"Text-to-Speech Synthesis", Cambridge University Press, February 2009.
- Samir Nanavati, Michael Thieme, Raj Nanavati "Biometrics – Identity Verification in a Networked World", WILEY- Dream Tech Edition 2009.(UNIT 1,2,3,4,)
- Paul Reid "Biometrics for Network Security", Pearson Education.2009. (UNIT – V)
- John D. Woodward, Jr. Wiley Dreamtech Biometrics- The Ul
- Perry J. Gait analysis. Normal and Pathological Fuction. SLACK Incorporeted, 1992

Syllabus - Semester Fourth

IMPLEMENTATION PRACTICAL ON MATLAB

Course Code: FCH2451 **Credit Units: 3**

List of Exercises

- Speech Sample Collection
- Speech sample Registration
- Speech Sample Analysis: Forensic Freeware
- Biometric Sample Collection: Face, Fingerprint, Iris, Signature
- Biometric Sample Registration
- Motion Analysis: Capture
- Motion Analysis: Examination

Examination Scheme:

Components	**TA**	**LR**	**V**	**ATTD**	**EE**
Weightage(%)	10	7	8	5	70

Note: TA-Teacher's Assessment, LR-Lab Record, V-Viva

Text & References:

- Samir Nanavati, Michael Thieme, Raj Nanavati "Biometrics – Identity Verification in a Networked World", WILEY- Dream Tech Edition 2009.(UNIT 1,2,3,4,)
- Paul Reid "Biometrics for Network Security", Pearson Education.2009. (UNIT – V)
- Daniel Jurafsky and James Martin "Speech and Language Processing", 2nd edition, Prentice- Hall, 2008.
- Xuedong Huang, Alex Acero and Hsiao-Wuen Hon, "Spoken Language Processing", Prentice- Hall, May 2001.
- Paul Taylor, "Text-to-Speech Synthesis", Cambridge University Press, February 2009.

Syllabus - Semester Fifth

CYBER SECURITY

Course Code: FCH2551 **Credit Units: 3**

Course Objective:

- Understand the threats in networks and security concepts.
- Apply authentication applications in different networks.
- Understand security services for email.
- Awareness of firewall and it applications.

Course Content:

Module-I:

Ethical hacking, Attack Vectors, Cyberspace and Criminal Behaviour, Clarification of Terms, Traditional Problems associated with Computer Crimes, Realms of Cyber world, brief history of the internet, contaminants and destruction of data, unauthorized access, computer intrusions, white-collar crimes, viruses and malicious code, virus attacks, pornography, software piracy, mail bombs, exploitation, stalking and obscenity in internet, Cyber psychology, Social Engineering.

Module-II:

Introduction to Digital forensics, Forensic software and handling, forensic hardware and handling, analysis and advanced tools, forensic technology and practices, Biometrics: face, iris and fingerprint recognition, Audio-video evidence collection, Preservation and Forensic Analysis.

Module-III:

Investigation Tools, e-discovery, EDRM Models, digital evidence collection and preservation, email investigation, email tracking, IP tracking, email recovery, searc and seizure of computer systems, password cracking

Module-IV:

Forensic Analysis of OS artifact, Internet Artifacts, File System Artifacts, Registry Artifacts, Application Artifacts, Report Writing, Mobile Forensic- identification, collection and preservation of mobile evidences, social media analysis, data retrival, Email analysis from mobile phones.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- Charles P. Fleeger, "Security in Computing", Prentice Hall, New Delhi, 2009.
- BehrouzA.Forouzan, ―Cryptography & Network Security‖, Tata McGraw Hill, India, New Delhi, 2009.
- William Stallings, ―Cryptography and Network Security, Prentice Hall, New Delhi, 2006
- Chalie Kaufman, Radia Perlman, Mike Speciner, ―Network Security: Private Communication in a Public Network‖, Pearson Education, New Delhi, 2004.
- Neal Krawetz, ―Introduction to Network Security‖, Thomson Learning, Boston, 2007.
- Bruce Schneier, ―Applied Cryptography‖, John Wiley & Sons, New York, 2004.

CYBER SECURITY PRACTICAL

List of Exercises

- File System Analysis
- Log Analysis
- Network Devices: Modem, Router, Switch, Hub, Repeater
- SQL Injection
- Cross Site Scripting
- Click Jacking
- TCP/IP Attacks
- Botnet analysis
- Malware Analysis
- IR Objectives and Team Building
- Email Tracking
- IP Tracking
- Cyber psychology and Social Engineering Test Profiling

Syllabus - Semester Sixth

INCIDENT RESPONSE MANAGEMENT

Course Code: FCH2651 **Credit Units: 3**

Course Objective:

- Defining an incident relating to cyber security.
- Recognizing an Incident
- Protocols for first on crime scene investigations.
- Government approved handling of computer crime scenarios.

Course Content:

Module-I:
Cyber Incident Statistics, Computer Security Incident, Information as Business Asset, Data Classification, Information Warfare, Key Concepts of Information Security, Vulnerability, Threat and Attacks, Types of Computer Security Incidents, Examples of Incidents, Incidents Categorization, Low Level Incident, Mid Level Incident, High Level Incident

Module-II:
Incident Prioritization, Incident Response, Incident Handling, Disaster Recovery, Technologies and Impacts, Virtualization and Impacts, Estimated Cost of an Incident, Incident Reporting Organizations, Vulnerability Reports, Incident Identification, Need fpr Incidents Response, Goals for Incident Response,

Module-III:
Incident Response and Handling Process; Step 1: Identification; Step 2: Incident Recording; Step 3: Initial Response; Step 4: Communicating the Incident; Step 5: Containment; Step 6: Formulating a Response Strategy; Step 7: Incident Classification; Step 8: Incident Investigation; Step 9: Data Collection; Step 10: Forensic Analysis, Step 11: Evidence Protection; Step 12: Notify External Agencies; Step 13: Eradication; Step 14: System Recovery; Step 15: Incident Documentation; Step 16: Incident Damage and Cause assessment; Step 17: Review and Update the Response Policies

Module-IV:
Incident Response Team development, Security Awareness and Training Checklist, Incident Management, Purpose of Incident management, Incident management process, Incident management team, Incident Response Team and Members, Member Goals and Responsibilities, Developing Skills in Incident Response Personnel, Incident Response Team Structure, Team Dependencies and Services.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- CERT-In Guidelines

DATA ANALYTICS

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
MTH2151	Optimization Techniques	3	-	-	3
MTH2251	Statistics	3	-	-	3
MTH2351	Data Mining	3	-	-	3
MTH2451	Database Management System	3	-	-	3
MTH2551	Introduction to Financial Modelling	3	-	-	3
MTH2651	Statistical Quality Control	3	-	-	3
	TOTAL				**18**

DATA ANALYTICS

Syllabus - Semester First

OPTIMIZATION TECHNIQUES

Course Code: MTH2151 **Credit Units: 03**

Course Objective:
The problems in optimization are the most common applications of mathematics. The main aim of this course is to present different methods of solving optimization problems in the areas of linear programming.

Course Contents:
Module I: Introduction to OR
Historical Development of OR, OR models and Advantages, Methodology of OR, Advantages of OR, Features of OR solution, Applications and Scope of OR

Module II: Linear Programming Problems (LPP)
Definition of LPP, General Structure of Linear Programming, Formulation of LPP, Advantages and Limitations of Linear Programming, Graphical Solutions of Linear Programming Problems. Simplex Method, Degeneracy, Duality.

Module III: Transportation Problems
Introduction to Transportation Model, Degeneracy in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution – Stepping Stone and MODI Method. **Assignment Problems:** Definition, Types of Assignment Problems, Hungarian Method for AP.

Module IV: Game Theory
Concept of Game problem. Rectangular games. Pure strategy and Mixed strategy. Saddle point and its existence. Optimal strategy and value of the game. Algebraic method, Graphical method and Dominance method of solving Rectangular games. Inter-relation between the theory of Games and L.P.P

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

References:

- Operations Research, S D Sharma, KNRN Publication
- Operations Research, P.K. Gupta and D. S. Hira, Sultan Chand Ltd.
- Introduction to Operations Research, Hamdy A Taha, PHI Limited, New Delhi.
- Operations Research, J K Sharma, Macmillan Publication

Syllabus - Semester Second

STATISTICS

Course Code: MTH2251 **Credit Units: 03**

Course Objective:
Statistics plays an important role in data analytics. The main aim of this course is to help the students to read, classify and then interpret the data given to them and draw conclusions.

Module I: Data and Representation
Introduction to Statistics, Collection of data, classification and tabulation of data, Types of data: Primary data, Secondary data, Presentation of data Diagrammatic and Graphical Representation: Histogram, frequency curve, frequency polygon, Ogive curves, stem and leaf chart.

Module II: Measures of Central Tendency and Dispersion
Arithmetic Mean (A.M.) Definition, Mode, Median, Partition Values : Quartiles, Deciles and Percentiles, Box Plot, Percentile ranks. Means of transformed data, Geometric Mean (G.M.) Definition, Harmonic Mean (H.M.), Weighted Mean : Weighted A.M., G.M. and H.M.
Range, Mean deviation Mean square deviation, Variance and Standard Deviation, Combined variance (derivation for 2 groups), Combined standard deviation.

Module III: Correlation and Regression
Bivariate normal distribution, types, importance, methods of measuring correlation-scatter diagram, Karl Pearson's Coefficient of Correlation and Spearman's rank Correlation. Regression lines, Difference between regression and correlation, uses of Regression.

Module IV : Sampling theory and tests of significance
Methods of sampling (Description only): Simple random sampling with and without replacement (SRSWR and SRWOR) stratified random sampling, systematic sampling.
Tests of significance – z, t, chi-square and F.

Examination Scheme:

Components	CD	CT1	SA	A	EE
Weightage	5	10	10	5	70

CD= Class Discussion, CT 1= Class Test, SA= Short Assignments, A= Attendance. EE= External Examination

References:

- Mood, A. M., Graybill, F. A. And Boes, D.C. : Introduction to the Theory of Statistics, McGraw Hill.
- Biswas and Srivastava – A textbook, mathematical Statistics, Ist Edition, Narosa Publishing House, New Delhi.
- Gupta, S.C. and V. K. Kapoor – Mathemathical Statistics, Sultan Chand and sons.
- Hogg,R.V. and Craig, A.T: Introduction to Mathematical Statistics, McMillan.
- S. C. Gupta – Fundamentals of Statistics, Himalaya Publishing House.

Syllabus - Semester Third

DATA MINING

Course Code: MTH2351 **Credit Units: 03**

Module 1: DATA WAREHOUSING
Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

Module 2: BUSINESS ANALYSIS
Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

Module 3 : DATA MINING , CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING
Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing, Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – Kmeans – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

Module 4 : ASSOCIATION RULE MINING AND CLASSIFICATION
Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Backpropagation – Support Vector Machines – Associative Classification – Lazy
Learners – Other Classification Methods – Prediction

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:
1. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier, 2007.

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining", Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

Syllabus - Semester Fourth

DATABASE MANAGEMENT SYSTEM

Course Code: MTH2451 **Credit Units: 03**

Module-I

INTRODUCTION: Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

Module-II

ENTITY-RELATIONSHIP MODEL: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

Module-III

RELATIONAL MODEL AND RELATIONAL ALGEBRA: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

Module-IV

TRANSACTION MANAGEMENT: The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock - Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related structures; The write-ahead log protocol; Checkpointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

TEXT BOOKS:

1. **Fundamentals of Database Systems –** Elmasri and Navathe, 5th Edition, Addison-Wesley, 2007
2. **Database Management Systems** – Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2003.

REFERENCE BOOKS:

1. **Data Base System Concepts** – Silberschatz, Korth and Sudharshan, 5th Edition, Mc-GrawHill, 2006.
2. **An Introduction to Database Systems** – C.J. Date, A. Kannan, S. Swamynatham, 8th Edition, Pearson Education, 2006.

Syllabus - Semester Fifth

INTRODUCTION TO FINANCIAL MODELLING

Course Code: MTH2551 **Credit Units: 03**

Prerequisites: Introduction to Probability Theory

Basic notions %G–%@ Cash flow, present value of a cash flow, securities, fixed income securities, types of markets.

Forward and futures contracts, options, properties of stock option prices, trading strategies involving options, option pricing using Binomial trees, Black %G–%@ Scholes model, Black %G–%@ Scholes formula, Risk-Neutral measure, Delta %G–%@ hedging, options on stock indices, currency options.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts / References

- D.G. Luenberger, Investment Science, Oxford University Press, Oxford, 1998.
- J.C. Hull, Options, Futures and Other Derivatives, 4th ed., Prentice-Hall, New York, 2000.
- J.C. Cox and M. Rubinstein, Options Market, Englewood Cliffs, N.J.: Prentice Hall, 1985.
- C.P Jones, Investments, Analysis and Measurement, 5th ed., John Wiley and Sons, New York, 1996.

Syllabus - Semester Sixth

STATISTICAL QUALITY CONTROL

Course Code: MTH2651 **Credit Units: 03**

Total quality control in an industry. Quality planning, quality conformance, quality ad-herence. Quality assurance and quality management functions.

Control charts and allied techniques. Concept of quality and meaning of control. Concept of inevitability of variation-chance and assign-able causes. Pattern of variation. Principles of rational sub-grouping.

Different types of control charts. Concept of process capability and its comparison with design specifications, CUSUM charts.

Acceptance sampling. Sampling inspection versus 100 percent inspection. Basic concepts of attributes and variables inspection. OC curve, Single, double, multiple and sequential sampling plans, Management and organisation of quality control.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Texts / References :

- A.J. Duncan, Quality Control and Industrial Statistics, 5th ed., Richard D. Irwin, 1986.
- E.L. Grant and R. Levenworth, Statistical Quality Control, 6th ed., McGraw-Hill, 1988.
- J.M. Juran and F. M. Grayna, Quality Planning and Analysis, Tata McGraw-Hill, 1970.
- D.C. Montgomery, Introduction to Statistical Quality Control, Wiley, 1985.
- T.P. Ryan, Statistical Methods for Quality Improvement, Wiley, New York, 2000.

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AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

MATHEMATICAL PHYSICS

Course Code: PHY4101 **Credit Units: 04**

Course Objective:
Aim is to introduce the concept of mathematical methods and techniques which form the basis to study the post graduate level Physics Courses.

Course Contents:

Module I: Complex Analysis
Functions of complex variable, derivative and Cauchy-Riemann differential equations, Cauchy's integral theorem and integral formula, Taylor's and Laurent's series, Singularities of an analytic function, Residues and their evaluation, Cauchy's residue theorem.

Module II: Linear Differential Equations
Introduction, First order differential equations, examples and solution, Second order linear Ordinary Differential Equations with variable coefficients; Solution by series expansion; Legendre Polynomial, Bessel's Function, Hermite and Lagauerre Polynomials and their solutions; Physical applications; Generating functions; reccursion relations.

Module III: Laplace Transforms
Laplace transform (LT); First and second shifting theorems; Inverse LT by partial fractions; LT of derivative and integral of a function; Solution of differential equation using LT, Some simple applications of Laplace Transforms: Electric Circuit, Solution of Simultaneous differential equation by LT, Solution of Partial Differential Equation by LT, Laplace Transform of delta function and their uses.

Module IV: Fourier Transforms
Fourier series; Partial sums; Fourier integral and transforms; Fast Fourier Transforms, Fourier Transform of delta function and their uses., Physical Application of Fourier series Analysis :Forced Vibartion, Reimann Zeta Function and Half wave rectifier

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage%	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- L.A. Pipes and L.R. Harvill, Applied Mathematics for Engineers and Physicists, McGraw-Hill, New Delhi (1970).
- G. B. Arfken and H.J. Weber, Mathematical Methods for Physicists, 5th edition, Academic Press, London (2001).
- E. Kreyszig, Advanced Engineering Mathematics, 5th edition, Wiley Eastern (1991).

CLASSICAL MECHANICS

Course Code: PHY4102 **Credit Units: 04**

Course Objective:
A detailed exposition of classical mechanics for the students, opting for physics is vitally important for a clear understanding of recent intricate theories of quantum mechanics, Modern Physics and research to build a well developed and conceptualized foundation.

Course Contents:

Module I: Symmetries and Conservation Laws
Mechanics of a system of particles, constraints, D'Alembert's principle, Variational calculus and its applications, Hamiltons variational Principle, Lagrangian equations, applications of Lagrangian formulation, conservation theorems and symmetry properties.

Module II: Hamiltonian Formulation
Hamiltonian equation of motion, applications of hamiltonian formulation, Principle of least action, the equations of canonical transformations, cyclic coordinates, phase space and Liouville's theorem, Poisson bracket, Jacobi's Indentity .

Module III: Central Force Problem
Reduction to one body problem, equation of motion and first integral, one dimensional problem and classification of orbits, Differential equation for the orbit, Kepler problem and planetary motion, Rutherford formula, scattering in central force field, transformation to laboratory frames.

Module IV: Rigid Body and Vibrating System
Euler angles, tensor of inertia, kinetic energy of a rotating body, symmetric top and applications.
Vibrating string, solution wave equation, normal vibrations, dispersion, coupled vibrating system.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- H. Goldstein, Classical Mechanics, 2nd edition, Narosa Publishing House (1994).
- W. Greiner, Classical Mechanics, Springer-Verlag (2003).
  Classical mechanics – S.L.Gupta, Meenakshi Prakashan, 1970, New Delhi.
- Introduction to classical mechanics – R.G.Takwall and P.S.Puranik, Tata – McGraw Hill, 1980, New Delhi.
- Classical mechanics – N.C.Rana and P.S.Joag, Tata McGraw Hill, 1991, New Delhi.

ELECTRONICS

Course Code: PHY4103 **Credit Units: 04**

Course Objective: This course gives a comprehensive view of the Integrated Circuit Fabrication and Technology, operational amplifiers, modulation and demodulation techniques. Practical Transmitting and Receiving Antennas- the antenna action and their types will also be studied in detail.

Course Contents:

Module I: Integrated Circuit Fabrication

Integrated-Circuit Technology, Advantages and limitations of Integrated Circuits, Basic Monolithic Integrated Circuits, Epitaxial Growth, Masking and Etching, Diffusion of Impurities, Integrated Capacitors and Inductors, Large-Scale and Medium-Scale Integration, Metal-Semiconductor Contact.

Module II: Operational Amplifiers

The ideal Op-Amp-inverting, non-inverting and differential amplifiers-CMRR; Op-Amp IC building blocks-emitter coupled differential amplifier, active load, level shifting and output stage; Op-Amp characteristics-open-loop input output characteristics, frequency response and slew rate; Op-Amp applications-adder, subtractor, integrator, differentiator, comparator, voltage-to-current converter, current-to-voltage converter and logarithmic amplifier.

Module III: Modulation and Demodulation

Definition, Amplitude modulation, Methods of Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Modulation Systems- PAM, PWM, PPM, PCM, Delta Modulation, Principle of AM Detection, Frequency Demodulation. Digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK). Multiplexing - time division and frequency division. Applications of Modulation Techniques.

Module IV: Antennas

Antenna Action, Short Electric Doublet, Radiation from a Current Element, Thin Linear Antenna, Effect of Ground: Image Antenna, Short Vertical Grounded Antenna, Total Effective resistance and Efficiency of an Antenna, Yagi Antenna, Loop Antenna, Parabolic Reflectors, Antenna measurements, Broadband antenna principles, Practical Transmitting Antennas, Receiving Antennas, Difference in Receiving and Transmitting Antennas.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage (%)	10	8	7	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Hand Book of Electronics, Gupta & Kumar, Pragati Prakashan.
- Integrated Electronics: Analog and Digital Circuits and Systems, Jacob Millman and Christos C. Halkias, Tata McGraw-Hill.
- Digital Principles and Applications by A.P. Malvino and D.P. Leach, Tata McGraw-Hill, Publishing Co., New Delhi.
- Text Book of Electronics by S. Chattopadhyay, New Central Book Agency P.Ltd., Kolkata, 2006.
- Electronics Principles by Malvino, 6th Edition, Tata McGraw-Hill Publishing Co., New Delhi, 2001.
- Electronics Principles and Applications by A.B. Bhattacharya, New Central Book Agency P.Ltd., Kolkata, 2007.

QUANTUM MECHANICS-I

Course Code: PHY4109 **Credit Units: 04**

Course Objective:

Course Contents:

Module I: Introductory concepts
A quick review of failure of classical Physics, Wave particle duality, Wave-packet, Uncertainty principle and its applications
Schrodinger's time dependent equation; Statistical interpretation of wave function, normalization, probability current density, expectation values, Ehrenfest's theorem, Time independent Schrodinger equation, stationary states, orthogonality, Energy, linear momentum and angular momentum operators.

Module II: General Formalism
Linear vector space, linear operators, eigenfunction and eigenvalues, Herimtian operator, Postulates of Quantum Mechanics, Simultaneous measurability of observables, General Uncertainty relation, Dirac's notation (bra & ket), Schrodinger and Heisenberg representation.

Module III: Applications
Quick review of particle in 1D and its extension to 3D box, degeneracy of energy states. Square potential barrier, quantum tunneling and alpha emission. Harmonic Oscillator using operator method, creation and annihilation operators.

Module IV: Hydrogen atom and angular momentum
Schrodinger equation in three dimension (spherical coordinates), separation of variables, radial equation, angular equation, spherical harmonics, angular momentum and their commutation relation, L^2 and L_z operators, Ladder operator.

Examination Scheme:

Components	TA	CT	Attendance	EE
Weightage (%)	10	15	5	70

TA: Teacher Assessment, CT: Class Test EE: External Examination

Text:

- Introduction to Quantum Mechanics by David J Griffiths
- Feynmann Lectures in Physics, vol. 3

References

- Modern Quantum Mechanics by J.J. Sakurai and San Fu Tuan (Addison Wesley)
- Quantum Mechanics by L.I. Schiff (Mc Graw Hill)
- Quantum Physics by S. Gasiorowics (John Wiley)
- Advanced Quantum Mechanics by Paul Roman (Addison Wesley)
- Quantum Mechanics by J. L. Powell, B. Crasemann

COMPUTATIONAL PHYSICS

Course Code: PHY4110 **Credit Units: 04**

Course Objective:
This course aims at exposing the students to basic Computational Physics which will be useful for them to solve the problems of Physics.

Course Contents:

Module I Introduction to MATLAB and Plotting: vector and matrix generation, subscripting and the colon notation, matrix and array operations and their manipulations, introduction to some inbuilt functions. Two & three-dimensional graphics: basic plots, change in axes and annotation in a gure, multiple plots in a gure, saving and printing gures, mesh plots, surface plots and their variants.

Module II m-files: scripts and user de ned functions, calling functions into a script le, subfunctions, and nested functions, concept of local and global variable, few examples of in-built functions, editing, saving m- les.

Module III Loops and Conditional statements: Flow control using various statements and loops including For-End and While-End loops with Break commands. Conditional Statements: If-End statement, If-Else-End statement, nested If-Else-End statements.

Module IV Applications of MATLAB: Introduction to builtin functions: related to matrix inversion, eigenvalues, eigenvectors, condition number; for data representation: bar charts, histograms, pie chart, stem plots etc; for solving various type of di erential equations; for specialized plotting e.g., contour plots, sphere, and animations.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, EE:End Semester Exam, A: Attendance

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill, 2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India, 2014.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press, 2016

INTEGRATED PHYSICS LAB-I

Course Code: PHY4111 **Credit Units: 03**

List of Experiment (Any Eight)

1. Data and error analysis.
2. Plotting and curve fitting software
3. Use of the instruments CRO, multimeter.
4. To design and study various aspects of frequency modulation and demodulation. PAM, PWM and PPM Modulation and demodulation.
5. To study the frequency response of an operational amplifier & to use operational amplifierfor different mathematical operations.
6. To design and study the characteristics of a regulated power supply and voltage multiplier circuits.
7. To design a rectangular/triangular waveform generator using Comparators and IC8038.
8. To design (i) Low pass filter (ii) High pass filter; (iii) All-pass filter; (iv) Band pass filter (v)Band-reject passive filter.
9. To design and study logic gates and flip flop circuits.
10. Use of timer IC 555 in astable and monostable modes and applications involving relays,LDR.
11. The Torsional Pendulum and Moment of Inertia
12. Study of the Corioliseffect.
13. Determination of Lande's factor using ESR spectrometer.
14. To plot the polar curve of a filament lamp and to determine its mean spherical intensity.
15. Raman effect in liquids.
16. Rydberg's constant using constant deviation prism.

Examination Scheme:

Components	**TA**	**V**	**LR**	**Attendance**	**EE**
Weightage (%)	7	10	8	5	70

TA : Teacher Assessment,V: Viva, LR: Lab Record EE: External Examination

Text & References:

- J. Milman and C.C. Halkias, Electronic Devices and Circuits, McGraw-Hill (1981).
- A.P. Malvino, Electronics: Principles and Applications, Tata McGraw-Hill (1991).
- G.B. Calyton, Operation Amplifiers, ELBS (1980).
- J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw Hill (2001).
  R. A. Gayakwad, op-Amps and Linear IC'S, Pearson Education (2003)
- R. P. Singh and S. D. Sapre, Communication Systems: Analog and Digital, Tata McGraw Hill (2007)

Syllabus - Second Semester

STATISTICAL MECHANICS

Course Code: PHY4202 **Credit Units: 04**

Course Objective:
The aim of the course is to introduce the concept of statistical mechanics and applications to various problems in applied Physics.

Course Contents:

Module-I:
The Statistical Basis of Thermodynamics, The macroscopic and the microscopic states, Contact between statistics and thermodynamics, Entropy on microscopic scale, physical significance of the number Ω(N,V,E), Thermodynamic equilibrium, Mechanical equilibrium, Chemical equilibrium, Review of phase space, Liouville's theorem, basic postulates of statistical mechanics, The classical ideal gas, The entropy of mixing and Gibb's paradox, Sackur tetrode equation of entropy, Correct Boltzmann counting

Module II
Elements of ensemble theory, microcanonical, canonical, grand canonical ensemble, quantum states and the phase space, equilibrium between system and a heat reservoir, partition function, physical significance of the various statistical quantities in the canonical ensemble, The classical systems, energy fluctuations in the canonical ensemble, statistics of paramagnetism, Boltzmann's equation, Maxwell & Boltzmann statistics, Equipartition theorem and its Simple applications, Virial theorem,. Maxwell velocity distribution, related distributions and mean values.

Module III
Equilibrium between a system and a particle- energy reservoir, density and energy fluctuations in Grand canonical ensemble, formulation of quantum statistics, Fermi-Dirac and Bose-Einstein statistics. Applications of the formalism to: (a) Ideal Bose gas, The field of sound waves, Einstein and Debye theory of specific heat, properties of black-body radiation, Bose- Einstein condensation, experiments on atomic BEC,(b) Ideal Fermi gas, properties of simple metals, Pauli paramagnetism, electronic specific heat, Compressibility of Fermi gas, A relativistic degenerate electron gas.

Module IV
Kinetic theory of a gas, black body radiation, Rayleigh Jeans' formula, Wien's law, Planck radiation law, non-equilibrium statistical mechanics, Ising model, master equation and irreversibility,. Langevin equation, fluctuation-dissipation theorem, Thermodynamics of the early universe, white dwarf stars and Chandrasekhar mass limit.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- F. Reif, Fundamentals of Statistical and Thermal Physics, International Students Edition, Tata McGraw-Hill (1988).
- K. Haung, Statistical Mechanics, Wiley Eastern (1991).
- Elementary Statistical Mechanics – S.L.Gupta, V.Kumar Pragati Prakashan Publication 1979.

QUANTUM MECHANICS-II

Course Code: PHY4208 **Credit Units: 04**

Course Objective:
The course is intended to introduce the concept of quantum mechanics to students at the advanced level so that they can solve problem of various branches of Physical Sciences.

Course Contents:

Module I: Spin & Identical Particles
Spin, Stern-Gerlach experiment, Pauli spin matrices, eigenvalues of J^2 and J_z, addition of angular momenta, Clebsh-Gordan coefficients.
Identical particles, particle exchange operator, symmetric and anti-symmetric wave functions, Pauli principle and Slater determinant, spin functions for system with more than one electron.

Module II: Perturbation theory
Time-independent perturbation theory: Basic concepts, Non-degenerate energy levels, degenerate perturbation theory, fine structure of Hydrogen, Spin-orbit coupling, Zeeman effect.
Time-dependent perturbation theory: 1st order perturbation, Fermi's Golden rule, absorption and emission of radiation, Einstein A and B coefficient.

Module III: Variational principle and WKB approximation
Theory of Variational principle; Ground state energy for 1D harmonic oscillator, Delta function potential, and He.
WKB approximation, classical region, tunneling, Gamow's theory of alpha decay, connection formula.

Module IV: Scattering theory and relativistic wave equation:
Scattering cross section, scattering amplitude, Centre of Mass frame, Laboratory frame, partial wave, scattering by a central potential (partial wave analysis), phase shift, Born approximation, Validity of Born Approx.
Klien-Gordon equation and its interpretation, Dirac equation for a free particle.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance
EE: End Semester Examination

Text & References:

- Quantum Mechanics: L.I. Schiff.
- Modern Quantum Mechanics: J.J. Sakurai.
- Introduction to Quantum Mechanics : C.J. Joachain and B.H. Bransden.
- Introduction of Quantum Mechanics: D.J. Griffiths
- Principles of Quantum Mechanics: P.A.M.Dirac.
- A text book of quantum mechanics – P.M Mathews and K.Venkatesan, Mc Graw Hill,
- Principles of Quantum Mechanic: R. Shankar.
- Quantum mechanics – J.P.Dicke and R.H.Wittke, Addison Wiley
- Quantum mechanics A. K. Ghatak and Lokanathan, Mc Millan

CONDENSED MATTER PHYSICS-I

Course Code: PHY4209 **Credit Units: 04**

Course Objectives:
This course will be an introduction to condensed matter physics, themodern reincarnation of solid state physics. Condensed matter systems encompass solids,liquids, liquid crystals and more; all these systems are composed of many interactinmicroscopic constituents (*e.g.* atoms, molecules, electrons).This course will (mostly, notexclusively) focus on the atomic and electronic structure of solids.

Course Contents:

Module I: Crystal structure and diffraction
Structural description of liquids and solids, Crystalline and amorphous solids. The crystal lattice: Basis vectors,Bravais lattices, Unit cell. Symmetry operations, point groups, space groups and typical structures, Quasi crystals, Miller indices. Crystal systems, Directions and planes in crystals. Inter-planar spacing's Reciprocal Lattice.
X-ray diffraction from crystals, Laue's equation, Bragg's law in direct and reciprocal lattice, Atomic and crystal structure factors; Ewald construction,

Module II: Bonding and Imperfection
The Van-der-Waals bond. Cohesive energy of inert gas, solids, Ionic bond. Cohesive energy and bulk modulus of ionic crystals, Madelung constant. The covalent bond and Metallic bond, characteristic features and examples
Mechanism of plastic deformation in solids, Stress and strain fields of screw and edge dislocations, stacking fault, Elasticenergy of dislocations, Forces between dislocations, Frenkel and Schottky defects, elastic constants, elastic waves in crystals,

Module III: Lattice Vibrations & Thermal properties
Interatomic forces and lattice dynamics of crystals,Quantization of elastic waves.Classical theory of lattice vibration under harmonic approximation; Vibrations of linear monatomicand diatomic lattices, Dispersion curves, acoustic and optical modes, long wavelength limits; Phonon frequencies and density of states,Adiabatic approximation (qualitative discussion); Normal modes and phonons
Lattice heat capacity, models of Debye and Einstein,Drude model of electrical and thermal conductivitycomparison with electronic heat capacity; Anharmonic effects in crystals, thermal expansion and thermal conductivity.

Module IV: Energy Band Theory
Electrons in a periodic potential: Bloch theorem, Nearly free electron approximation,Kroning-Penny model- wave equation of electrons in a periodic potential of a crystal, Formation of energy bands, metals, insulators and semiconductors, Effective mass, concept of holes,Fermi surface,Free electron theory of metals, Tight binding approximation. Semiconductors:Carrier statistics in intrinsic and extrinsic crystals.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & Reference Books:

- Solid State Physics: C. Kittel
- Solid State Physics: S O Pillai
- Introduction of Solids: L.V. Azaroff
- Crystallography Applied to Solid State Physics: A.R. Verma and O.N.Srivastava
- Elementary Dislocation Theory: Weertman and Weertman.
- Crystal Structure Analysis:Buerger
- The Powder Method:Azaroff&Buerger:

ELECTRODYNAMICS

Course Code: PHY4215 **Credit Units: 04**

Course Objective: The main aim of the course is to give concept of Electromagnetic field theory which is useful for research and industrial applications.

Course Contents:

Module I:

Electromagnetic (EM) Fields and Potentials Vector calculus: Various important vector identities, Gauss and Stokes theorem, Dirac-delta function. Electrostatics: Laplace and Poisson equations; Dirichlet and Neumann boundary conditions; Method of images (point charge near a conducting plane and a sphere); Separation of variables in Cartesian and spherical coordinates. Magnetostatics: Curl and divergence of magnetic field; vector potential; Boundary conditions on field vectors D, E, B and H; Gauge transformations: Lorentz and Coulomb gauges.

Module II:

Maxwell's Equations & Electromagnetic Waves Maxwell's Eq.: Correction in the Ampere's law and Maxwell's equations; Energy density of Fields and Poynting's theorem; conservation of momentum and Maxwell's stress tensor. EM waves in vacuum: Wave equation of E & B; energy & momentum of EM waves; Propagation of EM waves in matter: propagation in linear media, reflection and transmission, Fresnel equation; EM waves in conducting media, skin depth, reflection and transmission in conducting media; Dispersion of EM waves and Cauchy's formula **Module III:**

Guided Waves and Radiation Guided Waves: Wave guides; TE, TM and TEM modes; Rectangular wave guide; coaxial transmission line; resonant cavity Radiation: Lienard-Wiechert potentials; fields of a moving point charge; electric dipole radiation magnetic dipole radiation

Module III:

Relativistic Electrodynamics Four vector formalism: Four vectors; Covariant and contravariant vectors; Transformation of Four vectors; Velocity, Current, Momentum and Potentials as four vectors. Lorentz transformation in four vector notation Covariance of Electrodynamics: Magnetism as a relativistic phenomenon; Electromagnetic field tensor; Lorentz Transformation of Fields

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**E**
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & Reference Books:

- Classical Electrodynamics by Jackson J D
- Introduction to electrodynamics, D. J. Griffith, Benjamin-Cummins (1999)
- Feynman Lectures in Physics, Vol.2
- Fields and Waves in Communication Electronics by S. Ramo, J.R. Whinnery and T.V. Duzer
- Electromagnetics – Kraus & Carver, TMH, 1973

ATOMIC AND MOLECULAR PHYSICS

Course Code: PHY4216 **Credit Units: 04**

Course Objective: The aim of this course is to give the basic ideas about the structure of atoms and molecules, electronic structure, interaction of radiation and external fields with atoms and molecules.

Course Contents:

Module I

Quantum states of one electron atoms, Hydrogen spectrum, Larmor's theorem, Magnetic moment and Bohr magnetron, Spin orbit interaction, hydrogen fine structure, Vector atom model, two electron systems, LS and jj Coupling schemes, spectroscopic terms, equivalent and non equivalent atoms, Helium atom spectrum, spectra of alkali atoms, Nuclear spin, magnetic moment, isotopic effect and Hyperfine structure, Normal and anomalous Zeeman effect, Paschen Back effect, Stark effect.

Module II

Rotational spectra of diatomic molecules as a rigid rotor and non rigid rotor, intensity of rotational lines, Diatomic molecule as a simple harmonic oscillator, vibrational energy of diatomic molecule, Anharmonicity, Vibrational-rotational spectra, Raman effect, quantum theory of Raman effect, rotational Raman spectra, vibrational Raman spectra .

Module III

Electronic band spectra, electronic energy and total energy, vibrational structure of electronic transitions, rotational structure of electronic bands, The branches(P,Q,R) of band, Band head formation. Intensities in electronic bands, Frank-Condon principle, Fortrat diagram.

Module IV

Interaction of atoms in the formation of molecules, covalent, ionic bonding and vander Waal's interactions, concept of molecular potential, Born-oppenheimer approximation, Electronic states of diatomic molecules, Electronic angular momenta, The LCAO approach, states for hydrogen molecular ion, Coulomb, exchange, overlap integral, symmetries of electronic wave functions. Term symbols for simple molecules.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**E**
Weightage (%)	5	10	10	5	7

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & Reference Books:

- Arthur Beiser, Concepts of Modern Physics, 6th edition, Tata McGraw-Hill, New Delhi (2003).
- G. Aruldhas, Molecular Structure and Spectroscopy, Prientice Hall of India, NewDelhi (2002).
- I, Chapmen B.P. Straughan & S. Walker, Spectroscopy: Vol. and Hall (1976).
- G.M Barrow, Introduction to Molecular Spectroscopy, McGraw Hill Ltd., Singapore (1986).
- Introduction to Atomic Spectra, H. E. White, McGraw-Hill

INTEGRATED PHYSICS LAB-II

Course Code: PHY4212 **Credit Units: 03**

List of Experiment (Any Eight)

1. Measurement of vacuum using the Pirani/thermocouple gauge.
2. Measurement of lattice parameters and indexing of powder patterns.
3. Determination grain size of the alloy by optical microscope.
4. Calculation of the optical band gap of the semiconductor by absorption spectroscopy.
5. Calculation of the grain size and strain in the samples from the XRD pattern data.
6. Production and measurement of high pressure.
7. To study temperature-dependence of conductivity of a given semiconductor crystal using four probe method.
8. To determine the Hall coefficient for a given semi-conductor.
9. To determine dipole moment of an organic molecule.
10. To study the lattice dynamics using LC analog kit.
11. To study the characteristic of J-H curve using ferromagnetic standards.
12. To determine the velocity of ultrasonic waves using interferometer as a function of temperature.
13. Temperature dependence of a ceramic capacitor - Verification of Curie-Weiss law for the electrical susceptibility of a ferroelectric material.
14. Tracking of the Ferromagnetic-paramagnetic transition in Nickel through electrical resistivity.
15. To study the characteristics of a PN junction with varying temperature & the capacitance of the junction.
16. (i) Study of the characteristics of klystron tube and to determine its electronic tuning range;(ii) To determine the standing wave ratio and reflection coefficient; (iii) To determine the frequency & wavelength in a rectangular waveguide working on TE10 mode; (iv) To study the square law behavior of a microwave crystal detector.
17. To determine the specific charge (e/m) of an electron.
18. To determine the charge of an electron using Millikan oil drop experiment.
19. To determine the emission spectra of hydrogen atom.
20. To study the Kerr effect using Nitrobenzene

Examination Scheme:

Components	**TA**	**V**	**LR**	**Attendance**	**EE**
Weightage (%)	7	10	8	5	70

TA: Teacher Assessment V: Viva LR: Lab Record EE: External Examination

Text & References:

- Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 5th edition.
- A.J. Dekker, Solid State Physics, Prentice Hall of India (1971).
- N.W. Ashcroft and N.D. Mermin, Solid State Physics, Saunders College Publishing (1976).
- Ali Omar, Elementary Solid State Physics, Narosa Publishing House.
- J.S. Blakemore, Solid State Physics, 2nd edition, Cambridge University Press (1974).

Syllabus - Third Semester

CONDENSED MATTER PHYSICS-II

Course Code: PHY4315 **Credit Units: 04**

Course Contents:

Module I: Transport Theory

Electronic transport from classical kinetic theory; Introduction to Boltzmann transport equation; electrical and thermal conductivity of metals, thermoelectric effects and thermoelectric power. Hall Effect, Elementary ideas of Quantum Hall effect, Magneto resistance.

Module II: Optical Properties

Interaction of electrons and phonons with photons, Direct and indirect transitions, Optical absorption: Absorption in insulators, Polaritons, one phonon absorption,interband transitions optical properties of metals, skin effect and anomalous skin effect, Color Centres, Trap, recombination, excitons, Photoconductivity, luminescence.

Module III Dielectric Properties

Electronic and ionic polarization of molecules, orientationpolarization,static dielectric constant of gases and solids; Lorentz internal field, Complexdielectric constant and dielectric losses, relaxation time, Classical theory of electronic polarization andoptical absorption,Clausius-Mosotti relation, Ferroelectricity,; piezo, pyro- and ferro-electricity, 1^{st}order, 2^{nd}order phase transitions, Curie-Weiss Behavior.

Module IV Magnetic properties

Origin of magnetism,Langevin's theory of diamagnetism,Classical and quantum theory of paramagnetism, quenching of orbital angular momentum; Ferromagnetism: Curie-Weiss law, Spontaneous magnetization, temperature dependence of magnetization, Heisenberg's exchange interaction, Mean field theory,ferromagnetic domains and Bloch-wall energy, Hysteresis loop, Ferrimagnetism and anti-ferromagnetism, Superparamagnetism, spin waves and Magnons (Introductory).

Module V Superconductivity

Phenomenological description of superconductivity, occurrence of superconductivity, Meissner effect; Type-I and type-II superconductors; Vortex state (qualitative discussions), Thermal properties of superconductors, Superconducting energy gap (Δ), isotope effect,Quasi crystals, Outlines of the BCS theory, Mechanism responsible for cooper pair formation,Ginzburg-Landau theory, London equation; Flux quantization A.C. and D.C. Josephson effect, SQUID,High Temperature (T_c) superconductors (information only), Applications of Superconductivity.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & Reference Books:

- Solid State Physics: C. Kittel
- A.J. Dekker, Solid State Physics, (Prentice Hall of India)
- Solid State Physics:N.W. Ashcroft and N.D. Mermin, (Saunders College Publishing (1976)).Liquid Elementary Solid State Physics: M Ali Omar, (Narosa Publishing House).

NUCLEAR AND PARTICLE PHYSICS

Course Code: PHY4321 **Credit Units: 04**

Course Objective: The aim of the course is to introduce the concept of nuclear structure, nuclear forces and nuclear reactions for a clear understanding of recent intricate theories of nuclear physics. Course Contents:

Course Contents:

Module-I:

Nuclear Properties and Radioactivity Nuclear radii and measurements, nuclear binding energy (review), Radioactive decays : Review of barrier penetration of alpha decay & Geiger-Nuttal law. Beta decays, Fermi theory, Kurie plots and comparative half-lives, Allowed and forbidden transitions, Experimental evidence for Parity-violation in beta decay, Electron capture probabilities, Double beta decay, Neutrino, detection of neutrinos, measurement of the neutrino helicity. Multipolarity of gamma transitions, internal conversion process, transition rates, Production of nuclear orientation, angular distribution of gamma rays from oriented nuclei.

Module-II:

Two-Body Problems and Nuclear Forces Properties of deuteron, Schrödinger equation for the deuteron and the ground state; rms radius, spin dependence of nuclear forces, electromagnetic moment of deuteron and the necessity of tensor forces. Nucleon-nucleon scattering, experimental n-p scattering data, partial wave analysis of n-p scattering, phase shifts, singlet and triplet potentials, effective range theory, low energy p-p scattering, meson theory of nuclear forces, Charge independence and charge symmetry; spin dependence, S-wave effective range theory; central and tensor forces, dipole and quadruple moments of deuteron.

Module-III:

Nuclear Reactions Compound nucleus and Direct reactions (elastic, inelastic, transfer, break-up), Nuclear fusion, Laser induced fusion, Quantum mechanical theory, Resonance scattering and reactions, Dispersion relation, Nuclear fission: experimental features, spontaneous fission, barrier penetration, statistical model.

Module-IV: Nuclear Structure and Elementary Particle Physics 15 Liquid drop model, Shell model (extreme single particle), magnetic moment, quadruple moment; Collective models; concept of unified model Elementary particles, Various quantum numbers and their conservation, Gellmann Nishijima formula, C, P and T invariance, applications of symmetry arguments to particle reactions.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & Reference Books:

- J. M Blatt and V.E. Weisskipf: Theoretical Nuclear Physics
- B.K. Agrawal : Nuclear Physics, Lokbharti Pub, Allahabad. 1989
- RR Roy and B.P.Nigam, Nuclear Physics, Willey-Easter, 1979
- RD. Evans-The Atomic Nucleus(McGraw-Hills, 1955)
- B.L. Cohen - Concept of Nuclear Physics Tata Mc-Graw Hills, 1988
- Kenneth S. Krane, Introductory Nuclear Physics, Willey-Easter

LASER PHYSICS

Course Code: PHY4322 **Credit Units: 04**

Course Objective: The aim of the present course is to acknowledge the students with different types of lasers and its applications.

Course Contents:

Module I

Stimulated Absorption, Stimulated Emission and spontaneous Emission :Absorption and Gain Coefficient. Radiative Lifetime and Spontaneous Transition Probabilities. Saturation: Saturation of Absorption. Gain Saturation. Widths and Profiles of Spectral Lines: Homogeneous and Inhomogeneous Broadening. Natural Linewidth. Doppler Width. Collision Broadening of Spectral Lines.

Module II

Basic principles of LASERS Laser Amplification. Laser Oscillation.Optical and Electrical Pumping. Optical Resonators. Optimization of Favourable Losses in Resonators. Resonance Frequencies of Optical Resonators. Laser Modes. Rate Equations for Three-Level and Four-Level Lasers. Steady State Output. CW and Transient Laser Behaviour. Single-Mode Operation. Q-Switching. Mode Locking.

Module III

Types of Lasers. Solis State lasers (Ruby laser, Semiconductor laser, Nd: YAG laser), Gas lasers (HeNe laser, Excimer laser), Liquid (organic dye) lasers.

Module IV

Doppler limited Absorption and Fluorescence Spectroscopy with lasers, Fluorescence Excitation Spectroscopy and LIF. Non- linear Spectroscopy. Doppler- Free Techniques in Spectroscopy. Laser Raman Spectroscopy, Time-Resolved Laser Spectroscopy. Properties of Lasers, Applications of Lasers.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & Reference Books:

- K.Shimoda : Introduction to Laser Physics; (Springer-Verlag)
- O. Svelto : Principles of Lasers (plenum Press)
- D.C. OShea, W.R. Callen & W.T. Rhodes. Introduction to Lasers and their Applications (Addison-Wesley)
- W Demtrder. Laser Spectroscopy A Basic Concepts and Instrumentation (SpringerVerlag)
- A. Corney : Atomic and Laser Spectroscopy (Clarendon Press)
- Thyagarajan and Ghatak : Lasers- Theory and Applications

INTEGRATED PHYSICS LAB-III

Course Code: PHY4316 **Credit Units: 03**

Course Contents:

1. Fabrication of thermocouple and calibration of the same for the temperature measurement.
2. Production and characterization of plasma.
3. Determination of the transition temperature of the materials undergoing phase transition and calculation of the transition enthalpy.
4. Determination of Young's modulus of steel by flexural vibrations of a bar.
5. To measure numerical aperture and propagation loss and bending losses for optical fibre as function of bending angle and at various wavelengths.
6. To determine wavelength of a given laser source.
7. To determine the Diameter, Divergence and Focus Spot Size of a Laser Beam.
8. To measure the degree of polarization using laser.
9. To study Propagation loss & bending loss using Optical Fiber
10. To study the characteristics of LED & Detector using Fiber Optic.
11. To determine the numerical aperture of a given optical fiber.
12. To study the frequency modulation & demodulation by using Fiber Optic Link.
13. To determine the Planck's constant using photocell
14. To determine the mean wavelength of sodium light and to measure the wavelength difference (Äë) using Michelson interferometer
15. To study the spectral characteristics of the incident beam using Fabry Perot Interferometer
16. To find the intensity distribution of single, double and multiple slit by using Fraunhofer diffraction pattern
17. To measure the grating element of grating by Fraunhofer diffraction pattern.
18. To determine the thickness of a thin transparent sheet using Michelson Interferometer.
19. To verify the Fresnel's formula for reflection and refraction by using a plane refracting surface using Spectrometer.
20. To determine the effect of magnetic field on the polarization state in dispersive medium (Faraday Experiment).

Examination Scheme:

Components	TA	V	LR	Attendance	EE
Weightage (%)	7	10	8	5	70

TA : Teacher Assessment,V: Viva, LR: Lab Record EE: External Examination

Text & References:

- J. Milman and C.C. Halkias, Electronic Devices and Circuits, McGraw-Hill (1981).
- A.P. Malvino, Electronics: Principles and Applications, Tata McGraw-Hill (1991).
- G.B. Calyton, Operation Amplifiers, ELBS (1980).
- J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw Hill (2001).
- R. A. Gayakwad, op-Amps and Linear IC'S, Pearson Education (2003).
- R. P. Singh and S. D. Sapre, Communication Systems: Analog and Digital, Tata McGraw Hill

SUMMER INTERNSHIP EVALUATION

Course Code: PHY4335 **Credit Units: 03**

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or any in any related industrial unit or in any research lab. The students are to learn various industrial, technical and administrative processes followed in the industry/research. In case of on campus training the students will be given specific tasks of synthesizing /testing/analysis/characterization. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of the same.

Examination Scheme

Feedback from Industry:	20
Training Report:	40
Viva:	15
Presentation:	25
Total	**100**

DIGITAL ELECTRONICS AND MICROPROCESSORS

Course Code: PHY4306 **Credit Units: 03**

Course Objective:
The main aim of the course is to give concept of Digital Electronics and Microprocessor which is useful for research and industrial application.

Course Contents:
Module I: Boolean Algebra
Truth tables Logic gates: OR, AND, Inverter gates, The Universal NOR and NAND gates, XOR and XNOR gates, De-Morgan's Theorem, Reduction Technique Karnaugh map simplification. Parity check. The half adder, the Full adder, Parallel binary adder, half and full subtractors.
Sequential Logic: Latches, R.S. Flip/Flop, The D.Flip/Flop, T.Flip/Flop, J.K. Flip/flop, Master/ slave flip/flop, Race Problem, Binary Ripple counter, modified counters using Negative feedback.

Module II: Shift Registers and Counters
Universal Shift Register, shift counter, Ring Counter, D/A converter and A/D converter. Simultaneous and Counter method of A/D converter, Successive Approximation method, Seven segment LED display, BCD to seven segment decoder.
Logic Families: Transistor as a Switch, TTL integrated circuits, CMOS integrated circuit. Logic families and their characteristics, comparing Logic families, Interfacing. Introduction to VHDL and Programming techniques.

Module III: **Introduction to Microprocessor**
Microprocessor 8085: PIN Out and Signals, Internal architecture, Flags, Program counter. Introduction to 8085 Instruction Set: Data Transfer, Arithmetic & Logical Instruction, Branch and machine Code, OP-Code Format, Addressing Mode Timing Diagram. M **(10)**achine Cycle.

Module IV: Microprocessor: - **Programming and Interfacing**
Subroutine and Sub programming, CALL and RETURN, STACK, PUSH & POP, 8085 Interrupts, RST Code; SID, SOD, RIM and SIM; Delay Program Calculation, Memory Organization. (RAM, EPROM, ROM, PROM, DRAM.) Introduction to 8086 and registers. Addressing and Interfacing, Basic Interfacing Concept, Introduction to I/O and Memory Mapped Techniques, Handshaking, Interfacing I/O devices, Display, Keyboard, Generating Control Signals, De Multiplexing of address Bus, Programming Technique, Interfacing 8155, Programmable I/O Ports and Timer IC, Programmable Peripheral Interface 8255 with 8085. Interfacing of A/D and D/A converters, Study of 8279, 8253.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- D. V. Hall, Microprocessors and Interfacing- Programming and Hardware, Tata McGraw Hill (1999)
- Microprocessor Architecture Programming and applicationsa by R.S Gaonkar
- Digital Electronics by Malvino and Leach
  Digital Electronics by V.K.Jain
- B. Brey, The Intel Microprocessors- Architecture, Programming and Interfacing, Pearson Education (2003)

MATERIAL SCIENCE

Course Code: PHY4307 **Credit Units: 03**

Course Objective:
The aim of the present course is to acknowledge the students with Basics of the materials science and various types of material fabrication and their characterization techniques.

Course Contents:

Module I: Introduction to materials
Metals, Alloys (ferrous and non-ferrous), Ceramics and their properties, polymers and their Properties, composites, Types of Composites and their Properties, superalloys, shape memory alloys, Nanomaterials.

Module II: Diffusion and dislocation defects
Crystal defects, Laws of Diffusion, Diffusion Coefficient: Temperature dependence, Factors that influence diffusion, Kirkendall Effect. Dislocation and Strengthening Mechanism: Dislocations and Slip Systems, Slip in single crystals, plastic deformation in polycrystalline materials, strengthening by grain size reduction, solid solution strengthening, strain hardening, recovery recrystallization and grain growth.

Module III: Phase diagrams and Phase Transformations: Phase Diagram: Phases, Eutectic Point, Gibb's Phase rule, Hume-Rothery's conditions, lever rule, Binary Phase diagrams and types, Interpretation of the phase diagrams. The liquid Phase, Nucleation, Nucleation kinetics, Homogeneous and Heterogeneous nucleation, Growth and over all transformation kinetics, Development of microstructure, Martensitic Phase Transformation, Continuous cooling transformation diagrams, Applications

Module IV: Material Failure: Elastic and Plastic Deformation, Mechanism of Plastic Deformation, ductile to brittle transition, Fracture and its types, fracture toughness, methods of protection against fracture. Fatigue: cyclic stresses, S-N curve, crack initiation and propagation, factors that affect fatigue life. Creep: Generalized creep behavior, stress and temperature effects, Mechanism of creep, creep resistant materials.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text/ Reference Books:

- Elements of Material Science and Engineering: VanVlack, Wesley Pub. Comp.
  Introduction to Engineering Materials: B. Agarwal, McGraw Hill Publication
- Materials Science, M S Vijaya and G Rangrajan, Tata McGrawhill, 2011.
- Material Science & Engineering –V. Raghvan, Prentice Hall of India Pvt. Ltd, New Delhi
  Engineering Materials: Kenneth G. Budinski, Prentice Hall of India, New Delhi
  Introduction to ceramics- W. D. Kinger y, H. K.Bowen and D. R.. Ublmann Weily and sons.
- Synthesis, Characterization and Application of Smart Materials, R. Rai, Nova Publishers USA (2012).

RENEWABLE ENERGY RESOURCES

Course Code: PHY4317 **Credit Units: 03**

Course Objective:
This is an introductory course to renewable energy technologies and potentials to the Science students aiming to explain basic concepts of Renewable Energy resources.

Course Contents:

Module I: Energy & Thermodynamics & Environmental impact
Heat Transfer in Renewable Energy Systems - conduction, convection and radiation, thermal aspects of energy generation Work, heat, and the first law of thermodynamics. Heat engines and the second law of thermodynamics. The Carnot cycle. Applications of the second law to various energy transformation processes: heat pumps and refrigerators; different engine cycles. Use of fossil fuel, Energy crisis, Global Warming, Carbon emission and climate change. Need for sustainable development and Renewable Energy

Module II: Solar Energy (Thermal and Photovoltaic)
Solar energy option, Environmental impact of solar power, physics of the sun, Thermonuclear reactions , Black body radiation, Spectral distribution, the solar constant, radiation on titled surface / earth, Solar thermal Energy, Application of solar energy in Solar thermal and solar photovoltaic system, Brief introduction to 3 generation of Solar cells,

Module III: Ocean, tidal , wave energy
Principle of ocean thermal energy conversion (OTEC), setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Fundamentals of tidal power, Potential and conversion techniques, mini-hydel power plants. Use of tidal energy, Limitations of tidal energy conversion systems.

Module IV: Geothermal and Wind Energy
Structure of earth's interior, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principal of working, Types of geothermal station with schematic representation, Applications.
Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals; types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Recent development and applications

Module V: Hydrogen Energy and Bio-Gas
Properties of hydrogen in respect of it's use as source of renewable energy, Sources of hydrogen, Production of hydrogen; electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production. Storage Issues of Hydrogen, Applications of hydrogen energy.
Biomass: Raw materials, Properties/ characteristics of bio gas, Principles of Bio-Conversion; Photosynthesis, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion, Transportation of bio gas, bio gas plant technology & status, Biomass cogeneration Energy recovery from urban waste, Power generation from liquid waste, Bio gas applications.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	15	5	5	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text &References:

- Aldo V. da Rosa, ―Fundamentals of Renewable Energy Processes‖, 2005, Academic Press
- Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
- Kothari D.P., ―Renewable energy resources and emerging technologies‖, Prentice Hall of India Pvt. Ltd.
- Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
- Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.
- Tiwari and Ghosal, ―Renewable energy resources‖ Narosa Publication.
- K Mittal ―Non-Conventional Energy Systems‖ , Wheeler Publication
- Twidell& Weir, ―Renewable Energy Sources‖
- Ramesh & Kumar, ―Renewable Energy Technologies‖, Narosa Publications.

INTRODUCTION TO ASTROPHYSICS

Course Code: PHY4318 **Credit Units: 03**

Course Objective: To develop an understanding and appreciation of the laws of the Universe. A survey of modern astronomy covering topics about the solar system, galaxies, evolution of stars and methods used to explore the Universe.

Course Contents:

Module-I: Spectrum of EM radiation, and observation in different wavelength bands, atmospheric window. Different types of telescope, Limit of Resolution and resolving power.
Overview of major contents of universe, Black body radiation, specific intensity, flux density, luminosity, Apparent and absolute magnitudes, Bolometric magnitude, Basics of radiative transfer (Emission/absorption coefficients, source functions).

Module-II: Sun as a star: Basic parameters e.g. Solar constant, luminosity, effective temperature, mass, density etc.; Hydrostatic equilibrium, central temperature and pressure at centre of the Sun. Source of energy in the stars: Kelvin-Helmholtz timescale; possibility of thermonuclear reactions.

Module-III: Solar System: Various components of the solar system, Planets, their satellites, atmosphere at different planets, formation of the solar system.
The Galaxy: Size and shape of the Milky Way; interstellar extinction and reddening (qualitative); different types of Nebulae; orbits of stars and epicycle theory; stellar populations.

Module-IV: Morphological classification of galaxies; rotation curve and idea of dark matter; Active galaxies (basic understanding); clusters of galaxies and large scale distribution
Expansion of the universe; Hubble law and Hubble constant; Big-bang picture and Cosmic microwave background radiation (qualitative discussion).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- The Physical Universe: An introduction to Astronomy by Frank H. Shu
- Astrophysical concepts by Harwit Martin
  Astrophysics for Physicists by Arnab Rai Choudhuri
- An Introduction to modern Astrophysics by Bradley W. Carroll and Dale Ostile, Pearson Addison-Wesley
- http://www.iucaa.ernet.in/~dipankar/ph217/
- http://nptel.iitm.ac.in/courses/115105046

NONLINEAR DYNAMICS

Course Code: PHY4319 **Credit Units: 03**

Course Objective: To introduce the concepts required for understanding 'real world' nonlinear phenomena using a variety of mathematical and laboratory models. This course provides an introduction to nonlinear dynamics theory and its applications to mechanical, chemical, electromagnetic or biological oscillators; stability, phase space analysis, limit cycles, bifurcations, perturbation methods, chaos, fractals, strange attractors, and other advanced topics.

Learning Outcomes: On completion successful students will be able to:

- Explore the basic concepts of nonlinear dynamics using the 'simple' pendulum.
- Analyze simple one and two-dimensional nonlinear systems.
- Identify attractors of those nonlinear systems, and to characterise their stability. Understand and apply the basic numerical methods relevant for nonlinear systems.
- Demonstrate an understanding of what constitutes chaotic behaviour and explain why this imposes limits on predictability. Survey applications of the ideas in several areas of physics, and in other disciplines
- Describe the concept of a fractal and explain the idea of a non-integer dimension.

Prerequisites: A course in differential equations. Some knowledge of computer programming.

Course Contents:

Module I: Introduction - Overview of the course introducing some of the basic ideas.
General introduction and motivation; examples of linearity and nonlinearity in physics and the other sciences; modelling systems using iterated maps or differential equations.

Module II: General features of dynamical systems - The structures that may arise in the analysis of ordinary differential equations. Systems of differential equations with examples; control parameters; fixed points and their stability; phase space; linear stability analysis; numerical methods for nonlinear systems; properties of limit cycles; Periodic orbits, limit cycles, Poincare maps, Floquet theory, nonlinear oscillators and their applications; the impossibility of chaos in the phase plane; Bifurcations: their classification and physical examples (Local and global bifurcations); spatial systems, pattern formation and the Turing mechanism; strange attractors and chaotic behaviour.

Module III: The logistic map - period doubling and chaos in a simple iterated map.
Linear and quadratic maps; graphical analysis of the logistic map; linear stability analysis and the existence of 2-cycles; numerical analysis of the logistic map; universality and the Feigenbaum numbers; chaotic behaviour and the determination of the Lyapunov exponent; other examples of iterated maps.

Module IV: Fractals - complex geometrical objects of which strange attractors are examples.How long is the coastline of Britain? Artificial fractals: the Cantor set and von Koch curve; fractal dimensions; iterations of the complex plane and the Mandelbrot set; how fractals arise in the description of dynamical systems. Multifractals

Module V: Further aspects of chaotic dynamics - exploring the basic ingredients of chaos. Fractal structures in simple maps; how strange attractors come about; the evolution of phase space volumes in chaotic and non-chaotic systems; mixing and information entropy. Controlling chaos NB: Of course
many topics will be skipped due to time limits. This course plan may be modified during the semester.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Recommended texts

- S.H. Strogatz, "Nonlinear Dynamics and Chaos with Applications to Physics, Biology, Chemistry, and Engineering, (Addison Wesley 1994). ISBN 0-7382-0453
- K.T. Alligood, T.D. Sauer, and J.A. Yorke, CHAOS — An Introduction to Dynamical Systems,Springer, 1996[A book similar in level and content to Strogatz but goes more deeply and carefully into mathematical definitions and the derivation of results.]

Useful references

- Richard H. Rand, Lecture Notes on Nonlinear Vibrations, version 52, 2005. Available online at http://audiophile.tam.cornell.edu/randpdf/nlvibe52.pdf
  G.L.Baker, & , J.P. Gollub*Chaotic Dynamics: An Introduction,* (CUP 1996), Second edition
- D.W. Jordan, & P.Smith, *Nonlinear Ordinary Differential Equations,* (OUP 1999), Third edition [Supplementary reading]
- J.Gleick, *Chaos: Making a New Science,* (Heinmann 1998)
  I.Stewart, *Does God play Dice? The Mathematics of Chaos,* (Penguin 1990)
- James Gleick (Penguin, New York, 1987) *Chaos* [A popular, entertaining and non-mathematical survey of key advances in nonlinear dynamics and about the people who made these advances. Best book for beginners]
- Edward Ott *Chaos in Dynamical Systems, 2nd Edition* (Cambridge University Press, 1993).
- [This is an advanced graduate-level discussion of chaos theory, with many explicit mathematical examples worked out with impressive insight.]
- Pierre Berge, Yves Pomeau, Christian Vidal *Order within Chaos* (John Wiley & Sons, New York, 1984).[An especially good introductory book for scientists (as opposed to mathematicians)with many comparisons of ideas with experimental data, but unfortunately somewhat out of date and lacks exercises. The chapters about the Fourier analysis of time series, intermittency, and the synchronization of oscillators are particularly good.]
- Michael Cross Introduction to Chaos [an online graduate-level course. Many good insights here, strongly recommended].
- Holger Kantz and Thomas Schreiber *Nonlinear time series analysis* (Cambridge University Press, 1997). [A good summary of concepts and techniques for deducing information about a dynamical system from empirical time series.]
- T. S. Parker and L. O. Chua *Practical Numerical Algorithms for Chaotic Systems* (Springer-Verlag, 1989). [This book discusses numerical methods for analyzing nonlinear dynamical systems, although primarily lower-dimensional ones].

PLASMA PHYSICS-I

Course Code: PHY4323 **Credit Units: 03**

Course Objective: This course aims at exposing the students to the basic knowledge of plasma physics, plasma parameters, to distinguish plasma from a gas, the motion of charged particles under different electric and magnetic field conditions. To study this course, the students will be able to understand the collective behavior of plasma, the techniques of plasma production and diagnostics.

Course Contents:

Module–I: Introduction to Plasma Physics
Plasma state, Natural Plasma, fundamental concepts, concept of temperature, Quasineutrality in plasma, density of plasma, electron and ion temperatures, mobility of charged particles, Debye shielding, criteria for ionized gas to be a plasma, dielectric constant of plasma, optical properties of plasma.

Module–II: Orbit Theory of Plasma
Effect of magnetic field on mobility of electrons, Particle motion in a static uniform magnetic field, in uniform force, uniform electric fields, motion in gravitational fields, Grad- B drift, curvature drift, polarization drift, particle in non-uniform magnetic and electric fields, particle in time varying electric and magnetic fields.

Module–III: Fluid description of plasma
Relation of plasma physics and electromagnetic, equation of motion for fluid, equation of continuity, single fluid equations, fluid-drifts perpendicular and parallel to magnetic field, magnetic pressure, magnetic tension, plasma approximation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A: Attendance, CT: Class test**, HA:** Home assignment, **S/V/Q:** Seminar/Viva/Quiz, **EE:** End Semester Examination

Text & Reference Books:

- Introduction to Plasma Physics and Controlled Fusion, Francis F. Chen, Springer.
- Fundamentals of Plasma Physics, J. A. Bittencourt, Elsevier.
- Fundamentals of Plasma Physics, Paul Murray Bellan, Cambridge.
- Textbook of Plasma Physics, Suresh Chandra, CBS Pvt Ltd.

Syllabus - Fourth Semester

EXPERIMENTAL TECHNIQUES

Course Code: PHY4410 **Credit Units: 04**

Course Objective: The objective of the present course is to introduce some advanced measurement, characterization and analytical methods commonly used in experimental physics research to the post graduate students.

Course Contents:

Module I: Vacuum Techniques:

Basics: Introduction to vacuum technique, units, ranges, review of Kinetic theory of gases, Physical parameters at low pressures, Throughput, different vacuum pumps for production of low, medium, high and ultra- high vacuum. Vacuum gauges (Mc Leod, Knudsen, Pirani, Penning and Ionization gauges), Leak detection, Industrial & Scientific applications.

Module II: Diffraction and Microscopic Techniques:

X-Ray diffraction, Electron diffraction, neutron diffraction, Transmission electron microscope (TEM), Scanning electron microscope (SEM), Energy dispersive X-ray analysis techniques (EDX). Atomic Force microscope (AFM), Surface Tunneling microscopy (STM).

Module III: Spectroscopy & Thermal Techniques:

UV-VIS spectroscopy, photoluminescence, Infra-red spectroscopy, Raman spectroscopy, Photoelectron spectroscopy (XPS, UPS, AES). Thermal Techniques: TG, DTA, DSC. Scanning Thermal Microscopy (SThM)

Module IV: Accelerators & Detectors:

Van deGraff Accelerator, Tandem Accelerator, Linear Accelerator (LINAC), Cyclotron, Betatron, Synchrocyclotron, Synchrotron. Detailed study of Ionization chamber; Proportional counter, GM counter, Scintillation detector, photomultiplier tubes, photodiode, semiconductor diode detector.

Examination Scheme:

Components	CT	HA	S/V/Q	Attendance	EE
Weightage(%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & Reference:

- Basic Vacuum Technology, A. Chambers, R.K. Fitch and B.S. Halliday.Taylor & Francis 1998.
- A Users Guide to Vacuum Technology, O'Hanlon. John Wiley & Sons.
- Measurement & Detection of Radiation, Nicholas Tsoulfanids, S Landsberger, CRC Press.
- Radiation Detection and Measurement, G F Knoll, John Wiley & Sons.
- Students solutions manual to Radiation Detection and Measurement, David K Wehe
- Measurement & Detection of Radiation, Nicholas Tsoulfanids, S Landsberger, CRC Press.
- Radiation Detection and Measurement, G F Knoll, John Wiley & Sons.
- Atomic Radiation Detection and Measurement, Harold S Renne, Lloyd J Austin, Literary Licensing.
- Nuclear Radiation Detectors, S. S. Kapoor, V S Ramamurthy, New Age International Publishers.

MAJOR PROJECT

Course Code: PHY4437 **Credit Units: 09**

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curriculae where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the layout of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

Title or Cover Page

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

Acknowledgement(s)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

It is incomplete without student's signature.

Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not

have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

Materials and Methods

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in ¯point‖ form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

Conclusion(s) & Recommendations

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)? What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

Implications for Future Research

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

Appendices

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

References

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect* , **8** (suppl 1): 116–117.

For book:

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

NANO-SCIENCE AND TECHNOLOGY

Course Code: PHY4404 **Credit Units: 03**

Course Objective:
The objective of the present course is to introduce Nanoscience and nanotechnology. The course also provides the fundamentals of Nanoscience & nanotechnology and some of its applications. The course further provides the introduction of some of the Synthesis and characterization techniques.

Course Contents:

Module-I: Physics of Low-dimensional Materials -
Nano-materials and their types, Top down and bottom up approach. 1D, 2D and 0D confinement and Concept of quantum dots, quantum wires and quantum wells; Density of states for bulk materials, quantum wells, wires and dots; Importance of size distribution control, size measurement and size selection .

Module-II: Synthesis of Nanomaterials
Chemical methods: Sol-gel/Combustion method, Solvothermal, Chemical bath deposition Chemical vapour deposition, Homo- and hetero-nucleation growth methods, Co-precipitation method, Citrate precursor method. Sputtering and types:RF sputtering,DC sputtering and Magnetron sputtering. Thermal Evaporation, e-beam evaporation, Pulse Laser Ablation (PLD)

Module-III: Properties and Applications of Nanomaterials Physical and Mechanical properties of nanomaterials,Optical Properties, Electronic properties, Magnetic Properties, Electro-magnetic properties

Module-IV: Applications of Nanomaterials
Applications of carbon based nanostructured materials: CNT, Graphene and Fullerenes, Defense application,Medical Application, Mechanical Applications. Applications in communication, Water purification and Agriculture applications.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

Suggested Books:

- Edelstein A. A. and Cammarata R.C., ¯Nanomaterials-Synthesis Properties and Applications‖, Institute of Physics Publishing, London, 1998.
- Poole, Jr. CP and Owens, FJ, ¯Introduction to Nanotechnology‖, Wiley India, 2006.
- Shik, A, ¯Quantum Wells: Physics and Electronics of two-dimensional systems‖, World Scientific, 1999.
- Benedek et al G., ¯Nanostructured Carbon for advanced Applications‖, Kluwer Academic Publishers, 2001.
- Harrison, P, ¯Quantum Wells, Wires, and Dots: Theoretical and Computational Physics‖, John Wiley, 2000.

ATMOSPHERIC PHYSICS

Course Code: PHY4405 **Credit Units: 03**

Course Objectives:
Several fundamental aspects related to Physics, Thermodynamics and Chemistry of the Atmosphere and Oceans will be introduced to the students in order to make them understand, and apply the knowledge to the physico-chemical processes that influence the weather and climate.

Course Contents:

Module-I: Thermodynamics
Thermodynamics of dry and moist air, atmospheric stability and dry adiabatic lapse rate, moist processes in the atmosphere, saturated and unsaturated ascent, moist adiabatic and saturated adiabatic processes in the atmosphere, saturated adiabatic lapse rate, pseudo adiabatic processes and equivalent potential temperature, conditional instability second kind, moist convection, aerosols, condensation processes, formation of cloud droplets, precipitation.

Module-II: Ocean Morphology
Ocean physics, thermodynamics of sea water, observed temperature, salinity, and density in the ocean, density stratification, water mass distribution, coastal currents and upwelling, thermohaline circulation. Oceans currents, coupling of surface and deep ocean waters, basic foundation of turbulence, turbulent flows, turbulent vorticity, turbulence pressure, eddy diffusivity, coherent structures, surface fluxes, air-sea interaction, mixing processes in the ocean.

Module-III: Earth-Atmosphere Radiation Balance
Radiative transfer in atmosphere and ocean: Sun and climate, Planck function, black-body radiation, local thermodynamic equilibrium, radiometric quantities, absorption and emission, Schwarzchild's equation, radiative equilibrium in a grey atmosphere, balance between incoming solar and outgoing
thermal radiation, role of aerosols, absorption by atmospheric gases, heating rates, net radiative heating, Radiative transfer in atmosphere-ocean system.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

References

- The Solid Earth: An Introduction to Global Geophysics [Paperback] C. M. R. Fowler, Cambridge University Press, 1990.
- Climate and the Oceans, Ed. Geoffray K. Vallies, Princeton University Press, 2012.
- Ocean Circulation: Wind-Driven and Thermohaline Processes, Ed. RuiZin Huang, Cambridge University Press, 2009.

GENERAL RELATIVITY & COSMOLOGY

Course Code: PHY4406 **Credit Units: 03**

Course Objective:
This subject aims to provide an introduction to cosmology, including the physics of the early Universe, dark matter and dark energy, and the evolution of the observed large-scale structure.

Course Contents:

Module-I
Newtonian Cosmology, Einstein's universe, Cosmological Principle, Olbers' paradox, Hubble's observations and Expansion of the Universe, Cosmological redshift, Einstein equation for cosmology, Friedman models.

Module-II
Angular diameter distance and luminosity distance as cosmological tools, cosmological models with Ë term, Radiation dominated and matter dominated solutions.Thermal history of the Universe, radiation dominated universe, Big-bang nucleosynthesis, recombination, decoupling of matter and radiation, Horizon problem, flatness problem, introduction to inflation.

Module-III
Formation of large scale structures: Density fluctuations, Jeans mass in expanding universe, evidence of dark matter, growth of fluctuations, Dark matter candidates.Alternative to Friedman cosmology,
Mach's principle, introduction to Brans-Dicke theory

Module-IV
Measurement of Hubble constant, various methods (e.g. Cepheid stars, Tully-Fisher relation, SNIa, Surface brightness fluctuations, Fundamental Plane relation) and recent results.Cosmic microwave background, spectrum and anisotropy, power spectrum of fluctuations, Sunyaev-Zel'dovich effect in galaxy clusters. Latest observations of SNe Ia and evidence of dark energy, Matter-energy of the Universe.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Books Recommended:

- S. Weinberg- Gravitation and Cosmology: Principles and Applications of the General Theory of Relativity (Wiley, 1972).
- Peebles- Principles of Physical Cosmology
- Peacock- Cosmological Physics
- S. Banerji and A. Banerjee – General Relativity and Cosmology (Elsevier, 2007)
- J. V. Narlikar- Introduction to Cosmology (Cambridge Universe Press)

OPTICAL FIBERS AND COMMUNICATION

Course Code: PHY4407 **Credit Units: 03**

Course Objective:
The objective of the present course is to introduce fundamentals of optical fibers, detectors and amplifiers and their applications in Physics.

Course Contents:

Module-I: Optical Fiber Fundamentals
Light propagation in optical fiber, Acceptance angle and numerical aperture, Losses in optical fiber: absorption loss scattering loss, bending loss, and splice loss. Pulse propagation in dispersive medium, pulse broadening, Intermodal and intramodal dispersion, group velocity dispersion (material and waveguide).

Module-II: Modal Analysis of step index multimode and graded index fiber
Characteristics equation of step index multimode fiber, Transverse Electric (TE), Transverse magnetic (TH) and Hybrid modes, linearly polarized modes, V parameter, mode cutoff, Mode field diameter, Modal analysis of graded index fiber.

Module-III: Optical Sources, Detectors and Amplifiers
Types of Optical Sources, Light emitting diodes (LED), Edge emitting LEDs, Coupling of LEDs with fibers, Semiconductor Lasers; Detectors: Photoconductors, Photodiodes, Avalanche Photodiodes and Phototransistors, Amplifiers: Semiconductor Laser Amplifiers, characteristics, advantages and drawback, Erbium Doped Fiber Amplifier (EDFA), gain and noise in EDFA and noise figure.

Module-IV: Fiber Optical Communication Components and System
Coupling Components- couplers, connectors and splices, Modulators and Modulation methods, Transmitters, Receivers, Repeaters and switches; Transmitter, Receiver and link design, Line codes for optical fiber links, wavelength division multiplexing (WDM) and Optical Division Multiplexing.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**Attendance**	**EE**
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- John. M. Senior, Optical fiber communications: principles and practice, Prentice Hall of India.
- Gerd Keiser, Optical fiber communications, McGraw Hill, 3rd edition.
- D. K. Mynbaev, L. L. Scheiner, Fiber optic communication technology, Pearson Technology.
- Introduction to fiber optics, Ajoy Ghatak and K. Tyagrajan.
- R. P. Khare, Fiber optic and optoelectronics, Oxford University press.
- Light wave Communication Systems: A practical prospective: R Papannareddy, Penrum International Publishing
- Fundamental of photonics, Saleh and Teich, Wiley Interscience, 2nd Edition, 2007.

PHYSICS OF SOLAR PHOTOVOLTAICS

Course Code: PHY4408 **Credit Units: 03**

Course Objective:
In this course, one would learn about the fundamentals of photoelectric conversion: charge excitation, conduction, separation, and collection. You will become familiar with commercial and emerging photovoltaic (PV) technologies and various cross-cutting themes in PV: conversion efficiencies, loss mechanisms, characterization, manufacturing, systems, reliability, life-cycle analysis, and risk analysis

Course Contents:

Module I: Solar Cells and Sunlight
Outline of solar cell development, physical source of sunlight, review of solar intensity at the Earth's surface, solar insolation data

Module II: Review of Semiconductor Properties
Crystal structures and orientations, forbidden energy gaps, dynamics of electrons and holes, carrier density, carrier transport, generation and recombination of carriers due to light, direct and in-direct band gap semiconductors, basic device physics, p-n junction diode,

Module III: Standard Silicon Solar Cell Technology (1 st generation solar cells)
Photovoltaic effect , solar cell output parameters, characteristic lifetime, diffusion length, diffusion coefficient, absorption coefficient, efficiency limits, losses, and measurements. Review of fabrication technology, polysilicone and single crystal silicon cell technologies. Design of Solar Cells , Solar cells to solar module

Module IV: Thin Film Solar cells (2nd – Generation)
Polysilicone silicon, amorphous silicone, gallium arsenide solar cells, copper sulfide and cadmium sulfide solar cells, potential & drawbacks of currently manufactured technologies (single- and multicrystalline silicon, CdTe, CIGS, CPV)

Module V: Emerging Solar Cells technologies and concepts (3rd –Generation)
Organic solar cells, Dye-sensitized solar cells, Perovskite solar cells, GaAs solar cells, Thermo-photovoltaic approaches to overcome single junction efficiency limits, spectrum modification approaches, hot carrier solar cells, Quantum Dot solar cells

Examination Scheme:

Components	CT	Assignment	Attendance	EE(1)
Weightage (%)	15	10	05	70

Text & References:
- Solar Photovoltaics (Fundamentals, Technologies and Application) by Chetan Singh Solanki
- Martin A. Green, Solar Cells-Operating Principles, Technology, and System Applications
- M. S. Tyagi, Introduction to Semiconductor Materials and Devices
- Third Generation Photovoltaics (Advanced Solar Energy Conversion) By Martin A. Green; Lecture Notes

BIOPHYSICS

Course Code: PHY4409 **Credit Units: 03**

Course Objective:
This course aims at exposing the students to basic Biophysics concepts which will be useful for them to solve the integrated problems of Biology and Physics.

Course Contents:

Module I: General Biophysics and Techniques in Biophysics
Fundamentals of Biophysics, Surface tension, Adsorption, Osmosis, Osmotic pressure, Dialysis, Colloids, Colloidal systems of life, Buffer, Buffer capacity, Buffers in life system, pH, its importance, Basics of spectroscopy, X-ray crystallography, NMR, UV etc

Module II: Molecular Biophysics
Different levels of protein structure, Primary, secondary, tertiary and quaternary structure. Main chain and side chain torsion angles, Alpha helix, beta sheet, turns. Ramachandran plot , Allowed conformations for a pair of linked peptide units, Motifs and domains.

Module III: Thermodynamics
Laws of thermodynamics, concept of free energy, unavailable energy and entropy, heat content of food, bomb calorimetry, chemical kinetics – rate, order, molecularity of reactions and energy of activation

Module IV: Simulations, Data Analysis and Visualization
Advantages and challenges in simulations of Biophysics, Basics of simulation software such as NAMD and/or GROMACS, Data Analysis of simulation generated data, Visualization software such as PyMol and VMD

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Biophysics by W Hoope Edtr., Springer – Verlag New York .
- Molecular Biophysics by R B Setlaw & EC Pollard, Addison Wesley Reading MA
- Essentials of Biophysics by P Narayanan, New Age International Publishers.

RADIATION PHYSICS

Course Code: PHY4411 **Credit Units: 03**

Course Objective:
The objective of the course on Radiation Physics is to expose the students to the concepts of different kinds of radiations, their interaction with matter, radiation detection and radiation dosimetry. The course will enable students to understand that interaction of matter with different kinds of radiations such as charged particles, electrons, neutrons, EM waves etc. and further their technological applications primarily as radiological applications.

Course Contents:

Module I: Radiation Sources
Basic units and definitions, Fast electron sources: beta decay, internal conversion & Auger electrons; Heavy charged particle sources: Alpha decay & spontaneous fission; Sources of electromagnetic radiation: Gamma rays following beta decay, Annihilation radiation, Bremsstrahlung, Characteristic X-rays & Synchrotron radiations; Neutron sources: Radioisotope sources & photoneutron sources

Module II: Radiation Interaction
Interaction of heavy charged particles: Nature of interaction, stopping power, energy loss characteristics, The Bragg curve, Energy straggling, Range & Range straggling, Energy loss in thin absorbers; Interaction of fast electrons: Specific energy loss, Electron range and transmission curves, Interaction of gamma rays: Photoelectric absorption, Compton scattering, Pair production; Interaction of neutrons: Slow neutron & fast neutron interaction; Radiation exposure and dose: Gamma ray exposures, Absorbed Dose, Dose equivalent,

Module III: Radiation Detectors and Spectroscopy:
General characteristics of detectors: Detector model, Modes of detector operation, Energy resolution, Detector efficiency; Gas filled detectors, Organic and inorganic scintillation detectors, Semi-conductor detectors [Si(Li), Ge(Li) HPGe]. Photomultiplier tubes, Gamma ray spectrometers, Gamma ray spectrometry with NaI(Tl) scintillation and semiconductor detectors; Background and detector shielding.

Module IV: Radiation Dosimetry
Radiation dosimetry, its types and applications: Environmental, space, personal and medical dosimetry; General properties of dosimeter; Thermoluminescence (TL) and its mechanism; TL dosimetry: TL glow curve and TL spectra; Concept of trapping parameters: activation energy, order of kinetics & frequency factor; TLD protocols, optically stimulated luminescence (OSL) based dosimetry

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**H**	**E**
Weightage (%)	5	10	10	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text Books

- Nuclear Radiation Detectors: S. S. Kapoor and V. S. Ramamurthy, New Age, International, New Delhi.
- Introduction to Radiological Physics and Radiation Dosimetry: Frank Herbert Attix, Wiley-VCH

- The Atomic Nucleus: R.D. Evans, Tata Mc Graw Hill, New Delhi
- Thermoluminescence of Solids, S. W. S. Mckeever, Cambridge University Press

Reference Books

- Radiation Detection and Measurements: G. F. Knoll, Wiley & Sons, New Delhi.
- Introductory Nuclear Physics: K. S. Krane, Wiley & Sons, New Delhi.
- An Introduction to X-ray Spectrometry: Ron Jenkin, Wiley.
- Techniques for Nuclear and Particle Physics Experiments: W. R. Leo, Narosa Publishing House, New Delhi.
- Thermally and Optically Stimulated Luminescence: R Chen, V. Pagonis, John Wiley & Sons.

PLASMA PHYSICS-II

Course Code: PHY4412 **Credit Units: 03**

Course Objective:
This course has been so framed to give the students a solid grounding of plasma physics, waves in plasma, fluid theory and kinetic theory of plasma. Also the students will be able to understand the applications of natural plasma in industry and nature.

Course Contents:

Module–I: Waves in a fluid plasma
Representation of waves, plasma oscillations, electron plasma waves, ion plasma waves, Sound waves, Ion waves, plasma approximation, electrostatic electron waves perpendicular to magnetic, electrostatic ion waves perpendicular to B, Lower frequency waves, Electromagnetic waves, Magnetosonic and Hydromagnetic waves.

Module–II: Kinetic theory of plasma
Difference between fluid theory and kinetic theory, distribution function and microscopic variables, Boltzmann equation, fluid equations, Vlasov equations, Landau damping, physical mechanism of Landau damping, Energy equations, moment equations, cold plasma limit.

Module–III: Transport processes in plasma
Collision parameters, Diffusion parameters, Ambhipolar diffusion, Recombination, diffusion across a magnetic field, ambhipolar diffusion across the magnetic field, collision in a fully ionized plasma, plasma resistivity, single fluid MHD equations, Diffusion in fully ionized plasma.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class test**, HA:** Home assignment, **S/V/Q:** Seminar/Viva/Quiz, **EE:** End Semester Examination

Text & Reference Books:

- Introduction to Plasma Physics and Controlled Fusion, Francis F. Chen, Springer.
- Fundamentals of Plasma Physics, J. A. Bittencourt, Elsevier.
- Fundamentals of Plasma Physics, Paul Murray Bellan, Cambridge.
- Textbook of Plasma Physics, Suresh Chandra, CBS Pvt Ltd.

HIGH ENERGY PHYSICS

Course Code: PHY4413 **Credit Units: 03**

Course Objective:
The aim of the course is to introduce the basic concepts of elementary particle physics and quantum field theory for a clear understanding of the universe at very fundamental level. Further, the students will be able to gain knowledge of the important concepts which are used in modern day particle physics experiments.

Course Contents:
Module I: Basic Concepts
Natural units, Cosmological origin of universe, Fundamental building blocks and interactions, Historical introduction to particle zoo, Cross section, Decay rate, Pseudo-rapidity, Discrete and Continous Symmetries, Isospin, Strangeness, Hypercharge, Parity, Meson and Baryon Octet, Baryon Decuplet, Eight-fold way, Charge Conjugation, Time Reversal, CP symmetry, CPT theorem, Feynman diagrams, Collider physics, Integrated Luminosity, Hybrid detectors.

Module II: Standard Model of Particle Physics
Gauge theory, Local and global symmetry, Spontaneous breaking of symmetry, Abelian and Non-Abelian gauge fields, Goldstone theorem, Higgs mechanism, Higgs field and coupling to three generations of matter, Gauge boson and fermion mass generation via spontaneous symmetry breaking, Elementary idea of CKM matrix, Basic introduction of Glashow-Weinberg-Salam theory.

Module III: QCD and Quark Model
Deep inelastic scattering, Quark model, Asymptotic freedom, Color confinement, Hadron formation, Flavor symmetry.

Module IV: Basic Idea of Beyond Standard Model Physics
Neutrino – types, oscillation and mass, Elementary idea of Supersymmetry & String theory, Dark matter & Dark Energy, New Physics.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**Attendance**	**EE**
Weightage (%)	10	8	7	5	70

CT – Class Test, S/V/Q – Seminar/Viva/Quiz, HA – Home Assignment, EE – End Semester Examination

Text & References:

- Introduction to Elementary Particles, D. Griffiths (2nd Ed., Wiley-VCH, 2008)
- Quarks & Leptons, F. Halzen and A. D. Martin (John Wiley, 1984)
- An Introductory Course of Particle Physics, Palash B. Pal (CRC Press, 2015)
- Gauge Theory of Elementary Particle Physics: Problems and Solutions, T. P.
- Cheng and Ling-Fong Li (Oxford, 2000)
- Elementary Particles and the Laws of Physics, R. P. Feynman and S. Weinberg
- (Cambridge University Press, 1999)
- Introduction to High Energy Physics, D. H. Perkins (Cambridge University Press, 2000)

Amity School of Applied Sciences

Master of Science (Biochemistry)

FLEXILEARN
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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

BASIC BIOCHEMISTRY

Course Code: BCH4101 **Credit Units: 03**

Course Objective: The main objective is to prepare students with the basic concepts of biochemistry. This course will provide students with knowledge of the fundamentals of biochemistry like thermodynamic processes, metabolic pathways, carbohydrates, lipids.

Course Contents:

Module-I: Fundamentals of Biochemistry, Carbohydrates and Lipids
Macromolecules and their monomeric subunits. Properties of Water: with interactions in aqueous systems. Ionization of water, weak acids and weak base. Preparations of solutions of different strength and scales (molarity, molality, normality, formality, w/w, v/v ratio calculation exercises).The pH scale, measurement of pH, pH metry, acid base titration curves. Buffers, biological buffer systems.
Carbohydrates: Classification, basic chemical structure, monosaccharides, aldoses, and ketoses, cyclic structure of monosaccharides, isomerism; keto aldo, D-and L- isomerism, optical isomerism, anomers and epimers, mutarotation, chemical properties of monosaccharides, action of strong acids, alkalis, oxidation, reduction, osazone formation glycoside formation; Derivatives of monosaccharides, phosphoric acid ester, amino sugar, deoxy sugar, sugar acids, sugar alcohols, Formation of disaccharides, reducing and non-reducing disaccharides; disaccharides maltose, lactose, sucrose. homo polysaccharides - starch, glycogen, cellulose, dextrin; hetero polysaccharides - types of glycosaminoglycans and functions of glycoproteins structural and storage polysaccharides; Structure and role of glycoconjugates - proteoglycans, glycoproteins and glycolipids (gangliosides and lipopolysaccharides); General reaction and properties. Carbohydrates as informational molecules.
Lipids: Building blocks of lipids - fatty acids, glycerol, ceramide; Storage lipids - triacyl glycerol and waxes; Structural lipids in membranes – glycerophospholipids; Galactolipids and sulpholipids, etherlipids, sphingolipids and sterols, structure, distribution and role of membrane lipids. Plant steroids; Lipids as signals, cofactors and pigments. Separation techniques Lipoproteins, Chylomicrons, LDL, HDL, and VLDL. Pathological changes in lipid levels. Formation of micelles, monolayers, bilayer, Liposomes, Vitamins and Co-enzymes: Classification, water-soluble and fat-soluble vitamins. Structure, dietary requirements, deficiency conditions, coenzyme form

Module-II: Fundamental of Thermodynamics & Metabolism of Carbohydrates
Laws of thermodynamics. Concept of state functions, enthalpy, entropy, free energy, standard free energy, change, equilibrium constant, coupled reactions, energy charge, ATP cycle, phosphorylation potential, and phosphoryl group transfers. Chemical basis of high standard energy of hydrolysis of ATP, PEP, 1,3 BPG and thioesters. Redox reactions, standard redox potentials and Nernst equation. Universal electron carriers. Autotrophs, Heterotrophs, catabolism, anabolism, metabolic pathways, ATP as energy currency, experimental approaches to study metabolism, High energy compounds. **Glycolysis:** overview, reactions, regulations including hormones, fates of pyruvate, feeder pathways for glycolysis, galactosemia. Lactose intolerance. **Cori and Cori cycle**. **Pentose phosphate pathway** and its importance, Relationship between glycolysis and pentose phosphate pathway. Anaerobic ATP production, fermentation. Cyanide resistant respiration, Pasteur Effect. Glycogen synthesis, glycogen breakdown, regulation of glycogen metabolism, gluconeogenesis. Overview of **citric acid cycle**, synthesis of acetyl Coenzyme A, enzymes of citric acid cycle, regulation of citric acid cycle, use of isotope for the study of citric acid cycle, anaplerotic reactions, amphibolic nature, Malate aspartate shuttle, Glyceraldehyde-3-phosphate dehydrogenase shuttle,

Glyoxylate cycle in plants. Signaling pathways, regulation of carbohydrate metabolism by hormones, diseases associated with metabolic irregularities. **Oxidative phosphorylation;** The electron transport chain - its organization and function. Peter Mitchell's chemiosmotic hypothesis and Proton motive force. FoF1 ATP synthase, structure and mechanism of ATP synthesis. Metabolite transporters in mitochondria. Regulation of oxidative phosphorylation. ROS production and antioxidant mechanisms. Thermogenesis Alternative respiratory pathways in plants.

Module-III Metabolism of lipids and Amino acids

Degradation of lipids; Lipid digestion, absorption and transport. Fatty acid oxidation: transport to mitochondria, activation of fatty acids, β oxidation of saturated, unsaturated, odd and even numbered and branched chain fatty acids, regulation of fatty acid oxidation, peroxisomal β oxidation, ω oxidation and α oxidation. Ketone-body metabolism. **Synthesis of lipids;** Transport of mitochondrial Acetyl Co A to cytosol, Fatty acid synthase complex enzyme. Synthesis of saturated, unsaturated, odd and even chain fatty acids, regulation of fatty acid metabolism. Synthesis of glycerophospholipids and sphingolipids. Cholesterol metabolism, diseases associated Metabolic fates of amino groups. Transamination, role of pyridoxal phosphate, glucose-alanine cycle, Kreb's bicycle, urea cycle, its regulation and inherited defects of urea cycle. Gamaglutamyl cycle. Catabolic pathways of individual amino acids. Glucogenic and ketogenic amino acids. Metabolism of one carbon units.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Lehninger: Principles of Biochemistry (2017) 7th ed., Nelson, D.L. and Cox, M.M. W.H. Freeman & Company (New York), ISBN:13: 9781464126116 / ISBN:10- 1464126119.
- Biochemistry (2013) 4th ed., Voet, D., Voet, J. & Pratt, C. Wiley & Sons, Inc. (New Jersey), ISBN: 978-1-11809244-6.
- Physical Biochemistry (2009) 2nd ed., Sheehan, D., Wiley-Blackwell (West Sussex), ISBN: 9780470856024 / ISBN: 9780470856031.
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.
- The Tools of Biochemistry (1977; Reprint 2011) Cooper, T.G., Wiley India Pvt. Ltd. (New Delhi), ISBN: 978-81-265-3016-8.
- Stryer Biochemistry, 5th Edition, Stryer

BIOCHEMISTRY OF PROTEINS AND ENZYMES

Course Code: BCH4109 **Credit Units: 03**

Course Objective: The main objective is to prepare students with the basic concepts of Protein and enzyme biochemistry. This course will provide students with knowledge of the fundamentals of enzyme kinetics and conceptual understanding of proteins.

Module-I: Introduction to amino acids, peptides and proteins

Amino acids and their properties - hydrophobic, polar and charged. Physical properties, optical properties (Stereoisomerism); Chemical properties (acid base properties, titration curve) of amino acids; Uncommon amino acids and their functions. Multimeric proteins, Conjugated proteins and Metallo-proteins. Diversity of peptide and protein function and their applications. Solid phase peptide synthesis. Organization of protein structure into primary, secondary, tertiary and quaternary structures. alpha-helix bets- structure, β-helix, super secondary structure. Tertiary Structure: Forces stabilizing, unfolding/ refolding expt. Prediction of tertiary Structure. Quaternary structure – hemoglobin. Ramachandran plot. Helix coil transitions, Vander Walls, electrostatic, Hydrogen bonding, and hydrophobic interactions. Protein motif; zinc finger, leucine zipper, Solid phase peptide synthesis. N-terminal and C-terminal amino acid analysis. Sequencing techniques - Edman degradation. Generation of overlap peptides using different enzymes and chemical reagents. Disulfide bonds and their location. Forces stabilizing the protein structure - covalent and non-covalent. Importance of primary structure in protein folding. The peptide bond, dihedral angles psi and phi, helices, sheets and turns, Ramachandran map. Motifs and domains. Structures of myoglobin and hemoglobin, α-keratin, silk fibroin, collagen.

Module II: Protein folding, Conformational Diseases and Specialized proteins

Denaturation and renaturation of Ribonuclease A – discovery of protein folding. Introduction to thermodynamics of folding and molten globule. Assisted folding by molecular chaperones, chaperonins and PDI. Defects in protein folding. Diseases associated with misfolding – Alzheimer's and Prion based. Transport protein: Hemoglobin - Oxygen binding curves, influence of 2,3-BPG, CO2 and H+, Hill plot, Cooperativity between subunits and models to explain the phenomena - concerted and sequential models. Hemoglobin disorders-sickle cell anemia, thalassemia's. Motor proteins- Actin and myosin. Defense proteins- Antibodies, Membrane proteins Integral and membrane associated proteins. Hydropathy plots to predict transmembrane domains.

Module-III: Extraction, purification and characterization of proteins

Solubilization of proteins from their cellular and extracellular locations. Use of mechanical and chemical methods, homogenization, ultrasonication, French press and centrifugation. Ammonium sulphate fractionation, solvent fractionation, dialysis and lyophilization Ion exchange chromatography, molecular sieve chromatography, hydrophobic interaction/reverse phase chromatography, affinity chromatography, HPLC and FPLC. Determination of purity, molecular weight, extinction coefficient and sedimentation coefficient. IEF, SDS-PAGE and 2-D electrophoresis.

Module-IV: Enzyme Kinetics

Nature of enzymes - protein and non-protein (ribozyme, abzymes). Cofactor and prosthetic group, apo- and holo-enzymes. Features of enzyme catalysis. Classification of enzymes and nomenclature. Fischer's lock & key and Koshland's induced fit hypothesis. Enzyme specificity. Enzyme kinetics- Michaelis-Menten equation, Lineweaver-Burk plot. Determination of Km, Vmax, Kcat. Factors affecting enzyme activity.

Enzyme inhibition-Reversible (competitive, uncompetitive, non-competitive) and irreversible inhibition. Mechanism based inhibitors.

Module-V Mechanism of enzyme action, enzyme regulation and Bioluminescence

General mechanisms of action. Acid-base and covalent catalysis (chymotrypsin, lysozyme). Metal activated enzymes and metalloenzymes. Allosteric regulation and feedback inhibition (ATCase). Reversible covalent modification (glycogen phosphorylase). Proteolytic cleavage zymogen. Multienzyme complex. Coenzymes. Isoenzymes. Applications of enzymes in research. Application of enzymes in diagnostics (SGPT, SGOT, creatine kinase), Enzyme immunoassay (HRP), Enzyme therapy (Streptokinase). Pancreatic enzymes; Trypsin, Chymotrypsin, Elastase, Protease and Protease inhibitors. Multienzyme complex: Pyruvate Dehydrogenase system, (*E. coli* and mammalian), Tryptophan synthetase, fatty acid synthetase. Clogged gutter mechanism of enzyme inhibition. **Bioluminescence;** History, Source of Bioluminescence material, examples of bioluminescence organism Mechanism of Bio- luminescence in specific organisms, Evolution and Bioluminescence. Use and applications of bioluminescence Unusual Bio-molecules; Prions, Fullerenes, Small Nuclear Riboproteins (SNURPNs), Lectins, Antifreeze proteins, Stress Proteins, Chaperons, Ionophores (Crown ethers, Cryptans) Biomimetic Chemistry- Mimicking of Ion Channels, Enzyme receptor carriers, antibodies, Vesicles and Sensors, Enzyme mimicking-Cram‟s Protease Model, Rebok‟s allosteric Model and Flavinophores for NAD Host-guest Chem

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Lehninger: Principles of Biochemistry (2017) 7th ed., Nelson, D.L. and Cox, M.M. W.H. Freeman & Company (New York), ISBN:13: 9781464126116 / ISBN:10- 1464126119.
- Biochemistry (2013) 4th ed., Voet, D., Voet, J. & Pratt, C. Wiley & Sons, Inc. (New Jersey), ISBN: 978-1-11809244-6.
- Physical Biochemistry (2009) 2nd ed., Sheehan, D., Wiley-Blackwell (West Sussex), ISBN: 9780470856024 / ISBN: 9780470856031.
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.
- The Tools of Biochemistry (1977; Reprint 2011) Cooper, T.G., Wiley India Pvt. Ltd. (New Delhi), ISBN: 978-81-265-3016-8.
- Stryer Biochemistry, 5th Edition, Stryer.

BIOSTATISTICS

Course Code: BCH4102 **Credit Units: 02**

Course Objective: An important objective of the course is to develop an understanding of the basics of biostatistics. The course will familiarize students with the application of biostatics that will be highly beneficial during their experimental analysis and research.

Course Contents:

Module-I: Biostatistics I
Principles and practice of statistical methods in biological research, samples and populations, measures of central tendency; mean, median mode; standard deviations and standard error, measures of dispersion: correlation and regression, sampling theory, Coefficient of variation, standard deviation; Range and interquartile range; Grouped mean and grouped variance; Frequency distributions; One way ANOVA; Two-way ANOVA; AMOVA; student's t test, Q Test, F Test

Module-II: Biostatistics II
Pearsonian chi square Basic idea of probability, probability distributions, binomial, Poisson, normal Statistical quality control, Chi Square Test – Observed and expected frequencies, Calculating p values, assumptions of a chi square goodness of fit; Correlation –Two-way scatter plot, Pearson's correlation coefficient; Regression – regression concepts, simple linear regression; Calculation of R^2 and ρ.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

References/Texts

- Fundamentals of Biostatistics by Bernard Rosner.
- Textbook of Biostatistics I by A.K. Sharma.
- Bioinformatics: Sequence and genome analysis by David W. Mount.
- DNA Sequencing: From Experimental Methods to Bioinformatics
  Author(s): Luke Alphey.
- Introduction to Bioinformatics, Author(s): Teresa Attwood, David Parry-Smith.

CELL BIOLOGY AND SIGNALING

Course Code: BCH4110 **Credit Units: 04**

Course Objective: This will cover the concepts of cell biology and signaling at the post graduate level. The main objective is to prepare students with a clear concept of cellular and signaling processes to help them understand the upcoming topics clearly.

Course Contents:

Module-I: Fundamentals of Cell & Membrane Biology

Cell Theory: Historical background, Molecular logic of cells (Prokaryotes and Eukaryotes), Subcellular organelles: Organization, ultrastructure & Gross functions. , Cell and subcellular membrane (structure, composition & function), Role of cholesterol and fatty acid composition in membrane fluidity . Transport across cell membranes: Passive, active and facilitated transport. Symport, uniport and antiport. Unicellular, homocellular and transcellular transport processes. Transport of glucose and aminoacids into cells, Molecular and patch clamp approaches to the structure function relationship of voltage gated channels. Artificial Membranes (Liposomes) in Drug Delivery, Enveloped viruses: Structure, function and entry mechanism, importance as a probe in cell biology. Use of fluorescence probes in membrane fusion. Detail studies on influenza virus hemagglutinin (HA) and Sendai virus fusion protein as a model. Kinetics of viral-envelope protein-induced cell fusion and applications in targeted drug/gene delivery. Role of membrane proteins in normal and abnormal cell physiology.

Module-II: Cell Cycle & Cytoskeleton

Cell cycle: Phases of cell cycle, Restriction points and quiescent cells, length of each phase. Cell cycle control mechanisms in yeast and mammalian cells: Role of various cyclin-Cdk complexes in transition of various check points. Role of ubiquitin-protein ligase- SCF and APC/C in the control of cell cycle. Microtubule organization center and control. Mitosis and meiosis: Different stages and their characteristic features. Cell cycle in relation to cancer and apoptosis. Concept of extracellular matrix and cell adhesion molecules. Cell junctions and their functions. Cytoskeleton: Microfilaments, intermediate filaments and microtubules, Cytoskeletal proteins in mitosis. Details of the mechanism of muscle contraction.

Module III: Protein Sorting & Modification

Signal for Protein Sorting: Roadmap of biosynthetic protein traffic, Dynamics of protein trafficking, experimental evidences of protein translocation across ER-membrane. Signal Recognition Particles: Characterization and function, signal peptide and signal peptidase, Mechanism of movement of polypeptide through ER membrane into the ER lumen. Protein Modification in ER: GRP, PERK, Unfolded response pathway, eiF2a, PDI roles in survival and death. Role of PDI and Bip in protein maturation in ER. Biosynthesis of O-linked and N-linked sugars, Golgi antiport. Role of Dolicolphosphate in the biosynthesis of precursor N-linked oligosaccharides. Sorting of protein in Golgi: Evidences for three compartments for Golgi stack, sorting of resident ER-protein from other proteins, targeting of lysosomal enzymes and specificity of lysosomal enzymes phosphorylation. Golgi vesicular Transport: Coated and uncoated vesicle, Composition of coated vesicles, Role of ARF and coatomer in the formation of coated bud and vesicles. Mechanisms of targeting and fusion of Golgi-derived transport vesicles to the correct target site. Role of NSF, SNAPs and SNAREs. Protein Import in Mitochondria: Characteristics of signal sequences, nature of receptors, accessories proteins, co-receptors for import of mitochondrial proteins, mechanism. Protein Import in Peroxisomes: Characteristics of signal sequences, nature of receptors, accessories proteins, co-receptors. Mechanism of entry of proteins into the peroxisomal matrix and insertion into peroxisomal membranes. Signal for Import and Export of Macromolecules from Nucleus: Characteristics of signal sequences, nature of importins and exportins. Mechanism of entry and exit of macromolecules

from nucleus. Mechanism of entry of large and small molecules into nucleus via Nuclear-Pore-Complex.

Module IV: Cell Signaling & Tissue Culture

Signaling: General principles, endocrine, paracrine and autocrine signaling, components of intracellular signal transduction pathways. Signaling by G-protein coupled receptors, signaling of growth factors (EGF and insulin) via activation of receptor tyrosine kinases, Signaling of TGFB by direct activating Smad proteins. Cytokine signaling via JAK/STAT pathway. Cell Survival and death signals: Programmed cell death and role of caspases in extrinsic and intrinsic pathways.

Plant tissue culture-General techniques, nutrient media, callus, cloning and regeneration. Anther, meristem, ovary and embryo culture. Animal Tissue culture: Techniques, hybridoma technology, monoclonal antibodies.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

References/Texts:

- Molecular Biology of the Cell, Fifth Edition by Bruce Alberts.
- Molecular Cell Biology, Seventh Edition by Harvey L. Lodish and W.H. Freeman.
- The Cell: A Molecular Approach, Fifth Edition by Geoffery M. Cooper, Robert E. Hausman.
- Lehninger Principles of Biochemistry, Fourth Edition by David L. Nelson (Author), Michael M. Cox (Author).

BIOCHEMICAL ENGINEERING

Course Code: BCH4104 **Credit Units: 02**

Course Objective: The course aims to promote progress in the crucial chemical engineering aspects of the development of biological processes associated with everything from raw materials preparation to product recovery, relevant to industries as diverse as medical / healthcare, food and environmental protection. Its applications are used in the food, feed, and pharmaceutical, biotechnology, and water treatment industries.

Course Contents:

Module-I: Kinetics
Kinetics and Statistics; Stoichiometry: mass balances; Stoichiometry: energy balances; Growth kinetics; Measurement of growth; Inhibition; Effect of pH and temperature; Factors affecting microbial growth; Immobilized enzymes: methods, mass transfer considerations.

Module-II: Bio-separations
Biomass removal and disruption: Centrifugation; Sedimentation; Flocculation; Microfiltration; Sonication; Bead mills; Homogenizers; Chemical lysis; Enzymatic lysis. Membrane-based techniques: 1) Ultrafiltration, 2) Reverse osmosis, 3) Dialysis, 4) Diafiltration, 5) Pervaporation,6) Perstraction

Module-III: Bioreactors
Introduction to bioreactors; Batch and Fed-batch bioreactors, Continuous bioreactors; Immobilized cells; Bioreactor operation; Sterilization; Aeration; Sensors; Instrumentation; Culture-specific design aspects: plant/mammalian cell culture reactors.

Module-IV: Downstream processes
Industrial enzymes; Fermentation: antibiotic, Process configurations (packed bed, expanded bed, simulated moving beds) Description of industrial processes; case study

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Texts/References

- Michael Shuler and Fikret Kargi, Bioprocess Engineering: Basic Concepts, 2nd Edition, Prentice Hall, Englewood Cliffs, NJ, 2002.
- Pauline Doran, Bioprocess engineering principles, 1 Edition, Academic Press, 1995.
- Colin Ratledge, Bjorn Kristiansen, Basic Biotechnology, 2nd Edition, Cambridge University Press, 2001.
- Roger Harrison et al., Bioseparations Science and Engineering, Oxford University Press, 2003.

INSTRUMENTATION TECHNIQUES

Course Code: BCH4106 **Credit Units: 03**

Course Objective: The main objective of the course is to provide students with an insight into the basic instrumentation techniques used in biochemical research.

Course Contents:

MODULE-I: Microscopy
Principle of light microscopy, phase contrast microscopy, fluorescence microscopy, scanning electron microscopy, transmission electron microscopy, Confocal microscopy, Cryo-electron microscopy Chromatographic techniques

MODULE-II: Chromatography and Centrifugation
Preparation of sample, different methods of cell lysis, salting out, dialysis. Introduction to chromatography. Different modes of chromatography: paper, thin layer and column. Preparative and analytical applications. Principles and applications of: Paper Chromatography, Thin Layer Chromatography, Ion Exchange Chromatography, Hydrophobic interaction chromatography Molecular Sieve Chromatography, Affinity Chromatography, reverse phase chromatography. Principle of **centrifugation**, basic rules of sedimentation, sedimentation coefficient. Various types of centrifuges, low speed centrifuge, high speed centrifuge and ultracentrifuge, types of rotors. Application of centrifugation, differential centrifugation, density gradient centrifugation- zonal and isopycnic.

MODULE-III: Spectroscopy
Electromagnetic radiation, interaction of radiation with biomolecules, principle of UV-visible absorption spectrophotometry, Lambert's Law, Beer's Law, working of a spectrophotometer. Applications of UV-visible absorption spectrophotometry in biochemistry. Fluorescence spectrophotometry: Phenomena of fluorescence, intrinsic and extrinsic fluorescence, applications of fluorescence in biochemistry. Circular Dichroism, FTIR, ITC, TGA, DSC.

MODULE-IV: Mass spectrometry & advanced florescence techniques
Mass spectrometry; m/z ratio, Mclafferty rearrangement, characteristic spectra of some simple organic molecules, Time of Flight (TOF), MS-MS, ESI-MS, MALDI, GCMS and LCMS. Fluorescence correlation spectroscopy (FCS), FRAP, FACS, FRET Techniques.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Text and References

- Boyer, R.F., Biochemistry Laboratory: Modern Theory and Techniques, 6th ed., Boston, Mass: Prentice Hall, 2012, ISBN-13: 9780136043027.
- Plummer D. T., An Introduction to Practical Biochemistry 3rd ed., Tata McGraw Hill Education Pvt. Ltd. (New Delhi), 1998, ISBN: 13: 9780070994874 / ISBN:10: 0070994870.
- Wilson K. and Walker J., Principles and Techniques of Biochemistry and Molecular Biology, 7th ed., Cambridge University Press, 2010, ISBN 9780521516358

- Sheehan, D., Physical Biochemistry Principles and Applications, 2nd ed., Wiley India (JW), 2016, ISBN: 10: 9788126564842/ ISBN:13:9788126564842
- Fundamentals of Analytical Chemistry (with CD-ROM and InfoTrac) by Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, Hardcover: 992 pages, Publisher: Brooks Cole
- Dean‟s Analytical Chemistry Handbook by Pradyot Patnaik, Hardcover: 1280 pages, Publisher: McGraw-Hill Professional
- Quantitative Chemical Analysis, Sixth Edition by Daniel C. Harris, Hardcover: 928 pages, Publisher: W. H. Freeman
- Analytical Chemistry by Gary D. Christian, Hardcover: 848 pages Publisher: Wiley; 6th edition
- Comprehensive Medicinal Chemistry by Hansh C, Vol IV, Elsevier Pergamon.
- Medicinal Chemistry-A Biochemical Approach by Nogrady T, Oxford University Press New York, Oxford.Scopes R, Protein purification: Principles and practice, Springer-Verlag NY 1982.
- P.Gerhardt (Ed.), Methods for General Bacteriology, Amer.Soc. Microbiol/ Washington, 1981.
- N.C. Price and L. Stevens, Fundamentals of Enzymology, Oxford University Press, 1989.
- C.N.R. Rao, UV and Visible spectroscopy, Butterworths, 3rd edition, London,1972.
- K. Nakanishi, Infrared absorption spectroscopy - practical, Holden-Day, Inc., San Francisco and Nankodo Company Ltd., Tokyo, 1962.
- J.K.M. Sanders and B.K, Hunter, Modern NMR Spectroscopy: A Guide for chemists, Oxford University Press, London, 1987.
- W. Kemp, NMR in Chemistry, A Multinuclear Introduction, McMillan, London, 1986.
- W.R. Croasmun and R.M.K. Carlson (Ed), Two-dimensional NMR spectroscopy, Applications for Chemists and Biochemists, VCH, New York, 1987.

BIOCHEMISTRY LAB

Course Code: BCH4105 **Credit Units: 02**

Course Objective: To help students learn bioorganic preparations and analysis.

Bioorganic Preparations and Analytical Biochemistry

1. Safety measures in laboratories.
2. Preparation of normal and molar solutions.
3. Preparation of buffers, phosphate and acetate buffers.
4. Titration of a weak acid using a pH meter
5. Qualitative test for lipids.
6. Qualitative test for nucleic acids.
7. Determination of pKa and titration of Amino acids using pH meter
8. Separation of amino acids/ sugars/ bases by thin layer chromatography/paper chromatography.
9. Organic Preparations -Dinitrophenyl hydrazone of ascorbic acid or any other ketone
10. Qualitative and Quantitative Analysis of –
    a. Carbohydrates
    b. Free and bound phosphate
    c. Vitamin C
11. Fats: Acid number, saponification, and iodine values
12. Fractionation of egg proteins and its quantification
13. Isolation of lipids from egg yolk and separation by TLC
14. Cholesterol estimation.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

Suggested Readings

- Experimental Biochemistry- R.W. Switzer & L.F. Garrity (W.H.Freeman & Co.)
- Modern Experimental Biochemistry - R. Boyer (Pearson Education)
- Practical Biochemistry - K. Wilson & J. Walker (Cambridge Univ. Press)
- Laboratory Manual in Biochemistry - J. Jayaraman (Narosa Publishing House)
- Practical Biochemistry - D.T. Plummer (TATA McGraw-Hill)
- Practical Biochemistry - R.C.Gupta & S. Bhargava
- Experimental Physiology and Biochemistry - P.V.Chadha
- Experimental Biochemistry – A Student Companion - B.S. Rao & V. Deshpande,
- I.K. Interational Pvt. Ltd. (N. Delhi, Mumbai, Bangalore) 2005.
- Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New York), ISBN:978-0-470-28173-4

BIOCHEMICAL ENGINEERING LAB

Course Code: BCH4107 **Credit Units: 02**

Course Objective: To help students learn the laboratory techniques used in the food, feed, and pharmaceutical, biotechnology, and water treatment industries.

Course Content:

Expt. 1: Cheese Production from Milk
Expt. 2: Digestion of Protein into Amino Acid
Expt. 3: Cellulose Degradation-Glucose Assay by Dinitrosalicylic Colorimetric Method
Expt. 4: Starch Hydrolysis by Amylase
Expt. 5: Enzyme Immobilization by Gel Entrapment- Entrapment in Polyacrylamide Gel, Entrapment In Alginate Gel, Enzyme Entrapment In Gelatin Gel
Expt. 6: Aseptic Culture Techniques --- Use of a Steam Autoclave and Petri Dish Preparation.
Expt. 7: Batch Submerged Fermentation of Baker Yeast in a Shaker Flask,
Expt. 8: Wine Fermentation

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Suggested Readings

- Experimental Biochemistry- R.W. Switzer & L.F. Garrity (W.H.Freeman & Co.)
- Modern Experimental Biochemistry - R. Boyer (Pearson Education)
- Practical Biochemistry - K. Wilson & J. Walker (Cambridge Univ. Press)
- Laboratory Manual in Biochemistry - J. Jayaraman (Narosa Publishing House)
- Practical Biochemistry - D.T. Plummer (TATA McGraw-Hill)
- Practical Biochemistry - R.C.Gupta & S. Bhargava
- Experimental Physiology and Biochemistry - P.V.Chadha
- Experiments in Microbiology - Gilstrap-Kleyn-Nester
- Experimental Biochemistry – A Student Companion - B.S. Rao & V. Deshpande,

I.K. Interational Pvt. Ltd. (N. Delhi, Mumbai, Bangalore) 2005

BIOINFORMATICS LAB

Course Code: BCH4111 **Credit Units: 01**

Course Objective: To help students learn applications of Bioinformatics.

1. Sequence retrieval (protein and gene) from NCBI and Molecular file formats - FASTA, GenBank/Genpept/DDBJ/PDB/SwissProt.
2. Structure download (protein and DNA) from PDB and Molecular viewer by visualization software (Pymol / Rasmol/Jmol/Chimera/Discovery Studio)
3. BLAST suite of tools for pairwise alignment
4. Multiple sequence alignment (CLUSTALW/TCoffee) and construction of guide trees
5. Domain Analysis (pfam/CDART/ CDD/ SMART/ProDom)
6. Gene prediction using GENSCAN/GLIMMER
7. Primary sequence analyses (Protparam) and Secondary structure prediction (GOR, nnPredict).
8. Homology Modeling: Tertiary structure prediction (SWISSMODEL) and Protein structure evaluation - Ramachandran map (PROCHECK)
9. Abintio modeling
10. Molecular docking and simulation
11. Phylogenetic analysis
12. Drug discovery projects and introduction of Schrodinger
13. Structural alignment and introduction of Structure databases (CATH, SCOP, and PDBsum).

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings

- Bioinformatics – Principles and Applications (2008), 1st ed. Ghosh, Z. and Mallick, B., Oxford University Press (India), ISBN: 9780195692303.
- M. Michael Gromiha, Protein Bioinformatics: From Sequence to Function, Academic Press (2010)
- Bioinformatics: Sequence and Genome Analysis (2001), 1st ed., Mount, D.W. Cold Spring Harbor Laborator Press (New York), ISBN: 0-87969-608-7.
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- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins (2005), 3rd ed., Baxevanis, A.D. and Ouellette, B.F., John Wiley & Sons, Inc. (New Jersey), ISBN: 0-47147878-4.
- D.E. Krane and M.L. Raymer, Fundamental concepts of bioinformatics, Pearson Education Inc. 2006
- Bioinformatics and Functional Genomics (2003), 1st ed., Pevsner, J., John Wiley & Sons, Inc. (New Jersey), ISBN: 0-47121004-8

Syllabus - Second Semester

ADVANCED BIOCHEMISTRY

Course Code: BCH4201 **Credit Units: 04**

Course Objective: The objective of the course is to provide students with an insight in advanced biochemistry. The students will be provided with an in-depth knowledge about plant metabolic pathways, Biochemistry of human hormone and tissue biochemistry and fundamentals of Neurobiochemistry.

Course Contents:

Module-I: Plant Biochemistry-I

Chlorophylls and accessary pigments, Photosynthesis and Carbon assimilation. historical background and Hill's reaction. Structure of PSI and PSII complexes, Light reaction, The Z-scheme of photosynthetic electron flow, Cyclic and non-cyclic photophosphorylation, Calvin cycle and regulation; C4 cycle and Crassulacean acid metabolism (CAM), Photorespiration, Photo inhibition of photosynthesis, Photosynthetic carbon reduction cycle, Synthesis of polysaccharides in plants. Photosynthesis in Microbes, Bacteria, Fungi, Algae and Yeast Plant. growth hormones- Auxins, Gibberellins, Cytokines, *Abscisic* Acid and Ethylene. Biological nitrogen fixation by free living and in symbiotic association; Structure and function of the enzyme nitrogenase. Nitrate assimilation: Nitrate and Nitrite reductase. Primary and secondary ammonia assimilation in plants; ammonia assimilation by glutamine synthetase-glutamine oxoglutarate amino transferase (GS-GOGAT) pathway. Seed storage proteins in legumes and cereals. Sulphur Assimilation in Plants.

Module-II: Biochemistry of Human Hormones

Functions of hormones and their regulation. Chemical signaling - endocrine, paracrine, autocrine, intracrine and neuroendocrine mechanisms. Chemical classification of hormones, Classification of Hormones Biosynthesis, Storage, Secretion, Transport and Metabolic effects (including hypo and hyper conditions) of Hormones of Pituitary, Hypothalamus, Thyroid, Parathyroid, Pancreas, Adrenal Medulla, Adrenal Cortex, Gonads, Kidneys and G I Tract and their half-lives. Hormone therapy. General introduction to Endocrine methodology. Hormone receptors - extracellular and intracellular. Receptor - hormone binding, Scatchard analysis. G protein coupled receptors, G proteins, second messengers - cAMP, cGMP, IP3, DAG, Ca^{2+}, Effector systems - adenyl cyclase, guanyl cyclase, PDE, PLC. Protein kinases (PKA, PKB, PKC, PKG). Receptor tyrosine kinases - EGF, insulin and Ras - MAP kinase cascade. **Non-receptor** tyrosine kinase erythropoietin receptor JAK - STAT pathway. Steroid hormone Receptor. Receptor regulation and cross talk**.**

Module-III: Biochemistry of Tissues

Muscles: Structure of Skeletal, smooth and cardiac muscle, Molecular mechanisms of skeletal muscle contraction: role of troponin, tropomyosin, and calcium in contraction, excitation-contraction coupling. Smooth muscle contraction and its control. Excitation-contraction coupling in cardiac muscle. Twitch, myosin ATPase activities, The motor unit, Role of calmodulin, muscular dystrophies. **Bones:** Composition, formulation, Structure and functions, factors affecting bone metabolism, bone remodelling, osteoporosis, osteomalacia. **Connective Tissue**: Biosynthesis, composition, structure and metabolism of Collagen and its Disorders-Ehler‟s Syndrome (Type I to VII), Osteogenesis Imperfecta (Type I to IV).

Module-IV: Neurobiochemistry

Central Nervous system. Peripheral Nervous system. Blood brain barrier and CSF. Structure and maintenance of neurons. Functional classes of neurons. Membrane potentials: Resting Membrane Potential, Graded potentials, Action potential. Synapse: excitatory and inhibitory.

Temporal and spatial summation. Neurotransmitters (GABA, Acetylcholine, Dopamine) and neuromodulators (definition with examples). Somatic sensation: definition and cellular pathways of pain transmission and modulation. Biochemistry of memory mechanisms, Sensory Receptors of Taste, Vision, Odour, Hearing, Touch. Physiology of EEG, sleep.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Lehninger Principles of Biochemistry, Fourth Edition by David L. Nelson (Author), Michael M. Cox (Author)
- Biochemistry, Fourth Edition by Donald Voet, Judith G. Voet.
- Plant biochemistry, Second Edition by Goodwin, Mercer.
- Neuroscience Exploring the Brain, Fourth Edition by M. F. Bear, B.W. Connors, M.A. Paradiso

STRUCTURAL BIOLOGY

Course Code: BCH4202 **Credit Units: 03**

Course Objective: This course will provide students with a detailed knowledge about protein structure, allowed and disallowed conformations, protein folding and functions. An insight into protein crystallography will be given which will familiarize students with the theoretical knowledge of solving protein structures.

Course Contents:

MODULE-I: MACROMOLECULAR STRUCTURE

Structure of proteins. nucleic acids; membranes, action of other biologically important molecules and molecular assemblies like ribosomes, nucleosomes; functional significance of structure. Van der Waals radii of atoms (equilibrium separation (between non covalently bonded atoms) –contact distance criteria; Noncovalent forces determining biopolymer structure; dispersion; forces; electrostatic interactions; van der Waals interactions; hydrogen bonds; hydrophobic interactions; distortional energies; description of various interactions by potential functions; principles of minimization of conformational energy.

MODULE-II: PRINICPLES OF PROTEIN STRUCTURE

Structural implications of the peptide bond; rigid planar peptide unit; cis and trans configuration; conformations of a pair of linked peptide units; 8 torsion angles phi and psi -steric hindrance; hard sphere approximation; allowed and disallowed conformations; Ramachandran Diagram; conformational maps for glycine and other natural amino acids; conformationally constrained amino acids and their importance., Intrinsically disordered protein

MODULE-III: MACROMOLECULAR CRYSTALLOGRAPHY

DNA External features and symmetry – unit cell and Miller indices – seven
crystal systems – Bravais lattices – point groups and space groups – X-ray diffraction – Bragg's law Generation, detection and properties of X-rays-choice of radiation, Patterson function synchrotron radiation Powder photographs – interpretation of powder photograph – ASTM index. Theory of diffraction by helical structures and application to alpha-helix and. Steps and Procedures of structure solution: MR, MIR, MWAD, SWAD. Dynamic nature of proteins, protein folding problem, Levinthal's paradox, energy landscape theory, introduction to small angle x-ray scattering (SAXS).

MODULE-IV: DLS, NMR and EPR

Theory of Dynamic Light Scattering, Hydrodynamic Diameter, Number average diameter, volume average diameter, Intensity average diameter. NMR spectroscopy, relaxation methods, CW and FT NMR, chemical shift, spectra of aldehyde, ketone, alcohol and steroids, magic angle, 2D NMR, TOCSY, NOSEY, COSEY. Fundamentals of EPR.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Lehninger Principles of Biochemistry, Fourth Edition by David L. Nelson (Author), Michael M. Cox (Author)
- Crystallography Made Crystal Clear: A Guide for Users of Macromolecular Models.

GENETICS

Course Code: BCH4203 **Credit Units: 04**

Course Objective: To provide students with an overview of the principles of plant and animal genetics including Mendelian and modern concepts of heredity. Developments in molecular genetics will be addressed through the chemistry and physiology of the gene and the nature of gene action in prokaryotic and eukaryotic cells. This course will also provide students with knowledge of the diseases arising out of genetic disorders.

Course Contents:

MODULE-I: PRINCIPLES OF GENETICS

Model systems in genetic analysis: *E.coli*, Neurospora crassa, yeast, Drosophila, Arabidopsis, Maize, *C. elegans*, Zebra fish. Mendelian Genetics- Concept of allele, Mendel's Laws of Inheritance, Mendelian Genetics in Eukaryotic life cycles with specific examples from plants, Drosophila and human. Chromosome theory of inheritance, chromosome segregation in meiosis, formation and function of synaptonemal complex, crossing over and chiasmata formation, genes affecting mitosis & meiosis, cytological basis of crossing over. Extensions to Mendelism: Codominance, incomplete dominance, gene interactions, multiple alleles with specific example of ABO blood group in humans, pleiotropy, penetrance and expressivity. Genes and environment: norm of reaction, phenocopies sex limited and sex influenced characters. - pseudo alleles- Rh blood group incompatibility; complex loci ; complementation test in Genetics, Extra chromosomal inheritance: Inheritance of mitochondrial and chloroplast genes, maternal inheritance. Role of genetics in Agriculture, Industry and medicine.

MODULE-II: LINKAGE & MAPPING TECHNIQUES

Linkage: Discovery, coupling versus repulsion of syntenic alleles Genetic mapping: Recombination frequency and map construction, genetic mapping in a three-point test cross, examples of linkage maps, coincidence and interference. Haploid mapping-tetrad analysis in fungi; unordered (yeast)and ordered (*Neurospora*) spores; chi-square test for linkage, LOD score for linkage testing. Physical mapping: Somatic cell hybridization for positioning genes on chromosomes and physical maps using molecular markers, DNA polymorphism in mapping. Polygenic inheritance, QTL mapping and development of mapping population in plants.

MODULE-III: HUMAN GENETICS I

History and development of Human genetics- hereditary traits, genetics and disease; organization of the Human genome; Unique & Repetitive DNA ,; Methods of genetic study in humans (Pedigree analysis, Chromosomal, Biochemical and Somatic cell genetics analysis); Sex –linked, sex-limited and sex-influenced traits. Human Genome Project Chromosomal Basis of genetic disorders: Karyotyping and identification of chromosome variation, Metabolic disorders, inter-allelic and intra-allelic heterogeneity; defects in membrane transport (cystic fibrosis), defects in structural proteins (DMD and BMD),collagen disorders (Osteogenesis imperfecta), Genetical factors in common diseases- congenital defects, coronary heart disease, diabetes, cancers, mental diseases, genetic counselling,

MODULE IV: HUMAN GENETICS II

Pharmacogenomics**:** Pharmacogenetics, genetics of globin triplet repeat disorders, Effects of drugs in individual and susceptibility: Acetylation polymorphisms, Succinyl choline sensitivity and G6PD deficiency. Cancer genetics and immunogenetics

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Genetics, Fourth Edition by P.K. Gupta.
- Principles of Genetics, 8th edition by Gardener, Simmons, Snustad.
- Genetics, Third edition by Strickberger, Monroe W.
- Principles of Genetics, 7th edition by Robert H. Tamarin

CLINICAL BIOCHEMISTRY

Course Code: BCH4204 **Credit Units: 03**

Course Objective: The objective of the course is to provide students with a knowledge of the various diseases arising due to disorders in the biochemical processes of cells, involving the hepatobiliary, myocardial and endocrinal systems. It also provides preliminary knowledge of cancer biology. This course also provides in-depth knowledge of amino acid and Nucleic acid metabolism and disorders

Course Contents:

MODULE-I: Introduction to Clinical Biochemistry

Definition and scope of Clinical Biochemistry in diagnosis, collection and preservation of biological fluids (Blood, Urine, CSF), normal value of important constituents of blood, CSF and urine. Blood Clotting – Disturbances in blood clotting mechanisms – haemorrhagic disorders – haemophilia, von Willebrand's disease, purpura, Rendu-Osler-Werber disease, thrombotic thrombocytopenic purpura, disseminated intravascular coagulation, acquired prothrombin complex disorders, circulating anticoagulants.

MODULE-II: Disorders of Carbohydrate, Lipid and Amino acids Metabolism

Disorders of Carbohydrate Metabolism – Diabetes mellitus, glucose and galactose tolerance tests, sugar levels in blood, renal threshold for glucose, factors influencing blood glucose level, glycogen storage diseases, G6PD, pentosuria, galactosemia. **Disorders of Lipids** – Plasma lipoproteins, cholesterol, triglycerides & phospholipids in health and disease, hyperlipidemia, hyperlipoproteinemia, Gaucher's disease, Tay-Sach's and Niemann-Pick disease, ketone bodies, Abetalipoproteinemia. **Catabolism, Biosynthesis and disorders of Amino Acid metabolism;** Catabolic pathways of individual amino acids. Glucogenic and ketogenic amino acids. Metabolism of one carbon units. Disorders of amino acid metabolism, phenylketonuria, alkaptonuria, maple syrup urine disease, methyl malonic acidemia (MMA), homocystinuria and Hartnup's disease. Overview of amino acid synthesis. Biosynthesis of non-essential amino acids and its regulation. *De novo* synthesis of purine and pyrimidine nucleotides, regulation and salvage pathways. Digestion of nucleic acids, degradation of purine and pyrimidine nucleotides. Inhibitors of nucleotide metabolism. **Metabolic disorder of nucleotides:** gout, Lesch-Nyhan Syndrome, SCID, adenosine deaminase deficiency. Artherosclerosis and its risk factor.

MODULE-III: Diseases caused due to misfolded proteins and **Autoimmune diseases**

Alzheimer's, Huntington's diseases, Kuru, Creutzfeldt-Jakob disease, Sickle Cell anaemia, Thalassemia. Concepts in immune recognition-self and non-self-discrimination, organ specific autoimmune diseases-Hashimoto's thyroiditis, Graves' disease, Myasthenia Gravis, Diabetes Melitus-I, Systemic diseases: Systemic lupus erythematosus (SLE), Rheumatoid arthritis.

MODULE-IV: Infectious diseases and Hormonal imbalances

Viral infection: Polio, Measles, Mumps, influenza, HIV. Bacterial infections: Tetanus, Diphtheria, Tuberculosis, Typhoid, Cholera. Protozoan: Malaria and Trypanosomiasis. Parasitic infections: Leishmania. Hormonal imbalances leading to disease: Diabetes Insipidus, Acromegaly, Gigantism, Dwarfism, Goitre, Cretinism, Cushing and Conn's syndrome, Addison's disease.

Module-V: Organ Functional test and Diagnostic Enzymes

Enzymes in health and diseases. Biochemical diagnosis of diseases by enzyme assays – SGOT, SGPT, CPK, cholinesterase, LDH. Kidney and liver functional test, Jaundice, Hepatitis, pancreatic, gastric and

intestinal functional test, myocardial infarction test.

Module-VI: Cancer Biology and *In vitro* fertilization

Cancer Biology: Phenotypic characters of cancer cells; Genetic basis of cancers: Protooncogene, Oncogene, Tumor suppressor genes, Hodgkin's and Non- Metastasis, anti-cancer drugs & chemotherapy. Fundamentals of IVF.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Books recommended:

- Notes on clinical chemistry- Whitby-Smith-Beekett-Walker. Balackwell Sci, Inc.
- Principle of internal Medicine- Harison T. R. McGrow Hill, NY.
- Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4
- Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley & Sons, Inc (New Jersey), ISBN; 978-0-470-08158-7
- Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J. L. and Stryer, L., W.H Freeman and Company (New York)
- Genetics (2012) 6th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons. (Singapore) ISBN: 978-1-118-09242-2
- Klein's Microbiology, (2008) 7 ed., Prescott, Harley, Wiley, J.M. Sherwood, L.M. Woolverton, C.J. Mc Graw Hill International Edition (New York) ISBN: 978-007-126727

IMMUNOLOGY

Course Code: BCH4209 **Credit Units: 03**

Course Objective: The objective of this course is to familiarize students about the structural features of the components of the immune system as well as their functions. An overview of clinical immunology will help students understand the utmost importance of this particular branch of science.

Course Contents:

MODULE-I: Cellular basis of Immunity
Historical Perspective, Innate and Adaptive Immunity, Hematopoiesis, cells of the immune system, primary and secondary lymphoid organs and tissues. Anatomical barriers, cell types of innate immunity, soluble molecules and membrane associated receptors (PRR), connections between innate and adaptive immunity, localized and systemic response. Complement activation by classical, alternate and MB lectin pathway, biological consequences of complement activation, regulation and complement deficiencies

MODULE-II: Antigens and Antibody
Antigens, carriers, adjuvants and haptens, factors responsible for immunogenicity, B and T cell epitopes. Structure, classes and subclasses of immunoglobulins, effector functions of antibody, antigenic determinants on Ig, Ig super family. Clonal selection theory of antibody production, monoclonal and polyclonal antibodies, poly reactive antibodies, catalytic antibodies, abzymes. Monoclonal antibodies production and applications

MODULE-III: Biology of the B Lymphocyte & T Lymphocyte
Dreyer-Bennett hypothesis, Clonal selection theory of antibody production, multigene organization of Ig locus, mechanism of V region DNA rearrangement, mechanisms of antibody diversity. Antigen independent phase of B cell maturation and selection, humoral response – T-dependent and T-independent response, anatomical distribution of B cell populations. General organization and inheritance of MHC, structure, distribution and role of MHC class I and class II proteins, pathways of antigen processing and presentation. Structure and role of T cell receptor (TCR) and co-receptor, T cell development, generation of receptor diversity, selection and differentiation. General properties of effector T cells, cytotoxic T cells (Tc), natural killer cells; NK - T cells and antibody dependent cellular cytotoxicity (ADCC).

MODULE-IV: Autoimmunity and Hypersensitivity
Self-tolerance and autoimmunity, Organ specific and systemic autoimmune diseases, Gell and Coombs classification, IgE mediated (Type I) hypersensitivity, antibody mediated cytotoxic (Type II) hypersensitivity, immune complex mediated (type III) hypersensitivity and delayed type (Type IV) hypersensitivity

MODULE-V: Transplantation Immunology and Vaccines
Immunological basis of graft rejection, clinical manifestations, immunosuppressive therapy and privileged sites. Vaccines - active and passive immunization, types of vaccines

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Kuby Immunology (2007) 6th ed., Kindt, T.L., Goldsby, R.A. and Osborne, B.A., W.H Freeman and Company (New York), ISBN:13: 978-0-7167-8590-3 / ISBN: 10:0-7617-8590- 0
- Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley& sons, Inc (New Jersey), ISBN: 978-0-470-08158-7.
- Janeway's Immunobiology 2012 8th ed., Murphy, K., Mowat, A., and Weaver, C.T., Garland Science (London & New York), ISBN: 978-0-8153-4243-4

TERM PAPER

Course Code: BCH4231 **Credit Units: 01**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Biochemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related to the contemporary research issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for term paper (List is indicative, not exhaustive)

- Molecular Biology
- Protein Biochemistry
- Immunology
- Biophysics
- Cell Biology
- Structural Biology
- Genetics

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

ADVANCED BIOCHEMISTRY LAB

Course Code: BCH4206 **Credit Units: 02**

Course Objective: To provide students hands-on training in the major instrumentation techniques common to biochemistry.

Course Contents:

1. Verification of Beer-Lambert‟s law and determination of absorption coefficients
2. Paper chromatography – Separation of amino acids and carbohydrates in a mixture
3. Thin layer chromatography of fatty acids
4. DNA Gel Electrophoresis
5. Isoelectric pH of casein
6. Amino Acid Assay by Ninhydrin Colorimetric Method
7. Determination of pKa of acetic acid and glycine.
8. Digestion of Protein into Amino Acid
9. Isolation of chloroplast from spinach leaves and estimation of chlorophyll content.
10. Separation of photosynthetic pigments by TLC
11. Isolation of mitochondria from liver and assay of marker enzyme SDH.
12. Determination of CMC of detergents.
13. Preparation of RBC ghost cell.
14. Study the photosynthetic O_2 evolution in hydrilla plant.
15. Isolation of Cytochrome C from Goat heart

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings

- Experimental Biochemistry- R.W. Switzer & L.F. Garrity (W.H.Freeman & Co.)
- Modern Experimental Biochemistry - R. Boyer (Pearson Education)
- Practical Biochemistry - K. Wilson & J. Walker (Cambridge Univ. Press)
- Laboratory Manual in Biochemistry - J. Jayaraman (Narosa Publishing House)
- Practical Biochemistry - D.T. Plummer (TATA McGraw-Hill)
- Practical Biochemistry - R.C.Gupta & S. Bhargava
- Experimental Physiology and Biochemistry - P.V.Chadha
- Experimental Biochemistry – A Student Companion - B.S. Rao & V. Deshpande,
- I.K. Interational Pvt. Ltd. (N. Delhi, Mumbai, Bangalore) 2005.

CELL BIOLOGY AND GENETICS LAB

Course Code: BCH4207 **Credit Units: 02**

Course Objective: To make the students visualize cellular proteins and genetic material, observe the basic cell division processes and learn to perform karyotyping studies so that they can have a clear understanding of the structural details and functions of chromosomes.

Practical's:

A) Cell Biology

1. Isolation & visualization of cellular proteins.
2. Quantification of cells by Trypan blue exclusion dye.
3. Calculation of nucleolar frequency following haematoxyline staining
4. Understanding principles of cell culture and aseptic techniques.
5. Preparation of adhesion and suspension cell cultures.
6. Assessment of proliferation in cultured cells by MTT assay.
7. Observation of DNA fragmentation in apoptotic cells

B) Genetics

Plant/Animal/Human Cytogenetics:

1.Squash preparation from root tips of Allium cepa, analyzing metaphase chromosomes and preparation of karyotype.
2. Squash preparation from root tips of Allium sativum, analyzing metaphase chromosomes and preparation of karyotype.
3. Squash preparation from root tips/shoot tips of Nigella sativa/ Aloe vera, analyzing metaphase chromosomes and preparation of karyotype.
4. Squash preparation of salivary glands of Dipteran larva to observe polytene chromosomes.
5. Induction of polyploidy in onion roots.
6. Estimation of mitotic index from root tips of Allium cepa
7. Estimation of mitotic index from root tips of Allium sativum.
8. Karyotype identification (from photographs) and explaining aspects of chromosome structure / behaviour crucial for interpreting results of chromosome analysis.
9. Study of different human pedigrees (from photographs)
10. Study different stages of meiosis by temporary preparation in flower buds (Sagittaria sp./ Rhoeo sp./Setcreasea sp./ Allium cepa) / grasshopper testes .
11. Identification of mitotic and meiotic chromosomes of humans from permanent slides.
12. Smear technique to demonstrate sex chromatin in buccal epithelial cells.
13. Banding techniques in the production of various cytogenetic preparations.

Molecular Genetics:

1. Demonstrate familiarity with databases of information pertaining to genes, markers, maps and diseases such as Online Mendelian Inheritance in Man (OMIM) and Medline;
2. Understanding the principles of designing oligonucleotide primers for PCR and utilization of relevant software;
3. PCR applications in assigning genotypes to RFLP / VNTR sequences; screening samples for identified mutations.

Biochemical /Pharmacogenetics:

Electrophoretic screening for enzyme polymorphisms; estimation of enzyme deficiency / drug sensitivity.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings

- Experimental Biochemistry- R.W. Switzer & L.F. Garrity (W.H.Freeman & Co.)
- Modern Experimental Biochemistry - R. Boyer (Pearson Education)
- Practical Biochemistry - K. Wilson & J. Walker (Cambridge Univ. Press)
- Laboratory Manual in Biochemistry - J. Jayaraman (Narosa Publishing House)
- Practical Biochemistry - D.T. Plummer (TATA McGraw-Hill)
- Practical Biochemistry - R.C.Gupta & S. Bhargava
- Experimental Physiology and Biochemistry - P.V.Chadha
- Experiments in Microbiology - Gilstrap-Kleyn-Nester
- Experimental Biochemistry – A Student Companion - B.S. Rao & V. Deshpande,
- I.K. Interational Pvt. Ltd. (N. Delhi, Mumbai, Bangalore) 2005.

CLINICAL AND PROTEIN BIOCHEMISTRY LAB

Course Code: BCH4208 **Credit Units: 02**

Course Objective: To provide students with hands-on-training in various estimation using urine and blood. This course also provides intensive lab training of various proteins and enzyme parameters.

Clinical Biochemistry Lab

- Absorption spectrum of hemoglobin isolated from whole blood.
- **Qualitative and quantitative analysis of:**
  Urine (urea, uric acid, glucose, proteins, Bence-Jones proteins, Cl-, PO3-3, Ca+2 Estimation of creatinine)
- Experiments on blood:
  A. Identification and count of blood corpuscles
  B. Estimation of haemoglobin
  C. Determination of A/G ratio in serum
- Blood pressure measurement
- Glucose tolerance test
- Estimation of serum T4
- HCG based pregnancy test
- Estimation of serum electrolytes
- Isolation and estimation of serum cholesterol
- Lipid Profile: Triglyceride, Cholesterol
- Blood grouping
- Anthrompometric measurements: BMI, Waist/Hip Ratio, Mid Arm Muscle Area (MAMA), Mid Arm Area (MAA).
- Case studies: Renal clearance, ECG, LFT, EEG
- Separation of isoenzymes of LDH by electrophoresis.
- Assay of serum transaminases – SGOT and SGPT.
- Estimation of serum urea.
- Estimation of serum uric acid.
- Estimation of serum creatinine.
- Estimation of bilirubin
- Assay of glutamate dehydrogenase

Protein Lab

- Estimation of proteins by Biuret / Lowry / Bradford method and UV absorbance measurements.
- Ammonium sulphate fractionation of crude homogenate from germinated mung beans
- Enzyme activity assay
- Assay to determine enzyme activity and specific activity
- Progress curve plot for an enzyme
- Effect of pH/temperature on enzyme activity
- Determination of Km and Vmax using Lineweaver-Burk plot.
- Calculation of inhibitory constant (Ki) for an enzyme
- SDS-PAGE analysis of proteins
- Desalting Chromatography

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings

- Experimental Biochemistry- R.W. Switzer & L.F. Garrity (W.H.Freeman & Co.)
- Modern Experimental Biochemistry - R. Boyer (Pearson Education)
- Practical Biochemistry - K. Wilson & J. Walker (Cambridge Univ. Press)
- Laboratory Manual in Biochemistry - J. Jayaraman (Narosa Publishing House)
- Practical Biochemistry - D.T. Plummer (TATA McGraw-Hill)
- Practical Biochemistry - R.C.Gupta & S. Bhargava
- Experimental Physiology and Biochemistry - P.V.Chadha
- Experiments in Microbiology - Gilstrap-Kleyn-Nester
- Experimental Biochemistry – A Student Companion - B.S. Rao & V. Deshpande,
- I.K. Interational Pvt. Ltd. (N. Delhi, Mumbai, Bangalore) 2005.
- Lehninger: Principles of Biochemistry (2017) 7th ed., Nelson, D.L. and Cox, M.M. W.H. Freeman & Company (New York), ISBN: 13: 978-1259903885 / ISBN: 10-1259903885.
- Vander's Human Physiology (2019) 15th ed., Widmaier, E.P., Raff, H. and Strang, K.T. McGraw Hill International Publications (USA), ISBN: 978-0-07-128366-3
- Endocrinology (2007) 6th ed., Hadley, M.C. and Levine, J.E. Pearson Education (New Delhi), Inc. ISBN: 978-81-317-2610-5.
- The Cell: A Molecular Approach (2009) 5th Ed. Cooper, G.M. and Hausman, R.E. ASM Press & Sunderland, (Washington DC), Sinauer Associates. (MA). ISBN:978-0-87893-3
- Vander's Human Physiology (2019) 15th ed., Widmaier, E.P., Raff, H. and Strang, K.T., McGraw Hill International Publications (New York), ISBN: 978-1259903885
- Human Physiology (2018) 15th ed., Stuart Ira Fox., McGraw Hill International Publications, (New York) ISBN 978-1259864629.
- Textbook of Medical Physiology (2016) 13th ed., Guyton, A.C. and Hall, J.E., Reed Elseviers India Pvt. Ltd. (New Delhi). ISBN: 978-1455770052
- Introduction to Human Physiology (2012) 8th edition; Lauralee Sherwood. Brooks/Cole, Cengage Learning. ISBN-13: 978-1133104544
- Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.

Syllabus - Third Semester

RECOMBINANT DNA TECHNOLOGY

Course Code: BCH4301 **Credit Units: 03**

Course Objective: Recombinant DNA technology deals with genetic manipulation of Bacteria/Virus/ /plants/animals by incorporating DNA sequences from different sources into a and finds its application in plant/animal genomics, Cell Biology, Signaling and clinical research. This course will help students in understanding the tools used in gene exploration, creation of genomic library, cloning and expression of proteins,

Course Contents:

MODULE-I: Fundamentals of Gene Cloning
Restriction and modification systems, restriction endonucleases and other enzymes used in manipulating DNA molecules. sticky ends, blunt ends, linkers and adapters, homopolymer tailing, Synthetic oligonucleotides. Ligation of DNA molecules.

MODULE-II: Cloning Vectors
Plasmids and bacteriophages as vectors for gene cloning. Cloning vectors based on *E. coli* plasmids, pBR322, pUC8, pGEM3Z. Cloning vectors based on M13 and λ bacteriophage, and in vitro packaging. Vectors for yeast, Ti-plasmid, and retroviral vectors, high capacity vectors BAC and YAC.

MODULE-III: Transformation, Transfection and Gene Libraries
Uptake of DNA by cells. Selection and identification for transformed cells, insertional inactivation, blue-white selection. Transfection. Chemical and physical methods of DNA introduction into cells. The problem of selection, direct selection, marker rescue. Identification of recombinant phages, cDNA and Genomic libraries, identification of a clone from gene library, colony and plaque hybridization probing, Southern and Northern hybridization, methods based on detection of the translation product of the cloned gene.

Module-IV: PCR, DNA Sequencing and
Fundamentals of polymerase chain reaction, Types of PCR; hot start, multiplex, two step, reverse transcriptase PCR and Nested PCR, quantitative PCR, Primer designing for PCR. Cloning PCR products. DNA sequencing by Sanger's method including Automated Sanger's DNA sequencing. Introduction to Next Generation Sequencing.

Module-V: Expression of Cloned Genes Applications of Genetic Engineering
Vectors for expression of foreign genes in *E. coli*, cassettes and gene fusions. Hybrid promoters trc, tac, λpL and T7 promoter-based expression vectors, IPTG induction. Challenges in producing recombinant protein in *E. coli*. Production of recombinant protein by eukaryotic cells. Fusion tags such as, poly histidine, glutathione, maltose binding protein and their role in purification of recombinant proteins. Site–directed mutagenesis, Protein engineering (T4-lysozyme), yeast two hybrid systems, Production of recombinant pharmaceuticals such as insulin, human growth hormone, factor VIII. Recombinant vaccines. Gene therapy (SCID), Applications in agriculture – *Bt* cotton, glyphosate herbicide resistant crops, ethical concerns.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

References: -

- Gene Cloning and DNA Analysis (2010) 6th ed., **Brown, T.A**., Wiley-Blackwell publishing (Oxford, UK), ISBN: 978-1-4051-8173-0.
- Principles of Gene Manipulation and Genomics (2006) 7th ed., **Primrose, S.B., and Twyman, R. M.,** Blackwell publishing (Oxford, UK) ISBN:13: 978-1-4051-3544-3.
- Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., **Glick B.R., Pasternak**, J.J. and Patten, C.L., ASM Press (Washington DC), ISBN: 978-1-55581-498-4 (HC).
- Molecular Cloning: A laboratory manual (2014), 4nd ed., Michael R Green and J. **Sambrook** Cold spring Harbor laboratory press (3vol.), ISBN: 978-1-936113-42-2

ADVANCED GENETICS

Course Code: BCH4302 **Credit Units: 03**

Course Objective: This course will provide students with a knowledge of advanced genetics involving organization of nuclear and organelle genomes, structural details of chromosomes, gene mutation, repair, genetic toxicology and microbial genetics.

Course Contents:

MODULE-I: DNA Structure and Genome Organization

Building blocks of DNA structure, Watson and Crick model, features of the double helix, various forms of DNA, denaturation and renaturation of DNA, C_0t curve, hyperchromicity, melting temperature, factors affecting Tm of DNA molecules. Eukaryotic genome organization: Nucleosome structure and packaging of DNA into higher order structures. Linking number. Genome organization in viruses and prokaryotes. c-value paradox. Epigenetics: Histone code, Monoallelic expressions & Genomic imprinting.

MODULE-II: Cytogenetics, Transposition & Recombination

Techniques in the study of mitotic and meiotic chromosomes: Banding, karyotyping, chromosome labeling/painting, *in situ* hybridization. Satellite DNAs, premature chromosome condensation. Special types of chromosomes: B-chromosome, polytene and lambrush chromosomes; Numerical and structural changes in chromosome, genetic implications of ploidy. Dosage compensation and mechanism of sex determination in plants and animals. Mechanism of transposition in prokaryotes and eukaryotes: Transposable Elements, LINES, SINES, Alu family, mechanisms of DNA amplification. Controlling elements in maize, *Drosophila* P element. Recombination: Homologous and non-homologous recombination. Role of Spo 11 and MRX protein in Meiotic recombination, Gene Conversion. Genome evolution.

MODULE-III: DNA Mutation, Repair & Genetic Toxicology

DNA Mutation and Repair: Gene mutation types and its mechanism, spontaneous vs induced, Point mutations; Missense; Nonsense mutations Forward; Reverse; Intragenic and Extragenic suppressor; Somatic versus germinal mutation. Mutant types-lethal, conditional, biochemical., Inborn errors of metabolism, Mutation detection systems, Mutation induction, Gain of function and loss of function mutations in cancer Mutagens in genetic dissection. Radiation genetics. Molecular basis of gene mutations. DNA Repair mechanisms: Damage Reversal, Excision repair, double-strand break repair & post replicative repair. Repair defects and human diseases. Systems that safeguard DNA. Importance with reference to carcinogenesis,

Genetic Toxicology: Genotoxicity-classification of genotoxic agents, genotoxic test systems. Teratogenicity, DNA damage and genome instability, Endogenous metabolism and DNA damage, Exogenous factors (irradiation and carcinogens),

MODULE IV: Microbial Genetics

Methods of genetic transfers- Transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating. Fine structure of genes: Principles of gene regulation, concept of operons, negative and positive regulation, regulatory proteins, activators, repressors, regulation of lac, trp, ara and his operons. **Concept of split genes, pseudogenes, overlapping genes and multigene families.**

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

References/Texts:

1. Genetics, Fourth Edition by P.K. Gupta.
2. Principles of Genetics, 8th edition by Gardener, Simmons, Snustad.
3. Genetics, Third edition by Strickberger, Monroe W.
4. Principles of Genetics, 7th edition by Robert H. Tamarin
5. Prescott's Microbiology, 10th edition by Wiley J.M.

MOLECULAR BIOLOGY

Course Code: BCH4303 **Credit Units: 03**

Course Objective: The objective of the course is to introduce to the students the basic concepts of DNA replication, how genes are transcribed and how translation takes place in prokaryotes and eukaryotes and how these processes are regulated, so that students can apply this knowledge in enhancing their analytical and problem-solving skills.

Course Contents:

Module-I: Replication

General features of replication, the chemistry of DNA synthesis, DNA polymerase, the replication fork, enzymes and proteins in DNA replication, E coli DNA polymerases, topoisomerases and their classification. Linking numbers, Topoisomerase inhibitors and their clinical importance. Stages of replication-initiation, elongation and termination, origin of replication, relationship between replication and cell division, replication in eukaryotes, end replication problem, telomerase, various modes of replication. Comparison of replication in prokaryotes and eukaryotes. Inhibitors of DNA replication and applications in medicine.

Module-II: Transcription and RNA Splicing

Transcription in prokaryotes; Comparison between transcription and DNA replication, RNA polymerases, transcription cycle in bacteria, sigma factor, bacterial promoters, various stages of RNAsynthesis, initiation, elongation and termination, rho-dependent and rho-independent termination. Inhibitors of transcription and applications as antimicrobial drugs. Comparison between prokaryotic and eukaryotic transcription. **Transcription in eukaryotes**; The three classes of eukaryotic RNA polymerases, transcription by RNA polymerase II, RNA polymerase II core promoters, general transcription factors, transcription by RNA polymerase I and III. Transcription control. Inhibitors of eukaryotic transcription and their applications. **RNA Processing;** Various types of RNA processing-polyadenylation and capping, processing of rRNA and tRNA. Chemistry of RNA splicing, the spliceosome machinery, splicing pathways, group I and group II introns, alternative splicing, exon shuffling and RNA editing.

Module III: Translation

Salient features of the genetic code, triplet nature, degenerate, wobble in the anticodon. Experimental approaches used to decipher the genetic code. Suppressor tRNAs. Exceptions to the nearly universal genetic code. Messenger RNA, transfer RNA, charging of tRNA. The structure of ribosome. Three stages of translation-initiation, elongation and termination. Translation in eukaryotes. Regulation of translation. Comparison of prokaryotic and eukaryotic protein synthesis. Inhibitors of translation and their clinical importance.

MODULE- IV: Eukaryotic Gene expression & Molecular Virology

Gene Expression: Regulating expression of eukaryotic genes. Role of chromatin in gene expression and silencing, enhancers and insulators, activators and repressors, Regulatory RNAs in eukaryotes: synthesis and mechanism of siRNA and miRNA. **Molecular Virology:** Nature and classification: The viral particles: capsid, envelope, other Virion components, Prion, complex viruses. Isolation and cultivation of viruses.

Virus purification, Assay of animal, bacterial and plant viruses. Multiplication of bacteriophages from infection to maturation and release. Abortive infection. Viral interference and interferon. Viral diseases. General outline with specific examples of common plant pathogenic viruses.

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Biochemistry (3rd /4th/5th edition) L. Stryer, WH Freeman and Co.
- Molecular biology of the gene, Vol I and II (4TH ed) J D Watson, Benjamin/Cummings publ. Co Inc.
- Molecular cell biology (1988) J Darnell and D. Baltimore, W, H Freeman and Co.
- Molecular biology of the Cell, B. Alberts, Garland Pub. In., NY
- Genes (2nd ed), B. Lewin, John Wiley and sons, NY.

MOLECULAR BIOLOGY AND MICROBIOLOGY LAB

Course Code: BCH4306 **Credit Units: 02**

Course Objective: To provide training and experience in some important microbiological and molecular biology techniques.

MICROBIOLOGY PRACTICALS:

1. Preparation of glassware for microbiological work, cotton plugs, medium and their sterilization
2. Sterilization of heat sensitive material by filtration.
3. Preparation and sterilization of medium, preparation of slants and stabs, pouring of medium into plates.
4. Serial dilution, plating for counting colonies.
5. To perform various culture transfer techniques: Streaking, Spreading, Pouring, sub culturing.
6. Isolation of microorganisms from soil and water collected from different places.
7. Single colony isolation techniques and its preservation.
8. Examination of microorganisms: Simple staining, Gram staining, Acid Fast Staining
9. To prepare temporary mount of algae (spirogyra)
10. To prepare temporary mount of fungi (Penicillium)
11. Endospore staining
12. Staining of flagella
13. Staining of capsule
14. localization of root nodule bacteria by staining.
15. Study of different shapes of bacteria, fungi, algae, protozoa using permanent slides/pictographs
16. Study the morphological structures of viruses (DNA and RNA) and their important characters using electron micrographs.
17. Bacterial growth studies: Bacterial number counting by haemocytometer, colony counting, bacterial growth curve, determination of generation time.
18. Antibiotic sensitivity tests, antibiotic assay by paper disc / cup method, MIC determination.
19. Purification of α-amylase from *Bacillus aminolucifecieus*.

MOLECULAR BIOLOGY PRACTICALS:

1. Isolation of chromosomal DNA from *E coli* cells
2. To hydrolyze DNA and separate nucleotide bases by paper chromatography
3. To plot ultraviolet absorption spectrum of DNA
4. Determination of DNA concentration by A260nm
5. Determination of the melting temperature
6. Estimation of DNA by diphenylamine
7. Separation, identification and estimation of free amino acids.
8. Study of Immuno-electrophoresis
9. Estimation of RNA by Orcinol Method
10. Extraction of total nucleic acids from plant tissue
11. To study growth curve and diauxic growth curve effect in *E. coli*
12. Isolation of total RNA from bacteria/yeast

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Experiments in Microbiology - Gilstrap-Kleyn-Nester.
- Experiments in Molecular Biolgy, Biochemical Applications by Zachary F. Burton and Jon M. Kaguni.
- Practical Protocols in Molecular Biology by Yongming Li, Yugi Zhao.
- Essential Molecular Biolgy: A practical Approach, Vol II by Terence Austen Brown.

INSTRUMENTATION AND GENETIC ENGINEERING LAB

Course Code: BCH4307 **Credit Units: 02**

Course Objective: To provide training to students in handling of some important instruments in laboratory for performing some biological experiments. This also provide immense knowledge of practical aspects of recombinant DNA technology and the various techniques for DNA manipulation in prokaryotes and eukaryotes.

Course Contents:

1. Conductometry: Estimation of Cl- or SO4 by conductometric precipitation titration.
2. Viscometric study of DNA and protein denaturation
3. Size exclusion chromatography for separation of a mixture proteins
4. Separation of amino acid acids by TLC/paper chromatography
5. To perform agarose gel electrophoresis
6. Separation of protein by ion-exchange chromatography
7. Separation of protein by SDS-PAGE
8. EMSA (virtual lab)
9. Virtual lab on Microarray profiling or 2D-DIGE
10. Virtual Lab of Primer designing
11. Virtual lab on extraction of sequence from genomic and cDNA libraries.
12. Virtual lab of PCR, Restriction digestion and Cloning and Vector analysis.
13. DNA estimation by UV spectrophotometry.
14. Transformation, Competent cell preparation and Isolation of plasmid DNA from *E. coli*
15. Amplification of a DNA fragment by PCR.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings:

- Experimental Biochemistry- R.W. Switzer• & L.F. Garrity (W.H.Freeman & Co.)
- Modern Experimental Biochemistry - R. Boyer (Pearson Education)
- Practical Biochemistry - K. Wilson & J. Walker (Cambridge Univ. Press) Laboratory Manual in Biochemistry - J. Jayaraman (Narosa Publishing House)
- Practical Biochemistry - D.T. Plummer (TATA McGraw-Hill)• Practical Biochemistry - R.C.Gupta & S. Bhargava Experimental Physiology and Biochemistry - P.V.Chadha
- Experiments in Microbiology - Gilstrap-Kleyn-Nester
- Experimental Biochemistry – A Student Companion - B.S. Rao & V. Deshpande, I.K. Interational Pvt. Ltd. (N. Delhi, Mumbai, Bangalore) 2005.

SUMMER INTERNSHIP / STUDY ABROAD PROGRAM

Course Code: BCH4335 **Credit Units: 06**

Methodology:
Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or any in any related industrial unit or in any research lab. The students are to learn various industrial, technical and administrative processes followed in the industry/research. In case of on campus training the students will be given specific tasks of synthesizing /testing/analysis/characterization. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation of the same.

Examination Scheme

Feedback from Industry:	20
Training Report:	40
Viva:	15
Presentation:	25
Total	**100**

MICROBIOLOGY

Course code: BCH4308 **Credit Units: 03**

Course objective: The objective of the course is to trace the history of development of the discipline of Microbiology and to emphasize the existence of the immense diversity in the microbial world and maintenance of microbes under laboratory conditions.

Module I: History of Microbiology, Diversity of Microbial world and Microbial Cell organization

History of development of microbiology as a discipline, Spontaneous generation versus biogenesis, contributions of Anton von Leeuwenhoek, Joseph Lister, Paul Ehrlich, Richard Petri, Charles Chamberland, Edward Jenner, Louis Pasteur, Robert Koch, Martinus W. Beijerinck, Sergei Winogradsky, Alexander Fleming, Elie Metchnikoff and Emil von Behring Difference between prokaryotic and eukaryotic microorganisms. General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Archaea, Algae, Fungi and Protozoa) with emphasis on distribution, occurrence and morphology. Cell-wall: Composition and detailed structure of Gram positive and Gram-negative cell walls, mechanism of Gram's staining. Cell Membrane: Structure, function and chemical composition of bacterial and archaeal cell membranes.

Module-II: Microbial Nutrition, Growth Pathogenicity of Microorganisms and Antimicrobial Chemotherapy

Nutritional types of microorganisms, growth factors, culture media- synthetic and complex, types of media; isolation of pure cultures, growth curves, mean growth rate constant, generation time; influence of environmental factors on growth of microbes: effect of pH, temperature, solute, oxygen concentration, pressure and radiations. Sterilization, disinfection and antiseptics. Use of physical methods (heat, low temperature, filtration, radiation) and chemical agents (phenolics, halogens, heavy metals, sterilizing gases) in microbial control. Introduction to pathogenic microbes; Bacteria, Viruses, Algae, protozoa and fungi. General Characteristics of antimicrobial drugs, determining the level of microbial activity: dilution susceptibility test and disc diffusion test. Range of activity and mechanism of action of penicillin, vancomycin and tetracycline.

Module III: Food and Industrial Microbiology

Importance of microbiology in food and industries; Basic design of fermenter, continuous and discontinuous culture. Preparation of fermented food products such as yoghurt, curd and cheese. Preparation of alcoholic beverages like wine and beer. Single cell proteins. Treatment of waste water (Municipal treatment plant) and sewage. Bioremediation and biodegradation.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Suggested Readings:

- "Brock Biology of Micro-organisms 10e" Michael M. Madigan, John Martinko, Jack Parker
- **Principles of Genetics,** by Eldon J. Gardner (Author), D.Peter Snustad (Editor), Michael Simmons (Editor).
- General Microbiology, 7th edition by Hans G. Shlegel
- Prescott‟s Microbiolgy by Joanne Willey, Linda Sherwood and Chris Woolverton.
- Microbiology by Pelczar.

ECOLOGY AND EVOLUTION

Course Code: BCH4310 **Credit Units: 03**

Course objective: The objective of the course is to make students have knowledge about the structure and functions of the ecosystem and evolution. This course will help students understand the inter-relationship between organisms in population and communities and the various types of pollution responsible for destroying the ecosystem, evolution prokaryotes and eukaryotes.

Course Contents:
Module-I: Ecology -I

The Environment: Physical environment; biotic environment; biotic and abiotic interactions. Habitat and Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement. Population Ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection); concept of metapopulation – demes and dispersal, interdemic extinctions, age structured populations. Species Interactions: Types of interactions, interspecific competition, herbivory, carnivory, pollination, symbiosis. Community Ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones. Ecological Succession: Types; mechanisms; changes involved in succession; concept of climax. Ecosystem Ecology: Ecosystem structure; ecosystem function; energy flow and mineral cycling (C,N,P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, estuarine).

Module-II: Ecology-II
Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India. Applied Ecology: Environmental pollution; global environmental change; biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches. Conservation Biology: Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves)

Module-III: Evolution and Behavior-I

Emergence of evolutionary thoughts Lamarck; Darwin–concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis. Origin of cells and unicellular evolution: Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism. C. Paleontology and Evolutionary History: The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale; Origins of unicellular and multi cellular organisms; Major groups of plants and animals; Stages in primate evolution including Homo.

Module-IV: Evolution and Behavior-II
Molecular Evolution: Concepts of neutral evolution, molecular divergence and molecular clocks; Molecular tools in phylogeny, classification and identification; Protein and nucleotide sequence analysis; origin of new genes and proteins; Gene duplication and divergence. The Mechanisms: Population genetics – Populations, Gene pool, Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution. Brain, Behavior and Evolution: Approaches and methods in study of behavior; Proximate and ultimate causation; Altruism and evolution-Group selection, Kin selection, Reciprocal altruism; Neural basis of learning, memory, cognition,

sleep and arousal; Biological clocks; Development of behavior; Social communication; Social dominance; Use of space and territoriality; Mating systems, Parental investment and Reproductive success; Parental care; Aggressive behavior; Habitat selection and optimality in foraging; Migration, orientation and navigation; Domestication and behavioral changes.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings:

- Ecology and Environment, 12th Edition by P.D.sharma.
- Fundamentals of ecology, 5th edition by Eugene P. Odum and Gary W. Barrett.
- The End of History and the Last Man, Francis Fukuyama
- Animal Behavior: An Evolutionary Approach, John Alcock

MICROBIOLOGY LAB

Course Code: BCH4311 **Credit Units: 02**

Course objective: To student learn fundamental experiments of Microbiology

Course Contents:

1. Observation of microorganisms using bright field microscope - Bacteria, Protozoa, Moulds and Yeasts, Algae – from natural habitat
2. Observation of microorganisms using staining techniques:
   a. Monochrome staining
   b. Negative /Relief staining (Capsule staining)
   c. Gram staining of bacteria
   d. Spore staining
3. Observation of motility in bacteria using:
   a. Hanging drop method and Cragie‟s tube method
   b. Swarming growth methods
4. Enumeration of yeast cells using a counting chamber
5. Cultivation of microorganisms:
   a. Preparation of simple laboratory nutrient media (solid and liquid) and using them to cultivate bacteria.
   b. Observation of the growth of cultures and reporting of colony and cultural characteristics (Nutrient and Mac Conkey‟s agar)
6. Isolation of bacteria by streak plate technique
7. Enumeration of bacteria from fermented food / soil / water by:
   a. Spread plate method
   b. Pour plate method
8. Aseptic transfer techniques (slant to slant, broth to broth, broth to agar and Agar to Agar)
9. Preservation of cultures on slants, soil and on grain surfaces; revival of these cultures and lyophilized cultures.
10. Checking sterilization efficiency of autoclave using a biological indicator (*B.stearothermophilus*)
11. Demonstration of checking of efficacy of chemical disinfectant: Phenol Coefficient Rideal Walker method)
12. Preparation of Winogradsky column and observation of different types of microorganisms using bright filed microscope.
13. Study of normal flora of skin:
    a. Cultivating and observing different morphoforms of bacteria from skin
    b. Study of effect of washing skin with soap and disinfectant on it‟s microflora
14. a. To study the effect of different parameters on growth of E. coli: pH, temperature, sodium chloride concentration
    b. Study of Oligodynamic action of heavy metal

Suggested Readings:

- Experiments in Microbiology - Gilstrap-Kleyn-Nester
- Wilson K. and Walker J.M. (2005) Principles and Techniques of Biochemistry and
- Molecular Biology. 6th Edition. Cambridge University Press.
  David T. Plummer (1993) An Introduction To Practical Biochemistry, 3rd Edition, Tata
- McGraw-Hill Publishing Company Limited, New Delhi

ECOLOGY AND EVOLUTION LAB

Course Code: BCH4313 **Credit Units: 02**

Course objective: To student learn basic experiments of Ecology and Evolution.

Ecology Lab:

1. Assessment of density, frequency and abundance of plants/animal in a community using various techniques i.e. transect, quadrate etc.
2. Determination of physical and chemical characteristics of soil.
3. Assessing influence of light, temperature and moisture on plant germination and growth.
4. Assessing influence of soil nutrient status on plant germination and growth.
5. Spatial variations of dissolved oxygen concentration in water and percentage saturation.
6. Dissolved free carbon dioxide dynamics in relation to pH and alkalinity of water.
7. Estimation of total hardness. total alkalinity and Salinity of water.
8. Estimation of Primary productivity and assessment of nutrient status of water bodies.
9. Microbial analysis of soil and water.
10. Study of insect diversity in soil.
11. Productivity determination of different ecosystems - Lindeman‟s efficiency.
12. Microbial analysis of soil and water.
13. Evolutionary studies on adaptive characters
14. Phylogenetic analysis

Suggested Readings:

- Field Sampling: Principles and Practices in Environmental Analysis, Conklin, A.R. Jr.,(2004), CRC Press.
- Practical Methods in Ecology, P.A. Henderson (2003).
- Principles and Standards for Measuring Primary Production, Fahey, T.J. and Knapp, A.K., (2007), Oxford University Press, UK
- Ecological Modeling, Grant, W.E. and Swannack, T.M., (2008), Blackwell.
- Fundamental Processes in Ecology: An Earth system Approach, Wilkinson, D.M., (2007), Oxford University Press, UK

Syllabus - Fourth Semester

DEVELOPMENTAL BIOLOGY AND NEUROLOGICAL DISORDERS

Course Code: BCH4408 **Credit Units: 03**

Course Objective: The objective of the course is to provide students with a detailed in-sight into the developmental biology and to develop fundamental understanding of Biochemistry behind neurological disorders.

Course Contents:

Module-I: Fundamentals of Developmental Biology

Basic concepts of development: Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development. **Gametogenesis, fertilization and early development:** Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination.

Module-II: Morphogenesis, Organogenesis & Programmed Cell Death

Morphogenesis and organogenesis in animals: Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis – vulva formation in *Caenorhabditis elegans*, eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development- larval formation, metamorphosis; environmental regulation of normal development; sex determination. **Morphogenesis and organogenesis in plants:** Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum.* **Programmed cell death, aging and senescence**

Module-III: Neurological disorders & Neurodrugs

Headache, facial pain, migraine, epilepsy, stroke, selected neurocutaneous diseases, movement disorder, Benign essential (familiar) tremor, Parkinsonism, Huntington‟s disease, multiple sclerosis, motor neuron disease, Myasthenia Gravis. Sedative-Hypnotic Drugs Ethyl alcohol and Inhalants CNS Depressants (Barbiturates, Anesthetics and Antiepileptics Anxiolytics Psychostimulants Cocaine & Amphetamines, Caffeine & Nicotine Opiates, Opioids, and Nonopioid Analgesics Opioid Analgesics Non-narcotic, Anti-inflammatory Analgesics Drugs Used to Treat Psychological Disorders Depression Bipolar Disorder Schizophrenia Parkinsonism Integration of Drugs and Psychological Therapy

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Suggested Readings:

- "Molecular biology of the Cell" by Albert et.al
- "Developmental biology" by Scott Gilbert.
- Lehninger Principles of Biochemistry, Fourth Edition by David L. Nelson (Author), Michael M. Cox (Author)
- Biochemistry, Fourth Edition by Donald Voet, Judith G. Voet
- Medical Neurobiology 1st Edition by Peggy Mason PhD (Author)
- Genetics, Third edition by Strickberger, Monroe W.

METHODOLOGIES OF BIOCHEMISTRY

Course Code: BCH4409 **Credit Units: 03**

Course Objective: The objective of the course is to provide students with a sound background of latest techniques used in biochemistry research and to provide them with an understanding of the principles underlying these techniques. The course is designed to impart laboratory skills in the form of practical exercises so that students can apply this knowledge to augment their research acumen and improve their understanding of the subject.

Module-I: Electrophoresis Methods for analysis of proteins

Basic Principle of electrophoresis, Paper electrophoresis, Gel electrophoresis, discontinuous gel electrophoresis, PAGE, SDS-PAGE, Native gels, denaturing gels, agarose gel electrophoresis, buffer systems in electrophoresis, electrophoresis of proteins and nucleic acids, protein and nucleic acid blotting, detection and identification (staining procedures), molecular weight determination, Isoelectric focusing, 2D protein gel electrophoresis, 2D-DIGE, Pulse field Electrophoresis, Zymograms. Immunochemical methods - immunodiffusion, rocket immunoelectrophoresis Protein-Protein Interaction: Immunoprecipitation, Co-Immunoprecipitation (Co-IP), Pull down assays, Yeast two hybrid, Protein fragment complementation assay, Western blotting, Far western blotting, Protein microarrays, ELISA.

Module-II: Microbiological/Cell culture techniques

Types of media, selective and enrichment media, sterilization methods, bacterial culturing, CFU determination, growth curves, Generation/doubling times, cell counting, viable and nonviable. Growth and maintenance of cultures, biosafety cabinets, CO_2 incubator. Staining procedures, plating and microtony.

Module-III: Methods for analysis of nucleic acids and proteins

DNA and RNA isolation; Hybridization methods: Southern blotting, Northern blotting, Western Blotting, *In situ* hybridization, Colony hybridization. Binding of nucleic acids with protein: DNA pull down assays, In vitro transcription assay; In vitro translation assay; Electrophoretic Mobility Shift Assay (EMSA), DNA foot printing assay, Electrophoretic Mobility Shift Assay; RNAse protection assay; Primer Extension, Chromatin immunoprecipitation (ChIP), ChIP on ChIP. Gene expression analysis: Reporter assays - example luciferase assay, DNA Microarrays.

Module IV: Cell Biology techniques and Labeling methods

Cell culture and transfection, Immortalization of cells; Overexpression and Silencing of genes; Generation of transient and stable lines; Cell synchronization techniques; Immunohistochemistry, Immunofluorescence, Preparation of mouse embryonic fibroblasts; Cytotoxicity assay; Cell viability assays; Cell staining techniques; Cell proliferation assay; Migration assay; Invasion assay; Soft agar assay; Apoptosis assays; Kinase assay; Ubiquitination assay; Protein and mRNA turnover assays; Subcellular fractionation and identification of various fractions. Cell Flow cytometry, FACS, TUNEL assay, Non-invasive scanning of soft tissue, Radioactive and Non-radioactive labeling: DNA, Proteins, Whole cells, Fluorescent labeling. DNA, Proteins, bacteria, living cells; Metabolic labeling, Pulse chase analysis.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	15	5	5	5	70

References/Texts:

- Protein-Protein Interactions: Methods and Applications (Methods in Molecular Biology) (2004) Vol. 261, Haian, F. (ed), Humana Press (Totowa, NJ), ISBN: 1-58829-120-0 / ISBN: 978-1588291202.
- Protein-Protein Interactions: A Molecular Cloning Manual (2005) 2nd ed., Golemis, E.A. and Adams, P.D., Cold Spring Harbour Laboratory Press (New York), ISBN: 0879697237/ ISBN: 13: 9780879697235.
- The Ultimate Guide to Your Microscope (2008) Levine, S. and Johnstone, L., Sterling, ISBN: 9781402743290.
- Physical Biochemistry: Principles and Applications (2010) 2nd ed., Sheehan, D., Wiley Blackwell (West Sussex), ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
- Principles and Techniques of Biochemistry and Molecular Biology (2010) 7th ed., Wilson, K., and Walker, J. (eds), Cambridge University Press (New Delhi), ISBN: 978-0-521-73167-6 / ISBN: 978-0-521-51635-8.
- Introduction to Instrumentation in Life Sciences (2012) Bisen, P.S. and Sharma, A., CRC Press/Taylor and Francis Group (California), ISBN: 978-1-4665-1240-5.
- Molecular Cloning: A Laboratory Manual (2012) Vol. 1-3, 4th ed., Green M.R. and Sambrook J., Cold Spring Harbour Laboratory Press (New York). ISBN: 978-1-936113-41-5 / ISBN: 978-1-936113-42-2.
- Biophysical Chemistry (2013), Schimmel, C.R.C., Macmillan Higher Education, ISBN: 0716738619, 9780716738619.
- Current Protocols in Protein Science (2013) Coligan, J.E., Dunn, B.M., Speicher, D.W., Wingfield, P.T., Lippincott-Schwartz, J. and Yamada, K.M., John Wiley and Sons (Somerset, NJ), Print ISSN: 1934-3655 / Online ISSN: 1934-3663.
- Current Protocols in Molecular Biology (2013) Ausubel, F.M. et al., John Wiley and Sons (Somerset, NJ), Print ISSN: 1934-3639 / Online ISSN: 1934-3663.
- Current Protocols in Immunology (2013) Coligan, J.E. et al., John Wiley and Sons (Somerset, NJ), Print ISSN: 1934-3671 / Online ISSN: 1934-368X.
- Current Protocols in Cell Biology (2013) Bonifacino, J.S., Dasso, M., Harford, J.B., Lippincott-Schwartz, J. and Yamada, K.M., John Wiley and Sons (Somerset, NJ), ISBN: 1934-2500.
- Boyer, R.F., Biochemistry Laboratory: Modern Theory and Techniques, 6th ed., Boston, Mass: Prentice Hall, 2012, ISBN-13: 9780136043027.
- Wilson K. and Walker J., Principles and Techniques of Biochemistry and Molecular Biology, 7th ed., Cambridge University Press, 2010, ISBN 9780521516358.
- Wiley, J.M., Sherwood, L.M. and Woolverton, C.J. Prescott's Microbiology 10th edition. McGraw Hill Higher Education 2017, ISBN13: 9781259657573.
- The Tools of Biochemistry (2011) 2nd ed., Cooper T G, Wiley-Interscience Publication (New Delhi), ISBN: 13:9788126530168.
- Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1982) 2nd ed., Freifelder, D., W.H. Freeman and Company (New York), ISBN:0716713152 / ISBN:0716714442.

GOOD LABORATORY PRACTICES SEMINAR

Course Code: BCH4407 **Credit Units: 1**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Biochemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A research paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The research paper will be related to the contemporary research issue and the topic will be given by the supervisors of the department.
2. The research paper has to prepared/communicated before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for research paper (List is indicative, not exhaustive)
Molecular Biology
Proteomics
Structural Biology
Genetics

Evaluation Scheme

Organisation and relevance of content	**Literature Review**	**Bibliography**	**Publication**	**Total**
30	30	20	20	100

MAJOR PROJECT

Course Code: BCH4437 **Credit Units: 8**

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curriculae where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project, the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page**
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgement(s)**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract**
  A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in detail including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

  While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

- **Conclusion(s) & Recommendations**
  A conclusion should be the final section in which the outcome of the work is mentioned briefly.
  Check that your work answers the following questions:
  - Did the research project meet its aims (check back to introduction for stated aims)?
  - What are the main findings of the research?
  - Are there any recommendations?
  - Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References**
  References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognized system.

Examples:

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect,* **8** (suppl 1): 116–117.

For book:

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

Amity School of Applied Sciences

Master of Science (Chemistry)

FLEXILEARN
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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

PHYSICAL CHEMISTRY

Course Code: CHY4101 **Credit Units: 04**

Course Objectives

This course is intended to give the students the requisite knowledge of fundamentals of physical chemistry with the focus on enhancing their problem-solving ability. A knowledge of graduation level thermodynamics, electrochemistry, solid state chemistry and quantum mechanics is necessary. This course will give the students a better understanding of the various aspects and application of physical chemistry.

MODULE I: CHEMICAL THEROMODYNAMICS

Laws of thermodynamics (work function, free energy, enthalpy, entropy, Maxwell's relations etc.), partial molar properties, chemical potential, Vant Hoff's equation, Gibbs-Duhem equation, Concept and determination of fugacity, Non ideal systems: excess functions for non- ideal solutions, activity, activity coefficient, Debye-Huckel theory for activity coefficient of electrolytic solutions, ionic strength.

MODULE-II: APPLIED ELECTROCHEMISTRY

Electrochemical cells, Nernst equation, electrical double layer, kinetics of electrode processes – Corrosion: Introduction, forms, monitoring & prevention methods.

MODULE III: QUANTUM CHEMISTRY

Schrodinger Equation and the postulates of Quantum Mechanics. Discussion of solutions of the Schrodinger Equation to some model systems viz. particle in a box, the harmonic oscillator, The rigid rotor, the hydrogen atom, Perturbation Theory, Huckels Theory of conjugated system.

MODULE IV: SURFACE CHEMISTRY

Adsorption: Gibbs adsorption isotherm, BET equation and estimation of surface area Micelles: Surface active agents, classification of surface agents, micellization, critical micellar concentration (CMC), factors affecting the CMC of surfactants, thermodynamics of micellization.

MODULE V: SOLID STATE CHEMISTRY

General Principles, Crystal Defects including thermodynamics of Schottky and Frenkel defects, colour centres, nonstoichiometric defects. Electronic Properties- band theory, insulators, intrinsic, extrinsic and doping semiconductors, p-n junction, super conductors. Magnetic properties- Classification of materials, quantum theory of paramagnetics, cooperative phenomena, magnetic domains, hysteresis

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. J. P. Lowe and K.Peterson, Quantum Chemistry Academic Press.
2. D. A. McQuarrie, Quantum Chemistry Viva Books Pvt. Ltd.: New Delhi.
3. R. G. Mortimer, Mathematics for Physical Chemistry Elsevier.
4. F. L. Pilar, Elementary Quantum Chemistry, Dover Publication Inc.: NewYork.
5. P. W. Atkins and J. de Paula, Atkin's Physical Chemistry, Oxford University Press.
6. I. L. Levine, Quantum Chemistry, Prentice-Hall Inc., New Jersey.
7. T. Engel and P. Reid, Physical Chemistry, Benjamin-Cummings.
8. D. A. McQuarrie and J. D. Simon, Physical Chemistry: A Molecular Approach, Univ. Science Books.
9. R. J. Silbey, R. A. Alberty and M. G. Bawendi, Physical Chemistry, Wiley.

ORGANIC CHEMISTRY

Course Code: CHY4102 **Credit Units: 04**

Course Objective :

This course is intended to give the students the requisite knowledge of fundamentals of organic chemistry with the focus on enhancing their problem-solving ability. A student will learn the how stereochemistry effects the reaction products and mechanism. This course will give the students a better understanding of the various aspects and application of pericyclic and photo-chemistry. The crux of the course is to give the student the knowledge of reaction mechanism and its effect on final product formation.

MODULE I: STEREOCHEMISTRY

Conformational analysis of cycloalkanes, decalines, effect of conformation on reactivity, conformation of sugars, steric strain due to unavoidable crowding. Elements of symmetry, chirality, threo and erythro isomers, R,S-nomenclature, E,Z-nomenclature, methods of resolution, optical purity, sterospecific, regioslective, steroselective and regiospecific synthesis, asymmetric synthesis-Cram's rule-Prelog's rule. Optical activity in the absence of chiral carbon (biphenyls, allenes and spiranes), Chemoselectivity orientation and reactivity (Elimination reaction).

MODULE II: REACTION MECHANISM

Types of mechanism, types of reactions, thermodynamic and kinetic requirements, kinetic and thermodynamic control. Hammond's postulate, Curtin-Hammett principle. Potential energy diagrams, transitions states and intermediates, methods of determining mechanism, isotope effects.

MODULE III: PERICYCLIC REACTIONS

Parameters of symmetry, Conservation of molecular orbital symmetry, classification of pericyclic reactions – electrocyclic reactions, cyclo addition and sigmatropic rearrangements, ene reactions, woodward – Hoffmann correlation diagram.

MODULE IV: NAMED REACTIONS

Clemmensen, Wolff Kishner, Meerwein – Ponndorrf- Verley, Claisen, Dieckmann, Benzoin, Michael addition, Mannich reaction, Wittig reaction, Chichibabin reactions, Hundsdiecker reactions, Robinson reaction, Reformatsky reaction, Gattermann Koch reaction, Wagner – Meerwein rearrangement, Benzil – benzylic reaction, Favorskii reaction, Pinacol- pinacolone rearrangement, Suzuki, Negishi, Stille, Sonogashira, Heck, Sharpless epoxidation and Grubbs catalytic reaction.

MODULE V

Organic Photochemistry

Basic principles, Jablonsky diagram, exciplex, photochemistry of alkenes-intramolecularreactions of olefinic bond- geometrical isomerism, cyclization reactions, rearrangements of1,4 and 1,5 dienes. Photochemistry of carbonyl compounds intramolecular reactions ofsaturated-, cyclic- and acyclic-, α,β-unsaturated- and unsaturated carbonyl compounds,cyclohexadienones. Intramolecularcycloaddition reaction-dimerization and oxetaneformation. Norrish type I and type II reactions, di-pi-methane rearrangements, Paterno-Burchi reaction

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. A guidebook to mechanism in Organic chemistry (Orient-Longmens)- Peter Sykes
2. Organic reaction mechanism (Benjamin) R. Breslow
3. Mechanism and structure in Organic chemistry (Holt Reinh.) B. S. Gould.
4. Organic chemistry (McGraw-Hill) Hendrikson, Cram and Hammond.
5. Basic principles of Organic chemistry (Benjamin) J. D. Roberts and M. C. Caserio.
6. Reactive Intermediates in Organic chemistry (John Wiley) N. S. Issacs.
7. Stereochemistry of Carbon compounds. (McGraw-Hill) E. L. Eliel
8. Organic Stereochemistry (McGraw-Hill) by Hallas.
9. Organic reaction mechanism (McGraw-Hill) R. K. Bansal.
10. Organic chemistry- R. T. Morrison and R. N. Boyd (Prentice Hall.)
11. Modern organic reactions (Benjumin) H. O. House.
12. Principle of organic synthesis- R.O.C. Norman and J. M. Coxon. (ELBS)
13. Reaction mechanism in organic chemistry- S. M. Mukharji and S. P. Singh.
14. Stereochemistry of organic compoundsc) D. Nasipuri.
15. Advanced organic chemistry (McGraw-Hill) J. March.
16. Introduction to stereochemistry (Benjumin) K. Mislow.
17. Stereochemistry by P. S. Kalsi (New Age International)

INORGANIC CHEMISTRY

Course Code: CHY4109 **Credit Units: 04**

Course Objective:

This course is intended to give the students knowledge of advances in inorganic reaction mechanism and bonding with focus on VBT and CF theory. This course will help the student draw the structure of complexes of various geometry and based on their and IUPAC names. A knowledge of graduation level bonding and coordination chemistry is required.

MODULE-I: METAL-LIGAND EQUILIBRIUM IN SOLUTION

Stepwise and overall formation constants and their relation and trends, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand. Chelate effect and its thermodynamic origin, determination of binary formation constants by potentiometry and spectrophotometry.

MODULE-II: REACTION MECHANISM OF TRANSITION METAL COMPLEXES

Energy profile of a reaction, reactivity of metal complex, inert and labile complexes, substitution rection of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism, direct and indirect evidences in favour of conjugate mechanism, anation reactions, reactions without metal ligand bond cleavage. Substitution reactions in square planar complexes, the trans effect, mechanism of the substitution reaction. Redox reaction, electron transfer reactions, mechanism of one electron transfer reactions, outer sphere type reactions, cross reactions and Marcus-Hush theory, inner sphere type reactions.

MODULE-III: METAL-LIGAND BONDING

VBT, CFT, Limitation of VBT and crystal field theory, molecular orbital theory, octahedral, tetrahedral and square planar complexes, p-bonding and molecular orbital theory.

MODULE-IV: ELECTRONIC SPECTRA AND MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES

Spectroscopic ground states, correlation. Orgel and Tanabe-Sugano diagrams for transition metal complexes (d1-d9 states), calculations of 10Dq, B and β parameters, charge transfer spectra, anomolous magnetic moments, Orbital contribution to magnetic moment, magnetic exchange coupling and spin crossover.

Module-V: ENZYMES

Catalytic power of enzymes, turnover number, specificity and regulation. Nomenclature and classification, extraction (large scale production) and purification of enzymes. Immobilization of enzymes, enzyme therapy.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Advanced Inorganic Chemistry, F.A. Cotton and Wilkinson, John Wiley.
2. Inorganic Chemistry, J.E. Huhey, Harpes & Row.
3. Chemistry of the Elements. N.N. Greenwood and A. Earnshow, Pergamon.
4. Inorganic Electronic Spectroscopy, A.B.P. Lever, Elsevier.
5. Magnetio chemistry, R.1. Carlin, Springer Verlag.
6. Comprehensive Coordiantion Chemistry eds., G. Wilkinson, R.D. Gillars and J.A. Mc Cleverty, Pergamon.
7.Advanced Inorganic Chemistry, Malik, Tuli, Madan, S. Chand & Company

CHEMINFORMATICS & BIOINFORMATICS

Course Code: CHY4110 **Credit units: 02**

Course Objective:

Chemoinformatics is a rather new discipline in science. It has been described as the application of informatics methods to solve chemical problems. Chemoinformatics focuses primarily on chemical information related to or derived from structural information. Thus, chemoinformatics covers areas such as design, organisation, management, retrieval, analysis and visualisation of chemical information. The course objectives are to introduce participants to different chemoinformatics methods, provide examples on the use of chemoinformatics in modern drug research, and allow the participants to gain practical experience through exercises with representative methods used in chemoinformatics.

MODULE I: Differential & Integral Calculus

Definition of limit, continuity & Derivative of a real valued function of real variable at a point, Rolle's Theorem, Mean Value Theorem, Taylor's Theorem, Maxima and Minima of one Variable, Indefinite and definite integral, properties of definite integral.

Module II: Cheminformatics and Molecular Modeling

Cheminformatics tools for drug discovery. Chemical Structure Representation (SMILE & SMART). Chemical databases: CSD, ACD, WDI, ChemBank, hazardous chemical database, PUBCHEM. High Throughput and Virtual Screening, Molecular Docking of Protein, Small molecule and Nucleotide, Concepts of Force Field, Introductory Molecular Dynamics simulation.

Module III: Introductory Bioinformatics

General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). File Format (Genbank, DDBJ, FASTA, PDB, SwissProt). Protein Structure: Primary, Secondary, Super Secondary, Domains, Tertiary, Quaternary, Ramachandran plot. Protein databases (Primary, Composite, and Secondary). Homology Modeling, Fold Recognition, Abintio Method. Protein folding, Motif and Domain: Motif databases and analysis tools. Domain databases (CDD, SMART, ProDom) and Analysis tools, Specialized Genome databases: (SGD, TIGR, and ACeDB). Structure databases (CATH, SCOP, and PDBsum), Introduction to Sequences, alignments and Dynamic Programming; Local alignment and Global alignment (algorithm and example), Pairwise alignment (BLAST and FASTA) and multiple sequence alignment (Clustal W).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Introducing Cheminformatics, David Wild.

2. Bioinformatics: Sequence and Genome Analysis, David W. Mount.
3. Cheminformatics a text book, Johann Gasteiger and Thomas Engel
4. Computational Approaches in cheminformatics and bioinformatics, Rajarshi Guha
5. Mathematical Calculus by Thomson & Finley

FOUNDATIONS OF BIOCHEMISTRY

Course Code: CHY4111 **Credit Units: 02**

Course Objectives:

The objective of this course is to provide the students basic understanding of biochemical processes. To provide the students elementary idea about important biochemical molecules.

ModuleI: The Living System

Molecular logic of cells (Prokaryotes and Eukaryotes), Molecular architecture of cell: Cell, subcellular organelles & membrane (structure, organization and composition), Gross functions, Biogenesis of mitochondria and chloroplast, Transport and cellular recognition processes (introduction only).

ModuleII: Introduction to Basic Biomolecules and Energy Processes

Amino acids, polypeptides, proteins, nucleotides, purines and pyrimidines, concept of genes, DNA and RNA, biological roles of carbohydrates and amino sugars; glycolysis, TCA cycle, neoglucogenesis, ATP transport, siderophores and catalytic antibodies/abzymes.

ModuleIII: Basic Biochemical Mechanism

DNA replication; Meselson & Stahl's experiment and semi conservative model, central dogma of molecular biology, role of DNA polymerase, RNA polymerase and other enzymes, introductory concepts of transcription and translation, starting idea of protein folding.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Biochemistry (3rd /4th/5th edition) L. Stryer, WH Freeman and Co.
2. Lehninger Principles of Biochemistry, Fourth Edition by David L. Nelson (Author), Michael M. Cox(Author)
3. Biochemistry, Fourth Edition by Donald Voet, Judith G.Voet

PHYSICAL CHEMISTRY LAB

Course code: CHY4105 **Credit units 02**

(Minimum 10 Experiments to be performed)

Phase Equilibria:

1. Determination of mutual solubility curve of phenol and water and find consolute point.
2. To determine the distribution coefficient of I_2 between two immiscible solvents(CCl_4 andH_2O).

Chemical Kinetics:

3. To study kinetically the alkaline hydrolysis of ethyl acetate.
4. To study the kinetics of reaction between $K_2S_2O_8$ and KI.:
    a. Determination of the rate constant and order of reaction.
    b. To study the influence of ionic strength on the rate constant.
5. Determination of the effects of change of temperature, concentration of reactant and and ionic
   strength of the media on the velocity constant of hydrolysis of an ester

Electrochemistry:

6. Determination of the velocity constant, order of the reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductomertically.
7. Determine the equivalent conductance of weak electrolyte at infinite dilution by Kohlrausch law.
8. Determination of solubility and solubility product of sparingly soluble salts (e.g., $PbSO_4$, $BaSO_4$) conductometrically.
9. Determination of the strength of strong and weak acids in a given mixture conductomerically.

Potentiometry:

10. Measurement of pH of buffer solution
11. Determination of the strength of strong and weak acids in a given mixture using a potentiometer/pH meter.
12. Acid base titration in a non-aqueous media using a pH meter.

Colligative Properties

13. Determination of depression in Freezing point of solutions.

Adsorption

14. Determine the adsorption isotherms of acetic acid from aqueous solutions by charcoal and verify Freundlich adsorbtion isotherm.

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva, A: Attendance.

Suggested Readings:

1. A.Finlay and J.A.Kitchener, “Practical Physical Chemistry, Longman
2. F.Daniels and J.H.Mathews, “Experimental Physical Chemistry”, Longman
3. H.H.Willard, L.L.Merritt and J.A.Dean, “Instrumental Methods of Analysis”, Affiliated East-West Press
4. D.P.Shoemaker and C.W.Garland, “Experimental Physical Chemistry”, McGraw-Hill
5. A.I.Vogel, “A Textbook of Quantitative Inorganic Chemistry”, Longman
6. J.B.Yadav, “Advanced Practical Chemistry”, Goel Publishing House
7. J.J.Lingane, “Electroanalytical Chemistry”, Interscience
8. L.Meites, H.C.Thomas and R.P.Bauman, “Advanced Analytical Chemistry McGraw Hill.

ORGANIC CHEMISTRY LAB

Course Code: CHY4106 **Credit Units: 02**

(Minimum 10 Experiments to be performed)

Qualitative Analysis:

1. Separation, purification and identification of compounds of binary mixture, derivative preparation and confirmatory tests.

Organic Synthesis:

2. Any oxidation reaction
3. Reduction: Transfer hydrogenation reaction
4. Aldol condensation: Dibenzal acetone from benzaldehyde.
5. Friedel Craft's reaction
6. Preparation of p-amino azobenzene from aniline via diazoaminobenzene.
7. Preparation ofm-phenylene diamine from Nitrobenzene via m-dinitrobenzene and m-nitroaniline.
8. Preparation of benzidine from benzene involving benzidine rearrangement.

Quantitative Analysis:

9. Determination of the percentage of sulphur in the given organic compounds by Messenger's method.
10. Estimation of Glucose using Fehling's solution.
11. Determination of equivalent weight of the given carboxylic acid using Silver-salt method.
12. Determine percentage purity of the given carbonyl compound using hydroxylamine hydrochloride.
13. Determination of strength of known aniline solution by bromination using KBr-$KBrO_3$ mixture.

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A: Attendance,V – Viva.

Suggested Readings:

1. A.I.Vogel, “A Textbook of Practical Organic Chemistry”, Longman
2. A.I.Vogel, “Elementary Practical Organic Chemistry – Part 3: Quantitative Organic Analysis”, Longman
3. F.G.Mann and B.C.Saunders, “Practical Organic Chemistry”, Longman
4. B.B.Dey and M.V.Sitaraman, “Laboratory Manual of Organic Chemistry”,
5. B.L.Oser (Ed), “Hawk’s Physiological Chemistry”, Tata McGraw-Hill
6. British Pharmacopoeia and Indian Pharmacopoeia,
7. A.C.Agarwala and R.M.Sharma (Eds), “A Laboratory Manual of Milk Inspection”, Asia Publishing House

CHEMINFORMATICS & BIOCHEMISTRY LAB

Course Code: CHY4112 **Credit Units: 01**

1. Representation of chemical structures through various tools
2. Homology modeling
3. *Abintio* modeling
4. Validation of structures
5. Visualization of PDB file
6. Protein Sequence alignment
7. Genome database retrieval
8. Molecular docking and Simulation

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A- Attendance, V – Viva.

Suggested Readings:

1. Practical Cheminformatics, Muthukumaraswamy Karthikeyan.

RESEARCH SEMINAR

Course Code: CHY4108 **Credit Units: 01**

Objectives

A seminar is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning for research based activity. Prereq., graduate standing in chemistry/ biochemistry/ Forensic Sciences on consent of instructor. Seminar to acquaint new graduate students with departmental research (This one will be running through out first semesters on every Monday any Lecture, where normally Ph.D students /internal Faculties /external speakers will give talk on their research or other topic of their specialization).

The trainer has to make sure that the aspect covered is practically practiced by the participants. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Seminar

The seminar may be conducted on any of the following major themes:

- Nuclear Chemistry
- Modern trend in Inorganic Chemistry
- Modern trend in Organic Chemistry
- Modern trend in Physical Chemistry
- Nanotechnology and its application
- Polymer Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry
- Green Chemistry
- Any other relevant topics

These themes are merely indicative and other recent and relevant topics of study may be included.

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus- Second Semester

ANALYTICAL CHEMISTRY

Course Code: CHY4201 **Credit Units:03**

MODULE I: WET CHEMICAL METHODS OF ANALYSIS
Volumetric analysis –neutralization, precipitation, complexometric and redox titrations- theoretical titrations curves - theory of indicators; Gravimetric analysis, volatilization and precipitation methods- homogeneous precipitation; Colorimetric analysis - principles and applications- estimation of iron and nickel.

MODULE II: ELECTROANALYTICAL TECHNIQUES
Conductometry, and high frequency titrations; Potentiometry, pH-metry, Ion selective electrodes; Electrogravimetry and coulometry; Voltammetry –polarography, amperometric titrations and anodic stripping voltammetry; principles, practice and applications.

MODULE III: SEPARATION TECHNIQUES
Solvent extraction and Ion exchange techniques – principles and applications; Chromatographic techniques – adsorption chromatography, thin layer chromatography, gas chromatography, high performance chromatography, size exclusion chromatography; Supercritical fluid chromatography.

MODULE IV: RESEARCH BASED ANALYTICAL TECHNIQUE
Preparations of solutions of different strength and scales (molarity, molality, normality, formality, w/w, v/v ratio calculation exercises) buffers, gel apparatuses, native and SDS -PAGE gels, Isoelectric point

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. D.A.Skoog, D.M.West, F.J. Holler and S.R.Crouch, " Fundamentals of Analytical Chemistry", 8th Edn., - Thomson Brooks/Cole Pub. (2005).
2. J.Mendham, R.C.Denney, J.D. Barnes and M.J.K.Thomas, " Vogel's Text book of quantitative chemical analysis", 6th Edn., Pearson Education (2008).
3. F.W. Fifield and D.Kealey, " Principles and Practice of Analytical Chemistry, 1st Indian Reprint, Blackwell Pub. (2004).
4. H.H Willard, L.L Merritt, J.A Dean, and F.A Settle, " Instrumental Methods of Analysis", 7th Edn., -CBS Pub (2004).
5. G. D.Christian, "Analytical Chemistry", 6th Edn., John Wiley Press (2006).
6. K.A. Rubison and J,F. Rubison, " Contemporary Instrumental Analysis, Printice Hall, Inc. (2000).

7.A.K.Srivastva& P.C. Jain," Instrument approach to chemical analysis" 4th edition,S.Chand & Company(2012)
8.C.L.Wilson and D.W.Wilson, "Comprehensive Analytical Chemistry", Dan van Nostrand 9. J.G.Dick, "Analytical Chemistry, McGraw Hill

INDUSTRIAL CHEMISTRY

Course Code: CHY4202 **Credit Units: 03**

Course Objective:

This course is intended to give the students the knowledge of various aspects of industrial chemistry with the focus on preparation of different types of glass, cement, soaps and detergent. A student taking up this course should be able to understand the logic and chemistry behind the different types of catalytic process and catalyst.

MODULE I: GLASS INDUSTRY

Introduction, classification of glass, basic raw materials of glass, manufacturing processes including chemical reactions, some special glasses: optical glass, coloured glass, fibre glass, laminate glass, safety glass, photosensitive glass, photochromatic glass, lead glass, borosilicate glass and glass wool.

MODULE II: CEMENT INDUSTRY

Types of cement, manufacture of Portland cement, composition, setting and hardening of cement, Mortars and concrete, gypsum, plaster of paris, estimation of silica, alumina, calcium oxide and sulphates in Portland cement.

MODULE III: SOAPS AND SYNTHETIC DETERGENTS

Manufacture of detergent, types of detergents, anionic, cationic, nonionic and amphoteric detergents, manufacture of soap, Liquid soap**.**

MODULE IV: HOMOGENEOUS AND HETEROGENEOUS CATALYSIS and CATALYTIC PROCESSES

Conversion, selectivity, contact time, time on stream, Kinetics of heterogeneous catalysis, adsoprtion, phase transfer catalysis, super acid catalysis, intramolecular catalysis, enzyme catalysis, semi-conductor catalysis and photocatalysis. Promoters, stabilizers, catalyst deactivation by poisoning, fouling and sintering, Cracking, reforming, alkylation, isomerization, hydrogenation/dehydrogenation, dehydrocyclisation, dehydrosulphurization, hydrocracking, oxidation, metathesis, carbonylation, polymerization, synthetic fuels, hydrogen generation.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Jens Hagen,Industrial catalysis, 2nd Edition, Wiley-VCH Verlay Gambh & Co,.(2006).
2. Herman Pines, The chemistry of catalytic hydrocarbon conversions, Academic Press, New York (1981).
3. R. Pearce and W.R.Patterson, Catalysis and chemical processes, Leonard Hill, London (1981).
4. Charles, N. Satterfield, Heterogeneous catalysis in industrial practice, 2nd Edn. Mc.Graw Hill, International Edition, Singapore (1993).

5. Catalytic Chemistry, Bruce-gates, John Wiley & Sons
6. Organic Chemistry Vol.2 IL Finar 5th Edn. Longmans 1975
7. Dryden's outlines of Chemical Technlolgy 2nd Edn., edited and revised by M.Gopala Rao, Marshel sitting – EastWest Press, 1973.
8. Chemical Process Industries 3 Edn., R Norries Shreve, Mc Graw Hill 1967.
9. Chemistry of Engg Materials by CV Agarwal.
10. Applied Chemsitry for Engineer's by Diamont
11. Industrial Chemistry by BK Sharma, Goel Publishing house Meerut.

ORGANOMETALLIC CHEMISTRY

Course Code: CHY4211 **Credit Units:04**

Course Objective:

The main idea of this course is to give students a brief idea about Bioinorganic chemistrythat examines the role of metals in biology. It includes the study of both natural phenomena such as the behaviour of metalloproteins as well artificially introduced metals, including those that are non-essential, in medicine and toxicology. Many biological processes such as respiration depend upon molecules that fall within the realm of inorganic chemistry. The discipline also includes the study of inorganic models or mimics that imitate the behaviour of metalloproteins. It also covers organometallic chemistry which is the study of chemical compounds containing bonds between carbon and a metal. Since many compounds without such bonds are chemically similar, an alternative may be compounds containing metal-element bonds of a largely covalent character. Organometallic chemistry combines aspects of inorganic chemistry and organic chemistry.

Course Content:

MODULE I: ROLE OF METAL IONS IN BIOLOGICAL SYSTEM

Elements of life: essential major, trace and ultratrace elements. Basic chemical reactions in the biological systems and the role of metal ions (specially Na^{+}, K^{+}, Mg^{2+}, Ca^{2+}, Fe^{3+}/2+, Cu2+/+, and Zn2+).Metal ion transport across biological membrane Na^{+}/K^{+}ion pump, ionophores. Toxic metal ions and their effects, chelation therapy (examples only), Pt and Au complexes as drugs (examples only), metal dependent diseases.

Module II: Biological functions of haemoglobin, myoglobin and hemocynin, cytochromes and ferredoxins, carbonate bicarbonate buffering system and carbonicanhydrase. Biological nitrogen fixation, Photosynthesis: (Photosystem-I and Photosystem-II), chlorophyll and related elementary ideas

MODULE III: METALLOCENE

Metallocenes, Structure and synthesis of cyclopentadienyl complexes, Covalent vs Ionic bonding in metallocenes, Arene complexes

MODULE IV: REACTIONS IN ORGANOMETALLIC CHEMISTRY

Substitution reactions in carbonyl complexes, Oxidative addition and reductive elimination, Insertion and elimination, Nucleophilic and electrophillic attack of coordinated ligands, Synthesis of ferrocenes derivatives, carbonylate anion as nucleophile. Introduction to carbenes, types of carbenes (Fischer type and Schrock type carbene complexes, synthesis, structure, bonding and reactions of carbenes.

MODULE V: APPLICATIONS OF ORGANOMETALLICS IN CATALYSIS

(b) In Catalysis: Asymmetric hydrogenation; synthesis of acetic acid (Monsanto) Cativa process; Arylation/vinylation of olefins (Heck reaction); Wacker process (olefin oxidation); Asymmetric epoxidation.

MODULE- VI: METAL π-COMPLEXES

Metal carbonyl, structure and bonding, 18 elctron rule, vibrational spectra of metal carbonyls for bonding and structural elucidation, important reactions of metal carbonyls; preparation, bonding structure and important reaction of transition metal nitrosyl, dinitrogen and dioxgen complexes; tertiary phosphine as ligand.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. C. Elschenbroich. Organometallics (3rd edn.), Wiley-VCH Publication (2006).
2. C. Elschenbroich & A. Salzer.Organometallics – A Concise Introduction (2nd edn.),VCHPublication (1992).
3. F. Mathey & A. Sevin.Molecular Chemistry of the Transition Elements, John Wiley (1996).
4. F. A. Cotton & G. Wilkinson.Advanced Inorganic Chemistry (5th edn.), John Wiley (1988).
5. R. C. Mehrotra & A. Singh. Organometallic Chemistry: A Unified Approach (2nd edn.), New Age International (2000).
6. Yamamoto, Organo Transition Metal Chemistry,

INTRODUCTION TO LABORATORY SAFETY

Course Code: CHY4212 **Credit Units: 01**

Course Objective :

The basic goal of this course is to make sure students know about potential work hazards, how to recognize them, and how to protect themselves. This course is designed to help reduce possible accidents arising out of negligence. This introductory course in laboratory chemical safety is required for all entering chemistry graduate students. Topics to be covered include laboratory emergencies, chemical hazards, lab inspections and compliance, managing and working with chemicals, waste handling, case studies of university accidents.

MODULE I: INTRODUCTION TO LABORATORY SAFETY

Risks in a Research Laboratory, Health Effects Due to "Hazardous" Chemical Exposure (How Does One Determine the Hazards Associated with Specific Chemicals, Exposure Routes, Toxicity Risk Assessment), Personal Protective Equipment (PPE) Proper Attire (Eye/Face Protection, Lab Coats, Gloves, Respirators, Disposal/Removal of PPE), Emergency Equipment Safety Showers/Eye Washes, Key Campus and Department Chemical Safety Contacts, Case Study: Dartmouth Chemical Poisoning (Key Lessons learnt).

MODULE II: LABORATORY EMERGENCIES: SPILLS AND FIRES

Handling the Accidental Release of Hazardous Materials, Notifications, Spill Containment and Clean-up, Leaking Gas Cylinders, Fires Classification, Fire Extinguishers (how they work, types), Risk Assessment, Flammable Hazards, Flammability Characteristics, Flammability Classes, Causes of Ignition, Reactive Hazards, Explosives, Case Study: University of Texas Austin Sodium Fire (Key Lessons learnt).

MODULE III: CHEMICAL HAZARDS

Chemical Hygiene Plan, The New Safety Data Sheets (SDS) versus the Old Material Safety Data Sheets (MSDS), Assessment of Chemical Toxicity, Toxic Hazards (Dose, Risk Assessment, Types of Toxins, Working with Highly Toxic Compounds (General Considerations, Planning, Precautions for Minimizing Exposure – Handling, In the Event of a Spill), General Considerations (Chemical Segregation, Transfer and Transport, Chemical Fume Hoods (Safety, Types, Operation), Other Types of Ventilation) Case Study: University of Wisconsin – $LiAlH_4$ Explosion (Key Lessons learnt).

MODULE IV: MANAGING AND WORKING WITH CHEMICALS

Working with Flammable Substances (Standard Operating Procedures), Working with Highly Reactive or Explosive Substances, Working with Compressed Gases (Parts of the Cylinder, Cylinder Pressure Regulator, Storage Guidelines, Transporting Cylinders, Handling Compressed Gas Cylinders) Working with Cryogenics (Health Hazards, Liquid N_2),Waste Handling. Characterization of Waste. Collection and Storage (Lids, Leaks, Labels, Location, Containers), Consequences of Mixing Incompatibles, Solid Wastes (Chemicals, Broken Glass, Sharps, Cylinders). Waste Handling, Characterization of Waste, Collection and Storage (Lids, Leaks, Labels, Location, Containers), Consequences of Mixing Incompatibles

Solid Wastes (Chemicals, Broken Glass, Sharps, Cylinders, Pick-up), Special Cases, Hazardous Waste Minimization, Case Study: the "UCLA Incident".

MODULE V: WORKING ON LABORATORY EQUIPMENTS

Working with Water (liquid)-dependent Equipment (Hazards, Proper Use, Heating Baths), Working with High Pressure Vacuum Pumps, Working with Stirring and Mixing Devices, Working with Heating Devices (Variacs, Oil, Salt, Sand Baths, Microwave Ovens), Ultrasonicators, Centrifuges and HPLCs. Laser classifications, Effects of lasers on skin and eyes, Protective eyewear, Enclosing laser beams, Examples of common mistakes and ways to avoid them, Non-beam hazards, Risk Assessment: when is it okay to violate specific safety rules? The importance of understanding, how things work, Case Study: Laboratory Equipment.

MODULE VI: BIOSAFETY, RADIATION, AND ANIMALS

Chemicals such as acrylamide & ethidium bromide, Pathogens, Biological waste handling, Recombinant DNA, Mammalian cell culture, Case Study.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. CRC Handbook of lab safety, 4th Edition, A. K. Furr
2. Laboratory Safety for Chemistry Students, 2nd Edition, David C. Finster and Robert H. Hill, Jr.
3. Complete Guide to Laboratory Safety, 4th Edition, Dan Scungio and Terry Jo Gile

SPECTROSCOPY

Course Code: CHY4213 **Credit Units:03**

Course Objective:

The course is designed to give students the basis of organic compound charachterization. The student will be able to analyse and interpret spectroscopic data collected by the methods discussed in the course. They will be able to solve problems related to the structure, purity and concentration of chemicals and to study molecular interactions by choosing suitable spectroscopic methods and interpreting corresponding data.

MODULE I: UltraViolet and Visible Spectroscopy:

Principles of electronic spectroscopy,Absorption Law's, Type of electronic transitions, Effect of solvent on electronic transitions, Chromophores &Auxochromes, Ultraviolet bands of carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fieser-Woodward rules for conjugated dienes and carbonyl compounds. Qualitative applications of UV-Vis spectroscopy.

MODULE II: INFRARED SPECTROSCOPY

Principle of IR spectroscopy, Modes of vibrations, Hook's law and calculation of frequency for different bonds. Fundamental vibrations and selection rule. Characteristic vibrational frequencies of common organic compounds. Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance. Fingerprint region. Introduction to Raman spectroscopy. Applications of IR and Raman Spectroscopy in organic chemistry.

MODULE III: Nuclear Magnetic Resonance (NMR) Spectroscopy:

General introduction, chemical shift and factors effecting it, spin-spin interaction, shielding – deshieldingmechanism, chemical shift values and correlation of protons present in different groups in organic compounds. Proton exchange (proton on N, O and S atom), Karplus-relationship of coupling constant with dihedral angle. Simplification of complex spectra-by double resonance, contact shift reagents, D_2O shake. Nuclear Overhauser Effect (NOE). Principle and introduction to C-13 NMR, F-19, P-31, DEPT and 2-D NMR, Applications of NMR in organic chemistry.

MODULE IV: MASS SPECTROMETRY

Introduction, ion production—Electron ionization (EI), Chemical Ionization (CI), Fast atom bombardment (FAB) and Matrix Assisted Laser Desorption Ionization (MALDI), factors affecting fragmentation, ion analysis, and ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, Molecular ion peak, Base peak, Isotopic peaks, Meta-stable peak, McLafferty rearrangement. Determination of molecular weight and molecular formula: Nitrogen Rule, hydrogen deficiency index. Introduction to GCMS, LCMS and HRMS. Combined structural elucidation problems based on IR, UV, NMR and mass spectral data.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Spectrometric Identification of Organic Compounds, R. M. Silverstein, G.C.Bassler and T.C.Morrill, John Wiley.
2. Spectroscopy of Organic Compounds by P. S. Kalsi.
3. Application of Spectroscopy of Organic Compounds, J.R. Dyer, Prentice Hall.
4. Spectroscopic Methods in Organic Chemistry, D.H. Williams,I. Fleming, Tata McGraw-Hill.
5. Organic spectroscopy by Jagmohan
6. Organic spectroscopy by W. Kemp
7. Elementary Organic Spectroscopy by Y. R. Sharma.

ANALYTICAL CHEMISTRY LAB

Course Code: CHY4206 **Credit Units:02**

Minimum 10 Experiments to be performed

Chromatography

1. Estimation of zinc and magnesium in the given mixture solution against EDTA(Disodium salt) solution
2. Thin-layer chromatography-separation of nickel, manganeses, cobalt and zinc.
3. Separation and identification of the sugars present in the given mixture of glucose, fructose and sucrose by paper chromatography and determination of Rf values.
4. Separation of artificial colorants in confectionary using TLC.
5. Extraction and Determination of caffeine by tea leaves

Colorimetry

6. To verify Beer-Lambert's Law for potassium permanganate solution and hence to determine the molar extinction coefficient and unknown concentration of given sample colorimetrically
7. To verify the Beer-Lamberts Law and determine the concentration of given dye solution colorimetrically.
8. To estimate the amount of D-glucose in given solution colorimetrically.

Quantitative Analysis

9. Estimation of amines/phenols using bromate bromide solution/or acetylation method.
10. Determination of lodine and Saponification values of an oil sample.
11. To determine the acid value of given oil
12. Determination of protein content of wheat flour.

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A: Attendance,V – Viva.

Suggested Readings:

1. .L.Wilson and D.W.Wilson, "Comprehensive Analytical Chemistry", Dan van Nostrand
2. J.G.Dick, "Analytical Chemistry, McGraw Hill
3. D.A.Skoog and D.M.West, "Analytical Chemistry – An Introduction", Reinholdt.
4. I.M.Kolthoff, V.J.Elving and Sandell, "Treatise on Analytical Chemistry", Interscience

INDUSTRIAL CHEMISTRY LAB

Course Code: CHY4207 **Credit Units: 01**

Minimum 10 Experiments to be performed

Analysis of Cement

1. Determination of silica content from given sample

Analysis of polymers

2. Determination of Acid Values of plastic material.
3. Determination of Saponification value of plastic material.
4. Determination Iodine value of a plastic material.
5. Determination of hydroxyl Value of plastic material.
6. Determination of Carbonyl Value of plastic material.
7. Determination of Molecular Weight of a polymer.
8. Determination of Capacity of cation exchange resin.
9. Determination Capacity of an anion exchange resin.
10. Determination of glass transition temperature of plastic.

Preparation of polymers

11. Preparation of Urea Formaldehyde resin and Phenol Formaldehyde resin.
12. To synthesize and hydrolyse Nylon 6:6/polyacrylic acid/polyaminde

Water Analysis

13. Determination ofTotal dissolved solids
14. Determination ofCarbonate and non-carbonate hardness by EDTA
15. Determination ofDissolved oxygen, BOD, COD
16. Determination ofTurbidity

Preparation of Dyes (methyl orange, bismark brown**)**
Preparation of Cosmetics (shampoo, lipstick, detergent**)**
Preparation of Drugs(Paracetamol and Aspirin)

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A: Attendance,V – Viva.

Suggested Readings:

1.A Textbook of quantitative chemical analysis, VIth Edition Vogel, Pearson Education Limited.
2. Practical Organic Chemistry, Mann and Saunders, IV Edition, ELBS and Longman Publication
3. Comprehensive Experimental Chemistry, V. K. Ahluwalia, New Age Publication, Delhi
4. Practical Manual of Organic Chemistry, R. K. Bansal
5. A Textbook of quantitative inorganic analysis including elementary instrumental analysis, IVth Edition Vogel, ELBS and Longman Publication
6. Advanced Practical Inorganic Chemistry, Gurdeep Raj, Goel Publishing House, Meeru

TERM PAPER

Course Code: CHY4231 **Credit Units: 01**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related to the contemporary research issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for term paper (List is indicative, not exhaustive)

- Inorganic chemistry
- Organic chemistry
- Physical chemistry
- Green chemistry
- Agricultre chemistry

Evaluation Scheme

Organisation and relevance of content	**Literature Review**	**Bibliography**	**Presentation**	**Total**
30	30	20	20	100

Syllabus- Third Semester

INSTRUMENTAL METHODS OF ANALYSIS

Course Code: CHY4301 **Credit Units: 04**

Course Objective: The curriculum is developed to help the students to understand the basic theory & applications of various sophisticated instruments. The instrumental analysiscourse aims to provide students with an understanding of the functioning and applications of these instruments in our day to day life. It covers the basic principles of theory, its operation and their applications in chemistry, physics, biology, nanotechnology, material science and materials chemistry. Recent advances in the characterization of nanomaterials will also include in the course. The course is further enhanced with invited lectures on recent developments and applications in characterization of nanomaterials.

Course Contents:

MODULE I: MICROSCOPIC TECHNIQUES

Microscopic techniques, Transmission electron microscopy, Scanning electron microscopy, high resolution scanning electron microscopy, high resolution transmission electron microscopy, Selected Area Electron Diffraction Pattern, Chromatographic techniques in combination with Mass Spectrometer (GC-MS, LC-MS etc) and their applications in various fields such as chemistry, biology, medicine, nanotechnology etc.

MODULE II: ANALYTICAL TECHNIQUES

Thermal Analysis (DSC, TGA, DTA etc).Applications of XRD measurements, Calculation of particle size from XRD measurements using Debye Scherer formula.Applications of spectroscopic techniques in chemistry, biology, nanotechnology, nanomedicine etc.

MODULE III: MOSSBAUER SPECTROSCOPY

Doppler shift and recoil energy, isomer shift and its interpretation, quadrupole interactions, effect of magnetic field on Mossbauer spectra, applications to metal complexes, metal carbonyls, Fe-S cluster and tin compounds.

MODULE IV: DYNAMIC LIGHT SCATTERING

Theory of Dynamic Light Scattering (DLS).Hydrodynamic Diameter, Number average diameter, volume average diameter, Intensity average diameter.Applications of dynamic light scattering in synthesis of nanometerials, chemistry, biology and nanomedicine.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance.

Suggested Readings:

1. Fundamentals of Analytical Chemistry (with CD-ROM and InfoTrac) by Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, Hardcover: 992 pages, Publisher: Brooks Cole
2. Dean's Analytical Chemistry Handbook by Pradyot Patnaik, Hardcover: 1280 pages, Publisher: McGraw-Hill Professional
3. Quantitative Chemical Analysis, Sixth Edition by Daniel C. Harris, Hardcover: 928 pages, Publisher: W. H. Freeman
4. Analytical Chemistry by Gary D. Christian, Hardcover: 848 pages Publisher: Wiley; 6th edition
5. Comprehensive Medicinal Chemistry by Hansh C, Vol IV, Elsevier Pergamon.
6. Medicinal Chemistry-A Biochemical Approach by Nogrady T, Oxford University Press New York, Oxford.
7. Drago, R. S. Physical Methods in Chemistry W. B. Saunders Co. U. K. 1977
8. Ebsworth, E. A. V. Structural Methods in Inorganic Chemistry Blackwell Scientific Publications 1991.

ADVANCED PHYSICAL CHEMISTRY

Course Code: CHY4319 **CreditUnits: 04**
Course Objective:

This course is intended to give the students the requisite knowledge of advances in physical chemistry with the focus on enhancing their problem-solving ability. A knowledge of photochemistry, electrochemistry and quantum mechanics is necessary. This course will give the students a better understanding of the various aspects and application of physical chemistry.

ModuleI: CLASSICAL AND STATISTICAL MECHANICS

(i) *Classical and Classical Statistical mechanics*: equation of motion in Newton, Lagrange and Hamiltonforms. Poisson bracket notation. Concept of ensembles – micro-canonical, canonicaland grand-canonical.Fluctuations
(ii) Quantum Statistical Mechanics:Maxwell-Boltzmann statistics, Bose-Einstein (BE) and Fermi-Dirac (FD) distribution.

Module II: Photochemistry

Interaction of radiation with matter. Spontaneous and stimulated emission, Einstein A and B coefficients. Principle of the LASER. Different types of lasers. Uses of lasers.
The salient features of Raman spectroscopy, 'Resonance Raman' spectroscopy, second harmonic generation, 'Surface Enhanced Raman' spectroscopy.Photoelectron spectroscopy(XPES, UPES).

Module III: CHEMICAL DYNAMICS AND EMULSIONS:

Collision theory of reaction rates, steric factors, activated complex theory and RRKM, collisional dynamics. Arrhenius equation, reactions in solution ion, Kinetic salt effects, steady state kinetics, kinetic and thermodynamic control of reactions, treatment of unimolecular reactions, homogenous catalysis and kinetics of enzyme catalysis
Emulsions: macro- and micro-emulsions; aging and stabilization of emulsions; Phase behaviour of micro emulsions. Colloids, vesicles, lipid bilayer membrane: structure and properties, monolayers, liquid crystals, foams and aerosols.

Module IV: ION-ION INTERACTIONS:

Ion Transport in solutions: Ionic movement under the influence of an electric field , mobility of ions, ionic drift velocity and its relation with current density, Einstein relation between the absolute mobility and diffusion coefficient, the Stokes- Einstein relation , the Nernst -Einstein equation, Waldens rule, the Rate- Process approach to ionic migration , the Rate process equation for equivalent conductivity, total driving force for ionic transport, Nernst - Planck Flux equation, ionic drift and diffusion potential , the Onsager phenomenological equations. The basic equation for the diffusion, Planck- Henderson equation for the diffusion potential.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 8th Ed., OxfordUniversity Press (2006).
2. Ball, D. W. *Physical Chemistry* Thomson Press, India (2007).
3. Castellan, G. W. *Physical Chemistry* 4th Ed. Narosa (2004).
4. Mortimer, R. G. *Physical Chemistry* 3rd Ed. Elsevier: NOIDA, UP (2009).
5. Huang K.S. *Statistical Mechanics*3rd ED. Wiley
6. Huang K.S. *Statistical Mechanics*3rd ED. Wiley

ADVANCED ORGANIC CHEMISTRY

Course Code: CHY4318 **Credit Units:04**

Course Objective: The main objective of this organic chemistry course is to give a good idea of different important chemical reactions. Synthetic organic chemistry plays an important role in our daily life due to the importance of synthesis of various organic compounds for the prevention of various diseases.It couse includes the disconnection approach, synthons and umpolung reactions and applications of complex metal hydrides. This course also covers the various important reagent such as LDA, PPA, diazomethane, ozone phase transfer catalyst etc. It also includes invited lectures on the recent development of synthetic organic chemistry recations.

Course Content:

MODULE I : **DISCONNECTION APPROACH**

Introduction to disconnection approach,functional group interconversions.Introduction to Retro-synthesis of aromatic Heterocyclesand 3, 4, 5 and 6 membered carbocyclic and heterocyclic rings. One group C-X and two group disconnections in1,2,1,3 -,1,4-& 1,5- difunctional compounds, Retro- synthesis of Alkene ,acetylenes andaliphatic nitro Alcohols and carbonyl compounds, amines.

MODULE II: SYNTHONS AND UMPOLUNG

An introduction to Synthons and synthetic equivalents, importance of the order ofevents in organic synthesis, chemoselectivity, regioselectivity, Diels Alder reaction,Michael addition and Robinson annulations, Reversal of polarity (Umpolung).

MODULE III : INTRODUCTION TO PROTECTING GROUPS AND APPLICATIONS

a) Protecting Groups: Principle of protection of alcohol, amine, carbonyl and carboxylgroups

b) Application of the following in synthesis Merrifield resin, polymeric reagents. Solid phase synthesis of polypeptide &oligonucleotides, electro organic synthesis, enzyme catalyzed reaction in synthesis &resolution of racemic mixtures.

MODULE IV: APPLICATION OF FOLLOWING REAGENTS &REACTION IN SYNTHESIS

Complex metal hydrides, lithium dialkyl cuprate, lithium diisopropylamide (LDA) Dicyclohexylcarbodiimide(DCC), Trimethyl silyl iodide, tributyltin hydride, peracids, lead tetra acetate, PPA, Diazomethane , ozone phase transfer catalyst, woodward-prevost hydroxylation, Barton and Shapiro reaction Hoffmann – Loffler- Fretag, Peterson synthesis.

Selenium dioxide, crown ethers, DDQ, Dess-Martin periodinane, periodic acid & Iodoisobenzyl diacetate.Application of following metal in organic synthesis Pd, Hg, and Rh, Tl and Si

MODULE V: **Supramolecular Chemistry**

Factors leading to strong binding (noncovalent interactions). New molecular receptors: crown ethers, cryptands, cyclophanes, siderophores, cyclodextrin, and their application in specific recognition processes. Supramolecular reactivity and catalysis, switching devices. Self-assembly of supramolecularaggregates, principles of gene synthesis, catalytic antibodies, molecular channels, transport processes and carrier design. Supramolecular devices and nanotechnology.Supramolecular photochemistry

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. S.Warren: Designing of organic synthesis
2. J. Fuhrhop & G. Penzlin. : Organic synthesis (2nd ed.)
3. Carruthres: some modern methods of organic synthesis.
4. Fieser & Fieser : Reagent in organic synthesis
5. R.O.C.Norman: principle of organic synthesis
6. CAREY & sundberg: Advanced organic Chemistry
7. Bartan and Ollis : comprehensive organic Chemistry
8. R.Admas: - organic reactions
9. Stone & west: Advances in organometallic Chemistry
10. C.W.Bird: Transition metal intermediate in organic synthesis
11. Swan &black :organometallic in organic synthesis.
12. A. Mitra : synthesis of prostaglandins
13. John Apsimon: Total synthesis of natural products
14. M. K. Mathur, C. K. Narang & R.E.Williams: polymers as aid in organic Synthesis
15. P. HODGE & D.C.SHERRINGTON: Polymer supported reaction in organic synthesis.
16. C.J.Gray: Enzyme catalysed reactions
17. T.W. Green & P.G.M.Wats : Protecting groups in organic Chemistry
18. Weber &Gokel : phase transfer catalyst in organic synthesis.
19. Protecting group chemistry J. Roberton (OX)

ADVANCED INORGANIC CHEMISTRY

Course Code: CHY4323 **Credit Units: 04**

Course Objective :

This course is intended to give the students the knowledge of various aspects of advance inorganic chemistry with the focus on boron chemistry, ligand synthesis and their complexation studies with transition and non-transition metals. Pre-requisite knowledge of basic inorganic chemistry is must. A student taking up this course should be able to assess and suggest a suitable symmetry elements and operators for wide range of compounds.

Module I: GROUP THEORY

Symmetry in nature, symmetry elements and symmetry operations. Symmetry properties of atomic orbitals. Elements of group theory. Elements of group theory: groups, sub-groups, classes and characters, classes of symmetry operations, symmetry point groups; representation of groups by matrices. Representation of symmetry operator transformation of basis vector, Symmetry transformation of operators The Great Orthogonality Theorem (without proof) and its consequences; construction and applications of character tables, representation of cyclic groups. direct product and projection operator and their applications; symmetry adapted linear combination (SALC)sThe Great Orthogonality Theorem: statement and interpretation, proof of important corollaries; construction of character tables, cyclic groups and construction of their character tables. Mulliken Symbols, Use of the character table.

ModuleII: INORGANIC RINGS, CAGES AND CLUSTERS

Introduction, clusters in elemental states, cluster classification, Low nuclearity (M3 – M4) and high nuclearity cluster (M5 – M10), Metal metal bonding (MO), Carbonyl clusters, skeletalelectron (Elm) counting, Wade-Mingos-Luber rule, application of isolobal and isoelectronicanalogy, capping rules, carbide, nitride, chalcogenide and halide containing cluster,important examples like Nb, Ta, Mo, W clusters,Metal Clusters, Chains and Fullerenes, Compounds with metal-metal multiple bonds

Module III: CHEMISTRY OF BORONS

Higher boron hydrides-structures and reactions, equation of balance, Lipscomb topological diagrams, polyhedral skeletal electron pair theory (PSEPT), carboranes, metalloboranes and heteroboranes, metallocarboranes, zintl ions, chevrel compounds, infinite metal chains, cluster-surface analogy, cluster compounds in catalysis.

Module IV: INTRODUCTION TO SYNTHETIC METHODOLOGIES FOR TRANSITION AND NON-TRANSITION METAL COMPOUNDS

Ligand design and ligand synthesis: polypyridine, Schiff base, oxime, macrocycle, tripod,podand, coronand, cryptand, octopus, tailoring and appending of pendant arm, electronreservoir, ligand topology and molecular mechanics, coordination compound design andsynthesis: self-assembly, structure-directed synthesis, building block, metalloligand,polymeric ensembles (chain, sheet, network), supramolecular framework, molecular machine, biomodelling, molecular/crystal engineering.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Inorganic Chemistry: Principles of Structure and Reactivity (4th Edition) by James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Hardcover: 964 pages, Publisher: Benjamin Cummings

2. Advanced Inorganic Chemistry 6th Edition F. Albert Cotton , Geoffrey Wilkinson , Carlos A. Murillo , Manfred Bochmann

3. Chemical Applications of Group Theory, 3rd EditionF. Albert Cotton

NATURAL PRODUCTS AND HETEROCYCLIC CHEMISTRY

Course Code: CHY4325 **Credit Units: 03**

Course objective: The course provides an understanding of important natural products. Using selected examples, this course describes the process of identification and isolation of natural products from natural sources, their chemical synthesis and structure elucidation.The course gives a broad introduction to heterocyclic chemistry. Emphasis is given on the most important heterocyclic systems, such as coumarines, indoles, pyrimidines, imidazoles, aziridines and oxiranes etc. For each group, ring synthesis, chemical properties and characteristic reactions will be discussed.

Course Contents:

MODULE I: TERPENOIDS AND CAROTENOIDS

Classification, nomenclature, occurrence, isolation, general methods of structure determination, isoprene rule. Structure determination, stereochemistry and synthesis of the following representative molecules: Citral, α-Terpeneoland β-Carotene

MODULE II: ALKALOIDS

Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradatin, classification based on nitrogen heterocyclic ring, role of alkaloids in plants. Structure, stereochemistry and synthesis of the following: Coniine, Nicotine, Atropine, and Quinine.

MODULE III: HETEROCYCLIC - I

Introduction, classification, nomenclature of three, four, five and six-membered rings. Methods of synthesis and chemical reactions of aziridines, oxiranes, thiiranes, azetidines, oxetanes. Methods of Synthesis and chemical reactions with emphasis on the mechanism of electrophilic substitutionof pyrrol, thiophene and furan. Synthesis and reactions of pyridine with emphasis on nucleophilic substitution reactions.

MODULE IV: HETEROCYCLIC – II

Introduction to condensed five and six membered heterocycles; preparation and reactions of indole, quinoline and isoquinoline with special reference to Fischer-indole synthesis, Skraup synthesis and BischierNapieralski synthesis. Synthesis and chemical reactions of five membered ring with two heteroatoms; pyrazole, imidazole, oxazole, thiazole, isothiazole, and benzofused analogue like coumarins, thiocoumarins, phenazine, phenothiazines, 1,4 and 1,5-benzodiazepines.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings:

1. Heterocyclic Chemistry, Vol 1-3, A. A. Gupta. M. Kumar and V. Gupta, 35 Springer Verlag
2. The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme
3. Heterocyclic Chemistry, J. A. Joule, K. Mills and G.F. Smith, Chapman and Hall
4. Heterocyclic Chemistry,T.LGilchrist,LongmanScietificTechinal
5. Contemporary Heterocyclic Chemistry, G. A. Newkome and W. W. Paudler, Wiley-Inter Science
6. Organic Chemistry, Vol 2, I. L. Finar, ELBS
7. Natural Products- Chemistry and Biological Significance, J. Mann, R.S. Davidson, J. B. Hobbs, D.V. Banthrope and J. B. Harborne, Longman, Essex.

DRUGS AND DYES

Course Code: CHY4304 **Credit Units: 04**

Course Objective: At the end of this course students must acquire a good knowledge about the various drugs their active constituents, their pharmacological actions and therapeutic uses. Beside drugs they will learn about various dyes used in day to day life, their properties and applications.

Course Content:

MODULE I: INTRODUCTION TO DRUGS

Definition of drug (WHO), classification of drugs, nomenclature of drugs, stereochemical aspects of drugs, definitions of terms commonly used in the chemistry of drugs, routes of drug administration and different dosage forms and applications

MODULE II: MECHANISM OF ACTION, STRUCTURE AND SYNTHESIS OF DRUGS

Sulphonamides : Sulphathiazole, Sulphadiazine(any two)
Antiseptics : Iodoform, Dettol
Antileprotic drugs : Dapsone (DDS), Acedapsone (DADDS)
Anticancer agents : Alkylating agents
CardiovascularDrugs : Amyl nitrate, Methyldopa
Antipyretics&Analgesics: Novalgin, Paracetamol
Antimalarials :Chloroquine ,Primaquine,Mepacrine
Anti diabetic : Tolbutamide
Antitubercular : p-amino salicylic acid, Ethambutol

MODULE III: INTRODUCTION TO DYES

Historical development of synthetic Dyes - Introduction, Nomenclature, classification based on structure & mode of applications of fibres.Structural features of a dye (chromophores and auxochromes), bathochromic and hypsochromic effects, diazotisation and coupling, colour and chemical constitution (Witt's theory, Armstrong theory and Modern theory). Dye intermediates-unit, batch & continuous process in the preparation of dye intermediates,

MODULE IV: STRUCTURE AND PREPARATION OF DYES

Nitro Dyes : Picric acid, Martius yellow, Naphthol yellow S
Nitroso Dyes : Fast green O, Naphthol green Y
Azo Dyes : Methyl orange, Methyl red, Congo Red
Phthaleins : Phenolphthalein
Phthalocyanines: Copper phthalocyanine
Xanthenes : Fluorescein, Eosin, Mercurochrome
Rhodamines : Rhodamine B
Thiazine Dyes : Methylene blue
Cyanine Dyes : Quinoline blue
Antraquinone Dyes: Alizarin
Indigoids : Indigo (Indigotin)

Thioindigos : Thioindigo
Azine Dyes : Safranine T

Action of light on dyes and dyed fibres, Factors affecting fastness of dyed fibres General consideration, fluorescence, phototropy, mechanism of fading.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Books Suggetsed:

1. The Organic Chemistry of Drug Synthesis, Vol. 1,2,3,4 by Lednicer Daniel, 1st edition, John Wiley & Sons INC.
2. Exploring QSAR Vol; I Fundamentals and Applications in Chemistry and Biology by CHansh and A Leo Vol. II: hydrophobic, Electronic and Steric Constants by C Hansh, A Leoand D Hockman ACS Book Catalog.
3. Foye' s Principles of Medicinal Chemistry by Foye, 6th edition, Lippincott William Wilkins.
4. Comprehensive Medicinal Chemistry by Hansh C, Vol IV, Elsevier Pergamon.
5. Quantitative Drug Design- A Critical Introduction by Martin YC, Marcel Dekker Inc. NewYork.
6. Medicinal Chemistry-A Biochemical Approach by Nogrady T, Oxford University Press NewYork, Oxford.
7. Computer Aided Drug Design, by Pops and Perruns, Academic Press, NY
8. Burger' s Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York.
9. Introduction to Medicinal Chemistry' – How Drugs Act and Why by Alex Gringauz, Willey-VCH Publication 1997.
10. Drug Design by Bothara KG &Kulkarni VM, 3rd edition, NiraliPrakashan.
11. An Introduction to Drug Design by SN Pandeya& IR Dimmock, 1st edition, New AgeInternational Publishers.
12. Structure based Drug Design by Veerapandian, 1st edition, Taylor & Francis New York,London.
13. Holtje. Sippl.,Rognan and Folkers, Molecular Modeling.
14. P.K. Larsen, Tommy and U.Madsen, textbook of Drug Design and Discovery.

ADVANCED NATURAL PRODUCTS CHEMISTRY

Course Code: CHY4305 **Credit Units:03**

Course Objective: The main idea of this course is the give the students details of natural product chemistry, which includes the study of Vitamins, alkaloids, terpenes and steroids etc. These plays a key role in our day to day life. The course covers the importance of these naturally occurring materials and their applications in chemistry, biology and medicine. The course will alos includes the invited lectures on recent advances in natural product chemistry and it gives a reasonable good overview of the naturally occurring chemicals and their important reactions, their applications etc.

Course Content:

MODULE I: NATURAL PRODUCTS AND THEIR BIOSYNTHETIC PATHWAYS

General classification of natural products, their isolation and characterisation and biosynthesis of common plant products; Biosynthesis pathways for natural products using co-enzymes and enzymes; Synthesis of selected natural products based on genetic classification – fatty acid derivatives and related compounds, general biogenesis and synthesis of cis jasmone, methyl jasmonate, prostaglandins, exaltone and muscone.

MODULE II: VITAMINS

Vitamins: Classification, occurrence, chemistry of Vitamins A, C and E, structure elucidation and synthesis, deficiency syndromes,

MODULE III :ALKALOIDS

Alkaloids, defination, Isolation, Classification (define different categories of alkaloids with specific examples, their medicinal uses, synthesis).Drugs (cocaine, opiates, quinine, vincristine, curare, mescaline, etc.) and toxins (nicotine, lupinines, strychnine, tetrodotoxin, etc.Introduction, 2. Simple Alkaloids I: Pyrrole Derivatives 3. Simple Alkaloids II: Piperidine Derivatives 4. Aromatic Alkaloids I: Simple Derivatives 5. Aromatic Alkaloids II: More Complex Derivatives 6. The Indole Alkaloids 7.Miscellaneous Alkaloids with Interesting Bioactivities.

MODULE IV:TERPENES AND STEROIDS

Classification and biosynthesis of mono- sesqui-, di- and triterpenoids and steroids.Acetyl CoA, Mevalonic acid, acetoacetyl CoA, squalene to lanosterol, Cholesterol to estradiol, diosgenin and its utility in hormone synthesis.

MODULE V: GENERAL CHEMISTRY OF THE FOLLOWING COMPOUNDS

Cholesterol, Artemisinin, Gibbereline A3, Azadirachtin.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. K. Nakanashi. Natural Products Chemistry, Vols. I and II, Academic Press, New York andLondon (1974).
2. M. Harmata. Strategies and Tactics in Organic Synthesis 4 & 5, Academic Press (2004)
3. T. L. Gilchrist. Heterocyclic Chemistry (2nd edn.), Longman Scientific & Technical Publicns.(1992).
4. R. K. Bansal. Heterocyclic Chemistry: Synthesis, Reactions and Mechanisms, Wiley Eastern (1991).

INDUSTRIAL MANAGEMENT AND SAFETY PROCESSES

Course Code: CHY4307 **Credit Units:03**

Course Objective: The curriculum is developed to help the students understand the basic functions & responsibilities of a manager, provide him tools and techniques of managing different activities of the business concerned and to understand & interpret the provisions of some of the important provisions related to patent, trademark etc. It also aims at minimizing the chances of risks, injuries and accidents by implementing risk management techniques and safety management operations, monitoring the operating systems and bolstering the safety measures of an industry in general. With the rise of natural disasters in and around our world, the importance of the safety of human capital, protection of the environment and conservation of existing assets of an industry is increasing, leading to growing relevance of these skills.

Course Contents:

MODULE I: BASIC CONCEPTS OF MANAGEMENT FUNCTION OF MANAGEMENT

Planning, Organizing, Directing, Control, Decision-making, Budgeting, Inventory Management (IM) & Quality Control (QC), Meaning & Importance of Inventory management, Inventory models, Cost consideration, Economic order quantity model.

MODULE II:QUALITY MANAGEMENT

Meaning & definition of Quality-Quality control systems-quality assurance-planning for quality-total quality management (TQM) philosophy-implementation of TQM in service and manufacturing industries-national & international standards.

MODULE III: MANUFACTURING MANAGEMENT

Production planning & control, dynamics of material flow-inventory-bottlenecks and process variability, planning levels and time scales, forecasting-aggregate planning, synchronized manufacturing and theory of constraints-just in time production-shop floor performance monitoring.

MODULE IV:SAFETY IN CHEMICAL PROCESS INDUSTRIES

Safety in industries; need for development; importance safety consciousness in Indian chemical industry; safety programmes, elements of safety programme; effective realization, economic and social benefits.Industrial safety- Chemical process industries; potential hazard; chemical and physical job safety analysis; high presssure; high temperature operation; dangerous and toxic chemicals; highly radioactive materials; safe handling and operation of materials and machineries; planning and layout.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. William Handley, “Industrial Safety ", Hand Book McGraw-Hill Book Company 2nd Edition, 1969.
2. Fawatt, H.H. and Wood, W.S., “Safety and Accident Prevention in Chemical Operation", Interscience, 1965.
3. Heinrich, H.W. Dan Peterson, P.E. and Nester Rood, “Industrial Accident Prevention ", McGraw-Hill Book Co., 1980.
4. Blake, R.P., “Industrial Safety ", Prentice Hall Inc., New Jersy - III Edition, 1963.
5. Subbaram N.R. “Handbook of Indian Patent Law and Practice", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.
6. Eli Whitney, Moduleed States Patent Number: 72X, Cotton Gin, March 14, 1794.
7. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].

ADVANCED NANOCHEMISTRY

Course Code: CHY4308 **Credit Units:03**

Course Objective: This course is intended to give the students' knowledge of advances in nanochemistry and introduction to ionic liquids. This course will help the student understand superplasticity and its industrial Applications. A knowledge of introductory level nanochemistry is required.

Course Content:

MODULEI:SIZE EFFECTS ON STRUCTURE AND MORPHOLOGY OF NANOPARTICLES

Fundamental Properties - Size Effects on Structure and Morphology of Free or Supported Nanoparticles - Size and Confinement Effects - Fraction of Surface Atoms - Specific Surface Energy and Surface Stress - Effect on the Lattice Parameter - Effect on the Phonon Density of States - Nanoparticle Morphology - Equilibrium Shape of a Macroscopic Crystal - Equilibrium Shape of Nanometric Crystals - Morphology of Supported Particles.

MODULE II:SUPERPLASITICITY AND REACTIVITY OF METAL NANOPARTICLE

Superplasticity – Introduction – Mechanism - Superplastic Nanostructured Materials - Industrial Applications. Reactivity of Metal Nanoparticles - Size Effects-Structural Properties - Electronic Properties - Reactivity in Chemisorption and Catalysis of Monometallic Nanoparticles - Support Effects - Alloying Effects - Effect of Surface Segregation - Geometric Effects -Electronic Effects - Preparation and Implementation in the Laboratory and in Industry.

MODULEIII:SUPERCRITICAL FLUIDS

Supercritical Fluids –Introduction – Physicochemical Properties - Solubility - Viscosity - Diffusion -Thermal Conductivity - Applications - Purification and Extraction - Synthesis.

MODULEIV:FEATURES OF NANOSCALE GROWTH

Specific Features of Nanoscale Growth – Introduction - Thermodynamics of Phase Transitions - Dynamics of Phase Transitions - Thermodynamics of Spinodal Decomposition - Thermodynamics of Nucleation – Growth - Size Control - Triggering the Phase Transition- Application to Solid Nanoparticles - Controlling Nucleation - Controlling Growth - Controlling Aggregation. Stability of Colloidal Dispersions - Breaking Matter into Pieces.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. C. Brechignac, P. Houdy, M. Lahmani, ―*Nanomaterials and Nanochemistry*‖, Springer publication (2007).

2. Kenneth J. Klabunde, ―*Nanscale materials in chemistry*‖, Wiley Interscience Publications (2001).

3. C. N. Rao, A. Muller, A. K. Cheetham ,―*Nanomaterials chemistry*‖, Wiley-VCH (2007).

CHEMISTRY OF COSMETICS

Course Code: CHY4309 **Credit Units:03**

Course Objective: This course is intended to provide a comprehensive survey of ingredients fundamental to the cosmetic industry. The course will emphasize current trends in the selection of cosmetic ingredients. The chemistry and technology of cosmetic raw materials will be related to their behavioral properties as utilized in the construction of stable functional systems. In this way, it is intended to generate a better understanding of the contributions of ingredients to the performance of finished product formulations. Emphasis will be placed on recognizing and dealing with problem areas associated with the use of various ingredients. Safety considerations and other pertinent matters which can influence ingredient selection will be included in these discussions.

Course Content:

MODULE I: INTRODUCTION

Classification of raw materials and raw materials used in the cosmetic industry for the manufacture of finished products. Method of sampling, Indian Standard specification laid down for sampling and testing of various cosmetics in finished form by the bureau of Indian standards. Factors affecting stability of a formulation, ICH guidelines, Methods of stabilizations and Methods of stability testing.Concept of development of stability indicating analytical methods.

MODULE II: PHYSICAL AND CHEMICAL PROPERTIES OF COSMETICS

Determination of Physical and chemical constants such as extractive values, moisture content, alcohol content, volatile oil content, ash values, bitterness values, foreign matters, and physical constants applicable to the lipid containing drugs. Microbial counts, bioburden and Pharmacopoeial microbial assays.

MODULE III: PREPARATION OF COSMETICS

Brief introduction of the following cosmetic preparation and a detailed study on their quality control: Shampoo, Tooth paste, skin powder, skin creams, hair creams, nail polish, after shave lotion, bath and toiletries, lipstick and hair dyes, perfumes, depilatories.

MODULE IV: PACKAGING OF COSMETICS

Packaging of cosmetics –Filling of solids, semisolids & liquids. Materials used for cosmetic packaging Rules & regulations and legal provisions for packaging & labeling.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. Comprehensive Pharmacy Review 5th Edition by Leon Shargel, Alan H. Mutnick, Paul F. Souney, Larry N. Sawnson – 2004.
2. Applied Biopharmaceutics and Pharmacokinetics, 4th Edition by Leon Shargel / Andrew B.C., Yu – 1999.
3. A. H. Beckett and J. B. Stenlake Practical Pharmaceutical Chemistry, Part I and Part II, 4th Edition.
4. G. H. Jeffery, J. Basset, J. Mendham, R. C. Denny (Rev. by) Vogels Text Book of Quantitative Chemical Analysis, 5th Edition 1989, ELBS.
5. The Controller of Publications; New Delhi, Govt. of India, Indian Pharmacopoeia, Vol. I and Vol. II - 1996.
6. J. B. Wilkinson and R. J. Moore :Herry'sCosmeticology; Longman Scientific and Technical Publishers, Singapore.
7. P.D. Sethi; Quantitative Analysis of Drugs in Pharmaceutical Formulations, 3rd Edition - 1997,
8. ICH guideline for impurity determination and stability studies.
9. Practical HPLC method development by Lloyd R. Snyder, Joseph J. Kirkland, Joseph I. Glajch, John Wiley and Sons 2nd Edition – 1997

MEDICINAL CHEMISTRY

Course Code: CHY4310 **Credit Units:03**

Course objective: This course is intended to provide students with chemical principles that are required to understand the action and behavior of drug compounds and hence the relationship between the structure and stereochemistry of a compound and its chemical and therapeutic properties, and thus the chemical considerations in drug design: size, physico-chemical properties and ADME (absorption, distribution, metabolism, and excretion).

Course Contents:

MODULE I: DRUG DEVELOPMENT

Drug development: Lead modification. (a) Identification of active part -Pharmacophore (b) Fundamental group modification (c) Structure-activity relationship (d) Structure modification to increase potency and therapeutic index (i) Homologation ii) Chain branching (iii) Ring chain transformations (iv) Bioisosterism. Drug development process: (a) Pre-formulation, product development (b) Preclinical studies; Acute toxicity, sub acute toxicity, chronic toxicity, LD_{50}, ED_{50}, pharmacodynamicsutagenecity and reproductive studies.

MODULE II: PHARMACOKINETICS

Basic principles of pharmacokinetics including absorption, distribution, metabolism and excretion of drugs and metabolites in the human body, important pharmacokinetic parameters in defining drug therapeutics, mathematical approach to pharmacokinetic modeling.

MODULE III: PHARMACODYNAMICS

Introduction, elementary treatment of enzyme stimulation, enzyme inhibition, sulphonamides, membrane active drugs, drug metabolism, biotransformation, significance of drug metabolism in medicinal chemistry.Therapeutic index, explanation of quantal dose, graded dose, dose-effect curves, efficacy, potency, margin of safety

MODULE V: ANTIBIOTICS

Definition, characteristics, classification, synthesis and therapeutic uses of Penicillin, Ampicillin, Amoxicillin, Chloramphenicol, Cephalosporin, Tetracycline and Streptomycin

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. Principles of Medicinal Chemistry, W. C. Foye, Philadelphia, USA
2. An introduction to Medicinal chemistry, G. L. Patrick, Oxford University Press
3. Burger's Medicinal Chemistry and Drug Discovery, Vol. 1-5, John Wiley
4. The Organic Chemistry of Drug Design and Drug Action, Richard B. Silvermann, Academic Press

5. Medicinal Chemistry, Ashutosh kar, New Age International Ltd
6. Essentials of Medical Pharmacology, K. D. Tripathi, Jaypee Brothers
7. A textbook of medicinal chemistry, P. Primo, CBS Publishers & Distributors
8. Text book of pharmaceutical organic chemistry, Md. Ali, CBS Publishers

ENVIRONMENTAL CHEMISTRY

Course Code:CHY4321 **Credit Units: 03**

Course Objective: This course is intended to provide students with knowledge of key themes, theories and problems and describe important chemical reactions in the atmosphere and in water, including important chemistry in connection with air pollution, water pollution, and case studies of many environmental disasters.

MODULE I: CHEMISTRY AND THE ENVIRONMENT

Chemistry and the environment - environmental pollution - causes - pollutants – air pollution - effects of air pollution: Environmental fate of pollutants – transformation process - bioconcentration - fate of air, water and soil pollutants

MODULE II: WATER POLLUTION

Water pollution - water quality parameters - turbidity, colour, pH, acidity, alkalinity, solids, hardness, chlorides, residual chlorine, sulphates, fluorides, phosphates, iron and manganese, DO, BOD, COD, nitrogen, grease, volatile acids, gas analysis.

MODULE III: INDUSTRIAL POLLUTION

Cement, sugar, distillery, drug, paper and pulp, thermal power plants, nuclear power plants, metallurgy.Polymers, drugs etc.

Environmental disasters – Cherbonyl, Three Mile Island, Seveso and minamata disasters,Japan tsunami

MODULE IV: BIOLOGICAL ACTIVITY

Biological activity - biodegradation of carbohydrates, proteins, fats and oil, detergents, pesticides; Metabolic fate of pollutants - adsorption – distribution -metabolism - excreation.

MODULE V: ENVIRONMENTAL TOXICOLOGY

Toxic heavy metals**:**Mercury, lead, arsenic and cadmium, Causes of toxicity. Bioaccumulation, sources of heavy metals, Chemical speciation of Hg, Pb, As, and Cd. Biochemical and damaging effects. Toxic Organic Compound**:**Pesticides, classification, properties and uses of organochlorine and ionospheres pesticides detection and damaging effects.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Suggested Readings:

1. Environmental Chemistry, S.E. Mahan, Lewis Publishers.
2. Environmental Chemistry, Sharma & Kaur, Krishna Publishers.
3. Environmental Chemistry, A.K. De, Wiley Eastern
4. Environmental Pollution Analysis, S.M. Khopkar, Wiley Eastern

5. Standard Method of Chemical Analysis, F.J. Welcher Vol. III, Van Nostrand Reinhold Co.
6. Environmental Toxicology, Ed. S. Landsberger and M. Creatchman, Gordon and Breach Science Publication.
7. Enviromental Chemistry, C. Baird, W.H. Freeman.

POLYMER TECHNOLOGY

Course Code: CHY4311 **Credit Units:03**

Course objective: This course is designed to familiarize students with the various polymer characterization and manufacturing techniques for converting polymer feed stocks into plastic end products. It involves a study of various plastics processing techniques. Students will become familiar with specialty polymers and their industrial uses, and design factors to create materials with desirable end-use properties

Course Contents:

MODULE I: POLYMER PROCESSING

Plastic Technology: Extrusion, injection molding, blow molding, compression molding, thermoforming, rotational molding, casting.Fiber Technology- Textile and fabric properties, spinning, fiber after- treatments.Elastomer Technology- Vulcanization, reinforcement, elastomer properties and compounding.Recycling of polymers Classification of polymer recycling processes. Waste polymer recovery, sortation, microsortation, polymer reprocessingand Polymer incineration

MODULE II: POLYMER BLENDS AND ALLOYS

Definition, Polymer Blends, compatibilisation, Polymer Blends, Industrial applications of polymer blends.

MODULE III: SPECIALTY POLYMERS

Liquid Crystal Polymers (LCP): Smectic, nematic, cholestric crystals, thermotropic main chain LCP, side chain LCP, chiral nematic LCP, properties of commercial LCP's. Electroactive polymers: Filled polymers, conducting polymers- doping, conducting mechanism, EMI shielding, applications- rechargeable batteries, sensors, photoconductive polymers. Ionic Polymers: Ionic crosslinking, ion exchange, hydrophilicity, ionomers, polyelectrolytes, applications, Synthetic Polymeric membranes- membrane preparation, membrane modules, applications, High temperature and fire resistant polymers, Hydrogels, smart polymers, Dendritic polymers- their applications.Biomedical polymers: Contact Lens, Dental Polymers, Artificial heart, Kidney and skin cells Biobased polymers: PLA, PCL

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. Principles of Polymerization by G. Odian, (Wiley Interscience, New Delhi)
2. Polymer Science by Gowarikar

3. Thermal Characterization of Polymeric Materials- E. Turi (Academic Press)
4. Polymer Characterization- Physical Techniques by D. Campbell and J.R.White (Chapman and Hall)
5. Text Book of Polymer Science, F.W.Billmeyer (Willey Eastern)
6. Applied Rheology in Polymer Processing by B. R. Gupta, (Asian Books, Pvt. Ltd. New Delhi)
7. Polymer Blends and Alloys by R.P. Singh, C.K. Das and S. K. Mustafi, (Asian Books Pvt. Ltd.)
8. Principles of Polymer Science by Bahadur and Shastry
9. Plastics Technology Handbook by Manas Chanda and S.K.Roy (4th Edition, CRC Press, New York)
10. Analysis of polymers- an introduction, by Crompton T.R., pergaman press 1989.
11. Thermal characterization of polymeric materials, by Turi E.A., Academic press Inc.

NON–CONVENTIONAL ENERGY SOURCES

Course Code: CHY4312 **Credit Units:03**

Course Objective: A detailed exposition of the course for the student, opting for Applied Chemistry is so vitally important for a clear understanding of recent intricate theories of non-conventional sources of energy.

Course Contents:

MODULE I: SOLAR ENERGY
Heat Transfer in Renewable Energy Systems - conduction, convection and radiation, Heat transfer and engineering concepts to the renewable energy systems, Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, Spectral distribution, the solar constant, radiation on titled surface/earth, instruments for measuring solar radiation. Application of solar energy and solar photovoltaic system

MODULE II: BIO-GAS
Raw materials, Properties/characteristics of bio gas, Principles of Bio-Conversion; Photosynthesis, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion, Transportation of bio gas, bio gas plant technology & status, Biomass cogeneration Energy recovery from urban waste, Power generation from liquid waste, Bio gas applications.

MODULE III: GEOTHERMAL AND WIND ENERGY
Structure of earth's interior, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principal of working, Types of geothermal station with schematic representation, Applications. Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals; types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Recent development and applications.

MODULE IV: OCEAN AND HYDROGEN ENERGY
Principle of ocean thermal energy conversion (OTEC), setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Fundamentals of tidal power, Potential and conversion techniques, mini-hydel power plants. Use of tidal energy, Limitations of tidal energy conversion systems. Properties of hydrogen in respect of it's use as source of renewable energy, Sources of hydrogen, Production of hydrogen; electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production. Applications of hydrogen energy.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. Bansal Keemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
2. Kothari D.P., “Renewable energy resources and emerging technologies”, Prentice Hall of India Pvt. Ltd.
3. Rai G.D, "Non-Conventional energy Sources", Khanna Publishers.
4. Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd.
5. Tiwari and Ghosal, “Renewable energy resources” Narosa Publication.
6. Twidell & Weir, “Renewable Energy Sources”
7. K Mittal “Non-Conventional Energy Systems” , Wheeler Publication
8. Ramesh & Kumar, “Renewable Energy Technologies”, Narosa Publications.

INDUSTRIAL WASTE AND WATER TREATMENT

Course Code: CHY4313 **Credit Units:03**

Course Objectives: This course will give the basic understanding of the chemical principles involved in water and wastewater treatment. It presents the basic chemistry and treatment methodologies used in drinking water and wastewater operations. The students would be able to characteristics and treatment of industrial waste, advanced methods of treatment waste and disposal, reuse and recovery of waster from various industries. A brief introduction to environmental Impact assessment has also been added to create general awareness.

Course Contents:

MODULE I: **AN INTRODUCTION TO SOURCE, CHARACTERISTICS AND TREATMENT OF INDUSTRIAL WASTE**

Undesirable waste characteristics, sources and characteristics of waste water, industrial waste survey, waste characteristics - estimation of organic content, water reuse and in-plant waste control, idea of different technologies for the treatment of industrial waste water and the basis for the selection of treatment technology.

MODULE II: **TREATMENT OF INDUSTRIAL WASTES**

Different steps in the treatment of industrial waste (equalization, neutralization, sedimentation, oil separation, flotation, coagulation), sources and removal of heavy metals e.g. As, Ba, Cd, Cu, F, Fe, Rb, Mn, Hg, Ni, Se, Ag & Zn)

MODULE III: **ADVANCE WATER TREATMENT OF INDUSTRIAL WASTE**

Aeration, air stripping of volatile organics (VOC), biological oxidation - removal of organics (sorption, stripping, biodegradation), nitrification and de-nitrification. Lagoons and stabilization basins, membrane processes, trickling filtration, adsorption, ion exchange, chemical oxidation, sludge dewatering and disposal.

MODULE IV:**WASTE WATER REUSE AND RECOVERY**

Treatment, disposal, reuse and recovery of trade waste from (1) Textile Manufacture (2) Distilleries (3) Sugar (4) Paper and Pulp mills (4) Tanneries (5) Food Processing industries (6) Fertilizer Industry.

MODULE V: **ENVIRONMENTAL IMPACT ASSESSMENT**

Introduction to EIA, impact assessment methodologies, environmental inventory, environmental impact assessment (planning and management), environmental indices and indicators for describing the affected environment, EIA guidelines, introduction to environmental impact statement.

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. Thomous S. Spiro and William M. Stiglicini, Chemistry of The Environment, Prentice Hall of India Pvt. Ltd. (2002)
2. Nicholas P. Cherimisinoff, Biotechnology for Waste and Waste Water Treatment, Prentice Hall of India Pvt. Ltd. (2001).
3. Jarry A. Nathanson, Basic Environmental Technology, 4th ed ,Prentice Hall of India Pvt. Ltd. (2003).
4. W.Wesley Eckenfelder, Indusrtrial Water Pollution Control, 2nd ed., Tata Mc-Graw Hill Book Company (1989).
5. Larry W. Canter. , Environmental Impact Assessment, 2nd ed, Tata Mc Graw Hill (1996).

NUCLEAR CHEMISTRY

Course Code: CHY4314 **Credit Units:03**

Course objective: This course is designed to provide basic information of Radiation and Nuclear chemistry; requirements, methods of preparation, uses of Radioelements. This should improve a student's knowledge of types of radioactive decay, natural decay series, nuclear models, nuclear properties, instrumentation and Introduction to health

Course Contents:

MODULE I: INTRODUCTION TO RADIOACTIVITY

Discovery of radioactivity, α, β and γ radiations, the radioactive series, radioactive decay, modes of decay, the n/p ratio, odd even rule, artificial radioactivity, transmutation of elements, the G.M counter

MODULE II: CHEMISTRY OF RADIOACTIVE ELEMENTS

Positions of radioactive elements in periodic table, trans-uranides and trans-actinides, super heavy elements; nomenclature & predicted chemistry, the Seaborg model, radiation dosimetry, radiolysis of aqueous solutions

MODULE III: USES OF NUCLEAR ISOTOPES

Introduction to nuclear medicine, positron emission tomography (PET) , radiocarbon dating and its uses, nuclear reactors, uses of heavy water in nuclear reactors, Trace analysis of elements and compounds - neutron activation analysis, isotope dilution analysis. Nuclear waste and its environmental effect

MODULE IV: NUCLEAR MODELS

Liquid-drop model, electron shell model, nuclear reactions, fission and fusion, cold fusion, idea about nuclear spin and its application in NMR, nuclear splitting, Zeeman effect and stark effect (only definition and qualitative explanation)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1. Essentials of Nuclear Chemistry, H. J. Arnikar, 4th Edition Wiley Eastern (1987).
2. Chemical Applications of Radioisotopes, H. J. M. Bowen. Buttler and Tanner (1969).
3. Introduction of Nuclear and Radiochemistry, G Friedlander, T. W. Kennedy, E. S. Macias and J. M. Miller, 3rd Edition, John Wiley (1981).

FOOD TECHNOLOGY

Course Code: CHY4315 **Credit Units:03**

Course objective: The contents have been drawn-up to accommodate the widening horizons of the discipline of Food Technology. They reflect the current changing needs of the students. This will create awareness among the students about the fundamentals of food and nutrition science involved in our everyday life

Course Contents:

MODULE I: INTRODUCTION TO FOOD

Carbohydrates: Structure and functional properties of mono- oligo-polysaccharides including starch, cellulose, pectic substances and dietary fibre; Proteins: Classification and structure of proteins in food; Lipids: Classification and structure of lipids, Rancidity of fats, Polymerization and polymorphism; Pigments: Carotenoids, chlorophylls, anthocyanins, tannins and myoglobin; Food flavours: Terpenes, esters, ketones and quinones; Enzymes: Specificity, Kinetics and inhibition, Coenzymes, Enzymatic and non-enzymatic browning; Nutrition: Balanced diet, Essential amino acids and fatty acids, PER, Water soluble and fat soluble vitamins, Role of minerals in nutrition, Antinutrients, Nutrition deficiency diseases.

MODULE II: FOOD MICROBIOLOGY

Characteristics of microorganisms; Microbial growth in food: Intrinsic and extrinsic factors, Growth and death kinetics, serial dilution method for quantification; Food spoilage: Contributing factors, Microbial spoilage of milk and milk products, meat and meat products; Foodborne disease: Toxins; Fermented food: Buttermilk, yoghurt, cheese, sausage, alcoholic beverage, vinegar, sauerkraut and soya sauce.

MODULE III: FOOD PRODUCTS TECHNOLOGY

Processing principles: Canning, chilling, freezing, dehydration, control of water activity, CA and MA storage, fermentation, hurdle technology, addition of preservatives and food additives, Food packaging, cleaning in place and food laws; Grain products processing: Milling of rice, wheat, and maize, production of bread, biscuits and breakfast cereals, Solvent extraction, refining and hydrogenation of oil; Milk and milk products processing: pasteurized and sterilized milk, cream, butter, ghee, ice-cream, cheese and milk powder; Animal products processing

MODULE IV: FOOD CHEMICAL ENGINEERING

Mass and energy balance; Momentum transfer: Flow rate and pressure drop relationships for Newtonian fluids flowing through pipe, Characteristics of non Newtonian fluids - generalized viscosity coefficient and Reynolds number, Flow of compressible fluid, Flow measurement, Pumps and compressors; Heat transfer: Heat transfer by conduction, convection, radiation, boiling and condensation, heat exchangers; Mass transfer: Molecular diffusion and Fick's Law, Steady state mass transfer, Convective mass transfer;

MODULE V: FOOD MECHANICAL ENGINEERING

Mechanical operations: size reduction of solids, high pressure homogenization, filtration, centrifugation, settling, sieving, flow through porous bed, agitation of liquid, solid-solid mixing, and single screw extrusion; Thermal operations: Energy requirement and rate of operations involved in process time evaluation in batch and continuous sterilization, evaporation of liquid foods, hot air drying of solids, spray and freeze-drying, freezing and crystallization.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1.Handbook of Food Rheology and Technology by Bernhard Senge (Editor), Joachim Kaldasch (Editor)

2. Formulation Engineering of Foods by Ian T. Norton, Peter Fryer, J. Norton

3. Guide to Foodborne Pathogens, 2nd Edition by Ronald G. Labbé, Santos García

4. The Molecular Biology and Biochemistry of Fruit Ripening by Graham Seymour, Gregory A. Tucker, Mervin Poole, James Giovannoni

RENEWABLE ENERGY CONVERSION SYSTEMS

Course Code: CHY4322 **Credit Units: 03**

Course Objective:
Course provides an introduction to different renewable energy sources. It analyses the full range of renewable energy supplies needed for modern economies. The course includes power from sun, wind, bio, tidal, ocean, geo and hydro.

Course Contents:

Module I: Introduction to Renewable Energy
Renewable and Non-Renewable Energy, World energy scenario; Fossil fuel resources - estimates and duration; India's energy scenario; Synergy between energy and environment, global environment issues, greenhouse gas emission, global warming, green energy solutions, technical and social implications of renewable energy

Module II: Solar Concepts
Introduction, Sun as the source of radiation, Earth and Solar constant, Extra-terrestrial solar radiation, components of radiation, effects of earth's atmosphere, Introduction to solar PV, Introduction to solar Thermal.

Module III: Biofuels, Wind Energy
Biofuels- Definition, generations and types
Wind-Characteristics, Sources of wind, components of wind turbines, advantages and environmental aspects of wind energy

Module IV: Hydro Energy, Tidal Energy
Hydro- Principles, hydro-turbines, social and environmental aspects
Tidal- The nature of the resource, physics, power generation, technical factors, environmental factors, tidal energy potential, tidal barrage, tidal stream, tidal current turbines.

Module V: Geothermal, OTEC
Geothermal- Principles, suitable sites and criteria, Advantages and disadvantages,
OTEC- Principles, Open and closed systems.

Examination Scheme:

Components	CT	Assignment	V/Q	Attendance	EE
Weightage (%)	15	5	5	5	70

Suggested Readings:

1. Renewable energy resources – J. W. Twidell
2. Renewable energy engineering and technology-edited by V. V.N. Kishore
3. Wind Energy Comes of Age, Paul Gipe, John Wiley & Sons Inc.
4. Directory, Indian Windpower 2004, CECL, Bhopal.
5. Solar Energy: Fundamentals, design, modeling and applications, Authored by G. N. Tiwari

INORGANIC CHEMISTRY LAB

Course Code: CHY4324 **Credit Units:02**

(Minimum 10 experiments to be performed)

Quantitative and Qualitative Analysis of following:

1. Ores analysis (oxides and carbonate ores)
2. Nickel/Copper

Estimation of following:

3. Active CaO in lime
4. Chlorine in bleaching powder
5. Lead content in red lead

Preparation and Characterizations/study by spectral methods

6. Trialkoxyboanes.
7. Tin (IV) chloride
8. Sodium tetrathionate
9. Cr (III) complexes.$[Cr(H_2O)_6]NO_3.3H_2O$,$[Cr(H_2O)_4Cl_2]Cl.2H_2O$,$[Cr(en)_3]Cl_3$, $[Cr(acac)_3]$.
10. Fe(II) chloride and its application as catalyst in Friedel-Craft reaction
11. Ferrocene
12. Kinetic study of Cr(III) with a multidentate ligand (EDTA)

Qualitative Inorganic Semi-micro Analysis

13. Detection of atleast four cations and anion in a mixture of salts.

***MSDS -Compilation of MSDS of chemicals used by students in each experiment is compulsory**

Examination Scheme:

IA				**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, A-Attendance, V – Viva.

Suggested Readings:

1. G.H.Jeffery, J.Bassett, J.Mendham and R.C.Denney Vogel's Text book of quantitatives chemical analysis, ELBS 5th Edn. Longman, Singapoor Publishers,Singapore, 1996.
2. R. Mukhopodhyay, P.Chatterjee, " Advanced practical Chemistry"
3. Dinesh Sharma, " A hand book of Analytical Inorganic chemistry", First Published(2004)
4. I.M.Kolthoff, E.B.Sandell et.al. Quantitative chemical analysis, CHYmillan, Madras 1980.
5. A Text book of quantitative Inorganic Analysis – A. I. Vogel
6. Standardsmethodsof ChemicalAnalysiF.J.Welcher
7. Experimental Inorganic Chemistry – W. G. Palmer.

8. Manual on Water and Waste Water Analysis, NEERI- Nagpur D.S. Ramteke and C. A. Moghe
9. Inorganic synthesis- King.
10. Synthetic Inorganic Chemistry-W .L. Jolly
11. EDTA Titrations –F Laschka

INSTRUMENTATION WORKSHOP

Course Code: CHY4320 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Nuclear Chemistry
- Modern trend in Inorganic Chemistry
- Modern trend in Organic Chemistry
- Modern trend in Physical Chemistry
- Nanotechnology and its application
- Polymer Chemistry
- Pharmaceuticals
- Food Technology
- Agriculture Chemistry
- Computational Chemistry
- Green Chemistry
- Any other relevant topics

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

12. Relevant study material and Suggested Readings: will be provided by the trainer in advance.
13. The participants are expected to explore the topic in advance and take active part in the discussions held
14. Attending and Participating in all activities of the workshop
15. Group Activities have to be undertaken by students as guided by the trainer.
16. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
17. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Simulation
- Quiz
- Quality analysis& characterization
- Identification and preparation of materials

Evaluation Scheme:

Attendance	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the case/ Assignment/ Write up**	**Total**
10	**30**	**30**	**30**	**100**

SUMMER INTERNSHIP / STUDY ABROAD PROGRAMME

Course Code: CHY4335 **Credit Units: 6**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the internship is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Chemistry & its application at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A summer internship is primarily a record of intelligent reading and research on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The internship will be related to the contemporary research issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for term paper (List is indicative, not exhaustive)

- Inorganic chemistry
- Organic chemistry
- Physical chemistry
- Green chemistry
- Agricultre chemistry

Marking Scheme:

Committee (50)			Supervisor's Assessment: Regularity and Quality of Work (50)	Total (100)
Presentation: Contents + Delivery (20)	Viva: (Q & A) (20)	Dissertation: Content + Formatting (10)		

Evaluation component of the Supervisor is 50% and the remaining 50% by committee

Syllabus- Fourth Semester

MAJOR PROJECT

Course Code: CHY4437 **CreditUnits: 10**

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curriculae where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page**
  The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

- **Acknowledgement(s)**
  Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract**
  A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

  Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

  While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

  Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

- **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

- **Implications for Future Research**
  This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices**
  The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **Suggested Readings:**
  Suggested Readings: should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

  Examples:
  For research article:
  Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect* ,**8** (suppl 1): 116–117.
  For book:
  Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:
- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT
Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.
The Project should fulfill the following ***assessment objectives:***
- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:
Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

GOOD LABORATORY PRACTICES SEMINAR

Course Code: CHY4408 **Credit Units: 01**

Objectives

The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge ofgood laboratory practices. Undertaking this verysignificant practical unit of examining and analyzing various aspects of Chemistry. Good laboratory practice or GLP is a set of principles intended to assure the quality and integrity of non-clinical laboratory studies that are intended to support research or marketing permits for products regulated by government agencies. The term GLP is most commonly associated with the pharmaceutical industry and the required non-clinical animal testing that must be performed prior to approval of new drug products. However, GLP applies to many other non-pharmaceutical agents such as color additives, food additives, food contamination limits, food packaging, and medical devices.
GLP is a quality management system, not a scientific management system. Or, in other words, GLP defines a set of quality standards for study conduct, data collection, and results reporting. GLP does not define scientific standards. If a study follows GLP, then you can be reasonably sure that the reported results were collected as outlined in the study protocol; however, you cannot be sure that the study actually addresses the scientific hypothesis. In the world of cooking, GLP would ensure that someone follows the recipe exactly as written; however, it does not assure you that the recipe was good or that the resulting item will be tasty!

The student is expected to attend the Good Laboratory Practices Seminar's diligently. The student will be tested on the basis of understanding and organization of content based on the seminar.

Evaluation Scheme

Attendance	Active Participation/ Write up	Multiple Choice Questions/ Quiz	Solving the case/ Assignment	Total
10	**30**	**35**	**25**	**100**

CHEMISTRY OF NANOMATERIALS

Course Code: CHY4407 **Credit Units: 02**

Course objective: Material science plays a vital role in this modern age of science and technology. The rapid development in the field of nanomaterials and composite science has opened vast opportunities for better understanding and utilization of various materials. The course curriculum is designed to give students an idea of the detailed aspects of important topics of material science like composites, nanomaterials, their synthesis, characterization, and application.

Course Contents:

MODULE I: INTRODUCTION TO CHEMISTRY OF MATERIALS & NANOMATERIALS

Materials & their classification; Classifications of nanostructured materials; Fundamental differences between bulk materials and nanomaterials; Role of chemistry in material design, Nanoscale Science and Technology-Implications for Physics, Chemistry, Biology and Engineering; Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic, and Thermal properties.

MODULE II: SYNTHESIS TECHNIQUES FOR NANOMATERIALS AND THEIR CHARACTERIZATION

Bottom-UP Approach: Self-Assembly, Sol-Gel Synthesis, Hydrothermal growth, Thin Film Growth – Physical Vapour Deposition, Chemical Vapour Deposition

Top-Down Approach: Emulsification-Diffusion Solvent Diffusion/Evaporation Method, Ball Milling, Microfabrication, Lithography

Characterization techniques: X-ray diffraction technique, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, particle size analyzer.

MODULE III: APPLICATION OF MATERIAL CHEMISTRY & NANOCHEMISTRY

Application of organic and inorganic nanoparticles; biomedical applications: design of nanoparticles for oral delivery of peptide drugs, development of nanoscaffolds for tissue engineering and regenerative medicine, bioimaging with quantum dots.

Industrial applications: Nanotechnology in packaging industries, textiles, solar cells, space exploration, computing and information technology; electrical conductive carbon nanotube (CNT) dispersed Si_3N_4 ceramics.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance.

Suggested Readings:

1.Introduction to Nanoscience by Gabor L. Hornyak, Joydeep Dutta, Harry F. Tibbals, Anil K. Rao.CRC Press, 2008.
2. Nanotechnology: Importance and Application by M.H. Fulekar, IK International, 2010.
3. Environanotechnology by Mao Hong fan, Chin-pao Huang, Alan E Bland, Z Honglin Wang, RachidSliman, Ian Wright. Elsevier, 2010.
4. Nanotechnologies, Hazards and Resource efficiency by M. Steinfeldt, Avon Gleich, U. Petschow, R. Haum. Springer, 2007.
5. Nanotechnlogy: Health and Environmental risk by Jo Anne Shatkin. CRC press, 2008.
6. Nanotechnology in Biology and Medicine: Methods, Devices and Application by Tuan Vo-Dinh .CRC press, 2007.
7. Nanomaterials for Biosensors by Challa Kumar. Wiley-VCH, 2007.
8. Nanosystem characterization tools in the life sciences by Challa Kumar. Wiley-VCH, 2006.

INTRODUCTION TO POLYMERIC MATERIALS

Course Code: CHY4405 **Credit Units:03**

Course Objective: The curriculum is developed to help the students to understand the importance of polymeric materials and their usefulness in day to day life. The Polymeric materials course aims to provide students with an understanding of the different kinds of polymers, their preparation, polymerization and chemical bonding between them. It also covers the applications of these polymeric materials in plastics, elastomers

Course Content:

MODULE I: INTRODUCTION TO POLYMER

History and Concept of macromolecules, monomers with specific example viz. acrylonitrile, vinyl, chloride, methyl methacrylate, isobutylene, isoprene, styrene, hexamethylene diamine and adipic acid, caprolactum, ethylene oxide and sebacic acid, ethylene glycol and terephthalic acid, functionality, Degree of polymerization, Classification of polymers depending on – (a) The origin (natural, Semisynthetic, synthetic etc. (b) The structure (linear, branched, network, hyperbranched, dendrimer (c) The formation (condensation, addition)(d) Homopolymers, copolymers(e) The behaviour on application of heat and pressure (thermoplastic and Thermosetting)(f) The form and application (plastics, fiber. elastomers and resin(g) Stereisomers: Isotactic, Syndiotactic, Atactic, Organic and Inorganic polymers. Concept of molecular mass, polydispersity, number average and weight average, molecular weight distribution in linear polymers.

MODULE II- CHEMISTRY OF POLYMERIZATION (MECHANISM)

chain polymerization- Free radical, Ionic and coordination mechanism, Common features of two types of Mechanism of cationic polymerization and anionic polymerization, Mechanism of coordination polymerization – Ziegler-Natta catalysts, Ring opening polymerization-mechanism of polymerization of cyclic ethers, cyclic amides and cyclosiloxanes.

MODULE III- METHODS OF POLYMERISATION

Methods of polymerization. Bulk polymerization, Solution polymerization, Emulsion polymerization, Suspension polymerization, Melt polycondensation. Controlled polymerization methods, viz, Nitroxide mediated polymerization (NMP), Atom Transfer Radical Polymerization (ATRP), Reversible Addition Fragmentation Termination (RAFT).

MODULE IV-SPECIAL POLYMERS AND THEIR APPLICATIONS

Polyethylene (LLDP, HDP, LLDPE and HDPE), PVC, polyvinyl accohol, polyvinylacetate, polybutadiene, polychloroperene, polystyrene, polyacrylare, PMMA, and acrylonitrrile copolymers.

polyamides (Nylon 6, Nylon 6,6, Nylon 6,10), polyesters (poly ethylene terephthalate (PET), polybutylene, terphthalate (PBT), aromatic polyesters), polycarbonate, polyurethanes – Flexible and rigid polyurethane, polyurethane elastomers, coatings, adhesives, sulphur, containing polymers, polimdes, polyethersulphones, polyetherketones. Thermosetting resins – phenolic resins, amino resins, epoxy resins, silicone polymers, and cyanate ester resins.

MODULE V- POLYMER DEGRADATION

Introduction, Types of degradation-Thermal, mechanical, Photodegradation, oxidative degradation, Hydrolytic degradation, Degradation by ultrasonic waves and high energy radiation.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**A**	**EE**
Weightage(%)	15	5	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, A: Attendance EE: End Semester Examination

Suggested Readings:

1) F.W. Billmeyer, Jr. Textbook of polymer science, Wiley- Interscience, N.Y.(1971)
2) Introduction to polymer chemistry, R. Seymour, Wiley –Interscience (1981)
3) Physical chemistry of CHYromolecules, by D.D. Deshpande, Vishal publications, (1985)
4) principles of polymerization, G.Odian, Wiley – Interscience (1981)
5) Organic polymer chemistry, K. J. Saunders, Chapman and Hall, London (1973).
6) Principles of polymer chemistry by P.J. Flory.
7) Polymer Science –V R Gowarikar.

Amity School of Applied Sciences

Master of Science (Forensic Science)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Programme Overview

Duration: 2 years

Master of Science (M.Sc.) degree program prepares its graduates for a career change, advancement or entry into the challenging and rewarding field of research and development. The program offers a challenging, student centered curriculum that is research-based and provides a foundation for life-long learning.

Students of all the degree Programmes at the time of graduation will be able to:

PO1 **Scientific knowledge:** Develop specialized field knowledge and integrate disciplinary or interdisciplinary knowledge across content areas.

PO2 **Problem analysis:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO3 **Effective communication:** Communicate effectively in presenting ideas orally and in writing.

PO4 **Critical thinking:** Engage in critical inquiry through principle approaches or methods and through effective evaluation strategies.

PO5 **Environment and sustainability:** Understand the impact of the professional solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO6 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms

PO7 **Individual and Team work:** Demonstrate the capability to work both independently and in cooperation with others

PO8 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Learning Outcomes: After completing the program the student will be able to:

PSO1 Develop knowledge of the functions and services provided by the Forensic Laboratories and utilization of basic sciences for forensic investigations

PSO2 Develop research aptitude in the students by the dissertation project and help them to choose their area of expertise for further studies and career.

PSO3 Gain an advanced knowledge of analytical techniques, this will provide them enough confidence to start their career in research as well as in industry with ease.

PSO4 Develop comprehensive knowledge on Crime scene reconstruction and significance of various biological, physical and chemical evidences for forensic investigations.

PSO5 Understand and gain knowledge on procedures and scopes of fingerprints examination, serology, anthropology, DNA fingerprinting, toxicology and cyber forensic etc.

PSO6 Analyze the Sociological and Psychological aspects of crime and Criminal behavior and presentation of evidences in court of law.

Syllabus - First Semester

CRIMINOLOGY, CRIMINAL LAW AND POLICE ADMINISTERATION

Course Code: FCH4101 **Credits :03**

Course Description

This course provides basic knowledge and understanding of Criminology and criminal laws. Knowledge and understanding of basic concepts of crime and criminal behavior and factor of crime and criminology theory, Criminal Justice System in India structural and functional process. This course focuses on educating the students about criminal laws of IPC and Cr. P.C. This course serves as a prerequisite for better understanding of Police Administration of India development and history and responsibilities

Course Objectives

The objective of this course is to:

- Provide an overall understanding about Criminology and criminal laws and there applications.
- Introduce a comprehensive knowledge of Police Administration, Criminal Laws of IPC and Cr. PC. and criminal behaviour

Course Contents:
Module I: Introduction and Theories of Criminology Criminology: Definition, Nature and Scope. Criminal Action and Criminal Behavior, Introduction of Victimology, Causes of crime (Social, Economic, Psychological, Political, Culture, and Geographical) and their prevention, Juvenile Delinquency, Role of the Correctional Institutions. Theory of Criminology - Differential Association Theory, Self Concept and Containment theory, Labeling theory, Barrier Theory
Module II: Examination in the Court Expert Testimony: The role of the expert-witness; acceptance of evidence in the court; Direct examination, re-examination and cross – examination of prosecution lawyer and defense lawyer.
Module III: Type of Offenses and Indian Court's structure Criminal offenses, Nature and types, Framing of Charges, Terrorism, Sexual Offenses, White collar crime, Courts: Structure and types- criminal courts, Juvenile Courts.
Module IV: Criminal Law

Criminal Law: Definition, Scope and development, Sections of I.P.C, Cr.PC related to Crime, Law of Evidences and Criminal Justice System in India: structural and functional process.
Module V: Police Administration system Police duties and responsibilities, Structure of Police in India, role of Police in society, Police Investigation, Interrogation and Interviewing of criminals, maintenance of Law and order, Custodial crimes and death, Police and human rights.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Ahmad Siddique: Criminology Problems & perspectives.
2. Rama Ahuja: Social Problems in India.
3. Batuk Lal: Law of Evidence
4. Rao, S. Venugopal: Police Administration.
5. Nath, Trilok: Indian Police.
6. Mishra. S.C. : Police Administration in India
7. Government of India, Ministry of Home Affairs: Reports of National Police Commission
8. Sutherland and Cassey: Criminology

FORENSIC PHYSICS

Course Code: FCH4103 **Credit Units: 03**

Course Objective: This course will cover:

1. Important physical evidences found at crime scene.
2. Understanding of general characteristics and identification of physical evidences.
3. Examination and evidential value of important physical evidences.

Course Contents
Module I: Soil Formation and types of soil, composition of soil, particle size distribution, composition and analysis of concrete, cement and its types.
Module II: Glass Types of glass and their composition, Forensic examination of glass fractures, determination of direction of impact: cone fracture, rib marks, hackle marks, concentric and radial fractures.
Module III: Paint Types of paint and their composition, macroscopic and microscopic studies, pigment distribution, micro-chemical analysis.
Module IV: Tool Marks & Restoration of Erased / Obliterated Marks Types of tool marks: compression marks, striated marks, combination of compression and striated marks, repeated marks, class characteristics and individual characteristics, tracing and lifting of marks.
Module V: Analysis Techniques **Soil**: microscopic examination, density gradient analysis, interpretation of soil evidence **Glass**: colour and fluorescence, physical matching, refractive index, and interpretation of glass evidence. **Paint**: Pyrolysis Chromatographic techniques, IR spectroscopy and Raman spectroscopy, interpretation of paint evidence, solubility test, Thin layer chromatography **Tool Marks**: Photographic examination of tool marks. Method of making-cast, punch, engrave; methods of obliteration, method of restoration.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text References

1. B. Caddy, Forensic Examination of glass and paints analysis and interpretation, ISBN 078405749 2001.
2. Bengold and Nelson Morgan, Speech and Audio Signal Processing, John Wiley and Sons, USA, 1999.
3. C.E. OHara and J.W. Osterburg, An Introduction to Criminalistic, Indiana University Press, Blomington, 1972.
4. Denis Shaw, Physics in the Prevention and Detection of Crime, Contem Phys. Vol.17, 1976.
5. F.W. Sears, M.W Zemansky, and H.D. Young, University Physics, Sixth Ed., Narosa, 1995.
6. Nickolls, L.C., Scientific Investigation of Crime, Bulterwest, London, 1956.
7. R. Saferstein, Forensic Science Handbook, Vols. I, II, (Ed), Prentice Hall, Eaglewood Cliffs, NJ; 1988.

FORENSIC BALLISTICS

Course Code: FCH4106

Credit Units: 02

Course Objective: - The objectives of the course:

1. To understand the basics of the projectile motion, ballistics and role of ballistics in Forensic Science
2. Classification of different types of firearms and explosives.

Course Contents
Module I: Introduction to Ballistics: Definition and scope, Firearms, Indian Arms Act, Types of evidences associated, History and mechanism of Muzzleloaders (Match lock, Wheel lock, Flint lock firearms), Briefs of Pinfire, Rimfire and Centrefire systems of cartridge, Characteristic features of the firearms, various types of modern firearms, classification of firearms on different basis, bore characteristics Different parameters of classification of firearms, Introduction to Shotgun, Revolver, Pistol, Rifle and Country Made/ Improvised Firearms. Proof Marks of Weapons.
Module II: Firearm Ammunition: Ammunition Components of Shotgun and Rifled firearm cartridges, Headstamp Markings on Ammunition. Various types of bullets and their compositional aspects, latest trends in their manufacturing and design, smooth bore and improvised ammunition.
Module III: Internal and external Ballistics: Internal Ballistics: Definition, shapes and manner of Propellant burning, Muzzle velocity and Factors affecting muzzle velocity, ballistic coefficient, phenomenon of ricochet External Ballistics: Definition- Bullet Trajectory and factors affecting bullet flight. Wound Ballistics: Definition of wound ballistics, Ballistic aspect of firearm injuries, significance of studying cavitations in body, Bullet Entry/Exit Hole Identification, Evaluation of Accident, Suicide, Homicide firearm injuries.
Module IV: Bullet linkage: Different types of marks produced during firing process on bullet-number/direction of lands and grooves, width of lands and depth of grooves, angle and pitch of rifling, striation marks on lands and grooves, techniques for obtaining test material from various types of weapons and their linkage with fired ammunition, class and individual characteristics.
Module V: Range of Firing determination: Introduction and methods of estimation. Gunshot Residue: Introduction and methods of analysis. Bullet and Cartridges matching: Ejecta, burning, scorching, blackening, tattooing and metal fouling, shots dispersion and GSR distribution, time of firing – different methods employed, and their limitations, stereo & comparison microscopy, automatic bullet and cartridge comparison.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Brain J. Heard; Hand book of Firearms and Ballistics; John Willey, England, 1997.
2. D.A. Skoog, D.M. West and F.J. Holler; Analytical Chemistry: An Introduction; Saunders College Publishing, Philadephia, USA, (1994)
3. Dettean, J D; Kirk's Fire Investigation, 5th ed, Prentice Hall, Eaglewood Cliffs, N.J (2002)
4. Working Procedure Manual: Chemistry, Explosives and Narcotics, BPR&D Pub (2000)
5. Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, The University Book Agency, Allahabad.
6. Gunther & Gunther, 1935 : The Identification of Firearms, Wouldies, New York
7. Jauhri, M. 1980: Monograpnh on Forensic Ballistics, Govt. of India Publication, New Delhi.
8. Burrad, 1951: The Identification of Firearms and Forensic Ballistics.

FORENSIC PHYSICS - LAB

Course Code: FCH4107 **Credit Units: 02**

Course Objective: The students will understand & perform experiments relating to: Examination of physical properties of physical evidences commonly encountered at the crime scene.

Course Contents: Lab/Practical
1. Examination of physical properties of Soil by microscopy 2. Examination of physical properties of Glass by microscopy 3. Comparative analysis of paints by TLC 4. Solubility test for paints and soil 5. Comparative analysis of Glass fragments/ examination of glass fractures 6. Size distribution analysis of soil particles. 7. Mineral test for soil 8. Casting of tyre marks 9. Casting of shoeprints 10. Comparison of bangles 11. Examination of fibres

Examination Scheme:

	IA			**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
2. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
4. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals.
5. G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2nd Edn. Wiley, New York, 1989

CRIME SCENE INVESTIGATION (CSI) – LAB

Course Code: FCH4108 **Credit Units: 02**

Course Objective: The course focuses on following objectives-

1. Developing an understanding and application of Crime Scene Investigation.
2. Develop an understanding on processing of crime scene (searching, sketching and photography of Crime scene (Indoor and Outdoor).
3. Brief description on procedure adopted for collection, preservation and packaging of Physical evidences.

Course Contents: Lab/Practical
1. Camera and its parts 2. Sketching of the Indoor Crime scene 3. Sketching of the outdoor Crime scene 4. Photography of the Indoor crime scene 5. Photography of the outdoor crime scene 6. Collection, packaging and forwarding of trace evidences by Druggist Fold method. **7.** Collection and preservation of various physical evidences (Fingerprint, blood, saliva, fibre, hair etc.) 8. Forwarding of physic-al evidences

Examination Scheme:

	IA			**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
2. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
4. Virginia Department of Forensic Science, Practical and Manuals

FORENSIC AND CRIMINAL INVESTIGATIONS

Course Code: FCH4111 **Credit Units: 03**

Course Objective: The course focuses on following objectives-

1. Developing an understanding and appreciation of the scope of Crime Scene Investigation and Management.
2. Develop an understanding on handling of different physical evidences found at the crime scene
3. Develop comprehensive knowledge on various investigative techniques used in processing the crime scene.

Course Contents:
Module I: Introduction to Forensic Science Introduction and History of Forensic Science, Basic principles and significance, Utilization of Forensic Science, Forensic Scientist at the scene of crime, Structure of Forensic Labs, ethics in forensic science
Module II: Crime Scene Management Definition and causation of crime, Types of crime scene, Crime scene survey, protection of crime scene, searching of physical evidences, Recording, documentation and presentation in the court, processing and reconstruction of the crime scene.
Module III: Physical Evidences Physical evidences and its types (fingerprints, glass, fibre, blood, saliva, weapon of crime etc.), Blood spatter analysis, Characteristic blood patterns, testimonial and real evidence, admissibility of scientific evidence and importance of physical evidences, Collection, preservation, packing and forwarding of different types of evidences to the laboratories.
Module IV: Investigation and Interrogation techniques Interviewing of the criminals; methods used by the police in getting information from the criminal; the ethical issues related to the same. Criminal profiling, Portrait Parley, Polygraphy, Narcoanalysis, Brain Fingerprinting, Modus operendi, Speech signal processing and pattern recognition – basic factors of sound in speech, acoustic characteristics of speech signal

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Nabar, B. S., Forensic Science in Crime Investigation, Asian Law House, 2001.
2. Allison, R., Investigation of Crime Scene, Global vision Publishing House, 2008.
3. Bodziak, W., Footwear Impression Evidence (2nd Edn.) CRC Press, Boca Raton, Florida, 2000.
4. DeForest, P., Gaensslen, R., and Lee, H., Forensic Science - An Introduction to Criminalistics, McGraw Hill, New York, 1983.
5. Fisher, B., Techniques of Crime Scene Investigation (6th Edn.) CRC Press, Boca Raton, Florida, 2000.
6. James, S.H., and Nordby, J.J., (Eds), Forensic Science; An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.

INSTRUMENTATION – CHEMICAL

Course Code: FCH4112 **Credit Units: 03**

Course Objective The objective of the course is to provide student with practical understanding of working and applications of various instrumentation techniques used in the forensic science laboratory for the chemical analysis of evidences.

Course Contents:
Module I: Chromatographic Techniques - 1 General principles, Paper chromatography, Column chromatography, TLC, Adsorption chromatography, Partition chromatography
Module II: Chromatographic Techniques - II Gas chromatography, Gas-liquid chromatography, Ion-exchange chromatography, Exclusion (permeation) chromatography, Affinity chromatography, HPLC, HPTLC, Capillary Chromatography, Interfacing GC with IR spectrometry
Module III: Mass Spectrometry Sample flow, Ionization methods, Mass analyzers, Vacuum systems, Data handling, Correlation of mass spectra and molecular structure, Fourier transform mass spectrometry, Tandem mass spectrometry, Electrospray ionization mass spectrometry, GC-MS, LC-MS .
Module IV: Measurements, Signals and Data Introduction, Noise, Signal-to-noise ratio, Sensitivity and detection limit, Sources of noise, Signal-to-noise enhancement, Evaluation and measurement, precision, Accuracy and instrument calibration, Data representation, The Automated Laboratory, Molarity, Molality, Mole fraction, Normality and Formality

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Lindsay S; High Performance Liquid Chromatography, Wiley & Sons NY (1992)
2. Handbook of TLC, 2nd Ed, Marcel Dekker; NY (1995)
3. Jarris, KE, A.L. Gray et al, Handbook of Inductively Coupled Plasma Mass Spectrometry, Glasgow Blockie, (1992)

4. Maclaffrty F.W. & F. Turecek; Interpretation of Mass spectra, 4th Ed., Mill Valley, CA Univ Science Books, (1993)
5. Chapmen J R; Practical Organic Mass Spectrometry - A Guide for Chemical and Biochemical Analysis, Wiley & Sons, NY (1993)
6. H.H Willard et al; Instrumental Methods of Analysis CBS Pub. and Distributors, Delhi (1986).
7. Skoog, Holler, Crouch, principles of instrumental analysis, 6th edition, 2007.
8. Mendham et al., Vogel's Quantitative Chemical Analysis, Pearson Education Ltd., 2009.
9. N. Gray, Instrumental Methods of Analysis, 1st Edition, CBS Publisher, 2011.

RESEARCH SEMINAR

Course Code: FCH4110 **Credit Units: 01**

Objectives

A seminar is primarily an academic event that is organized to provide the students a one to one hands on experience on any aspect of their learning for research based activity. Prerequisite, graduate studying in Chemistry/ Biochemistry/ Forensic Sciences on consent of instructor. Seminar to acquaint new graduate students with departmental research (This one will be running through out first semesters on every Monday any Lecture, where normally Ph.D. students /internal Faculties /external speakers will give talk on their research or other topic of their specialization).

The trainer has to make sure that the aspects covered are practically practiced by the participants. The evaluation will be done by Board of Examiners comprising of the faculties.

Major Themes for Seminar

The seminar may be conducted on any of the following major themes:

- Forensic Science & its related laws
- Criminal Investigations & its proceedings
- Forensic Chemistry
- Forensic Physics
- Forensic Ballistics
- Forensic Fraud Investigations
- Forensic Document Examinations
- Investigative Techniques
- Forensic Analytical Techniques
- Forensic Medicine & Odontology
- Forensic Anthropology Examinations
- Cyber & Digital Forensics
- Any other relevant topics

These themes are merely indicative and other recent and relevant topics of study may be included.

Evaluation Scheme:

Attendance	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the case/ Assignment/ Write up**	**Total**
10	**30**	**30**	**30**	**100**

Syllabus - Second Semester

FORENSIC PHOTOGRAPHY

Course Code: FCH4201 **Credit Units: 02**

Course Objective: This course is designed to:

1. Provide foundation knowledge of photography
2. Develop an understanding and application of Photography in Forensic Science and CSI

Course Contents
Module I: Introduction Introduction to forensic photography; required equipments for photography – Camera, lens, shutter, depth of field, film; Importance of Forensic photography in a crime scene investigation
Module II: Types of Photography and Photo Prints History and Development of Photography. Basic principles and techniques of Black & White and colour photography. Developing techniques and methods of photography, Different kinds of developers and fixers, modern developments in photography, linkage of cameras and film negatives.
Module III: Photography of various crime scenes Photography in indoor and outdoor scene of crime. Aerial photography. Surveillance photography – Cameras and accessories for surveillance photography, moving surveillance on foot, 2-person foot surveillance, surveillance with vehicles, fixed surveillance. Use of photography in reconstructing the scene of crime and its presentation in the court of law.
Module IV: Guidance Documentation Image magnification, U. V. and I. R. illumination in Photography. Photography of Artefactual evidences (Bloodstain, fingerprint, imprints, and micro evidence).
Module V: High-tech Photography for Crime Scene Digital photography, working principle of digital camera works and basics of digital imaging. videography/ high speed videography, High-speed photography, legal aspects of visual evidence.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Redsicker, D. R., The Practical methodology of Forensic Photography, CRC Press, London, 1994.
2. Henry Horeustein; Colour Photography -A working Manual, Little Brown Co. Boston (1995)
3. B.H.E. Jacobson, Ray GG Attridge; The Manual of Photography, Focal Press, London (1988)
4. Jahne B; Digital Image Processing, Heidelberg Springer (1990) Photography- 2nd Ed. CRC Press LLC (2001)
5. R.E. Jacobson, S.F. Ray, G.G. Attridge, N.R. Oxford; The Manual of Photography- Photographic and Digital Imaging, 9th Ed., Focal Press (2000)

ELEMENTS OF FORENSIC MEDICINE AND ODONTOLOGY

Course Code: FCH4202 **Credit Units: 03**

Course Objectives:

During the course the student will

1. Understand and appreciate the scope of forensic medicine.
2. Know about different types of injuries, causes and manner of death and their medico legal significance
3. Learn about the utility of the odontological studies in identification and other medico legal purposes like age, sex and population Determinations.

Course Contents
Module I: Introduction to Forensic Medicine Definition of forensic medicine, cause, manner and characteristics of death. Autopsy, Post-mortem changes.
Module I: Wounds and its medico legal significance Basic injury production and healing mechanisms, Mechanical injuries (Abrasions, Bruises, Lacerations, Incised and stab wounds) and their medico legal significance.
Module III: Causes and manner of death Deaths due to Asphyxia, Fire, Electrocution. Various Sexual offences
Module IV: Forensic Odontology - I Introduction to Forensic Odontology, Types of dentition, Basic structure of human teeth, types of teeth & their morphology, Determination of age from teeth using various methods, Dental anomalies and their role in Personal Identification.
Module V: Forensic Odontology - II Bite marks: Types & forensic importance, Collection, preservation and examination of Bite marks, Admissibility of bite mark evidences in Court of Law. Role of Forensic Odontology in mass disaster victim identification.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

References:

1. Modi's Medical Jurisprudence and Toxicology,23rd Edition, by K. Mathiharan & Amrit K. Patnaik, Third reprint, 2009, LexisNexis, Butterworth, New Delhi
2. Essentials of forensic medicine, Dr. K. S. Narayan Reddy.
3. Forensic Medicine and toxicology, JB Mukherjee, Vol I & II.
4. Forensic Dentistry, Paul. G. Stimson & Curtis. A. Mertz, CRC
5. Forensic Odontology, Pramod .K. Dayal
6. Keith Simpson's , Forensic Medicine
7. Glister's Medical Jurisprudence and Toxicology, Churchill Livingstone Dental Anatomy
   Atlas, Whitaker

QUESTIONED DOCUMENTS

Course Code: FCH4205 **Credit Units: 03**

Course Objective: The course focuses on following objectives-

1. Developing an understanding and appreciation for the scope of Questioned Documents.
2. Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountered.
3. Give brief description on various methods of their detection and examination.

Course Contents:
Module I: Questioned Documents Definition, Importance, Classification and Preliminary Examination of questioned documents. Handwriting: Definition, Scripts, Development, Instruments and Appliances of handwriting expert. Handwriting Characteristics: General Characteristics, Individual Characteristics, Development of Individuality in Handwriting Comparison of Handwriting: Natural Variations, Fundamental Divergences.
Module II: Forgeries Forgery and its types and characteristics, identification and examination of forgeries. Decipherment of secret indented and charred documents, Preservation of documents, Examination of seal and other mechanical impressions, examination of sequence of intersecting of strokes, Standards for Comparison and Disguise etc.
Module III: Age of Document & Alterations Determination of Age of Document- Absolute/relative age, Indented and Invisible Writings, Alterations in the document: erasures, additions, overwriting and obliterations. Comparison of type written/printed matter: Working of typewriter, Printing and machine defects, alterations in typed text, various type of typewriting devices- check writing machines, electronic typewriter and proportional spacing typewriter. Comparison of Printed matter- Various Printing Processes**.**
Module IV : Instrumentation and Photography of Documents Basic Principles and Techniques Visible and Florescence (UV and IR), Photomicrography & Microphotography, Stereo-zoom Microscopy, Video Spectral Comparator (VSC) and Electrostatic Detection Apparatus (ESDA), Projectina, Docucentre.
Module V: Security Documents Brief description of security documents, security and verification features of passports, credit

cards, cheques etc. Types of security documents, Salient features for identifications, Instrumentation used for their examination.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Osborn, A. S. (1998). Classes of Questioned Documents. Questioned Documents, 2nd edition, First Indian reprint, Universal law publishing co. Pvt. Ltd., New Delhi.
2. Kelly, J. S. Lindblom, B. S. (2006). Science, Handwriting Examination and the Courts. Scientific Examinations of Questioned Documents, 2nd edition, CRC Press, Taylor & Francis group.
3. Huber, A. R. Headrick, A. M. (1999). The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals, CRC Press, Boca Raton London.
4. Saferstein, Richard, Criminalistics, An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
5. Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rd Edn) Universal Law Publishing Co. Ltd. New Delhi, 2001.
6. Cossidy, M.J., Footwear Identification, Royal Canadian Mounted Police, Ontario, Canada, 1980.
7. Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.
8. Charles C. Thomas, Typewriting Identification I.S.Q.D.; Billy Prior Bates; Springfield, Illinois, USA, 1971.
9. Hard less, H.R., Disputed Documents, handwriting and thumbs – print identification: profusely illustrated, Low Book Co., Allahabad, 1988.
10. Lerinson, Jay, Questioned Documents, Acad Press, London, 2001.
11. Morris, Ron, N., Forensic handwriting identification, Acad Press, London, 2001.
12. Ordway Hilton, Scientific Examination of Questioned Documents, Rev. ED., Elsevier, New York, 1982.
13. Wilson, R., Harrison, Suspect Documents – Their Scientific Examination; Universal Law Publishing, Delhi, 1997.

FORENSIC MEDICINE AND ODONTOLOGY -LAB

Course Code: - FCH4206 **Credit Units: 02**

Course Objective:

- Identification of individual teeth, dental charting.
- To identify individual by using dentition.
- Age estimation by dental evidences.

Course Contents: - Lab/Practical
1. Types of Dentition a. Temporary b. Mixed c. Permanent 2. Identification of individual teeth based on the morphological features. 3. Estimation of age from the teeth. a. Living subject b. Maxilla & mandible c. From X-Rays 4. Comparison and Identification of Individuals from bite marks a. Direct comparison b. By casting c. By photography 5. Autopsy observation through visits and recording the files.

Examination Scheme:

	IA			EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory Third Edition
2. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
3. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals

4. G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2nd Edn. Wiley, New York, 1989
5. Redsicker, D. R., The Practical methodology of Forensic Photography, CRC Press, London, 1994.
6. R.E. Jacobson, S.F. Ray, G.G. Attridge, N.R. Oxford; The Manual of Photography-Photographic and Digital Imaging, 9th Ed., Focal Press (2000)

QUESTIONED DOCUMENTS AND FINGERPRINTS – LAB

Course Code: FCH4208 **Credit Units: 02**

Course Objective: - The course focuses on following objectives-

1. Developing an understanding and application on practical aspects of Questioned Documents and Fingerprints.
2. Develop an understanding on procedure adopted for examination of different types of questioned documents, the types of forgeries, disguise and their examination along with giving appropriate conclusion on the basis of findings.
3. Brief description on identification, analysis and examinations of various kinds of fingerprints and other impressions that are encountered on crime scenes.

Course Contents: - Lab/Practical

1. Examination and comparison of security documents, fake currency and stamp papers.
2. Development of latent finger prints by chemical methods and photography.
3. Development of latent finger prints by physical methods and photography.
4. Comparison of fingerprints, palm prints along on the basis of ridge characteristics and ridge details.
5. Comparison of forged (disputed) signature with the specimen signatures.
6. Comparison of disguised (disputed) signature with specimen signatures.
7. Examination and comparison of disputed anonymous letter with specimen of suspect/suspects.
8. Identification of altered/added/obliterated/erased/handwriting on cheques and deeds.
9. Ridge counting and ridge tracing.
10. Recording of prints on fingerprint chart.
11. Examination of other impressions and photography.

Examination Scheme:

	IA			**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
2. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009

3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
4. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals
5. Bridges, B. C., Vollmar, A. Monir, M., Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting, Expert Testimony Opinion Evidence, The University Book Agency, Allahbad, 2000.

INSTRUMENTAL ANALYSIS – BIOLOGICAL

Course Code: FCH4209 **Credit Units: 04**

Course Objective: The objective of the course is to provide student with practical understanding of working and applications of various instrumentation techniques used in the forensic science laboratory for the analysis of biological evidences.

Course Contents:
Module I: General Principles of Biological/ Bio-chemical Analysis pH and buffers, Physiological solution, Cell fractionation. Outline of Genetic Manipulations, Enzymes used in genetic manipulation, Cloning procedures, Isolation of specific nucleic acid sequences – complementary DNA, Gene libraries, Colony hybridisation, Expression of genes
Module II: Centrifugation Techniques Basic principles of sedimentation, Various types of centrifuges, Density gradient centrifugation, Preparative centrifugation, Analysis of sub-cellular fractions, Ultra-centrifuge- Refrigerated Centrifuges
Module III: Electrophoretic Technique General principles, Factors affecting electrophoresis, Types of Electrophoresis- Agarose gel electrophoresis, Polyacrylamide gel electrophoresis, its types, Isoelectric focusing (IEF), Isoelectrophoresis.
Module IV: Immuno-chemical Techniques General principles, Production of antibodies, Precipitin reaction, Gel immuno-diffusion, Immunoelectrophoresis, Radio Immuno Assay (RIA), ELISA, Fluorescence Immuno Assay.
Module V: Microscopy Basic principles, Simple and Compound Microscope, Comparison Microscope, Phase Contrast Microscope, Stereoscopic Microscope, Polarizing Microscope, Fluorescent Microscopy, Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM).

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Baker DR.; Capillary- Electrophoresis, NY (1995)
2. H.H Willard et al; Instrumental Methods of Analysis CBS Pub. and Distributors, Delhi (1986)
3. Bryan L. William & Keith Wilson; Principles & Techniques of Practical Biochemistry, Edward Arnold Pub. (1975)
4. Keith Wilson & John Walker; Practical Biochemistry- Principles & Techniques, 5th Ed., Cambridge University Press (2000)
5. David. L. Nelson & Michael M, Cox Lenninges; Principles of Biochemistry, 4th Ed., Freeman Pub. (2005).
6. Leremy M. Beig, John L. Tymoczko, Lubert Stryes; Biochemistry5th Ed., Freeman Pub. (2003)
7. Genes VIII, Lewin International Edition, Pearson Prentice Hall,(2004)
8. Watson Gillman, Witkowski, Zolles; Recombinant DNA, 2nd Ed., Scientific American Books, (1998)
9. George M. Malacinski; Essentials of Molecular Biology, 4th Ed. Jones and Bartlet Pub. (2003).
10. Daniel L. Nartl & Elizabeth W. Jones; Genetics- Principles and Analysis, 4th Ed., Jones & Bartlet Pub (1998)
11. Gardnes & Snustd; Principles of Genetics 6th Ed., John Wiley & Sons (1981)
12. D.M. Weir; Hand Book of Experimental Immunology, 2nd Ed., Blackwell Pub. (1973)
13. Ivan M. Roett; Essential Immunology, 6th Ed., Blackwell Pub. (1988).

FINGERPRINT SCIENCE

Course Code: FCH4210 **Credit Units: 03**

Course objective:

1. Developing an understanding and appreciation for the scope of Fingerprints.
2. Develop comprehensive knowledge on fingerprint patterns, fingerprint classification, the various methods of fingerprint development.

Course content:
Module I: Introduction to Fingerprints Dactylography, Dermatoglyphics and Dactyloscopy, Basis concepts of Fingerprint Science, Friction Ridge Skin, Morphogenesis of Friction Ridge Skin, Primary Dermal Ridge Development, Definition of fingerprint, History of Fingerprint Identification, Fingerprint as forensic Evidence, Visible Fingermarks, Latent Fingermarks.
Module II: Classification of Fingerprints for Comparison purposes Pattern area, Core, Delta, Type lines, ridge characteristics, Fingerprint Pattern Types: Essentials and its types of Loop, Arch, Whorl, Composites, Accidental patters etc., Ten Digit and Single Digit fingerprint classification.
Module III: Methods of Taking Fingerprints From living and dead persons, preserving and lifting of fingerprints. Comparison Protocols: Class and individual characteristics (Galton's details), different ridge characteristics, Standards of proof, Automatic Fingerprint Identification System (AFIS), Poroscopy and Edgeoscopy.
Module IV: Fingerprint Developing Methods Chemistry of latent fingerprint residue, factor contributing to latent fingerprints, Methods of Development of latent fingerprints using conventional methods–Powder (Black and grey, fluorescent and magnetic), Fuming method, Vacuum Metal Deposition (VMD) method, Chemical method, Reagent chemistry and formulations, Photography of fingerprints**.**
Module V: Report Writing and Court Room Testimony Evidence and testimony in court, Information required by the Forensic expert, Components of Forensic Reports, Preparation of Report, Presenting findings in a Report, Expert and the rules of evidences, Daubert's challenges to fingerprints.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Nath, S., Fingerprint Identification, CRC Press, 2nd edition, 2002.
2. Champhod, C., Fingerprint and other ridge skin impressions, CRC Press, 2004.
3. Bridges, B. C., Vollmar, A. Monir, M., Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting, Expert Testimony Opinion Evidence, The University Book Agency, Allahabad, 2000.
4. James, S. H. and Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigation Techniques, CRC Press, London, 2003.
5. Nanda, B. B., and Tiwari, R. K., Forensic Science in India. Select Publishers, New Delhi, 2001.
6. Saferstein, Richard, Criminalistics, An Introduction to Forensic Science, 6th Ed. Prentice-Hall, New Jersey, 1998.
7. Sharma, B. R., Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi, 2001.

ARSON AND EXPLOSIVES

Course Code: FCH4211 **Credit Units: 02**

Course objective:

1. To understand the basics of ballistics and role of ballistics in Forensic Science
2. Classification of different types, composition and analysis of explosives.

Course content
Module I: Fire Chemistry Light and Flame, Chemistry of Fire, Combustion reaction, Fire Triangle, Fire Tetrahedron; Backdraft, Thermo-chemistry of Fire, Heat Capacity and Phase changes, Accelerants and types of accelerants, Combustible and Flammable liquids, Flash point, Fire point, Ignition point, Auto Ignition point, Vapour Density, Vapour Pressure, Fire extinguisher.
Module II: Arson Legal Definition, Arson motives, Degrees of Arson, Determining origin and cause; Fire patterns, Collection/Preservation of Arson Evidences, Flashover, Backdraught, Live or dead at time of arson; Documenting the fire or crime scene; Scheme of analysis: Extraction of samples from debris (Direct and solvent extraction methods, Head Space method, SPME, Distillation), Clean-up (Filtration & Acid stripping), Analysis (GC, GC-MS, FTIR & SEM etc.), Interpretation of GC-MS spectra.
Module III: Petroleum Products Introduction to Petroleum Products, Properties and Testing of Petroleum and Petroleum Products, Adulteration of petroleum products as per Prevention of Malpractices in Supply and Distribution, Analysis of common petroleum products including, Petrol, Kerosene, Diesel as per BIS specifications. Analysis of Dyes used in petroleum products, Chemical fingerprinting of petroleum products.
Module IV: Explosives and Analysis of Explosive Definition of Explosives, Definition as per Indian Explosive Acts. History of Explosives, Chemistry of explosives, Deflagration and Detonation phenomenon (Redox Chemistry, Kinetics-Molecular Theory of gases & Gas Laws), Characteristics of high and low explosives, Dust explosion, Gas/vapour explosion, BLEVE, Effect of blast wave on structures & human and Pyrotechnics. Pre-blast and Post blast residue collection, Systematic examination of explosives and explosion residues in the laboratory using chemical and instrumental techniques and interpretation of results. Definition of IED, Components of IED, Explosives Initiation (Explosive Trains); Types (Molotov cocktail, Letter bomb, Pipe bomb, VBIED and CBRN), Detection of Hidden Explosives. Bomb Scene: Specific approach to scene of explosion, Reconstruction of sequence of events.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Suggested Readings

1. Modi's (1988) Medical Jurisprudence & Toxicology, M. M. Tripathi Press Ltd. Allahabad.
2. Saferstein, R (1982) Forensic Science Hand Book, Vol I, II and III, Pretince Hall, NI.
3. Saferstein, R (2000) Criminalistics.
4. Curry (1986) Analytical Methods in Human Toxicology, Part II.
5. Curry, A.S. (1976) Poison Detection in Human Organs.
6. Mathew E. Johll (2009) Investigating Chemistry: A Forensic Science Perspective
7. Suzanne Bell (2009) Drugs, Poisons, and Chemistry
8. DFS Manuals of Forensic Chemistry and Narcotics.
9. A Naquest (1984) legal chemistry. A guide to the detection of poisons, examination of tea, stains, etc.
10. DFS -Working Procedure Manual- Chemistry, Explosives
11. E. Stahl (1969) Thin Layer Chromatography: A Laboratory Handbook.
12. Jehuda Yinon; Forensic and Environmental Detection of Explosives
13. Saferstein (1976) Criminalistics.
14. Saferstein: Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc. USA
15. Yinon Jitrin (1993) Modern Methods & Application in Analysis of Explosives, John Wiley & Sons, England
16. J A Siegel, P.J Saukko (2000) Encyclopaedia of Forensic Sciences Vol. I, II and III, Acad. Press.

TERM PAPER

Course Code: FCH4231 **Credit Units: 01**

Objectives

A seminar is primarily an activity based academic event that is organized to provide the students a one to one hands on experience on any aspect of their learning for research based activity. Prerequisite, graduate studying in Chemistry/ Biochemistry/ Forensic Sciences on consent of instructor. Seminar to acquaint new graduate students with departmental research (This one was for second semester students to attained and fourth semester students had to present on one selected topic of their choice or Ph.D. students/ internal faculties /external speaker will give talk).

The trainer has to make sure that the aspects covered are practically practiced by the participants. The evaluation will be done by Board of examiners comprising of the faculties. This one will be one time event in one semester.

Major Themes for Seminar

The seminar may be conducted on any of the following major themes:

- Forensic Science & its related laws
- Criminal Investigations & its proceedings
- Forensic Chemistry
- Forensic Physics
- Forensic Ballistics
- Forensic Fraud Investigations
- Forensic Document Examinations
- Investigative Techniques
- Forensic Analytical Techniques
- Forensic Medicine & Odontology
- Forensic Anthropology Examinations
- Cyber & Digital Forensics

  Any other relevant topics

These themes are merely indicative and other recent and relevant topics of study may be included.

Evaluation Scheme:

Attendance	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the case/ Assignment/ Write up**	**Total**
10	**30**	**30**	**30**	**100**

THIRD SEMESTER

FORENSIC CHEMISTRY, TOXICOLOGY AND PHARMACOLOGY

Course Code: FCH4301 **Credit Units: 03**

Course Objectives:

During the course the student will:

1. Understand the scope of forensic chemistry, toxicology and pharmacology
2. Understand and appreciate the scope, diversity and utility of a variety of chemical analysis
3. Learn the principles of primary techniques used for forensic identification of various chemicals, drugs and poisons

Course Contents
Module I: Introduction to Forensic Chemistry Forensic Chemistry: Introduction, types of cases/exhibits, preliminary screening, presumptive test (colour and spot test), inorganic analysis, micro – chemical methods of analysis, Analysis of petroleum products.
Module I I: Toxicology of alcohol and Examination of Alcoholic Beverages Fate of alcohol in body, alcohol in the circulatory system, Breath test instruments, Field Sobriety testing, Examination of alcoholic beverages; Country made liquor, Illicit liquor. Analysis of blood for alcohol.
Module III: Drugs of Abuse Introduction, classification of drugs of abuse, drugs of abuse in sports and doping, narcotics drugs and psychotropic substances, designers drugs and their forensic examination, Drugs and Cosmetic Act, Excise Act, NDPS Act.
Module IV: Introduction to Toxicology Definition, Law relating to poison, Classification of poisons. Action of poisons and factors modifying its action, routes of administration of poisons, Role of Toxicologist
Module V: Forensic Pharmacology Pharmacology and Toxicology of Psychotropic Drugs: Sedatives, Stimulants, Opiates. Extraction, Isolation of drugs from viscera, tissues and body fluids.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

References:

1. A Burger; Medicinal Chemistry, Vol. II, Wiley Interscience, New York; (1970)
2. A.I Vogel; Textbook of Practical Organic Chemistry including Qualitative Organic Analysis; ELBS, Essex (1971)
3. Boudreau, JE et al – Arson & Arson Investigation, Survey & Assessment National Institute of Law Enforcement, U.S Dept. of Justice, US Govt. Printing Press (1977)
4. Clark, E.G.C., Isolation and identification of Drugs, Vol. I and Vol. II, Academic Press, 1986.
5. Cravey, R.H., Baselt, R.C., Introduction to Forensic Toxicology, Biochemical publications, Davis C A, 1981.
6. Gleason, M.N. et.al, Clinical Toxicology of Commercial products, Williams and Williams, Baltimore

FORENSIC BIOLOGY AND SEROLOGY

Course Code: FCH4302 **Credit Units: 03**

Course Objective: This course will cover:

1. The important biological evidences commonly found at crime scene
2. Significance of forensic anthropology, and forensic botany.
3. Importance of serology and DNA analysis in interpretation of crime.

Course Contents
Module I: Hair and Fibre Structure of hair and its biochemical properties, Phases of hair growth, types of hair. Differences between animal and human hair, Forensic examination of different types of hair. Different types of fibres and their identification.
Module II: Botanical Evidences and Diatoms Different botanical evidences of forensic significance: seeds, pollens etc. Diatoms: Classification, basic structure and morphology, forensic significance of diatoms, extraction methods.
Module III: Forensic Anthropology Definition and scope of forensic anthropology, Human skeletal system and types of bones. Estimation of age from skull and long bones, site and side determination. Estimation of Stature from skeletal remains. Determination of sex from skull, mandible and pelvis.
Module IV: Forensic Serology Definition and scope of forensic serology. Nature, composition and functions of blood and other fluids. Collection, preservation and packing of biological fluids. Introduction to ABO, Rh, MN systems, Lectins – their forensic significance, Determination of secretor/ non secretor status.
Module V: DNA Profiling DNA Profiling: Introduction, molecular biology of DNA, polymorphism, DNA Extraction methods (Organic and Inorganic extraction, FTA cards), DNA typing systems-RFLP analysis, sequence polymorphism. Evaluation of results, analysis of STR, SNP and Mitochondrial DNA markers, Y-STRs, PCR amplifications, Forensic applications of DNA profiling, limitations of DNA profiling

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text References:

1. Pandey, B. P., Plant Anatomy; S. Chand, New Delhi, 1998.
2. Biology Methods manual, Metropolitan Police Forensic Science Laboratory, London, 1978.
3. Byrd, J. H. & Castner, J. L., Forensic Entomology, The Utility of Arthorpods in legal Investigation, CRC Press, USA, 2000.
4. Catts, E.P & Haskell N.H., Entomology and death: A procedural guide, Joyce's Print Shop, 1990.
5. Mauersberger, Herbert R., & Mathews, Textile Fibres – Their physical, Microscopic and chemical properties, John Wiley, New York, 1954.
6. Richard Saferstein; Forensic Science Hand Book; Ed.; Prentice – Hall, Englewood Cliff, New jersey; (1982)
7. Smith; DGV; A manual of Forensic Entomology Ithaca New York Camstock Univ. Press, USA, (1986)
8. Fisher, B., Techniques of Crime Scene Investigation (6th Edn.) CRC Press, Boca Raton, Florida, 2000.

FORENSIC BIOLOGY AND SEROLOGY-LAB

Course Code: FCH4304 **Credit Units: 02**

Course Objective: This course will cover:

1. The practical aspects of forensic biology, anthropology, and serology
2. To collect, pack and analyse biological, anthropological, & serological evidences
3. To document chain of custody, write laboratory reports pertaining to the examinations conduct presumptive and confirmatory tests for evidence

Course Contents: Lab/Practical
1. Determination of species of origin from blood and other biological evidences using precipitin test 2. Presumptive and Confirmatory tests for blood 3.Examination and Identification body fluids 4. Microscopic Examination of Hair for the determination of different types of medulla and scale 5. Microscopic Examination of Hair for the determination of species 6. Gel Immuno Diffusion tests for species origin 7. Blood grouping from dried stains by Absorption Inhibition or Absorption Elution 8. Extraction /Isolation of Diatoms from water/soil and tissues 9. Identification of bones based on its morphology and anatomical planes 10. Sex Determination from Skull, Mandible, Pelvis and long bones 11. Age Estimation from Skull and Long bones 12. Sexing from Barr Bodies

Examination Scheme:

	IA			**EE**	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. Lab Procedures by V Veeraraghavan, S Lukose
2. Laboratory Protocols CIMMYT Applied Molecular Genetics Laboratory, Third Edition
3. Kathy Mirakovits, Gina Londino, The Basics of Investigating Forensic Science: A Laboratory Manual 2015
4. Washington state patrol Forensic Laboratory services: Crime Laboratory: Technical & Training Manuals

5. G.H. Stout & L.H. Jensten, X-ray Structure Determination – A practical Guide; 2nd Edn. Wiley, New York, 1989
6. Redsicker, D. R., The Practical methodology of Forensic Photography, CRC Press, London, 1994.

FORENSIC CHEMISTRY AND TOXICOLOGY - LAB

Course Code: FCH4305 **Credit Units: 02**

Course Objective:

The students will understand & perform experiments related to:-

1. Isolation techniques for different poisons
2. Analysis of different poisons
3. Spot tests for different cations and Anions

Course Contents: - Lab/Practical
1. Isolation techniques of different toxic substances 2. TLC of insecticides, Barbiturates and other drugs 3. Analysis of volatile and non-volatile poisons 4. Analysis of vegetable poisons 5. Spot test of nitrates, nitrites, carbonates, sulphates, sulphites, chlorates 6. Spot test of mercury, iron, copper, aluminium, cadmium, zinc and other metallic poisons

Examination Scheme:

	IA			**EE**	
A	**PR**	**V**	**LR**	**PR**	**V**
5	10	5	10	35	35

Note: IA –Internal Assessment, EE- External Exam, A: Attendance, PR- Performance, LR – Lab Record, V – Viva.

Text and references:

1. A Glencoe Program Physics principles and problems: Forensic Laboratory Manual Student edition
2. Thomas Kubic, Nicholas Petraco Forensic Science Laboratory Manual and Workbook, Third Edition 2009
3. A. I. Vogel Textbook of Practical organic Chemistry including Qualitative organic analysis
4. Isolation and identification of Drugs by E.G.C. Clark
5. Bryan L. William & Keith Wilson; Principles & Techniques of Practical Biochemistry, Edward Arnold Pub. (1975)
6. K. Nakanishi, Infrared absorption spectroscopy - practical, Holden-Day, Inc., San Francisco and Nankodo Company Ltd., Tokyo, 1962.

STATISTICS AND RESEARCH METHODOLOGY

Course Code: FCH4315 **Credit Units: 03**

Course Objective: This course is designed to:

1. Provide foundation knowledge of quantitative and qualitative research methods used in Forensic Sciences.
2. Provide understanding of the use of survey, field, and qualitative research techniques to develop practice knowledge;
3. Describe distributions in terms of shape, centre, and spread including the ability to construct visual displays of data (charting, graphing);
4. Provide an understanding of and ability to use the basic principles of statistical inference.

Course Contents:
Module I: Introduction to Research Research its definition and objectives, Types of Research, Research process, Defining the research problem, Research design.
Module II: Sampling Principles, methods: census and sample survey, sample design. Types of sampling, rationale for using a particular sampling procedure.
Module III: Tools of Data Collection Observation, interview schedule, questionnaire, survey, case study methods
Module IV: Statistics Introduction, Descriptive Statistics: Frequency distribution, class intervals, graphical presentation: bar diagram, histogram, pie chart; Measures of Central Tendency: mean, median, mode; measures of dispersion: variance and standard deviation.
Module V: Parametric and Non-parametric Statistics Methods of Correlation, Skewness and Kurtosis Variance, Types of Correlation (Pearson and Rho); Tests of Significance. Level of Significance, one sample, two samples and k-samples, Kruskall-Wallis, ANOVA.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Broota, K.D., Experimental designs in psychological research, Wiley eastern, New York, 1992.
2. Guilford, Statistics in Psychology and Education, McGraw hill, New York, 1986.
3. Katz and Kahn, Research in Behavioural Sciences, Methuen, USA, 1979.
4. Kerlinger, F., Foundations of Behavioural Research, Surjeet Publications, Delhi, 1983.
5. Rajamanickam, M., Statistical Methods in Psychological and Educational Research, Concept Publishing Co. New Delhi, India, 1983.
6. Smith, Jonathan, A. (Ed.), Qualitative Psychology: A Practical Guide to Research Methods, Sage Publications, 2003.
7. Woodworth and Schlosberg, Experimental Psychology, Methuen and co. ltd, London, 1971.

INSTRUMENTATION - PHYSICAL

Course Code: FCH4316 **Credit Units: 03**

Course Objective: The objective of the course is to provide student with practical understanding of working and applications of various instrumentation techniques used in the forensic science laboratory for the analysis of evidences.

Course Contents:
Module I : Basic Concepts - Atomic & Molecular Spectroscopy Introduction to Atomic orbitals, spectra, Bohr Model. Quantum Theory, molecular orbital, types of molecular energies, vibrational and electronic spectra. Classification of spectroscopic methods.
Module II: Molecular Spectroscopy **Ultra-violet and visible spectrophotometry**: Types of sources and stability, wavelength selection, filters, reference cells and sampling devices, detectors, resolution, qualitative and quantitative methods for detection (Single beam and double beam). **Infrared spectrophotometry**: Basic principle, Dispersive and non-dispersive instruments, FTIR, instrumentation, Forensic applications, correlation of infra-red spectra with molecular structure. **Raman spectrophotometry**: Basic principle, theory, instrumentation, forensic applications. **Fluorescence spectrophotometry**: Types of sources, structural factors, instrumentation, comparison of luminescence and UV-visible absorption methods.
Module III: Atomic Spectroscopy **Atomic absorption spectrometry**: Instrumentation and techniques, interference in AAS, background correction methods, quantitative analysis, Applications in Forensic Science. **Atomic emission spectrometry**: Instrumentation and techniques, arc/spark emission, comparison of ICP vs AAS methods, quantitative analysis, applications in forensic science. **X-ray spectroscopy**: X-ray absorption and fluorescence methods, X-ray diffraction, Applications in Forensic Science. **Neutron Activation Analysis:** Introduction, principle, theory, instrumentation and forensic applications.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. James W. Robinson; Atomic Spectroscopy, 2nd Edn. Revised & Expanded, Marcel Dekkar, Inc, NY. (1996)
2. V.B. Patania; Spectroscopy, Campus Books International, (2004)
3. Jerry Workman, Jr, Art Springsteen; Applied Spectroscopy-A compact reference for Practitioners, Academic Press (1997)
4. N.Subrahmanyam & Brij Lal; A text Book of Optics, S. Chand & Co. (2004).
5. Gurdeep R. Chatwal & Sham K. Anand; Instrumental Methods of Chemical Analysis, Himalaya Pub. House (2004).
6. Hobart H. Willard, Lynne L. Merrett Jr, John A Dean Frank A. Settle Jr; Instrumental Methods of Analysis, 7th Edn. CBS Pub. & Distributors (1986)

7. R.S. Khandpur; Handbook of Analytical Instruments, Tata McGraw Hill Pub.Co. New Delhi (2004)
8. John A. Dean; Analytical Chemistry Handbook, McGraw Hill Inc. (1995)
9. K.C.Thompson & R.J. Renolds; Atomic Absorption Fluorescence & Flame Emission Spectroscopy, a Practical Approach, 2nd Edn. Charles Griffin & Co. (1978)
10. John C. Lindon, George E. Tranter & John L. Holmes; Encyclopaedia of Spectroscopy & Spectrometry, Academic Press (2000)
11. Colin N. Banwell & Elaine M, Mc. Cash; Fundamentals of Molecular Spectroscopy 4th Edn, Tata McGraw-Hill Pub. Co. New Delhi (1995)
12. R.Murugeshan; Optic & Spectroscopy, S.Chand & Co. (1998)
13. Jack L Koeing; Spectroscopy of Polymers, 2nd Edn., Elsevier pub. Co. (1999)
14. Kamlesh Bansal; Analytical Spectroscopy Campus, Books International (2000)
15. D.R. Khanna & H.R. Gulati; Fundamentals of Optics Geometrical Physical & Quantum, 20th Edn., R. Chand & Co. (2002)
16. Francis A. Jenkins; Fundamentals of Optics, 4th Edn., McGraw Hill Book Co. Auckland (1981)
17. K. Thyagarajan; Lasers Theory & Applications, Macmilan, India Delhi (2004)
18. H.D.Bist; Lasers and their applications in the Indian Context, Tata McGraw Hill Pub. Co, New Delhi (1985)
19. John D.Cutnell & Kenneth W Johnson; Physics 5th Edn., John Wiley & Sons Inc., NY. (2002)
20. E.R.Mengel; Laser Spectroscopy Techniques & applications, Marcel Dekker NY (1995)
21. E.R.Mengel; Fluorescence in Forensic Science in Encyclopedia of Analytical Chemistry, Wiley & sons (2000)
22. G.R. Chatwal; Analytical Spectroscopy 2nd Edn, Himalaya Pub. House (2002)

INSTRUMENTATION WORKSHOP

Course Code: FCH4318 **Credit Units: 1**

Objectives

A workshop/seminar is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspect covered is practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:

- Crime Scene Investigation
- Forensic Toxicology
- Forensic Anthropology
- Handwriting &Typewriting Analysis
- Crime Scene Investigation
- Criminology, Criminal Law &Police Administration
- Fingerprint Science
- Forensic Serology
- DNA Fingerprinting
- Wounds & its Medico-Legal Aspects

These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

i. Relevant study material and references will be provided by the trainer in advance.
ii. The participants are expected to explore the topic in advance and take active part in the discussions held
iii. Attending and Participating in all activities of the workshop
iv. Group Activities have to be undertaken by students as guided by the trainer.
v. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
vi. Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

i. Case Study
ii. Simulation
iii. Quiz
iv. Quality analysis & characterization
v. Identification and preparation of materials

Evaluation Scheme:

Attendance	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the case/ Assignment/ Write up**	**Total**
10	**30**	**30**	**30**	**100**

ADVANCED FORENSIC BIOLOGY AND ANTHROPOLOGY

Course Code: FCH4306 **Credit Units: 03**

Course Objectives:

During the course the student will

1. Understand and appreciate the scope of forensic biology and Forensic Anthropology
2. Understand and appreciate the scope, diversity and utility of a variety of Human, Animal and plant evidences and their examination
3. Learn the primary technique used for identification of various biological evidences
4. Acquire the knowledge on techniques presently being used in the forensic examination of biological evidences and skeletal remains

Course Contents
Module I: Introduction to Wild Life Forensics Introduction to wildlife forensics, Examination of pug marks, horn, skin, fur, hair, nail and teeth. Identification of some endangered species of plants and animals. Wildlife life protection Act.
Module II: Forensic Entomology and Forensic Microbiology Collection of insects, Shipment of collected insects, Identification of insect and its stage of growth. Determination of the post-mortem interval or "time since death" in homicide investigations, Forensic Entomotoxicology. Introduction to Forensic Microbiology
Module III: Forensic Anthropology Somatometry, Osteometry and Craniometry. Identification of individuals from skeletal remains, Collection, Handling, preservation of skeletal remains of forensic science and report writing.
Module IV: Forensic Taphonomy and Radiology Forensic Taphonomy. Fire modification of bones, Assessment of ante mortem and post-mortem skeletal trauma. Artefacts in the skeletal remains. Application of radiology in forensic anthropology
Module V: Superimposition and Facial Reconstruction Superimposition techniques. Facial reconstruction; three dimensional and computer assisted facial reconstruction

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Richard Saferstein; Forensic Science Hand Book; Ed.; Prentice – Hall, Englewood Cliff, New jersey; (1982)
2. Biology Methods manual, Metropolitan Police Forensic Science Laboratory, London, 1978.
3. Byrd, J. H. & Castner, J. L., Forensic Entomology, The Utility of Arthorpods in legal Investigation, CRC Press, USA, 2000.
4. Encyclopaedia of Forensic Sciences, Volume, I, II, II & IV, Edited By Jay A. Siegel, Geoffrey
   C. Knifer &PekkaSaukko,AcamicPress,2000 A laboratory manual on Biological Anthropology, Anthropometry, Indira P. Singh, M.K. Basin,: Kamal Raj Enterprises,1989
5. Advances in Forensic Taphonomy: Method, Theory, and Archaeological Perspectives ,William D. Haglund , Marcella H. Sorg, CRC Press; 1 edition, 2001
6. Brogdon's Forensic Radiology, Second Edition, Edited by Michael J. Thali, Mark D. Viner,B.G. Brogdon, Published November 22nd 2010 by CRC Press – 654 pages

FORENSIC GENETICS

Course Code: FCH4319 **Credit Units: 03**

Course Objective: This course is designed to:

1. Provide foundation knowledge of genetics
2. Provide understanding of the inheritance laws and gene interactions
3. Provide understanding of mutation and genetic diseases

Course Contents:
Module I: Introduction to Genetics Mendel's work and Laws of heredity, Test cross, Back Cross, Incomplete dominance and simple problems, Structure of DNA and RNA, Structural Organization of Chromosome, Special types of chromosomes (Salivary gland and Lamp-brush chromosomes)
Module II: Cell Division and Linkage Cell cycle, Mitosis and Meiosis, Coupling and repulsion hypothesis, Mechanism of linkage and its importance, Linkage in Maize and Drosophila, Mechanism of crossing over and its importance
Module III: Interaction of Genes Supplementary genes, Complementary genes, Pleiotrophy, Lethal genes, Epistasis, Multiple Allelism
Module IV: Mutations Mutagens and their types (Physical, chemical, biological), Mutation: Definition and types, Spontaneous and induced mutation, Chromosomal and Gene Mutation, Mutations in plants, animals and microbes for economic benefit of man
Module V: Inherited Diseases Karyotype, Inherited disorders, Allosomal (Klinefelter syndrome and Turner's syndrome), Autosomal (Down's syndrome and Cri-Du-Chat syndrome)

Examination Scheme:

Components	**A**	**CT**		**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15		5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Basic Human Genetics by E.J. Manage and A.P. Manage (1997 India Reprint) Rastogi Publications, Meerut.
2. Snustad & Simmons, Principles of Genetics, 4th Edition, Wiley, 2005

3. M.W. Thompson et al, Genetics in Medicine by, 5th Edition, W.B. Sounders Company, London
4. Lewin, Genes IX, 9th Edition , Jones & Bartlett, 2007
5. Gustavo Maroni, Molecular and Genetic Analysis of Human Traits, 1st Edition, Wiley-Blackwell, 2001.

CYBER FORENSIC AND COMPUTER APPLICATIONS

Course Code: FCH4317 **Credit Units: 03**

Course Objective: The objectives of the course are to:

1. Provide students with a technical skills and competencies in the field of forensic computing thus producing competent and confident graduates.
2. Produce students who will have a hands-on knowledge and able to perform technical role in forensic computing field.
3. Equip students with the right skills thus enabling them to adapt real working environment, while contributing positively to the society at large.

Course Contents:
Module I: Computer Fundamentals - I Computer characteristics and classifications, Concept of Computer Hardware, Concept of Computer Software
Module II: Computer Fundamentals - II Fundamentals of programming languages, Concept of Algorithm and Flow Chart, Networking and Internet Concepts
Module III: Data Storage Fundamentals Data Storage Devices, Storage Fundamentals (Sector, Cluster, FAT etc.), File System Concepts, Data Storage and Recovery, Basics of Operating System Software
Module IV: Pattern Recognition and Biometrics Pattern Recognition and Biometrics – Face, Iris and retinal imaging, Speech recognition, finger and palm print, gait pattern, signatures, Pattern comparison, Image processing – Proactive Forensic science
Module V: Cyber Crimes, Search and Seizures of Evidence Cyber Crimes – definition, IT laws – Introduction, internet, hacking, virus, obscenity, pornography, programme manipulation, software piracy, intellectual property and computer security etc., Encryption and Decryption methods, Investigation of cyber-crimes and tools for analysis

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. James, S.H. and Nordby, J.J. Eds., Forensic Science An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
2. Leshin, C.B., Internet Investigation in Criminalistics, Prentice Hall, New Jersey, 1997.
3. Tessarolo, A.A. and Marignani, A., Forensic Science and the Internet. The Canadian Society of Forensic Science Journal, Vol. 29, 1996.
4. Bernad Jahne: Digital Image processing, Springer Verlag (1993)

ADVANCED QUESTIONED DOCUMENTS AND FINGERPRINTS EXAMINATION

Course Code: FCH4310 **Credit Units: 03**

Course Objective: The course focuses on following objectives-

1. Developing an understanding and appreciation for the scope of Questioned Documents Examination.
2. Develop an understanding on different types of cases in questioned documents and different writing conditions.
3. Brief description on case presentation and report writing.
4. Develop comprehensive knowledge on advanced Instrumentation techniques used for examination.

Course Contents:
Module I: Introduction to Poroscopy and Edgeoscopy Introduction: Poroscopy and edgeoscopy, Fingerprints Examination on the basis of poroscopy and its significance, evaluation of fingerprints on the basis of edgeoscopy and its significance in fingerprint field.
Module II: Advanced Methods of Development of Latent Fingerprints Automatic fingerprint identification system, application of radiations to examine latent fingerprints on various surfaces including skin, SPR, Phase transfer catalyst, DFO, Indanedione, Oil Red O, Factors affecting fingerprints
Module III: Personality assessment and Different Writing Condition Evaluation of personality and psychological traits from handwriting, Evolutionary phases in handwriting, effect of age factor in handwriting and variations in handwriting characteristics, effect of alcohol and drugs on handwriting characteristics/ signatures.
Module IV: Report Writing and Case Representation Expert's opinion, Examination in chief, Cross examination, Re-examination, Oath taking, Summons for evidences, Report writing and Case representation in Court of Law as Moot court.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. Albert, S. Osborn, Questioned Documents, Second Ed., Universal Law Publishing, Delhi, 1998.
2. Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.
3. Kelly, J. S. Lindblom, B. S. (2006). Science, Handwriting Examination and the Courts. Scientific Examinations of Questioned Documents, 2nd edition, CRC Press, Taylor & Francis group.
4. Huber, A. R. Headrick, A. M. (1999). The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals, CRC Press, Boca Raton London.
5. Ordway Hilton, Scientific Examination of Questioned Documents, Rev. ED., Elsevier, New York, 1982.
6. Wilson, R., Harrison, Suspect Documents – Their Scientific Examination; Universal Law Publishing, Delhi, 1997.
7. Charles C. Thomas, Typewriting Identification I.S.Q.D.; Billy Prior Bates; Springfield, Illinois, USA, 1971.
8. Hard less, H.R., Disputed Documents, handwriting and thumbs – print identification: profusely illustrated, Low Book Co., Allahabad, 1988.
9. Kurtz, Sheila, Grapholypes a new plant on handwriting analysis, Crown Publishers Inc., USA, 1983.
10. Lerinson, Jay, Questioned Documents, Acad Press, London, 2001.
11. Morris, Ron, N., Forensic handwriting identification, Acad Press, London, 2001.

ADVANCED FORENSIC CHEMISTRY AND TOXICOLOGY

Course Code: FCH4320 **Credit Units: 03**

Course Objective: - The objectives of the course:

1. that the student understands the basic pharmacodynamics, pharmacokinetic and toxicological principles underlying the actions of the various poisons encountered in forensic toxicology.
2. To ensure that the student understand nature of the toxicological investigations undertaken in forensic laboratories.

Course Contents:
Module I: Pharmacology-I Sites and mechanisms of action of drugs, Dose-effect relationships; agonists, partial agonists and antagonists. Factor modifying drug actions; side effects, overdose, idyosincratic and allergic reactions; teratogenesis and foetal toxicity. Drug interactions.
Module II: Pharmacology-II Movement of drug molecules across cell membranes, Blood-brain barrier and Placental filter. Routes of administration and drug adsorption. Binding to plasma proteins. Drug distribution, metabolism and elimination. Drug bioavailability and half-life.
Module III: Toxicology and Isolation techniques of toxins Definition of Toxicology, Principle of Toxicology, Isolation of Toxic substances from viscera and other relevant materials. Role of drug recognition expert.
Module IV: Different Toxins-I Nature, administration, sign and symptoms, Fatal dose, postmortem findings, Detection and medicolegal aspects of- **a) Metallic poisons** Arsenic, Mercury **b) Vegetable poisons** Abrus Precatorius, Calotropis Gigantia,Castor ,Oleander, Aconite.
Module V: Different Toxins-II **a) Insecticides** Organophosphorous compounds, Organochloro Compounds and Carbamates **b) Volatile Poisons** Methyl alcohol, Chloroform, c) **Asphyxiants** Cyanide, Carbon monoxide **d) Animal Poisons** Snake venom, Cantharide, Insect bite.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	5	5	70

Text & References:

1. Text book of pharmacology, Lawrence
2. A. Stolemen, Progress in Chemical Toxicology: Acad. Press, New York, 1963.
3. Clark, E.G.C., Isolation and identification of Drugs, Vol. I and Vol. II, Academic Press, 1986.
4. Cravey, R.H., Baselt, R.C., Introduction to Forensic Toxicology, Biochemical publications, Davis C A, 1981.
5. Gleason, M.N. et.al, Clinical Toxicology of Commercial products, Williams and Williams, Baltimore, USA, 1969.
6. Modi, Jaishing P, Textbook of Medical Jurisprudence & Toxicology, M.M. Tripathi Pub.2001.
7. Working Procedure Manual – Toxicology, BPR&D Publication, 2000.

FORENSIC WILDLIFE AND ENTOMOLOGY

Course Code: FCH4321 **Credits: 03**

Course Objective: During the course the students will be able to

1. Understand the scope of wildlife forensics
2. Understand and appreciate the diversity and utility of variety of animal evidences
3. Elaborate concepts of entomology
4. Estimate the time since death by life cycle of different insects

Course Contents
Module I: Forensic Entomology History, significance, determination of time since death- Dipterans larval development- life cycle of blowfly, housefly. Succession colonization of body, determining whether the body has been moved, body disturbance, presence and position wounds, linking suspect to the scene, collection and preservation of entomological evidence.
Module II: Entomotoxicology Insects as toxicological indicators, Impact of drugs & toxins on insect development and Identification of drugs and toxins from the insects and larvae feeding on the body, entomology as an evidentiary tool in abuse cases.
Module III: Botanical evidences Introduction, types, location, collection evaluation and forensic significance. **Wood:** Type of wood and their identification and comparison. **Leaves:** Identification of various types of leaves and their anatomy, methods of comparison. **Pollens:** Structure, function, methods of identification and comparison.
Module IV: Diatoms and Microbes **Diatoms:** Nature, location, structure, extraction from various body tissues, including bone marrow, preparation of slides, methods of identification and comparison, forensic significance. **Microbes:** Types and identification of microbial organisms of forensic significance.
Module V: Wildlife Forensics Introduction, importance, protected and endangered species of Animals and Plants. Identification of wild life materials such as skin, fur, bones, nails, horn, teeth, flowers and plants, by conventional and modern methods, Identification of Pug marks of various animals. Different methods of poaching of wildlife animals. Types of wildlife crimes. Wildlife (Protection) Act, 1972.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- Jason H. Byrd and James L. Castner; Forensic entomology, CRC Press LLC, 2001.
- Forensic Science Hand book by Richard saferstein Vol (II); Prentice Hall, Publications.
- Richard saferstein; Forensic Science Hand book, Vol (I); Prentice Hall, Publications.
- Curry, A. S. (1965) Methods of Forensic Science, Vol. IV, Interscience, New Youk.
- Chowdhuri, S. (1971) : Forensic Biology, B P R & D Govt. of India.
- Linarce, Adrian; "Forensic Science in Wildlife Investigation", CRC Press, Taylor & Francis, 2009.
- Baalu, T.R.; "The Wildlife Protection Act, 1972", Nataraj Publication, 2001.
- G. Erdtman; "Pollen Morphology & Plant Taxonomy: Angiosperms (an introduction to Palynology), Hafner Publishing Co., 1971.
- Esau Katherine; "Plant Anatomy", Wiley Eastern Ltd., 1965.

GOOD LABORATORY PRACTICES SEMINAR

Course Code: FCH4409 **Credit Units: 01**

Course Objective:
Students will be introducing to learning the written and oral communication of technical information. Assignments include writing and presenting proposals, reports, and documentation. Emphasis on use of rhetorical analysis, computer applications, collaborative writing, and usability testing to complete technical communication tasks in the workplace.

Course Contents:
Module I: Technical Writing Process Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.
Module II: Journal Paper Writing Journal paper writing: Abstract for paper and poster, different kind of journal for forensic Sciences, impact factors of journals, ISBN number, Citation, H-index.
Module III: Documentation Process Writing Skills, Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing. Analytical report, Project management in technical communication, Project writing, project proposal writing.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. M. Frank. Writing as thinking: *A guided process approach, Englewood Cliffs,* Prentice Hall Reagents.

2. L. Hamp-Lyons and B. Heasely: Study Writing; *A course in written English.* For academic and professional purposes, Cambridge Univ. Press.

3. R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.

4. Daniel G. Riordan & Steven A. Panley: *"Technical Report Writing Today"* - Biztaantra.

5. Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).

6. Contemporary Business Communication, Scot Ober, Biztantra, 5th Edition (2004).

QUALITY MANAGEMENT AND ACCREDITATION IN FORENSIC SCIENCE LABORATORIES

Course Code: FCH4405 **Credit Units: 02**

Course Objective: The objective of this course is to introduce the students with the Quality management system and requirements for the competence of testing and calibration, the technical requirements needed in a laboratory.

Course Contents:
Module I: Management requirements I General requirements for the competence of testing and calibration laboratories – Introduction, scope, management requirements: Organization, Quality system, Document control, Review of requests
Module II: Management requirements II Internal Audits; Control of records, Corrective and preventive actions, Tenders and contracts, Subcontracting of tests and calibration, Purchasing services and supplies, Service to the clients, Complaints
Module III: Technical requirements I Technical requirements: General, Personnel, Accommodation and Environmental conditions, Test and Calibration methods
Module IV: Technical requirements II Equipment, measurement traceability, sampling, handling of test and calibration items, assuring the quality of test and calibration results and reporting the results
Module V: Laboratory Management Laboratory information management system, Validation and safety equipments

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination;

A: Attendance

Text & References:

1. International standard on General requirements for the competence of testing and calibration laboratories, Fist Edn., 1999-12-15, ISO/IEC 1702:1999(E)
2. Mario Deva RGAS, The Total Quality Management, NCC Blackwell Publication, (1995).
3. Willard Merritt, Dean & settle; Instrumental Methods of Analysis, CBS Publishers & Distributors, 7thEdn. New Delhi, (1986)

FORENSIC PSYCHOLOGY

Course Code: FCH4408 **Credit Units: 03**

Course Objectives:

1. To facilitate the learning of traditional and emergent fields of cognitive neuropsychology.

2. To understand-brain-behaviour relationship in day to day life

3. To explore the practical implications of cognitive processes in human performance.

Course Contents:
Module-I: Cognitive Neuroscience Introduction, Philosophical antecedents, Emergence of Cognitive psychology, Approaches and key issues, Organization of Nervous system: Cognition in the Brain, Sensation to representation, Theoretical approaches to perception, Deficits in perception. Attention and consciousness
Module-II: Memory Models, Processes, Practical Applications of Cognitive Psychology in improving memory processes, Representations and manipulation of knowledge in: Images and Propositions, Spatial cognition and Cognitive map
Module-III: Language Nature and Acquisition: Bilingualism and Multilingualism Reading, Bottom-up and Top-down processes, Comprehension, Neuropsychology of Language. Problem-solving and Creativity, Practical applications of cognitive psychology. Decision-making and reasoning: Deductive reasoning and inductive reasoning
Module-IV: Intelligence Information possessing and intelligence, alternative approaches to intelligence. Computer simulation, improving intelligence

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

MAJOR PROJECT

Course Code: FCH4437 **Credit Units: 10**

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricula where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

1. A short account of the activities that were undertaken as part of the project;
2. A statement about the extent to which the project has achieved its stated objectives;
3. A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
4. Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
5. Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

Title or Cover Page

The title page should contain Project Title; Student's Name; Programme; Year and Semester

and Name of the Faculty Guide.

Acknowledgement(s)

Acknowledgment to any advisory or financial assistance received in the course of work may

be given. It is incomplete without student's signature.

Abstract

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

Table of Contents

Titles and subtitles are to correspond exactly with those in the text.

Introduction

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

Materials and Methods

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

Results and Discussion

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and

maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in “point” form.

While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather; it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.

Conclusion(s) & Recommendations

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:

1. Did the research project meet its aims (check back to introduction for stated aims)?
2. What are the main findings of the research?
3. Are there any recommendations?
4. Do you have any conclusion on the research process itself?

Implications for Future Research

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

Appendices

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

References

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichiacoli* O157: H7. *Clin Microbiol Infect* ,**8**(suppl 1): 116–117.

For book:

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

1. A4 size Paper
2. Font: Arial (10 points) or Times New Roman (12 points)
3. Line spacing: 1.5
4. Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

1. Range of Research Methods used to obtain information
2. Execution of Research
3. Data Analysis (Analyze Quantitative/ Qualitative information)
4. Quality Control
5. Conclusions

Assessment Scheme:

Continuous Evaluation:

40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:

60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

Amity School of Applied Sciences

Master of Science (Mathematics)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - FirstSemester

COMPLEX ANALYSIS

Course Code: MTH4101 **Credits: 04**

Course Objectives:

The objectives of this course are to acquaint the students with the mathematics involved in basics of Complex Numbers, Analytic Function, Complex Integration, Integration theorems for evaluation of complex integrals and to get them familiar with various important applications in evaluating real integrals.

CourseContents:

Module 1: Review of Analytic Functions
Complex Number, Limit, Continuity and Differentiability of Complex Functions, Branches of Multiple-valued Functions, Sequences and Series of Complex Number, Analytic functions: C-R equations; Sufficient Condition for Analyticity, Analyticity of Elementary Functions, Conjugate Function, Laplace's Equation, Harmonic Functions, Milne-Thomson's Method, Simply and Multi-Connected Region, Line Integral, Cauchy's Theorem and its Application in Line Integral.

Module 2: Complex Integration
Cauchy's Integral Formula, Cauchy's Integral Formula for Derivative and higher order Derivative; Morera's Theorem, Cauchy Inequality, Liouville's Theorem, Generalized version of Liouville's Theorem, Picard's Theorem, Fundamental Theorem of Algebra, Uniqueness Theorem and Identity Theorem, Maximum Modulus and Minimum Modulus Theorem, Schwarz's Lemma and Examples based on the above all Theorems.

Module 3: Bilinear Transformations and Power Series
Bilinear Transformations, Cross Ratios, Fixed Point Invariants; Standard Forms of Bilinear Transformations: Translation, Rotation, Magnification, Inversion; Mappings from: Disc to Disc, Disc to half Plane, and half Plane to half Plane, Mappings of Standard Transformations and their Applications. Conformal Mappings and its Properties. Power Series: Radius of Convergence of Series, Expansion of Complex Function, Operations on Power Series, Taylor's Theorem and Laurent's Theorem (with proof and examples).

Module 4: Residues and Evaluation of Real Integrals
Classification of Singularities, Residue: Residue at Pole, Cauchy's Residue Theorem and its applications in Evaluating Real Integrals, Improper Integrals, Evaluation of a Real Integral round the Unit Circle, Improper Integrals involving Elementary Functions, Argument Principle, Rouche's Theorem.
Meromorphic functions and it Properties and Riemann Mapping Theorem (without proof).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	5	5	70

A-Attendance; **CT**-Class Test; **S/V/Q**-Seminar/Quiz/Viva; **HA**-Home Assignment; **EE**-End Semester Examination

REAL ANALYSIS

Course Code: MTH4102 **Credit Units: 04**

Course Objectives:
The objectives of this courseare to introduce the students to the fundamental ideas of Real Analysis: limits of sequences, infinite series, limits of real functions, continuity, differentiability and the Riemann integral. The module should encourage students to think clearly and critically and to begin to be able to prove simple statements on their own.

Course Contents:

Module-I: Sequences and Series of Functions, Point-wise and uniform convergence, Cauchy criterion for uniform convergence, Uniform convergence and continuity, Uniform convergence and differentiation, Weierstrass approximation theorem.

Module-II: Set functions, intuitive idea of measure, Elementary properties of measure, Measurable sets and their fundamental properties. Lebesgue measure of sets of real numbers, Algebra of measurable sets; Borel sets, Equivalent formulation of measurable sets in terms of open, Closed, Fo and Gs sets, Non measurable sets.

Module-III: Measurable functions and their equivalent formulations, Properties of measurable functions. Approximation of measurable functions by sequences of simple functions, Measurable functions as nearly continuous functions, Egoroff's theorem, Lusin's theorem, Convergence in measure and F Riesz theorem for convergence in measure. Almost uniform convergence.

Module-IV: Shortcomings of Riemann Integral, Lebesgue Integral of a bounded function over a set of finite measure and its properties. Lebesgue integral as a generalization of Reimann integral, Bounded - convergence theorem, Lebesgue theorem regarding points of discontinuities of Riemann integral. functions, Integral of non-negative functions, Fatou's Lemma, Monotone convergence- Theorem, General Lebesgue Integral, Lebesgue convergence theorem.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- J. E. Marsden and M. J. Hoffman, Elementary Classical Analysis, 2nd Edn., W. H. Freeman,1993.
- Rudin, W., Principles of Mathematical Analysis", McGraw-Hill Book Company,1976.
- Lang, S., Real and Functional Analysis", Springer-Verlag, 1993.
- Barra, G.D., Measure Theory and Integration", Woodhead Publishing,2003.
- P. M. Fitzpatrick, Advanced Calculus, 2nd Edn., AMS, Indian Edition,2010.

COMPUTING and C PROGRAMMING

Course Code: MTH4105 **Credit Units: 03**

Course Objectives:
The objectives of this course are to acquaint the students with the mathematics involved in basics of computers system, its components, data representation inside computer and to get them familiar with various important features of a procedure-oriented programming language i.e. C.

Course Contents:

Module-I: Data representation: number systems, character representation codes, binary, octal, hexadecimal and their inter conversions, binary arithmetic, floating point arithmetic, header files, static variables, register variables, declaration of variable names, data types and sizes, constants, format specifier, storage class, scope.

Module-II: Arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bit-wise operators, assignment operators and expressions, conditional expressions; precedence and order of evaluation. if else, nested if.

Module-III: Loops- switch,while and for, do-while. break and continue, go to and labels, Character Input Output Arrays, Character Arrays. Multi-Dimensional Arrays, Basics of Structures, Arrays of Structures, Unions.

Module-IV: Basics of functions, functions arguments block structures, recursion, pointers, function arguments, call by value, call by reference pointers and arrays functions, pointer arrays, pointers to pointers, command line arguments, strings operation.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Rajaraman, V., Computer Programming in C" , Prentice Hall of India,1995.
- Schildt, H., C: The complete reference", Osbourne Mcgraw Hill, 4th Edition,2002.
- Kanetkar, Y., Let us C", BPB Publications, 14th Edition,2016.
- Kernighan & Ritchie, C Programming Language", The (Ansi C Version), Prentice Hall India Learning Private Limited; 2 edition(1990).

C PROGRAMMING LAB

Course Code: MTH4106 **Credit Units: 01**

Software Required: Turbo C

Course Contents:
1. Some basic programs to understand the working of Clanguage.
2. Programs involving conditional operator like if-end, elseif-end
3. Programs involving nestedif-else-end
4. Programs involving multiple selections using switchstatement
5. Programs involving loops like while and dowhile.
6. Programs involving forloops.
7. Programs involving user defined functioncalls.
8. Programs involving arrays andmatrices
9. Programs involvingstrings
10. Programs involvingstructures
11. Programs involvingUnions
12. Programs involving pointers, and solving various problems with the help ofthose.
13. Programs involving filehandling

Examination Scheme

Internal Assessment

Components	Attnd.	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

References

- Rajaraman, V., Computer Programming in C" , Prentice Hall of India,1995.
- Schildt, H., C: The complete reference", Osbourne Mcgraw Hill, 4th Edition,2002.
- Kanetkar, Y., Let us C", BPB Publications, 14th Edition,2016.
- Kernighan & Ritchie, C Programming Language", The (Ansi C Version), Prentice Hall India Learning Private Limited; 2 edition(1990).

ORDINARY DIFFERENTIAL EQUATIONS

Course Code: MTH4109 **Credit Units: 04**

Course Objectives:
This course provides an introduction to few important theoretical topics involving ordinary differential equations. Emphasis is placed on the development of abstract concepts and applications various types of differential equations.

Course Contents:
Module-I: Picard's Iterative Method to solve Initial Value Problem (IVP) and Simultaneous Differential Equations (DE) with initial condition, Lipschitz Condition, and Picard's theorem for Existence and uniqueness. Independence solution of Linear DE: Existence and Uniqueness Theorem of a second order LDE, Linearly dependent and independent solutions of a second order LDE, Wronskian and some important theorems and Wronskian of *n* functions.

Module-II:Linear Differential Equation of Second Order: General form, Solution of linear differential equation of second order by Reduction of order, Reduction to normal form, Transformation of the equation by changing the independent variable, Method of variation of parameters.

Module-III: **Integration in Series**: Review of power series, Analytic function, ordinary and regular singular points, power series solution in power of $(x-x_0)$ or power series solution about the ordinary point, power series solution about the regular singular point (Frobenius Method), Frobenius Method: Roots of indicial equation unequal and differing by an integer.

Module-IV Legendre equation and its solution, Legendre function of first and second kind, Generating function for Legendre polynomial and its some properties. Bessel function: Bessel's equation and its solution, Bessel's function of the first and second kind of order n, Relation between $J_n(x)$ and $J_{-n}(x)$. Gauss Hypergeometric function and its properties.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Braun, M. Differential Equations and Their Applications", 4th Ed., Springer,2011
- Coddington E.A., Ordinary Differential Equations", Tata McGraw Hill,2002
- Simmons G.F., Differential Equations with Applications and Historical Notes", 2nd Edition, Tata Mc-Graw Hill,2003
- Deo, S.G., Lakshmikantham, V., and Raghvendra, V.,Text Book of Ordinary Differential Equations", 2nd Ed., Tata McGraw Hill,2010

LINEAR ALGEBRA

Course Code: MTH4110 **Credit Units: 04**

Course Objectives:
The course aims to introduce real n-dimensional vector spaces, abstract vector spaces and their axioms, linear transformations; inner products (dot products), orthogonality, cross products, and their geometric applications; subspaces, linear independence, bases for vector spaces, dimension, matrix rank; eigenvectors, eigen-values, matrix diagonalization. Some applications of linear algebra will also be discussed.

Course Contents:

Module-I: Vector Spaces and Linear Transformations: Review of vector spaces, basis and dimension, examples of infinite dimensional spaces, ordered bases and coordinates, linear transformations, algebra of linear transformations, rank-nullity theorem, matrix representation of a linear transformation, change of basis, linear functional, dual spaces, reflexivity.

Module-II: Linear Operators: Brief review, the module associated with a linear operator, orders and the minimal polynomial, cyclic modules and cyclic subspaces, the decomposition of vector space V, the rational canonical form, characteristic polynomial of an operator, eigenvalues and eigenvectors of linear operators, eigen-space, minimal polynomial, Jordan canonical form, triangularizability and Schur'slemma, diagonalizable operators, projections, algebra of projections, resolution of the identity, spectral resolution, exponential of a square matrix

Module-III: Inner product Normed Spaces: Inner product between two vector spaces, Orthogonal and orthonormal vectors, Normed spaces with examples. Further properties of Normed spaces and Inner product Spaces. Isometries, projection theorems and best approximations Theorem .orthogonal direct sum.Riesz representation theorems.

Module-IV: Adjoint operators and Quadratic Forms: Adjoint of a linear operator Self adjoint operator. Unitary operators and Isometries. Structure of Normal operators. Positive operators. Gram-Schmidt process fororthogonalisation.quadratic forms.Positive definite form. Diagonalization of symmetric matrices.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Strang, G., Linear Algebra and its Applications", 3rd Edition, Thomson Learning Asia Pvt Ltd, 2003
- Hoffman, K. and Kunze, R., Linear Algebra", 2nd Edition, Pearson Education (Asia) Pvt. Ltd Prentice Hall of India, 2004.
- Leon, S.J., Linear Algebra with Applications", 8th Edition, Pearson,2009
- Olver, P. J. and Shakiban, C., Applied Linear Algebra", 1st Edition, Prentice Hall,2005
- Sudan L., Applied Linear Algebra", Prentice Hall,2001

Syllabus – Second Semester

OPERATIONS RESEARCH

Course Code: MTH4217 **Credit Units: 04**

Course Objectives:
The problems in optimization are the most common applications of mathematics. The main aim of this course is to present different methods of solving optimization problems in the areas of linear programming, non linear programming, and integer linear programming. In addition to theoretical treatments, there will be some introduction to numerical methods for optimization problems.

Course Contents:

Module-I: **Review** Introduction to Operation Research**,** Linear programming problem and its formulation, convex sets and their properties, graphical method, basic feasible solution, simplex method, big-M and two phase methods; infeasible and unbounded LPPs, alternate optima; Dual problem and duality theorems, dual simplex method and its application in post optimality analysis; Sensitivity Analysis, Balanced and unbalanced transportation problems, Vogel's approximation method for solving transportation problems; Hungarian method for solving assignment problems.

Module-II: Dynamic Programming Bellman's Principle of optimality of Dynamic Programming, Multi-stage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem.

Module-III: Integer Linear Programming Problems: Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound method.

Module-IV: PERT and CPM: Basic idea of PERT & CPM, Difference between PERT & CPM, PERT/CPM network components and precedence, Relationship critical path analysis, Project Scheduling, Project Time Cost, Trade Off, Resource allocation.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- Taha, H.A., Operations Research: An Introduction", MacMillan Pub Co., NY, 9th Ed. (Reprint), 2013.
- Mohan, C. and Deep, K., Optimization Techniques", New Age India Pvt. Ltd, New Delhi,2009.
- Ravindran, A., Phillips, D.T. and Solberg, J.J., Operations Research: Principles and Practice", John Wiley and Sons, NY, 2nd Ed. (Reprint),2012.
- Hillier, F. S., and G. J. Lieberman, Introduction to Operations Research", 2nd ed., Holden-Day, San Francisco, 1974.
- Kanthi Swarup, P.K.Gupta and Man Mohan, \Operations Research". Sultan Chand and Sons New Delhi, Fourteenth Edition-2008

TOPOLOGY

Course Code: MTH4205 **Credit Units: 04**

Course Objectives:
Topology is a modern branch of geometry. It serves to lay the strong foundations of concepts for study in analysis and in geometry. It is also a prerequisite for many concepts related to Analysis. The course is designed to develop an understanding of topological ideas & techniques and their role in analysis.

Course Contents:

Module-I: Introduction: Finite, countable, uncountable sets, functions, relations, axiom of choice, Zorn's Lemma. Schroder Bernstein theorem.

Module-II: Topological Spaces and Continuous Functions: Open sets, closed sets, basis for a topology, sub basis, T1 and T2 spaces, order topology, product topology, subspace topology, limit point, continuous function, general product topology, metric space and its topology, quotienttopology.

Module-III: Connectedness and Compactness: Connected spaces, connected subspaces, local connectedness, compact subspace, limit point compactness, local compactness.

Module-IV: Countability and Separation Axioms: Countability axioms, separation axioms, regular and normal spaces, Urysohn's Lemma, UrysohnMetrization Theorem, Tietze Extension Theorem, Tychonoff Theorem.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Munkres, J.R., Topology", 2nd Edition, PHI,2010.
- Simmons, G.F., Introduction to Topology and Modern Analysis", Krieger Publishing Company, 2003.
- Mansfield, M.J., Introduction to Topology", East-West Student Edition,1973.
- Min, Y., Introduction to Topology: Theory & Applications", Higher Education Press,2010.
- Gamelin, T.W. and Greene, R.E., "Introduction to Topology", 2nd Ed., Dover Publications,1999.

STATISTICS BASED LAB

Course Code: MTH4206 **Credit Units:01**

Course Objectives:
The objectives of this Lab work are to acquaint students to use statistical software in computation and interpretation of various statistical results.

Course Contents:

Fundamentals of R, and SPSS software or Turbo C and their application in computation of:
1. Measurement of CentralTendencies
2. Measurement of Dispersion
3. Measurement of Skewness &Kurtosis
4. Analysis of Correlation &Regression
5. Sampling from discrete and continuous Probability Distribution (Binomial, Poisson, Geometric, Negative Binomial, Exponential, Gamma, Normal)
6. Test of Significance (Chi-square Test, F-test, Analysis ofVariance)
7. Solution of Linear Equations
8. Calculating Eigenvalues and Eigenvectors of amatrix
9. Testing and Evaluation of nature of Quadratic forms (+ve definite, -ve definite,Indefinite)

Examination Scheme:

Internal Assessment

Components	Attnd.	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

References

- V. K. Rohatgi and A. K. Md. E. Saleh, An Introduction to Probability and Statistics, 2nd Edn., Wiley, 2001.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edn., Wiley, 1968.
- Miller, I. and Miller, M:Freunds Mathematical Statistics with Applications, 7th edition, Prentice Hall.
- Hogg, R., Mckean, J. and Craig, A.:Introduction to Mathematical Statistics, 7th edition, Pearson Education

PARTIAL DIFFERENTIAL EQUATIONS

Course Code: MTH4213 **Credit Units: 04**

Course Objectives:
This course aims to acquaint the students with various mathematical techniques for classification of PDE and their solutions. The students will be taught Laplace's equation, Heat equations, Green's function, wave equations and the approach to solve various boundary value problems involving parabolic, elliptic and hyperbolic differential equations which arise in many physicalsituations.

Course Contents:

Module-I: Simultaneous Differential Equations of the First Order and First Degree. Methods of solution of $dx/P = dy/Q = dz/R$. Orthogonal Trajectories of a system of curves on a surface. Pfaffian differential forms and equations. Solution of Pfaffian differential equations in three variables. Charpit's method, Jacobi's method for nonlinear PDEs.

Module-II: Second Order PDE equations with Variable Coefficients, Classification and canonical forms of second order equations in two variables. Classification of second order equations in n variables. Characteristic curves of second order equations in two variables.

Module-III: Review of Integral Transform and Fourier series. Laplace's equation, Analytic solutions of Laplace Equation in 2D Cartesian and polar coordinates, Interior & Exterior Dirichlet's problem, Green's function for Laplace equation, Eigen function method for finding Green's function.

Module-IV: One and Two Dimensional Wave Equation, solution by method of characteristics and Fourier series method. solution of homogeneous and non-homogeneous diffusion equation, Duhamel's principle.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Zachmanoglou, E.C., Thoe, D.W., Introduction to Partial Differential Equations with Applications", Dover Publications, 1996.
- Sneddon, I. N., Elements of Partial Differential Equations", McGraw-Hill Book Company,1998.
- Amarnath, T., An Elementary Course in Partial Differential Equations", Narosa Publishing House (II Edition),2012.
- Rao, K. S., Introduction to Partial Differential Equations", PHI Learning Pvt. Ltd. (2nd Edition), 2012
- Lawrence C. Evans, Partial Differential Equations", American Mathematical Society2010.

PROBABILITY THEORY

Course Code: MTH4218 **Credit Units: 03**

Course Objectives:
The objectives of this course are to extend and master students knowledge of probability and statistical methods and to provide theoretical background for studying advanced statistical methods. Upon successful completion of this course, students will be able to study, correctly apply and interpret different statistical methods.

Course Contents:

Module-I: Probability Classical, Axiomatic and Statistical approaches of probability, sample space and discrete probability spaces, probability measures on countable and uncountable spaces, conditional probability, Bayes theorem and stochastic independence, examples and applications

Module-II: Probability distribution functions: Random variables, discrete and continuous rvs, distribution functions, probability mass and density functions, distribution functions, Moment generating function and moments, Characteristic function, Cumulant Generating Function and cumulants, moments in terms of cumulants, Mathematical Expectations, Variance, Covariance, Variance of a Sum and their significance.

Module-III: Discrete and Continuous Distributions: Standard univariate discrete distributions such as binomial, poisson, geometric, negative binomial, hypergeometric, and their properties; Standard continuous distributions such as normal, exponential, Beta distribution of first and second kind, Gamma distribution

Module-IV: Convergence in Probability Modes of convergence of sequences of random variables, Independent and Identically Distributed Variables, Weak and Strong laws of large numbers, Central limit theorems, Chebychevs Inequality, Markov Inequality, Kolmogorov Inequality

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- V. K. Rohatgi and A. K. Md. E. Saleh, An Introduction to Probability and Statistics, 2nd Edn., Wiley, 2001.
- W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edn., Wiley, 1968.
- Miller, I. and Miller, M:Freunds Mathematical Statistics with Applications, 7th edition, Prentice Hall.
- Hogg, R., Mckean, J. and Craig, A.: Introduction to Mathematical Statistics, 7th edition, Pearson Education

INTRODUCTION TO MATLAB

Course Code: MTH4215 **Credit Units: 03**

Course Objectives:
The objectives of the course are to familiarize the students with the main features of the MATLAB integrated design environment. Students will learn concepts related to programming in MATLAB and they will also get to the exposure to use few built-in functions to solve many practicalproblems.

Course Contents:

Module-I: Introduction to MATLAB and Plotting: vector and matrix generation, subscripting and the colon notation, matrix and array operations and their manipulations, introduction to some inbuilt functions. Two & three-dimensional graphics: basic plots, change in axes and annotation in a figure, multiple plots in a figure, saving and printing figures, mesh plots, surface plots and their variants.

Module-II: **m-Files**: scripts and user defined functions, calling functions into a script file, sub-functions, and nested functions, concept of local and global variable, few examples of in-built functions, editing, saving m-files.

Module-III: Loops and Conditional statements: Flow control using various statements and loops including For-End and While-End loops with Break commands. Conditional Statements: If-End statement, If-Else-End statement, nested If-Else-Endstatements.

Module-IV: Applications of MATLAB: Solving a linear system of equations including over determined and system with infinitely many solutions. Calculus of polynomials using inbuilt functions, Solving equations in one variable, Solving IVPs using inbuilt functions.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill,2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India,2014.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press,2016.

MATLAB PROGRAMMING LAB

Course Code: MTH4216 **Credit Units: 01**

Course Objectives:
MATLAB is a scientific computing tool which covers almost all area of science and engineering. Students will be using MATLAB environment to solve various types of mathematicalproblems.

Course Contents:
Fundamentals of Linear Algebra, Numerical Analysis, Differential Equations and their application using MATLAB :
1. Generating arrays and matrices and theirmanipulations
2. Eigenvalues & Eigenvectors of various type ofmatrices
3. Using built-in functions to solve system ofequations
4. Functions related to plotting 2D and 3Dplots
5. Introducing built-in functions for numericalapproximations
6. Annotation ofPlots
7. Writing m files including script and functionfiles
8. Introducing notion of sub-functions and nestedfunctions
9. Solving IVPs using ode45 and othersolvers
10. Solving system of equations ofIVPs

Examination Scheme

Internal Assessment

Components	Attnd.	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

Reference Books:
- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill,2008.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, Wiley India,2014.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press,2016.

Syllabus – Third Semester

NUMERICAL ANALYSIS

Course Code: MTH4325 **Credit Units: 03**

Course Objectives:
The objectives of this course are to introduce some advanced numerical methods, commonly used in research to the post graduate students. Student will be introduced to numerical techniques for solving algebraic and transcendental equation, Interpolation of polynomial, Differentiation, Integration and ordinary differential equations.

Course Contents:
Module-I: Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method, Iteration method, Newton Raphson method, Newton Raphson method for multiple roots, Secant method as an improvement on Newton Raphson method, and Muller's method, Graeffe's Root Square Method. Convergence and error analysis of these methods.

Module-II: Finite differences, interpolation and approximation: Finite difference operators, their properties and their interrelations, problems based on finite difference tables, Newton's forward and Newton's backward interpolation formula, various central difference formulae including Stirling's formula, Bessel's formula and Cubic -Spline interpolation. Divided differences: Operators and difference table, Newton's divided difference formula, Lagrange's interpolation formula.

Module-III: Solution of system of linear equations:
Direct methods: Cramer's rule, Matrix inverse method, Gauss elimination and Gauss-Jordan method, LU decompositionmethod.Iterative methods: Jacobi's method, Gauss-Seidel method and their convergence criterion. Concept of ill-conditioning, and condition number for system ofequations.

Module-IV: Numerical Differentiation and Integration: Numerical differentiation using Newton's for- ward and backward formula, order of leading error terms. Newton-Cotes quadrature formula - derivations & comparison of Trapezoidal rule, Simpsons 1/3 and 3/8 rules. Error analysis of these methods. Numerical solution of first order differential equations: Euler's method, modified Euler's method, Predictor-Corrector Method, Runge-Kutta second order and fourth order methods, their derivations and their extension to solve system of IVPs.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- Gerald, C. F. & Wheatly P. O., Applied Numerical Analysis", 6th Ed., Addison-Wesley Publishing, 2002.
- Fausett, L. V., Applied Numerical Analysis", Prentice Hall, 2nd Ed.2007
- Froberg, C. E., "Introduction to Numerical Analysis", 2nd Ed., Addison Wesley.,2004
- E. Scheid, Numerical Analysis", Mc Graw Hill1988.
- Jain, M.K., S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computations", New Age International, New Delhi,2003.

ABSTRACT ALGEBRA

Course Code: MTH4326 **Credit Units: 04**

Course Objectives:
Students will learn the facts, formulas, and techniques in this course to prove theorems about nature of groups, subgroups, quotient groups, rings, subrings, ideals, quotient rings, fields and theassociated mappings. Students will also solve problems related to the size and composition of subgroups and quotient groups; the orders of elements; isomorphic groups and rings; and the composition of ideals and fields.

Course Contents:
Module-I: Groups, symmetric groups, Cayley's theorem, Normal subgroups, center of a group, quotient groups, Fundamental theorem on homomorphisms, Class equation of groups, Cauchy's Theorems for abelian and non abelian groups, Sylow's Theorems for abelian and non abelian groups, solvable groups.

Module-II: Maximal groups, composition Series of a group, Jordan Holder Theorem, solvable groups, nilpotent groups, direct product of groups, structure theorem for finite abelian groups.

Module-III: Rings, homomorphism of rings, ideals, maximal ideals, quotient rings, Integral Domains, Fields, Euclidean domains, PID, UFD, Polynomial rings, polynomial over the rational fields, Gauss lemma, Eisenstein criterion.

Module-IV: Modules, Definition and examples, Direct sum, Free modules, Quotient modules, Simple modules, Modules over Principle ideal domains, Modules with chain conditions, Artenian Modules, Noetherian Modules, Hilbert's basis theorem.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Herstein, I. N., Topics in Algebra", 2nd Ed., John Wiley & Sons,2004.
- Fraleigh, J. B., A First Course in Abstract Algebra", 7th Ed., Pearson Education,2003.
- Dummit, D. S. and Foote, R. M., Abstract Algebra", 3rd Ed., John Wiley & Sons,2004.
- Artin M., Algebra", 2nd Ed., Prentice Hall India,2011.
- Gallian J. A., Contemporary Abstract Algebra", 8th Ed., Cengage Learning,2013.

NUMERICAL ANALYSIS LAB

Course Code: MTH4327 **Credit Units: 01**

Softwares required: Turbo C and MATLAB

Course Objective:

The objective of the course is to explain the most common numerical methods used in engineering analysis, when to use each method, and how to implement basic methods in a structured manner using MATLAB's programming language.

Course Contents:

Module-I: Roots of Transcendental Equations: Programs for Initial approximation for roots, Bisection method, Regula-Falsi method, Iterative method, Newton Raphson method, Secant method. Comparison of these methods. How to use built-in functions to find the roots of Transcendental Equations.

Module-II: System of Linear Equations: Programs for Jacobi method, Gauss-Seidal method, their comparative study using various stopping criterion. Programs for forward and back substitution, LU decomposition method, and using built in functions for system of equations.

Module-III: Programs for Numerical Differentiation, Programs for trapezoidal rule, Simpson's 1/3 and 3/8 rule and their comparison. Using built-in functions for both numerical differentiation and numerical integration.

Module-IV: Programs for solving IVPs for Euler's method and its variants. How to use built in functions for solving IVPs and how to extend the code for solving system of IVPs.

Examination Scheme

Internal Assessment

Components	Attnd.	Performance	Lab Record	Viva
Weightage (%)	5	10	10	5

End-Term Exam

Components	Performance	Viva
Weightage (%)	35	35

Reference Books:

- Applied Numerical Methods with Matlab for Engineers and Scientists by Steven Chapra, McGraw Hill.
- MATLAB: An introduction with applications: Amos Gilat, 5th Edition, WileyIndia.
- Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford UniversityPress.

MATHEMATICAL METHODS

Course Code: MTH4342 **Credit Units: 04**

Course Objectives:
To introduce the methods and concepts to solve integral equations, and problems through calculus of variations.

Course Contents:
Module-I:Integral Transforms: Fourier transforms: Definitions, properties, Fourier transforms of some elementary functions, convolution theorems, Fourier transform as a limit of Fourier Series. Laplace transforms: Definitions, properties, Laplace transforms of some elementary functions, convolution theorem, inverse Laplace transformation, applications

Module-II: Definitionand Classification of Linear Integral Equations: Conversion of initial and boundary value problems into integral equations. Conversion of integral equations into differential equations. Fredholm Integral Equations: Solution of integral equations with separable kernels, Eigen-values and Eigen-functions. Solution by the successive approximations, Neumann series and resolvent kernel. Solution of integral equations with symmetric kernels, Hilbert-Schmidt theorem, Green's function approach.

Module-III: Volterra Integral Equations: Successive approximations, Neumann series and resolvent kernel. Equations with convolution type kernels, Sturm Liouville problem and its applications.

Module-IV: Calculus of Variations: Basic concepts of the calculus of variations such as functionals, extremum, variations, function spaces. Necessary condition for an extremum, Euler's equation with the cases of one variable and several variables. Invariance of Euler's equations. Functionals dependent on one or two functions and related problems.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Jerry, A. J., Introduction to Integral Equations with Applications, Wiley Publishers (2nd Edition), 1999.
- Chambers, L. G., Integral Equations: A Short Course, International Text Book Company Ltd,1976.
- Kanwal R. P., Linear Integral Equations, BirkhuserBosten, (2nd Edition),1997.
- Gelfand, I. M., Fomin, S. V., Calculus of Variations, Dover Books,2000
- Weinstock R., Calculus of Variations with Applications to Physics and Engineering, Dover Publications,1974.

Summer Workshop

Course Code: MTH4335 **Credit Units: 03**

1. Workshop will be conducted for one-week (six hours per day). The content of the course will be intended to give an exposure to
   - Technical softwares/tools related to scientific computing and statistics.
   - Report writing, Presentation etc.

2. The students will have to appear for class-test(s) during the workshop.

1. During summer break, students have to work on the assignment(s) given to them.

2. The assignment(s) will have to be submitted within two weeks of commencement of new semester followed by viva-voce.
3. The evaluation will be done by the committee comprising of faculty members who served as resource persons in the workshop.

Evaluation scheme:

Components	Attendance	Assignment(s)	Class test(s)	Viva-voce
Weightage (%)	5	35	30	30

DISCRETE MATHEMATICAL STRUCTURES

Course Code: MTH4303 **Credit Units: 04**

Course Objectives:
Discrete mathematical structure is basically the study of the logical and mathematical relationships between discrete objects using application of Boolean algebra, graphs, lattice and trees. At the end of the course, students will be able to relate computing theory with applications. He can understand and design their project machine like finite state machine using algorithmic approach, and able to understand the importance of graph algorithms in daily life research problem solving.

Course Contents:
Module-I: Mathematical logic and Lattices: Propositional logic, propositional operators, tautology, normal forms and arguments, Lattices: Lattices as partially ordered sets, their properties, duality, Lattices as algebraic systems, Sub lattices, Direct products, Bounded Lattices, Complete Lattices, Complemented Lattices and Distributive lattices. Cover of an elements, atoms, join and meet irreducible elements.

Module-II: Boolean Algebra Boolean Algebras: Boolean Algebras as lattices. Various Boolean Identities. The Switching Algebra example. Sub algebras, Direct products and Homeomorphisms. Boolean forms and their Equivalence. Min-term Boolean forms, Sum of product Canonical forms. Minimization of Boolean functions, The Karnaugh Mapmethod.

Module-III: Graphs Definition of (undirected) graph, Walk, Path, Circuit, Cycles, Degree of a vertex, Connected graphs, Complete and Bipartite graphs, Planar graphs, Euler's formula for connected Planar graphs, Kuratowski's Theorem and its uses. Coloring of graphs, five color theorem and statement of four colour theorem.

Module-IV: Trees and Directed Graph Trees, Cut-sets, Spanning Trees, Fundamentals Cut-sets and minimum Spanning Trees, Prim's and Kruskal's algorithms, Connectivity, Matrix Representation of graphs, Directed Graphs, In-degree and out-degree of a vertex.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- J. P. Trembley & R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co.,1997.
- J. L. Gersting, Mathematical Structure for Computer Science (3rd ed.) , Computer Science Press, Seymour Lepschutz, Finite Mathematics, McGraw-Hill Book Co. NewYork.
- J. E. Hopcroft and J.D. Ullman, Introduction to Automata Theory Languages & Computation, Narosa Publishing House,Delhi.
- C. L. Liu, Elements of Discrete Mathematics, Tata McGraw-Hill Publishing Co. Ltd, NewDelhi.
- N. Deo, Graph Theory with Applications to Engineering and Computer Sciences, Prentice Hall of India, NewDelhi

FUZZY SETS AND THEIR APPLICATIONS

Course Code: MTH4305 **Credit Units: 04**

Course Objectives:
The objectives of this course are to familiarize students with fundamental knowledge of fuzzy sets, fuzzy logic and its applications in fuzzy decision making and neural network. Upon successful completion of this course, students shall be able to understand basic knowledge of fuzzy dynamic systems, fuzzy data basis and fuzzy information retrieval systems.

Course Contents:
Module-I: From Classical Crisp Sets to Fuzzy Sets Introduction, crisp sets, Fuzzy sets. Properties of fuzzy set, Fuzzy sets versus crisp sets: alpha cuts, strong alpha cut, properties of alpha cuts, representations of fuzzy sets, level set of fuzzy sets, support s of fuzzy set, core and height of fuzzy sets, cardinality of fuzzy sets, extension principle for fuzzy sets, first decomposition theorem, second decomposition theorem, third decompositiontheorem.

Module-II: Operations on Fuzzy sets Fuzzy complements, fuzzy intersection, fuzzy unions, fuzzy numbers, linguistic variables, arithmetic operations on intervals. Lattice of fuzzy numbers, fuzzy equations.

Module-III: Fuzzy Relations and Fuzzy Logic Classical logic an overview, Multi-valued logics, fuzzy propositions, fuzzy quantifiers, linguistic Hedges, inference from quantified and conditional propositions, fuzzy propositions, Information and uncertainty, non-specificity of crisp and fuzzy sets, fuzziness of fuzzysets

Module-IV: Fuzzy Applications Introduction, application in civil engineering, mechanical engineering and computer engineering, brief introduction to fuzzy systems and Genetic algorithms.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- Ross, T. J., Fuzzy Logic with Engineering Applications", Wiley India Pvt. Ltd., 3rd Ed,2011.
- Zimmerman, H. J., Fuzzy Set theory and its application", Springer India Pvt. Ltd., 4th Ed.,2006.
- Klir, G. and Yuan, B., Fuzzy Set and Fuzzy Logic: Theory and Applications", Prentice Hall of India Pvt. Ltd., 2002.
- Klir, G. and Folger, T., Fuzzy Sets, Uncertainty and Information", Prentice Hall of India Pvt. Ltd., 2002

NUMBER THEORY & CRYPTOGRAPHY

Course Code: MTH4329 **Credit Units: 04**

Course Objectives:
The course provides an introduction to basic number theory, where the focus is on computational aspects with applications in cryptography. Moreover, the course provides an introduction to some basic cryptographic techniques to understand fundamental mathematical concepts underlying digital signatures, public key encryption, and key establishment protocols.

Course Contents:
Module-I: Euclid's division lemma, Divisibility, The Linear Diophantine Equation, the fundamental theorem of Arithmetic, Fermat's Little theorem, Wilson's Theorem, Generating functions. Congruences, Residue Systems, The Theorems of Fermat and Wilson Revisited, The Chinese Remainder Theorem.

Module-II: Combinatorial Study of $\phi(n)$, Formulae for $d(n)$ and $\sigma(n)$, Multiplicative Arithmetic Functions, The Mobius Inversion Formula, Primitive Roots Modulo p, Tchebychev's Theorem. Euler's Criterion, the Legendre Symbol, The Quadratic Reciprocity Law, Consecutive Residues and Non-residues.

Module-III: Cryptographic Hash Functions Hash functions and data integrity, security of Hash functions, The random oracle model, algorithms in random oracle model, comparison of security criteria, Compression functions from encryption functions, Hash functions from compression functions.

Module-IV: Public Key Cryptography and Discrete Logarithms Finite fields, construction, The Elgamal crypto system, RSA public key crypto system, algorithms for discrete logarithm problems, Shanks Baby step Giant step algorithms, The pollard algorithm, factoring algorithms, attacks on RSA, security of Elgamal system, The Deffe Hellman key exchange problems, Digital signature algorithms using RSA, secrete key sharing principles, The Shamir Secret sharing protocol.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Niven, I., Zuckerman, S.H., Montgomery, L.H., An Introduction to the Theory of Numbers, John Wiley and Sons. New York,1991
- Dan Flath, Introduction to Number Theory, Wiley,1988)
- K. Ireland, M. Rosen. A Classical Introduction to Modern Number Theory, Springer Verlage,1990.
- Douglas R. S. Cryptography Theory and Practice, Third edition, Chaman & Hall/CRC,2005
- Johannes Buchmann. Introduction to Cryptography, Second edition, Springer,2004.
- N. Koblitz. Course in Number Theory and Cryptography, Springer,1994.
- A. J. Menezes, P.C. Van Oorschot and S.A. Vanstone. Handbook of Applied Cryptography, CRC Press, Boca Raton,1997.

TENSORS AND DIFFERENTIAL GEOMETRY

Course Code: MTH4340 **Credit Units: 04**

Course Objectives:
To provide the basics geometric concepts curves, surfaces and tensors.

Course Contents:
Module-I: Theory of Space Curves: Space curves, Planer curves, Curvature, Torsion and Serret-Frenet formulae. Osculating circles, Osculating circles and spheres. Existence of space curves. Evolutes and involutes of curves.

Module-II: Theory of Surfaces: Parametric curves on surfaces. Direction coefficients. First and second Fundamental forms. Principal and Gaussian curvatures. Lines of curvature, Euler's theorem. Rodrigues formula, Conjugate and Asymptotic lines.

Module-III: Geodesics: Canonical geodesic equations. Nature of geodesics on a surface of revolution. Clairaut's theorem. Normal property of geodesics. Torsion of a geodesic. Geodesic curvature. Gauss-Bonnet theorem. Surfaces of constant curvature. Conformal mapping. Geodesic mapping. Tissots theorem.

Module-IV: Tensors: Summation convention and indicial notation, Coordinate transformation and Jacobian, Contra-variant and Covariant vectors, Tensors of different type, Algebra of tensors and contraction, Metric tensor and 3-index Christoffel symbols.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Willmore, T. J., An Introduction to Differential Geometry", Dover publications,2012.
- O'Neill B., Elementary Differential Geometry", Academic press, 2nd Ed,2006
- Lang, S., Fundamentals of Differential Geometry", Springer,1999.
- Spain, B., Tensor Calculus: A concise Course", Dover Publications,2003.
- Struik, D., J., Lectures on Classical Differential Geometry", Dover Publications,1988.

STATISTICAL METHODS

Course Code: MTH4341 **Credit Units:04**

Course Objectives:
The course aims to equip the students with statistical tools and concepts that help them in decision making.

Course Contents:
Module-I: Multivariate Probability Distributions Random vectors, joint, marginal and conditional distributions, conditional expectations, Moment generating functions, Multinomial and Bivariate Normal Distributions, Chi square, t and F Distributions and their properties.

Module-II: Sampling Theory Random sampling with and without replacement, stratified sampling, cluster sampling, systematic sampling etc. Distribution of sample mean andvariance

Module-III: Estimation and Testing Basic concept of estimation, definition of a statistic, properties of a good estimator unbiasedness, efficiency, consistency and sufficiency, MVUE Estimator, Cramer Rao Inequality and applications, Maximum Likelihood Estimators.
Testing: Null and Alternative Hypothesis, Type 1 and Type 2 Error, Z-test, t test, Chi-square, F-test and Analysis of Variance one way classification and two way classification

Module-IV: Correlation and Regression Types, importance, methods of measuring correlation-scatter diagram, Karl Pearson's and Spearman's Rank Correlation. Regression lines, Difference between regression and correlation, Meaning of Regression, Standard error of estimate, Partial and Multiple correlationcoefficients.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- Miller, I. and Miller, M:Freunds Mathematical Statistics with Aplications,7th edition, PrenticeHall.
- Biswas and Srivastava- A Textbook, Mathematical Statistics, Narosa Publishing House, NewDelhi.
- Mood, A.M., Graybill, F.A. and Boes, D.C.(1974): Introduction to the Theory of Statistics, McGrawHill.
- Des Raj &Chandak (1998): Sampling Theory, Narosa PublishingHouse.
- Mathematical Statistics by Gupta and Kapoor, Sultan Chand andSons

Syllabus – Fourth Semester

FLUID DYNAMICS

Course Code: MTH4409 **Credit Units: 04**

Course Objectives:
Almost everything on this planet is either in a state of fluid or moves within or near a fluid. Fluids have the ability to transport matter and its properties as well as transmit force. The main objectives of the course are to develop fundamental knowledge and understanding of the mechanics of fluid both at rest and in motion.

Course Contents:
Module-I: Concept of Fluid and its Physical Properties: Physical Properties of fluids. Concept of fluids, Continuum Hypothesis, Kinematics of Fluids, methods of describing fluid motion, translation, rotation and deformation of fluid elements, Stream Lines, Path lines and Streak lines, Vorticity. Eulerian and Lagrangian methods of description of fluids, General motion of fluid element

Module-II: General Theory of Stress: Rate of strain in a real fluid, Symmetry of stress tensor, Principal axes and Principle values of stress tensor, Constitutive equation for Newtonian Fluid. Conservation of mass, Conservation of momentum, Conservation of energy. One and two dimensional in viscid incompressible flow. Viscous flow, stress and strain analysis. Stokes hypothesis.

Module-III: Equation of Continuity: Motion using stream tube, Circulation, Velocity potential, Irrotational flow, Some theorems about rotational and irrotational flows, Stokes theorem, Kelvin's minimum energy theorem, Gauss theorem, Kelvin's circulation theorem, Vortex motion and its elementary properties, Integration of equations of motion, Bernoulli's equation, Stream function in two dimensional motion, Complex variable technique, Blasius theorem, Milne's circle theorem, Sources, Sinks and Doublets.

Module-IV: Incompressible Viscous Fluid Flows: Steady flow between two parallel plates (nonporous and porous), Plane Couette flow, Plane Poiseuille flow, Unsteady flow over a at plate, Unsteady flow between two rigid parallel plates. Non-dimensional numbers and their physical significance. The Navier-Stokes equations of motion. Some exactly solvable problems in viscousflows.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- Batechelor, G. K., An Introduction to Fluid Dynamics", Cambridge Press.,2002.
- Schliting, H. ,Gersten K., Boundary Layer Theory, Springer, 8th edition,2004.
- Drazin, P. G., Reid W. H., Hydrodynamic Stability, Cambridge Press,2004.
- Charlton, F., Text Book of Fluid Dynamics, C.B.S. Publishers, Delhi,1985.

MATHEMATICAL MODELLING

Course Code: MTH4411 **Credit Units: 04**

Course Objectives:
Mathematical modeling is a process of creating a mathematical representation of some phenomenon in order to gain a better understanding of that phenomenon. The objectives of this course are to learn how to make a creative use of some mathematical tools such as difference equations, ordinary and partial differential equations, Numerical analysis to build a mathematical description of some physical problems.

Course Contents:
Module-I: Mathematical Modelling through Ordinary Differential Equations and Systems of Ordinary Equations of First Order : Linear Growth and Decay Models, Non-linear growth and Decay models, Compartment models, Mathematical Modelling in Population Dynamics, Mathematical modeling of Epidemics, Mathematical modeling in medicine, arms race battles and international trade, Mathematical modeling in dynamics.

Module-II: Modeling with Difference Equations: overview of basic concepts concerning matrices, eigenvalues and eigenvectors, The Harrod Model, the cobweb model, Samuelson's interaction model, application to Actuarial Science, Application to population dynamics and genetics.

Module-III: Queuing Models: Poisson Process, Pure birth death process M/M/1, M/M/c, M/Ek/1 queuing models, steady state probabilities, waiting time distribution. Cost consideration in network models.

Module-IV: Mathematical Modeling through Mathematical Programming Maximum Principle: Linear programming models in harvesting of animal populations, forest management, transportation and assignment models, Non-linear programming models in optimal portfolio selection, information theory, non-linear programming models arising from pollution control, Pontryagins maximum principle, solution of a simple time-optimal problem, optimal harvesting of animal populations

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- J N Kapur, Mathematical Modeling", New Age International (P) Ltd., Publishers, New Delhi,2005
- Barnes, B. and Fulford, G. R., Mathematical Modelling with Case Studies", CRC Press, Taylor and Francis Group,2009
- Edsberg, L., Introduction to Computation and Modeling for Differential Equations", John Wiley and Sons,2008
- F R Giordano, M D Weir, and W P Fox, A First Course in Mathematical Modeling", Cengage Learning; 4th edition, 2008
- M M Gibbons, A Concrete Approach to Mathematical Modeling", John Wiley and Sons,2007.
- P.E. Wellstead, Introduction to Physical System Modeling", Academic Press,1977.

PROJECT

Course Code: MTH4437 **Credit Units: 06**

GUIDELINES FOR PROJECT REPORT: The Project Report is the final research report that the student prepares on the project assigned to him/her. The following components should be included in the project report:

1) **Title or Cover Page:**The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

2) **Acknowledgement(s):**Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature**.**

3) **Abstract:**A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project.

4) **Table of Contents:**Titles and subtitles are to correspond exactly with those in the text.

5) **Introduction:** Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided**.**

6) **Results and Discussion:** Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books.

7) **Conclusion(s) & Recommendations:**A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions: Did the research project meet its aims (check back to introduction for stated aims)? What are the main findings of the research? Are there any recommendations?

8) **References:**References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system

The Layout Guidelines for Project Report:

1)A4 size Paper

2) Font: Arial (10 points) or Times New Roman (12 points)

3) Line spacing: 1.5

4)Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3cm

Assessment Scheme: Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

FUNCTIONAL ANALYSIS

Course Code: MTH4402 **Credit Units: 04**

Course Objectives:
The course introduces basic concepts of functional analysis and the concepts associated with the dual of a linear space. Student will learn the basic properties of norm (Banach) and inner product (Hilbert) spaces as well as fundamentals of linear operator theory. They will also develop an understanding to use these concepts in various mathematical applications in pure mathematics such as representationtheory.

Course Contents:
Module-I: Prerequisites for the Course: Metric Space Further Examples of Metric Spaces Open Set, Closed Set, Neighborhood Convergence, Cauchy Sequence, Completeness Examples. Completeness Proofs Completion of Metric Spaces. Vector Space, Further Properties of Vector spaces.

Module-II: Normed linear spaces, Banach spaces Further Properties of Normed Spaces. Finite Dimensional Normed Spaces and Subspaces . Compactness and Finite Dimension continuous linear transformations, equivalent norms Bounded and Continuous Linear Operators .Linear Functionals Linear Operators and Functionals on Finite Dimensional Spaces, Normed Spaces, the Hahn-Banach theorem and its consequences. Normed Spaces of Operators. Dual S.

Module-III: Conjugate space and second conjugate space .The open mapping Theorem, The closed graph theorem, The conjugate of an operator, The uniform boundedness principle, Definition and examples and simple properties of Hilbert spaces.

Module-IV: Orthogonal complements, The projection theorem, orthogonal sets, The Bessel's inequality, Fourier expansion and Parseval's equation, separable Hilbert spaces, The conjugate space, Riesz's theorem, The adjoint of an operator, Self adjoint operators, Normal and unitary operators, Projections, The spectral theorem on a finite dimensional Hilbertspace.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Simons, G. F., Introduction to Topology and Modern Analysis", McGraw Hill,2004.
- Ponnusamy S., Foundation of Functional Analysis", Narosa Publication,2002.
- Jain P. K. and Ahuja O. P., Functional Analysis", New Age International Publishers,2010.
- Nair, M. T., "Functional Analysis: A First Course", PHI Pvt. Ltd,2004.
- Conway, J. B., A Course in Functional Analysis", Springer - Verlag, New York,1990.
- Lahiri, B. K., Elements of functional Analysis", The World Press Pvt. Ltd., Calcutta,1994.
- Kreyszig, E., Introductory Functional analysis with Applications, John Wiley & sons, New York, 1978

CLASSICAL MECHANICS

Course Code: MTH4410 **Credit Units: 04**

Course Objectives:
A detailed exposition of classical mechanics for the student, opting for physics is so vitally important for a clear understanding of recent intricate theories of quantum mechanics, modern physics and research for they are built an well developed and conceptualizedfoundation.

Course Contents:
Module-I: Lagrangian Formulation Mechanics of a system of particles, constraints, D'Alembert's principle, Variational calculus and its applications, Lagrangian equations, conservation theorems and symmetry properties, applications of Lagrangian formulation.

Module-II: Central Force Problem Reduction to one body problem, equation of motion and first integral, one dimensional problem and classification of orbits, Differential equation for the orbit, Kepler problem and planetary motion, Rutherford formula, scattering in central force field, transformation to laboratory frames.

Module-III: Rigid Body and Vibrating System Euler angles, tensor of inertia, kinetic energy of a rotating body, symmetric top and applications. Vibrating string, solution wave equation, normal vibrations, dispersion, coupled vibrating system. Non linear Dynamics, phase trajectories.

Module-IV: Hamiltonian Formulation Hamiltonian equation of motion, Hamilton's equation in different co-ordinate systems example in Hamiltonian dynamics, two dimensional harmonic oscillator the equations of canonical transformations, cyclic coordinates, phase space and Liouville's theorem, Poisson bracket. Lagrange brackets, general Poisson bracket under canonicaltransformation.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References:

- H. Goldstein, Classical Mechanics, 2nd edition, Narosa Publishing House(1994).
- W. Greiner, Classical Mechanics, Springer-Verlag(2003).
- Introduction to classical mechanics R.G.Takwall and P.S.Puranik, Tata McGraw Hill, 1980, New Delhi.
- Classical mechanics N.C.Rana and P.S.Joag, Tata McGraw Hill, 1991, NewDelhi.

BIOMECHANICS

Course Code: MTH4412 **Credit Units: 04**

Course Objectives:
The objectives of this course are to study the mechanics of flow of blood in human beings and movement of insects, spread of viruses etc by using mathematical tools like ordinary differential equation, partial differential equation, Calculus of variation, Laplace Transforms etc.

Course Contents:
Module-I: Mathematical Aspects of population biology; Some fundamental aspects, Models and their mathematical formulations, Single species models, Stability and classification of equilibrium points, Relationship between eigen values and critical points.

Module-II: Introduction to Biological Fluid Mechanics: Basic concepts of Fluid Dynamics, Fluid Parameters, Viscosity, Navier- Stokes Equations of viscous fluid motion, Poiseuille's flow, Model for blood flow, Properties of blood, Pulsatile Flow of blood,sedimentation.

Module-III: Modeling through partial differential equations: simple models, mass balance equations, Variational principles, probability generating function, traffic flow problems, initial & boundary conditions.

Module-IV: Study of alcohol in the blood stream; Volume of blood in human body; Stochastic epidemic model; Genetic graphs; Food webs: Linear programming in forest management; Mathematics in fisheries; Case studies on anchovy wipe out.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Brauer, F., Driessche, P. V. D. and Wu, J., Mathematical Epidemiology", Springer,2008.
- Murray, J. D., Mathematical Biology", Springer,1993.
- Kapur, J.N., Mathematical modeling", New Age International Publishers, New Delhi,2015.
- Fung, Y. C., Biomechanics", Springer-Verlag,1990.
- Keshet, L. E., Mathematical Models in Biology", SIAM,1988.

CODING THEORY

Course Code: MTH4413 **Credit Units: 04**

Course Objectives:
The objectives of the course are to teach the students how to produce algebraic codes based on the methods of groups and finite fields and to make the students familiar with some of the most widely used codes and their applications. After learning this course, students will be able to understand and implement the most widely used algebraic codes, write programs coding and decoding messages.

Course Contents:
Module-I: The Communication Channel, the coding problem, types of codes, Error Detecting and Error Correcting Codes, linear Codes. The Hemming metric, description of Linear Block Codes by matrices.

Module-II: Dual Codes, Standard Array Syndrome, Step by Step Decoding Modular Representation, Error Correction Capabilities of linear codes, Bounds of Minimum Distance for Block Codes, Plotkin Bound, Hamming sphere packing bound bounds for Burst Error Detecting and Correcting Codes.

Module-III: Important linear Block Codes, Hamming Codes, Golay Codes, Perfect Codes, Quasi perfect Codes, Reed Muller Codes, Codes derived by Hadamard Matrices, Product Codes. Concatenated codes.

Module-IV: A double-error correcting decimal Code and an introduction to BCH Codes, BCH bounds, Cyclic Codes, Matrix representation of Cyclic Codes, Hamming and Golay Codes as Cyclic Codes, Error detection with Cyclic codes, MDS Codes.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- J H Van Lint, Introduction To Coding Theory, Springer Verlag, Heidelberg,1998
- V. Pless, Introduction to the theory of Error Correcting Codes (3rd Ed.), Wiley Interscience, New York,1998
- V. Pless and W C Huffman, Fundamentals of Error Correcting Codes, Cambridge University Press, 2003.
- R. Hill, A first course in Coding Theory, Oxford University Press,1986.
- M. Y. Rhee, Error Correcting Coding Theory, McGraw Hill Inc.,1989

STOCHASTIC PROCESSES

Course Code: MTH4414 **Credit Units: 04**

Course Objectives:
To introduce the basic concepts of stochastic processes.

Course Contents:
Module-I: Poisson Process: Inter-arrival and waiting time distributions, conditional distributions of the ar- rival times, non-homogeneous Poisson process, compound Poisson random variables and Poisson processes, conditional Poisson processes.

Module-II: Markov Chains: Introduction and examples, Chapman-Kolmogorov equations and classification of states, limit theorems, transitions among classes, the Gamblers ruin problem, mean time in transient states, branching processes, applications of Markov chain, time reversible Markov chains, semi Markov processes.

Module-III: Continuous-Time Markov Chains: Introduction, continuous time Markov chains, birth and death processes, The Kolmogorov differential equations, limiting probabilities, time reversibility, applications of reversed chain to queueing theory.

Module-IV: Brownian Motion and other Markov Processes: Introduction, hitting time, maximum variable, Arc sine laws, variations on Brownian motion, Brownian motion with drift, backward and forward diffusion equations.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Ross, S. M., Stochastic Processes" Wiley India Pvt. Ltd., 2nd Ed.2008.
- Brzezniak, Z. and Zastawniak, T., Basic Stochastic Processes: A Course through Exercises", Springer,1992.
- Medhi, J., Stochastic Processes", New Age Science,2009.
- Resnick, S.I., Adventures in Stochastic Processes", Birkhauser,1999.
- Hoel, P.G. and Stone, C.J., \Introduction to Stochastic Processes", Waveland Press,1986

STATISTICAL INFERENCE

Course Code: MTH4415 **Credit Units: 04**

Course Objectives:
To introduce the concepts of statistical inference.

Course Contents:
Module-I: Point estimation. Characteristics of a good estimator: Unbiasedness, consistency, sufficiency and efficiency. Method of maximum likelihood and properties of maximum likelihood estimators (without proof). Method of minimum Chi-square. Method of Least squares and method of moments for estimation of parameters. Problems andexamples.

Module-II: Sufficient Statistics, Cramer-Rao inequality and its use in finding MVU estimators. Statistical Hypothesis (simple and composite). Testing of hypothesis. Type I and Type II errors, significance level, p-values, power of a test. Definitions of Most Powerful (MP), Uniformly Most Powerful (UMP)and Uniformly Most Powerful Unbiased (UMPU)tests.

Module-III: Neyman-Pearsons lemma and its applications for finding most powerful tests for simple hypothesis against simple alternative. Tests based on t, F and X^2distributions.

Module-IV: Likelihood ratio tests and their reduction to standard tests. Large sample tests. Interval estimation, Pivotal quantity and its use in finding confidence intervals, concept of best confidence intervals.

Examination Scheme:

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

References

- Hogg & Craig, Introduction to Mathematical Statistics", Pearson Education,2005.
- Miller, I. and Miller, M., Freunds Mathematical Statistics with Applications", Prentice Hall PTR, 7th edition,2006.
- Lehman, E.L., Testing of Statistical Hypothesis", Wiley Eastern Ltd,1959
- G. Casella, R. L. Berger, \Statistical Inference", Duxbury Press,2002.
- Rohatgi, V.K., Statistical Inference", Dover Publications,2011.

NUMERICAL SOLUTIONS TO ODE AND PDES

Course Code: MTH4416 **Credit Units: 04**

Course Objectives:
The course covers few classical and contemporary methods for solving initial and boundary value problems. Finite difference operators and their application to solve various types of PDEs shall be introduced in the course.

Course Contents:
Module-I: Iterative solvers for nonlinear equations and system of linear equations: Iterative method and Newton's method for system of nonlinear equations; Iterative methods to solve system of linear equations including Gauss-Seidel and Jacobi's method with pivoting; Concept of norms and condition number; Application of these methods for test problems using MATLAB codes.

Module-II: Initial value Problems Single-step methods: General definitions and Lipschitz condition, Derivations and stability analysis for Taylor series method, Euler's method and its variants, Runge-Kutta second order and fourth order methods; Implementation of these methods for various test problems using MATLAB.

Module-III: Initial value Problems Multi-step methods: General definitions and derivations of Adams Bashforth, Adams Moulton methods, Predictor-corrector method; stability analysis of these methods and application of these methods for some test problems using MATLAB.

Module-IV: Introduction to Finite difference methods General concepts of truncation error and stability for a finite difference scheme; Numerical solution of one-dimensional heat equation, including Explicit Euler, Backward Euler, Crank-Nicolson schemes with various type of boundary and initial conditions; Laplace Equations and Poisson's equations with different type of boundary and initial conditions.

Examination Scheme

Components	**A**	**CT**	**HA**	**EE**
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, Seminar, or Quiz, EE: End Semester Exam

Recommended Books:
- Numerical Methods in Engineering and Science by B. S. Grewal, Khanna Publishers,2014
- Numerical Methods for Scientific and Engineering Computation by Jain, Iyengar, Jain, New Age International Publishers, 1996
- Elements of Numerical Analysis by Radhey S Gupta, Macmillan India Ltd,2008.

MATERIALS SCIENCE & TECHNOLOGY

Programme Structure-2019

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
PHY2151	Fundamentals of Materials Science	3	-	-	3
PHY2251	Classification & Selection of Materials	3	-	-	3
PHY2351	Properties of Materials	3	-	-	3
PHY2451	Manufacturing Processes for Materials	3	-	-	3
PHY2551	Materials Testing & Characterization	3	-	-	3
PHY2651	Materials at Nanoscale	3	-	-	3
	TOTAL				**18**

MATERIALS SCIENCE & TECHNOLOGY

Syllabus - Semester First

FUNDAMENTALS OF MATERIALS SCIENCE

Course Code: PHY2151 **Credit Units: 03**

Course Objective:
The objective of this course is to introduce the students with the basics of the materials science and physical phenomenon.

Course Contents:

Module-I: Basics of Crystal Structure
Space lattice and unit cells, Crystal system, Symmetry operation, Structures of common metallic and ceramic materials, Packing fraction, coordination number, Crystallographic points, directions and planes, Linear and planar densities, Structure determination using X-ray diffraction and Braggs law, single crystal and polycrystalline materials, non-crystalline materials and glass transition temperature,

Module-II: Bonding in Solids and Imperfections
Forces between Atoms: Mechanism of Bond Formation and Bond Energy, Primary bonding in solids viz. ionic, covalent and metallic bonds, Secondary bonding, Perfect and imperfect crystal, Point defects in metals and ceramics, Frenkel and Schottky defects, Color centres, Dislocations: edge and screw dislocation, Interfacial defects, Volume defects,

Module-III: Diffusion and Alloy Systems
Diffusion and its types, Diffusion mechanisms, Diffusion Coefficient: Fick's Laws of Diffusion, Factors affecting diffusion, Applications of diffusion, Alloy systems, Solid solutions: Substitutional and Interstitial, The families of engineering alloys, Hume-Rothery's Rules, Intermediate solid solutions.

Module-IV: Phase diagrams and phase transformation
Phase, Phase equilibrium, Phase rule, Unary and binary phase diagrams, Interpretation of phase diagrams, Phase diagrams of some important metals and ceramics, microstructure changes during cooling, lever rule, invariant reactions, iron-iron carbide phase diagram. Phase transformation, Nucleation and growth of phases, Introduction to TTT curves, heat treatment processes

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance

Text and references:

- Fundamentals of Materials Science and Engineering by W Callister, John Willey and Sons
- Materials Science by S. L. Kakani, New Age International
- Materials Science and Engineering by Raghvan, PHI
- Ceramic Materials by C Barry Carter, Springer.
- Materials Science and Engineering by W F Smith, McGraw Hill

Syllabus - Semester Second

CLASSIFICATION & SELECTION OF MATERIALS

Course Code: PHY2251 **Credit Units: 03**

Course Objective:
The objective of the course is to introduce and familiarize the students with the different classes of engineering and advanced materials to the students.

Course Contents:

Module-I: Metals and Alloys
Metals, Alloys (ferrous and non-ferrous), types of steel, cast iron, High temperature steels, properties and applications.
Aluminum and its alloys- physical, chemical and mechanical properties, magnesium, titanium alloys - microstructural features, properties and applications.
Copper and its alloys: classification, physical, chemical and mechanical properties; lead, tin, zinc, silver, gold alloys - microstructural features - properties and applications.

Module-II: Ceramics and glasses
Ceramics: bonding, crystal structure and defects; structure of silicates; polymorphic transformations.
Non crystalline materials - structure, requirement for glass formation, Zachariasen rules, viscosity based transition points, devitrification; glass forming methods; Unary; binary and ternary systems.

Module-III: Composites and Polymers
Composites: Introduction, classification, bonding and failure criteria. Reinforcing materials, different processing methods, novel applications.
Polymers: Introduction, comparison with metals and ceramics - classification, Polymerization, molecular weight determination, Properties, processing and applications.

Module-IV: Advanced materials
Biomaterials: Introduction, need for biomaterials; Property requirements; Metallic, ceramic and polymeric implants, composites as biomaterials; applications.
Superalloys, Iron, nickel and cobalt based superalloys, Shape memory alloys, low temperature materials. Nano materials – Concept, scale /dimensional aspects, materials and coatings for wear resistance.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance

Text and references

- Avner, S. H., “Introduction to Physical Metallurgy”, second edition, McGraw Hill, 1985.
- Raghavan, V., “Physical Metallurgy”, Prentice Hall of India, 1985.
- Kingery W. D., Bowen, H. K., Uhlhmen D. R., ‘Introduction to Ceramics’, 2nd Edition, John Wiley, 1976.
- Chiang Y.M., Birnie D. P., Kingery W.D., Physical Ceramics: Principles for Ceramic Science and Engineering, John Wiley, 1997.
- Billmeyer F, ‘Textbook of Polymer Science’, Wiley Interscience, 1994
- Hench L. Larry, and Jones J., (Editors), Biomaterials, Artificial organs and Tissue Engineering, Woodhead Publishing Limited, 2005.

Syllabus - Semester Third

PROPERTIES OF MATERIALS

Course Code: PHY2351 **Credit Units: 03**

Course Objective:
The objective of the course is to study the properties of the materials to be used in the different applications and to introduce the students to the basics of the structure property correlation in the materials

Course Contents:

Module-I: Mechanical behavior
Concept of stress and strain, tensile strength, compressive strength, yield point phenomenon, Elastic behavior of materials,elastic modulus, Anelastic and Viscoelastic behaviour, strengthening mechanism, work hardening, solid solution hardening, precipitation hardening,hardness, Failure mechanisms: fracture, creep and fatigue.

Module-II: Electrical and dielectric properties
Electricity conductivity, density of states, Fermi energy, Band theory of solids, metals, Semiconductors, Insulators, Semiconductors: Intrinsic and Extrinsic semiconductors, Factors affecting carrier mobility, hall-effect, carrier concentration of semiconductors
Dielectric Behavior: Capacitance, Types of Polarization, Frequency Dependence of the Dielectric Constant, Dielectric Strength, Ferroelectricity, Piezoelectricity, pyro-electricity Applications

Module-III: Magnetic and Optical properties
Introduction, Dia, Para Ferro, Antiferro and Ferrimagnetic materials. Effect of temperature on magnetic behavior, Domains and hysteresis, Soft and Hard magnetic materials. Application.
Optical properties: Light Interactions with Solids, Atomic and Electronic, Interactions, Optical properties of nonmetals, Opacity and translucency in insulators, Luminescence, LEDs, lasers, Light propagation in optical fibers

Module-IV: Thermal Properties and corrosion resistance
Introduction, Heat capacity, thermal expansion, Materials of Importance: Invarand Other Low-Expansion Alloys, Thermal Conductivity, Thermal Stresses
Introduction, Corrosion rates, Passivity, Environmental effects, Cause and Types of corrosion, Corrosion of ceramics and polymers, Corrosion Prevention.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: attendance

Text and references:

- V. Raghavan, Introduction to Materials Science and Engineering; PHI, Delhi, 2005.
- L. H. Van Vlack, Elements of Material Science and Engineering; Thomas Press, India, 1998.
- W.F. Smith, Principles of Materials Science and Engineering: An Introduction; Tata Mc-Graw Hill, 2008.
- W. D. Callister, Materials science and engineering, An introduction, John Wiley and sons 2014.

Syllabus - Semester Fourth

MANUFACTURING PROCESSES FOR MATERIALS

Course Code: PHY2451 **Credit Units: 03**

Course Objective:
The different industrial processes used for the fabrication and preparation of the materials is introduced in this course.

Course Contents:

Module-I: Introduction to manufacturing processes
different approaches – technical and economic considerations – significance of material properties with respect to selection of manufacturing process

Module-II: Processing techniques
Conventional casting processes – advantages and limitations – melting practices – design of castings – special casting processes
Powder processing: pre-consolidation-shape forming processes; Fundamental Sintering mechanisms, various advanced sintering techniques.

Module-III: Fabrication of materials
Fabrication of materials by Rolling; forging; extrusion; drawing - sheet metal forming. Classification of rolling, extrusion, drawing, advantages and limitations of different fabrication processes.

Module-IV: Conventional material joining processes
Conventional material joining processes – concept of weldability – need for dissimilar joints- machining processes – concept of machinability – material examples – developments in machining processes

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance

Text and references

- Rao, P.N, 'Manufacturing Technology', Tata McGraw Hill, 1996.
- Kalpakjian, S, 'Manufacturing Engineering and Technology', 3rd Edition, Addison-Wesly,1995.
- Crawford R.J., "Plastics Engineering", Pergamon Press, 2nd Edition, 1987.
- M.N. Rahaman, Ceramic Processing and Sintering, 2nd ed.,, CRC press
- F.C. Campbell, Elements of Metallurgy and Engineering Alloys, ASM International, 2008
- J. Beddoes, M.J. Bibby, Principles of Metal Manufacturing Processes, Elsevier, 2003.

Syllabus - Semester Fifth

MATERIALS TESTING & CHARACTERIZATION

Course Code: PHY2551 **Credit Units: 03**

Course Objective:
The objective of the course is to introduce different materials testing and characterization techniques to the students.

Course Contents:

Module-I: Introduction and Spectroscopic methods
Introduction: Comparison of major techniques, Advantages and disadvantages; Spectroscopic methods: Atomic absorption spectrometry, Atomic fluorescence spectrometry, UV-Visible spectroscopy; Raman spectroscopy, Fourier transform infrared spectroscopy, XPS, UPS, Auger electron spectroscopy.

Module-II: X-ray techniques and Optical Microscopy
X-ray techniques: XRD, X-ray fluorescence spectroscopy, Wavelength dispersive spectroscopy (WDS);Energy dispersive spectroscopy (EDS),
Optical Microscopy: Image formation, Resolution, Aberrations, Imaging modes, Specimen preparation, Confocal microscopy

Module-III: Electron microscopy and Thermal analysis
Electron microscopy: Scanning electron microscopy; Transmission electron microscopy, Electron diffraction, Scanning tunneling microscope, Atomic force microscope
Thermal analysis: Thermo gravimetric analysis, Differential thermal analysis, Differential scanning calorimetry, Dynamic mechanical analysis, Thermo-mechanical analysis

Module-IV: Electrical, magnetic and non-destructive testing
Electrical and magnetic properties: Two probe and four probe methods for electrical characterization, Vibratingsample magnetometer (VSM),
Non-destructive testing:Radiography, Ultrasonic, Acoustic emission, Thermography, Holography, Basic principles, Applications in airframe and rock.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance.

Text and references:

- S. Zhang, Lin Li, A. Kumar, Materials Characterization Techniques, CRC press, 2008.
- Y. Leng, Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, John Wiley & Sons (Asia), 2008.
- D.A. Skoog, F.J. Holler, S. R. Crouch, Instrumental Analysis, Cengage Learning, 2007.
- W. Kemp, Organic Spectroscopy, 3rd ed., Pagrave, 2007.
- W. W. Wendlandt, Thermal Methods of Analysis, John Wiley, 1974.
- B. Raj, T. Jayakumar, M. Thavasimuthu, Practical Non-Destructive Testing, 2nd ed., Narosa Publishing House, 2002.

Syllabus - Semester Sixth

MATERIALS AT NANOSCALE

Course Code: PHY2651 **Credit Units: 03**

Course Objective:
The main objective of the course is familiarize the students to the exciting area of the nanotechnology and preparation, characterization of change in the materials properties at the nanoscale.

Course Contents:
Module-I: Introduction to Nano world:
Introduction to Nanostructures: Carbon Nanotubes (CNT), Graphenes, Fullerenes, Nano Peapods, Quantum Dots and Semiconductor Nanoparticles Metal-based Nanostructures (Iron Oxide Nanoparticles) Nanowires, Polymer based nanostructures including dendrimers, Introduction to metal based nanostructures, Protein-based Nanostructures: Nanomotors etc.

Module-II: Structure, properties and Bonding in Nanomaterials:
Chemical Bonds (types and strength)Intermolecular Forces Molecular and Crystalline Structures, Hierarchical Structures, Bulk to Surface transition, surface reconstruction, Mechanical, Electronic, Optical, Magnetic and Thermal properties.

Module-III: Synthesis & Methods of preparation of nanomaterials:
Bottom -up Synthesis, Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD Sputtering, Evaporation, Bio-inspired synthesis, Nanocomposite fabrication, Nanolithography, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE etc.

Module-IV: Applications
Nano-electronics, Nano optics, Nanoscale chemical-and bio-sensing Biological/biomedical applications, Photovoltaic, fuel cells, batteries and energy-related applications, High strength nanocomposites, Nanoenergetic materials

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Exam; A: Attendance

Text and references:

- B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath, James Murday, textbook of Nanoscience& Nanotechnology (Orient Blackswan Pvt. Ltd.)
- Chris Binns, Introduction to Nanoscience& Nanotechnology (Wiley).
- B.K. Parthasarathy, Nanoscience& Nanotechnology (Isha Books).
- Nanotechnology: Importance and Applications by M.H. Fulekar, IK International 2010.

PHARMACEUTICALS & COSMETIC SCIENCE

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (18)
CHY2351	Cosmetic Formulation	2	1	-	3
CHY2451	Industrial management & safety process	2	1	-	3
CHY2551	Drug Design	2	1	-	3
CHY2651	Application of Nanotechnology in Medicine	2	1	-	3
CHY2751	Intellectual Property Rights & Quality Assurance (THEORY)	2	1	-	3
CHY2851	Pharmaceutical & Cosmetic Sciences lab	-	-	6	3
	TOTAL				**18**

PHARMACEUTICALS & COSMETIC SCIENCE

Syllabus

COSMETIC FORMULATION

Course Code: CHY2351 **Credit Units: 03**

Course Objective:
This course is intended to provide a comprehensive survey of ingredients fundamental to the cosmetic industry. The course will emphasize current trends in the selection of cosmetic ingredients. The chemistry and technology of cosmetic raw materials will be related to their behavioral properties as utilized in the construction of stable functional systems. In this way, it is intended to generate a better understanding of the contributions of ingredients to the performance of finished product formulations. Emphasis will be placed on recognizing and dealing with problem areas associated with the use of various ingredients. Safety considerations and other pertinent matters which can influence ingredient selection will be included in these discussions.

Course Content:
Module I:
Classification of raw materials and raw materials used in the cosmetic industry for the manufacture of finished products. Method of sampling, Indian Standard specification laid down for sampling and testing of various cosmetics in finished form by the bureau of Indian standards. Factors affecting stability of a formulation, ICH guidelines, Methods of stabilizations and Methods of stability testing.Concept of development of stability indicating analytical methods.

Module II:
Determination of Physical and chemical constants such as extractive values, moisture content, alcohol content, volatile oil content, ash values, bitterness values, foreign matters, and physical constants applicable to the lipid containing drugs. Microbial counts, bioburden and Pharmacopoeial microbial assays.

Module III:
Brief introduction of the following cosmetic preparation and a detailed study on their quality control: Shampoo, Tooth paste, skin powder, skin creams, hair creams, nail polish, after shave lotion, bath and toiletries, lipstick and hair dyes, perfumes, depilatories.

Module IV:
Packaging of cosmetics –Filling of solids, semisolids & liquids. Materials used for cosmetic packaging Rules & regulations and legal provisions for packaging & labeling.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

1. Comprehensive Pharmacy Review 5th Edition by Leon Shargel, Alan H. Mutnick, Paul F. Souney, Larry N. Sawnson – 2004.
2. Applied Biopharmaceutics and Pharmacokinetics, 4th Edition by Leon Shargel / Andrew B.C., Yu – 1999.
3. A. H. Beckett and J. B. Stenlake Practical Pharmaceutical Chemistry, Part I and Part II, 4th Edition.
4. G. H. Jeffery, J. Basset, J. Mendham, R. C. Denny (Rev. by) Vogels Text Book of Quantitative Chemical Analysis, 5th Edition 1989, ELBS.
5. The Controller of Publications; New Delhi, Govt. of India, Indian Pharmacopoeia, Vol. I and Vol. II - 1996.
6. J. B. Wilkinson and R. J. Moore :Herry'sCosmeticology; Longman Scientific and Technical Publishers, Singapore.
7. P.D. Sethi; Quantitative Analysis of Drugs in Pharmaceutical Formulations, 3rd Edition - 1997,
8. ICH guideline for impurity determination and stability studies.
9. Practical HPLC method development by Lloyd R. Snyder, Joseph J. Kirkland, Joseph I. Glajch, John Wiley and Sons 2nd Edition – 1997.

INDUSTRIAL MANAGEMENT AND SAFETY PROCESSES

Course Code: CHY2451 **Credit Units: 03**

Course Objective:
The curriculum is developed to help the students understand the basic functions & responsibilities of a manager, provide him tools and techniques of managing different activities of the business concerned and to understand & interpret the provisions of some of the important provisions related to patent, trademark etc. It also aims at minimizing the chances of risks, injuries and accidents by implementing risk management techniques and safety management operations, monitoring the operating systems and bolstering the safety measures of an industry in general. With the rise of natural disasters in and around our world, the importance of the safety of human capital, protection of the environment and conservation of existing assets of an industry is increasing, leading to growing relevance of these skills.

Course Contents:
Module I:
Basic Concepts of Management Function of Management
Planning, Organizing, Directing, Control, Decision-making, Budgeting, Inventory Management (IM) & Quality Control (QC), Meaning & Importance of Inventory management, Inventory models, Cost consideration, Economic order quantity model.
Quality Management
Meaning & definition of Quality-Quality control systems-quality assurance-planning for quality- total quality management (TQM) philosophy-implementation of TQM in service and manufacturing industries-national & international standards.

Module II:
Manufacturing Management
Production planning & control, dynamics of material flow-inventory-bottlenecks and process variability, planning levels and time scales, forecasting-aggregate planning, synchronized manufacturing and theory of constraints-just in time production-shop floor performance monitoring.

Module III:
Safety in Chemical Process Industries
Safety in industries; need for development; importance safety consciousness in Indian chemical industry; safety programmes, elements of safety programme; effective realization, economic and social benefits.Industrial safety- Chemical process industries; potential hazard; chemical and physical job safety analysis; high presssure; high temperature operation; dangerous and toxic chemicals; highly radioactive materials; safe handling and operation of materials and machineries; planning and layout.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

1. William Handley, “Industrial Safety ", Hand Book McGraw-Hill Book Company 2nd Edition, 1969.
2. Fawatt, H.H. and Wood, W.S., “Safety and Accident Prevention in Chemical Operation", Interscience, 1965.
3. Heinrich, H.W. Dan Peterson, P.E. and Nester Rood, “Industrial Accident Prevention ", McGraw-Hill Book Co., 1980.
4. Blake, R.P., “Industrial Safety ", Prentice Hall Inc., New Jersy - III Edition, 1963.
5. Subbaram N.R. “Handbook of Indian Patent Law and Practice", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.
6. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
7. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].

DRUG DESIGN

Course Code: CHY2551 **Credit Units: 03**

Course Objective

The Principles of Drug Design course aims to provide students with an understanding of the process of drug discovery and development from the identification of novel drug targets to the introduction of new drugs into clinical practice. It covers the basic principles of how new drugs are discovered with emphasis on lead identification, lead optimization, classification and kinetics of molecules targeting enzymes and receptors, prodrug design and applications, as well as structure-based drug design methods. Recent advances in the use of computational and combinatorial chemistry in drug design will also be presented. The course is further enhanced with invited lectures on recent developments and applications of drug design principles in the pharmaceutical industry.

Course Content:

Module I:

Introduction- Definition of drug (WHO), classification of drugs, nomenclature of drugs, stereochemical aspects of drugs, definitions of terms commonly used in the chemistry of drugs, routes of drug administration and different dosage forms and applications

Module II:

Structure Activity Relationships in drug design-Structure based drug design, ligand based drug design. Some case studies e.g. development of penicillin and ciprofloxacin. Target selection and lead identification, Natural product sources, Fermentation / Microbial sources, Synthetic, Introduction to Pharmacogenomics. Methods of conformational search used in pharmacophore mapping; catalyst/HipHop, DiscoTech, GASP, etc. with practical examples, ADME databases

Module III:

Molecular Modeling- Energy minimization, geometry optimization, conformational analysis, Approaches and problems; Bioactive vs. global minimum conformations; Mechanism based Drug Design including SEX, MM, Molecular graphics.

Module IV:

QSAR-Electronic effects; Hammett equation, Lipophilicity effects; Hansch equation, Steric Effects; Taft Equation; Experimental and theoretical approaches for the determination of physico-chemical parameters, parameter inter-dependence; Regression analysis, extrapolation versus interpolation, linearity versus non-linearity of different examples Free Wilson Analysis; The importance of biological data in the correct form; 2D – QSAR; 3D-QSAR-examples CoMFA and CoMSIA (any one).

Module V:

Molecular docking and dynamics-Rigid docking, flexible docking, manual docking; Advantages and disadvantages of flex-X, flex-S, autodock and dock softwares with successful examples; Monte Carlo simulations and molecular dynamics in performing conformational search, docking etc. De novo drug design techniques.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

1. The Organic Chemistry of Drug Synthesis, Vol. 1,2,3,4 by Lednicer Daniel, 1st edition, John Wiley & Sons INC.
2. Exploring QSAR Vol; I Fundamentals and Applications in Chemistry and Biology by C Hansh and A Leo Vol. II: hydrophobic, Electronic and Steric Constants by C Hansh, A Leo and D Hockman ACS Book Catalog.
3. Foye' s Principles of Medicinal Chemistry by Foye, 6th edition, Lippincott William Wilkins.
4. Comprehensive Medicinal Chemistry by Hansh C, Vol IV, Elsevier Pergamon.
5. Quantitative Drug Design- A Critical Introduction by Martin YC, Marcel Dekker Inc. New York.
6. Medicinal Chemistry-A Biochemical Approach by Nogrady T, Oxford University Press New York, Oxford.
7. Computer Aided Drug Design, by Pops and Perruns, Academic Press, NY
8. Burger' s Medicinal Chemistry by Wolff ME, John Wiley & Sons, New York.
9. Introduction to Medicinal Chemistry' – How Drugs Act and Why by Alex Gringauz, Willey-VCH Publication 1997.
10. Drug Design by Bothara KG &Kulkarni VM, 3rd edition, NiraliPrakashan.
11. An Introduction to Drug Design by SN Pandeya& IR Dimmock, 1st edition, New Age International Publishers.
12. Structure based Drug Design by Veerapandian, 1st edition, Taylor & Francis New York, London.
13. GuarinoRechard A. – New Drug Approval Process, 3rd Edition, Marcel Decker.;2004
14. Deshpande S. W. – Drug & Magic Remedies Act, 1954.;2008
15. Ariens, Drug Design, Academic press, NY,1975.
16. Foye, Principals of Med. Chem.
17. Martin, Y., QSAR, 1978
18. Hansch, Principles of Med. Chem.
19. Kubiny's, QSAR
20. Holtje. Sippl.,Rognan and Folkers, Molecular Modeling.
21. P.K. Larsen, Tommy and U.Madsen, textbook of Drug Design and Discovery.

APPLICATION OF NANOTECHNOLOGY IN MEDICINE

Course Code: CHY2651 **Credit Units: 03**

Course Objective:
This course will focus on developing students' understanding of the fundamental properties, as well as synthesis and characterization of nanomaterials, coupled with their applications in nanomedicine. This course also provides a realistic approach and covers the basic concepts of chemistry, physics and biology in the behavior of molecules and molecular interaction. It also includes various experimental techniques used to characterize bio-nano systems, the nano scientific principle involved in the processing, fabrication and manipulation of nanostructures and nanoparticles .

Course Content:
Module I:
Introduction to nanomedicine-Overview of nanotechnology from medical perceptive, different types of nanobiomaterials and their biomedical applications, and cell nanostructure interactions, Synthesis, characterization, and properties of smart nanomaterials, Surface modification/bio functionalization of nanomaterials
Module II:
Nanocarriers (e.g. liposomes, polymer capsules, polymer nanoparticles, porous materials, nanogels, dendrimers, microemulsions, inorganic nanoparticles, carbon nanotubes, lipoproteins, solid lipid nanoparticles) for drug delivery applications, Stimuli-responsive smart nanomaterials, Nanomaterials in different imaging (e.g.fluorescence and MRI) applications

Module III:
BioMEMS, Lab-on-a-Chip, nano/microfluidics, biosensors, Regenerative medicine, including tissue engineering, cell and gene therapy, DNA-based nanostructures, Cellular nanomachines, Toxicology of nanomaterials

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

- Nano Medicines Edited by Dr.ParagDiwan and AshishBharadwaj, Pentagon press(2006) ISBN 81-8274-139-4.
- Christof M. Niemeyer, Chad A. Mirkin, Nanobiotechnology:Concepts, applications and perpectives, Wiley-Interscience 2004).
- Geoffery A. Ozin, Andre C. Arsenault, Nanochemistry: A chemical approach to nanomaterials, RSC publishing (2005)
- Challa Kumar, Biofunctionalization of nanomaterials, Wiley-Interscience (2006).

INTELLECTUAL PROPERTY RIGHTS AND QUALITY ASSURANCE

Course Code: CHY2751 **Credit Units: 03**

Course Objective:
This course will focus on intellectual property rights and patenting & Indian patent law for pharmaceutical industry.

Course Content:
Module I:
Requirements of GMP, cGMP, GLP, USFDA, WHO Guidelines and ISO 9000 Series, Drugs and Cosmetics Acts and rules, Drug Regulatory Affairs, Documentation- Protocols, Forms and Maintenance of records in Pharmaceutical industry, Preparation of documents for New Drug Approval and Export Registration, Processing and its application, Intellectual Property Rights (Patent, Copyright and Trademarks), Standard Operating Procedure (SOP) for different dosage forms.

Module II:
Concepts in Validation, Validation of manufacturing, Analytical and Process Validation and its Application, Basic concepts of Quality Control and Quality Assurance Systems, Source and Control of Quality Variation of Raw Materials: Containers, Closures, Personnel, Environmental, Etc., In-process quality tests, IPQC problems in Pharmaceutical industries. ICH Guidelines, Sampling Plans, Sampling and Characteristic Curves, Master Formula generation and Maintenance.

Module III:
Patenting, Indian patent law and pharmaceutical industry
Introduction of (IPR) Intellectual Property Rights, Patents, Design, Trademarks, Copyrights, Geographical Indications etc
Patent System: Definition of Patent, Criteria for obtaining patent (Novel, Non-obvious Applications) Filing and Processing of Patents: General procedure for securing patents in India. Case studies Opposition to Grant of Patent, Patent infringement: Silent features of Indian Patents Act 1970 with latest amendments with special reference to- Product & Process Patents, Provision of compulsory license, Exclusive Marketing Right, The Term of Patent, Patent offices in India; International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities -History - General Agreement on Trade and Tariff (GATT).
Case Studies on - Patents (Basmati rice, turmeric, neem, etc.) - Copyright and related rights - Trade Marks.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	10	7	8	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References:

1. Willing, S.H., “Good Manufacturing Practices for Pharmaceuticals” Marcel Dekker, Inc., New York
2. Drugs and Cosmetics Acts and rules
3. Patel, A.H., “Industrial Microbiology” Macmillon India Ltd., Delhi.
4. Nash, R.A. and Wachter A.H., “Pharmaceutical Process Validation” Marcel Dekker, Inc., New York
5. Bolton, S.H. “Pharmaceutical Statistics”
6. Banker, G.S. and Rhodes, C.T. “Modern Phaarmaceutics” Marcel Dekker, Inc., New York.
7. Careleton, F.J. and Agallow, J.P. “Validation of Aseptic Pharmaceutical Processes” Marcel Dekker, Inc.,
New York.
8. Garfeild “Quality Assurance Principles of Analytical Laboratories”
9. Latest Editions of I.P., U.S.P and B.P.
10. Bubharam N. R. - Whatever one should know about patents, 2nd Edition, Pharmabook Syndicate.
11. P. Narayan – Intellectual Property Law, Edition 3rd; Eastern Law House; 2001.

PHARMACEUTICAL & COSMETICS SCIENCES LAB

Course Code: CHY2851 **Credit Units: 03**

List of Experiments (Any 15 Experiments are to be performed)

Polymers

- Caprolactum from cyclcohexanone .
- Synthesis of Nylon-6,10
- Preparation of Polystyrene.
- Study the morphology of polymers through optical microscopy.
- Preparation of Epoxy resin using Bisphenol-A and Epichlorohydrin.
- Determination of molecular weight of high polymer using viscosity method.
- Determination of melt flow index of polymers and Compare their Melt Flow Characteristics

Dyes

- Preparation of Methyl Orange- An azodye.
- Preparation of Indigo

Food Industry

- Separation of artificial colorants in confectionary using TLC.
- Determination of protein content of wheat flour.

Cosmetic Products

- Shampoo
- Detergent
- Talc
- Lipstick
- Perfumes

Drugs Analysis

- Preparation of Paracetamol and Aspirin
- Analysis of Drugs:
  - Novalgin
  - Sulfa-drugs
  - Paracetamol

Examination Scheme:

Components	TA	LR	V	ATTD	EE
Weightage(%)	8	7	10	5	70

Note: TA-Teacher's Assessment, LR-Lab Record, V-Viva

Text & References:

- A Textbook of quantitative chemical analysis, VIth Edition Vogel, Pearson Education Limited.
- Practical Organic Chemistry, Mann and Saunders, IV Edition, ELBS and Longman Publication
- Comprehensive Experimental Chemistry, V. K. Ahluwalia, New Age Publication, Delhi
- Practical Manual of Organic Chemistry, R. K. Bansal
- A Textbook of quantitative inorganic analysis including elementary instrumental analysis, IVth Edition Vogel, ELBS and Longman Publication
- Advanced Practical Inorganic Chemistry, Gurdeep Raj, Goel Publishing House, Meerut

POLYMER TECHNOLOGY

Programme Structure-2019

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
PTE2151	Polymerization	2	-	2	3
PTE2251	Waste Plastic Recycling	3	-	-	3
PTE2351	Polymer Technology	3	-	-	3
PTE2451	Rubber & Tyre Technology	3	-	-	3
PTE2551	Polymeric Nano Composites	2	-	2	3
PTE2651	Bio-Medical Plastics	3	-	-	3
	TOTAL				**18**

POLYMER TECHNOLOGY

OBJECTIVES OF PROGRAM

The term polymer refers to two different classes of materials – Plastic and Rubber. Polymer engineering uses the theory and knowledge of chemistry in order to handle production and use of polymers. The primary aim of this program is to train students to fulfill the constantly growing requirements of the polymer- based industry. The course provides an in-depth understanding of traditional commodities, such as plastics and specialty polymers, which have wide applications in the biomedical research and pharmaceutical fields. In India, the demand for polymer engineers has increased. After successful completion of the course, one can take up a career in sectors such as automotive, aerospace, packaging, power transmission, and other related manufacturing sectors. Industries based on manufacturing, processing and design of generic polymer (plastics, rubber, composites) also employ such students.

POLYMER TECHNOLOGY

Syllabus - Semester First

POLYMERIZATION

Course Code: PTE2151 **Credit Units: 03**

Course Objective:
This course provide principles, mechanism and techniques of polymerization. They will also learn about kinetic of polymerization and copolymerization.

Course Contents:

Module-I: General Characteristics of Chain Growth Polymerization, Alkene Polymerization by Free radical, anionic and cationic initiators. Kinetics of Vinyl radical polymerization

Module-II: General Characteristics of Step Growth Polymerization. Chemistry of Step Growth. Polymerization, Kinetics and Statistics of Linear Stepwise Polymerization, Absolute reaction rates.

Module-III: Chemistry of Non-radical chain Polymerization, Anionic and Cationic Polymerization Co-ordination Polymerization, Ring Opening Polymerization

Module-IV: Copolymers, Types of copolymers,copolymerization, Kinetics of Copolymerization, Block and Graft Copolymerization, Cyclopolymerization.

Module-V: Polymerizations in homogenous &heterogenous systems, Diene and divinyl Polymerization Bulk, suspension, solution and emulsion polymerization

Examination Scheme:

	IA				EE	
Components	**CT**	**Assignment**	**LR**	**Attendance**	**Theory**	**Practical**
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Record.

Suggested Readings:

- Textbook of Polymer Science, F. W. Billmeyer, John Wiley & Sons
- Polymer Science & Technology, J. R. Fried, Prentice Hall
- Polymer Science, V. R. Gowariker, New Age International
- Polymer Science & Technology, P. Ghosh, Tata McGrawHill
- Principles of Polymerization, Odian, Wiley India

Syllabus - Semester Second

WASTE PLASTIC RECYCLING

Course Code: PTE2251 **Credit Units: 03**

Course Objective:
This course is beneficial to deal with different types of plastics waste, identification of plastics, segregation of plastic wastes, different types of recycling techniques, recycling of commingled plastic waste as well as various rules and regulation regarding plastic manufacturing, disposal and recycling.

Course Contents:

Module I: Introduction, Thermoplastics & thermo sets, Terminology used in recycling, coding & labeling of plastic products for sorting and identification.

Module-II: Organizations involved in plastic recycling. Types of recycling- Primary recycling, secondary recycling, tertiary recycling and quaternary recycling, recycling of mixed waste, recycling of nonwoven sacks

Module-III: Residential recycling: collection containers, education and production, recovery of resins, collection vehicles, role of material recovery facilities (MRF), role of MRF.

Module-IV: Plastic separation, working MRF,case studies, collection and separation systems.

Module-V: Recycling of PET, polyelelfines, polystyrene, Polyvinyl chloride, Engineering Thermoplastics, Acrylics, Thermo sets.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Suggested Readings:

- Plastics Recycling; Ehrig, Hanser.
- Rubber Recycling: De, IsayevKhait, CRC Press.
- Feedstock Recycling & Pyrolysis of waste plastics, Scheirs&Kaminskey,, Wiley Interscience,
- Handbook of Plastic Technology, Vol, 2, Allen &Beker, CBS Publishers.
- Plastic Fabrication & Recycling, Chanda& Roy, CRC Press,

Syllabus - Semester Third

POLYMER TECHNOLOGY

Course Code: PTE2351 **Credit Units: 03**

Course Objective:
In this course students will learn about preparation, properties and applications of different types of plastics, especially thermoplastics and thermosetting plastics.

Course Contents:

Module-I: Preparation, properties and applications ofPolyolefins- Polyethylene, Polypropylene, Polyisobutylene, Vinyl Polymers: Polystyrene, Polyvinylchloride, Polyvinylacetate, Poly(methylmethacrylate), Polyacrylonitrile, Poly(acrylic acid)

Module-II: Preparation, properties and applications ofDiene Polymers- Polybutadiene, Styrene-Butadiene Rubber, Nitrile Rubber, Polyisoprene, Polychloroprene.

Module-III: Preparation, properties and applications ofPolyesters -Poly(ethylene terephthalate), Polycarbonates, Polyester resins.

Module-IV: Preparation, properties and applications ofPolyamides- Nylons, Polyimides, Polyurethanes, Raw Materials, PU elastomers, PU Foams, PU coatings, adhesives and sealants.

Module-V: Preparation, properties and applications ofEpoxy Polymers - Types of epoxies, Taffy Process, Hardness,Phenolics - Novolacs& Resoles.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Readings:

- Polymer Synthesis: Theory & Practice, Braun, Springer International
- An Introduction to Plastics, Elias, Wiley Interscience
- Principles of Polymerization, G. Odion, Wiley Interscience
- Synthetic Polymers, Feldman &Barbalate, Chapman & Hall
- Synthesis of Polymers, D. Schluter, Wiley VCH

Syllabus - Semester Fourth

RUBBER & TYRE TECHNOLOGY

Course Code: PTE2451 **Credit Units: 03**

Course Objective:
At the end of the course students should be able to understand different types of rubbers, different additives used in rubber industries, compounding of rubber, manufacturing of tyres and design of tyres

Course Contents:

Module-I: Rubber Technology: Introduction, natural and synthetic rubbers, filler systems, stabilizer systems, vulcanization system, compounding ingredients, environmental requirements in 4 compounding.

Module-II: Manufacture of nitrilerubber ,chleroprene rubber, diene rubber, SBR rubbers.

Module-III: Tyre Technology- Introduction, development of tyres, classification and types of tyres, tyre components, pneumatic tyres**.**

Module-IV: Tyre& tread design, tread pattern, carcass design, bead design, Unit V: Tyre testing techniques, tubeless tyres, colouredtyres.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Suggested Readings:

- Handbook of Plastics Testing & Failure Analysis, Vishu Shah, Wiley Interscience
- Polymer Testing & Evaluation of Plastics, Mathur&Bhardwaj, Allied Publishers
- Encyclopedia of Polymer Science & Technology, Herman F. Mark, Wiley Interscience
- Fatigue, Testing & Analysis, Lee, Elsevier
- Introduction to Plastics & Composites, E. Miller, Marcel Dekker

Syllabus - Semester Fifth

POLYMERIC NANO COMPOSITES

Course Code: PTE2551 **Credit Units: 03**

Course Objective:
This module deals with introduction, classification, preparation, properties, characterization and applications of polymer nanocomposites.

Course Contents:

Module-I: PREPARATION OF SYNTHESIS: Polymer Nanocomposites, Nanocomposites Preparation and Synthesis, Polymer Matrices: Thermoplastics, Thermosets, Elastomers, Natural and Biodegradable Polymers

Module-II: RHEOLOGY OF NANOCOMPOSITES : Rheology of Multiphase Systems, Rheology of Polymer / clay nanocomposite, Recent studies on Rheology, Measure Techniques, Steady shear Rheology, Dynamic Rheology, Non Linear Viscoelastic properties, Extensional Rheology, Rheological modeling of Nanocomposites.

Module-III: PROCESSING OF NANOCOMPOSITES : Extrusion, Injection Moulding, Blow Moulding, Foaming, Rotational Moulding

Module-IV: STRUCTURE AND PROPERTIES CHARACTERIZATION: Scattering Techniques, Microscopic Techniques, Spectroscopic Techniques, Spectroscopic Techniques, Chromatography, Solid-state characterization: Mechanical Testing, Thermal Characterization

Module-V: APPLICATION OF POLYMER NANOCOMPOSITES: Different applications of Thermoplastics, Thermosets, Biodegradable Polymersnanocomposites.

Examination Scheme:

	IA				EE	
Components	**CT**	**Assignment**	**LR**	**Attendance**	**Theory**	**Practical**
Weightage (%)	10	5	10	5	40	30

Note: IA –Internal Assessment, EE- External Exam, CT- Class Test, LR – Lab Record.

Suggested Readings:

- Luigi Nicolis& Gianfranco Carotenuto “Metal -Polymers Nanocompsites” A John Wiley & Sons, Inc Publication 2005
- Y.C. Ke& P. Stroeve“ Polymer-Layered Silicate and Silica Nanocomposites- Elsevier, 2005 3. L.A. Utracki“ Clay-Containing Polymeric Nanocomposites” Rapra Technology Limited, 2004

Syllabus - Semester Sixth

BIO-MEDICAL PLASTICS

Course Code: PTE2651 **Credit Units: 03**

Course Objective:
In this module student will learn about introduction, properties, processing and applications of different polymeric materials used in biomedical and tissue engineering.

Course Contents:

Module-I:
Synthetic and Natural biomaterials used in Biomedical applications
i) Polyolefin's, Polyamides, Acrylic Polymers, Fluorocarbons, Polyesters, Engg. Plastics.
ii) Collagen, Polysaccharides, Proteins etc.

Module-II:
Human applications of Plastics : Cardiovascular iMTPLants, Dental IMTPLants, Role ofplastics in Ophthalmology, Hydro gels, Drug Delivery Systems, Sutures, Burn Dressings andArtificial Skin. Hernia Mesh, adhesives and Sealants, Artificial organs and devices, Blood bags,Condoms etc.

Module-III:
Blood – polymer interactions and blood compatibility, Chemical and biochemical degradation of polymers, Tissue engineering and polymers.

Module-IV:
Testing and evaluation: in-vitro-/vivo; Standards in product development and regulations; Ethical and sociological issues.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Suggested Readings:

- Buddy D. Ratner, Allan S. Hoffman, Fredrick J.Schoen and Jack E. Lemons (eds),"Biomaterials Science – An Introduction to Materials in Medicine", Academic Press, SanDiego (1996).
- Joon B. Park and Roderic S. Lakes, "Biomaterials : An Introduction". 2 edition, Plenum Press, New York (1992).
- Sujata V. Bhat, "Biomaterials", Narosa Publishing House, New Delhi, (2002).

Amity School of Liberal Arts & FL

Bachelor of Arts French (Honors)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Arts French (Honors)

Syllabus – First Semester

Compétences Langagières à l'écrit - I – Written expression - I

Course Code: FRE2101 **Course Credits: 04**

Course Objective:
To furnish the linguistic tools

- to present oneself and others, to ask and give personal information
- to give directions, to describe one's surrounding
- to talk about likes and dislikes, hobbies
- to tell time and date, to talk about daily routine
- to describe weather
- to take about events in past, to talk about one's experiences

Course Contents:

Unité 1 : Parlez-vous français ?
Actes de Communication :
Saluer, se présenter, communiquer en classe, épeler, différencier le tutoiement du vouvoiement, consulter le dictionnaire, appliquer des stratégies de lecture.
Unité 2 : Elle s'appelle Laura
Actes de Communication :
Se présenter ou présenter quelqu'un, demander et donner des renseignements personnels, exprimer des objectifs, compter, se renseigner sur la nationalité.
Unité 3 : Mon quartier est un monde
Actes de Communication :
Localiser, décrire et qualifier une ville ou un quartier, exprimer la quantité.
Unité 4 : Tes amis sont mes amis
Actes de Communication :
Parler de ses gouts, de ses intérêts et de ses loisirs, parler de la première impression produite [par quelqu'un et de son caractère, parler de son entourage.

Unité 5 : Jour après jour
Actes de Communication :
Parler de nos habitudes, exprimer l'heure, informer sur l'heure, le moment, la fréquence ; parler de séquences d'actions.
Unité 6 : On fait les boutiques
Actes de Communication :
S'informer sur un produit, acheter et vendre un produit, donner son avis sur la façon de s'habiller, parler du temps qu'il fait.
Unité 7 : Et comme dessert ?
Actes de Communication :
Donner et demander des informations sur des plats et des aliments, commander et prendre la commande dans un restaurent, exprimer la quantité, situer une action dans le futur.

Unité 8 : Je sais bricoler
Actes de Communication :
Parler de faits passés, parler de nos expériences et de ce que nous savons faire.
Grammaire :
1. Le genre des noms
2. Les articles indéfinis, définis, partitifs
3. Les verbes – être, avoir, aller, faire, vivre, sortir, prendre, en –er au présent, les verbes pronominaux
4. Les adjectifs possessifs, qualificatifs, interrogatifs, démonstratifs
5. L'interrogation, Les quantificatifs
6. Les prépositions de lieu, La négation
7. Les adjectifs de nationalité et de couleur – le nombre et le genre
8. Les pronoms COD
9. Le futur proche : aller + infinitif
10. Le passé compose et les marqueurs temporels du passé

Examination Scheme:

Components	**CT**	**Home Assign**	**Att.**	**EE**
Weightage (%)	20	5	5	70

Text & References:
Text:
Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 1 (A1) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 1 (A1) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A1. Paris: Didier, 2010.

Compétences Langagières à l'Oral I - Oral expression I

Course Code: FRE2102 **Course Credits: 04**

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and "registre de langage"
- To overcome the fear of speaking a foreign language and take position as a foreigner speaking French

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 1 (A1) Livre de l'élève. Paris: Maison des Langues, 2009.
- Corbeau, Sophie., et al.hôtellerie-restauration.com. Paris: CLE International, 2006. Print.

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Texts& References:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 1 (A1) Livre de l'élève. Paris: Maison des Langues, 2009.Print.
- Corbeau, Sophie., et al.hôtellerie-restauration.com. Paris: CLE International, 2006. Print.

Practical Phonetics – I

Course Code: FRE2104 **Credit Units: 02**

Course Objective:

- To introduce the students to the sounds found in French language.
- To make them able to combine those sounds and pronounce them.
- To introduce and perfect them to the use of liaison in French language.

Module 1

- Les sons isolés du système phonique: Les voyelles, les Consonnes, les semi-consonnes.
- Les sons dans la chaîne parlée: facteurs d'accents linguistiques et phonétiques
- Les lettres non prononcées, les sons spécifiques du français
- La chaîne des mots et la continuité

Module 2

- Le rythme
    - Plusieurs mots ou un seul mot
    - Les groupes rythmiques
    - La dernière syllabe du groupe et plus longue
    - Les syllables des groupes sont régulières
    - Les syllabes sont toutes régulières
    - Plusieurs groupes rythmiques
    - Synthèse rythmique

- La musique et l'intonation
    - La montée de la voix dans la question
    - La descente de la voix à la fin des phrases
    - La montée de la voix quand la phrase n'est pas finie
    - Synthèse rythmique et mélodique

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:

Les livres à consulter:

Charliac, Lucile et al., *Phonétique Progressive du Français* – niveau débutant, Clé Internationale, Paris, 2003.

Life in France and Francophone Studies – I

Course Code: FRE2105 **Credit Units: 02**

Course Objective:

- To familiarise the students with the essentials of life, culture and civilisation of France.
- To introduce them to the history, political system, education system and social structure of France.
- To acquaint the students with the gastronomy, monuments, sports, cinema and music of France.

Course Contents:

Module 1

Part 1: History and Geography of France
Part 2: Political and Education System of France
Part 3: Social Life of France
Part 4: Dimensions of India – France relations

Module 2

Part 1: The Gastronomy of France
Part 2: The major monuments of France & Symbols of France
Part 3: The sports in France
Part 4: Cinema, Television, Radio and Music in France

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:

Les livres à consulter:

Mathiex Jean, *Histoire de France*, Gallimard, Paris, 1996.
Labrune Gérard, *La géographie de la France*, Nathan, Paris, 1997.
Mény Yves, *Le système politique français*, Montchrestien, Paris, 2008 (6th ed.)
Toulemonde Bernard, *Le système éducatif en France*, La Documentation Française, Paris, 2003.
Pasqua Charles et al., *Demain La France, tome 1: La priorité sociale*, Demain la France, Paris, 1992.
Nignon Edouard, *Éloges de la cuisine française*, Menu Fretin, Paris, 2014.
Le grand livre de la gastronomie française: Encylopédie par regions, Christine Bonneton.
Commission des monuments historiques, *Les Monuments historiques de la France: Bulletin des diverses sections de la Commission des monuments historiques et de la Commission supérieure des monuments naturels et des sites*, 1936.
Pastoureau Michel, *Les emblèmes de la France*, Christine Bonneton, Paris, 1997.
Rocquin Baudry, *Le sport en France: Histoire, économie, sociologie*, Breal, Paris, 2017.
Douin Jean-Luc et Thierry Fremaux, *Le cinéma français*, La Martinière, Paris, 2014.

Syllabus-Second Semester

Compétences Langagières à l'écrit - II – Written expression - II

Course Code: FRE2201 **Course Credits: 05**

Course Objective:
To furnish the linguistic tools

- to express one's point of view, difficulties, emotions, motivation, preferences etc.
- to describe lodgings, objects
- to talk about or narrate events in past and future,
- to talk about health, express pain and symptoms
- to ask and to give advices, to give instructions
- to compare objects and people, to describe daily activities

Course Contents:

Unité 1 : J'adore le français !
Actes de Communication :
Parler de sa relation avec les langues, exprimer son point de vue (1), exprimer des difficultés et des émotions, parler de faits passés, exprimer une motivation
Unité 2 : Faites comme chez vous !
Actes de Communication :
Décrire un logement et des objets, localiser, faire des comparaisons, exprimer des préférences, nommez ses activités quotidiennes
Unité 3 : Bien dans sa peau
Actes de Communication :
Parler de sa sante, décrire des douleurs et des symptômes, demander et donner des conseils, donner des instructions, exprimer son point de vue (2)
Unité 4 : En ce temps–là…
Actes de Communication :
Situer dans le passé, décrire des situations du passé et du présent

Unité 5 : L'histoire, les histoires
Actes de Communication :
Poser des questions sur un parcours de vie, décrire et rapporter des faits et des situations du passé, raconter des anecdotes, situer des événements dans le passé, demander des informations
Unité 6 : Qui vivra verra
Actes de Communication :

Faire des prévisions, parler de l'avenir, parler de condition et de conséquences, exprimer différent degrés de certitude, parler du temps.

Grammaire :

1. le passé composé et l'imparfait
2. les prépositions de lieu
3. Les pronoms **COD**, **y**, relatifs **(qui, que, ou),** le pronom personnel **on**
4. la comparaison de l'adjectif et de l'adverbe (plus, moins, aussi, autant que…)
5. L'impératif, la forme et la place des pronoms réfléchis à l'impératif
6. Le futur proche et les marqueurs temporels du futur
7. Les adjectifs et les pronoms indéfinis
8. Les adjectifs qualificatifs et leur place
9. La subordonnée temporelle avec **quand**
10. Devoir (au conditionnel), Etre en train de + infinitif

Examination Scheme:

Components	**CT**	**Home Assign**	**Att.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A2. Paris: Didier, 2010.

Compétences Langagières à l'Oral II - Oral expression II

Course Code: FRE2202 **Course Credits: 05**

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and "registre de langage"
- To overcome the fear of speaking a foreign language and take position as a foreigner speaking French

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Livre de l'élève.Paris: Maison des Langues, 2009.
- Corbeau, Sophie., et al.tourisme.com. Paris: CLE International, 2004. Print

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Livre de l'élève.Paris: Maison des Langues, 2009.Print.
- Corbeau, Sophie., et al.tourisme.com. Paris: CLE International, 2004. Print

Practical Phonetics – II

Course Code: FRE2204 **Credit Units: 02**

Course Objective:

- To introduce the students to principle difficulties of French pronunciation and aide them to overcome them.
- To introduce them to the various aspects of accents and proper pronunciation.
- To make the students capable in using different styles of pronunciation.

Module 1

- La tension
- La sonorité
- La labialité
- L'acuité
- Les autres difficulté

Module 2

- Les syllable du mot
  - L'égalité syllabique
  - La syllabe accentuée dans le mot
  - La désaccentuation
- La continuité
  - L'enchaînement vocalique
  - l'enchaînement consonantique
  - La liaison
- La phrase et l'intonation
- Les styles

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:

Les livres à consulter:

Charliac, Lucile et al., *Phonétique Progressive du Français* – niveau débutant, Clé Internationale, Paris, 2003.

Charliac, Lucile et Annie-Claude Motron, *Phonétique Progressive du Français* – niveau intermédiare, Clé Internationale, Paris, 1998.

Life in France and Francophone Studies – II

Course Code: FRE2205 **Credit Units: 02**

Course Objective:

- To familiarise the students with the essentials of life, culture and civilisation of France.
- To introduce them to the history, political system, education system and social structure of France.
- To acquaint the students with the gastronomy, monuments, sports, cinema and music of France.

Course Contents:

Module 1

Part 1: Introduction to *Colonisation* and *Enlightenment*.

Part 2: History of the Francophone World

- Colonial expansion of France: Phase I
- Colonial expansion of France: Phase II
- Movements against French Colonisation
- Disintegration of the Colonial Empire
- Impact of the French Colonisation

Part 3: Introduction to the 'International Organisation of Francophonie' (OIF).

Part 4: The Languages in the Francophone world.

- The varieties of French language
- The other languages of the francophone world

Module 2

Part 1: Francophone authors and Literatures

- Major Francophone authors
- Major characterstics of the Francophone Literature
- Orality in Francophone literature
- Study of the abstracts from some Francophone novels

Part 2: Ethnic communities of the Francophone World

- What is Ethnicity?
- Ethnicity in Africa and major ethnic groups of Africa.
- Inter-ethnic relations and its impact on the social and political life of the continent.

Part 3: Current issues of the Francophone world (**to be updated from time to time**)

- Boko Haram
- Mali Conflict
- Algeria
- Libya conflict
- Central African Republic issue
- South sudan crisis
- DRC conflict
- Somalia civil war

Part 4: Francophone cinema

- African cinema

- Acadien cinema
- Canadian cinema
- Suisse cinema

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:

Les ressources à consulter:

Alexandre P, Francophonie: the French and Africa. J. Contemporary History, 1969, 4(1):117-25

Beauclair Michelle, *The Francophone World: Cultural Issues and Perspectives*, Peter Lang, Bern, 2007.

Bujra Abdalla, *African Conflicts: Their causes and their political and social environment*, Development Policy Management Forum, Addis Ababa, 2002.

Crettien Charles, *France's relations with her former colonies*, Proceedings of the Meeting of the French Colonial Historical Society, Vol. 8 (1985), pp.1-8

Deniau X, *La Francophonie*, Presses Universitaires de France, Paris, 1983.

Holm John, *An introduction to pidgins and creoles*, Cambridge University Press, Cambridge, 2004.

Kirk-Greene, Anthony & Daniel Bach. (eds.), *State and society in Francophone Africa since independence*, Palgrave macmillan, 1995, UK.

Yacono, Xavier, *Histoire de la colonisation française*, Presses Universitaires de France, Paris, 1988 (4th ed.).

Syllabus- Third Semester

Compétences Langagières à l'écrit - III – Written expression - III

Course Code: FRE2301 **Course Credits: 04**

Course Objective:
To furnish the linguistic tools

- to ask for a service, authorization.
- to ask questions in a given situation
- to talk about or narrate events in past
- to talk about one's relation with a language
- to describe someone, a journey, sentiments
- to accept or to refuse a proposal
- to give one's opinion, to carry out a debate or an interaction

Course Contents:

Unité 7 : Je vous en prie !
Actes de Communication :
Demander un service, demander l'autorisation, refuser et accepter, se justifier
Unité 8 : Apprendre en jouant !
Actes de Communication :
Poser des questions en fonction de la situation de communication, situer des actions dans le temps, décrire et raconter dans le passe, situer géographiquement, exprimer différents degrés de certitude
Unité 1 : Dis-moi ce que tu as fait, je te dirai qui tu es
Actes de Communication :
Raconter des expériences passes, Exprimer la cause, parler de sa relation avec les langues, faire une description détaillée, parler de ses motivations, justifier un choix
Unité 2 : Les voyages formes la jeunesse
Actes de Communication :
Préciser les détails d'un voyage, faire des propositions, donner son opinion, faire des hypothèses, situer dans l'espace
Unité 3 : La voix est le miroir de l'âme
Actes de Communication :
Décrire le caractère d'un personnage, décrire ses sentiments, parler de ses espoirs et de ses projets, évoquer ses regrets, donner et suivre des indications scéniques
Unité 4 : On n'arrête pas le progrès ?
Actes de Communication :
Exprimer des opinions, défendre des idées, réaliser un débat d'idées, débattre et décider de la seconde vie d'un objet, gérer des interactions
Grammaire :
1. L'opposition – passe compose et imparfait, plus-que-parfait

2. L'accord du participe passe avec avoir
3. Les pronoms COD
4. Le système de l'hypothétique, le conditionnel
5. Les prépositions et articles pour localiser (régions)
6. Les articulateurs temporels et logiques
7. Le subjonctif et les verbes d'opinion

Examination Scheme:

Components	**CT**	**Home Assign**	**Att.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B 1) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Cahier d'exercices. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A2. Paris: Didier, 2010.

Girardeau, Bruno et Nelly Mous. Réussir le DELF B1. Paris: Didier, 2010.

Compétences Langagières à l'Oral III - Oral expression III

Course Code: FRE2302 **Course Credits: 04**

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and "registre de langage"
- To master the current social communication skills in oral
- To enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 2 (A2) Livre de l'élève. Paris: Maison des Langues, 2009.
- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1) Livre de l'élève. Paris: Maison des Langues, 2009.

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri,Version Originale 2 (A2) Livre de l'élève. Paris: Maison des Langues, 2009.Print.
- 2. M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri,Version Originale 3 (B1) Livre de l'élève. Paris: Maison des Langues, 2009.Print.

Understanding French Texts – I

Course Code: FRE2304 **Credit Units: 06**

Course Objective:

- To enhance students' linguistic skills through the study of written discourse.
- To understand the structure and content of texts written in French, such as magazine and newspaper articles, reports, press releases and literary texts.
- To express ideas and opinions in French in relation to the individual, family and daily life, society, environment and current affairs.

Course Contents:

Module 1
La Famille : L'individu, la famille et la vie journalière
Structure and function of the family: relationships; patterns of daily life and living conditions; young people and their values; health and fitness, healthy living choices, aspects of cultural life, for example, music and dance: importance and influence on individuals and society.
Module 2
La société et les affaires sociales
Gender roles in society; employment and unemployment: causes and consequences; role of the media; Religion in multicultural societies; education: education system and the role of education in the development of society; crime and violence, for example, crime against individuals and existing laws for the related issues.

Module 3
L'environnement

Destruction of the environment and its challenges: pollution; deforestation; climate change. Conservation of the environment and its benefits: recycling; reforestation; nature reserves including protection of endangered species.

Module 4
L'actualité
Current issues: social and political unrest: causes and consequences; political alliances: objective and composition of the alliances, government policies.

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:
Les livres à consulter:
Lhote, G. et al. Parlez-moi: Le français au quotidien, Paris: Nathan, 1998.

Lien, B. and Raud, M.	Thèmes et Textes. Topics and text studies for advanced French, London: John Murray, 1998.
Maun, I. and Rodrigues, I.	Bien lire, bien écrire, Sandy, Beds. : Advance Materials, 2001.
Maruani, M	Travail et emploi des femmes, Paris: Editions La Découverte (Coll Repère) 2006.
McLachlan, A.	Zénith, Oxford: Heinemann Educational, 2000.
Monnerie-Goarin, A. et al	Champion (nouvelle édition), Paris: CLE International, 2001.
Murillo, J. et al.	Forum, Paris, Hachette FLE, 2000 – 2003.
Neather, T. et al.	Prévisions/Réalisations, Cheltenham: Nelson Thornes, 1998.
Noël, M. F. and Davies, V.	Communiquez, London: Hodder and Stoughton, 1999.
Open University	Francothèque: A Resource for French Studies, London: Hodder and Stoughton, 1997.
Paris, D and Foltete-Paris B	Environnement.com, Paris: Clé International 2009.

Les sites web à consulter:

www.advmaterials.demon.co.uk
www.champs-elysees.com
www.cilt.org.uk
www.cndp.fr
www.esb.co.uk
www.fdlm.org
www.fle.fr
www.french.about.com
www.frenchteachers.org
www.grantandcutler.com
www.quia.com/pages/babelspeak/html
www.rf.fr
www.sitesforteachers.com
http://www.tv5.org/TV5Site/enseigner-apprendre-francais/accueil_enseigner.php
www.voila.fr
www.yahoo.fr

Introduction to French and Francophone Civilization & Culture-I

Course Code: FRE2305 **Credit Units: 04**

Course Objective:

- To familiarise the students with the essentials of culture and civilisation of France and francophone countries.
- To introduce them to the history, political system, historical movements and social structure of France.
- To acquaint the students with the gastronomy, monuments, sports, cinema and music of France and francophone countries.

Course Contents:

Module 1: De la préhistoire au Moyen Age

Part 1: La préhistoire de la France: Les grottes de Lascaux
Part 2: La période barbare et l'empire romain
Part 3: La société dans le Moyen Age, la guerre de Cent Ans
Part 4: Le Moyen Age: la croisade et la guerre de religion
Part 5: Les personnes clés: Vercingétorix, Charlemagne, Jeanne d'Arc, Henri IV

Module 2: La Renaissance

Part 1: Les causes de la renaissance
Part 2:Développement dans la science et la littérature
Part 3: Les changements dans la société
Part 4: Le règne de Louis XIV

Module 3: La Révolution Française

Part 1: les circonstances politiques et sociales vers 1789
Part 2: La Révolution Française: les évènements et la fondation de la constitution
Part 3: Les causes de la Révolution: climat, société, politique et âge des Lumières
Part 4: Le règne de Napoléon
Part 5: Les personnes clés: Napoléon, Victor Hugo, Voltaire, Montesquieu, Rousseau, Diderot

Module 4: De la monarchie a la République

Part 1: La monarchie constitutionnelle et La IIe République
Part 2: La IIIe République 1870-1940
Part 3: L'expansion coloniale
Part 4: Les guerres mondiales
Part 5: Les personnes clés: Jules Verne, Jules Ferry, Dreyfus, Philippe Pétain, General Charles de Gaulle

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:
Les livres à consulter:

Mathiex Jean, *Histoire de France*, Gallimard, Paris, 1996.
Mény Yves, *Le système politique français*, Montchrestien, Paris, 2008 (6th ed.)
Pasqua Charles et al., *Demain La France, tome 1: La priorité sociale*, Demain la France, Paris, 1992.
Commission des monuments historiques, *Les Monuments historiques de la France: Bulletin des diverses sections de la Commission des monuments historiques et de la Commission supérieure des monuments naturels et des sites*, 1936.

Syllabus- Fourth Semester

Compétences Langagières à l'écrit - IV – Written expression - IV

Course Code: FRE2401 **Course Credits: 05**

Course Objective:
To develop the writing skills

- to express sentiments, obligation, possibility
- to present a person, to narrate a story
- to give or to justify one's opinion,

Course Contents:

Unité 5 : Les paroles volent, les écrits restent
Actes de Communication :
Exprimer ses sentiments, exprimer l'obligation, la possibilité, l'interdiction, exprimer la manière
Unité 6 : A chacun son cinéma
Actes de Communication :
Présenter les personnages d'un film, raconter l synopsis d'un film, exprimer son avis, justifier son opinion
Unité 7 : Y a-t-il une vie après l'école ?
Actes de Communication :
Synthétiser des informations et les transmettre, présenter et publier un compte rendu d'enquête, rapporter un événement, une information, une interview
Unité 8 : Pas de nouvelles, bonnes nouvelles !
Actes de Communication :
Rapporter les paroles d'autrui, rendre compte d'événements, présenter des faits et des événements

Unité 9 : Tout finit par des slams
Actes de Communication :
Exprimer ses sentiments, exprimer ses idées, expliquer la définition d'un mot, comprendre la formation des mots, jouer avec les mots
Grammaire :

1. Constructions et mode des verbes de sentiments, des verbes impersonnels
2. Le gérondif, le participe présent
3. Les pronoms COD, COI, la double pronominalisation
4. Le pronom relatif- ce que, ce qui, ce dont
5. La place de l'adjectif
6. Le discours rapporte, la concordance des temps dans le discours rapporte au passe
7. L'interrogation directe et indirecte
8. Le pronom en
9. Les registres de langues, les figures de style

Examination Scheme:

Components	**CT**	**Home Assign**	**Att.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Text:
Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B 1) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF B1. Paris: Didier, 2010.

Compétences Langagières à l'Oral IV - Oral expression IV

Course Code: FRE2402 **Course Credits: 04**

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and "registre de langage"
- To master the current social communication skills in oral
- To enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1) Livre de l'élève. Paris: Maison des Langues, 2009.

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 3 (B1) Livre de l'élève. Paris: Maison des Langues, 2009.Print.

Understanding French Texts – II

Course Code: FRE2406 **Credit Units: 04**

Course Objective:

- To familiarise the students with the texts written in French in relation to the science, technology, industries and economic issues.
- To understand the structure and content of texts written in French, such as magazine and newspaper articles, reports, press conferences, speeches and literary texts.
- To enhance students' linguistic skills through the study of written discourse.

Course Contents:

Module 1

La Science et la technologie

Symptoms and transmission of diseases like cancer and AIDS, treatment and preventative measures;
the impact of Science and Technology on medical practices, disease prevention and cure;
the impact of Information and Communication Technology on social life.

Module 2

L'industrie et l'économie

Various kinds of industries as agriculture and tourism: eco-tourism, genetically modified foods; renewable and non-renewable sources of energy; new trends in business, for example, e-commerce: innovations and impact on traditional business. Impact of industrialization, liberalization and globalization on social and economic life.

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:

Les ressources à consulter:

Lhote, G. et al.	Parlez-moi: Le français au quotidien, Paris: Nathan, 1998.
Lien, B. and Raud, M.	Thèmes et Textes. Topics and text studies for advanced French, London: John Murray, 1998.
Maun, I. and Rodrigues, I.	Bien lire, bien écrire, Sandy, Beds. : Advance Materials, 2001.
Maruani, M	Travail et emploi des femmes, Paris: Editions La Découverte (Coll Repère) 2006.
McLachlan, A.	Zénith, Oxford: Heinemann Educational, 2000.
Monnerie-Goarin, A. et al	Champion (nouvelle édition), Paris: CLE

	International, 2001.
Murillo, J. et al.	Forum, Paris, Hachette FLE, 2000 – 2003.
Neather, T. et al.	Prévisions/Réalisations, Cheltenham: Nelson Thornes, 1998.
Noël, M. F. and Davies, V.	Communiquez, London: Hodder and Stoughton, 1999.
Open University	Francothèque: A Resource for French Studies, London: Hodder and Stoughton, 1997.

Les sites web à consulter:

www.advmaterials.demon.co.uk
www.champs-elysees.com
www.cilt.org.uk
www.cndp.fr
www.esb.co.uk
www.fdlm.org
www.fle.fr
www.french.about.com
www.frenchteachers.org
www.grantandcutler.com
www.quia.com/pages/babelspeak/html
www.rf.fr
www.sitesforteachers.com
http://www.tv5.org/TV5Site/enseigner-apprendre-francais/accueil_enseigner.php
www.voila.fr
www.yahoo.fr

Introduction to French and Francophone Civilization & Culture-II

Course Code: FRE2405 **Credit Units: 04**

Course Objective:

- To familiarise the students with the essentials of culture and civilisation of France and francophone countries.
- To introduce them to the history, political system, historical movements and social structure of France.
- To acquaint the students with the gastronomy, monuments, sports, cinema and music of France and francophone countries.

Course Contents:

Module 1: La colonisation française
Part 1: L'Introduction de la *Colonisation* et l'illumination.
Part 2: L'Histoire du monde Francophone

- Expansion colonial de la France: Phase I
- Expansion colonial de la France: Phase II
- Mouvements contre Colonisation française
- Désintégration de l'Empire Coloniale
- Impact de la Colonisation française

Part 3: Organisation Internationale de la Francophonie (OIF).
Part 4: Les Langues dans le monde Francophone.

Module 2: La vie politique
Part 1: IVe République
Part 2: Ve République
Part 3: les institutions politiques
Part 4: Les parties politiques
Part 5: L'avenir européen

Module 3: La vie économique
Part 1: centralisation et décentralisation
Part 2: nationalisation et privatisation
Part 3: La technologie, les transports
Part 4: L'Union européenne

Module 4: La francophone contemporaine
Part 1: Auteurs Francophone et Littératures

- Grand auteurs Francophones
- Caractéristiques de la littérature Francophone

Part 2: Communauté ethnique du monde Francophone

- Qu'est-ce que l'ethnie?
- Ethnie en Afrique et les groupes majeurs en Afrique.
- Conflits ethniques et impact sur la vie sociale et politique de l'Afrique

Part 3: quelques sujets importants (**to be updated from time to time**)

- Boko Haram

- Conflit Mali
- Algérie
- Conflit Libye
- République de l'Afrique centrale
- Crise du Soudan du Sud
- conflit DRC
- Guerre civile de la Somalie

Part 4: Cinéma Francophone

- Cinéma africain
- Cinéma acadien
- Cinéma canadien
- Cinéma suisse

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:

Les ressources à consulter:

Alexandre P, Francophonie: the French and Africa. J. Contemporary History, 1969, 4(1):117-25

Beauclair Michelle, *The Francophone World: Cultural Issues and Perspectives*, Peter Lang, Bern, 2007.

Bujra Abdalla, *African Conflicts: Their causes and their political and social environment*, Development Policy Management Forum, Addis Ababa, 2002.

Crettien Charles, *France's relations with her former colonies*, Proceedings of the Meeting of the French Colonial Historical Society, Vol. 8 (1985), pp.1-8

Deniau X, *La Francophonie*, Presses Universitaires de France, Paris, 1983.

Holm John, *An introduction to pidgins and creoles*, Cambridge University Press, Cambridge, 2004.

Kirk-Greene, Anthony & Daniel Bach. (eds.), *State and society in Francophone Africa since independence*, Palgrave macmillan, 1995, UK.

Yacono, Xavier, *Histoire de la colonisation française*, Presses Universitaires de France, Paris, 1988 (4th ed.).

Français à travers des textes littéraires - French through Literary Texts

Course Code: FRE2404 **Course Credits: 04**

Course Objective:

- To introduce students to French literature through a study of extracts of select literary works
- To enable them to read and understand literary texts and find new meanings through analysis, evaluation, synthesis
- To understand the nuances of the langue, figures of speech, stylistics
- To empower them to develop critical/ creative thinking

Course Content: Material compiled by the Department

Module I: Le français à travers des poèmes

Extraits des œuvres de:
Vigny
Verlaine
Jaques Prévert
Victor Hugo
Lamartine
Rimbaud

Module 2: Le français à travers des romans / nouvelles /récits

Extraits des œuvres de:
Guy de Maupassant
André Malraux
Emile Zola

Module 3: Le français à travers des écrits philosophiques

Extraits des œuvres de:
René Descartes
Votaire
Rousseau
Jean-Paul Sartre
Blaise Pascal

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Castex, P.G., P. Surer et G. Becker. Histoire de la Littérature Française. Paris : Hachette, 1974.Print.
- Itinéraires Littéraires. (Moyen Age XVIe, XVIIe, XVIIIe) Paris: Collection Hatier. Print.
- Dix Siècles de Littérature Française. Paris :Collection Bordas, 1991. Print.

Français sur Objectif Spécifique: Le Français de l'Hôtellerie et la Restauration - French for Hotel Management

Course Code: FRE2103 **Course Credits: 05**

Course Objective:

- To familiarize the students with the essentials of French for hotel and catering sector
- To enable the students to understand how they communicate in French in simple, common professional situations of the hotel and catering sector
- To initiate the students in the techniques of reception and services like reservation, house-keeping, catering, handling claims, preparing for departure

Course Contents: Unités 1--6

Module 1

Bienvenue à l'hôtel de la paix : Le personnel – l'établissement

Module 2

Réservation: réserver une chambre par téléphone, remplir une fiche de réservation, réserver une table au restaurant, réserver par Internet, confirmer une réservation, refuser une réservation, modifier ou annuler une réservation.

Module 3

Accueil: accueillir un client et un groupe (prendre contact, prendre en charge le client, prendre congé, prendre contact avec le responsable du groupe), installer un client dans sa chambre, comprendre et écrire des messages d'accueil, accueillir au restaurant, accueillir au téléphone.

Module 4

Services: informer les clients sur les différents services et équipements de l'hôtel, prendre note d'une commande par téléphone, caractériser les tâches professionnelles du métier de concierge, assurer les services a l'étage, décrire un plat, prendre une commande au restaurant.

Module 5

Réclamations: comprendre les requêtes des clients, savoir dresser une table, comprendre les messages électroniques de réclamations des clients, s'excuser et envisager une réparation, faire face à des dysfonctionnements, s'excuser et proposer une réparation, comprendre le travail du personnel d'étage, rédiger une lettre d'excuse.

Module 6

Départ: préparer le départ du client, présenter la note au client et répondre à ses demandes de précisions, évaluer des prestations, toujours en contact !

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Le livre à suivre: Corbeau, Sophie., et al.hôtellerie-restauration.com. Paris: CLE International, 2006. Print.

Référence : Chanderasekar, Rajeswari et al. A votre service. Paris :Hachette, 2011. Print.

Syllabus- Fifth Semester

Compétences Langagières à l'écrit - V – Written expression - V

Course Code: FRE2501 **Course Credits: 05**

Course Objective:
To develop the writing skills

- To report speech, to express one's point of view
- To analyze an editorial, to compare informations given in different texts
- To describe or narrate an experience
- To give advice and organize a debate
- To express an opposition, a hypothesis, a goal, probabilities
- To compare

Course Contents:
Unité 1 : Informer : tous journalistes ?
Actes de Communication :
Rapporter des paroles, rapporter des informations, exprimer son point de vue, analyser un éditorial, comparer le traitement de l'information dans différentes unes de journaux
Unité 2 : Gérer son image
Actes de Communication :
Exprimer une hypothèse, raconter son expérience
Unité 3 : Vivre mieux
Actes de Communication :
Donner des conseils, organiser un débat, exprimer des probabilités
Unité 4 : Faire du lien
Actes de Communication :
Comparer, exprimer son opposition, argumenter, commenter des données chiffrées

Unité 5 : Vivre ensemble
Actes de Communication :
Savoir captiver son auditoire, rire, se moquer, convaincre, relever des procèdes humoristiques, exprimer le but
Grammaire :

1. Les formes de la question et les mots interrogatifs
2. Les prépositions de lieu
3. Le discours rapporte
4. L'hypothèse (les phrases avec si), l'opposition
5. Le passe simple, le futur antérieur
6. Les pronoms relatifs composés
7. Les adjectifs qualificatifs
8. La restriction, le passif
9. La négation (ni..ni..)

Examination Scheme:

Components	CT	Home Assign	Att.	EE
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri,Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri,Version Originale 4 (B2) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF B2. Paris: Didier, 2010.

Compétences Langagières à l'Oral V- Oral expression V

Course Code: FRE2502 **Course Credits: 04**

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and "registre de langage"
- To master the current social communication skills in oral
- To enrich the formulations, the linguistic tools and vary the sentence structure
- To present facts, projects, plans with precision
- To develop logical thinking, to speak, argue and debate in a coherent and cohesive manner employing appropriate words of liaison, and transition

Course Content:

Preparing presentations, exposés on any topic, developing the techniques of debates, discussions; mastering the art of convincing through logical arguments

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009.

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009.Print.

Introduction à la littérature française: Typologie des genres littéraires français – Partie-I (Introduction to French Literature-I)

Course Code: FRE2507 **Credit Units: 05**
Course Objective:

To introduce the students to French literature through extracts of texts selected from different literary genres of various famous authors across the centuries.

Course Content: Material compiled by the Department from Itinéraires Littéraires, andDix Siècles deLittérature Française

Module-1 : Poésie
Mignonne allons voir si la rose : Pierre de Ronsard
Ballade des pendus : François Villon
Module 2: Poésie-II
Le bateau ivre : Rimbaud
L'homme et la mer : Charles Baudelaire
Module- 3 : Theatre-I
Le cid : Pierre Corneille
Tartuffe : Molière
Module 4: Théâtre-II
Le mariage de Figaro : Beaumarchais
Hernani : Victor Hugo
Module-5 : Roman
Les misérables : Victor Hugo
Le père Goriot : Honore de Balzac
Madame Bovary : Gustave Flaubert
Examination Scheme

Components	**CT**	**Att.**	**H**	**EE**
Weightage	20	5	5	70

Text & References:

Castex, P.G., P. Surer et G. Becker. Histoire de la Littérature Française. Paris : Hachette, 1974.Print.

Itinéraires Littéraires. (Moyen Age XVIe, XVIIe, XVIIIe) Paris: Collection Hatier. Print.
Dix Siècles de Littérature Française. Paris :Collection Bordas, 1991. Print.
Masson, Nicole. La littérature française. Editions Eyrolles, 2007.
Ploquin, Françoise, Laurent Hermeline, and Dominique Rolland. Littérature française: les textes essentiels. Hachette, 2000.

Introduction à la Traduction – Introduction to Translation

Course Code: FRE2503 **Course Credits: 05**

Course Objective:

- To introduce to students basic concepts and theory of translation
- processes of translation
- methods and 'procédé' of translation

Course Contents:

Module 1

Translation – Definition and basic concepts (equivalence of text in translation – word to word translation and meaning based translation), Interpretation

Translation and Traductologie (Translation Studies)

Module 2

Technical translation and Literary translation
Types of Translation according to Roman Jakobson (illustrating the subject matter of translation studies)

Module 3

Text (source text, target text, texts in print/audio/video, texts through words and images), analysis of text (identifying difficulties in text-unknown words, technical terms, expression specific to the context, deciphering meaning, finding equivalent terms/expressions in Target language etc), practice translating texts, phenomenon of untranslatablity and skewed translation

Module 4

Methodology of translation, methods, 'sept procédés de traduction' by Vinay & Darbelnet

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Vinay, Jean-Paul and Jean Darbelnet. *Comparative Stylistics of French and English : A methodology for translation*. Trans. Sagar, Juan C., and M.-J. Hamel. Amsterdam/ Philadelphia: Jean Benjamins Publishing Company, 1995. Print.
- Newmark, Peter. *A textbook of translation*. New York: Prentice-Hall International, 1988. Print.

INTRODUCTION TO LINGUISTICS

Course Code: FRE2505 **Credit Units: 04**

Course Objective:
This paper aims to provide the students the basic knowledge of Linguistics and its various branches of study. The focus of the paper is to enable the learners to have an understanding of the science of language and to be able to analyze linguistically any given language including the foreign language that they pursue.

Course Contents:

Module I: Introduction
What is language and linguistics?
Design features of human language.
Various branches of Linguistics and their application.

Module II: Phonetics and Phonology
Anatomy and physiology of speech production
Classification of sounds through IPA symbols
Difference between Phonetics and Phonology.

Module III: Morphology
Basic concepts of morphology
Word Formation processes

Module IV: Syntax
Theories and concepts of Syntactic structure.
Analysis of sentence structure

Module V: Semantics
Basic concepts of Semantics
Meaning and types of Meaning

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:
Text: Fromkin, V., and R. Rodman. 1974 (9th Edition).. *An Introduction to Language*. New York: Holt, Rinehart and Winston.

References:

1. Akmajian, A., R.A. Demers, A.K. Farmer, & R.M. Harnish 2001. *Linguistics: An Introduction to Language and Communication*. Cambridge, Massachusetts: The MIT Press
2. Carnie, Andrew. 2013 (3rd Edition). *Syntax: A Generative Introduction*. West Sussex: Wiley-Blackwell Publication
3. Crystal D.1997. *Encyclopedia of Language: 2nd Vol*., Cambridge: Cambridge University Press

4. Haegeman, L. 1991. (rev. Ed.). *Introduction to Government and Binding Theory*.
5. Hockett. C.F. 1958. *A Course in Modern Linguistics*. New York: Macmillian. Indian Edition, New Delhi: Oxford and IBH Publishing Co.
6. Katamba, F. and John Stonham 2006. *Morphology* 2nd ed. London: Palgrave.
7. Ladefoged, Peter. 2001 (4th edn.). *A course in phonetics*. New York: Harcourt Brace.
8. Lyons J, 1977. *Semantics*. 2 Vols. Cambridge: Cambridge University Press.
9. Odden, David. 2005. *Introducing phonology*. Cambridge: Cambridge University Oxford: Blackwell.Press
10. Roach, P. 2001. *Phonetics*. Oxford: Oxford University Press.

Français sur Objectif Spécifique: Le Français du Tourisme - French for Tourism industry

Course Code: FRE2203 **Course Credits: 06**

Course Objective:

- To familiarize the students with the basic essentials of French for tourism industry
- To enable the students to understand how they communicate in French in simple, common professional situations of the tourism industry
- Apart from providing the students with the linguistic tools to present themselves and their company, receive clients, this course also familiarizes them with services like organizing event in a tourist site, promoting a destination, conceive the design and sale of a product, accompanying and providing support.

Course Contents: Unités 1–-6

Unité 1 : Premiers contacts

Actes de Communication : se présenter et parler de son métier, présenter une entreprise touristique, savoir répondre au téléphone et prendre un message, comprendre et rédiger un CV, le qui fait quoi dans le tourisme en France

Unité 2 : Accueil

Actes de Communication : lire un plan, indiquer la direction, accueillir et servir les passagers à bord d'un avion, lire un indicateur horaire et informer sur les horaires, expliquer un billet de train, prendre une réservation, un bon comportement pour un bon accueil

Unité 3 : Animation

Actes de Communication : concevoir, rédiger et présenter un programme, concevoir et proposer des animations, connaître le calendrier des jours fériés, renseigner sur le programme des manifestations, évaluer une prestation touristique, les différentes formes de tourisme

Unité 4 : Promotion d'une destination

Actes de Communication : renseigner sur les activités proposées par une ville, rédiger une lettre commerciale : mise en forme et formules, rédiger une lettre publipostage, comprendre la demande d'un visiteur et proposer une documentation adéquate, l'organisation de la promotion touristique en France

Unité 5 : Vente d'un produit touristique

Actes de Communication : connaître les caractéristiques techniques des produits touristiques, se familiariser avec la mise en forme, le style des brochures de voyagistes, connaître les différentes étapes d'un entretien de vente, annuler une réservation et proposer des solutions de remplacement, les produits touristiques de demain

Unité 6 : Guide

Actes de Communication : utiliser des outils documentaires : guides et cartographie, préparer une visite guidée, décrire un monument : son histoire, son architecture et les anecdotes qui lui sont liées, adapter commentaires et attitudes au groupe, les guides touristiques en ligne

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Le livre à suivre: Corbeau, Sophie., et al.tourisme.com. Paris: CLE International, 2004. Print.

References: Marion, Juliette, Baptiste Chauveau et Léo Bézies-Gros. Carnet de Voyage. Delhi : Goyal Publishers and Distributors, 2013. Print.

Syllabus- Sixth Semester

Compétences Langagières à l'écrit - VI – Written expression - VI

Course Code: FRE2601 **Course Credits: 05**

Course Objective:
To furnish the writing skills

- to express regret, one's opinion, the cause, sentiments
- to defend or to justify oneself
- to talk about one's relation with a language
- to compare, to talk about the qualities of other's

Course Contents:

Unité 6 : Avoir ses chances
Actes de Communication :
Exprimer des regrets, exprimer des reproches, se défendre, comparer des modèles d'enseignement, débattre des questions éducatives
Unité 7 : Pouvoir le dire
Actes de Communication :
Présenter et exprimer son opinion, exprimer la cause, se justifier, rendre compte d'actions, prendre position
Unité 8 : S'engager
Actes de Communication :
Argumenter, structurer son discours, jouer avec les sons, utiliser des procèdes de l'art oratoire
Unité 9 : Créer
Actes de Communication :
S'opposer, concéder, défendre des idées
Unité 10 : Circuler
Actes de Communication :
Parler de notre relation avec la langue française, fait le récit d'une expérience, vanter les mérites et les qualités de quelqu'un, exprimer ses sentiments

Grammaire :
1. Le regret et le reproche
2. Les règles d'accord du participe passé
3. Le conditionnel passé
4. L'expression du but, la cause, l'opposition et la concession
5. Les pronoms indéfinis
6. Le subjonctif
7. La comparaison, le passe simple
8. Les marquers temporels
9. Les expressions impersonnelles

Examination Scheme:

Components	**CT**	**Home Assign**	**Att.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Text:

Le livre à suivre:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009.

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Cahier d'exercices. Paris: Maison des Langues, 2009.

Références :

· Girardeau, Bruno et Nelly Mous. Réussir le DELF A2. Paris: Didier, 2010.

Compétences Langagières à l'Oral VI - Oral expression VI

Course Code: FRE2602 **Course Credits: 04**

Course Objective: To provide the students with the know-how

- To understand the French phonetic system
- To develop strategies of listening comprehension
- To pass from written to oral, from oral to written easily
- To be sensitized to nuances of speech, dialectical variations, and "registre de langage"
- To master the current social communication skills in oral
- To enrich the formulations, the linguistic tools and vary the sentence structure
- To present facts, projects, plans with precision
- To develop logical thinking, to speak, argue and debate in a coherent and cohesive manner employing appropriate words of liaison, and transition

Course Content:

Preparing presentations, exposés on any topic, developing the techniques of debates, discussions; mastering the art of convincing through logical arguments

Exposé : présentation, appréciation et critique du texte et débat sur l'exposé
Genres littéraires: Présenter un texte littéraire
Se présenter à une interview

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009.

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

M. Denyer, A. Garmendia, C. Royer, Marie–Laure Lions–Olivieri, Version Originale 4 (B2) Livre de l'élève. Paris: Maison des Langues, 2009. Print.

Introduction à la littérature française: Typologie des genres littéraires français – Partie- II (Introduction to French Literature-II)

Course Code: FRE2603 **Credit Units: 06**

To introduce the students to French literature through extracts of texts selected from different literary genres of various famous authors across the centuries.

Course Content: Material compiled by the Department from Itinéraires Littéraires, andDix Siècles deLittérature Française.

Module 1: Poésie-I
Liberté : Paul Eluard
Déjeuner du Matin : Jacques Prévert
Module 2: Poésie-II
Le Cimetière marin :Paul Valéry
Le Pont Mirabeau :Guillaume Apollinaire
Module 3: Théâtre-I
Rhinocéros : Eugène Ionesco
Huis clos : Jean-Paul Sartre
Module 4: Théâtre-II
Antigone : Jean Anouilh
En attendant Godot : Samuel Beckett
Module 5: Roman-I
La Peste : Albert Camus
La Jalousie : Alain Robbe-Grillet
Module 6: Roman-II
Le petit prince : Saint-Exupéry
La Place de l'étoile : Patrick Modiano

Examination Scheme

Components	**CT**	**Att.**	**H**	**EE**
Weightage	20	5	5	70

Text & References:

- Castex, P.G., P. Surer et G. Becker. Histoire de la Littérature Française. Paris : Hachette, 1974.Print.

- Itinéraires Littéraires. (Moyen Age XVIe, XVIIe, XVIIIe) Paris: Collection Hatier. Print.
- Dix Siècles de Littérature Française. Paris :Collection Bordas, 1991. Print.
- Masson, Nicole. La littérature française. Editions Eyrolles, 2007.
- Ploquin, Françoise, Laurent Hermeline, and Dominique Rolland. Littérature française: les textes essentiels. Hachette, 2000.

Français sur Objectif Spécifique: Le Français Professionnel et des Affaires – Professional and Business French

Course Code: FRE2403 **Course Credits: 05**

Course Objective:

- To familiarize the students with the essentials of professional French
- To enable the students
- To understand how they communicate in French in simple, common situations related to the business and corporate world
- To prepare their CVs, to face interviews

Course Contents: français.com- intermédiaire **Unités 6–-9**
Unité 6 : Actes de Communication : Entreprises
Actes de Communication : identifier une entreprise, lire /expliquer/ dessiner un graphique, analyser/ comparer des résultat et des tendances, analyser des techniques de vente, lancer un produit, analyser un secteur économique

Unité 7: Travail
Actes de Communication : identifier les différents services de l'entreprise, les tâches du secrétariat, examiner différentes façons d'aménager un lieu de travail, rédiger un rapport, analyser les rélations du travail, comparer les conditions de travail d'un pays à l'autre, rédiger un e-mail

Unité 8: Recherche d'emploi
Actes de Communication : consulter/ analyser/ expliquer une petite annonce/ ses motivations
rédiger une petite annonce/ une lettre de motivation/ un curriculum vitae
passer un entretien d'embauche

Unité 9: Prise de parole
Actes de Communication: pratiquer l'écoute active : analyser/ comparer des types de conversations, reformuler, questtionner, interrompre, répliquer avec tact, présenter des objections, faire une présentation – établir une grille d'évaluation, faire/ évaluer un exposé, prendre de notes, maîtriser les techniques d'interview, poser les bonnes questions et collecter des informations

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:
Le livre à suivre: Penfornis, Jean-Luc. français.com- intermédiaire . Paris: CLE International, 2002. Print.

Etude détaillée d'un roman français-
Detailed study of a French Novel

Course Code: FRE2607 **Credit Units: 04**

Course Objective:

- To enable students to do a detailed study of a literary work.
- To understand a work in relation to the author and in relation to the other works of the author
- To provide a broad perspective of the thoughts and philosophy of the period, of the contemporary works

Course Contents:

Module 1
Lecture d'un roman choisi.
Module 2
L'auteur, sa biographie et ses œuvres littéraires.
Module 3
L'époque, les écrivains contemporains et leurs œuvres.
Module 4
Etude et discussion sur les idées principales de ce roman choisi.

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Bayard, Pierre. *Comment parler des livres que l'on n'a pas lus?*. Minuit, 2012.

Bessière, Jean. *Questionner le roman*. Presses universitaires de France, 2015.

PROJECT REPORT EVALUATION

Course Code: FRE2637 **Credit Units: 02**

The Project Report is primarily a research work and its primary objective is to gain knowledge through practical experience, a sound appreciation and understanding of the theoretical principles learnt during the semesters. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR PROJECT REPORT

Topic: The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include literature, culture, civilization or any other related areas.

Synopsis of Project Report: A Synopsis of the Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following – Title of Project Report Introduction Problems of Research/Presenting the Topic/Problems/Issues of Research Objectives of Research Tentative Subheadings Suggested readings Source Material and References presenting your own ideas in a Project Report is encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources should be cited. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases. There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet. Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.
Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You must also obtain permission from the Supervisor before using your Project Report for more than one course.

Length and Format Length is not important; 20 to 25 pages of 2 spaced texts is a good target. The title, author, course, and date should be typed onto a cover sheet. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is not to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. It will read by the supervisor carefully, who may offer suggestions for

improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This will make the writing of a Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have a gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Project Report look and sound professional.

Evaluation of Project Report
Evaluated by
1 Institution

 Scope and content Understanding and presenting the topic Depth and breadth of analysis Project fulfillment Language, logical flow, coherence. Data collection ability in the field (if any) Scope of Implementation. (if applicable)
Criteria Marks: 50
2 Board of Examiners Viva-voce
Examination Marks: 50 **Total 100**

Project Schedule Registration First week of the last academic month Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.
Approval of Project Topic Week following: the week of registration

Submission of Synopsis to Faculty Guide

Prior to the completion of End-Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

Duration of Project: The project stretches for the full duration of the Semester break

Submission of Report: **First Draft** – After 20 Days from the commencement of the project **Second Draft** – 20 days after submission of the first draft. The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.
Final Draft – Within second week of rejoining of institution.

Literature of France: from Origin to 16 century

Course Code: FRE2608 **Credit Units: 04**

Course Objective:

- To introduce the students to the the French litertature from moyen age to sixteenth century.
- To introduce the students with different genre of literature; novel, poem, theatre etc
- To introduce and perfect them to analyse variety of texts.

Le Moyen Âge

Module 1; Chanson de geste, l'histoire

- Introduction au Moyen Âge
- Naissance de la littérature française
- La Chanson de Roland.
- Les genres littéraires au Moyen Âge

Module 2: Theatre, Roman

- Les romans d'aventure et d'amour
- Le théâtre du Moyen Âge
- Introduction à la farce
- La farce de maître Pathelin
- Le théâtre religieux
- Le Roman de Renart

La Renaissance

Module 3: Roman,

- Du Moyen Âge à la Renaissance
- les œuvres de Rabelais
- Pantagruel
- Gargantua

Module 4: Poésie, Theatre

- La Pléiade
- Les Poésies de Ronsard,Du Bellay
- Montaigne
- Cleopatre Captive,Jules César

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References:

https://www.espacefrancais.com/les-courants-litteraires/
Blumenfeld-Kosinski, Renate. *Reading myth: classical mythology and its interpretations in medieval French literature*. Stanford: Stanford University Press, 1997.

Les livres à consulter:

Xavier Darcos, *Histoire de la littérature française*, Hachette Education,(lire en ligne
Les Grands etapes de la literature francaise

Amity School of Liberal Arts&FL

Bachelor of Arts German (Honors)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Arts German (Honors)

Syllabus - First Semester

WRITTEN EXPRESSION-I
(Schriftliche Kompetenz- I)

Course Code: GER2101 **Credit Units: 06**

Course Objective:
To furnish the linguistic tools

- to introduce oneself and others, to ask and give personal information.
- to describe ones family and surroundings
- to name and count things and to talk about likes and dislikes.
- to describe ones house and give opinions
- to tell time and date and to talk about daily routine and activities.
- to talk about leisure time and hobbies
- to talk about events in the past
- to describe professions
- to talk about weather
- to ask directions and advices, to ask for help

Course Contents:
Lektion 1 : Guten Tag. Mein Name ist…
Jemanden begrüßen, sich verabschieden, Herkunftsland erfragen und nennen, Sprachen benennen.

Lektion 2 : Familie und Freunde
Familienmitglieder und Freunde vorstellen, Wohnort nennen, Angaben zu personen machen.

Lektion 3 : Essen und Trinken
Dinge benennen, Einkaufsgespräche führen, Zahlen, Vorlieben ausdrücken,

Lektion 4 : Meine Wohnung
Nach einem Ort fragen, eine Wohnung/ Haus beschreiben, Möbel und elektronische geräte benennen, Wohnungsanzeigen

Lektion 5 : Mein Tag
Uhrzeit nennen, Alltagsaktivitäten nennen, Tagesablauf, öffnungszeiten verstehen.

Lektion 6 : Freizeit
Wetter, Jahreszeiten, über Freizeit und Hobbys sprechen, Wetterbericht

Lektion 7 : Lernen- ein Leben lang
Fähigkeiten ausdrücken, absichten ausdrücken, über Aktivitäten in der Vergangenheit sprechen.

Lektion 8 : Beruf und Arbeit
Berufe benennen und efragen, Information über Vergangenheit und Gegenwart austauschen, Anzeigen verstehen

Lektion 9 : In einer Fremden Stadt
Anweisungen und Ratschläge geben, über Erlaubtes/ Verbotenes und Regeln sprechen
Grammatik :

1. Possessivartikel
2. Modalverb sollen
3. Nomen, definiter und undefiniter Artikel
4. Verbkonjugation
5. Personalpronomen
6. Prepositionen
7. Adjektive
8. Trennbare Verben
9. Akkusativ
10. Modal verben
11. Perfekt mit haben und sein
12. Wortbildung
13. Präteritum
14. Imperativ

Examination Scheme:

Components	**CT**	**Home Assign**	**Att.**	**EE**
Weightage (%)	20	5	5	70

Text and References

- Niebisch, Daniela et al. Schritte International 1. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006

ORAL EXPRESSION-I

(Mündliche Kompetenz-I)

Course Code: GER2102 **Credit Units: 06**

Course Objective:

To provide the students with the know-how
- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking German.

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- Niebisch, Daniela et al. Schritte International 1. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006
- Deutche Welle : Deutsch interaktiv

Examination Scheme

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Texts & References

- Niebisch, Daniela et al. Schritte International 1. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006

INTRODUCTION TO GERMAN HISTORY AND CULTURE

Course Code: GER2103 **Credit Units: 3**

Course objective:

- This course is designed to give students an overview of the history of Germany. It gives an insight into the various historical and political developments of Germany.
- The course will highlight how the current Germany came into existence.

Course Content: Material compiled by the department

Module I
Introduction (1500-1648): The German Reformation, Peasant's Movement, Thirty Years War

Module II
The age of Absolutism and Industrialization (1648-1918): Rise of Prussia, Religion, Culture and Enlightenment, The impact of the French Revolution, The revolution of 1848, Unification of Germany, Germany under Bismarck, First World War

Module III
Democracy and Dictatorship (1918-1945): Weimar Republic, Collapse of Weimar democracy, Second world war, The consolidation of Hitler's Power, Holocaust, resistance and defeat

Module IV
The two Germanies (1945-1990): The creation of two Germanies, Politics, economy and society in West Germany, Politics, economy and society in East Germany, The revolution of 1989 and the Unification of Germany

Examination Scheme

Components	**CT**	**Attd.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References

- Fulbrook, Mary. *A concise history of Germany*. Cambridge University Press, 2004.
- Tipton, Frank B. *A history of modern Germany since 1815*. A&C Black, 2003.
- Williamson, David. *Germany since 1815*. Palgrave Macmillan. 2005

Syllabus – Second Semester

WRITTEN EXPRESSION-II
(Schriftliche Kompetenz-II)

Course Code: GER2201 **Credit Units: 05**

Course Objective:
- to name body parts and describe appearances
- to give advices and instructions
- to describe modes of transports
- to ask directions and understand itinerary
- to convey information in written and verbally
- to describe clothes and express
- to express preferences and choice
- to narrate events and to congratulate in written and verbally
- to accept and refuse invitations

Course Contents:
Lektion 10: Gesundheit
Körperteile benennen, über das Befinden anderer sprechen, das aussehen beschreiben, Anweisungen und Ratschläge geben und verstehen, einen Brief schreiben, einen Termin vereinbaren.

Lektion 11: In der Stadt Unterwegs
Nach dem Weg Fragen und Weg beschreiben, Ortsangaben machen, Richtungen bestimmen, Fahrplan

Lektion 12: Der Kunde ist König
Zeitangaben verstehen und machen, zeitliche Bezüge nennen um Serviceleistungen bitten, höffliche Bitten und aufforderungen ausdrücken, einen Informationstext verstehen, schriftliche Mitteilungen und Telefonansagen verstehen.

Lektion 13: Neue Kleider
Kleidungsstücke benennen und bewerten, Gefallen/Missfallen ausdrücken, Vorlieben und Bewertungen ausdrücken, im Kaufhaus um Hilfe/Rat bitten

Lektion 14: Feste
Das Datum erfragen und nennen, über Personen und Dinge sprechen, Gründe angeben, einen Termin Schritlichabsagen und zusagen, Einladungen lesen und schreiben, Feste nennen Glückwünsche ausdrücken.

Lektion 1 : Kennenlernen
Themen :
Gründe nennen, von Reiseerlebnissen berichten, Familien Stammbaum: über die Familie berichten, Wohn- und Lebensformen

Lektion 2 : Zu Hause
Themen :
Richtungen angeben, Gespräch unter Nachbarn verstehen, Mitteilungen lesen und sprechen

Lektion 3 : Guten Appetit !
Themen :
Häufigkeitsangaben machen, über Frühstücksgewohnheiten sprechen, Dinge im Haushalt benennen, Gespräche im Restaurant führen, Vorlieben ausdrücken, Private Einladungen

Lektion 4 : Arbeitswelt
Themen :
Ratschläge geben, Bedingungen ausdrücken, Telefongespräche am Arbeitsplatz führen, Zeitungsmeldung, „Welcher Berufstyp sind Sie“

Grammatik:

- Präposition
- Konjunktiv II
- Verben mit verschiedenen Präfixen
- Demonstrativpronomen
- Personalpronomen mit Dativ
- Verben mit Dativ
- Ordinalzahlen
- Konjunktion Konjunktion *weil , wenn , dass*
- Verben in Perfekt
- Namen im Genitiv
- Präpositionen, Verben mit Präpositionen
- Verben mit wechseln Präposition
- Direktional- Adverbien
- Indefinitpronomen im Nominativ and Akkusativ
- Konjunktiv II : *sollte*

Examination Scheme:

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Text and References

- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006

ORAL EXPRESSION-II
(Mündliche Kompetenz-II)

Course Code: GER2202 **Credit Units: 05**

Course Objective:
To provide the students with the know-how
- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking German.

Course Content:
Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- Niebisch, Daniela et al. Schritte International 1. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006
- Deutche Welle : Deutsch interaktiv

Examination Scheme

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Texts & References

- Niebisch, Daniela et al. Schritte International 2. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006

GERMAN THROUGH ACTIVITIES
(Deutsch mit Aktivitäten)

Course Code: GER2203 **Credit Units: 06**

Course Objective:

- To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in German spontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application
- To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews
- To empower them to develop skills independently and to develop critical/ creative thinking

Course Content: Material compiled by the Department

Module I: Deutschen mit Spielen und Rätseln
Übungen, Spiele und illustierte Vokabeln, Phonetik und Wortschatzaufgaben.

Module II: Deutsch mit Gedichte und Lieder
Grammatische und phonetische und Vokabeln Übungen mit Kindergedichte und Lieder

Module III: Deutsch mit Rollenspiele
Rollenspiele von alltäglichen Themen, einen Dialog führen

Module III : Deutsch mit Filme
Grammatik durch Filme , Die Themen verstehen und zusammenfassen,

Module IV: Deutsch mit Märchen und Fabeln
Bekannte deutsche Märchen und Fabeln lesen und verstehen

Examination Scheme:

Components	**CT**	**Attd.**	**C**	**P**
Weightage (%)	40	5	30	25

*****There is no end-term examination. There is continuous assessment.

Text & References
Material compiled by the Department

Syllabus - Third Semester

WRITTEN EXPRESSION-III
(Schriftliche Kompetenz-III)

Course Code: GER2301 **Credit Units: 04**

Course Objective:
To furnish the linguistic tools

- To describe past experiences and events like journey
- To talk about family, living conditions
- To ask and tell directions
- To talk about eating habits, order food in a restaurant
- To talk about different professions, making phone calls at workplace
- To give health tips and understand expert's opinion
- To discuss and give opinions on Germany's education and school system
  Give ideas/ suggestions/ requests, talk about gifts and gift- coupons, marriage customs

Course Contents:
Lektion 5 : Sport und Fitness
Themen :
Gesundheitstipps geben, Interesse ausdrücken, Gefühle ausdrücken, telefonische Anfrage, einen Expertentipp verstehen

Lektion 6 : Ausbildung und Karriere
Themen :
über den Ausbildungsweg sprechen, die Meinung sagen, über das Schulsystem und Schulerinnerungen sprechen, Kursangebote : Aus- und Weiterbildung, ein Interview verstehen

Lektion 7 : Feste und Geschenke
Themen :
Über Geschenke sprechen, Ideen ausdrücken, Bitten und Empfehlungen ausdrücken, Geschenkgutscheine, Hochzeitsbräuche, ein Fest planen

Lektion8 : Am Wochenende
Themen :
Gegenstände ausdrűcken, Wűnsche ausdrűcken, Vorschläge machen, Wochendaktivitätenuns Veranstaltungskalender

Lektion 9 : Warenwelt
Themen :
Gegenstände beschreiben, etwas vergleichen, kurze Interviews im Radio, über private Ausgaben sprechen, einen Gegenstand präsentieren

Lektion 10 : Kommunikation
Themen :
Unpersönliche Sachverhalte verstehen, Produkte beschreiben, Anrufbeantwörter : Nachrichten verstehen, Telefongespräche : sich entschuldigen

Lektion 11 : Unterwegs
Themen :
Ortsangaben machen, Wege beschreiben, Sicherheitsangaben verstehen, Verkehrsnachrichten, Wetterverhältnisse

Lektion 12 : Reisen
Themen :
Reiseziele angeben, Kleinanzeigen verstehen, eine Reise buchen, Postkarten schreiben, eine Traumreise planen

Grammatik :

- reflexive Verben
- Präteritum der Modalverben
- Konjuktion : Trotzdem
- Konjunktiv II : wäre, hätte,wűrde
- Adjektivdeklination
- Komparativ und Superlativ
  Vergleichspartikel : *als, wie*
- Passiv- Präsens
- Frageartike : *was für ein… ?*
- Wortbildung Adjektive und Nomen
- Lokale, modale und temporale Präpositionen
- Indirekte Fragen mit Fragepronomen

Examination Scheme:

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006

ORAL EXPRESSION-III
(Mündliche Kompetenz-III)

Course Code: GER2302 **Credit Units: 04**

Course Objective: To provide the students with the know-how
- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations, and ,,Sprache bemerken und festhalten"
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:
- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Deutche Welle : Deutsch interaktiv

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:
- Niebisch, Daniela et al. Schritte International 3. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Deutche Welle : Deutsch interaktiv

GERMAN HISTORY AND CULTURE

Deutsche Geschichte & Kultur (Landeskunde I)

Course Code: GER2303 **Credit Units: 04**

Course Objective:

- This course is designed to give students an overview of the geography, culture, society and history of Germany.
- This course will broaden students' vocabulary, improve their writing skills through study of history and culture.

Course Content:

Module I

Geographie: geographiche Lage Deutschlands, Fläche, Bundesländer und Hauptstädte, Einwohner, Staatsfrom, Verwaltung, die deutsche Nationalhyme, die Bundesflagge, das Bundeswappen.

Module II

Einführung(1500-1648): Die deutsche Reformation(1517), 30-jährige Krieg (1618-1648)

Module III

Absolutismus and Industrialisierung (1648-1918): Aufklärung, die französische Revolution: Ereignis und Auswirkung, März Revolution (1848), Vereinigung Deutschlands, deutsche Kaiserreich- Otto von Bismarck (1871-1890), erster Weltkrieg (1914-1918)

Module IV

Demokratie und Diktatur (1918-1945): November Revolution (1918), Verfassung (1919), weimarer Republik (1919-1933), Inflation (1923), Weltwirtschaftskrise(1929), drittes Reich (1933-1945), zweiter Weltkrieg (1939-1945)

Module V

Teilung und Wiedervereinigung Deutschlands (1945-1990): Ende des Kriegs/ Teilung Deutschlands (1945), West Deutschland (DDR) : Politik, Ökonomie und Gesellschaft, Ost Deutschland (BRD): Politik, Ökonomie und Gesellschaft , 1989: Revolution und Wiedervereinigung

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text and References

- Berger, Maria Cr. u Martini, Maddalena. *Generation E Deutschsprachige Landeskunde im Europaischen Kontext.* Klett Verlag
- Ethlers, Michaela u Schladebach, Almut. *Politik in Deutschland*. Ernst Klett Sprachen Stuttgart
- Fulbrook, Mary. *A concise history of Germany*. Cambridge University Press, 2004.
- Tipton, Frank B. *A history of modern Germany since 1815*. A&C Black, 2003.
- Williamson, David. *Germany since 1815*. Palgrave Macmillan. 2005

Syllabus – Fourth Semester

WRITTEN EXPRESSION-IV
(Schriftliche Kompetenz-IV)

Course Code: GER2401 **Credit Units: 05**

Course Objective:
To develop the writing skills
- to express wishes, sentiments, possibilities
- to discuss weekend and free time activities
- to present, describe and compare objects
- to understand radio interviews
- telephonic conversations, automatic answering machine
- to understand transport news and directions
- to talk about and plan a trip to your dream destination
- to make conversations in a bank, exchange money

Course Contents:
Lektion 13 : Geld
Themen :
Sich am Bankschaler informieren, sich über Zahlungswege informieren, über Dienstleistungen sprechen, Radiointerview, Zeitungsanmeldungen

Lektion 14 : Lebensstationen
Themen :
Über Vergangenes sprechen, Wünsche, Vorschläge und Ratschläge, Kosenamen, Statistik und Interview

Lektion 1 : Glük im Alltag
Themen :
Über Vergangenes berichten, eine Zeitungmeldung schreiben, über Glücksmomente sprechen, Pech gehabt, über Glückbringer sprechen

Lektion 2 : Unterhaltung
Themen :
Gegensätze ausdrücken, Dinge und Personen beschreiben, Fernsehprogramm, einen Konsens finden, einen Krimi lesen

Lektion 3 : Gesund bleiben
Themen :
Entspannungsübungen machen und beschreiben, Ratschläge und Empfehlungen geben, Untersuchung beim Arzt- einen Vorgang beschreiben, Vorsorge, über eine Statistil sprechen, einen Beipackzettel verstehen

Lektion 4 : Sprachen
Themen :
Über irreales spreche, etwas nicht verstehen, nachfragen & begründen, Wichtigkeit ausdrücken, über das Sprachlernen sprechen, eine Radiosendung verstehen

Lektion 5 : Eine Arbeit finden
Themen :
Über Berufswünsche und –interessen sprechen, über Geschäftsideen sprechen, über die Arbeit sprechen, sich schriftlich bewerben, sich telefonisch vorstellen

Lektion 6 : Kundenwünsche
Themen :
über Urlaubsinteressen sprechen, über eine Statistik sprechen, gute Vorsätze fassen, Verkaufsgespräche führen, eine Reisebroschüre verstehen, Informationen über Wuppertal im Internet

Grammatik :

- Vergleichspartikel : *als, wie*
- Passiv- Präsens
- Frageartike : *was für ein… ?*
- Wortbildung Adjektive und Nomen
- Lokale, modale und temporale Präpositionen
- Indirekte Fragen mit Fragepronomen
- Konjunktion: *als, obwohl, darum, deswegen, damit*
- Präteritum
- Plusquamperfekt
- Gradpartike : *ziemlich*
- Relativpronomen und Relativsatz
- Genetiv
- Passiv- Präsens mit Modalverb
- Irreale Bedingungssäatze
- Präposition : *wegen, trotz*
- Infinitiv mit *zu, um..zu, statt…zu, ohne zu*
- Zweiteilige Konjunktionen : *nicht nur… sondern auch… , zwar…aber… , entweder…oder…*
- Verben mit Präpositionen

Examination Scheme:

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006

ORAL EXPRESSION-IV
(Mündliche Kompetenz-IV)

Course Code: GER2402 **Credit Units: 04**

Course Objective: To provide the students with the know-how
- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations, and ,,Sprache bemerken und festhalten"
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:
Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations participating in debates, and discussions) of:
- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006
- Deutsche Welle : Deutsch Interaktiv

Examination Scheme:

Components	**CT**	**Attd.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 4. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006

GERMAN THROUGH LITERARY TEXTS
(Deutsch mit literarischen Texten)

Course Code : GER2403 **Credit Units: 05**

Course Objective:

- To make the students understand the differences between various kinds of literary texts like novel, poem, short story, parable etc.
- To introduce them to German literature through a study of selected literary works
- To enable them to read and understand literary texts and find new meanings through analysis, evaluation and synthesis
- To empower them to develop critical/ creative thinking

Course Content:

Module I: Bedeutung und Merkmale der unterschiedlichen literarischen Textsorte :

Romane, Kurzgeschichten, Gedichte, Ballade, Fabeln, Märchen, Novelle usw.

Module 2: deutsche Kurzgeschichten :

- Das Brot- Wolfgang Borchert
- Ein Tisch ist ein Tisch- Peter Bichsel
- Popp und Mingel- Marie Luise Kaschnitz
- Anekdote zur Senkung Arbeitsmoral- Heinrich Boell
- Die Küchenuhr – Wolfgang Borchert

Module 3: deutsche Gedichte :

- Todesfuge- Paul Celan
- An den Mond- Goethe
- Wandrers Nachtlied- Goethe
- Der Knabe im Moor- Annette von Droste-Hülshoff
- Die Stadt- Theodor Storm

Module 4: deutsche Novelle:

- Das Erdbeben in Chili - Heinrich von Kleist
- Katz und Maus - Eine Novelle Günter Grass
- Der Tod in Venedig - Thomas Mann
- Peter Schlemihls wundersame Geschichte - A.v.Chamisso

Module 5 : deutsche Ballade, Fabeln, Märchen :

- Erlkönigs Tochter - Johann Gottfried von Herder
- Kinder- und Hausmärchen der Brüder Grimm - Brüder Grimm
- The Tortoise and the Hare

Examination Scheme:

Components	CT	Attd.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Wolfgang Borchet : An diesem Dienstag neunzehn Geschichten. Rowohlt, Hamburg/Stuttgart 1947
- Johann Wolfgang von Goethe : An den Mond Goethes Schriften, Achter Band. Seite 153-154. G.J.Göschen, Leipzig 1789
- http://www.dirkvanwingerden.nl/Duits_GHL-web/Literatuur/B02.pdf
- http://www.deutschunddeutlich.de/contentLD/GD/GT67cTischistTisch.pdf
- Annette von Droste-Hülshoff: Der Knabe im Moor, in: Deutsche Balladen, hrsg. v. Hartmut Laufhütte, Stuttgart 2000
- http://www.celan-projekt.de
- http://lyrik.antikoerperchen.de/theodor-storm-die-stadt,textbearbeitung,213.html
- http://www.literaturwelt.com/werke/herder/erlkoenigstochter.html

ENHANCING LANGUAGE PROFICIENCY
(Beherrschung der Sprachfertigkeit)

Course Code: GER2404 **Credit Units: 04**

Course Objective:
To enable students to enhance their language proficiency
- by analyzing texts and authentic documents of different genres
- through a study of newspaper and magazine articles and other texts

Course Contents:

Module 1
Verscheidene Texttypen und Textsorten
Analyse von Texte unterschiedlicher Genre.
Textexterne und textinterne Faktoren

Module 2
Informative Texte : Zeitungen, Zeitschriften, Sachtexte usw

Module 3
Kochrezepte, Gebrauchsanleitungen, Anzeige, Werbung, usw.

Examination Scheme:

Components	**CT**	**Attd.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:
Material compiled by the Department

GERMAN CULTURE AND CIVILISATION
(Einführung in die deutsche Kultur und Zivilisation)

Course Code: GER2405 **Credit Units: 04**

Course Objective:

- This course is designed to give a broad cultural and social background of Germany.
- This course will highlight various other cultural aspects like German festivals, cuisine, cinema, music and theatre.
- The course will also talk about contemporary themes in Germany like political engagement of Germans, technology, environment, higher education etc.

Course Content:

Module I
Deutschland und Nachbarländer: Deutschlands Beziehung mit Nachbarländer wie Frankreich, Italien usw. , deutsch Sprachige Länder wie Schweiz, Österreich, Luxemburg usw.

Module II
Deutsche Kultur: Bräuche und Traditionen (Feste, Kochkunst, Kino, Malerei, Musik und Tanzkunst)

Module III
Zeitgenössische Themen: politische Stellung der Bundesläder, Technologie, Automobil und die Folgen für die Umwelt, die Streben nach höherer Bildung, Singles und unverheiratete Paare, deutsche Sorge, Hoffnungen und Visionen zum Thema Europa

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text and References

- Kirchmeyer Susanne, *Blick auf Deutschland: Landeskunde Deutsch als Fremdsprache*. Ernst Klett Verlag. Stuttgart 2004
- Berger, Maria Cr. u Martini, Maddalena. *Generation E Deutschsprachige Landeskunde im Europaischen Kontext.* Klett Verlag
- Ethlers, Michaela u Schladebach, Almut. *Politik in Deutschland*. Ernst Klett Sprachen Stuttgart
- Tipton, Frank B. *A history of modern Germany since 1815*. A&C Black, 2003.

Syllabus – Fifth Semester

WRITTEN EXPRESSION-V
(Schriftliche Kompetenz-V)

Course Code: GER2501 **Credit Units: 05**

Course Objective:

To furnish the linguistic tools

- To report past experiences, to write a newspaper article, to talk about a happy or sad moments
- To express differences and contrasts, to describe people and things
- To talk about television programs, to find a consensus, to read a thriller novel
- To do & describe relaxing exercises for one's health, to give suggestions and advices, examination by a doctor, to talk about statistics, to understand an instruction leaflet
- To ascertain opinions and views, to talk about language learning, to understand a radio transmission.
- To talk about professional wishes and interests, about business ideas, to apply for a job and to introduce oneself over telephone
- To talk about holiday wishes and dialogues while shopping, to understand travel brochures
- To talk & exaggerate about a dream house, unreal wishes, to live neighbors and resolve conflicts

Course Contents:

Lektion 7 : Rund ums Wohnen
Themen :
Über eine Traumwohnung sprechen und übertreiben, über irreales sprechen, eine Hausordnung verstehen, mit Nachbarn leben und Konflikte lösen

Lektion :8 Unter Freunden
Themen :
eine Spielanleitung verstehen, Du oder Sie ?eine Person näher beschreiben,űber Freunde und Kollegen sprechen, eine Kontaktanzeige und ein interview verstehen, Reportage : Tipps fűr Singles

Lektion 9 : Technik und Alltag
Themen
Unter Schein und Wirklichkeit sprechen, Über zeitliche Bezűge sprechen, Bedienungsanleitungen verstehen und erklären, sich in einem ,, Forum''im Internet austauchen, eine Geschichte verstehen

Lektion 10 : Rund ums Produkt
Themen :
Uber Pannen und Missgeschicke im Alltag sprechen, ein Produkt näher beschreiben, sich im Handel, bei Dienstleitern beschweren, Radiosendung : Frauen in der Werbung

Lektion 11 : Mit Menschen
Themen :
Über Plännen und gute Vorsätze sprechen, sich entschuldigung und jemanden űberreden,űber Benimm-Regeln sprechen einen Standpunkt vertreten,űber andere ländern und ihre Sitten sprechen

Lektion 12 Rat und Hilfe
Themen :
ein Problem beschreiben und sich beraten lassen, ein schriftliches Interview verstehen, einen Sachtext verstehen,űber Engagement sprechen, űber Vorbilder und Gewissensfragen sprechen

Lektion 13 Aus Politik und Geschichte
Themen :
Uber Politische Entscheidung sprechen und sie vergleichen, Zeitungsmeldungen űber politisches Engagement, Deutsche Geschichte nach 1945, űber Parteien und Politiker sprechen.

Lektion 14 Zu Hause in der Welt
Themen :
űber Deutschland und das Heimatland sprechen, Radio-Umfrage : Meinungen zu Europa, Kurioses aus Europa, űber Heimat sprechen, Artikel : Zukunftvisionen

Grammatik :

- Temporale Konjunktionen mit Wiederholung von Präteritum, Plusquamperfekt, Adjektivdeklination
- Infinitiv mit zu Perfekt und wiederholung von Präsens und Konjunktiv II
- Graduierung der Adverbien, doppelte Verneinung
- Konjunktion *falls*
- Relativsatz mit Präposition
- Adjektiv als Nomen
- *N*-Deklination
- Zweiteilige Konjunktion *je…desto, sowohl…als auch, weder..noch*
- Konjunktion *als ob, nachdem,während*
- *Relativsä*tze mit was und wo
- Werden+ Infinitiv
- Konjuntion :*seit dem,ohne dass,bis,in dem*
- Adjektivdeklination mit dem *Komparitiv und Superlativ*
- Partizip Perfekt als Adjektiv
- Passiv Präteritum und Perfekt

Examination Scheme:

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 6. Ismaning : Heuber Verlag, 2006

ORAL EXPRESSION-V
(Mündliche Kompetenz-V)

Course Code: GER2502 **Credit Units: 04**

Course Objective: To provide the students with the know-how
- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations, and ,,Sprache bemerken und festhalten"
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:

Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations participating in debates, and discussions) of:

Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006
Niebisch, Daniela et al. Schritte International 6. Ismaning : Heuber Verlag, 2006

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Niebisch, Daniela et al. Schritte International 5. Ismaning : Heuber Verlag, 2006
- Niebisch, Daniela et al. Schritte International 6. Ismaning : Heuber Verlag, 2006

INTRODUCTION TO GERMAN LITERATURE
(Einführung in die deutsche Literatur)

Course Code: GER2503 **Credit Units: 05**

Course Objective:

To introduce students to different literary epochs starting from enlightenment till modernism through extracts of selected texts from different genres by famous authors.

Course Content:

Module 1:
Aufklärung **:** Emilia Galotti (1772) - Lessing
Nathan der Weise (1779) - Lessing

Sturm und Drang : Teil des Briefromans : Leiden des jungen Werther(1774) – Goethe
Der Erlkönig - Goethe (1778)

Klassik : Maria Stuart – Schiller (1800)

Module 2 :
Romantik : Teil des romans Der blonde Eckbert (1797) – Tieck
Kinder- und Hausmärchen (1812) - Gebrüder Grimm

Junges Deutschland
und Vormärz : Der Hessische Landbote (1834) - Büchner
Woyzeck (1836) - Büchner
Das Lied der Deutschen (1841) – Fallersleben
Deutschland. Ein Wintermärchen (1844) - Heine

Realismus : Maria Magdalene (1844) - Hebbel
Immensee (1850) – Storm
Kleider machen Leute – Gottfried Keller

Module 3 :
Naturalismus **:** Bahnwärter Thiel (1888) - Hauptmann
Vor Sonnenaufgang (1889) – Hauptmann

Moderne : Buddenbrooks (1901) - Thomas Mann

Examination Scheme:

Components	**CT**	**Attd.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Wulf , Segebrecht: *Gedichte und Interpretationen:* Band 3. Klassik und Romantik Taschenbuch – 1986
- Thomas , Mann: *Buddenbrooks* Paperback – Apr 2015
- Friedrich Hebbel : *Maria Magdalena* (German Texts) Paperback – Import, Dec 1944, Blackwell Publishers 1944
- Gottfried Keller : *Kleider Machen Leute.* Paperback, Nabu Press
- Ludwig Tieck: *Der Blonde Eckbert* / Der Runenberg , CreateSpace Independent Publishing Platform 2015
- Friedrich Schiller : *Maria Stuart: Ein Trauerspiel*. CreateSpace Independent Publishing Platform 2013
- Gotthold Ephraim Lessing *: Emilia Galotti: Ein Trauerspiel* in fünf Aufzügen Taschenbuch 2014
- Nathan der Weise Taschenbuch – 3. Februar 2015
- Gotthold Ephraim Lessing , CreateSpace Independent Publishing Platform 2015
- Woyzeck Reclam XL - Text und Kontext Taschenbuch 2013
- Georg Büchner , Rüdiger Bernhardt C. Bange Verlag; Auflage: 3. Aufl. 2013
- Gotthold Ephraim Lessing : *Königs Erläuterungen: Textanalyse und Interpretation zu Lessing. Emilia Galotti*, Bange; Auflage: 2., Aufl. (10. August 2012)
- Theodor Storm: *Immensee* ,CreateSpace Independent Publishing Platform 2012
- Heinrich Von Kleist : *Das Erdbeben in Chili / Die Verlobung in St. Domingo.* CreateSpace Independent Publishing Platform 2015
- Thomas Mann : *Der Tod in Venedig* 2014

SUMMER PROJECT EVALUATION

Course Code: GER2535 **Credit Units: 03**

Summer Project is primarily a research work and its primary objective is to gain knowledge through practical experience, a sound appreciation and understanding of the theoretical principles learnt during the semesters. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR SUMMER PROJECT REPORT

Topic

The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include literature, culture, civilization or any other related areas.

Synopsis of Summer Project Report

A Synopsis of the Summer Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

Title of Summer Project Report
Introduction
Problems of Research/Presenting the topic/Problems/Issues of Research
Objectives of Research
Tentative Subheadings
Suggested readings

Source Material and References

Presenting your own ideas in a Summer Project Report is encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources should be cited. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases.
There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet.

Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes

that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.

Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You must also obtain permission from the Supervisor before using your Summer Project Report for more than one course.

Length and Format

Length is not important; 20 to 25 pages of 2 spaced texts is a good target. The title, author, course, and date should be typed onto a cover sheet. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading

Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is *not* to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. It will read by the supervisor carefully, who may offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This will make the writing of a Summer Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have a gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Summer Project Report look and sound professional.

Sl. No.	Evaluated by	Criteria	Marks
1	Institution	• Scope and content • Understanding and presenting the topic • Depth and breadth of analysis • Project fulfillment • Language, logical flow, coherence. • Data collection ability in the field (if any) • Scope of Implementation.(if applicable)	50
2	Board of Examiners	Viva-voce Examination	50
		Total	**100**

Project Schedule

Registration

First week of the last academic month

Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.

Approval of Project Topic
Week following the „week of registration"

Submission of Synopsis To Faculty Guide
Prior to the completion of End-Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

Duration of Project
The project stretches for the full duration of the Semester break .

Submission of Report
First Draft – After 20 Days from the commencement of the project.
Second Draft – 20 days after submission of the first draft.
The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.
Final Draft – Within second week of rejoining of institution.

INTRODUCTION TO LINGUISTICS

Course Code: GER2504 **Credit Units: 04**

Course Objective:
This paper aims to provide the students the basic knowledge of Linguistics and its various branches of study. The focus of the paper is to enable the learners to have an understanding of the science of language and to be able to analyze linguistically any given language including the foreign language that they pursue.

Course Contents:

Module I: Introduction
What is language and linguistics?
Design features of human language.
Various branches of Linguistics and their application.

Module II: Phonetics and Phonology
Anatomy and physiology of speech production
Classification of sounds through IPA symbols
Difference between Phonetics and Phonology.

Module III: Morphology
Basic concepts of morphology
Word Formation processes

Module IV: Syntax
Theories and concepts of Syntactic structure.
Analysis of sentence structure

Module V: Semantics
Basic concepts of Semantics
Meaning and types of Meaning

Examination Scheme:

Components	CT	Attd.	H	EE
Weightage (%)	20	5	5	70

Text & References:

Text: Fromkin, V., and R. Rodman. 1974 (9th Edition) *An Introduction to Language*. New York: Holt, Rinehart and Winston.

References:

- Akmajian, A., R.A. Demers, A.K. Farmer, & R.M. Harnish 2001. *Linguistics: An Introduction to Language and Communication*. Cambridge, Massachusetts: The MIT Press
- Carnie, Andrew. 2013 (3rd Edition). *Syntax: A Generative Introduction*. West Sussex: Wiley-Blackwell Publication
- Crystal D.1997. *Encyclopedia of Language: 2nd Vol*., Cambridge: Cambridge University Press
- Haegeman, L. 1991. (rev. Ed.). *Introduction to Government and Binding Theory*.
- Hockett. C.F. 1958. *A Course in Modern Linguistics*. New York: Macmillian. Indian Edition, New Delhi: Oxford and IBH Publishing Co.
- Katamba, F. and John Stonham 2006. *Morphology* 2nd ed. London: Palgrave.
- Ladefoged, Peter. 2001 (4th edn.). *A course in phonetics*. New York: Harcourt Brace.
- Lyons J, 1977. *Semantics*. 2 Vols. Cambridge: Cambridge University Press.
- Odden, David. 2005. *Introducing phonology*. Cambridge: Cambridge University Oxford: Blackwell.Press
- Roach, P. 2001. *Phonetics*. Oxford: Oxford University Press.

BUSINESS GERMAN-I
(Deutsch für den Beruf-I)

Course Code: GER2505 **Credit Units: 4**

Course Objective:
The Program's objective is to familiarise students with the current terminology used in German business contexts and building an extensive active and passive Business German vocabulary.

Course Content: Unternehmen Deutsch (Course Book)

Module I
Herzlich Willkommen:
Gäste, Besucher begrűβen, sich vom Gastgeber verabschieden, Wűnsche , Bitten im Hotel vortragen, Besuchs und Besichtigungprogramme planen, sich nach Veranstaltung erkűndigen Speisen und Getränke empfehlen und bestellen.

Rund um die Firma
Űber Branchen und Produkte sprechen, Wirtschaftbereiche benennen, Schaubilder und Diagramme beschreiben, Unternehmenstrukturen erläutern, die Geschichte einer Firma darstellen, ein Unternehmen vorstellen.

Am Arbeitsplatz
Abteilung im Betrieb und ihre Aufgaben darstellen, Betieblicher Arbeit, neue Mitarbeiter vorstellen,űber Krankenheiten,Schmerzen und Beschwerden sprechen,Fragen beim Arzt beantworten, Krankversicherungssysteme vergleichen.

Von Haus zu Haus mit…
Planen und organisieren, auf Aufträge erteilen und reagieren, passende Mittel in der Geschäftkommunikation wählen.

Das perfekte Mietsystem
Abläufe beschreiben: Was wird von wem gemacht? űber Vereinbarung und Verpflichtung informieren, Ursachen fűr Störungen im geschäftlichen Ablauf ermitteln, Verschiedene Zahlungsweisen unterscheiden und benutzen.

Grammatik

- Reflexivpronomen und Verben
- Genitiv-Atribut
- Possessivartikel
- Verben mit Präposition
- Satzbau: Dativ-und Akkusativ
- Adjektivendung
- Relativsatz und pronomen
- KII-Gegenwart und Vergangenheit: wűrde+Infinitiv, hätte/ware+Partizip
- Passiv
- Indirekte Fragen mit Ob und dass Sätze

Examination Scheme:

Components	CT	Att.	H	EE
Weightage %	20	5	5	70

Text & References:

- Jörg Braunert, Wolfram Schlenker : Unternehmen Deutsch B1/B2. Ernst Klett Sprachen GmbH, Stuttgart 2006

Syllabus - Sixth Semester

WRITTEN EXPRESSION-VI
(Schriftliche Kompetenz-VI)

Course Code: GER2601 **Credit Units: 05**

Course Objective:
To furnish the linguistic tools

- To give, accept and decline an invitation
- To talk about wishes and expectations
- To read biographies and make notes
- To compare pictures
- To read advertisements
- To talk about rights and duties
- To predict things and advice
- To talk about media and its role
- To talk about eating habits and food
- To summarize a text
- To express ideas about nature
- To describe tourist places
- To talk about professions and job applications
- To write a bio data and to ask questions regarding it
- To talk about relationships
- To discuss a hypothesis, to take a position and to criticize
- To talk about books and reading habits
- To talk about a theme for and against the motion, to interrupt and continue a discussion.

Course Contents:

Lektion 1 : Von Feen und Prinzen
Themen :
Über Märchen sprechen und nacherzählen, eine Biografie lesen und Notizen machen,Bilder vergleichen, einen Werbetext schreiben

Lektion 2 : Mein gutes Recht
Themen :
Über Rechte und Pfichten sprechen, Wissen und Nichtwissen ausdrücken, Vermutungen äußern, sich beschweren, Konflikte lösen, eine beschwerdebrief schreiben, Ratschläge geben

Lektion 3 : Digital zu Hause
über Medien und Mediennutzung sprechen, eine Grafik auswerten und kommentieren, eine Nachricht auf der Mailbox hinterlassen.

Lektion 4 : Einfach lecker ?!
Über Lebensmittel und Essen sprechen, Aussagen kurz kommentieren, etwas aushandeln, bestätigen, bestellen, einen Text auswerten und zusammenfassen

Lektion 5 : Natur pur
Eigene Ideen/Gedanken zum Thema 'Natur' ausdrücken, einen Standort beschreiben, über Urlaubziele sprechen, über Ausbildungsinhalte sprechen

Lektion 6 : Viel Arbeit
Über Arbeit diskutieren, über Arbeitsuche und Bewerbung sprechen, Frage zum Lebenslauf stellen und beantworten, eine tabellarischen Lebenslauf schreiben, ein Bewerbungsschreiben verfassen

Lektion 7 : wo die Liebe hinfällt
Über Beziehungen sprechen, eine Hypothese diskutieren, Positionen im Raum darstellen, Eindrücke beschreiben und kommentieren, eine Kritik schreiben.

Lektion 8 : Lesezeichen
Über Bücher und Lesegewohnheiten sprechen, Vor- und Nachteile zu einem Thema sammeln und Stellung nehmen, eine Diskussion führen, beim Diskutieren unterbrechen/ weitersprechen, eine Geschichte zu Ende schreiben.

Grammatik :

- Infinitiv mit zu Perfekt und wiederholung von Präsens und Konjunktiv II
- Graduierung der Adverbien, doppelte Verneinung
- Partizip I mit Verb oder Nomen, Nebensatz von Hauptsatz
- Satzglieder erkennen, Umstellprobe, Satzgliedkerne erkennen, verben und Ergänzungen
- Nomen Verb Verbindungen
- Reflexivpronomen
- Adjektivpaare auf –los und -voll
- Indirekte Rede
- Konzessive und konsekutive Konnektoren und Präpositionen
- Indefinitpronomen : irgendwer, irgendwelche

Examination Scheme:

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Text and References

- Studio d: Sprach-und Prüfungstraining: die Mittelstufe./von Rita Maria Niemann und Nelli Pasemann. B2, Sprach-und Prüfungstraining. Cornelsen, 2012.

ORAL EXPRESSION-VI
(Mündliche Kompetenz-VI)

Course Code: GER2602 **Credit Units: 04**

Course Objective:
To provide the students with the know-how
- to understand the German phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking German.

Course Content:
Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:

- Studio d: Sprach-und Prüfungstraining: die Mittelstufe./von Rita Maria Niemann und Nelli Pasemann. B2, Sprach-und Prüfungstraining. Cornelsen, 2012.

Examination Scheme

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Texts & References
- Studio d: Sprach-und Prüfungstraining: die Mittelstufe./von Rita Maria Niemann und Nelli Pasemann. B2, Sprach-und Prüfungstraining. Cornelsen, 2012.

INTRODUCTION TO TRANSLATION
(Einführung in die Übersetzung)

Course Code: GER2603 **Credit Units: 6**

Course Objective:
To introduce to students
- basic concepts and theory of translation
- methods and procedures

Course Contents:

Module I
What is translation, the concept of source text and target text, the concept of original audience and target audience, text internal and text external factors, types of dictionaries and references, using parallel text and background text.

Module II
Introduction to methodology and theories of translation, equivalence and adequacy in translation, skopus theory, about various pioneers of translation and their theories.

Module III
Grammatical and lexical aspects of translation, stylistic variations in language, various text types.

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Venuti, Lawrence. *The translation studies reader*. Routledge, 2012.
- Schleiermacher, Friedrich. "On the different methods of translating." *The translation studies reader* (1813): 43-63.Benjamin, Walter. *The task of the translator*. Vol. 69. Illuminations, 1968.

DISSERTATION

Course Code: GER2637 **Credit Units: 03**

Dissertation is primarily a research work. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

The Dissertation will help students deal with literary problems and issues and they will learn to demonstrate critical thinking in research and writing.

GUIDELINES OF DISSERTATION

Objectives of Dissertation

The students will decide the topic at the beginning of the session in consultation with the Supervisor assigned. The progress of the work will be monitored regularly by the Supervisor. At the end of the Semester/Term the detailed dissertation will be submitted to the Supervisor assigned. The evaluation will be done by Board of Studies of the Institute.

Title of Dissertation

The title should reflect the area and problems/issues of the dissertation properly. The student should do a preliminary reading of primary as well as secondary texts on the identified area of research followed by discussion with the teaching faculty before deciding the title. The title may be decided only after the area and problems of research have been identified. The student should ensure that the title is related to one or more of the courses or areas of the study program.

Synopsis of Dissertation:

A Synopsis of the Dissertation should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –
Title of Dissertation
Introduction
Problems of Research
Objectives of Research
Tentative Chapterization
Suggested readings

Format of Dissertation:

- Cover page should provide **Title, Student's particulars, Supervisor's Name and name of Institution/School.**
- Self- declaration
- Certificate from the HOI/HOD of the school. & the supervisor
- Acknowledgements
- Table of contents.

- Chapter I should be a general introduction of the Dissertation: background of the area, problems and objectives of the dissertation. The nature and scope of the dissertation may also be given.
- Other chapters will constitute the body of the Dissertation. The number of chapters and their length will depend on, among others, a critical analysis, implications and major findings.
- References: quotes and extracts should be recorded appropriately in Parenthetical References or Footnotes.
- Appendices and Glossary, if any, should be placed after the concluding chapter.
- Bibliography should be put at the end of the Dissertation: It should include all primary and secondary materials referred in the Dissertation. The references will include Manuscript, Primary Tests, Secondary Texts, Journals, e-texts and Web-links.
- Annexures (if any)

Please note:
Format for Cover page, declaration and certificates from the HOI/HOD of the school will be provided by the department.

Typing Instructions:
- Paper A4 Size
- Font (Times New Roman)-12 Points
- Spacing between two lines 2
- Margins Left = 1.5 inch, Right = 1 inch

Submission of Dissertation:
- Students **MUST** write the dissertation in the **Language of Specialization** only.
- Each student will make at least three copies of project report in the recommended format. It should be typed on one side. The students will submit one copy to the school and one copy to the concerned guide (internal).
- Two or more students cannot work on the same topic. It will not be acceptable.
- Each student is required to make a soft copy of the dissertation (in CD) and submit along with the dissertation.
- Dissertation will be run on plagiarism software and if found copied appropriate action will be taken against the student.
- Only 30-40% quotations are allowed, 60% of work should be their original work.
- The cover page must be hard bound in navy blue color with golden embossing. The size of the report would depend on the project undertaken. However it must be 30-35 (approx.) typed pages on A4 size paper. All the students are required to use uniform font and format (except in heading and subheadings) throughout the dissertation.
- The dissertation must be submitted along with certificates (one from the Head of the Institution of the school and another from the Supervisor) authenticating the originality of the work done in the prescribed format.
- If any matter in the report is picked up from any source and the source name is not referred in the bibliography section then it will be treated as a case of plagiarism. (Cheating)
- If the student uses any table/graph or Figure, then it is to be numbered and source of information from which it is collected, is to be mentioned under each.
- Page numbers should be mentioned at the bottom center of each page.

Assessment Scheme:

Continuous Evaluation: 40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation: 60%
(Based on the organization of the work, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/presented, outcomes vs. objectives, presentation/ viva etc.)

DETAILED STUDY OF SELECTED AUTHOR / LITERARY WORK

(Karl Georg Büchner *Woyzeck* – Eine Feinstudie
Karl Georg Büchner *Woyzeck* - A detailed study)

Course Code: GER2604 **Credit Units: 04**

Course Objective:

- To enable students to do a detailed study of a literary work- ***„Woyzeck''* von Georg Büchner**
- To understand a work in relation to the author and in relation to the other works of the author
- To provide a broad perspective of the thoughts and philosophy of the period, of the contemporary works

Course Contents:

Module 1
Studie des Drama **„Woyzeck'' von Karl Georg Büchner**

Module 2
Der Autor, Biographie, literarische Werke

Module 3
Die Zeitwende, zeitgenössische Autoren und Ihre Werke

Module 4
Schreibstil des Autors (dramatische Technik der szenischen Darstellung und Episierung)

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Wirthwein Heike(Hg.)Büchner Georg,*Woyzeck Reclam XL Text und Kontext Taschenbuch*. Philipp,jun. GmbH, 2013.
- Büchner, Georg, Friedrich Ludwig Weidig, and Hans Magnus Enzensberger. *Der hessische Landbote*. Insel Verlag, 1965.
- Büchner, Georg: Leonce und Lena Ein Lustspiel, Joseph Kiermeier-Debre (Hg.), Deutscher Taschenbuch Verlag.(1. März 1998)
- Büchner, Georg: *Lenz*, Archipelago; Bilingual edition (November 1, 2004)
- Büchner, Georg**:** *Dantons Tod* (German Edition), Klett Lerntraining; Auflage: 4. Auflage (11. März 2013)

BUSINESS GERMAN-II
(Deutsch für den Beruf-II)

Course Code: GER2605 **Credit Units: 4**

Course Objective: The syllabus is in continuation of Business German-I where the students deal with complex grammar and business oriented vocabulary. It prepares the students to communicate effectively at workplace, makes them aware of the professional language and develops intercultural competence.

Course Content : Unternehmen Deutsch (Course Book)
Module I
Der Mitarbeiter im Betrieb
Über das Personalwesen sprechen, Wűnsche und Ziele ausdrűcken, Inhalte präsentieren, ein Mitarbeitergespräch fűhren, Zielverinbarungen treffen, Arbeitszeiten und Gehälter vergleichen.

Verkaufen, verkaufen, verkaufen
Umsatzziele und Maβnahmen vorschlagen und vereinbaren, Marketingstrategien besprechen, Vorschläge machen, zustimmen,widersprechen, Verkaufsverhandlung fűhren, planen, organisieren, evaluieren.

Auf der Messe
Űber Messen sprechen, Grűnde fűr eine Messebestellung nennen, Messegespräche fűhren, Produkte vorstellen, Aufgabe im Team verteilen, pro und contra diskutieren.

Import-Export
Eine Auftragsabwicklung erläutern, Lieferwege nachverfolgen, űber die Allgemeinen Geschäftsbedingungen sprechen, auf Beschwerden reagieren.

Ich möchte hier arbeiten
Um informationen zu Stellenanzeigen bitten, Bildungssysteme vergleichen, einen Lebenslauf schreiben, Bewerbungsbriefe schreiben,Vorstellungsgespräche fűhren, sich űber den Arbeitsmarkt in einem deutschsprachigen Land erkűndigen.

Grammatik
- Dass- Sätze/ Infinitivsätze mit zu
- Konjunktiv II
- Der Gebrauch von werden und Konjugation
- Partizip Perfekt und mit sein und als Adjektive
- Passiv Perfekt und Präteritum
- Präpositionen mit Genitiv: trotz, wegen, während, statt
- Relativsätze mit Präposition
- konjunktion mit Nebensatz: wenn, obwohl, weil, während

Examination Scheme:

Components	CT	Att.	H	EE
Weightage %	20	5	5	70

Text & References:
- Jörg Braunert, Wolfram Schlenker : Unternehmen DeutschB1/B2. Ernst Klett Sprachen GmbH, Stuttgart 2006

Bachelor of Arts Spanish (Honors)

FLEXILEARN
-Freedom to design your degree

Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

WRITTEN EXPRESSION-I
(Expresión Escrita-I)

Course Code: SPA2101 **Credit Units: 05**

Course Objective:
To furnish the linguistic tools

- to present oneself and others, to ask and give personal information
- to give directions, to describe one's surrounding
- to talk about likes and dislikes hobbies
- to tell time and date, to talk about daily routine
- to describe weather
- to take about events in past, to talk about one's experiences

Course Contents:
Unidad 1: Nosotros
Objetivos Comunicativos:
A dar y a pedir los datos personales: el nombre, la edad etcétera. , a saludar y a despedirnos.

Unidad 2: Quiero aprender español
Objetivos Comunicativos:
A expresar intenciones, a expresar intereses, a explicar motivos de lo que hacemos.

Unidad 3:¿Dónde está Santiago?
Objetivos Comunicativos:
Describir lugares y países, expresar existencia, hablar de ubicación, hablar del clima.

Unidad 4: ¿Cuál prefieres?
Objetivos Comunicativos:
Identificar objetos, expresar necesidad, hablar de preferencias, comprar en tiendas, preguntar pro productos, pedir precios etc.

Unidad 5: Tus amigos son mis amigos
Objetivos Comunicativos:
Hablar del aspecto y del carácter, expresar gustos e intereses, preguntar sobre gustos, contrastar gustos, hablar de relaciones personales.

Unidad 6: Día a día
Objetivos Comunicativos:
Hablar de hábitos, expresar frecuencia, describir rutina diaria y el uso de los verbos reflexivos.

Unidad 7: ¡A comer!
Objetivos Comunicativos:
Pedir y dar información sobre comida, las comidas del día, hábitos gastronómicos de los españoles, platos típicos del mundo latino.

Contenido Gramatical:

- Ortología o pronunciación correcta: vocales, consonantes, sílabas. El acento tónico o de intensidad. Grupos fónicos y figuras entonacionales. La puntuación.

- Las tres conjugaciones: -ar,-er, -ir y los verbos ser, tener y llamarse
- El artículo determinado e indeterminado. Algunos usos de a, con, de, por y para
- Los pronombres personales sujeto .El presente de Indicativo (verbos terminados en –ar/-er/-ir)
- Algunos usos de hay, El verbo estar. El Superlativo, Un/una/unos/unas, Mucho/ mucha/ muchos/muchas
- Qué/cuál/cuál**es/**cuántos/ cuántas**/** Dónde/Cómo
- Los demostrativos: este/esta/estos/estas/esto
- El/la/los/las adjetivo, Qué**+** sustantivo/ cuál/cuáles
- Tener que + Infinitivo, El verbo Ir El verbo gustar, Los posesivos
- El presente de Indicativo de algunos verbos irregulares. Los verbos reflexivos
- Yo también/ Yo tampoco/ Yo sí/ Yo no. Primero/ Después/ Luego

Examination Scheme

Component	**CT**	**Home Assign**	**Att.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al.*Aula Internacional 1*. Barcelona: Difusión, 2005.

Corpas, Jaime et al. *Cuadernos de gramática española A1*. Barcelona: Difusión, 2010.

Fuentes

Concha Moreno Garc. *Nuevo Español Sin Fronteras.*SGEL.2005.

ORAL EXPRESSION-I
(Expresión Oral)

Course Code: SPA2102 **Credit Units: 05**

Course Objective: To provide the students with the know-how
- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking Spanish.

Course Content:
Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:
- Corpas, Jaime et al. *Aula Internacional 1*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005*

Examination Scheme:

Components	**CT**	**Attd.**	**EE**
Weightage (%)	25	5	70

Texts & References:

- Corpas, Jaime et al. *Aula Internacional 1*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005*.

GRAMMAR AND COMMUNICATIVE SPANISH-I
(Gramática y españolcomunicativo)

Course Code: SPA2103 **Credit Units: 5**

Course Objective:
To furnish the linguistic tools

- to present oneself and others, to ask and give personal information
- to give directions, to describe one's surrounding
- to talk about likes and dislikes, hobbies
- to tell time and date, to talk about daily routine
- to describe weather
- to talk about events in past, to talk about one's experiences

Course Content:
Actos de comunicación

Unidad 1: Conociendo gente
Saludos y despedidas formales e informales, Presentarte y presentar a otros, Preguntar y contestar sobre nombre, nacionalidad y profesión.

Unidad 2: ¿Dónde está?
Situar lugares y objetos en el espacio, Preguntar y contestar sobre direcciones y teléfonos, Preguntar y contestar sobre la existencia de lugares y objetos.

Unidad 3: ¿Tienes tiempo?
Hablar de horas y de fechas, hablar de algunas costumbres y situar en el tiempo, preguntar y expresar costumbres y frecuencia

Unidad 4: ¡Que cara esta la vida!
Hablar de cantidades: precios, salarios, monedas etcétera, Preguntar e informar sobre el precio de cosas usuales, comprar el precio entre países, Expresar sorpresa, acuerdo y desacuerdo con exclamaciones.

Unidad 6: ¿Y cómo es él?
Descripciones físicas, hablar de relaciones con otras personas, preguntar por la edad, llamar la atención, confirmar una afirmación

Unidad 7: Para gustos están los colores
Expresar y pedir opinión, expresar, preguntar y contrastar gustos y preferencias

Gramática:

- El género y el número
- El articulo determinado e indeterminado
- Las tres conjugaciones –ar, -er& -ir y los verbos ser, llamarse, tener, vivir etc.
- Construcciones con hay e el verbo estar
- Los artículos
- Interrogativos: ¿Cuál?, ¿Dónde?

- Presente de hacer, ir(se) y venir
- Contracciones al, del
- Marcadores de frecuencia
- Algunos exclamaciones
- Los demostrativos
- Adjetivos posesivos
- La doble negación.

Examination Scheme:

Components	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Text: *Nueva Español sin Fronteras1*, SGEL, Madrid, 1998

Referencia
Aula Internacional 1, Editorial difusión, Barcelona, 2006 (Indian Edition Available)

Syllabus – Second Semester

WRITTEN EXPRESSION-II
(Expresión Escrita-II)

Course Code: SPA2201 **Credit Units: 05**

Course Objective:
To furnish the linguistic tools

- to express one's point of view, difficulties, emotions, motivation, preferences etc.
- to describe lodgings, objects
- to talk about or narrate events in past and future,
- to talk about health, express pain and symptoms
- to ask and to give advices, to give instructions
- to compare objects and people, to describe daily activities

Course Contents:

Unidad 8: El barrio ideal
Objetivos Comunicativos:
Describir pueblo, barrios y ciudades, hablar de lo que más uno gusta de un lugar, pedir y dar información para llegar a un sitio.

Unidad 9: ¿Sabes cocinar?
Objetivos Comunicativos:
Hablar de platos típicos del mundo hispánico, hablar de experiencias pasadas, hablar de habilidades y aptitudes, hablar de cualidades y defectos de las personas.

Unidad 10: Una vida de película
Objetivos Comunicativos:
Escribir y describir una biografía imaginaria, hablar de cineastas del mundo hispánico.

Unidad 1:¿El español y tú
Objetivos Comunicativos:
Hablar de hábitos, expresar duración, preguntar y responder sobre motivaciones, hablar de dificultades, hacer recomendaciones.

Unidad 2: Hogar dulce hogar
Objetivos Comunicativos:

Expresar gustos y preferencias, describir una casa, ubicar objetos en el espacio, describir objetos: los muebles y las partes de la casa.

Unidad 3: Esta soy yo
Objetivos Comunicativos:
Identificar y describir físicamente a las personas, hablar de las relaciones y de los parecidos entre personas.

Unidad 4: ¿Cómo va todo?
Objetivos Comunicativos:
Desenvolverse en situaciones muy codificadas: invitaciones, presentaciones, saludos y despedidas, pedir cosas, acciones y favores.

Contenido Gramatical:

- Los verbos poner y traer
- La forma impersonal con **se**
- Los cuantificadores

- A resaltar un aspecto
- El Pretérito Perfecto
- Saber + Infinitivo
- Adjetivos de carácter
- La forma y algunos usos del Pretérito Indefinido
- Marcadores temporales para el pasado
- Empezar a + Infinitivo
- Ir / Irse

Examination Scheme

Component	**CT**	**Home Assign**	**Attd.**	**EE**
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir
Corpas, Jaime et al. *Aula Internacional 1*. Barcelona: Difusión, 2005.
Corpas, Jaime et al. *Cuadernos de gramática española A1*. Barcelona: Difusión, 2010.
Corpas, Jaime et al. *Cuadernos de gramática española A2*. Barcelona: Difusión, 2010.
Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2005.

Fuentes
Concha Moreno Garc. *Nuevo Español Sin Fronteras 1.*SGEL.2005.
Concha Moreno Garc. *Nuevo Español Sin Fronteras 2.*SGEL.2005.

ORAL EXPRESSION-II
(Expresión Oral)

Course Code: SPA2202 **Credit Units: 05**

Course Objective: To provide the students with the know-how
- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to produce sentence-level oral discourse in Spanish and begin to connect strings
- of coherent sentences to approximate paragraph-level oral discourse
- to apply appropriate listening strategies to aid their understanding of extended
- discourse in spoken Spanish
- to be sensitized to nuances of speech, dialectical variations.
- to overcome the fear of speaking a foreign language and take position as a foreigner speaking Spanish

Course Content:
Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations) of:
- Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras.* *España: SGE, 2005*

Examination Scheme:

Components	**CT**	**Attd.**	**EE**
Weightage (%)	25	5	70

Text & References
- Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras.* *España: SGE, 2005.*

GRAMMAR AND COMMUNICATIVE SPANISH-II

Course Code: SPA2203 **Credit Units: 6**

Course Objective:
To furnish the linguistic tools

- to express one's point of view, difficulties, emotions, motivation, preferences etc.
- to ask and to give advices, to give instructions
- to express likes and give opinions regarding what one has seen or read.
- to talk about events in past, to talk about one's experiences
- to talk about habits in past.

Course Content:

Actos de comunicación
Unidad 8: ¡Ay, Qué dolor, qué dolor!
Preguntar cómo se encuentra una persona, expresar dolor y malestar, expresar obligación, expresar deseos.

Unidad 9: El próximo fin de semana salimos
Expresar planes e intenciones, expresar acciones futuras, hablar por teléfono, poner mensajes en el contestador automático

Unidad 10: Unidad de repaso.

Unidad 11: ¿Que ha pasado? Hablar de pasado. Dar excusas y disculparte. Ofrecer ayuda inmediata. Expresar gustos y opciones sobre algo que has visto o leído. Expresar ignorancia**.**

Unidad 12: ¿Qué tal las vacaciones?
Hablar de acontecimientos pasados. Hablar de la última vez. Expresar tiempo aproximado.

Unidad 13: …Porque Éramos Jóvenes
Expresar hábitos y costumbre en el pasado. Describir en el pasado. Expresar la circunstancia en que ocurre algo.

Gramática:

- Uso de seguir + gerundio, seguir + infinitivo, estar + gerundio
- Tener/deber + infinitivo
- Tener ganas de/Apetecer + infinitivo / nombre
- Futuros de los verbos en –ar, -er y –ir.
- Ir a+ infinitivo, pensar +infinitivo, estar pensando en +infinitivo
- Después de/ antes de + Infinitivo
- Pretérito perfecto, pronombres objeto directo, verbo Saber.
- Pretéritos irregulares, acordarse de + pretérito.
- Pretérito imperfecto, marcadores temporales de frecuencia.
- Usos del imperfecto. Soler + infinitivo.

Examination Scheme:

Components	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References

Text: *Nueva Español sin Fronteras1*, SGEL, Madrid, 1998

Referencia:
Aula Internacional 1, Editorial difusión, Barcelona, 2006 (IndianEditionAvailable)

Syllabus - Third Semester

WRITTEN EXPRESSION-III
(Expresión Escrita-III)

Course Code: SPA2301 **Credit Units: 04**

Course Objective:
- to furnish the linguistic tools
- to ask for a service, authorization.
- to ask questions in a given situation
- to talk about or narrate events in past
- to talk about one's relation with a language
- to describe someone, a journey, sentiments
- to accept or to refuse a proposal
- to give one's opinion, to carry out a debate or an interaction

Course Contents:

Unidad 5: Guía del ocio
Objetivos Comunicativos:
Hablar de actividades de ocio, hablar de horarios, relatar experiencias pasadas, describir lugares, hablar de intenciones y de proyectos.

Unidad 6: No como carne
Objetivos Comunicativos:
Hablar de gustos y de hábitos alimentarios, preparar el bufé para una fiesta con toda la clase.

Unidad 7: Nos gustó mucho
Objetivos Comunicativos:
Hablar de experiencias y a valorarlas, expresar el deseo de hacer algo, hacer una lista de las cosas más interesantes del lugar.

Unidad 8: Estamos muy bien
Objetivos Comunicativos:
Dar consejos, hablar de estados de ánimo, describir dolores, molestias y síntomas.

Unidad 9: Antes y ahora
Objetivos Comunicativos:
Hablar de hábitos, costumbres y circunstancias en el pasado, situar acciones en el pasado y en el presente, argumentar y debatir.

Unidad 10: Momentos Especiales
Objetivos Comunicativos:
Relatar en pasado, secuenciar acciones, el contraste entre el pretérito indefinido y el pretérito imperfecto.

Unidad 11: Busque y compre
Objetivos Comunicativos:
Dar instrucciones, describir una escena en pasado y en presente, imperativos y sus usos.

Unidad 12: Mañana
Objetivos Comunicativos:
Hablar de acciones y situaciones futuras, expresar condiciones.

Contenido Gramatical:

- El pretérito perfecto .Ir a+ infinitivo
- ya/ todavía no , las formas impersonales con se
- Algunos usos de ser y de estar y/pero/además
- Usos del pretérito perfecto y del pretérito indefinido
- parecer, caer bien/mal
- me/te/le/nos/os/les gustaría + infinitivo
- usos de los verbos ser y estar
- Algunos usos del pretérito imperfecto
- ya no / todavía, futuro imperfecto.
- El contraste entre pretérito indefinido y el pretérito imperfecto
- Las formas del pasado de estar + gerundio.
- Imperativos

Examination Scheme

Component	**CT**	**Home Assign**	**Attd.**	**EE.**
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al. *Aula Internacional 1*. Barcelona: Difusión, 2005.
Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2005.
Corpas, Jaime et al. *Cuadernos de gramática española A1*. Barcelona: Difusión, 2010.
Corpas, Jaime et al. *Cuadernos de gramática española A2*. Barcelona: Difusión, 2010.

Fuentes

Concha Moreno Garc. *Nuevo Español Sin Fronteras1.*SGEL.2005.
Concha Moreno Garc. *Nuevo Español Sin Fronteras 2.*SGEL.2005.

ORAL EXPRESSION-III
(Expresión Oral)

Course Code: SPA2302 **Credit Units: 04**

Course Objective: To provide the students with the know-how
- which includes all aspects of the Spanish language: grammar, vocabulary and phonetics,
- colloquial expressions etc., and benefit from continuous personalized evaluation.
- to express in Spanish in a variety of situations, through active learning.
- to develop strategies of listening comprehension
- conversation practice, listening comprehension and reproduction of the text. Use of
- audio and video materials
- to be sensitized to nuances of speech, dialectical variations.
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:
Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:
- Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2006.
- Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2006*

Examination Scheme:

Components	**CT**	**Attd.**	**EE**
Weightage (%)	25	5	70

Text & References:

- Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2006.
- Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2006.*

INTRODUCTION TO SPANISH CULTURE AND CIVILIZATION
(Introducción de la cultura y la civilización española)

Course Code: SPA2303 **Credit Units: 04**

Course Objective:
This course will provide students with a panoramic view and brief analysis of the civilization and culture of Spain and the Spanish people from earliest times to the present. Although history will occupy a large part of this study, other perspectives from geography, political science, economics, music, art, folklore and the dance will be covered. Special emphasis will be given to those chapters covering: 1) Spain's geography, the transition to democracy (1975 to Present) and aspects of the twentieth century (1900 to 1975); 2) Roman Spain and the Middle Ages up to 1492; and 3) the reign of Ferdinand and Isabella through the Golden Age (1469 to 1700).

Course Contents:
Module I
Geografía: La geografía de España, las costas del Mediterráneo, las montanas, los ríos u el clima.

Module II
Historia: Desde sus primeros días al descubrimientos de América hasta la epopeya de la independencia de América.

Module III
Políticas: Desde la transición hasta hoy.

Module IV
Sociedad: El carácter psicológico y la vida de los Españoles

Module V
Cultura: Arte, música, cine, gastronomía.

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- Ugarte, Francisco. España y su civilización (sexta edición). McGraw-Hill, 2009.
- *The Hispanic Way*.Noble/La Casa. Lincolnwood, Illinois: Passport Books, 1990.

Syllabus – Fourth Semester

WRITTEN EXPRESSION-IV
(Expresión Escrita-IV)

Course Code: SPA2401 **Credit Units: 05**

Course Objective:
To develop the writing skills
- to express sentiments, obligation, possibility
- to present a person, to narrate a story
- to give or to justify one's opinion.

Course Contents:

Unidad 1: Volver a empezar
Objetivos Comunicativos:
Hablar de hábitos en el presente, relatar experiencias pasadas, el uso de los tiempos del pasado.

Unidad 2: Prohibido Prohibir
Objetivos Comunicativos:
Expresar prohibición, expresar obligatoriedad, expresar impersonalidad, hablar de hábitos.

Unidad 3: Mensajes
Objetivos Comunicativos:
Desenvolverse por teléfono, tomar y dejar recados por teléfono, algunas estrategias de comunicación.

Unidad 4: Va y le dice
Objetivos Comunicativos:
Relatar en presente, resumir un argumento, contar chiste, los usos de los pronombres de OD y de OI

Unidad 5: ¡Basta Ya!
Objetivos Comunicativos:
Expresar deseos, reclamaciones y necesidades, valorar situaciones y hechos.

Unidad 6: El turista accidental
Objetivos Comunicativos:
Recursos para contar anécdotas, recursos para mostrar interés al escuchar un relato, hablar de cosas y de consecuencias.

Unidad 7: Tenemos que hablar
Objetivos Comunicativos:
Expresar interés y sentimientos, hablar de las relaciones entre las personas, contra argumentar, suavizar una expresión de desacuerdo.

Unidad 8: De Diseño
Objetivos Comunicativos:
Describir las características y el funcionamiento de algo, opinar sobre objetos, usar las frases exclamativas.

Contenido Gramatical:

- Pretérito perfecto y Indefinido.
- Los pronombres de OD y de OI

- Presente de subjuntivo
- Pretérito pluscuamperfecto.
- Los verbos irregulares
- Expresiones exclamativas.

Examination Scheme

Component	CT	Home Assign	Attd.	EE
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al. *Aula Internacional 1*. Barcelona: Difusión, 2005.
Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2005.
Corpas, Jaime et al. *Cuadernos de gramática española A1*. Barcelona: Difusión, 2010.
Corpas, Jaime et al. *Cuadernos de gramática española A2*. Barcelona: Difusión, 2010.
Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.

Fuentes

Concha Moreno Garc. *Nuevo Español Sin Fronteras 1.*SGEL.2005.
Concha Moreno Garc. *Nuevo Español Sin Fronteras 2.*SGEL.2005.

ORAL EXPRESSION-IV
(Expresión Oral)

Course Code: SPA2402 **Credit Units: 04**

Course Objective: To provide the students with the know-how
- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure

Course Content:
Listening exercises and speaking tasks (imagining dialogues, role plays, telephone conversations, participating in debates, and discussions) of:
- Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2006.*

Examination Scheme:

Components	**CT**	**Attd.**	**EE**
Weightage (%)	25	5	70

Text & References:
- Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2006.*

BUSINESS SPANISH
(Español professional paranegocio)

Course Code: SPA2403 **Credit Units: 05**

Course Objective:

- To familiarize the students with the essentials of professional French
- To enable the students;
  -to take an appointment
  -to enquire and give information about different cities of Spain
  -to talk about work habits and preferences (verbs like to want/ prefer)
  -to present Spanish companies, prepare their CVs, and to face interviews

CourseContents: IntermedioUnidad6-9 pp. **56-95**

Contenidoléxico: Unidad: 6: Lugares para trabajar, l**ugares para vivir**

i) Características de un piso
ii) Objetos de oficina
iii) Instalaciones y servicios de un hotel

Unidad 7: Agenda de trabajo

i) Actividadescotidianas
ii) Las partes del día
iii) Los días de la semana
iv) Proponer y concertarunacita
v) Rechazar una propuesta , justificarse , plantear una alternativa , expresar consejo
vi) Curriculum vitae

Unidad 8: Citas y reuniones

i) Hábitosalimentarios
ii) Platostípicos
iii) Los ingredientes de un plato.

Unidad 9: Productos y proyectos

i) Colores, materiales, tamaño de los productos.
ii) Estaciones del año.

TareaComunicativa:

i) Hablar de acciones habituales y del horario.
ii) Expresar gustos y preferencias de trabajo
iii) Proponer y rechazar una cita a compañeros del trabajo o invitar a unos clientes.
iv) Conversación entre un camarero y dos clientes.
v) Expresarobligación y consejo
vi) Enfrentar la entrevista de trabajo: presentar a si mismo, estudios, practicas, experiencia profesional, preparación para entrevista, simulación de entrevista.
vii) Describir los productos: material, color, función, precio.

ContenidoGramatical:

i) La concordancia del adjetivo, el presente de indicativo de preferir y querer.
ii) Contraste entre ser y estar, los cuantificadores del adjetivo.
iii) La comparación: más /menos+adjetivo+que, más /menos+sustantivo+que.
iv) El superlative:el/la/los/las, más /menos+adjetivo+que
v) El presente de indicativo de empezar, querer, preferir, poder, dormir, salir etc
vi) Con+ pronombrespersonales:conmigo,contigo

vii) Marcadores de frecuencia y secuencia; siempre, casi siempre, a veces, nunca y primero, después, luego
viii) La construcción es que, tener que + Infinitivo
ix) Por la mañana/tarde/noche, a/al mediodía
x) El verbo gustar, los pronombres de Objeto Indirecto, las fechas
xi) A mí también /tampoco, a mí, sí/no
xii) Expresiones para invitar y proponer algo

Examination Scheme

Component Codes	**CT**	**Attd.**	**H**	**EE.**
Weightage (%)	20	5	5	70

Text &References:
El Libroparaseguir

- González, Marisa et al. *Socios 1Libro del alumno*. Barcelona: Difusión, 2007.
- González, Marisa et al. *Socios 1Workbook*. Barcelona: Difusión, 2007.

SPANISH THROUGH LITERARY TEXTS
(Español a través de los textos literarios)

Course Code: SPA2404 **Credit Units: 04**

Course Objective:
- To introduce students to Spanish literature through a study of extracts of select literary works
- To enable them to read and understand literary texts and find new meanings through analysis, evaluation, synthesis and introducing them to different literary movements.
- To understand the nuances of the langue, figures of speech, stylistics
- To empower them to develop critical/ creative thinking

Course Content: Material compiled by the Department

Module I: El español a través de poemas
Extractos de las obras de:
Romancero
Pablo Neruda
Antonio Machado
Miguel Hernández
Federico García Lorca

Module II: El español a través de cuentos/ novelas
Extractos de las obras de
Julio Cortázar-El fin del mundo
Mariano José de Larra -Vuelva usted mañana
Leopoldo Alas - Adiós cordera
Vicente Huidobro - La mujer con abrigo largo
Diego Muñoz Valenzuela- El paseo matinal
Miguel Delibes- El príncipe destronado

Module III: El español a través de los escritores filosóficos
Extractos de las obras de
Benito Jerónimo Feijoo
José Ortega y Gasset
Miguel de Unamuno
Aristotle
Karl Marx

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text &References: ***ShorterNarrativeTexts:***
Breve Biblioteca Hispánica, **EUNSA, Pamplona, 1998.**

SPANISH THROUGH ACTIVITIES
(Español a través de las actividades)

Course Code: SPA2405 **Credit Units: 04**

Course Objective:
To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in Spanish spontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application.
To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews.
To empower them to develop skills independently and to develop critical/ creative thinking.

Course Contents:

Module I: Español a través del teatro
Escenas de juego de roles de la vida cotidiana, monólogos.
Reproduce clásico y moderno - Extractos

Module II: Español a través de las canciones
Ejercicios de gramática, vocabulario, dictados, fonética mientras escuchar / aprender a cantar canciones españolas de ayer y de hoy.

Module III: Español a través de las películas
Lenguaje cinematográfico y poca gramática del cine
Críticos / películas

Module IV: Español a través de la comida
Platos populares y tradicionales españoles. Recetas de platos y vocabulario de comida.

Examination Scheme

Component Codes	**CT**	**Attd.**	**C**	**P**
Weightage (%)	40	5	30	25

*There is no end-term examination. There is continuous assessment.
Text & References: Material compiled by the Department

Syllabus – Fifth Semester

WRITTEN EXPRESSION-V
(ExpresiónEscrita-V)

Course Code: SPA2501 **Credit Units: 05**

Course Objective:
To develop the writing skills

- To report speech, to express one's point of view
- To analyze an editorial, to compare informations given in different texts
- To describe or narrate an experience
- To give advice and organize a debate
- To express an opposition, a hypothesis, a goal, probabilities
- To compare

Course Contents:

Unidad 9: Misterios y enigmas
Objetivos Comunicativos:
Hacer hipótesis y conjeturas, relatar sucesos misteriosos.

Unidad 10: Buenas noticias
Objetivos Comunicativos:
Redactar una noticia, referirse a una noticia y comentarla, el uso de voz pasiva.

Unidad 11: Yo nunca lo haría
Objetivos Comunicativos:
Dar consejos, evocar situaciones imaginarias, opinar sobre acciones y conductas, expresar desconocimiento, expresar deseo.

Unidad 12: América
Objetivos Comunicativos:
Recursos para narrar acontecimientos de pasado, los usos del presente de subjuntivo, cómo expresar conocimientos y desconocimientos sobre un tema.

Unidad 1: Maneras de vivir
Objetivos Comunicativos:
Hablar de sentimientos, del carácter y de la personalidad, dar consejos y hacer propuestas, expresar deseos, hablar de las cualidades de personas y objetos.

Unidad 2: Así pasó
Objetivos Comunicativos:
Usos del imperfecto de indicativo, uso del imperfecto de subjuntivo, usos del gerundio, la colocación del adjetivo.

Unidad 3: ¿Y tú qué opinas?
Objetivos Comunicativos:
Dar nuestra opinión usando creo que más indicativo, no creo que más subjuntivos. Discutir vocabulario para hablar del ocio y del turismo.

Contenido Gramatical:

- Futuro simple
- Subjuntivos
- La voz pasiva
- Uso de condicional
- Pretérito imperfecto del subjuntivo
- Usos de por y para.

Examination Scheme

Component	**CT**	**Home Assign**	**Attd.**	**EE.**
Weightage (%)	20	5	5	70

Text & References:

Text

El Libro para seguir

Corpas, Jaime et al. *Aula Internacional 1*. Barcelona: Difusión, 2005.
Corpas, Jaime et al. *Aula Internacional 2*. Barcelona: Difusión, 2005.
Corpas, Jaime et al. *Cuadernos de gramática española A1*. Barcelona: Difusión, 2010.
Corpas, Jaime et al. *Cuadernos de gramática española A2*. Barcelona: Difusión, 2010.
Corpas, Jaime et al. *Aula Internacional 3*. Barcelona: Difusión, 2006.
Corpas, Jaime et al.*Aula Internacional 4*. Barcelona: Difusión, 2006.

Fuentes

Concha Moreno Garc. *Nuevo Español Sin Fronteras 1.*SGEL.2005.
Concha Moreno Garc. *Nuevo Español Sin Fronteras 2.*SGEL.2005.

ORAL EXPRESSION-V
(Expression Oral)

Course Code: SPA2502 **Credit Units: 04**

Course Objective: To provide the students with the know-how
- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure
- to present facts, projects, plans with precision
- to develop logical thinking, to speak, argue and debate in a coherent and cohesive manner employing appropriate words of liaison, and transition

Course Content:
Preparing presentations, talk about any topic, developing the techniques of debates, discussions; mastering the art of convincing through logical arguments

- Corpas, Jaime et al. *Aula Internacional 4*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005.*

Examination Scheme:

Components	**CT**	**Att.**	**EE**
Weightage (%)	25	5	70

Text & References:
- Corpas, Jaime et al. *Aula Internacional 4*. Barcelona: Difusión, 2006.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005.*

INTRODUCTION TO TRANSLATION
(Introducción a la Traducción)

Course Code: SPA2503 **Credit Units: 05**

Course Objective:
To introduce to students
- Basic concepts and theory of translation
- Methods and procedures
- Translation of commercial correspondence, such as brochures, handouts, agreements, contracts, etc. from Spanish to English and vice versa.

Course Contents:

Module I
What is translation, the concept of source text and target text, the concept of original audience, text internal and text external factors, types of dictionaries and references, using parallel text and background text.

Module II
Introduction to methodology and theories of translation, equivalence and adequacy in translation, skopus theory, about various pioneers of translation and their theories.

Module III
Grammatical and lexical aspects of translation, stylistic variations in language, various text types.

Module IV
Theory and problems of Translation: Commercial, Economic, Journalistic and Technical Texts.

Examination Scheme

Component	**CT**	**Attd.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Jack Child *Introduction to Spanish Translation;* University Press of America, 2012
- José H. Valdivieso, L. Teresa Valdivieso, D.C. Heath / Co, *Negocio y comunicación*, Lexington, Massachussets, 1988.
- Blanca Aguirre, Consuelo Hernández, *Curso de español comercial*, SEGEL, Madrid, 1987.
- Josefa Gómez de Enterría, *Correspondencia comercial en español*, SEGEL, Madrid, 1990.

SUMMER PROJECT EVALUATION

Course Code: SPA2535 **Credit Units: 03**

Summer Project is primarily a research work and its primary objective is to gain knowledge through practical experience, a sound appreciation and understanding of the theoretical principles learnt during the semesters. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR SUMMER PROJECT REPORT

Topic

The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include literature, culture, civilization or any other related areas.

Synopsis of Summer Project Report

A Synopsis of the Summer Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

Title of Summer Project Report
Introduction
Problems of Research/Presenting the topic/Problems/Issues of Research
Objectives of Research
Tentative Subheadings
Suggested readings

Source Material and References

Presenting your own ideas in a Summer Project Report is encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources should be cited. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases.

There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet.

Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.

Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You must

also obtain permission from the Supervisor before using your Summer Project Report for more than one course.

Length and Format
Length is not important; 20 to 25 pages of 2 spaced texts is a good target. The title, author, course, and date should be typed onto a cover sheet. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading
Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is *not* to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. It will read by the supervisor carefully, who may offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This will make the writing of a Summer Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have a gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Summer Project Report look and sound professional.

Sl. No.	Evaluated by	Criteria	Marks
1	Institution	• Scope and content • Understanding and presenting the topic • Depth and breadth of analysis • Project fulfillment • Language, logical flow, coherence. • Data collection ability in the field (if any) • Scope of Implementation.(if applicable)	50
2	Board of Examiners	Viva-voce Examination	50
		Total	**100**

Project Schedule

Registration
First week of the last academic month
Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.

Approval of Project Topic
Week following the „week of registration"

Submission of Synopsis To Faculty Guide
Prior to the completion of End-Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

Duration of Project
The project stretches for the full duration of the Semester break .

Submission of Report
First Draft – After 20 Days from the commencement of the project.

Second Draft – 20 days after submission of the first draft.
The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.

Final Draft – Within second week of rejoining of institution.

INTRODUCTION TO LINGUISTICS

Course Code: SPA2504 **Credit Units: 04**

Course Objective: This paper aims to provide the students the basic knowledge of Linguistics and its various branches of study. The focus of the paper is to enable the learners to have an understanding of the science of language and to be able to analyze linguistically any given language including the foreign language that they pursue.

Course Contents:
Module I: Introduction
What is language and linguistics?
Design features of human language.
Various branches of Linguistics and their application.
Module II: **Phonetics and Phonology**
Anatomy and physiology of speech production.
Classification of sounds through IPA symbols.
Difference between Phonetics and Phonology.
Module III: Morphology
Basic concepts of morphology
Word Formation processes
Module IV: Syntax
Theories and concepts of Syntactic structure.
Analysis of sentence structure
Module V: Semantics
Basic concepts of Semantics
Meaning and types of Meaning

Examination Scheme:

Components	CT	ATT	H	EE
Weightage %	20	5	5	70

Text & References:
Text:
Fromkin, V., and R. Rodman. 1974 (9th Edition)..*An Introduction to Language*. New York: Holt, Rinehart and Winston.

References:
1. Akmajian, A., R.A. Demers, A.K. Farmer, & R.M. Harnish 2001. Linguistics: An Introduction to Language and Communication. Cambridge, Massachusetts: The MIT Press
2. Carnie, Andrew. 2013 (3rd Edition). Syntax: A Generative Introduction. West Sussex: Wiley- Blackwell Publication
3. Crystal D.1997. Encyclopedia of Language: 2nd Vol., Cambridge: Cambridge University Press
4. Haegeman, L. 1991. (rev. Ed.). Introduction to Government and Binding Theory.
5. Hockett. C.F. 1958.A Course in Modern Linguistics. New York: Macmillian. Indian Edition, New Delhi: Oxford and IBH Publishing Co.
6. Katamba, F. and John Stonham 2006. Morphology 2nd ed. London: Palgrave.
7. Ladefoged, Peter. 2001 (4th edn.).A course in phonetics. New York: Harcourt Brace.
8. Lyons J, 1977. Semantics. 2 Vols. Cambridge: Cambridge University Press.
9. Odden, David. 2005. Introducing phonology. Cambridge: Cambridge University Oxford: Blackwell.Press
10. Roach, P. 2001. Phonetics. Oxford: Oxford University Press.

INTRODUCTION TO CULTURE AND CIVILIZATION OF LATIN AMERICAN COUNTRIES

(INTRODUCCIÓN A LA CULTURA Y CIVILIZACIÓN DE AMERICA LATINA)

Course Code: SPA2505 **Credit Units: 04**

Course Objective:

- The course is designed to give a broad geographical, historical, cultural and social background of Latin America. It will give the students an insight into the major events- historical, political and cultural- of Latin American society.
- This course enables students to be able to understand more about the histories and cultures of Latin America.
- The course will highlight the various other cultural aspects like Latin American festivals, cuisine, cinema, music and theatre.

Course Contents:

Module I
Latino América Retos y problemas

Module II
La cultura contemporánea

Module III
La América precolombina

Module IV
Descubrimiento y conquista del Nuevo Mundo

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

- Quesada, Sebastián. *Imágenes de América Latina*. EDELSA, 2001.

Syllabus – Sixth Semester

WRITTEN EXPRESSION-VI
(ExpresiónEscrita-VI)

Course Code: SPA2601 **Credit Units: 05**

Course Objective:
- To develop the writing skills
- to express regret, one‟s opinion, the cause, sentiments
- to defend or to justify oneself
- to talk about one‟s relation with a language
- to compare, to talk about the qualities of others

Course Contents:

Unidad 4: Se valorará la experiencia
Objetivos Comunicativos:
Usos del pretérito perfecto de subjuntivo, usos de se en oraciones impersonales, usos de las oraciones pasivas.

Unidad 5: La vida es puro teatro
Objetivos Comunicativos:
Describir acciones con adjetivos, gerundios y adverbios, describir los movimientos y la situación de personas y cosas, describir estados de ánimo, hablar de la postura corporal.

Unidad 6: Dijiste que lo harías
Objetivos Comunicativos:
Uso de presente/ imperfecto de subjuntivo, escribir y describir relatos breves, una carta etcétera.

Unidad 7: Lugares con encanto
Objetivos Comunicativos:
Usos de la voz pasiva, hablar de ciudades; describirlas y comentar sus cualidades, expresar sentimientos positivos, negativos o neutros sobre algo.

Unidad 8: Antes de que sea tarde
Objetivos Comunicativos:
Uso de diferentes recursos léxicos y gramaticales para cohesionar textos: uso de sinónimos, hipónimos, pronombres. Comprender y poder capaz de formar noticias y artículos periodísticos imaginarios.

Unidad 9: Vivir para trabajar
Objetivos Comunicativos:
Hablar de cualidades en el trabajo, hablar de problemas y sentimientos en el trabajo, describir una empresa, hablar de las funciones de un puesto de trabajo.

Unidad 10: Como no lo sabía
Objetivos Comunicativos:
Hablar de hechos no realizados en el pasado y de sus consecuencias, hacer reproches, hablar de habilidades etcétera.

Contenido Gramatical:

- Pretérito perfecto de subjuntivo
- Uso de se, construcciones relativas: aquellos que, todo aquel que etcétera.
- Condicional compuesto
- El pretérito pluscuamperfecto de subjuntivo.
- Usos de poner y quedar
- Volver a más infinitivo.
- Seguir más gerundio.

Examination Scheme:

Component	**CT**	**Home Assign**	**Attd.**	**EE.**
Weightage (%)	20	5	5	70

Text & References:

- **El Libro para seguir**: Corpas, Jaime et al.*Aula Internacional 1*. Barcelona: Difusión, 2005.
- **El Libro para seguir**: Corpas, Jaime et al.*Aula Internacional 2*. Barcelona: Difusión, 2005.
- **El Libro para seguir**: Corpas, Jaime et al.*Aula Internacional 3*. Barcelona: Difusión, 2006.
- **El Libro para seguir**: Corpas, Jaime et al.*Aula Internacional 4*. Barcelona: Difusión, 2006.

ORAL EXPRESSION-VI
(Expression Oral)

Course Code: SPA2602 **Credit Units: 04**

Course Objective: To provide the students with the know-how
- to understand the Spanish phonetic system
- to develop strategies of listening comprehension
- to pass from written to oral, from oral to written easily
- to be sensitized to nuances of speech, dialectical variations.
- to master the current social communication skills in oral
- to enrich the formulations, the linguistic tools and vary the sentence structure
- to present facts, projects, plans with precision
- to develop logical thinking, to speak, argue and debate in a coherent and cohesive manner employing appropriate words of liaison, and transition

Course Content:
Preparing presentations, talk about any topic, developing the techniques of debates, discussions; mastering the art of convincing through logical arguments

Presentación: presentación, aprecio y texto crítico y el debate sobre la declaración.
Géneros literarios: Presentar un texto literario.
Asistirunaentrevista.
- Corpas, Jaime et al. *Aula Internacional 4*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005.*

Examination Scheme:

Components	**CT**	**Att.**	**EE**
Weightage (%)	25	5	70

Text &References:
El Libro para seguir:
- Corpas, Jaime et al. *Aula Internacional 4*. Barcelona: Difusión, 2005.
- Jesús Sánchez Lobato et al. *Español sin fronteras. España: SGE, 2005.*

INTRODUCTION TO SPANISH LITERATURE

(Introducción a la literatura española: Tipología de los géneros literarios españolas)

Course Code: SPA2603 **Credit Units: 06**

Course Objective:
To introduce the students to Spanish literature through extracts of texts selected from different literary genres of various famous authors across the centuries

Course Content:

Module I: Novelas

Miguel de Cervantes	: Novelas Ejemplares
Federico García Lorca	: La casa de Bernarda Alba
Doña Perfecta	: Benito Pérez Galdós
La familia de Pascual Duarte	: Camilo José Cela
Benito Pérez Galdós	: Marianela

Module II: Teatro

Pedro Calderón	: Autos Sacramentales
La Celestina	: Fernando de Rojas
La vida es sueño	: Lope de Vega
Don Juan Tenorio	: José Zorrilla

Module III: Poesía

Luis de Góngora	: Letrillas y sonetos
Francisco de Quevedo	: Sueños
José Martí	: Versos sencillos
Rubén Darío	: Canto de Vida Esperanza
Pablo Neruda	: Veinte poemas de amor

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- *Literaturahispanoamericana1 y 2*, Ed. de Enrique Anderson Imbert y Eugenio Florit, Holt, Rinehart and Winston, 1970.
- Alborg, Juan Luis. *Historia de la literatura española. Tomo II: Barroco.* Madrid, Gredos, 1972.
- Wilson, Edward M. y Moir, Duncan. *Historia y crítica de la literatura española 3. Siglo de Oro: Teatro (1492-1700).* México, Ariel, 1987.

DISSERTATION

Course Code: SPA2637 **Credit Units: 03**

Dissertation is primarily a research work. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.
The Dissertation will help students deal with literary problems and issues and they will learn to demonstrate critical thinking in research and writing.

GUIDELINES OF DISSERTATION

Objectives of Dissertation

The students will decide the topic at the beginning of the session in consultation with the Supervisor assigned. The progress of the work will be monitored regularly by the Supervisor. At the end of the Semester/Term the detailed dissertation will be submitted to the Supervisor assigned. The evaluation will be done by Board of Studies of the Institute.

Title of Dissertation

The title should reflect the area and problems/issues of the dissertation properly. The student should do a preliminary reading of primary as well as secondary texts on the identified area of research followed by discussion with the teaching faculty before deciding the title. The title may be decided only after the area and problems of research have been identified. The student should ensure that the title is related to one or more of the courses or areas of the study program.

Synopsis of Dissertation:

A Synopsis of the Dissertation should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –
Title of Dissertation
Introduction
Problems of Research
Objectives of Research
Tentative Chapterization
Suggested readings

Format of Dissertation:

- Cover page should provide **Title, Student's particulars, Supervisor's Name and name of Institution/School.**
- Self- declaration
- Certificate from the HOI/HOD of the school. & the supervisor
- Acknowledgements
- Table of contents.
- Chapter I should be a general introduction of the Dissertation: background of the area, problems and objectives of the dissertation. The nature and scope of the dissertation may also be given.
- Other chapters will constitute the body of the Dissertation. The number of chapters and their length will depend on, among others, a critical analysis, implications and major findings.

- References: quotes and extracts should be recorded appropriately in Parenthetical References or Footnotes.
- Appendices and Glossary, if any, should be placed after the concluding chapter.
- Bibliography should be put at the end of the Dissertation: It should include all primary and secondary materials referred in the Dissertation. The references will include Manuscript, Primary Tests, Secondary Texts, Journals, e-texts and Web-links.
- Annexures (if any)

Please note:
Format for Cover page, declaration and certificates from the HOI/HOD of the school will be provided by the department.

Typing Instructions:
- Paper A4 Size
- Font (Times New Roman)-12 Points
- Spacing between two lines 2
- Margins Left = 1.5 inch, Right = 1 inch

Submission of Dissertation:
- Students **MUST** write the dissertation in the**Language of Specialization** only.
- Each student will make at least three copies of project report in the recommended format. It should be typed on one side. The students will submit one copy to the school and one copy to the concerned guide (internal).
- Two or more students cannot work on the same topic. It will not be acceptable.
- Each student is required to make a soft copy of the dissertation (in CD) and submit along with the dissertation.
- Dissertation will be run on plagiarism software and if found copied appropriate action will be taken against the student.
- Only 30-40% quotations are allowed, 60% of work should be their original work.
- The cover page must be hard bound in navy blue color with golden embossing. The size of the report would depend on the project undertaken. However it must be 30-35 (approx.) typed pages on A4 size paper. All the students are required to use uniform font and format (except in heading and subheadings) throughout the dissertation.
- The dissertation must be submitted along with certificates (one from the Head of the Institution of the school and another from the Supervisor) authenticating the originality of the work done in the prescribed format.
- If any matter in the report is picked up from any source and the source name is not referred in the bibliography section then it will be treated as a case of plagiarism. (Cheating)
- If the student uses any table/graph or Figure, then it is to be numbered and source of information from which it is collected, is to be mentioned under each.
- Page numbers should be mentioned at the bottom center of each page.

Assessment Scheme:
Continuous Evaluation: 40%
(Based on abstract writing, interim draft, general approach,
research orientation, readings undertaken etc.)
Final Evaluation: 60%
(Based on the organization of the work, objectives/
problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/presented, outcomes vs. objectives, presentation/ viva etc.)

APPLIED SPANISH GRAMMAR AND INTRODUCTION TO LINGUISTICS

(Gramática aplicada del español e Introducción a la lingüística)

Course Code: SPA2604 **Credit Units: 04**

Course Objective: To lay a foundation in Spanish Grammar
To provide the students

i. with a knowledge of basic grammatical concepts
ii. with technical tools to do grammatical analysis of sentences
iii. with a knowledge of basic theories and concepts in linguistics.

Course Content:

Module 1
Construcciones infinitivos
Los verbos auxiliares modales
Preposiciones
Por y para
Adjetivos indefinidos, pronombres y adverbios

Module 2
Las diferencias entre el español de América Latina y el español de España

Module 3
La lengua; su definición
Lugar de lengua en los hechos de lenguaje
Lugar de la lengua en los hechos humanos. La semiología

Examination Scheme:

Components	**CT**	**Att.**	**H**	**EE**
Weightage (%)	20	5	5	70

Text & References:

- Bradley,PeterT.,andLan Mackenzie. *Spanish: An Essential Grammar*. London: Routledge, 2004.
- Saussure, Ferdinand De, Charles Bally, and Albert Sechehaye. *Curso de Linguistica General*. Madrid: Akal Editor, 1980.

DETAILED STUDY OF LITERARY TEXTS
(Estudio de los textos literarios en detalle)

Course code: SPA2605 **Credit Units: 04**

Course Objective:
- To make students understand Spanish literature in detail.
- To enable them to read and understand literary texts and find new meanings through analysis, evaluation, synthesis and introducing them to different literary movements and theories.
- To understand the nuances of the langue, figures of speech, stylistics
- To empower them to develop critical/ creative thinking

Course Content

Modulo I: El español a través de poemas, leyendas

Bécquer, Gustavo Adolfo : Rimas y leyendas
Jorge Manrique : Coplas a la muerte de su padre
Pablo Neruda : Veinte poemas de amor
Rubén Darío : Prosas Profanas
Dámaso Alonso : Hijos de La Ira

Modulo II: El español a través de novelas

Lazarillo de Tormes : Autor anónimo
Pedro Calderón : La vida es sueno
Miguel de Cervantes : Don Quijote de la Mancha
Dulce Chacón : La voz dormida
Carmen Laforet : Nada

Modulo II: El español a través de los ensayos y cuentos

Pedro Henríquez Ureña : La AméricaEspañola y su originalidad.
Andrés Bello : Nuestro Ideal: La creación de la cultura americana
José Martí : Nuestra América
Rafael Arévalo Martínez : La Mentira
Rómulo Gallegos : El Piano Viejo
Manuel Rojas : Un Mendigo

Examination Scheme:

Components	CT	Att.	H	EE
Weightage (%)	20	5	5	70

Text & References:

ShorterNarrativeTexts:

Breve Biblioteca Hispánica, **EUNSA, Pamplona, 1998.**
Barry,Peter. *Beginning Theories:* *An introduction to literary and cultural theory*.**New Delhi.**

Amity School of Liberal Arts & FL

Bachelor of Arts - History (Honors)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Arts - History (Honors)

Syllabus - First Semester

SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD

Course Code: HIS2104 **Credit Units: 5**

Course Objective
The course is designed to provide in-depth knowledge about the historical processes of the ancient world. Some key components of the course include evolution of humankind, the Neolithic phase, Bronze Age civilizations, and the history of Ancient Greece. The course will give an insight into the socio-cultural and political factors which impacted the historical process in the world during the ancient period.

Course Content

Unit I Evolution of humankind
- Palaeolithic Culture
- Mesolithic Culture

Unit II Neolithic Phase
- Food production-beginnings of agriculture and animal husbandry

Unit III Bronze Age Civilizations
- Case Study I: Egypt
- Case Study II: Mesopotamia

Unit IV Ancient Greece I
- Slave society in ancient Greece
- Agrarian economy, urbanisation and trade

Unit V Ancient Greece II
- Polis in ancient Greece: Athens and Sparta
- Greek Culture
- Greek Religion

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Compulsory Readings
Burns and Ralph. World Civilisations
Cambridge History of Africa, Vol. I
V. Gordon Childe, What Happened in History
G. Clark, World Prehistory : A New Perspective

B. Fagan, People of the Earth
Amar Farooqui, Early Social Formations
M. I. Finley, The Ancient Economy
Jacquetta Hawkes, First Civilisations
G. Roux, Ancient Iraq
Bai Shaoyi, An Outline History of China
H. W. F. Saggs, The Greatness that was Babylon
B. Trigger, Ancient Egypt: A Social History
UNESCO Series: History of Mankind, Vols. I – III/ or New ed. History of Humanity
R. J. Wenke, Patterns in Prehistory

Optional Readings
G. E. M. Ste Croix, Class Struggles in the Ancient Greek World
J. D. Bernal, Science in History, Vol. I
V. Gordon Childe, Social Evolution
Glyn Daniel, First Civilisations
A. Hauser, A Social History of Art, Vol. I

HISTORY OF EARLY INDIA-I

Course Code: HIS2105 **Credit Units: 5**

Course Objective

The course is aimed at providing in-depth knowledge about the historical processes of early India. The course also intends to provide a historiographical background to ancient Indian history by reconstructing the history of the period. The course will focus on Stone Age cultures, advent of food production, the Harappan Civilization, and the Vedic Period.

Course Content

Unit I Reconstructing Ancient Indian History

- Early Indian notions of History
- Sources and tools of historical reconstruction
- Historical interpretations (with special reference to gender, environment, technology, and regions)

Unit II Pre-historic Hunter-Gatherers

- Palaeolithic cultures- sequence and distribution; stone industries and other technological developments
- Mesolithic cultures- regional and chronological distribution; new developments in technology and economy; rock art

Unit III The Advent of Food Production

- Understanding the regional and chronological distribution of the Neolithic and Chalcolithic cultures : subsistence, and patterns of exchange

Unit IV The Harappan Civilization

- Origins; settlement patterns and town planning; agrarian base; craft productions and trade; social and political organisation; religious beliefs and practices; art; the problem of urban decline and the late/post-Harappan traditions

Unit V Cultures in Transition

- The Aryan Invasion Debate
- The Vedic Period

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Compulsory Readings

D. P. Agrawal, The Archaeology of India, 1985
Bridget & F. Raymond Allchin, The Rise of Civilisation in India and Pakistan, 1983
A. L. Basham, The Wonder that Was India, 1971
D. K. Chakrabarti, The Archaeology of Ancient Indian Cities, 1997, Paperback
D. K. Chakrabarti, The Oxford Companion to Indian Archaeology, New Delhi, 2006
H. C. Raychaudhuri, Political History of Ancient India, Rev. ed. with Commentary by B.N. Mukherjee,1996

K. A. N. Sastri, ed., History of South India, OUP, 1966
R. S. Sharma, Material Culture and Social Formations in Ancient India, 1983
Upinder Singh, A History of Ancient and Early Medieval India, 2008
Romila Thapar, Early India from the Beginnings to 1300, London, 2002

Optional Readings

Uma Chakravarti, The Social Dimensions of Early Budhdhism, 1997
Rajan Gurukkal, Social Formations of Early South India, 2010
R. Champakalakshmi, Trade, Ideology and Urbanisation South India 300 BC- AD 1300, 1996

SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE MEDIEVAL WORLD

Course Code: HIS2106 **Credit Units: 5**

Course Objective

The course is designed to introduce students to the social patterns and cultural formations of the Medieval world. The key components of this course are an in-depth analysis of the Roman Republic, the religion and culture of ancient Rome, crisis of the Roman Empire, economic developments in Europe, and social formations in Central Islamic lands. The course is aimed at equipping students with learning about the historical processes of the medieval world.

Course Content

Unit I The Roman Republic

- Origins of the Roman Empire
- Slave society in ancient Rome
- Agrarian economy, urbanization and trade

Unit II Religion and Culture in Ancient Rome

- Roman Religion
- Cultural Patterns

Unit III Crises of the Roman Empire

- Causes of Decline of the Roman Empire

Unit IV Economic Developments in Europe from the 7th to the 14th Centuries

- Organisation of production
- Towns and trade
- Technological developments
- Crisis of feudalism

Unit V Societies in Central Islamic Lands

- The tribal background, ummah, Caliphal state; rise of Sultanates
- Religious developments : the origins of Shariah , Mihna ,Sufism
- Urbanisation and trade

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Compulsory Readings

Perry Anderson, *Passages from Antiquity to Feudalism*
Marc Bloch, *Feudal Society*, 2 Vols
Cambridge History of Islam, 2 Vols
Georges Duby, *The Early Growth of the European Economy*
Fontana, *Economic History of Europe*, Vol. I (relevant chapters)

P. K. Hitti, *History of the Arabs*
P. Garnsey and Saller, *The Roman Empire*

Optional Readings

S. Ameer Ali, The Spirit of Islam
J. Barraclough, The Medieval Papacy
Encyclopaedia of Islam, Ist ed., 4 vols
M. G. S. Hodgson, The Venture of Islam

Syllabus - Second Semester

HISTORY OF EARLY INDIA-II

Course Code: HIS2205 **Credit Units: 4**

Course Objective
The course is aimed at developing an understanding among students about the socio-political processes of Ancient Indian history. The key components of the course include social stratification, changing political formations, history of the Gupta Empire, religious philosophy and their development in this phase, and the important cultural developments of the period.

Course Content
Unit I Social Stratification
- Class, *varna, jati*, untouchability
- Gender and the institution of marriage

Unit II Changing political formations
- The Mauryan Empire
- Post-Mauryan Polities with special reference to the Kushanas and theSatavahanas
-

Unit III The Gupta Empire and Post-Gupta Period
- Nature of Polity
- Socio-cultural developments
- Post-Gupta Period: Pallavas, Chalukyas, and Vardhanas

Unit IV Religion, Philosophy and Society
- Consoloidation of the brahmanical tradition
- Development of Jainism
- Development of Buddhism
- The beginnings of Tantricism

Unit V Cultural Developments
- A brief survey of Sanskrit, Pali-Prakit and Tamil literature
- Scientific and technical treatises
- Art and architecture – forms and patronage; Mauryan, post-Mauryan,Gupta, post-Gupta

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Compulsory Readings

B. D. Chattopadhyaya, The Making of Early Medieval India, 1994
D. P. Chattopadhyaya, History of Science and Technology in Ancient India, 1986
D. D. Kosambi, An Introduction to the Study of Indian History, 1975
S. K. Maity, Economic Life in Northern India in the Gupta Period, 1970
B. P. Sahu (ed), Land System and Rural Society in Early India, 1997
K. A. N. Sastri, A History of South India
R. S. Sharma, Indian Feudalism, 1980
Romila Thapar, Asoka and the Decline of the Mauryas, 1997
Susan Huntington, The Art of Ancient India: Buddhist, Hindu, Jain, New York, 1985

Optional Readings

N. N. Bhattacharya, Ancient Indian Rituals and Their Social Contents, 2nd ed., 1996
J. C. Harle, The Art and Arhitecture of the Indian Subcontinent, 1987
P. L. Gupta, Coins, 4th ed., 1996
Kesavan Veluthat, The Early Medieval in South India, New Delhi, 2009
H. P. Ray, Winds of Change, 1994
Romila Thapar, Early India : From the Origins to 1300, 2002

INDO-ISLAMIC POLITY AND CULTURE IN MEDIEVAL INDIA-I

Course Code: HIS2206 **Credit Units: 4**

Course Objective
The course is aimed at introducing students to the critical components of Medieval Indian history, beginning from the Delhi Sultanate. The key components of the course include historiography, political structures, social and economic developments, and cultural and religious processes.

Course Content
Unit I Interpreting the Delhi Sultanate
- Survey of sources: Persian tarikh tradition; vernacular histories; epigraphy

Unit II Sultanate Political Structures
- Foundation, expansion and consolidation of the Sultanate of Delhi; The Khaljis and the Tughluqs; Mongol threat and Timur's invasion; The Lodis: Conquest of Bahlul and Sikandar; Ibrahim Lodi and the battle of Panipat
- Theories of kingship; ruling elites; Sufis, ulama and the political authority; imperial monuments and coinage
- Emergence of provincial dynasties: Bahamanis, Vijayanagar, Gujarat, Malwa, Jaunpur and Bengal
- Consolidation of regional identities; regional art, architecture and literature

Unit III Society and Economy
- Iqta and the revenue-free grants
- Agricultural production; technology
- Changes in rural society; revenue systems
- Monetisation; market regulations; growth of urban centres; trade and commerce; Indian Ocean trade

Unit IV Religion, Society and Culture
- Sufi silsilas: Chishtis and Suhrawardis; doctrines and practices; social roles
- Bhakti movements and monotheistic traditions in South and North India; Women Bhaktas; Nathpanthis; Kabir, Nanak and the Sant tradition
- Sufi literature: malfuzat; premakhayans

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Compulsory Readings
Mohammad Habib and K.A. Nizami, eds, Comprehensive History of India, Vol. V, The Delhi Sultanate
Satish Chandra, Medieval India I
Peter Jackson, The Delhi Sultanate
Catherine Asher and Cynthia Talbot, India Before Europe
Tapan Raychaudhuri and Irfan Habib, eds, Cambridge Economic History of India, Vol. I

K.A. Nizami, Religion and Politics in the Thirteenth Century
W.H. McLeod, Karine Schomer, et al, eds, The Sants
S.A.A. Rizvi, A History of Sufism in India, Vol. I
Mohibul Hasan, Historians of Medieval India

Optional Readings

Cynthia Talbot, Precolonial India in Practice
Simon Digby, War Horses and Elephants in the Delhi Sultanate
I.H. Siddiqui, Afghan Despotism
Burton Stein, New Cambridge History of India: Vijayanagara
Richard M. Eaton, ed., India's Islamic Traditions
Vijaya Ramaswamy, Walking Naked: Women, Society, Spirituality in South India
Sheldon Pollock, Languages of the Gods in the World of Men
Pushpa Prasad, Sanskrit Inscriptions of the Delhi Sultanate
Andre Wink, Al-Hind, Vols. I-III

RISE OF MODERN WEST-I

Course Code: HIS2207 **Credit Units: 4**

Course Objective
The course is designed to introduce students to the historical processes which led to the modernization of the West. The key components of the course include a study of the transitional phase from feudalism to capitalism, early colonial expansion, the Renaissance period, the period of the Reformation, and the emergence of the European state system.

Course Content
Unit I Transition from feudalism to capitalism
- Problems and theories

Unit II Early colonial expansion
- Motives
- Voyages and explorations
- The conquests ofthe Americas: beginning of the era of colonization; mining and plantation; theAfrican slaves

Unit III Renaissance
- Its social roots
- City states of Italy
- Spread of humanism in Europe
- Artistic Expressions

Unit IV Reformation
- Origins
- Course and results of the European Reformation in the 16th century

Unit V Emergence of European State System
- Spain
- France
- England
- Russia

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Compulsory Readings
T.S. Aston and C. H. E. Philpin (eds.), The Brenner Debate
H. Butterfield, The Origins of Modern Science
Carlo M. Cipolla, Fontana Economic History of Europe, Vols. II and III
Carlo M. Cipolla, Before the Industrial Revolution, European Society and Economy. 1000– 1700. 3rd ed (1993)
D. C. Coleman (ed.), Revisions in Mercantilism

Ralph Davis, The Rise of the Atlantic Economics
Maurice Dobb, Studies in the Development of Capitalism
J. R. Hale, Renaissance Europe
R. Hall, From Galileo to Newton
Christopher Hill, A Century of Revolutions
Rodney Hilton, Transition from Feudalism to Capitalism
H. G. Koenigsberger and G. L. Mosse, Europe in the Sixteenth Century
Stephen J. Lee, Aspects of European History, 1494 – 1789
G. Parker, Europe in Crisis. 1598- 1648
G. Parker and L. M. Smith, General Crisis of the Seventeenth Century
J. H. Parry, The Age of Reconnaissance
Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe
V. Poliselky, War and Society in Europe, 1618– 48
Theodore K. Rabb, The Struggle for Stability in Early Modern Europe
V. Scammell, The First Imperial "Age: European Overseas Expansion, 1400 – 1715
Jan de Vries, Economy of Europe in an Age of Crisis 1600–1750

Optional Readings

M. S. Anderson, Europe in the Eighteenth Century
Perry Anderson, The Lineages of the Absolutist State
Stuart Andrews, Eighteenth Century Europe
B. H. Slicher von Bath, The Agrarian History of Western Europe. AD. 500–1850
The Cambridge Economic History of Europe. Vol. I – VI
James B. Collins, The State in Early Modern France: New Approaches to European History
G. R. Elton, Reformation Europe, 1517–1559
M. P. Gilmore, The World of Humanism. 1453–1517
Peter Kriedte, Peasants, Landdords and Merchant Capitalists
J. Lynch, Spain under the Hapsuburgs
Peter Mathias, First Industrial Revolution
Harry Miskimin, The Economy of Later Renaissance Europe: 1460–1600
Charles A. Nauert, Humanism and the Culture of the Renaissance (1996)
The New Cambridge Modern History of Europe, Vols. I – VII
L. W. Owie, Seventeenth Century Europe
D. H. Pennington, Seventeenth Century Europe
F. Rice, The Foundations of Early Modern Europe

HISTORY OF AFRICA

Course Code: HIS2208 **Credit Units: 03**

Course Objective

This course has been introduced in order to provide an in-depth understanding about the historical developments in the African continent. Relevant issues concerning the political, economic, social, and cultural processes in Africa will be covered as part of the course. It will help in equipping the students with a deeper understanding of African identity and ethnicity as well as making them aware about the nationalist struggles that shaped the history of most countries in Africa, including the famous South African struggle for independence. A study of colonization in Africa by various colonial powers and its subsequent decay will help the students in drawing parallels with the history of colonial rule in India.

Course Content

SEMESTER V

UNIT I Perspectives on African History

- Main historiographical trends
- Recent interventions

UNIT II Trade, Commerce and Migration

- Changing patterns of trade
- The trans- Atlantic slave trade and its repercussions
- Migration of capital and labour, with special reference to southern Africa

UNIT III Patterns of Colonisation in the African Continent

- Colonization of Africa in the 19th century-origins
- European imperialism and the partition of Africa
- French colonization of the Maghreb and West Africa
- British colonization of East, West and Southern Africa
- Belgian colonization of Congo

UNIT IV Emergence of New Identities

- Islam, Christianity and indigenous religions
- Race and class in colonial South Africa
- Language, education and cultural forms

UNIT V Popular Protests, Rebellions and National Liberation Movements

- Peasants and labour movements
- Nationalist movements in Algeria, China, Kenya, Congo, Angola and South Africa

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

Compulsory Readings

F. Ade Ajayi (ed.), *UNESCO General History of Africa*, Vol. VI, 1989
A.A. Boahen (ed.), *UNESCO General History of Africa*, Vol. VII, 1985
Michael Crowder (ed.), *Cambridge History of Africa*, Vol. VIII, 1984
Basil Davidson, *Africa in Modern History*, 1978
E. Flint (ed.), *Cambridge History of Africa*, Vol. V, 1976
A. Mazrui (ed.), *UNESCO General History of Africa* Vol. VIII, 1993
Endre Sik, *The History of Black Africa*, 2 Vols., 1966

Optional Readings

Bernard Magubane, *Political Economy of Race and Class in South Africa*, 1979
Bill Freund, *The Making of Contemporary Africa*, 1984

Syllabus - Third Semester

INDO-ISLAMIC POLITY AND CULTURE IN MEDIEVAL INDIA-II

Course Code: HIS2305 **Credit Units: 4**

Course Objective
The course is intended to provide an in-depth analysis about the social, political, cultural, and economic structures of the Mughal period. The key components of the course include historiography, establishment of the Mughal rule, consolidation of the Mughal rule under Akbar, the Mughal Empire under Aurangzeb, and the eventual decline of the Mughal Empire.

Course Content
Unit I Sources and Historiography
- Persian literary culture; translations; Vernacular literary traditions
- Modern Interpretations

Unit II Establishment of Mughal rule
- India on the eve of Babur's invasion
- Fire arms, military technology and warfare
- Humayun's struggle for empire
- Sher Shah and his administrative and revenue reforms

Unit III Consolidation of Mughal rule under Akbar
- Evolution of administrative institutions: zabt, mansab, jagir, madad-i-ma'ash
- Religious policies
- Relations with the Rajputs
- Expansion and integration

Unit IV Consolidation of the Empire under Jahangir and Shah Jahan
- Jahangir as a Ruler
- Nur Jahan's Junta
- Shah Jahan's reign

Unit V The Mughal Empire Under Aurangzeb
- War of Succession
- Aurangzeb's religious policies

Unit VI Decline of the Mughal Empire
- Debate
- Recent Historiographical Trends

ExaminationScheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :**Attendance ; **P :**Presentation ; **A/TP :**Assignment/Term Paper ; **CT :** Class Test ;
EE : ExternalExamination)

Texts and References

Compulsory Readings

S. Nurul Hasan, Religion, State, and Society in Medieval India
Jadunath Sarkar, History of Aurangzeb
MuzaffarAlam and Sanjay Subrahmanyam, eds, The Mughal State, 1526 – 1750
J.F. Richards, The Mughal Empire
Catherine Asher and Cynthia Talbot, India Before Europe
Irfan Habib, Agrarian System of Mughal India, 1526 – 1707
S.A.A. Rizvi, Religious and Intellectual History of the Muslims in Akbar's Reign
Stephen F. Dale, Garden of the Eight Paradises: Babur and the Culture of Empire
R P Tripati, The Rise and the Fall of the Mughal Empire

Optional Readings

Athar Ali, Mughal India: Studies in Polity, Ideas, Society, and Culture
Douglas Streusand, The Formation of the Mughal Empire
HarbansMukhia, Historians and Historiography During the Reign of Akbar
A.J. Qaiser, The Indian Response to European Technology and Culture
Richard M. Eaton, The Rise of Islam and the Bengal Frontier
Shireen Moosvi, Economy of the Mughal Empire
K.N. Chaudhuri, Trade and Civilization in the Indian Ocean
IqtidarAlam Khan, Gunpowder and Fire Arms: Warfare in Medieval India
Jos J.S. Gommans and Dirk H.A. Kolff, eds, Warfare and Weaponry in South Asia
Irfan Habib, An Atlas of the Mughal Empire

RISE OF MODERN WEST-II

Course Code: HIS2306 **Credit Units: 4**

Course Objective

The course is designed to provide a critical insight into the historical processes of the 17th-18th centuries in Europe. The critical components of the course include the 17th century European crisis, the English Revolution, rise of modern science, mercantilism and European economies, political process in the Europe in the 18th century, and the Industrial Revolution. The course is intended to develop the learning skills of students as far as European history is concerned.

Course Content

Unit I 17th century European crisis

- Economic factors
- Social factors
- Political dimensions

Unit II The English Revolution

- Major issues
- Political and intellectual currents

Unit III Rise of Modern Science

- Developments in science

Unit IV Mercantilism and European Economics

- Rise of Mercantilism in the 17th and 18th centuries in Europe

V European politics in the 18th century

- Parliamentary monarchy
- Patterns of Absolutism in Europe

VI The Industrial Revolution

- Origins
- Case Studies- Britain, France, Germany
- Course of the Industrial Revolution and its consequences

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Compulsory Readings

T.S. Aston and C.H.E. Philpin (eds.), The Brenner Debate
H. Butterfield, The Origins of Modern Science
Carlo M. Cipolla, Fontana Economic History of Europe, Vols. II and III
Carlo M. Clipolla, Before the Industrial Revolution, European Society and Economy, 1000–1700. 3rd ed. (1993)
D.C. Coleman (ed.), Revisions in Mercantilism
Ralph Davis, The Rise of the Atlantic Economics
Maurice Dobb, Studies in the Development of Capitalism

J.R. Hale, Renaissance Europe
R. Hall, From Galileo to Newton
Christopher Hill, A Century of Revolutions
Rodney Hilton, Transition from Fedualism to Capitalism
H.G. Koenigsberger and G.L. Mosse, Europe in the Sixteenth Century
Stephen J. Lee, Aspects of European History, 1494 – 1789
G. Parker, Europe in Crisis, 1598 – 1648
G. Parker and L.M. Smith, General Crisis of the Seventeenth Century
J.H. Parry, The Age of Reconnaissance
Meenaxi Phukan, Rise of the Modern West: Social and Economic History of Early Modern Europe
V. Poliselky, War and Society in Europe. 1618 – 48
Theodore K. Rabb, The Struggle for Stability in Early Modern Europe
V. Scammell, The First Imperial Age: European Overseas Expansion, 1400 – 1715
Jan de Vries, Economy of Europe in an Age of Crisis 1600 – 1750

Optional Readings

M. S. Anderson, Europe in the Eighteenth Century
Perry Anderson, The Lineages of the Absolutist State
Stuart Andrews, Eighteenth Century Europe
B. H. Slicher von Bath, The Agrarian History of Western Europe. AD. 500 – 1850
The Cambridge Economic History of Europe. Vol. I – VI
James B. Collins, The State in Early Modern France, New Approaches to European History
G. R. Elton, Reformation Europe, 1517 – 1559
M. P. Gilmore, The World of Humanism. 1453 – 1517
Peter Kriedte, Peasants, Landdords and Merchant Capitalists
J. Lynch, Spain under the Hapsuburgs
Peter Mathias, First Industrial revolution
Harry Miskimin, The Economy of Later Renaissance Europe: 1460 – 1600
Charles A. Nauert, Humanism and the Culture of the Renaissance (1996)
The New Cambridge Modern History of Europe, Vols. I – VII
L. W. Owie, Seventeenth Century Europe
D. H. Pennington, Seventeenth Century Europe
F. Rice, The Foundations of Early Modern Europe

HISTORY OF BRITISH RULE IN INDIA-I

Course Code: HIS2307 **CreditUnits: 4**

Course Objective

This course has been created to acquaint the students with the early history of the British rule in India. The key components of the course include the expansion and consolidation of colonial power, colonial strategy and ideology, rural economy and society under British rule, trade and industry under the British, and popular resistance movements. The course will help in enhancing the awareness of students about the coming of the British to India.

Course Content

Unit I India in the mid-18th Century

- Society-economy developments
- Political developments

Unit II Expansion and Consolidation of Colonial Power

- Mercantilism, foreign trade and early forms of exactions from Bengal
- Dynamics of expansion, with special reference to Bengal, Mysore,Western India, Awadh, Punjab, and Sindh

Unit III Colonial State and Ideology

- Arms of the colonial state: army, police, law
- Ideologies of the Raj and racial attitudes
- Education: indigenous and 'modern'

Unit IV Rural Economy and Society

- Land revenue systems and forest policy
- Commercialization and indebtedness
- Rural society: change and continuity
- Famines
- Pastoral economy and shifting cultivation

Unit V Trade and Industry

- De-industrialization
- Trade and fiscal policy
- Drain of Wealth
- Growth of modern industry

Unit VI Popular Resistance

- Santhal uprising (185-7); Indigo rebellion (1860); Pabna agrarianleagues (1873); Deccan riots (1875)
- Uprising of 1857

ExaminationScheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :**Attendance ; **P :**Presentation ; **A/TP :**Assignment/Term Paper ; **CT :** Class Test ;
EE : ExternalExamination)

Texts and References

Compulsory Readings

C. A. Bayly, Indian Society and the Making of the British Empire, New Cambridge History of India.
Bipan Chandra, Rise and Growth of Economic Nationalism in India.
Subash Chakravarty, The Raj Syndrome: A Study in Imperial Perceptions, 1989.
J.S. Grewal, The Sikhs of the Punjab, New Cambridge History of India
RanajitGuha, ed., ASubaltem Studies Reader.
Dharma Kumar and TapanRaychaudhuri, eds., The Cambridge Economic History of India, Vol. II.
P.J. Marshall, Bengal: The British Bridgehead, New Cambridge History of India.
R.C. Majumdar, ed., History and Culture of Indian People, Vols. IX and X.
British Paramountcy and Indian Renaissance
Rajat K. Ray, ed., Entrepreneurship and Industry in India, 1800-1947, Oxford In India Readings.
Eric Stokes, English Utilitarians and India.
Ram Lakhan Shukla, ed., Adhunik Bharat kaItihas

Optional Readings

David Arnold and RamchandraGuha, eds., Nature, Culture and Imperialism.
Amiya Bagchi, Private Investment in India.
Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India's Struggles for Independence.
A.R. Desai, Peasant Struggles in India.
R.P. Dutt, India today.
M.J. Fisher, ed., Politics of Annexation (Oxford in India Readings).
RanajitGuha, Elementary Aspects of Peasant Insurgency in Colonial India (1983).
P.C. Joshi, Rebellion 1857: A Symposium.
J.Krishnamurti, Women in Colonial India.
DadabhaiNaroji, Poverty and Un-British Rule in India.

HISTORY OF SOUTH-EAST ASIA

Course Code: HIS2308 **Credit Units: 03**

Course Objective

This course has been introduced in order to familiarize students with the history of South East Asia. From pre-colonial to post-colonial structures, this course intends to provide a deeper understanding of the political, social, economic, and cultural processes that shaped the history of the region. Some countries will be taken up as a case study in order to facilitate more in-depth analysis of the colonial and post-colonial structures in the region. This course will help in establishing a link between the common cultural heritage of India and South-East Asia.

Course Content

SEMESTER VI

UNIT I Historical Narratives on South-East Asia

- Major themes in South-East Asian studies
- Constructing the past
- New historiographical trends

UNIT IIThe Early Kingdoms-Political, Economic and Socio-Religious Developments

- Historical background
- Case Studies-Vietnam, Angkor, Champa, Srivijaya, Ayutthaya, Majapahit, and Pagan
- Maritime Trade
- Religions of Indian origin
- Beginnings of Islam

UNIT III Political, Economic and Socio-Religious Developments-16th-18th centuries

- South-East Asia in the 16th Century
- Centres of political power in the 17th and 18th centuries
- Administrative reforms in the 17th century
- Fragmentation in the 18th century
- Population, commercialisation, urbanization
- Nature of commerce, origins of economic dualism, trade in narcotics
- Indigenous beliefs
- Islam and Christianity and their impact on society and culture

UNIT IV Economy and Society in Early 19th Century

- Patterns of production- agriculture and crafts
- Economic trends- trade and banking
- Cultural expressions- folk and classical

UNIT V Colonisation and Colonial Transformations

- Processes of colonial control and the 'Informal Empire' in Thailand
- Peasant society and agrarian transformations, plantations, forests, mining
- Urbanisation: Colonial cities in plural societies
- Culture: (i) Colonial Discourses and the Creation of 'National Culture;' (ii) Oral traditions, literacy and the case of Malay Hikayats; (iii) Creation of 'Perfect Natives;' (iv) Education

- Japanese aggression in South-East Asia

UNIT VI Movements of Resistance and the Making of New Identities

- Peasant resistance
- The origins of the Vietnamese Revolution
- Indonesian Revolution

UNIT VII Emergence of Modern Nations and States

- The Union of Burma (Myanmar)
- Indonesia, the Sukarno Era
- Cambodia under Norodom Sihanouk
- The Vietnam War

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

COMPULSORY READINGS

B. Anderson: Imagined Communities
G. Hart, ed., Agrarian Transformations: Local Processes and the State in South- East Asia
J. Kemp, ed., Peasants and Cities, Cities and Peasants: Rethinking South-East Asian Models
Milton Osborne, South East Asia: An Introductory History
Nicholas Tarling, ed., Cambridge History of South-east Asia, Vol. I and II
D.R. Sardesai, History of South-East Asia

SUGGESTED READINGS

C. Dobbin, Islamic Revivalism in a Changes Peasant Economy, 1784-1847
Charles F. Keys: The Golden Peninsula
Daniel S. Lev and Ruth T. McVey eds., Making Indonesia – Essays on Modern Indonesia
Victor Purcell, The Chinese in Southeast Asia

Syllabus - Fourth Semester

HISTORY OF BRITISH RULE IN INDIA-II

Course Code: HIS2405 **CreditUnits: 05**

Course Objective
This course has been created to acquaint the students with the history of the British rule in India. The key components of the course include the cultural changes and religious reform movements during the British period, early trends in nationalism, Gandhian nationalism, communal politics, and the partition of India. The course will help in enhancing the awareness of students about the history of the freedom movement in India.

Course Content
Unit I Cultures changes and Social and Religious Reform Movements
- The advent of printing and its implications
- Reform and Revival: BrahmoSamaj, PrarthnaSamaj, Ramakrishnaand Vivekananda, Arya Samaj, Wahabi, Deoband, Aligarh and SinghSabha movements
- Debates around gender

Unit II Nationalism: Trends up to 1919
- Political ideology and organizations, formation of INC
- Moderates and extremists
- Swadeshi movement
- Revolutionaries

Unit III Gandhian nationalism after 1919: Ideas and Movements
- Mahatma Gandhi: his Perspectives and Methods
- Rowlatt Satyagraha and JallianwalaBagh
- Non-Cooperative and Civil Disobedience
- Provincial Autonomy, Quit India and INA
- Left-wing movements

Unit IV Communalism: Ideologies and practices
- RSS
- Hindu Maha Sabha
- Muslim League

Unit V Independence and Partition
- Negotiations for independence, and partition
- Popular movements
- Partition riots

ExaminationScheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :**Attendance ; **P :**Presentation ; **A/TP :**Assignment/Term Paper ; **CT :** Class Test ;
EE : ExternalExamination)

Texts and References

Compulsory Readings

Judith Brown, Gandhi's rise to Power, 1915-22.
Paul Brass, The Politics of India Since Independence, OUP, 1990.
Bipan Chandra, Nationalism and Colonialism in Modern India, 1979.
Bipan Chandra, Rise and Growth of Economic Nationalism in India.
Mohandas K. Gandhi, An Autobiography or The Story of My Experiments with Truth.
RanajitGuha, ed., ASubaltem Studies Reader.
Peter Hardy, Muslims of British India.
Mushirul Hasan, ed., India's Patition, Oxford in India Readings.
D.A. Low, ed., Congress and the Raj.
John R. McLane, Indian Nationalism and the Early Congress.
Jawaharlal Nehru, An Autobiography.
Gyanendra Pandey, The Construction of Communalism in colonial north India.
Sumit Sarkar, Modern India, 1885-1947.
Anil Seal, Emergence of Indian Nationalism.
Ram Lakhan Shukla (ed.), Adhunik Bharat kaItihas.
Eleanor Zelliot, From Untouchable to Dalit: Essays on the Ambedkar Movement

Optional Readings

Judith Brown, Gandhi: (et al) A Prisoner of Hope.
Bipan Chandra, Communalism in Modern India, 2nd ed., 1987.
Bipan Chandra, K.N. Panikkar, Mridula Mukherjee, Sucheta Mahajan and Aditya Mukherjee, India's, Struggles for Independence.
A.R. Desai, Social Background of Indian Nationalism.
A.R. Desai, Peasant Struggles in India.
Francine Frankel, India's Political Economy, 1947-77.
RanajitGuha, and G.C. Spivak, eds., Select Subaltern Studies.
Charles Heimsath, Indian Nationalism and Hindu Social Reform.
F. Hutchins, Illusion of Permanence.
F. Hutchins, Spontaneous Revolution.
V.C. Joshi (ed.), Rammohan Roy and the process of Modernisation in India.
J.Krishnamurti, Women in Colonial India.

HISTORY OF USA

Course Code: HIS2406 **Credit Units: 5**

Course Objective

This course has been introduced in order to acquaint students with the major trends in the history of America. By focussing on the political, constitutional, economic, and socio-cultural history of the USA, this course will help in developing a spirit of inquiry in students. The key components of the course include history of the American republic, evolution of American democracy, save society and culture, foreign policy, Civil War, imperialist policies, and resistance movements.

Course Content

Unit I Making of the Republic

- Revolution Sources of conflict: Revolutionary groups, Ideology: The War ofIndependence and its historical interpretations
- Processes and Features of Constitution making: Debates and historical interpretations

Unit II Evolution of American Democracy

- Federalists: Jeffersonianism: Jacksonianism, Rise of political parties-1840-1960
- Expansion of Frontier: Turner's Thesis; Marginalisation, displacementand decimation of native Americans; Case histories of: Tecumseh; Shawnee Prophet

Unit III Slave Society and Culture

- Agrarian South: Plantation economy
- Slave Society and Culture: Slave resistance

Unit IV Ante Bellum Foreign Policy

- War of 1812
- Monroe Doctrine
- Manifest Destiny

Unit V Civil War

- Abolitionism and Sectionalism
- Issues and interpretations
- Rise of Republicanism, Emancipation and Lincoln

Unit VI Industrial America

- Growth of Capitalism and Big Business
- The Great Depression

Unit VII US Imperialism

- Spanish-American War
- Expansion in the Far East and Latin America
- World War I and Fourteen Points
- America and World War II

Unit VII Resistance Movements

- Afro-American Movements:Black Movements**:** Booker T. Washington, W.E.B. Dubois; NAACP and Marcus Garvey
- Women's Movements:Rise of the Lowell Factory System, Abolitionists and Women's rights movement, Suffrage, Afro-American Women

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Compulsory Readings

Bernard Bailyn, The Great Republic.
Bernard Bailyn, The Ideological Origins of the American Revolution.
Charles Beard, An Economic Interpretation of the American Constitution.
Dee Brown, Bury My Heart at Wounded Knee, An Indian History of the American West.
Peter Carroll and David Noble, Free and Unfree: A New History of the United States.
David B. Davis, The Problem of Slavery in the Age of Revolution.
U. Faulkner, American Economic History.
Robert Fogel, Railroads and American Economic Growth.
Eric Foner, America's Black Past.
John Hope Franklin, From Slavery to Freedom.
Gerald N. Grobb and Geogre A. Billias, Interpretations of American History: Patterns and Prespectives, 2 Vols.
Richard Hofstadter, The Age of Reform, From Bryan to FDR
Linda Kerber, Women's America: Refocusing the Past.
David M. Potter, The Impending Crisis.
W. Pratt, A History of the United states Foreign Policy.
James Randail, TheCivil War and Reconstruction.
J. G. Randall and David Donald, The Civil War and Recontruction.
Kenneth Stampp, The Peculiar Institution, Slavery in the Ante-bellum South.
Fcderick Jackson Turner, The Frontier in American History.
Robert Wiebe, The Search for Order.

Optional Readings

Lee Benson, The Concept of Jackson Democracy.
Ray A. Billington, Westward Expansion.
Paul Boyer, Harvard Sitkoff, Nancy Woloch, The Enduring Vision: A History of the American People, Vols. Land 2.
Thomas Cochran, The Inner Revolution.
A. O. Craven, The Growth of Southern Nationalism, 1848 – 1861.
Lance E. Davis (ed.), American Economic Growth.
Carl N. Degler, At Odds: Women and Family in America from the Revolution to the Present.
Fogel and Engerman? Time on the Cross.
Lewis L. Gould (ed.), The Progressive Era.
John D. Hicks, The Federal Union: A History of USA Since 1865.
R.P. Kaushik, Significant Themes in American History.
David M. Kennedy, Thomas Baileyand Mel Piehl, The Brief American Pageant.
Irving Kristol, Gordon Wood and others, America's Continuing Revolution.
Richard W. Leopold, The Growth of American Foreign Policy.

Perry Miller, From Colony to Province.
Gary Nash (ed.), Retracing the Past.
Henry Pelling, American Labor.
Edward Pessen, Jacksonian Panorama.
Charles Sellers, Henry May and Neil McMillen, A Synopsis of American History; 2 Vols.
Donald Shihan, The Making of American History: The Emergence of the Nation, Vols. I & II.
Dwijendra Tripathi and S.C. Tiwari, Themes and Prespectives in American History.
James Weinstein, The Corporate Ideal in the Liberal state.

HISTORY OF CHINA AND JAPAN

Course Code: HIS2407 **Credit Units: 05**

Course Objective

The main objective of this course is to acquaint students with the history of two superpowers of the East-China and Japan. The course aims to introduce students to the different facets of political, social, cultural, and economic history of the two countries. Most of the major developments in China and Japan have been included in the course to provide the students with sufficient knowledge about the historical processes in the two countries of the Far East.

Course Content

SEMESTER V

UNIT I China during the 19th century: feudalism and commercialism

- Feudal values- the principles of Confucius
- Gentry, bureaucracy and common people
- The Canton commercial system

UNIT IIImperialism in China

- The transformation of China into an 'informal' colony
- The Opium Wars and Unequal Treaties
- Finance Imperialism
- The'Open Door' policy
- Agrarian and popular movements: Taiping and Yi Ho Tuan (Boxer Rebellion)
- Attempts at 'Self-Strengthening' (Tzu-chiang): Reforms of 1860-95; 1898; and 1901-08

UNIT III The Emergence of Nationalism in China

- The Revolution of 1911: Causes, nature and significance, social composition
- Contribution of Sun Yat-sen to the Revolution
- May Fourth Movement of 1919: nature and significance
- The Warlord Era-1916-1928

UNIT IV Nationalism and Communism in China (1921-1937)

- Formation of the CCP
- The Guomintang (Nationalist Party or KMT)
- The First United Front
- The Jiangxi Period and the rise of Mao Tse-tung
- The Second United Front

UNIT V Japan- Transition from Feudalism to Capitalism

- Crisis of Tokugawa Bakuhan system
- Meiji Restoration: Its nature and significance
- Political Reorganization
- Military Reforms
- Social, cultural and educational reforms (bunmeikaika)
- Financial reforms and Economic development in the 'Meiji' era.
- Meiji Constitution

UNIT VI Japanese Imperialism, Militarism and Fascism

- Japanese imperialism in China, Korea and Manchuria
- Popular/People's Rights Movement
- Nature of political parties
- Rise of Militarism- nature and significance
- Japan and the Second World War
- American occupation of Japan

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

COMPULSORY READINGS

George Allen, *A Short Economic History of Japan*
G. Beasley, *The Modern History of Japan*
Jean Chesneaux, et al, *China from Opium War to 1911 Revolution*.
Chalmers A Johnson, *Peasant Nationalism and Communist Power: The Emergence of Red China*, 1937 – 1945
E.H. Norman, *Japan's Emergence as a Modern State*
Mary C. Wright, *China in Revolution: The First Phase*, 1900 – 1913
George M. Beckmann, *Modernisation of China and Japan*
George M. Beckmann, *The Making of the Meiji Constitution*

SUGGESTED READINGS

B. Jansen (ed.), *The Cambridge History of Japan*, Vol. V and VI.
M.B. Jansen, *Japan and China: From War to Peace*, 1894 – 1972

HISTORICAL RESEARCH METHOD

Course Code: HIS2408 **Credit Units: 03**

Course Objective
This course is being offered in order to acquaint students with the intricacies of historical research, and its methodology. Historical research is a specialized area, and needs some knowledge of the technical aspects of research. In order to introduce students to the various research methodologies which might be of help to them in the future, this course has been introduced.

Course Content
Unit I History
- Definition
- Development of Historical Concepts
- Introducing E. H. Carr's What is History

Unit II History and its Allied Subjects
- Inter-disciplinary relation with Geography and Cartography
- Inter-disciplinary relation with Anthropology and Political Science
- Inter-disciplinary relation with Archaeology

Unit III Sources for the study of History
- Primary and Secondary
- Textual, Material, Digital, Oral

Unit IV Historical Methods
- Sources for the study of Indian History Ancient, Medieval, Modern and Contemporary

Unit V
- Significance and Purpose of History

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Compulsory Readings
E. H. Carr, What is History, London, 1961 (Hindi translation available)
Arthur Marwick, The Nature of History, Macmillan, London, 3rd edition 1989, Translated by L. B. Verma, Itihaas ka Swarup, Granth Shilpi, 2003
L. B. Verma, Itihaas ke bare mein, Itihaas Bodh Prakashan, 4th edition 2003

Syllabus - Fifth Semester

HISTORY OF USSR

Course Code: HIS2504 **CreditUnits: 5**

Course Objective
The course has been designed in order to acquaint students with the processes which shaped the history of USSR. The course includes key components such as the Russian Revolutions, the Civil War, the New Economic Policy, and the period of Soviet industrialization. The course is aimed at introducing students to the history of the Soviet Union and enhancing their learning abilities.

Course Content
Unit IThe Russia Revolutions of February and October 1917

- Dual Power
- Provisional government
- The establishment of soviet Power
- Nationalities question

Unit IICivil War and War Communism 1918-1921

- The first eight months
- Red and White Economic Policies

Unit IIIThe New Economic Policy

- Political Debates
- Trade unions
- Gender relations
- Foreign Policy
- The Comintern
- Formation of the USSR

Unit IVSoviet Industrialization

- Debates and Historiographical Interpretations

ExaminationScheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :**Attendance ; **P :**Presentation ; **A/TP :**Assignment/Term Paper ; **CT :** Class Test ;
EE : ExternalExamination)

Texts and References

Compulsory Readings

E.H. Carr : A History of Soviet Russia, 4 Volumes (1952).
Stephen F. Cohen : Bukharin and the Bolshevik Revolution : A Political Biography, 1888 – 1938 (1973).
Isaac Deutscher : Stalin (1949).
Maurice Dobb : Soviet Economic Development Since 1917 (1972).
Marc Ferro : The Russian Revolution of February 1917 (1972).
Sheila Fitzpatrick : Cultural Revolution in Soviet Russia (1978).
Arch Getty : The Origins of the Great Purges (1985).
Graeme Gill : Peasants and Government in the Russian Revolution (1979).
John Keep : The Last of the Empires : A History of the Soviet Union, 1945 – 1991 (1995).
John Keep : The Russian Revolution : A Study in Mass Mobilisation (1976).
A. Kollontai : Selected Writings.
Moshe Levin : The Making of the Soviet System (1985).
Roy &ZhoresMedvedev :Khrushcdev : The Years in Power (1977).
Alec Nove : An Economic History of the USSR (1993).
Richard Pipes : Russia of the Old Regime.
L.Szamuely : First Models of Socialist Economic Systems.
L.Trotsky : The History of the Russian Revolution (translated by Max Eastman) (1959).
A.B. Ulam : Expansion and Coexistence : A History of Soviet Foreign Policy, 1917 – 67 (1968).
K. Vaidyanathan : The Formation of the Soviet Control Asian Nationalities.

Optional Readings

Y.S. Borisovaet. al.: Outline History of the Soviet Working Class.
Dallin : Soviet Foreign Policy after Russia.
R.W. Davies: The Industrialisation of Soviet Russia, 3 volumes.
First Soviet Writers Congress, 1934 (Reprint, 1977)
Michael T. Florinsky: The End of the Russia Revolution.
Christopher Hill : Lenin and the Russian Revolution.
George Katkov (ed.): Russia Enters the Twentieth Century (1973).
David Lane: Politics and Society in the USSR (1972).
Richard Stites : Women's Liberation Movement in Russia : Feminism, Nihilism and Bolshevism, 1860 – 1930 (1976).
J. Stalin: Problems of Leninism.

HISTORY OF WEST ASIA

Course Code: HIS2505 **Credit Units: 5**

Course Objective
The course is aimed at introducing students to the history of West Asia. The region of West Asia plays an important role in global politics. Geopolitically, this region is very important. The key components of this course include the rise of Arab nationalism, the Palestinian problem, political formations in Turkey, and the rise of nationalism in Egypt.

Course Content
Unit I Rise of Arab Nationalism
- Causes and Result
- Mandate System in West Asia after First World War, Iraq , Syria and Lebanon

Unit II Palestinian Problem
- History and Development
- Arab and Israel conflicts upto 1967
- Formation of Kingdom of Saudi-Arab

Unit III Iran and Western Powers
- Iran and Western Powers
- Reign of Shah Raza Khan: Reforms and Achievements
- Foreign Policy of Iran in First Half of 20th Century

Unit IV Political Formations in Turkey
- Tanzimat Era
- Abdul Hamid's Policy of Reforms, Limitations
- Young Turk Movement; Programme and Achievements

Unit V Post-War Developments in Turkey
- Turkey and First World War
- Emergence of Kamal Pasha
- Reforms and Achievements

Unit VI Rise of Nationalism in Egypt
- Growth of Anglo-French Imperialism in Egypt
- Rise of Nationalism: Causes and Results
- Anglo-Egyptian Relations: Treaty of 1936 and afterwards till Second World War

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Compulsory Readings
Bernard Lewis, The Emergence of Modern Turkey
George Kirk, Short History of the Middle East
Sydney N Fisher, The Middle East

Hasan Kayali, Arabs and Young Turk
William Yale, The Near East
Erik J Zurrcher, Turkey, A Modern History
M Rowlatt, Founders of Modern Egypt
Alberts H Houran, Syria and Lebnan
Stephen H Longrigg, Iraq (1900-1950)
William Yale, The Near East
P Sykes, History of Persia vol. II
Charles Issawi, Economic History of Middle East
George Antonius, The Arab Awakening
Hans Kohn, A History of Nationalism in the East

Optional Readings
HE Wortham, Mustafa Kamal
Henry A Foster, Mustafa Kamal
George Lenczowski, The Middle East in the World Affairs
Terald Kurland, Arab Israeli Conflict
W. Lacqueur, A History of Zionism
D. Wilbur, Iran: Past and Present

HISTORY OF THE WORLD WARS

Course Code: HIS2506 **Credit Units: 5**

Course Objective

This course has been designed to make the students aware of the major political developments that shaped European history in particular and world history in general in the 20th century. The two world wars were a turning point in history of humanity not only in terms of its political, economic and social consequences but also in term of the aftermath of the wars which left an indelible mark on the history of human civilization. Many lives were lost and much was learnt from these two wars that were fought. The inter-war period and the historical processes that shaped this period are also significant in terms of various political institutions that came up during this time and brought Europe on the brink of the Second World War.

Course Content

SEMESTER VI

UNIT I First World War

- Origins- Europe on the brink of War
- Causes of World War I
- Alliances- Triple Entente and Triple Alliance
- Major events of World War I
- End of the War and the Treaty of Versailles
- Consequences of the War

UNIT II Europe between the Wars

- The League of Nations
- The Great Depression and its impact on Europe
- The Spanish Civil War
- Japanese Invasion of China
- Literary and cultural developments in the inter-war period

UNIT III Nazism and Fascism

- Rise of Fascism in Italy
- Italian Invasion of Ethiopia
- Rise of Nazism in Germany
- Stalinist Russia

UNIT IV Second World War

- Origins and causes
- The Axis powers and Allied powers
- Major events of the War
- Aftermath of the War

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

COMPULSORY READINGS

David Stevenson, 1914-1918: The History of the First World War, Penguin Books, UK, 2004
Ross F. Collins, World War One
Samuel L.A. Marshall, World War I
Jeremy Black, World War Two- A Military History
Antony Beevor, The Second World War
Anthony Wood, History of Europe, 1815 – 1960

SUGGESTED READINGS

William L. Shirer, Rise and Fall of the Third Reich
Mark A. Stoler and Stefanie M. Gustafson (ed), Major Problems in the History of World War II-Documents and Essays

HISTORY OF LATIN AMERICA

Course Code: HIS2507 **Credit Units: 03**

Course Objective

The course is aimed at introducing students to the history of Latin America. The history of this region has been kept out of the mainstream for very long. It is important for students to understand the developments which shaped this continent. The course intends to acquaint students with the historical background of various movements and transformations in the continent.

Course Content

Unit I Historiography

- Brief survey of pre-15th century
- Cultures and civilizations of Latin America

Unit II The Colonization and Conquest of Central and South America

- Spain and Portugal in Latin America (1490's onwards)
- War and conquest; agrarian transformation; gold and silver mining
- The question of labour and slavery
- Transatlantic commerce and the modern world system
- Institutions of state
- The advent of Christianity and evangelization
- Demographic consequences
- Resistance, collaboration, survival
- New and old hierarchies
- Gender, race, and culture: separateness or syncretism?

Unit III The Breakdown of the Colonial Order and the Movements for Independence

- Social base
- Practices and ideologies

Unit IV Class and State Formation

- Industrialization
- Immigration
- Popular culture 1830's to the 1930's: case studies of Mexico, Argentina, and Brazil

Unit V Authoritarianism Regimes

- Populism
- Revolutions
- the politics of literature, music and sports-1930's to the 1960's

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendance ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Compulsory Readings

Bethell, L., ed. *Cambridge History of Latin America: Colonial Latin America, volumeII*. Cambridge: Cambridge University Press, 1997.
Bethell, L., ed. *Cambridge History of Latin America: From Independence to c. 1870, volumeIII*. Cambridge: Cambridge University Press, 2002.
Bothell, L., ed. *Mexico Since Independence*. Cambridge: Cambridge University Press, 1985.
Burns, E.B. *Latin America Conflict and Creation: A Historical Reader*. New York: Pearson, 1992.
Chasteen, J. *Born in Blood and Fire: A Concise History of Latin America*. New York: W.W. Norton and Company, 2006.
Frank, A.G. *Capitalism and Underdevelopment in Latin America*. New York: Monthly Review Press, 1967.
Galeano, E. *Century of the Wind*: *Memories of Fire Volume III*. New York: Nation Books, 2010.
Galeano, E. *Faces and Masks*: *Memories of Fire Volume II*. New York: Nation Books, 2010
Galeano, E. *Genesis*: *Memories of Fire Volume I*. New York: Nation Books, 2010.
Galeano, E. *Open Veins of Latin America: Five Centuries of the Pillage of A Continent*. New York: Monthly Review Press, 1997.
Gott, R. *Cuba A New History*. New Haven: Yale University Press, 2005.
Levine, R.M., and John Crocitti, eds. *The Brazil Reader: History, Culture, Politics*. Durham: Duke University Press, 2002.
Nouzeilles, G., and Graciela Montaldo, eds. *The Argentine Reader: History, Culture, Politics*. Durham: Duke University Press, 2002.
Skidmore, T., and Peter H. Smith. *Modern Latin America*. New York: Oxford University Press, 2010.
Wade, P. *Race and Ethnicity in Latin America*. London: Pluto, 1997.
Williamson, E. *The Penguin History of Latin America*. London: Penguin Books, 2010.
Wright, T. *Latin America in the Era of the Cuban Revolution*. Connecticut: Praeger Publishers, 2001

Optional Readings

Bellos, A. *Futebal: The Brazilian Way of Life*. London: Bloomsbury, 2003.
Chavez, L., ed. *Capitalism, God and Good Cigar*. Durham: Duke University Press, 2005.
Craske, N. *Women and Politics in Latin America*. New Brunswick: Rutgers University Press, 1999.
Hanke, L., and Jane M. Rausch, eds. *Latin American History from Independence to the Present*. Princeton: Markus Wiener, 1999.
Karush, M.B., and O. Chamosa, eds. *The New Cultural History of Peronism*. Durham: Duke University Press, 2010.
Levine, R.M. *Father of the Poor: Vargas and His Era*. Cambridge: Cambridge University Press 1998.
Marichal, C. *etal*. *From Silver to Cocaine: Latin American Commodity Chains and the Building of World Economy, 1500-2000*. Durham: Duke University Press, 2006.
Marquez, G.G. *Autumn of the Patriarch*. London: Penguin, 1996.
Meyer, C.M. *et al.The Course of Mexican History*. New York: Oxford University Press,

1999.
Naipaul, V.S. *Loss of Eldorado: A History*. London: Penguin Books, 1982.
Romero, L.A. *A History of Argentina in the Twentieth Century*. Pennsylvania: Penn State University Press, 2002.
Womack, J. *Zapata and the Mexican Revolution*. New York: Alfred A. Knopf, 1972.

Syllabus - Sixth Semester

GENDER AND HISTORY

Course Code: HIS2604 **Credit Units: 04**

Course Objective
The role played by gender dynamics in shaping historical processes has not been paid much attention especially at the under-graduate level. This course is developed keeping in mind the need for students to be sensitized to the issue of gender through the prism of historical movements. This course seeks to provide a deeper understanding to the students about the role of gender in history, and how has played a significant role over a period of time.

Course Content

UNIT I Gender, Culture and History: Theoretical Perspectives
- Theories of Gender
- Historicising Gender
- Correlation between History and Gender

UNIT II Position of Women in the Indian Historical Context
- Women in the Indus Valley Civilisation
- Women in Vedic Age
- Construction of women's role by Manusmriti
- Women in the Epic Age
- Women in ancient Indian dynastic history
- Position of women in Medieval India
- Role of women in India's independence struggle

UNIT III Role of women in World History
- Women in the French Revolution
- Women in the Industrial Revolution

UNIT IV Origins of the Feminist Movement
- Socio-cultural genesis
- Political background
- Impact of feminism on history writing

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Scott, Joan Wallach. *Gender and the Politics of History*. New York: Columbia University Press, 1988

Zemon Davis, Natalie. “Women’s History in Transition: The European Case.” *Feminist Studies* 3, no. 3–4 (1976)
O’ Connor, Karen, Gender and Women’s Leadership, Sage Publications, 2010
Altekar A.S., *The Position of Women in Hindu Civilization: From Pre-Historic Times to the Present Day*, Motilal Banarasi Das, 1959 (second edition), New Delhi
Lal, Ruby, *Domesticity and Power in the Early Mughal World*, Cambridge University Press, 2005
Agrawal, M.G., *Women Freedom Fighters of India*, Isha Books, New Delhi, 2008

Web References:

http://www.ihp.sinica.edu.tw/~tangsong/reference/96102601.pdf
http://www.tcr.org/tcr/essays/CB_Women-French_Rev.pdf
http://www.history.ac.uk/ihr/Focus/Gender/websites.html
http://www.stephen-knapp.com/women_in_vedic_culture.htm
http://invention.smithsonian.org/centerpieces/whole_cloth/u2ei/u2materials/dublin.ht
http://odisha.gov.in/e-magazine/Orissareview/2010/August/engpdf/74-76.pdf

Optional Readings

Thakur, Bharti, *Women in Gandhi’s Mass Movement*
BowlesGloria, Duelli-KleinRenate, KleinRenate, *Theories of Women’s Studies*, Routledge & Kegan Paul, 1983
Jackson, Stevi and Jones, Jackie, *Contemporary Feminist Theories*, Edinburgh University Press, 1998

HISTORY OF CONTEMPORARY INDIA

Course Code: HIS2605 **Credit Units: 04**

Course Objective

This course is designed to provide an in-depth understanding about contemporary issues in India including most of the major political, economic, social, and cultural events that have shaped India post-independence. The course will equip students to not only prepare for relevant competitive examinations but will also help them in analysing events and issues related to contemporary times. The course will help students in developing critical thinking about processes of which they are a part. By providing a link between the past and the present, this course will enrich the knowledge of the students and make them aware about various issues related to the growth and development of India.

Course Content

SEMESTER V

UNIT I Political Events in the History of Contemporary India

- Emergence of political parties at the national level
- Emergence of political parties at the state level
- History of electoral politics and its contemporary relevance
- Caste and religion as factors in electoral politics in contemporary India
- The Kashmir Issue
- Uniform Civil Code
- Violence and Politics- Sikh Riots, Babri Masjid, Bombay Riots, Gujarat Riots

UNIT II Perspectives on Development since Independence

- State and planning- The Five Year Plans, impact and assessment
- Reforms undertaken by the government since independence
- Economy and Liberalization, emergence of middle class, industrial expansion

UNIT III Development Strategy and its Impact

- New economic structures-mixed economy, privatisation, special economic zones (SEZ)
- Impact on industry, organised and unorganised labour
- Land reforms in India
- History of the Green and White Revolutions
- IT Revolution
- Environmental Issues- Historical perspective on environmental issues

UNIT IV Ideologies and Movements

- Emergence of Naxalism-historical perspective
- RSS and the emergence of Hindutva politics- secularism vs communalism debate
- Muslim right-wing organizations and politics
- Terrorism and its impact on India
- Linguistic movements and emergence of new states
- Human Rights and Women's Rights in India

- Right to Information

ExaminationScheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :**Attendence ; **P :**Presentation ; **A/TP :**Assignment/Term Paper ; **CT :** Class Test ;
EE : ExternalExamination)

Text and References

COMPULSORY READINGS

NeeraChandhoke and Praveen Priyadarshi (ed.) Contemporary India: Economy, Society, Politics, Delhi: Pearson, 2009
PratapBhanu Mehta and NeerjaJayal (ed), Handbook of Indian Politics, Oxford University Press
Bipin Chandra, Mridula Mukherjee and Aditya Mukherje, India since Independence, Penguin, New Delhi, 2008
Bipin Chandra, Struggle against Caste and Casteism in a Historical Perspective, Essays on Contemporary India, New Delhi: HarAnand, 1993
Stephen Cohen, India: Emerging Power, Oxford University Press, Chapter 4: Domestic Dimension
Afsir Karim, Terrorism: The Indian Experience, in Maroof Raza, (ed) Confronting Terrorism New Delhi: Viking, 2009
Ganguly, Sumit and DeVotta Neil (ed) Understanding Contemporary India, Viva Books 2003

SUGGESTED READINGS

T.K Oommen, Society: Tradition and Autonomy in HirnnmayKarlekar, Independent India: The First Fifty Years, New Delhi: Oxford, 1998
Gadgil, M. and Guha, R., ‘Ecological Conflicts and the Environmental Movement in India’ in Rangrajan, M. (ed.) Environmental Issues in India: A Reader, Pearson Delhi: Longman, 2006
Omvedt, G., Reinventing Revolution, New Social Movements and the Socialist Tradition in India. New York: Sharpe, 1983
Shah, G. (ed.), Social Movements and the State. New Delhi: Sage, 2002

ENVIRONMENTAL HISTORY- GLOBAL PERSPECTIVES

Course Code: HIS2606 **Credit Units: 03**

Course Objective
The course aims to acquaint students with environmental history. In today's world where global warming and climate change are important concerns, it is important to understand the basics of environmental history. The course will introduce students to various constituents of environment and the symbiotic relationship between man and nature. The measures taken to mitigate climate change and other environmental concerns shall also be analyzed as part of the course.

Course Content

Unit I Revisiting understanding/s of Environment

- Problematising Anthropocentricism and Anthropocene
- Challenging Stationarity?

Unit II Humans and animals: Multiplicity of interactions

- Entertainment and amusement
- A viable source of energy in 'energy-scarce' world

Unit III To and from the New World: ecological imperialism

- Native vs invasions
- Contestation over aquatic resources

Unit IV Colonialism and industrialization: ecological readings

- Access and use: new inequalities
- Elimination of diversity: endangered livelihood patterns
- Ever expanding encroachments of wild

Unit V World of insatiable appetite

- Fuel-ing consumption
- Issue of climate change
- Challenges

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

COMPULSARY READINGS

Ahmed, Nafeez. "Patriarchy is killing our Planet."*Ecologist*, 13 March, 2015
Bhattacharya, Neeladri. "Pastoralists in the Colonial World." In *Nature, Culture, Imperialism*, edited by David Arnold and Ramachandra Guha, 49-85. Delhi: Oxford University Press, 1995.
77

Botkin, B. Daniel. *Discordant Harmonies: A New Ecology for the Twenty-First Century*. New York: Oxford University Press, 1990. pp. 16-38.
Bulliet, Richard W. "History and Animal Energy in the Arid Zone." In *Water on Sand: Environmental Histories of the Middle-East and North Africa*, edited byAlan Mikhail, 51-70. New York: Oxford University Press, 2013.
Clemencon, Raymond. "Pushing past neo-liberalism: rethinking global change negotiations." In *Routledge Handbook of Climate Change and Society*, Edited by Constance Lever Tracy, 453-72. London and New York: Routedge, 2010.
Deloche, Jean. *Transport and Communication in India Prior to Steam Locomotion*, Vol-I, 226-254. Delhi: Oxford University Press, 1993.
Dorsey, Kurk. "National Sovereignty, the International Whaling Commission, and the Save the Whales Movement." In *Nation-States and the Global Environment: New Approaches to international Environmental History*, edited by Erika Marie Bsumek, David Kinkela and Mark Atwood Lawrance, 43-61. New York: Oxford University Press, 2013.
Gadgil, Madhav and Ramachandra Guha. "Conquest and control." In*This Fissured Land: An ecological History of India*, edited by Madhav Gadgil and Ramachandra Guha 113-45. Delhi: Oxford University Press, 1992.
Hedda, Reindl-Kiel. "Dogs, Elephants, Lions, a Ram and a Rhino on Diplomatic Mission: Animals as Gifts to the Ottoman Court." In *Animal and People in the Ottoman Empire*, Suraiya Faroqhi, 271-82. Istanbul: Eren, 2010.
Hughes, J Donald. "Amazon: the threats to biodiversity." In *An Environmental History of the World: Humankind's changing role in the community of life*, edited by Donald J Hughes, 217-24. London and New York: Routedge, 2001.
McNeill, J R. "Prologue: Peculiarities of a Prodigal Century." In *Something New Under the Sun: An Environmental History of the Twentieth-Century World*, J R McNeill, 3-17. London and New York: W.W. Norton & Company, 2000.
Milly, P.C.D., Julio Betancourt, Malin Falkenmark, Robert M. Hirsch, Zbigniew W. Kundzewicz, Dennis Lettenmaier, Ronald J. Stouffer. "Stationarity Is Dead: Whither Water Management."*Science* 319, (2008): 573–74.
Morrison, Kathleen. "Provincializing the Anthropocene."*Seminar* 637, (2015): 1-7.
Peretti, Jonah H. "Nativisim and Nature: Rethinking Biological Invasions." *Environmental Value* 7, (1998): 183-92.
Rangarajan, Mahesh. "Introduction," in *Environmental Issues in India: A Reader*, edited by Mahesh Rangarajan, xiii-xxvii. Delhi: Pearson, 2007.
Roy, Dunu. 'Environmentalism and Political Economy', in *Environmental Issues in India: A Reader*, Edited by Mahesh Rangarajan, 521-29. Delhi: Pearson, 2007.
Sanderson, Rachel. "Re-writing the History of Australian Tropical Rainforest: 'Alien Invasives' or 'Ancient Indigenes'?"*Environment and History* 14, (2008): 165-185.
Siddiqui, Shawahiq. "Engaging with the global."*Seminar*. 652, (2013): 35-43.
Tracy, Constance Lever and Barrie Pittock. "Climate change and Society: an introduction." In *Routledge Handbook of Climate Change and Society*, Edited by Constance Lever Tracy, 1-10. London and New York: Routedge, 2010.
Worster, Donald. "Doing Environmental History."*The Ends of the Earth: Perspectives on Modern Environmental History*, edited by Donald Worster and Alfred Crosby, 1-14. Cambridge: Cambridge University Press, 1988.

SUGGESTED READINGS

Aberth, John. "Harnessing the Nature." In *An Environmental History of the Middle Ages: The Crucible of Nature*, edited by John Aberth, 28-40. London and New York: Routledge, 2013.

Beinart, William and Karen Middleton. “Plant Transfers in Historical Perspective.”*Environment and History* 10, (2004): 3-29.
Crosby, Alfred. “Ecological Imperialism: The Overseas Migration of Western Europeans as biological phenomenon.” In *The Ends of the Earth: Perspectives on Modern Environmental History*, edited by Donald Worster and Alfred Crosby, 103-17. Cambridge: Cambridge University Press, 1988.
Davis, Diana K. “Enclosing Nature in North Africa: National Parks and the politics of Environmental History.” In *Water on Sand: Environmental Histories of the Middle-East and North Africa*, edited by Alan Mikhail, 159-79. New York: Oxford University Press, 2013.
Divyabhanusinh, “At the Court of Great Mughals.” In *India’s Environmental Histor*y, Vol-1, *From Ancient Times to the Colonial Period: A Reader*, edited by Mahesh Rangarajan and K Sivaramakrishnan, 269-95. Ranikhet: Permanent Black, 2012.
79
Finley, Carnel. “Global Borders and the Fish That Ignore them: The Cold War Roots of Overfishing.” In *Nation-States and the Global Environment: New Approaches to international Environmental History*, Edited by Erika Marie Bsumek, David Kinkela and Mark Atwood Lawrance, 62-75. New York: Oxford University Press, 2013.
Kinkela, David. “The Paradox of US Pesticide Policy during the Age of Ecology.”In *Nation-States and the Global Environment: New Approaches to international Environmental History*, edited by Erika Marie Bsumek, David Kinkela and Mark Atwood Lawrance, 115-34. New York: Oxford University Press, 2013.
Lewis, Simon L. and Mark, A Maslin. “Defining the Anthropocene.”*Nature* 519, (2015): 171-80.
Tucker, Richard. “The Tropical Cost of the Automotive Age: Corporate Rubber Empires and the Rainforest.” In *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World*, Richard Tucker, 113-50. Plymouth: Rowman & Littlefield Publishers, 2007 (Concise Revised Edition).
Urry John. “The Century of Oil.” In *Societies Beyond Oil: Oil Dregs and Social Futures*, John Urry, 36-52. London and New York: Zed Books, 2013.

DISSERTATION

Course Code: HIS2637 **Credit Units: 09**

Course Objective

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual or Theoretical Framework – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusions -- 10 marks
Chapter 5: Bibliography-- 5marks

The Components of a Dissertation
A Dissertation should have the following components:

1) **Cover Page:** This should contain the title of the dissertation, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.

2) **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a)*Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.

b)*Conceptual Framework*: (relating to the topic of the Dissertation).

c) *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).

d)*Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the work, and in writing the report.

6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the dissertation dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual and Theoretical Framework
Chapter 3: Analysis & Findings
Chapter 4: Conclusions

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.
Annexures,
References / Bibliography

Guidelines for evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

Amity School of Liberal Arts & FL

Bachelor of Arts Political Science (Honors)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Arts Political Science (Honors)

Syllabus - First Semester

INDIAN NATIONALISM

Course Code: POL2101 **Credit Units: 05**

Course Objective
The course will seek to provide the student with a basic yet meaningful understanding of the political scenario that led to the struggle for India's independence. It would endeavor to cover the entire duration of the growth of nationalism in India till the attainment of independence in 1947.

Course Content
Module-I: Origins and meaning of nationalism

Module-II: Emergence of nationalism in India
Historiography of Indian Nationalism, Agrarian Society and Peasant Discontent, The New Middle Class and the Emergence of Nationalism, Causes of nationalism in India, Foundation of the Indian National Congress, The moderate Congress: objectives and methods

Module-III: Early Nationalism: Discontent and Dissension
The Moderates and Economic Nationalism**,** Hindu Revivalism and Politics, Muslim Politics and the Foundation of the Muslim League**,** Patriotism in literature

Module-IV: Roots of extremism
The Swadeshi Movement in Bengal- 1905-1908, Extremism in other provinces, Repression, conciliation, and divide and rule, War and Indian politics, Bhagat Singh, Surya Sen and the Revolutionary Terrorists

Module-V: Movements from below
Tribal Movements,Moplahs, Deccan Riots,Caste consciousness, Communal consciousness, Labour

Module-VI: The Age of Gandhian Politics
Limited Self Government, 1909-1919, The Arrival of Mahatma Gandhi, Champaran, Kheda, Ahmedabad, Khilafat and Non-Cooperation Movements, Civil Disobedience Movement, The Rowlatt Satyagraha, The Act of 1935 and the Princely States

Module-VII: Independence and Partition
Simla Conference, The Cabinet Mission, Quit India Movement, The turbulent forties, The Mountbatten Plan, Freedom and Partition, Communal holocaust and peasant rebellion, Post-Partition violence, Impact of violence on polities of India and Pakistan, Integration of States

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

Text:

Anderson, Benedict. 1983. *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. USA/UK: Verso, New Left Books.
Bandyopadhyay, Shekhar. 2004. *From Plassey to Partition: A History of Modern India*. New Delhi: Cambridge University Press.
Chandra, Bipan, Mridula Mukherjee, Aditya Mukherjee, K N Panicker and Sucheta Mahajan. 1989. *India's Struggle for Independence*. New Delhi: Oxford University Press.
Sarkar, Sumit. 1983. *Modern India 1885-1947*. New Delhi: Macmillan.

References:

Chatterjee, Partha. 1993. *The Nation and its Fragments: Colonial and Post-colonial histories*. New Delhi: Oxford University Press.
Nandy, Ashish. 1994. *The Illegitimacy of Nationalism: Rabindranath Tagore and the Politics of the Self*. New Delhi: Oxford University Press.
Bayly, C A. 1998. *Origins of Nationality in South Asia: Patriotism and Ethical Government in theMaking of Modern India*. New Delhi: Oxford University Press.
Raychaudhuri, Tapan. 1979. "Indian Nationalism as Animal Politics". *The Historical Journal* 22(3): 747-63.
Jalal, Ayesha and Sugata Bose. 1997. "Exploding Communalism: The Politics of Muslim Identity in South Asia". In *Nationalism, Democracy, and Development: State and Politics in India*. UK: Cambridge University Press.
Guha, Ranajit. 1982. *Subaltern Studies: Writings on South Asian History and Society*, Volume I.UK: Oxford University Press.
Prakash, Gyan. 1992. *Another Reason: Science and the Imagination of Modern India*. Princeton: Princeton University Press.
Gandhi, M K. 1997. *Hind Swaraj and Other Writings*. New Delhi: Oxford University Press.

BRITISH COLONIALISM IN INDIA

Course Code: POL2102 **Credit Units: 05**

Course Objective
The purpose of this course is to help the students understand India's colonial past. The importance and relevance of understanding this past is the fact that the roots of many political institutions and ideas, social and economic structures that are central to politics in India today can be traced back to this past. The course seeks to achieve this understanding by studying colonialism in India from different perspectives that reveal different facets of colonialism in India: social-economic, political, religious, legal, and educational.

Course Content
Module-I: Imperialism and colonialism
Brief History of Global and Indian imperialism; Major Perspectives on Colonialism – Liberalism, Marxism, Post-colonialism

Module-II: Foundations of Colonial Rule in India
Consolidation of British power in India; Police and Civil Administration; Legal Foundations of the Colonial State; Issues related to the sovereignty and relations with British Parliament and major constitutional developments

Module-III: Economy and Society
Impact on Agriculture, land relations and ecology; the 'Deindustrialization' Debate

Module-IV: Religion and Society
Colonial Ideology of Indian Improvement/'civilizing mission': Orientalists and the Anglicists (Utilitarians and Missionaries); Shaping Communities: Census and Enumeration; Colonialism and the Gender question

Module-V: Education
Teaching the Colonial Subject: Education; The New Middle Class

Module-VI: Early Indian Responses
Peasant and Tribal Uprisings; The 1857 Rebellion

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

Text:

Bandopadhyay, S. 2004. *From Plassey to Partition: A History of Modern India*. New Delhi: Orient Longman.
Fulcher, J. 2004. *Capitalism: A Very Short Introduction*. Oxford: Oxford University Press.
Datta, G. Sobhanlal.2007. 'Imperialism and Colonialism: Towards a Postcolonial Understanding', in Dasgupta, Jyoti Bhusan (ed.) *Science, Technology, Imperialism and War*. New Delhi: Centre for Studies in Civilization Publication and DK.
Metcalf, T.1995. 'Liberalism and Empire' in Metcalf, Thomas. *Ideologies of the Raj*. Cambridge: Cambridge University Press.
Young, R.2003. *Postcolonialism: AVery short introduction*. Oxford: Oxford University Press.
Metcalf and Metcalf.2002. *A Concise History of India*. Cambridge: Cambridge University Press.
Sarkar, S.1983. *Modern India (1885-1847)*. New Delhi: Macmillan.
Chandra, B.1999. *Essays on Colonialism*. Hyderabad: Orient Longman Ltd.
Mann, M.2004. 'Torchbearers Upon the Path of Progress: Britain's Ideology of a Moral and Material Progress in India', in Mann, M. and Fischer-Tine, H. (eds.) *Colonialism as Civilizing Mission: Cultural Ideology in British India*. London: Anthem Press.
Jones, K.1981. 'Census and Religious Identity', in Barrier, N.G. (ed). *Census in British India: New Perspective*. Delhi: Manohar Publishers.

References:

Thapar, R. 2000. 'Interpretations of Colonial History: Colonial, Nationalist, Post-colonial', in DeSouza, P.R. (ed.) *Contemporary India: Transitions*. New Delhi: Sage Publications.
Young, R.2001. 'Concepts in History: Colonialism, Imperialism, Neocolonialism, Postcolonialism', in Young, R. *Postcolonialism: An Historical Introduction*. Oxford: Blackwell.
Singha, R.1998. *Despotism of Law*. New Delhi: Oxford University Press.
Sangari, Kand S Vaid.1989. *Recasting Woman: Essays in Colonial History*. New Delhi: Oxford University Press.
Seth, S.2008. *Subject Lessons: The Western Education of Colonial India*. New Delhi: Oxford University Press.
Cohn, B.1987. 'The Census, Social Structure and Objectification of society', in Cohn, Bernard. *An Anthropologist Among Historians and Other Essays*. New Delhi: Oxford University Press.

POLITICAL PHILOSOPHY-I

Course Code: POL2103 **Credit Unit: 05**

Course Objective
The course aims at (i) introducing the students to concepts and concerns that are of key significance to philosophical thought and practice, (ii) helping the students understand the meaning, need and approaches to political philosophy, (iii) studying and analyzing the political philosophies of stalwarts such as Plato and Aristotle with reference to the early Greek political setting.

Course Content
Module-I: An Introduction to Political Philosophy
An Introduction to Philosophy; Meaning, Nature and Method of Political Philosophy

Module-II: Democracy
Concept; Active Citizens and Democracy; The Problem of Minority; Conclusion.

Module-III: Liberty
Meaning and Significance of Liberty; Freedom and the Limits of Government; Analysis.

Module-IV: Justice
Meaning and Need of Justice; The Significance of Procedure; Are There Any Universal Theories of Justice?; Conclusive Analysis.

Module-V: Greek Political Thought and Practicum
Greek Political Legacy; Plato; Aristotle; Machiavelli; A Study of Current Trends in Political Thought and Practicum.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References:

Text:
Bird, Colin. 2006. *An Introduction to Political Philosophy*. New Delhi: Cambridge University Press.
Boucher, Dand P Kelly (eds).2003. *Political Thinkers: From Socrates to the Present*. New York: Oxford University Press.
Nelson, B.2008. *Western Political Thought*. New Delhi: Pearson Longman.

References:

Kukathas, Ch. and G F Gaus(eds.). 2004. *Handbook of Political Theory*. New Delhi: Sage Publications.
Cranston, Maurice. 1964. *Western Political Philosophers*. London: Foutana.
Skoble, AJand T R Machan.2007. *Political Philosophy: Essential Selections*. New Delhi: Pearson Education.
Strauss, Land J Cropsey(eds.). 1987. *History of Political Philosophy*. 2nd Edition. Chicago: Chicago University Press.
Swift, A.2006. *Political Philosophy: A Beginner's Guide for Students and Politicians*. 2nd edition. Cambridge: Cambridge University Press.
Wolff, J.2002. *An Introduction to Political Philosophy*. Oxford: Oxford University Press.

Syllabus - Second Semester

INDIAN STATE AND POLITICS AFTER INDEPENDENCE

Course Code: POL2201 **Credit Units: 04**

Course Objective
To provide the student with a comprehensive background of the political scenario as it developed after independence in 1947. To understand processes that shaped independent India such as the Constitution of India, the Executive and the Legislature, electoral politics and political parties, federalism and the federal structure, communalism and communal politics, linguistic movements etc.

Course Content
Module-I: The Indian Constitution
Making of India's Constitution: Perspectives from the Constituent Assembly, Indian Constitution: Features, Socio-economic basis and philosophy and the Preamble, Major Amendments: Trends and rationale

Module-II: Fundamental Rights and Directive Principles
Fundamental Rights, Directive Principles of State Policy

Module-III: Organs of the Government
The Union Executive: the President, Prime Minister, Cabinet, Governor, Parliamentary form of government: The Lok Sabha and the Rajya Sabha, Supreme Court: Judicial Review and Judicial Activism

Module-IV: Federalism in India
Nature of Indian Federalism, Centre-State relations, Issues of state autonomy, Panchayati Raj and Urban Local Bodies

Module-V: Political Parties and Electoral Processes
Political Parties and Pressure Groups,Election Commission, Electoral Reforms

Module-VI: Major Issues in Indian Politics
Caste, religion, language, region, Problems of illiteracy, regional imbalance, environmental degradation, and poverty alleviation, Development strategy and liberalization

Module-VII: Laws for internal security
Preventive detention laws and constitutional exceptions, Extra-ordinary laws: anti-terror laws, laws against organized crime

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

Text:

Jayal, Neerja Gopal and Pratap Bhanu Mehta. 2011. *The Oxford Companion to Politics in India* (Student Edition). New Delhi: Oxford University Press.
Basu, D D. 2013. *Introduction to the Constitution of India*. New Delhi: Lexis Nexis.
Kohli, A. 2001. *The Success of India's Democracy*. New Delhi: Cambridge University Press.
Brass, P. 1994. *Politics in India Since Independence*. New Delhi: Cambridge University Press.

References:

Kothari, R. 1970. *Politics in India*. New Delhi: Orient Blackswan.
Kohli, A. 1988. *India's Democracy*. New Delhi: Orient Longman.
Bhambri, C P. 1998. *The Indian State: Fifty Years*. New Delhi: Shipra.
Kashyap, S C. 1992. *Our Parliament*. New Delhi: National Book Trust.
Kothari, R. 1967. *Party System and Election Studies*. Bombay: Asia Publishing House.
Chanda, A. 1965. *Federalism in India: A Study of Union-State Relations*. London: George Allen and Unwin.
Austin, G. 1979. 'The Constituent Assembly: Microcosm in Action', in *The Indian Constitution: Cornerstone of a Nation*. New Delhi: Oxford University Press.
Chaube, S.K. 1973. *Constituent Assembly of India*. Delhi: People's Publishing House.
Austin, G. 2000. 'The Social Revolution and the First Amendment', in *Working a Democratic Constitution*. New Delhi: Oxford University Press.

POLITICAL PHILOSOPHY-II

Course Code: POL2202 **Credit Unit: 04**

Course Objective

This paper aims at helping the students understand the concepts, trends and issues in modern western political philosophy. Thus (i) the first module would help the educands gain an analytical overview of modern western political thought and (ii) the other three modules would work towards imbuing the students with an indepth sight into some perennial issues of politico-philosophical significance. Towards the latter end, the second, third and fourth modules would include a study and analysis of the political philosophies of Hobbes, Locke and Rousseau.

Course Content

Module-I: Modern Western Philosophy: An Introduction
Modern Western Philosophy- An Introduction; Natural Rights; Utilitarianism; Liberals and Conservatives; Anarchists and Socialists; Justice; A Deeper Sense of Politics; Global Politics

Module-II: Hobbes
Human Nature and the State of Nature; The Role and Powers of the Sovereign; Secular Moralism and Role of Social Contract

Module-III: Locke
Doctrine of Natural Law, Legitimate Regime, Property and the Class State

Module-IV: Rousseau
The Social Contract: Its Problem and Assumptions; The General Will and the Questions of Stability

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References:

Text:
Rawls, John and Samuel Freeman. 2007. *Lectures on the History of Political Philosophy*. Cambridge MA: Belknap Press.
Hudelson, Richard. 1999. *Modern Political Philosophy*. Armonk NY: M.E. Sharpe.
Kenny, nthony. 2006.*The Rise of Modern Philosophy*. New York: Oxford University Press.

References:
Zagorin,Perez. 2009. *Hobbes and the Law of Nature*. Princeton, New Jersey: Princeton University Press.
Harrison, Ross. 2003. *Hobbes, Locke and Confucian Materpiece: An Examination of Seventeenth Century Political –Philosophy*. New York: Cambridge University Press.
Broome, J.H. 1963. *Rousseau: A Study of His Thought*. London: Edward Arnold.

GLOBAL THEMES IN DEVELOPMENT AND POLITICS

Course Code:POL2203 **Credit Units: 04**

Course Objective
The course would provide the students with an insight into key global issues in order for them to understand future developments and events. Necessary teaching aids such as group discussions and viewing of key documentary films would be made use of to explain the specifics of each of the topics mentioned below.

Course Content
Module-I: Decolonization
Methods and stages of decolonization, History of decolonization, Post-colonial organizations

Module-II: Democracy
Brief history of democracy, Variants of democracy, Forms of modern democracy

Module-III: Development
History of international development, Theories and concepts of international development, International development in practice

Module-IV: Disarmament
History and definition of disarmament, Nuclear disarmament, India and disarmament

Module-V: Food Security
Need for food security, Challenges to achieving global food security, Risks to food security

Module-VI: Fair Trade
Theories of fair trade, The WTO and fair trade, Basics of the fair trade system

Module-VII: Governance
Need for global governance, Concepts and themes in global governance, Regional views

Module-VIII: Human Rights
Philosophy of human rights, International protection, Violation of human rights, Substantive rights

Module-IX: Peace and Security
Ethnic conflict and international security, International cooperation, Rule of Law

Module-X: Population
World human population, Predicted growth and decline, Control of global population

Module-XI: Refugees
Reasons for global refugee crisis, Historical and contemporary crises

Module-XII: Terrorism
Definitions and theories of terrorism, Types of terrorism, Global terrorism crisis

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts:

Crick, Bernard. 2002. *Democracy: A Very Short Introduction*. New Delhi: Oxford University Press.
Przeworski, Adam, M. Alvarez, Jose Antonio Cheibub and Fernando Limongi. 2000. *Democracy and Development: Political Institutions and Well-Being in the World, 1950-1990*. Cambridge: Cambridge University Press.
Sen, Amartya K. 2001. *Development as Freedom*. New Delhi: Oxford University Press.

References:

Escobar, Arturo. 1994. *Encountering Development: The Making and Unmaking of the Third World*.Princeton: Princeton University Press.
Polanyi, Karl. 2010. *The Great Transformation: the political and economic origins of our time*. London: Wiley-Blackwell.
Stiglitz, Joseph E. 2003. *Globalization and its Discontents*. New Delhi: Penguin Books.

CURRENT THEMES IN INDIAN POLITICS

Course Code: POL2204 **Credit Units: 03**

Course Objective

The course would attempt to appreciate the various political processes active in contemporary India and understand their implications for the social and political future of the country. It would prepare the students to critically evaluate contemporary and modern Indian politics and encourage evaluative thinking. Class lectures would be aided by regular group discussions, class debates and interactive question and answer sessions.

Course Content

Module-I: The Nature and Functioning of Democracy

The Parliamentary System: An Evaluation; Democracy: Social and Economic Dimensions; The Changing Nature of the Party System; The Nature of Coalition Politics; Transformative Nature of Electoral Processes in India

Module-II: Key themes in Indian Politics

Why Is Secularism Important for India; Contemporary Debates on Nationalism; Hindu Nationalism and its Impact on the Polity

Module-III: Current Political Scenarios

Dimensions of Indian Federalism; Democratic Decentralization and Panchayati Raj; The Changing Nature of Public Administration; Judicial Reforms in Modern India; The Changing Face of the Civil Society; India in the Global Strategic Environment

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Chandhoke, Neera and Praveen Priyadarshi. 1999. *Contemporary India: Economy, Society, Politics*. New Delhi : Pearson Learning.

Rothermund, Deitmar. 2013. *Contemporary India: Political, Economic and Social Development*. New Delhi : Pearson Learning.

Hasan, Zoya, S N Jha, and Rasheeduddin Khan. 1989. *The State, Political Process, and Identity: Reflections on Modern India*. New Delhi : Sage Publications.

References :

Kothari, R. 1970. *Politics in India*. New Delhi: Orient Blackswan.
Kohli, A. 2001. *The Success of India's Democracy*. New Delhi: Cambridge University Press.
Kohli, A. 1988. *India's Democracy*. New Delhi: Orient Longman.
Bhambri, C P. 1998. *The Indian State: Fifty Years*. New Delhi: Shipra.
Brass, P. 1994. *Politics in India Since Independence*. New Delhi: Cambridge University Press.
Kashyap, S C. 1992. *Our Parliament*. New Delhi: National Book Trust.
Kothari, R. 1967. *Party System and Election Studies*. Bombay: Asia Publishing House.

PLATO'S POLITICAL PHILOSOPHY

Course Code: POL2205 **Credit Unit: 03**

Course Objective

This paper aims at helping the students understand and analyze the political thought and contemporary relevance ofthe legendary political philosopher - Plato. It begins with an insight into the origin anddevelopment of the political philosophy of Plato. It proceeds with an understanding and analysis ofspecific concerns of significance to Plato, ancient Greek Politics as also Contemporary Society.

Course Content

Module-I: Plato's Political Philosophy: An Introduction
Plato and Greek Politics; Plato and Socrates - Socratic Ideal, Method and Politics; An overview of Plato's earlier and later Political Philosophy.

Module-II: Platonic Politics
Education; The Ideal State; 'Philosophic Rule'.

Module-III: Plato's Later Political Theory
Plato and Syracuse; The Statesman; The Ideal Ruler; The Actual State; The 'Second Best State'.

Module-IV: Political Principles
The Mixed Constitution; The Rule of Law; The Nocturnal Council; Actualizing the 'Second Best State'.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

Text:
Klosko, George. 2006. *The Development of Plato's Political Theory*. New York: Oxford University Press.
Hall, Robert W.2004. *Plato*. London:Routledge.
Brumbaugh, Robert S.1964. *Plato for the Modern Age*. New York:Collier Books.

References:
Pappas, Nickolas. 1995. *Routledge Philosophy Guidebook to Plato and the Republic*. New York: Routledge.
Skemp, J.B.1957. *Statesman*. New York:Liberal Arts Press.
Cahn, Steven M.2002. *Classics of Political and Moral Philosophy*. New York: Oxford University Press.

TERM PAPER

Course Code:POL2231 **Credit Units: 02**

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students.The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related tocontemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Issues of caste in Indian politics
- State and democracy
- Internal security scenario
- Theories of secularism
- Justice and related themes
- Multicultural societies
- Feminist critique of Indian politiccs
- Media and politics
- Cultural imperialism

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

ELECTIONS AND ELECTORAL POLITICS

Course Code: POL2206 **Credit Units: 01**

Course Objective

The objective of the course would be to inculcate a basic understanding of the intricacies of the process that culminates in the dance of democracy at the end of the term of the incumbent government. The course would seek to provide the students with a clear picture of the specific themes that govern the conduct of elections and the manner in which various political parties respond to the call for polls.

Course Content

Module-I : Brief History of Elections in India

Elections in India since 1947 ; Electoral reforms ; Election Commission : challenges and issues

Module-II : Study of Indian Elections : an overview

Case studies ; Comparative approaches ; Electoral process ; voter registration ; absentee voting

Module-III : Political debates in the study of elections

Scientific dilemmas ; Political issues

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Ahuja, M L. 1998. *Elections and Electoral Processes in India- 1952-1998*. New Delhi : Mittal Publications.

Kumar, Arun. 2000. *Elections in India*. New Delhi : Neha Publications.

References :

Roy, Meenu. 2000. *Electoral politics in India: election process and outcomes, voting behaviour and current trends*. New Delhi : Deep & Deep Publications.

REVIEW OF CONTEMPORARY LITERATURE-I

Course Code: POL2230 **Credit Units: 02**

Course Objective

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** End-Term Examination)

PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2232 **Credit Units: 03**

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form of project report followed by a presentation.

Guidelines for Project Report

1. **Length of the report** : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).
2. **Contents of the report** :
    a. Cover page
    b. Acknowledgements
    c. Table of Contents
    d. Introduction
    e. Review of readings
    f. Findings and analysis
    g. Conclusions
    h. Bibliography or References
    i. Annexures
3. **Steps for completion of project** :
    a. Finalization of topic in consultation with faculty
    b. Introductory presentation with research objectives and questions specified
    c. Field work
    d. Preparation of project report
    e. Submission of project report
    f. Final Presentation and viva

Possible research topics

1. Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
2. Prepare a research report on the impact of elections in your constituency.
3. Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
4. Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Syllabus – Third Semester

INDIAN POLITICAL THOUGHT-I

Course Code: POL2301 **Credit Unit: 04**

Course Objective
This paper aims at helping the students understand the ancient Indian political thought with a contemporary perspective. It begins with an overview ofancient Indian political thought and proceeds to clarify the significant concepts and theories that are of relevance. It, also, includes a detailed study and analysis of the political philosophies of two majorthinkers viz., Manu and Kautilya.

Course Content
Module-I: Ancient Indian Political Thought: An Overview
The Political Philosophy of- the Bhagwad Gita, Manusmriti, Arthashastra; Evolution from the Puranas to the Nitishastras.

Module-II: Basic Concepts and Concerns
Duties of the King; Justice and Punishment; Purusharthas; Varnas.

Module-III: Manu
Manusmriti; Manu on the Political Institutions; Manu and Modern Thinkers.

Module-IV: Kautilya
State, Law and Justice; Principles of Government.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References
Text:
Sharma, Urmila andSK Sharma. 1996. *Indian Political Thought*. New Delhi: Atlantic Publishers and Distributors.
Ghoshal, U.N.1959. *A History of Indian Political Ideas: The Ancient Period and the Period of Transition to the Middle Ages*. London:Oxford University Press.
Singh, MPandHimanshu Roy(eds.). 2012. *Indian Political Thought: Themes and Thinkers*. Delhi: Pearson.

References:
□ otwani□ □ □ ewal andErnest Wood. 1958*Manu Dharma S'astra: A Sociological and Historical Study*. Madras: Ganesh and Company.
Rangarajan, LN.2000. *The Arthashastra*. New Delhi: Penguin Books.

STATE POLITICS IN INDIA

Course Code: POL2302 **Credit Units: 04**

Course Objective

The course will seek to define historical legacies and current themes in the development of politics in the states of India. It would provide the student within-depth understanding of the democratic processes in practice in various states and encourage them to understand the politics of states better. A study of politics and political processes in states also pertains to the exigencies of coalition politics at the centre.

Course Content

Module-I : Regions and Regionalism

Regional cultures in Indian Civilization ; States Reorganization Commission ; Integration and ethnic conflict ; Movements for state autonomy : Jharkhand and Uttarakhand

Module-II : Political Parties and Electoral Politics in the States

Congress Party in Uttar Pradesh ; BJP's expansion and coalition strategies ; Regionalization of Indian Politics ; Telugu Desam Party in Andhra Pradesh ; Changing Nature of Tamil Nadu ; Asom Gana Parishad in Assam ; Politics of the left in West Bengal

Module-III : Social Movements and Politics in the States

Decline of Backward Caste Politics in North India ; Bahujan Samaj Party and Subaltern Mobilization in Uttar Pradesh ; Ethnic Minorities in Majoritarian Indian Polity

Module-IV: Economic Reforms and Indian Politics

India's federal economy ; Globalization and State Disparities in India ; India's special economic zones : protest politics and growth patterns ; Reforms and economic growth in Indian states

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Pai, Sudha. 2013. *Handbook of Politics in Indian States : Regions, Parties and Electoral Reforms*. New Delhi : Oxford University Press.

Narain, Iqbal. 1976. *State Politics in India*. Meerut : Meenakshi Prakashan.

Weiner, Myron. 1968. *State Politics in India*. Princeton : Princeton University Press.

References :

Jenkins, Rob. 2004. *Regional Reflections : Comparing Politics across India's States*. New Delhi : Oxford University Press.
Yadav, Yogendra. 2000. 'Understanding the Second Democratic Upsurge: Trends of Bahujan Participation in Electoral Politics in the 1990s', in Francine R. Frankel, Zoya Hasan, Rajeev Bhargava and Balveer Arora (eds.), *Transforming India*. New Delhi : Oxford University Press.
Yadav, Yogendra and Suhas Palshikar. 2003. 'From Hegemony to Convergence: Party System and Electoral Politics in the Indian States – 1952-2002'. *Journal of the Indian School of Political Economy*, January-June.

POLITICS OF POST-COLONIAL STATES

Course Code: POL2303 **Credit Units: 04**

Course Objective
The objective of the course is to delineate the specific features of post-colonial states and their development patterns. The students would be exposed to world-class literature on both the definition of the post-colonial state as well as the trajectory of political processes as they developed in those states, for a better and complete understanding of national as well as international politics.

Course Content
Module-I : Definition of post-colonial state
Europe as an instrument of colonialism ; historical trajectory of post-colonial states ; debates modernity in post-colonial states ; democratic institutions in post-colonial states

Module-II : Development of the post-colonial state in Africa
Ghana ;Kenya ; South Africa ; Democratic Republic of Congo ; Algeria

Module-III : Political processes in post-colonial states inLatin America
Argentina ; Brazil ; Bolivia

Module-IV : Post-colonial states in Asia
Pakistan ; Bangladesh ; Sri Lanka ; Nepal

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Texts :
Young, Crawford. 2012. *The Post-Colonial State in Africa : Fifty Years of Independence, 1960-2010*. Madison : University of Wisconsin Press.
Moraña, Mabel, Enrique Dussel, Carlos A. Jáuregui. 2008. *Coloniality at Large: Latin America and the Postcolonial Debate (Latin America Otherwise)*. Duke University Press.
Shastri, Amita and A. Jeyaratnam Wilson. 2001. *The Post-Colonial States of South Asia : Democracy, Development, and Identity*. New Delhi : Palgrave Macmillan.

References :
Gardezi, Hassan M. 1985. 'The Post-Colonial State in South Asia: The Case of Pakistan'. *Comparative Studies of South Asia, Africa and the Middle East* Fall5(2): 1-7.
Forrest, Joshua B. Nationalism in Post-Colonial States. In *After Independence : Making and Protecting the Nation in Post-Colonial and Post-Communist States*, edited by Lowell W Barrington. University of Michigan Press. (http://www.press.umich.edu/pdf/0472098985-ch2.pdf)

SUMMER PROJECT EVALUATION

Course Code: POL2335 **Credit Units: 03**

Objective

The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity.The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Brief Review of Literature – 25 marks
Chapter 3: Research Findings and Analysis – 25marks
Chapter 4: Conclusions– 10marks
Chapter 5: Bibliography – 05marks

Components of a Project Report

The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4)Body of the Report: The body of the report should have these four logical divisions

- **a)*Introduction:*** This will cover the background, rationale/ need / justification, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- **b)*Brief Review of Literature*:** (relating to the topic of the Project).
- **c) *Research Findings and Analysis*:**(using the tools and techniques mentioned in the methodology).
- **d)*Conclusions:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic
- Relevance of the topic
- Time available for completion

- Feasibility of data collection within the given time limit
- Challenges involved indata collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor

STEP III: Collection of information and data relating to the topic and analysis of the same

STEP IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Brief Review of Literature
Chapter 3: Research Findings and Analysis
Chapter 4: Conclusions
Chapter 5: Bibliography

STEP V: The following documents are to be attached with the Final Project Report.

- Approval letter from the supervisor (Annexure-IA)
- Student's declaration (Annexure-IB)
- Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate. The evaluation scheme shall be as follows:

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Annexure-IB

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Political Science is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.
I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:

Signature of Student
Name

Registration No.

Place:
Date:

POLITICS AND MEDIA

Course Code: POL2304 **Credit Units: 03**

Course Objective
To provide students with an overarching perspective on the various processes at play in the manner in which the media – print and visual – transform into vehicles of politics. The course will, through exploration of several case studies pertaining to various types of media, encourage the students to critically analyse media messages, both print and visual.

Course Content
Module-I : Theories of the mass media
Ageda Setting Theory ; Cultivation Theory ; Dependency Theory ; Hypodermic Needle Theory ; Knowledge Gap ; Media Richness Theory ; Medium Theory ; Spiral of Silence ; Two Step Flow Theory ; Uses and Gratifications Approach ; Priming ; Framing

Module-II : Print media and politics
Brief history of newspapers in India ; Growth of print media in India ; print media and Indian political parties ; democratic processes and print media

Module-III : Television news media and politics
Brief history of television media in India ; Growth of Television news media in india ; democratic politics and television media : perspectives and trends

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :
McQuail, Dennis. 2010. *McQuail's Mass Communication Theory*. New Delhi : Sage Publications.
Jeffrey, Robin. 2000. *India's Newspaper Revolution : Capitalism, Politics and the Indian Language Press, 1977-99*. New Delhi : Oxford University Press.
Mehta, Nalin. 2008. *Television in India: Satellites, Politics and Cultural Change*. New Delhi : Routledge.

References :
Sahay, Uday. 2006. *Handbook of the Media in Contemporary India*. New Delhi : Oxford University Press.
Batabyal, Somnath, Angad Chowdhry, Meenu Gaur, Matti Pohjonen. 2011. *Indian Mass Media and Politics of Change*. New Delhi : Routledge.

REVIEW OF CONTEMPORARY LITERATURE-II

Course Code: POL2330 **Credit Units: 02**

Course Objective

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** End-Term Examination)

TERM PAPER

Course Code: POL2331 **Credit Units: 02**

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students.The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related tocontemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Issues of caste in Indian politics
- State and democracy
- Internal security scenario
- Theories of secularism
- Justice and related themes
- Multicultural societies
- Feminist critique of Indian politiccs
- Media and politics
- Cultural imperialism
- Plato's Republic

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

SOUTH ASIA IN PERSPECTIVE

Course Code:POL2305 **Credit Units: 01**

Course Objective

The course would attempt to inculcate understanding of the various political processes at work in South Asia, particularly states like Pakistan, Bangladesh, Sri Lanka and Nepal. It will supplement the South Asia unit from the core paper on post-colonial states and their development after independence. This course will focus primarily on two countries in South Asia – Pakistanand Sri Lanka.

Course Content

Module-I : Institutions and Political Processes in South Asia

Development of post-colonial institutions ; historical development and current debates in democracy in South Asia ; role of military in post-colonial societies in South Asia

Module-II : State and Polity in Pakistan

Democracy and electoral process ; Islamization and cultural change ; the army and its role in political process ; Pakistan's foreign policy ; issues of internal security and terrorism

Module-III : State and Polity in Sri Lanka

Democratic institutions and their functioning ; role of the military ; the Tamil issue ; internal security and terrorism ; Sri Lanka's foreign policy

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Brass, Paul R. 2010. *Routledge Handbook Of South Asian Politics: India, Pakistan, Bangladesh, Sri Lanka, And Nepal*. USA : Routledge.

Reference :

Newman, Edward, Itty Abraham, and Meredith L. Weiss. 2010. *Political Violence in South and Southeast Asia: Critical Perspectives*. UNU Press.

PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2332 **Credit Units: 03**

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form of project report followed by a presentation.

Guidelines for Project Report

Length of the report : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).

Contents of the report :

- Cover page
- Acknowledgements
- Table of Contents
- Introduction
- Review of readings
- Findings and analysis
- Conclusions
- Bibliography or References
- Annexures

Steps for completion of project :

- Finalization of topic in consultation with faculty
- Introductory presentation with research objectives and questions specified
- Field work
- Preparation of project report
- Submission of project report
- Final Presentation and viva

Possible research topics

- Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
- Prepare a research report on the impact of elections in your constituency.
- Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
- Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Syllabus – Fourth Semester

INDIAN POLITICAL THOUGHT-II

Course Code: POL2401 **Credit Unit: 05**

Course Objective
This paper aims at helping the students understand the pre as also post-Independence Indian political thought with a contemporary perspective. It, thus, deals extensively as also intensively with the life-sketches and political philosophies of four major Indian thinkers viz., Mahatma Gandhi, Sri Aurobindo, B.R. Ambedkar and M.A. Jinnah.

Course Content
Module-I: MKGandhi
Life Sketch; Political Thought; Critical Analysis.

Module-II: Sri Aurobindo
Foundations of Political Thought; Nationalism and the Ideal of Human Unity; Utopian Elements.

Module-III: BRAmbedkar
Untouchability, Justice, Democracy; Education**.**

Module-IV: MAJinnah
Life Sketch; Political Philosophy; Critical Analysis**.**

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References:

Text:
Sharma, Urmila andSK Sharma.1996. *Indian Political Thought*. New Delhi:Atlantic Publishers and Distributors.
Singh, MPand HimanshuRoy. 2012. *Indian Political Thought: Themes and Thinkers*. New Delhi: Pearson.
Ghoshal, U.N.1959. *A History of Indian Political Ideas: The Ancient Period and the Period of Transition to the Middle Ages*. London:Oxford University Press.

References:
Dalton, Dennis. 2000. *Mahatma Gandhi: Nonviolent Power in Action*. New York:Columbia University Press.
Lorenzo, David J.1999. *Tradition and the Rhetoric of Right: Popular Political Argument in the Aurobindo Movement*. Madison, NJ:Fairleigh Dickinson University Press.

PUBLIC ADMINISTRATION-I

Course Code: POL2402 **Credit Unit: 05**

Course Objective
This paper aims to help the students understand the key concepts and concerns in the field of public administration. It begins with an introduction to the discipline and proceeds towards an analysis of the main theories and principles. It concludes with a contemporary study and analysis of the relevance of the discipline.

Course Content
Module-I: Introduction to Public Administration
Meaning, Scope and Significance; New Public Administration.

Module-II: Theories and Principles of Public Administration
Classical Theory, Scientific Management Theory, Human Relations Theory, Theory of Bureaucracy, Ecological Approach; Principles of Organization.

Module-III: An Analysis
Public Administration in Asia and Beyond; Contemporary Relevance; Areas ofImprovement.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References:

Text:
Chakrabarty, Bidyut andMohit Bhattacharaya. 2003. *Public Administration: A Reader*. New Delhi: Oxford University Press.
Sapru, R.K.2009. *Administrative Theories and Management Thought*. New Delhi:Prentice-Hall India.
Stevenoff, Jand E.W.Russell (ed.). 2000. *Defining Public Administration*. New York:Longman.

References:
Simon, Herbert A., Donald W.Smithburg, andVictor A Thompson**.**1950. *Public Administration*. New York:Alfred AKnopf.
Fry, Brian R.1989. *Mastering Public Administration: From Max Weber to Dwight Waldo*. Chatham NJ:Chatham House.
Cox, Raymondand Susan Buck. 2009. *Public Administration in Theoryand Practice*. Pearson Education.

SOCIAL MOVEMENTS IN INDIA

Course Code: POL2403 **Credit Units: 05**

Course Objective

To facilitate the understanding of various social movements in India and their impact on India's polity, economy and society as well as the changes they brought about in the manner in which politics is conducted in India. To provide wide ranging information on subaltern struggles in many parts of the country.

Course Content

Module-I : Defining social movements

Definition and features of social movements ; difference from historical movements ; objectives and ideologies of social movements

Module-II : Peasant Movements

Key causes of peasant movements ; classification of peasant movements ; Naxalite Movement in West Bengal ; Telangana Movement in Andhra Pradesh ; pesant struggles in Uttar Pradesh ; impact of peasant movements ; leadership and organization

Module-III : Tribal Movements

Key causes of peasant movements ; classification of peasant movements ; types of tribal movements ; tribal movements in Bihar ; resistance movements in north-western and southern India ; movements in north east India ; issues concerning tribal movements ; organization and leadership of tribal movements

Module-IV : Dalit Movements

Types of dalit movements ; issues in dalit movements ; casuses of dalit movements ; dalit movements in Andhra Pradesh, Maharashtra, Tamil Nadu and Uttar Pradesh ; organization and leadership of dalit movements ; key participants

Module-V : Backward caste/class movements

Definition and types of backward caste/class movements ; causes of backward caste/class movements ; issues concerning backward caste/class movements ; participation and leadership of backward caste movements

Module-VI : Working Class Movements

Types and methods of working class movements ; issues in working class movements ; participation and leadership of working class movements ; organization of working class movements

Module-VII : Middle Class Movements

Typology of middle class movements ; issues in middle class movements ; 'nativism' vs. 'nationalism' ; participation and leadership of middle class movements ; organization of middle class movements

Module-VIII : Students Movements

Issues in students movements ; participation and leadership ; organization of students movements ; key students movements in India

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Rao, M S A. 2000.*Social Movements in India*. New Delhi : Manohar Publishers and Distributors.
Shah, Ghanshyam. 2004. *Social Movements in India : A Review of Literature*. New Delhi : Sage Publications.

References :

Omvedt, Gail. 1993. *Reinventing Revolution : New Social Movements and the Socialist Tradition in India*. M E Sharpe.
Shah, Ghanshyam. 2002. *Social Movements and the State*. New Delhi : Sage Publications.
Ray, Raka and Mary Fainsod Katzenstein. 2005. *Social Movements in india : poverty, power and politics*. New York : Rowman and Littlefield.

RELIGION AND POLITICS IN INDIA

Course Code: POL2404 **Credit Units: 03**

Course Objective

The course would attempt to provide the students with quality understanding of the interstices of religion and politics in modern India, with the roots of the current issues lying firmly in movements, events as well as processes witnessed during the colonial period. It would also inculcate in the student an appreciation of the various ways in which politics interacts with religion in Indian society.

Course Content

Module-I : Secularism in a religious society

Definitions and theories of secularism ; Historical Evolution of Secularism in India ; India as a secular state ; Functioning of Indian Secularism

Module-II : Hindu Nationalism

Hindu Nationalism as a social movement ; Militant Social Movement Phase (1989-1992) ; the RSS as a Hindu Nationalist Sect and their political model

Module-III : Persistence of Hindu-Muslim conflict

Congress policy towards Muslims ; Muslim grievances in North India ; Muslim politics and voting behaviour ; Hindu-Muslim polarization ; Hindu consciousness and Hindu-Muslim conflict

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Brass, Paul R. 1990. *The Politics of India Since Independence*. New Delhi : Cambridge University Press.
Kohli, Atul. 2001. *The Success of India's Democracy*. New Delhi : Cambridge University Press.
Jayal, Neerja Gopal and Pratap Bhanu Mehta. 2010. *The Oxford Companion to Politics in India*. New Delhi : Oxford University Press.

References :

Jaffrelot, Christophe. 2010. *Religion, Caste and Politics in India*. New Delhi : Primus and Ratna Sagar.
Hasan, Zoya. 2011. *Politics of Inclusion : Castes, Minorities and Affirmative Action*. New Delhi : Oxford University Press.

PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2432 **Credit Units: 03**

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form ofproject report followed by a presentation.

Guidelines for Project Report

Length of the report : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).

Contents of the report :

- Cover page
- Acknowledgements
- Table of Contents
- Introduction
- Review of readings
- Findings and analysis
- Conclusions
- Bibliography or References
- Annexures

Steps for completion of project :

- Finalization of topic in consultation with faculty
- Introductory presentation with research objectives and questions specified
- Field work
- Preparation of project report
- Submission of project report
- Final Presentation and viva

Possible research topics

- Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
- Prepare a research report on theimpact of elections in your constituency.
- Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
- Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

TERM PAPER

Course Code:POL2431 **Credit Units: 02**

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students.The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related tocontemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Issues of caste in Indian politics
- State and democracy
- Internal security scenario
- Theories of secularism
- Justice and related themes
- Multicultural societies
- Feminist critique of Indian politiccs
- Media and politics
- Cultural imperialism

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

REVIEW OF CONTEMPORARY LITERATURE-III

Course Code: POL2430 **Credit Units: 02**

Course Objective

The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** End-Term Examination)

CINEMA AND POLITICS IN INDIA

Course Code: POL2405 **Credit Units: 03**

Course Objective
To facilitatedeeper understanding of the manner in which politics infiltrates the narratives of popular films to create a cultural consciousness conforming to the dominant political discourse. To make visual cultures compelling and intersting for the students. The unique feature of the course would be teaching through viewing of films.

Course Content
Module-I : History of Cinema in India
Evolution of Bombay cinema ; Development of genres and ideologies ; Hindi Cinema in the post-1947 period ; Representation in Hindi cinema

Module-II : Communal Politics and Hindi cinema
Concept of 'cinematic imagination' ; Representation in cinematic narratives ; Reading *Sarfarosh*, *Fiza* ; *Mission Kashmir* ; *Black Friday*

Module-III : Current themes in cinema and politics
Cinema and the dominant discourse ; representation in hostile scenarios ; cultural mobilization and cinema ; Viewing *Kahaani*, *Jodha Akbar*, *Veer Zaara* ; *Rang De Basanti*

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :
Prasad, M Madhava. 1998. *Ideology of the Hindi Film: A Historical Construction*. New Delhi: Oxford University Press.
Dwyer, Rachel and Patel, Divya. 2002. "Indian cinema". *Cinema India: the visual culture of Hindi film*. London: Oxford University Press.

References :
Freitag, Sandria B. 2001. "Visions of the Nation: theorizing the nexus between creation, consumption, and participation in the public sphere". In *Pleasure and the Nation: the history, politics and consumption of public culture in India*, edited by Rachel Dwyer and Christopher Pinney. London: Oxford University Press.
Barnouw, Eric and Krishnaswamy, S. 1980. *Indian Film*. New York: Oxford University Press, Second Edition.
Kesavan, Mukul. 1994. "Urdu, Awadh, and the Tawaif: the Islamicate roots of Hindi cinema". In *Forging Identities: gender, communities and the state*, edited by Zoya Hasan. New Delhi: Kali for Women.

WORKSHOP ON CONTEMPORARY POLITICS

Course Code: POL2433 **Credit Units: 01**

Course Objective

The course would facilitate students to engage with political issues of their choice and discuss the same with fellow students so that perspectives emerge and the development of varied points of view are encouraged.Students would also be encouraged to prepare and make presentations in class and share thoughts on politics and political issues.

Format of Workshop

1. The workshop would be a culmination of class discussions on various emerging issues in Indian and global politics.
2. Students would prepare and make presentations on any one topic of their choice.
3. The presentation would be followed by question and answer session in which other students and invited faculty members would participate.
4. The workshop would be held on a convenient date and day so that several members of the faculty could take part in it.

Guidelines for workshop

Step 1 :*Selection of topic for workshop presentation :* The students would select a topic of relevance in consultation with the faculty.

Step 2 : *Selection of a date/day/venue for workshop :* The workshop would be organized and managed entirely by the students. The faculty would play the role of advisors. From selection of suitable date and venue to inviting AUH faculty and officials for the workshop, students would be in charge of the smooth conduct of the workshop.

Step 3 :*Preparation for workshop presentation :*Once the topic is selected, students would start gathering relevant material for the presentation during the workshop. Since the presentation would be followed by questions and answers, the students have to be prepared for a tough session. Faculty will facilitate the collection of material and preparation of the presentation.

Step 4 : *Submission of presentation* : Students would submit their presentations in hard copy format for evaluation purposes.

Examination Scheme

Power Point Presentation and Q&A	Participation and organization
75 marks	25 marks

Syllabus – Fifth Semester

PUBLIC ADMINISTRATION-II

Course Code: POL2501 **Credit Unit: 05**

Course Objective
This paper aims to help the students develop a deep and analytical understanding of the Indian public administrative system. It, thus, enters into a penetrating analysis of the systems of local government, personnel administration, financial administration and the like - as conceived and found inIndia. It takes up thestudy ofrecent events and debates and wouldencourage the students to enter into a constructive dialogue towards the betterment of the system.

Course Content
Module-I: Structure ofGovernment Organizations in India
Departments; Public Corporations; Chief Executives

Module-II: Personnel and Financial Administration in India
Civil Services; Recruitment, Training and Performance Appraisal; Budget; Audit and Accounts

Module-III: Local Self-Government
Historical Overview; The structure of Local Self-Government in India; An analysis

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References:

Text:
Maheshwari, S.R.2009. *Indian Administration*. New Delhi:Orient BlackSwan.
Bhagwan, VandV Bhushan. 2005. *Indian Administration*. New Delhi:S. Chand.

References:
Rockwell, Stephen J.2010. *Indian Affairs and the Administrative State in the Nineteenth Century*. Cambridge University Press.
Chowdhry, Sachin. 2011. *Planning Development for Metropolitan Region*. New Delhi:Indian Institute of Public Administration.

INTERNATIONAL RELATIONS

Course Code:POL2502 **Credit Units: 05**

Course Objective

The course would go beyond the traditional understanding of international politics and provide the students with a detailed overview of the various systems and processes that have and continue to shape the contemporary world. It would also take into consideration the perspective of the devloping nations in defining political interaction between nations.

Course Content

Module-I : Theories

Theories of international relations ; India's perspective ; race and international relations ; class and international relations ; gender and international relations

Module-II : Concepts

Imperialism ; Sovereignty ; Security ; Geopolitics ; Sustainable Development ; Cosmopolitanism

Module-III : Global issues

Global history ; globalization ; global finance ; global economic development ; global culture ; global migration ; global cities ; global justice

Module-IV : Law, institutions and movements

International Law ; Theories of International Organization ; United Nations ; Human Rights ; Humanitarianism ; Gandhi and World Politics

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Chimni, B S and Siddharth Malavarappu. 2010. *International Relations : Perspectives from the Global South*. New Delhi : Pearson Education.
Khanna, V N. 2004. *International Relations*. New Delhi : Vikas Publications.
Johari, J C. 1986. *International Relations and Politics*. New Delhi : Vantage Press.

References :

Chandra, P. *International Relations*. New Delhi : Vikas Publishing House.
Pruthi, R K. 2006. *International Relations*. New Delhi : Neha Publications.
Hunter, Nick. 2012. *International Relations*. Hienemann Library.
Codevilla, Angelo M. 2010. *Student's Guide to International Relations*. Intercollegiate Studies Institute.

INDIA'S FOREIGN POLICY

Course Code: POL2503 **Credit Units: 05**

Course Objective
To provide an in-depth overview of the development of India's foreign policy particularly with reference to the contemporary scenario characterised by global terrorism and violence. To evaluate and discuss the methods of engaging with South Asia and the world that India has adopted over the years.

Course Content
Module-I : Features and perspectives
Foreign policy and national interest ; principles and objectives

Module-II : Non-alignment
The genesis of non-alignment ; India and non-alignment ; non-aligned movement and its impact on international relations ; contemporary relevance of non-aligned movement

Module-III : India-Pakistan Relations
The early years (1947-62) ; major developments leading to the 1971 conflict ; India-Pakistan relations in 1980s ; Kashmir conflict and Indo-Pak relations ; global terrorism and its impact on India-Pakistan relations ; contemporary trends in India-Pakistan relations

Module-IV : India's relations with other states in South Asia
India's policy towards Bangladesh ; India and Nepal ; India's foreign policy towards Sri Lanka : history, the Tamil question and contemporary trends

Module-V : India-China Relations
Evolution of India's China Policy ; India-China relations through the years ; major events and conflicts ; economic relations between India and China ; contemporary perspectives on India-China Relations

Module-VI : India's policy towards the rest of the world
Southeast Asia in Indian Foreign Policy ; Indio-Iranian Relations ; India's policy towards Israel ; India's relations with Korea ; India-Japan Relations ; India's relations with Russia ; India and the United States

Module-VII : Issues in India's foreign policy
Evolution of India's Nuclear Policy ; India's foreign economic policies ; domestic and international influences on India's energy policy

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Ganguly, Sumit. 2011. *India's Foreign Policy*. New Delhi : Oxford University Press.
Dubey, Muchkund. 2012. *India's Foreign Policy : Coping with the changing world*. New Delhi : Pearspon Education.
Khanna, V N. 2010. *Foreign Policy of India*. New Delhi : Vikas Publishing House.

References :

Dutt, V P. 1999. *India's Foreign Policy in a Changing World*. New Delhi : Vikas Publishing House.
Shukla, Vatsala. 2005. *India's Foreign Policy in the New Millennium*. New Delhi : Atlantic.
Balakrishnan, T K. 2010. *India's Foreign Policy : problems and paradoxes*. New Delhi : Mohini Publishers and Distributors.
Mattoo, Amitabh and Happymon Jacob. 2010. *Shaping India's Foreign Policy*. New Delhi : Har Anand Publications.

READING KARL MARX

Course Code: POL2504 **Credit Units: 03**

Course Objective

To provide the students with an indepth understanding of one of the foremost political thinkers of our time—Karl Marx through a reading of some of his key works such as *Das Kapital*, *German Ideology*, and *The Communist Manifesto*.The course will concentrate on indepth reading of relevant portions of the works cited above and the global implications of the same.

Course Content

Module-I : Early Writings of Karl Marx

Early literary works ; Critique of Hegel (1844) ; Thesis on Feuerbach (1845)

Module-II : *German Ideology* (1845)

Key concepts ; Idealism and Materialism ; Real Basis of Ideology ; Proletarians and Communism

Module-III : *The Communist Manifesto* (1848)

Bourgois and Proletarians ; Proletarians and Communists ; Socialist and Communist Literature

Module-IV : *Capital* (1867)

The Two Factors of a Commodity : Use Value and Value ; Labour and Commodities ; The Form of Value ; Fetishism of Commodities

Module-V : Key Concepts in Marx's Writings

Productions and wages ; Profits ; Currency ; Supply and Demand ; Wages and Prices ; Value and Labour ; Production of Surplus Value ; Struggle between Capital and Labour and its Results

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Marx, Karl. 1844. *Critique of Hegel's Philosophy of Right*. Published by Oxford University Press in 1970.

Karl, Marx. 1845. *Thesis on Feuerbach*. Published in Brussels. Translated in Cyril Smith in 2002.

Karl, Marx. 1845. *German Ideology*. From Marx-Engels Collected Works, Volume 5.

Karl, Marx. 1848. *The Communist Manifesto*. Marx/Engels Selected Works, Vol. One, Progress Publishers, Moscow, 1969.

References :

Bottomore, T B and Maximilien Rubel. *Karl Marx : Selected Writings in Sociology and Social Philosophy*.

Freedman, Robert (Ed). *Marx on Economics*.

Fischer, Ernst and Franz Marek. *Marx in his own words*.

CIVIL SOCIETY IN INDIA

Course Code: POL2505 **Credit Units: 02**

Course Objective
The course would identify the importance of a vibrant civil society in a democratic polity and attempt to underline the same for the students through reeading and teaching. Students would be provided with both the theoretical aspects as well as the current and practical scenario with regard to the development of a civil society in India.

Course Content
Module-I : Civil Society as the 'Third Sphere'
Civil society and governance ; Critique of civil society as Third Sphere ; Indian perspective on civil society ; the crisis of governance ; civil society and the goal of goof governance ; corruption and the Right to Information

Module-II : Civil Society in Practice in India
Save the Chilika Movement in Orissa ; Case study of the Chhattisgarh Mukti Morcha ; Democratic governance, civil society and Dalit protest ; governance and the subalterns ; the pavement dwellers of Mumbai ; land distribution for Kol tribals in Uttar Pradesh

Module-III : Case Study of Aam Aadmi Party in Delhi
Genesis of the movement and development ; from movement to political party ; movement-politics interface ; reflections on election results for Aam Aadmi Party

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Texts :
Tandon, Rajesh and Ranjita Mohanty. 2003. *Does Civil Society Matter ? Governance in Contemporary India*. New Delhi : Sage Publications.
Rosenblum, Nancy M and Robert C Post. 2001. *Civil Society and Government*. Princeton University Press.

References :
Chandhoke, Neera. 2005. *State and Civil Society : explorations in political theory*. New Delhi : Sage Publications.
Kaviraj, Sudipta and Sunil Khilnani. 2001. *Civil Society : History and possibilities*. New Delhi : Cambridge University Press.
Gudavarthy, Ajay. 2012. *Reframing Democarcy and Agency in India : interrogating political society*. New Delhi : Anthem Press.

TERM PAPER

Course Code: POL2531 **Credit Units: 02**

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students.The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related tocontemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Issues of caste in Indian politics
- State and democracy
- Internal security scenario
- Theories of secularism
- Justice and related themes
- Multicultural societies
- Feminist critique of Indian politiccs
- Media and politics
- Cultural imperialism

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

REVIEW OF CONTEMPORARY LITERATURE-IV

Course Code: POL2530 **Credit Units: 02**

Course Objective

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** End-Term Examination)

POST-COLD WAR WORLD POLITICS

Course Code: POL2506 **Credit Units: 03**

Course Objective

To provide a theoretical understanding of politics as it developed in the post-Cold War scenario particularly with regard to the politics of the United States of America vis-a-vis the rest of the world, the shifting of the power blocks, and the growth ofanti-American sentiment in certain parts of the world. The course would also encourage students to read contemporary literature on emerging international political scenarios.

Course Content

Module-I : Overview of the post-Cold War decade

Historical background of US foreign policy ; US relations with EU ; brief history of US interventions in West Asia, South East Asia and the Middle East

Module-II : Post-Cold War American Politics

Key institutional players ; lobbies and their importance in American politics ; media and public opinion in US ; America's position in a globalized economy

Module-III : America and the Arab/Muslim World

Historical development of politics of the Arab/Muslim world ;why the Arabs/Muslims hate America ? US intervention and international war against terrorism

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Cameron,Fraser. 2002. *US Foreign Policy after the Cold War: Global Hegemon or Reluctant Sheriff?* London: Routledge.

Jentleson, Bruce W. 2000. *American Foreign Policy: The Dynamics of Choice in the 21st Century*. W.W. Norton & Company.

References :

Antizzo, Glenn J. 2010. *U.S. Military Intervention in the Post-Cold War Era : How to Win America's Wars in the Twenty-first Century*. LSU Press.

Lewis, Bernard. 1990. "The Roots of Muslim Rage". *The Atlantic Online*, September. Details available at http://www.theatlantic.com/past/issues/90sep/rage.htm.

Mamdani, Mahmood. 2004. "Introduction: Modernity and Violence". *Good Muslim, Bad Muslim: Islam, the USA, and the Global War against Terror*. New Delhi: Permanent Black.

Huntington, Samuel P. 1993. "The Clash of Civilizations?" *Foreign Affairs* 72 (3) Summer: 22. Details available at http://www.foreignaffairs.com/articles/48950/samuel-p-huntington/the-clash-of-civilizations.

Said, Edward W. 2000. "The Clash of Definitions". In *Reflections on Exile and Other Essays*. Cambridge, Massachusetts: Harvard University Press.

THEORIES OF PUNISHMENT

Course Code: POL2507 **Credit Unit: 01**

Course Objective
This paper aims at helping the students understand the concepts and concerns that are intrinsic to the idea of punishment. It starts with a study and analysis of the concept of punishment and proceeds to understand the latter against the contemporary background.

Course Content
Module-I: An introduction to the Idea of Punishment
Concept of Punishment; Theories of Punishment.

Module-II: The Relevance of 'Punishment'
Case Studies from Different Parts of the World; Conclusion.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References:

Text:
Tunick, Mark. 1992. *Punishment: Theory and Practice*. California:University of California Press.
Simmons, J.A.1995. *Punishment*. New Jersey:Princeton University Press.

References:
Duff, R.A.2001. *Punishment, Communication, and Community*. Oxford:Oxford University Press.
Tonry, Michael. 2000. *The Handbook of Crime & Punishment*. New York:Oxford University Press.

PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2532 **Credit Units: 03**

Course Objective
The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project
The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form of project report followed by a presentation.

Guidelines for Project Report

Length of the report : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).

Contents of the report :

- Cover page
- Acknowledgements
- Table of Contents
- Introduction
- Review of readings
- Findings and analysis
- Conclusions
- Bibliography or References
- Annexures

Steps for completion of project :

- Finalization of topic in consultation with faculty
- Introductory presentation with research objectives and questions specified
- Field work
- Preparation of project report
- Submission of project report
- Final Presentation and viva

Possible research topics

- Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
- Prepare a research report on the impact of elections in your constituency.
- Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
- Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Syllabus – Sixth Semester

COMPARATIVE GOVERNMENT AND POLITICS

Course Code:POL2601 **Credit Units: 04**

Course Objective
The core objective of the course is to impart an understanding of comparative forms of government and politics in countries with parliamentary as well as presidential forms of government. At the end of the course the student will be able to distinguish between forms and nature of governments in various countries and draw comparisons between political systems.

Course Content
Module-I : Theoretical background
Political concepts ; The State ; Democracy and democratic politcal regimes ; Authoritarian rule ; Theoretical approaches ; Structural-Functional Analysis ; System Analysis ; Constitutionalism

Module-II : Forms of politics
Political culture ; political communication ; political participation

Module-III : Elements of Political Systems
Political Parties ; Interest Groups ; Elections ; Voters

Module-IV : Institutions
Constitution and law ; Multilevel governance ; Legislatures ; Political Executive ; Bureauracy and Public Administration

Module-V : Policy and Methods
Policy Process ; Comparative Methods

Module-VI : Comparative political structures and processes
United States ; United Kingdom ; China ; Pakistan

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :
Hague, Rod and Martin Harrop. 2013. *Comparative Government and Politics : an introduction*. London : Palgrave Macmillan.
Samuels, David J. 2013. *Comparative Politics*. Minnesota : Pearson.
Almond, G et al. 2011. *Comparative Politics Today* (9th Edition). New Delhi : Pearson.

References :

Alex de Tocqueville. 1964. *Democracy in America*, 2 Vols. Bombay : Popular Prakashan.
Akbar S.Ahmad. 2002.*Discovering Islam*. UK : Routlege.
Bagehot W. 1963. *The English Constitution*. London : Fontana.
Blondel, J. 1980.*An Introduction to Comparative Government*. London : Weiden & Nicholson.
Blondel, J. 1973. *Comparative Legislatures*. Engle WoodChiffs NJ : Prentice Hall.
Derbyshere, I. 1991. *Politics in China*. London : Chambers.
Dicey, A. 1969. *Introduction to the Study of the Law of the Constitution*, 10th edn.London : Macmillan.
Finer, H. 1969. *Theory and Practice of Modern Government*. London : Methuen.
Flamming J. et.al. 1990.*American Politics in a Changing World*. Pacific Groove, California : Brooks Cole.
Gittings J. 1989. *China Changes Face: The Road from Revolution 1949-89*. London, Oxford : Oxford University Press.
Griffith E.S. 1983. *The American System of Government*, 6th edn. London : Methuen.
Harding H. 1987. *China's Second Revolution: Reform after Mao*. Washington D.C : Brookings Institution.
Holmes I. 1997. *Post Communism: An Introduction*. Cambridge : Polity.
Hu nor H.C. 1973. *An Introduction to Chinese Politics*. London : David Charles.
John L. Esposito, John Obert Voll. 1996. *Islam and Democracy*. US : Oxford University.
Khanna V.N. 2004. *Comparative Study of Government andPolitics*. New Delhi : R. Chand & Co.
Lijphart A. 1994. *Electoral System and Party System*. New Haven C. T: Yale University Press.
Mackerra C. and A. Yorke. 1991. *The Cambridge Handbook of Contemporary China*. Cambridge : Cambridge University Press.

DISSERTATION

Course Code: POL2637 **Credit Units: 09**

Course Objective

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual or Theoretical Framework – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusions -- 10 marks
Chapter 5: Bibliography-- 5marks

The Components of a Dissertation
A Dissertation should have the following components:
1) Cover Page: This should contain the title of the dissertation, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions
a)*Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b)*Conceptual Framework*: (relating to the topic of the Dissertation).
c) *Presentation of Data,Analysis and Findings*:(using the tools and techniques mentioned in the methodology).
d)*Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the work, and in writing the report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:
- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.

- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: Writing the dissertation dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual and Theoretical Framework
Chapter 3: Analysis & Findings
Chapter 4: Conclusions

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.
Annexures,
References / Bibliography

Guidelines for evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

Cover Page / Title page

Project Report on
Title of the Project

XXXXXXXXXXXXXXXXX

(Submitted for the partial fulfilment for the awardof Degree of B.A. Honours in Political Science
To
Amity School of Liberal Arts

Submitted by

Name of the Candidate :.....
Registration No. .....
Name of the College .....
College Roll No. .....

Supervised by
Name of the Supervisor:
Designation

Month & Year of Submission

University Logo and Name

(Annexure-IB)

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in Political Science is my original work and has not been submitted earlierto any other University /Institution for the fulfilment of the requirement for any course of study.
I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor:

Signature of Student
Name

Registration No.

Place:
Date:

READING GANDHI

Course Code: POL2602 **Credit Unit: 04**

Course Objective

The course aims at introducing the students to the life and philosophy of Mohandas Karamchand Gandhi. It enters into a critical evaluation of Gandhian thought and encourages students to analyze Gandhi's contribution to the Indian Society and suggest workable implications for the latter.

Course Content

Module-I: M K Gandhi: An Introduction

Life Sketch; Influences; Criticism.

Module-II: Gandhi's Political Thought

Gandhian Philosophy; Political Thought and Action; Implications for the Indian Society.

Module-III: Critical Evaluation of Gandhi's Contribution

Was Freedom for India, in 1947, possible without Gandhi?; Why is Gandhi called the 'Father of the Nation'?; Conclusive Analysis.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References:

Text:

Gandhi, M K and Ronald Duncan. 1951. *Selected Writings of Mahatma Gandhi*. Boston:Beacon Press.
Dalton, Dennis. 2000. *Mahatma Gandhi: Non-Violent Power in Action*. New York:Columbia University Press.
Wolpert, Stanley. 2002. *Gandhi's Passion: The Life and Legacy of Mahatma Gandhi*. New Delhi: Oxford University Press.

References:

Gandhi, M K. 1958. *All Men Are Brothers: Life and Thoughts of Mahatma Gandhi as Told in His Own Words*. Paris:UNESCO.
Deluca, Anthony R.2000. *Gandhi, Mao, Mandela, and Gorbachev: Studies in Personality, Power, and Politics*. Westport CT:Praeger.

READING VIVEKANANDA

Course Code: POL2603 **Credit Unit: 03**

Course Objective
This paper intends to familiarize the students with the life and political thought of Swami Vivekananda. It begins with a life sketch of the Indian stalwart and proceeds with an intensive analysis ofhis political thought. It concludes with a critical and contemporary evaluation ofthe political philosophy of the thinker.

Course Content
Module-I: Swami Vivekananda: An Introduction
Life Sketch; An Overview of Political Philosophy.

Module-II: Political Thought of Swami Vivekananda
Metaphysical Foundations; Freedom; Philosophy of History; Social Philosophy.

Module-III: Analysis
Vivekananda and Nationalism; Contemporary relevance.

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text & References:

Text:
Sharma, Urmila andS.K.Sharma. 1996. *Indian Political Thought*. New Delhi: Atlantic Publishers and Distributors.
Singh, M.P. and Himanshu Roy. 2012. *Indian Political Thought: Themes and Thinkers*. New Delhi: Pearson.
Ghoshal, U.N.1959. *A History of Indian Political Ideas: The Ancient Period and the Period of Transition to the Middle Ages*. London:Oxford University Press.

References:
Sharma, Jyotirmaya. 2013. *A Restatement of Religion: Swami Vivekananda and the Making of Hindu Nationalism*. Yale: Yale University Press.
*Complete works of Swami Vivekananda*http://www.ramakrishnavivekananda.info/vivekananda/complete_works.htm

READING AMBEDKAR

Course Code: POL2604 **Credit Units: 03**

Course Objective
To cultivate a nuanced understanding of the life and works of the man who oversaw the drafting of the Indian Constitution – Dr B R Ambedkar. The course will also attempt to inculcate in the students an appreciation of Dr Ambedkar as a product of social inequalities and the overcoming of discrimination to attain great intellectual heights.

Course Content
Module-I : Early life and writings
Early times ; struggle for education ; higher learning ; thoughts on the organization of the downtrodden ; conflict and controversy with Congress

Module-II : Annihilation of Caste
Background of composition ; key concepts and arguments ; defining caste discrimination ; social reform in Ambedkar's writings

Module-III : Writings on caste
Castes in India : their genesis, mechanism and development ; What Path to Salvation ?; Essays on Untouchables and Untouchability : Social, Political, Religious ; Manu and the Shudras ; Who were the Shudras ?

Module-IV : Political Writings
Ranade, Gandhi and Jinnah ; Communal Deadlock and a way to solve it ; What Congress and Gandhi have done to the Untouchables ; Pakistan or the Partition of India ; Notes on Parliamentary Procedure ; The Problem of Political Suppression

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :
Rodrigues, Valerian. 2004. *The Essential Writings of B R Ambedkar*. New Delhi : Oxford University Press.

Referenes :

Ambedkar, B R. 1944. *Annihilation of Caste*. Sources : http://ccnmtl.columbia.edu/projects/mmt/ambedkar/

Ambedkar, B R. 1916. *Castes in India : their genesis, mechanism and development*

- *What Path to Salvation ?*
- *Essays on Untouchables and Untouchability : Social, Political, Religious*
- *Manu and the Shudras*
- 1946. *Who were the Shudras ?*

Sources : http://www.ambedkar.org/

Ambedkar, B R. 1943. *Ranade, Gandhi and Jinnah*

- 1945. *Communal Deadlock and a way to solve it*
- 1945. *What Congress and Gandhi have done to the Untouchables*
- 1945. *Pakistan or the Partition of India*
- *Notes on Parliamentary Procedure*
- *The Problem of Political Suppression*

Sources : http://www.ambedkar.org/

MODERN THEMES IN GENDER

Course Code:POL2605 **Credit Units: 01**

Course Objective
The course would encourage discussions on concepts like patriarchy and other issues concerning gender. The students would be imparted relevant knowledge on the gender imbalance particularly in India and the urgent need for a rethinking of social mores and the imagination of gender.

Course Content
Module-I : Theoretical Background
Classical approaches and their critiques ; Poststructuralist and post-modernist approaches ; Theories of identity and gender ; patriarchy and its criticisms

Module-II : Women's Movement
Historical roots of the Women's movement ; women's resistance to gender-based oppression ; mobilization of women

Module-III : Current themes in Gender
Changes in gender relations ; gender and division of labour ; gender and political violence ; gendered discourse on nationalism

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :
Momsen, Janet. 2009. *Gender and Development*. London : Routledge.
Wharton, Amy S. 2005. *The Sociology of Gender : An Introduction to Theory and Research*. Wiley.

References :
The Gender Book. 2013. http://www.thegenderbook.com/
Forbes, Geraldine. 2004. *Women in Modern India*. New Delhi : Cambridge University Press.
Kumar, Radha. 2000. *The History of Doing: An Illustrated Account of Movements for Women's Rights and Feminism in India, 1800-1990*. New Delhi : Zubaan Books.
Menon, Nivedita. 2001. *Gender and Politics in India*. New Delhi : Oxford University Press.

POLITICAL VIOLENCE: CONCEPTS AND TRENDS

Course Code: POL2606 **Credit Units: 03**

Course Objective
The primary objective of this course is to foster awareness of the critical role played by politics and the violence arising out of politics in societies. The course would provide examples and illustrations from across the world, beginning from the efficacy conflicts, both high and low intensity, in establishing regimes and driving political order in nation states.

Course Content
Module-I : Theoretical background
Concepts and definitions ; forms of collective violence ; difference between high and low intensity conflicts ; 'non-state actors' and political violence

Module-II : Wars as political violence
What is a war ? ; causes of wars ; overt and covert wars ; case studies from Vietnam, Somalia and Latin America

Module-III : Terrorism as political violence
Definitions of terrorism ; forms and methods of terrorism ; brief history of terrorist movements ; causes of terrorism ; domestic vs. Global terrrorism ; case studies from Jammu and Kashmir

Module-IV : Ideological violence
Maosim as political violence ; brief history of Maoism in India ; causes of the rise of Maoism ; current debates around Maoism ; case studies from Andhra Pradesh, Maharashtra and Chhattisgarh

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References
Texts :
Gurr, Ted Robert. 2011. *Why Men Rebel* (Fortieth Anniversary Edition). New York : Paradigm Publishers.
Kalyvas, Stathis N. 2006. *The Logic of Violence in Civil War* (Cambridge Studies in Comparative Politics). London : Cambridge University Press.
References :
Enders, Walter and Todd Sandler. 2011. *The Political Economy of Terrorism*. London : Cambridge University Press.
Scott, James C. 1987. *Weapons of the Weak : Everyday forms of peasant Resistance*. USA : Yale University Press.
Mukherjee, Nirmalangshu. 2013. *The Maoists in India*. India : Aramyllis.
Paul, Santosh. 2013. *The Maoist Movement in India : Perspectives and Counterperspectives*. New Delhi : Routledge.

REVIEW OF CONTEMPORARY LITERATURE-V

Course Code: POL2630 **Credit Units: 02**

Course Objective

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** End-Term Examination)

TERM PAPER

Course Code:POL2631 **Credit Units: 02**

Objective

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students.The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge of politics by undertaking hands-on research on a topic of their choice. The topics selected by the students must be commensurate with the ongoing courses pertaining to the semester in question.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned.

Guidelines:

1. The term paper will be related tocontemporary politics and related philosophical injunctions and the topic(s) will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Issues of caste in Indian politics
- State and democracy
- Internal security scenario
- Theories of secularism
- Justice and related themes
- Multicultural societies
- Feminist critique of Indian politiccs
- Media and politics
- Cultural imperialism

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Presentation	Total
30	30	20	20	100

PROJECT (WITH PRESENTATION AND EVALUATION)

Course Code: POL2632 **Credit Units: 03**

Course Objective

The major objective of this course would remain development of the ability to undertake independent research on any topic of political or socio-economic of relevance and produce an intellectual treatise which enhances future knowledge and provides a basis for further investigative work. The course would emphasise on the methodology of research.

Methodology of Project

The project would be designed to encourage original research and at the same time provide the students with an opportunity to work on political issues that affect the everyday life of the students and those who live around them. For example, students could observe and assess the impact of impending elections on people in their constituency from the socio political point of view. Their observations could be reecorded in the form of project report followed by a presentation.

Guidelines for Project Report

Length of the report : The project report should not exceed 5000 words in length (excluding Bibliography and Annexures).

Contents of the report :

- Cover page
- Acknowledgements
- Table of Contents
- Introduction
- Review of readings
- Findings and analysis
- Conclusions
- Bibliography or References
- Annexures

Steps for completion of project :

- Finalization of topic in consultation with faculty
- Introductory presentation with research objectives and questions specified
- Field work
- Preparation of project report
- Submission of project report
- Final Presentation and viva

Possible research topics

- Select coverage of any political issue of importance and trace its development through news reports published in any reputed newspaper (English/Hindi).
- Prepare a research report on the impact of elections in your constituency.
- Prepare a report on the representation of terrorism in Hindi films. The report should contain a list of films viewed with full details.
- Select any philosophical issue of your choice and attempt to bring out your own conclusions based on your reading of the various texts on that issue.

Examination Scheme

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Amity School of Liberal Arts & FL

Bachelor of Arts English (Honors)

FLEXILEARN
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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Arts English (Honors)

Syllabus - First Semester

HISTORY OF ENGLISH LITERATURE

Course Code: ENG2101 **Credit Units: 05**

Course Objective:
The course is designed to give a broad background of English Literature over a period of some 14 centuries to the students. This will give the students an insight into the major literary canons – that sequence of interlinked works - with their characteristic trends and genres with major literary authors and texts. This course explores the long history of writing in the British Isles, from the Anglo-Saxon and the early Christian period and the world over in the present day. It gives a record of English writing – poetry, drama and fiction in the various regions.

Course Contents:

Module-I: Anglo-Saxon, Anglo-Norman, Medieval Age (Morality plays, Miracle plays & Mystery Plays)

Module-II: Renaissance in Europe (Elizabethan Theatre; Jacobean – Revenge plays, Metaphysical Poets; Puritan Age)

Module-III: Classical Age (Restoration & Augustan Age)

Module-IV: Romanticism

Module-V: Victorian Age

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Harry Blamires. 1984. A Short History of English Literature Second Edition. London. Rutledge
- David Daiches. 1979. History of English Literature, Vol. I, II, III. Allied Publishers.
- Jesse Matz. 2004. The Modern Novel: A Short Introduction. Wiley-Blackwell.
- Krishna, Arvind. An Illustrated History of Indian Literature In English. Orient Black Swan.
- Sanders, Andrew. Short Oxford History of English Literature. Oxford Univ. Press, London

ENGLISH POETRY FROM CHAUCER TO BLAKE

Course Code: ENG2102 **Credit Units: 05**

Course Objective:
The course includes a study of English poetry from Chaucer of the later Middle Age to the Age of Transition. It has representative poets from different ages and their poems. This course will enable the students to get a broad perspective of the important periods of English Poetry and different genres of poetry. It will also tackle such issues as - poet in relation to society, themes of nature, imagination, etc

Text:

1.	Geoffrey Chaucer	-	Prologue to the Canterbury Tales
2.	John Donne	-	The Canonization, The Sunne Rising
3.	John Milton	-	Paradise Lost Book I. (Non – detailed)
4.	William Blake	-	The Lamb, The Tiger

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Fowler, Alistair & Scot-Kilvert, Ian: Edmund Spenser. Longman.
- Thomas, C.T. (Ed): Rape of the Lock. Orient Black Swan.
- Guibbory: The Cambridge Companion to John Donne. Cambridge University Press.
- Danielson, Dennis (Ed): Cambridge Companion to Milton. Cambridge University Press.
- De Grazia, Margreta & Wells, Stanley: Cambridge Companion to Shakespeare. Cambridge University Press.
- Zunder, William: Paradise Lost: J Milton. Macmillan.
- Bottrall, Margaret: William Blake: Songs of Innocence and Experience. Octavo.

DRAMA FROM ELIZABETHAN TO RESTORATION AGE

Course Code: ENG2103 **Credit Units: 05**

Course Objective:
The course will give an insight into different genres of Drama from the Elizabethan to the restoration age. For that matter writers and their works, which are representative of the significant periods, are taken up.

Text:

Marlowe	-	Dr. Faustus
Shakespeare	-	Macbeth
Congreve	-	The Way of the World

Examination Scheme:

Components	**Assignment**	**Sessional**	**Presentation**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- Ali, Amir. Basic Introduction to Shakespeare. Oxford University Press.
- Bloom, Harold. Christopher Marlowe. New York: Chelsea House, 1986.
- Clemen, Wolfgang. Shakespeare's Dramatic Art: Collected Essays. New York: Routledge, 2005.
- Lyons, Patric. Congreve: Comedies. Macmillian.
- Morwood, James and David Crane. Eds., Sheridan Studies. Cambridge University Press, 1995.
- Taylor, D. Crane. William Congreve. Oxford University Press, 1931.

Syllabus - Second Semester

INTRODUCTION TO LINGUISTICS

Course Code: ENG2204 **Credit Units: 05**

Course Objective:
The paper aims to provide the learner the basic knowledge of Linguistics, various aspects of language study and its applications. The focus of the paper is also to introduce the learners with the basics of correct pronunciation and articulation and thereby to improve their communication skills.

Course Contents:
Module-I: Introduction
What is language
Characteristics of Human Language
Linguistics: Definition and Explanation
Importance and applications of Linguistics
Levels of language study

Module-II: Phonetics and Phonology
Difference between Phonetics and Phonology
Classification of Sound System
Articulation and Production of sounds
Tone, accent and stress

Module-III: Morphology
Suffixes and Prefixes
Word Formation Processes

Module-IV: Semantics
Meaning
Types of meaning
Sense and Reference

Module-V: Syntax
Theories of sentence structure
Sentence structure analysis

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Adams, V. 1973. An Introduction to Modern English Word Formation. London. Longman
- Chomskey, N., and M. Halle. 1968. The Sound Pattern of English, New York : Harper and Row.
- Lyons, J, 1977. Semantics. 2 Vols. Cambridge University Press
- Crystal D. 1977. Encyclopedia of Language : 2nd Vol., Cambridge University Press

ENGLISH POETRY FROM WORDSWORTH TO TENNYSON

Course Code: ENG2202 **Credit Units: 05**

Course Objective:
The course includes a study of English poetry from Wordsworth of the Romantic Age to Tennyson of the Victorian Age. It has representative poets from these ages and their poems. This course will enable the students to get a broad perspective of the important as well as prolific periods of English Poetry and different genres of poetry. It will also tackle such issues as - poet in relation to society, themes of nature, imagination, the Victorian Dilemma, etc.

Text:

1.	William Wordsworth	-	Tintern Abbey, Ode on the Intimations of Immortality.
2.	Samuel Taylor Coleridge	-	Kubla Khan.
3.	Shelley	-	Ode to the West Wind.
4.	John Keats	-	Ode to Nightingale, Ode on a Grecian Urn.
5.	Browning	-	My last Duchess.
6.	Matthew Arnold	-	Dover Beach.
7.	Tennyson	-	Ulysses.

Examination Scheme:

Components	**Assignment**	**Sessional**	**Presentation**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- Roe, Nichole: Romanticism. Oxford University Press.
- Wolfson, Susan J: Cambridge Companion to Keats. Cambridge University Press.
- Fraser, George Sutherland: John Keats: Odes: A Casebook. Macmillan.
- Robinson, Daniel: A Century of Sonnets: The Romantic Era Revival. Oxford University Press.
- Palmer, David John: Tennyson. Ohio University Press.

MODERN DRAMA

Course Code: ENG2203 **Credit Units: 05**

Course Objective:
The study of Modern plays will help students understand the complex relationship of play, theater and audience as also their associated theatrical techniques. The study of prescribed texts will also help students in understanding certain socio-political issues of the times.

Text:

T.S. Eliot	-	Murder in the Cathedral
G.B. Shaw	-	Pygmalion
John Osborne	-	Look Back in Anger
Harold Pinter	-	The Birthday Party

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Brown, John R. Theatre Language: A Study of Arden, Osborne, Pinter and Wesker. London: Allen Lane, 1972.
- Dillon, Cynthia Bishop. The Playwriting Self of Bernard Shaw. Southern Illinois University Press, 1991.
- Malamud, Randy. T. S. Eliot's drama: A Research and Production Sourcebook. London: Greenwood Press, 1992.
- Raby, Peter. Ed., The Cambridge Companion to Harold Pinter. Homerton College: Cambridge University Press, 2001.

RESEARCH METHODOLOGY-I

Course Code: ENG2205 **Credit Units: 01**

Course Objective:
This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing, to help them acquire both a theoretical thrust and hands-on experience in writing research proposals before they embark on the execution of the thesis proper.

Module-I: Introduction
Meaning and Definition of Research
The nature of inquiry in Social Sciences and Humanities
The relationship between Scholarship, Criticism and Research
Textual Criticism
Literary History

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Texts and References

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing

Syllabus - Third Semester

20TH CENTURY INDIAN ENGLISH POETRY

Course Code: ENG2301 **Credit Units: 05**

Course Objective:
The study of Translated texts will help students to localize culture and identity through understanding of a wide spectrum of perspectives on Indian nationhood and culture. The study of Modern Indian Poetry will acquaint students with the development of new art form as a result of multiplicity subjective positions initiated by a variety of experiences in Modern India.

Short Stories in translation:

1. Premchand - The Holy Panchayat
2. Ismat Chughtai - The Quilt
3. Ambai - The Squirrel
4. Basheer - Daughter
5. Saadat Hasan Manto - Toba Tek Singh

Indian English Poetry:

1. Toru Dutt - Our Casurina Tree
2. N. Ezekiel - Night of the Scorpion
3. K.N. Daruwalla - The Ghaghra in Spate
4. Kamala Das - Dance of Eunuchs
5. Gieve Patel On Killing A Tree

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Mehrotra Krishna Arvind. The Oxford India Anthology of Twelve Modern Indian Poets. Oxford univ. Press
- Singh R.P. Anthology of Indian English Poetry. Orient Black Swan
- Ramanujan A.K. The Collected Essays of A.K. Ramanujan Oxford.

ENGLISH NOVEL

Course Code: ENG2302 **Credit Units: 05**

Course Objective:
English Novel being a very important aspect of English literature, this course aims to give a broad understanding of the English Novel. It will give an insight into the major literary periods in relation to the English novel and their related characteristics and issues.

Text:
1. Jonathan Swift - Gulliver's Travels
2. Jane Austen - Pride and Prejudice
3. Charles Dickens - Hard Times
4. E.M. Foster - A Passage to India

Background Topics:
- The English Novel in nineteenth century England, Faith and Doubt
- The Writer and Society
- Fiction and its Readers.

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- John Richetti. Cambridge Companion to the Eighteenth Century Novel. Cambridge Univ. Press
- Wilbur L Cross. Development Of The English Novel

LITERARY CRITICISM

Course Code: ENG2303 **Credit Units: 05**

Course Objective:
Literary Criticism has come to hold a prominent place in the study English Literature. The course will give an insight into certain literary traditions in relation to English Literary Criticism. The course will acquaint the students in contemporary issues and trends in literary criticism from Aristotle to the present day.

Text:

1. Aristotle - Poetics
2. Dryden - "Three Unities" form Essay of Dramatic Poesy
3. Wordsworth - Preface to the Lyrical Ballads
4. Coleridge - "Fancy and Imagination'" from Biographia Literaria
5. Arnold - The Study of Poetry
6. T.S. Eliot - Tradition and the Individual Talent

Examination Scheme:

Components	**Assignment**	**Sessional**	**Presentation**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- Amian Das Gupta, Poetics. Pearson Education.
- John R. Willingham, A Handbook of Critical Approaches to Literature. Oxford University Press.
- Lodge, Modern Criticism and Theory: AReaders, 2/E. Pearson Education.
- Patric Waugh, Literary Theory and Criticism. Oxford University Press.

RESEARCH METHODOLOGY-II

Course Code: ENG2304 **Credit Units: 01**

Course Objective:
This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing to help them acquire both a theoretical thrust and hands-on experience in writing research proposals before they embark on the execution of the thesis proper.

Module-I: The Mechanics of Research
The Mechanics of dissertation Writing
Data Collection – Primary and Secondary Sources.
Procedure in Literary Research e-learning and Research

Module-II: Language, Style and Types of Discourses
The Style suitable for a Literary Thesis
Narration Argumentation
Exposition Description

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Texts and References

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing

SUMMER PROJECT EVALUATION

Course Code: ENG2335 **Credit Units: 03**

Summer Project is primarily a research work. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR SUMMER PROJECT REPORT

Topic

The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Focus is of the utmost importance. Too broad a topic will either lead to superficial treatment or an unnecessarily long paper; too narrow a topic will lead to a lack of source material and redundancy. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include Literature, Linguistics, Applied Linguistics, English Language Teaching and other related areas.

Synopsis of Summer Project Report

A Synopsis of the Summer Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

- Title of Summer Project Report
- Introduction
- Problems of Research
- Objectives of Research
- Tentative Chapter Division
- Suggested readings

Source Material and References

Presenting your own ideas in a Summer Project Report is acceptable and even encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources is required, and ten or more is typical. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases.

There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet.

Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.

Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You

must also obtain permission from the Supervisor before using your Summer Project Report for more than one course.

Length and Format

Length is not important; 40 to 60 pages of 1.5 spaced text is a good target. The title, author, course, and date should be typed onto a cover sheet.. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading

Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is not to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. I will read it carefully, offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This, I hope, will make the writing of a Summer Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have a gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Summer Project Report look and sound professional.

Evaluation of Project Work

Sl. No.	**Evaluated by**	**Criteria**	**Marks**
1	Institution	Quality Depth & Breadth of analysis, Coverage, Scope and content Project fulfillment Data collection ability in the field (if any) Scope of Implementation.	50
2	Board of Examiners	Viva-voce Examination	50
3		**Total**	**100**

Project Schedule

Registration

First week of the last academic month

Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.

Approval of Project Topic

Week following the ‘week of registration’

Submission of Synopsis to Faculty Guide

Prior to the completion of End-Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

Duration of Project

The project stretches for the full duration of the Semester break

Submission of Report

First Draft – After 20 Days from the commencement of the project

Second Draft – 20 days after submission of the first draft.

The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.

Final Draft – Within second week of rejoining of institution

Syllabus - Fourth Semester

20TH CENTURY INDIAN ENGLISH NOVEL

Course Code: ENG2401 **Credit Units: 05**

Course Objective:
This course will orient students towards understanding of Indian English Novel since its beginnings till recent day. To this end the texts will be studied in their relevance to the major sociopolitical issues of the Indian nation in the 20th century. The study of such texts will put in perspective the issues of Indian Culture, Religion and Nationalism.

Text:
1. R.K. Narayan - The Guide
2. Salman Rushdie - Midnight's Children
3. Amitav Ghosh - The Shadow Lines
4. Kamala Markandaya - Nectar in a Sieve

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:
- Iyengar K.R. Srinivas. Indian Writing in English. Advent Books Division
- Daiches D. Critical Approaches to English Literature. Orient Black Swan.
- V. Padma. Fiction as Window: Critiquing the Indian Literary Cultural Ethos since the1980.Orient Blackswan.
- Dodiya Jaydesinh. Indian Women Novelists in English. Sarup and sons.

PROSE DOWN THE AGES

Course Code: ENG2402 **Credit Units: 05**

Course Objective:
This course will introduce the different styles of prose through different ages. It instructs the students how the various styles be examined in the aesthetic structure of prose.

Essays:
- The Suffering Servant of God Life and Death - The Book of Job
- Francis Bacon (1561–1626) – Of Studies, Of Great Place
- Joseph Addison (1672-1719) - Reflections in Westminster Abbey, The Vision of Mirza
- Sir Richard Steele (1672 – 1729) - The Spectator Club
- Oliver Goldsmith (1730 – 1774)) – National Prejudices
- William Hazlit (1778 – 1830) – On Going a Journey
- Charles Lamb (1775–1834) - Dream-Children; a Reverie

Examination Scheme:

Components	**Assignment**	**Sessional**	**Presentation**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- W. E. Williams (Editor). 1943. A Book of English Essays (Penguin English Library). Penguin Books Ltd
- Department of English and Modern European Languages. 1998. Forms of English Prose. Oxford
- Ashok Thorat. 1998. Poetry and Minor Forms of English Literature. Oxford
- John J. Gross. 1998. The new Oxford book of English prose. Oxford

LITERARY THEORY

Course Code: ENG2403 **Credit Units: 05**

Course Objective:
This course will familiarize students with the study of major twentieth-century theories and its applications. The course will enable students to comment on various theories and apply them to works of literature and aspects of contemporary culture.

Text:
1. Structuralism - Definition and Concept.
2. Post-Structuralism & Deconstruction - Definition and Concept.
3. Marxism - Definition and Concept.
4. Post Colonialism - Definition and Concept.
5. Feminism - Definition and Concept.

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Gayatri Chakravarty Spivak, 'Can the Subaltern speak?' in Colonial Discourse and Post Colonial Theory: A Reader, eds. Patrick Williams and Laura Chrisman (London: Harvester Wheatsheaf, 1994)
- Lodge, Modern Criticism and Theory: A Readers,2/E. Pearson Education.
- Patric Waugh, Literary Theory and Criticism. Oxford University Press.
- Peter Barry, The Beginning Theory.
- Seldon, A Reader's Guide to Contemporary Literary Theory, 5/E. Pearson Education.
- Terry Eagleton, Literary Theory: An Introduction, 2nd ed. (Oxford: Blackwell).
- Young, Robert J C, Postcolonialism: A Very Short Introduction. Oxford.

RESEARCH METHODOLOGY-III

Course Code: ENG2410 **Credit Units: 01**

Course Objective:
This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing to help them acquire both a theoretical thrust and hands-on experience in writing research proposals before they embark on the execution of the thesis proper.

Module-I: Basics of Research
- Research Objectives
- Literature Review
- Research Gap
- Research Hypothesis

Module-II: The Mechanics of Research
- The Mechanics of dissertation Writing
- Data Collection – Primary and Secondary Sources.
- Methods of data collection : Questionnaire, Interview, observation, document analysis
- Methods of data analysis : Descriptive Statistics
- Procedure in Literary Research e-learning and Research

Examination Scheme:

Components	**Assignment**	**Sessional**	**Presentation**	**EE**
Weightage (%)	15	10	05	70

Texts and References:

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing

POST-COLONIAL LITERATURE

Course Code: ENG2406 **Credit Units: 03**

Course Objective:
To read a range of colonial and postcolonial fiction with reference to its historical context and its contemporary reception. To discuss the stereotypes encoded in colonial fiction and the efficacy of literary techniques employed by authors who desired to challenge these stereotypes. To discuss the methods used by postcolonial authors to convey the legacy of Imperialism.

Text:
1. Edward Said - Orientalism
2. Chinua Achebe - Things Fall Apart
3. Bill Ashcroft, Gareth Griffiths and Helen Tiffin - The Empire Writes Back: Theory and Practice in Post- Colonial Literature

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

Recommended Readings:
- The Mimic Men by V.S.Naipaul
- Beloved by Toni Morrison
- The Empire Writes Back: Theory and Practices in Post-Colonial Literature by Bill Ashcroft, Gareth Griffiths and Helen Tiffin

FEMINIST WRITINGS

Course Code: ENG2408 **Credit Units: 03**

Course Objective: This course will enable the students to explore woman's role, status, self-image, and history in literature written by women. It is based on the principles of feminism and includes all literary works centering on a woman's struggle for equality and to be accepted as a human being, before becoming a victim of gender stereotypes

Text:

1. Virginia Woolf – A Room of One's Own
2. Simone de Beauvoir – The Second Sex
3. Kate Millett - Sexual Politics

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

Recommended Readings:

- Woolf, Virginia. A Room of One's Own. Broadview Press, 2001.
- Beauvoir, Simone de. The Second Sex. Trans. H. M. Parshley. Vintage Books (Random House). 1952.
- Millett, Kate. Sexual Politics, Garden City, New York: Doubleday, 1970.

LITERATURE AND SOCIETY

Course Code: ENG2409 **Credit Units: 03**

Course Objective:
This course tends to deal with diverse social issues like caste, class, race, gender, violence and war.

Course Contents:
1. Omprakash Valmiki- 'Joothan'
2. Rabindranath Tagore- 'The Exercise Book'
3. Ambai- 'Yellow Fish'
4. Wole Soyinka-'Telephone Conversation'
5. Wilfred Owe- 'Dulce et Decorum Est'
6. Sa'adat Hasan Manto- 'The Dog of Tetwal'

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Valmiki, Omprakash. Joothan: A Dalit's Life. Trans. Arun Prabha Mukherjee. Kolkata: Samya, 2003. Print
- Valmiki, Omprakash. "Writing and Responsibility." Jourmnal of literature and Aesthetics 8 (2008): 13-16. Print
- Dutta, Krishna and Robinson, Andrews, (1995) Rabindranath Tagore: The MyriadMindedMan, London, Bloomsbury.
- Manto, Saadat Hasan. Kingdom's End: And Other Stories. Trans. Khalid Hasan. London: Verso, 1987. Print.

Syllabus - Fifth Semester

MODERN ENGLISH POETRY

Course Code: ENG2501 **Credit Units: 04**

Course Objective:
This course will study some poems of representative poets that go into shaping Modernism. The employment of newer styles and techniques in poetry as Myth, Imagery, symbolism and allusions will be dealt. At a broader plane, the texts will be studied in relation to the major socio-political issues around such times that engulf the modern man. The course will study the relationship between the texts and the socio-political issues of the times - unrest in Ireland in the first quarter of 20th century and degeneration of structures and moral values brought about by the two world wars.

Text:

1.	T.S. Eliot	a)	The Love Song of J. Alfred Prufrock
		b)	Hollow Men
2.	W.B. Yeats	a)	The Second Coming
		b)	Sailing to Byzantium
3.	W. H. Auden	a)	In the Memory of W. B. Yeats
		b)	September 1, 1939.
4.	G. M. Hopkins	a)	Pied Beauty
5.	Philip Larkin	a)	Church Going

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Howes, Marjorie, The Cambridge Companion to W. B. Yeats, Cambridge University Press, 2006
- Tate, Allen, T. S. Eliot: The Man and His Work, Penguin, 1971.
- Haffenden, John, W.H. Auden, the Critical Heritage, Routledge & Kegan Paul, 1983.
- Fuller, John, W.H. Auden: A Commentary, Princeton University Press, 1998

CONTEMPORARY LITERATURE

Course Code: ENG2502 **Credit Units: 04**

Course Objective:
Contemporary literature is an important area of study in the contemporary English Literary Studies. The texts will be discussed in terms of key aspects, including: colonial and post-colonial experience; national, cultural, and racial identity; voice; language; political writing; gender and colonization; exile; and imperialism. Discussing texts in their historical and cultural contexts, the course aims to give students both a broad knowledge of Contemporary literature and in-depth understanding of specific texts and issues.

Text:
1. Gabriel García Márquez- Chronicle of a Death Foretold
2. Pablo Neruda-Tonight I Can Write , The Way Spain Was
3. Derek Walcott - A Far Cry from Africa, Names
4. Margaret Atwood- Spelling, This is a Photograph of Me, Procedures for Underground

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Binod Mishra, Explorations in Australian L:iterature. Sarup &Sons.
- Elleke Boehmer, Colonial and Postcolonial Literatures: Migrant Metaphors. Oxford.
- Lazarus, The Cambridge Companion to Postcoloial Studies. Cambridge University Press.

POPULAR FICTION

Course Code: ENG2503 **Credit Units: 04**

Course Objective:
It is quite interesting to study popular forms of novel in literature. The course will locate these popular forms of novel in the domain of novel genre. The course will work out certain novel genres which in the past were not popularly included in literary studies, which in the present times have captured the attention of English literature studies.

Text:

1. Children's Fiction
   Lewis Caroll — Through the Looking Glass
2. Detective Fiction
   Agatha Christie — The Murder of Roger Ackroyd
3. Spy Thriller
   Ian Fleming — From Russia with Love

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Christopher Pawling, 'Popular Fiction: Ideology or Utopia?,' Popular Fiction and Social Change, ed. Christopher Pawling (London: Macmillan, 1984).
- Umberto Eco, 'Narrative Structure in Fleming,' in the Study of Popular Culture: A Sourcebook, ed. Bob Ashley (London: Pinter, 1989), pp. 124-34.
- Darko Suvin, 'On Teaching SF Critically,' from Positions and Presupositions in Science Fiction, (London: Macmillan), pp. 86 – 96.
- Felicity Hughes, 'Children's Literature: Theory and Practice,' ELH. 45 (1978), pp. 542-62.

MODERN EUROPEAN DRAMA

Course Code: ENG2505 **Credit Units: 03**

Course Objective:
This module seeks to extend students' knowledge and understanding of modern drama to a wider European context. In so doing it will enhance their awareness and ability to handle critical and theoretical approaches to the study of drama, as well as enlarging their understanding of European cultural issues.

Text:
1. Henrik Ibsen - A Doll's House
2. Bretold Brecht - Mother Courage
3. Samuel Beckett - Waiting for Godot

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Styan, J. L. Modern Drama In theory and Practice: Vol. I, Realism and Naturalism, Cambridge University Press, UK, 1983.
- Monaco, Paul, Modern European culture and Consciousness, 1870 – 1970, State University of New York Press, Albany, 1983.

INDIAN WOMEN WRITING

Course Code: ENG2506 **Credit Units: 03**

Course Objective:
To introduce a variety of writings by Indian women writers and to explore the breadth of those writings from artistic and historical perspectives. To enable students to analyze and discuss literary texts by familiarizing them with basic approaches and concepts used in literary study. The students will explore woman's role, status, self-image, and history in literature written by women.

Text:
1. Anita Desai - Voices in the City
2. Nayan tara Sahgal - Storm in Chandigarh
3. Bharati Mukherjee - Jasmine

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:
- Voices in the City by Anita Desai
- The Fiction of Anita Desai by R.K.Dhawan
- Storm in Chandigarh by Nayantara Sahgal
- The Fictional Milieu of Nayantara Sahgal: A Feminist Perspective by Asha Choubey
- Jasmine by Bharati Mukherjee
- Bharati Mukherjee: Critical Perspectives by Somdatta Mandal

NEW LITERATURE IN ENGLISH

Course Code: ENG2507 **Credit Units: 03**

Course Objective:
Through this course the students will demonstrate an understanding of literatures across the globe. They will be able to understand the socio-political background of varied literatures.

Text:
- Margaret Atwood- The Handmaid's Tale
- Patrick Write – Voss
- Wole Soyinka- A Dance of the Forests

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Atwood, Margaret (2001), Bloom, Harold, ed., The Handmaid's Tale, Philadelphia: Chelsea House.
- Soyinka, Wole. A Dance of the Forests. Oxford University Press, 1966.
- Write, Patrick. Voss. Penguin USA; Reprint edition (27 January 2009).

Syllabus - Sixth Semester

MODERN ENGLISH NOVEL

Course Code: ENG2601 **Credit Units: 05**

Course Objective:
This course, through study some representative texts, will help students understand Modernism as a different art from carved out by a peculiar blend of autobiography and art and employment of new literary styles and techniques as Bildungsroman, Stream of Consciousness and Epiphany. Besides, the study of such art from will help students understand the writers' subjective positions in their experience and exploration of human relationships ushered by the modern times.

Text:
1. D. H. Lawrence - Sons and Lovers
2. Joseph Conrad - Lord Jim
3. James Joyce - Portrait of an Artist as a Young Man

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Sagar, Keith, The Art of D. H. Lawrence, Cambridge University Press, 1975
- Sander, Scott Russell, D. H. Lawrence: The World of the Five Major Novels, Viking Press, 1974
- H. Stape, ed., The Cambridge Companion to Joseph Conrad, Cambridge University Press, 2006
- Brady, Philip and James F. Carens, eds. Critical Essays on James Joyce's A Portrait of the Artist as a Young Man, New York: G. K. Hall, 1998.
- Wollaeger, Mark A., ed. James Joyce's A Portrait of the Artist as a Young Man: A Casebook, Oxford, New York, 2003.
- Connolly, Thomas E., Joyce's Portrait: Criticisms & Critiques, Appleton-Century-Crofts, New York. 1962.

AMERICAN LITERATURE

Course Code: ENG2602 **Credit Units: 05**

Course Objective:
American Literature as part of English Literary study has gained prominence in the present times. The course will give a detailed study of the Anglo American Writing in relation to contemporary culture and issues.

Text:
1. Hawthorne - Scarlet Letter
2. Mark Twain - The Adventures of Huckleberry Finn
3. Robert Frost - Stopping by Woods on a Snowy Evening.
4. Emily Dickenson - Because I could not stop for death.
5. Walt Whitman - Song of Myself

Examination Scheme:

Components	**Assignment**	**Sessional**	**Presentation**	**EE**
Weightage (%)	15	10	05	70

Background Topics:
- Puritan America, Conglomeration of American society, Racial issues in America, American Individualism of the nineteenth Century, American Humour.

LITERATURE & GENDER

Course Code: ENG2605 **Credit Units: 03**

Course Objective
The course introduces students to representations of gender and sexuality in literary works. The content includes theory of gender and sexual identity; influence of gender and sexual identities on literary expression, and influence of literature on gender and sexual identities; terminology and methods of literary analysis and evaluation.

Text:

- Oscar Wilde - The Picture of Dorian Gray
- Virginia Woolf - Mrs. Dalloway
- Kate Chopin - The Awakening

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Art and Morality: A Defence of "The Picture of Dorian Gray", Edited by Stuart Mason
- Virginia Woolf: The Major Novels by John Batchelor
- Virginia Woolf: A Critical Memoir by Winifred Holtby
- Virginia Woolf: A Feminist Slant by Jane Marcus
- Kate Chopin's The Awakening: A Sourcebook by Janet Beer and Elizabeth Nolan

LITERARY FORMS AND PRACTICAL CRITICISM

Course Code: ENG2606 **Credit Units: 03**

Course Objective: This course will give the students an understanding of various literary forms and trends. It will also enhance their analytical skills.

Text:

- **Poetic Forms**: Sonnet, Ballad, Ode, Epic, Mock- Epic, Elegy, Dramatic Monologue, Lyrics, Heroic Couplet, Epistle
- **Forms of Novels:** Picaresque, Gothic, Domestic, Realistic, Regional, Stream of Consciousness
- **Practical Criticism**

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Kenneth, Burke. *The Philosophy of Literary Forms*, University of California Press; 3rd edition (August 27, 1974).
- Abrams, M.H. *A Glossary of Literary Terms*. Wadsworth Publishing Co Inc; 11th Revised edition edition (15 January 2014)

DALIT LITERATURE

Course Code: ENG2607 **Credit Units: 03**

Course Objective: This course will enable the students to delineate the historical circumstances that produced Dalit Literature and acquaint them with some of the dominant and non-dominant themes recurring in them.

Text:

- B. R. Ambedkar- Bhimayana
- Bama- Karukku
- Omprakash Valmiki - Joothan

Examination Scheme:

Components	Assignment	Sessional	Presentation	EE
Weightage (%)	15	10	05	70

Text & References:

- Omvedt, G. (2011). *Understanding caste : from Buddha to Ambedkar and beyond*. New Delhi: Orient Blackswan Publishing.
- Vyam, D.,…[etal.](Eds.). (2011). *Bhimayana incidents in the life of Bhimrao Ramji Ambedkar*. New Delhi: Navayana.
- Bama. *Karakku*. Oxford University Press-New Delhi. 2011
- Omaprakāśa Vālmīki, *Joothan: An Untouchable's Life*. Columbia University Press, 2013

DISSERTATION

Course Code: ENG2637 **Credit Units: 07**

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree. The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report. The Dissertation will help students deal with literary problems and issues and they will learn to demonstrate critical thinking in research and writing.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography-- 5marks

The Components of a Dissertation
A Dissertation should have the following components:
1) Cover Page: This should contain the title of the, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the work and name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions
a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) Conceptual Framework / National and International Scenario: (relating to the topic of the Dissertation).
c) Presentation of Data, Analysis and Findings: (using the tools and techniques mentioned in the methodology).
d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the work, and in writing the report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Dissertation should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of the Dissertation Work

Step I: Selection of the topic should be made keeping the following points into consideration:
- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Dissertation Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Dissertation:

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Dissertation Work in any Organisation / Institution.
Annexures,
References / Bibliography

Guidelines for evaluation:

- Each of the students has to undertake a topic individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Dissertation and Viva-Voce Examination has to be English. The Dissertation must be typed and hard bound.
- Failure to submit the Dissertation or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Dissertation and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Dissertation unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Dissertation.
- Evaluation of the Dissertation to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Dissertation separately, obtaining a minimum marks of 40 (Dissertation and Viva-Voce taken together) in paper 3.5.
- Marking Scheme for Dissertation and Viva-Voce Examination:

Dissertation	Power Point Presentation & Viva
75 marks	25 marks

Cover Page / Title page

Project Report on
Title of the Project
XXXXXXXXXXXXXXXXX
(Submitted for the partial fulfilment for the award of Degree of B.A. Honours in English
To
Amity School of Liberal Arts

Submitted by

Name of the Candidate :.....
Registration No. .....
Name of the Department .....
University Roll No. .....

Supervised by
Name of the Supervisor:
Designation

Month & Year of Submission

University Logo and Name

(Annexure-IB)

Student's Declaration

I ……..hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of B.A. Honours in English is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.
I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of Supervisor: Signature of Student
Name

Registration No.

Place:
Date:

COMMUNICATION SKILLS - COURSES BEING OFFERED IN VARIOUS PROGRAMMES

Achieving Academic Excellence

Programme Structure
Curriculum & Scheme of Examination

AMITY UNIVERSITY HARYANA

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PROGRAMME STRUCTURE - COMMUNICATION SKILLS COURSES BEING OFFERED IN VARIOUS PROGRAMMES

UNDERGRADUATE -4 YEAR PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS2152	English-I	1	-	-	1
2	CSS2252	English-II	1	-	-	1
3	CSS2151	Effective Listening	1	-	-	1
4	CSS2251	Presentation Skills	1	-	-	1
5	CSS2351	Reading and Comprehension	1	-	-	1
6	CSS2451	Corporate Communication	1	-	-	1
7	CSS2551	Employability Skills	1	-	-	1
8	CSS2651	Workplace Communication	1	-	-	1

UNDERGRADUATE -3YEAR PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS2151	Effective Listening	1	-	-	1
2	CSS2251	Presentation Skills	1	-	-	1
3	CSS2351	Reading and Comprehension	1	-	-	1
4	CSS2451	Corporate Communication	1	-	-	1
5	CSS2551	Employability Skills	1	-	-	1
6	CSS2651	Workplace Communication	1	-	-	1

POSTGRADUATE PROGRAMMES

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS4151	Basics of Communication	1	-	-	1
2	CSS4251	Corporate Communication	1	-	-	1
3	CSS4351	Interpersonal Communication	1	-	-	1
4	CSS4451	Cross Cultural Communication	1	-	-	1

POSTGRADUATE PROGRAMME –MBA (EXECUTIVE)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS4152	Managerial Communication	3	-	-	3

UNDERGRADUATE –INTEGRATED LAW PROGRAMMES (BA LLB, B.COM LLB, BBA LLB)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
3	CSS2151	Effective Listening	1	-	-	1
4	CSS2251	Presentation Skills	1	-	-	1
5	CSS2351	Reading and Comprehension	1	-	-	1
6	CSS2451	Corporate Communication	1	-	-	1
7	CSS2551	Employability Skills	1	-	-	1
8	CSS2651	Workplace Communication	1	-	-	1

INTEGRATED PROGRAMMES (UNDERGRADUATE-POSTGRADUATE)

Semester	Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
1	CSS2152	English-I	1	-	-	1
2	CSS2252	English-II	1	-	-	1
3	CSS2151	Effective Listening	1	-	-	1
4	CSS2251	Presentation Skills	1	-	-	1
5	CSS2351	Reading and Comprehension	1	-	-	1
6	CSS2451	Corporate Communication	1	-	-	1
7	CSS2551	Employability Skills	1	-	-	1
8	CSS2651	Workplace Communication	1	-	-	1
9	CSS4351	Interpersonal Communication	1	-	-	1
10	CSS4451	Cross Cultural Communication	1	-	-	1

SYLLABUS - COMMUNICATION SKILLS- COURSES BEING OFFERED IN VARIOUS PROGRAMMES

SYLLABUS-UNDERGRADUATE-4 YEAR PROGRAMMES

Syllabus - First Semester

ENGLISH-I

Course Code: CSS2152 **Credit Units: 1**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:
Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Communication
The process and importance
Principles & benefits of Effective Communication

Module IV: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module V: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Examination Scheme:

Components	Written	CAF	V/P	GD/Extempore	A
Weightage	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- MadhulikaJha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- M. Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hill
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Second Semester

ENGLISH-II

Course Code: CSS2252 **Credit Units: 1**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module II: Communication Skills-I
Developing listening skills
Developing speaking skills

Module III: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module IV: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module V: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

Examination Scheme:

Components	Written	CAF	V/P	GD/Extempore	A
Weightage	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- MadhulikaJha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- M. Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hill
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Third Semester

EFFECTIVE LISTENING

Course Code: CSS2151 **Credit Units: 1**

Course Objective:
To develop a deep understanding of the fundamentals of communication, and to improve communication skills by appreciating the importance of listening and learning essential techniques to improve the same.

Course Contents:

Module I: Fundamentals of Communication
Role and purpose of communication: *7 C's of communication*
Barriers to effective communication
Forms of Communication: one-to-one, informal and formal

Module II: Listening Skills
The process, importance and types of listening
Effective Listening: Principles and Barriers

Module III: Enhancing Listening Skills
Paraphrasing
Summarizing
Guidelines to increase listening
Activities to enhance listening

Examination Scheme:

Components	**Written Test**	**CAF**	**V/P**	**GD/Extempore**	**A**
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, MalraTreece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Fourth Semester

PRESENTATION SKILLS

Course Code: CSS2251 **Credit Units: 1**

Course Objective:
To develop good presentation skills by learning the essential steps for its planning and preparation, and effective use of verbal & non-verbal communication for delivering a business presentation.

Course Contents:

Module I: Social Communication Skills
Conversational English
Appropriateness
Building rapport

Module II: Context Based Speaking
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

Module III: Non Verbal Communication
Relevance and effective usage
Para language
Chronemics
Haptics
Proxemics
Body language
Object language

Module IV: Business Presentation
Audience Analysis
Preparing effective PowerPoint presentation
Delivering of presentation
Handling questions

Examination Scheme:

Components	**Written Test**	**CAF**	**V/P**	**GD/Extempore**	**A**
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Fifth Semester

READING AND COMPREHENSION

Course Code: CSS2351 **Credit Units: 01**

Course Objective:
To facilitate development of good reading & comprehension skills by deepening vocabulary, and refining academic language proficiency

Course Contents:

Module I: Effective Reading
Process, types and reading rate adjustment
Tips for improving reading skills
Reading Comprehension

Module II: Business/Technical Language Development
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Module III: Business Communication
Reading Business/ Technical press
Researching for Business /Technology

Module IV: Activities
News reading
Picture reading
Review of a book/journal

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Sixth Semester

CORPORATE COMMUNICATION

Course Code: CSS2451 **Credit Units: 01**

Course Objective:
To develop competencies to form written communication strategies necessary in the workplace, and to execute them for effective communication

Course Contents:
Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats
Module III: Official Correspondence
Memo, Notice and Circulars
Agenda and Minutes
Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Module V: Social Networking
Advantages
Opportunities
Making Contacts

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance
Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Anjanee Sethi & BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Seventh Semester

EMPLOYABILITY SKILLS

Course Code: CSS2551 **Credit Units: 01**

Course Objective:
To enhance employability skills of the learners by enabling them to write effective resume and face the interview with confidence.

Course Contents:
Module I
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Interviews
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Mock interview sessions

Module III
Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV
Assessment through employability score card

Module V: Business Etiquette
Introduction
Dressing up
Exchanging Business card
Shaking hands
Dining etiquette

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Eighth Semester

WORKPLACE COMMUNICATION

Course Code: CSS2651 **Credit Units: 01**

Course Objective:
The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication.

Course Contents:
Module I:Dynamics of Group Discussion
Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels
Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Professional Skills
Negotiations
Meetings
Email writing
Telephonic Skills

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

SYLLABUS - UNDERGRADUATE-3 YEAR PROGRAMMES

Syllabus – First Semester

EFFECTIVE LISTENING

Course Code: CSS2151 **Credit Units: 01**

Course Objective:
To develop a deep understanding of the fundamentals of communication, and to improve communication skills by appreciating the importance of listening and learning essential techniques to improve the same.

Course Contents:
Module I: Fundamentals of Communication
Role and purpose of communication: *7 C's of communication*
Barriers to effective communication
Forms of Communication: one-to-one, informal and formal

Module II: Listening Skills
The process, importance and types of listening
Effective Listening: Principles and Barriers

Module III: Enhancing Listening Skills
Paraphrasing
Summarizing
Guidelines to increase listening
Activities to enhance listening

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, MalraTreece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Second Semester

PRESENTATION SKILLS

Course Code: CSS2251 **Credit Units: 01**

Course Objective:
To develop good presentation skills by learning the essential steps for its planning and preparation, and effective use of verbal & non-verbal communication for delivering a business presentation.

Course Contents:
Module I: Social Communication Skills
Conversational English
Appropriateness
Building rapport

Module II: Context Based Speaking
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

Module III: Non Verbal Communication
Relevance and effective usage
Para language
Chronemics
Haptics
Proxemics
Body language
Object language

Module IV: Business Presentation
Audience Analysis
Preparing effective PowerPoint presentation
Delivering of presentation
Handling questions

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Third Semester

READING AND COMPREHENSION

Course Code: CSS2351 **Credit Units: 01**

Course Objective:
To facilitate development of good reading & comprehension skills by deepening vocabulary, and refining academic language proficiency

Course Contents:

Module I: Effective Reading
Process, types and reading rate adjustment
Tips for improving reading skills
Reading Comprehension

Module II: Business/Technical Language Development
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Module III: Business Communication
Reading Business/ Technical press
Researching for Business /Technology

Module IV: Activities
News reading
Picture reading
Review of a book/journal

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Fourth Semester

CORPORATE COMMUNICATION

Course Code: CSS2451 **Credit Units: 01**

Course Objective:
To develop competencies to form written communication strategies necessary in the workplace, and to execute them for effective communication

Course Contents:
Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats
Module III: Official Correspondence
Memo, Notice and Circulars
Agenda and Minutes

Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Module V: Social Networking
Advantages
Opportunities
Making Contacts

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance
Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Fifth Semester

EMPLOYABILITY SKILLS

Course Code: CSS2551 **Credit Units: 01**

Course Objective:
To enhance employability skills of the learners by enabling them to write effective resume and face the interview with confidence.

Course Contents:
Module I
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Interviews
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Mock interview sessions

Module III
Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV
Assessment through employability score card

Module V: Business Etiquette
Introduction
Dressing up
Exchanging Business card
Shaking hands
Dining etiquette

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus – Sixth Semester

WORKPLACE COMMUNICATION

Course Code: CSS2651 **Credit Units: 01**

Course Objective:
The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication.

Course Contents:
Module I:Dynamics of Group Discussion
Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels
Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Professional Skills
Negotiations
Meetings
Email writing
Telephonic Skills

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

SYLLABUS – POSTGRADUATE PROGRAMMES

Syllabus - First Semester

BASICS OF COMMUNICATION

Course Code: CSS4151 **Credit Units: 01**

Course Objective:
It is rightly said, one cannot 'not communicate''. This course is designed to facilitate our young Amitians to communicate effectively by emphasizing on practical communication through refurbishing their existing language skills and also to bring one and all to a common take-off level.

Course Contents:

Module I: Fundamentals of communication
Relevance of communication
Effective communication
Models of communication
Effective use of language

Module II: Tools of communication
Proficiency in English – The international
Language of business
Building vocabulary
(Denotative & connotative)
Extensive vocabulary drills
(Synonyms / Antonyms / Homonyms)
One Word substitution
Idioms & phrases
Mechanics and Semantics of sentences
Writing sentences that really communicate
(Brevity, Clarity, and Simplicity)
Improving the tone and style of sentences

Module III: Barriers to Effective use of language
Avoiding clichés
Removing redundancies
Getting rid of ambiguity
Euphemism
Jargons
Code switching

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Echoes: JhaMadhulika: Orient Longman
- Practical English Usage, Swan M, Cambridge
- Business Communication- Sethi, BhavanaAdhikari, Tata McGraw Hill

Syllabus - Second Semester

CORPORATE COMMUNICATION

Course Code: CSS4251 **Credit Units: 01**

Course Objective:
This course is designed to hone the Corporate Communication skills of the budding managers and enable them to be an integral part of the corporate communication network. The Verbal Communication (oral and written) will be the lingua franca of this endeavor.

Course Contents:

Module I: Communication in Practice
Verbal Communication
Communication Networks
Developing writing skills
Inter- office communication
The business letters
E mail – Netiquette (étiquette on the mail)
Intra- office communication
Memos
Notices
Circulars
Agenda and Minutes
Business Report writing
Resume writing

Module II: Cross Functional Communication
Marketing/ integrated marketing communication
Project management communication
Human Resource communication
Financial Communication

Module III: Communication for Public Relations
Functions and activities of PR
Reputation Management
Building Corporate Image and Identity
Negotiation Techniques

Examination Scheme:

Components	**Written Test**	**CAF**	**V/P**	**GD/Extempore**	**A**
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- The Oxford Handbook of Commercial Corrospondence, Ashley A, Oxford Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford
- Business Communication- Sethi, BhavanaAdhikari, Tata McGraw Hill

Syllabus - Third Semester

INTERPERSONAL COMMUNICATION

Course Code: CSS4351 **Credit Units: 01**

Course Objective:
'Actions speak louder than words.' Every business communicator needs to understand the nuances of 'body language and voice.' This course is designed to enable the young Amitian to decipher the relevance of Kinesics, Proxemics and Para Language that cater to the fundamental requirements of effective business presentations and speeches.

Course Contents:

Module I: Non - Verbal Communication
Principles of non- verbal communication
Kinesics
Proxemics
Paralanguage and visible code

Module II: Speaking Skills
Pronunciation drills (Neutralizing regional pulls)
Conversational English
Guidelines to an effective presentation

Module III: Interviews and GDs

Note:
1 written test of 20 marks of one hour duration will be conducted. Also, each student will be required to make a presentation for 20 marks over and above the teaching hours. They will have to be programmed accordingly.

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication,9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

Syllabus - Fourth Semester

CROSS CULTURAL COMMUNICATION

Course Code: CSS4451 **Credit Units: 01**

Course Objective:
The influx of multinationals, FDIs and Retail Management makes global communication a harsh reality and offers cultural communication challenges. This course is designed to inculcate trans-cultural communication skills among the young Amitians.

Course Contents:

Module I: Importance of Culture in Communication
Principles of effective cross cultural communication
Developing Communication Competence

Module II: Barriers to effective communication
Sender, Receiver and Situation related barriers
Measures to overcome the barriers
Listening skills

Module III: Cross cultural communication
Characteristics of culture
Social differences
Contextual differences
Nonverbal differences
Ethnocentrism

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Understanding Human Communication,9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

SYLLABUS – POSTGRADUATE PROGRAMME (MBA-EXECUTIVE)

Syllabus - First Semester

MANAGERIAL COMMUNICATION

Course Code CSS4152 **Credit Units: 03**

Course Objective:
This course is designed to provide the business professionals an overview of the broad categories of Business communication and to impart managerial knowledge in oral and written communication to help them develop their managerial communication competence.

Course Content:

Module I: Introduction
Relevance of Communication
Principles of effective communication
Forms of Communication
Effective use of language

Module II: Managerial Writing Strategies
The managerial communication process
Levels of managerial communication
Critical errors in communication
Channels of Communication

Inter Office communication
Business Letters
Emails
Netiquette

Intra Office Communication
Memos
Notices
Circulars
Minutes
Report Writing

Module III: Preparing For Interview
Resume Writing
Group Discussion(s)
Making formal presentations
Interviews:
Types of Interviews
Styles of Interview
Conducting Interviews
Mock Interviews

Module IV: Strategies for Understanding Messages
Non Verbal Communication

Intercultural Managerial Communication
- Ethnocentrism
- Ethno relativism

Conflict Management

Examination Scheme

Components	Viva	Presentations	CT/Quiz	MCAF	Attendance
Weightage	20	20	20	35	5

MCAF - Management Communication Assessment File

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

Web Sources

- www.shkaminski.com/Classes/Handouts/Communication
- www.communicationskills.co.in
- www.hodu.com
- writingforresults.net

SYLLABUS – UNDERGRADUATE INTEGRATED LAW PROGRAMMES (BA LLB, B.COM LLB & BBA LLB)

Syllabus - Third Semester

EFFECTIVE LISTENING

Course Code: CSS2151 **Credit Units: 1**

Course Objective:
To develop a deep understanding of the fundamentals of communication, and to improve communication skills by appreciating the importance of listening and learning essential techniques to improve the same.

Course Contents:

Module I: Fundamentals of Communication
Role and purpose of communication: *7 C's of communication*
Barriers to effective communication
Forms of Communication: one-to-one, informal and formal

Module II: Listening Skills
The process, importance and types of listening
Effective Listening: Principles and Barriers

Module III: Enhancing Listening Skills
Paraphrasing
Summarizing
Guidelines to increase listening
Activities to enhance listening

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, MalraTreece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Fourth Semester

PRESENTATION SKILLS

Course Code: CSS2251 **Credit Units: 1**

Course Objective:
To develop good presentation skills by learning the essential steps for its planning and preparation, and effective use of verbal & non-verbal communication for delivering a business presentation.

Course Contents:
Module I: Social Communication Skills
Conversational English
Appropriateness
Building rapport

Module II: Context Based Speaking
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

Module III: Non Verbal Communication
Relevance and effective usage
Para language
Chronemics
Haptics
Proxemics
Body language
Object language

Module IV: Business Presentation
Audience Analysis
Preparing effective PowerPoint presentation
Delivering of presentation
Handling questions

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Fifth Semester

READING AND COMPREHENSION

Course Code: CSS2351 **Credit Units: 01**

Course Objective:
To facilitate development of good reading & comprehension skills by deepening vocabulary, and refining academic language proficiency.

Course Contents:

Module I: Effective Reading
Process, types and reading rate adjustment
Tips for improving reading skills
Reading Comprehension

Module II: Business/Technical Language Development
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Module III: Business Communication
Reading Business/ Technical press
Researching for Business /Technology

Module IV: Activities
News reading
Picture reading
Review of a book/journal

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Sixth Semester

CORPORATE COMMUNICATION

Course Code: CSS2451 **Credit Units: 01**

Course Objective:
To develop competencies to form written communication strategies necessary in the workplace, and to execute them for effective communication.

Course Contents:
Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats

Module III: Official Correspondence
Memo, Notice and Circulars
Agenda and Minutes

Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Module V: Social Networking
Advantages
Opportunities
Making Contacts

Examination Scheme:

Components	**Written Test**	**CAF**	**V/P**	**GD/Extempore**	**A**
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Seventh Semester

EMPLOYABILITY SKILLS

Course Code: CSS2551 **Credit Units: 01**

Course Objective:
To enhance employability skills of the learners by enabling them to write effective resume and face the interview with confidence.

Course Contents:
Module I
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Interviews
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Mock interview sessions

Module III
Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV
Assessment through employability score card
Module V: Business Etiquette
Introduction
Dressing up
Exchanging Business card
Shaking hands
Dining etiquette

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance
Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Eighth Semester

WORKPLACE COMMUNICATION

Course Code: CSS2651 **Credit Units: 01**

Course Objective:
The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication.

Course Contents:
Module I: Dynamics of Group Discussion
Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels
Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Professional Skills
Negotiations
Meetings
Email writing
Telephonic Skills

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:
- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

SYLLABUS – INTEGRATED PROGRAMMES (UNDERGRADUATE-POSTGRADUATE)

Syllabus - First Semester

ENGLISH-I

Course Code: CSS2152 **Credit Units: 1**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:
Module I: Vocabulary
Use of Dictionary
Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I
Articles
Parts of Speech
Tenses

Module III: Communication
The process and importance
Principles & benefits of Effective Communication

Module IV: Spoken English Communication
Speech Drills
Pronunciation and accent
Stress and Intonation

Module V: Short Stories
Of Studies, by Francis Bacon
Dream Children, by Charles Lamb
The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan
Glory at Twilight, Bhabani Bhattacharya

Examination Scheme:

Components	Written	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- M. Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hill
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Second Semester

ENGLISH-II

Course Code: CSS2252 **Credit Units: 1**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:
Module I: Essentials of Grammar - II
Sentence Structure
Subject -Verb agreement
Punctuation

Module II: Communication Skills-I
Developing listening skills
Developing speaking skills

Module III: Communication Skills-II
Developing Reading Skills
Developing writing Skills

Module IV: Written English communication
Progression of Thought/ideas
Structure of Paragraph
Structure of Essays

Module V: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

Examination Scheme:

Components	Written	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- MadhulikaJha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- M. Ashraf Rizvi ,Effective Technical Communication, Tata McGraw Hill
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Third Semester

EFFECTIVE LISTENING

Course Code: CSS2151 **Credit Units: 1**

Course Objective:
To develop a deep understanding of the fundamentals of communication, and to improve communication skills by appreciating the importance of listening and learning essential techniques to improve the same.

Course Contents:
Module I: Fundamentals of Communication
Role and purpose of communication: *7 C's of communication*
Barriers to effective communication
Forms of Communication: one-to-one, informal and formal

Module II: Listening Skills
The process, importance and types of listening
Effective Listening: Principles and Barriers

Module III: Enhancing Listening Skills
Paraphrasing
Summarizing
Guidelines to increase listening
Activities to enhance listening

Examination Scheme:

Components	**Written Test**	**CAF**	**V/P**	**GD/Extempore**	**A**
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, MalraTreece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Fourth Semester

PRESENTATION SKILLS

Course Code: CSS2251 **Credit Units: 1**

Course Objective:
To develop good presentation skills by learning the essential steps for its planning and preparation, and effective use of verbal & non-verbal communication for delivering a business presentation.

Course Contents:
Module I: Social Communication Skills
Conversational English
Appropriateness
Building rapport

Module II: Context Based Speaking
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

Module III: Non Verbal Communication
Relevance and effective usage
Para language
Chronemics
Haptics
Proxemics
Body language
Object language

Module IV: Business Presentation
Audience Analysis
Preparing effective PowerPoint presentation
Delivering of presentation
Handling questions

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance
Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman –Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus - Fifth Semester

READING AND COMPREHENSION

Course Code: CSS2351 **Credit Units: 01**

Course Objective:
To facilitate development of good reading & comprehension skills by deepening vocabulary, and refining academic language proficiency.

Course Contents:
Module I: Effective Reading
Process, types and reading rate adjustment
Tips for improving reading skills
Reading Comprehension

Module II: Business/Technical Language Development
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism

Module III: Business Communication
Reading Business/ Technical press
Researching for Business /Technology

Module IV: Activities
News reading
Picture reading
Review of a book/journal

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:
- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Effective Technical Communication, M. Ashraf Rizvi.
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Sixth Semester

CORPORATE COMMUNICATION

Course Code: CSS2451 **Credit Units: 01**

Course Objective:
To develop competencies to form written communication strategies necessary in the workplace, and to execute them for effective communication.

Course Contents:

Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats

Module III: Official Correspondence
Memo, Notice and Circulars
Agenda and Minutes

Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Module V: Social Networking
Advantages
Opportunities
Making Contacts

Examination Scheme:

Components	**Written Test**	**CAF**	**V/P**	**GD/Extempore**	**A**
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P-** Viva/Presentation, **GD-** Group Discussion, **A-** Attendance

Text & References:

- Business Communication, Raman –Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Anjanee Sethi & Bhavana Adhikari, Business Communication, Tata McGraw Hill

Syllabus - Seventh Semester

EMPLOYABILITY SKILLS

Course Code: CSS2551 **Credit Units: 01**

Course Objective:
To enhance employability skills of the learners by enabling them to write effective resume and face the interview with confidence.

Course Contents:
Module I
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Interviews
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Mock interview sessions

Module III
Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV
Assessment through employability score card

Module V: Business Etiquette
Introduction
Dressing up
Exchanging Business card
Shaking hands
Dining etiquette

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Eighth Semester

WORKPLACE COMMUNICATION

Course Code: CSS2651 **Credit Units: 01**

Course Objective:
The course is designed to empower students to carry out day to day communication at work place by adequate understanding of various types of communication and use of technology to facilitate efficient interpersonal communication.

Course Contents:
Module I: Dynamics of Group Discussion
Introduction,
Methodology
Role Functions
Mannerism
Guidelines

Module II: Communication through Electronic Channels
Introduction
Technology based Communication Tools
Video Conferencing
Web Conferencing
Selection of the Effective Tool
E-mails, Fax etc.

Module III: Professional Skills
Negotiations
Meetings
Email writing
Telephonic Skills

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,
- AnjaneeSethi&BhavanaAdhikari, Business Communication, Tata McGraw Hill

Syllabus – Ninth Semester

INTERPERSONAL COMMUNICATION

Course Code: CSS4351 **Credit Units: 01**

Course Objective:
'Actions speak louder than words.' Every business communicator needs to understand the nuances of 'body language and voice.' This course is designed to enable the young Amitian to decipher the relevance of Kinesics, Proxemics and Para Language that cater to the fundamental requirements of effective business presentations and speeches.

Course Contents:

Module I: Non - Verbal Communication
Principles of non- verbal communication
Kinesics
Proxemics
Paralanguage and visible code

Module II: Speaking Skills
Pronunciation drills (Neutralizing regional pulls)
Conversational English
Guidelines to an effective presentation

Module III: Interviews and GDs
Note:
1 written test of 20 marks of one hour duration will be conducted. Also, each student will be required to make a presentation for 20 marks over and above the teaching hours. They will have to be programmed accordingly.

Examination Scheme:

Components	**Written Test**	**CAF**	**V/P**	**GD/Extempore**	**A**
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:
- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication,9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

Syllabus - Tenth Semester

CROSS CULTURAL COMMUNICATION

Course Code: CSS4451 **Credit Units: 01**

Course Objective:
The influx of multinationals, FDIs and Retail Management makes global communication a harsh reality and offers cultural communication challenges. This course is designed to inculcate trans-cultural communication skills among the young Amitians.

Course Contents:
Module I: Importance of Culture in Communication
Principles of effective cross cultural communication
Developing Communication Competence

Module II: Barriers to effective communication
Sender, Receiver and Situation related barriers
Measures to overcome the barriers
Listening skills

Module III: Cross cultural communication
Characteristics of culture
Social differences
Contextual differences
Nonverbal differences
Ethnocentrism

Examination Scheme:

Components	Written Test	CAF	V/P	GD/Extempore	A
Weightage (%)	40	25	20	10	5

CAF- Communication Assessment File, **V/P**- Viva/Presentation, **GD**- Group Discussion, **A**- Attendance

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Understanding Human Communication,9/e, Adler R Oxford
- Business Communication- Sethi, Adhikari, Tata McGraw Hill

ENGLISH LITERATURE

Programme Structure

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
ENG2151	Shakespearean Comedy	2	1	3
ENG2251	Romantic Poetry	2	1	3
ENG2351	The Novels of England	2	1	3
ENG2451	The English Novels of India	2	1	3
ENG2551	Genre Fiction	2	1	3
ENG2651	Contemporary Literature	2	1	3
	TOTAL			**18**

ENGLISH LITERATURE

Syllabus - Semester First

SHAKESPEAREAN COMEDY

Course Code: ENG2151 **Credit Units: 03**

Text:

1. Shakespeare - A Midsummer Night's Dream
2. Shakespeare - The Tempest
3. Shakespeare - Twelfth Night

Examination Scheme:

Components	**CT**	**S**	**A**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- Ali, Amir. Basic Introduction to Shakespeare. Oxford University Press.
- *Clemen, Wolfgang. Shakespeare's Dramatic Art: Collected Essays. New York: Routledge, 2005.*
- *Smith, Emma. Shakespeare's Comedies: A Guide to Criticism. Blackwell Publishers, 2004.*
- Eagleton, Terry. Shakespeare and Society: Critical Studies in Shakespearean Drama. 1967.
- Bryant, J.A., Jr. Shakespeare and the Uses of Comedy. 1986.
- Mangan, Michael. A Preface to Shakespeare's Comedies, 1594-1603. 1996.

Syllabus – Semester Second

ROMANTIC POETRY

Course Code: ENG2251 **Credit Units: 03**

Text:

1. William Wordsworth - Tintern Abbey, Ode on the Intimations of Immortality.
2. Samuel Taylor Coleridge - Ode to Dejection, Kubla Khan.
3. Shelley - Ode to the West Wind.

Examination Scheme:

Components	**CT**	**S**	**A**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- Roe, Nichole: Romanticism. Oxford University Press.
- Wolfson, Susan J: Cambridge Companion to Keats. Cambridge University Press.
- Fraser, George Sutherland: John Keats: Odes: A Casebook. Macmillan.
- Robinson, Daniel: A Century of Sonnets: The Romantic Era Revival. Oxford University Press.

Syllabus – Semester Third

THE NOVELS OF ENGLAND

Course Code: ENG2351 **Credit Units: 03**

Text:

1. Jonathan Swift - Gulliver's Travels
2. Jane Austen - Pride and Prejudice
3. Charles Dickens - Hard Times

Examination Scheme:

Components	**CT**	**S**	**A**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- John Richetti. Cambridge Companion to the Eighteenth Century Novel. Cambridge Univ. Press
- Wilbur L Cross. Development Of The English Novel

Syllabus - Semester Fourth

THE ENGLISH NOVELS OF INDIA

Course Code: ENG2451 **Credit Units: 03**

Text:

1. R.K. Narayan - The Guide
2. Salman Rushdie - Midnight's Children
3. Amitav Ghosh - The Shadow Lines

Examination Scheme:

Components	**CT**	**S**	**A**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- Iyengar K.R. Srinivas. Indian Writing in English. Advent Books Division
- Daiches D. Critical Approaches to English Literature. Orient Black Swan.
- V. Padma. Fiction as Window: Critiquing the Indian Literary Cultural Ethos since the1980.Orient Blackswan.
- Dodiya Jaydesinh. Indian Women Novelists in English. Sarup and sons.

Syllabus - Semester Fifth

GENRE FICTION

Course Code: ENG2551 **Credit Units: 03**

Text:

1. Science Fiction Issaac Asinov Foundation
2. Children's Fiction Lewis Caroll Through the Looking Glass
3. Detective Fiction Agatha Christie The Murder of Roger Ackroyd

Examination Scheme:

Components	**CT**	**S**	**A**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- Christopher Pawling, 'Popular Fiction: Ideology or Utopia?,' Popular Fiction and Social Change, ed. Christopher Pawling (London: Macmillan, 1984).
- Umberto Eco, 'Narrative Structure in Fleming,' in the Study of Popular Culture: A Sourcebook, ed. Bob Ashley (London: Pinter, 1989), pp. 124-34.
- Darko Suvin, 'On Teaching SF Critically,' from Positions and Presupositions in Science Fiction, (London: Macmillan), pp. 86 – 96.
- Felicity Hughes, 'Children's Literature: Theory and Practice,' ELH. 45 (1978), pp. 542-62.

Syllabus - Semester Sixth

CONTEMPORARY LITERATURE

Course Code: ENG2651 **Credit Units: 03**

Text:

1. D. H. Lawrence - Sons and Lovers
2. Joseph Conrad - Lord Jim
3. James Joyce - Portrait of an Artist as a Young Man

Examination Scheme:

Components	**CT**	**S**	**A**	**EE**
Weightage (%)	15	10	05	70

Text & References:

- Sagar, Keith, The Art of D. H. Lawrence, Cambridge University Press, 1975
- Sander, Scott Russell, D. H. Lawrence: The World of the Five Major Novels, Viking Press, 1974
- H. Stape, ed., The Cambridge Companion to Joseph Conrad, Cambridge University Press, 2006
- Brady, Philip and James F. Carens, eds. Critical Essays on James Joyce's A Portrait of the Artist as a Young Man, New York: G. K. Hall, 1998.
- Wollaeger, Mark A., ed. James Joyce's A Portrait of the Artist as a Young Man: A Casebook, Oxford, New York, 2003.

FRENCH STUDIES

PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Value-added Course: FL- French and Minor track courses), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

Components	Codes	Weightage (%)
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	70

PROGRAMME OBJECTIVE

This programme is designed for the students who opt for French as a Minor **in addition to taking French as Foreign Language (Value-added Course).**

This programme aims at providing an understanding of the basics of French grammar and phonetics.

Students get sensitized towards different "registres de langue" and are able to distinguish formal and informal language right from the beginning and use appropriate language while communicating in the professional and business world.

Through various listening and speaking exercises this course enables the students to quickly take position as a foreigner speaking French and establish contacts and communicate in oral and written language.

This programme also provides an insight into French literature. By furnishing information on select socio-cultural aspects of France, this programme creates a backdrop for a better understanding of the language and the people.

This programme focuses on developing all four language skills of reading, writing, listening and speaking. Through training in various activities it enhances the critical/ creative thinking and encourages the learners to think spontaneously in French.

FRENCH STUDIES

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LAN2161	Professional French for Business-1	2	1	-	3
LAN2261	Professional French for Business-2	2	1	-	3
LAN2361	Professional French for Business-3	2	1	-	3
LAN2461	Professional French for Business-4	2	1	-	3
LAN2561	Introduction to French Literature & Select Socio-Cultural aspects of France	2	1	-	3
LAN2661	French Through Activities	2	1	-	3
	TOTAL				**18**

Prerequisites:

1. The student should have opted for French as FL

2. In each semester the student should opt for the course offered without skipping any course. They are expected to follow the sequence. These courses cannot be opted for independently as OE in any semester.

Syllabus - Semester First

PROFESSIONAL FRENCH FOR BUSINESS-1
(FRANÇAIS PROFESSIONNEL ET DES AFFAIRES-1)

Course Code: LAN2161 **Credit Units: 03**

Course Objective:

- This course aims at providing an understanding of the basics of French grammar and phonetics. Students get sensitized towards different "registres de langue" and are able to distinguish formal and informal language right from the beginning and use appropriate language while communicating in the professional and business world.
- Through various listening and speaking exercises this course enables the students to quickly take position as a foreigner speaking French and establish contacts and speak about things.

Course Contents:
Module I: Entrer en contact et faire connaissance
Actes de Communication :
S'adresser poliment à quelqu'un, se présenter, présenter quelqu'un, présenter une entreprise, présenter des renseignements personnels

Module II: Parler des objets
Actes de Communication :
Parler des objets, exprimer ses besoins, expliquer les usages des objets, situer les objets, faire des descriptions, comparer et exprimer ses préférences \

Grammaire :
1. articles indéfinis, masculin et féminin des noms, pluriel des noms
2. pronoms sujets, et toniques, on, c'est/il est + profession, qui est-ce ? qu'est-ce que?
3. masculin et féminin des adjectifs de nationalité
4. verbes parler, habiter, s'appeler, être, avoir, aller faire, connaître, vendre,
5. article défini, complément du nom avec de, quel interrogatif
6. pour + infinitif, il manque...
7. verbe avoir, ne...pas/pas de, question avec est-ce que ?, question négative, réponse "oui/ non/ si"
8. prépositions de lieu, il y a/qu'est-ce qu'il y a
9. adjectifs possessifs (un seul possesseur) accord et place des adjectifs qualificatifs
10. comparatifs et superlatifs

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text & References:
Text:
Le livre à suivre : Penfornis, Jean-Luc. Français.Com (Débutant). Paris: Clé International, 2007.

References:
Tauzin, Béatrice et Dubois Anne-Lyse. Objectif Express 1. Paris: Hachette, 2009.

Syllabus - Semester Second

PROFESSIONAL FRENCH FOR BUSINESS-2
(FRANÇAIS PROFESSIONNEL ET DES AFFAIRES-2)

Course Code: LAN2261 **Credit Units: 03**

Course Objective:
To enable the students to
- plan, prepare, talk about time schedules, schedule meetings
- take appointments, confirm, anticipate or postpone appointments
- discuss work habits, frequency of actions, weather
- talk about travel, make reservations at hotel, buy tickets
- understand and give instructions, directions, advice

Course Contents:
Module I: Emploi du Temps
Actes de Communication :
Demander et donner l'heure, des horaires, raconter sa journée, parler de ses habitudes au travail, de ses loisirs, dire la date, parler du temps qu'il fait, fixer rendez-vous (au téléphone par e-mail)

Module II: Voyage
Actes de Communication :
Faire des réservations –un billet de train, une chambre d'hôtel, régler la note, expliquer un itinéraire, parler de ses déplacements, exprimer un conseil, une interdiction, une obligation, acheter un billet de train, consulter un tableau d'horaires

Grammaire:
1. question avec à quelle heure ? adjectifs interrogatifs, démonstratifs
2. verbes pronominaux au présent
3. adverbes de fréquence, pourquoi... ? Parce que .../pour infinitif
4. expressions indiquant la date, le lundi, lundi prochain
5. verbes impersonnels, il faut+ infinitif, il est interdit de + infinitif
6. adjectifs possessifs (plusieurs possesseurs), adjectif tout
7. impératif affirmatif et négatif
8. les prépositions à et de : à et en + moyen de transport, en/au+pays, aller à/venir de
9. verbes pouvoir /devoir+infinitif,
10. verbes : dormir, venir, partir, questions avec d'où, où, par où, à quel, de quel

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text&References:
Text:
Le livre à suivre : Penfornis, Jean-Luc. Français.Com (Débutant). Paris: Clé International, 2007.

References:
Tauzin, Béatrice et Dubois Anne-Lyse. Objectif Express 1. Paris: Hachette, 2009.

Syllabus - Semester Third

PROFESSIONAL FRENCH FOR BUSINESS-3
(FRANÇAIS PROFESSIONNEL ET DES AFFAIRES-3)

Course Code: LAN2361 **Credit Units: 03**

Course Objective:
To furnish linguistic tools

- to talk about work and problems related to work
- to perform simple communicative tasks (explaining a setback, asking for a postponement of appointment, give instructions, place orders, reserve)
- to acquaint themselves with the current social communication skills
- Oral (dialogue, telephone conversation)
- Written (e-mails, reply to messages)

Course Contents: Unité 5, 6: pp. 74 to 104
Module I: Déjeuner d'affaires
Actes de Communication :
Manger au restaurant, comprendre un menu, commander , engager une conversation téléphonique, parler de sa formation, de son expérience, de ses compétences, raconter des événements passés, consulter sa boîte e-mails, répondre aux messages

Module II: Problèmes
Actes de Communication :
Identifier un problème, demander des précisions, expliquer un contretemps, déplacer un rendez-vous, demander de l'aide (par téléphone, par e-mail), donner des instructions, expliquer un problème, suggérer une solution

Grammaire:
1. articles partitifs, un peu de, beaucoup de, une bouteille de, un morceau de…
2. futur proche, passé récent, verbes appeler, savoir et connaître (au présent)
3. passé composé avec avoir, affirmatif, négation et interrogatif
4. passé composé avec être, accord du participe passé
5. pronoms COD, COI, impératif et place du pronom et impératif des verbes pronominaux
6. négations (ne…rien, ne…personne, ne…plus, ne…pas encore, trop/pas assez,)
7. passé composé des verbes pronominaux
8. si/quand+présent, être en train de,
9. interrogations qu'est-ce que/ qu'est-ce qui/qui est-ce que/qui est-ce qui
10. verbe devoir au conditionnel présent

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text & References:
Text:
Le livre à suivre : Penfornis, Jean-Luc. Français.Com (Débutant). Paris: Clé International, 2007.
References:
Tauzin, Béatrice et Dubois Anne-Lyse. Objectif Express 1. Paris: Hachette, 2009.

Syllabus - Semester Fourth

PROFESSIONAL FRENCH FOR BUSINESS-4
(FRANÇAIS PROFESSIONNEL ET DES AFFAIRES-4)

Course Code: LAN2461 **Credit Units: 03**

Course Objective:
- To strengthen the language of the students in both oral and written
- To provide the students with the linguistic tools
- to use the basic tenses – present, past and future
- to express emotion
- to accomplish simple tasks of day-to-day programmes
- to prepare a résumé and to appear for interviews

Course Contents: Unité 7: pp. 106 -120
Rédiger un résumé : Français.Com, Intermédiaire- p.98
Passer un entretien d'embauche : Français.Com, Intermédiaire – p.100

Module I: Tranches de vie
Actes de Communication :
Evoquer un souvenir, raconter dans le passé, rapporter des événements marquants d'une vie professionnelle, expliquer une situation de stress, donner son avis, faire des projets
Contenu grammatical : 1. formation de l'imparfait, emploi du passé composé et de l'imparfait
2. pronoms : y, chacun (/ chaque)
3. pronoms relatifs «qui, que, où » et mise en relief
4. pronom « en » de quantité
5. futur simple
6. indicateurs de temps : depuis, il y a, pendant, pour, en
7. propositions complétives : je pense que…, je crois que …

Module II: Faire le point
Actes de Communication : Rappel
Grammaire: Révision

Examination Scheme:

Components	CT	V	Att.	EE
Weightage (%)	15	10	5	70

Text & References:

Text:
Le livre à suivre : Penfornis, Jean-Luc. Français.Com (Débutant). Paris: Clé International, 2007.

References:
Tauzin, Béatrice et Dubois Anne-Lyse. Objectif Express 1. Paris: Hachette, 2009.

Syllabus - Semester Fifth

INTRODUCTION TO FRENCH LITERATURE & SELECT SOCIO-CULTURAL ASPECTS OF FRANCE

(INTRODUCTION À LA LITTERATURE FRANÇAISE ET À CERTAINS ASPECTS SOCIOCULTURELS DE France)

Course Code: LAN2561 **Credit Units: 03**

Course Objective:
The student gets an insight into various literary genres through extracts of novels, plays, and poems of renowned French writers. They also get acquainted with select socio-cultural aspects of France.

Course Contents:

Module I: Théâtre
Le bourgeois gentilhomme – **Molière**
Le Cid – **Corneille**
Phèdre – **Racine**
En attendant Godot **– Samuel Beckett**

Module II: Roman / Récit
Madame Bovary – **Gustave Flaubert**
L'Etranger – **Albert Camus**

Module III: Poésie
Le Lac (Méditations) – **Alphonse Lamartine**
Vieille Chanson du Jeune Temps (Les Contemplations) – **Victor Hugo**
Correspondances – **Baudelaire**
Pour faire le portrait d'un oiseau – **Jacques Prévert**
Liberté **– Paul Elouard**

Module IV: Aspects socioculturels de France
Introduction à l'histoire contemporaine, le système politique, les institutions et la géographie, les pays francophones
Peinture, cinéma, sculpture, architecture, musique et gastronomie

Examination Scheme:

Components	**CT**	**V**	**Att.**	**EE**
Weightage (%)	15	10	5	70

Text & References:

- P.G. Castex, P. Surer, et G. Becker. Histoire de la Littérature Française. Paris: Hachette, 1974.
- Deshusses, Pierre, Léon Karlson et Paulette Thomander. Dix Siècles de Littérature Française. Paris: Collection Bordas, 1991.

Syllabus - Semester Sixth

FRENCH THROUGH ACTIVITIES
(FRANÇAIS À TRAVERS DES ACTIVITÉS)

Course Code: LAN2661 **Credit Units: 03**

Course Objective:

- To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in French spontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application
- To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews
- To empower them to develop skills independently and to develop critical/ creative thinking

Course Contents:

Module I: Le français à travers des chansons
Exercices de grammaire, de vocabulaire, de dictée, de phonétique tout en écoutant/ en apprenant à chanter des chansons françaises d'hier et d'aujourd'hui

Module II: Le français à travers des pièces de théâtre
Jeu de rôles, scènes de la vie quotidiennes
Monologues
Pièces de théâtre classiques ou modernes - extraits

Module III : Le français à travers des films
Langage cinématographique et petite grammaire du cinéma
Critique/ appréciation des films

Module IV: Le français à travers des contes/ des fables
Contes populaires et traditionnels français
Fables de Jean de la Fontaine

Examination Scheme:

Components	Class Test	Attd.	End Term*
Weightage (%)	25	5	70

*All evaluation will be activity based.

Text & References:

Material compiled by ASL

GERMAN STUDIES

PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Value-added Course: FL- German and Minor track courses), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

Components	Codes	Weightage (%)
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	70

PROGRAMME OBJECTIVE

This programme is designed for the students who opt for German a Minor **in addition to taking German Foreign Language (Value-added Course).**

This programme aims at providing an understanding of the basics of German grammar and phonetics.

Students get sensitized towards different “Sprache Register” and are able to distinguish formal and informal language right from the beginning and use appropriate language while communicating in the professional and business world.

Through various listening and speaking exercises this course enables the students to quickly take position as a foreigner speaking German and establish contacts and communicate in oral and written language.

This programme also provides an insight into German literature. By furnishing information on select socio-cultural aspects of Germany, this programme creates a backdrop for a better understanding of the language and the people.

This programme focuses on developing all four language skills of reading, writing, listening and speaking. Through training in various activities it enhances the critical/ creative thinking and encourages the learners to think spontaneously in German.

GERMAN STUDIES

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LAN2162	Professional German for Business-1	2	1	-	3
LAN2262	Professional German for Business-2	2	1	-	3
LAN2362	Professional German for Business-3	2	1	-	3
LAN2462	Professional German for Business-4	2	1	-	3
LAN2562	Introduction to German Literature & Select Socio-Cultural aspects of Germany	2	1	-	3
LAN2662	German Through Activities	2	1	-	3
	TOTAL				**18**

Prerequisites:

- The student should have opted for German as FL
- In each semester the student should opt for the course offered without skipping any course. They are expected to follow the sequence. These courses cannot be opted for independently as OE in any semester.

Syllabus - Semester First

PROFESSIONAL GERMAN FOR BUSINESS-1
(Deutsch-1)

Course Code: LAN2162 **Credit Units: 03**

Course Objective: The complete course provides a comprehensive operational capability in the workplace. The course presents a variety of scenarios from various professional fields and work areas regarding the daily work and give professional language and intercultural skills.

Course objective of this semester is to enable students speak on following topics.

i) How to pronounce names, address and the professions.
ii) To be acquainted with the people.
iii) To ask, how to reach your destination.
iv) To welcome the guests.
v) To ask/confirm/deny an appointment.
vi) To tell the time.

Course Contents: Kapitel 1, 2, 3- pp**. 9-50**
Inhalt: Kapitel 1: Erster Kontakt

i) GutenTag!
ii) Familie und Beruf.
iii) Die Gruppe Allianz.
iv) Karten,Ausweis,Scheine
v) Neue Kollegen

Kapitel 2:Besucher Kommen

i) Wiewar die Reise?
ii) Herzlich willkommen!
iii) Die Leutesind da!
iv) Wer sind die Leute?
v) Kate Carlosbeginntihr Praktikum.

Kapitel 3:Leute

i) MeineFamilie.
ii) Auf einem Seminar
iii) EineVerabredung.
iv) Freizeit und Hobbys.

KommunikationsAufgabe:

i) Eine andere Person und sich vorstellen.
ii) Über den Berufund die Familiesprechen.
iii) Über die Teilnehmer von einem Seminar sprechen.
iv) Visitenkarten und Ausweise lesen und verstehen.
v) Informationen zur Personen fragen.
vi) Über die Reisesprechen.
vii) Ein Programm planen.
viii) Um eineFührung/Informationsmaterial bitten.
ix) ÜberAufgaben und Termine sprechen.
x) EinPraktikumsplan besprechen.
xi) Einen Praktikumsp an machen.
xii) Verwandtschaft bezeichnung ernennen.

xiii) Personen beschreiben.
xiv)Sich verabreden.
xv) E-Mails lesen.
xvi)Über die Freizeit und seine Hobbys sprechen.

Grammatik Inhalt:

i) Verben in Präsens(ich,er/sie/Sie)
ii) Possesivartikel:mein,sein/ihr
iii) Adverben(und,aber,oder,auch,schon,erst,noch)
iv) Präsens/Präteritum:haben und ein.
v) Zeitangaben:Wann/Wie lange?
vi) Negation:nicht/kein
vii) Verben mit Vokaländerung:e→i(e)

Examination Scheme

Component Codes	**CT**	**V**	**Att.**	**EE**
Weightage (%)	15	10	5	70

Text & References:

Becker, Braunert et al. *UnternehmenDeutsch*.**Stuttgart: ErnstKlettSprachen, 2011.**

Syllabus - Semester Second

PROFESSIONAL GERMAN FOR BUSINESS-2
(Deutsch-2)

Course Code: LAN2262 **Credit Units: 03**

Course Objective: To enable students speak on following topics.

i) To advise and to choose.
ii) To book and to reserve.
iii) To describe the route.
iv) To describe any organisation.
v) To organise the work.
vi) To compare things/persons/equipments.

Course Contents: Kapitel 4, 5, 6- pp. 51-92

Kapitel 4:Bedarf,Bestellung,kauf

i) Wir brauchen einen Drucker
ii) Ich möchte einen Wagenmieten.
iii) Das Angebot.
iv) Im Tagunshotel.'
v) Die Dienstreise.

Kapitel 5:ImBüro and Unterwegs.

i) Das Praktikanten büro.
ii) Entschuldigung,wie kommeIch von hier zum….?
iii) Und was machen wir mit….?
iv) Unterwegs zur Firma Rohla.
v) Vor der Messe.

Kapitel 6:Namen,Zahlen,Daten,Fakten

i) Das Mercedes-Benz Kundencenter Bremen.
ii) Chrono.data GmbH& Co. KG
iii) Die Arbeitsorganisation in der Rückware.
iv) Drucker und Regale.
v) Was für einTypbinich?

Kommunikationsaufgabe:

i) Wünsche ausdrücken.
ii) Waren vergleichen.
iii) Beraten,auswählen.
iv) Bestellen,buchen ,reservieren.
v) Kleidungsstücke auswählen.
vi) Fahrpläne verstehen.
vii) Den Wegbeschreiben.

Grammatik Inhalt:

i) haben,brauchen
ii) unbestimmterArtikel ein-/Negation kein
iii) Ich hätte möchte/würde gern
iv) Imperativ mit Sie und du
v) Personalpronomen:Akkusativ
vi) Wo für/für wen?

Examination Scheme

Component Codes	**CT**	**V**	**Att.**	**EE.**
Weightage (%)	15	10	5	70

Text & References:

Becker, Braunert et al. *UnternehmenDeutsch*.**Stuttgart: Ernst KlettSprachen, 2011.**

Syllabus - Semester Third

PROFESSIONAL GERMAN FOR BUSINESS-3
(Deutsch-3)

Course Code: LAN2362 **Credit Units: 03**

Course Objective:

To get the students acquainted with the current business communication skills in oral and written.

i) To read job advertisement and then to evaluate it.
ii) To call up someone.
iii) To plan an appointment.
iv) To inform and to justify the change of appointment.
v) To distribute, to accept and to refuse the assignment.
vi) To plan a business trip.

Course Contents: Kapitel 7 & 8- pp. 93-106

Inhalt:Kapitel7 :Aufstellensuchen

i) Versicherungen
ii) Welche Stellepasst?
iii) Das Home-Office von Frau Hörbiger
iv) DreiVersicherungen, drei Länder
v) Zwei Städte

Kapitel8: Tagesplan,Wochenplan

i) Aufgaben über Aufgaben
ii) Herr Sommer,Sie sollen…..
iii) Reise planung
iv) Viel zu tun
v) EinVerrükter Tag-nichts hat geklappt!

Kommunikationsaufgabe:

i) Versicherungen vergleichen
ii) Stellenanzeigen lesen und vergleichen
iii) Stellenanzeigen bewerten
iv) Ein Home-Office einrichten
v) Telefonieren
vi) Über Vesicherungen sprechen und vergleichen

Grammatik Inhalt:

i) Steigerung:Komperativ,Superlativ
ii) Indefinit Pronomen
iii) Adjektivdeklination mit dem bestimmten Artikel.
iv) Komparativ und Superatliv als Attribut.
v) Modalverb:sollen
vi) Nebensatz mit weil
vii) Präsens und präteritum der Modalverben:
wollen,müssen,können,dürfen,sollen

Examination Scheme

Component Codes	**CT**	**V**	**Att.**	**EE.**
Weightage (%)	15	10	5	70

Text & References:

Becker, Braunert et al. *UnternehmenDeutsch*.**Stuttgart: Ernst KlettSprachen, 2011.**

Syllabus - Semester Fourth

PROFESSIONAL GERMAN FOR BUSINESS-4
(Deutsch-4)

Course Code: LAN2462 **Credit Units: 03**

Course Objective:

To strengthen both oral and written language of students **.**To fine tune the grammar in application, to use modalverbs/ genitivecase.

i) To comprehend the instructions.
ii) To use the equipment and to work with program.
iii) To speak about disturbances and their causes.
iv) To complain about errors, defects and damages.
v) To find the solutions of problems.
vi) To explain the colleague his/her task.
vii) To write an invitation.

Course Contents: Kapitel, 9 &10- pp. 121-148
Inhalt Unit 9: Sechs Freunde

i) Einweisung für Frau Carlson
ii) Was ist da passiert?
iii) Hilfe,der Computer spinnt!
iv) Störungen beseitigen,Defekte und Schäden beheben
v) Reparatur oder Neukauf?

Unit 10:

i) Willkommen bei uns!
ii) Kleine Feiern
iii) Ach,das ist interessant
iv) Die Verabschiedung

Kommunikationsaufgabe:

i) Anweisungen verstehen
ii) Geräte bedienen,mit Programmen arbeiten.
iii) Über Störungen,Beschädigungen,Defekte sprechen
iv) Über Störungen und ihreUrsachen sprechen.
v) Störungen,Defekte beheben.
vi) Störungen reklamieren und Problem lösungen finden.
vii) Einen Mitarbeiter und seine Aufgabe vorstellen.

Grammatik Inhalt:

i) (Verbal-) Adjective
ii) Nebensatz mit dass
iii) Ursache und Folge:weil/deshalb
iv) Verb:werden im Präsens
v) Esist…/es wird

Examination Scheme

Component Codes	**CT**	**V**	**Att.**	**EE.**
Weightage (%)	15	10	5	70

Text & References:

Becker, Braunert et al. *UnternehmenDeutsch*. Stuttgart: Ernst KlettSprachen, 2011.

Syllabus - Semester Fifth

INTRODUCTION TO THE GERMAN LITERATURE AND SOCIO CULTURALASPECTS OF GERMANY
(Einführung in die Literatur und der sozio-kulturelle Aspekt Deutschlands Deutsch-5)

Course Code: LAN2562 **Credit Units: 03**

Course Objective:
To introduce the students to various literary genres through extracts of novels, plays, and poems of renowned German writers. They also get acquainted with select socio-cultural aspects of Germany.

Course Contents:

Module I: Einführung des soziokulturellenAspektDeutschlands

Einführung in die Zeitgeschichte das politische System,Institutionen und Geographie,deutschsprachige Ländern . Malerei,Film,Skulptur, Architektur, Musik und Gastronomie .

Module II: Gedichte:

1. Die Teilung der Erde-Friedrich Schiller
2. Willkommen und Abschied- Johann Wolfgang von Goethe
3. Anmeine Mutter – Heinrich Heine

Module III: Kurze Geschichte:

1. Das Brot:Wolfgang Borchert.
2. Die Küchenuhr : Wolfgang Borchert
3. Popp und Mingel : Marie LuiseKaschnitz
4. Aschenputtel: Grimm Bruder
5. Der Froschkönig: Grimm Bruder

Examination Scheme

Component Codes	**CT**	**V**	**Att.**	**EE.**
Weightage (%)	15	10	5	70

Text & References:

AlloAllkemper, Norbert Otto Eke.*Eine Einführung in die Literaturwissenschaft***. Stuttgart:Wilhelm Fink Gmbh&Co. Verlag-KG ,2004**

Syllabus - Semester Sixth

GERMAN THROUGH ACTIVITIES
(Deutsch durch Aktivitäten Deutsch-6)

Course Code: LAN2662 **Credit Units: 03**

Course Objective:
To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in Germanspontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application.
To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews.
To empower them to develop skills independently and to develop critical/ creative thinking.

Course Content:

Module I: DeutschdurchAktivitäten:
Rollenspiel- Szenen des täglichen Lebens ,Monologe .Das klassische und modern Spiele - Auszüge

Module II: Deutschdurch Lieder
Grammatik, Wortschatz, Diktat, Phonetik , Lernen durch Hören, deutsche Lieder von gestern und heute.

Module III: Deutschdurch die Filme.
Kurz FilmSprache und Grammatik des Films
Kritiker / Filme

Module IV:Deutschund das typische deusche Essen.
Beliebte und traditionelle deutsche Gerichte,.Rezepte für Gerichte und Lebensmittel Wortschatz.

Examination Scheme

Component Codes	CT	Att.	EE.*
Weightage (%)	25	5	70

Text & References:
Material compiled by ASL

*All evaluation will be activity based.

HISTORY

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
HIS2151	History of Ancient India	3	-	-	3
HIS2251	History of Medieval India	3	-	-	3
HIS2351	History of Modern India	3	-	-	3
HIS2451	The Ancient World	3	-	-	3
HIS2551	Rise of the Modern West	3	-	-	3
HIS2651	History of the World from Mid 20th Century to the 21st Century	3	-	-	3
	TOTAL				**18**

HISTORY

Syllabus - Semester First

HISTORY OF ANCIENT INDIA

Course Code: HIS2151 **Credit Units: 03**

Course Objective
This course is aimed at acquainting students with the basics of Indian history beginning from the pre-historic period to the early phase of medieval India.

Course Contents
Module-I: Reconstructing Ancient Indian History, Prehistory and Proto-history
Sources of Ancient Indian history, Paleolithic, Mesolithic, Neolithic periods, Pre-Indus Civilizations

Module-II: The Indus Valley Civilization
Origin, main excavated sites and their characteristics, system of town planning, socio-religious and economic history, causes of decline

Module-III: Vedic Period, Caste System and the Emergence of New Religious Orders
Four Vedas and literature of Later Vedic period like Unpanishadas, Brahmanas, Sutras and Dharamshastras, etc, rise of Buddhism and Jainism, causes, spread and decline

Module-IV: The Mauryan Empire
Sources, Sixteen Mahajanapadas, Magadhan to Mauryan period, Hariyanka dynasty, Shishunaga and Nandas, political administration, socio-religious and economic conditions, art and architecture, decline of the Mauryan Empire

Module-V: Kushana Empire and Gupta Empire
Shungas, Kanvas and Kushanas, Kanishka and Mahayana Buddhism, Gandhara, Mathura and Amravati Schools of Art, Trade and Silk Route

Module-VI: India under Harsha, Post- Harsha period
Vardhans and Satvahanas, early-medieval period and feudalism

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(**A :** Attendance ; **A/TP :** Assignment/ Term Paper ; **CT :** Class Test ; **EE :** Endterm Examination)

Texts and References

- Thapar, Romila, Early India, Penguin, 2002
- Sharma, R.S., India's Ancient Past, Oxford University Press, 2011
- Jha, D.N., Ancient India in Historical Outline, Manohar Publishers, 2008
- Upinder Singh, History of Ancient and Early Medieval India, Pearson, 2008

Syllabus - Semester Second

HISTORY MEDIEVAL INDIA

Course Code: HIS2251 **Credit Units: 03**

Course Objective
This course is aimed at acquainting students with the basics of medieval Indian history beginning from the Sultanate period to the decline of the Mughal Empire in the 18th century.

Course Contents
Module-I: Political and Economic Developments in the Sultanate Period
Coming of the Turks to India, Dynastic history—Ilbari Turks, Khaljis, Tughlaqs, Sayyids, and Lodhis, socio-political and economic developments, emergence of new institutions, nobility and new ruling elite, economic developments—urban revolution and rural revolution

Module-II: Socio-religious Movements in the Sultanate Period, Art and Architecture
Bhakti—origins, nirguna and saguna bhakti, Sufism-origins, silsilahs and impact on Indian society, developments in architecture

Module-III: Mughal India Part-I
The Early Mughals—Babur and Humayun, period of Akbar and Jahangir, political developments, new institutions, territorial integration, economic developments

Module-IV: Mughal India Part-II
Period of Shah Jahan and Aurangzeb—political developments, new institutions, territorial integration, economic developments

Module-V: Cultural Developments during the Mughal Period
Paintings, architecture, music, calligraphy, patronage of the arts

Module-VI: Fall of the Mughal Empire
Causes for the fall of the Mughal Empire, theories—old and new, rise of regional polities, coming of the British

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(**A :** Attendance ; **A/TP :** Assignment/ Term Paper ; **CT :** Class Test ; **EE :** Endterm Examination)

Texts and References

- Chandra Satish, Medieval India Vol. I and II, Haranand Publications Pvt. Lt, 2001
- Kumar Sunil, Emergence of the Delhi Sultanate, Permanent Black, 2010
- Habib Irfan, Medieval India I: Researches in the History of India, Oxford University Press, 1998

Syllabus - Semester Third

HISTORY OF MODERN INDIA

Course Code: HIS2351 **Credit Units: 03**

Course Objective
This course is aimed at acquainting students with the basics of modern Indian history beginning from the period of British imperialism to the partition of India, and the emergence of the new Indian state.

Course Contents

Module-I : Economic Developments
Land Revenue, Trade, Drain of Wealth, Growth of Modern Industry

Module-II: Popular Resistance- The Revolt of 1857
Causes of the Revolt, major participants, debates and historiography

Module-III: Socio-religious Reform Movements
The socio-religious movements of the 19th century- Brahmo Samaj, Prarthana Samaj, Arya Samaj, Ramakrishna Mission, debates on reform and revival

Module-IV: Nationalism, Mahatma Gandhi and the National Movement, India's Walk to Freedom
Gandhi's idea of nationalism and freedom, satyagrahas, Ahmedabad Mill Strike, Non-cooperation and Khilafat movement, Civil Disobedience movement

Module-V: Partition and Independence
Quit India movement, Cripps Mission, Mountbatten Plan, Partition riots, impact of partition on India

Module-VI: Emergence of a New State
India after partition, new developments, framing of the Constitution, Five-Year Plans

Examination Scheme

Components	**A**	**A/TP**	**CT**	**EE**
Weightage (%)	5	15	10	70

(**A :** Attendance ; **A/TP :** Assignment/ Term Paper ; **CT :** Class Test ; **EE :** Endterm Examination)

Texts and References

- Bandopadhyay, Sekhar, From Plassey to Partition, Orient Blackswan, 2004
- Sarkar, Sumit, Modern India, Pearson India, 2014
- Chandra Bipan, Panikkar K.N., Mukherjee Mridula, Mahajan Sucheta, and Mukherjee Aditya, India's Struggles for Independence

Syllabus - Semester Fourth

THE ANCIENT WORLD

Course Code: HIS2451 **Credit Units: 03**

Course Objective
This course is aimed at acquainting students with the basics of world history beginning from pre-history to the Greco-Roman civilizations. The political, social, economic, and cultural aspects of all the phases will be covered as part of this course.

Course Contents

Module-I: Pre-History- Paleolithic and Mesolithic phases
Human evolution, Paleolithic- sites, tools, main characteristic features, Mesolithic- sites, tools, main characteristic features

Module-II: Neolithic Revolution
The beginning of agriculture, revolutionary change, sites, tools, main characteristic features

Module-III: Bronze Age Civilizations-Mesopotamia
Geographical setting, phases in the development of the civilization, polity, economy, society, culture

Module-IV: Bronze Age Civilizations- Egypt
Geographical setting, phases in the development of the civilization, polity, economy, society, culture

Module-V: Greek Civilization
Geographical setting, phases in the development of the civilization, polity, economy, society, culture

Module-VI: Roman Civilization
Geographical setting, phases in the development of the civilization, polity, economy, society, culture

Examination Scheme

Components	**A**	**A/TP**	**CT**	**EE**
Weightage (%)	5	15	10	70

(**A :** Attendance ; **A/TP :** Assignment/ Term Paper ; **CT :** Class Test ; **EE :** Endterm Examination)

Texts and References

- Amar Farooqui, *Early Social Formations*
- Glyn Daniel, *First Civilizations*

Syllabus - Semester Fifth

RISE OF THE MODERN WEST

Course Code: HIS2551 **Credit Units: 03**

Course Objective
This course is aimed at acquainting students with the basics of World history, beginning from the Renaissance to the Industrial Revolution. All the important themes and landmark events in world history will be covered as part of this course.

Course Contents

Module-I: The Age of Renaissance
Period of the Renaissance in Europe, spread, major characteristic features, major artistic developments- paintings and sculptures, debates and recent historiography

Module-II: The Age of Reformation
Period of Reformation- background and origins, Martin Luther and the Reformation in Germany, Reformation outside Germany, nature of Reformation, legacy of the Reformation, debates and recent historiography

Module-III: Origins of Modern Politics- The French Revolution
Historiographical trends, causes, phases of the revolution, Age of the Republic, economic and political policies, role of women, impact of the revolution

Module-IV: The American Revolution
Historiographical trends, causes, important events, ideology of the revolution, impact of the revolution

Module-V: British Industrial Revolution
Historiographical trends, factors for the emergence of industrialization, major technological developments, economic impact, socio-political impact

Examination Scheme

Components	**A**	**A/TP**	**CT**	**EE**
Weightage (%)	5	15	10	70

(**A :** Attendance ; **A/TP :** Assignment/ Term Paper ; **CT :** Class Test ; **EE :** Endterm Examination)

Texts and References

- Meenaxi Phukan, *Rise of the Modern West: Social and Economic History of Early Modern Europe*
- J. R. Hale, *Renaissance Europe*
- Christopher Hill, *A Century of Revolutions*

Syllabus - Semester Sixth

HISTORY OF THE WORLD FROM MID-20TH CENTURY TO THE 21ST CENTURY

Course Code: HIS2651 **Credit Units: 03**

Course Objective
This course is aimed at acquainting students with the history of the two world wars and the post-war events. All the important themes and landmark events will be covered as part of this course.

Course Contents

Module-I: World War I
Causes; political, economic, military, social developments; end of the war and the Treaty of Versailles

Module-II: Inter-War Period
Rise of Nazism in Germany, rise of Fascism in Italy, Stalinist Russia

Module-III: World War II
Causes; political, economic, military, social developments; end of the war and reconstruction of Europe

Module-IV: Liberation from Colonial Rule
End of colonial rule in Latin America, Arab World, Africa and South-East Asia

Module-V: Cold War
Power blocks- USA and USSR, political and economic developments

Module-VI: Rise of USA as a World Power
Reasons for the emergence of US as a world power, historiograhical trends, political developments in the post-Cold War period, economic supremacy

Examination Scheme

Components	A	A/TP	CT	EE
Weightage (%)	5	15	10	70

(**A :** Attendance ; **A/TP :** Assignment/ Term Paper ; **CT :** Class Test ; **EE :** Endterm Examination)

Texts and References

- David Stevenson, 1914-1918: The History of the First World War, Penguin Books, UK, 2004
- Ross F. Collins, World War One
- Samuel L.A. Marshall, World War I
- Bernard Bailyn, The Ideological Origins of the American Revolution
- R.P. Kaushik, Significant Themes in American History

KOREAN STUDIES

Programme Structure-2018

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
LAN2165	Introduction to Korean History & Geography	3	-	3
LAN2265	Korean Cultural Perspectives	3	-	3
LAN2365	Modern History of Korea & Introduction to Korean Language	3	-	3
LAN2465	Contemporary Korea	3	-	3
LAN2565	Polity and Economy of Korea	3	-	3
LAN2665	Themes in Korean Literature	3	-	3
	TOTAL			**18**

KOREAN STUDIES

Course Objective:

The course is designed to give a broad geographical, historical, cultural and social background of Korea. This will give the students an insight into the major events- historical, political and cultural- of Korean society extending from pre-history era till date. This course explores how today's Korea came into existence and what role does it play in world, especially in East Asia. The course will highlight the various cultural aspects also like Korean festival, cuisine, cinema, music and theatre.

Besides this, the course brings out the various phases of contemporary Korea dealing with colonial legacy, anti-colonial movements, social, political and economic agenda; liberation and division; emerging political, economic and administrative structures; Korean war and aftermath; pace, pattern and processes of socio-economic transformation in the peninsula, Government (s) and politics in the peninsula etc. Exercises also involve practical analysis of material and articles dealing with current issues related to Korea. Texts related to economic, social, and political issues of contemporary Korea are read, analysed and discussed. Besides written examination, grading will also be based on active class discussion and participation.

Besides this, the students are also given introductory lectures on Korea's relations with its neighbours like China, Russia and Japan and also with important strategic partners like USA and India.

KOREAN STUDIES

Syllabus - Semester First

INTRODUCTION TO KOREAN HISTORY AND GEOGRAPHY

Course Code: LAN2165 **Credit Units: 03**

History

- Prehistory and Gojoseon
- Proto–Three Kingdoms
- Three Kingdoms
- North-South States Period
- Goryeo dynasty
- Joseon dynasty
- Korean Empire

Geography

- Location
- Area
- Demography
- Rivers
- Mountains

Syllabus - Semester Second

KOREAN CULTURAL PERSPECTIVES

Course Code: LAN2265 **Credit Units: 03**

Culture

- Attire
- Gastronomy
- Monuments
- Dance/song
- Society
- Loisir

Syllabus - Semester Third

MODERN HISTORY OF KOREA AND INTRODUCTION TO KOREAN LANGUAGE

Course Code: LAN2365 **Credit Units: 03**

History

- Japanese occupation and Japan-Korea Annexation
- Division
- Korean War

Language

- Introduction to the history of Korean language
- Introduction to the writing system
- Basic Korean expressions and day to day situations

Syllabus - Semester Fourth

CONTEMPORARY KOREA

Course Code: LAN2465 **Credit Units: 03**

Korea in International affairs

- Indo-Korea relations
- R.O.K- US relations
- R.O.K- China relations
- R.O.K- Japan relations
- R.O.K- Russia relations
- R.O.K- D.P.R.K relations

Geography

- Strategic benefits and disadvantages

Syllabus - Semester Fifth

POLITY AND ECONOMY OF KOREA

Course Code: LAN2565 **Credit Units: 03**

Politics

- National government
- Political parties and elections
- Latest elections
- Political pressure groups and leaders
- Administrative divisions
- International organization participation

Business Korean

- The miracle on Han
- Chaebol
- Leading Business Houses
- Business culture

Syllabus - Semester Sixth

THEMES IN KOREAN LITERATURE

Course Code: LAN2665 **Credit Units: 03**

Themes in Korean Literature

- History of Korean literature
- Oral literature
- Modern day Korean literature
- Korean literature abroad

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

Text & References:

- Extracts from various Handbooks including 'Facts About Korea', tourism booklets, books on Korean culture and heritage, Korean culture related websites etc.
- History of Korea by Han Woo Keun
- New History of Korea by Lee Ki- Baek
- Shin Young-Ha, Social history of Korea
- Shin, Gyegyun. 1999. Korean Life. Seoul: Korean Textbook Co.
- Korean Culture & Information Service. 1995. Guide to Korean Culture. Seoul: KCIS.
- A Text Book of Korean Culture by Vyjayanti Raghavan, J.M. Kim & Ravikesh, New Delhi: Manak Publishers
- Academy of Korean Studies. 2005. Exploring Korean History through World Heritage. Seoul: AKS.
- Shin, Gyegyun. 1999. Korean Life. Seoul: Korean Textbook Co.
- Korean Culture & Information Service. 1995. Guide to Korean Culture. Seoul: KCIS.
- 30 Years of Diplomatic Relations between India and Korea, Embassy of R.O.K
- Recent News Articles and internet sources
- Articles from Korean Newspapers and Journals
- Facts About Korea
- Excerpts from Political analysts

Amity School of Liberal Arts & FL

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Arts English

Syllabus - First Semester

ENGLISH LITERATURE FROM MEDIEVAL PERIOD TO 17TH CENTURY

Course Code: ENG4102 **Credit Units: 05**

Course Objective:
The student will study select authors and texts from Anglo-Saxon Period through the Middle Ages till the seventeenth century and with an aim to develop an understanding of the historical cultural and philosophical influences that shaped the literatures of those times.

Virgil	:	The Aeneid
Malory	:	Morte d'Arthur
Chaucer		The Canterbury Tales: The Prologue, Nun's Priest Tale, Wife of Bath's Tale.
Wyatt and Surrey	:	SURREY: Alas! so all Things now do Hold their Peace; The Frailty and Hurtfulness of Beauty; The Golden Gift that Nature did thee Give; Love that doth Reign and Live within my Thought; So Cruel Prison
Thomas Wyatt	:	Farewell Love and all thy Laws for ever; In Spain; The Long Love that in My thought doth Harbour, Unstable Dream; What should Say
Milton	:	Paradise Lost: Books I, II
Andrew Marvell	:	To His Coy Mistress
John Bunyan	:	The Pilgrim's Progress

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Peter S. Hawkins and Rachel Jacoff, The Poets' Dante, Twentieth-Century Responses, Edited.
- The Riverside Chaucer, Geoffrey Chaucer, Houghton Mifflin Company, 1987.
- Geoffrey Chaucer, The Canterbury Tales, Barnes & Noble Classics, 2006.
- George Williamson, Six Metaphysical Poets: A Reader's Guide, Syracuse University.
- John Bunyan, L. Edward Hazelbaker, The Pilgrim's Progress in Modern English, (Pure Gold Classics).

DRAMA FROM SHAKESPEARE TO BEN JONSON

Course Code: ENG4103 **Credit Units: 05**

Course Objective:
The course will provide the student with knowledge of the growth and development of drama in the Elizabethan period with Shakespeare as the representative poet through analysis of generic texts. Other representative texts of Thomas Middleton, Webster and Ben Jonson will be studied with Historical and cultural backgrounds. Students would also be encouraged to form a critical understanding of the different forms of drama like the tragedy, comedy, history, tragic-comedy, melodrama, farce etc.

Text:

Shakespeare	:	The Tempest, Hamlet, Antony and Cleopatra
Webster	:	The Duchess of Malfi
Ben Jonson	:	Alchemist

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- A.C Bradley, Shakespearean Tragedy
- Wilson Knight, A Wheel of Fire
- G. Evans, Elizabethan Jacobean Drama: The Theatre in Its Time
- Ben Singer, Melodrama and Modernity: Early Sensational Cinema and Its Contexts, Columbia University Press, 2001

RESTORATION AND AUGUSTAN PROSE AND POETRY

Course Code: ENG4104 **Credit Units: 05**

Course Objective:
The course will explore the major trends and some marginalized aspects in English prose and poetry of the Restoration and Augustan periods. A close reading and analysis of selected representative writers of the periods with their representative texts will be done. This will help to provide an understanding of the developments in varied literary styles in relation to political and cultural issues of these pivotal literary periods.

Text:

John Dryden	:	Absalom and Achitophel
Alexander Pope	:	The Rape of the Lock
Jonathan Swift	:	Tale of the Tub.
James Thompson	:	Seasons
Addison & Steele	:	Sir Roger at Home; The Coverley Household; On Ghosts and Apparitions; sir Roger at Church; The Scope of Satire; Female Orators; A Hunting Scene With Sir Roger
Samuel Johnson	:	Selections from Lives of the Poets (Cowley, Milton, Dryden and Addison).

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Paul Hammond, Restoration Literature: An Anthology, Oxford World's Classics
- Louis Kronenberger, An Eighteenth Century Miscellany: The Classics of the Eighteenth Century Which Typify and Reveal an Era.
- Kenneth Young, John Dryden: A Critical Biography.
- Mark Van Doren, The Poetry of John Dryden.
- Arthur C. Kirsch, Literary Criticism of John Dryden.
- Peter Dixon ed., Alexander Pope, London: G. Bell, 1972.

18TH AND 19TH CENTURY NOVELS

Course Code: ENG4105 **Credit Units: 05**

Course Objective:
This course will address the rise of the English novel. In addition to reading novels and understanding the historical milieu in which they are embedded, this course will present the central issues that have come up in novel genre as of the construction of subjectivity in terms of gender and culture.

Text:

Henry Fielding	:	Tom Jones
Jane Austen	:	Emma
Dickens	:	Hard Times
Thomas Hardy	:	Tess of the d'Urbervilles
Leo Tolstoy	:	Anna Karenina

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Ian Watt, Rise of the Novel, Penguin.
- Walter Allen, History of the English Novel, Penguin
- Arnold Kettle, Introduction to the English Novel - I.
- George Lukacs, Essays in European Realism.
- R.F. Brissenden, Virtue in Distress: Studies in the Novel of Sentiment from Richardson to Sade, Basingstoke: Macmillan, 1974.
- John Carroll (ed), Samuel Richardson: A Collection of Critical Essays, Englewood Cliffs: Prentice-Hall, 1969.
- Margaret Anne Doody and Peter Sabor (eds), Samuel Richardson: Tercentenary Essays, Cambridge: Cambridge University Press, 1989.
- Sala, George A., Charles Dickens: An Essay. London: Routledge, 1870.
- Watkins, William. Charles Dickens. London, 1870.
- Mackenzie, R. S., Life of Charles Dickens. Philadelphia: T. B. Peterson, 1870.
- Burritt, Elihu, The Life and Writings of Charles Dickens: A Memorial Volume. 1870; NewSala, George A. Charles Dickens: An Essay. London: Routledge, 1870.
- Watkins, William. Charles Dickens. London, 1870.
- MacKenzie, R. S., Life of Charles Dickens. Philadelphia: T. B. Peterson, 1870.
- Jones, Malcolm, New Essays on Tolstoy, Cambridge University Press, Cambridge, 1978.
- Mandelker, Amy, "The Judgment of Anna Karenina." A Plot of Her Own: The Female Protagonist in Russian Literature. Ed. Sona Stephan Hoisington. Chicago: Northwestern University Press, 1995.
- Tolstoy, Leo, Anna Karenina, Trans. Richard Pevear and Larissa Volohonsky. New York: Viking Penguin, 2001.

Syllabus – Second Semester

RESTORATION AND AUGUSTAN DRAMA

Course Code: ENG4201 **Credit Units: 05**

Course Objective:
This course will make a close reading and analysis of the representative dramatic texts of the period, and introduce students to a variety of styles, genres and themes primarily through the works of five dominant figures: John Dryden, Aphra Behn, William Congreve, Richard Sheridan, and Oliver Goldsmith. The students will examine the genres and styles employed in the selected texts and also the political and social issues of the period.

Text:

John Dryden	:	All for love
Aphra Behn	:	The Rovers
William Congreve	:	The Way of the World
Oliver Goldsmith	:	She Stoops to Conquer

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- J. M. Armistead, Four Restoration Playwrights: A Reference Guide to Thomas Shadwell, Aphra Behn, Nathaniel Lee, and Thomas Otway, Boston: G. K. Hall, 1984
- Scott McMillin, W.W., Restoration and Eighteenth-Century Comedy, Norton & Company
- Marcie Frank, Gender, Theatre, and the Origins of Criticism: From Dryden to Manley, Cambridge University Press, 2002.

ENGLISH ROMANTIC POETRY

Course Code: ENG4203 **Credit Units: 05**

Course Objective:
This course will introduce students to the representative English Romantic poets and their selected works. This course will help students to develop a tentative definition of the term Romanticism by identifying major social, political and cultural influences on poetry and poetic subjects and critical theories espoused by the poets themselves regarding poetry.

Text:

Wordsworth	:	The Prelude Books I, II ,III.
Coleridge	:	The Rime of the Ancient Mariner
Keats	:	Hyperion, Lamia
Shelley	:	Prometheus Unbound
Lord Byron	:	Don Juan Canto I & II

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- M.H. Abrams, The Mirror and the Lamp: Romantic Theory and the Critical Tradition (1958), on Romantic literary criticism and poetic theories
- M. H. Abrams, The Correspondent Breeze: Essays on English Romanticism (1984), includes "Structure and Style in the Greater Romantic Lyric"
- Harold Bloom (ed.), Romanticism and Consciousness,1970.
- CM Bowra, The Romantic Imagination
- W. Paul Elledge, Byron and the Dynamics of Metaphor, 1968.
- W. Paul Elledge, "Parting Shots: Byron Ending Don Juan I," Studies in Romanticism, 1988.
- Robert F. Gleckner, Byron and the Ruins of Paradise, 1967.
- Robert F. Gleckner, ed., Critical Essays on Lord Byron, 1991.
- Abraham, Shane. "John Keats and the Fever of Creation." Thesis. Coe College, 1994. WordCat. Online. OCLC. 22 Sept. 1997.
- Austin, Allen C. "Toward Resolving Keat's Grecian Urn Ode." Context for Criticism. ed. Donald Keesey. Mountain View: Mayfield, 1994. 48-58.
- Bennett, Andrew. Keats, Narrative and Audience: The Posthumous Life of Writing. Cambridge, Eng.: Cambridge UP 1994.

VICTORIAN POETRY AND PROSE

Course Code: ENG4204 **Credit Units: 05**

Course Objective:
This course will introduce students to a wide range of prose and poetry written during the Victorian period, as well as to social and intellectual concerns that define and preoccupy these works. The course will closely consider formal and historical aspects of these texts, especially as they correspond with Victorian debates surrounding religious belief, anxieties of nation.

Text:

Tennyson	:	In Memoriam
Robert Browning	:	The Last Ride Together, Rabbi Bin Ezra
Matthew Arnold	:	The Scholar Gipsy, Dover Beach, Culture and Anarchy
Rossetti	:	The Blessed Damozel
Pater	:	'Style' from Appreciation

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Altick, Richard D, Victorian People and Ideas: A Companion for the Modern Reader of Victorian Literature. New York: Norton, 1973.
- Buckley, Jerome Hamilton, The Victorian Temper: A Study in Literary Culture. Cambridge: Harvard University Press, 1951.
- Gilmour, Robin, The Victorian Period: The Intellectual and Cultural Context of English Literature, 1830-1890. London: Longman, 1993.
- Houghton, Walter Edwards, The Victorian Frame of Mind, 1830-1870. New Haven: Yale University Press, 1957.
- Tucker, Herbert F., A Companion to Victorian Literature and Culture. Malden, MA: Blackwell, 1999.
- Williams, Raymond, Culture and Society, 1780-1950. London: Chatto & Windus, 1958 Brooke, Stopford. The Poetry of Robert Browning. 1902.

THEORETICAL LINGUISTICS

Course Code: ENG4205 **Credit Units: 05**

Course Objective:
The aim of this course is to familiarize students with the major theories in Phonology, Morphology, Syntax, Semantics, discourse and Pragmatics. The paper introduces scientific reasoning and methodology of modern linguistics to be applied to different spheres of life.

Course Contents:
Module-I: Introduction to Sociolinguistics
- Language Contact, Policy and Shift
- Diglossia, Code Switiching and Mixing
- Language Death and Revitalization
- Language globalization and Localization

Module-II: Phonology and Morphology
- Airstream Mechanism
- Sound Systems of English Language
- Phoneme Vs Allophones
- Stress and Intonation

Module-III: Introduction to Syntactic Theories
- Syntactic Categories
- Traditional Vs Generative Grammar

Module-IV:
- Introduction to Semantic Theories
- Types of Semantic Relations
- Major Semantic Theories
- Discourse and pragmatics
- Speech Act Theories

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Ambrose- Grillet, Jeane, 1978. Glossary of Transformational Grammar , Rowley, MA : Newbury House
- Crystal David, 1971, Linguistics, Baltimore : Penguin Books
- Crystal David. 1980. A First Dictionary of Linguistics and Phonetics. Boulder, Co : Westview
- Dineen, Francis P. 1967. An Introduction to General Linguistics. New York : Holt, Rinehart and Winston.
- Finegan, E. 1999. Language : E : its Structure and Use 3rd ed. For Worth TX.
- Myerhoff, M. 2011. Introducing Scociolinguistics 6th ed. London : Routledge.

RESEARCH METHODOLOGY-I

Course Code: ENG4206 **Credit Units: 01**

Course Objective:
This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing, to help them acquire both a theoretical thrust and hands-on experience in writing research proposals before they embark on the execution of the thesis proper.

Module-I: The Philosophy of Research
The Philosophy, Meaning and Definition of Research
The nature of inquiry in Physical Sciences, Social Sciences and Humanities.
The relationship between Scholarship, Criticism and Research.
Interpretation
Textual Criticism
Literary History

Module-II: Project Proposals: Theory and Practice
The Identification of a Research Problem / Research Gap
The problems faced by a Research Scholar.
Parts of a Project Proposal
Preparing Minor Project Proposals

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Texts and References

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing

Syllabus – Third Semester

20TH CENTURY POETRY

Course Code: ENG4301 **Credit Units: 05**

Course Objective:
The course aims to introduce the 20th century developments in poetry that characterized the culmination of literary modernism. Representative texts would be discussed with an objective to encourage the students to examine various formal and technical innovations of the period.

Text:

T.S. Eliot	:	The Wasteland
Ezra Pound	:	Cantos 1, 13 and 49.
W.B. Yeats	:	Sailing to Byzantium; The Second Coming, A Prayer for my daughter.
W.H. Auden	:	Spain, September 1, 1939
Philip Larkin	:	Aubade; Church Going
Ted Hughes	:	Crow; Thought Fox; The Jaguar.
Sylvia Plath	:	Daddy; Ariel;
G M Hopkins	:	The Wreck of Deutschland.

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Harvester Wheatsheaf, English Poetry of the First World War: Contexts and Themes, 1990.
- Michael Levenson, The Cambridge Companion to Modernism, Cambridge UP, 1999.
- Vassiliki Kolocotroni, Modernism: An Anthology of Sources and Documents, Edinburgh, 1998.
- Peter Nicholls, Modernisms: A Literary Guide, Macmillan, 1995.
- Dukore, Bernard F. Bernard Shaw, Playwright. Aspects of Shavian Drama. University of Missouri Press: Columbia, 1973.
- Gordon, David. Bernard Shaw and the Comic Sublime, St. Martin`s: New York, 1990.
- Harold Bloom, ed., T. S. Eliot's "The Waste Land," 1986.
- Jewel Spears Brooker and Joseph Bentley, Reading "The Waste Land": Modernism and the Limits of Interpretation, 1990.
- Richard Ellmann, Yeats, the Man and the Masks, 1948.
- R. F. Foster, W. B. Yeats: A Life, 1997.
- Harold Bloom, Criticism, 1970.

20TH CENTURY DRAMA

Course Code: ENG4302 **Credit Units: 05**

Course Objective:
The course aims at developing the student's response to the post World War developments in English drama. English drama post Second World War betrays a great deal of sociological and aesthetic peculiarities, and the prescribed texts would mark an interesting discussion in the ways in which the fall of the Empire affected literature back in England, among other things.

Text:

Samuel Beckett	:	Endgame
Harold Pinter	:	The Birthday party
John Osborne	:	Look Back in Anger
Henrik Ibsen	:	The Doll's House
Bernard Shaw	:	Man and Superman.
Eugene O' Neil	:	Mourning Becomes Electra.

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Lawrence Cahoone ed., From Modernism to Post-Modernism: An Anthology, Blackwell, 2003.
- Camus, Albert. The Myth of Sisyphus and Other Essays. Tl. Justin O'Brien. New York: Vintage Books, 1961.
- Coe, Richard N. Beckett.: Oliver and Boyd, Glasgow, 1964.
- Cohn, Ruby, ed. Casebook on Waiting for Godot: The Impact of Beckett's Modern Classic: Reviews, Reflections, and Interpretations. New York: Grove Press, 1967.
- Peter Bary Ed., The Cambridge Companion to Harold Pinter, Homerton College, Cambridge
- D. Daiches Ed., The Penguin Companion to English Literature, 1972.

LITERARY CRITICISM

Course Code: ENG4303 **Credit Units: 05**

Course Objective:
The course focuses on critical theory as it applies to literature and culture. Review of classical Greek origins of issues concerning the nature of literature and criticism and English literary theory and criticism. Students will be able to comment on theories and apply various these to works of literature.

Text:

Aristotle	:	Poetics
Longinus	:	On the Sublime
Sidney	:	An Apologie for Poetry
Dryden	:	Essay on Dramatic Poesy
Coleridge	:	Biographia Literaria: Chapter XIV.
Matthew Arnold	:	The Function of Criticism in the Present time; The Study of Poetry
T.S.Eliot	:	The Metaphysical Poets
William Empson	:	Seven Types of Ambiguity
I A Richards	:	As a Critic
F R Leavis	:	As a Critic

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Davis, Michael. Aristotle's Poetics: The Poetry Of Philosophy. Lanham: Rowman & Littlefield Publishers, 1992.
- Empson ,William Seven Types of Ambiguity ,New Directions Publishing Corporation
- I.A.Richards, Practical Criticism, Kegan Paul, London, 1929.
- Keith Hanley, Wordsworth's Revolution in Poetic Language
- M.A.R. Habib, A History of Literary Criticism From Plato to the Present, Rutgers University.
- Marshall Brown Ed. Cambridge History of Literary Criticism. New York: Cambridge UP, 1989
- Ransom, J C Poetry, A Note on Ontology Critical Theory Since Plato, 3rd Edition, Cengage, 2005
- Wellek, Rene. A History of Modern Criticism 1750-1950. New Haven: Yale UP, 1955

20TH CENTURY NOVEL

Course Code: ENG4304 **Credit Units: 05**

Course Objective:
The course will study a selection of twentieth-century novels which will initiate students to participate in certain of the major debates that have animated twentieth-century literature and criticism. In addition to the focus on 'texts and debates', the course attends in detail to the variety of historical contexts in which the literary texts and the critical debates have arisen.

Text:

Joseph Conrad	**:**	**The Heart of Darkness**
DH Lawrence	:	Women in Love
Albert Camus	:	The Plague
Gabriel Garcia Marquez	:	One Hundred Years of Solitude
J.M. Coetzee	:	Disgrace

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Dominic Head, The Cambridge Introduction to Modern British Fiction, 1950–2000, Brunel University.
- William Lyon Phelps, Essays on Russian Novelists, Macmillan, 1916.
- Gabriel García Márquez: A Critical Companion / Pelayo, Rubén., 1991
- Gabriel García Márquez: A Study of The Short Fiction / Oberhelman, Harley D., 1991
- Chinua Achebe, "An Image of Africa."
- John Batchelor, The Life of Joseph Conrad: A Critical Biography, 1993.
- Ted Billy, ed., Critical Essays on Joseph Conrad, 1987.
- Harold Bloom, ed., Joseph Conrad's "Heart of Darkness," 1987.
- Harold Bloom, ed., Joseph Conrad, 1986.
- Harold Bloom, Marlow, 1992.
- Bernard McKenna, James Joyce's Ulysses: A Reference Guide, Greenwood Press, 2002.
- Margot Norris, A Companion to James Joyce's Ulysses. St. Martins, 1998.
- Hubben, William, Dostoevsky Kierkeqaard Nietzsche and Kafka: Four Prophets of our Destiny, New York: Collier Books, 1967.

RESEARCH METHODOLOGY-II

Course Code: ENG4305 **Credit Units: 02**

Course Objective:
This paper proposes to introduce student to the philosophy and mechanics of research, to train them in the use of language, style and discourses suitable for dissertation writing, to help them acquire both a theoretical thrust and hands-on experience in writing dissertation before they embark on the execution of the thesis proper.

Module-I: Language, Style and Types of Discourses
The Style suitable for a Literary Thesis
Narration Argumentation
Exposition Description

Module-II: Research Objectives
Literature Review
Research Plan
Research Hypothesis

Module-III: The Mechanics of Research
The Mechanics of dissertation Writing
Data Collection – Primary and Secondary Sources.
Methods of data collection : Questionnaire, Interview, observation, document analysis
Methods of data analysis : Descriptive Statistics
Procedure in Literary Research e-learning and Research

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Texts and References

- Bateson, F.W. The Scholar Critic 2. Thorpe, James.
- Gibaldi, Joseph. MLA Handbook
- Brooks, C. and Warren, R.P. Modern Rhetoric
- Lodge, David. Modes of Modern Writing
- Kaplan, R.B. The Conduct of Inquiry: Methodology of Behavioural Sciences, San Francisco, 1964. Form and Style in Thesis Writing

SUMMER PROJECT EVALUATION

Course Code: ENG4335 **Credit Units: 03**

Summer Project is primarily a research work. It involves academic reading of several sources and writing on a particular topic relating to the core course or courses of the program. It is a scholarly inquiry into academic problems or issues. It should involve a systematic approach to gathering and analysis of information/ideas, leading to production of a structured report. The research topic should hold significant academic value commensurate with level of the Program.

GUIDELINES FOR SUMMER PROJECT REPORT

Topic

The topic of the paper will be of the student's choice with consent of the Supervisor. It must be relevant to the content of the course, but it should be treated in greater depth than it is covered in class. Focus is of the utmost importance. Too broad a topic will either lead to superficial treatment or an unnecessarily long paper; too narrow a topic will lead to a lack of source material and redundancy. Make sure the subject focuses on one question or topic so that the paper has a definite purpose. Composing an introduction and conclusion can be a good test of the cohesiveness of the subject. The domain can include Literature, Linguistics, Applied Linguistics, English Language Teaching and other related areas.

Synopsis of Summer Project Report

A Synopsis of the Summer Project Report should be submitted to the Board of Studies of the Institute. The Board, after deliberation, will suggest changes and modifications and will assign a supervisor from amongst the teaching faculty of the Institute. The synopsis should include the following –

1. Title of Summer Project Report
2. Introduction
3. Problems of Research
4. Objectives of Research
5. Tentative Chapter Division
6. Suggested readings

Source Material and References

Presenting your own ideas in a Summer Project Report is acceptable and even encouraged. However, the paper must be based on facts and opinions from authoritative sources and these sources must be given proper credit. A minimum of three published sources is required, and ten or more is typical. Direct quotes must be placed inside quotation marks or in indented sections and should be used sparingly. Paraphrasing is better in most cases.

There are two popular ways to cite references. One is to place superscripted numbers in the text with corresponding footnotes at the bottom of the page or endnotes at the end of the paper. More typical of scientific papers is to place the author and year in parentheses (Heaton, 1984). In either case you need a bibliography of all cited sources at the end of the paper with author(s), year, title, publication or publisher, volume, and pages. These should be in alphabetical order by name of the primary author. Preference however should be given to MLA Style Sheet.

Be sure to find source materials that are specific to your topic, either books or journal articles. Textbooks are usually too general and should be avoided. The libraries have published and computerized indexes that can be used to find relevant sources. See the Supervisor or a reference librarian if you are unfamiliar with these resources.

Plagiarism is the presenting of someone else's wording or ideas as one's own and is a violation of university policy. If you use someone else's words or ideas, you must give them proper credit. You must also obtain permission from the Supervisor before using your Summer Project Report for more than one course.

Length and Format

Length is not important; 40 to 60 pages of 1.5 spaced text is a good target. The title, author, course, and date should be typed onto a cover sheet.. Illustrations are not required but are often useful in explaining graphical concepts and in giving the paper character. The bibliography should be the last section of the paper. The entire report has to be submitted in two spiral bound copies.

Grading

Students are required to make two submissions: a first draft and a final draft prior to final submission. The first draft is *not* to be a "rough" draft; it should be a completed, typed paper like you would ordinarily submit. I will read it carefully, offer suggestions for improvement, give it a grade, and return it to you promptly. The final draft, which is worth a larger share of the points, is your chance to respond to the suggestions and submit an improved paper. This, I hope, will make the writing of a Summer Project Report more of a learning experience. We strongly suggest using a word processor so that the final draft can be created by editing rather than complete retyping.

Grading is based on both research content and presentation. Your paper should demonstrate that you have a gained a level of expertise in the subject by studying the relevant literature. Your presentation should be clean and convincing with proper use of paragraphs, complete sentences, and correct grammar, spelling, and punctuation. Make your Summer Project Report look and sound professional.

Evaluation of Project Work

Sl. No.	Evaluated by	Criteria	Marks
1	Institution	✓ Quality ✓ Depth & Breadth of analysis, ✓ Coverage, ✓ Scope and content ✓ Project fulfillment ✓ Data collection ability in the field (if any) ✓ Scope of Implementation.	50
2	Board of Examiners	Viva-voce Examination	50
3		**Total**	**100**

Project Schedule

1. **Registration**
   First week of the last academic month

Allotment of Faculty Guide takes place in accordance to the area of interest / stream chosen by the student at the time of registration.

2. **Approval Of Project Topic**
   Week following the 'week of registration'

3. **Submission Of Synopsis To Faculty Guide**
   Prior to the completion of End -Term Examination. The synopsis could be submitted any time after the allotment of project topic but certainly must be before completion of last examination.

4. **Duration of Project**
   The project stretches for the full duration of the Semester break

5. **Submission of Report**
   First Draft – After 20 Days from the commencement of the project
   Second Draft – 20 days after submission of the first draft.
   The first and second reports could be submitted through e-mail or any other medium as per the consent of faculty guide.
   Final Draft – Within second week of rejoining of institution

Syllabus - Fourth Semester

LITERARY THEORY

Course Code: ENG4401 **Credit Units: 05**

Course Objective:
This course will familiarize students with the study of major twentieth-century theories and applications. In this course, Historical, formalist, archetypal, psychoanalytic, Marxist, reader-response, New Historicist, feminist, postcolonial perspectives will be dealt. The course will enable students to comment on various theories and apply them to works of literature and aspects of contemporary culture.

Text:

Immanuel Kant	:	"What Is Enlightenment?"
Simone De Beauvoir	:	'Introduction' of *The Second Sex*
Foucault	:	"What is an Author?" from *The Essential Works of Foucault*
Jacques Lacan	:	Return to Freud: The Real, The Symbolic and The Imaginary
Ferdinand de Saussure	:	Course in General Linguistics (Major Concepts)
Derrida	:	*Structure, Sign, and Play in the Discourse of the Human Sciences*
Bill Ashcroft	:	'*Cutting the Ground: Critical Models of Post Colonial Literatures', from The Empire Writes Back.*
Edward Said	:	*Orientalism:* Introduction.
Homi Bhabha	:	*'How Newness enters the world: Postmodern space, Post Colonial times and the trials of cultural translation', in the Location Of Culture*
Gayatri Chakraborti Spivak	:	*Can the Subaltern Speak?*

Examination Scheme:

Components	**TP**	**S**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Amritjit Singh, Peter Schmidt, Postcolonial Theory and the United States: Race, Ethnicity, and Literature, 2000
- Henry Schwarz, Sangeeta Ray edited, *A Companion to Postcolonial Studies*.
- J A Cuddon, *A Dictionary of Literary Terms and Literary Theory*, 1998
- Jacques Lacan *Return to Freud: The Real, The Symbolic and The Imaginary* New York University Press
- Leroy Searle & Hazard Adams *Critical Theory Since Plato*, 3rd Edition, Cengage, 2005
- Bhabha, Homi, *Location of Culture*, Rutledge; 1 edition 1994
- Beauvoir Simone De Introduction' of *The Second Sex*, Vintage
- Saussure Ferdinand de *Course in General Linguistics*, McGraw-Hill, 1965
- Said Edward, *Orientalism*, Vintage 1969
- Spivak Gayatri Chakraborti Can the Subaltern Speak? Turia & Kant, 2007

AMERICAN LITERATURE

Course Code: ENG4402 **Credit Units: 05**

Course Objective:
This course will examine American Literature from the late 18th through the 19th century till the 20th century. In particular, it will focus on the relation of aesthetic innovation to the cultural milieu. The course will address these in the context of questions of genre and forms and changing understandings of gender, race, and nationalism.

Text:

Walt Whitman	:	Songs of Myself (Section 1, 2, 3, 5, 6, 7, 11, 24, 25, 32, 44, 49, 51, 52)
Nathaniel Hawthorne	:	The Scarlet Letter
Edgar Allan Poe	:	Philosophy of Composition, The Raven
Dylan Thomas	:	Under Milkwood
Henry Thoreau	:	Walden
Mark Twain	:	Adventures of Huckleberry Finn
Edward Albee	:	Who's Afraid of Virginial Woolf?
Ralph Emerson	:	Complete Essays – Self- Reliance, Pursuit of Happiness
Ernest Hemingway	:	Farewell to Arms

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Recommended Readings:

- Winthrop, Jordan D., et. al. The Americans: The History of a People and a Nation. Evanston: McDougal, Littell & Co., 1989.
- P. Zweig, Walt Whitman: The Making of a Poet (1984); D. S. Reynolds, Walt Whitman's America (1995).
- Bell, Michael Davitt. The Problem of American Realism. Chicago: U of Chicago P, 1993.
- Becker, George, ed. and introd. Documents of Modern Literary Realism. Princeton: Princeton University Press, 1963.
- Berthoff, Werner. The Ferment of Realism: American Literature, 1884-1919. New York: Free Press, 1965.
- Chase, Richard. The American Novel and Its Tradition. Garden City, N. Y.: Doubleday Anchor, 1957.
- Anderson and K. M. Sanderson, ed., Mark Twain: The Critical Heritage (1972).
- Stuart Levine and Susan Levine ed., The Short Fiction of Edgar Allan Poe, Urbana: University of Illinois, 1976, 1990.
- Linda Wagner-Martin ed., Hemingway: Eight Decades of Criticism. Michigan State University Press, 2009.

EUROPEAN COMEDY

Course Code: ENG4403 **Credit Units: 05**

Course Objective:
The course will introduce trends and issues related to European drama through study of the prescribed texts; develop critical arguments of local issues in relation to wider structures of individual plays and to generically structured theatre. The students will also be encouraged to make critical understanding of national and cross-national concepts of dramatic practice and identify the relationships between drama and wider philosophical, cultural and political issues.

Text:

Cervantes	:	Don Quixote Vol - I
Rabelais	:	The Histories of Gargantua and Pantagorel
Moliere	:	The Misanthrope
Bakhtin	:	The Grotesque
George Meredith	:	Comedy
Henry Bergson	:	Laughter

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Gregory Dobrov, Figures of Play: Greek Drama & Metafictional Poetics, 2000.
- Ian Watt, Myths of Modern Individualism: Faust, Don Quixote, Don Juan, Robinson Crusoe, 1997

ANCIENT GREEK AND LATIN LITERATURE IN TRANSLATION

Course Code: ENG4407 **Credit Units: 05**

Course Objective:
Identify texts, contexts, and authors—and thematic, genre-based and stylistic hallmarks of those texts and authors within the early literary traditions. Understand, discuss and interpret key texts, ideas, themes, and aesthetic modalities and explain how the texts, ideas, themes and modalities arose within a given cultural or historic context. Recognize and discuss significant genre and stylistic aspects of those texts. Relate their knowledge of ancient texts and belief systems to enduring issues and values in contemporary societies, including their own.

Text:

Homer	:	The Iliad
Sophocles	:	Oedipus Rex
Aristophanes	:	The Frog
Ovid	:	Metamarphoses – Story of Phateon (Book II); The Rape of Proserpine (Book V) Story of Pygmalion the Statue (Book X); The region of Augustus in Which He Flourished (Book XV)
Marcus Aurelius	:	The Meditations – Book I to V

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings

- A Companion to Greek Tragedy by Justina Gregory, Blackwell Publishing
- The Cambridge Companion to Greek Tragedy (Cambridge Companions to Literature) (Paperback) by P. E. Easterling
- Greek Tragedy in Action, Oliver Taplin, Routledge, 2003
- Gender and Politics in Greek Tragedy, Michael X. Zelenak, Peter Lang Publishing, 1998
- Greek Tragedy: A Literary Study, H. D. F. Kitto, Methuen, 1939
- Greek and Roman Comedy: Translations and Interpretations of Four Representative Plays, Edited by Shawn O'Bryhim, Translated by George Fredric Franko, Timothy Moore, Shawn O'Bryhim, and Douglas Olson

20TH CENTURY INDIAN ENGLISH LITERATURE

Course Code: ENG4404 **Credit Units: 05**

Course Objective:
This course will attempt to explore issues of contemporary Indian English. The aim is to open the students to the varieties of social and literary provocation at work in the texts prescribed and at the same time trace the changes in style, themes and its ideologies in the contemporary Indian English Writings. Students will be encouraged to - appreciate the sheer linguistic vitality of Indian English Writings; understand how the Indian subcontinent has been imaginatively reworked in recent Indian English writing and assess the cross-cultural impact of such reinvention.

Text:

Raja Rao	:	Kanthapura
Anita Desai	:	In the Lighthouse
Amitav Ghosh	:	The Glass Palace
Salman Rushdie	:	Midnights Children
Girish Karnad	:	Tughlaq
Nissim Ezikiel	:	Background Casually; Poet, Lover, Birdwatcher.
A.K. Ramanujan	:	Obituary; A River.
Kamla Das	:	The Descendants; A Hot Noon in Malabar.

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Singh, R. S. Indian Novel in English. Rep. Humanities Press Inc. Atlantic Highlands, New Jersey. 1978
- Iyengar, K. R. Srinivasa. Indian Writing in English. Rep Asia Publishing House. New York, New York. 1973.
- Krishnaswamy, Shantha. The Woman in Indian Fiction in English (1950-80). Ashish Publishing House. New Delhi, India. 1984.
- Sara Suleri, The Rhetoric of English India, University of Chicago Press, 1993.
- M. D. Fletcher ed., Reading Rushdie: Perspectives on the Fiction of Salman Rushdie, ISBN, Netherlands, 1994
- Tabish Kahir, Babu Fictions: Alienation in Contemporary Indian English Novels, Oxford UP, 2001.
- T.S. Anand edited, Modern Indian English Fiction. New Delhi, Creative Books, 2002.
- K.V. Surendran, Indian English Fiction: New Perspectives, New Delhi, Sarup & Sons, 2002.
- Walsh, William. Indian Literture in English. Longman, London. 1990
- N. S. Pradham Ed. Major Indian Novels: An Evaluation. Rep by Humanities Press Inc., Atlantic Highlands, New Jersey. 1986.

INDIAN LITERATURE IN TRANSLATION

Course Code: ENG4405 **Credit Units: 05**

Course Objective:
The course aims at introducing certain key texts of the ancient and modern Indian traditions for detailed reading and critical analysis. The course had become a critical addition to M.A programme in English, considering the recent emphasis put on the native traditions in understanding literature and the related disciplines. The texts delineate the importance of the oral traditions and give important perspectives on the literary issues like author and reader, text and textuality, literature and society, literature and genre, language and literature et al.

Text:

Ved Vyas	:	The Mahabharata
Vedic Texts	:	Upanishads Concept of Personal and Impersonal God and Aum
Bhasa	:	The Vision of Vasavadatta (Svapna-Vasavadattam)
Bharata Muni	:	Natyashastra
Mira	:	'Life without Hari is no life', Today your friend is coming', Murli sounds on the banks of the Jumna', 'The Bil woman tasted them, plum after plum', 'I have talked to you', 'Go to where my loved one lives',
Kabir	:	**Poems** : 'Hey Qazi , what's the book you're preaching from?', 'Tell me, Ram; what will happen to me? 'If cast was what the Creator had in mind?, Why be so proud of this useless, used –up body? 'Pundit, so well-read, go ask God'.
Rabindra Nath Tagore	:	The Post Office
Prem Chand	:	Godan
Shrilal Shukla	:	Raag Darbari

Examination Scheme:

Components	**TP**	**Sessional**	**Presentation**	**EE**
Weightage (%)	10	10	05	70

Recommended Readings:

- Ananta Ch Sukla edited, Art and Representation: Contributions to Contemporary Aesthetics, 2000
- Ananta Ch. Sukla edited, Art and Representation: Contributions to Contemporary Aesthetic, 2000
- Arthur A Macdonell, A History Of Sanskrit Literature
- Bharata Muni, Madhusudana Sastri, Abhinavagupta, Natyasastram, Kasi Hindu Visvidyalayiya Samsk, 1971.
- Jafri, Sardar & Q Hyder, *Ghalib and His Poetry*, Popular Prakshan, Bombay, 1970
- Karnad, Girish, Tuglaq in ,Collected Plays: Tughlaq, Hayavadana, Bali : The Sacrifice, Naga-Mandala (play With A Cobra)(Volume 1), OUP, 2005
- Shukla Shrilal, *Raag Darbari*, tr. Gillian Wright, Penguin
- Songs of the Saints of India, tr. J.S Hawley and Mark Juergensmeyer (New Delhi: Oxford University Press, 2004
- Tagore Rabindra Nath, The Post Office, tr. Debabrata Mukhopadhyay Rupa & Co. 2002
- Victor Witter Turner, Edward M Bruner edited, The Anthropology of Experience, 1986.

LINGUISTICS AND ENGLISH LANGUAGE TEACHING

Course Code: ENG4406 **Credit Units: 05**

Course Objective:
This paper aims to provide the learner the basic knowledge of Linguistics. This course will introduce the intricacies of language and linguistics to the students focusing on the application of linguistic knowledge in language teaching. The focus of the paper is also to introduce the learners with difference in language learning and language acquisition.

Introduction: What is language? Characteristics of human language; Linguistics: Definition and explanation; Importance and applications of linguistics; Levels of language study.

Phonetics and Phonology: Difference between Phonetics and Phonology; Classification of sound system; Articulation and Production of sounds; Tone, Accent and Stress.

Sociolinguistics: Language; Dialect; Registers; Bilingualism; Multilingualism.

Language Acquisition: Theories of language acquisitions; Stages of language acquisition; Problems of language acquisition.

Methods of Language Teaching and Learning: Grammar Translation; Audio – Visual; Immersion (Total and Partial); Direct Method; Communicative Language Teaching.

Examination Scheme:

Components	TP	Sessional	Presentation	EE
Weightage (%)	10	10	05	70

Text & References:

- Adams ,V.1973. *An Introduction to Modern English Word Formation*. London: Longman
- Chomsky,N.,and M.Halle.1968. *The sound pattern of English*. New York: Harper and Row.
- Lyons J, 1977. *Semantics*. 2 Vols. Cambridge: Cambridge University Press.
- Crystal D.1997. Encyclopedia of Language: 2nd Vol., Cambridge: Cambridge University Press

DISSERTATION

Course Code: ENG4437 **Credit Units: 03**

GUIDELINES FOR DISSERTATION

The aim of the dissertation is to provide you with an opportunity to further your intellectual and personal development in your chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of your degree

The dissertation can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Selecting the Dissertation Topic

It is usual to give you some discretion in the choice of topic for the dissertation and the approach to be adopted. You will need to ensure that your dissertation is related to your field of specialization.

Deciding this is often the most difficult part of the dissertation process, and perhaps, you have been thinking of a topic for some time.

It is important to distinguish here between 'dissertation topic' and 'dissertation title'. The topic is the specific area that you wish to investigate. The title may not be decided until the dissertation has been written so as to reflect its content properly.

Few restrictions are placed on the choice of the topic. Normally we would expect it to be:

- relevant to business, defined broadly;
- related to one or more of the subjects or areas of study within the core program and specialisation stream;
- clearly focused so as to facilitate an in-depth approach, subject to the availability of adequate sources of information and to your own knowledge;
- of value and interest to you and your personal and professional development.

Planning the Dissertation

This will entail following:

- Selecting a topic for investigation.
- Establishing the precise focus of your study by deciding on the aims and objectives of the dissertation, or formulating questions to be investigated. Consider very carefully what is worth investigating and its feasibility.
- Drawing up initial dissertation outlines considering the aims and objectives of the dissertation. Workout various stages of dissertation
- Devising a timetable to ensure that all stages of dissertation are completed in time. The timetable should include writing of the dissertation and regular meetings with your dissertation guide.

The Dissertation plan or outline

It is recommended that you should have a dissertation plan to guide you right from the outset. Essentially, the dissertation plan is an outline of what you intend to do, chapter wise and therefore should reflect the aims and objectives of your dissertation.

There are several reasons for having a dissertation plan

- It provides a focus to your thoughts.
- It provides your faculty-guide with an opportunity, at an early stage of your work, to make constructive comments and help guide the direction of your research.
- The writing of a plan is the first formal stage of the writing process, and therefore helps build up your confidence.

- In many ways, the plan encourages you to come to terms with the reading, thinking and writing in a systematic and integrated way, with plenty of time left for changes.
- Finally, the dissertation plan generally provides a revision point in the development of your dissertation report in order to allow appropriate changes in the scope and even direction of your work as it progresses.

Keeping records
This includes the following:

- Making a note of everything you read; including those discarded.
- Ensuring that when recording sources, author's name and initials, date of publication, title, place of publication and publisher are included. (You may consider starting a card index or database from the outset). Making an accurate note of all quotations at the time you read them.
- Make clear what is a direct a direct quotation and what is your paraphrase.

Dissertation format
All students must follow the following rules in submitting their dissertation.
- Front page should provide title, author, Name of degree/diploma and the date of submission.
- Second page should be the table of contents giving page references for each chapter and section.
- The next page should be the table of appendices, graphs and tables giving titles and page references.
- Next to follow should be a synopsis or abstract of the dissertation (approximately 500 words) titled: **Executive Summary.**
- Next is the 'acknowledgements'.
- Chapter I should be a general introduction, giving the background to the dissertation, the objectives of the dissertation, the rationale for the dissertation, the plan, methodological issues and problems. The limitations of the dissertation should also be hinted in this chapter.
- Other chapters will constitute the body of the dissertation. The number of chapters and their sequence will usually vary depending on, among others, on a critical review of the previous relevant work relating to your major findings, a discussion of their implications, and conclusions, possibly with a suggestion of the direction of future research on the area.
- After this concluding chapter, you should give a list of all the references you have used. These should be cross - references with your text. For articles from journals, the following details are required e.g.

  Draper P and Pandyal K. 1991, The Investment Trust Discount Revisited, Journal of Business Finance and Accounting, Vol18, No6, Nov, pp 791-832.

  For books, the following details are required:
  Levi, M. 1996, International Financial Management, Prentice Hall, New York, 3rd Ed, 1996

- Finally, you should give any appendices. These should only include relevant statistical data or material that cannot be fitted into the above categories.

The Layout Guidelines for the Dissertation:
- A4 size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

Guidelines for the Assessment of the Dissertation
While evaluating the dissertation, faculty guide will consider the following aspects:

1. Has the student made a clear statement of the objective or objective(s).

2. If there is more than one objective, do these constitute parts of a whole?
3. Has the student developed an appropriate analytical framework for addressing the problem at hand.
4. Is this based on up-to-date developments in the topic area?
5. Has the student collected information / data suitable to the frameworks?
6. Are the techniques employed by the student to analyse the data / information appropriate and relevant?
7. Has the student succeeded in drawing conclusion form the analysis?
8. Do the conclusions relate well to the objectives of the project?
9. Has the student been regular in his work?
10. Layout of the written report.

Assessment Scheme:

Continuous Evaluation:	40%
(Based on Abstract, Regularity,	
Adherence to initial plan, Records etc.)	
Final Evaluation: Based on,	60%
Contents & Layout of the Report,	25
Conceptual Framework,	10
Objectives & Methodology and	10
Implications & Conclusions	15

PERFORMING ARTS

Programme Structure-2019

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
PAR2151	Introduction to Performing Arts	2	-	2	3
PAR2251	Dynamics of Dance, Music & Theatre	2	-	2	3
PAR2351	Social relevance of Dance, Music & Drama in Contemporary Indian Scene	2	-	2	3
PAR2451	Indian Folk Arts	2	-	2	3
PAR2551	Modern Indian Performing Arts	2	-	2	3
PAR2651	Arts, Aesthetic & Society	2	-	2	3
	TOTAL				**18**

PERFORMING ARTS

OBJECTIVES OF PROGRAM

AMITY CENTRE FOR PERFORMING ARTS Amity School of Liberal Arts offers **Open Elective Course in PERRFORMING ARTS** . This open elective course in Performing Arts is envisioned for students who have a flair for dance/music/theatre and are looking for structured intervention at the UG level. The course hopes to give a strong platform for our students to develop a passion for the Arts, sharpen their artistic skills and broaden their theoretical base.

The course attempts to transcend the definition of art across content and context while reaching out to individuals and communities. While the focus will be predominantly within the parameters of dance, music and theatre.

The primary aim of the course is not to make students experts in one art form or the other, but introduce them to the possibilities with art and to help them get an integrated sense of art. It is desirable that every student continues to work under an artist/group in one art form or the other outside the curriculum, toward long term development.
Note : The medium of instruction and examination for the course would be Hindi and English.

Objectives:-

- To address a spectrum of art concerns
- To give a base in dance, music and theatre
- To stimulate a composite sense of art
- To foster a blend of practical and theoretical understanding and practice in the arts
- To enable identification and growth opportunities in chosen field of dance/music/theatre

PERFORMING ARTS

Syllabus - Semester First

INTRODUCTION TO PERFORMING ARTS

Course Code: PAR2151 **Credit Units: 03**

Course Objectives:
To give a strong base in the respective areas of dance, music and theatre.
To expose them to the terms and practice in the field.

Course Contents:

Module-I: Introduction to Performing Arts
- What is Performance?
- Performing Art and art of Performance.
- Nature and Structure of Performance.
- Dance- Theory/ practical.
- Music - Theory/ practical.
- Theatre - Theory/ practical.

Module-II: Introduction to Indian Classical dance Forms

Theory-
- Bharathanatyam
- Kathak
- Kathakali
- Kuchipudi
- Manipuri
- Mohiniatam
- Odissi
- Sathriya

Practical-
Teen Tal(Kathak)
- Simple Tatkar with Ekgun, Dugan and Chougan layakaries.
- Guru-Vandna , Thaat , Tehai , Tora/Tukra Chakardhar Tukda , Kavit.
- 2 Small semi classical dance in Dadra and Kahrawa Tal.

Module-III: Tradition of Indian Music

Theory-
- Definition of Sangeet.
  - Hindustani (Vocal/ Instrumental)

- Carnatic (Vocal/ Instrumental)
- Classification of musical instruments – Structure and playing techniques of Harmoniyam , Naad ,Tanpura , shruti and Tabla.
- Definitions and Explanation of Musical terms such as: Dhwani, Sangeet, Swar, Laya, Raag, Taal, Shuddh- Vikrit, Chal-Achal, Mandra-Madhya-Taar, Sthayee – Antara, Aroha- Avaroha, Raag Jati, Tal Jati, Alap-Tan, Varn, Alankar, Pakad, Bandish, Vilambit-Madhya-Drut, Matra, Theka, Vibhag, Tali, Khali, Sam ,Dhrupad, Dhamar , Khyal ,Khyal , Thumri. Tappa , Saragam , Geet , Tarana.

Practical-

- Sargam Exerises
- Sargam Patterns to study rhytms
- Scale exercises
- Bhajan , Geet , Ghazal
- Alankars (atleast ten alankaras in all Ragas of varying nature)
- Sight singing or playing of written notations and writing notations on listening
- Tala – Keherwa , Dadra
- Tabla lesson-1
- Guitar lesson-1

Module-IV: Theatre

Theory-

- Overview of Theatre.
- What is Theatre?
- Thorough knowledge of Bharata's Natyashastra, and its relevance to an influence on Indian Classical Theatre. Origin, aim and nature of Sanskrit natya according to Bharata and later commentators.
- The types of theatres and their construction according to Natyashastra.

Practical-

- Basic Understanding of Voice and Speech.
- Breathing Exercises.
- Exercises in Volume and Pitch.
- Pronunciation.
- Diction.
- Intonation.
- Emotional Expression.
- Types of Stage.
- Reading : Prose Passages, Story Telling, Tongue-Twister.
- Play-reading and working on a scene for performance.

Module-V: Workshop and Presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture.

Examination Scheme:

Continuous Assessment /Internal Assessment					End Term Examination	
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**Theory**	**Practical**
Weightage(%)	10	5	10	5	30	40

Recommended Books

Reference Books– Dance

- **Dance dialects of India** -Ragini Devi
- **Indian Classical dance Tradition in transition** – LeelaVenkatarama
- **Nritanjali** – an introduction to hindu Dancing - Sri .Ragini

Reference Books– Music

- **Raga Vigyan (All the parts)** Pt. V.N. Patwardhan
- **Raag Parichay –** Harish Chandra Srivastava – Part 1,2&3
- **Sangeet Vishaal –** Vasant(for theory only)
- **Sangeet Bodh –** Dr Sharacchandra Shridhar Paranjpe, Madhya Pradesh Hindi Granth Academy .
- **Raag Parichay –** Sangeet Sadan Prakashan Allahabad
- **Sangeet Visharad –** Sangeet Karyalaya Hatharas

Reference books – Theatre

- **Natyashastra** – Prof Brojmohan chaturvedi .
- **Performance Tradition in India** – SurseshAwasthi, Ed, Year 2009, ISBN 978-81-237-3618-1
- **From the Wings**(Notes on Indian Theatre) – Nemichandra Jain
- **What we do – Working in the Theatre** – Bo Metzler – Publishers – Infinity Publishing. Com

Syllabus - Semester Second

DYNAMICS OF DANCE, MUSIC & THEATRE

Course Code: PAR2251 **Credit Units: 03**

Course Objectives:
To understand the dynamic nature of the three forms - dance, music and theatre.
To provide deeper understanding of the subject.

Course Contents:

Module-I: History of Dance

Theory-
- History and technique of Indian dance from the ancient times till modern times to be gathered from different sources like Literature , Epigraphy , Sculpture , Iconography, Painting and religious thought. This entails a thorough study of the Natyashastra and relevant texts.
- History of Kathak Dance.
- Gharanas of Kathak Dance.

Practical-
Teental (Kathak)
- Tatkar in Teental in Ekgun, Dugun and Chaugun Layakari.
- Ganesh Vandna.
- Thaat, Simple Amad ,Tihai , Tora/ Tukra , Chakardar Tukra , Paran , Chakardhar Paran , Kavit , Gat. Bhava – Ched Chad & Shingar, Paltas.
- Brief Introduction to Tintala, Dadra , Kaharwa and Jhaptal.

Module-II: Understanding the dynamics of Music

Theory-
- Raga- Introduction ,Definition , Lakshan and classification in Indian Music,
- Thaat- Introduction , Names and Swar of ten Thaats.
- Comparative study of Raga – Thaat.
- Non-detail terms: Aashrraya Raga ,Sangeet; two main systems of Indian Music; Naad, Saptak; Thaat; Alankar; Raga, Janak-Janya Ragas and Ashraya raga; Vadi, Samvadi, Anuvadi, Vivadi; Aroha, Avaroha, Pakad; Chal and Achal Swara.
- Asthayi, Antara; Taan, Alaap; Matra, Vibhag,Taal, Avartan, Sam, Tali, Khali,

Practical-
- Saragam practice
- Detailed and intensive study of the following ragas - Yaman , Bilaval , Khamaj. with Alap, Swaravistar, Sargam,one lakshan geet , one Saragam geet , One Chhota Khyal or Razakhani Gat.
- Taal- Teen tal ,Ektal.

Module-III: Instrumental Music

Theory-

- Description of the five taals – Teental, Ektal, chowtal, Dadra and Keharwa, writing them in Thah and Dugun in Taal notation.
- Knowledge of musical notation system of Pt.V.N. Bhatkhande and Vishnu Digambar (swara and Taal-lipi).
- Introducing Guitar

Practical-

- Handling of the instrument; correct posture and finger movement. Playing of 10 alankars in Thah, Dugun and Chaugun.
- Table lesson -2
- Guitar lesion -2

Module-IV: Ancient Practice of Natya

Theory-

- Origin & Development of Classical Indian Theatre.
- Introduction to Natyashastra.,Dasharupaka.
- Rasa & Bhava Theory.
- Kinds of Acting.-Nayak and Naika Bheda.,Natyadharmi & Lokadharmi.
- Sanskrit Plays – Kalidas.

Practical-

- Working on Body, Mind, Voice.
- Theatre design - Direction, Stage Mgt, Sets and Props, Costumes, Light and Sound, Backstage.
- Natyashastra : Angika Abhinaya, Vachika Abhinaya, Aaharya Abhinaya and Satvika Abhinaya.
- Tools and Training of an Actor: Physical : Body and Voice, Psychological – Intellect and Emotional.
- Reading one Shakespeare Play.
- Yoga and pranayam .

Module-V: Workshop and Presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture .
- Rehearsals towards class room performance of Dance , Music and Theatre.

Examination Scheme:

Continuous Assessment /Internal Assessment					**End Term Examination**	
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**Theory**	**Practical**
Weightage(%)	10	5	10	5	30	40

Recommended Books

Reference Books – Dance

- **AbhinayaDarpana**– Nandi Keshwaran.
- **Naatyasaastra** – Unni.

Reference Books – Music

- **Raga Vigyan (All the parts)** Pt. V.N. Patwardhan
- **Raag Parichay –** Harish Chandra Srivastava – Part 1,2&3
- **Sangeet Vishaal –** Vasant(for theory only)
- **Sangeet Bodh –** Dr Sharacchandra Shridhar Paranjpe, Madhya Pradesh Hindi Granth Academy .
- **Raag Parichay –** Sangeet Sadan Prakashan Allahabad
- **Sangeet Visharad –** Sangeet Karyalaya Hatharas

Reference books – Theatre

- **Minding the Body and Mending the Mind**- Joan Borysenko, Ph.D, publishers- The bantam Books.
- **All about Theatre** - Off Stage– by Chris Hogget.
- **A Phaidon Theatre Manual (Series)** – Phaidon Press Ltd, London.
- **An Actor Prepares** – Stanislavsky.

Syllabus - Semester Third

SOCIAL RELEVANCE OF DANCE, MUSIC & DRAMA IN CONTEMPORARY INDIAN SCENE

Course Code: PAR2351 **Credit Units: 03**

Course Objectives:
The paper is a deeper exploration of identified Art form. The overall aim is to arrive at a platform to integrate and understand the inter-relation of Performing arts - to create an aesthetic experience for the artist and audience

Course Contents:

Module-I: Kathak

Theory-
- Study of following terms. Kavit, Vandana, Gat, Gat Nikas, Premalu , Nagma, Nritta, Nritiya and Natya.
- Simple knowledge of Kathak Dance.
- Brief study of Abhinay and its four parts.
- Laya and its types with special reference to Indian Dances.
- Knowledge of Six Eyebrow movements and Nine Head Gestures.

Practical-
Teental & Jhaptal –
- Thaat , Aamad ,Tehai , Tora/Tukar , Chakardhar Tukra .
- Practised of prescribed material of Teen taal and Jhaptaal with Tali and Khali.
- Practical knowledge of Aasanyukt Mudras.
- Detail Practical knowledge of Sanyukt Mudras based on Abhinay Darpan.

Module-II: Fundamentals of Vocal Music

Theory-
Raga Samaya (Time), Parmel praveshak Raga, Margi – Deshi Sangeet .
Shruti, Swar – Vibhajan.
Varna : Sthayi, Arohi, Avarhi, Sanchari, Alnkar (Palta), Kana Swara, Meend Vilom, anulom Ghaseet, Soot, Khatka, Murki, Gamak.

Practical-
- One chhota Khyal or Razakhani Gat, with Alap and Tana in
  - Bhupali ,Bihag ,Alhaiya – Bilaval ,Bhairav
- Light music
- Tala- Jhaptal , Chaartala

Module-III: Instrumental & Tabla

Theory-

- Detailed knowledge of the following Talas with Dugan and Chaugun
- **Study of Talas: -** Dadra, Kaharwa, Trital, Ektal, Jhaptal, Chautal, Roopak
- Introduction to western instruments.

Practical-

- Table lesson - 3
- Start playing some western instruments.
- Guitar lesson-3

Module-IV: Play

Theory-

- Reading Different Type Of Plays And Analysis (Either Sanskrit/ Greek/ Modern/ Absurd Play)
- Analysing The Play By Looking Separately Its Structure, Plot, Characters, Themes And style.

Practical-

20-25 Minutes One Act Play By The Students.

Module-V: Workshop and presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture .
- Rehearsals towards class room performance of Dance , Music and Theatre.

Examination Scheme:

Continuous Assessment /Internal Assessment					**End Term Examination**	
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**Theory**	**Practical**
Weightage(%)	10	5	10	5	30	40

Recommended Books

Reference books Dance-

- **Kathak Shingar** - T.R. Azad
- **Bhatiya Sanskrit Mei Kathak Parampara** - Mandvi Singh Kathak
- **Nritya Shiksha** (part- 2) - Puru Dadhicha
- **Kathak saunderyatmak Shastriya Nritya** – Shikha Khare

Reference books Music-

- **Raga Vigyan (All the parts)** Pt. V.N. Patwardhan
- **Raag Parichay –** Harish Chandra Srivastava – Part 1,2&3
- **Sangeet Vishaal –** Vasant(for theory only)
- **Sangeet Bodh –** Dr Sharacchandra Shridhar Paranjpe, Madhya Pradesh Hindi Granth Academy .

- **Raag Parichay –** Sangeet Sadan Prakashan Allahabad
- **Sangeet Visharad –** Sangeet Karyalaya Hatharas

Reference books Theatre-

- **The Theatre: An Introduction** , By Oscar G. Brockett.
- **Play Production** , By Henning Nelms,
- **Natyashastrada Adhyaaya Sangraha,** By Adya Rangacharya.
- **Samskrutha Nataka**, by A.R.Krishna Shastri

Syllabus - Semester Fourth

INDIAN FOLK ARTS

Course Code: PAR2451 **Credit Units: 03**

Course Objective:
The paper aims at a practical and formal introduction for the Folk Culture of India. To the identified performance stage after basic training in Folk dance, Folk music and, Folk theatre.

Course Contents:

Module-I: Folk Dance of India
Theory -

- What is folk Dance ?
- Origin and Development of Folk Dance in India.
- Different Folk Dance forms of India.
- Popular Folk Dances of India

Practical-
Practical work involving learning and research about Folk Dance related to the students' own region.

Module-II: Folk Music of India
Theory-

- What is folk music?
- Origin and Development of Folk Music in India.
- Different Folk musical forms of India.

Practical-
Practical work involving learning and research about Folk Music related to the students' own region.

Module-III: Folk Instrument of India
Theory-
Folk Instruments of India.
Folk Music and Popular Culture.
Folk artists of India

Practical-
Practical work with students regional forms (learning from each other)
Table lesson -4
Guitar lesson-4

Module-IV: Folk Theatre of India
Theory-

- What is folk Theatre?
- Origin and Development of Folk Theatre in India.
- Different Folk Art Forms in India.
- Folk Art :- Chhau/ Paika/ Hunta/ Barao/ Mundari/ Domkach Etc.

Practical-
Folk Theatre of India, Theatre in awareness building, Publicity, Street Theatre, theatre in Human Recourse Development, Education & Therapy.

Module-V: Workshop and presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture .
- Rehearsals towards class room performance of Dance , Music and Theatre.

Examination Scheme:

Continuous Assessment /Internal Assessment					**End Term Examination**	
Components	**Class Test**	**Home Assignment**	**Class Performance + Project**	**Attendance**	**Theory**	**Practical**
Weightage(%)	10	5	10	5	35	35

Recommended Books

Reference books Kathak-

- **Kathak Nritya** – L.N Garg
- **Kathak Nritya Shiksha part 1 & 2 -** Puru Dadhicha
- **Kathak Darpan** - T.R. Azad
- **Bhartiya Sanskriti me Kathak Parampra**- Mandvi Singh
- **Himachal ke Lok Naritya**- Hari Ram Justa

Reference books Music-

- **Bharatiya Sangitmala Part – I, II, III** Pt. Y.S. Pandit Mirashibuva
- **Abhinava Sangita Shiksha** Pt. S.N. Ratanjhankar
- **Abhinava Geetamanjri** Pt. S.N. Ratanjhankar Part – I, II, I
- **History of Indian Music** Swami Prajnanananda
- **Historical Study of Indian** Music Swami Prajnanananda
- **Musical Instrumental of India** B.C. Deva
- **Svara Aur Ragon Ke Vekas men Vadyon KaYogadan** Indrani Chakravarti

Reference books Theatre-

- **The Theatre: An Introduction** , By Oscar G. Brockett.
- **Play Production** , By Henning Nelms,
- **Rangabhoomi Kaipidi.** By N.S. Venkataram
- **Costume in Theatre.** By James Laver.

Syllabus - Semester Fifth

MODERN INDIAN PERFORMING ARTS

Course Code: PAR2551 **Credit Units: 03**

Course Objective:
The course is a deeper exploration of identified Art form. The overall aim is to arrive at a platform to integrate and understand the inter-relation of Performing arts - to create an aesthetic experience for the artist and audience.

Course Contents:

Module-I: Dance

Theory-
- Development of Kathak Dance during Mugal and Hindu period
- Study of Dashavtaras.
- Elementary knowledge of Rasa and their application in Dance.
- A study of Tandav and Lasya.
- Importance of Make-Up, Costumes and Instruments in Kathak Dance.
- Relationship between Dance and Religion
- Dance Theory on basics of Kathak and Contemporary Dance
- Introduction to Contemporary Dance
- Short Biography and Contribution to Dance

Practical-
- Kathak – fusion Dance
- Indian Contemporary Dance
- Shuddh – Kathak

Module-II: Music

Theory-
- History of western music.
- Brief introduction to western notation system
- Contribution of Pt. V.D. Paluskar and Pt. V.N Bhatkhande
- Rabindra Sangeet - Different Forms of Rabindra sangeet
- Life Sketch of Rabindra Nath Tagore with Special reference to his Musical Quality

Practical-
- Forms of compositions – Dhamar, (Hori) Tarana, thumri , Bhajan.
- Laxangeet and Sargam geet in Raga Yaman and Bhaiav
- Rag – bhimpalasi , bageshri.
- Tala- Ada Chutaal , Tilwada.
- Contribution & life sketch – Vidushi Annapurna Devi, Vidushi Kishori Amonkar.

Module-III: Instrumental Music

Theory-

- Names of different parts (components) of the Tanpura with the help of a simple sketch. Tuning and handling of the instrument.

Practical-

- Play western Instruments
- Playing of Thekas of the following six Taals with development: two kaayadas and its four paltas with tihai in Teentaal, One tukda in each ,Jhaptaal and Ektaal, one paran in chaartaal, two kismen each in Dadra and KeharwaTaal.
- Simple developments of Taals - Taali, Khali etc. on hands.
- Guitar lesson – 5
- Table lesson -5

Module-V: Introduction to Modern Theatre (Indian & World)

Theory

- Origin and Development of Modern after Romanticism.
- Trends and Concepts of Modern Indian Theatre
- Modern Indian Theatre- Practice
- Realistic and Non-Realistic Theatre

Practical-

- Practice: Dialogue delivery
- Nav rasa
- Yoga & pranayam
- Movement
- Rhythm and Tempo

Module-V: Workshop and presentation

- Dance-workshop /guest- lecture .
- Music- workshop / guest-lecture.
- Theatre –workshop / guest – lecture .
- Rehearsals towards class room performance of Dance , Music and Theatre.

Examination Scheme:

Continuous Assessment /Internal Assessment					**End Term Examination**	
Components	**Class Test**	**Home Assignment**	**Class Performance + Project**	**Attendance**	**Theory**	**Practical**
Weightage(%)	10	5	10	5	30	40

Recommended Books:

- Reference books Kathak-
- **Kathak Nritya** Shiksha part - 2 – Dr. Vidya Nidhi
- **Kathak Darpan** -. T.R. Azad
- **Kathak Shingar** - . T.R. Azad
- **Kathak Nritya (Part 1&2)** – Dr. Vidhi Naggar

Reference books Music-

- **Bharatiya Sangita men Tala Aur Rupa** Vidhana . Subhadra Chaudhary
- **Rasa Siddhanta-** Prem Lata Sharma
- **Musical Instrumental of India** -B.C. Deva
- **Svara Aur Ragon Ke Vekas men Vadyon KaYogadan -** Indrani Chakravarti
- **Musical Instruments** Carl Geiringer
- **Msical Instruments in Indian Scupture -**G.H. Tarlekar & J. NaliniTarlekar

Reference books Theatre-

- **The Theatre: An Introduction** , By Oscar G. Brockett.
- **Play Production** , By Henning Nelms,
- **Rangabhoomi Kaipidi**. By N.S. Venkataram
- **Scenic Design and Stage Lighting**. by Seldon and Sellman.
- **Costume in Theatre**. By James Laver.
- **Stage Make-up**. By Richard Carson.

Syllabus - Semester Sixth

ARTS, AESTHETIC & SOCIETY

Course Code: PAR2651 **Credit Units: 03**

Course Objectives:
To advance the knowledge and skill level of the Performing Arts.
To provide a platform to practically experiment and exhibit the learning of the Performing Arts.
To provide a deeper knowledge and skill of the Dance , Music and Theatre.
To provide a learning framework.

Course Contents:

Module-I: Dance

Theory-
- Detailed study of Nritta, Natya and Nritya.
- Rasa and Bhava and their importance in Kathak Dance
- Detailed study of kathak Dance by following the sequence of Dance.
- Detailed study of Folk and Classical Dance and their comparision.
- Brief study of Thumari and Bhajan in Dance.
- Essay on:- Importance of Dance in Human life , Dance and Nature

Practical-
- One advance Tatkar variety with atleast ten variations. Ekgun, Dugun, Chaugun of Tatkar in Ektaal, Four Tukras, three Parans, Two Chakkardhar, Amad, Thehai and Kavit in any of Teental. Ability to play Harmonium and Theka of Teen Tal. Ability to write notation and Padhant on hands of the above mentioned Taals.
- Practical demonstration of any Taal of your choice.
- Practical demonstration of Teen Taal.

Module-II: Science of Music

Theory-
- Vibration And Frequency, Pitch And Its Relation With vibrator, Vocal And Instrumental Range Of Sound, Amplitude,Timbre, Qualities Of Musical And Unmusical Overtones (Swayambhu Swara), Echo, Reverberation And Resonance Of Sound.
- Concept of Aesthetics in Music(By Indian and Western scholars)
- Contribution of Scholars In Indian Music.

Prominent Gharanas of Dhrupad and Khyal –

Origin And Development of Gharanas In Hindustani Vocal Music. Four Banis of Dhrupad. Study of Popular Gharanas of Dhrupad. Study of Popular Gharanas of Khyaal. Merits And Demerits of Gharanas System.

Practical-

Preparing for performance - Individual and group

- Classical music
- Created music – Based on emotions, topics and themes
- Practical Knowledge of Critical and Comparative analysis of Ragas and Talas of the Prescribed Course.
- Ragas :Desh, Aasavari , Malkauns .
- Talas :Jhaptal, Rupak, Addha with Thah, Dugun, Tigun and Chaugun
- Layakari, Vilambit Khyal in any one of the Prescribe Ragas.Drut Khyal in all the Ragas with Aalap and Taan.
- Light Music

Module-III: Instrumental Music

Theory-

- Brief description of four eminent instrumentalists (present or recent past).
- Non-detail terms: Names of 10 Pranas, AadiLaya (Only in Dadra and Keharwa),
- Lehra (Nagma), Paran, Uthan, Chakkardar Tukda, Dumdar and Bedum Tihai, Gat,Padhant,
- Detailed topics: Origin and development of Tabla, Basic 10 Varnas (Syllables) of Tabla,
- Writing in Taal notation, Thekas, in Thah, Dugun,
- Tigun and Chaugun, of all Taals .
- Names of different parts (components) of the Tabla with the help of a simple sketch. Tuning of the instrument.

Practical-

- Technique of producing bols on Tabla like Tirkit, Kran, etc.
- Development of following Taals: Teental , uthan, , new kaydas and its paltas with tihai, Rela, Chakardaar Tukda, Damdar and Bedam Tihai, Roopak , Tihai, Sooltaal ,Tihai, Teevra Taal , Paran, Deepchandi Taal, Tilwada Taal (only Theka).
- Guitar lesson -6
- Table lesson -6

Module-IV: Theatre

Theory-

- The Art and Craft of Acting –The Physical Actor and the Emotional Actor.
- Natyashastra : Angika Abhinaya, Vachika Abhinaya, Aaharya Abhinaya and Satvika Abhinaya.
- Tools and Training of an Actor: Physical : Body and Voice, Psychological – Intellect and Emotional.
- Learning Various Subjects Through Theatre.
- Significance Of Fairy Tales, Moral Stories, Allegories
- And Inspirational Stories

Practical-

- A Full Length Play Performed By The Students And Directed By The Faculty Or Guest Faculty.
- Theatre As A Community Event.
- Theatre For Development.
- A Project Report Based On Working With any Community

Module-V: Workshop / Project

- Dance – Workshop / Project
- Music- Workshop / Project
- Theatre- Workshop / Project
- Rehearsals towards class room performance of Dance , Music and Theatre

Examination Scheme:

Continuous Assessment /Internal Assessment					**End Term Examination**	
Components	**Class Test**	**Home Assignment**	**Class Performance + Project**	**Attendance**	**Theory**	**Practical**
Weightage(%)	10	5	10	5	35	35

Recommended Books

Reference books Kathak-

- **Kathak Nritya** Shiksha part - 2 – Dr. Vidya Nidhi
- **Kathak Darpan -**. T.R. Azad
- **Kathak Shingar -** . T.R. Azad
- **Kathak Nritya (Part 1&2)** – Dr. Vidhi Naggar

Reference books Music-

- **Bharatiya Sangita men Tala Aur Rupa** Vidhana . Subhadra Chaudhary
- **Rasa Siddhanta-** Prem Lata Sharma
- **Musical Instrumental of India -**B.C. Deva
- **Svara Aur Ragon Ke Vekas men Vadyon KaYogadan -** Indrani Chakravarti
- **Musical Instruments in Indian Scupture -**G.H. Tarlekar & J. NaliniTarlekar

Reference books Theatre-

- **The Theatre: An Introduction** , By Oscar G. Brockett.
- **Play Production** , By Henning Nelms,
- **Rangabhoomi Kaipidi**. By N.S. Venkataram
- **Scenic Design and Stage Lighting**. by Seldon and Sellman.

PHYSICAL EDUCATION & SPORTS MANAGEMENT

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
PED2151	Health Education and Sports Science	2	-	2	3
PED2251	Human Anatomy and Exercise	2	-	2	3
PED2351	Sports Training and Conditioning	2	-	2	3
PED2451	Basics of Sports Management	2	-	2	3
PED2551	Sports Psychology	2	-	2	3
PED2651	Sports Medicine	2	-	2	3
	TOTAL				**18**

PHYSICAL EDUCATION & SPORTS MANAGEMENT

Syllabus - Semester First

HEALTH EDUCATION AND SPORTS

Course Code: PED2151 **Credit Units: 03**

Course Objective: - The aim of the course is to teach students about the rules for the preservation and development of their physical, mental and emotional health, which will be help to improve the standard of health and fitness status of the individual/community/society.

Part-A

Module I: Health Education

1.1. Introduction of Health Education
1.2. Safety and Security (Hygiene and Precaution)
1.3. Individual and Family Health
1.4. Food and Nutrition

Module-II Physical Fitness and Wellness

2.1. Meaning and Definition of Physical fitness and wellness
2.2. Types of Physical Fitness and Wellness
2.3. Importance of Physical fitness and Wellness
2.4. Healthy diet schedule (Pre-Match-Post)

Module-III Human Posture

4.1 What is a good Posture
4.2. Posture deformities
4.3. Types of Posture deformity
4.4. Remedies of Posture deformities by exercise and Yoga

Part-B

Fitness Assessment (Practical)

Health Related

1. **Cardio-Respiratory fitness**
   -1mile run walk test
   -12 min cooper test
2. **Body Composition**
   -Body Mass Index (BMI)
   -Body Fat Percentage
   (Skin fold measurement/Body composition analyzer)
3. **Flexibility**
   -Sit & reach test (abdominal & hamstring)
   -Back stretch test (shoulder)
4. **Muscular Strength**

Skill/Sports Related

1. Agility
-Shuttle run
-Sumo agility test

2. Speed
-50 yard dash
-8 Sec dash

3. Coordination
-Eye hand coordination
-Fast Foot step test
-Skipping

4. Balance

-Pull ups or pushups with weight (boys)
-Flex arm hang (girls)
-Grip Strength Test
-Bench press

-Static Balance Test
-Dynamic Balance Test

5. **Muscular Endurance**
   Sit-ups
   Pull ups and push ups

5. Power
-Standing Broad Jump

6. Reaction Time
-Nelson Scale test

Fundamental Skills of Game/Sport

Basketball

- History, Rule and Regulation of Sports
- Basic and Specific Skills
- Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}
External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

(1) **General Fitness Test (5 marks)**
(2) **Sports Specific Test (10 Marks)**
(3) **Project File (10 Marks)**
(4) **Viva (10 Marks)**

Syllabus - Semester Second

HUMAN ANATOMY AND EXERCISE

Course Code: PED2251 **Credit Units: 03**

Course Objective: - The aim of the course is to provide the knowledge of cell, tissues, organs and systems, microscopic structure of cell, Human body and their internal system and the effect of sports or exercise on their system.

Part –A

Module -I Introduction of Various Human Systems

1.1. Meaning and concept of anatomy, need and importance of anatomy for the athlete/non-athlete
1.2. Brief introduction of various systems cell, tissues, organs and systems, microscopic structure of cell,

Module -II Effect of Exercise on various systems

1.1. Muscular System, Cardio-vascular system, Respiratory system, Nervous system, Reproductive system, Urinary system, Digestive system)

Module-III Fatigue

3.1. Concept, cause and systems of fatigue
3.2. Remedial measure to overcome fatigue
3.3. Importance of Warming-up in sports
3.4. Importance of Limber down in sports

Part-B

Fitness Assessment (Practical)

Health Related

1. **Cardio-Respiratory fitness**
   -1mile run walk test
   -12 min cooper test
2. **Body Composition**
   -Body Mass Index (BMI)
   -Body Fat Percentage
   (Skin fold measurement/Body composition analyzer)
3. **Flexibility**
   -Sit & reach test (abdominal & hamstring)
   -Back stretch test (shoulder)
4. **Muscular Strength**
   -Pull ups or pushups with weight (boys)
   -Flex arm hang (girls)
   -Grip Strength Test
   -Bench press

Skill/Sports Related

1. **Agility**
   -Shuttle run
   -Sumo agility test
2. **Speed**
   -50 yard dash
   -8 Sec dash
3. **Coordination**
   -Eye hand coordination
   -Fast Foot step test
   -Skipping
4. **Balance**
   -Static Balance Test
   -Dynamic Balance Test

5. **Muscular Endurance**
   Sit-ups
   Pull ups and push ups

5. Power
-Standing Broad Jump

6. Reaction Time
-Nelson Scale test

Fundamental Skills of Game/Sport

Football

- History, Rule and Regulation
- Basic and Specific Skills
- Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}
External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

(1) **General Fitness Test (5 marks)**
(2) **Sports Specific Test (10 Marks)**
(3) **Project File (10 Marks)**
(4) **Viva (10 Marks)**

Syllabus - Semester Third

SPORTS TRAINING AND CONDITIONING

Course Code: PED2351 **Credit Units: 03**

Course Objective: - The aim of the course to provide the scientific knowledge of sports training and conditioning which help to the athlete or non athlete for develop their physical efficiency and performance.

Part-A

Module-I Introduction

1.1. Introduction of Sports Training
1.2. Meaning and Definition of Sports Training
1.3. Principle of Sports Training
1.4. Significance of Sports Training

Module-II Motor Components

2.1. Introduction
2.2. Speed
2.3. Strength
2.4. Endurance
2.5. Flexibility and Coordination

Module-III Methods to develop various motor components

3.1. Development of Speed
3.2. Development of Strength
3.3. Development of Endurance.
3.4. Development of Flexibility and Coordination.

Part-B **Fitness Assessment (Practical)**

Health Related

1. Cardio-Respiratory fitness
-1mile run walk test
-12 min cooper test

2. Body Composition
-Body Mass Index (BMI)
-Body Fat Percentage
(Skin fold measurement/Body composition analyzer)

3. Flexibility
-Sit & reach test (abdominal & hamstring)
-Back stretch test (shoulder)

4. Muscular Strength
-Pull ups or pushups with weight (boys)
-Flex arm hang (girls)
-Grip Strength Test
-Bench press

Skill/Sports Related

1. Agility
-Shuttle run
-Sumo agility test

2. Speed
-50 yard dash
-8 Sec dash

3. Coordination
-Eye hand coordination
-fast Foot step test
-Skipping

4. Balance
-Static Balance Test
-Dynamic Balance Test

5. Muscular Endurance

Sit-ups

Pull ups and push ups

5. Power

-Standing Broad Jump

6. Reaction Time

-Nelson Scale test

b. Fundamental Skills of Game/Sport

Athletics

- History, Rule and Regulation
- Basic and Specific Skills
- Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}

External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

1. **General Fitness Test (5 marks)**
2. **Sports Specific Test (10 Marks)**
3. **Project File (10 Marks)**
4. **Viva (10 Marks)**

Syllabus - Semester Fourth

BASICS OF SPORTS MANAGEMENT

Course Code: PED2451 **Credit Units: 03**

Course Objective: - The aim of this course is to provide the management and organizational skill to the students for organizes any sports/competition or events by giving the practical assignments.

Part -A

Module-I Sports management and planning in sports

1.1 Brief introduction of Sports Management
1.2 Management of Intramural and extramural competition
1.3. Types of Planning
1.4. Principle of planning
1.5. Importance of Effective Planning

Module-II Controlling

2.1. Introduction of Controlling
2.2. Definition and Nature of Controlling
2.3. Steps of Controlling
2.4 Principle of Effective Control
2.5. Importance of Controlling in Physical Education and Sports

Module-III Budgeting and Stocking in Sports

2.1. Introduction
2.2. Definition of Budget and Stocking
2.3. Principles of Effective Budget
2.4. Steps in Constructing/ Preparation of Budget in Physical Education and Sports
2.5. Presentation of Budget Maintenance of Stocks
2.6. Financial Management

Part-B

Fitness Assessment (Practical)

Health Related

1. **Cardio-Respiratory fitness**
   -1mile run walk test
   -12 min cooper test
2. **Body Composition**
   -Body Mass Index (BMI)
   -Body Fat Percentage
   (Skin fold measurement/Body composition analyzer)
3. **Flexibility**
   -Sit & reach test (abdominal & hamstring)
   -Back stretch test (shoulder)
4. **Muscular Strength**
   -Pull ups or pushups with weight (boys)
   -Flex arm hang (girls)

Skill/Sports Related

1. **Agility**
   -Shuttle run
   -Sumo agility test
2. **Speed**
   -50 yard dash
   -8 Sec dash
3. **Coordination**
   -Eye hand coordination
   -fast Foot step test
   Skipping
4. **Balance**
   -Static Balance Test
   -Dynamic Balance Test

-Grip Strength Test
-Bench press

5. **Muscular Endurance**
   Sit-ups
   Pull ups and push ups

5. Power
-Standing Broad Jump

6. Reaction Time
-Nelson Scale test

Fundamental Skills of Game/Sport
Volleyball & Throw Ball

- History, Rule and Regulation of
- Basic and Specific Skills
- Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}
External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

(1) **General Fitness Test (5 marks)**
(2) **Sports Specific Test (10 Marks)**
(3) **Project File (10 Marks)**
(4) **Viva (10 Marks)**

Syllabus - Semester Fifth

SPORTS PSYCHOLOGY

Course Code: PED2551 **Credit Units: 03**

Course objective: - The objective of this course is to facilitate the understanding of how psychological factors influence involvement and performance in sports setting. The course will explore such topics as Achievement motivation, Goal setting in sports.

Part-A

Module-I Introduction of Sports Psychology

1.1. Meaning, nature and scope of Sports Psychology in Physical Education and Sports
1.2. Importance of Sports Psychology in Physical Education and Sports

Module-II Achievement Motivation

2.1. Meaning and definition of achievement motivation
2.2. Types of Motivation
2.3. Significance of achievement motivation in the field of Physical Education and Sports

Module-III Goal Setting

3.1. Introduction
3.2. Types of Goal Setting
3.3. Significance of Goal Setting in the field of Physical Education and Sports

Part-B

Fitness Assessment (Practical)

Health Related

1. **Cardio-Respiratory fitness**
   -1mile run walk test
   -12 min cooper test
2. **Body Composition**
   -Body Mass Index (BMI)
   -Body Fat Percentage
   (Skin fold measurement/Body composition analyzer)
3. **Flexibility**
   -Sit & reach test (abdominal & hamstring)
   -Back stretch test (shoulder)
4. **Muscular Strength**
   -Pull ups or pushups with weight (boys)
   -Flex arm hang (girls)
   -Grip Strength Test
   -Bench press

Skill/Sports Related

1. **Agility**
   -Shuttle run
   -Sumo agility test
2. **Speed**
   -50 yard dash
   -8 Sec dash
3. **Coordination**
   -Eye hand coordination
   -Fast Foot step test
   -Skipping
4. **Balance**
   -Static Balance Test
   -Dynamic Balance Test

5. **Muscular Endurance**
   Sit-ups
   Pull ups and push ups

5. Power
-Standing Broad Jump

6. Reaction Time
-Nelson Scale test

1. **Fundamental Skills of Game/Sport**

Cricket

- History, Rule and Regulation of
- Basic and Specific Skills
- Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}
External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

(1) **General Fitness Test (5 marks)**
(2) **Sports Specific Test (10 Marks)**
(3) **Project File (10 Marks)**
(4) **Viva (10 Marks)**

Syllabus - Semester Sixth

SPORTS MEDICINE

Course Code: PED2651 **Credit Units: 03**

Course objective: - The aim of the course is to provide scientific knowledge of sports medicine, care of sports injuries, rehabilitation process and prevention of drugs in sports. This course also enhance the visibility of athletes by provide the comprehensive, diverse and educational experience in the field of sports medicine.

Part-A

Module –I First-Aids

1.1. Basic of First-Aids
1.2. Preparing to respond to a health emergency –location and availability to your sports arena
1.3. Preparing to respond to a health emergency –location and availability to your work place

Module –II Sports Injuries & Rehabilitation

2.1. Introduction
2.2. Types of Sports Injuries
2.3. Cause of Sports Injuries
2.4. Rehabilitation of Sports Injuries
-Prevention and Management of Sports injuries by therapeutic modalities and Massage

Module –III Drug Abuse in Sports

3.1. Introduction
3.2. Meaning and Definition of Doping
3.3. Classification of Doping
3.4. Doping Method
3.5. The prevention of Doping in Sports

Part-B

Fitness Assessment (Practical)

Health Related

1. **Cardio-Respiratory fitness**
   -1mile run walk test
   -12 min cooper test
2. **Body Composition**
   -Body Mass Index (BMI)
   -Body Fat Percentage
   (Skin fold measurement/Body composition analyzer)
3. **Flexibility**
   -Sit & reach test (abdominal & hamstring)
   -Back stretch test (shoulder)
4. **Muscular Strength**
   -Pull ups or pushups with weight (boys)

Skill/Sports Related

1. **Agility**
   -Shuttle run
   -Sumo agility test
2. **Speed**
   -50 yard dash
   -8 Sec dash
3. **Coordination**
   -Eye hand coordination
   -fast Foot step test
   -Skipping
4. **Balance**
   -Static Balance Test

-Flex arm hang (girls)
-Grip Strength Test
-Bench press

-Dynamic Balance Test

5. **Muscular Endurance**
   Sit-ups
   Pull ups and push ups

5. Power
-Standing Broad Jump

6. Reaction Time
-Nelson Scale test

Fundamental Skills of Game/Sport

Racquet Sports

- History, Rule and Regulation of
- Basic and Specific Skills
- Techniques and Tactics

Examination Scheme:

Components	FA	CA	CP	A	EE
Weightage	10	10	5	5	70

Internal Assessment: 30

{FA=Fitness Assessment (10 Marks), CA=Competition Assignment (10Marks), CP=Class Presentation (5Marks), A=Attendance (5Marks)}
External Assessment: 70

Part-A: Theory = 35

Part-B: Practical Examination = 35

(1) **General Fitness Test (5 marks)**
(2) **Sports Specific Test (10 Marks)**
(3) **Project File (10 Marks)**
(4) **Viva (10 Marks)**

POLITICAL STUDIES

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
POL2151	Indian National Movement	3	-	-	3
POL2251	Indian State and Politics after Independence	3	-	-	3
POL2351	State Politics in India	3	-	-	3
POL2451	Politics and Media	3	-	-	3
POL2551	South Asia: Political Perspectives	3	-	-	3
POL2651	Post-Cold War World Politics	3	-	-	3
	TOTAL				**18**

POLITICAL STUDIES

Syllabus - Semester First

INDIAN NATIONAL MOVEMENT

Course Code: POL2151 **Credit Units: 03**

Course Objectives:
The course will seek to provide the student with a basic yet meaningful understanding of the political scenario that led to the struggle for India's independence. It would endeavour to cover the entire duration of the growth of nationalism in India till the attainment of independence in 1947.

Course Contents
Module-I: Emergence of nationalism in India
Agrarian Society and Peasant Discontent, The New Middle Class and the Emergence of Nationalism, Foundation of the Indian National Congress, The moderate Congress: objectives and methods

Module-II: Early Nationalism: Discontent and Dissension
The Moderates and Economic Nationalism**,** Hindu Revivalism and Politics, Muslim Politics and the Foundation of the Muslim League

Module-III: Roots of extremism
The Swadeshi Movement in Bengal- 1905-1908, Extremism in other provinces, Repression, conciliation, and divide and rule, War and Indian politics, Bhagat Singh, Surya Sen and the Revolutionary Terrorists

Module-IV: The Age of Gandhian Politics
Limited Self Government, 1909-1919, The Arrival of Mahatma Gandhi, Champaran, Kheda, Ahmedabad, Khilafat and Non-Cooperation Movements, Civil Disobedience Movement, The Rowlatt Satyagraha, The Act of 1935 and the Princely States

Module-V: Independence and Partition
Simla Conference, The Cabinet Mission, Quit India Movement, The turbulent forties, The Mountbatten Plan, Freedom and Partition, Communal holocaust and peasant rebellion, Post-Partition violence, Impact of violence on polities of India and Pakistan, Integration of States

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

Text:

Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism*, 1983
Shekhar Bandyopadhyay, *From Plassey to Partition: A History of Modern India*, 2004
Bipan Chandra, Mridula Mukherjee, Aditya Mukherjee, K N Panicker and Sucheta Mahajan, *India's Struggle for Independence*, 1989
Sumit Sarkar, *Modern India 1885-1947*, 1983

References:

Partha Chatterjee, *The Nation and its Fragments: Colonial and Post-colonial histories*, 1993
Ashish Nandy, *The Illegitimacy of Nationalism: Rabindranath Tagore and the Politics of the Self*, 1994
C A Bayly, *Origins of Nationality in South Asia: Patriotism and Ethical Government in the Making of Modern India*, 1998
Tapan Raychaudhuri, "Indian Nationalism as Animal Politics", *The Historical Journal* 22(3): 747-63, 1979
Ayesha Jalal and Sugata Bose, "Exploding Communalism: The Politics of Muslim Identity in South Asia", in *Nationalism, Democracy, and Development: State and Politics in India*, 1997
Ranajit Guha, *Subaltern Studies: Writings on South Asian History and Society*, Volume I, 1982
Gyan Prakash, *Another Reason: Science and the Imagination of Modern India*, 1992
M K Gandhi, *Hind Swaraj and Other Writings*, 1997

Syllabus - Semester Second

INDIAN STATE AND POLITICS AFTER INDEPENDENCE

Course Code: POL2251 **Credit Units: 03**

Course Objectives:
To provide the student with a comprehensive background of the political scenario as it developed after independence in 1947. To understand processes that shaped independent India such as the Constitution of India, the Executive and the Legislature, electoral politics and political parties, federalism and the federal structure, communalism and communal politics, linguistic movements etc.

Course Contents:
Module-I: The Indian Constitution
Making of India's Constitution: Perspectives from the Constituent Assembly, Indian Constitution: Features, Socio-economic basis and philosophy and the Preamble, Major Amendments: Trends and rationale

Module-II: Fundamental Rights and Directive Principles
Fundamental Rights, Directive Principles of State Policy

Module-III: Organs of the Government
The Union Executive: the President, Prime Minister, Cabinet, Governor, Parliamentary form of government: The Lok Sabha and the Rajya Sabha, Supreme Court: Judicial Review and Judicial Activism

Module-IV: Federalism in India
Nature of Indian Federalism, Centre-State relations, Issues of state autonomy, Panchayati Raj and Urban Local Bodies

Module-V: Political Parties and Electoral Processes
Political Parties and Pressure Groups, Election Commission, Electoral Reforms

Module-VI: Major Issues in Indian Politics
Caste, religion, language, region, Problems of illiteracy, regional imbalance, environmental degradation, and poverty alleviation, Development strategy and liberalization

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Text and References

Text:

Jayal, Neerja Gopal and Pratap Bhanu Mehta. 2011. *The Oxford Companion to Politics in India* (Student Edition). New Delhi: Oxford University Press.
Basu, D. 2013. *Introduction to the Constitution of India*. New Delhi: Lexis Nexis.
Kohli, A. 2001. *The Success of India's Democracy*. New Delhi: Cambridge University Press.
Brass, P. 1994. *Politics in India Since Independence*. New Delhi: Cambridge University Press.

References:

Kothari, R. 1970. *Politics in India*. New Delhi: Orient Blackswan.
Kohli, A. 1988. *India's Democracy*. New Delhi: Orient Longman.
Bhambri, C P. 1998. *The Indian State: Fifty Years*. New Delhi: Shipra.
Kashyap, S C. 1992. *Our Parliament*. New Delhi: National Book Trust.
Kothari, R. 1967. *Party System and Election Studies*. Bombay: Asia Publishing House.
Chanda, A. 1965. *Federalism in India: A Study of Union-State Relations*. London: George Allen and Unwin.
Austin, G. 1979. 'The Constituent Assembly: Microcosm in Action', in *The Indian Constitution: Cornerstone of a Nation*. New Delhi: Oxford University Press.
Chaube, S.K. 1973. *Constituent Assembly of India*. Delhi: People's Publishing House.
Austin, G. 2000. 'The Social Revolution and the First Amendment', in *Working a Democratic Constitution*. New Delhi: Oxford University Press.

Syllabus - Semester Third

STATE POLITICS IN INDIA

Course Code: POL2351 **Credit Units: 03**

Course Objectives:
The course will seek to define historical legacies and current themes in the development of politics in the states of India. It would provide the student within-depth understanding of the democratic processes in practice in various states and encourage them to understand the politics of states better. A study of politics and political processes in states also pertains to the exigencies of coalition politics at the centre.

Course Contents :

Module-I : Regions and Regionalism
Regional cultures in Indian Civilization ; States Reorganization Commission ; Integration and ethnic conflict ; Movements for state autonomy : Jharkhand and Uttarakhand

Module-II : Political Parties and Electoral Politics in the States
Congress Party in Uttar Pradesh ; BJP's expansion and coalition strategies ; Regionalization of Indian Politics ; Telugu Desam Party in Andhra Pradesh ; Changing Nature of Tamil Nadu ; Asom Gana Parishad in Assam ; Politics of the left in West Bengal

Module-III : Social Movements and Politics in the States
Decline of Backward Caste Politics in North India ; Bahujan Samaj Party and Subaltern Mobilization in Uttar Pradesh ; Ethnic Minorities in Majoritarian Indian Polity

Module-IV: Economic Reforms and Indian Politics
India's federal economy ; Globalization and State Disparities in India ; India's special economic zones : protest politics and growth patterns ; Reforms and economic growth in Indian states

Examination Scheme

Components	A	P	A/TP	CT	EE
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :
Pai, Sudha. 2013. *Handbook of Politics in Indian States : Regions, Parties and Electoral Reforms*. New Delhi : Oxford University Press.
Narain, Iqbal. 1976. *State Politics in India*. Meerut : Meenakshi Prakashan.
Weiner, Myron. 1968. *State Politics in India*. Princeton : Princeton University Press.

References :

Jenkins, Rob. 2004. *Regional Reflections : Comparing Politics across India's States*. New Delhi : Oxford University Press.

Yadav, Yogendra. 2000. 'Understanding the Second Democratic Upsurge: Trends of Bahujan Participation in Electoral Politics in the 1990s', in Francine R. Frankel, Zoya Hasan, Rajeev Bhargava and Balveer Arora (eds.), *Transforming India*. New Delhi : Oxford University Press.

Yadav, Yogendra and Suhas Palshikar. 2003. 'From Hegemony to Convergence: Party System and Electoral Politics in the Indian States – 1952-2002'. *Journal of the Indian School of Political Economy*, January-June.

Syllabus - Semester Fourth

POLITICS AND MEDIA

Course Code: POL2451 **Credit Units: 03**

Course Objectives:

To provide students with an overarching perspective on the various processes at play in the manner in which the media – print and visual – transform into vehicles of politics. The course will, through exploration of several case studies pertaining to various types of media, encourage the students to critically analyse media messages, both print and visual.

Course Contents :

Module-I : Theories of the mass media
Ageda Setting Theory ; Cultivation Theory ; Dependency Theory ; Hypodermic Needle Theory ; Knowledge Gap ; Media Richness Theory ; Medium Theory ; Spiral of Silence ; Two Step Flow Theory ; Uses and Gratifications Approach ; Priming ; Framing

Module-II : Print media and politics
Brief history of newspapers in India ; Growth of print media in India ; print media and Indian political parties ; democratic processes and print media

Module-III : Television news media and politics
Brief history of television media in India ; Growth of Television news media in india ; democratic politics and television media : perspectives and trends

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :
McQuail, Dennis. 2010. *McQuail's Mass Communication Theory*. New Delhi : Sage Publications.
Jeffrey, Robin. 2000. *India's Newspaper Revolution : Capitalism, Politics and the Indian Language Press, 1977-99*. New Delhi : Oxford University Press.
Mehta, Nalin. 2008. *Television in India: Satellites, Politics and Cultural Change*. New Delhi : Routledge.

References :
Sahay, Uday. 2006. *Handbook of the Media in Contemporary India*. New Delhi : Oxford University Press.
Batabyal, Somnath, Angad Chowdhry, Meenu Gaur, Matti Pohjonen. 2011. *Indian Mass Media and Politics of Change*. New Delhi : Routledge.

Syllabus - Semester Fifth

SOUTH ASIA: POLITICAL PERSPECTIVES

Course Code: POL2551 **Credit Units: 03**

Course Objectives:

The course would attempt to inculcate understanding of the various political processes at work in South Asia, particularly states like Pakistan, Bangladesh, Sri Lanka and Nepal. It will supplement the South Asia unit from the core paper on post-colonial states and their development after independence. This course will focus primarily on two countries in South Asia – Pakistan and Sri Lanka.

Course Contents :

Module-I : Institutions and Political Processes in South Asia
Development of post-colonial institutions ; historical development and current debates in democracy in South Asia ; role of military in post-colonial societies in South Asia

Module-II : State and Polity in Pakistan
Democracy and electoral process ; Islamization and cultural change ; the army and its role in political process ; Pakistan's foreign policy ; issues of internal security and terrorism

Module-III : State and Polity in Sri Lanka
Democratic institutions and their functioning ; role of the military ; the Tamil issue ; internal security and terrorism ; Sri Lanka's foreign policy

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :
Brass, Paul R. 2010. *Routledge Handbook Of South Asian Politics: India, Pakistan, Bangladesh, Sri Lanka, And Nepal*. USA : Routledge.

Reference :
Newman, Edward, Itty Abraham, and Meredith L. Weiss. 2010. *Political Violence in South and Southeast Asia: Critical Perspectives*. UNU Press.

Syllabus - Semester Sixth

POST-COLD WAR WORLD POLITICS

Course Code: POL2651 **Credit Units: 03**

Course Objectives:
To provide a theoretical understanding of politics as it developed in the post-Cold War scenario particularly with regard to the politics of the United States of America vis-a-vis the rest of the world, the shifting of the power blocks, and the growth of anti-American sentiment in certain parts of the world. The course would also encourage students to read contemporary literature on emerging international political scenarios.

Course Contents :

Module-I : Overview of the post-Cold War decade
Historical background of US foreign policy ; US relations with EU ; brief history of US interventions in West Asia, South East Asia and the Middle East

Module-II : Post-Cold War American Politics
Key institutional players ; lobbies and their importance in American politics ; media and public opinion in US ; America's position in a globalized economy

Module-III : America and the Arab/Muslim World
Historical development of politics of the Arab/Muslim world ; why the Arabs/Muslims hate America? US intervention and international war against terrorism

Examination Scheme

Components	**A**	**P**	**A/TP**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(**A :** Attendence ; **P :** Presentation ; **A/TP :** Assignment/Term Paper ; **CT :** Class Test ; **EE :** External Examination)

Texts and References

Texts :

Cameron,Fraser. 2002. *US Foreign Policy after the Cold War: Global Hegemon or Reluctant Sheriff*? London: Routledge.
Jentleson, Bruce W. 2000. *American Foreign Policy: The Dynamics of Choice in the 21st Century*. W.W. Norton & Company.

References :

Antizzo, Glenn J. 2010. *U.S. Military Intervention in the Post-Cold War Era : How to Win America's Wars in the Twenty-first Century*. LSU Press.

Lewis, Bernard. 1990. "The Roots of Muslim Rage". *The Atlantic Online*, September. Details available at http://www.theatlantic.com/past/issues/90sep/rage.htm.

Mamdani, Mahmood. 2004. "Introduction: Modernity and Violence". *Good Muslim, Bad Muslim: Islam, the USA, and the Global War against Terror*. New Delhi: Permanent Black.

Huntington, Samuel P. 1993. "The Clash of Civilizations?" *Foreign Affairs* 72 (3) Summer: 22. Details available at http://www.foreignaffairs.com/articles/48950/samuel-p-huntington/the-clash-of-civilizations.

Said, Edward W. 2000. "The Clash of Definitions". In *Reflections on Exile and Other Essays*. Cambridge, Massachusetts: Harvard University Press.

QUEBEC STUDIES

Programme Structure-2018

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
LAN2164	Introduction to the French North America- a short history of Quebec	3	-	3
LAN2264	Quebec Society Culture and Language	3	-	3
LAN2364	Quebec in the World Affairs	3	-	3
LAN2464	Political Economy of Quebec	3	-	3
LAN2564	Introduction to Major Literary Movements in Quebec-I	3	-	3
LAN2664	Introduction to Major Literary Movements in Quebec-II	3	-	3
	TOTAL			**18**

QUEBEC STUDIES

The course will be open to all the undergraduate students of AUG, especially students pursuing B.A (H) French and students learning French as FL.

Description of the Course

The **Introduction to Study of Quebec** attempts to study a society that is overwhelmingly majority francophone in an anglophone American sphere. This course will do a survey of geographical, historical, demographical, cultural, political and social developments in Québec, from the French conquest to the present. The course is intended to provide students with a broad understanding of the narrative of Quebec history and to improve their knowledge of many important issues that have defined and continue to define and redefine Quebec, including the North American Free Trade Agreement, the evolution of the Canadian constitutional debate, the reform of social programs, provincial linguistic policies, native issues, regional differences and relations between the anglophone, allophone and francophone communities (the Ottawa-Paris-Quebec triangle).

Organization of the Course

The weekly lectures (3hrs per week), learning responses, videos, clips, forum, and the weekly mandatory readings are an integral part of this course. It will also include workshop by faculty from Quebec. Movie screening and other cultural exposure will be organized in collaboration with Quebec Bureau Mumbai. The course will be spread up to two semesters.

Who can attend?

Open to all the undergraduate student of AUG. Students learning French (B.A Hons./ FL) will have additional benefit.

Why to attend?

- Quebec government has special provision of fees waiver for Indian students. The knowledge of Quebec society, its institution and education system will help students to better explore higher education opportunity and work possibility in Quebec as the knowledge of this course will add to the extra immigration point (like the knowledge of French)**.**

- Knowing about the business prospects in Quebec will help students who wants to set up their own business or expand their reach to American continent. Quebec can be helpful to penetrate US market also as they do share lot of commonalities in business culture.

QUEBEC STUDIES

Syllabus - Semester First

INTRODUCTION TO THE FRENCH NORTH AMERICA – A SHORT HISTORY OF QUEBEC

Course Code: LAN2164 **Credit Units: 03**

PERIODS IN THE HISTORY OF QUÉBEC: SOCIAL PHENOMENA

- Origins till colonization : The experience of the Indigenous peoples and the colonization attempts
- French conquest: The evolution of colonial society under French rule
- The change of empire and British North America Act

Syllabus - Semester Second

QUEBEC SOCIETY, CULTURE AND LANGUAGE

Course Code: LAN2264 **Credit Units: 03**

Quebec society, culture and language

- Period of Grande Noirceur/Great Darkness
- Quiet Revolution: The modernization of Québec. Official Language Act
- Contemporary Quebec: culture, arts and cinema

Syllabus - Semester Third

QUEBEC IN THE WORLD AFFAIRS

Course Code: LAN2364 **Credit Units: 03**

Quebec in the world affairs

- *Vive le Québec libre*: Evolution of international relations of Québec.
- The province as global player: Québec and *la Francophonie*
- Quebec-Paris-Ottawa triangle; presence of France in Quebec
- Ottawa-Quebec-Washington: presence of Quebec in United States

Syllabus - Semester Fourth

POLITICAL ECONOMY OF QUEBEC

Course Code: LAN2464 **Credit Units: 03**

Political economy of Quebec

- Politics of social and economic development in Quebec
- Legal tradition, national identity and Quebec Exceptionalism
- business culture of Quebec
- Quebec vs Canadian business culture

Syllabus - Semester Fifth

INTRODUCTION TO MAJOR LITERARY MOVEMENTS IN QUEBEC-I

Course Code: LAN2564 **Credit Units: 03**

Introduction to major literary movements in Quebec- I

- Evolution of French language
- Early literature, 1830–60
- The literary movement of 1860
- The Montreal School, 1895–1935

Syllabus - Semester Sixth

INTRODUCTION TO MAJOR LITERARY MOVEMENTS IN QUEBEC-II

Course Code: LAN2664 **Credit Units: 03**

Introduction to major literary movements in Quebec-II

- World War II and the postwar period, 1935–60
- The "Quiet Revolution"
- The Quiet Revolution of French Canadian minorities
- Contemporary trends
- The cosmopolitan culture of French Canada and Quebec

Examination Scheme:

Components	CT	S	A	EE
Weightage (%)	15	10	05	70

References: Material compiled by the department

Text book:

- Rudy, Jarrett, et al. *Quebec questions: Quebec studies for the twenty-first century*. Oxford University Press, 2010.
- Dickinson, John A., and Brian Young. *A short history of Quebec*. McGill-Queen's Press-MQUP, 2008.

Audio-visual:

- Viewing of feature film "Mon Oncle Antoine"
- Viewing of documentary film "Québec My Country Mon Pays"
- Viewing of documentary short " The Oka Legacy "

SANSKRIT

Programme Structure-2019

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
SKT2151	Introduction to Sanskrit Language	3	-	-	3
SKT2251	General Introduction to Vedic Literature & Conversational Sanskrit	3	-	-	3
SKT2351	General Introduction to Sanskrit Literature & Sanskrit Conversation	3	-	-	3
SKT2451	Sanskrit Language & Indian Culture	3	-	-	3
SKT2551	Introduction to Sanskrit Linguistics	3	-	-	3
SKT2651	General Introduction to Indian Philosophy & Sanskrit Grammar	3	-	-	3
	TOTAL				**18**

SANSKRIT

OBJECTIVES OF THE PROGRAM

AMITY CENTRE FOR SANSKRIT AND INDIC STUDIES under the aegis of Amity School of Liberal Arts (ASLA) offers **SANSKRIT** as of the **Open Elective Courses**. This course intends to make the learners aware of the fact that Sanskrit is the gateway of the ancient Indian wisdom and is a perennial source of inspiration for national integrity and universal brotherhood.

This course aims to improve the Reading, Writing, Speaking and Listening skills in Sanskrit learners. It also aims to enable them to appreciate different forms and genres of Sanskrit literature and to become aware of the rich intellectual tradition of India.

Note: The medium of instruction and examination for the course would be Hindi, Sanskrit and English.

SANSKRIT

Syllabus - Semester First

INTRODUCTION TO SANSKRIT LANGUAGE

Course Code: SKT2151 **Credit Units: 03**

Course Objectives:
To enable the students to understand the importance and relevance of Sanskrit language and to provide the students with an insight about the mechanism of the Sanskrit language.

Course Contents:

Module-I: Introduction to Sanskrit and its importance
- An introduction to Sanskrit language
- Importance and relevance of Sanskrit language.
- Special features of Sanskrit language.

Module-II: Sanskrit Orthography
- Alphabets of Sanskrit language
- Phonetics of the Sanskrit language
- Articulation of Sanskrit Sounds : Vowels, Consonants and Semi-vowels .
- Identifying the word-endings.
- Maheshwar Sutra
  Concept of Māheśvara-sūtra and Pratyāhāra, Sanskrit alphabets: places of articulation and articulatory efforts. On the basis of Laghusiddhāntakaumudī.

शब्द रूप तथा धातु रूप

शब्द रूप - देव , फल , लता , मुनि , नदी ,मति ,वरि ,साधू ,धेनु , मधु , वधू , मातृ , पितृ , कर्तृ ,आत्मन् , विद्वस् , जगत्।

धातु रूप - परस्मैपदी धातु - पठ् , गम् , अस् , लिख्

आत्मनेपदी धातु - सेव् , रुच् , वृत्

Module-III: Sanskrit Texts
- Reading and discussion upon the stories and about Sanskrit text Panchtantra.
- Text Reading (Grammar, Translation, Explanation), Message, Purpose of this text.

Module-IV: Verbal Form (लकार बोध)
- Tense – Present tense, Future tense ,Past tense .
- Learning, memorizing and understanding the conjugation of verbs & words and speculations of Sanskrit grammar.
- Studying purush ,vachan, karak and vibhakti and general use of them.

Module-V: Language Formation

- Reading understanding and practicing simple sentences of the Sanskrit language from Saral Sanskrit Shikshan.
- Listing and using name of objects in Sanskrit.
- Listing of Tatsam (Sanskrit) words from Hindi.
- Enlisting sentences for general conversation.

Student Learning Outcomes:

Students who complete this course will be able to know and explain features of Sanskrit language . They will illustrate the importance of this language . They will read simple Sanskrit sentences and make similar sentences in verbal and written forms .They will also start reading and understanding the simple text from Sanskrit.

Examination Scheme :

Continuous Assessment /Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**EE**
Weightage(%)	10	10	5	5	70

Recommended Books

<u>Text Book</u>

रचनानुवादकौमुदी कपिलदेवद्विवेदी , विश्वविद्यालयप्रकाशन वाराणसी।

संस्कृत शिक्षणसरणी आचार्यरामशास्त्री,परिमलपब्लिकेशन्स दिल्ली।

अनुवादकला अथवा वाग्व्यवहारदर्श चारुदेवशास्त्री – मोतीलालबनारसीदास दिल्ली।

व्याकरणचंद्रोदय (खंड१ - ५) चारुदेवशास्त्री ,मोतीलालबनारसीदास दिल्ली।

सरलसंस्कृतशिक्षण भारतीय विद्याभवन नईदिल्ली

पंचतंत्र विष्णु शर्मा

लघुसिद्धान्तकौमुदी धरानन्द शास्त्री दिल्ली

<u>Reference Book</u>

संस्कृत सहचर राधामोहन पाण्डेय स्टूडेंट्सफ्रेंड्स पटना।

सम्भाषण सन्देश संस्कृतभारतीबेंगलुरु।

संस्कृत-हिन्दीकोश वामन शिवरामआप्टे

प्रारंभिक संस्कृतव्याकरण शिप्रापब्लिकेशन।।

पाणिनिशिक्षा मोतीलालबनारसीदास।

Composition and Essay RanjiUpadyay ,Cowkhambavidyabhava.

Higher Sanskrit Grammar M.R.Kale,MotiLalBanarsidas,Delhi.2007

Syllabus - Semester Second

GENERAL INTRODUCTION TO VEDIC LITERATURE & CONVERSATIONAL SANSKRIT

Course Code: SKT2251 **Credit Units: 03**

Course Objectives :
This course aims to get students acquainted with the history of Sanskrit literature from Vedic literature to Purāṇa. It also intends to give an outline of use of Sanskrit language and to make students aware of morals and ethics in Indian culture through Vedic texts.

Course Contents:

Module-I: Vedic Literature
- A general introduction of Vedic Samhita (Rigveda , Yajurveda , Samaveda , Atharvaveda - time subject - matter , philosophy and social life).
- A general introduction of Brahman ,Aaranyak , Upanishad , Vedanga and Purana.

Module-II: Introduction to Indian cultural Traditions
- Ancient Indian Education System
- Status of women in ancient Indian society.
- Dharm –dharmshastra

Module-III: Communicative words in Sanskrit
- Listing and using names of objects, fruits, flower and animals in Sanskrit.
- Preparing a dictionary of Sanskrit words, verbs
- Memorizing Sankhyavacaka Shabd.

Module-IV: Introductory Grammar
- Learning memorizing and understanding the Verb , Phonetics of the Sanskrit Language and speculation of Sanskrit grammar.
- An introduction to all types of सन्धि.
- Making new sentences for general conversation.
- Translation practice on various topics of daily life

Module-V: Prefixes and Suffixes
- **प्रत्यय का सामान्य परिचय**

कृत प्रत्यय - तव्यत्, तव्य, अनीयर्, यत्, ण्यत्, क्यप्, ण्वुल्, तृच्, अण्, क्त, क्तवतु, शतृ, शानच्, तुमुन्, घञ्, अच्, क्तिन्, क्त्वा (ल्यप्), ल्युट् .

तद्धित प्रत्यय - मत्वर्थीय- मतुप्, इनि, ठन्। अपत्यार्थक- अण्, इञ्, ढक् . भावकर्मार्थक- त्व, तल्, इमनिच्, ष्यञ्। Others तरप्, तमप्, ईयसुन्, इष्ठन्, तसिल्,

Student Learning Outcomes:
Students who complete this course will be able to understand simple Sanskrit. They will Come to know about specific texts of contemporary importance will enable them to understand the salient features of Indian culture and make their firsthand viewpoint about these scriptures.

Examination Scheme :

Continuous Assessment /Internal Assessment					End Term Examination
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**EE**
Weightage(%)	10	10	5	5	70

Recommended Books

Text Book

रचनानुवादकौमुदी कपिलदेवद्विवेदी , विश्वविद्यालयप्रकाशन वाराणसी।

वृहद अनुवाद चन्द्रिका कपिलदेव द्विवेदी , विश्वविद्यालय प्रकाशन वाराणसी

संस्कृत शिक्षणसरणी आचार्यरामशास्त्री,परिमलपब्लिकेशन्स दिल्ली।

अनुवादकला अथवा वाग्व्यवहारदर्श चारुदेवशास्त्री – मोतीलालबनारसीदास दिल्ली।

व्याकरणचंद्रोदय (खंड१ - ५) चारुदेवशास्त्री ,मोतीलालबनारसीदास दिल्ली।

सरलसंस्कृतशिक्षण भारतीय विद्याभवन नईदिल्ली

पंचतंत्र - भीमसेन शास्त्री

लघु सिद्धांत कौमुदी- धरानन्द शास्त्री दिल्ली

Reference Book

संस्कृत सहचर राधामोहन पाण्डेय स्टूडेंट्सफ्रेंड्स पटना।

सम्भाषण सन्देश संस्कृतभारतीबेंगलुरु।

संस्कृत-हिन्दीकोश वामन शिवरामआप्टे

प्रारंभिक संस्कृतव्याकरण शिप्रापब्लिकेशन।।

पाणिनिशिक्षा मोतीलालबनारसीदास।

Composition and Essay Ranji Upadyay, Cowkhambavidyabhava.
Higher Sanskrit Grammar, M.R. Kale, MotiLal Banarsidas, Delhi.2007

Syllabus - Semester Third

GENERAL INTRODUCTION TO SANSKRIT LITERATURE AND SANSKRIT CONVERSATION

Course Code: SKT2351 **Credit Units: 03**

Course Objective:
This course aims to get the students acquainted with the outline of Sanskrit literature. It has two sections:
(i) Literature (poetry, prose and play) and
(ii) Survey of literature. In literature segment two most famous plays of Sanskrit have been introduced, which not only reflect the poetic excellence, but also depict contemporary society.

Course Contents:

Module-I: Bhagvad Gita
- Bhagavadgītā – IInd Chapter, verses, 11, 13, 16, 18, 20, 22, 23, 24, 25 and 27.
- Gītā; Ch. 12- Text Reading (Grammar, Translation, Explanation),
- Philosophy of devotion.

Module-II: Classical Sanskrit literature : An introduction / overview
- Rāmāyaṇa Mahābhārata,
- **Bhāsa**,**-Svapnavassavadattam** Introduction, Author, Story, Unique features / Style of Bhāsa
- **Kālidāsa**,- **Abhijnanashakuntalam** Introduction, Author,story, Personification of nature, Language, and other problems related to texts.

Module-III: Oral and Written Practice in Sanskrit
- Reading prose content from the syllabus loudly with sense in dialogue mode
- Reading poetry from the syllabus loudly with proper tone and intonation
- Writing prose and poetry from the course content for practice

Module-IV: Translation in and from Sanskrit
- Translation of Hindi / English text in Sanskrit and vice versa.
- Writing short passages in Sanskrit.

Module-V: Media and Art in Sanskrit
- Magazines and Newspapers, Media – Radio, TV, Internet, blogs, important sites, Sanskrit Wikipedia (general awareness only).
- Script writing, News editing/ writing.(Sanskrit only)
- Music and Dancing in the context of नाट्यशास्त्र

  Concept of Music - *Saṅgīta*,
  Concept of Instrument – *Vādya*
  Concept of Dance - *Nṛtya*,
  Concept of Rhythm – *Tāla*,
  Inter-relation among Painting, Dancing and Music
  Importance of music in drama,

Note: It is expected to understand the concepts in the light of Viṣṇudharmottara Purāṇa; Part-III, Chapter 36-43, Citrasūtra; and Classical Indian Dance in Literature & The Arts, KapilaVatsyayan, SangeetNatak Academy, New Delhi (Chapter I, pp. 5-22, Chapter V pp.333-344) only selected portions.

Students Learning Outcome:
After completing the course the students will be able to understand the outline of Sanskrit Literature. They will be able to read, write and speak sentences in Sanskrit .They will be able to know Sanskrit Media and Indian classical- Arts.

Examination Scheme :

Continuous Assessment /Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**EE**
Weightage(%)	10	10	5	5	70

Suggested Readings:

<u>Text Books</u>

अभिज्ञानशाकुन्तलम् (कालिदास) : – सुबोधचन्द्र पंत, मोतीलाल बनारसीदास, दिल्ली.
– सुरेन्द्रदेव शास्त्री, रामायणलाल बेनीप्रसाद, इलाहाबाद.

श्रीमद्भगवद्गीता, - व्याख्याकार - मदनमोहनअग्रवाल,चौखम्बासंस्कृत प्रतिष्ठान दिल्ली।

श्रीमद्भगवद्गीता - एस राधाकृष्णन कृत हिंदीअनुवाद ,राजपालएण्डसन्स दिल्ली।

स्वप्नवासदत्तम् - एम आर काले , मोतीलाल बनारसीदास नई दिल्ली।

भारतकालीनकलाएँ - भारतेन्दुमिश्र ,प्रतिभाप्रकाशनदिल्ली२००४

भारतीयनाट्य ;स्वरुपऔरपरंपरा - - राधावल्लभत्रिपाठी , हरिसिंहगौरविश्वविद्यालय , सागर -१९८८

<u>Reference Books</u>

उपाध्याय, बलदेव – *संस्कृत साहित्य का इतिहास*, शारदा निकेतन, वाराणसी.
– *वैदिक साहित्य और संस्कृति*, वाराणसी.

तिवारी, रमाशंकर *महाकवि कालिदास*, चौखम्बा विद्याभवन, वाराणसी.

द्विवेदी, हजारी प्रसाद *कालिदास की लालित्य योजना*, राजकमल प्रकाशन, दिल्ली.

शर्मा, उमाशङ्कर (ऋषि) *संस्कृत साहित्य का इतिहास*, चौखम्बा भारती अकादमी, वाराणसी, 1999.

तिलक बालगंगाधर श्रीमद्भगवद्गीतारहस्य और कर्मयोगशास्त्र ,अपोलोप्रकाशन।

Dikshit,Ratnamayi *Women in Sanskrit Dramas*, Meherchand Lacchman Das, Delhi-6.

Keith,A.B. *History of Sanskrit Literature*, MLBD,Delhi.

Keith,A.B. *Sanskrit Drama*, Oxford University Press, London,1970.

Syllabus - Semester Four

SANSKRIT LANGUAGE & INDIAN CULTURE

Course Code: SKT2451 **Credit Units: 03**

Course Objectives:
The aim of this course is to develop the inner urge of knowing of Indian culture with various aspects of the ancient Sanskrit texts , and to make students to converse in Sanskrit language.

Course Contents:

Module-I: Introduction to Sanskrit Culture
- What is Culture?
- Characteristic / Salient features of Indian Culture**.**
- Read and discuss Hymns of Sangathan sukta of Rigveda.
- Read and discuss Hymns of Shiv Sanklap Sukta of Yajurveda.
- Collecting remembering sentences of wisdom in Sanskrit with Hindi meaning.

Module-II: Basic Tenets of Sanskrit Culture
- Collecting 15 Sanskrit Mottos of various Institution and Government Departments, translating them into Hindi.
- Reading and discussion upon Varn system and Ashram system.
- Reading and discussion upon four purusharthas.
- Introduction to the eight types of Marriage.

Module-III: Sanskrit Text
- Niti Shatakam of Bhrtrihari (10 verses of **murkh paddhti** and 10 verses of **vidwat paddhti**)

Module-IV: Introductory Grammar
- Memorizing complex conjugations and speculations of Sanskrit.
- Making and practicing sentences of Sanskrit
- Writing short notes on general topics of daily life.

Module-V: Conversing in Sanskrit
- Preparing a dictionary of Sanskrit words, verbs
- Writing and presenting interviews and description in Sanskrit.
- Translation of Unseen passage from Sanskrit into Hindi.

Student Learning Outcome:
Students who complete this course will be able to enlist the Sanskrit Mottos of various institutions. They will be able to explain the basic tenets of Sanskrit culture. They will be able to read, write and speak sentences in Sanskrit. Chanting of verses from Niti Shatak and telling their verbal meaning as well as detailed description will be ensured.

Examination Scheme :

Continuous Assessment /Internal Assessment					End Term Examination
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**EE**
Weightage(%)	10	10	5	5	70

Suggested Readings:

Text Books

रचनानुवादकौमुदी कपिलदेव द्विवेदी , विश्वविद्यालयप्रकाशन वाराणसी।

संस्कृतशिक्षणसरणी आचार्य रामशास्त्री,परिमलपब्लिकेशन्स दिल्ली।

वैदिकसाहित्यऔरसंस्कृति बलदेवउपाध्याय- शारदामंदिर वाराणसी

भारतीयसंस्कृतिकाउत्थान रामजीउपाध्याय, चौखम्बाविद्याभवन वाराणसी।

वेदोंमेंभारतीयसंस्कृति आद्यादत्त-ठाकुर ,हिंदीसमिति लखनऊ।

मनुस्मृति पंडित रामेश्वर भट्ट , राष्ट्रीय संस्कृत संस्थान ,नई दिल्ली

नीतिशतकम् डॉ विष्णु दत्त शर्मा शास्त्री , ज्ञान प्रकाशन मेरठ

Reference Books

संस्कृति के चार अध्याय , दिनकररामधारीसिंह –लोकभारतीप्रकाशन इलाहाबाद।

भारतीय संस्कृति सर्वपल्ली राधाकृष्णन

धर्म समाजऔरसंस्कृति , श्रीमालीकृष्णमोहन ग्रंथशिल्पीप्राइवेट।

भारत की राष्ट्रियसंस्कृति , हुसैनएसआबिद नेशनलबुकट्रस्ट नईदिल्ली

Ancient Indian Education R.K. Mukherjee -MLBD,Delhi .

History of Sanskrit Literature- A.B.KITH (हिंदीअनुवाद- मंगलदेवशास्त्री ,मोतीलालबनारसीदासदिल्ली।

Syllabus - Semester Fifth

INTRODUCTION TO SANSKRIT LINGUISTICS

Course Code: SKT2551 **Credit Units: 03**

Course Objectives:
The aim of this course is to teach students the basics of Sanskrit linguistics. This will also describe the families of languages prevalent in the world and place of Sanskrit therein, and to get acquainted with the basic rules of translation and translate the texts of Hindi and English into Sanskrit.

Course Contents:

Module-I: Introduction to linguistics.
- Introduction to linguistics and Classification of languages.

Module-II: Linguistics and Sanskrit language
- Place of Sanskrit language in the classification of languages.
- Read Special features of Sanskrit language, and reading about language family -Sanskrit and Indo – European family.

Module-III: Translation
Rules for Translation into Sanskrit from Hindi and English
- Cases and Case-endings
- Sanskrit Voices : Concept, types and rules
- Application of compounds and numeral words
- Application of suffixes

Concept of Voice, nature of active voice (*kartṛ-vācya*), passive voice (*karma-vācya*) and impersonal passive voice (*bhāva-vācya*), Rules of voice change and Changing voice of simple sentences specially with reference to verbal terms, *kṛtya*-suffixes &*niṣṭhā*-suffixes.
Translation from Hindi/English into Sanskrit (Translation of passages and independent sentences) .

Module-IV: Essay
- Art of Essay writing : Structure-formation like introduction, main body, conclusion etc. by the points and sub-points and uses of appropriate references.
- Traditional Essays based on the issues and topics related to the subjects like Sanskrit Language, Culture, Veda, Rāmāyaṇa, Mahābhārata, Upaniṣad, Gītā, Renowned Sanskrit Poets and their poetic excellence.
- Contemporary Essays based on the issues and topics related to the subjects like entertainment, sports, national and international affairs and problems.

Module-V: Language Formation
- Preparing a dictionary of Sanskrit words, verbs
- Collect paragraphs from texts like *Pañcatantra*, *Hitopadeśa*etc. and translate them into Hindi/English.
- Collect paragraphs from daily national newspapers and translate them into Sanskrit.

Student Learning Outcome:

After completing the course the students will be able to enlist the school of language and place of Sanskrit there in .They explain the basic rules of translation. They will be able to translate the texts of Hindi and English into Sanskrit .

Examination Scheme :

Continuous Assessment /Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**EE**
Weightage(%)	10	10	5	5	70

Suggested Readings:

Text Books

बृहदअनुवादचन्द्रिका चक्रधरनौटियाल**,** मोतीलालबनारसीदास दिल्ली।

तुलनात्मकभाषाविज्ञान भोलानाथतिवारी , मोतीलालबनारसीदास दिल्ली।

भाषाविज्ञान भोलानाथतिवारी-, किताबमहल इलाहाबाद।

भाषाविज्ञानकीभूमिका देवेन्द्रनाथशर्मा**,**राधाकृष्णनप्रकाशन दिल्ली।

Reference Books

संस्कृतकाभाषाशास्त्रीयअध्यय भोलानाथव्यास , चौखम्बाविद्याभवन दिल्ली।

संस्कृत निबंधशतकम्कपिलदेवद्विवेदी **-,**विश्वविद्यालयप्रकाशन वाराणसी।

संस्कृतका ऐतिहासिक एवं डी .डी .शर्मा, हरियाणासाहित्यअकादमीचंडीगढ़।

व्याकरणचंद्रोदय चारुदेवशास्त्री - **(भाग -1,2,3)**मोतीलालबनारसीदास।

Linguistic introduction to Sanskrit B.K Ghosh–, Sanskrit pustakbhandar , Kolkata.
Modern Linguistic-S.K Varma**.,** Oxford university press Delhi .

Higher Sanskrit Grammar .Kale , MLBD, Delhi (Hindi Translation)

The Students' Guide to Sanskrit Composition, V.S Apte, Chowkhamba Sanskrit Series, Varanasi (Hindi Translation also available)

Syllabus - Semester Sixth

GENERAL INTRODUCTION TO INDIAN PHILOSOPHY & SANSKRIT GRAMMAR

Course Code: SKT2651 **Credit Units: 03**

Course Objectives:
This course aims to get the students acquainted with the basic approach to study philosophy. To enable students to form and use sentences of the Sanskrit languages and to make students aware about morals and ethics of Indian culture through Sanskrit texts.

Course Contents:

Module-I: Schools of Indian Philosophy
Salient features of Indian Philosophy, Vedic and Non-vedic Schools of Indian Philosophy and their basic doctrines as given below:-

- Sāṁkhya - prakṛti, guṇatraya&puruṣa
- Yoga - Concept of yoga and its eight stepts, samādhi, Īśvara&kaivalya
- Mīmāṁsā – Dharma &adharma, bhāvanā, apūrva, vidhi and niṣedha
- Vedānta – Brahma, Īśvara, māyā, jīvaand jagat
- Nyāya-Vaiśeṣika – seven padārthas, four pramāṇas and paramāṇukāraṇvāda
- Bauddha – Four-fold āryasatya, anātmavādaand kṣaṇikatvavāda
- Jaina – Anekāntavāda, syādvāda
- Cārvāka – materialism and basic ethics

Module-II: Yogasutra - Concentration

- Concept of Yoga : (Yogasūtra, 1.2)
- Restriction of fluctuations by practice (abhyāsa) and passionlessness (vairāgya) :(Yogasūtra, 1.12-16)
- Eight aids to Yoga (aṣṭāṅgayoga) : (Yogasūtra, 2.29, 30,32, 46, 49, 50; 3.1-4).
- Yoga of action (kriyāyoga) : (Yogasūtra, 2.1)
- Introduction to the system of Asanas and Pranayama.

Module-III: Sanskrit Grammar

- Memorizing complex conjugations and speculations of Sanskrit .
- Practicing and Memorizing Sandhi, Samas,Pratyay,and Karak.
- Making and practicing sentences of Sanskrit
  Writing short notes on general topics of daily life

Module-IV: Language Formation

- Preparing a dictionary of Sanskrit words, verbs
- An introduction to computational Sanskrit
- Framing sentences of general conversation
- Writing of sentences on various topics

Module-V: Conversational Sanskrit

- Listing sentences of general conversation.
- Interaction within and out of class using Sanskrit sentences.
- Conversational practice of the various topics.

Students Learning Outcome:

Students who complete this program will be able to understand Sanskrit language. Students will be able to discussion on various aspects of Art of living and Indian philosophy. The students will be able to speak Sanskrit in their class.

Examination Scheme :

Continuous Assessment /Internal Assessment					**End Term Examination**
Components	**Class Test**	**Home Assignment**	**Class Performance**	**Attendance**	**EE**
Weightage(%)	10	10	5	5	70

Recommended Books

<u>Text Books</u>

भारतीय दर्शन चंद्रधर शर्मा

वैदिकसाहित्य और संस्कृति बलदेवउपाध्याय शारदामंदिर वाराणसी

भारतीयदर्शन बलदेवउपाध्याय चौखम्भाओरिएण्टल दिल्ली।

भारतीय दर्शन राधाकृष्णन

पातञ्जलयोगदर्शन हरिहरानंद राजकमलप्रकाशन दिल्ली।

<u>Reference Books</u>

भारतीयदर्शन की रुपरेखा हरेंद्रप्रसादसिन्हा मोतीलालबनारसीदास दिल्ली।

भारतीयदर्शन की प्रमुखसमस्या ,महेशभारती

Higher Sanskrit Grammar M.R .Kale MLBD, Delhi (Hindi Translation)
Introduction to Indian Philosophy Chatterjee S.C & D.M. Dutta , Calcutta University .
Outline of Indian Philosophy M Hiriyanna London (Hindi , English)
History of Indian philosophy S.N Dasgupta MLBD, Delhi

SPANISH STUDIES

PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students.The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Value-added Course: FL- Spanish and Minor track courses), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

Components	Codes	Weightage (%)
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	70

PROGRAMME OBJECTIVE

This programme is designed for the students who opt for Spanish as a Minor **in addition to taking Spanish as Foreign Language (Value-added Course).**

This programme aims at providing an understanding of the basics of Spanish grammar and phonetics.

Students get sensitized towards different "registros de lengua" and are able to distinguish formal and informal language right from the beginning and use appropriate language while communicating in the professional and business world.

Through various listening and speaking exercises this course enables the students to quickly take position as a foreigner speaking Spanish and establish contacts and communicate in oral and written language.

This programme also provides an insight into Spanish literature. By furnishing information on select socio-cultural aspects of Spain, this programme creates a backdrop for a better understanding of the language and the people.

This programme focuses on developing all four language skills of reading, writing, listening and speaking. Through training in various activities it enhances the critical/ creative thinking and encourages the learners to think spontaneously in Spanish.

SPANISH STUDIES

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits (18)
LAN2163	*EFE Professional Spanish for Business-I	2	1	-	3
LAN2263	EFE Professional Spanish for Business-II	2	1	-	3
LAN2363	EFE Professional Spanish for Business-III	2	1	-	3
LAN2463	EFE Professional Spanish for Business-IV	2	1	-	3
LAN2563	Introduction to Spanish Literature & Select Socio-Cultural aspects of Spain	2	1	-	3
LAN2663	Spanish Through Activities	2	1	-	3
	TOTAL				**18**

*EFE- Español para Fines Específicos (Spanish for specific purposes)

Prerequisites:

1. The student should have opted for Spanish as FL
2. In each semester the student should opt for the course offered without skipping any course. They are expected to follow the sequence. These courses cannot be opted for independently as OE in any semester.

Syllabus - Semester First

EFE PROFESSIONAL SPANISH FOR BUSINESS-I

(Español I)

Course Code: LAN2163 **Credit Units: 03**

Course Objective:
To familiarize the students with the Spanish language with its phonetic system, its accents
To enable them

i) To greet and introduce themselves
ii) To furnish basic information/ fill in forms
iii) To identify things and talk about things

This course will help them in building their foundation in four language skills which is reading, writing, listening and speaking.

Course Contents: Unidad 1, 2, 3- pp**. 10-36**, Números del 0 al 1000

Contenido léxico: Unidad 1: En clase de Español

i) Adjetivos de nacionalidad
ii) Nombres de paises

Unidad 2: Datos Personales

i) Nombres propios, profesiones, estudios y lugares de trabajo
ii) Abreviaturas de direcciones

Unidad 3: El mundo de la empresa

i) Tipo de empresa, actividades,etc.

Tarea Comunicativa :

i) Preguntar a si mismo o una persona
ii) Presentar las cosas y compañía
iii) Expresar una opinión(a mi juicio, en mi opinión, me parece que, opino que etc)
iv) Pedir y dar información sobre empresas
v) Expresar cierta inseguridad o duda ante una información.
vi) Expresar acuerdo o desacuerdo ante una propuesta.

Contenido Gramatical:

i) El alfabeto español
ii) El Presente de Indicativo del verbo ser y llamarse
iii) Los demostrativos: este esta,estos,estas,esto
iv) El Presente de los verbos regulares e irregulares.
v) Preguntar con qué, el pronombre relativo que
vi) La preposición en + lugar, el número de los sustantivos
vii) Los posesivos:mi,tu,su,nuestro/a/os/as
viii) El articulo indefinido plural (unos/unas)
ix) Ser + descripción de una empresa, estar en + lugar

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

Text & References:

El Libro para seguir: González, Marisa et al. *Socios 1Libro del alumno*. Barcelona: Difusión, 2007.

Syllabus - Semester Second

EFE PROFESSIONAL SPANISH FOR BUSINESS-II

(Español II)

Course Code: LAN2263 **Credit Units: 03**

Course Objective: To enable students

i) To talk about places and location, time schedule, weather
ii) To express preferences, needs
iii) To perform simple communicative tasks like placing orders, making inquiries and giving/ asking for directions.
iv) To familiarize the students with verbs, conjugation of verbs in present tense.

Course Contents: Unidad 4, 5, 6- pp. 36-56

Contenido Lexico: Unidad 4: Le Presento al director general

i) Adjetivos de carácter
ii) Cargos y departamentos
iii) Relaciones de parentesco

Unidad 5: De gestiones

i) Establecimientos y servicio
ii) Objetos de oficina

Unidad: 6: Lugares para trabajar, l**ugares para vivir**

i) Características de un piso
ii) Objetos de oficina
iii) Instalaciones y servicios de un hotel

Tarea Comunicativa :

i) Hablar del cargo de alguien.
ii) Pedir y dar la hora
iii) Hablar del horario de un establecimiento y la dirección.
iv) Preguntar por el precio y cantidades de las cosas en el mercado–adjetivos como bueno, malo, caro, barato etc.

Contenido Gramatical:

i) El Presente de Indicativo del verbo estar, el género y el número de los adjetivos, muy, bastante, un poco +adjetivo
ii) La negación, articulo, definidos (el, la, los, las), preguntas con qué, dónde, de dónde y cómo, preposiciones y locuciones de lugar: en, entre, cerca de.
iii) La forma impersonal hay, la diferencia entre estar y hay
iv) El Presente de Indicativo de los verbos irregulares con cambio vocálico: o>ue(poder) e>ie(cerrar)
v) Tener que+Infinitivo, verbo preferir y querer, contraste entre ser y estar, verbo gustar
vi) La concordancia del adjetivo, el presente de indicativo de preferir y querer.
vii) Contraste entre ser y estar, los cuantificadores del adjetivo.
viii) La comparación: más /menos+adjetivo+que, más /menos+sustantivo+que.
ix) El superlative:el/la/los/las, más /menos+adjetivo+que

Examination Scheme

Component Codes	**Class Test**	**Viva**	**Attd.**	**End Term**
Weightage (%)	15	10	5	70

El Libro para seguir: González, Marisa et al. *Socios 1Libro del alumno*. Barcelona: Difusión, 2007.

Syllabus - Semester Third

EFE PROFESSIONAL SPANISH FOR BUSINESS-III

(Español III)

Course Code: LAN2363 **Credit Units: 03**

Course Objective:
To get the students acquainted with the current social communication skills in oral and written
To furnish linguistic tools

i) To take an appointment
ii) To enquire and give information about different cities of Spain
iii) To talk about work habits and preferences (verbs like to want/ prefer)
iv) To present Spanish companies

Course Contents: Unidad 7, 8- pp. 66-76
Contenido léxico:Unidad 7 Agenda de trabajo

i) Actividades cotidianas
ii) Las partes del día
iii) Los días de la semana
iv) Proponer y concertar una cita
v) Rechazar una propuesta , justificarse , plantear una alternativa , expresar consejo
vi) Curriculum vitae

Unidad 8: Citas y reuniones

i) Hábitos alimentarios
ii) Platos típicos
iii) Los ingredientes de un plato.

Tarea Comunicativa: i) Hablar de acciones habituales y del horario.

i) Expresar gustos y preferencias de trabajo
ii) Proponer y rechazar una cita a compañeros del trabajo o invitar a unos clientes.
iii) Conversación entre un camarero y dos clientes.
iv) Expresar obligación y consejo
v) Enfrentar la entrevista de trabajo: presentar a si mismo, estudios, practicas, experiencia profesional, preparación para entrevista, simulación de entrevista.

Contenido Gramatical:

i) El presente de indicativo de empezar, querer, preferir, poder, dormir, salir etc
ii) Con+ pronombres personales:conmigo,contigo
iii) Marcadores de frecuencia y secuencia; siempre, casi siempre, a veces, nunca y primero, después, luego
iv) La construcción es que…
v) Tener que + Infinitivo
vi) Por la mañana/tarde/noche, a/al mediodía
vii) El verbo gustar, los pronombres de Objeto Indirecto, las fechas
viii) A mí también /tampoco, a mí, sí/no
ix) Expresiones para invitar y proponer algo

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

Text & References: El Libro para seguir: González, Marisa et al. *Socios 1Libro del alumno*. Barcelona: Difusión, 2007.

Syllabus - Semester Fourth

EFE PROFESSIONAL SPANISH FOR BUSINESS-IV

(Español IV)

Course Code: LAN2463 **Credit Units: 03**

Course Objective:

To strengthen the language of the students in both oral and written**.** To fine tune the grammar in application, to use present, present continuous tenses**.** To provide the students with the know-how

i) To express emotion
ii) To talk about experiences
iii) To talk about the qualities and defects of people

Course Contents: Unidad 9, 10- pp. 86-96

Contenido Léxico Unidad 9: Productos y proyectos

i) Colores, materiales, tamaño de los productos.
ii) Estaciones del año.

Unidad 10: Claves del éxito

i) Las claves para tener éxito en una empresa de nueva creación.
ii) Acuerdo y desacuerdo.
iii) Balances y resultados de una empresa
iv) Calidades en una persona para sacar buen trabajo.

Tarea Comunicativa:

i) Describir los productos: material, color, función, precio.
ii) Expresar planes y experiencias.
iii) Hablar de los proyectos de empresa y como les gusta trabajar.
iv) Expresar una hipótesis: imagina que están haciendo sus compañeros de trabajo.
v) Habla de las prioridades en un trabajo.
vi) Cosas positivas y negativas para una empresa.

Contenido Grammatical:

i) Estar+Gerundio, ir a +Infinitivo
ii) Pronombres de Objeto Directo:lo,la,los,las
iii) Más/menos/igual de/adjetivo + que , tan + adjetivo + como
iv) Verbos+mas/menos/igual/lo mismo + que, mas/menos+sustantivo+como
v) El/la/los/las mismo/a/os/as+sustantivo+que
vi) Marcadores temporales de futuro :el/la próximo/a, dentro de..etc.
vii) La preposición en como marcador temporal
viii) Es de + material, sirve para+ función
ix) Seguro que, me imagino que, a lo mejor, quizá
x) El pretérito perfecto, participios regulares e irregulares, marcadores con pretérito perfecto: hoy, este mes, alguna vez, nunca, etc., ya todavía no.
xi) Formulas para valorar hechos pasados: muy bien, regular, fatal, etc
xii) Conectores: debido a, porque, por eso, pero, sin embargo, etc.
xiii) Lo más/ menos importante es...

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

Text & References:

El Libro para seguir: González, Marisa et al. *Socios 1Libro del alumno*. Barcelona: Difusión, 2007.

Syllabus - Semester Fifth

INTRODUCTION TO SPANISH LITERATURE & SELECT SOCIO-CULTURAL ASPECTS OF SPAIN

(Introducción a la literatura y el aspecto socio cultural de España, Español V)

Course Code: LAN2563 **Credit Units: 03**

Course Objective:
To introduce the students to various literary genres through extracts of novels, plays, and poems of renowned Spanish writers. They also get acquainted with select socio-cultural aspects of Spain.

Course Contents:
Module I: Introducción al aspecto socio cultural de España

Introducción a la historia contemporánea, el sistema de la política, las instituciones y la geografía, los países de habla hispana. Pintura, cine, escultura, arquitectura, música y gastronomía.

Module II: Teatro

Autos de los Reyes Magos - **Ramón Menéndez Pidal**
Vida es Sueños- **Calderón de la Barca**
El Tragaluz – **Antonio Buero Vallejo**

Module III: Novela e Historia

La Celestina- **Fernando de Rojas**
Lazarillo de Tormes- **Anónimo**
El Conde Lucanor- **Don Juan Manuel**
Vuelve Usted Mañana- **Mariano José de Larra**

Module IV: Poesía

Yo soy un hombre sincero – **José Martí**
La Paloma– **Rafael Alberti**
Nanas de Cebolla– **Miguel Hernández**

Examination Scheme

Component Codes	Class Test	Viva	Attd.	End Term
Weightage (%)	15	10	5	70

Text & References:
El Libro para seguir: Quesada, Sebastián et al. *Imágenes de España.* Madrid : Edelsa, 2001. 2007.

Libros para referencia: Don Juan Manuel, El Conde Lucanor. Letras Hispanicas : Catedra; 22 edition (January 1, 2006) (Book 53)

Syllabus - Semester Sixth

SPANISH THROUGH ACTIVITIES

(Español a través de las actividades, Español VI)

Course Code: LAN2663 **Credit Units: 03**

Course Objective:
To introduce plays, songs, poems and films with the purpose of helping students to read, listen, write, speak and think in Spanish spontaneously; learn the content and be able to find new meanings through analysis, evaluation, synthesis and application
To launch students on their personal course of learning through training in activities like acting, reciting poems, appreciating cinematography and writing film reviews
To empower them to develop skills independently and to develop critical/ creative thinking

Course Contents:
Module I: Español a través del teatro

Escenas de juego de roles de la vida cotidiana, monólogos.
Reproduce clásico y moderno - Extractos

Module II: Español a través de canciones

Ejercicios de gramática, vocabulario, dictados, fonética mientras escuchar / aprender a cantar canciones españolas de ayer y de hoy.

Module III: Español a través de las películas

Lenguaje cinematográfico y poca gramática del cine
Críticos / películas
Module IV: Español a través de la comida

Platos populares y tradicionales españoles. Recetas de platos y vocabulario de comida.

Examination Scheme

Component Codes	Class Test	Attd.	End Term*
Weightage (%)	25	5	70

*All evaluation will be activity based.

Text & References:

TAGORE STUDIES

PREAMBLE

Tagore Studies will be a mainly Activity, Presentation and Seminar-based **Learner-Centric** Course that will offer the option of taking it up as a Minor Discipline (all six courses for 18 Credits) or One-at-a-time Course (3 Credits) under Open Elective Choice where the participants would be able to engage themselves in

- *Making a Choice, as to which Course/Courses to opt for* (for instance, someone from Fine Arts and Aesthetics background may like to opt for 'Tagore as a Culture Icon with special reference to his Painting' or 'Tagore and Mass Media,' whereas a Literature candidate may like to go for 'Tagore as a Poet' and 'Tagore as a Fiction Writer.' Students enrolled in Mass Media and Communication may love to get connected to 'Tagore and Mass Media' as well as 'Tagore as a Fiction Writer.' Those from the History orientation may like to opt for the 'Cultural History' area under 'Tagore as a Cultural Icon' module).

- *Collaboration* within or across disciplines to create a joint appraisal/critique/text which could then be presented before the class for internal evaluation – by the faculty and remaining students together – in a peer review mode together.)

- *Communication* would be tested on the oral or ppt presentations that a participant may like to make on any aspect of Tagore in a Colloquium model where one person communicates and the others on the panel comment, agree, differ or substantiate etc where their performance is evaluated.

- *Critical thinking* with respect to the issues raised by Tagore in the areas on Religion, Societal Practices, Nation Building, or Politics (especially in ENG2652) on which a participant may like to write an end-semester Term Paper.

- *Creativity* in performing a text, or putting up a play for the larger University community, or writing a sequel to or a new text/story/poem/essay creatively – or translating Tagore into one's own language based on his English versions.

COURSE OVERVIEW

It is expected that students cutting across disciplines should be interested in ENG2152 as an Open Elective course, just as students in History would like to opt for ENG2252 as well as ENG2352. Students under Mass Media and Communication may like opting for ENG2652 module whereas the students in Literature programme may find all or at least ENG2352, ENG2452 and ENG2552 to be attractive.

TAGORE STUDIES

Programme Structure

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
ENG2152	Rabindranath Tagore in the 21st Century	3	-	3
ENG2252	Tagore- Autobiographies and Biographical Sketches	3	-	3
ENG2352	Tagore as a Cultural Icon - Tagore as a Painter & Performer	3	-	3
ENG2452	Tagore as a Poet	3	-	3
ENG2552	Tagore as a Fiction Writer	3	-	3
ENG2652	Tagore and Mass Media	3	-	3
	TOTAL			**18**

TAGORE STUDIES

Syllabus - Semester First

RABINDRANATH TAGORE IN THE 21ST CENTURY

Course Code: ENG2152 **Credit Units: 03**

Theme:

The face of the world is changing, and as time passes, the changes are visible with a lot of disturbing images. But each time one feels an element of doom and despair, one's faith is rekindled to see that there are thinkers and doers like Tagore who firmly believed that ultimately the truth and beauty would prevail. It is not surprising to see Einstein sharing the same beliefs as the doyen of Indian literature, Rabindranath Tagore (1861-1941). Einstein had said: 'The ideals which have lighted my way, and time after time have given me new courage to face life cheerfully have been kindness, beauty, and truth." The progress of mankind is crucially dependent on this realization. In exchanges with Einstein, Tagore had commented: "The progress of our soul is like a perfect poem. It has an infinite idea which once realized makes all movements full of meaning and joy. But if we detach its movements from that ultimate idea, if we do not see the infinite rest and only see the infinite motion, then existence appears to us a monstrous evil, impetuously rushing towards an unending aimlessness." No amount of personal loss could make Tagore deviate from his own trajectory of working for his own country, his own times and for his own mother tongue – Bangla, or Bengali that holds together two nations, India and Bangladesh. He knew that after the dark comes light, as he said: "Clouds come floating into my life, no longer to carry rain or usher storm, but to add color to my sunset sky." Tagore's relevance today will be focused under this course.

Course Coverage:

Module-1: Contributions of Tagore and Relevance of Tagore Today

- The current economic recession and financial crises in the world, and the continuing problems of religious polarization, militarism and hostilities – Tagore's warning and predictions
- Compassionate humanism and Composite Culture in India
- Nationalism and Internationalism.
- Tagore and Education at all levels

Module-2: Tagore's works – An Introduction to the range and variety

- Number of works: A Chronological Account
- The genre of publications and the range
- Variations of the same works and the *Bichitra Variorum*

Module-3: Translation and Dissemination of Tagore's works

- Tagore's own Translations
- Authentic Translation of Tagore by others
- Multiple Translations of Tagore

- Other Indian Languages & Foreign Languages Translation – A brief account

Module-4: Tagore and International Personalities

- Tagore, Yeats and Rothenstein
- Tagore and Einstein
- Tagore and Romain Rolland
- Tagore and Leonard Elmhirst
- Tagore and Victoria Ocampo

Examination Scheme:

Components	**CT/OP**	**AS/LC**	**A**	**EE**
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)
Through this course, we are made aware as to why Tagore was critical of the de-humanizing economic systems, which, supported by educational methods based principally on competitions and rote-learning, fail miserably in generating creative and sensible individuals ready to think beyond the texts. Tagore's own practical project was to show the way for a modernized and less restrictive form of society that does not shun or abandon traditional values, but one that comprise networks of self sustaining groups, villages, or communities, where children and young people are encouraged to develop their natural curiosity and creativity, and to express themselves freely with body and mind. Tagore's approach to education and rural reconstruction, if implemented widely as he intended, could lead to a radical redesign of society, a turning of the world upside down. For both planners and thinkers, it is important to see the relevance of Tagore's arguments beyond his own time.

At the end of the course students will be able to: (Definitive Outcomes)
(i) Understand the text used,
(ii) Talk about the text,
(iii) Think about issues raised by Tagore through his writings,
(iv) Work with his ideas, and
(v) Raise new issues in the changing contexts to see the relevance of Tagore's messages.

Resources:
Main Text:

- Bhattacharya, Krishnachandra. (1931). 'Swaraj in Ideas,' Ashutosh Memorial Lecture. *Visva-Bharati Quarterly* 20, 103-114.
- Crolick, Sandy. (2010). 'Crisis in civilization and Cultural criticism'. March issue, *Ezinearticles*. Url: (http://ezinearticles.com/?The-Crisis-of-Civilization-And-Cultural-Criticism&id=3876540
- Das Gupta, Uma, ed. (2006). Rabindranath Tagore: My Life in My Words. New Delhi: Penguin/Viking.
- Das Gupta,Uma & Anandatup Ray (2009) Rabindranath Tagore & His Contemporary Relevance. Parabaas at https://www.parabaas.com/rabindranath/articles/pContemporaryTagore.html
- Singh, Udaya Narayana. (2011a). Man at The Centre Of Universe - Tagore's Ideas On Complete Education. *India Perspectives*, 24.1. MEA, New Delhi.
- Singh, Udaya Narayana. (2012a). 'U-Topos & Tagore: Inaugural Talk' in Konrad Meisig, ed. *Utopias from Asia*: An International and Inter-disciplinary Symposium in Santiniketan on the

occasion of the 150th Birthdy Anniversary of Rabindranath Tagore (An Asian Impact Activity In Memorium of Momoyo Okura). Weisbaden: Harrassowitz Verlag. Xvii-xxvi.

- Singh, Udaya Narayana & Navdeep Suri, eds. (2011). *Rabindranath Tagore: A Commemorative Volume*. 1861-1941. New Delhi: Public Diplomacy Division, Ministry of External Affairs, Government of India.
- Tagore, Rabindranath. (1928). *Letters to a Friend*, edited with two introductory essays by C.F.Andrews. London: George Allen & Unwin; 1929. New York: The Macmillan Company. Also in Sisir Kumar Das, ed. 1994. *The English Writings of Rabindranath Tagore: Vol III: A Miscellany*. New Delhi: Sahitya Akademi.
- Tagore, Rabindranath. (1929) 'Ideals of Education', *Viśva-Bhāratī Quarterly*, April-July 73-74
- Tagore, Rabindranath. (1931) *The Religion of Man.* Kolkata: Granthan Vibhaga, Visva-Bharati. Reprinted (1970). London: Unwine Books
- Thompson, Edward. (1921). Rabindranath Tagore: His Life and Works. Kolkata: YMCA, 1921; rpt. 1961.

Additional Texts:

- Dev Sen, Nabaneeta. 2006. 'Crisis in Civilization and a Poet's Alternatives: Education as one alternative weapon' (www.parabas.com Special Rabindranath Tagore section) Paper presented at an International Seminar on Tagore's Philosophy of Education, organized by Chicago University Law School, at Ramkrishna Mission Institute of Culture in Kolkata on 29 March 2006
- Dutta, Krishna & Robinson, Andrew. (1995). *Rabindranath Tagore: The Myriad-Minded Man*, New York: Saint Martin's Press.
- Singh, Udaya Narayana. (2013a). Tagore redrawing the *Boundaries*: In other words, Crossing the limits of language. In Sanjukta Dasgupta & Chinmoy Guha, eds. *Tagore: At Home in the World*, New Delhi: Sage. 3-12. An earlier version: (2010) Retrieved from http://www.museindia.com/viewarticle.asp?myr=2010&issid=33&id=2130 in *Muse India* portal [ISSN: 0975-1815];

Other Readings:

- Singh, Udaya Narayana. 2006. *India Writes: A Story of Multilingual and Pluricultural Society.* New Delhi: National Book Trust. 154 pp. Frankfurt Book Fair, Guest of Honor Publication.
- Tagore, Rabindranath. (2008). *Sadhana* (1935), In *The English Writings of Rabindranath Tagore* (Vol 2, pp. 19-26). Ed. by Sisir Kumar Das. New Delhi: Sahitya Akademi. Originally, (1916/1922). *Sādhanā: The Realisation of Life*. New York: The Macmillan Company.
- Chatterjee, Ramananda et al, eds. (1931). *The Golden Book of Tagore.* Calcutta: The Golden Book Committee.

Syllabus - Semester Second

TAGORE- AUTOBIOGRAPHIES AND BIOGRAPHICAL SKETCHES

Course Code: ENG2252 **Credit Units: 03**

Theme:
In this section, we shall first look into Tagore's 1912-work *Jibansmriti*, the English translation of which, *My Reminiscences*, was published by Macmillan in 1917 under Surendranath Tagore's translation. Here Tagore describes the early years of his life; his experiences of loneliness, love, and loss. Tagore's emergence as a poet could also be read about here. In this work, he introduces his family circle and describes his experience with the formal education against which he rebelled. In a published lecture, titled "My School" (*The Modern Review*, 1931), Tagore speaks of his mission to revolutionize education by rearing young minds in harmony with nature. His autobiographical texts capture a child's-eye view of a mysterious, fascinating world in which fantasy blends seamlessly with reality. In a portion, he also describes his first encounters with death, the poignancy.

Tagore's book - *Talks in China* (1925) which was largely autobiographical, contextualizing his life in relation to the broad historical trends of the time, came up after he was invited by Liang Chi-Chao, president of the University Lecture Association of Beijing in April–May 1924. This will also be touched upon.

Tagore's *Chhelebela* (*Boyhood Days*) was published in 1940, in response to a request to write something for young readers, where Tagore embarked on this delightful account of his childhood and adolescence.

When Rabindranath Tagore passed away in 1941 he left behind thousands of pages of poetry, prose, plays, essays, letters, humorous pieces, autobiographical writings, and travel literature. An astonishing number of these works remain of interest to us even today. In a letter in *Chhinnapatra* (*Torn Leaves*, 92), Tagore confesses that though poetry has been for him "a kind of secret and forbidden delight," he has also found pleasure in writing short fiction, writing "in the form of a diary or some such genre," as well as producing polemical pieces. He affirms that it is "very important to cross swords with our people on social issues," although this offers him a pleasurable dilemma: "I don't want to disappoint any of my Muses." His growing awareness of and talent for theater and performing arts, including music and dance were all discussed here.

Finally, in *Atmaparichay* (*Self-Recognition*, 1943), a collection of six introspective essays published posthumously, Tagore reveals some other aspects of himself – when he says: "It is not easy to know oneself. It is difficult to organize life's various experiences into a unified whole."

Course Coverage:
Module-1: The Childhood days – Growing up and De-schooling (1861-78)

- Prince Dwarkanath Tagore, Raja Rammohun Ray & Bankimchandra
- Debendranath Tagore and the Jorasanko Family
- Early Childhood, Loss of Mother and the influence of elder brothers
- Giving up Schooling and Self-education

Module-2: Tagore and his says of the Youth – Creative Urge (1878-1889)

- Tagore's "education" in England
- Begins to write and publish poetry
- Marriage, Children and Death in the family
- In Eastern Part of Bengal and Contacts

Module-3: Tagore as an Administrator and Institution Builder (1890-1913)

- Tagore's Management of Estate and Rural reconstruction
- Moves to Santiniketan to set up a School
- Tagore as an essayist and participation in nation building
- Spurt in poetic creativity and Short Stories
- The Nobel Prize

Module-4: Tagore's Discovery of the Self (1914-1941)

- Establishment of 'Sriniketan' and the experiments
- Tagore and Gandhi relationship
- Numerous travels abroad and Belles letters
- Tagore's influence over the contemporaries
- Tagore's philosophy

Examination Scheme:

Components	**CT/OP**	**AS/LC**	**A**	**EE**
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)
There could be several reasons as to why one benefits immensely from reading biographies and autobiographies. These texts help us see where we are going and where we need to go to because they allow us to *stand on the shoulders of giant scholars and performers.* Sir Isaac Newton wrote in a letter (in 1670) to his friend Robert Hooke, "If I have seen further, it is by standing on the shoulders of giants" That is exactly what reading biographies can do for you – allow you to see further. Then, George Santayana had warned us in 1905, "Those who cannot remember the past are condemned to repeat it." Therefore, the best way of taking advantage from others is by reading about their lives. There may not be a direct lesson as you will have to discover for yourself as to what lessons are there to learn. It is therefore a way of promoting 'self-help' based on the stories and experiences of others. It is, as if, Tagore would mentor you from a distance in finding answers to your own questions in life. It is difficult to generalize but all smart people, and all great leaders read biographies. Their personal libraries are likely to have a few biography and memoir and autobiography.

At the end of the course students will be able to: (Definitive Outcomes)
(i) Learn how to write a daily journals of their own activities and make it a habit which could be of great use in future.
(ii) Learn how to jot down great ideas for use at an appropriate time.
(iii) Come out of agony and depression to see that finally truth does prevail and perseverance pays.
(iv) Will come to know of many unanswered questions about history of the era mentioned in the books.

(v) Find a lot of materials and quotable quotes for use in later days.

Resources:
Main Text:

- Alam, F. & Radha Rani Chakravarty, eds. (2011), *The Essential Tagore*, Harvard University Press & Visva-Bharati.
- Das Gupta, Uma. (2004). Rabindranath Tagore: A Biography. New Delhi: Oxford University Press.
- Kripalani, Krishna. (1962). Rabindranath Tagore: A Biography. New York: Grove Press.
- Tagore, Rabindranath (1916), *Sādhanā: The Realisation of Life,* Macmillan
- Tagore, Rabindranath (1917) *My Reminiscnces*. New York: McMillan.
- Tagore, Rabindranath (1930), *The Religion of Man*, Macmillan
- Tagore, Rabindranath (2005), *My Boyhood Days* [Tr from *Chelebela*, 1940]. Kolkata: Rupa & Co.

Additional Texts:

- Ayyub, A. S. (1980), *Tagore's Quest*, Kolkata: Papyrus.
- Henn, Katherine. (1985). Rabindranath Tagore: A Bibliography. ATLA Bibliography Series, 13; London: The American Theological Library Association.
- Kripalani, K. (2005), *Tagore—A Life*, National Book Trust of India
- Sigi, R. (2006), *Gurudev Rabindranath Tagore—A Biography*, Diamond Books.
- Som, R. *(2010), Rabindranath Tagore: The Singer and His Song*,
- Thompson, E. (1926), *Rabindranath Tagore: Poet and Dramatist*, Pierides Press.
- Stewart, T. K. & Twichell, C. (translator) (2003), Rabindranath Tagore: Lover of God, Lannan Literary Selections, Copper Canyon Press.

Other Readings:

- Das, Sisir Kumar. (2007). Atmajibani: Jibani O Rabindranath (Autobiography: Biography and Tagore, in Bengali). Kolkata,
- Radice, W. (translator) (1995), *Rabindranath Tagore: Selected Poems* (1st ed.), London: Penguin (published 1 June 1995).
- Radice, W (translator) (2004), *Particles, Jottings, Sparks: The Collected Brief Poems*, Angel Books (published 28 December 2004).
- Mukhopadhyay, Prabhatkumar and Kshitis Roy, eds. (1961). Rabindranath Tagore: A Centenary Volume, 1861–1961, Forword by S. Radhakrishnan. New Delhi: Sahitya Akademi.

Syllabus - Semester Third

TAGORE AS A CULTURAL ICON - TAGORE AS A PAINTER & PERFORMER

Course Code: ENG2352 **Credit Units: 03**

Theme:
This unit will take us back to look at our cultural history – particularly at the way it unfolded itself during the last few hundred years. When we were beginning to negotiate with the western world, we lacked either the will or the vision, or perhaps both, in constructing our own cultural landscape. As a civilization in India, we had the required talent, the native intuition and appropriate knowledge to create our own pathways. But while under the British rule, we failed to communicate this wisdom and originality, because we fell into the trap of believing that we must build, promote and practice a medium of expression that should be understood by our western readers or viewers. That forced us to adopt the medium of English and its styles of expression. These we then decided to introduce in our education system that would be open only to the elites and the middle class gentry. It was not at all surprising, therefore, that along with English poetry and drama, the average neo-educated Indians began to adore the life-style and culture of their British masters, including their music, taste, dress, and even sports. We had been at an interesting cross-road of history when Tagore had emerged as an indigenous Cultural Icon that could match with the best in the west. Tagore's advent came as a boon to both civil society in India and to our cultural fields. How Tagore emerged as a Cultural Icon in a subjugated country is discussed here with copious examples from different fields of culture and literature to which he had contributed.

Course Coverage:
Module-1: Indian Cultural History and Emergence of Tagore

- 18th-19th Century Bengal and the British Indian Rule
- Cultural, Social, Intellectual and Artistic Re-awakening

Module-2: Doodling, Designs and the Brand Santiniketan

- Doodling on poetry copy-books with Hand-writing and Erasure aesthetics
- Masks, Faces and Designs
- Bringing in Designers Andre Karpeles and Stella Kramrisch (1896-1993)
- Abanindranath Tagore

Module-3: Tagore's Experiments in Painting & Creating an Arts School

- The range of Tagore's Paintings
- Painting nature and mystic landscapes
- Merger of the Familiar and the Unknown
- Dramatic Figures and Scenes

Module-4: Tagore as a Playwright and his experiments in Music and Dance

- From 'Valmiki Pratibha' (1881) to 'Visarjan' (1890) to 'The Post-Office' (1912)
- The Sung Poetry and his own Musical experiments with fusion
- Dance-Drama as a genre

Examination Scheme:

Components	CT/OP	AS/LC	A	EE
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)

The fallacy in the perception that the 'Eastern' or so-called 'Oriental' Culture remains static – visibly recognizable over a long period of history began to change to become more like the 'Western' culture with the advent of the English rule and education will be clear with these lectures. The stereotype of the 'Unchanging East' and the meek acceptance of the meaning of 'Progress' or 'Development' as a move towards 'Material Culture' need to be demystified. A very practical advice that Tagore had given to those who are worried about this area could be seen in his statement: "You have to judge progress according to its aim. A railway train makes its progress towards the terminus station – it is a movement. But a full grown tree has no definite movement of that kind. Its progress is the inward progress of life. It lives, with its aspiration towards light tingling in its leaves and creeping in its silent sap." How Tagore had created a fusion of the best traditions of the west and the east in his plays and music to emerge as a Cultural Icon of our time is explained in this course.

At the end of the course students will be able to: (Definitive Outcomes)
(i) Appreciate Tagore's contribution in national reawakening that happened in the 19th Century India;
(ii) Be exposed to some of the finest musical experiments and scores where words touching one's soul and tunes appealing to one's senses get enmeshed;
(iii) How plays could be used as instruments in social awakening or in protest movements could be clear from this course
(iv) How education could change the face of our Society and Humanity will be appreaciated.

Resources:
Main Text:

- Clothey, Fred (2006). *Religion in India: A historical introduction*. London New York: Routledge.
- Keay, John. (2011), *India: A History*, 2nd Ed – Revised and Updated, Grove Press / Harper Collins,
- Henderson, Carol E. (2002). *Culture and Customs of India*. Greenwood Publishing Group.
- Lal, Ananda. (2001), *Rabindranath Tagore: Three Plays*. Oxford University Press.
- O'Connell, Kathleen M. & Joseph T. O'Connell, eds. (2009), *Rabindranath Tagore: Reclaiming a Cultural Icon.* Kolkata: Visva-Bharati Granthan Vibhaga.
- Parimoo, Ratan. (1973) *The Paintings of Three Tagores: Abanindranath, gaganendranath and Rabindranath – Chronology and Comparative Study.* Vadodara: MS University.
- Sarvabhutananda, Swami et al, eds. *Proceedings of the International Seminar on Cultural Unity of India*; Feb 16-19, 2013; Kolkata: Ramakrishna Mission Institute of Culture.
- Sivakumar, Raman, ed. (2011) *Rabindra Chitravali*, 4 Vols. Pratikshan, Kolkata & Visva-Bharati, Santiniketan
- Sivakumar, R. (2011). *The Last Harvest: Paintings of Rabindranath.* Ahmedabad: Mapin.
- Som, Reba (2009). *Rabindranath Tagore: The Singer and his Song*. New Delhi, India: Penguin Books (Viking).

Additional Texts:

- Dalmia, Vasudha and Rashmi Sadana (editors), *The Cambridge Companion to Modern Indian Culture*, Cambridge University Press,
- Walia, Shelly. URL: https://qz.com/603884/portraits-of-some-of-indias-oldest-indigenous-tribes/

Other Readings:

- Bhattacharya, Sabyasachi, ed. (1997), *The Mahatma and the Poet: Letters and Debates between Gandhi and Tagore: 1915-1941*. New Delhi: National Book Trust.
- Chaki-Sarkar, Manjusree. (2003) 'Tagore and the Modernization of the Indian Dance.' In Sunil Kothari ed *New Directions in Indian Dance*. Mumbai: Marg Publications.
- Robinson, Andrew. (1989). The Art of Rabindranath Tagore. London: Andre Deutsch.

Syllabus - Semester Fourth

TAGORE AS A POET

Course Code: ENG2452 **Credit Units: 03**

Theme:
Noted American author, Pearl Buck wrote about Tagore's poetry: "In a very real sense he was a world poet…He spoke out of his own soul and mind and heart. To him beauty is eternal and invincible, the indispensable source of refreshment for the soul, the mind, the heart of mankind." Rabindranath began writing poems at the age of 6 and as a young boy studied the classical poetry of Kalidasa. He also studied the Upanishads, languages and modern sciences. He was sent to England in 1878 to become a barrister, but he returned by 1880 without completing his education. His marriage to Mrinalini Devi, and his later assignment to look after his family's estates in the areas now in Bangladesh, allowed him a productive period of writing poetry, plays and short stories. When he joined Santiniketan (in West Bengal) to found an ashram, which became a world school, the opportunity grew further. Tagore thus emerged as Asia's first Nobel Prize winner for literature in 1913 for his book – 'The Song Offerings: Gitanjali'. As a creative genius and a seer-poet, he also played a crucial role in the cultural renaissance of India and Bengal in the 19th and early 20th Century.

Although he was inspired by notable poet Biharilal Chakrabarty and acknowledged him as his poetry-guru, his own poetry was undeniably unique. This was evident right from his first published volume of poetry entitled "Sandhyasangeet" (or Evening Songs) which came out in 1882. When his greatest source of inspiration - his sister-in-law Kadambari Devi, a wise and brilliant woman of her time, passed away in 1885, it inflicted a deep wound on Rabindranath. This sense of loss finds expression in many of his works, from "Kori O Komal" (1886) to several others. Rabindranath also wrote "Prabhat Sangeet" (or Morning songs) soon. The poems of love in this collection also symbolized the naissance of Rabindranath's personal view of God. The history of the completion that which Rabindranath was talking of, may be found in several other anthologies - "Naivedya", "Utsarga" and "Kheya", as also in "Chitra", "Kalpana" and "Khanika" – and subsequent works of his, until 'Gitanjali' (1910). Poems of yearning for the Divine, an immense craving for the Infinite, form an integral part of the temperament of the lyrical poems of "Gitanjali". In 1913, the English edition of "Gitanjali" was published with an introduction by English poet, W. B.Yeats. The rest is history. This course will also present a glimpse of the post-Gitanjali poetic creations of Tagore which took a completely different turn.

Course Coverage:

Module-1: Early Phase of Tagore's Poetry

- The Prabhat Sangeet (1883) and the Sandhya Sangeet (1882) days
- The 'Kari o Komal' (1886), 'The Manasi' (1890) and the 'Chitra' & 'Chaitali' (1896) phase

Module-2: The 'Gitanjali' Period

- 'Kanika' (1899), 'Kshanika' (1900) and the Bengali Original 'Gitanjali' (1910)
- Making of the English Gitanjali (1912)
- The sequels – 'Gitimalya' (1914) and 'Gitali' (1914)

Module-3: The Poetic Plays

- The 'Chitrangada' (1892) – based on the epic story of the Maha-Bharata
- The 'Chandalika' (1938) – touching upon the issue of caste prejudices
- The Card Country, or 'Tasher Desh' (1933)

Module 4: Later Phase of Tagore's Poetry

- Punascha' (1932) and 'Parishesh' (1932)
- 'Shesh Saptak' (1935), Patraput (1936) and Shyamali (1936)
- 'Shesh Kotha' (1940) and 'Rogshajyay' (1941)
- Poetry on Paintings – 'Bichitrita' 91933)

Examination Scheme:

Components	**CT/OP**	**AS/LC**	**A**	**EE**
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)

Going through this course will make the participants appreciate the position of Tagore, namely, that since Man did not have any choice as to his origin and his state, i.e. his environ, and because the human mind is not contented with what is given, man likes to create, construct and set up himself and all that is around him in the way he likes. This works as a driving force for all in literature and art. Because man was not born complete, he wants to get over his incompletion by creativity. Yet another learning outcome will be to realize what Tagore mentions in his essay, 'The Significance of Literature.' Through his poems, Tagore makes an attempt to define the various worlds that he places before him as a thinker-author – some real, and some unreal; some approachable through 'language', and some that employ a "language that is beyond language". This Utopia expressed in his mystic poetry becomes clearer when we see him saying:

"The world becomes another world in our mind. In this world exist not only the color, shape, sound, and other attributes of the other world, but also our likes and dislikes, our fear and wonder, our pleasure and grief. Our mind, through its various processes, suffuses the outside world differently… This act of the mind enables us to individualize external reality… Through the color and shape of their mind, the external world assumes variegated shapes… This world is more precious to the imaginative individual than the outside world or the human world. The mind helps this world to become more suitable for access into people's hearts, rendering it unique for consumption… Thus there is a difference between the outside world and the human world. The human world does not inform us of what is black and white and what is large and small. It tells us of what is dear and vile, what is beautiful and ugly, and what is good and bad in different ways."
It is the nature of the human mind and the human world that get truly reflected in his poetry – which the participants will be able to discover through this course.

In particular, a few of Tagore's poems in English translation would be discussed here from 'The Fountain's Awakening' to 'The dark Night of Sorrows.' Tagore's songs (over 2500 compositions) that belong to another genre of poetry will also be presented and discussed here, since Tagore had himself declared that music being the most abstract of all the arts, just as mathematics was in the region of science, musical expression was the purest and most unimpeded form of creative expression. And it is in

his songs that the evolution of the poet from what he called a state of being into one of becoming is best captured.

At the end of the course students will be able to: (Definitive Outcomes)
(i) Comprehend the influences on Tagore by the poetic tradition of India
(ii) Read and recite a few major poems in English translation and be exposed to some fine recorded recitations of original poems
(iii) Understand the problems and nuances of poetic translation of Tagore texts – based on translations done by the poet himself and by the others
(iv) Be exposed to a variety of poems – with so much of thematic and stylistic variations

Resources:
Main Text:

- Alam, Fakrul & Radha Chakravarty, eds. (2011) The Essential Tagore. Harvard University Press & Visva-Bharati.
- Hogan, Patrick Colm & Lalita Pandit, eds. () *Rabindranath Tagore: Universality and Tradition*. Madison, Teaneck: Fairleigh Dickinson University Press.
- Jelnikar, Ana. (2008). "W. B. Yeats's (Mis) Reading of Tagore: Interpeting an Alien Culture," University of Toronto Quarterly 77:4 (Fall no, 2008).
- Kabir, Humayun (1959). 'Tagore's Poetry'. *Indian Literature* Vol. 2, No. 1 (Oct. 1958—Mar. 1959), pp. 5-20
- Singh, Udaya Narayana. (2013/2016). *The Original Gitanjali*. Andorra: AnimaViva multilingüe SL, Escaldes – Engordany, Principat d'Andorra. Indian edn., Kolkata, Delhi: E-Lekhan Foundation.

Additional Texts:

- Aronson, Alex. (1943). Rabindranath Through Western Eyes. Kolkata.
- Zahurul Haque, Abu Saeed. (1981) Folklore and Nationalism in Rabindranath Tagore. Dhaka: Bangla Academy.

Other Readings:

- Mukherjee, Sujit. (1964). Passage to America: The Reception of Rabindranath Tagore in the United States, 1912–1941. Kolkata: Bookland.

Syllabus - Semester Fifth

TAGORE AS A FICTION WRITER

Course Code: ENG2552 **Credit Units: 03**

Theme:

Rabindranath Tagore is a poet dramatist, novelist, actor, composer, educator, painter, and a Philosopher. In a word he is the Leonardo-da–Vinci of our Renaissance True to the Indian Tradition, his own philosophical vision was depicted is his essays, stories as well as in his fiction. Tagore's short stories emerged at a time when this genre was not so well-cultivated in India, and they have given rise to many films later. The stories often deal with apparently simple subject matter: commoners, whereas his non-fiction writings dealt with history, linguistics, and spirituality. Well-known also as travelogue writer, his *Europe Jatrir Patro* ('Letters from Europe') are a treat to read. His career as a story-teller through dramatic mode began with *Balmiki Pratibha* in 1881 but soon he came up with *Bisarjan* (1890). His later dramas such as *Dak-ghar* ('The Post Office, 1912) or *Raktakarabi* ('Red Oleanders' 1926) were more philosophical and allegorical. The dance dramas such as *Chandalika* (1938), *Shyama* (1939), and *Chitrangada* (1905) are still extremely popular. This unit will also give an introduction to Tagore's well-known novels – Chokher bali (1903), Noukadubi (1906), Gora (1910), Chaturanga (1916), Ghare Baire (1916), Jogajog (1929), Char Adhyay (1933), and Shesher Kabita (1929) etc.

Course Coverage:

Module-1: Tagore's Initial Texts leading to his 'Galpaguccha'

- 'Bou-Thakuranir Hat' (1883) and 'Rajarshi' (1887)
- The beginning of his short stories from 1891 – 'Byabadhan', 'Khokababur Pratyabartan', 'Postmaster' (1891);
- 'Dena-paona', 'Ekti Asharhe Galpo' and Kabuliwalla' (all 1891-92);
- 'Kshudhita Pashan' & 'Icchapuran' (1895)

Module-2: Selected Novella – Initial Phase

- 'Nashtanir' (1901);
- 'Chokher Bali' (1902);
- 'Noukadubi' (1906)

Module-3: Selected Novels – Later Phase

- Gora (1910)

Module-4: Poet as a Story-teller – Experiments in Fusion

- Ghare Baire (1916)
- Shesher Kavita (1929)

Examination Scheme:

Components	CT/OP	AS/LC	A	EE
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)
This course will provide a thorough and in-depth knowledge of Tagore's profound understanding of human emotions, values and social systems in nineteenth and twentieth century Bengal. More importantly, the man-woman relationships dramatized in Tagore's novels and plays will provide the learners with a glimpse of the turbulences and upheavals that in turn will enable to comprehend the larger politics of gender, sexuality and patriarchy in various guises. One will gradually have a critical acumen to realize the play of hierarchies in the past and the contemporary times. Also, a reading of Tagore's novels will make one aware of his humanist thinking that undermined the parochialism and jingoist nationalism. Tagore's broader humane worldview that repudiated ultra-nationalist excesses is very relevant for today. His plays and novels show that though he argued fiercely against the bonds of colonialism, he warned against the excesses of nationalism. For him "the idea of the nation is one of the most powerful anesthetics that man has invented." So, no wonder, going through this course one will not only revisit the colonial/ national histories, changing roles and status of women but also will grasp the working of social dynamics in different forms in the current era.

At the end of the course students will be able to: (Definitive Outcomes)
i) Appreciate Tagore's take on nationalist and colonial histories.
ii) Understand Tagore's lyrical humanism and how that is pertinent in a world of strife and conflict
iii) Explore the representation of women and how it is related to the feminist studies.
iv) Unravel how fiction can written as a mode of beauty and truth as well as to radically critique the systemic ideologies.

Resources:
Main Text:

- Chaudhuri, Amit. (2008) Clearing a Space: Reflections on India, Literature and Culture. Delhi and Ranikhet: Permanent Black.
- Nussbaum, Martha C. (1996) For Love of Country?, edited by Joshua Cohen for Boston Review. Boston: Beacon Press.
- Sen, Amartya. (2005) "Tagore and His India," reprinted in The Argumentative Indian: Writings on Indian History, Culture and Identity. London: Allen Lane/Penguin, 89–120.
- Tagore, Rabindranath (2009). *Gora*. India: Penguin.
- Tagore, Rabindranath (2005). *Home and the World*. India: Penguin Classics
- Tagore, Rabindranath (2004). *Chokher Bali*. Kolkata: Rupa Publishers
- Tagore, Rabindranath (2012). *Red Oleanders*. Kolkata: Niyogi Books Private Ltd
- Tagore, Rabindranath (2012). *Selected Stories*. India: Maple Press

Additional Texts:

- Chakrabarti, Santosh (2004). *Studies in Tagore: Critical Essays*. New Delhi: Atlantic
- Chanda, Singh Geetanjali (2008). *Indian Women in the House of Fiction*. New Delhi: Zubaan
- Chatterjee, Indira (2007). *A Thematic Study of Tagore's Novels*. Gurgaon: Shubhi.
- Chatterjee, Bhabatosh (1996). *Rabindranath Tagore and Modern Sensibility*. Delhi: Oxford University Press

- Dutta, P. K (2004). Rabindranath Tagore's *The Home and the World*: A Critical Companion. New Delhi: Permanent Black
- Sen, Krishna & Tapati Gupta, eds. (2006). Tagore and Modernity, Kolkata: Dasgupta & Co.

Other Readings:

- Bandyopadhyay, Asit (2004). "Rabindranath Tagore: Novelist, Short Story Writer and Essayist." *Studies on Rabindranath Tagore*. Ed. Mohit K. Ray. New Delhi: Atlantic.
- Basu, Rajasri (2012). Ed. *Women and Tagore*. New Delhi: Abhijeet
- Dasgupta, Sanjukta (2017**).** *Remembering Rabindranath*. Retrieved from http://www.museindia.com/focuscontent.asp?issid=33&id=2157 in *Muse India* portal [ISSN: 0975-1815]
- Dutta, Ram (2009). *Celebrating Tagore*. New Delhi: Allied.
- Mukhopadyay, Subhas (1999). *Tagore Without Bounds: Samvastar Lecture XII*. New Delhi: Sahitya Academi
- Roy, Soumitra (2017). *Tagore's Ghore Baire*. Retrieved from http://www.museindia.com/focuscontent.asp?issid=33&id=2135 in Muse India portal [ISSN: 0975-1815]
- Raj. G. V (1983). *Tagore: The Novelist*. New Delhi: Sterling.

Syllabus - Semester Sixth

TAGORE AND MASS MEDIA

Course Code: ENG2652 **Credit Units: 03**

Theme:
Very few are aware that Rabindranath Tagore had himself dabbled into screenplay writing in the early days of Indian cinema. The silent era Orient Pictures film '*Balidan*' (1927) directed by Naval Gandhi and based on Tagore-play '*Bisarjan*' (known in English as '*Sacrifice*'), had its screenplay written jointly by Jamshed Ratnagar and Rabindranath Tagore. This commercially successful film was set in the fictional kingdom of Tippera, and involved clashes between a progressive-minded King and a "tradition-bound priest.

'*Natir Puja*' (*The dancing girl's worship*, 1932) - based on a recording of his 1926 dance-drama - is the only film where Rabindranath Tagore is credited as the director. Produced by B.N.Sircar of the New Theatre's Group, it was shot in four days where Tagore had himself enacted a small role. Although it was not a commercial success, the prints of the film were destroyed in a fire at the New Theatres. Though recently, attempts have been made to restore the film.

Tapan Sinha's Bengali version of Tagore-story '*Kabuliwala*' (1957) was remade in Hindi in 1961 – with the lead role being played by Chhabi Biswas in Bengali and Balraj Sahni in Hindi. Both versions were immensely successful aesthetically as well as commercially. The music was scored by Pt Ravi Shankar for the Bengali version and by Salil Choudhury for the Hindi version. It received two National Film Awards in 1956 and the Silver Bear Extraordinary Prize of the Jury in the Berlin Film Festival. The story was translated from Bangla into English by the Irish woman Margaret Elizabeth Noble, more popularly known to the world as Sister Nivedita.

Satyajit Ray's '*Teen kanya*' (literally, 'The Three Daughters') was a tribute to Tagore in his centenary year – 1961 as it was made out of three stories by the Master – 'Postmaster', 'Monihara' ("The Lost Jewels'), and 'Samapti' ('The Conclusion') – awarded as the best film at the National level and also honored at the Berlin Film Festival. The common thread seems to be three extraordinary women and their tale of love and affection.

'*Dak Ghar*', a 1912-play by Tagore, rendered into English by W.B.Yeats, and translated and performed in Spanish, French, German and Polish in Europe, was made into a Hindi film in 1965 – directed by Zul Vellani, produced by the Children's Film Society.

Many other successful films could be named – such as Kumar Shahani's 1997-film '*Char Adhyay*' produced by NFDC – based on Tagore's 1934 novel, and remade recently as a successful Bengali commercial film – '*Elar Char Adhyay*' (2012) directed by Bappaditya Bandopadhyay. In between, the same novel became the subject matter of another film – '*Chaturanga*' (2008) directed by Suman Mukherjee

There was yet another classic Tagore film that was remade – Satyajit Ray's '*Charulata*' (1964), with Soumitra Chatterji, Madhabi Mukherjee and Shailen Banerjee - remade by Agnidev Chatterji in 2012 with Rituparna Sengupta, Arjun Chakraborty and Kaushik Sen. Ray had received the Silver Bear as the

Best Director in the 15th Berlin International Festival in 1965 for this film and also Golden Lotus Award nationally in the same year.

There were some more movies with double versions – such as Tagore's story '*Naukadubi*' ('The Wreck') being made as '*Ghunghat*' (1960) by Ramanand Sagar under a Gemini Studio production where Bharat Bhushan, Leela Chitnis, Pradeep Kumar, Bina Rai, Asha Parekh etc acted. The film went on to get two Filmfare awards. In 2011, Rituporno Ghosh made it in Bengali under the original title – 'Noukadubi' – produced by Subhash Ghai, and it was premiered as the opening film of the *Indian Panorama* section during the 41st International Film Festival of India (IFFI), Goa on 24 November 2010, in the year that marked Rabindranath Tagore's 150th birth anniversary.

Course Coverage:
In this unit, memorable films and other performances made out of Tagore's works will be introduced, viewed and discussed, and a few documentary films on Tagore will be shown as a part of the course. Evaluation pattern will differ from the other courses under Tagore Studies.

Module-1: Satyajit Ray and Rituparna Ghosh on Tagore's Biopic plus some other Documentaries on Tagore & Discussions
Module-2: Memorable films – Charulata (Satyajit Ray 1964)
Module-3: Chokher Bali (Rituparno Ghosh, 2003)
Module-4: Ghare Baire (Satyajit Ray, 1985)
Module-5: Multiple versions of Tagore films – 'Kabuliwala', 'Char Ahyay', 'Charulata' etc.

Examination Scheme:

Components	**CT/OP**	**AS/LC**	**A**	**EE**
Weightage (%)	20	05	05	70

CT/OP: Class Test/Oral Presentation, AS/LC: Assignments/Library Consultation, A: Attendance, EE: End-Term Examination

Learning Outcomes: (of the Course)
Tagore has been a source of inspiration to generations of filmmakers and theatre performers. Be it his songs, poems, short stories, novels, or plays, his works attracted many. Even recently, a few film-directors such as Sekhar Das (Jogajog) and Suman Ghosh (Kadambari) came up with elements from tagore stories or from his life. Subhabrata Chatterjee's debut Bengali film, Monihara, based on Tagore's short story was another example. Suman Mukherjee of 'Chaturanga'-fame was working on his next film, Shesher Kabita, based on Tagore's novel of the same name. Tagore's influence on the Bengali television too can't be denied. A television series, Chokher Bali, based on Tagore's work, which was launched recently, too has found many takers.

This being the pervasive influence of Tagore on Mass Media, a student with interest in cinematography, screenplay or direction and production would be incomplete without being exposed to a course such as this. It would also bring out the best in the candidate in appreciating or critiquing film and television classics.

At the end of the course students will be able to: (Definitive Outcomes)
(i) The Social Reformist in Tagore could be understood better through this course. His political ideas would be clearer.
(ii) The stunningly contemporary elements in Tagore's stories would be possible to use in further studies and works by the candidates.

(iii) The issues of gender equality and women's emancipation would be appreciated through this course.
(iv) Since Tagore's translation do not match the quality of his originals, the cinematic translations in the inter-semiotic endeavors make it easier for us to appreciate his genius.

Resources:
Main Text:

- Asaduddin, M & Anuradha Ghosh. (2012) *Filming Fiction: Tagore, Premchand*. New Delhi: Oxford University Press.
- Barnouw, Eric (1981) 'Lives of a Bengal Filmmaker: Satyajit Ray of Calcutta.' The Quarterly Journal of the Library of Congress, Vol. 38, No. 2 (SPRING 1981), pp. 60-77
- Chakravorty, Mrinalini. (2012). Picturing "The Postmaster": Tagore, Ray, and the Making of an Uncanny Modernity. Framework: The Journal of Cinema and Media, Vol. 53, No. 1 (SPRING 2012), pp. 117-146 (Wayne State University Press).
- Dasgupta, Sanjukta, Sudeshna Charkavarti, and Mary Mathew. (2013),*Radical Rabindranath: Nation, family and gender in Tagore's fiction and films*. New Delhi: Orient Blackswan.
- Hogan, Patrick Colm. (2008). Understanding Indian Movies: Culture, Cognition, and Cinematic Imagination. (Austin, TX: University of Texas P [Cognitive Approaches to Literature and Culture Series], 2008)
- Sen, I. (2014). Review of Sanjukta Dasgupta et al, in *Sociological Bulletin, 63*(2), 328-330.
- Sengoopta, Chandak. (1993) 'THE MOVIES: Satyajit Ray: The Plight of the Third-World Artist.' The American Scholar, Vol. 62, No. 2 (Spring 1993), pp. 247-254
- Yadav, Anubha. (2012). 'From Textual Image to Image-Text.' *Indian Literature*, 56.4: 253-55.

Additional Texts:

- Benegal, Shyam. (2012) 'Talkies, Movies, Cinema.' *India International Centre Quarterly*, Vol. 38, No. 3/4, The Golden Thread: Essays in Honour of C.D. Deshmukh (WINTER 2011 - SPRING 2012), pp. 354-369.
- Chatterjee, Partha (2012) 'Indian Cinema: Then and Now.' India International Centre Quarterly, Vol. 39, No. 2 (AUTUMN 2012), 45-53.
- Emmie Te Nijenhuis (1974). *Indian Music: History and Structure.*. BRILL Academic.
- Kapila Vatsyayan (1977). *Classical Indian dance in literature and the arts*. Sangeet Natak Akademi.
- Lago, Mary & Ronald Warwick, eds. (1989). *Rabindranath Tagore: perspectives in time*. Basingstoke and London: Macmillan Press.
- Sen, Mrinal. (1997). 'Rambling Thoughts.' *Social Scientist*, Vol. 25, No. 3/4 (Mar. - Apr.) 19-26.

Other Readings:

- Dasgupta, Chidananda. (2002), 'Cinema, Marxism and the Mother Goddess.' India International Centre Quarterly, Vol. 28, No. 4, Special Commemorative Volume: 40 Years — a Look Back (Winter 2001/Spring 2002), pp. 122-133.
- Hogan, Patrick. (1993) 'Historical Economies of race and Gender in Bengal: Ray and Tagore on the Home and the World.' Journal of South Asian Literature, Vol. 28, No. 1/2, MISCELLANY (Spring, Fall 1993), pp. 23-43
- Mehta, Tarla. (1995). *Sanskrit Play Production in Ancient India.* Motilal Banarsidass.
- Kundu, Kalyan, Sakti Bhattacharya, and Kalyan Sircar, eds. (1990). Rabindranath and the British Press (1912–1941). London: Tagore Centre.

APPAREL MERCHANDISING
(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VFD2151	Introduction to Apparel Merchandising	1	-	4	3
VFD2251	Apparel Market Research & Product Analysis	1	-	4	3
VFD2351	Vendor Management & Product Evaluation	1	-	4	3
VFD2451	Prototype Preparation & Merchandise Plan	1	-	4	3
VFD2551	Pre-Production Management	1	1	2	3
VFD2651	Shipment & Documentation Management	1	-	4	3
	TOTAL				**18**

- *Eligible for appearing assessment of Qualifications pack-occupational standards for a merchandiser (sub sector-Apparel) according to National Occupational Standards, NSQF level 5, approved by National Skill Development Corporation (NSDC)*

APPAREL MERCHANDISING

Syllabus - Semester First

INTRODUCTION TO APPAREL MERCHANDISING

Course Code: VFD2151 **Credit Units: 03**

Course Objective:
This course helps the students to get a preview to develop merchandising skills for apparel products. This course covers the basic knowledge of fashion; textile and apparel industry, Safety Management and introduction to merchandizing,

Course Contents:
Module-I: Fashion Terminology
The Language of fashion – Introduction to fashion concept; Definitions and meaning, Classification, Style, Change, Acceptance, Taste, Look, Trends, Season; Color, Texture, Fit, Comfort, Brand or Designer Label, Fashion cycles. **Adoption Theories –** Trickle down, Trickle up, Trickle-across and Laver's law. **Fashion clothing categories, Styling & Size range -** Women's wear, Men's wear Children's wear

Module-II: Introduction to Textiles
Textile fibers & Yarns - Definition & classification. **Woven fabrics -** Classification, fabric properties and identification of fabrics types. **Knit fabrics –** Classification, fabric properties and identification of fabrics types. **Textile processing –** Introduction to Dying, Printing and Finishing. **Care symbols & Labeling.**

Module-III: The Overview of Apparel Industry & Apparel Production
Apparel industry - Major segments; **Organizational structures -** Structure of Export house, Buying house and Domestic companies, Buyer's classification and buying network in exports. Sources of fabric buying and selling of finished fabric. **Apparel construction techniques** - Introduction to Drafting & Patten making. **Machinery & Equipment -** Cutting, sewing, finishing, washing, stain removal, embellishment. **Production methodology -** Assembly line, individual garment manufacturing, job work, quality checkpoints. **Design & Tech-pack -** Introduction & Definition. Labelling & Packing.

Module-IV: Workplace Safety Management Practices
Health and safety instructions – Importance of sound health, hygiene and good habits. Ill-effects of alcohol, tobacco and drugs.. Occupational health and safety risks. Signage related to health and safety. Personal protective equipments & its use. Method of write report on the hazards and risks / threats faced at workplace**.** event of a mock drills, evacuation procedures, accident, emergency or fire **Environmental management system (EMS)** - EMS procedures. Proper disposal system for waste and by-products. Identification, handling and storage of hazardous substances.

Module-V: Basics of Apparel Merchandising
Introduction, Functions and role of Merchandiser, Merchandising Process, Meaning and Need for quality control in Merchandising process.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- Gini Stephens Frings (1999). Fashion: From concept to consumer, Prentice-Hill Inc.
- Kadolph Sara,J (2009). Textiles, Pearson
- Leila Aitken. Step by step dress making course
- Fuller, C., & Vassie, L. H. (2004). Health and safety management: principles and best practice. Pearson Education.

Syllabus - Semester Second

APPAREL MARKET RESEARCH AND PRODUCT ANALYSIS

Course Code: VFD2251 **Credit Units: 03**

Course Objective:
This course focuses on the awareness about apparel business plans, market target is and design brief. Scopes of this course include Market trend assessment, Determine design brief, Identification of Design brief and analyze.

Course Contents:

Module-I: Assessment of Market Trends
Research on market trends - Conduct research on target market, materials, trims, better or new sources / suppliers for procurement; **Design review -** Review previous designs & samples developed by the business to assess relevance to current design/samples;

Module-II: Determination of Key Criteria for Design Brief
Identify processes - Identify business processes and client goals; Identify Quality standards for designs, Identify budget, cost points and timing constraints, **Tech-pack review -** Check the Tech-pack received and identify it with the design brief given by the designer and also checked if all specifications are there in the tech-pack, If not clarify and modify if needed.

Module-III: Organizational Context & Technical Knowledge
Organizational processes - Organization's policies, procedures, guidelines and standards for dealing with buyers/clients, Recognizing and adapting to cultural differences in the workplace, including modes of behavior and interactions, Production capacity and processes of business are identified. Systematically work completion with attention to detail without damage to goods and equipment. Awareness of Intellectual Property rights, **Technical processes -** Garment construction techniques and processes, Detailed knowledge of a range of fabrics and trims, An understanding on the cost process involved in making an apparel, Vendors, Compliance Standards.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A**-Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management
- B S Jolly, Law, Ethics & Communication- FOR CA-IPCC, Tata McGraw-Hill Education
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles
- John Donnellan , Merchandise Buying and Management.
- P Narayan, Intellectual Property Rights
- V. D Dudeja, Professional Management of Fashion Industry

Syllabus - Semester Third

VENDOR MANAGEMENT AND PRODUCT EVALUATION

Course Code: VFD2351 **Credit Units: 03**

Course Objective:
This course is aimed to understand the merchandiser's way to set the objectives to develop the product given following the work flow and the norms required. This course covers preparation of Bill of Materials, Identification of Vendor or Supplier and Evaluation of different parameters.

Course Contents:
Module-I: Vendor Identification.
Vendor database - Method of Identify the vendors for initial development and confirmation on bulk if approved, Method of update the Vendor database, **Swatches collection -** Collect all kind of relevant swatches to meet the design brief from fabrics to trims and get confirmation on the same. **Appropriateness of Tech-pack -** Method of appropriate personnel are consulted with to confirm feasibility.

Module-II: Preparation & Evaluation of the Bill of Material (BOM)
Bill of Material (BOM) – Procedure and Method of preparation a well formed BOM (Bill of Material) for each of the styles in the collection. Method of specify all that is required like the raw material, parts, quantities of each needed to manufacture the end product. **Primary costing -** Method of initial costing of the sampling derived. **Consumption identification -** Appropriate personnel identified for the consumption to be made for making, **Follow up Procedures -** Required involvement of patternmaker and tailor, Determination of monitoring procedures and checking points, follow-ups with IE Department and calculation of the SAM (Standard Allowed Minute) of the sample. **TNA (Time and Action) calendar** – Method of TNA (Time and Action) calendar preparation made with the estimated details got to fix on the delivery date after confirmation on the sample.

Module-III: Organizational Context & Technical Knowledge
Organizational processes – Understand the protocol to obtain more information on work related tasks. Understand the limits of merchandiser's role and responsibilities in relation to IT service requests or incidents and reporting structure. **Technical processes -** Understand how to use equipment, templates and processes for preparing the tech-pack., understand the fabrics and garments that require stitching by hand or machine stitching. Understand Sewing and Pattern making techniques to put across ideology the tailor master to make the same, Understand concepts of product and pricing life cycle, Procedure for Pricing and costing.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
- A J Chuter, Introduction to clothing production management.
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles..
- V. D Dudeja, Professional Management of Fashion Industry.

Syllabus - Semester Fourth

PROTOTYPE PREPARATION AND MERCHANDISE PLAN

Course Code: VFD2451 **Credit Units: 03**

Course Objective:
This course helps the students to learn how to develop the samples against the design brief for analyzing and getting it confirmed for bulk production as well as how to plan and process for production. The scope of this course is Prototype Preparation and Merchandise plan.

Course Contents:
Module-I: Prototype Preparation
Specification sheet follow-ups - Procedure of check the specification sheet prepared in accordance with standard format. Preparation, coordination and confirmation of pattern cutting, detailed drawings and mini- markers. Preparation, coordination and confirmation of patterns developed are according to the shrinkage report, tested and received. Procedure and method of checking of assembled garments according to specifications sheet and accepted garment assembly techniques. **Prototype test report** – Procedure and method of Prototype sent for test report either according to company norms or as per the buyers standards requested.

Module-II: Merchandise Plan.
Buyer approval process - Preparation, coordination and confirmation Prototype checked with design team and sent to buyer for approval and accordingly changes done if any and confirmed for production. Size sets approved internally. **P.O (Purchase Order) & P.I (Performa Invoice) -** Procedure and Method of raise and receive P.O (Purchase Order) & P.I (Performa Invoice) after confirmation on the costing to buyer and vendor. **Approval and updating of work sheets -** Procedure and method of approval and updating of all the work sheets, like the trims sheet, fabric sheet, consumption sheet (fabric and thread) this also includes in tech-pack, if any. Procedure and method of actual TNA updating that sent for approval.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles
- Harry B. Watton (1992.). New Product Planning, Prentice Hall Inc.
- John Donnellan , Merchandise Buying and Management.
- Lynda Gamans, Retailing Principles
- Maria Constantino, Fashion Marketing and PR
- Nicholas Alexender, international Retailing

Syllabus - Semester Fifth

PRE-PRODUCTION MANAGEMENT

Course Code: VFD2551 **Credit Units: 03**

Course Objective:
This course focuses on the method of organizes and coordinates the pre-production meeting and a well prepared pre-production file.

Course Contents:
Module-I: Updating Time & Action Calendar (TNA)
Time & Action Calendar (TNA) Follow-ups- Procedure and method of updated on the TNA prepared. Procedure and method of coordination with all departments in the organization. Procedure and method of check on mainly with status on the warehouse to know if the raw materials, trims and all necessary ordered are getting in-house on time.

Module-II: Preparation of pre-production file and pre-production meeting (PPM)
Pre-production file - Procedure and method of create a good and accurate and pre-production file. - Procedure and method of create Trims and accessories card, Procedure and method of create a card that contained all the approved swatches / lab dips and samples with strike offs etc. Procedure and method of maintaining the file with the tech-pack, production order sheet with size break up, cut plan and mini marker, packaging specification, washing instruction (if any), Test report, TNA Chart and important mail conversations etc. **Pre-production meeting** - Procedure and method of clarifies and address any potential issues if any at the pre-production meeting. Procedure and method of identify any other issues, raised if any from the other department personnel attending the meeting. Procedure and method of handling to sort out issue based PPM meeting, if any. Procedure and method of prepare minutes of the PPM meeting.

Module-III: Applied Learning Assignments. (Practical)
The students will have to prepare a pre-production file for the part of their study. Each student has to submit their file in a standard format guided by the faculty for the final evaluation. The students are asked to give a brief oral presentation with 'Power Point' to the class about their understanding. The submission of pre-production file and presentation will be part of student's internal examination scheme.

Examination Scheme:

Components	A	L	Practical	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management
- B. Rao (2009). Business Ethics & Professional Values, Excel Books India.
- B S Jolly, Law, Ethics & Communication- FOR CA-IPCC, Tata McGraw-Hill Education
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles
- Harry B. Watton (1992.). New Product Planning, Prentice Hall Inc.
- Herta A. Murphy (1990), Effective Business Communications, McGraw-Hill Ryerson, Limited.
- John Donnellan , Merchandise Buying and Management.
- V. D Dudeja, Professional Management of Fashion Industry

Syllabus - Semester Sixth

SHIPMENT & DOCUMENTATION MANAGEMENT

Course Code: VFD2651 **Credit Units: 03**

Course Objective:
This course is aimed to understand how the merchandiser coordinates with the factory to check on the smooth running of it to meet the delivery line. This course discus about hoe the merchandiser handles the program during shipment while the quality check is done and all approved.

Course Contents:
Module-I: Buying House Coordination
Buyer Coordination - Procedure and method of coordinate with buyer or buying house if any clarification is required that is if any issue raised during production is not well identified internally. **QA or 3rd Party QA** - Procedure and method of coordinating with buying house QA or 3rd Party QA for initial/mid and final inspection of shipment. Procedures and methods of inspection

Module-II: Coordination and Management of Shipment
Execution of orders - Procedure and method of check execution of orders whether it is running on time. **Shipping and Documentation** - Procedure of shipping and documentation. Method of coordination with shipping and documentation department for forwarding approved shipment. Procedure and method of closely work with logistics and help shipping department with timely information of packing reports for preparation of shipping documents.

Module-III: Industrial Visits
The students will have to visit various export and buying houses for the part of their study.
The students are asked to give a brief oral presentation with 'Power Point' to the class about their Understanding. They have to explain, what kind of knowledge they want to develop in the field of merchandizing and a debate will follow as well. The submission of industrial visit report and presentation will be part of student's internal examination scheme.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- A J Chuter, Introduction to clothing production management
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Grace I kunz, Merchandising: Theory, Practice and Principles
- Harry B. Watton (1992.). New Product Planning, Prentice Hall Inc.
- John Donnellan , Merchandise Buying and Management.
- Lynda Gamans, Retailing Principles
- Maria Constantino, Fashion Marketing and PR
- Nicholas Alexender, international Retailing

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Programme Structure
Curriculum & Scheme of Examination
2021

AMITY UNIVERSITY HARYANA
GURUGRAM

Syllabus – First Semester

PATTERN MAKING AND DRAFTING-I

Course Code: FST2101 **Credit Units: 02**

Course Objective: This study makes students understand the skills of developing the ideas into real garments by pattern making to get the required style, shape and fit. This course gives the full knowledge of basic blocks and an insight into design details like gathers, pleats, tucks, darts and trims etc.

Course Contents:

Module I: Basic elements of pattern
Pattern making tools; Work room terminology; Symbols; Pattern making terms, Fabric terms, Grain lines, Master Patterns; Standard size charts: Male, Female& Kids

Module II: Drafting of Master Patterns
Bodice block (Front & Back), Sleeve block, Skirt block (Front and Back)

Module III: Fullness Techniques
Fullness techniques- Darts, Tucks, Pleats, Frills& Gathers; **Darts**-Fish dart, Diamond dart ,Press darts; **Tucks – Pin tucks** (Horizontal, Vertical, Diagonal, Square, Diamond, Realized) **Wide tucks** (Space, Blind, Shell, Group);**Pleats-** Box Pleats, Inverted Pleats, Double Pleats, Knife Pleats, etc; **Gathering** - Machine Gathers, Hand Gathers, Sharing Gathers, Elastic Gathers, **Frills-**Single frills, Double Frills, Triple Frills, Finish frills.

Module IV: Pockets and Plackets
Plackets - Different type of placket opening of upper and lower garment; **Pockets** - Types of Pockets, Finishing of patch pocket, side pocket, in seam pocket. Flap pocket, kurta pocket.

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Nora. M. MacDonald. UK December 2009/US October 2009. *Principles of Flat PatternDesign 4th edition*. Fairchild Books

Reference Books

- Ernestine Kopp., Lee Gross. Beatrice Zelin & Vittorina Rolfo. UK January 1991/US September 1991. *How to draft basic patterns*. Fairchild Books
- Helen Joseph-Armstrong. UK April 2013/US February 2013. *Draping for Apparel Design*. Fairchild Books.
- Bernard Zamk off & Jeannie Price. UK August 2009/ US June 2009. *Basic PatternSkills for Fashion Design*. Fairchild Books
- Brunella Giannangeli. December 2010... *Couture unfolded: Innovative pleats, folds& draping in Fashion Design*. Promopress Bilingual Edition

INTRODUCTION TO APPAREL MANUFACTURING TECHNIQUE

Course Code: FST2102 **Credit Units: 02**

Course Objective: This course enables the students to understand the relationship between pattern making and sewing. They learn to apply the basic garment construction skills in process of design realization and gain knowledge of basic blocks and an insight into design details like gathers, pleats, tucks, darts and trims etc.

Course Content:

Module – I: Introduction of Sewing Machine and Tools

Introduction to Parts of a Sewing Machine & their functions, Types of sewing machine. Understanding the simple problems of sewing machine and its maintenance, Practical training.

Module – II: Basic Hand stitches and Machine stitches

Basting - Even basting, Uneven basting, Running stitch, Hemming stitches -Simple hemming stitch, Blind hemming stitch, Plain Seam, Curved Seam, piping, Bias bound, French seam, Flat felled seam, Forgotten seam, Welt seam, Double top stitched seam, Self bound seam, Lapped seams, Corded seams

Module – III: Fullness techniques - Darts, Tucks, Pleats, Gathering, Ruffles, Frills,
Different types of Neckline finishing – Piping, shape facing and Bias Facing

Module – IV: Pockets and Plackets

Plackets: Different types of Plackets, Finishing of placket opening of upper and lower garment, **Pockets**: Different type of pocket, finishing of patch pocket, side pocket, , in seam pocket.

Module – V: Trimmers and Zippers

Attachment of different types of trimmers, zippers lace, braid, elastic, hook and loop fastening, Velcro, seam binding and tape, eyelets, zip fasteners, buttons, tack buttons, snap fasteners and rivets

Market Survey – Market Survey and prepare a swatch file of different type of trimmers and Zippers available in market.

Submission of Practical Work records (Compulsory)

Course Evaluation

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Milva Fiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion.* Fairchild Books.

- Zoya Nudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction.* Ava Publishing

Reference Books

- Pamella Powell. UK September 2010/US July2010. *Tailored Fashion Design*. Fairchild Books.
- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's.* Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- Raul Jewel. Publishing year unknown. *Encyclopedia of Dress Making.* Publisher unknown.

COMPUTER APPLICATIONS

Course Code: FST2103 **Credit Units: 02**

Course Objective:
This course introduces students with computer and its importance in the present world. Fundamentals of computers are learnt through lectures and practical assignments. Different applications of computers are used to make them skilled.

Course Content:

Module I : Overview of the working of a computer
Basic concepts in stored program execution, Input, output, storage devices, RAMS, ROM etc.

Module II : History of computers and it emergence

Module III : Working knowledge of Microsoft Word & Excel

Module III : **Working knowledge of PowerPoint and learn making presentation in PPT**

Examination Scheme:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:
- Winifred Aldrich, CAD in Clothing and Textiles

References:
- Triedman and Cullan , Colour Graphic
- B.B. Publications Introduction to Computers

DESIGN AND COLOUR CONCEPT

Course Code: FST2104 **Credit Units: 02**

Course Objective
This course involves an interdisciplinary approach to the study of design and color by dealing with reasoned application of knowledge and skills in the areas of fashion design and technology which foster positive values and attitudes for enterprise, creativity and innovation through design-and-make activities.

Course Contents:

Module I : The Language of Design.
Visual language – Define Design, Designer, Visual art, Visual Design, Image, **Interactivity of Design** – Design as communication, Information; **Concept of good design; Kinds of design** - Structural design, Decorative design, Types of Decorative Design – Naturalistic, Conventional, Abstract, Historic, and Geometric; **Design disciplines**, **Design Industry –** Structure & Classification.

Module II : The Power of Design
Visual Literacy - Creative thinking, Problem solving, Innovation; **Design Methods; The design process; Design process models** – (1) Spiral process models (2) Double diamond' process models; **Dimension of Design-** 2D, 3D and concept of 4D; **Design Governance in India -** National Design Policy, Design Act 2000, Intellectual property right, Professional Design Associations, Design Promotion Agencies.

Module III : Terminology of Colour
Understanding colour –Define color, **Colour perception key elements** – (1) Light, (2) Substance, (3) Human vision and responses, **Fundamental categories of colour**; **Physical or surface qualities of color ; The color making attributes -** Hue, Value, and Saturation. **Dimensions of color** – (1) Colour Systems (2) Colour Space (4) Colour Gamut, (5) Colour Models. **Color management** – Application for Computer Aided Designing, Colour management in fashion designing.

Module IV : Colour in visual design.
Colour Theory – Introduction, History, Derivation of modern colour theories – Newton's Colour wheel and its formation, Additive System & Light theory, Subtractive System & Pigment theory, CMY & CMY*K*, Introduction to Pigment theory of RYB colour model, **A System Perspective** – Choice of the Colour system in Visual Design. Colour qualities, Uses of colours.

Examination Scheme:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

Text:

- Richard Hora, Elements of design Colour Theory
- Bryan Peterson, Design Basics for Creative Results, F+W Media, 2003

References:

- Design Council UK, 34 Bow Street, London. : A study of the design process, A Design Way finder.
- David A. Lauer, Stephen Pentak, Design Basics, Wadsworth, USA
- Mary Buckley, Color theory: a guide to information sources
- Frank W. Baker, Media Literacy in the K–2 Classroom, ISTE, 2012
- Ms. Shruti Hemani and Prof. Ravi Mokashi Punekar, Colours in Visual Design Department of Design, IIT Guwahati.
- Tom Fraser, Adam Banks: Designer's Color Manual, Chronicle Books, 2004
- Articles by Design Institute of Australia & India Design Council.

FUNDAMENTALS OF TEXTILES

Course Code: FST2105 **Credit Units: 02**

Course Objective:
To understand the tactile and behavioral characteristics of various fibers and yarns in relation to their application and end use

Course Contents:
Module I: Classification of textile fibers and Identification
Introduction - Definition of textile fibers, classification of Textile fibers; **Desirable properties of an Ideal Textile fiber** –Staple fiber, filament; **Natural Cellulosic Fibers -** Seed hair fibers- Cotton, Bast fibers- Flax, Ramie, Jute, Hemp, Leaf fibers; **Natural Protein Fibers -** Animal hair fibers- Wool, Speciality hair fibers, Silk- Sericulture and type of silks.**Natural Mineral Fibers Manmade Synthetic Fibers –**Polyamides - Nylon, Types of Nylon- Nylon-6 and Nylon-66, Aramid, Polyesters, Acrylic, Polypropylene, Polyolefin, Elastomers – Rubber, Spandex; **Manmade Regenerated Fibers-** Viscose Rayon, Cupromonium Rayon, Layocell, **Identification of Textile Fibers–** Microscopy, Burning tests, Solubility tests.

Module II: Yarn manufacturing, properties and testing
Introduction - Definition of yarns, Classification of yarns and Filaments; **Yarn Manufacturing –** Yarn from staplefibers –Fiber preparation - Ginning, Spinning, **Properties of yarns** – Yarn count– Indirect system, Direct system, Metric count, Wool system, British worsted system. **Types of Yarns-** Simple and complex yarns, Types of complex yarns, Textured Yarns.**Fiber Blends-** General characteristics, Production. **Threads -** Difference between thread and yarn, Sewing threads- Types and properties. **Fabric Analysis** – EPI, PPI and GSM

Module III: Fabric Surface Ornamentation
Introduction - Dyeing and Printing; **Dyeing** – Direct & Resist (Tie-dye & Batik); **Printing** – Block Printing, Stencil printing, Screen Printing and Discharge printing etc.

Module IV: Different type of fabrics and their end applications
Brocades, crepe, Tussar, Muslin, Jeans, Denim, Drill (Twill based fabric), Cotton, Wool, Silk, Georgette, Poplin, crepe, chiffon, Gauge, Cambric, Velvet, Corduroy, Satin, Organdy, Organza, Tweed, Upholstery fabrics etc.

Module V: Market Survey
Market survey and preparation of swatch file with collection of fabrics available along with their details.

Course Evaluvation:

Components	A	HA	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; HA -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

Text Books:

- Bernard P. Corbman, Textiles: fiber to fabric, McGraw-Hill Professional, 6th edition, 1983.

Reference Books:

- Anne Fritz & Jennifer Cant, Consumer Textiles, Oxford University Press, 1988
- Marjory Joseph, Essentials of Textiles, 3rd edition, 1984
- E P G Gohl& L D Vilensky, Textile Science, 2nd edition, 1983
- KadolphSara,J, Textiles, Pearson, 2009

BASICS OF FASHION

Course Code: FST2106 **Credit Units: 02**

Course Objective:
This subject helps the students to get acquainted to the basic terminology of fashion, relate to its application, customer types and fashion market segmentation. A simple preview of fashion career scope is given that would be useful later in to choose the relevant area of fashion career.

Course Contents:
Module I : Fashion Terminology
The Language of Fashion – Introduction to Fashion concept; **Fashion -** Definitions and meaning, Style, Change, Acceptance, Taste, Fashion Look, Fashion trends, Fashion season; **Classification of Fashion.**

Module II : Fashion Cycles & Fashion Motivation
Consumer Identification – Fashion leaders, Fashion Innovators, Fashion motivators or Role models, Fashion victims, Fashion followers**; Consumer Buying Motivation; Methods of Fashion Selection –** Aesthetic Appeal, Color, Texture, Style, Price, Fit, Comfort, Appropriateness, Brand or Designer Label, Fabric performance and care, Quality, Convenience.

Module III : Fashion Clothing Categories
Women's Wear- Dresses, Social apparel, Suits, Outer wear, Sportswear, Active wear, Swimwear, Lingerie, Accessories. **Styling –** Couture, Designer, Traditional Styling. **Size Range** - Junior, Missy, Petite, Large or Women. **Men's Wear** – Tailored, Furnishings, Sportswear, Active sportswear, Work cloths, Accessories. **Styling** – Designer Styling, Traditional Styling, Contemporary. **Size Range –** Men's suits, Dress shirts. **Children's Wear –** Girls dress, Boy's Clothing, Sportswear, Swimwear, Outerwear, Sleepwear, Accessories. **Styling** – Infants, Toddlers and Yong children, Older children. **Size Range –** Newborn, Infant, Toddler, Girls', Boys'.

Module IV : Fashion Career Scope - Work Details & Skills Required
Fashion Designer, Merchandiser, Fashion technologist - Pattern maker, Technical Designer/spec-tech, CAD/Operator, Fashion Research & Development Professionals – Colorist, Fashion Forecaster, Fashion Communication - Fashion Stylist, Fashion Photographer, Fashion Journalist, Fashion Editor. Costume Designer/Coordinator.

Module V : Applied Learning Assignments.
Make the influential list of Indian and International fashion designers and trace their fashion and style from the News papers and Magazines.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

Text:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.

References:

- Phyllis Tortora, The Fairchild's Dictionary of Fashion
- S. A Hussain, Variety- Fashion for Freedom
- Sandra J.Keiser & Myrna B.Garner, Beyond Design, Fairchild publication.
- G. J Sumathi, Elements of Fashion & Apparel Design.
- Solomon, Consumer Behavior: In Fashion, Pearson Education India.

SOCIAL AND PSYCHOLOGICAL ASPECTS OF CLOTHING

Course Code: FST2107 **Credit Units: 02**

Course Objective
The object of this course is to be able to relate aspects of clothing to the society and to expand student's perspective in fashion, in keeping with present roles, personal lifestyles, and social clothing concepts.

Course Contents:

Module I : Origin of clothing & Clothing Theories.
Origin of Clothing- Theories of clothing – Theory of modesty, Immodesty, Protections, Adornment, Combined need theory, Other theories in fashion; **Relation between clothing and other disciplines**- (a) Physical Health (b) Mental Health; **Clothing and first impressions.**

Module II : Relation between clothing, fashion and the wearer.
Personality and Self concept, - Motivation in clothing choices. Individual values, Interests and attitudes related to clothing. **Behavior and clothing choices** - Practices and effect of fashion and clothing on the individual; Introduction **to cosmetology and Fashion Grooming.**

Module III : Clothing and Society.
Clothing and Social behavior - Clothing influenced by religion and culture, Clothes and conformity, Clothes and occupation, Concept of uniforms, Cloths and social class, Clothes & color and its impact.

Module IV : Case study
Influence of global fashion in Indian cloth wearing. (Compulsory)

Examination Scheme:

Components	A	CS	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:
- Susan B. Kaiser, The social psychology of clothing and personal adornment, Macmillan, 1985
- Anthony Gonzalez (2007): Cosmetology, Global Media Publications

References:

- Avis. M. Dry, The Psychology of Jung, Methuen & Co., London, 1961.
- Horn, Marilyu J, The Second Skin, Houghton Miffin Co., USA, 1968.
- Claudia Piras & Bernhard Roetzel, Ladies: A guide to fashion and style, Dumonte Monte, 2002.
- Vincent Brome, Jung, Granada Publishing, London, 1978.
- Flugel, J.C. The psycho-analytical study of the family, The Hograth Press & INPA, London, 1950.
- Rona Berg, Beauty: The new basics, Workman Publishing Company Inc., 2000.
- Solomon, Consumer Behavior: In Fashion, Pearson Education India.

FASHION ART ILLUSTRATION AND MODEL DRAWING-I

Course Code: FST2108 **Credit Units: 03**

Course Objective: The study of this course develops the student's ability to visualize the ideas and putting them in concepts for fashion garments. It gives an understanding to different illustration techniques and explores other media for creating concepts through practical assignments.

Course Contents:
Module-1: Sketching of block figures (front, side, ¾, back)
Module-2: Sketching of flesh figures (front, side, ¾, back)
Module-3: Types of lines and prints (flat illustration)
Module-4: Rendering of croquis with different color medium (staedtlers pencil, water colors, poster paint)
Module- 5: Fashion face (front & side) and hairstyles
Module-6: Different postures, poses and hand gestures.
Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; H -**Home Assignment**; R-** Practical work records**; EE-**End Semester Examination)

Text & References:
Text Books:

- Kathryn McKelvey, Fashion Source book.

References Books:

- Fashion Design and Illustrations
- Patrick John Ireland, Introduction to Fashion Design
- Bina Abling, Model Drawing
- Bina Abling, Fashion Sketch Book

Syllabus - Second Semester

FASHION ART ILLUSTRATION AND MODEL DRAWING-II

Course Code: FST2201 **Credit Units: 02**

Course Objective:
This course deals with the study of the basic styles and the different silhouettes they create the identification of styles – when, where and how to use. The students will be able to understand the relevance of working drawings and learn to use them appropriately.

Course Contents:
Module- 1: Draping of different types of dresses in various silhouettes (females)
Module-2: Uses of textures (leather, denim, knitted, chiffon etc)
Module-3: Designing of Indian traditional wear for females
Module-4: Designing of kid's wear.
Module-5: Project on theme based composition
Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; H** -Home Assignment**; R-** Practical work records**; EE-**End Semester Examination)

Text &References:

Text Books:
- By Patrick John Ireland, Encyclopaedia of Fashion Detail

Reference:
- Inside fashion design
- Fashion Design and Illustrations
- Ritu Bhargava, Design Ideas and accessories
- Bina Abling, Advanced Fashion sketch book

PATTERN MAKING & DRAFTING-II

Course Code: FST2202 **Credit Units: 02**

Course Objective: This part of pattern making course enables to Develop an about the details of construction and understanding the patterns of kids wear and it's variation. This course gives the full knowledge of different type of collars and sleeves.

Course Content:

Module I: Collars
Drafting and adaptation of various collars - Peter Pan Collar – Flat and raised, Cape collar, Sailor's collar, Convertible collar, Mandarin collar

Module II: Sleeves
Drafting of different type of Sleeves –Plain sleeve, puff gathered top and bottom, bell sleeve, bishop sleeve, Cap sleeve. Flared Sleeve, Magyar Sleeve Balloon Sleeve, Petal Sleeve, Leg-o- mutton sleeve**,** Kimono& Raglan

Module III: Petticoat
Drafting of petticoat – A- Line, Straight, 6 panels

Module IV: Project
Kids wear Project- To develop an understanding of the fashion design process along with kids wear segments. Developing a design brief and a range of kids wear for different age groups.

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Nora. M. MacDonald. UK December 2009/US October 2009. *Principles of Flat PatternDesign 4th edition*. Fairchild Books

Reference Books

- Ernestine Kopp., Lee Gross. Beatrice Zelin & VittorinaRolfo. UK January 1991/US September 1991. *How to draft basic patterns*. Fairchild Books
- Helen Joseph-Armstrong. UK April 2013/US February 2013. *Draping for Apparel Design*. Fairchild Books.
- Bernard Zamkoff& Jeannie Price. UK August 2009/ US June 2009. *Basic PatternSkills for Fashion Design*. Fairchild Books

- BrunellaGiannangeli. December 2010... *Couture unfolded: Innovative pleats, folds& draping in Fashion Design*. Promopress Bilingual Edition
- Winfred A, Metric Pattern Cutting for children's wear and baby wear, 2011, New Delhi, Wiley.
- Peacock John, Children's costume- The complete historical source book, 2009, London, Thames and Hudson.

GARMENT CONSTRUCTION-I

Course Code: FST2203 **Credit Units: 02**

Course Objective: The course enables to develop an understanding of the garments of kids wear and its variation. This course gives the full knowledge of different type of collars and sleeves.

Course Contents:
Module I: Collars Peter Pan collar – Flat and raised, Cape collar, Sailor's collar, Convertible collar, Chinese/Mandarin Collar. Construction and adaptation of various collars

Module II: Sleeves
Plain sleeve, puff gathered top and bottom, bell sleeve, bishop sleeve, Cap sleeve, Flared Sleeve, Magyar Sleeve, Balloon Sleeve, Petal Sleeve, and Leg-o- mutton sleeve**.** Construction of different type of Sleeves

Module III: Petticoat
Types of Petticoat-A- Line, Straight, 6 Panels**,** Construction of petticoat

Module IV: Project Kids wear
Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- MilvaFiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion.* Fairchild Books.
- ZoyaNudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction.* Ava Publishing.

Reference Books

- Mary Ruth Sheilds. UK October 2010/US August 2010. *Industry Clothing Construction Methods.* Fairchild Books.
- Pamella Powell. UK September 2010/US July2010. *Tailored Fashion Design*. Fairchild Books.
- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's.* Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- Raul Jewel. Publishing year unknown. *Encyclopedia of Dress Making.* Publisher unknown.

COMPUTER-AIDED DESIGN-I

Course Code: FST2204 **Credit Units: 01**

Course Objective:
This course focuses on the usage of Usage of computers in Fashion & Apparel Industry

Course Content:

Module I	**:**	**Corel Draw - Tool Introduction and usage.**
Module II	**:**	**Functions of tools and its usage.**
Module III	**:**	**Figure Drawing - Block figure and Flesh figure**
Module IV	**:**	**Working with layouts**
Module V	**:**	**Creating Prints and textures**
Module VI	**:**	**Tutorials**

Examination Scheme:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- Winifred Aldrich, CAD in Clothing and Textiles

FABRIC ARTISTRY & EMBROIDERY

Course Code: FST2205 **Credit Units: 02**

Course Objective
The students will develop a thorough understanding of various techniques used to impart various decorative skills on fabric through practical exercises.

Course Contents:

Module I : Introduction to fabric decoration.
Embroidery - Basic stitches- Running, Back stitch, split stitch, Simple couching, Stem, Satin, Cross, Blanket and Crossed buttonhole Closed buttonhole, Framed, Buttonhole, Chain, Feather, Fly, Herring bone, French knot bullion. **Transferring and Tracing techniques of Designs -** Practical exercise.

Module II : Techniques of thread embroidery
Mirror Work - Mirror work places of India, Types of mirrors, stitches and designs. **Bead Works** – Definition, Bead work places of India, Articles, materials and stitches used for bead work. **Metal thread embroidery -** Definition, Metal thread embroidery places of India, Articles, materials and stitches used for Metal thread embroidery. **Smocking –** Definition, stitches used for smocking – Honey comb smocking.

Module III : Lace Work, Appliqué Work & Quilting
Lace Work – Types of hand and machine made laces, Attaching laces to fabrics; **Appliqué Work** - Definition and Traditional examples- Raw edge appliqué, Satin stitched appliqué, Couched appliqué, Buttonhole appliqué, Chain stitched appliqué, Lined appliqué, Patch Work. **Quilting** – Definition and Traditional examples – Kantha and Sujni – executing various designs using running stitch.

Module IV : Basic Hand Stitches
Hand Stitches - Running stitch, Basting, Gathering, Overcastting, Fagoting, and Hemming.

Module V : Basics of Fabric Embellishment. (Theory)
Constructed Artistry - Yarn design, Weave design, Knitwear design; **Dye & Print Artistry** - Tie & Dye, Batik, Stencil, Screen, Block Printing. **Indian Hand-Painted Artistry** – Pichvai of Rajasthan, Pad of Rajasthan, Kalamkari of Andhra Pradesh, Patachitra of Orissa.
Submission of practical work records - (Compulsory)

Examination Scheme:

Components	A	H	R	V	EE
Weightage (%)	05	05	15	05	70

(**A** - Attendance**; H -**Home Assignment**; R-** Practical work records**; V-** Viva voce**, EE-**End Semester Examination)

References:

- Creative Publishing, Miunezota, Colour and Design on Fabric (Singer Design), 2000.
- The Buttrick Co. NY, USA, Buttrick Dressmaking, 1940.
- Janet Maigh, Crazy Patch Work, Collins and Brown, London, 1998.
- Morrel Anna, Techniques of Indian Embroidery, BT Batsford Ltd; London, 1994
- Jacquie Wilson, Handbook of textile design, Woodhead Publishing Limited England, 2001
- Langerford A Kadolpher S, Textiles Printine Hall, N.J. Ohio, 1998.

DESIGN PROCESS & APPLICATION OF COLOUR THEORY

Course Code: FST2206 **Credit Units: 03**

Course Objective:
This course focuses on the practical application on the theory subjects of design and colour in the fashion design studio. It aims at allowing the students must be able to document the design process verbally and visually through sketches, written notes, and analysis showing the practical development of a theme, concept, or idea of both design and colour.

Course Contents:
Module I : Design Theory applicable to Fashion Art.
Basic elements & principles of design and application in studio work.

Module II : Design in textiles and clothing.
Design Pattern - Basic repeat structures – Straight repeat, Half drop, Tile (or brick) repeat, Repeat mirrored vertically and horizontally. **Design layouts -** Tossed patterns, All-over designs, Foulards, Ogees, Stripes, Borders, Engineered designs. Centering of Design repeats. **Classification of printed textile designs** - Motifs and styles- Florals, Pictorial and figurative designs, Paisleys, Geometrics, Abstracts, Ethnic designs, Co-ordinating designs. **Different types of Textile designs** – Traditional, Contemporary, Stylized, Naturalistic.

Module III : Colour Theory applicable to Fashion Art.
Pigment Wheel - Classification of hues in the pigment wheel, Primary colours, Secondary colours, and Tertiary colours. **Color properties -** Hue, Value, Tints and Shades, Tones, Intensity or Saturation, Colour Temperature- Warm and cool colours, Color Interaction, Color Contrast, **Coluor Harmony and Color Schemes**- (1) Basic Colour schemes - Chromatic Colours, Achromatic, Monochromatic, Polychromatic, Analogous, Complementary- Direct complements. (2) Advanced color schemes- Split complements, Triadic, Tetradic, Square, Dyadic or Dyad, Neutral, Earth Tone, Pale colour scheme.

Module IV : Colour in Design Process.
Colour in Design Principles - Principle of rhythm, Balance, Proportion and scale, Emphasis, **Colour Interaction and Colour Effects** - Contrast of hue, Light-dark contrasts, Cold- Warm contrasts, Complementary contrast, Simultaneous contrast, Contrast of saturation, Contrast of extension. **Color schemes in designing -** Four F's in design: First impressions, Form, Function, and Fashion. **Interpretation of International Colours.**

Submission of practical work records - (Compulsory)

Examination Scheme:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; H -**Home Assignment**; R-** Practical work records**; EE-**End Semester Examination)

Text & References:

Text:

- George A. Agoston , Color theory and its application in art and design, Springer-Verlag, 1987
- Jacquie Wilson, Handbook of textile design, Woodhead Publishing Limited England, 2001

References:

- Richard Hora, Design Elements: A Visual Reference, Art Direction Book, 1982
- Ms. Shruti Hemani and Prof. Ravi Mokashi Punekar, Colours in Visual Design, DOD, IIT Guwahati.
- Bosomworth, Encyclopedia of patterns and motifs, Studio Editions, Limited, 1995.

TECHNOLOGY OF TEXTILES MANUFACTURING

Course Code: FST2207 **Credit Units: 03**

Course Objective:
This course imparts the knowledge about two major technologies of fabric manufacturing – Woven and Knits that develop the foundation for fabric application in fashion.

Course Contents:
Module I : Introduction to Fabrics
Fabrics –Classification, Types, Properties. **Woven Fabrics - design and structure**- Idea of fabric structure, Warp, Weft, Interlacement diagram – Warp way and weft way, Creation of draft, peg plan and tie-up from the weave repeat. **Classification of Weaves** – **(1) Basic/Simple Weaves**- **Plain Weave**, Study of derivative structures of plain – **Twill Weave**, Classification and derivatives of twill weaves; **Satin Weave** – Satin & Sateen. **(2) Compound/Complex/Novelty Weaves** - Dobby Weave, Jacquard Weave, Double Cloth & Double Weave, Pique, Pile Fabrics- Classification, Loop & cut pile; warp & weft pile.

Module II : Mechanism of Weaving
Different forms of yarn packages and use - Hanks, Cones, Cheeses, and Spools. **Loom**- Classification of looms, Parts of Loom, Passage of warp in a loom. **Basic loom mechanisms**- Primary motions, Secondary motions, Auxiliary motion; **Handlooms** - Loom Types, Essential features of handloom Fabrics; **Power looms** - Loom Types, Essential features of Power loom Fabrics; **Dobby, Jacquard**; **Special Purposed looms** - Circular Looms, Multiphase loom, Magazine loom, Ribbon loom, Needle loom, Swivel loom, Box loom; **Weaving Preparatory Process**.

Module III : Woven Fabric Types and Analysis
Fabric Types - Buckram, Cambric, Casement, Cheese Cloth, Chiffon, Chintz, Corduroy, Crepe, Denim, Drill, Flannel, Gabardine, Georgette, Kashmir Silk, Khadi, Lawn, Mulmul, Muslin, Organdy, Poplin, Sheeting, Taffeta, Tissue, Velvet, **General principles of woven cloth analysis** - Parts of woven Fabric - Body, Selvedge, Method of identifying warp and weft, Assumption of count of warp and weft, Determination of ends/inch and pick/inch, weave analysis of fabrics .

Module IV : Knitted Fabric & Mechanism of Knitting
Introduction to Knit design and structure – Definition, comparison between knitting and weaving ,Classification of knitting Machines; **Important terms in knitting** – course- wales – gauge-face loop-back loop- loop length, texture. **Weft Knitting**- Plain Knit stitch, Purl stitch, Rib stitch, Novelty stitches; **Warp knitting**- Tricot, Raschel, Crochet, Milanese; **Pile knitting**- Terry, Velour, **Jacquard Knitting.**

Module V : Knitted Fabric Types and Analysis
Knitted Fabric Types - Jersey Knit, Rib knits, Double knit, Knitted fur fabrics, **Blended Fabrics** - Reasons why fabrics are blended; Types of Blended Fabrics - Terry Cotton, Terry-wool Suiting Fabrics, Poly- Viscose Rayon. **Common fabric defects and its causes** - Major and Minor Defects.

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

Text:

- Bernard P. Corbman, Textiles: fiber to fabric, McGraw-Hill Professional, 1983.

References:

- Anne Fritz & Jennifer Cant, Consumer Textiles, Oxford University Press, 1986.
- Terry Brackenbury, Knitted Clothing Technology.
- N.N.Banerjee, Weaving Mechanism, Textile Book House, West Bengal, 1982
- Kadolph Sara,J, Textiles, Pearson, 2009.

FASHION- BUSINESS LAWS, ETHICS AND COMMUNICATION

Course Code: FST2208 **Credit Units: 03**

Course Objective:
This Course intends to make the students aware of legal background relating to fashion business and company law also to develop good business communication skills and a sound understanding of related legal deeds and documents.

Module I : Fashion - Business Laws
Law of Contract – Concept and its role in society; Consideration and capacity; Free consent and Public Policy; Public & Government Contracts and Quasi Contracts; Discharge of Contracts : Performance & Non Performance; Breach of Contract & Remedies; Representative Contracts; Special Contracts : Indemnity, Guarantee & Bailment, Electronic Contracts. **Industrial Relation Laws –** Industrial Relations and contract of Employment; Trade Union Law; Industry and Industrial Disputes & Resolution Mechanism; Regulation of Managerial Prerogatives; Job Losses and their Regulations; Discipline and Misconduct; Contract Labour, Wages Act, Injury Compensation **Intellectual Property Laws –** Introduction to Intellectual Property; International Conventions on Intellectual Property Protection; Copyrights & Neighboring rights; Patent Act; Design Act; Trademarks Act; Emerging areas of Intellectual Property Protection. **Law relating to Foreign Trade –** Introduction and Carriage of Goods by Sea; Carriage by Air and Multi Modal Transportation of Goods; International Sales & Payments; Settlement of Commercial disputes; The World Trade Organization and India

Module II : Business Ethics
Introduction to Business Ethics - The nature, purpose of ethics and morals for organizational interests; Ethics and Conflicts of Interests; Ethical and Social Implications of business policies and decisions; Corporate Social Responsibility; Ethical issues in Corporate Governance. **Environment issues -** Protecting the Natural Environment; Prevention of Pollution and Depletion of Natural Resources; Conservation of Natural Resources. **Ethics in Workplace -** Individual in the organization, discrimination, harassment, gender equality. **Ethics in Marketing and Consumer Protection -** Healthy competition and protecting consumer's interest. **Ethics in Accounting and Finance -** Importance, issues and common problems.

Module III : Business Communications
Communication in Business Environment – Business Meetings – Notice, Agenda, Minutes, Chairperson's speech; Press releases, Corporate announcements by stock exchanges; Reporting of proceedings of a meeting. **Basic understanding of legal deeds and documents -** Partnership deed, Power of Attorney, Lease deed, Affidavit, Indemnity bond, Gift deed, Memorandum and articles of association of a company, Annual Report of a company.

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

References:

- S.K Kapoor, Law of Contracts
- P Narayan, Intellectual Property Rights
- B S Jolly, Law, Ethics & Communication- FOR CA-IPCC, Tata McGraw-Hill Education
- Herta A. Murphy, Effective Business Communications, McGraw-Hill Ryerson, Limited, 1990
- B. Rao, Business Ethics & Professional Values, Excel Books India, 2009

FASHION THEORY

Course Code: FST2209 **Credit Units: 03**

Course Objective:
To provide a broad foundation to acquire the knowledge of fashion theory and its growth which develop the students' potential for professional activities that demand considerable independence or for fashion research work

Course Contents:
Module I : Fashion Development
Origin of the Fashion**,** Effect of Industrial Revolution on Fashion; Mass production of clothing; Introduction of Retailing; Changes caused by communications, leisure, and Industry; Effect of world War-i; Effect of depression on Fashion; Effect of world War –ii; Reactionary Postwar Fashion; Fashion at 1960s; Anti fashion at 1970s; Fashion 1980s; Fashion 1990s.

Module II : Fashion Evaluation & Adoption.
Introduction - Fashion Cycles, Length of Fashion Cycles**; Adoption-** Traditional Fashion adaption (Trickle – Down Theory), Reverse Adaption (Trickle-up or Bottom-up Theories), Mass Dissemination (Trickle-across Theory); James Laver and Laws on the Timeline of Style

Module III : Study of International Fashion Centers.
France, Italy, England, Germany, Canada, United States.

Module IV : Applied Learning Assignments.
Visit fashion malls and analyze current fashion styles and find social, economical, technological influence on it. Also refer the fashion magazines and newspapers for trend review. Make a report with views and reasons.

Examination Scheme:

Components	**A**	**L**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.

References:
- Phyllis Tortora, The Fairchild's Dictionary of Fashion
- S. A Hussain, Variety- Fashion for Freedom
- Sandra J.Keiser & Myrna B.Garner, Beyond Design, Fairchild publication.
- G. J Sumathi, Elements of Fashion & Apparel Design.
- Solomon, Consumer Behavior: In Fashion, Pearson Education India.

List of Magazines
Apparel online, Fiber 2 Fashion, Cosmopolitan. Marie Claire, Elle, Vogue, Harper's Bazaar, In Style, Glamour, Lucky, Allure, W Magazine.

Syllabus - Third Semester

FASHION ART ILLUSTRATION AND MODEL DRAWING-III

Course Code: FST2301 **Credit Units: 02**

Course Objective: The Course enables to further enhance the designing skills of the students and help them in designing more formal and high fashion garments. The students will also be working in their own stylized form with respective themes.

Course Contents:
Module-1: Optical illusions
Module-2: Male block figures (front, side, ¾, back)
Module-3: Male flesh figures (front, side, ¾, back)
Module-4: Rendering of male Croquis with different color mediums (Staedtlers pencils, water colors, poster paints)
Module-5: Designing of casual wear for females with background
Module-6: Designing of executive wear for females with background
Module-7: Designing of sportswear for females with background
Module-8: Designing of resort wear for females
Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; H -**Home Assignment**; R-** Practical work records**; EE-**End Semester Examination)

Text &References:
Text Books:
- Kathryn McKelvey, Fashion Source Book

References:
- BinaAbling, Fashion Model Drawing
- Patrick John Ireland, Introduction to Fashion Design
- Patrick John Ireland, Encyclopaedia of Fashion Detail, Batsford, 1987

ADVANCE PATTERN MAKING-I

Course Code: FST2302 **Credit Units: 02**

Course Objective: The course enables students to learn about details of construction of patterns women's garments like sari blouse and its variation, kurta, salwar etc. The course gives the full knowledge of dart manipulation. The students learn to interpret design and create the patterns for that design.

Course Contents:

Module I: Master Patterns
Adult Bodice block (front & back), Plain sleeve, Skirt (front & back)

Module II: Dart Manipulation
Introduction the slash and spread technique; Suppression positions; Single dart series- common dart position and shaped darts; Two dart series;Form of suppression: dart folds, dart tucks, gathers, pleats, flares etc; Development of styles through dart manipulation –connecting darts to create seam lines; style development.

Module III: Torso, Princess line foundation

Module IV: Sari Blouse
Drafting of four dart, princess-panel, yoke band, katori cut blouses

Module V: Kurta& Salwar
Drafting of Kurtas: Straight, A-Line, Kalidar and Umbrella Kurta; Drafting of Salwar: Plain and Patiala

Module VI Project - Indian Traditional wear project
Research on market, trends, Forecasts, brands for specific Indian wear ensembles, details, trims and finishes client research. Design Realization of one chosen ensemble from a range of five.

Submission of practical work records - (Compulsory)

Course Evaluation:

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Nora. M. MacDonald. UK December 2009/US October 2009. *Principles of Flat Pattern Design 4th edition*. Fairchild Books
- Aldrich W, Metric Pattern cutting for women's wear, 5th Edition, 2008, Oxford, Blackwell.
- Joseph Armstrong, Pattern making for Fashion Design, IV Edition, 2013, New Delhi, Pearson.

Reference Books

- Ernestine Kopp., Lee Gross. Beatrice Zelin&VittorinaRolfo. UK January 1991/US September 1991. *How to draft basic patterns*. Fairchild Books
- Helen Joseph-Armstrong. UK April 2013/US February 2013. *Draping for Apparel Design*. Fairchild Books.
- Bernard Zamkoff& Jeannie Price. UK August 2009/ US June 2009. *Basic PatternSkills for Fashion Design*. Fairchild Books
- BrunellaGiannangeli. December 2010... *Couture unfolded: Innovative pleats, folds& draping in Fashion Design*. Promopress Bilingual Edition
- Steven, S. Illustrating Fashion: Concept to Creation, 2010. New York, Fairchild Books.
- Tain, L. Portfolio Presentation for Fashion Designers 1998. New York, Fairchild Books.

GARMENT CONSTRUCTION-II

Course Code: FST2303 **Credit Units: 02**

Course Objective: The course enables students to learn about details of construction. It's important and most commonly worn women's garments like sari blouse and its variation, kurta, salwar etc. This course gives the full knowledge of dart manipulation. The students learn to interpret design and create the pattern for that design.

Course Content:
Module I: Master Patterns
Adult Bodice block (front & back), Plain sleeve, Skirt (front & back)

Module II: Dart Manipulation
Introduction the slash and spread technique; Suppression positions; Single dart series- common dart position and shaped darts; Two dart series; Form of suppression: dart folds, dart tucks, gathers, pleats, flares etc.; Development of styles through dart manipulation –connecting darts to create seam lines; style development.

Module III: Construction of Torso & Princess line foundation

Module IV: Sari Blouse
Introduction &Construction of Sari Blouses – four dart, princess-panel, yoke band, katori cut

Module V: Kurta & Salwar
Introduction &Construction of Kurta- Straight, A-Line, Kalidhar and Umbrella Kurta; **Salwar-** Plain and Patiala salwar

Module VI: Project - Indian Traditional wear project
Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- MilvaFiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion.* Fairchild Books.
- ZoyaNudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction.* Ava Publishing.

Reference Books

- Julie Cole & Sharon Czachor. UK July 2014/US June 2014. Professional Sewing Techniques for Designers. Fairchild Books 2nd edition.
- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's.* Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- *Classic Tailoring Technique's- A Construction Guide for Women's Wear*. Fairchild Books.

HISTORY OF INDIAN COSTUMES

Course Code: FST2304 **Credit Units: 03**

Course Objective

This course aims to provide students with the appropriate vocabulary to describe costume as well as to develop the students' capacity to recognize the characteristic styles of each century, thereby enabling them to accurately describe the images. They will be more sensitive to the influence of culture, art and history on trends and to the various facets fashion can have in an Indian society.

Course Methodology : Research Project

The Research Project Guidelines:

1. The students will have to submit and present a Research Project Assignment; this will give the students the opportunity to demonstrate their ability to carry out some interesting and creative research in History of Indian Costumes.
2. The students will have to make sketches, collect pictures with brief points of each period and submit in a standard size file.
3. The students are asked to give a brief oral presentation with 'Power Point' to the class about their research. They have to explain, what kind of interests they want to develop in the research and a debate will follow as well. The submission of project assignment file and presentation will be part of student's Examination Scheme.
4. The students will have to visit various historical places and museums for the part of their research.

The project contents will be broken down into three modules which out lined below.

Module - I : Ancient Indian costumes

1. Indus valley civilization & Vedic Period. - Men's and Women's costumes, jewellery, hairstyles and footwear.
2. Mauryan and Sunga period. - Men's and Women's costumes, jewellery, hairstyles and footwear.
3. Kushan period. - Men's and Women's costumes, jewellery, hairstyles and footwear.
4. Satvahana period. - Men's and Women's costumes, jewellery, hairstyles and footwear.
5. Gupta period - Men's and Women's costumes, jewellery, hairstyles and footwear.

Module -II : Medieval Indian Costumes.

Mughal period - Men's and Women's costumes, jewellery, hairstyles and footwear.

Module-III : Colonial Indian Costumes.

British Period - Men's and Women's costumes, jewellery, hairstyles and footwear.

Examination Scheme:

Components	A	LR	B	P	Viva	Total
Weightage (%)	10	25	10	30	25	100

(**A -** Attendance, **LR -** Literature Review, **B -** Bibliography, **P –** Presentation)

References:

- Roshan Alkazi, Ancient Indian Costumes, National Book Trust, India, 1996
- John Peacock, The chronicle of Western Costumes
- Illustrated Encyclopaedia of Costume and Fashion.
- Govind Sadashiv Ghurye, Indian Costume, Popular Prakashan, 1966
- Ritu Kumar, Costumes and textiles of royal India, Antique Collectors' Club, 2006
- Chales Fabri, Indian dress: a brief history, Disha Books, 1994

TECHNOLOGY OF PROCESSING & CARE RENOVATION OF TEXTILES

Course Code: FST2305 **Credit Units: 03**

Course Objective:
To develop the holistic understanding of the technology of textile processing and various kinds of finishes those enhance performance and aesthetics of the fabric.

Course Contents:
Module I: Introduction to Textile Processing.
Fiber Chemistry- Molecules of the fibers**,** bonding, covalent bonds, benzene ring, Polarity, Hydrogen bond, Ionic compounds, Vander Waals; Molecular orientation, structure and fiber properties – Crystallinity, Amorphous regions, Water affinity, Solubility, Oxidation and Reduction; **Preparatory Processing of Textiles-** Singing, Desizing, Scouring, Bleaching, Mercerization, Treatment with liquid Ammonia, Preparation of Silk and Wool.

Module II: Textile Dying.
Introduction to dying- Dyes and Pigments, Classification of dyes – (1) Natural Dyes, (2) Synthetic Dyes - Direct, Acid, Mordant, Reactive, disperse, Vat, Azoic, Basic (cationic), Optical Brighteners; **Methods of Dyeing** – (1)Fiber dyeing – Dope, Top, (2) Yarn Dyeing – Skein (Hank), Package, Warp-beam, Space; (3)Fabric Dyeing (Piece Dyeing) – Winch, Jet Dyer, Beam dyer, Jig, Padding, Foam, Dyeing of Blends – Cross Dyeing, Union dyeing; Garment Dyeing; **Dyeing defects** – Identifications, Tests to determine colour fastness.

Module III: Textile Printing.
Introduction to Printing- Dyes and Pigments for printing; **Classification of Printing styles**– Direct, Discharge, Resist; **Printing Methods –** Block, Roller, Duplex, Stencil, Screen, Transfer, Blotch, TAK dyeing, Jet Spray, Electrostatic, Photo printing, Differential printing, Warp Printing.

Module IV: Textile Finishing.
Introduction to Finishing – Objectives, Classification, Finishing equipment; **Aesthetic Finishes -** Lustre, Drape, Texture, Hand; **Special Purpose or Functional Finishes** –Stabilization, Shape-retention, Appearance-retention, Comfort related, Biological control, Safety related; **Textile Testing-** Tensile strength, Snap Pull & Pilling.

Module V: Care Renovation of Textiles
Introduction to care of textiles – Sunlight, Dampness, High temperature, Perspiration, Wear and Tear; Stains Removal Methods for different types of fabrics; **Laundering** – Soaps, Synthetic or non soap detergents, Pretreatment Products; Hand laundering, Washing Machine, Dry cleaning; **Storage-** Methods of textile storage; **Care symbols &Labeling -** Canadian care labeling, European care labeling, Japanese Industrial Standard care labeling, Australian care labeling, USA care labeling: ASTM D 5489.

Course Evaluation:

Components	A	HA	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; HA -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- Bernard P. Corbman, Textiles: fiber to fabric, McGraw-Hill Professional, 1983.
- Anne Fritz & Jennifer Cant, Consumer Textiles, Oxford University Press, 1986.
- V.A.Shenai, Technology of Textile Processing, Sevak Publication, 1999.
- E.R.Trotrman, Dying and Chemical Technology of Textile Fibers, CharloesGritin& Co, U.K., 1984.
- KadolphSara,J, Textiles, Pearson, 2009.
- DhantyagiSushila, Fundamentals of Textiles and their care, Orient laugman Ltd, 1996
- Basics of Textiles and Visual Inspection System, Textile committee, Govt. of India, Ministry of Textiles, Mumbai.

APPAREL PRODUCTION

Course Code: FST2306 **Credit Units: 02**

FST2306	**Apparel Production**	L	T	P	C
Version 1.1	Date of Approval: July 2021	1	-	2	2
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

This course enables and builds people to understand completely about apparel production in terms of machinery and equipment. Production methodology helps to understand the concept of assembly line, garment manufacturing, and quality checkpoints in production line.

Course Objectives

- The objective of this course is to Make students aware of the methods of apparel production. Its provide knowledge regarding machinery, equipment's, production methodology, Garment cost

Course Outcomes

On completion of this course, the students will be able to

- CO1. Understand the methods of apparel production.
- CO2. Learn production planning and control, quality assurance and production methodology.
- CO3. Understand the concept of labeling and packaging in apparels.
- CO4. Write the cost sheet in terms of garment costing.

Modules	**Blooms 5level***	**Number of hours**
Modules I : Introduction to Indian Apparel Industry : Organizational structure and sectors of the garment industry, apparel product types, developments in recent years, opportunities and challenges in Indian apparel sector, over view of global apparel industry, major trends in international apparel technological concepts.	L1,	10
Modules II: Machinery and Equipment This unit includes machinery and equipment related to cutting, sewing, finishing, washing, stain removal and embellishment.	L1,L3	10
Modules III: Production & **Workroom management :** Pre production process: Tech pack analysis, sampling, pattern and marker preparation, fabric and accessory procurement, sample types, approvals. Garment production: Sequence of production operations for shirts, trousers, jackets, skirts and vests.	L1,L2,L3	10
Module IV– Production Management and Material **Planning & Allocation** Meaning and need for production	L2,L3,L6	10

management; Types of production- Job Batch and mass production. Material planning and allocation; Process planning and process sheet; Job Production control		
Module V–Garment Costing	L4,L6	5

Bloom's Level

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Giglio and berks fashion production terms Greg hazer fantastic fit for everybody; Helen gover AK fashion buying.

Reference Books

1. AJ Shooter introduction to Ooh clothing production management apparel online apparel views clothesline Moda Vogue simplicity.

Submission of Practical Work records (Compulsory)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Relationship between the Course Outcomes (COs , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	2	1	1	1	3	1	1	1	2	2	3	1	3	3	3	3	3
CO2	2	1	1	1	3	1	1	1	1	1	3	1	3	3	3	3	3
CO3	2	1	1	1	3	1	1	1	2	3	3	1	2	2	2	2	2
CO4	2	1	1	1	3	1	1	1	1	1	3	1	1	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly relate

BASICS OF MANAGEMENT

Course Code: FST2307 **Credit Units: 01**

Course Objective:
This subject deals with the basic applications and principles of management in the area of fashion

Course Contents:

Module I : **Meaning & Principles of management**
Professional management of the fashion industry, Relevance of fashion management

Module II : **Structure of an organization**
Function of different departments, Relationship between individual departments

Module III : **Leadership**
Need for leadership, functions of a leader, and manager as a leader.

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Module IV : **Communication**
Importance of communications, communication process, barriers of communication, making communication effective.

Module V : **Authority**
Types and features, relevance of authority in management

Module VI : **Motivation**
Characteristics of motivation, methods of improving motivation, incentives, pay, promotion, rewards, job satisfaction and job enrichment

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:
- Koontz and Heinz, Principles of Management

References:
- Mike Easey , Fashion marketing
- Philips Kotler, Marketing management
- Maria Constantino, Fashion Marketing and PR
- Nicholas Alexender, international Retailing
- V. D Dudeja, Professional Management of Fashion Industry
- Lynda Gamans, Retailing Principles

INTRODUCTION TO FASHION RESEARCH & PRODUCT DEVELOPMENT PROCESS

Course Code: FST2308 **Credit Units: 01**

Course Objective:

This subject is designed to introduce the student to the language of design and a range of skills associated with research methods, application and development for a fashion outcome. The module will highlight the value of research in relation to the creative exploration of concepts and will provide a foundation which can be built upon and extended as the student progresses throughout the programme.

Course Contents:

Module-I : Fundamentals of Design thinking.

Stages of Thinking-Define, Research Ideate, Prototype, select, Implement, Learn, **Research**- Identifying drivers, Information gathering, Target Groups, Sample and feedbacks; **Idea generation**- Basic design directions, Themes for thinking, Inspiration and reference, Brainstorming, Value, Inclusion, Sketching, Presenting Ideas; **Creative Thinking Methods** - Innovation through Design Thinking - The Need for Creative and Design Thinking.

Module-II : The Research Method and Design Process.

Research -Nature and Definition; **Research Process** – Preparation, Information gathering-Goal, Identification of Problems and Hypothesis, Exposition of facts and interpretation, Presentation of result and findings; **Research Methods** – Literature review, Collection of preliminary field data, Define the problem, Analyzes and Modification, Presentation of findings; **Design Process** – Study historic and contemporary examples, Experimentation with materials and visual Ideas, Visual analysis and identification of design problems, Created the work series and explore in subsequent work, Board presentation.

Module-III : Fashion Product Development.

Introduction to Product development process – Target market, Merchandising, Season; **Design –** Concept boards, knockoffs**,** Fakes**,** Design elements – Color and Fabric selection, Design principles, Sketching Ideas – Style boards. Sample Development – Draping, Flat pattern, Prototype, Fit; **Tech packs –** Designer work sheets**, Line selection-** Editing, Reassessment of merchandising plan, Line presentation**; Manufacturing-** Duplicates the samples.

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

References

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Gavin Ambrose & Paul Harris, Design Thinking, AVA Publishing, Switzerland.
- Harry B. Watton, “New Product Planning”, Prentice Hall Inc., 1992.
- Jacob Solinger, “Apparel Manufacturing Handbook”, Reinhold Publications, 1998.
- Introduction to research in education, Ary Hort Reinhart,1982
- Research methodology by C. R Kothari, Published by Wiley Eastern Ltd, New Delhi,2000
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Lateral Thinking: Creativity Step by Step, Edward De Bono, 1970.
- How Customers Think: Essential Insights into the Mind of the Market – Gerald Zaltman
- Five Minds for the Future – Howard Gardner
- Harry Nystrom, “Creativity and Innovation”, John Wiley & Sons, 1979.

COMPUTER-AIDED MANUFACTURING (CAM)

Course Code: FST2309 **Credit Units: 03**

Course Objective:
This module makes the student know-how the Computer Applications in the Fashion & Apparel Industry.

Course Content:

Module I	**:**	**Adobe Photoshop - Functions of Tools & Working on layers**
Module II	**:**	**Photo-editing & its usage**
Module III	**:**	**Demo on 'TUKA cad' Module**
Module IV	**:**	**Mode conversation through editing**
Module V	**:**	**Demo on 'Opti Tex'**
Module VI	**:**	**Rendering & filter effects along tutorials**

Examination Scheme:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:

- Corel DRAW 11 for Windows: Visual Quick start Guide
- Jim X. Chen, Guide to Graphics software
- David Huss, Gary W. Priester ,Corel DRAW Studio Techniques, McGraw-Hill Osborne Media, 1998
- CorelDraw 10 for Windows: Visual Quick Start Guide.
- Linnea Dayton, Cristen Gillespie, The Photoshop Cs/Cs2 Wow!

References:

- Illustrated Encyclopedia of Costume and Fashion,
- Jill B. Treadwell, Edited: Donald Treadwell, Public Relations Writing: Principles in Practice, SAGE, 2004

PROJECT PRESENTATION

Course Code: FST2332 **Credit Units: 03**

Guidelines for the project

The purpose of this project is to help students to learn the procedure of doing research on a subject of their interest related to fashion field and then analyse & evaluate it in a presentable manner. They will have to submit a report and will have to give presentation for the same. This project will be conducted during their summer break.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project.
- A statement about the extent to which the project has achieved its stated objectives.
- A statement about the outcomes of the evaluation and dissemination process engaged in as part of the project.
- Any problems that have arisen and may be useful to document for future reference.

Project Report

The project report is the final research report that the student prepares on the project he chose. Following components should be included in the project report:

- **Title or Cover Page:** Title Page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide
- **Acknowledgement(s):** Acknowledgement to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract:** A good abstract should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- Table of Contents
- Introduction
- Materials and Methods
- Result and Discussions
- Conclusions & Recommendations
- Implications for Future Research
- References

The Layout Guidelines for the Project File & Project Report

- A4 Size Paper
- Font: Arial (10 points) or Times New Roman (12 points)
- Line spacing: 1.5
- Top and bottom margins: 1 inch/2.5 cm; left & right margins: 1.25 inches/ 3 cm

Assessment Scheme:

Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements etc.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report, analysis and results, achievement of objectives, presentation/viva)

Syllabus - Fourth Semester

FASHION ART ILLUSTRATION AND MODEL DRAWING-IV

Course Code: FST2401 **Credit Units: 02**

Course Objective: The study of this course develops the student's ability to design for different category of people: casual and formal. This focuses on designing of a garment according to requirement of the industry keeping in mind the forecast of the season. After the students learn the draping of male figure and move to stylized sketching using different color mediums. Students will be able to work on theme boards, mood boards & color boards.

Course Contents:
Module-1: Draping of male figures.
Module-2: Uses of textures in male's apparel (leather, denim, knits etc.)
Module-3: Designing of wedding collection- males & females.
Module-4: Designing of night wear.
Module-5: Designing of uniforms- air lines, hotel staff and industries.
Module-6: Inspirational and innovative designing
Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; H -**Home Assignment**; R-** Practical work records**; EE-**End Semester Examination)
Text & References:

Text Books:
- Mc Kenzie, Best in sports wear design
- Lisa Light, Destination Bride, F+W Media, 2005

References:
- Patrick John Ireland, Introduction to fashion design
- Sharon Lee Tate, Inside fashion design, Pearson Education India, 2004
- Fashion design and illustrations
- Patrick John Ireland, Encyclopedia of fashion detail, Batsford, 1987

ADVANCE PATTERN MAKING-II

Course Code: FST2402 **Credit Units: 01**

Course Objective: The course enables students to learn about details of construction of pattern for important and most commonly worn women's garments like trousers, skirt and its variation, shirt's etc. This course gives the full knowledge of cuffs, plackets and belts. The students learn to interpret design and create the pattern for that design.

Course Content:

Module I: Basic methods and techniques
Basic yokes and cowls, Basic Bodice Contouring: Corset, Strapless Foundation.

Module II: Developing pattern for various Styles
Dresses with seam lines, co-ordinates and dresses without seam lines.

Module III: Skirt Variations
Circular Skirt, Semi Circular Skirt, Four Gore Skirt, Eight Gore Skirt, Princess Line Skirt, Skirt with Flounce, Skirt with Inverted Pleats, Skirt with Box Pleats, Skirts with Knife Pleats and Skirt with Yoke Skirt with Set in Pleats.

Module IV: Executive wear
Drafting of basic trouser block and its variation.
Drafting of shirt (basic and slim fit) with cuffs and collars.

Module V: Drafting of corporate wear and Semi Couture Women's Evening Wear Project - Research on market, trends, Forecasts, brands for specific, details, trims and finishes, client research, fabric sourcing and surface development Design Realization of one chosen ensemble from a range of five.

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- Nora. M. MacDonald. UK December 2009/US October 2009. *Principles of Flat PatternDesign 4th edition*. Fairchild Books
- Aldrich W, Metric Pattern cutting for women's wear, 5th Edition, 2008, Oxford, Blackwell.
- Joseph Armstrong, Pattern making for Fashion Design, IV Edition, 2013, New Delhi, Pearson.

Reference Books

- Ernestine Kopp., Lee Gross. Beatrice Zelin&VittorinaRolfo. UK January 1991/US September 1991. *How to draft basic patterns*. Fairchild Books
- Helen Joseph-Armstrong. UK April 2013/US February 2013. *Draping for Apparel Design*. Fairchild Books.
- Bernard Zamkoff& Jeannie Price. UK August 2009/ US June 2009. *Basic PatternSkills for Fashion Design*. Fairchild Books
- BrunellaGiannangeli. December 2010... *Couture unfolded: Innovative pleats, folds& draping in Fashion Design*. Promopress Bilingual Edition
- Steven, S. Illustrating Fashion: Concept to Creation, 2010. New York, Fairchild Books.
- Tain, L. Portfolio Presentation for Fashion Designers 1998. New York, Fairchild Books.

GARMENT CONSTRUCTION-III

Course Code: FST2403 **Credit Units: 01**

Course Objective: The course enables students to learn about details of construction and its important and most commonly worn women's garments like trousers, skirts, shirt's etc. This course gives the full knowledge of cuffs, plackets and belts. The students learn to interpret design and create the pattern for that design.

Course Contents:
Module I: Garment construction methods and techniques
Basic yokes and cowls, Basic Bodice Contouring: Corset, Strapless Foundation.
Module II: Basic Shirt and Slim fit with cuffs and collars.
Module III: Skirt variations
Skirt/Cascades Variation, Gathered Flared, Circular, Handkerchief and Godets etc
Module IV: Basic Trouser and its Variation
Module V: **Project –I**: Evening gown
Project –II: Corporate wear

Submission of Practical Work records (Compulsory)

Course Evaluation

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- MilvaFiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion.* Fairchild Books.
- ZoyaNudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction.* Ava Publishing.

Reference Books

- Mary Ruth Sheilds. UK October 2010/US August 2010. *Industry Clothing Construction Methods.* Fairchild Books.
- Pamella Powell. UK September 2010/US July2010. *Tailored Fashion Design*. Fairchild Books.
- Julie Cole & Sharon Czachor. UK July 2014/US June 2014. Professional Sewing Techniques for Designers. Fairchild Books 2nd edition.
- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's.* Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- *Classic Tailoring Technique's- A Construction Guide for Women's Wear*. Fairchild Books.
- Raul Jewel. Publishing year unknown. *Encyclopedia of Dress Making.* Publisher unknown.

COMPUTER-AIDED DESIGN (CAD)-III

Course Code: FST2404 **Credit Units: 02**

Course Objective:
This study will introduce the student the usage of computer software in different areas of Fashion Designing &Technology.

Course Content:

Module I	**:**	**Illustrator: Tool Introduction and usage**
Module II	**:**	**Functions of tools & creating objects**
Module III	**:**	**Reach ERP**
Module IV	**:**	**Setting up artwork: Transparency, Gradients and patterns**
Module V	**:**	**Dobby/Jacquard**
Module VI	**:**	**Working on Color separation (2 D)**

Examination Scheme:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:

- Corel Draw 11 for Windows: Visual Quick Start Guide
- From Sue Chastain, your guide to Graphics software
- David Huss, Gary W. Priester, Corel Draw Studio Techniques.
- Corel Draw 10 for Windows: Visual Quick Start Guide.
- Linnea Dayton, Cristen Gillespie, The Photoshop Cs/Cs2 Wow!

References:

- Femina - Magazine.
- Elle – Magazine.
- Donald, Illustrated Encyclopedia of Costume and Fashion Public Relations Writing: Principles Practice

FASHION MERCHANDIZING-I

Course Code: FST2405 **Credit Units: 02**

Course Objective:
The aim of this subject is to enable students to appreciate the unique aspects and concepts of business management. It focuses attention on apparel business giving a thorough knowledge of merchandising.

Course Contents:

Module I	**:**	**Fashion Merchandising** Introduction, Functions and role of Merchandiser, Merchandising Process
Module II	**:**	**Marketing and merchandising concepts** Study of fashion principles and fashion cycle, Fad etc., Fashion movement. Study of domestic and international markets
Module III	**:**	**Environment and segmentation of fashion** Market segments and target markets
Module IV	**:**	**Merchandising systems** Wholesaling & retailing
Module V	**:**	**Merchandise Planning & Buying** Sources of Consumer information, Merchandising Team, Merchandise Plan, Key trends in Merchandising and sourcing
Module VI	**:**	**The structure of the Retail Industry** Retail merchandising, Retail Formats & Locations, Communicating with Consumers, Value addition in the Supply Chain from Yarn/ Fabric to retail.
Module VII	**:**	**Organizational Structures** Structure of export house, buying house and domestic companies, Buyer's classification and buying network in exports

Examination Scheme:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:
- John Donnellan , Merchandise Buying and Management.
- Grace I kunz, Merchandising: Theory, Practice and Principles

References:
- Mike Easey, Fashion Marketing
- Maria Constantino, Fashion Marketing and PR
- Nicholas Alexender, international Retailing
- V. D Dudeja, Professional Management of Fashion Industry
- Lynda Gamans, Retailing Principles

QUALITY CONTROL & PRODUCTION MANAGEMENT-I

Course Code: FST2406 **Credit Units: 03**

FST2406	**QUALITY CONTROL & PRODUCTION MANAGEMENT-I**	L	T	P	C
Version 1.1	Date of Approval: July 2021	2	1	-	3
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

This subject provides a detailed knowledge to students regarding the quality aspects, production, planning and control, maintenance of equipment, material handling, utilization of resources etc of a garment so that the quality and cost both are in an equilibrium.

Course Objective:

- This course provides a detailed knowledge regarding the quality aspects and production management of apparel.

Course Outcomes

On completion of this course, the students will be able to

- CO1. Conceptualize the understanding of Production management
- CO2. Apply technology and work measurement to increase productivity, decrease costs, and shorten delivery time.
- CO3. Develop and analyze quality and engineering specifications and production standards for products and processes.
- CO4. Explain various quality systems.

Modules	**Blooms Level**	**No. of Hours**
Module - I Quality Control- Meaning and Need for quality control; Approaches to quality control; Statistical quality control; Acceptance sampling, Types of defects	L1, L3, L4, L6	4
Module – II Inspection and Testing-Quality of Indian clothing, manufacturers with respect to exports; Role & characteristics of Quality controller; Need and planning for inspection; Types of inspection; Role of operator and inspector in inspection; Difference between inspection and testing	L1, L2, L3, L4, L5, L6	6
Module – IIIQuality Assurance **Garment Quality**: Garment Quality tests for dimensions, fabric construction, weight, properties, stitch lines, seams, special stitches, finishes etc.Durability characteristics of trims - resistance of zippers, buttons, snaps, buckles etc. to abrasion, bursting and corrosiveness.	L1, L3, L4, L5, L6	6

Garment defects: Garment defects Cutting defects, sewing defects, assembly defects, pressing, finishing and packaging defects, and procedures of quality evaluation, revision and approvals as specified inthe specification sheet.		
Module VI– Mobility fitting	L1,L3,L4,L5,L6	5

Bloom's Level

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

1. Chutler AJ, Introduction to Clothing Production Management, Blackwellscience, UK, 1998
2. Control, ASCQ quality Press, Marcel DekkerInc,New . York, 1992
3. Gerry Cooklin, Introduction to Clothing manufacture, Blackwellscience,UK, 1991.

Reference Books

1. Ruth E C, Apparel Manufacturing &Sewn Product Analysis. , Pradip V Mehta, Introduction to quality
2. . Harold Carr & BarbaraLatham, The Technology of Clothing Manufacture,Oxford pub., lTSA, 1994

Submission of Practical Work records (Compulsory)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written ExaminationExamination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Relationship between the Course Outcomes (COs , Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	2	1	1	2	3	3	2	3	1	2	1	1	1	3	3	2	1
CO2	2	1	1	2	2	2	3	2	1	2	1	1	2	1	3	3	1
CO3	2	1	1	2	3	3	2	3	1	2	1	1	1	1	2	3	1
CO4	2	1	1	2	2	2	3	2	1	2	1	1	1	3	2	3	1

1: strongly related, 2: moderately related and 3: weakly relate

HISTORY OF WESTERN COSTUMES

Course Code: FST2407 **Credit Units: 03**

Course Objective

This course aims to provide students with the appropriate vocabulary to describe costume as well as to develop the students' capacity to recognize the characteristic styles of each century, thereby enabling them to accurately describe the images. Students are given the opportunity to develop both their observation and description skills from the history, as they are applied to costume, ornamentation and trends.

Course Methodology : Research Project

The Research Project Guidelines

1. The students will have to submit and present a Research Project Assignment; this will give the students the opportunity to demonstrate their ability to carry out some interesting and creative research in History of Western Costumes.
2. The students will have to make sketches, collect pictures with brief points of each period and submit in a standard size file.
3. The students are asked to give a brief oral presentation with 'Power Point' to the class about their research. They have to explain, what kind of interests they want to develop in the research and a debate will follow as well. The submission of project assignment file and presentation will be part of student's Examination Scheme.
4. The students will have to visit various historical places and museums for the part of their research.

The project contents will be broken down into three parts which outlined below.

Module I **: Ancient costumes of the Western world**

1. Egyptian clothing - Men's and Women's costumes, jewellery, hairstyles and footwear.
2. Greek clothing - Men's and Women's costumes, jewellery, hairstyles and footwear.
3. Roman and Italic clothing - Men's and Women's costumes, jewellery, hairstyles and footwear.
4. Byzantine Period - Men's and Women's costumes, jewellery, hairstyles and footwear.

Module II **: Costumes of the Medieval World**

Renaissance Period - Men's and Women's costumes, jewellery, hairstyles and footwear.

Module III **: Costumes of the Modern World**

1. Victorian Period - Men's and Women's costumes, jewellery, hairstyles and footwear.
2. Fashion – 1900s - Men's and Women's costumes, jewellery, hairstyles and footwear.
3. Fashion – 1950s - Men's and Women's costumes, jewellery, hairstyles and footwear.

4. Fashion – 2000s - Men's and Women's costumes, jewellery, hairstyles and footwear.

Examination Scheme:

Components	**A**	**LR**	**B**	**P**	**Viva**	**Total**
Weightage (%)	**10**	**25**	**10**	**30**	**25**	**100**

(**A -** Attendance, **L -** Literature Review, **B -** Bibliography, **P** – Presentation)

References:

- Mules, Timeline of World Costumes.
- John Peacock, The chronicle of Western Costumes.
- Illustrated Encyclopaedia of Costume and Fashion.
- Lucy Johnston, 19th century Fashion in Detail.
- Pepin Press, Pictorial History of Costumes.
- John Peacock, Complete sourcebook of men's fashion.

VISUAL MERCHANDISING

Course Code: FST2408 **Credit Units: 03**

Course Objective:
Skill development in the creation of showroom or retail store window/interior displays that sell merchandise. Study of the basic techniques of store planning, mannequin dressing, alternate form design, and display space conceptualization and implementation

Course Contents:

Module I: Introduction to Visual Merchandising (VM): Introduction, Objectives, Concept of Visual Merchandising, Objectives of Visual Merchandising, Growth of Visual Merchandising, Visual Merchandising in India, Scope of visual merchandising in India, Visual Merchandising as a Support for Positioning Strategy, Prospects of Visual Merchandising, Challenges in Visual Merchandising, The common challenges, Ways to overcome the visual merchandising challenges

Module II: The Merchandise Mix: Introduction, Objectives, Concept of Merchandise Mix, Merchandise line, The Assortment of Products, Assortment strategy, Merchandise Mix of Show Off, Role of a merchandiser, Other Atmospherics in Merchandising, Colour scheme, Lighting

Module III: Store Management in Merchandising: Introduction, Objectives, Types of Stores, Location of a Store, Types of retail locations, Planning a Store Layout, Various Types of Store Layouts, Grid layout, Forced-path layout, Free-form layout, Boutique layout, Combined layout, Store Space Allocation, Heads of space allocation in a store, Managing Customer Navigation in a Store, General Rules of Customer Traffic in a Store, The Loop for Guiding the Shoppers through a Store

Module IV: Store Design and Display: Introduction, Objectives, Concept of Store Design and Display, Objectives of store design, Purpose and importance of display, Rules of display planning, Display Settings, Store Design, Exterior of a store, Interior of a store, Window displays, Merchandise Presentation Strategies, Colour blocking, Other techniques of merchandise placement, Physical materials used to support the display, Components of display, Some Useful Display Fixtures, Shelves, Gondolas, Round racks, Four ways, Saccades and fixation, Replenishes, Planogramming

Module V: Store Image & Security: Introduction, Objectives, Concept of Image Mix, Elements of Image Mix, Merchandise, Fixtures, Sound/Music, Odour, Visuals, Employees, Elements that Levy Negative Impact on Shoppers, Change of Image, Security Issues

Module VI: Managing Communication for a Retail Store Offering: Introduction, Objectives, Marketing Communication, Thematic Communication, Methods of Communication, Graphics, Signage

Module VII: The Present and Future of Visual Merchandising: Introduction, Objectives, Visual Merchandising at Different Stores, Apparel store, Furniture store, Gift store, Future Prospects of Visual Merchandising

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

Text:

- Judith Bell and Kate Ternus , Silent Selling
- Sarah Bailey and Jonathan Baker, Visual Merchandising for Fashion

References:

- Martin M Pegler, Visual Merchandising and Display

FASHION MARKETING MANAGEMENT

Course Code: FST2409 **Credit Units: 03**

Course Objective:
The objective of this course is to impart knowledge about fashion global market, fashion brand management, different pricing strategies, and necessary for successful employment in apparel businesses.

Course Contents:
Module I : Fashion for global market
Social, Cultural, Economic, Demographic factors relating to branded and licensed products, Analyzing potential or global market, identify target consumers and competition, market research and testing, customization

Module II : Fashion Marketing Concepts
The concept of marketing, Utility, Marketing functions and related activities, The concepts of market segmentation and niche marketing, The marketing mix, The channels of distribution used in the fashion industry, Marketing and merchandising

Module III : Economics in the Fashion Industry
The concept of economic goods/services, The concept of economic resources, The concept of supply and demand, Cost and retail, Gross profit and net profit.

Module IV : Fashion Promotional Mix
Types of media used in fashion retail advertising, The importance of special promotional events

Module V : Consumer Demand for Fashion Marketing
Consumer Groups - Demographic Trends & Psychographic Trends, Consumer spending – Personal Income, Disposable Income, Discretionary Income, Purchasing Power, Factors influencing consumer behaviour.

Module VI : Pricing strategies & Decisions
Concept and importance of pricing, Factors affecting pricing decisions, Methods of pricing

Module VII : Fashion Brand Management
Types and relevance of branding, Fashion & brand positioning, launching strategies, distribution, marketing campaigns for brand introduction

Examination Scheme:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

Text:

- By V. D Dudeja, Professional Management of Fashion Industry

References:

- Mike Easey , Fashion marketing
- Philips Kotler, Marketing management
- Maria Constantino, Fashion Marketing and PR
- Nicholas Alexender, international Retailing
- V. D Dudeja, Professional Management of Fashion Industry
- Lynda Gamans, Retailing Principles

TRADITIONAL INDIAN TEXTILES DOCUMENTATION (CONCENTRATION ELECTIVES)

Course Code: FST2410 **Credit Units: 03**

Course Objective:
The conceptual idea behind this documentation project is to acquire a thorough understanding of the craft's historicity and explores the creative importance and poetic potential of Indian traditional textiles & handcrafts productions which function as an inspirational tool for fashion design students

Course Methodology : Research Documentation.
Aim : To appreciate, document and add value to any traditional textiles & crafts of India.

Course Guidelines:

- The project will necessarily be a scientific, methodical documentation of a particular Textile and Craft traditions of India prevalent in the region, which will have the following core issues in the background.
  - Textile and Craft Tradition
  - Materials, Processes and Techniques
  - Craft survey and records the old –age craft of India
- Each section will be divided into groups, each group comprising minimum of 3 students.
- **The student's group has to choose any one of the state / region of India for Documentation topic.**

  Example List:

  ANDHRA PRADESH – Kalamkari & Pochampalli, BIHAR - Madhubani, GUJARAT - Block Printing, KASHMIR – Jamavar, ORRISSA – Ikat, RAJASTHAN - Bandhini / Tie & Dye, TAMIL NADU – Kancheevaram, UTTAR PRADESH - Banaras Bocades, WEST BANGAL - Jamdani & Baluchar.

  The students can also prepare assignment of Textile and Craft traditions found at their town / village, artisans and crafts communities who live in their locality.
- Visit to any craft village by each group to document any traditional craft of India. Students are expected to stay in the craft village & document the process & products of the craft.
- After the completion of documentation, students could make presentation at class.
- There will be an evaluation by a jury comprising of external experts and internal faculty guide from the department. Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.
- **Each student will present the following on the day of evaluation.**
  1. The final document file - This must be prepared on plain A3 paper. Each page should be used in the same orientation (landscape or portrait), Keep this simple. Your folder should contain well produced drawings, motifs, sketches, diagrams, photographs, Textile / costume sample or Value added craft item, strike offs, Swatches and brief notes / points where appropriate. Additional marks will be awarded for neat presentation, clearly drawn designs and correct spelling, grammar and punctuation.
  2. Video / PPT of the craft's village (location, structure, socio-economic condition, work process, product range and market etc.)

Examination Scheme:

Evaluation Components	RA				A	P	V	Total Weightage (%)
	Internal Evaluation		External Evaluation					
Craft Document	10	20	15	30	10	20	20	**100**
Swatches and Products Presentation	10		15					

(RA – Research Analysis, A - Attendance, P – Presentation, V – Viva voce)

STUDY ON TRADITIONAL DRESSES OF INDIA
(CONCENTRATION ELECTIVES)

Course Code: FST2411 **Credit Units: 03**

Course Objective:
The course objective is to familiarize students with aspects of the cultural past that still shape the present way to express an Indian identity in fashion which enable students to understand the relationship between tradition and contemporary trends, form and function, creator and consumer.

Course Methodology : Research Project
Aim : To explore the linkages between, craft traditions and Indian fashion environment through project studies.

Course Guidelines:

- Each of the students has to undertake a Project individually under the supervision of a faculty and to submit the same following the guidelines stated below.
- The projects taken up for this subject may have different stages of planning, execution and presentation. The projects may be taken up in a group of students where they can work on a particular craft tradition. Students may visit the crafts-persons in clusters in various regions. In the preparatory stage, students can discuss about various crafts traditions practiced in the region, their history, distribution etc., collect all information available through various sources including library, internet and resource persons. To avail comprehensive data on various aspects of the crafts, students may develop an interview schedule and decide on number of crafts persons to be interviewed, which all places they will be visiting etc. The students must equip on interaction with crafts persons and other people from the community, type of language they should use, how to be polite with them and while handling their materials etc. Students can buy some of the product from crafts persons, take photographs after seeking their permission, make drawings, etc. which later on they can use in presentation or submission of project report.
- **Following are the core issues for research and project background, the students can be choose the areas of study and topics based on this.**

1. Craft Traditions
2. Philosophy and Aesthetics
3. Materials, Processes and Techniques
4. Environment & Resource Management
5. Social Structures
6. Economy and marketing
7. Textile Craft Traditions and their relevance in the cotemporary fashion.

- Language of Project Report and Viva-Voce Examination may be English. There will be an evaluation by a jury comprising of external experts and internal faculty guide from the department.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as “Absent” in the Examination.

Examination Scheme:

Evaluation Components	RA				A	P	V	Total Weightage (%)
	Internal Evaluation		External Evaluation					
Conceptual Framework	10	20	15	30	10	20	20	**100**
Presentation, Analysis & Findings	10		15					

(RA - Research Analysis, A- Attendance, P – Presentation, V – Viva voce)

TERM PAPER

Course Code: FST2431 **Credit Units: 02**

Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

Examination Scheme:

Organization and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

WORKSHOP

Course Code: FST2433 **Credit Units: 01**

OBJECTIVES:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR WORKSHOP
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of at least 500 words about the learning outcome from the workshop.

METHODOLOGY
The methodology followed at the workshop could be based on any one or more of the following:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Examination Scheme:

Attendance	Active Participation	Multiple Choice Questions / Quiz	Solving the Case Assignment / Write up	Total
10	30	30	30	100

Syllabus - Fifth Semester

FASHION ART ILLUSTRATION AND MODEL DRAWING-V

Course Code: FST2501 **Credit Units: 02**

Course Objective: The Course helps the students design accessories for different segment of people, along with their display and story board.

Course Contents:
Module-1: Designing of range of ties and stoles.
Module-2: Designing of accessories- head gears, belts, bags etc.
Module-3: Fashion illustration with different mediums- charcoal pencils, glitters, poster colors, staedtlers, 3-d material etc.
Module-4: Fashion illustration with different techniques- tissue paper and blow Ink color.
Submission of practical work records - (Compulsory)

Course Evaluation:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; H -**Home Assignment**; R-** Practical work records**; EE-**End Semester Examination)

Text & References:
Text Books:

- Phyllis Tortora, The Fairchild Encyclopedia of Fashion Accessories

References:

- Patrick John Ireland, Encyclopedia of fashion detail, Batsford, 1987
- Kathryn McKelvey, Fashion Design Process
- Hamiyn, Key Moments in Fashion
- Gavin Waddell, How Fashion Work

GARMENT CONSTRUCTION-IV

Course Code: FST2502 **Credit Units: 01**

Course Objective: The course enables students to learn about details of grading in construction and its important and most commonly worn women's garments like trousers, skirt and its variation, shirt's etc. The students learn to interpret design and create the pattern for that design.

Course Content

Module I: Construction of Different Grades Garments
Basic Bodice Block, Sleeves, Skirts, Trouser, collars, jackets

Module II: Project - Research on market, trends, Forecasts, brands for specific Indian wear ensembles, details, trims and finishes client research. Design Realization of one chosen ensemble from a range of five.
Theme –

- Bridal Wear
- Formal wear
- Maternity Wear
- Beach wear
- Night wear
- Executive Wear
- Street Wear
- Casual Wear

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books

- Bina Abling& Kathleen Maggio. UK October 2008/US August 2008. *Integrating Draping, Drafting & Drawing*. Fairchild Books
- MilvaFiorella Di Lorenzo. UK November 2009/US September 2009. *Tailoring Technique's for Fashion.* Fairchild Books.
- ZoyaNudelman. UK August 2009/US June 2009. *The Art of Couture Sewing*. Fairchild Books.
- Annette Fischer. UK November 2008/US December 2008. *Basic Fashion Design 03-Construction.* Ava Publishing.

Reference Books

- Mary Ruth Sheilds. UK October 2010/US August 2010. *Industry Clothing Construction Methods.* Fairchild Books.
- Pamella Powell. UK September 2010/US July2010. *Tailored Fashion Design*. Fairchild Books.
- Julie Cole & Sharon Czachor. UK July 2014/US June 2014. Professional Sewing Techniques for Designers. Fairchild Books 2nd edition.

- Amaden-Crawford, Crawford. UK September 2014. *Fashion Sewing- Introductory Technique's.* Fairchild Books.
- Janace. E. Bubonia. UK December 2014/US October 2014. *Apparel Quality- A Guide to Evaluating Sewn Products*. Fairchild Books.
- *Classic Tailoring Technique's- A Construction Guide for Women's Wear*. Fairchild Books.
- Raul Jewel. Publishing year unknown. *Encyclopedia of Dress Making.* Publisher unknown.

COMPUTER AIDED DESIGN (CAD)-IV

Course Code: FST2503 **Credit Units: 02**

Course Objective:
This module will make the student use Fashion studio for compilation of portfolio for Graduation Design Collection undergoing various processes.

Course Contents:

Module I : Tools Introduction and usage

Module II : Cleaning & Selection of fabric

Module III : Color Reduction

Module IV : Texture Mapping.

Module V : Mood board & Color board

Module VI : Draping

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

Text:
- Winifred Aldrich, CAD in Clothing and Textiles
- Alison Beazley and Terry Bond, Computer Aided Pattern Design and Product Development

References:
- Bina Abling, Advanced Fashion Sketchbook
- Pepin Press, Ikat Patterns

PATTERN DRAPING

Course Code: FST2504 **Credit Units: 01**

Course Objective:
After the students have a thorough knowledge of flat pattern-making and its application they are now introduced to the concept of three dimensional process of pattern making by draping the material on to the mannequin.

Course Contents:

Module I : **Introduction**
Equipments needed, grain, seam allowances, preparation of fabric, dress form.

Module II : **Basic patterns**
Basic bodice (front & back), Basic skirt (front & back), Basic sleeve

Module III : **Variations in necklines, armholes, waistlines, princess bodice and boned bodice**

Module IV : **Creating patterns by dart manipulations**
Multiple darts, Dart tucks, Gathers, Pleats, Flare, Style lines and control seams

Module V : **Style lines and control seams**
Use of style lines, Cowls and twists in bodice, Midriff & yoke styles

Module VI : **Variations in skirts**
Variation of the basic skirt, flared, pegged, paneled, gathered, gored and pleated, Peplums- flared and gathered

Module VII : **Collars**
The Mandarin collar, Convertible Collar, Peter Pan collar, Shawl collar, Notched Collar

Module VIII : **Sleeves - The Dolman sleeve, Raglan and Kimono sleeve**

Module IX : **The Shift**
A Line, Tent, Blouson, Use of Facings, Closures and Pockets

Module X : **Final Presentation**

Submission of practical work records - (Compulsory)

Examination Scheme:

Components	A	P	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; P -** Presentation**; R-** Practical work records**; EE-**End Semester Examination)

Text & References:
Text:
- Jaffe and Rellis, Draping for Fashion Design
- Connie Amaden- Crawford, The Art of Fashion Draping

References:
- Natalie Bray, Dress Fitting

PATTERN GRADING

Course Code: FST2505 **Credit Units: 01**

Course Objective:
After the knowledge of flat pattern making the students now learn how to increase or decrease any pattern in proportion.

Course Contents:

Module I	**:**	**Introduction to Grading** History, Sizes & Measurement Sizes & Development, Importance of grading, Methods of grading- Stack and Track methods, Different types of grading- horizontal, vertical and diagonal
Module II	**:**	**The Master Grades** Grading of adult bodice block- front and back, Inset and grown on sleeves
Module III	**:**	**Grading of collar s and lapels** Tailored lapel, Tailored Collar, Shawl Collar
Module IV	**:**	**Grading of skirts** Fitted skirt block-front and back, flared skirts, skirt variations, Grading of Sheeth Block
Module V	**:**	**Grading of Trouser Block** Basic Block; Trouser variation
Module VI	**:**	**Grading of Jacket** Paneled, Box and double breasted jackets
Module VII	**:**	**Computerized Grading Technology**

Examination Scheme:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; H -**Home Assignment**; R-** Practical work records**; EE-**End Semester Examination)

Text & References:
Text:
- Gerry Cooklin, Pattern Grading for Women's Clothes
- Gerry Cooklin, Pattern Grading for Men's Clothes
- Gerry Cooklin, Garment Technology for Fashion Designers

References:
- Natalis Bray, More Dress Pattern Designing

FASHION MERCHANDIZING-II

Course Code: FST2506 **Credit Units: 03**

Course Objective:
After the students have understood the relevance and functions of merchandising process, they are taught the skills related to sourcing, developing and presenting product lines, vendor and customer relationship and export documentation.

Course Contents:

Module I	**:**	**Developing & Presenting Product Lines** Traditional Line Planning, Contemporary Line Planning, Fundamental methods of product line planning, Concept of merchandise presentation
Module II	**:**	**Strategies and Decisions** Pricing strategies, Promotional strategies, sourcing of raw materials.
Module III	**:**	**Time Flow Management** Maintaining time schedule chart, Current Indian exports and India's position
Module IV	**:**	**Global sourcing**
Module V	**:**	**Customer / Vendor Relationship** Concept of Customer Service, Role of Personal Selling purposes.
Module VI	**:**	**Financial aspect of merchandising** Merchandise accounting, Inventory Valuation, Retail pricing
Module VII	**:**	**Merchandise Control & Presentation** Merchandise Control & report Analysis
Module VIII	**:**	**Merchandising and related careers**

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:
- John Donnellan, Merchandise Buying and Management
- Grace I kunz, Merchandising: Theory, Practice and Principles

References:
- Mike Easey, Fashion Marketing
- Maria Constantino, Fashion Marketing and PR
- Nicholas Alexender, international Retailing
- V. D Dudeja, Professional Management of Fashion Industry
- Lynda Gamans, Retailing Principles

QUALITY CONTROL & PRODUCTION MANAGEMENT-II

Course Code: FST2507 **Credit Units: 03**

FST2507	**QUALITY CONTROL & PRODUCTION MANAGEMENT-II**	L	T	P	C
Version 1.1	Date of Approval: July 2021	2	1	0	3
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

Analyse, synthesis and demonstrate the basic decision-making, production, and creative processes involved in the conversion of materials to finished textile/apparel products and be familiar with the various production systems with respect to quality and able to Identify and discuss concept of apparel machinery Conceptualize the understanding of Production management

Course Objectives

- This subject provides a detailed knowledge to students regarding the quality aspects, production, planning and control, maintenance of equipment, material handling, utilization of resources etc of a garment so that the quality and cost both are in an equilibrium.

Course Outcomes

On completion of this course, the students will be able to:

- Conceptualize the understanding of Production management
- Examine the different standards applicable to industry Learn about the workroom management.
- Identify and discuss concept of apparel machinery
- Analyse the basic decision-making, production, and creative processes involved in the conversion of materials to finished textile/apparel products and be familiar with the various production systems with respect to quality.

Course Content

Modules	**Blooms level***	**Number of hours**
Module I: Quality Control and Standards Introduction to quality control and standards: Evolution of quality, quality planning, qualitycontrol, quality assurance Quality Management System- Organizing, planning and implementation. Quality standards: importance, benefits, levels and sources of standards- ISO, AATCC, ASTM,BS, BIS, DIN.	L1, L2	6
Module II: Eco Management Eco management of textile and apparel industry: Global scenario, eco textiles, eco standards andcertifications - ISO 14000, Eco-mark, OekoTex 100 standards, GOTS, OHSAS, Green label,Green Seal.Eco specifications and restrictions in apparels and textiles:	L1, L2	6

Module III: Inventory Control and Cost Estimation Need and advantages of inventory control; introduction and functions of cost estimation, estimation procedure, elements of cost and ladder of costs, method of calculating depreciation, overhead expenses and distribution of overhead expenses	L1, L5	7
Module IV: Various Production Systems Study various production systems with respect to quality. Eg. Lean, Sigma, 5S etc.	L1, L2	10
Module V: Care, Labelling and Packaging **Labelling:** Introduction, labelling parameters, fibre content, care labelling and flammability,wash care labels, **Packing:** Function and scope of packing, packing methods, instructions, materials, weight, ratio,and labelling considerations for shipment by air and sea, packing marks, warehousing - assortment and storage methods	L1, L3	7

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Textbooks & Reference

1. David H, "ISO 9000 quality system handbook", Butterworth publishing, New Delhi, 2006.
2. Juran J M and Gryna, F M, "Quality Planning and Analysis - From Product Development through Use", Tata McGraw Hill Publishing Limited, New Delhi, 2001.
3. Pradeep V Mehta, "Managing Quality in Apparel Industry", NIFT publication.
4. Sara J Kadolph, "Quality Assurance for Textiles and Apparels", Fairchild publications, 2nd Edition, 2007.
5. Saville, B.P. "Physical testing of textiles", Woodhead Publishing Ltd and CRC Press LLC, 1999

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Relationship between the Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	-	2	3	1	1	3	3	2	1	1	1	1	1	1	3	1	1
CO2	3	2	3	1	2	3	3	1	2	1	2	1	2	1	3	2	1
CO3	3	2	-	1	3	3	3	3	1	1	1	2	3	1	2	3	1
CO4	3	2	-	1	4	3	3	1	2	1	1	2	1	1	2	1	1

1: strongly related, 2: moderately related and 3: weakly relate

FASHION FORECASTING

Course Code: FST2508 **Credit Units: 03**

Course Objective:
The students are made to start their work with the collection of data regarding fashion forecasting, trend analysis and presentations. They are then made to forecast the fashion trend and dictate fashion in their very own way.

Course Contents:

Module-I : Concept of fashion forecasting (Theory)
Awareness of fashion fairs and fashion centers, Knowledge of creative writing, Reading of fashion forecast magazine, Sources of information, Role of Exhibitions and Fashion shows

Module-II : Fashion Forecasting Process (Theory)
Market Research- Consumer research, Shopping, Sales records; **Evaluating the collections**- Similar Ideas indicate fashion trends, Trends for target market; **Fashion services** – Collection reports, Trend books, consulting, Color services, Television/Video services , News letter services, Web sites, Directories and reference books, Fashion Magazines and news papers, Catalogs. **Design Sources**- Historic inspirations, Folk influences, Vintage clothing shops, Museums, Libraries and bookstores, Arts, Fabrics/Textiles, Travel, Form follows function, The street scene, The turn of the century, innovations and technologies.

Module-III : Applied Learning Assignments. (Practical)

Market Research	-	On site visits to fashion retailers and cloth markets and study the market trends and collect various cloth samples, catalogs etc.
Forecasting Exploration	-	Students will explore a variety of sources like Magazines, News papers, Internet sites and in-site, their market research reports etc. to become familiar with apparel, textile, color, style, and general culture and consumer forecasting resources. Each student will identify and report trends found to class.
Preparation of story boards	-	Students will prepare story boards for specific target.
Presentation of designs	-	Students will prepare fashion forecast for different seasons.
Final Presentation	-	Each student have to submit their Research file in a standard format guided by the faculty for the final evaluation.

Examination Scheme:

Components	A	CD	A & F	P	Viva	Total
Weightage (%)	**10**	**20**	**20**	**25**	**25**	**100**

(**A -** Attendance, **CD -** Concept Development, **A & F -** Analysis & Findings, **P** – Presentation)

References:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Tracy Diane and Tom Cassidy, Colour Forecasting
- Kathryn Mc Kelvey, Fashion Design Process, Innovation and Practice

List of Magazines

Apparel online, Fiber 2 Fashion, Cosmopolitan. Marie Claire, Elle, Vogue, Harper's Bazaar, In Style, Glamour, Lucky, Allure, W Magazine.

CRAFT DOCUMENTATION
(ORGANIZATIONAL PROJECTS)

Course Code: **FST2535** **Credit Units: 06**

Objective

The objective of this programme is to bring about the transformational change from a practical application of the learned knowledge in real time corporate world and industry towards laying a focused and insightful planning for a strong foundation towards understanding and contributing towards Indian crafts.

Methodology

- Market Visit
- Field Trip
- Documentation and Presentation
- Scope and Final Presentation

Guidelines

- The Craft Documentation is scheduled between 4th and 5th semester.
- CD is a complete practical training programme with study of each and every aspects of the organization, and the training experience should be submitted as Organizational Project Report.
- There are two guides will be associate with CD. Faculty Guide for overall guidance and Company Guide for monitoring the SIP students in respective departments of the allocated company.
- Every student should attend the company allocated to him/her regularly and complete the project on given time lines. Disciplinary action will be initiated if any student is found to be absenting himself/herself without the permission from company guide / Faculty guide / HOS.
- Student in organizational Project (OP) / CD are the role ambassadors of Amity University Haryana (AUH). They carry the brand image of AUH and should always show high level of dignity at the work place.
- Every student is expected to carry a pen, notepad daily to the company where he/she assigned the project and should always note down the progress of him/her along with daily dosage of work schedule.
- The students in the OP/CD can be meeting the faculty guide in between the programme with prior permission from the company guide. Such cases the company guide should be inform to faculty guide/HOS
- The students by virtue of his/her carelessness fail to do the project, will not be awarded the graduation certificate and also kept out-of-placement services.

FINAL RECORD PREPARATION FORMAT
(Summery of Organizational Project Report content)

1. Cover Page
2. Inner cover page
3. Company Certificate
4. Amity University Haryana Certificate
5. Table of contents / Index
6. Acknowledgement
7. Declaration
8. Executive Summery
9. Introduction

- Brief on the Industry
- Brief on the Company

10. Project Objective
    - Primary and Secondary
11. Methodology
12. Scope of the study
13. Significance of the study
14. Project Analysis
    - Work Done Analysis
    - Research Methodology analysis
15. Tabulation and Graphical Representation
16. Inference from Study
17. Contributions
18. Learning's
19. Suggestions
20. Conclusions
21. Achievements (In case of any appreciation letter, stipend achievement letter, Photographs on the significant occasions or any others)
22. Reference
23. Annexure.

- Language of Project Report and Viva-Voce Examination may be English. There will be an evaluation by a jury comprising of external experts and internal faculty guide from the department.
- Failure to submit the Project Report in proper manner / without company certificate / AUH certificate or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.

Examination Scheme:

<table>
<tr><th rowspan="2">Evaluation Components</th><th colspan="4">OPR</th><th rowspan="2">A</th><th rowspan="2">P</th><th rowspan="2">V</th><th rowspan="2">Total Weightage (%)</th></tr>
<tr><th colspan="2">Internal Evaluation</th><th colspan="2">External Evaluation</th></tr>
<tr><td>Project Analysis</td><td>10</td><td rowspan="2">20</td><td>15</td><td rowspan="2">30</td><td rowspan="2">10</td><td rowspan="2">20</td><td rowspan="2">20</td><td rowspan="2">100</td></tr>
<tr><td>Conclusion & Recommendations</td><td>10</td><td>15</td></tr>
</table>

(OPR - Organizational Project Report, **A -** Attendance**, P –** Presentation**, V –** Viva voce)

MANUFACTURING PROCESS IN APPAREL INDUSTRY AND EXPORT MANAGEMENT
(CONCENTRATION ELECTIVES – Group-I)

Course Code: FST2509 **Credit Units: 01**

Course Objective:
The basic objective of this course is to provide the students with necessary knowledge, skills and foundations for acquiring a wide range of rewarding careers into the rapidly expanding Apparel Industry.

Course Contents:

Module I : Introduction to Apparel Industry.
Structure - Size Structure, Manufacturing structure – Own account, Sub-contractor, Working Methods; **Sectors –** Based on garment types. **Product & Organization Types –** Unit size, Production run, Change in fabrics, New operations, Operator skills, Salary levels, Engineering, Marketing & Design.

Module II : Organizational structure & Process of Apparel Industry.
Design Department - , Marketing Department, Finance Department, Purchase Department, Production Department, Operations (Planning) Department , Shipping Department.

Module III : Production Engineering.
Basic Method study – Work study, Method study, Time standard, Principles of motion economy, Method records, Practical aspects, **Basic Work Measurement** – Management tools, Time study Procedure, Standard Minute, Standard performance, Watches, Timing elements, Timing errors, Rating allowances, Standard time calculation, Predetermined motion study

Module IV : Export Management
Export / Import (EXIM) Policy of India – Benefits of International Marketing, Concepts of WTO and Globalization; **Export Promotion Activities -** Functions of TEXPROCIL, AEPC, PDEXIL and HEPC ,Textile Committee and Textile Commissioner's Office; **Export Finance** – Pre shipment and Post shipment Finances; **Documentary Credit** – Letter of Credit; **Pricing in export -** Export Price composition, Ex-Factory, FAS, FOB, C&F, CIF; **Export Procedures** – Export Order Processing, Export Documents, Export Incentives.

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

References:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Chuter A.J., Introduction to Clothing Production Management, Blackwell Science, 1998
- David J Taylor, Materials Management In Clothing Production, BSP Professional Books, London, 2001
- O. P. Khanna, Industrial Engineering and Management, Dhanpat Rai & Sons, 1985
- P. K. Khurana, Export Management, Galgotia Publishing Company, New Delhi.

- T. A. S. Balagopal Export Management– Himalaya Publishing House, Mumbai.
- Albaum, International Marketing and Export Management – Pearson Education India, 2006
- R. L. Varshney and B. Bhattacharya, International Marketing Management – An Indian Perspective, Sultan Chand & Sons.
- Pepsi Handbook of India Exports – Global Business Press, New Delhi.

QUALITY ASSURANCE IN APPAREL INDUSTRY
(CONCENTRATION ELECTIVES-GROUP-I)

Course Code: FST2510 **Credit Units: 01**

Course Objective:
This course puts strong emphasis on further developing students understanding and working knowledge of techniques to identify the product defects, propose solutions to these problems and strategically handle the quality control with appropriate inspection systems.

Course Contents:
Module I : Introduction and Inspection Methods
Quality control – Definition, Importance of quality, Raw material Inspection, **Fabric Inspection** - 4 point System , 10 point System; **Trims Inspection; In process Inspection, Final Inspection** – AQL random sampling inspection; Sampling Plans, Acceptance Sampling, Product Quality Audit, Comparability checks, Documents required before inspection.

Module II : Testing of Garments
Seam strength, Fabric Stretch properties, Dimensional changes due to Laundering, Dry cleaning and Steaming & Pressing, Durable Press Evaluation of Fabrics and Apparel, Needle cutting / yarn severance - Suability of fabrics, Bow and Skewness in Woven and Knitted fabrics, Distortion of yarn in Woven Fabrics, Fabric Streak Analysis, Soil/Stain release, Wrinkle Recovery, Water Resistance and Water Repellency, Fusible Interlinings, Testing of Zippers, Elastic Waist Band , Sewing Threads, Pantyhose, Wear Testing; 45° Degree Flammability & Vertical Flammability Tests.

Module III : Use and parameters of Quality Packing Accessories
Packing - Classification of Packing, Stand up pack, Flat pack, Hanger pack, Hanger with sandwich pack, Dead man pack ; **Packing materials** - Poly bag – Plain / Gazetted pack, Back support board, Window board - Plain board, Inner collar patty, PVC, Outer patty, Butterfly, Plastic clips, Plain and gripper - Pins - plain and ball head, Hang tags, Price ticket, Fabric tag, Tissue paper, Size sticker, Warning sticker, Cello tape, Cartons.

Module IV : **Care Labeling & Garment Defects.**
Care labels - Introduction to Care labels, Different systems of Care labeling – American, British, Canadian, Japanese, and International labeling, Eco-labeling; **Shade sorting**-Introduction, Importance Instrumental shade sorting. **Defects in garments** - Major and minor defects, Pattern defects, Spreading defects, Cutting defects, Stitching defects- Broken stitch, Unraveling seams, Re-stitched seams, Rolling pockets, Skipped stitch, Wavy seams; **Ways to minimize defects in garments.**

Module V : **Garment Industry Certification**
Quality Control Program - Seven tools of quality controls; ISO 9000 series standards, Procedure of obtaining ISO 9000 series standards, WRAP Certification & Procedures, SA 8000 certification. **Quality Management system**- Total Quality Management, Phases of TQM, 5S Concepts, Daily Work Management, Six sigma concepts. **Quality control tools -** Lean Production system, Comparison between Lean and Mass production system.

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Reference:

- Pradip V. Mehta, Satish K. Bhardwaj, Managing Quality In The Apparel Industry, New Age Intl, 1998
- Sara J. Kadolph, Quality assurance for textiles and apparel, Fairchild Publications, 2007
- Glock Ruth E., Glock, Apparel Manufacturing: Sewn Product Analysis, Pearson Education India, 2005.
- Samuel Lloyd Myers, Textile and Apparel Testing and Labeling, Harvard University, 1954

FASHION RETAILING AND VISUAL MERCHANDISING (CONCENTRATION ELECTIVES - GROUP-II)

Course Code: FST2511 **Credit Units: 01**

Course Objective:
The aim of the course is to provide an integrated curriculum frame work within which students are able to acquire a range of knowledge and transferable skills relevant to employment in retail industry.

Course Contents:

Module I : Introduction to Fashion Retailing & Strategies.
Fashion Retailing-Definition, Concept, Importance, Functions – Indian Retails vs. Global Scenario, **Retail Location**- Factors affecting location decision, Site Selection. **Retail Directions** -Value directed retailing; Service oriented retailing, Unique Merchandising, Shopping as entertainment, Street retailing, Global expansion of retailing; **Types of Retail operations** – (1) Specialty stores- Single brand or Private label retailers, Secondary spin-offs, (2) Department stores, (3) Mass Merchants – Discounters, Off-Price retailers, Outlet stores, Warehouse clubs, (4) Promotional stores, (5) Non store retailing - Mail order merchants, Party plan retailing, Electronic retailing, Television shopping, Online shopping.

Module II : Fashion Retail Functions & Organizations.
Retailing Functions – Merchandising, Store operations, Marketing, Sales Promotion, Finance, Real estate or Store planning, Human resources. **Organizations –** (1) Shopping Centers – Traditional Malls, Diversified Malls, Value centers, Outlet Malls, Transportation centers, Recreational Malls, Town center malls; (2) The small stores, (3) The large stores, (4) Store with in a store – In store designer boutiques, Leased departments; (5) Multiple -unit stores – Chain stores, Department store groups, corporate ownerships. **Retail Buying –** Buyer's role, Duties & responsibilities of a retail buyer

Module III : Introduction to Visual Merchandising.
Visual Merchandising - Definition, Concept, Importance; **Store Planning –** Store Image, Target customers, Seasonal Visual merchandising, **Store Design –** (1) Windows – Special event windows, Fashion message windows, Direct-sell windows; (2) Interiors - Apparel fixtures, Folding and stacking, Accessories display

Module IV : Managing Visual Merchandising.
Elements - Mannequins, Standards Manuals, Presentation packages, Tele communications, Designer / Brand in-store shops, **Store Administration** - Floor space management, Managing store inventories and display.

Module V : Case Study (Compulsory)

Impact of Foreign Direct Investment (FDI) in Indian Fashion Retail Industry.

Examination Scheme:

Components	A	CS	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

Reference:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Dickerson Kitty G., Inside The Fashion Business, Pearson Education India, 2004
- Swati Bhalla & Anuraag S., Visual Merchandising, Tata McGraw-Hill Education, 2010
- Diamond, Fashion Retailing: A Multi-Channel Approach , Pearson Education India, 2007
- Rosemar Varley, Retail Product Management: Buying And Merchandising, Routledge, 2006
- Jay Diamond, Ellen Diamond, Contemporary Visual Merchandising, Prentice Hall PTR, 2010

FASHION PROMOTION
(CONCENTRATION ELECTIVES - GROUP-II)

Course Code: FST2512 **Credit Units: 01**

Course objective:
This course describes various types of fashion promotion with procedures and its relation to store needs and target customers.

Course Contents:

Module I : Fashion- Sales Promotion.
Sales promotion – Objectives, Fast sales boost, Encourage Trial, Encourage repeat purchases, Simulate purchase of large stocks, Gain distribution and shelf space. **Promotion Techniques- Consumer Promotion-** Money off, Bonus packs, Premiums, Free samples, Coupons, Competitions, Draws; **Trade Promotions** – Price discounts, Free goods, Competitions, Allowances. **Evaluating sales promotion –** Pretesting research, Post testing research. **Promotional Aids** – Personal appearances, Designer Trunk shows, In-store clinics, Merchandise representatives, Videos, Image books, Display fixtures, Radio scripts and TV commercials, Glossy photographs, Hangtags. Fashions promote associations, Fashion awards.

Module II : Fashion -Advertising.
Define advertising objectives –Position the offering, Create awareness, Stimulate trail, Remind the rain force, Provide support for sales force, correcting misconceptions. **Advertising Strategy –** Identify and understand the target audience, Establish advertising spend, Massage decisions. **Advertising Media** – The term 'Media', Print Media - Types, Methods of advertising, advantages and disadvantages; Electronic Media - Types, Methods of advertising, advantages and disadvantages. **Kinds of advertising-** Image advertising, Item advertising, Promotional advertising. **Advertising Department** – Art, Copy, Production, traffic. **Advertising Agencies.**

Module III : Fashion – Public Relations.
Public relations – Introduction; **Functions of public relations** – Facilitates company's overall operations, Aids promotion, Helps tracking social and environmental issues, Ensure customer's satisfaction, Attracting and retaining talented employees, Give benefits to stake holders , Develop reputation of the organization, Responds effectively to negative publicity. **Publicity** – Task of publicity department, **Characteristics of publicity** – Credible message, No media cost, Loss of control of publication, Loss of control of content, Loss of control of timing. **Publicity Campaigns** – Press package, Individual approaches. **Special events -** Fashion shows – Formal fashion shows, Designer trunk shows, Department fashion shows, Informal fashion shows.

Module IV : Applied Learning Assignments.

1. Visit any department store and observe the various techniques of sales promotion activities and make a report.
2. Search through various news papers and magazines and analyze the coverage of advertising campaigns of different large chain store / fashion brand. Clip the stores advertisements and find the, name, trade mark, manufacturer and store specialties and locations.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- Jay Diamond, Ellen Diamond, Fashion Advertising and Promotion, Fairchild Books, 1999
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Kotler Philip & Armstrong, Gary, Marketing: An Introduction, Pearson Education.
- Stanton, William J. et al, Fundamentals of Marketing, McGraw-Hill Publishing Co. Ltd.
- Phyllis Tortora, The Fairchild's Dictionary of Fashion
- S. A Hussain, Variety- Fashion for Freedom
- Belch, Advertising And Promotion, Tata McGraw-Hill Education, 2003

THE BUSINESS OF LUXURY FASHION
(CONCENTRATION ELECTIVES - GROUP-III)

Course Code: FST2513 **Credit Units: 01**

Course objective:
This course aims to give students a deeper understanding of the luxury sector & reveal the importance of the profession in the contemporary world.

Course Contents:

Module I : Introduction to Luxury Fashion.
Luxury- Concept, Definition in economics, Origins of luxury fashion, Market characteristics **Conspicuous consumption** – Definition and theory, **Socio-economic significance** - Status symbol, Consumerism, Life style and culture. **Luxury and Ethics** -Accessible luxury, Intangible luxury. Sustainable luxury: social luxury guilt-free, luxury, sweatshop-free clothing.

Module II : The Luxury Fashion Consumer & Buying Behavior
Consumer Behavior – Introduction, Models of Consumer Behavior; **Buying Behavior -** Introduction, The consumer purchase-decision process; **Cross-Cultural Behavior -** Economic, demographic and socio-cultural trends and consumer; Globalization of consumer markets and international marketing implications. Luxury consumer market indicators.

Module III : Luxury Retail Design and Atmosphere
Luxury retail - Location, Store concept, Retail extension, Product merchandizing design, New selling techniques, Designer outlet shopping. **Store planning and Design** – Store Image, Target consumers, Seasonal Visual Merchandising, Windows, Interiors, **Shopping as entertainment.**

Module IV : The Art of Creating and Managing Luxury Fashion Brands
Branding – Defining a luxury brand, Branding benefits, **Luxury fashion branding strategy development** - Brand concept, Brand identity, Brand awareness, Brand positioning, Brand loyalty, Brand equity, Brand value; **The luxury fashion marketing strategy** - The product, Pricing, The place of distribution, Promotion, The celebrity connection, People, Positioning. **Building a Brand or Designer Name** –Multi products – Secondary lines, New product divisions, Size ranges, Accessory collections; Licensing, Joint ventures, Exporters, Manufacturers as Retailers – Factory outlet stores, In-store boutiques, Catalogs, Televisions, and Internet sales. Franchising, Leased Departments, Consignment stores Jobbers.

Module V : Global Nature of Fashion Business.
Introduction to international Fashion business – Importance, Nature and scope, Modes of entry into International Business Internationalization process and managerial implications, Multinational Corporations and their involvement, Agreement on Textiles and Clothing (ATC) ; **The luxury fashion business strategy model**- Definition, The business strategy modeling process.

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- Uche Okonkwo, Luxury Fashion Branding: Trends, Tactics, Techniques, Palgrave Macmillan, 2007,
- Bennet, Roger, International Business, Financial Times, Pitman Publishing, London, 1999.
- Gini Stephens Frings, Fashion: From concept to consumer, Prentice-Hill Inc. 1999
- Berry, C.J. The idea of luxury –A conceptual and historical investigation, Cambridge University Press.
- Kotler Philip & Armstrong, Gary, Marketing: An Introduction, Pearson Education.
- Stanton, William J. et al, Fundamentals of Marketing, McGraw-Hill Publishing Co. Ltd.
- Phyllis Tortora, The Fairchild's Dictionary of Fashion

COUTURE DESIGN
(CONCENTRATION ELECTIVES - GROUP-III)

Course Code: FST2514 **Credit Units: 01**

Course Objective:
This course offers students the opportunity to enhance their skills to the segment of the fashion industry known as the Couture /High fashion / Designer label market. This is an applied learning course and students need to experience this with concerned faculty experts.

Course Contents:

Module I : Introduction to Couture Design. (Theory)
Couture – Definition, Origin of Couture, Function of couture, Chambre Syndicale de la Haute Couture, **Couture Design Concept -** High-End Luxury, Luxury Sociology and Ceremonies, Concept of 'made-to-measure' clothing**; Designer Clothing -** Definition, Concept, Designer Label, Designer Brands. Key Concept Innovation & Development of couture design. Study of Indian couture designers and International couture designers

Module II : Couture Decorative Techniques & Embellishments. (Practical)
Expands knowledge of the couture by exploring various decorative techniques, Apply glass seed beads, sequins, pearls, and faux gems on different types of fabrics. Create embellishments such as flowers and frog closures from fabric and ribbons, hand embroider original designs, and learn the arts of quilting, cartridge pleating, and quilting

Module III : Couture Apparel Design - Advanced Illustration Techniques. (Practical)
Study the muscular and skeletal functions of the human body and their relationships to the design and creation of haute couture apparel, visualizing how anatomy and aesthetics form the basis of designing a haute couture collection. Become proficient in the translation of ideas via the fashion design sketch and further develop a personal drawing style and various apparel silhouettes.

Module IV : Couture Apparel Design - Advanced pattern Making & Sewing Techniques (Practical)
Skill development in taking body measurements; Developing custom fittings for customized patterns; In depth coverage of the process of transferring a custom body fitted canvas to a couture or designer dress form and padding it for custom sizing; The sewing techniques practiced in the finest haute couture ateliers around the world.; Learn couture techniques in couture fabric selection, proper cutting procedures, hand stitching, seam and hem finishes, pocket construction, inner construction methods pressing, and finishing.

Module V : Haute Couture Portfolio - Applied Learning Assignments.
Write a short description of a person, which include age, build, job, place of residence, interests, and lifestyle. Consider that, this person will be the typical customer. Determine the price range and style range according to the customer life style. Designing a personal collection based on a theme: determine and carry out all the stages of product development from the design to the completed prototype. Apply knowledge of the couture to design, drape, fit, and construct. Develop styles and images through fabric sourcing, market research, and inspirational research for the project.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

References:

- Caroline Rennolds Milbank, Couture, the great designers, Stewart, Tabori & Chang, 1985
- Claire B. Shaeffer, Couture Sewing Techniques, Taunton Press, 2011
- Berry, C.J; The idea of luxury – a conceptual and historical investigation, Cambridge University Press.
- Phyllis Tortora, The Fairchild's Dictionary of Fashion
- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.

Syllabus - Sixth Semester

RETAIL MERCHANDISING AND MANAGEMENT

Course Code: FST2601 **Credit Units: 03**

Course Objective: The objective of the course is providing insights on retail operations. This will enable the students to become good retail planners and decision makers and help focus on change and adaption to change

Module I: Introduction to retail: retail in India; retail models and theories of retail development; understanding the retail consumers; ethical issues in retailing

Module II: Retail marketing strategy; retail franchising; retail store location and site selection; retail store design and visual merchandising; customer relationship management in retailing

Module III: Basics of retail merchandising; the process of retail merchandising; the method of merchandise, Procurement; retail pricing and evaluating merchandise performance; retail communication mix

Module IV: Retail store operations; servicing the retail customers; retail human resource management; financial aspects of retail management; retail information system; supply chain management in retailing

Module V: Evolution of E-commerce industry and role of e-commerce in fashion retail

Examination Scheme:

Components	A	CS	CT	EE
Weightage (%)	05	10	15	70

References:

- Pradhan, Swapna; **Retaling Management**; Tata McGraw Hill; New Delhi
- Bajaj, Chetan, Tuli, Rajnish and Srivastava, Nidhi; **Retail Management**; OUP; New Delhi
- Berman, Barry & Evans, Joel R.; **Retail Management – A strategic approach**; Pearson Education/Prentice Hall of India; New Delhi
- Levy, Michael & Weitz, Barton A.; **Retailing Management**; Tata McGraw Hill; New Delhi
- Newman, Andrew J. & Cullen, Peter; **Retailing – Environment and Operations**; Thomson Asia Pvt. Ltd.; New Delhi
- Dunne, Patrick M., Lusch, Robert F & Griffith, David A.; **Retailing;** Thomson Asia Pvt. Ltd; ND Lamba, A.J.; **The Art of Retailing**; Tata McGraw Hill; New Delhi

FASHION STUDY APPLICABLE TO HOME FURNISHING

Course Code: FST2602 **Credit Units: 03**

Course Objective:
The objective for students is to make them understand the major home furnishings categories and the diverse consumer demand for fashionable and functional products. Information for interior designers, merchandisers, product developers, retailers, and consumers about the types of consumer goods for the home and the raw products used to make them.

Module I: Introduction to home furnishing industry, Home furnishings and the marketplace

Module II: Materials in home furnishings; Textiles, Wood, Glass, Metals, Pottery, Plastics, Other materials

Module III: The categories of home furnishings: Bedding, Linens, Carpet, rugs & flooring, Furniture

Module IV: The categories of home furnishings : Paints and wall-coverings, Lighting, Tableware

Examination Scheme:

Components	A	CS	CT	EE
Weightage (%)	05	10	15	70

References:

- Virginia Hencken Elsasser, Know your home furnishings, 2003
- Fashion Apparel, Accessories & Home Furnishings, Pearson Education India, 2007

LEATHER SCIENCE APPLICABLE TO FASHION ART

Course Code: FST2603 **Credit Units: 03**

Course Objective:
The objective of this course is to impart knowledge about leather science which enables students to understand the designing of leather garments and accessories.

Course Contents:

Module I : Leather – Components and structure.
Layers of Hides and Skins – Epidermis/outer layer, Dermis/corium, Hyaline layer, Flesh/Adipose layer; **Grain Pattern -** Buff, Cow, Goat, Sheep; **Chemical Composition of Hides and Skins –** Water, Proteins, Fats, Minerals, Traces of pigments, carbohydrates; **Characteristics of surface** – Substance (Thickness), Colour, Tension and stretch, Quality.

Module II : Types of Leather
Garment leathers – Grain Leather (Nappa), Natural Dry Milled leather (NDM), Printed Dry Milled leather (PDM), Oil pull up, Antique, Two-Tone. **Shoe Leathers** – Non-Grain leathers – Nubuck, Suede; **Split Leather**- Leathers for footwear- Cow, Buff, Goat, Sheep; Burnish, Corrected Grain (CG), Embossed, Softy. **Range of Thickness –** Footwear leather; Garments.

Module III : Processing of Leathers.
Pre-Tanning Operations (Beam house Operations) – Sorting, soaking, Un haring or Liming, Fleshing, , Pasting, De-liming, bating, Pickling. **Tanning** – Mineral tanning, Vegetable tanning. **Post-Tanning** – Neutralization, Re-tanning, Dyeing-types & methods, Oil, Chemical, Combinations, Drying, Conditioning, Staking. **Finishing** – Fat Liquoring, Setting, Finishing materials – Fixing Chemicals, Feel Modifiers, Types of Finishes-Aqueous, Non-aqueous, Methods of finishing –Auto spray, Roller coating, Brushing/Padding, Final plating. **Methods of Joining leather**- Wet and Dry adhesives. **Defects of Hides and Skins -** Ante mortem Defects**;** Post mortem Defects, Processing Defects

Module IV : The Leather Industry
Introduction – History and Development**,** classification of leather goods. **Nature of leather Industry** – Organization, Operation, Sources of leather supply; Leather marketing and merchandising, Research and Development. **Industry Trends** – Enlarging markets; Increased competition from synthetics, Foreign Trade, Industry growth factors, **Indian leather goods Industry-** Locations**,** Nature, Products.

Module V : Fur Clothing
History and Use, Fur Sources, Processing of Fur, Nature of Fur Trade, Anti-fur campaigns

Examination Scheme:

Components	**A**	**CS**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

References:

- K. J. Adcock, Leather: From Raw Material to the Finished Product, Sir Isaac Pitman & Sons
- Leach, Hides And Skins For The Tanning Industry, Food & Agriculture Org., 1995.
- Eiri, Hand Book Of Leather & Leather Products Technology, Engineers India Research In, 2007
- Marion Kite, Roy Thomson, Conservation of Leather and Related Materials, Routledge, 2012
- Frings, Frings Gini Stephens, Fashion: From Concept To Consumer, Pearson Education India, 2002

ENTREPRENEURSHIP

Course Code: FST2604 **Credit Units: 03**

Course Objective:
Identify and apply the elements of entrepreneurship and to entrepreneurial processes. Recognize the importance of entrepreneurship and identify the profile of entrepreneurs and their role in economic growth. Use the entrepreneurial mind-set and behave responsibly and ethically in their roles as entrepreneurs. To enable them to identify the opportunities in apparel, textile and Accessories

Course Contents:

Module I : Introduction to Entrepreneurship: What is Entrepreneurship, Why Entrepreneurship, Characteristics of Entrepreneur & Entrepreneurship

Module II : Importance of Entrepreneurship: Importance of Entrepreneurship, Common Myths about Entrepreneurship

Module III : Entrepreneurial Opportunities and Enterprise Creation
Sensing Entrepreneurial Opportunities, Environment Scanning, Market Assessment, Identification of Entrepreneurial Opportunities

Module IV: Enterprise Planning and Resourcing: Business Planning - Preparation of a Project Report, Resource Assessment -Financial and Non – Financial, Fixed and Working Capital Requirement, Funds, Flows, Profit Ratios, Break Even Analysis etc., Mobilising Resources - Sources and Means of Fund,Facilities and Technologies for starting an Enterprise. Organising/Production of goods and services-quality, quantity and flow of inputs.

Module V: Supply Chain and Logistics: What is supply chain? What is the role and importance of Supply chain and logistics in fashion industry? Various challenges faced by fashion industry due to constraints in infrastructure of India

Examination Scheme:

Components	**A**	**CS**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

References:

- Steve Mariotti, Entrepreneurship
- Peter F Drucker, Innovation and Entrepreneurship
- Bruce R. Barringer & R. Duane, Entrepreneurship: Successfully launching New Ventures Ireland, Pearson publication, 2008

NONWOVENS IN FASHION APPAREL APPLICATIONS

Course Code: FST2605 **Credit Units: 03**

Course Objective:
The aim of this course is to provide the students with necessary knowledge associated with nonwoven fabrics with special reference to apparel applications, and fashion designers to assure nonwoven start gaining 'respect' in fashion apparel products.

Course Content:

Module I : Overview of nonwovens
Nonwoven fabrics –Introduction, Definition of nonwovens by EDANA, Comparison of nonwovens between other textiles, Nonwoven fabric properties, Specific properties; Usage; **Nonwoven Industry** – Market overview.

Module II : Production Process.
Introduction – Process flow chart for producing nonwovens, **Web Formation** – Dry Laid –Carding, Air laying; Spun melt –In spun laid process, In melt blown; Wet laid; Other techniques. **Web Bonding** – Chemical bonding, Thermal Bonding (Cohesion Bonding) – Calendar bonding, Through-Air Thermal bonding, Drum & Blanket Systems, Sonic bonding , Mechanical Bonding –Needle punching, Hydro-entanglement, Stitch bonding.

Module III : Finishing Treatment.
Introduction- Classification of Finishes, **Dry Finishing** –Shrinkage, Wrenching, Creeping, Crabbing, Calendaring, Pressing, Perforating, Slitting, Splitting, Graining and Velouring, Singing; **Wet Finishing –** Washing, Dyeing, Printing; **Chemical Finishing** – Antistats, Antimicrobials, Water repellents, Lubricants. UV absorbers and polymer stabilizers, Flame retardants, Softeners, Absorbency and rewetters, Thermoplastic binders, resins and emulsion polymers, Thermosetting resins and cross-linking agents, Soil release, Optical brighteners; **Coating, Laminating, Flocking.**

Examination Scheme:

Components	A	CS	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

References:

- Subhash K. Batra, Behnam Pourdeyhimi, Introduction to Nonwovens Technology, DES tech Publications, Inc.
- Wilhelm Albrecht, Nonwoven Fabrics, John Wiley & Sons, 2006
- Stephen J; Russell, Handbook of nonwovens, Woodhead, 2007.
- Frings, Frings Gini Stephens, Fashion: From Concept To Consumer, Pearson Education India, 2002
- Vaibhav K. Dhange, Nonwovens in fashion apparel applications, International Journal of Fiber and Textile Research 2012

DESIGNING AND DEVELOPMENT OF FASHION ACCESSORIES

Course Code: FST2606 **Credit Units: 01**

Course Objective: Students will be able to learn about different types of accessories that are relevant to fashion industry

Course Contents:

Module I: Introduction to fashion accessories, Types of accessories

Module II: Functional and decorative importance of accessories

Module III: Designing and developing accessories: Sketching and rendering of headgear, hand wear, foot wear and hand bags (3 each) (Construction of any one)

Module IV: Sketching and rendering of belts, gloves and (construction of any one), Sketching of Indian jewellery- Mughal Jewellery, Thewa, Kundan Jewellery, Temple Jewellery, Sketching of accessories on women and men's croqui (2 each) Jewellery designing based on theme. (with Concept Board)

Examination Scheme:

Components	**A**	**CS**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

References:

- John Peacock, Fashion Accessories: The Complete 20th Century Sourcebook
- Julia Kuo, 20 Ways to Draw a Dress and 44 Other Fabulous Fashions and Accessories

ADVANCE PATTERN MAKING-III

Course Code: FST2610 **Credit Units: 01**

Course Objective: The course is designed to inculcate the skills of making patterns for the men's wear which is expected to grow in Indian market in terms of exports and domestic market. Students would be encouraged to make their unique sketches and make the patterns for the same.

Course Content:

Module I: Making patterns of Executive shirt and Slim Fit Shirt with Attachment of Collars, cuffs, placket and front pocket. Collars- (shirt collar, stand collar, roll collar, notch collar), cuffs, plackets.

Module II: Making patterns of Trouser with zip fly, cross and back pocket, technical details in belt attachment, loop attachments.

Module III: Making patterns of Jacket

Module IV: Project – Men's wear collection with Specification Sheet and Costing of each garment stitched.

Submission of Practical Work records (Compulsory)

Course Evaluation:

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text books:

- Aldrich, W., Metric Pattern Cutting for Men's Wear, 2010. Oxford, Willey Blackwell Publishers.
- Kershaw, G., Pattern Making for Men's Wear, 2013. London, Lawrence king publishing.
- Kim, Pattern Making for Men's Wear: Classic to Contemporary, I. and Kim, M. 2014. New York, Fairchild Books.

References:

- Coffin, D., Making Trousers for Men and Women: A Multimedia Sewing Workshop, 1998. Newton, Taunton Press.
- Doyle, M. and Rodgers, J. Essentials of Pattern Grading, 2013. Canada, Hanover Phist.
- Price, J., Grading Techniques for Fashion Design, 1996. New York, Fairchild Books.

GARMENT CONSTRUCTION-V

Course Code: FST2611 **Credit Units: 01**

Course Objective: The course is designed to inculcate the skills of making patterns for the men's wear which is expected to grow in Indian market in terms of exports and domestic market. Students would be encouraged to make their unique sketches and make the patterns for the same.

Course Contents:
Module I: Stitching of Executive shirt and Slim Fit Shirt with Attachment of Collars, cuffs, placket and front pocket.
Module II: Stitching of Trouser with zip fly, cross and back pocket, technical details in belt attachment, loop attachments.
Module III: Stitching of Jacket
Module IV: Project – Men's wear collection with Specification Sheet and Costing of each garment stitched.

Submission of Practical Work records (Compulsory)

Course Evaluation

Components	**A**	**H**	**R**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, H: Home Assignment, R: Practical work records, EE: End Semester Examination;

Text Books:

- Shaeffer, C., High Fashion Sewing Secrets from the World's Best Designers: A Step-By-Step Guide to Sewing Stylish Seams, Buttonholes, Pockets, Collars, Hems, And More, 2001. New York, Rodale Books.
- Kim, I. and Uh. M. Apparel Making in Fashion Design, 2008. Oxford, Berg Publications.
- Cabrera, R., Classic Tailoring Techniques: A Construction Guide for Men's Wear, 2009. New York, Fairchild Books.

Reference Books:

- Aldrich, W., Metric Pattern Cutting for Men's Wear, 2010, Oxford, Willey Blackwell Publishers.
- Kershaw, G., Pattern Making for Men's Wear, 2013. London, Lawrence king publishing.
- Kim, I. and Kim, M., Pattern Making for Men's wears: Classic to Contemporary, 2014. New York, Fairchild Books.

PROJECT
(CONCENTRATION ELECTIVES)

Objectives

1. To understand the relationship of forecasting to product development and the need for forecasting knowledge for all aspects of apparel and textile businesses.
2. Integrate consumer, aesthetic and quantitative trend information into the product development process.
3. Engineer new value into an existing product or line while holding costs.

This course is a 'team project' integrated with Concentration Electives -1. The team size should be minimum of two. The team has to be choosing any one of the project from the following:

Course Code:	Concentration Electives -2	Credit Units:
FST2607	Sportswear Design and Development	03
FST2608	Costume Design pertaining to performing arts.	03
FST2609	Functions of Indian Buying Houses/Agents – A study	03

Project Guideline

- Students' team has to complete the project through various research methods.

- **Research Project Idea Generation**: current (or perennial) problems and controversies in the apparel field with relevant chosen topic. This method allows historians the opportunity to explain how the current situation came about and to analyze contributing factors to the problem. To find perennial problems in the apparel industry, search through apparel-related journals. Based on this analysis, formulate the purpose of a potential research study. Think about WHY this topic is important to study (the "so what" question). Summarize the points (research question/purpose; why significant; brief literature review) in a one page outline – Design Brief. Critically think about the purpose of your research study.

- **The Final Research Paper:** This will include the updated sections: introduction, literature review/background, methods, and results with discussion, conclusion and ideas for future research. Students should include images as well as a complete reference list. All citations should comply with requirements for submitting a paper.

- **Professional Presentation:** Students will prepare a PowerPoint presentation for a maximum of 15 minutes (about 15-20 slides) including: introduction, brief literature review, methods, results and discussion, and conclusion. Images should be embedded within the PPT.

Project Evaluation

- There will be an evaluation by a jury comprising of external experts and a committee of internal faculties from the department. Failure to submit the portfolio with final products or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.

<table>
<tr><th rowspan="2">Evaluation Components</th><th colspan="4">R A</th><th rowspan="2">A</th><th rowspan="2">P</th><th rowspan="2">V</th><th rowspan="2">Total Weightage (%)</th></tr>
<tr><th colspan="2">Internal Evaluation</th><th colspan="2">External Evaluation</th></tr>
<tr><td>Portfolio Presentation</td><td>10</td><td rowspan="2">20</td><td>15</td><td rowspan="2">30</td><td rowspan="2">10</td><td rowspan="2">20</td><td rowspan="2">20</td><td rowspan="2">100</td></tr>
<tr><td>Products Presentation</td><td>10</td><td>15</td></tr>
</table>

(R A– Research & Analysis, A - Attendance, P – Presentation, V – Viva voce)

Syllabus - Seventh Semester

FABRIC MANUFACTURING TECHNOLOGY: CROCHET & NON-WOVEN

Course Code: FST2701 **Credit Units: 03**

Course Objective: Overview of nonwovens: Definition, Structure, and Creation, Staple-fibre based processes: fibre preparation and web formation, Web bonding processes: Mechanical Thermal, and Chemical, Polymer-extrusion based technologies: Spunbond and Meltblown, Finishing processes: Mechanical and chemical, Basics of crochet techniques

Module 1: Apparel Applications
Nonwoven Apparels – Introduction, Advantages; **Manifesting fashion apparel requirements** - Physical requirements, Thermo-physiological requirements, Biomechanical requirements, Psychological requirements, Nonwoven Performance from Apparel Perspective – Bending, Area Modification, **Nonwoven Fashion Apparels : From 1960 to 2012 -** Disposable fashion garments, NCSU nonwoven fashion garments, Nonwoven woollen apparel, Fabrican Spray-on fabric**.**

Module 2: Crochet Introduction: Discussion of needle sizes, stitch sizes & types of yarn (weight, texture). Learn chains, slip stitch, single crochet, half double crochet, double crochet, treble crochet, joining new ball of yarn. Practice single crochet stitches

Module 3: Crochet Advance Learning: Learn finishing. Learn fringe application. Discuss mistakes: dropped stitch, added stitches, inconsistent stitches, etc. Practice half double crochet stitch. Learn how to read stitch patterns. Learn basic patterns: clusters, shells, popcorn, and more. Practice following pattern stitch instructions. Begin pattern stitch sampler scarf.

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

References:

- S.J. Russell (Ed.), Handbook of Nonwovens, Woodhead Publishing, CRC Press, Washington DC, 2007.
- W. Albrecht, H. Fuchs and W.Kettelmann, Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Process, Wiley-VCH, Verlag GmbH & Co. KGaA, Weinheim, 2003.
- Linda P. Schapper, The Complete Book of Crochet Stitch Designs: 500 Classic & Original Patterns Paperback – 24 Nov 2011

FIELD TRIP/VISIT DOCUMENT EVALUATION

Course Code: FST2702 **Credit Units: 04**

Course Objective: Students will get the practical exposure by visiting the field/market and need to submit a report on basis of that.

Course Content: Self study and practical observation by student in the industry.

Teaching Tools:
Self Study, Observation

Learning outcome: Students are exposed to practical aspects of the functional areas of fashion industry and expected to learn the work-flow of fashion business

COMPUTER-AIDED DESIGN (CAD) - V

Course Code: FST2703 **Credit Units: 03**

Course Objective: Student will learn to present their learning during graduation project via help of coral draw

Module: Application of Coral Draw to enhance the learning in the industry and use of computer systems to assist in the creation, modification, analysis, or optimization of those designs

Examination Scheme:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

- Winifred Aldrich, CAD in Clothing and Textiles

GRADUATION DESIGN COLLECTION

Course Code: FST2704 **Credit Units: 10**

Course Objective:

This programme focuses on the design and construction of the fashion garments for the partial fulfillment of the degree of B.Sc. in Fashion Design & Technology.
This course is practical application of creativity, Innovation, discovery, and expression in aesthetic or artistic design through the development of innovative garments that employ unique and sculptural shapes. The course will be assessed through critique and evaluation of design project in each topic area. Project components include inspirational research and development of aesthetic direction, ideation and sketching, garment construction and project presentation of the collection at a fashion show before and invited trade audience.

Course Methodology : Research Project & Product Development

Aim : To developing ideas from paper to object, theory to practice, and fabric to garment.

The projects taken up and have to develop through the following stages:

1. **Fashion Market Study -** Fashion market research information helps the students to understand what, where, and why consumers are buying across all retail channels. It combines point-of-sale (POS) market tracking with consumer panel insights so students can stay on top of fashion industry trends and effectively connect with the fashion consumer.

2. **Field trip / Visit -** The students will have the opportunity to create or styles a collection of designs based on various design inspirations and trends, and learn how to put together presentation boards and portfolio pages.

3. **Portfolio Development -** A portfolio is a collection of work that shows an applicant's skills and knowledge across a number of projects or studies. It is a visual representation of interests, exploration, experimentation, development and final pieces. So fashion portfolio is a critically important tool for successfully applying for additional education opportunities or landing your first internship or entry level job. It reflects your professional skills and best work.

4. **Digital Design Techniques & Presentation -** Include Computer-generated (CAD) mood, color, textile, fashion plate, and flat drawing pages as separate pages or in combinations, these demonstrate the designer's skills with CAD programs. Pages should be all portraits or all landscape orientation, with a few exceptions if needed, to allow for easy viewing by interviewers.

5. **Range Development** – The students will explore what makes a good range, taking into account customers, competitors, price points, fabrics, core items and seasonal specials.

6. **Final presentation -** Fashion show.

Project Evaluation

- There will be an evaluation by a jury comprising of external experts and a committee of internal faculties from the department. Failure to submit the portfolio with final products or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.

Evaluation Components	**R A**				**A**	**P**	**V**	**Total Weightage (%)**
	Internal Evaluation		**External Evaluation**					
Portfolio Presentation	10	20	15	30	10	20	20	**100**
Products Presentation	10		15					

(R A– Research & Analysis, A - Attendance, P – Presentation, V – Viva voce)

Syllabus - Eighth Semester

GRADUATION PROJECT

Course Code: FST2837 **Credit Units: 16**

Course objective: To provide an opportunity to students to apply and relate the concepts and theoretical inputs from various contextual studies offered in Fashion Design programme. To involve the students in the day to day activities of the functional areas of fashion industry and familiarize the practical aspects of the same.

Course Content:
Week 1 – Week 16: Self study and practical observation by student in the industry.
Week 17: Internal Jury
Week 18: External Jury

Teaching Tools:
Self Study, Observation

Learning outcome: Students are exposed to practical aspects of the functional areas of fashion industry and expected to learn the operational methodology of exploring business opportunities, solving problems and making decisions

Parameters to be considered in External Jury:
• Title of the Project
• Objective
• Research Methodology and Design
• Appropriateness of data
• Scope and coverage of the survey
• Comprehension and analysis
• Findings and recommendations
• Innovative approach to the industrial problems
Parameters to be considered in internal Jury:
• Title page
• Objective
• Report framework and methodology
• Context and analysis
• Comprehension and interpretation
• Findings and recommendations
• Report presentation
• Meeting the time requirements of DP schedule

Examination Scheme:

Evaluation Components	PA		Total Weightage (%)
	Internal Evaluation	External Evaluation	
Project Evaluation	50	50	100

(PA – Project & Analysis)

Amity Institute of Design (Interior Design)

Bachelor of Interior Design

FLEXILEARN

-Freedom to design your degree

Programme Structure
Curriculum & Scheme of Examination
2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus – First Semester

LANGUAGE OF DESIGN

(Theory)

Course Code: IND2101 **Credit Units: 03**

Course Objective:

Design is an activity of problem solving for the wellbeing of society and individuals. This course focuses to examine, analyze, study, and discuss how design can be understood, described, and developed as a process of inquiry, thought, and action. Each Module has an interdisciplinary approach to the study of design by dealing with the reasoned application of knowledge and skills.

Course Contents:

Module I : **Introduction to Design.**
Visual language - Visual Literacy - Visual communication - Image, Imagery & Visual imagery – Art and its Classification - Visual Design - Basic Concepts of Design- Definitions and meaning of design - Importance of design - Define Designer. - Understanding the Difference between Art and Design – categories of Design: Drawing, Problem solving, & Ideal pursuing.

Module II : **Design Concepts.**
Design as a process - Design as creation - Design as Communication - Design as Information - Design as a strategic business tool- Product and Service design - Design for Manufacturing and Assembly (DFMA).

Module III : **Scope of Design.**
Concept of good design - Principles of Good Design-Kinds of design: Structural design & Decorative design - Design disciplines- Design Industry: Structure & Classification - Design Industry in India.

Module IV : **Role of Design in Society.**
Function of Design - Indigenous Design Practices - Role of design in the changing social scenario - Role and responsibility of Designers.

Module V : **Design Governance in India.**
National Design Policy - Design Act 2000 - Intellectual property right- Professional Design Associations - Design Promotion Agencies.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. Thompson, Philip, and Peter Davenport. The dictionary of visual language. Penguin, 1980.
2. Lauer, David, and Stephen Pentak. Design basics. Cengage Learning, 2011.
3. Bryan Peterson, Design Basics for Creative Results, F+W Media, 2003
4. Jones, John Chris. Design methods. John Wiley & Sons, 1992.
5. Norman, Donald A. The design of everyday things. Basic books, 2002.
6. Sturken, Marita, Lisa Cartwright, and Marta Sturken. Practices of looking: An introduction to visual culture. Oxford: Oxford University Press, 2001.
7. Whiteley, Nigel. Design for society. Reaktion books, 1997.
8. Lovell, Sophie. Dieter Rams: as little design as possible. London: Phaidon, 2011.

DESIGN FUNDAMENTALS & ILLUSTRATION TECHNIQUES-I

(Practical)

Course Code: IND2102 **Credit Units: 02**

Course Objective:

Drawing is a foundational course that is essential for mastering in any stream of design. The goal of this course is to develop, through a variety of media, fundamental drawing skills; to understand and apply pictorial organization; develop vocabulary and terminology, and to develop perceptual, observational, conceptual awareness, and critical thinking skills in design.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Freehand drawing & Sketching.

Introduction to Different art media and materials - Method of holding pencil – Eye-Hand coordination - Line quality studies - Lines: Straight, Curvilinear, Angular, Thick-Thin, Plane, Volume - Straight Lines - Curvilinear Lines: Thick, Thin And Angular - Line Variety: Conveying movement of volume in terms of line.

Module II : Basic Drawing Techniques

Contour- Principles of One, Two and Three Dimensional compositions- Perception: Visual perception, Intuitive perception -Positive/Negative- Gesture - Value - Perspective: Linear, Aerial.

Module III : Methods of Sketching

Study and sketching various shapes, form and structure – Foreshortening – Study of Ellipses- Drawing through building and creating form - Sketching by method of seeing the shapes and forms- Sketching by using loose, circular strokes –Sketching by using free and scribbled lines – Sketching by using wide, bold strokes – Quick reference sketch - Conveying movement sketching - Rendering wave action – Sketching focusing on negative space - Sketching by filling in the negative spaces – Silhouetting - Drawing with a grid - Wire frame sketching - Spiral line sketching.

Module IV : Study the use of Chiaroscuro

Techniques of adding shadow to the subject to give it depth and realism - Understanding lights and shadows – Highlighting- Shading - Shading consistently – Study of casting shadows – Methods of ‘quick thumbnail’ sketches – Methods of ‘quick reference sketches’ and detailed rendering.

Module V : Composition Drawing (Self-study / Assignment)

Conduct a visual study of a man-made designed object. Develop a series of drawings in a composition that communicates information regarding form, size, materials, structure, texture, function, environment, etc. through freehand drawings and submit a portfolio file.

Course Evaluation:				
Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance; **H** -Home Assignment; **PR**- Practical work Record; **EE**-End Semester Examination)				

Text & References:

1. Walter Foster (Firm), Walter Foster Creative Team, Art of Basic Drawing, Walter Foster Publishing, 2005
2. Karl Christian Heuser, Freehand Drawing and Sketching: A Training and Work Manual, V.N. Reinhold, 1984
3. Natalia Tizon, Art of Sketching, Sterling Publishing Company, Inc., 2007.
4. Greg Albert, Rachel Rubin Wolf, Basic Drawing Techniques, F+W Media, 1991
5. David Rankin, Fast Sketching Techniques, F+W Media, Inc., 2011
6. Art Fundamentals: Theory and Practice, Ocvirk, Stinson, Wigg, Bone, and Clayton. McGraw Hill, 2002
7. Eissen,K. and Steur, R. Sketching,the Basics. BIS Publishers, 2011.
8. Montague, John. Basic Perspective Drawing: A Visual Guide (5th Edition). Wiley, 2010.
9. Ching, Francis. Design Drawing, Van Nostrand Reinhold, New York, 1998
10. Edwards, Betty. Drawing on the Right side of the Brain, Penguin Putman Inc, New York, 1988

DESIGN ELEMENTS & PRINCIPLES

(Practical)

Course Code: IND2103 **Credit Units: 02**

Course Objective:

This course is designed to familiarize the student with the elements and principles of design. The main objective of the course is to plan and produce good visual designs and artistically analyze designs produced by others.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Elements of Design (Part-1)

Point and Line: The meaning and Definition, Lines in a composition, Aspects, Lines as design components, Physical and Psychological effects, Reinforcement and countering with line aspects, Study of Line chart**. Space:** The meaning and Definition, Descriptive terms for space/shape relationships, Visual perception of spatial effects, Advancing or flattening cues, Space as Ground, Space as volume, Effects of Space, Spatial Effects. ***Shape and Form:*** The meaning and Definition, Mass and Volume, Type of shapes and forms, Attributes of Shape and Form, 2D shape Vs. 3D form.

Module II : Elements of Design (Part-2)

Texture and Pattern:*(i) texture* - Three dimensions of texture, Texture on the medium, Aspects of Texture, Texture interaction with light, Texture and Color, Textural Language, Psychological Effects, Audible effects of texture, *(ii) Pattern* - Aspects of Pattern, Visual Effects of Pattern, Psychological Effects of Pattern, Pattern and structural design, Combining patterns in one composition.

Module III : Elements of Design (Part-3)

Light and Shadow :*(i) Light* - The meaning and Definition , Visual perception of light, experience of light, The concept of Light and shadow, *(ii) Use of Light in Visual design* - Defines, Locates, Sculpts, Manipulation of light, *(iii) Psychological Effects of Light* – Lightness with openness, clarity, awareness, alertness, and knowledge, Darkness associated with gloom, mystery, quietness, seriousness, depression, threat, fear of the unknown, ignorance, age, sophistication, and experience, *(iv) Physical Effects of Light* – The quality of light, the source, accent, distort, subordinate, minimize and rearrange contours of shape. ***Colour:****(i) Color Definitions* - External Occurrence, Internal Sensation, Hue, Value, Intensity.

Module IV : Principles of Design

Directional Principles:*(i) Repetition* - Visual Effects, Types of repetition, Uses of repetition, Psychological effects. *(ii) Parallelism, (iii) Sequence, (iv) Alternation, (v) Gradation* – Needs, effects, psychological effects, uses, *(vi)Transition* - Visual effects, Psychological effects, Using transition, *(vii) Radiation* - effects, *(viii) Rhythm*- effects, Psychological effects, Rhythmic Terms, ***Highlighting Principles:****(i)Concentricity*- Effects, Psychological, Practical uses, Concentricity is perpendicular to radiation, *(ii) Contrast* - Physical and Psychological effects, Samples of Contrast, *(iii) Emphasis* - Physical and Psychological effects, Usages. ***Synthesizing Principles:****(i) Proportion*- The relationship of distances, sizes, amounts, degrees, or parts in relation to each

other, *(ii) Scale* – Visual and Psychological effects, *(iii) Balance* - Four types of balance, Effects of balance, *(iii) Harmony* - Culturally subjective, Time period subjective, *(iv) Unity*- harmony without unity, Unity without harmony.

Module V : Principles of Organization

Composition: Picture plane, Picture frame, Balance. ***Relationships:*** Symmetrical &Asymmetrical, Scale, Proportion, Golden Mean. ***Attributes:****(i) Emotional* - Active, Passive. *(ii) Esthetic*: Realistic, Impressionistic, Abstract, and Decorative.*(iii) Spatial*- Depth, Flat.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Lidwell, William, Kritina Holden, and Jill Butler. Universal principles of design. Rockport Pub, 2010.
2. Pentak, Stephen, and David Lauer. Design Basics. Cengage Learning, 2015.
3. Wong, Wucius. Principles of two-dimensional design. John Wiley & Sons, 1972.
4. Steven Bradley, Design Fundamentals: elements, attributes and principles, www.vanseodesign.com, 2014.

DESIGN STUDIO-I (BASIC GRAPHICS)

(Studio)

Course Code: IND2104 **Credit Units: 02**

Course Objective:

This is a practical course that focuses on creating intelligent and powerful graphic design, image processing and scientific Visualization. Students build a strong foundation for a design career by learning graphic design techniques, visual thinking, concept development, colour, composition, and typography. This course has been conducting through *design case studies and hands-on exercises* by using graphic softwares like Adobe Creative Suites and Corel Draw, etc.

Course Contents:

(NB: Submission of Practical work record / Graphic Portfolio is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to the Basic Computer Skills

Computer Vocabulary; Introduce the basic computer hardware; Operating system;Opening and Saving Files; Skills and activities practice of MS Word, Excel, PowerPoint; Internet - Internet navigation and search engines; Internet safe practices - the major pitfalls and risks found online; Internet protocols.

Module II : Introduction to Graphics

What is computer graphics?, Area of computer graphics, Design and drawing, Simulation, How the pictures actually stored and displayed, Difficulties for displaying pictures; Definition of multimedia, multimedia systems; digital media and hyper media; Multimedia file formats, standards, communication protocols. Understanding vector graphics and bitmaps, Introduction to graphic design softwares - Image making & photo editing softwares, Illustration & Drawing softwares, and 3D product design softwares, Architectural illustration softwares; etc.

Module III : Digital Image Making

Image authoring and editing tools, image file formats, layers, RGB, CMYK; contrast, brightness, hue, slicing, contrast ratio, aspect ratio. Gray scale filters, blending tools, image enhancing, designing technique.

Module IV : Digital Illustration & Drawing

Features and applications of drawing& illustration software; vector and raster images: resolution in images: illustrator environment; documents; working with colours; interface and toolbox; common tasks; creating basic shapes: reshaping objects; applying colour fills and outlines; text tools; text formatting; embedding objects into text; text wraps; text object links. Applying effects – distortion effects, contour effects, transparency and lens effects; depth effects; working with bitmaps; editing and applying bitmaps.

Module V : Graphic portfolio File (Self-study / Project Assignment)

Refer various graphic design magazines, books, internet for the examples of design that inspire you and build a graphic design portfolio. All final work must be saved as PDF in your folder. Print your final design documents and submit a graphic portfolio file.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Raja Raman V., "Fundamental of Computers" (4th edition.), Prentice Hall of India, New Delhi.
2. Weverka, P; Office2003 All-in-One Desk Reference For Dummies; John Wiley & Sons; 2011.
3. John Villamil& Louis Molina; Multimedia: An Introduction; New Jersey, Prentice – Hall India, 2002
4. Francis Botto; Dictionary of Multimedia and Internet Applications; New York, John Wiley & Sons, 1999
5. John Christopher Jones; Design Methods; Wiley, 1992
6. Jerry Palmer &MacDodson; Design and Aesthetics; Routledge, London, 1995
7. Rees, D; How to be an Illustrator; Laurence King Publications; 2014.
8. White, Alex W; The elements of graphic design; Sky horse Publishing Inc; 2002.

COLOUR CONCEPT & APPLICATIONS

(Practical)

Course Code: IND2105 **Credit Units: 02**

Course Objective:

This course is aimed to empower the students grasp the fundamentals of colour concepts as a basic creative activity and makes familiar with the language and tools necessary to communicate with design. This course covers such as science of colour, color fundamentals, etc.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : The Science of Colour

Understanding colour –Define color, Colour perception key elements – (1) Light, (2) Substance, (3) Human vision and responses, Fundamental categories of colour; Physical or surface qualities of color ; The color making attributes - Hue, Value, and Saturation. Dimensions of color – (1) Colour Systems (2) Colour Space (4) Colour Gamut, (5) Colour Models. Color management – Application for Computer Aided Designing, Colour management in designing.

Module II : Color fundamentals

Introduction, History, Derivation of modern colour theories – Newton's Colour wheel and its formation, Additive System & Light theory, Subtractive System & Pigment theory, CMY & CMY*K*, Introduction to Pigment theory of RYB colour model, A System Perspective– Choice of the Colour system in Visual Design. Colour qualities, Uses of colours.

Module III : Practical Exercise on Color Application

1. Colour mediums and its characteristics: To study and practice of various colour rendering with different colour media– Color Pencils, Pastels, water colours, Poster colours, Acrylic colours, Oils paints, Ink, Transparent Photo Colours, etc. Methods of colour mixing with different mediums**.**
2. Visual pattern and textures: Making various Visual pattern and textures by colours.
3. Principles of Addition, Subtraction: Newton's colour wheel, Pigment colour wheel, RGB & RYB.
4. Different colour rendering techniques: Monochrome and Wash rendering - Treatment of sky, Clouds, Landscape elements, Human figures, Foreground and surroundings - Shadow projections in renderings.

Module IV : Color Symbolism and Psychology (Self-study / Assignment)

Use colour wheel / paint swatches / color aid paper or other printed matter as samples and conduct a survey to chart responses to color. Record results, design and make a chart that visually displays (info graphic) results. The completion of the projecthas to be fulfilled by determine demographic of the group to be surveyed.Create groups to compare on the basis of gender, age, and ethnicity.Write and format a survey that asks basic color naming questions which include: Name the color, What associations have

with this color, Like / Dislike (the color sample), Name of the favorite color, etc.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Hornung, David. Colour: a workshop for artists and designers. Laurence King Publishing, 2005.
2. Stinson, Robert E., et al. Art fundamentals: Theory and practice. McGraw-Hill, 2002.
3. Leland, Nita. Exploring color. North Light Books, 1998.
4. Stockton, James. Designer's Guide to Color 1. Vol. 1. Chronicle Books, 1984.
5. Feisner, Edith Anderson. Colour: how to use colour in art and design. Laurence King Publishing, 2006.
6. Birren, Faber. Principles of color: a review of past traditions and modern theories of color harmony. V.N. Reinhold, 1969.
7. Fraser, Tom, and Adam Banks. Designer's color manual,. Chronicle Books, 2004.
8. Sharma, Abhay. Understanding color management. Cengage Learning, 2004.
9. Mollica, Patti. Color Theory: An essential guide to color. Walter Foster Pub, 2013.

INTRODUCTION TO CRAFT & MODEL MAKING

(Practical)

Course Code: IND2106 **Credit Units: 01**

Course Objective:

This course aims to give the basic insights into the concepts of crafts and model making are increasingly being used by designers to evaluate designs and innovative products. This helps to simulate the impacts of alternative approaches. The course will introduce the hands-on activity of making models and crafts to from a product design idea.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Fundamentals of Crafts &Model Making (Theory)

Introduction to Crafts, Significance of craft in design, Significance of product design; Introduction to model making; Modeling: Concepts and Definitions, Advantages of model making.

Module II : Design in Practice (Practical)

- **Mood Board / Storyboard Making**

Description:

Research: Visit galleries, exhibition, search Internet, Magazines, etc. - Take pictures of objects, scene and store front - Work off of a theme &keywords - Combine two theme to create something new - Cut out pictures that inspired- Picture organization - Coordinate and conquer to lay out the images– Various collage methods - Presentation of Mood Board.

Create a Design Description –Sketch and flesh out a more detailed interface to the idea - Show its usage in the context of performing real worldtasks - Come in three alternatives which vary the interface, the scenario, or both. - Create model sketches - Create Storyboard.

- **Working with Collage, Photomontage, Mural, 3-D Sculpturing&3-D Crafts. (Practical)**

Description:

Collage with paper and various waste materials with theme and presentation, Mural with different materials on live scale, Sculpture with different materials Clay, Plaster of Paris, Thermo coal, Paper Mache, Tin foil, Oil Colour, Acrylic colour, Fabric Waste material etc. Practice various Three-dimensional craft techniques by Additive process, Subtractive process, Constructional process

- **Model Making (Practical)**

Description:

Use a variety of simple building materials, such as Papers, Coloured cards, Foam core board, Balsa wood, Cardstock, Plasticine (Modeling Clay), hot glue, etc. Conduct the practical modeling activities and present themodels / prototypes.

The prototype illustrates 3 major tasks for interface / interaction design, likely (but not necessarily) based on storyboards. The prototype should be complete enough to "run" a new user through each task. Design models / prototype with specific STUs “Situation, Task, and User” in mind. Be sure to iteratively refine prototype until feel

satisfied that it works.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Hallgrimssom, Bjarki. Prototyping and modelmaking for product design. Laurence King Publ., 2012.
2. Fishwick, Paul A. Simulation model design and execution: building digital worlds. Prentice Hall PTR, 1995.
3. Ashby, Michael F., and Kara Johnson. Materials and design. Butterworth-Heinemann, 2013.
4. Eppinger, Steven D., and Karl T. Ulrich. "Product design and development. 1995
5. Norman, Donald A. The design of everyday things: Revised and expanded edition. Basic books, 2013.
6. Trudeau, Norman. Professional model making, Watson-Guptill Publications, 1995.
7. Simonds, Ben. Blender master class: a hands-on guide to modeling. No Starch Press, 2013.
8. Carson, I. I., and S. John. "Introduction to modeling and simulation; Winter Simulation Conference, 2004.
9. Hutchings, Pat, ed. From idea to prototype. AAHE Teaching Initiative, American Association for Higher Education, 1995.

HISTORY OF DESIGN & CULTURE

(Theory)

Course Code: IND2107 **Credit Units: 02**

Course Objective:

This course aims to have students acquire a familiarity with historical and philosophical aspects of design that contributed to the rise of design styles. This course will also explore the cultural studies that explore the relationship between the designs and the human culture and how the relationship may have evolved within different industries over time. *In-depth reading is highly recommended to gain deeper meaning and comprehension of this subject and research detailed information for an assignment.*

Course Contents:

Module I : Design Philosophy & History

Art and Aesthetics in Design, Applied Aesthetics & Technical Aesthetics, cognition and laws of beauty, Neurasthenics, Plato's Theory of Art; Historical Materials, Techniques and Methods of Design; Cave Art; Buddhist Art of Central Asia; Greeco-Roman Art; Renaissance to Baroque; Art of South and Southeast Asia; Western Art; Art of China and Japan; 'Art for Art's Sake'; Modern Art, Romanticism in Art; Modern Art to Design; Cubism; Cubist Sculpture; Collage (Synthetic Cubism); Piet Mondrian: 'Neo-plastic Art'; Rococo Design; Arts and craft movements; Renaissance Period & Industrial Design in Europe; Industrial Revolution & Technical Revolution; The Bauhaus and the Modern Design Education; Mid Century Modern Design, Mid Century Danish Industrial Design; Art Nouveau; Futurism; Dada cultural movement; Suprematism; Constructivism, Rice of corporate identity; Design After Modernism; History of Advertising, Identity &Branding; The Era of Information Design, Motion Graphics and User Interaction Design.

Module II : The Art and Design Tradition in India

Introduction to the History of Indian Art;Sculpture and Architecture of North India, Art & Design of South India, High Medieval Architecture, Tribal and Folk Arts of India; Indian Painting, Modern Indian Art; Symbols and metaphors of Indian Art and Design.

Module III : Culture: An introduction

The Concept and Meaning of Culture; Culture and Civilization; Culture and Heritage; General Characteristics of Culture; Importance of Culture in Human Life; Structure of Indian Society, Traditional Indian family; History of women in India, Tribal communities of India, Corporate culture; Socio-cultural issues in contemporary India.

Module IV : Study of Design Philosophies & Iconic Design Works (Self-study / Assignment)

Study and submit a project file about various designers and their area of specialization, Important work etc. Examples: AvinashGodbole; BenoySarkar; Manu Desai; Mickey Patel; Ram Mohan; SudarshanDheer; YeshwantChaudary; Dashrath Patel: Mahendra Patel: R K Joshi: SudhakarNadkarni: VikasSatwalekar, Ron Arad, Saul Bass, ManoloBlahnik, Robert Brown John, sambard Kingdom Brunel, Matthew Carter, Sam Buxton, Luigi Colani, Joe Colombo, Christian Dior, Tom Dixon, Norman Foster, Alec Issigonis, David Mellor, Dieter Rams, Philip Treacy, Phyllis Pearsall, Robert Wilson, Philip Worthington, Luis Barragán, FlaminioBertoni, Isamu Noguchi etc.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Chaitanya, K. A History of Indian Painting : The Modern Period. New Delhi: Abhinav Publications, 1994.
2. Buswell, R.E. Encyclopedia of Buddhism Vol. 1-2. USA: Macmillan Reference, 2004.
3. Aldo Leopold, *A Sand County Almanac***,** Ballantine Books, New York 1982
4. R.G. Collingwood, *The Principles of Art*, Oxford University Press, New York 1958 (reprint 1998)
5. Carpenter, T.H. Art and Myth in Ancient Greece. London: Thames and Hudson, 1991.
6. Tucker, Jonathan. The Silk Route Art History. London: Philip Wilson Publishers, 2003.
7. Nagaswamy, R. Facets of South Indian Art and Architecture. New Delhi: Aryan Books International, 2003.
8. http://www.designishistory.com/design/interactive/

CALLIGRAPHY EXPLORATION

(Practical)

Course Code: IND2108 **Credit Units: 01**

Course Objective:

The objective of this course is to develop a basic proficiency in creating various graphic forms and objects using calligraphic lettering skills through analyze a calligraphic letterform, identifying its distinctive features. This course covers compose various letter form to demonstrate an understanding of calligraphic elements and the basic terminology of calligraphy and deployment of its various strokes.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Calligraphy

Understanding calligraphy - Calligraphy definition – History of Calligraphy – Importance of calligraphy- Modern calligraphy - Tools required for calligraphy.

Module II : Practice Exercises

Description:

Reading and writing are not naturally learned skills. They have to be taught specifically. Learn different a Calligraphy style of writing requires regular practice. Hence, the students are required to practice in class as well as by given Assignments.

Topics Covered:

- English Calligraphy (Compulsory);
- Hindi Calligraphy (Optional, not mandatory)

Basic Strokes of Practice- Scribbles with Kalam, Nib, Brush and Calligraphy Pen; Alphabet, sentences and composition of different types; Basic calligraphic strokes for English; Foundational Hand - Majuscules, Miniscules and Numbers; Calligraphic Upper case Alphabets; Calligraphic Lower case Alphabets; Composing Alphabets; Composing a calligraphic paragraph; Square Designed Letters – Majuscules; Digital – Majuscules, Miniscules and Numbers; Bubble Designed Letters – Majuscules; Rose Designed Alphabets – Majuscules; Old English Script Designs – Majuscules, Miniscules and Numbers; Italic Script Designs – Majuscules, Miniscules and Numbers.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Wilson, Diana Hardy. The Encyclopedia of Calligraphy Techniques. Running Press, 1990.
2. Shepherd, Margaret. Calligraphy Made Easy: A Beginner's Workbook. Penguin, 1981.
3. Baron, Nancy. Getting Started in Calligraphy. Sterling Publishing Company, Inc., 1979.
4. Chazal, Julien; Calligraphy: A Complete Guide; Stackpole Books, 2013
5. Studley, Vance. Left-handed Calligraphy. The Rosen Publishing Group, 1991.

6. Apte, JagdeeshPandurang ;ChitraroopDevanagari; Pune, February 1960.
7. Dalvi, Girish. Anatomy of Devanagari Typefaces. Design Thoughts pp 30-36, 2009.
8. Kesavan, Bellary Shamanna, and P.N. Venkatachari, History of Printing and Publishing in India. New Delhi: NBT, 1984.
9. Schimmel, Annemarie, and Barbara Rivolta. Islamic Calligraphy. Vol. 50. No. 1. Brill Archive, 1992.
10. Denise Lach, Calligraphy: A Book of Contemporary Inspiration, Thames & Hudson, 2014.

FUNDAMENTALS OF FORM STUDIES

(Practical)

Course Code: IND2109 **Credit Units: 01**

Course Objective:

This course aims to enhance understanding of 3-dimensional visual perception to the students that develop the sense of structure, and understand how forms achieve their structural unity. This course helps the students to develop the sense of observation and capacity to retain and recall images and their co-ordination on basic fundamentals of 3 dimensional designs.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Shapes, Space, Form

Basic Understanding of various Shapes, Space, Form and its relationships - Surfaces, Planes, Shapes - Size, Scale, and overall Proportion of Shapes – Shape as Plane - Geometric Shapes - Organic Shapes - Rectilinear Shapes - Irregular Shapes - Hand-drawn Shapes - Accidental Shapes - Relationships between 2D shape and 3D form - Transforming Various Shapes into visual Forms - Size, Scale and overall Proportion of Forms - Form as volume and Mass- Attributes of Shape and Form.

Module II : Structure of forms

Point as a form, Line as form: Angular, Straight, Curved, Contour, Angular contour, Thick - The Overall Shape - The Body: parallel edges, Converging edges, regular bumps edges, Wavy edges, Irregular rough edges,- The extremities of line: Parallel cut extremes, Rounded extremes, Angular/slant cut extremes, Pointed extremes. Types of Shapes: Shape as Plane, Geometric Shapes: Square, Triangle, Circle, and Rhombus etc. - Organic Shapes- Rectilinear Shapes-Irregular Shapes- Hand-drawn Shapes- Accidental Shapes- Form as volume, Positive and negative space in a form

Module III : Types of forms

Representational Form- Non-representational Form- Natural Forms- Human-made forms-Type font as form- Abstract forms- The inter-relationship of forms: Detachment, Touching, Overlapping (Opacity), Interpenetration (transparency), Union, Subtraction, Intersection, Coinciding.

Module IV : Development of 3D Form Sketching(Self-study / Assignment)

Find, collect and archive any inspiration sources for an image idea - Think and find visual aesthetics through design elements such as linear, planar, volumetric considering key axes, and Positive and negative spaces from that sources – Think of any 3 dimensional form - Draw and represent this in black and white - Any details that the form has which make it look 3 dimensional are going to be the final details - Sketch or trace your form - Draw out the details that make sure that it look like it has dimension - Complete the drawing and shade in accordingly.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Itten, Johannes. Design and form: The basic course at the Bauhaus and later. John Wiley & Sons, 1975.
2. Wong, Wucius. Principles of form and design. John Wiley & Sons, 1993.
3. Lidwell, William, Kritina Holden, and Jill Butler. Universal principles of design. Rockport Pub, 2010.
4. Pentak, Stephen, and David Lauer. Design Basics. Cengage Learning, 2015.
5. Walter Foster (Firm), Walter Foster Creative Team, Art of Basic Drawing, Walter Foster Publishing, 2005
6. Karl Christian Heuser, Freehand Drawing and Sketching: A Training and Work Manual, V.N. Reinhold, 1984
7. Natalia Tizon, Art of Sketching, Sterling Publishing Company, Inc., 2007.
8. Greg Albert, Rachel Rubin Wolf, Basic Drawing Techniques, F+W Media, 1991
9. Hannah, Gail Greet. Elements of design,. Princeton Architectural Press, 2002.
10. Elam, Kimberly. Geometry of design: studies in proportion and composition. Princeton Architectural Press, 2001.

Syllabus – Second Semester

INTRODUCTION TO DESIGN THEORY

(Theory)

Course Code: IND2201 **Credit Units: 03**

Course Objective:

The aim of this course is to help the students to understand various theories behind the design process, design professional practice and the way the design engage in the world. This course examines, analyze, study, and discuss how design can be understood, described, and developed as a process of inquiry, thought, and action.

Course Contents:

Module I : Introduction to Design Concepts.

Art & design Terminology; Design approaches–Pure art to Applied science; Design Process – Discover, Design, Deliver; Design synthesis; Design synthesis methods-Concept mapping, Process Flow Diagramming, Reframing, Insight Combination;

Module II : The Science of Design

Introduction to Arteology; Descriptive and the Normative types of Arteological study; Format of Presentation of Design theory; Paradigms of Design theory.

Module III : Evolution of Design Theories.

Bauhaus and The 'language of vision; Paul Klee's Pedagogical Sketchbook; Wassily Kandinsky's Point and Line to Plane; Johannes Itten's Polar Contrasts; Charles & Ray Eames and The Powers of Ten; Lazlo Moholy-Nagy's Vision in Motion; Charles. W. Morris's the theory of 'semiotics'; Jacques Bertin's'semiology of graphics'

Module IV : The Principles & Theories of Design Application.

Introduction to Gestalt Theory; Gestalt Principles: Similarity, Continuation, Closure, Proximity, Figure/Ground, Symmetry and order; Maslow's hierarchy of needs; Privacy regulation theory by Irwin Altman; Robert Sommer& Edward .T. Hall: Studies in personal space. Theory of Cognitive ergonomics; User Interface Design; Donald Norman's stages of action; Ben Shneiderman's Principles of Human-Computer Interface Design.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Erlhoff, Michael, and Timothy Marshall, eds. Design dictionary. Walter de Gruyter, 2008.
2. Felton, Emma, Oksana Zelenko, and Suzi Vaughan, eds. Design and ethics. Routledge, 2013.
3. Lawson, Bryan. How designers think: the design process demystified. Routledge, 2006.
4. Samara, Timothy. Design evolution: Theory into practice. Rockport Pub, 2008.
5. Kepes, Gyorgy. Language of vision. Courier Corporation, 1995.

6. Nelson, Harold. G., E. Stolterman. The design way, Educational Technology, 2003.
7. Itten, Johannes, and Faber Birren. The elements of color. Vol. 4. John Wiley & Sons, 1970.
8. Cross, Nigel. Designerly ways of knowing. Springer London, 2006.
9. Friedman, Ken. "Theory construction in design research: criteria: approaches, and methods." Design studies 24.6 2003
10. Kim, Nanyoung. "A history of design theory in art education." The Journal of Aesthetic Education 40.2 (2006)
11. Richard Jones; Design Fundamentals Gestalt Theory; Blurb, Incorporated, 2015.
12. Shneiderman, Ben, and Shneiderman Ben. Designing the user interface. Pearson Education India, 2003.
13. http://www2.uiah.fi/projects/metodi/e00.htm
14. Klee, Paul. Pedagogical sketchbook. London: Faber & Faber, 1953.

TECHNICAL DRAWING & ILLUSTRATIONS

(Practical)

Course Code: IND2202 **Credit Units: 02**

Course Objective:

Basic technical drawing is essential as drawing is the language of designer. This course aims to enhance knowledge and any skill related in engineering drawing. More importantly, this course develops the ability to read drawing increases the productivity of a person besides enhancing confidence to perform task competently.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Technical Drawing & Illustrations

Importance of Engineering drawing; Method of folding of Engineering drawing sheets as per BIS SP: 46-2003; Drawing Instruments and their Standard uses. ***Drawing of Lines*****:** Definition, types and applications in Drawing as per BIS SP: 46-2003; Classification of lines (Hidden, Centre, construction, Extension, Dimension, Section); Drawing lines of given length (Straight, curved); Drawing of parallel lines, perpendicular line; Methods of Division of line segment. ***Lettering & Numbering as per BIS SP46-2003*****:** Single Stroke, Double Stroke, inclined, Upper case and Lower case. ***Sizes and Layout of Drawing Sheets*****:** Basic principle of Sheet Size, Designation of sizes, Selection of sizes, Title Block, its position and content, Borders and Frames (Orientation marks and graduations), Grid Reference, Item Reference on Drawing Sheet (Item List);

Module II : Free hand drawing of Geometrical Figures & Perception

Free hand drawing of Lines, polygons, ellipse, etc.; ***Geometrical figures*** and blocks with dimension; Transferring measurement from the given object to the free hand sketches. Depth ***Perception*****:** Binocular disparity, Monocular cues- Interposition - Atmospheric Perspective- Texture Gradient -Depth Perception through Linear or one point Perspective - Linear or one point Perspective - Two-point Perspective - Three-point Perspective -Three perspective angles for clear visual understanding-Eye level; ***Free Hand sketch of products*** **:**Automobiles, electronic gadgets, furniture etc.

Module III : Technical Drawing of Geometrical Figures & Dimensioning:

Definition, nomenclature and practice of Angle: Measurement and its types, method of bisecting; Triangle -different types; Rectangle, Square, Rhombus, Parallelogram; Circle and its elements. Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions. Dimensioning: Definition, types and methods of dimensioning (functional, non-functional and auxiliary); Types of arrowhead; Leader Line with text.

Module IV : Method of presentation of Engineering Drawing

Pictorial View; Orthogonal View; Isometric view

Module V : Symbolic Representation (As per BIS SP:46-2003)

Fastener (Rivets, Bolts and Nuts); Bars and profile sections;Weld, brazed and soldered

joints; Electrical and electronics element; Piping joints and fittings

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Madsen, David A. Engineering drawing and design. Cengage Learning, 2001.
2. Goetsch, David L., William Chalk, and John A. Nelson. Technical drawing. Cengage Learning, 2000.
3. Agrawal, Basant, and C. M. Agrawal. Engineering Drawing. McGraw-Hill Education, 2014.
4. Knowlton, Kenneth W.,. Technical freehand drawing and sketching. Glencoe/McGraw-Hill School Pub Co, 1977.
5. Pipes, Alan. Drawing for designers. Laurence King Publishing, 2007.
6. Cooper, Douglas. Drawing and perceiving; John Wiley & Sons, 2007.

DESIGN FUNDAMENTALS & ILLUSTRATION TECHNIQUES-II

(Practical)

Course Code: IND2203 **Credit Units: 02**

Course Objective:

This course focuses students' understanding of how to employ drawing skills needed to create design projects and communicate ideas that influences every aspect of life. This course will further explore more to create art, which incorporates the fundamental elements and principles of design and select materials that express issues such as content and subject matter. The program culminates with a design-based physical, 'hard copy' portfolio.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Representational Drawing.

Understanding the characteristics of the objects, its material and texture including color and form.

Simplification Drawing:

Module II : Simplification Drawing.

Drawing complete details to represent that particular object but reduce/ simplify the complex character of the object to make the perception simpler.

Module III : Study of Subject Matter.

The object - The still life – Drapery - Faces and figures - Nature and the landscape- Memory drawing and quick sketching

Module IV : Society and Articulation.

Study, interact, observe and document the socio – cultural, prejudices and beliefs to form clear understanding of the role of design, motifs, patterns, etc. and place in communication system.

Module V : Study of Signs and Symbols.

Abstraction, Reduction, and Simplification –Translation of designed objects into Icons, Signs, and Symbols that share a common – Translation of designed objects into Logo.

Module VI : Study of Poster Design.

The poster as the quintessential communication tool - Methods and techniques of poster making.

Module VII : Design Visualization (Self-study / Assignment)

Find, collect and archive any inspiration sources such as image ideas, color swatches, font ideas etc. - Think about their relevance of uses as a product – Find similar products during a variety of time periods - Present many versions and approaching to an idea- create a rough of the design understanding the layout- Make a conclusion of the product selection - Create five thumbnails of different compositions - Choose one to render a detailed drawing of the design, including color, typeface, etc. - Make it artful - It should look polished and finished - Finally, edit, and produce a portfolio of product ideas and design ideas with the evidence of individual's increased

understanding and application of the sketching process, evidence of understanding linear perspective, and evidence of text and idea development.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Grenier, Conceptual understanding and the use of hand-sketching in mechanical engineering design. Pro Quest, 2008.
2. Jackson, Lesley. Twentieth century pattern design. Princeton Architectural Press, 2007.
3. Moore, David Mike. Visual literacy: A spectrum of visual learning. Educational Technology, 1994.
4. Foster, John. New Masters of Poster Design. Rockport Publishers, 2006.
5. Hull, Joseph William. Perspective Drawing: Freehand and Mechanical, University of California Press, 1950.
6. Lockard, William Kirby. Design drawing. Pepper Pub., 1982.

DESIGN STUDIO-II (PHOTOGRAPHY & VIDEOGRAPHY)

(Studio)

Course Code: IND2204 **Credit Units: 02**

Course Objective:

The aim of this course is to develop knowledge, skills and understanding of Photography, Video and Digital imaging that enables students to gain an increasing accomplishment and independence in their representation of ideas in the fields of Design. This course enhances the students to visualize the concept of digital platform and various methods of image capture.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Frame work for skill development in Photography, Video and Digital imaging.

Photography, Video and Digital imaging is encourage creative and systematic investigation of formal and conceptual issues in the field of design and act as a tool of inspiration. Studies of Photography, Video and Digital imaging is required different philosophical views and frameworks of belief that affect interpretations of meaning and value. They are:

1. ***The subjective frame*** — *Personal experience:* This is about deeply felt and sensory experience, intuition and imagination in relation to the inter-subjective experiences afforded to artists and audiences.
2. *The cultural frame — Cultural and social meaning:* This is to represent the collective interests of, cultural groups, ideologies, classes, politicalgroups, genders, and spiritual and secular beliefs, events and objects in relation to the social perspective of the community out of which itgrows.
3. ***The structural frame*** — *Communication and the systems of signs:* This is the representation of the visual language as a symbolic system. A system of relationships between signs and symbols that are read and understood by artists and audiences who are able to decode the texts in terms of the relationships of symbols used to refer to the world. Through this system, ideas are circulated and exchanged.
4. ***The postmodern frame*** — *Ideas that challenge mainstream values of histories:* This is about texts' that reconfigure and question previous texts and current narratives. These are woven together through such things as irony, parody and quotation through critique, exposing the patterns of authority and the assumptions of mainstream values to reveal inconsistencies, uncertainties and ironies.

Module I : **Photography & Digital Imaging**

Different types of camera (DSLR) - Study of apertures, shutter speed and ISO. - Understanding white balance in DSLR their control - Understanding Focus: Depth of Field, Focal Length. - Types of Lens available: Zoom lens and Macro.-Use of tripod stand, study of panning tilt head. - Taking photographs: Outdoor and indoor subjects on films. - Photographing a subject with different lenses. - Types of lights: use of bounce and reflected lights. - Handling movie and video cameras.

Practice: Indoor & Outdoor shoot.

Module II : **Videography**

Types of cameras: HD. - Types of Framing: Framing, Angle of Framing, Aspect Ratio, Level of Framing, Canted Framing, and Following. - Use of White balance and their purpose. - Types of Shot, Reframing, and Point-Of-View shot, Scale, Extreme long shot, Long shot, Medium long shot, Medium Close-up, Close-up, and Extreme Close-up. - Working with Chroma-Green/Blue Screen. - Working with Audio, Capturing Audio while shooting, Recording Audio with HDSLR Video Camera, Importance of Audio while shooting.

Practice: Indoor & more on practical training like outdoor shoot with available lights

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Busch, David D. David Busch's Mastering Digital SLR Photography. Cengage Learning, 2011.
2. Garrett, John, and Graeme Harris. Collins Complete Photography Course. HarperCollins UK, 2010.
3. Krause, Jim. Photo idea index. How Books, 2005.
4. Martin, Jerry; Active Video: A Teaching Tool for Every Classroom; Good Year Books, 1998
5. Goodman, Robert M., and Patrick J. McGrath. Editing digital video. McGraw-Hill, 2002.
6. Barrett, Colin. Digitalvideo for Beginners: A Step-by-step Guide to Making Great Home Movies. Lark Books, 2005.

APPLICATION OF COLOR THEORY

(Practical)

Course Code: IND2205 **Credit Units: 02**

Course Objective:

This course focuses the students to gain an understanding of application of colour theory though practical exercises aimed at experimentation. This course is designed to not only develop and refine visual presentations in applying color, but to reinforce basic design and drawing skills as well.

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Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Colour Theory.

Theories of Successive and Simultaneous Contrast: Additive and Subtractive color; *The Physics of Color:* Color Systems-the Color Wheel: Munsell, Goethe, Runge, Itten; ***Pigment Wheel*** - Classification of hues in the pigment wheel, Primary colours, Secondary colours, and Tertiary colours. ***Theories of Color properties:*** Hue, Value, Tints and Shades, Tones, Intensity or Saturation, Colour Temperature- Warm and cool colours, Color Interaction, Color Contrast, Incremental differences in value gradation and match color values to an established gray scale. Show High/Low Value and High/Low Chroma.***Theories of Color Relationships:*** *Coluor* Harmony and Color Schemes- (1) Basic Colour schemes - Chromatic Colours, Achromatic, Monochromatic, Polychromatic, Analogous, Complementary- Direct complements. (2) Advanced color schemes- Split complements, Triadic, Tetradic, Square, Dyadic or Dyad, Neutral, Earth Tone, Pale colour scheme.

Module II : Practical Exercise on Color Application

Albers exercises &Visual Mixture*:* Value / Brilliance Scale; Colour wheel; Tetrad and Complementary Colour; Neutralize colour through Complementary colour mixes; Split complementary colour mixes; Match any given colour.***Relativity of colour****:* Colour perception and phenomenology - Change face of one colour by adjusting light, adjacent colour, and/or reflective colour. Make one colour appear as two, one colour appears as the opposite ground, two colours appear as one colour.***Compositional effects of colour*** - The application of colour in three different colour harmonies on a repeat side to side pattern of one's original design; Understanding of colour proportion and extension. ***Color and meaning in Design:***Principle of rhythm, Balance, Proportion and scale, Emphasis, Colour interaction and colour effects Contrast of hue, Light-dark contrasts, Cold- Warm contrasts, Complementary contrast, Simultaneous contrast, Contrast of saturation, Contrast of extension; Color Symbolism, Coluor Psychology, Historical & Contemporary use of Color, Local colour and subjective use of color, Emotional effects, Personal Coluor preferences, Interpretation of International Colours.

Module III : Color Application in Design (Self-study / Assignment)

Select different hues with varying values and make four compositions with each measuring 4 x 2.5 inches. The compositions will be mounted on one board. Incorporating the same four colors, make four free studies in any Products, Packaging and Interior Design by applying the colour theory. Try to disguise the fact that the same four colors were utilized in all four compositions. The way of mounted four

compositions on the board, the use of colour psychology & symbolism, cultural & emotional effects and a neat presentation are the key for evaluation.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. F. Tom, A. Banks; Designer's color manual: The complete guide to color theory and application. Chronicle Books, 2004.
2. Itten, Johannes, and Faber Birren. The elements of color. Vol. 4. John Wiley & Sons, 1970.
3. Zelanski, Paul, and Mary Pat Fisher. Color. Vol. 48. Ediciones AKAL, 2001.
4. Albers, Josef, and Nicholas Fox Weber. Interaction of color. Yale University Press, 2013.
5. Birren, Faber. Color & human response; Van Nostrand Reinhold Company, 1978.
6. Wong, Wucius. Principles of two-dimensional design. John Wiley & Sons, 1972.
7. Gage, John. Color and culture: Practice and meaning from antiquity to abstraction. University of California Press, 1999.
8. Kaufman, Donald, and Laurel Graeber. Color: Natural Palettes for Painted Rooms. Clarkson Potter Publishers, 1992.

FUNDAMENTALS OF APPLIED ERGONOMICS

(Theory)

Course Code: IND2206 **Credit Units: 02**

Course Objective:

Ergonomic is a scientific discipline concerned with the understanding of interactions among humans and the design of the system in order to optimize human well-being and overall system performance. The aim of this course is to provide basic concept about Ergonomics/Human Factors and its implementation in design and design process.

Course Contents:

(NB: Submission of Case study Report is compulsory for Module- V and will be part of the Final Course Evaluation)

Module I : Introduction to Ergonomics

The evolution of Ergonomics; Reasons to use ergonomics, Micro and Macro-ergonomics, Areas of ergonomics - Physical Ergonomics, Cognitive Ergonomics, Organizational Ergonomics; Applications and benefits of ergonomics; Principles of ergonomics.

Module II : Feature of Ergonomics

Anthropology; Anthropometry - Static Anthropometry; Dynamic Anthropometry; The human body types – Somatotypes – Ectomorphs, Mesomorphs, Endomorphs, Ectomorphs; Measuring Procedures; Biomechanics; Factors to be considered in Biomechanics – Force, Joint: Simple Joint- Compound Joint- Complex Joint, Range of Motion; Physiology; Psychology; ***Human Senses*:** Body sensors, vision sense, color theories, auditory sense, and smelling sense, tasting sense, touching sense, human body interaction with environment, thermoregulation of human body, working in polluted air, working at high altitude, effect of vibration on human body.

Module III : Office Workstation

Theories of healthy standing and sitting, free posturing, ergonomics design of the office computer workstation.

Module IV : Methods, Standards and Work Design:

Determination of work content, workstation, work methods, and times required for various occupational jobs/tasks. Design of tasks/jobs, workplace, and work environment to increase productivity, eliminate waste, and decrease occupational injury/illness.

Module V : Case study (Self-study / Assignment)

Plan a case study in three different areas of 'Human Factors Affecting Design' aims to improve the fit of products to their users and support user-centered design. Find out a core issues in relevant to the following aspects: Identify user preferences and usage-related phenomena and Product usage as a situated activity- User behavior in usage practices - Functional meaning attribution by users - The experience of comfort - Users' physical aspects in terms of body dimensions, strengths, and body joint motions.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. Bridger, RS: Introduction to Ergonomics, 2nd Edition, Taylor &Francis, 2003.
2. Dul, J. and Weerdmeester,B. Ergonomics for beginners, a quick reference guide, Taylor & Francis, 1993.
3. G. Salvendy (Edit), Handbook of Human Factors and ergonomics, John Wiley & Sons, Inc., 1998
4. Singh, S (Ed.),Ergonomics Interventions for Health and Productivity, Himanshu Publications, Udaipur, New Delhi, 2007
5. S Pheasant, C M. Haslegrave; Bodyspace: Anthropometry, Ergonomics and the Design of Work, CRC Press, 2005
6. Kroemer, Karl HE; Ergonomics: how to design for ease and efficiency. Pearson College Division, 2001.
7. Green, W.S. and Jordan,P .W, Human Factors in Product Design, Taylor & Rancis, 1999.

TYPOGRAPHY EXPLORATION

(Practical)

Course Code: IND2207 **Credit Units: 01**

Course Objective:

The objectives of this course into equip students with aesthetic and conceptual problem solving skills in various areas of design that develops the skills in craftsmanship, professionalism, and composition as well as work habits. This course introduces the language of type, its practical use and historical grounding.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Description:

Typography is, quite simply, the art and technique of arranging type. It's central to the work and skills of a designer and is about much more than making the words legible. Every designer needs to understand typography. Designing a typeface can be a long journey so it's prudent to have a clear vision of its purpose. You might begin with something purely self-expressive. However, the usual practice is to create a typeface in response to a brief. The students have to be follow the weekly assignments that will be graded on completion basis.

Module I : **Introduction to Lettering & Typography**

Introduction to Typography. - Historical Perspective. - Anatomy of Letter Form – Typeface Classification: Usage and context. - Setting Text. - Digital Typography.-

Module II : **Lettering & Typography Design**

The Grid Document Design. - Design Alphabets. - Typography and Logo Design. - Typography at rice. - Kinetic Typography. - Ambigrams

Module III : **Typographic Visualization (Self-study / Assignment)**

Develop and submit a Typography Portfolio with previous selected class assignments and various creative ideas that include:

Visualize the meaning of a word, using only the graphic elements of the letters forming the word, without adding any outside parts; Typographic Poster Design - Create a poster for Print magazines based on any theme or requirement; Calligami - Refer various origami methods – Inspire from Specific form to create own typeface; Magazine layout with Typography; Book Cover layout with Typography.

The design should be own interpretation of the words, showing the origin of the text, the tone and whether agree with it or not. The methods of typography generation are entirely up to the student, they can be traditional, experimental, found, photographed made, but they must all be different from each other.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Graham, Lisa. Basics of design: Layout & Typography for beginners. Cengage Learning, 2005.
2. Craig, James, and I.K Scala. Designing with Type: the essential guide to typography. Watson-Guptill, 2012.
3. Craig, James. Designing with type: A basic course in typography. Watson-Guptill, 1999.
4. Saltz, Ina. Typography essentials: 100 design principles for working with type. Rockport Pub, 2011.
5. Heller, Steven, and Louise Fili. Shadow Type: Classic Three-dimensional Lettering. Thames & Hudson, 2013.
6. Bringhurst, Robert. The elements of typographic style. Vol. 127. Point Roberts: Hartley & Marks, 1992.
7. Lewis, John. Typography: design and practice. Jeremy Mills Publishing, 2007.
8. Heller; Stop, Think, Go, Do: How Typography and Graphic Design Influence Behavior. RockportPublication; 2012

INTRODUCTION TO PROTOTYPING TECHNIQUES

(Practical)

Course Code: IND2208 **Credit Units: 03**

Course Objective:

This course is the continuation but further advanced from the last semester. The aim of this course is to introduce various design and prototyping techniques in action and spot various materials and processes. Audio-visual and workshop equipment has to be used to conduct this course.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Prototyping (Theory)

Introduction to Product Prototyping; Prototypes in a product design process; Design parameters; Manufacturing materials & processes; Transforming ideas into product prototypes; Human Factors and Ergonomics consideration in prototyping; Advantages of Rapid prototyping; Prototyping Processes;

Module II : PrototypeTechniques and Orientation (Practical)

Pre-Activity Description:

Begin brainstorming with words and quick sketches – Use of Sketch book and several sticky notes - Use specific STUs "Situation, Task, and User – Use Investigating Questions: How would it look? What size would it be? What would be its features? Would these vary, depending on the target audience? - Capture the Challenge - Ideas recorded in paragraphs to begin a first draft of a design description- Make brainstorming poster (The way of developed ideas) - From initial sketches or outlines to generate more detailed sketches of envisioned prototypes - Finalize the prototype sketches in scale - Review the sketches and critique - labeling them with dimensions and materials.

Activity Description - Topics covered:

- Prototyping Techniques in -Clay, Metal,Wood,Plastics,Ceramics,Composites etc.
- Finishing Techniques.

Post-Activity Description:

User Testing: Is the prototype functional? What works? What does not work? Is the prototype used to explore several design alternatives? What improvements could be made?

Discussion: the factors for final production - evaluating costs, time to build, material function and actual environmental impact.

Course Evaluation:

Components	**A**	**H**	**PR**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A** - Attendance; **H** - Home Assignment; **PR** - Practical work Record; **EE** - End Semester Examination)				

Text & References:

1. Hallgrimssom, Bjarki. Prototyping and Model making for Product design. Laurence King Publ., 2012.
2. Fishwick, Paul A. Simulation model design and execution: building digital worlds. Prentice Hall PTR, 1995.
3. Ashby, Michael F., and Kara Johnson. Materials and design. Butterworth-Heinemann, 2013.
4. Eppinger, Steven D., and Karl T. Ulrich. "Product design and development. 1995
5. Norman, Donald A. The design of everyday things: Revised and expanded edition. Basic books, 2013.
6. Bryden, Douglas. CAD and rapid prototyping for product design. Laurence King Publ., 2014.
7. Trudeau, Norman. Professional model making, Watson-Guptill Publications, 1995.
8. Simonds, Ben. Blender master class: a hands-on guide to modeling. No Starch Press, 2013.
9. Carson, I. I., and S. John. "Introduction to modeling and simulation. Winter Simulation Conference, 2004.
10. Hutchings, Pat, ed. From idea to prototype. AAHE Teaching Initiative, American Association for Higher Education, 1995.

SEMINAR / WORKSHOP / GUEST LECTURE FOR SKILL DEVELOPMENT

Course Code: IND2233 **Credit Units: 01**

Course Objective:
This course aims to judge the understanding as well as application of the knowledge gained by the students. The students have to be participated either Seminar (1) or Workshop (2) to earn the credit. Gust lecture (3) is addition to this for enhancing their knowledge by examining and analysing various aspects of design.

1. SEMINAR

The seminars intended to equip the students with some knowledge in areas which are not covered otherwise in the curriculum, but topics which are of interest or currently significant. The students need to find few topics with the help of faculties. They have to review various literatures, books, journals, internets, etc.

Points to be covered:

- Effective methods of literature review &Methods of bibliography writing.
- Enable open discussion between students and the subject experts.
- Students are encouraged to test their knowledge and to listen to other's points of view.
- Develop effective communication and presentation techniques for seminar presentation.
- Effective presentation techniques &Develop efficiency in group discussions.

Major Themes for Seminar:
Role of a designer in a project. - Relation of a designer with other consultants. - Design as a response to social and technological forces.- User participation in design. - Design and sustainability. - Various environmental and social issues and design.

Evaluation Scheme:

Components	Organisation and Relevance of content	Literature Review	Bibliography	Presentation	Total
Weightage (%)	30	30	20	20	100

2. WORKSHOP

Objectives:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. Workshop is undertaking a significant practical unit of examining and analyzing various aspects of design at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by jury of examiners comprising of the faculties.

Major Themes for Workshop are: -
Brainstorming./Design problem solving techniques./ Design Process. / Visual thinking./ Design

thinking./ Design Research techniques. / Effective prototyping./ Craft making. / Story telling. / Print making./ Textile Block Printing.

Guidelines for Workshop :

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study /Group Activity. /Role Play. / Business Planning./Quiz.

Evaluation Scheme:

Components	A	AP	MCQ	Solving the case/ Assignment / Write up	Total
Weightage (%)	10	30	30	30	100

(**A -** Attendance; **AP -** Active Participation; **MCQ -** Multiple Choice Questions)

3. GUEST LECTURE

Eminent subject experts from the field may be invited to deliver the lectures on different topics of their choice and share their experience with the students

Syllabus - Third Semester

INTRODUCTION TO SPATIAL DESIGN

(Theory)

Course Code: IND2301 **Credit Units: 03**

Course Objective:
The object of this course is to make students understand the various aspects of spatial design. The course is interdisciplinary and experimental, enabling the students to become a designer who is comfortable working in teams, on a variety of Interior design projects.

Course Contents:

Module I : Introduction to Spatial Design
Spatial Design: Meaning and Definition; Space: Definition; Interior space-spatial qualities: Form, Scale, Outlook; Structuring space with interior design elements; Spatial form; Spatial dimension – Square, Rectangle, Curvilinear spaces; Height of space; Spatial transitions – Openings within wall planes, Doorways, Windows, Stairways. Concept of space: Factors influencing living space, Requirements, Need for space, Space occupancy, Ownership, Style and other general factors. Division of space – Private, Public;Work and traffic – Definition, Utility, Determinants, General principles in planning space for various activities; Spatial Design concepts:Design for Branded Spaces; Curation and Exhibition Design; Social and Environmental Design and Design for Living.

Module II : Space for living
Significance of housing: Functions of house, Selection of site, Types of house plans: Site plan, Floor plan, Elevation plan, Cross-section plan, Perspective plan and Landscape plan, Principles of planning a house to suit the basic requirements, components attributed to livability in life space: Comfort, Convenience, Safety, Workability, Maintenance, Lighting, Satisfaction; Individual houses, Multi- storied flats, Row houses.

Module III : Interior Design Principles
Form – Point, Line, Volume, Shape, Texture & Colour – in relation to Light, Pattern etc. and application of the same in designing interiors; Ratio; proportions – Golden section; Relationships; Scale; Balance – Symmetrical, Radial, Occult; Harmony; Unity; Variety; Rhythm; Emphasis.

Module IV : Anthropometrics
Definition, theory of standard dimension based on human figures for activities, Functions, Circulation, Furniture design, Spatial requirements etc. Study of ergonomics design of furniture for living, Dining, Kitchen, Office etc.

Module V : Design Control
Design process – Analysis, Synthesis, Design evaluation; Design criteria – Function and Purpose, Utility and Economy, Form and Style; Human factors - Human dimensions, Distance zones, Activity relationships; Fitting the space – Plan arrangements, Function, Aesthetics.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Higgins, Ian; Spatial strategies for interior design; 2015.
2. Ching, Francis DK, and Corky Binggeli; Interior design illustrated. John Wiley & Sons, 2012.
3. Dodsworth, Simon, and Stephen Anderson. The fundamentals of interior design. Bloomsbury Publishing, 2015.
4. Smith, Dianne, ed. Perspectives on Social Sustainability and Interior Architecture; Springer S & B; 2014.
5. Miller, Sam F. Design Process: A Primer for Architectural and Interior Design. John Wiley & Sons, Inc., 1997.
6. Gordon, Gary. Interior lighting for designers. John Wiley & Sons, 2015.
7. Linton, Harold. Color in architecture; McGraw-Hill Professional Publishing, 1999.
8. Croney, John. Anthropometry for designers. Van Nostrand Reinhold Company, 1981.

INTERIOR DESIGN MATERIALS & APPLICATIONS

(Theory)

Course Code: IND2302 **Credit Units: 02**

Course Objective:

The objective of this course is to explore the diversity of interior building and finish materials, expanding the opportunities for creative design solutions. This course familiarizes the students to learn the technical vocabulary and scientific concepts associated with procedures used for their fabrication, testing and evaluation.

Course Contents:

Module I : Masonry

Mud, bricks; building tiles: roof, floor and wall tiles, stones, clay, lime, sand, mortars, cement and aggregates, concrete, gypsum based plaster etc.

Module II : Wood & Timbers

Wood as a building material: Identification, selection, application, types of wood, Commercial Classification, Nomenclature, Structure, Anatomy and Ultra structure, Conversion figure and natural defects, Availability of wood products, Wood based panels such as Plywood, MDF, HDF, Particle board, pre laminated boards etc. – their properties, process of manufacture, tools and technology of its application and quality assessment; Finishes to reconstituted wood: Lamination, Polishing etc. Various insulating materials, their properties and applications; Surface finishes for wood products and derivatives etc., Coatings: clear and pigmented finishes technical or protective coatings etc. Timber, cane, bamboo – characteristics of good timber, defects, applications of timber like joints, floors, openings, staircases, roof forms, etc. Finishes in timber like flooring, paneling, etc. Finishes to timber.

Module III : Paints, Varnishes& Adhesives

Paints: Protective coating paints, types of paints – water paints, distempers, cement based paints, emulsion paints, anti-corrosive paints etc. - Composition, functions, preparation and application method, painting on different surfaces, defects in painting; ***Varnishes*** : Oil and spirit; various types – French polish, damp proofing finishes etc. and methods of application. ***Adhesives***: Natural and Synthetic, their varieties, thermoplastic and thermosetting adhesives, epoxy resin. Method of application, bond strength etc.

Module IV : Glass and Glass Products

Composition and fabrication of glass, classification, types of glass- wired glass, fiber glass, rock wool, laminated glass, glass concrete blocks - their properties and uses in buildings. Commercial forms available – their physical and behavioral properties, tools and technology of its application in built forms. Materials and workmanship specifications

Module V : Traditional & Rural Materials

Roof: Details of pitched roof and hipped roof with pan tiles and Mangalore tiles. Details of madras terrace roof for small and medium span. ***Foundation and walls***: foundation and wall in stone masonry (Random rubble, SR & Ashlar) foundation and walls in stabilized mud and Compact earth blocks, various types of details for walls with bamboo and casuarinas Roofs in rural materials: Details of thatched roof with casuarinas/ bamboo / CEB frame work; Details of palm and hay roof with casuarinas / bamboo/ CEB.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Mehta, Madan, Building construction: Principles, materials, and systems. Pearson Prentice Hall, 2008.
2. Herzog, Thomas, et al. Timber construction manual. Walter de Gruyter, 2004.
3. Seethalakshmi, K. K., et al. Bamboos of India: A compendium. Vol. 17. Brill, 1998.
4. PratapRao, M; Interior Design Principles & Practice; Standard Publishers, 2009.
5. Godsey, Lisa. Interior design materials and specifications. A&C Black, 2012.
6. Stanley; Complete Painting; 2007
7. Mark Dixon, House Painting: Inside and Out; Taunton Press; 1997
8. Binggeli, Corky. Materials for interior environments. John Wiley & Sons, 2008.
9. Godsey, Lisa. Interior design materials and specifications. A&C Black, 2012.

ELEMENTS OF INTERIOR SPACE PLANNING & SCALING

(Practical)

Course Code: IND2303 **Credit Units: 02**

Course Objective:

This course provides a specific design methodology for understanding the nature of spaces, scales and space within a space along with elements and organization. The aim of the course is to impart an understanding of perception of interior space through architectural elements.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : **Interior Ergonomics**

Average measurements of human body in different postures – its proportion and graphic representation, application in the design of simple household and furniture. Role of mannequins in defining spatial parameter of design. Basic human functions and their implications for spatial planning. Minimum and optimum areas for various functions. Preparing user profile, bubble and circulation diagrams.

Module II **Introduction to Interior design Methodology**

Detailed study of spaces such as living, dining, bedrooms, kitchen, toilet etc. including the furniture layout, circulation, clearances, lighting and ventilation, etc. Case study of existing house and analysis of the spaces.

Module III : **Visual analysis of Designed Spaces**

Spaces noted for comfort and spatial quality; analysis of solid and void relations, positive and negative spaces. Integration of spaces and function in the design of Bus shelter, Milk booth, Watchman's cabin, traffic police kiosk, flower stall, ATM center, etc.

Module IV : **Interior Design: Symbols & Representation**

Representation of building elements, openings, materials, accessories etc., terminology and abbreviations used in architectural presentation; representation of landscape elements such as trees, indoor plants, planters, hedges, foliage, human figures in different postures, vehicles, street furniture etc.; by using different media and techniques and their integration to presentation drawings.

Module V : **Measuring and Drawing to Scale**

scales and construction of scales, simple objects, furniture, rooms, doors and windows etc. in plan , elevation and section etc. reduction and enlargement of drawings.

Module VI : **Interior Geometry**

Study of points, lines and planes leading to simple and complex solid geometrical forms. Orthographic projections of points, lines, first angle projections of planes and solids, sections of solids, development of surfaces of solids and intersections of solids. Use of geometry in buildings - isometric, axonometric, and oblique views. Working with models to facilitate visualization.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:

1. Karlen Mark; Space planning Basics, Van Nostrand Reinhold, New York, 1992.
2. Joseph D Chiara; Time Saver standards for Interior Design & space planning, McGraw Hill professional, 2001.
3. Francis.D. Ching & Corky Bingelli, Interior Design Illustrared, 2nd edition, Wiley publishers, 2004.
4. Julius Panero, Human Dimension & Interior Space, Watson – Guptill, 1979.
5. Stephen Kliment, Architectural Sketching and Rendering, Watson Guptill, 1984.
6. Ivo.D. Drpic, Sketching and Rendering of Interior Space, Watson- Guptill, 1988.
7. Maureen Mitton, Interior Design Visual Presentation, Wiley publishers, 2007
8. Shah, M.G., Building Drawing, Tata McGraw Hill Pub., Delhi, 2000.
9. Gill, P.S.T.B. of Geometrical Drawing, 3rd ed. Dewan Suhil Kumar Kataria, Ludhiana, 1986.

PSYCHOLOGY OF LIVING ENVIRONMENTS

(Theory)

Course Code: IND2304 **Credit Units: 02**

Course Objective:

Human beings are in constant interaction with the environment. With the growth of civilization, men are making more and more artificial environments, and interior designers play a significant role in this process. The object of this course is designed to acquaint the students with some fundamental aspects of Environmental Psychology in relation with interior designing.

Course Contents:

Module I : Introduction to Environmental Psychology

Emergence as a discipline, Importance in interior, Basic principles of psychology - changing understanding of man and his mental and emotional processes, corresponding relevance in design of built environment, Language of architecture (rhythm, balance, harmony, etc) and its elements (physical, aesthetic, sensory, colour, noise, light etc.), articulation of mass and space and its role in evoking emotions. Space syntax.

Module II : Environment and Human response

Behavioral response to the built and un-built environment, Processes involved in assessing and appraisal of environment, Responses to environment - Individual (environmental perception, spatial cognition, comfort, anthropometrics), Social (proxemics, territoriality, crowding, privacy), and Societal (neighborhood, community, work). Inducing behaviour through design.

Module III : Application in different environments

Design of spaces and places for occupants of varying ages, gender, use and group size , Educational (class room design, ambient noise, attention), Workplace (types of office design), Health care, religious, commercial, recreational, environments. Open spaces, cityscapes. Case studies

Module IV : Research methods in Environmental Psychology of Interiors.

Use of research to enhance the interior quality, measure satisfaction levels, direct behaviour in specific environments. Post occupancy evaluation, behavioral mapping, cognitive mapping, semantic differential techniques, trace measures. Case studies.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE**-End Semester Examination)				

Text & References:

1. ET Hall, ‘ The Hidden Dimension’ 1966
2. Proshansky, ‘Environmental psychology- People and their physical settings’ –1976
3. Canter and Lee, ‘ Psychology and the built environment’ - 1974
4. Bryan Lawson , ‘Language of Space’
5. Gifford R, ‘Environmental Psychology, Principles and Practices’, 2002
6. Kopec D, ‘Environmental Psychology for design’, 2006

7. Linda N. Groat, ‘Architectural research methods’, David Wang 2002
8. Amos Rappaport, ‘The Meaning of the Built Environment’, 1982 (updated edition 1990)
9. Francis D.K. Ching, Architecture-Form Space and Order, Van Nostrand Reinhoid Company, New York.
10. Munn, N.C. Psychology, Fundamentals of Human adjustment.

FUNDAMENTAL OF STRUCTURES

(Studio Practical)

Course Code: IND2311 **Credit Units: 02**

Course Objective: This course aims at developing basic Structural knowledge for interior design students to understand structural concepts complex form and structure understanding. This course will help to understand and identifying practical problems, on-site issues, designing patterns to obtain solutions involving existing structures, renovation, alterations of interior while forming the concept.
Forming a structure to a designer's idea is one of the most important steps for a perfect execution and this step teaches students and patrons the basics of the same.

Course Contents: (NB: Submission of Work record is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I :

- Basic of Structures in a building and its types in Residential & Commercial spaces
- Basic of Concept to understand and importance to Structures
- Understanding Beams & Columns, Foundation its types and sizes.

Module II :

- Calculation of Areas, understanding how to combine structure and design together.
- Basics of Structure placement in Design and understanding spaces.
- Material knowledge of Structures.
  Designing with Structure understanding of Staircase, Toilet, Kitchen.

Module III :

- Understanding Alteration and Renovation how to perform in Interior Design Structure
- Learning how to design with the existing structure.
- Understanding existing HVAC services and how to convert the structure into design.

Module IV : (Assignment)

- Case Study on Existing Residential Spaces understanding predefined Structures and Renovate designing on it.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

- Dechiara&callender, Time saver standards for Architectural design data.
- S.C.Rangwals – Engineering materials – Charotar Publishing, Anand.
- Bindra, S.P. and Arora, Building Construction: Planning Techniques and methods of Construction
- William. J. Guinness; Mechanical and Electrical Systems for Buildings
- Derek Clements-Croome, Derek J. Croome, Intelligent buildings, Thomas Telford Books, London, 2004.
- Kim, Jong-Jin; Qualities, Use, and Examples of Sustainable Building Materials, CSS,University of Michigan, 1998.

- Trachte, Sophie; Advanced and Sustainable Housing Renovation, A guide for Designers and Planners. UCL, 2010.

HISTORY OF INTERIOR DESIGN & STUDY ON POPULAR STYLES

(Theory)

Course Code: IND2306 **Credit Units: 02**

Course Objective:

This course aims to provide the knowledge on history of interior design, highlight the styles, and learn about some famous interior designers and their influence on design through the ages.

Course Contents:

Module I : **Early Classical Period**
Prehistoric Cave paintings – Primitive Designs- Interiors during Egyptian, Greek, Roman, Gothic, Early Christian & Renaissance Periods.

Module II **Middle Ages& Colonial to the Beginning Of The 20th Century**
Interiors in Romanesque, Gothic, and Renaissance periods; Colonial, Victorian designs, Arts & Crafts movement, Art Nouveau, Eclectism, Frank Lloyd Wright.

Module III : **Bauhaus To Post War Modernism**
Walter Gropius/ Bauhaus, De Stijl, Mies Van Der Rohe, Le Corbusier, Art Deco, Postwar Modernism.

Module IV : **Non-European Traditions & Scandinavian Traditions**
Interiors in China, Japan & the Islamic World – Influences of Pre Columbian American art & culture, African influences in interiors; Interior Design in Sweden, Finland, Norway. Contributions of Architects such as Aalvar Alto, etc.

Module V : **Indian Traditional Designs**
Traditional Styles of design & decorations of homes & accessories across the states in India including Rajasthan, Gujarat, Andhra, Tamil Nadu, Madhya Pradesh etc.

Module VI : **Popular Interior Design Styles &Design Movements**
Shabby Chic; Retro; New York Style; Mediterranean; Scandinavian; New England; Classical Style, Art Nouveau, Art Deco, The Bauhaus, Modern (International Style), Post Modern, Traditional Arabic / Islamic / Parisian, Locality Styles**,** Postwar Modernism, Late Modernism, High Technology, Post - Modernism, De Constructivism; Minimalism and Contemporary;

Module VII : **Contemporary Interior Designers.**
Early Pioneers : Art nouveau, Charles Renée Mackintosh, Antonio Gaudi, GerritRietveld- expressionist interior design;**Bauhaus And Post War Modernists :** Walter Gropius/ Bauhaus, De Stijl, Mies Van Der Rohe, **Modernism:** Le Corbusier, Frank Llyod Wright, Louis Khan, KenzoTange and Oscar Niemeyer; **International Style:**Alvar Alto, Phillip Johnson, Charles and Ray Eames , Eero Saarinen, EeroArnio, Arne Jacobsen; **Post Modernism And Minimalism:**ZahaHadid, Santiago Calatrava, Frank Gehry and Peter Eisenmann.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Interior Design Course, Mary GilliatCoyran, Octopus Ltd., London
2. Interior Design & Decoration, SherrilWhiton, Prentice Hall
3. Interior Design, Francis D.K. Ching, John Wiley & Sons, New York
4. History of Architecture, Sir Banister Fletcher, CBS Publishers & distributors, New Delhi
5. Time Saver Standards for Interior Design, Joseph De Chiara, McGraw Hill, New York.

LIGHTING & COLOUR IN INTERIORS

(Theory)

Course Code: IND2307 **Credit Units: 02**

Course Objective:

This course provides knowledge of the various types of lightings to effectively communicate their designs and understand the effect of various lights on colours and textures.The aim of this course is to equip the students to understand and successfully apply lighting techniques with colour effects.

Course Contents:

Module I : Introduction To Day Lighting

Lighting and vision; Nature of light – Wavelength, Photometric quantities – intensity, Flux, illumination and luminance, visual efficiency, sources of light, day light factor concept, design sky concept, day lighting requirements.

Module II Artificial Lighting

Electric lamps – incandescent, fluorescent, sodium vapour, mercury, halogen and neon. Different types of lights in interior and exterior - task lighting, special purpose lighting. Calculation of artificial lighting, guidelines for lighting design, Glare in artificial lighting; Color characteristics of artificial lighting, integration of day lighting with artificial lighting, lighting controls, intelligent building systems for lighting, switches, dimmers.

Module III : Effect of Colour In Lighting

Colour and light, colour and surface qualities, color and distances and scales. Problems with colour. Use of colour in various functional contexts – Residential interiors, Non Residential interiors. Use of color in special situations – out door/indoor spaces, accessories, art works etc.

Module IV : Luminaires& Fixtures

Definition, different luminaries for lighting, lighting control system- benefits & application, Impact of lighting, fixture types - free standing or portable, fixed, light fixture control; Floor, table and desk, wall mounted, ceiling units, built in lighting, miscellaneous types, decorative lighting, spot lighting, task lighting, underwater lighting,etc.; Lighting accessories- switches, sockets, fused connection units, lamp holders, ceiling roses etc.

Module V : **Study of Lighting Concepts(Self-study / Assignment)**

Study of projects based on different lighting concepts used in interiors and exteriors and survey of lamps available in the market with cost and technical specifications.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. Moore Fuller, Concepts and practice of Architectural Day lighting, Van Nostrand Reinhold co., New York, 1985.
2. David Egan. M. Concepts in Architectural lighting McGraw Hill Book company, New York, 1983.
3. John.F. Pile, Interior Design, 2nd edition, illustrated, H.N.Abrams, 1995.
4. Randall whitehead; Lighting design, source book.
5. Torquil Barker; Concepts of lighting, Lighting design in Architecture.

PERSPECTIVE DRAWING TECHNIQUES & TECHNICAL SPECS-I

(Practical - Graphics)

Course Code: IND2308 **Credit Units: 02**

Course Objective:

The objective of this course is to train the students in the field of interior perspective drawing, sciography and scheme detailing. This course provides presentation skills, techniques for construction as a tool towards effective visualization and presentation.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Measured Drawing & Views

Measured Drawing of Simple objects like Cupboards etc. and building components like Columns, Cornices, Doors, Windows etc. Isometric View: like Tables, Chairs, Cylindrical & Spherical elements etc. Axonometric View: like Interior views for living room, Toilet, Dining Room etc.

Module II Perspective View & Drawings

Principles and Visual effect of 3D objects, Study of Picture plane, Station Point, Vanishing Point, Eye level etc. Characteristics of perspective drawings, perspectives of simple geometric solids and spaces and complex geometries. Advanced examples in one point or parallel perspective, two points or angular perspective. Introduction to three point perspective. Interior perspectives of rooms. Rendering of the perspectives in different media through drawing pencil, pen, brush, charcoal, crayons, color, monochrome, wash rendering etc., Integrating landscape elements, human figures, shadows, foreground etc. in the perspectives.

Module III : Introduction to Sciography

Study of shade and shadows of simple geometrical solids of various forms and groups of forms, Shadows of Circular/Cylindrical/Spherical elements. Shade and Shadows of Architectural elements in Interiors. Simple and composite forms, shadows on horizontal, vertical planes and on their own surfaces.

Module IV : Scheme Detailing

Working drawing of - ***Building Components:*** Different types of doors and windows; *Building Surfaces:* Wall murals, reflected ceiling plans and flooring patterns; *Furniture:* Work station, living room furniture, bedroom furniture and dining tables; ***Detailing of Special Area:*** Toilets with plumbing diagram, kitchen with detailing of shelves and cupboards; *Detailing of Storage Areas:* Wardrobes, TV cabinet and showcase, crockery shelves, cadenza, chest of drawers, dressing table.

Module V : Drawing from Imagination(Self-study / Assignment)

Study of speculative drawings, diagramming, drawing compositions, concept sketches, design development sketches, presentation sketches , Presentation drawings, Graphical presentations etc.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Stephen Kliment, Architectural Sketching and Rendering, Watson Guptill, 1984.
2. Ivo.D. Drpic, Sketching and Rendering of Interior Space, Watson- Guptill, 1988
3. Maureen Mitton, Interior Design Visual Presentation, Wiley publishers, 2007
4. MogaliDelgadeYanes, Freehand drawing for Architects and Interior Designers, WW.Norton& Co., 2005
5. De Chiara et al – Time Saver standards for interior design and space planning, McGraw Hill, 1982.
6. Atkin William W. Corbellent, Pencil Techniques in Modern Design; Reinhold Pub. Corporation. New York, 1962.
7. Bately, Claude. Design Development of India Architecture.
8. Joseph D, Amelio, Perspective Drawing Hand book, Dover publications, 2004

INTERIOR DESIGN STUDIO-I

(Studio - Graphics)

Course Code: IND2309 **Credit Units: 02**

Course Objective:

The objective of this course is to develop understanding of the scale, function and options existing when designing small-scale spaces in residences. This studio course provides the interaction of two-and three-dimensional design of residential interiors.

Course Description

In the studio, the learning process is learning by doing. The core part of this course incorporates exercises to develop manual and digital presentation skills in order to present design ideas and solutions. Every module is blended with hand on sketches as well as application of basic computer graphics. Each student has to maintain a sketchbook compulsorily. Process sketches are scanned and integrated into the final presentation by PPT. Ahard copy of Design Studio Portfolio submission is compulsory.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Interior Design Studio Process

1. ***Design Objectives:***

Function; Cost Effectiveness; Durability, Maintainability; Compatibility; Design; Creativity; Flexibility; Timelessness.

2. ***Design Approach:***

Programming: Functional Requirements, Understanding the User's Needs; Concept Development: Physical and Behavioral Requirements, Space Planning, Architectural Design, Color Concept, Material Selection;

3. ***Design Development & Presentation:***

Design Narrative; Design Illustration; Color and Material Selection; Furnishings Selection; Concept Presentation- use of visual presentation materials, including renderings, floor plans, perspectives, finish and furniture boards, for the user / Clint to gain a clear understanding of the design.

4. ***Design Execution:***

Statement of Work, Architectural Floor Plan, Finish Schedule and Color Legend, Finish Floor Plan, Elevations, Sections, and Details, Miscellaneous Drawings, Furniture Floor Plan, Installation Plans, Furnishings Specifications, Furnishings Cost Estimates, Furnishings Order Form

Module II : Studio Project -1: Basic Residential Interior.

Use Module –I parameters and design Residential facilities, i.e. family housing and unaccompanied personnel housing (dormitories). Holistic concepts in residential interiors – ability to integrate various individual spaces into one theme – treatment of patios, courtyards, verandahs & other semi sheltered spaces – integration of built form and open spaces.

While the overall wear of finishes is reduced in family housing units, they still contain areas fitting all three categories of use:

- ***Heavy-use areas:*** Entrance foyers, kitchens, bathrooms, stairwells, and laundry areas.

- ***Medium-use areas:*** Corridors, hallways, dayrooms, family living, dining rooms and kids room, Home Theater.
- ***Light-use areas:*** Bedrooms.

Module II : **Studio Project -2: Different Types of House Designs (Self-study / Assignment)**

Study, Identify the difference and Design of:

Affordable House, Small house, Simplex Houses, Duplex House, Luxury Home, Double and Triple Story House, Multi Family House, Bungalow house, Farm house, Traditional houses, House Designs with garage, various Flats and Apartments, Villa, etc.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Linda O'Shea, ; The Interior Design Reference & Specification Book; Rockport Publishers; 2013
2. Interior Design; The New Freedom, BarbaralecDiamonstein, Rizzoli International Publications, New York, 1982.
3. Interior Colour by Design, Jonathan Poore, Rockport Publishers, 1994.
4. Worldwide Interiors – International Federation of Interior Architects & Designers, Rikuyo-Sha, Japan, 1987.
5. Simon Dodsworth Cardoso; The Fundamentals of Interior Design
6. Karlen Mark, Space planning Basics,
7. Maureen Mitton, Interior Design Visual Presentation
8. Carol Simpson, Estimating for Interior Designers

INTERIOR WORKSHOP PRACTICE-I

(Practical)

Course Code: IND2310 **Credit Units: 02**

Course Objective:

The course is intended to provide information on working with Wood and Bamboo which are among the major materials used in the interiors. This course aims to understanding the material and tools by making objects which allow students to explore the forms, surfaces, textures and patterns. Explore different joinery and support conditions.

Course Contents:

(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Safe Workshop Practice

General safety precaution inside the workshop: Suitable clothing - Eye Protection - Hearing Protection – Footwear - Dust Masks – Safe handling of Tools – Electric safety - Responsibility of individual.

Module II : Study of Hand Tools and Measuring Instruments.

Fitting Shop: Holding tools; Marking and measuring tools; Cutting tools; Finishing tools; Miscellaneous tools; Safe practice; Models for preparation.

Module III : Working with Wood and Wood Products

Understanding of wood as building material, finishing material for surfaces and as furniture material. The wood material parameters; Wooden joinery and its strength. Wood polishes and other finishes; color and surface quality; The safe and efficient use of the tools of the trade, Hand tools, portable power tools, Stationary power tools, Materials, Hardware. Safe working practices in a workshop. Joineries in wood – lap, butt, dowel, tenon& mortise, dovetail, etc. Exercises in plywood joinery; Wooden Paneling & Cladding; Wooden Flooring.

Module IV : Working with Bamboo & Cane

Bamboo / Cane and their products to understand material parameters. Bamboo and cane joinery and its strength. Polishes and other finishes

Module V : Carpentry

Introducing the techniques of planning, chiseling & jointing in timber to learn the use of hand tools.

Introduction to Timber; Marking and measuring tools; Holding tools; Planning tools; Cutting tools; Drilling and boring tools; Miscellaneous tools; Wood joints; Safe practice; Exercise involving the design of simple furniture and making a model of the same.

Module VI : Industrial Visit.

Visit various timber industries, furniture manufactures and wood craft centers. Learn, absorb and recognize different stages of timber processing, manufacturing different types of natural wood, interior decoration elements, several models of doors and windows, pieces of furniture and wood works.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. BENN, The book of the House, Ernest Benn Limited, London
2. Jannsen, Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Duttor Inc., New York, 1982.
4. Carol Stangler, The crafts and art of Bamboo, Rev. updated edition, Lark books, 2009.
5. Dr. Angelika Taschen, Bamboo style: Exteriors, Interiors, Details, illustrated edition, 2006.
6. Lonnie Bird, Jeff Jewitt, Taunton's Complete Illustrated Guide to Woodworking, Taunton, 2005.
7. Peter Korn, Wood working Basics : Mastering the essentials of craftsmanship, Taunton , 2003.
8. Albert Jackson & David Day, The complete manual of wood working, knopf publishers, 1996.

Syllabus - Fourth Semester

SUSTAINABLE DESIGN

(Theory)

Course Code: IND2401 **Credit Units: 03**

Course Objective:

This course introduces the students to the theoretical and practical aspects of sustainable design and the various technologies involved in executing them. This course aims to equip the students with various tools of sustainable design such as design methodology, resource optimization and innovative approaches to eco-design.

Course Contents:

Module I : Introduction to Sustainability

Sustainability: Definition and Meaning; ***Scope of sustainability***: Sustainable development; Brundtland Report; Ethics and Visions of sustainability, The principle of integrating environmental, social, economic and political dimensions; Eco system and food chain, Natural cycles, Carrying capacity, Ecological foot print; Carbon footprint , Climate change and Sustainability.

Module II Sustainability and the Design

Faces of Sustainable Design: Design for Disassembly, Design for the Environment, Product stewardship, Cradle to Cradle, Bio-mimicry, Green chemistry, Green marketing; ***Principles of Sustainable Design:*** Economy of Resources, Life Cycle Design, Humane Design; ***Sustainable Design Approaches:*** Sustainable design strategies, Sustainable design innovation, Systems design, Trans-disciplinary collaboration in design, Life cycle design and life cycle assessment (LCA), Design for disassembly, Design for reuse, Design for sustainable manufacturing and construction, Design for remanufacturing.

Module III : Sustainable Design Considerations

Design for environment, Land use planning; Smart growth and urban design; Transportation policy and design; Environmental site design; Site assessment and selection; Brownfield redevelopment strategies and infill development, Eco-design. Biophilia and Biophilic Design Socially responsible design, User-centered design, Design education and sustainability, Design ethics and sustainability.

Module IV : Sustainable Design Strategies

Selection of low-impact materials; Reduction of materials usage; Optimization of production techniques; Optimization of distribution system; Reduction of impact during use; Optimization of initial lifetime; Optimization of end-of-life system.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Charles. J. Kibert, ‘Sustainable Construction’ John Wiley and sons Inc, USA.
2. N.D. Kaushika, Energy, Ecology and Environment, Capital Publishing Company, New Delhi.
3. McDonough; The Upcycle: Beyond sustainability--designing for abundance. Macmillan, 2013.
4. Rodney Howes, Infrastructure for the built environment, Butterworth Heineman.
5. G.Tyler Miller JR, Living in the Environment, Wardsworth Publishing Company, USA
6. Wilson, E. O. Biophilia. Cambridge, MA: Harvard University Press, 1986.
7. Kellert, Stephen R., Biophilic design. John Wiley & Sons, 2011.
8. Marcus, Clare Cooper, and Marni Barnes. Healing gardens;John Wiley & Sons, 1999.
9. Rockwood, eds. Foundations of environmental sustainability:. Oxford University Press, 2008.
10. Crul, M. R. M., and J. C. Diehl; Design for sustainability. UNEP/Earthprint, 2006.
11. McDonough, William; Cradle to cradle: Remaking the way we make things. MacMillan, 2010.
12. Benyus, Janine M. Biomimicry. New York: William Morrow, 1997.

ADVANCED INTERIOR DESIGN MATERIALS & APPLICATIONS

(Theory)

Course Code: IND2402 **Credit Units: 03**

Course Objective:

This course expose the students to different materials of construction, progressively and to enable them to represent the different interior components through relevant drawings. The objective of this course is to familiarize the students of Interior Design on material and construction methodology.

Course Contents:

Module I : Rubber & Plastics

Natural rubber, latex, coagulation, vulcanizing and synthetic rubber- properties and application. Adhesives – Natural and Synthetic, their varieties, thermoplastic and thermosetting adhesives, epoxy resin. Method of application, bond strength etc. Types, thermosetting and thermo plastics, resins, common types of moldings, fabrication of plastics, polymerization and condensation. Plastic coatings, reinforced plastic, plastic laminates – properties, uses and applications

Module II Metals

Steel, Iron, Aluminium, Bronze, Brass, Copper – Alloys, Characteristics, Form and uses, Properties, Definition of terms, Methods of working with metals, Fixing and joinery in metals, Finishing and treatment to metals. Application of metals to build form and interiors - Special doors and windows, Ventilators – Sliding, Sliding and folding, Revolving, Pivoted, Rolling, Collapsible, Dormer, Skylights, Clerestory etc.

Module III : Fabrics and other Furnishing Materials

Fibers, Textiles, Fabric treatments, Carpets, Durries, Tapestries, Drapery, Upholstery, Wall coverings, etc. –Properties, Uses and application in the interiors. Other materials such as Cork, Leather, Paper, Rexene etc. – Their properties, uses and applications in the interiors. A brief overview of Green materials.

Module IV : Thermal Insulation And Acoustics Insulation Materials

Thermal insulation: Heat transfer heat gain/ loss by materials - vapour barriers and rigid insulations, blanket, poured and reflective insulation – Properties and uses of Spun glass, Foamed glass, Cork, Vegetable fiber**s,** Gypsum, Plaster of Paris, Hydride Gypsum. ***Acoustics:*** Definition of sound and noise, Reverberation time echo, Sound, Foci. ***Acoustics insulation****:* Porous, Baffle and Perforated materials such as Acoustic plastic, Acoustic tiles, wood, partition board, fiber board, cook, quilts and mats – their properties and uses – current developments. ***Applications:*** Applications of insulations in seminar hall, theater and cold storage.

Module V : Interior Components

Doors:Braced, panel flush doors, carved entrance doors and partially glazed doors. ***Windows:***casement window (without mullion), bay window, & French window. **Ventilator:** louvered & top hung ventilator.***Showcase&shelf:***TV shelf, showcase & room divided, dressing ward robe**.** ***Cupboard &Cabinets:***kitchen cupboard & wall cabinets. ***Partitions: simple*** paneled and glazed partitions – fixed sliding, folding, sliding & folding.***Shelves:***Show room shelves, Counters, cabinets, and storage. ***Falls Celling:***Falls celling of interior spaces using Wood panels, Glass, Thermacol, Gyp-board, Plaster of Paris, Aluminum strips &Perforated metal sheets.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Mehta, Madan, Building construction: Principles, materials, and systems. Pearson Prentice Hall, 2008.
2. Godsey, Lisa. Interior design materials and specifications. A&C Black, 2012.
3. Bindra, S.P. and Arora, Building Construction: Planning Techniques and methods of Construction
4. J. Rosemary Riggs; Materials and Components of Interior Architecture
5. R.Chudley – Building Construction Handbook – BLPD, London 1990.
6. S.C.Rangwals – Engineering materials – Charotar Publishing, Anand.

INTERIOR SERVICES

(Theory)

Course Code: IND2403 **Credit Units: 02**

Course Objective:

The main objective of the subject is to help the student get an understanding the various methods of interior construction &it's services so that this knowledge can be integrated with the design.

Course Contents:

Module I : Water Supply & Plumbing

Water Supplymethods& Removal of impurities, Consumption of water, Service connection from mains, House-service design, Tube well, Pumping of water, Types of pumps, Cisterns for storage; Common hand tools used for plumbing and their description and uses, Joints for various types of pipes, Sanitary fitting standards; Different types of pipes and accessories, Valves & taps, etc. Fittings & materials for piping: Cast iron, Steel, Wrought iron, Galvanized lead, Copper, Brass, Cement concrete and Asbestos pipes, PVC pipes, Sizes of pipes and taps, Testing drainage pipes for leakage - smoke test, water test etc., CI pipes for soil disposal and rain water drainage.

Module II : Electrical Systems

Single/ Three phase supply; Protective devices in electrical installation; ISI Specifications; Types of wires, Wiring systems, choice & methods; Planning electrical wiring; Main and distribution boards; Typical Electrical layout for interiors; Metering distribution boards, Circuits, MCB Cutouts; Conductors, Switch boards, Light and power circuits. Indian electricity rules,Preparation of electrical layout scheme for a interior using standard electrical symbols. Generator / battery backup system,

Module III : Illumination and Lighting

Electric light sources: Brief description, characteristics and application of different types of lamps, methods of mounting and lighting control Luminaries classification/ - Lumen method for design – Room reflectance/ Glare – manufacturer's data on luminaries / luminaries cost.

Module IV : Air-Conditioning System And Applications

Vapour compression cycle; Compressors; Evaporators; Refrigerant control devices; Electric motors; Air handling units; Cooling towers; Window type & Packaged air conditioners; Chilled water plants; Fan coiled systems; Water piping; Cooling load; AC systems for different types of buildings, Duct lay out, etc.

Module V : Acoustics

Introduction to acoustics, Methods used for good acoustics. Basic theory, Room acoustics; Behaviour of sound in enclosed spaces, sound absorption, Acoustic Design process and different types of buildings – Auditoriums, Concert halls, Cinema halls, Seminar rooms, Lecture halls, Classroom and Open offices. Noise reduction, Sound isolation, Transmission loss. TL for walls, Sound leaks in doors, Noise reduction between rooms, Construction details for noise reduction.

Module VI : **Building Drainage & Solid Waste Disposal**

Layout, Principles of drainage, Trap type, materials and functions, Inspection chambers, Design of Septic tanks and soak pits, Ventilation of house drains Anti-syphonage or vent pipes, One and two pipe systems , Sinks, bath tub, water closets, flushing cisterns, urinals, wash basins, bidet, shower panel etc. Solid wastes collection and removal from buildings. On-site processing and disposal methods. Aerobic and Anaerobic decomposition.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Charangith shah, Water supply and sanitary engineering , Galgotia Publishers
2. William. J. Guinness; Mechanical and Electrical Systems for Buildings
3. M.H.Lulla, Air conditioning
4. Peter Templeton & Saunders – Detailing for Architectural Acoustics – Architectural press, 1994.
5. TTT Institute (Madras), Environmental Engineering, Tata McGraw – Hill publishing Company Limited
6. V.K.Jain, Fire Safety in Buildings

ESTIMATION, COSTING & PROJECT MANAGEMENT

(Theory)

Course Code: IND2404 **Credit Units: 02**

Course Objective:

This course aims to equip the students to prepare the Estimate in order to foresee the cost of the work or to implement an interior design project & also to monitor / control project cost. Also, this course exposes the students to the currently prevalent techniques in the planning, programming and management of a project.

Course Contents:

Module I : Introduction To Estimation

Estimation – definition, purpose, types of estimate, and procedure for Estimating the cost of work in order to implement an interior design project or to make products related to interior design like furniture, artifacts etc.

Module II Rate Analysis & Estimation Format

Rate Analysis – definition, method of preparation, quantity & labor estimate for woodwork, steelwork, Aluminum work, glass & its rate for different, thickness & sections, finishing (enamel paint, duco paints, melamine, DU coats, Hand polishing, veneering and laminating) for walls & ceilings. Electrical & plumbing products, wiring, ducting etc., and laying of tiles & wall paneling in the estimate format of the project.

Module III : Detailed Estimate

Detailed Estimate – data required, factors to be considered, methodology of preparation, abstract of Estimate, contingencies, labor charges, bill of quantities, different methods of estimate for interior design works, methods of measurement of works.

Module IV : Costing of Fixtures & Fittings

Cost of the following items: Luminaries, Fan, Cables, Switches etc.; Tiles in skirting & dado, Cement plaster, Wood, Steel & Aluminum, Painting to walls : Cement paint, Oil paints , Distemper, Acrylic emulsion, Enamel paint; painting to joinery, Varnishing, French polishing, Plumbing equipments: Piping, Shower panels ,Cubicles, Tubs, Jacuzzis, Taps, Motors, Fountains, False ceiling of Aluminum panels, Steel & Wooden frame work, Thermosol etc. Wall paneling of tiles, Partitions made of materials like Aluminum, Wood, Steel etc.

Module V : Introduction To Specification

Specification: Definition, Purpose, Procedure for writing specification for the purpose of calling tenders, Types of specification. Specification for different item related to interior design project – woodwork for furniture window frames & pelmets, Partitions etc. Materials like steel aluminum glass of various kind. Wall paneling & false ceiling of materials like Aluminum, Steel, Wood, Electrical, Plumbing, Air-conditioning &Firefighting equipments.

Module VI : Project Management

Introduction: Project planning and project scheduling and project controlling, Role of Decision in project management, Method of planning and programming, Human aspects of

project management, work breakdown structure, Life cycle of a project, disadvantages of traditional management system; Event, activity, dummy, network rules, graphical guidelines for network, numbering of events; ***Critical Path Method And Pert Analysis:*** CPM network analysis & PERT time estimates, time computation & network analysis; ***project time reduction and optimization:*** Project cost, Indirect project cost, direct project cost, slope of the direct cost curve, total project cost and optimum duration, contracting the network for cost optimization, steps in cost-time optimization; ***project updating and allocation:*** When to update? Data required for updating, steps in the process of updating; Resource usage profile: Histogram, Resource smoothing and Resource leveling, Computer applications in project management

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. M. Chakraborti, .Estimation, Costing, Specification and Valuation in Civil engineering.
2. Dr. B.C.Punmia et al. Project planning and control with PERT and CPM, Laxmi Publications,
3. S. C. Rangwala, Elements of Estimating and costing, Charoter publishing House, Anand, India, 1984
4. R.A. Burgess and G.White, Building production and project Management, The construction press, London, 1975
5. Jerome D.Wiest, A Management Guide to PERT, CPM, prentice Hall of India Pub, Ltd., New Delhi, 1982

PERSPECTIVE DRAWING TECHNIQUES & TECHNICAL SPECS-II

(Practical)

Course Code: IND2405 **Credit Units: 03**

Course Objective:

The objective of this course is to develop the skills related to the preparation of drawings meant for execution on the site and preparation of working drawings for building interiors with specific reference to code of practice and incorporating specifications as complementary to the working drawings.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Preparation of Working Drawings

Preparation of working drawings – Suitable scales of drawings, methods of giving dimensions and standards on plans, sections, elevations, details etc.

Module II : Preparation of Plans

Architectural plans, furniture layout floor plans with clearances, Scale of Floor Plans, Drafting Standards, different level floor plans, detailed floor plans of each room.

Module III : Elevations and Sections

Detailed sectional elevations of all the walls in the interior with al the required dimensions and specifications, Scale of Interior Elevations, Drafting Standards for Interior Elevations, Designation of Materials. Types of Section Drawings, Building Sections, Sections of Interior Spaces

Module IV : Details of all Services

layouts for flooring, ceiling, electrical, plumbing, lighting, firefighting etc., toilet details, kitchen details, staircase details, furniture details, Interior finishing details, material, color and texture details, fixture and fixing and joinery details.

Module V : Specifications Writing

Writing detailed clause by clause specifications for materials pre and post execution, tests, mode of measurements, manufacturer's details and specifications etc. Manufacturer's specifications for various materials

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. Leibing. W. Ralph, Architectural Working Drawings, 4th edition, John wiley and sons, New York, 1999
2. Macey. W. Frank, Specification in detail, 5th edition, Technical press ltd, London, 1955.
3. Shah, M.G.; and others, Building Drawing, 3 rded, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 1996.
4. FreddStitt, Working Drawing Manual, McGraw-Hill Professional; 1st edition, 1998.
5. Kilmer, Working Drawings and Details for Interiors, John Wiley and Sons.

INTERIOR DESIGN STUDIO-II

(Studio-Graphics)

Course Code: IND2406 **Credit Units: 03**

Course Objective:

This course focuses on planning a designing of a working space. Each module is designed as a studio project and students will learn the fundamentals of the various types of working environment and how to design a functional and aesthetically appealing working space.

Course Description

In the studio, the learning process is learning by doing. The core part of this course incorporates exercises to develop manual and digital presentation skills in order to present design ideas and solutions. Every module is blended with hand on sketches as well as application of basic computer graphics. Each student has to maintain a sketchbook compulsorily. Process sketches are scanned and integrated into the final presentation by PPT. A hard copy of Design Studio Portfolio submission is compulsory

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Studio Project -1:OfficeInterior.

Office facilities generally have the highest concentration of occupants. These areas vary from home offices, to open-bay work spaces filled with conventional and modular furniture, to large systems furniture (pre-wired) installations. The interior plans are either closed plan office or Open plan. office

Most administrative facilities will contain some combination of the three types depending on the functions performed by the occupants, as well as physical constraints of the facilities.

- **Heavy-use areas** - Entrances, foyers, lobbies, main circulation corridors, stairwells, elevators, rest rooms, large conference or meeting rooms, snack bars, and media production areas.
- **Medium-use areas** - Internal circulation, staff office areas, and small conference rooms.
- **Light-use areas** - Commanders' suites and private conference areas.

Type of offices:

- Professional offices: Law, Accounting, stockbrokers, Real estate brokers etc.
- Corporate and Executive offices: Any size of office for any kind of business other than professional office that involved a corporate identity.

Module II Studio Project -2: Institutional Interiors

Institutional interior design involves in depth programming, planning, design, and management of space used by public and private organizations. The student needs to recognize the emotional content and public response and familiar with the very specific needs and requirements associated with Institutional interiors

Educational Institutions:

Educational facilities include grade and high schools for dependent children, specialized training facilities (such as simulators), professional and technical classrooms, and centers for college extension program.

- **Heavy-use areas:** Entrances foyers, Cafeteria, Rest rooms, Fitness areas, Technical classrooms.
- **Medium-use category:** Administrative offices, conference rooms, most other classrooms, Labs and corridors.
- **Light-use:** Principals' offices and commanders' suites.

Module III Studio Project -2: Other Institutions(Self-study / Assignment)
Government offices; Banks, Daycare centers, Religious centers, Fire and Police stations, Courts, Public Libraries etc.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Designs for 20th century Interiors – Fiona Leolie, VH Publications, London, 2000.
2. Interior Design; The New Freedom, BarbaralecDiamonstein, Rizzoli International Publications, New York, 1982.
3. Interior Colour by Design, Jonathan Poore, Rockport Publishers, 1994.
4. Worldwide Interiors – International Federation of Interior Architects & Designers, Rikuyo-Sha, Japan, 1987.
5. Simon Dodsworth Cardoso; The Fundamentals of Interior Design
6. Karlen Mark, Space planning Basics,
7. Maureen Mitton, Interior Design Visual Presentation
8. Carol Simpson, Estimating for Interior Designers

INTERIOR WORKSHOP PRACTICE-II

(Practical)

Course Code: IND2407 **Credit Units: 03**

Course Objective:

The course provides an understanding of comparative analysis of various metals and their design parameters facilitating usage in the interiors. The aim of this course is to introduce various methods of working with metals with an exposure to fixing, joinery and treatment.

Course Contents:

(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Machine Shop

Lathe; Work holding devices; Measuring tools; Cutting parameters; Tool materials; Tool geometry; Lathe operations; Safety precautions.

Module II : Working with various Metals

Types of metals, Properties of metals, Definitions of terms with reference to properties and uses of metals, Various methods of working with metals, Fixing and joinery in metals, Finishing and treatment of metals., Finishes on metals; Standard specifications; Metals in built form activity: Horizontal, vertical and inclined surfaces - in interior environment elements- Products and furniture forms- Doors, windows, Jalies, Railing, stair etc. Metals and other materials – Form and joinery.

Module III : Metals: Fabrication

Cutting, Planning, Drilling and lathing of steel sections used in furniture. Aluminium sections and their use in doors, windows and partitions.

Module IV : Welding

Introduction; Arc welding; Welding tools; Techniques of welding; Types of joints; Welding positions; Advantages& disadvantages of arc welding; Safe practice.

Module V : Industrial Visit.

Visit various Forging and Stamping Industries, Architectural and Structural Metals Manufacturing, Fabricated Metal Product Manufacturing like Aluminium fabrication, steel fabrication, etc. Learn, absorb and recognize different stages of metal processing, manufacturing different types of metals, interior decoration elements, several models of doors and windows, pieces of furniture and welding works. Visit Glass industries and understand the manufacturing process and glass fabrication.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Pete Silver et al – Fabrication, the designers guide – Architectural press, London 2006.
2. Albert C Smith - Architectural model as machine – Architectural press, oxford 2004.
3. John .F. Pile, Interior Design, Harry. N Abrams, Inc. New York; 1995.
4. Ron Fournier, Metal Fabricators Handbook, Rev. Illustrated edition, HP Books, 1990.
5. Stanford Hohauser, Architectural and Interior models, Van Nostrand Reinhold, 1970.

SEMINAR / GUEST LECTURE / WORKSHOP FOR SKILL DEVELOPMENT

Course Code: IND2433 **Credit Units: 04**

Course Objective:
The aim of this course is to develop various research skills to the student. They also expose to write a paper and present in a seminar. The workshops and guest lecturers aim to develop practical solutions in the field of interior design with more idea generations and innovations. The students have to be participated either Seminar (1) or Workshop (2) to earn the credit. Gust lecture (3) is addition to this for enhancing their knowledge by examining and analysing various aspects of design.

SEMINAR

Each student would be required to select one of the below subjects and present a written paper (essay) and present in the seminar. This should be based on extensive literature reviews, case studies, interviews (wherever possible), etc. The student may choose any area of interest in consultation with the concerned faculty for research. The study would be presented as a term paper with supporting illustrations. It will be periodically reviewed and presented as a seminar for final assessment.

Suggested areas for research:

1. Studies of Indian art & craft. Influence of location, tradition, culture and socio-economic development on art & craft in rural & urban India. Suggest suitable changes in technology to improve the products so as to make it acceptable in today's context.

2. Studies of the work of different interior designers through observation, interview and research. Understanding of the concepts of space, structure, organization, symbolism, form, colour, modes of presentation etc.

Evaluation Scheme:

Components	Organisation and Relevance of content	Literature Review	Bibliography	Presentation	Total
Weightage (%)	30	30	20	20	100

WORKSHOP

Objectives:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. Workshop is undertaking a significant practical unit of examining and analyzing various aspects of design at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by jury of examiners comprising of the faculties.

Major Themes for Workshop are: -
Decorative accessories in interiors / Occupant health & safety in interiors / Signage & Graphics - Optical

Illusions - Modular Co-ordinations. / Kitchen &Bath design - Storage design. / New materials and application in Interior Design.

Guidelines for Workshop :

The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study /Group Activity. /Role Play. / Business Planning. /Quiz.

Evaluation Scheme:

Components	A	AP	MCQ	Solving the case/ Assignment / Write up	Total
Weightage (%)	10	30	30	30	100

(**A -** Attendance; **AP -** Active Participation; **MCQ -** Multiple Choice Questions)

GUEST LECTURE

Eminent subject experts from the field may be invited to deliver the lectures on different topics of their choice and share their experience with the students

Syllabus - Fifth Semester

DESIGN THINKING & CREATIVE PROBLEM SOLVING

(Theory & Activities)

Course Code: IND2501 **Credit Units: 03**

Course Objective:

The objective of this course is to develop deep insights about design thinking. This course provides the ability to gain about users to define and re-frame problems, and to generate solutions or alternative approaches towards design and innovation.

Course Contents:

Module I : Design Thinking Process

Stages of thinking: The design process; Stage 1- Define ; Stage 2- Research ; Stage 3- Ideate ; Stage 4- Prototype ; Stage 5- Select ; Stage 6- Implement ; Stage 7- Learn. ***Research:*** Identifying drivers; Information gathering; Target groups; Samples and feedback. ***Idea generation:*** Basic design directions; Themes of thinking; Inspiration and references; Brainstorming ; Value ; Inclusion; Sketching; Presenting ideas. ***Refinement:*** Thinking in images; Thinking in signs; Appropriation; Humour ; Personification; Visual metaphors ; Modification; Thinking in words; Words and language; Type 'faces'; Thinking in shapes; Thinking in proportions ; Thinking in colour. ***Prototyping:*** Developing designs; 'Types' of prototype; Vocabulary. ***Implementation:*** Format; Materials; Finishing; Media; Scale; Series/Continuity.

Module II : Exploring Creativity

Definitions of creativity, Understanding components of creativity, Theories of creativity, Goals and objectives, Value judgments, Defining problems, Information gathering, Creative incubation, Creative thinking and creative process. Tools and techniques of creativity : Mind mapping, Brain storming with related stimuli and unrelated stimuli, Positive techniques for creativity, Creative pause, Focus, Challenge, Alternatives, Concepts, Provocation, Movement, Setting up provocations, Sensitizing techniques, Group or individual techniques. Simple design exercises.

Module III : Design Problems and Solutions

Definitions of problem solving; Formulation of problems, Nature of creative design problems, Design goals. Problem statements; Brain writing with unrelated stimuli, Idea mapping, Random input, Story boarding exercises, Problem solving techniques: Divide and conquer, Hill climbing strategy, Means - Ends analysis, Trial and error, Brain storming, Morphological analysis, Method of focal objects, Steps developed by Polya, Dekker, De Bono, Research, Analogy, Reduction (Complexity), TRIZ, Halpern's techniques etc; Creative solutions applicable to designs; Conceptual design, Embodiment design, Detail design, Iterations; Simple Design exercises;

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. Liedtka, Jeanne, and Tim Ogilvie. Designing for growth; Columbia University Press, 2011.
2. Liedtka, Jeanne, Solving problems with design thinking; Columbia University Press, 2013.
3. John Heskett, Design: A Very Short Introduction, Oxford University Press, 2005.
4. Jon Kolko, Exposing The Magic of Design; Oxford University Press, 2011.
5. Nigel Cross; Developments in Design Methodology, John Wiley & Sons, 1984
6. Mitchell, C. Thomas. Redefining designing: From form to experience. New York: Van Nostrand Reinhold, 1993.
7. Noone, Donald.J, Creative Problem solving, Hauppauge, 1993.
8. De Bono, Edward, Serious Creativity; Harper Collins publishers, 1992.
9. Peterson, Bryan. Design basics for creative results. Adams Media, 2003.
10. Casper, Steven, Eds. Innovation and Institutions; Edward Elgar Publishing, 2005.

REVITALIZATION OF ARTS & CRAFTS

(Documentation Project)

Course Code: IND2502 **Credit Units: 01**

Course Objective:

This course aims a detailed study of the characteristics of Indian arts and crafts and its application in the interiors that provides an understanding of the role of revitalization of Art/craft form in interior spaces through a project assignment.

Course Contents:

(NB: Submission of Project Report is compulsory for this course and will be part of the Final Course Evaluation)

Module I : Introduction to Creative Arts and Crafts in India

Creative arts and crafts in India and its application in interior design; Materials; Art movements through history; Traditional arts and crafts of India; Folk arts of India; Traditional arts and crafts of various states of India.

Module II : Project Assignment

Description:

The project will consist of a general to the crafts traditions of India, details about the crafts, their classifications, regional distribution etc. that will applicable to art in interior spaces such as –Residence, Reception, Lobby spaces, Theme Boutiques, Hotel, Restaurants, etc.This project will necessarily be a scientific, methodical documentation of a particular craft tradition prevalent in the region, which will have the following core issues in the background:

Philosophy and Aesthetics - Materials, Processes and Techniques - Environment and Resource management – Social structures - Economy & Marketing – International examples.

Project Objective:

Document people, life, culture and craft and understand the materials, tools, technology, processes and forms. Suggest suitable changes in technology to improve the products so as to make it acceptable in today's context.

Procedure:

Select one of the art / craft form with the consultation of the faculty. Discuss about the crafts traditions practiced in the region, their history, distribution etc. along with faculty. Collect all information available through various sources including library, internet and resource persons. To avail comprehensive data on various aspects of the crafts, students may develop an interview schedule and decide on number of crafts persons to be interviewed, which all places they will be visiting etc. Faculty must equip the students on interaction with craftsperson and other people from the community, type of language they should use, how to be polite with them and while handling their materials etc. Students can buy some of the objects from craftsperson, take photographs after seeking their permission, make drawings, etc. which later on they can use in PPT presentation along with submission of final project report. The students can also make a short documentary film basis on their research for their final presentation.

Requirements:

- The work will be periodically reviewed.
- The study has to be presented in the form of a 'Documentation Report' with illustrations /images as a seminar for final Course Evaluation.
- The students are asked to give a brief oral presentation with 'Power Point' to the class about their

research.

- They have to explain, what kind of interests they want to develop in the research and a debate will follow as well.
- The submission of project assignment file and presentation will be part of student's Examination Scheme.
- The students will have to visit various craft places and museums for the part of their research.
- There will be an evaluation by a jury comprising of external experts and internal faculty guide from the department.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.

Course Evaluation:

Components	**Conceptual Framework**	**Viva-Voce**	**Presentation**	**EE**
Weightage (%)	**40**	**40**	**20**	**100**
(EE-End Semester Examination)				

Resources :

1. Publication on Traditional Arts and Crafts on India, Ministry of Handicrafts Development, Govt.of India.
2. Edith Thomory, A History of fine arts in India and the west, Orient Longmann publishers Pvt. Ltd, New Delhi.
3. AditiRanjan, M. P. Ranjan; Handmade in India; Abbeville Press, 2009.

INTERIOR SAFETY SYSTEMS AND BUILDING MANAGEMENT

(Theory)

Course Code: IND2503 **Credit Units: 02**

Course Objective:

The objective of this course is a detailed study of, designs that eliminate or reduce hazards in the workplace to prevent mishaps and provide good indoor quality. This course also covers to make understanding of disaster management, seismic design principles and various building management systems.

Course Contents:

Module I : Safety Management.

Scope of Environmental safety; Need for public awareness; Elements of a safety and health management system applicable to interiors in the terms of design, components and selection of material; Interior structure and responsibilities; Interior designer responsibilities, Individual responsibilities, Safety Consultation; Minimum safety requirements for building interiors.

Module II : Health and Safety Aspects

Define the term 'accident'; Reasons accidents inside the buildings; The factors of slips, trips and falls in the workplace and methods to prevent them; Dealing with electric shock; Methods for electrical safety; Types of health hazards; Common hazardous substances and the routes of entry; Health and safety aspects of the interiors structure; Design layout and services; Types of injuries; Define 'first aid' and practical training on 'first aid'

Module III : Dealing of Fire Fighting Services

Mechanism of fire spread in building and prevention; Fire safety standards; Concepts in fire protection; Firefighting installation and requirements; Heat sensitive detectors; Smoke detectors; Automatic water sprinkler system; Foam systems; Fire proof materials for Interiors: Fabricated fire proof boards; Calcium silicate, Gypsum, Vermiculite, and Perlite boards; Fire protection of structural elements: Wooden, Steel, RCC, and Plastic structures; Fire and life safety requirements in different groups of buildings; Define LPG; Characteristics of LPG; LPG Installation; LPG - rules of usage; Dealing LPG in case of leakage; Dealing in the event of accident.

Module IV : Disaster Management & Seismic Design Principles

Emergency planning: on-site and off-site; Need of a plan, possible approach, and objectives of emergency plan. On-site emergency planning, formulation of the plan and emergency services; Identification of resources, actions and duties, emergency procedure; Mock drills. Concept of seismic design; Stiffness; Strength; Period; Ductility; Damping; Hysteric energy dissipation; Center of mass and rigidity; Torsion; Design eccentricities; Ductility based design: Design of energy absorbing devices, Seismic base isolation and seismic active control.

Module V : Building Management

Fundamentals for interior and exterior treatments: Termite proofing, Waterproofing, Acoustics, Thermal comfort, Fire protection. Walls- plastering, Putty, Curing – Before plastering, Painting and applying other finishes, Methods of curing; Roof- Plastering and curing; Factors influencing choice of treatments: Climate, Cost,

and Age. ***Vertical transportation systems:*** Lifts & Escalators- Definition, Location, Arrangement, Structure; ***Security and safety systems:*** Designing a security system; Burglar alarm; CCTV; Central alarm systems; Intrusion sensors and Space sensors; Cable TV, PABX, Computer labs: Access flooring, Server rooms. ***Intelligent buildings:*** Definition, Building environment, Architecture, IT, Artificial intelligence in intelligent buildings

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Hughes, Phil, and Ed Ferrett. Introduction to health and safety at work. Routledge, 2011.
2. Binggeli, Corky. Building systems for interior designers. John Wiley & Sons, 2003.
3. Vinod Kr. Sharma; Disaster Management, IIPA, New Delhi.
4. Jain, Virander K. Fire safety in buildings. Taylor & Francis, 2007.
5. Derek Clements-Croome, Derek J. Croome, Intelligent buildings, Thomas Telford Books, London, 2004.
6. C.V.R Murthy, Andrew Charlson. “Earthquake design concepts”, NICEE, IIT Kanpur, 2006.

TEXTILE IN INTERIORS

(Theory)

Course Code: IND2504 **Credit Units: 02**

Course Objective:

The objective of this course is to familiarize the students of Interior Design on textile materials used in interior. This course helps to gain knowledge and understanding of the functional and aesthetic requirements of textiles for a range of applications.

Course Contents:

Module I : Introduction To Fabrics

Fabric, yarn and fiber structure, Fabric structure- woven- warp, weft, selvedge ,knitted- course, non-woven, Fabric types and classification- woven, including plain, twill, satin, Jacquard, crepe and pile weaves, Knitted- including single knit, double knit, tricot knit, pile knit, lace and net, Non-woven-including felts webs and films, identification and properties of fabrics, yarns and fibers.

Module II : Textile Design Applicable to Interiors

Development of textile design in different cultures from primitive art to contemporary designs. Criteria of design of the elements and principles of textile design. Application of elements and principles of design across a range of textiles. Describe and analyze elements and principles of design -furnishings, textile arts. Functional and aesthetic requirements and features of textile range. Analysis of a motif, developing repeat as a basic unit of design.

Module III : Colour on Fabrics

Fabric coloration and decoration- Dying and Printing; Principles of applying color to fabrics. Textile arts and crafts in interiors, traditional and modern materials and methods. Preparing samples on tie and die printing, batik printing, appliqué, macramé and braiding.

Module IV : Textile Materials for Interiors.

Miscellaneous materials such as cork, leather, paper, Rexene etc. – their properties, uses and applications in the interiors. A brief overview of Green materials. Jute or hessian – dyed jute fabric and its applications – various kinds of processed leather, its application in interior design.

Module V : Home Furnishings

Furnishings-Classification; Types of curtain; Curtain construction; Selection criteria relation to backgrounds in walls; Floors and ceilings; Slip covers; Cushion covers; Bed linen and table linen; Floor coverings -rugs and carpets, types selection; Care and maintenance; Installation of floor coverings.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Inside today's home, Faulkner, R.and Faulkner 1987,Rinebart Winston, New York
2. Interior Design & Decoration, SherrilWhiton, Prentice Hall
3. Introduction to home furnishings, Stepat, D.D,1991, Themacmillancompany,New York.
4. The themes and Hudson manual of textile printing , Storeyjoyce ,1992, London
5. Colour in interior Design Jhon,F.P, 1997, McGraw Hill Company
6. Materials for Interior Environments, Corky Bingelli, John Wiley and Sons, 2007
7. Fabrics: A guide for architects and Interior Designers, Marypaul Yates, Norton publishers, 2002.
8. June Fish, Designing and printing textiles, Crowood press, 2005

INTERIOR LANDSCAPE DESIGN

(Studio based Theory)

Course Code: IND2505 **Credit Units: 02**

Course Objective:

This course aims to develop an understanding about the design of interior landscape with special emphasis on the choice and care of plant materials used in the interior spaces. This course covers study about the various landscaping elements and their application in interior spaces.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Interior Landscaping

Definition, classification of plants, indoor plants and their functions, layout & components, Floriculture – commercial, ornamental, Selection of plants & pest control.

Module II : Study of plants in relation to landscape design

Physical requirements of plants – light, temperature, water, planting medium, soil separator, weight of plants, acclimatization & maintenance. Techniques to meet physical requirements.

Module III : Interior Landscaping Elements & Principles

Various interior landscaping elements – water bodies - pools, fountains, cascades, Plants, rocks, artifacts, paving & lighting, Design guidelines- plant texture & colour, plant height, plant spacing.

Module IV : Roof And Deck Landscape

Protection of the integrity of the roof and structure, provisions for drainage, light weight planting medium, irrigation, selection of materials, water proofing, provision for utilities and maintenance.

Module V : Exercise on Interior Landscape (Self-study / Assignment)

Courtyard design - An outdoor room design - Terrace garden

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE**-End Semester Examination)				

Text & References:

1. Laurie, Michael, An Introduction to Landscape. 2nd edition, Prentice Hall, New Jersey, 1986.
2. Ingels, Jack. Landscaping principles and practices. Cengage Learning, 2009.
3. Walker, Theodore D. Planting design. John Wiley & Sons, 1991.
4. Harris, Charles W; Time-saver standards for landscape architecture; McGraw-Hill, 1988.
5. Trivedi. P.Prathiba. Beautiful Shrubs. Indian council of Agricultural Research. New Delhi, 1990.
6. Gerald Robert Vizenor, A Guide to Interior Landscapes, University of Minnesota Press, 1990.
7. Jialin Tong; Interior Landscape; Design Media Publishing Limited, 2014
8. Nelson Hammer and Mel Green, Interior Landscape Design, McGraw Hill, 1991.

INTERIOR DESIGN STUDIO-III

(Studio-Graphics)

Course Code: IND2506 **Credit Units: 02**

Course Objective:

Retail design is a very specialized discipline due to the heavy demands placed on retail space. The objective of this course is to introduce the basics of designing for Retail interiors and to develop skills required for the same that can apply into various interior design projects.

Course Description

In the studio, the learning process is learning by doing. The core part of this course incorporates exercises to develop manual and digital presentation skills in order to present design ideas and solutions. Every module is blended with hand on sketches as well as application of basic computer graphics. Each student has to maintain a sketchbook compulsorily. Process sketches are scanned and integrated into the final presentation by PPT. A hard copy of Design Studio Portfolio submission is compulsory.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Studio Project -1 : Malls and Shopping Centers

The structure of retail space creates the constraints of the overall design. In retail one hundred percent of the space must be utilized and have a purpose. The floor plan creates the circulation which then directly controls the direction of the traffic flow based on the studied psychology of consumer movement pattern within a retail space. Circulation is important because it ensures that the consumer moves through the store from front to back, guiding them to important displays and in the end to the cashier. The basic store layouts and circulation plans that all provide a different experience:

- **Design Planning for Retail Activity:**

Straight plan - Pathway plan - Diagonal plan- Curved plan - Varied plan - Geometric plan

- **Design Elements:**

Ergonomics in Retail interiors; Types of Shop layouts; Modular units; Materials used in counters, shelves, worktops, their comparative study. Lighting & colour scheme – Natural & Artificial light. Design of commercial ambiance.

- **Visual Merchandising Display Techniques:**

The art of selling-displays/products/marketing, design of display units, design of boutiques, showrooms; Product display: Windows displays / Internal displays / Hierarchy of product display / Power of visual communication / Graphics; Theme displays. Exhibition spaces: Display for exhibition, Lighting design for commercial spaces: Task; Display, Atmospheric, Focal lighting; Coloring commercial spaces: Coding & Decoding. Visual branding of the store.

Module II : Studio Project -2 : Other Retail formats (Self-study / Assignment)

Study, Identify the difference and Design of:

Traditional mom and pop stores, kiosks, Convenience store, Department stores, Super markets and hyper markets, Speciality stores, Off-price retailers, Catalogue showroom, Gift shops, Tradeshowrooms, etc.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Mesher, Lynne. Basics Interior Design 01: Retail Design. Vol. 1. Ava Publishing, 2010.
2. Spencer, Dale. Interior Design: Interior Design ideas for Retail Design. Venus Content Providers, 2015.
3. Interior Colour by Design, Jonathan Poore, Rockport Publishers, 1994.
4. Piotrowski, Christine M. Becoming an interior designer: a guide to careers in design. John Wiley & Sons, 2008..
5. Morgan, Tony. Visual merchandising: Window and in-store displays for retail. Laurence King Publishers, 2008.
6. Simon Dodsworth Cardoso; The Fundamentals of Interior Design
7. Karlen, Mark. Space planning basics. John Wiley & Sons, 2009.
8 Mitton, Maureen. Interior design visual presentation,John Wiley & Sons, 2012.
9 Carol Simpson, Estimating for Interior Designers.

COMPUTER AIDED INTERIOR DESIGN & DRAFTING

(Studio based Practical)

Course Code: IND2507 **Credit Units: 03**

Course Objective: The main objective of this course is to construct drawings and design objects of interior spaces with special emphasis on presentation, visualization of interiors, rendering techniques using AutoCAD and Revit Architecture. This course enhances the students to use CAD that automates design & drafting task so that creating and revising drawing becomes easy.

Course Contents: (NB: Submission of Practical work record / Graphic Portfolio is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Starting AutoCAD Introduction to AutoCAD, AutoCAD : System requirements, AutoCAD screen, Command entry, Setting up of page size, Starting drawings from scratch, Creating and using templates, Opening a drawing, Saving the drawing &Exit from AutoCAD.

Module II : Using Co-ordinate systems. The UCS, Working with Cartesian and Polar coordinate systems, Using displays with shortcuts, Setting up the drawing environment, Setting the paper size, Setting units, Grid limits, Drawing limits, Snap controls, Use of paper space and Model space, Drawing tools.

Module III : Setting up the Drawing Environment Basic commands dealing with drawing properties: Layer control, Change properties, Line weight control, etc. Inquiry methods: Using data base information for objects, Calculating distance, Angle, Areas etc.

Module IV : Dimensioning commands and blocks Dimensioning the objects in linear, Angular fashions along with quick time dimensioning etc. Creating and working with blocks, Creating symbols, Use of blocks in creating a layout, of an area.

Module V : Orientation towards 3D 2D to 3D conversion, Perspective view, Walk through the layout, Solid modeling : Concepts behind solid modeling, Composite solids creation and Modification, Solids display and Inquiry. Rendering and Presentation. Printing and plotting.

Module VI :

- Introduction to Basics of Photoshop.
- Basics of Rendering in Photoshop
- Editing and modification of images in Photoshop
- Planning Interface
- Annotations & Dimensions
- Page Layout & Printing

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(A-Attendance; H -Home Assignment; CT-Class Test; EE-End Semester Examination)				

Text & References:

- Douglas Seidler, Digital drawing for designers: A visual guide to AutoCAD 2011. Fairchild Publications, 2010.
- Byrnes, David, and Bill Fane. AutoCAD 2013 for dummies. John Wiley & Sons, 2012.
- Feng, Jin, and Jiang Lu. Basic AutoCAD for Interior Designers Using 2007. Prentice-Hall, Inc., 2007.

- Beverly,L.K ; James,M.K, Auto CAD for Interior Design and Space Planning (3rd Ed.) Prentice Hall; 1998.
- Dean Muccio, AutoCAD 2015 for the Interior Designer: AutoCAD for Mac and PC, SDC Publications, 2014.
- Adobe Photoshop Classroom In A Book : Andrew Faulkner and Conrad Chavez, 2020.

INTERIOR SPACE MODELING WORKSHOP-I

(Practical)

Course Code: IND2508 **Credit Units: 02**

Course Objective:

The Model-making is also part of the act of designing as assisting the designer's ability to pre-visualize. The objective of this course is to enhance the students to basics of model making with various materials and acquisition of hands on experience in model - building.

Course Description

Model-making is a very practical subject, in that it involves the handling of materials to produce a physical outcome. It could be taught purely from that practical standpoint. Focusing on the materials and tools needed, and the methods or techniques employed to make specific things. Generating the idea through freehand sketching is important in model making. The initial sketches are compulsory for students to pre-visualization before starting the model making. The number of freehand sketches should use and select one for further technical sketching. All models are built to a predetermined scale. As with measured drawings, the level of realism depends on the scale. For example, a model at scale 1:5, should display a lot more details that a model at scale 1:50. It is also best practice to include a support for the model, either in the form of a single piece of board to will keep it sturdy, makes it easier to carry and view at different angle.

Course Contents:

(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Model Making

Introduction to model making: Concepts; Need; Role of scale models in design; Various materials used for model making; General practices; Understanding of various tools and machines, Best practices and skills involved in operating the tools.

Module II : Model Making Exercises

- **Hand Building Techniques:**

Making a box with a lid- hollowing out, pinch pots – making a bowl, coiling – making a cylindrical pot, slab- building – making a cube shaped box, hand building with clay strips- making a vase. Introduction to block models of buildings involving the usage of various materials like Thermocol, Soap/Wax, Boards, Clay etc.;

- **Working in Scale:**

Design and make the models of*:Interior building components:* Steps or stairs; Rakes or ramps; Doors; Windows; Floorboards etc**.** *Furniture:* Dining / Table chair; Sofa; Barstool; Armchair; Table; Beds; Shelves; Cabinets; Kitchen Appliances; Mattresses.

Tools and Materials:

- **Measurements/Rulers:** Architectural Scale; Rulers; Triangular Rule;
- **Pens:** Sharp Pencil; Double-side Marker: Fine and Ultra-fine; Micron Pens 01, 03, and 08; Thick Marker;
- **Cutting Tool:** Snap-off Blade; Utility Knife; Scissors, Cutting Mat
- **Glues:** Rubber Cement Glue; Quick Dry Glue; Glue Gun; Transparent Cello Tape;

- **Board materials:** Thin Black and White Foam Board; Thick Black and White Foam Board; Chip Board; Thin Plywood; Clear Sheet Print.

Procedure:

Get an idea – Make number of initial freehand sketches - Select one for the finalization- Prepare base for models using wood or boards- Prepare tools and materials - Select a scale of model - Floor Plan and Section Cut Drawing - Add dimensions to drawing - Make sure safety as first concern while cutting - Cut - Labeling cut pieces - Keeping track of what is being glued to where - Getting and keeping right angles - Glue each pieces - Build interiors and structural model separately - Add colors and textures to finishing the model.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. Mitton, Maureen. Interior design visual presentation. John Wiley & Sons, 2012.
2. Jannsen, Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Duttor Inc., New York, 1982.
4. Magret Jacque. The Aesthetic Experiences: An anthropologist looks at the Visual Art.
5. Tapert, Annette, Swid Powell: Objects by Architects, Rizzoli, New York, 1990.

INTEGRATED PROJECT WORK

(Project)

Course Code: IND2532 **Credit Units: 04**

Course Objective:

The student will be required to produce a project feasibility report for the specific design undertaken in the design studio. This course aims to sensitize the student to the technical and socio-economic feasibility of the design project.

Course description:

This course for analyzing a design project for technical and socio-economic feasibility. The student has to submit a project feasibility report on the project done in the design studio including previous semesters by integrating the knowledge and skills acquired from all the subjects studied till date.

- Environmental impact assessment of the project following the standards and specifications.
- Socio-economic appraisal of the project and the design considering factors such as behavioral aspects, security considerations, costs for different user groups, aesthetic preferences etc.
- Technical feasibility – through execution and detailing of different spaces and elements of design, checking the feasibility of layout for service systems and specifications.
- Costing of the project – bill of quantities, schedule of rates, specifications etc. economic viability and financial viability.
- Space planning aspects/ issues – user activity spaces, access to physically challenged, fire safety, other services, green rating etc.

The Steps of the Project Report

Step I: - Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.

Step III: Collection of information and data relating to the topic and analysis of the same.

Step IV: - Writing the report dividing it into suitable chapters, viz.,
- Chapter 1: Introduction,
- Chapter 2: Conceptual Framework
- Chapter 3: Analysis & Findings
- Chapter 4: Conclusion and Recommendations.

Step V: - The following documents are to be attached with the Final Project Report.
- Bonafide Certificate cum Report Evaluation (From Faculty Guide & Internal and External Examiner)
- Student's declaration.

Evaluation Method for Dissertation Report:

Chapter Scheme for the Training Report.			**Marks Distribution.**
Overall Report Format / Layout		:	05
Chapter 1.	The Introduction	:	10
Chapter 2.	Conceptual Framework,	:	20
Chapter 3.	The Conceptual Framework	:	15
Chapter 4.	Research Methodology, Data Analysis & Interpretations.	:	10
Chapter 5.	Conclusion and Recommendations	:	10
Total		:	70

Procedure for evaluation:

- Submission of project feasibility report, Presentation of project feasibility report & Viva-voce
- The project feasibility report will be reviewed by a jury consisting of external and internal examiner to be appointed by the Department / University. Failure to submit the Seminar Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.

Course Evaluation:

Components	**Project Report**	**Viva-Voce**	**Presentation**	**Total**
Weightage (%)	**70**	**20**	**10**	**100**

References:

1. Earl Hall, Juliane Johnson; Integrated Project Management; Prentice Hall, 2002
2. American Institute of Architects; The Architecture Student's Handbook of Professional Practice, John Wiley & Sons, 2011
3. Project Management Institute; A Guide to the Project Management Body of Knowledge (PMBOK® Guide); Project Management Institute, Incorporated, 2013

Syllabus - Sixth Semester

INTRODUCTION TO DESIGN MANAGEMENT

(Theory)

Course Code: IND2601 **Credit Units: 03**

Course Objective:

The course provides an understanding of Design management that enables innovation and creates effectively-designed products, services, communications, environments, and brands that enhance the quality of life and provide organizational success. This course helps the students to understand the business side of design.

Course Contents:

Module I : Introduction to Design Management

Defining Design Management; Evolution of design management; Role of the Design Manager; Levels of Design Management; Principles of Design Management

Module II : The Design Process

Design Process models & Methodology: Waterfall Methodology; Iterative Methodologies; Spiral Methodology; "Agile" Methodologies; "Design for Success" Methodology; "IBM Global Services" Methodology; Double diamond' process models. Design Process Development: Phases, Objectives, Visual outputs; Factors in managing the design process.

Module III : Design Brings to Business

4C's of Design Management: Creativity, Complexity, Compromise, Choice; 3P's of Design Management: Patience, Persistence, Persuasion; Design Mix; Design Strategy; Design and Strategic Positioning; Principles of Design Management.

Module IV : Design and Innovation

Meaning and Definition of innovation; Introduction to the innovation Process; Human-Centered Design & Achieving Deep Customer Understanding; Identifying Opportunity Areas: Problem Framing & Definition; Idea Generation; Concept Development; Concept Development; Implementation; Managing Innovation.

Module V : Developing a Corporate Approach

Perceptions of Design; Design and brand identity; User experience (UX) design; Design and Product identity; Essential features of a corporate approach to design; Key issues of Design Management; Design and corporate Identity;

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** –Home Assignment**; CT**-Class Test**; EE**-End Semester Examination)				

Text & References:

1. Cooper, Rachel,ed. The handbook of design management. A&C Black, 2013.
2. Best, Kathryn. The fundamentals of design management. Ava Publishing, 2010.
3. De Mozota, Brigitte Borja; Design management; Skyhorse Publishing Inc., 2003.
4. Jerrard, Robert, (Ed.) Design management: exploring fieldwork and applications. Routledge, 2013.
5. Piotrowski, Christine M. Interior Design Management; John Wiley & Sons, 1992.
6. Hands, David. Vision and values in design management. AVA Publishing, 2009.
7. Hands, David; Design management case studies. Routledge, 2005.
8. Stone, Terry Lee. Managing the Design Process; Rockport Publishers, 2010.
9. Wheeler, Alina. Designing brand identity;. John Wiley & Sons, 2012.
10. Kuniavsky, Mike. Smart Things: Ubiquitous Computing User Experience Design; Elsevier, 2010.

MARKETING & ENTREPRENEURSHIP DEVELOPMENT

(Theory)

Course Code: IND2602 **Credit Units: 01**

Course Objective:

The objective of this course is to develop conceptual understanding of marketing and acquaint the students with various aspects of entrepreneurship business.

Course Contents:

Module I : Introduction to Marketing

Marketing: Nature& Scope of Marketing, Concepts – Production, Product, Selling, Marketing & Societal marketing, Marketing environment .***Market segmentation***: need, concept, nature, basis & strategies, mass marketing vs. Segmentation. ***Marketing mix:*** 4ps of products & 7ps of services, components & factors affecting.

Module II : Understanding Customers

Consumer decision makes process (Five step model), Factors affecting buying behaviour, Purchase behaviour, Buyer's role.

Module III Introduction to Services Marketing

Services: Introduction, Role, characteristics and classifications of services, Goods Vs. Services,; S***ervices marketing***: Role of marketing in services, Service marketing mix, Service marketing triangle ***Service quality:*** Quality and productivity, Quality gaps and their closing; S***ervice delivery:*** Managing demand and capacity, Importance of employees, Intermediaries and customer participation in effective delivery, Channel selection ***Marketing strategies for service marketing:*** Segmentation, Targeting and Positioning, Differentiation, Life cycle, Pricing and Market communication

Module IV : Entrepreneurship Development

Meaning, Definition, Concept, Evolution of Entrepreneurship, Characteristics and Skills of Entrepreneurship, Concepts of Intrapreneurship, Entrepreneur Vs. Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, Role of Entrepreneurship in Economic Development, Women Entrepreneurship: Meaning, Characteristic features, Women Entrepreneurship in India.

Module V : Role of Government in promoting Entrepreneurship

MSME policy in India, District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB), Financial Support System: Forms of Financial support, Long term and Short term financial support, Sources of Financial support and Financial Institutions, Investment Institutions.

Module VI : Project Identification

Assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H –**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Kotler, Philip, and Gary Armstrong. Principles of marketing. Pearson Education, 2010.
2. Gandhi, J. C. Marketing: A Managerial Introduction. Tata McGraw-Hill, 1991.
3. Peter, J. Paul, Consumer behavior and marketing strategy. London: McGraw-Hill, 1999.
4. Zeithaml, "Services marketing: Integrating customer focus across the firm." 2006.
5. Sahai; Entrepreneurship; Excel Books India, 2008
6. Tiwari, Anshuja. Entrepreneurship Development in India. Sarup& Sons, 2007.
7. Das, Keshab, ed. Micro and Small enterprises in India: The Era of reforms. Routledge, 2011.
8. Nagarajan, K.; Project Management; New Age International, 2004

PROFESSIONAL PRACTICE & OFFICE MANAGEMENT

(Theory)

Course Code: IND2603 **Credit Units: 01**

Course Objective:

The course objective is to develop legal, technical and financial aspects of Interior Design practice and management skills for professional practice. This course provides an overview of rules and regulations in Interior Design practice and technicalities of code of conduct in professional practice.

Course Contents:

Module I : Role of Interior Designer in Society

Interior Design Profession as compared to other professions. Difference between profession and business; Organizations related to interior design profession. Interior Designers approach to works, ways of getting works: types of works, works partly executed by other Interior Designers. : various precautions to be taken before taking up the work, conditions of engagement between interior Designer and client: commencement of work.

Module II : Attributes of professional practice.

Professional behavior, Ethics, Types of clients, Contracts, Tenders, Arbitration etc. as defined in terms of Interior Design field and current day context. Career opportunities, styles of interior design practice, relationship between client and professional, type of fees, process of fees negotiations, billing methods, tax liabilities, contracts – types of contracts – item rate, labour, lumpsum, cost plus percentage etc.

Module III : Designer's Tasks

Preparation of drawings; Interior Designer's relation with other parties connected with works such as client, contractor, sub-contractors, consultants and authorities. IIID Code of professional conduct: scale of charges: units and mode of measurements, clerk of work and his duties, inspection of work, certificate of payment to contractor, bill of quantities, schedule of rates, tenders, public, limited and negotiated tender documents and allied formalities. Preliminary knowledge of Consumer protection Act and other related acts on Interior Designers.

Module IV : Office Management

Planning and Scheduling Office Work: Office routine, work flow and office manual. Staff structure, Filing of records, Correspondence and Drawings, Maintenance of accounts, Studio Management, Meeting: Meetings with special reference to agenda, Quorum, Motions, Resolutions, Drafting and writing of minutes. Presentations in meetings,. Dealing with financial institutions; Role and functions; Types of financial institutions.

Module V : Visiting An Interior Designer's Office(Self-study / Assignment)

Gain practical knowledge of role of consultants and coordination between different consultants on a project. A report to be prepared by each student after visiting an interior designer's office.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H –**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Indian Institute of Architects. H.B. Professional Practice, The Architects pub. Bombay.
2. Namavati. H. Roshan. Professional Practice. 8th ed, Lakshani Book Depot, Bombay, 2001.
3. Christine .M. Piotrowski , Professional practice for Interior Designers, 3rd edition, Wiley and sons, 2001.
4. Cindy Coleman,Interior Design Handbook practice, McGraw Hill professional, isted, 2001
5. Ronald Veitch, Professional practice for Interior Designers, Peguis Publishers, Limited, 1987.
6. Balachandran, Sarojini. Customer-driven services management. SAGE Publications India, 2004.
7. Balachandran, V., and V. Chandrasekaran. Office management. Tata McGraw-Hill Education, 2009.
8. Knackstedt, Mary V. The Interior Design Business Handbook; John Wiley & Sons, 2002.

INTERIOR DESIGN STUDIO-IV

(Studio-Graphics)

Course Code: IND2604 **Credit Units: 02**

Course Objective:

It involves the study of user types, user behavior concepts relevant to Health Care & Hospitality interiors. Students will learn the fundamentals of the various types of working environment and how to design a functional and aesthetically.

Course Description

In the studio, the learning process is learning by doing. The core part of this course incorporates exercises to develop manual and digital presentation skills in order to present design ideas and solutions. Every module is blended with hand on sketches as well as application of basic computer graphics. Each student has to maintain a sketchbook compulsorily. Process sketches are scanned and integrated into the final presentation by PPT. A hard copy of Design Studio Portfolio submission is compulsory.

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Studio Project -1 : Health Care Interiors

Design Medical facilities include Medical centers, Hospitals, Clinics, and Pharmacies.

- **High volume traffic areas**: Patient waiting areas, administrative and doctors' offices, etc.
- **Medium-use areas:** Corridors, wet areas (kitchens, toilets, etc.) and chemicals.
- **Light-use areas:** Medical conference rooms. Wetareas and chemicals.
- Study, design and detailing of special acoustics and functional materials and furniture detailing.

Module II : **Studio Project -2 : Hospitality –*Lodging***

Design Lodging includes transient lodging facilities of all types: Quarters for visiting personnel, as well as temporary living facilities for families arriving at or leaving a base.

- **Heavy-use areas:** Registration desks, Lobbies, Entrance foyers, Stairwells, Elevators, and corridors, Wet areas such as Laundry rooms, Snack rooms, and Rest rooms.
- **Medium-use areas**: Management and Administrative offices.
- **Light-use areas:** Bedrooms, Suites, etc.
- Study, design and detailing of various work spaces, interactions zones.

Module III : **Studio Project -3 : Hospitality –*Food Service***

Design Food Service facilities: The most areas infood service facilities scan are considered heavy-use because they are subject to high traffic and frequent food and beverage spills.

- **Heavy-use areas:** Dining halls, Flight kitchens, Open mess facilities, Clubs, Snack bars, and Cafeterias.
- **Medium-use areas:** Management and administrative areas.
- **Light-use areas:** Special/private dining areas.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** –Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Linda O'Shea, ; The Interior Design Reference & Specification Book; Rockport Publishers; 2013
2. Interior Design; The New Freedom, BarbaralecDiamonstein, Rizzoli International Publications, New York, 1982.
3. Interior Colour by Design, Jonathan Poore, Rockport Publishers, 1994.
4. Worldwide Interiors – International Federation of Interior Architects & Designers, Rikuyo-Sha, Japan, 1987.
5. Simon Dodsworth Cardoso; The Fundamentals of Interior Design
6. Karlen Mark, Space planning Basics,
7. Maureen Mitton, Interior Design Visual Presentation
8. Carol Simpson, Estimating for Interior Designers

COMPUTER AIDED INTERIOR DESIGN & VISUALIZATION

(Studio based Practical)

Course Code: IND2605 **Credit Units: 03**

Course Objective:

The objective of this course is to provide the students an opportunity for understanding the technological implication of 3D design. This course provides the visual context of design concepts for a more effective design validation and visual communication using Autodesk 3D Max and Google Sketch up**.**

Course Contents:

(NB: Submission of Practical work record / Graphic Portfolio is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to 3D Max

Defining 3D graphics, Understanding 3D space, 3D Objects Co-ordinate systems, Modeling concepts, Spline based modeling, Mesh modeling, Parametric modeling, Working with splines, Extrude, Lathe, Bevel, Loft, Basic editing methods, Boolean.

Module II : 3D Modeling

Polygon modeling, Furniture modeling using polygon etc.

Module III : Introduction to Material Textures and Maps

Introduction to texturing, Standard materials and shades, Creating uniform textures, Working on sofa, Floor, Glass and metal materials, Editing UV co-ordinates.

Module IV : Digital Lighting

Introduction to digital lighting, Light theory, Creating 3 point lighting system in 3D graphics, Exposure controls, Basic lights and photometric lights, Light effects. Cameras.

Module V : Animation Fundamentals

Key frame animation, Animating along trajectories, Modifying animation using function curves, Understanding the basic principles of animation like weight and squash & stretch etc., Animating cameras.

Module VI : Introduction to Google Sketch up.

- **The fundamental tools:** Lines, Rectangles, and Circles, Move, Rotate and Offset, Push, Pull and Follow Me;
- **Understanding How Sketch Up Works:** Groups vs. Components, Creating and editing Groups, Creating and editing components;
- **Textures and Materials:**Applying colors and materials, Creating materials, Exporting images;
- **Sandbox Tools:** Creating landscaping, Importing trees;
- **Importing CAD files and Real World Modeling:** Good layer management, Cleaning up CAD files, Turning 2-D into 3-D.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H** –Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. 3D Max Design Tutorials, Autodesk, www.autodesk.com
2. Gerhard, Mark, and Jeffrey Harper. Mastering Autodesk 3ds Max Design 2011. John Wiley & Sons, 2010.
3. Prof. Sham Tickoo, 3Ds Max 5 For Animators, Interior Decorators & Arch, Dreamtech Press, 2003
4. Murdock, Kelly L. 3ds Max 2009 bible. Vol. 560. John Wiley & Sons, 2008.
5. Joe Zeh, Sketchup 2013 for Beginners, F & W Media Incorporated, 2014.
6. Brixius, Laurent. Google Sketch Up Workshop. Taylor & Francis, 2010.
7. Stine, Daniel John, Interior Design Using Hand Sketching, SketchUp and Photoshop. SDC Publications, 2011.
8. Daniel John Stine, Google Sketch Up 8 for Interior Designers, SDC Publications, 2012

INTERIOR SPACE MODELING WORKSHOP-II

(Practical)

Course Code: IND2606 **Credit Units: 02**

Course Objective:

This course is continuation of the Interior Space Modeling Workshop – I. This course aims to enhance the student's ability to represent their own ideas in three dimensional forms and communicate these with potential clients. During the course each student will build an archive of complete models using different materials and techniques which will lead to the realization of a project using the knowledge and skills acquired during the previous semesters.

Course Description

Model-making is a very practical subject, in that it involves the handling of materials to produce a physical outcome. It could be taught purely from that practical standpoint. Focusing on the materials and tools needed, and the methods or techniques employed to make specific things. Generating the idea through freehand sketching is important in model making. The initial sketches are compulsory for students to pre-visualization before starting the model making. The number of freehand sketches should use and select one for further technical sketching. All models are built to a predetermined scale. As with measured drawings, the level of realism depends on the scale. It is also best practice to include a support for the model, either in the form of a single piece of board to will keep it sturdy, makes it easier to carry and view at different angle.

Course Contents:

(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Detailed Modeling

Making detailed models which includes the representation of various building elements like:

Walls, Columns, Steps, Windows/glazing, Sunshades, Handrails using materials like Mountboard, Snowwhite board, acrylic sheets; Representing various surface finishes like brick/stone representation, stucco finish etc.; Various site elements – Contour representation, Roads/Pavements, Trees/Shrubs, Lawn, Water bodies, Street furniture, Fencing etc.

Module II : Models of Structural Design

Making models of the various structural systems used in Interior / buildings like:

Space frames: using Match sticks, wires; Different forms of shell roofs using POP, Clay, Soap; Tensile structures using fabric.

Module III Buildings& Interior Space Modeling Project (Self-study / Assignment)

Making models of the various interior spaces such as:

- Residences
- Offices
- Retail Spaces
- Recreational Spaces
- Scaled models of furniture.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H –**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Mitton, Maureen. Interior design visual presentation. John Wiley & Sons, 2012.
2. Jannsen, Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart, 1973.
3. Harry W.Smith, The art of making furniture in miniature, E.P.Duttor Inc., New York, 1982.
4. Magret Jacque. The Aesthetic Experiences: An anthropologist looks at the Visual Art.
5. Tapert, Annette, Swid Powell: Objects by Architects, Rizzoli, New York, 1990.

SEMINAR / GUEST LECTURE / WORKSHOP FOR SKILL DEVELOPMENT

Course Code: IND2633 **Credit Units: 04**

Course Objective:
This course provides a research orientation to the subjects related to interior design. The objective of this course is to develop the capacity of students to undertake research of subjects related to interior design. The students have to be participated either Seminar (1) or Workshop (2) to earn the credit. Gust lecture (3) is addition to this for enhancing their knowledge by examining and analysing various aspects of design.

1. SEMINAR
To present seminars supported by graphical presentation and documentation of research done.

Major Themes for Seminar:
Building Information Modeling (BIM). / Theory of Interior space. / Interior Design language of various cultures. / Influence of Fashion in Interior designing. / Use of rural technology in interiors.

Evaluation Scheme:

Components	Organisation and Relevance of content	Literature Review	Bibliography	Presentation	Total
Weightage (%)	30	30	20	20	100

2. WORKSHOP
Objectives:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. Workshop is undertaking a significant practical unit of examining and analyzing various aspects of design at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by jury of examiners comprising of the faculties.

Major Themes for Workshop are: -
Graphics and space transformation. / Color and light interaction to change space. / Eco-friendly furniture. / Effective visualization by using Computer graphics. / Study on textures and interior materials. / Effective model making of interior spaces.

Guidelines for Workshop :
The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.

- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:

Case Study / Group Activity. / Role Play. / Business Planning. / Quiz.

Evaluation Scheme:

Components	A	AP	MCQ	Solving the case/ Assignment / Write up	Total
Weightage (%)	**10**	**30**	**30**	**30**	**100**

(**A -** Attendance; **AP -** Active Participation; **MCQ -** Multiple Choice Questions)

3. GUEST LECTURE

Eminent subject experts from the field may be invited to deliver the lectures on different topics of their choice and share their experience with the students

FURNITURE ERGONOMICS & DESIGN

(Studio based Practical)

Course Code: IND2607 **Credit Units: 03**

Course Objective:
Ergonomics is an integral part of design, manufacturing, and use. This course aims a better understanding of ergonomics applied to furniture design that related end-user needs.

Course Contents:
(NB: Submission of Practical work record / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Anthropometric Measurements
Introduction; Percentile Humans; Anthropometric Databases; Anthropometric Resources.

Module II : Common Workplace Postures & Motions
Standing; Sitting; Reaching; Moving; Good and Bad Zones; Repetitive Motions

Module III : Ergonomics Applied To Furniture Design
Study of Anthropometry & Design criteria involved in the design of:

- Chairs, Tables.
- Sofa, Settee, Couch, etc.
- Cot, Bedside lockers, Wardrobes
- Cupboards, Shelves
- Bunk beds, Study table
- Display furniture

Module IV : Universal Design Considerations
Wheelchairs; Crutches, Canes, and Walkers; Knobs, Handles, and Controls; Access Ramps and Stairs; Resources on Universal Design.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance; **H**–Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)				

Text & References:

1. Kroemer, Karl HE, Ergonomics: how to design for ease and efficiency. Pearson College Division, 2001.
2. Jerzy Smardzewski; Furniture Design; Springer, 2015
3. The Encyclopedia of Furniture, Joseph Aronson, Crwon Publishers, New York
4. Interior Design & Decoration, SherrilWhiton, Prentice Hall
5. Office Furniture, Susan S.Szenasy, Facts on file Inc, New York
6. Interior Design Course, Mary GilliatCoyran, Octopus Ltd., London
7. Time Saver Standards for Interior Design, Joseph De Chiara, McGraw Hill, New York.
8. Lueder, Rani, and Valerie J. Berg Rice, eds. Ergonomics for Children; CRC Press, 2007.

HISTORY OF FURNITURE DESIGN

(Studio based Theory)

Course Code: IND2608 **Credit Units: 03**

Course Objective:

Furniture design has been a part of the human experience since the beginning of history. It is important to learn the history of furniture for a good furniture designing. This course helps the students to understand the glimpses of the developments of various furniture design styles through a historical timeline.

Course Contents:

(NB: Submission of Sketch Book / Portfolio is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I

- Study and track the main features, developments, styles and materials of:
- Neolithic Furniture –Assyrian Furniture – Egyptian Furniture – Greek Furniture – Roman Furniture.
- Sketch minimum three different furniture with brief description s about each relevant period and style

Module II

- Study and track the main features, developments, styles and materials of:
- Medieval Furniture –Renaissance Furniture–Jacobean Furniture –Colonial Furniture – Rococo Furniture.
- Sketch Minimum three different furniture with brief description about each relevant period and style

Module III

- Study and track the main features, developments, styles and materials of:
- Revival Furniture – Art Nouveau Furniture–Bauhaus Furniture–Art Deco Furniture – Modern Furniture.
- Sketch Minimum three different furniture with brief description about each relevant period and style

Module IV : Visits.

Visit various Historical places, Museums, Palaces, Old mansions, and Antique furniture shops, etc. Study and recognize different types of furniture. Take the photographs in different angles and make sketches. Note the historical relevance of each furniture i.e. historical events, ownerships by kings / rulers, time line, made of materials, design styles, similarity of styles in interior decoration other than furniture, etc. Conclude the study and submit in a portfolio form and presentation in PPT along with a visit report as well.

Module V : Indian Traditional Furniture. (Self-study / Assignment)

Make a list of Indian traditional furniture geographical wise/ state wise accordingly. Collect the pictures of each furniture design. Make a brief description that includes historical importance, timeline, design influence from western styles if any, make of material, about social relevancy, etc. Submit the study in a portfolio form and present in PPT as well.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance; **H**–Home Assignment; **CT**-Class Test; **EE-**End Semester Examination)				

Text & References:

1. Frederick Litchfield; Illustrated History of Furniture: From the Earliest to the Present Time; Cricket House Books LLC, 2009
2. Jerzy Smardzewski; Furniture Design; Springer, 2015
3. The Encyclopedia of Furniture, Joseph Aronson, Crwon Publishers, New York
4. John Morley; The History of Furniture; Little, Brown and Company, 1999
5. John F. Pile; A history of interior design; Laurence King Publishing, 2005
6. Jim Postell, Furniture Design, Wiley publishers, 2007.
7. Crochet, Treena M. Designer's Guide to Furniture Styles. Pearson Higher Ed, 2012.
8. Sheraton, Thomas. Thomas Sheraton's Classical Revival Furniture Designs. Courier Corporation, 2013.

FURNITURE CONSTRUCTION AND DETAILING

(Theory & Practical)

Course Code: IND2609 **Credit Units: 03**

Course Objective:

The course provides a framework to analyze and design furniture forms scientifically and sensitizes the students visual perception of furniture as a single form and as a system in a given interior space.. This course aims to familiarize the students of Interior Design on materials used in furniture and its design, construction and detailing

Course Contents:

(NB: Submission of Practical work record / Portfolio / Sketch Book is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Introduction to Furniture

Definition, Furniture categories, exploration of the idea of furniture, Role of furniture in interior design, Various stylistic transformations. Furniture designers and movements. Analysis of furniture in terms of human values, Social conditions, Technology and design criteria.

- **Design Practice: Measured** drawing of a piece of furniture: plan, elevation and drawings on full scale.

Module II : Functional and Formal issues in Furniture Design

Study and evaluation of popular dictums such as "Form follows function", Form and function are one", "God is in Details" etc.Human factors, engineering and ergonomic considerations: principles of universal design and their application in furniture design.

Module III : The Basics of Furniture Construction & Tools

Furniture Measurements and methods; Furniture material: Timber and Plywood, Detailed construction drawings & explaining construction and material finishes, Layout and machining plans; Fabrication: Stapling, Gluing; Furniture Joinery: screw joinery, nail joinery, Mortise &Tenon joints, Dovetail joints, Dowel joints, Edge joints. Furniture Construction: Drawers, Cadenza, Dining chairs, Sofa, Settee, Cots detail. Preparation for finishing, Other construction Techniques: Injection Molding, Investment casting, Sheet metal work, Die casting, Blow molding, Vacuum - forming etc.

- **Design Practice: Visit** various furniture manufacturers. Study and absorb different manufacturing methods. Take the photographs / Video; make sketches and notes for references.

Module IV : Seating Design& Storage Systems

Types of seating focus on: Functionality, Aesthetics, Style, Human factors and ergonomics, cost. ***Storage Systems:*** Functional analysis of storage systems, Deriving types of cabinets needed for interior spaces: Kitchen cabinets, Wardrobes Closets, Book cases, Show cases, Display systems etc. ***Modular kitchens:*** components, Construction, Layouts, Car case, Hardware selection, Fixing details, Finishes and Special types such as Tall units, Grain trolleys, and Carousels fold outs, etc.

- **Design Practice:** A detailed project involving the design of a small kitchen using modular components.

Module V : **Modular approach to furniture design (Self-study / Assignment)**

Study and inspire modern furniture designers such as Ward Bennet, Alvar Aalto, Owen Jones, Florence Knoll, Mies van der Rohe, George Nelson, Henri van de Velde, Hans Wegner etc. Survey & study various styles, systems and products available in the market. Design furniture, based on ergonomics, materials, working parameters and visual perception. Draw details and models along with a measure drawing, including plan elevations, sections. Make details of the same cost criteria of design & mass production of furniture forms. Make a full size prototype of the same.Submit the study in a portfolio form and present in PPT as well. The portfolio should contain evidence of each stage of the process starting from Inspiration and survey to photograph of final prototypes, including sketches and technical drawings.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. Aronson, Joseph. The encyclopedia of furniture. Clarkson Potter, 1965.
2. Joyce, Ernest, and Alan Peters. Encyclopedia of furniture making. Sterling Publishing Company, Inc., 2000.
3. Jim Postell, Furniture Design, Wiley publishers, 2007.
4. Habegger, Jerryll, and Joseph H. Osman. Sourcebook of modern Furniture. WW Norton & Company, 2005.
5. Lovell, Sophie. Limited Edition: Prototypes, One-Offs and Design Art Furniture. Walter de Gruyter, 2009.

SUSTAINABLE INTERIOR DESIGN & MATERIALS

(Theory)

Course Code: IND2610 **Credit Units: 03**

Course Objective:

Careful selection of environmentally sustainable building materials is the easiest way for architects to begin incorporating sustainable design principles in buildings. This course helps the students to understand the sustainable interior materials and methods.

Course Contents:

Module I : Bio Climatic Design Concepts

Environmental Impacts and Sustainable Design Strategies: Natural Resource Depletion, Energy Use, Pollution; The Designer's Role beyond Design and Construction. ***The principles of Life Cycle Design***; Phases of Building Materials, Life-cycle Assessment (LCA); Life-cycle Inventory (LCI); ***LCA in Practice:*** EIE, BEES; ***Assessments tools***: BREEAM, SBTool, LEED, Eco Profile, Promise, Green Mark of Buildings, Green Star, CASBEE. ***Certification Systems:*** First party, Second party and Third party; ***Third-party Certification Organizations:*** The Forest Stewardship Council (FSC), Green guard Environmental Institute (GEI), Green Seal, Inc., and Scientific Certification Systems (SCS); The Carpet and Rug Institute (CRI); Resilient Floor Covering Institute (RFCI).

Module II : Sustainable Interior Materials Selection

Criteria: Indoor Air Quality (IAQ); Reusable or Renewable Resources; Energy Efficiency; Water Conservation. ***Features:***Pollution prevention; waste reduction; recycled content; embodied energy; Natural materials; Minimal construction waste; Locally produced materials; Non- or less-toxic materials; Durable materials; Rapidly Renewable Materials; Low Maintenance; Reusability; Recyclability; Biodegradability; ***Harmful chemicals that can affect air quality in interior spaces:*** Volatile Organic Compounds (VOCs); Brominated flame retardants, Halogenated plastics, Bisphenol A, Heavy metals, Toxic solvents in finishes and sealants, Formaldehyde.

Module III : Key Sustainable Interior Materials and Methods

Bricks & Blocks: Recycled concrete bricks, Adobe bricks, Stabilized earth blocks, Compressed sand bricks, Hydra form bricks, Fly Ash Bricks, Wool Bricks; Wood Materials: ***Engineered wood*****:** Plywood, Oriented strand board, Glued laminated timber (glulam), Laminated veneer lumber,Cross-Laminated Timber, Parallel strand lumber, Finger-jointed lumber, I-joists and wood I-beams, Roof trusses and floor trusses, Certified Wood; ***Site and Landscaping*****:** Landscape pavers made from recycled plastic, Recycled asphalt and bitumen, Expanded polystyrene (EPS) foam; ***Foundations*****:** rigid plastic foam, Concrete blocks with foam inserts; ***Flooring*****:**Bamboo flooring, Cork flooring, Eco-friendly linoleum flooring; ***Structural Framing*****:** Wood and steel open-web joist; ***Roofing*****:** Solar Tiles Roofing, Sustainable Concrete, Fiber-resin composition roofing tiles, integrated sheathing and insulation, pre-tapered for flat roofs, Weatherproof shingles manufactured from recycled aluminum alloys; ***Structural Envelopes*****:** Super-insulated stress-skin panels; Earth bag construction; ***Insulation*****:** Homasote fiberboard, Cotton insulation, Hemp based products, Blown insulation; ***Interior Finishes*****:** wallpapers, recycled gypsum board or wallboard, Natural Fiber

Reinforced Plastics, Casein paint, Sisal wall coverings, recycled burlap or virgin jute fiber carpet, recycled wool carpet, recycled ground-up tire rubber*;* ***Plumbing*****:** Low flow shower heads, Solar hot water, Vacuum-assisted toilets; ***Ventilation*****:** Heat-recovery ventilator, Triple-Glazed [(low-emissivity (low-E) glass] Windows.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Kim, Jong-Jin; Qualities, Use, and Examples of Sustainable Building Materials, CSS,University of Michigan, 1998.
2. Binggeli, Corky. Materials for interior environments. John Wiley & Sons, 2008.
3. American Institute of Architects; Environmental Resource Guide Subscription. Washington: AIA; 1992.
4. Sassi, P Strategies for Sustainable Architecture; New York, Taylor and Francis, 2006
5. Spiegel, Ross; Green building materials: a guide to product selection and specification. John Wiley & Sons, 2010.
6. Yudelson, Jerry. The green building revolution. Island Press, 2010.
7. Martha Maeda, The Complete Guide to Green Building & Remodeling Your Home, Atlantic Publishing Co. 2011
8. Giudice, Fabio, Product design for the environment: a life cycle approach. CRC press, 2006.

SUSTAINABLE INTERIOR RENOVATION

(Theory)

Course Code: IND2611 **Credit Units: 03**

Course Objective:

Sustainable renovation needs special skills for diagnosis, conception, for using intelligent or new techniques, and then ensuring maintenance. This course provides an insight to the students about the need and importance as well as various concepts of sustainable renovation.

Course Contents:

Module I : Introduction to Sustainable Renovation.

Sustainable Renovation: Need, Meaning & Definition, Priorities for the renovation of housing, Definition of sustainable architecture, The inception of bioclimatic architecture, Typology of the existing housing, Constructive mode and materials, Renovation strategies.

Module II : The Comfort of Life

Increase the quality of the outdoor spaces: Favour social interactions, Favour soft mobility, Favour and reintroduce biodiversity; ***Increase the quality of indoor air*:** Limiting sources of indoor pollution, Optimizing the ventilation system, **Acoustic comfort:** Basic notions, Principles of acoustic insulation and correction, Optimizing the Acoustic comfort.

Module III : Energy Consumption.

Increase the thermal performances of housing: Optimizing the external walls performances, Optimizing the shape, : Additional insulation in housing renovation, Improving the air tightness, Reducing the thermal bridges, Thermal inertia in housing renovation, Optimizing the solar protections, : Natural night cooling, Optimizing the window conception, 'Passivhaus' standard in housing renovation; ***Reduce fossil energies consumption:*** Optimizing the heating system, Optimizing domestic hot water, : Heat pump for heating production, Hot water production by solar energy, Optimizing the lighting system, Renewable energies for generating electricity, Heat recovery on ventilation system, Air pre-heating by air ground exchanger.

Module IV : Water Consumption.

Reduce the tap water consumption: Rational use of tap water, Recovery and use of rainwater***; Increase the water resources:*** Water management on the parcel, Water recycling by plants, Water recycling in urban area.

Module V : Reduce production of waste & Consumption of Territory Resources

Reduce construction and demolition waste: Preventive measures to reduce waste, Waste management on building site, ***Reduce domestic waste:*** Preventive measures to reduce domestic waste; ***Reduce consumption of territory and resources:*** Embodied energy consumption, Construction materials.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE**-End Semester Examination)				

Text & References:

1. Trachte, Sophie; Advanced and Sustainable Housing Renovation, A guide for Designers and Planners. UCL, 2010.
2. Gelfand, Lisa, and Chris Duncan. Sustainable renovation; Vol. 19. John Wiley & Sons, 2011.
3. George Baxter, Tim Pullen; The Sustainable Building Bible; Ovolo Publishing, Limited, 2012.
4. Sung, Wen-Pei; eds. Environment, Energy and Sustainable Development. CRC Press, 2013.
5. Maroni, Marco, Bernd Seifert; eds. Indoor air quality: a comprehensive reference book. Elsevier, 1995.
6. Fuchs, Helmut V. Applied Acoustics; Springer Science & Business Media, 2013.
7. Brooker, Graeme, and Lois Weinthal, (Eds.) The handbook of interior architecture and design. A&C Black, 2013.
8. Fuchs, Matthias, et al. Energy manual: sustainable architecture. Walter de Gruyter, 2008.
9. Geyer-Allély, Elaine. Water consumption and sustainable water resources management. OECD, 1998.
10. Rhyner, Charles R., et al. Waste management and resource recovery. CRC Press, 1995.

ADAPTIVE REUSE AND RETROFIT

(Theory)

Course Code: IND2612 **Credit Units: 03**

Course Objective:

The objective of this course is to give a comprehensive overview on how existing buildings can be adapted and retrofitted to function sustainably.

Course Contents:

Module I : Sustainable Retrofit for Existing Building

Retrofitting options for existing buildings; Structural retrofit; Façade; Services; Interior retrofit; Performance analysis of existing buildings; Physical audits; Building Simulation; Metering and tracking options; Analysis the building's current performance; Decision influencers for retrofit; Economic, social and environmental issues.

Module II : Adaptive Reuse of old Building

Need for adaptive reuse; Issues to be explored in building adaption; Economic, social, environmental, and assessment models for adaptive reuse; Case studies of buildings with adaptive reuse.

Module III : Technologies for Energy Efficiency In Existing Buildings

Improving energy efficiency in existing buildings; Facade improvements; HVAC improvements; Indoor Environment Improvements; Monitoring the performance of retrofits; Case studies on energy efficiency improvements in existing buildings.

Module IV : Sustainable Conservation of Heritage Structures

Conservation of heritage structures; Sustainability in heritage structures; Adaptive reuse of heritage structures; Issues in adapting a heritage structure; Use of sustainable conservation techniques; Improving the energy performance of heritage structures; Case studies of sustainable conservation in heritage structures**.**

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. HarimohanPillai – Heritage conservation and cultural continuity – Saraswatham publishers, 2002.
2. Sustainable building design manual – TERI publication, 2004.
3. Sandra F Mendler - The HOK Guide book for sustainable design – John Wiley and Sons, Canada,2002
4. Sara J. Wilkinson; Sustainable Building Adaptation: Innovations in Decision-making, John Wiley and sons, 2014

5. John Krigger, Residential Energy: Cost Savings and Comfort for Existing Buildings, Prentice Hall, 2009
6. William H. Clark, Retrofitting for Energy Conservation, McGraw Hill Professional, 1997
7. Paul Apple, Sustainable Retrofit and Facilities Management, Routledge, 2013
8. ZeynepAygen, International Heritage and Historic Building Conservation; Routledge, 2013

PERFORMANCE SPACE DESIGN

(Studio based Theory)

Course Code: IND2613 **Credit Units: 03**

Course Objective:

This course provides the opportunity for the students to develop their own individual design in relation to Performative Spaces like theatre and performance design, stage and set design, production design for film and television through independent and collaborative project work.

Course Contents:

(NB: Submission of Practical work record / Graphic Portfolio is compulsory for all Modules and will be part of the Final Course Evaluation)

Module I : Performance Space Design

Introduction: Scenic Design , The nature of theatre design, Theatre forms, The goals of theatre design, The house and front of house, Scenic design, Considerations for the Scenic Designer: Mood and Spirit (production concept) ***Functional diversity of Performance Space:*** Movies, Conferences/ Seminar Auditorium, Live performance event space, Hybrid Performance Space etc.

Module II : Set Design and Stage Design Concept

Theatre Terms: Arena stage, Box set, Curtain set, Cyclorama, Drops, Flats, Minimal set, Permanent set, Prism set, Proscenium stage, Scrim, Set pieces, Teaser, Thrust stage, Unit set; ***Stage Elements:*** Act curtain, Apron acting, Back wall, Battens, Cyclorama or Cyc, Flies, Fly gallery, Gridiron or grid, Ground cloth, Leg, Pin rail, Proscenium arch, Tormentors, Trap, Wings; ***The Design and Setting:*** Provide adequate space for movement, Communicate the time and place, provide the audience with the mood and style of the play, Technically usable and safe.

Module III : Functional Area Descriptions:

Site and Building Exteriors: Public Scale, Parking, Accessibility for disabled, marquee, Exterior Design and Materials, etc.; ***Performance Space:*** Ceiling configuration and floor plans, Stage Specifications, Back stage and artistic support areas, Theatrical lighting system, Architectural lightning system, Audio- Video systems, Acoustic Canopies and Orchestra shells, Orchestra Pits and Pit lifts, Special show related systems for purpose-built facilities, Sight lines, Acoustics, Curtains, Changing rooms, Makeup rooms, Toilet rooms, General storage, Production and Pre- Production areas, Receiving areas**,** Ceiling configuration etc.;***Audience Environment:*** Ceiling configuration and floor plans, Seating and Seat Spacing plans including sightlines to the stage, Acoustical canopies; Lobby lay out, Box office, Toilet rooms, Ticket Sales Areas, Rest rooms, Managers office, , Exit requirements, Shop spaces etc.

Module IV : Visualization of Scenic Design

Visual Creation: Principles of layout for creating effective visual signage and explore the unique problems, technique, theory, and approaches of signage in film, theatre, and other forms of mediated exhibition; Introduction to the design applications for building signage; ***Visual Presentation:*** Setting the Mood Sketches and Renderings, Photomontage/Collage, Computer Generated visualization, Scale models; ***Designer's***

Plans: Ground Plan, Sectional, Center-Line Section, Front Elevations, Detail Drawings, Sight-line Drawings.

Module V : **Advanced or Specialized Design Practice (Self-study / Assignment)**

Select a thematic design concept suitable for any Performance. Develop a new type of performance space; an innovative space for the audience and performer to interact according to its function (E.g. Live performance event space, Film, Theater, Auditorium, TV/ Film Shooting floor, etc.). Apply the design ideas to a project and context in order to create excellent and relevant interior design outcomes. Consider audience perception of space. Use AutoCAD/ Revit Architecture/ Google sketch up/ 3DS Max etc. for the final visualization.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Parker, W. Oren; Scene Design and Stage Lighting; 8th Ed.; Orlando: Harcourt Brace College Publications; 2003.
2. Thorne, Gary. Stage design: a practical guide. Crowood, 2011.
3. Collins, Jane, and Andrew Nisbet; *Theatre and performance design: a reader in scenography*. Routledge, 2010.
4. Yi- Fu Tuan; Space and Place: The perspective of experience, University of Minnesota Press, 2001.
5. Irwin Altman & Erwin; Public Spaces and Places, (Human Behavior and environment), Springer link, 1989.

PUBLIC ART

(Studio based Theory)

Course Code: IND2614 **Credit Units: 03**

Course Objective:

This course approaches public art as an important part of an ongoing dialogue about cultural values, commerce, politics, and public life. This course aims to enhance the designing and artistic abilities towards Public Art either Indoor or outdoor.

Course Contents:

(NB: Submission of Practical work record / Graphic Portfolio is compulsory for Module IV& V that will be part of the Final Course Evaluation)

Module I : Introduction to Public Art

The Concept Of Public Art: Definition, The Social Dimension, ***Types of Public Art:*** Stand Alone, Applied, Integrated, Industrial, Heritage / Memorial, Interactive, Multimedia, Temporary, Ephemeral, Indigenous Art, Community Art; The Role and Benefits of Public Art; ***Purpose of Public Art:*** Functional, Decorative, Iconic, Integrated, Site specific, Interpretive, Commemorative, Temporary; Locations & Sites For Public Art. **Evolution of Public Art:** Renaissance Public Art (c.1400-1600), Baroque Public Art (c.1600-1700), Public Art 1700-1900, Public Art During the 20th Century: Socialist Realism, Degenerate Art, Fresco painting, Land Art, Skyscraper Architecture, Graffiti, Contemporary Public Art, Environmental public art.

Module II : Public Art Strategy & Principles

Strategy Objectives: To inspire different locations, To enhance the design and function of the public realm, To enhance the appearance, Character and value of buildings, To support professional art practice, To provide a level of guidance to artwork design, To provide direction on the appropriateness, To guide the acquisition and location for artworks, ***Principle Objectives:*** Place Making, Site Specific, Scale, Universal Access, Attractors, Interaction, Management; ***Key Values of Public Art:*** Social, Environmental, Economic and Aesthetic vales; ***Public Art Project Types:*** Artist Made Building Parts, Integrated Artworks, Design Teams.

Module III : Developing a Concept for Public Art

Concept Development: Research-Developing a Theme , Public Art Stakeholders; **Conceptual Design Report:** Artist Statement, Vision, Description of concept & artwork, Alignment of concept, Project goals, Location of proposed artwork, Placement plan, Suitability, Design benefits includes safety, structural integrity and accessibility, Dimensions- including an explanation of suitability of scale, Types & form of materials, Durability and performance, Anticipated maintenance,Life-cycle cost, Proposed fabrication, Timelines, Budget, Implementation schedule; ***Visual Presentation of Concept:*** Renderings, Boards, Computer-generated 3D visualization, Marquette and models.

Module IV : Case Study: Public Art in India. (Self-study / Assignment)

Make a list of famous public arts in India. Collect the images and brief of each one of them. Choose any appropriate three examples. Analyze its design and study what type

of contribution that given in the terms of Social, Environmental, Economic and Aesthetic.

Module V : Public Art Project

Consider a suitable place or circumstances in indoor or outdoor and select a theme. The selected theme should be innovative and convey some massages to the public. For example environmental concepts, commercial- advertisements, Big art, Contemporary, Modern-traditional-cultural fusions etc. Go through the previous modules, especially Module –IV. Prepare a detailed project from concept development to the final model. Make a full scale model if possible that can be considered as a public art. This activity can be a group project and during class students will give 10 minute presentations about their public art project. The presentations should include: A description of the Project Report, Images of the project stages and final object.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Knight, Keith, and Mat Schwarzman. Beginner's guide to community-based arts. New Village Press, 2005.
2. Miles, Malcolm. Art, Space and the City: Public art and Urban futures. Psychology Press, 1997.
3. Redstone, Louis G., and Ruth R. Redstone. Public Art: New Directions. New York: McGraw-Hill, 1981.
4. Cartiere, Cameron, and Shelly Willis, eds. The practice of public art. Routledge, 2008.
5. http://forecastpublicart.org; http://www.petemoorhouse.co.uk; http://associationforpublicart.org

PUBLIC SPACE DESIGN - CONTEXTUAL STUDIES

(Studio)

Course Code: IND2615 **Credit Units: 03**

Course Objective:

This course aims to impart knowledge to students on Study of interior design with reference to the context of the building typology and its environs.

Course Contents:

(NB: Submission of Practical work record / Graphic Portfolio is compulsory for Module V that will be part of the Final Course Evaluation)

Module I : Entertainment Spaces

Study of interiors for entertainment buildings such as clubs, multiplex and amusement parks – schemes for video games parlor, food court areas and exclusive indoor game areas of clubs.

Module II : Educational Spaces

Study of interiors for class rooms, seminar halls and AV halls – schemes for library, smart class rooms and discussion areas.

Module III : Sporting Spaces

Study of interior requirements foe gymnasium, indoor stadium and aquatic complex – schemes for interiors of stadium with focus on lighting requirements and visibility.

Module IV : Commercial Spaces

Study of interiors in saloons, pubs, discotheque and banks, etc. - schemes for the same.

Module V : Transportation Spaces

Study of interiors for airports, MRTS, railway stations and bus terminals – schemes for the same

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A**-Attendance**; H** -Home Assignment**; CT**-Class Test**; EE-**End Semester Examination)				

Text & References:

1. Henderson, Justin. Casino design: resorts, hotels, and themed entertainment spaces. Rockport, 1999.
2. Woolner, Pamela. The design of learning spaces. A&C Black, 2010.
3. Carlson Broto- architecture on sports facilities – PG 1 publishing, Spain, 2005
4. Piotrowski, Christine M., and Elizabeth A. Rogers. Designing commercial interiors. John Wiley and Sons, 2010.
5. Transport spaces – vol. I- images publishing, Hong Kong, 1999
6. Edward D Mills; Planning Buildings for administration, entertainment and recreation; Krieger publishers, NY, 1976

Syllabus - Seventh Semester

ADVANCED INTERIOR DESIGN STUDIO

(Studio)

Course Code: IND2701 **Credit Units: 02**

Course Objective:
This studio course aims to impart knowledge to students on modular construction, industrialized construction and design of prefabricated elements and construction methods.

Course Contents:
(NB: Submission of Practical work record / Graphic Portfolio is compulsory for all Modules will be part of the Final Course Evaluation)

Module I : Introduction to Prefabrication

Prefabrication: Meaning and definition; Types of foundation; Modular co-ordination; Prefabrication systems, Structural schemes; Design considerations; Economy of prefabrication; Prefabrication of load-carrying members; Disuniting of structures; Structural behavior of pre-cast structures; Advantages and Disadvantages of Prefabrication; Prefab Vs. Conventional Structures

Module II : Prefabricated Components: Materials

Plywood, block board, particle board, hard board, laminates, MDF, HDF, HDPE wood wool, sound insulating materials, Bituminous products, Structural Insulated Panels, Insulating Concrete Forms, Color Coated Galvalume Sheets, Zincalume Steel, ColorbondSteel; PUF Panel, Sandwich Panel, Aerocon panels, FRP Corrugated Sheets.

Module III : Prefabricated Components: Construction

Detail of wardrobes, Modular kitchens, Cabinet shelves and show cases for residence, Offices, Book stores and Commercial buildings, Work stations. Internal finishes to wall and ceiling using plywood, PVC, Marble, Granite, Cement, Fiber board, Plaster of Paris, Particle board, Wood wool, Straw and any other materials introduced in the market. Partition systems, False ceiling systems. Introduction to prefabrication and post tensioning of building components. Advantages and relevance in the Indian context.

Module IV : Prefabricated Design Principles

Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

Module V : Interior Prefabrication Design (Self-study / Assignment)

Consider the end use/ purpose and design the following: Portable Cabins, Prefab House, Prefab Row Housing, Prefabricated Storage House, Prefab Platform Shelter, etc.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Davies, Colin. The prefabricated home. Reaktion books, 2005.
2. Smith, Ryan E. Prefab architecture: A guide to modular design and construction. John Wiley & Sons, 2011.
3. Bruce, Alfred, and Harold Sandbank. A history of prefabrication. Vol. 3. John B. Pierce Foundation, 1943.
4. Emmitt, Stephen, and Christopher Gorse. Barry's advanced construction of buildings. John Wiley & Sons, 2010.
5. Hass, A.M., Precast concrete Design and Applications, Applied Science Publishers, England, 1995.
6. The Pennsylvania State University, Decision Support for Prefabrication Strategy Selection on Building Systems, ProQuest, 2008
7. "Structural Design Manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009
8. Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 1976.

DESIGN RESEARCH METHODS & PRESENTATION TECHNIQUES

(Theory)

Course Code: IND2702 **Credit Units: 03**

Course Objective:

The intention of this course is to introduce and initiate research thinking and to initiate the dissertation project. This course equips the student with adequate architectural design research methods for the realization of dissertation concept.

Course Contents:

Module I : Research

Introduction, Definition, Need, Aims, Importance, Scope, Classifications, Types, Characteristics, and Research Process.

Module II : Research Design

Meaning, Need, Types, Factors Affecting, Basic Purpose, and Principles.

Module III : Data Collection

Meaning, Need, Main Terminologies Used In Data Collection Population, Sample, Parameter, Variables, Etc., Types Of Data, Methods, Sources Of Various Types Of Data, Methods Of Data Collection: Observation Method, Interview Method, Data Collection Through Questionnaires, Collection Of Data Through Schedules, Case Study.

Module IV : Data Analysis

Meaning, Need, Classification; ***Only define and understand the Meaning of:*** Tabulation, Array, Range, Frequency Distribution, Presentation of Data-Graphic, Histogram, Polygon, Ogive, Measurement of central tendency- Mean, Mode, Median, Dispersion / Skewness, Correlation and Regression Analysis of two variables, Characteristics ,Types, Values of , Formulae for calculation etc.

Module V : Interpretation

Meaning, Definition, Significance, Techniques. Report Writing: Meaning, Significance, Steps, Types, Findings, Suggestions, Conclusion.

Module VI : Research Procedures.

Recognize philosophical implications; Formalize research: Identifying and defining the problem- Questions need to be documented in relation to such issues in interior design as: time, cost, safety, materials, processes, function, appearance, and ergonomics, etc.; Conduct literature reviews; Select appropriate research methodology; Understanding of research design parameters; Procedures to collect, analyze, interpret the data; Present information through a report.

Module VII : Design phases.

Research and produce Design Specifications; Sketch ideas and concepts; Develop detailed design; Produce a digital design presentation file for the final design; Make an oral presentation on their design.

Module VIII : Research Presentation Techniques: Interrelated components.

1. Research Report Presentation: Dissertation components, Writing styles appropriate

to research design, Style manuals, & Ethical considerations.

2. Design Presentation: Design Journal, Digital Design Presentation; Oral Presentation.

Course Evaluation:

Components	**A**	**H**	**CT**	**EE**
Weightage (%)	**05**	**10**	**15**	**70**
(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)				

Text & References:

1. Laurel, Brenda. Design research: Methods and perspectives. MIT press, 2003.
2. Kothari, C. R. *Research methodology: Methods and techniques*. New Age International, 2004.
3. Gupta, S. P., and M. P. Gupta. *Business statistics*. Sultan Chand & Sons, 2010.
4. Sanoff, Henry. *Visual research methods in design*. John Wiley & Sons Incorporated, 1991.
5. Snyder, James C., ed. *Architectural research*. Vol. 6. Van Nostrand Reinhold Company, 1984.
6. McMillian, J; Research in education: A conceptual introduction , HarpersCollins College Publishers; NY; 1997

INTERIOR DESIGN - DISSERTATION

(Research)

Course Code: IND2737 **Credit Units: 06**

Training Objective:

The Interior Design Dissertation is one of the components of Interior Design Project. The core idea behind this course is to develop research aptitude of students and motivate students to involve in individual research and methodology. This course aims to train them in handling research projects independently to further their intellectual and personal development in the chosen field. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

SESSIONS –I : PRE- DISSERTATION SEMINAR

The Pre- Dissertation Seminar provides students with a framework to understand some emerging concepts in Interior and projects of design complexity and equip the student with adequate Interior design research methods for the realization of thesis concept. During the Pre-Thesis Seminar, the subject of the thesis is developed and the project articulated. The Pre-Thesis Seminar should be conducted before the research work start. It is advised to conduct group-wise for the deep and healthy discussions.

Guidelines:

- Each student should submit minimum of 2 topics related to the research.
- Students are encouraged to pre-consult faculties in the department to choose and finalized their research topic.
- Each faculty can guide minimum of 3 students, depends the availability of facilities and no. of students in the class.
- The students should present their research topics / areas in the Pre-Thesis Seminar.
- A panel of faculty members has to judge the students' presentation and feasibility of research in the proposed topics.
- The individual faculty members of the panel can be selected the student with their preliminary choice of topic for further guidance through this process.

Points to be covered:

- Clear understanding of difference between design thesis and design studio.
- Selection of topics for Interior design thesis.
- Dissertation topics based on building typologies, Preparation of synopsis, Methodology of design.
- Emerging concepts in interiors due changes in social, economic, technological variables.
- Review of design projects related to real world instances and relevant to community at large.
- Review of projects of design complexity, involving themes, sub themes and interior expression.
- Research in Interior design: Tools and Methods required handling a Dissertation project.
- Scientific methods of research with special emphasis on interior design research methods.
- Interior enquiry visual, observations, questionnaire formats of enquiry, literature Review and case studies.

SESSIONS -II : DISSERTATION REPORT WRITING

Points to be considered:

- Suitability of the topic.
- Relevance of the topic.
- Time available at the disposal &Feasibility of data collection within the given time limit.

- Challenges involved in the data collection (time & cost, possibility of getting responses, etc.)

Guidelines:

- The research problem: what is a research problem? How to raise the problem? How to state the problem?
- Spotting the research problem from the inconsistencies and contradictions that one observes in life.
- Library search for thesis and dissertations.
- Topic defense: Final selection of the topic most preferred by student.
- Writing the thesis using the American Psychological Association (APA) style.
- Defense of the chosen topic.
- Writing the bibliography of the proposed thesis in the APA style.
- Formation of dissertation Proposal / Synopsys.
- The parts of the dissertation proposal: Chapter and its sections
- Writing Chapter 1. The Introduction / Research background
- Writing Chapter 2. The Review of Related Literature
- Writing Chapter 3. The Conceptual Framework
- Writing Chapter 4. Research Methodology
- Writing Chapter 5. Data Analysis & Interpretations.
- Writing Chapter 6. Summary, Conclusions, Discussion, and Recommendations Results, conclusion, etc.
- Writing the other parts of the dissertation.
- Completing the dissertation& Final presentation.

Note: – The relevant Sketches, Technical drawings, Photograph of scale models / Prototypes, etc. can be included in the report.

(PTO….)

(….continuation)

SESSIONS - III : ORGANIZATION OF THE DISSERTATION REPORT

- Front Page
- Bonafide Certificate cum Report Evaluation (From Faculty Guide & Internal and External Examiner)
- Declaration
- Acknowledgement
- Abstract
- Table of Contents
- List of Tables (optional)
- List of Figures (optional)
- Body Structure of the Dissertation
    - Chapter 1. The Introduction / Research background
    - Chapter 2. The Review of Related Literature
    - Chapter 3. The Conceptual Framework
    - Chapter 4. Research Methodology
    - Chapter 5. Data Analysis & Interpretations.
    - Chapter 6. Results, Discussion, Conclusions and Recommendations, etc.
- Bibliography
- Appendix

SESSIONS - IV : PRESENTATION & EVALUATION

Evaluation Method for Dissertation Report:

Chapter Scheme for the Training Report.			**Marks Distribution.**
Overall Report Format / Layout		:	05
Chapter 1.	The Introduction / Research background	:	10
Chapter 2	The Review of Related Literature	:	20
Chapter 3	The Conceptual Framework	:	15
Chapter 4, 5	Research Methodology, Data Analysis & Interpretations.	:	10
Chapter 6.	Results, Discussion, Conclusions and Recommendations.	:	10
Total		:	70

Report Format and Layout :

A4 size has to be used with a good quality paper (minimum 80 gsm). Margins: 1.5 inches on the left-hand side, about 0.75 inches at right-hand side (the outer edge); and 1 inch at the top and bottom of the page. The report has to be written in font Times New Roman, 12 points with 1.5 lines spaced. Typescript should appear on one side only. Footnotes, quotations, references and photographic captions may be single spaced. Where appropriate, these should contain lists giving the locations of figures and illustrations. The font size of Chapter title: 20 points with bold, Heading: 14 with bold / sub-headings: 12 with bold. If applicable footnotes be given on the same page where reference is quoted and the footnote size to be used 10 points. Title page/ front page, certificate and declaration type style and formats are as per the University / Department standards. The report should comprise of a minimum of 70 pages and has to be submitted in three copies.

Guidelines for Evaluation:

- Each of the students has to undertake a project individually under the supervision of a faculty.
- Final Report Dissertation should minimum 10 working days before the scheduled date of presentation.
- The student has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- The late submission doesn't consider for the evaluation.
- Without prior approval from supervisor of final Dissertation Report will not be considered for the evaluation.
- Uncompleted / unorganized reports does not consider for the evaluation.
- Seminar presentation with 'Power Point' is compulsory.
- Language of Project Report and Viva-Voce Examination should be in English.
- Failure to submit the Dissertation Reportor failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination.
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by internal expert and external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme

Components	**Project Report**	**Viva-Voce**	**Presentation**	**Total**
Weightage (%)	**70**	**20**	**10**	**100**

SEMINAR

Course Code: IND2733 **Credit Units: 03**

Course Objective:

The objective of the seminar is to judge the understanding as well as application of the knowledge gained by the students through their research work for the dissertation. The Seminar provides the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of interior design and its application at a level commensurate with the learning outcomes of the various courses taken up them in the on-going semester.

Course description:

A seminar is primarily a record of intelligent reading in several sources on a particular subject followed by a presentation. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. Seminars enable open discussion between students and the subject experts. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face is recommended. Students are encouraged to test their knowledge and to listen to other's points of view, thus enabling their critical abilities to develop. Students should prepare well prior to their research presentation.

Guidelines:

- The Seminar will be related to the contemporary issue and the topic will be given by the department.
- The presentation of the Seminar is scheduled to be held before the commencement of Semester examinations.
- The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review.
- The Bibliography shall form an important part of the paper.
- Examples of a few broad areas for Seminar (List is indicative, not exhaustive)
- Viva-voce by a jury consisting of external and internal examiner to be appointed by the Department / University.
- Failure to appear the seminar presentation & Viva-voce Examination will be treated as "Absent" in the Final Examination.

Major Themes for Seminar:

- Building Information Systems.
- Ethics and Social Responsibility in interior designing
- Emotional and physical impacts of residential lighting.
- Identification of various lighting styles.
- Popular trends in fixtures.
- Selection of kid-friendly surfaces and finishes for kids' rooms.
- Product knowledge to select the right paint

Guidelines for Evaluation:

- Seminar presentation with 'Power Point' is compulsory.
- Language of Project Report and Viva-Voce Examination should be in English.

- Failure to submit the Seminar Report or failure to appear at the Viva-voce Examination will be treated as “Absent” in the Examination.
- No marks will be allotted on the Seminar Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Seminar Report
- Evaluation of the Seminar to be done jointly by internal expert and external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme

Components	**Organisation and Relevance of content**	**Literature Review**	**Bibliography**	**Presentation**	**Total**
Weightage (%)	**30**	**30**	**20**	**20**	**100**

INTERIOR DESIGN PORTFOLIO DEVELOPMENT

(Studio-Graphics)

Course Code: IND2736 **Credit Units: 04**

Course Objective:

The portfolio submission is a mandatory component of the graduation process for the B. Des (ID) program. This course is intensive visualization skill based course that requires a lot of time and commitment. This course aims to develop the student's ability to communicate their ideas, thoughts and feelings about the field of interior design in a visual form.

Course description:

The Design Portfolio is not simply a collection of your work. Rather, it is a personal statement of creative ability and design thinking. The portfolio is a self-presentation tool that creatively communicates the students' design outlook and level of development through a variety of media and skill sets. The portfolio should include a selection of design works and at least one example of the development of design work in the area of interior design. The portfolio submits for consideration must clearly indicate students' potential for graduate study to the reviewers. Computer access is strongly recommended for this course, especially to visualization part.

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Please note, there is no typical model of a successful portfolio. Students remember that the reviewer is curious to see their best work and will make a decision based on the creativity display. It is always better to edit the work by presenting each project in a clear, concise, and legible manner before include into the portfolio. Also, do not include too many sketches and images. Students need to think of the progression of their work; show how each project builds on another or stand-alone projects that show their diverse talents. There is no minimum or maximum number of required pages, but the content counted on the basis of a number of projects available in the portfolio. Minimum 7 graphic projects and 1 Standalone project (compulsory) are required. If a student's original work is done on a larger format, scan / digital-photo it and reduces it to the requested size format. A table of contents should be included.

Originality and Integrity of Portfolio

Simply copying an image violates copyright law, is unethical, and constitutes plagiarism. Students are encouraged to create art and design from their imaginations, experiences and from direct observation of the world around them. It has make sure that all work should be the student's own.

In case students who make use of borrowed images, such as photographs in magazines, books or from the internet need to demonstrate a creativity and sophistication of approach that goes beyond mere copying. Students must show substantial and significant development that surpasses duplication.

PORTFOLIO DEVELOPMENT - GUIDELINES

I. Portfolio Format:

Students should submit their portfolio in two ways, electronic format and hard copy (paper format). The specifications are given below for each format.

Electronic Format: Use pdf. files with a maximum resolution of 300 dpi submitted on a CD-ROM.

Hard copy format:

Size	:	A3 / 11" × 17" Size is preferred.
Layout	:	Portrait or Landscape with removable page inserts.
Portfolio display case	:	Vinyl Back Ring Binder with transparent removable file storage folder.

Note: Premium quality paper should use to print out of computer generated images. Good quality Cartridge sheets need to use for illustrations and sketching. The use of wood, metal, glass, or plastic in hard copy portfolios is NOT acceptable.

II. Portfolio Preparation

Things to consider:

1. Composition - Placement or arrangement of elements in a work
2. Drawing - Demonstration of line weights, mark-making, proportion and medium
3. Design - Overall unity achieved by combining elements of art and principles of design.
4. Value - Relative darkness or lightness of a color
5. Spatial perception - Understanding of the spatial relationships of objects, and foreground, middle and background
6. Technique - Skillfulness in the use of fundamental methods and media
7. Color perception - General sensitivity to color and sophistication in its application
8. Originality - Capacity to think independently and transform the predictable; the quality of being new and original
9. Conceptual awareness - Expression of a clear idea, effective use of materials & processes to strengthen the concept
10. Aesthetic awareness - Guiding principle in matters of artistic beauty and taste *(PTO….)*

III. Portfolio Organization:

1. Portfolio Title Page

This is the starting page of an interior design portfolio contains a brief profile of the student that includes: Name & Photograph; Registration Number; Program Name, Institution Name; Contact Address; Date of Submission; Declaration of ownership, etc.

2. Table of Contents

3. Bonafide Certificate cum Portfolio Evaluation (From Faculty Guide & Internal and External Examiner)

4. Portfolio Work Contents

All the works included in the portfolio should be with the prior approval from the concerned faculty only. The organization of portfolio work can be segmented into 3 Parts:

Part-1 : Project (Standalone projects - that is presented from concept to completion)

This is the first part, which is integrated to dissertation project. The students have to convert the research findings into various Interior design ideas and concepts as part of the application process. These design ideas and concepts need to visually narrate and demonstrates as student's creative work and process in the form of a portfolio. This part must include:

- ***Highlight of research:*** Title, Scope and significance of study, Objective of study, Findings within one page.

- ***Design work Boards:*** Statement of design work (Design Brief), Mood board and Story board, Architectural Floor Plan, Finish Schedule and Color Legend, Finish Floor Plan, Elevations, Sections, and Details, Miscellaneous Drawings, Furniture Floor Plan, Installation Plans, Furnishings Specifications, Furnishings Cost Estimates, Furnishings Order Form, Specification sheets, Cost sheets etc.

Part-2 : Graphics (Projects builds on another)

The second part is mainly for to highlight what the students learned from the overall graduation studies. The students have to cover the major subject modules from the past semesters and visualize. It is not necessary to rework the entire modules. They can include the best works from their past assignment collections. But it is compulsory to consider each major area what they learned. Those who are lacking the sufficient collection of work, they may need to reproduce. The collection has to be presented as follows:

- **Design Skills:**

The design specialties most desirable to show as the following order of preferences:

Office/Corporate; Residential/kitchen & Bath; Hospitality Restaurant; Health care; Commercial Spaces and Interior design specializations.

All technical design skills that can be applied in a variety of building environments as above include:

- Freehand drawing of an interior space to include an architectural element (2D)
- Freehand drawing of an interior space to include an architectural element (3D)
- Freehand drawing of a collection of items / furniture. (2D)
- Freehand drawing of a collection of items / furniture. (3D)
- Design work including pieces that student designed at class or on your own.
- Interior visualizations by computer generated- 3D S Max, Sketch up, etc.
- Photographs of 3D Objects, Models, Prototypes etc. that student designed and created.
- Architectural drafting by hand.
- Architectural drafting by computer generated- Auto CAD.
- Any other work student feels may support their application to interior design includes their specializations.

- **Art Skills**

All art skills that can be applied in a variety of medias include:

- Freehand drawings.
- Artwork demonstrating use of colour by rendering with different colour media.

- 2D and 3D Drawings, Sketches, Posters, Graphics, Mural etc. (Manual)
- 2D and 3D Drawings, Sketches, Posters, Graphics, Mural etc. (Computer generated)
- Posters that explaining Typography and Calligraphy skills.
- Mood boards or Theme boards, Story boards that explaining Collage and Photomontage skills.
- Theme based Digital Photographs that explaining Photographic skill
- Photographs of Craft work that explaining Craft skill.

Part-3 : Written Content

The third part is to demonstrate students writing style and quality. The good hand written essay will be encouraged and gives the chance of more weightage. A 250 – 500 word essay discussing student's perspective of the Interior Design industry and why they are interested in Interior Design is essential.

IV. Portfolio Evaluation:

Strong presentation shows work in its best light and indicates students' ability to communicate in an effective manner.

The following criteria use to assess portfolio:

- Problem Solving & Creative Skills
- Drawing & Visual Skills
- Digital Literacy & Computer Skills
- Communication Skills
- Development of ideas - evidence of how you think
- An interest in contemporary interior design and the built environment.
- Experimental approach in your 3D work to handling materials in unusual combinations.
- Spatial awareness and an ability to think about interior design built environment.

Procedure for evaluation:

- Submission of priory approved portfolio hard copy.
- Make a presentation of their portfolio work (soft copy) in front of the examiners.
- Viva-voce
- The Portfolios will be reviewed by a jury consisting of external and internal examiner to be appointed by the Department / University.
- The jury will evaluate the soft copy presentation as well as a hard copy of portfolio.

Course Evaluation:

Components	**Creative skill**	**Design Research**	**Presentation**	**Total**
Weightage (%)	**40**	**40**	**20**	**I00**

Syllabus - Eighth Semester

TRAINING & ONSITE LEARNING

(Practical Industrial Training)

Course Code: IND2837 **Credit Units: 16**

Training Objective:

This is an industrial training session, which provides the opportunity to learn and work within a professional environment with practicing interior designers. The basic objective of training is to provide first hand practical exposure of the professional functioning of Interior Design industry and to acquaint students with the culture of corporate. The training will also provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus, this training is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach. Students can be undertaken their practical training in India or abroad.

Training Contents:

(NB: Submission of Training Report will be part of the Final Training Evaluation)

SESSIONS – I **:** **TRAINING.**

General Guidelines:

Every student of under graduate courses will be required to undergo a practical training in a interior design organization approved by the Institute for Minimum of '90 calendar days'. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him / her during the period of training. The work done by the candidate during the training period shall be submitted in the form of a report as per the guidelines provided by the Department.

Attitude:

- A member of the faculty will supervise the candidates during their Training along with a supervisor from Industry.
- Students need to aware of work environment and constantly look for opportunities to learn more about interior design.
- An internship is a privilege - the firm is not receiving payment for the hours they spend to train the student.
- It is student responsibility to provide value to them (not necessarily the other way around).
- Students need to take responsibility for making training as informative as can.
- Students need to document what they observed, ask lots of questions and show initiative.
- Training and work should be creative, exciting, noteworthy and detailed.

Progress Report:

- Students have to compulsorily submit a summary report of their progress once in every two week undersigned by the industrial supervisor.

Attendance:

- Minimum of '90 calendar days' of training is compulsory for students as a 'full-time trainee'. Daily attendance is compulsory and to be marked daily and duly checked and signed by the industrial and faculty supervisor.

- Those who are failure to complete the training with minimum of 90 days will not be considered for final examination.

The student will be required to repeat the training when:

- (i) The report from the employer is not satisfactory.

- (ii) The attendance in the employer office is less than 70% of the number of days required for training.

SESSIONS - II : TRAINING REPORT EVALUATION AND PRESENTATION.

The candidates will prepare a comprehensive Report. The Report and the certificate from the organization should be attested by the organization where the candidate did the Internship and the same will be submitted to the faculty for evaluation.

Guidelines for Writing an Internship Report

The Industrial Training Report should contain the items as suggested below and is to be presented in the manner and order listed. Students are advised to download the Microsoft Word template of the Industrial Training Report from the Industrial Training website and use the template to prepare the report.

Contents of Training Report:

1. Front Cover (Title Page)
2. Industrial Training Certificate (From Organization)
3. Declaration
4. Acknowledgements
5. Bonafide Certificate cum Report Evaluation (From Faculty Guide & Internal and External Examinar)
6. Abstract
7. Table of Contents
    - List of Tables (optional)
    - List of Figures (optional)
8. Body of the Industrial Training Report
    - Introduction/Learning Outcome.
    - Detail of Working Experience: Description of Tasks & Application of Theory and Soft Skills
    - Conclusion and Recommendations.
9. References
    - Citation in the text (if applicable)
10. Appendices
    - Summary of Daily Records, etc.

Evaluation Method for Training Report:

Chapter Scheme for the Training Report.			**Marks Distribution.**
Overall Report Format / Layout		**:**	05Marks
Chapter I:	Introduction / /Learning Outcome.	**:**	20marks
Chapter II:	Detail of Working Experience	**:**	30 marks
Chapter III:	Conclusion and Recommendations	**:**	15 marks
Total		**:**	70 Marks

Report Format:

The report has to be written in font Times New Roman, 12 points, 1.5 lines spacing, Print / Type on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

Evaluation and Presentation:

- Submission of Training Report.
- Brief oral presentation with 'Power Point' about the training.
- Evaluation by a jury consisting of external and internal examiner to be appointed by the Department / University.
- Failure to submit the Training Report or failure to appear at the Presentation / Viva-voce Examination will be treated as "Absent" in the Final Examination.

Evaluation Scheme:

Components	**Attendance**	**Training Report.**	**Presentation**	**Viva-Voce**	**Total**
Weightage (%)	**10**	**70**	**10**	**10**	**100**

ANNEXURE-I.- EXAMINATION SCHEME

A. Exam Scheme of 30 % (Internal) + 70 % (External)

S. No.	Sem.	Course Code	Course Name	Mode	Components			
					Internal			External
					A	H	CT	EE
1	1	IND 2101	Language of Design #	Theory	05	10	15	70
2	1	IND 2102	Design Fundamentals & Illustration Techniques -I	Practical	05	10	15	70
3	1	IND 2103	Design Elements& Principles	Practical	05	10	15	70
4	1	IND 2104	Design Studio – I (Basic Graphics)	Studio	05	10	15	70
5	1	IND 2105	Colour Concept & Applications	Practical	05	10	15	70
6	1	IND 2106	Introduction to Craft & Model Making	Practical	05	10	15	70
7	1	IND 2107	History of Design& Culture	Theory	05	10	15	70
8	1	IND 2108	Calligraphy Exploration	Practical	05	10	15	70
9	1	IND 2109	Fundamentals of Form Studies.	Practical	05	10	15	70
10	2	IND 2201	Introduction to Design Theory #	Theory	05	10	15	70
11	2	IND 2202	Technical Drawing & Illustrations	Practical	05	10	15	70
12	2	IND 2203	Design Fundamentals & Illustration Techniques - II	Practical	05	10	15	70
13	2	IND 2204	Design Studio – II (Photography & Videography)	Studio	05	10	15	70
14	2	IND 2205	Application of Color Theory	Practical	05	10	15	70
15	2	IND 2206	Fundamentals of Applied Ergonomics	Theory	05	10	15	70
16	2	IND 2207	Typography Exploration	Practical	05	10	15	70
17	2	IND 2208	Introduction to Prototyping Techniques	Practical	05	10	15	70
18	3	IND 2301	Introduction to Spatial Design #	Theory	05	10	15	70
19	3	IND 2302	Interior Design Materials & Applications	Theory	05	10	15	70
20	3	IND 2303	Elements of Interior Space Planning & Scaling	Practical	05	10	15	70
21	3	IND 2304	Psychology of Living Environments.	Theory	05	10	15	70
22	3	IND 2305	Application of Analytic Geometry	Theory	05	10	15	70

23	3	IND 2306	History of Interior Design & Study on Popular Styles	Theory	05	10	15	70
24	3	IND 2307	Lighting & Colour in Interiors	Theory	05	10	15	70
25	3	IND 2308	Perspective Drawing Techniques & Technical Specs - I	Practical	05	10	15	70
26	3	IND 2309	Interior Design Studio - I	Studio	05	10	15	70
27	3	IND 2310	Interior Workshop Practice - I	Practical	05	10	15	70
28	4	IND 2401	Sustainable Design #	Theory	05	10	15	70
29	4	IND 2402	Advanced Interior Design Materials & Applications	Theory	05	10	15	70
30	4	IND 2403	Interior Services	Theory	05	10	15	70
31	4	IND 2404	Estimation, Costing & Project Management	Theory	05	10	15	70
32	4	IND 2405	Perspective Drawing Techniques & Technical Specs-II	Practical	05	10	15	70
33	4	IND 2406	Interior Design Studio - II	Studio	05	10	15	70
34	4	IND 2407	Interior Workshop Practice - II	Practical	05	10	15	70
35	5	IND 2501	Design Thinking & Creative Problem Solving #	Theory	05	10	15	70
36	5	IND 2503	Interior Safety Systems and Building Management	Theory	05	10	15	70
37	5	IND 2504	Textile in Interiors	Theory	05	10	15	70
38	5	IND 2505	Interior Landscape Design	Practical	05	10	15	70
39	5	IND 2506	Interior Design Studio - III	Studio	05	10	15	70
40	5	IND 2507	Computer Aided Interior Design & Drafting	Practical	05	10	15	70
41	5	IND 2508	Interior Space Modeling Workshop – I.	Practical	05	10	15	70
42	6	IND 2601	Introduction to Design Management #	Theory	05	10	15	70
43	6	IND 2602	Marketing & Entrepreneurship Development	Theory	05	10	15	70
44	6	IND 2603	Professional Practice &Office Management	Theory	05	10	15	70
45	6	IND 2604	Interior Design Studio -IV	Studio	05	10	15	70
46	6	IND 2605	Computer Aided Interior Design & Visualization	Practical	05	10	15	70
47	6	IND 2606	Interior Space Modeling Workshop – II.	Practical	05	10	15	70
48	6	IND	Furniture Ergonomics & Design (CE)	Practical	05	10	15	70

		2607						
49	6	IND 2608	History of Furniture Decoration (CE)	Theory	05	10	15	70
50	6	IND 2609	Furniture Construction and Detailing (CE)	Theory	05	10	15	70
51	6	IND 2610	Sustainable Interior Design & Materials (CE)	Theory	05	10	15	70
52	6	IND 2611	Sustainable Interior Renovation (CE)	Theory	05	10	15	70
53	6	IND 2612	Adaptive Reuse And Retrofit (CE)	Theory	05	10	15	70
54	6	IND 2613	Performance Space Design (CE)	Theory	05	10	15	70
55	6	IND 2614	Public Art (CE)	Theory	05	10	15	70
56	6	IND 2615	Public Space Design - Contextual Studies (CE)	Studio	05	10	15	70
57	8	IND 2701	Advanced Interior Design Studio	Studio	05	10	15	70
58	8	IND 2702	Design Research Methods & Presentation Techniques.	Theory	05	10	15	70

B. Exam Scheme of 100% (Internal)

1. Seminar

(Common for Course code: IND2233 / IND2433 / IND2633 / IND2733)

Components	Organisation andRelevance of content	Literature Review	Bibliography	Presentation	Total
Weightage (%)	**30**	**30**	**20**	**20**	**100**

2. Workshop

(Common for Course code: IND2233 / IND2433 / IND2633)

Components	A	AP	MCQ	Solving the case/ Assignment / Write up	Total
Weightage (%)	**10**	**30**	**30**	**30**	**100**
(**A** - Attendance; **AP** - Active Participation; **MCQ** - Multiple Choice Questions)					

3. Documentation Project

(Course code: IND2502/ / Semester: 05)

Components	Project Report	Viva-Voce	Presentation	Total
Weightage (%)	**70**	**20**	**10**	**100**

4. Integrated Project Work

(Course code: IND2432 / Semester: 05)

Components	Project Report	Viva-Voce	Presentation	Total
Weightage (%)	**70**	**20**	**10**	**100**

5. **Interior Design Dissertation** **(Course code: IND2737 / Semester: 07)**

Components	Project Report	Viva-Voce	Presentation	Total
Weightage (%)	70	20	10	100

6. **Interior Design Portfolio Development.** **(Course code: IND2736 / Semester : 07)**

Components	Creative skill	Design Research	Presentation	Total
Weightage (%)	40	40	20	I00

7. **Training & Onsite Learning** **(Course code: IND2837 / Semester : 08)**

Components	Attendance	Training Report.	Presentation	Viva-Voce	Total
Weightage (%)	10	70	10	10	100

ANNEXURE-II.– LIST OF HAND TOOLS AND EQUIPMENTS

S. NO.	NAME OF THE ITEM
I	***ART MATERIALS FOR DESIGNING.***
1.	Pencil: H, HB, 2B, 3B, 4B, 5B, 6B
2.	12" Plastic Transparent Scale.
3.	12" Metal Steel Scale
4.	Staedtler colour pencil
5.	Fine Point Utility Marker, Black
6.	Drawing pens
7.	White Eraser- Large
8.	Pocket-sized pencil sharpener
9.	1" & ½" Masking Tape
10.	Tracing Paper
11.	Camlin Premium Poster Colours (12 colour)
12.	Camlin Artist's Water Colour (12 Colour)
13.	Crayons, Charcoal, Pastels, etc.
14.	Drawing Inks (06 Colours)
15.	Calligraphy Nibs and Pen set.
16.	Letter template (Metal)
17.	Set of Round and Flat Artist quality brushes
18.	Medium size Artist'sPalette
19.	Sponge

S. NO.	NAME OF THE ITEM
II	***MATERIALS FOR TECHNICAL DRAWING***
1.	Adjustable set square with beveled edge – 30 cm
2.	Compass with Long arm & pen holder
3.	Protractor – 15 cm
4.	Graphic Pens / Ink / Stencil
5.	Triangular Scale 30 cm (feet / inch, metric)
6.	Clutch pencil – 0.5mm , 0.2 mm , 2mm.
7.	M.D / Parallel Bar / T scale – 1250 mm long
8.	Plastic French Curve with ink edge - set of 12
9.	Flexi curve- 80cm
10.	Furniture template 1:50, 1:100,1:200
11.	Circular and oval template
12.	Metric Tape-5M
13.	Calculator Scientific
14.	Beam Compass with pen holder (Rotring / Staedtler made)
15.	Erasing shield small & Big sizes
IV	***COMPUTER & SOFTWARE***
1.	Laptop
2.	16 GB Pen drive

20. Cartridge sheets (White / Off-white) (A3 Size.)
21. Spiral-bound Designer's Sketch book (A4 size - 85 gsm paper with grid pattern)
22. Artist Sketch book (A4 size)
23. A3 Size. Portfolio Case /folder
24. Notebook & Pen, A4 Size White Plain Paper
25. Ring Binder/Box File.
26. Acrylic Colors (06 Colors)

III MODEL MAKING MATERIALS.

1. Transparent cello tape
2. Medium sized Scissors
3. Glue Stick
4. Synthetic Adhesive - (UHU POR or POLY ZAP)
5. Bond Cyanoacrylate Adhesive (Feviquick / Super glue)
6. Medium sizes xacto knife
7. Cutting Mat.
8. Medium Gauge Round Copper Wire
9. Medium Gauge Round Aluminium Wire
10. Plasticine (Modeling Clay)
11. Balsa wood (Soft wood) blocks
12. Small measuring tapes / Inch tape
13. White Form board
14. Colour vinyl flexible sheets
15. Colour chart papers / Coloured cards
16. Old Magazines with variety of images.
17. Broachers and Catalogs with images.
18. Old newspapers.
19. Hacksaw wire blade and frame
20. Thermocol, Paper Mache, Tin foil
21. Heavy Duty Stapler& Pins
22. Small chisel, Hammer, Cutting Pliers
23. Screwdriver and small size screws
24. Steel Pins, small size nails etc.
25. Needle punch, Needle File Set
26. Engineers Square
27. Nose Pliers
28. Hard Wire & Cable Cutter
29. Junior Hacksaw & Blades
30. Razor Saws

3. Adobe Photoshop
4. Adobe Illustrator
5. Corel Draw
6. Autodesk 3D S Max
7. Google Sketch up
8. AutoCAD
9. Revit Architecture
10. External Hard disk
11. SLR Digital Camera.

Amity Institute of Design (Fine Arts)

Bachelor of Fine Arts

FLEXILEARN
-Freedom to design your degree

Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus – First Semester

DRAWING-I

Course Code: FNA2101 **Credit Units: 03**

Course Objective:
Drawing is the basic element of learning art. Drawing exercises are to acquire accurate observation and skills to present representational art.

Course Contents:

Module I
Drawing still life or object drawing to explore basic drawing tool 'Pencil'. Suggestion of solidity by line work as well as light and shade, realization for rhythmic relationship between line, mass, volume and texture, emphasis on various visual experiences.
a) Learning basic elements of drawing.
b) Still life or object drawing, Free hand drawing from nature.

Module II
Pencil work representing still life with familiar objects .like fruits, foliage drapery, books and flowers etc.
Emphasis on creating characteristics and volume (light and shade).
a) Basic knowledge of drawing with pencil.
b) Still life with from arranged objects like fruits, drapery etc.

No. of works to be done - 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

***References*:**
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 195
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.

GEOMETRICAL DRAWING AND PERSPECTIVE - I

Course Code: FNA2102 **Credit Units: 02**

Course Objective:
Introduction to orthographic projections in simple positions, drawing of plan, elevation and section of simple objects to scale, full size, reduced or enlarged.

Course Contents:

Module I
Understanding and use of geometrical instruments. Simple exercise in angles and geometrical figures i.e. triangle, quadrilaterals, parallelograms, squares, rectangles, rhombus, polygons, circles etc.

Module II
Projections of solids in simple positions. Drawing of plan, elevation and section of simple objects. Enlargement and reduction of drawings in different scales. One point, two point and three point perspective etc.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Geometrical Drawings, C. L. Martin, Macmillan Co, London, 1968.

References:
- Artists Technique, Dr. Kurt Herbert

DESIGN – I

Course Code: FNA2103 **Credit Units: 02**

Course Objective:
Learning Design is to understand the basic visual language and various methods of form synthesis. It is to develop intellectual and imaginative abilities in creative thinking. It is to provide technical know-how about the principles of design, distribution of space, proportion, behaviour of force and energy contained in lines, form and colour. Organized design exercises in different media offer a wide range of opportunity to develop systematic and intuitive approaches to Creative Design work.

Course Contents:

Module I
Transformation of simple shapes into well balanced design. Understanding the subjective and objective value of applied art. Visualize complex forms into simple, primitive and basic forms from nature also.

Module II
Repetition of a well composed square block, with simple shapes or image into different scale to create rational or systematic design. Concept of positive and negative areas.

No. of works to be done - 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- A history of Graphic Design, Philip B. Meggs, Viking, London, 1986.
- The Designer's Handbook, Stan Smith & H. F. ten Holts.

References:
- The Creative Connection, Winteb/Milton
- Innovation, Industrial Designers Society of America

PAINTING - I

Course Code: FNA2104 **Credit Units: 02**

Course Objective:
The objective of this course is to acquire experience in basic knowledge to explore painting techniques. Structured exercises on painting include basic colour theory and pictorial composition, which enables students to be confident in the use and manipulation of colour. It also provides a clear idea of different painting techniques. Like water colour, Tempera and opaque colour.

Course Contents:

Module I
Understanding the colour and its possibilities. Practical approach to know primary, secondary and other colours to develop a clear perception about painting work. Painting from objects and nature; study of colours, forms, perspective, tone and texture. Experimenting with vibrant, fluorescent colours and passionate sophistication of opaque and transparent colours. Draw and paint with transparent or opaque colour on a theme (from memory & Nature)

Module II
Handling the tools, application and control of a wide range of painting media. Understanding the detail complex possibilities exploiting different types of colours. Project works on monochromatic experimentations.
Still life with monochromatic.

No. of works to be done – 06

- Colour knowledge and colour wheels
- Memory and landscape painting.
- Monochrome still life

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The complete painting course, Wendon Blake, Bonanza Books, New York, 1984

References:
- Drawing and Painting the natural environment, Barelay Sheaks, Warcester, Massachusetts, 1974
- Collage by Elizbeth
- Mosaics by Angelice Garnentt

SCULPTURE - I

Course Code: FNA2105 **Credit Units: 02**

Course Objective:
Clay Modeling to develop visual awareness in three dimensions, through manipulative skills in clay and plaster etc.

Course Contents:

Module I
Simple relief composition in clay, technique of terracotta and direct modeling in plaster.

Module II
Studies to understand three dimensional forms, texture and colour of the material, principle of weight, volume, space and contour.

Module III
Finishing of the final sculpture or relief and installation.

No. of works to be done - 03

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Modelling a likeness in clay, Daisy Grubbs

References:
- The Sculptors Handbook, Stain Smity & H. F. Ten Holt
- Complete Guide to Sculpture, Barry Midgley
- Sculptor's Manual, Bainbridge Copnall

PRINT MAKING - I

Course Code: FNA2106 **Credit Units: 02**

Course Objective:
This hands-on course is to introduce basic techniques in surface printing in one and more colors. It is to learn and experience simple methods of making printing lino & wood cut technique.

Course Contents:

Module I
Learning basic studio techniques in print making, surface printing relief media and use of printing equipments and tools. Understanding the concept of design construction and composition in black and white. Simple method of making relief blocks for lino print based on final design layout.

Module II
Handling the process of ink application on prepared block; experimenting with different colour-combination and paper surface. Wood cut printing in black and white.

No. of works to be done - 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Prints: Art and Techniques, Lambert, Susan, V & A Pub, London, 2001.

References:
- The Woodcut Artist's Handbook, George A. Walker
- The Best of Printmaking: An International Collection, Lynne Allen, Rockport Publishers sept.97
- Printmaking: A Contemporary Perspective, Paul Coldwell, Black Dog Publishing,28th march 10

HISTORY OF ART - I

Course Code: FNA2107 **Credit Units: 02**

Course Objective:
The objective of teaching history of art is to acquaint the students with art and artists through the ages, from the earliest time to the present. The course is designed on the conviction that the learners can understand its relation to his own time and the technology at his command through an awareness of the relationship to his artistic predecessors.

Course Contents:

Module I
What is art?
Introduction to various forms of art. Basics on conceptual and representational Approach. Difference between history and art history. Comparative study of art in relation to social, political aesthetical and philosophical aspects

Module II
Theoretical analysis of visual elements, concept of space, line, colour and forms
In works of art. Visual acquaintance of selected great works of art.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
Indian
- Fundamental of Indian Art by S. N. Dasgupta
- History of Indian and Indonesian Art by A. K. Coomaraswamy

Western
- History of Art by Janson
- Art through the ages by Helen Gardener

References:
- The Art and Architecture of Indian by Benjamin Rowland.
- The Story of Indian Art by S. K. Bhattacharya.
- 5000 Years of Indian Art by Shivaramaurti
- A History of Fine Arts in India and West by Edith Tomory
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy
- Aesthetics by Beneditto Croce
- History of Aesthetics by Bosanquet
- Art of Mankind by Van Loon
- Civilization of Mankind by Van Loon
- Concise History of Art-Vols. 1 & 2 by Gerrmain. Bazin.
- Introduction of Chinese Art by Lawrence Binyon
- History of Indian and Indonesian Art by Bejamin Rowland.
- Concise History of Art Vols. 1&2 by Germain Bazin
- Italian Painters of the Renaissance by Bernard Berenson

- Art Now by Herbert Read
- Grassroot of Art by Herbert Read.
- History of Modern Art by H. H. Arnason.
- History of Painting by Janson.
- History of Western Painting by Eric Newton.

VISUAL GRAPHICS - I

Course Code: FNA2108 **Credit Units: 02**

Course Objective:
The objective of the course is to focus on the usage of the digital media. The course lay emphasis on the basics of designing software's to ensure that the students are updated with the technological aspect of the industry.

Course Contents:

Module I
Photoshop: Introduction to any designing software's.
Getting familiar with the tools.

Module II
Photoshop: Making various layouts using the tools

No. of works to be done - 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Adobe Photoshop CS5 for Photographers: A professional image editor's guide to the creative use of Photoshop for the Macintosh and PC by Martin
- Adobe Photoshop CS5 Classroom in a Book by Adobe Creative Team
- Photoshop CS5: The Missing Manual by Lesa Snider

PHOTOGRAPHY - I

Course Code: FNA2109 **Credit Units: 02**

Course Objective:
The objective of the course is to introduce the fundamental technology, theory, history, techniques and applications of photography.

Course Contents:

Module I
Basic use of camera, its various parts and their functions.

Module II
Observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Ways of Seeing by John Berger
- Light and Lens: Photography in the Digital Age by Robert Hirsch

Syllabus – Second Semester

DRAWING - II

Course Code: FNA2201 **Credit Units: 02**

Course Objective:
Drawing exercises are to learn accurate observation and skills to represent work of art from life or surroundings.

Course Contents:

Module I
Drawing human figures to study proportion. Centre of gravity, inclination of main mass based on anatomical structure. & Animal Study.
a) Sketches / drawing

Module II
Drawing from nature - Outdoor study

No. of works to be done – Drawing 10 + Sketching 100

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 195
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.

GEOMETRICAL DRAWING AND PERSPECTIVE - II

Course Code: FNA2202 **Credit Units: 02**

Course Objective:
This is to provide adequate knowledge on visual illusion depending upon the distance and point of view. It makes the learners well-equipped in measurement and scaling system related to visual art.

Course Contents:

Module I
Isometric projection of simple objects like cube, prism, pyramids, cone etc.

Module II
Introduction of perspective - Parallel and angular perspective. Terminology like picture plane, station point, vanishing point. Perspective of simple geometrical objects and their combination.

No. of works to be done - 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Geometrical Drawings, C. L. Martin, Macmillan Co, London, 1968.

References:
- Artists Technique by Dr. Kurt Herbert

DESIGN – II

Course Code: FNA2203 **Credit Units: 02**

Course Objective:
The objective of learning Design and exercises is to develop spontaneity in creative thinking executing a meaningful construction of forms based on principles of design.

Course Contents:

Module I
Creating conceptual design emphasizing the importance of lines and forms. Project on experimental design in creative forms

No. of works to be done - 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- A history of Graphic Design, Philip B. Meggs, Viking, London, 1986.
- The Designer's Handbook, Stan Smith & H. F. ten Holts.

References:
- The Creative Connection, Winteb/Milton
- Innovation, published by Industrial Designers Society of America

PAINTING - II

Course Code: FNA2204 **Credit Units: 02**

Course Objective:
Learning colour techniques of transparent and opaque representing still life and social themes.
Course Contents:

Module I
Still life with multicolour in transparent water colour technique.

Module II
Developing opaque colour treatment on figurative composition based on social themes and Landscape painting.
Study of Indian Folk painting.

No. of works to be done - 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Water Color Painting step by step, Arthur Z Guptill, Waston Goptill, New York, 1967.

References:
- Drawing and Painting the natural environment, Barelay Sheaks, Warcester, Massachusetts, 1974
- Painting Sea and Sky, Jean Khanbegian, Grosset and Dunlop, New York, 1967

SCULPTURE - II

Course Code: FNA2205 **Credit Units: 02**

Course Objective:
Clay Modeling to develop visual awareness in three dimensions, through manipulative skills in clay and plaster etc.

Course Contents:

Module I
Simple relief composition in clay, technique of terracotta and direct modeling in plaster.

Module II
Studies for understanding the aesthetics of three dimensional forms, textures body, color of the material, principle of weight, volume, space and contour.

Module III
Finishing of the final sculpture or relief landscape and figurative composition and installation.

No. of works to be done- 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Modelling a likeness in clay, Daisy Grubbs

References:
- The Sculptors Handbook, Stain Smity & H. F. Ten Holt
- Complete Guide to Sculpture, Barry Midgley
- Sculptor's Manual, Bainbridge Copnall

PRINT MAKING - II

Course Code: FNA2206 **Credit Units: 02**

Course Objective:
To introduce more techniques of surface printing in one and more colours, creating blocks with cardboard, plywood or linoleum. Experimental printing with other materials.

Course Contents:

Module I
Experimenting and exploring various texture of different surface using materials like wire, wire mesh, coarse cloth, cork, cardboard and ply wood on print surface. Taking monoprints.

Module II
Experimenting with different color-combination and paper surface.

No. of works to be done- 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Printmaking in the sun, waston guptill, dan Weldon, 1st Jan 2001.
- Prints: Art and Techniques, Lambert, Susan, V & A Pub, London, 2001.

References:
- The Woodcut Artist's Handbook, George A. Walker
- The Best of Printmaking: An International Collection, Lynne Allen, Rockport Publishers sept.97
- Printmaking: A Contemporary Perspective, Paul Coldwell, Black Dog Publishing,28th march 10

HISTORY OF ART - II

Course Code: FNA2207 **Credit Units: 02**

Course Objective:
Teaching history of art is to acquaint the students with the importance of art in human life and its evolution through the ages from primitive era to modern times analyzing the progressive development in different countries and also in India.

Course Contents:

Module I
A detail study of Primitive art world wide.
Oriental Art:
Indus Valley Civilization
Japanese art
Chinese art.

Module II
Introduction to Middle Eastern art and Occidental art.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
Indian
- Fundamental of Indian Art by S. N. Dasgupta
- History of Indian and Indonesian Art by A. K. Coomaraswamy

Western
- History of Art by Janson
- Art through the ages by Helen Gardener

References:
- The Art and Architecture of Indian by Benjamin Rowland.
- The Story of Indian Art by S. K. Bhattacharya.
- 5000 Years of Indian Art by Shivaramaurti
- A History of Fine Arts in India and West by Edith Tomory
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy
- Aesthetics by Beneditto Croce
- History of Aesthetics by Bosanquet
- Art of Mankind by Van Loon
- Civilization of Mankind by Van Loon
- Concise History of Art-Vols. 1 & 2 by Gerrmain. Bazin.
- Introduction of Chinese Art by Lawrence Binyon
- History of Indian and Indonesian Art by Bejamin Rowland.
- Concise History of Art Vols. 1&2 by Germain Bazin
- Italian Painters of the Renaissance by Bernard Berenson

- Art Now by Herbert Read
- Grassroot of Art by Herbert Read.
- History of Modern Art by H. H. Arnason.
- History of Painting by Janson.
- History of Western Painting by Eric Newton.

VISUAL GRAPHICS - II

Course Code: FNA2208 **Credit Units: 02**

Course Objective:
The objective of the course is to focus the software's which are the core of every artist. The course lay emphasis on the basics of designing software's to ensure that the students are updated with the technological aspect of the industry.

Course Contents:

Module I
Introduction to Coral Draw.
Getting familiar with the tools.

Module II
Designing using Coral Draw.

No. of works to be done - 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Corel DRAW X5 The Official Guide by Gary David Bouton
- Corel DRAW 8 for Dummies by Deke McClelland
- Adobe Illustrator CS5 Classroom in a Book by Adobe Creative Team

PHOTOGRAPHY - II

Course Code: FNA2209 **Credit Units: 02**

Course Objective:
The objective of the course is to introduce the fundamental technology, theory, history, techniques and applications of photography.

Course Contents:

Module I
Rules of photography
Learning Camera and its basic components (Digital SLR & Beta Camera)

Module II
Learning the use of Camera Angles, Shots and lighting techniques while doing photography.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Ways of Seeing by John Berger
- Light and Lens: Photography in the Digital Age by Robert Hirsch

Syllabus – Third Semester

HISTORY OF ART - III

Course Code: FNA2301 **Credit Units: 02**

Course Objective:
The objective of teaching history of art is to acquaint the students with visual cultures from the earliest time to the present. The course is designed on the conviction that the learners can understand its relation to his own time and the technology at his command through an awareness of the relationship to his artistic predecessors.

Course Contents:
Module I
Mauryan Period
Sunga Period
Kushan Period
Gandhara Period

Module II
Ceylon
Cambodia
Module III
Early Christian Period

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:
Text:
Indian
- Fundamental of Indian Art by S. N. Dasgupta
- "Dance of Shiva" & "Transformation of Nature in Art" by A. K. Coomaraswamy

Western
- Art of Mankind by Van Loon
- Civilization of Mankind by Van Loon
- History of Art by Janson

References:
- Art through the ages by Helen Gardener
- Concise History of Art-Vols. 1 & 2 by Gerrmain. Bazin.
- History of Indian and Indonesian Art by A. K. Coomaraswamy
- The Art and Architecture of Indian by Benjamin Rowland.
- The Story of Indian Art by S. K. Bhattacharya.
- 5000 Years of Indian Art by Shivaramaurti
- A History of Fine Arts in India and West by Edith Tomory
- Introduction of Chinese Art by Lawrence Binyon
- History of Indian and Indonesian Art by Bejamin Rowland.
- Concise History of Art Vols. 1&2 by Germain Bazin
- Italian Painters of the Renaissance by Bernard Berenson
- Art Now by Herbert Read
- Grassroot of Art by Herbert Read.
- History of Modern Art by H. H. Arnason.
- History of Painting by Janson.
- History of Western Painting by Eric Newton.

AESTHETICS - I

Course Code: FNA2302 **Credit Units: 02**

Course Objective:
This course is essential for all the students acquiring fine arts skill to improve their sense of beauty. An artist must have a clear concept regarding theory of beauty to execute their idea in proper way.

Course Contents:

Module I
The importance of Aesthetics for a fine artist.
Introduction to Indian Aesthetics and its brief historical background.
Concept of beauty based ancient scriptures and their relevance of art.

Module II
Elements of art- Five Schools of Indian Aesthetics.
Inter-relationship of Visual and performing art.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Introductory Reading in Aesthetics by John Hospers

References:
- Aesthetic by Beneditto Croce
- History of Aesthetics by Bosanquet
- Philosophy of Beauty by E. F. Carritt
- Art Now by Herbert Read

SUMMER PROJECT EVALUATION-I

Course Code: FNA2335 **Credit Units: 03**

Course Objective:
The students have to prepare a summer assignment to develop their creative skills. They also have to prepare summer assignment and give a presentation highlighting the following:

- Balance
- Perspective
- Concept
- Value
- Texture
- Composition
- Art and Artist

Examination Scheme:

Assignment	-	60
Viva voce	-	40
Total	**-**	**100**

SPECILIZATION - SCULPTURE

STUDY FROM LIFE - I

Course Code: FNA2303 **Credit Units: 03**

Course Objective:
The objective of sculptural study from life is to learn human forms in details. It provides the skill to sculpt human figure in realistic way based on anatomy, planes, body masses, balance, posture and rhythm.

Course Contents:

Module I
Life Drawing:- Bust & Portrait:- Study of Human Portrait and bust using different drawing tools to study blocks, posture and rhythm, unity of body parts, inter-related force of lines, foreshortening and finishing.

Module II
Head Study Male & Female, Building of Armature study in clay and direct plaster.

Module III
Understanding of structure and proportion and detail modeling of full figure. Waste mould technique & casting in PoP.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Modeling a Likeness in Clay, Daisy Grubbs

References:
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- The Sculptor's Handbook, Prof H. F. Ten Holt

COMPOSITION - I

Course Code: FNA2304 **Credit Units: 02**

Course Objective:
The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I
Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II
Building of armature for direct work in plaster or cement on the given topic.

Module III
Waste mould and piece mould technique and casting in wax.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics.
- Techniques and materials by Barry Midgley.

CARVING - I

Course Code: FNA2305 **Credit Units: 02**

Course Objective:
This course is to learn about working with woods and its various texture to create relief work as well as three-dimensional composition.

Course Contents:

Module I
Introduction to various kinds of wood and carving tools. Practical approach to the introductory phase.

Module II
Simple compositions suitable for curving with appropriate emphasis on techniques.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture, John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- Dictionary of tools(wood work), R. A. Salaman

MURAL - I

Course Code: FNA2306 **Credit Units: 02**

Course Objective:
The objective of this course is to train the learners how to work on wall surface using various mural mediums emphasizing technical aspects in details. Mural is a permanent work on building walls inside or outside. It provides professional experience and good knowledge of handling fundamentals of working on vertical wall surface using specific materials.

Course Contents:

Module I
Making suitable layout designing for mural work as per the basic technical aspects of working on wall surface, which is to be viewed from wide eye level.

Module II
Practical mural work on board using painting mediums.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

PHOTOGRAPHY - I

Course Code: FNA2307 **Credit Units: 02**

Course Objective:
This course is designed to provide an adequate training on photography emphasizing on handling the camera, techniques and equipments. Advanced experiments on nature and indoor subjects based on various kinds of light effects.

Course Contents:

Module I
Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

Module II
Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

CERAMICS - I

Course Code: FNA2308 **Credit Units: 02**

Course Objective:
This course is designed to provide basic training on ceramics.

Course Contents:

Module I
Simple slab work and wheel work

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

ASSEMBLAGE - I

Course Code: FNA2309 **Credit Units: 02**

Course Objective:
This course is to provide basic concept on assemblage work.

Course Contents:

Module I
Introduction to various kinds of materials and their characteristics.

Module II
Practical method of assemblage.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

SCULPTURE METHODS AND MATERIALS - I

Course Code: FNA2310 **Credit Units: 02**

Course Objective:
The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I
Types of clay, Plaster of Paris, Cement & its properties

Module II
Nature and types of wood its growth and process of seasoning use of various tools and equipment.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.
- Methods and Materials of Sculpture by David Raid.

SPECIALISATION– APPLIED ARTS
DRAWING AND ILLUSTRATION – I

Course Code: FNA2311 **Credit Units: 02**

Course Objective:
Drawing exercises are must to develop creative ability, which is essential for any artist. It is to develop accurate sense of observation and skills of graphic presentation.

Course Contents:

Module I
Life and object study to understand light and shade, half tone and colored. Sketching from nature. Quick sketches in limited time from life and nature - Outdoor as well as indoor.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Art of Human Illustration, Nick Meglin,
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980

DESIGN-III

Course Code: FNA2312 **Credit Units: 03**

Course Objective:
This will be student's first introduction to design. Students will do small basic level exercises to understand design.

Course Contents:

Module I
Introduction to logo Design and Overlapping of different forms identify proportions with texture black & white and Colour.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980.

References:
- Design Graphics, C. L. Martin, Macmillan Co. London.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,

LETTERING AND TYPOGRAPHY – I

Course Code: FNA2313 **Credit Units: 02**

Course Objective:
Study and history of letter forms of both Roman and Vernacular as design form: spacing, study of basic type faces, study of fundamentals of layout and their practical application, preparation of simple typographical layout for News Papers.

Course Contents:

Module I
Study of basic type faces and exercise based on it

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Letter Assembly in Printing-D. Wooldridge

References:
- INFA Press and Advertising Year Book

PHOTOGRAPHY - III

Course Code: FNA2314 **Credit Units: 02**

Course Objective:
This course is designed to provide an adequate training on photography emphasizing on handling the camera, techniques and equipments. Advanced experiments on nature and indoor subjects based on various kinds of light effects.

Course Contents:

Module I
Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

Module II
Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

PRINTING TECHNIQUES – I

Course Code: FNA2315 **Credit Units: 02**

Course Objective:
This course in designed for learning basic techniques in print making, surface printing relief media and use of printing equipment and tools. This course provides training on technical method of making relief blocks with linoleum, cardboard, plywood and also serigraphy techniques.

Course Contents:

Module I
Creative experimentation with different colour combinations and paper surface. Printing exercises using relief blocks made from various materials based on different layouts, basically working on serigraphy.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S. Lumdsen
- Manal of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach

COMPUTER GRAPHICS – I

Course Code: FNA2316 **Credit Units: 02**

Course Objective:
Introduction to Design software related to designs.

Course Contents:

Module I
Application of Coral Draw software.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Computer Graphics, Edward Angel

ADVERTISING THEORY – I

Course Code: FNA2317 **Credit Units: 02**

Course Objective:
This course is to acquaint students about general introduction to advertising.

Course Contents:

Module I: Introduction to Advertising
Definition and characterizes of advertising
Role of Advertising
Benefits of Advertising
Function of Advertising
Advertising and Society
Ethical issues of Advertising

Module II: Origin and growth of advertising
Historical background and Future of Indian advertising
Changing trends of Indian Advertising

Module III: Economic and Social Implications of Advertising
Economic effects of Advertising
Explicit role of advertising
Indirect role of advertising
Social Issues in advertising

Module IV: Advertising in Marketing Mix
The Marketing concept
The Marketing Mix
Advertising Decisions
The Communication Spectrum

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Advertising Hand Book, D. V. Gandhi
- Modern Advertising, Hapner
- Economics Advertising, B. B. Chipling

References:
- Global Marketing & Advertising Understanding Cultural Paradoxes by Marieke K De Mooij.
- Effective Advertising: Understanding when, How and why advertising works by Gerard J Tellis
- Commonsense Direct Marketing by Drayton Bird
- The Advertising Business: Operations Creativity Media Planning, Integrated Communications by John Philip Jones.
- Advertising and the Mind of the Consumer: what works, what doesn't and why by Max Sutherland, Alice K Sylvester

SPECIALISATION – PAINTING
DRAWING - III

Course Code: FNA2318 **Credit Units: 02**

Course Objective:
The objective of Drawing Exercise is to learn to approach art in most direct way. It is an introduction to various aspects and techniques of drawing exploring variety of drawing tools and mediums such as pencil, charcoal, crayons, ink and color. This exercise provides accuracy in observation and great opportunity to study and experiment expressive force and spontaneity of line work. Drawing is the most significant basic skill of visual representation of real world.

Course Contents:

Module I: Still Life
Drawing exercises from selected arranged objects and drapery to learn and study using various drawing tools based on eye level, relative proportion, perspective, structure, form, volume, texture, source of light and its effect, balance and also tonal values.

Module II: Portraiture
Portraiture drawing study of human heads, construction of the skull, anatomy, proportion, planes, masses and specific feature; light and shade from different angles and finishing.
Life Drawing-Full Figure: Drawing study from full human figure based on human anatomy, proportion, planes and masses, building blocks, posture and rhythm, unity of body parts, inter-related force of lines, foreshortening and finishing.

Module III: Landscape/ Nature Study (outdoor)
Observation, finding the right view to study, addition and elimination, simplification, eye level and perspective, balance and rhythmic presentation with a unique aesthetic value.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:
- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison, from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.

PAINTING - III

Course Code: FNA2319 **Credit Units: 03**

Course Objective:
This is an intensive training to equip the students with a great skill for original and creative visual expression using different painting mediums and tools. Mastery of technical aspects provides essential foundation for the learners, though it is only means, not the end. Painting is the visual expression of thoughts, dreams and experiences. It is an introductory exposure to different schools, traditions, techniques and media of painting practiced through the ages.

Course Contents:

Module I: Still Life
Painting Study (Monochrome)from selected well arranged objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values, colour balance and colour perspective.

Module II: Painting from life: portraiture and full figure
Head study and full figure study (monochrome) same as drawing from life models (male & female)

Module III: Landscape
Outdoor study using different painting mediums (water colours/pastel/acrylic etc).

Module IV: Mix Media
Experimentation handling variety of painting mediums including collage and other innovative techniques working on still life, life or nature study to explore beyond traditional and academic method.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Notes on the techniques of Painting by Hilaire Hiler
- Painting Course by Ronald Pearsall

References:
- Big book of drawing and painting by Francisco Asensio Cerver.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.

COMPOSITION - I

Course Code: FNA2320 **Credit Units: 02**

Course Objective:
Composition exercise is the most important to learn and study theory of composition, individual approach to the possibilities. Experimenting innovative arrangement of the thing around to create unique visual presentation improves artistic sense and concept of beauty.

Course Contents:

Module I
Composition Exercises working on still life, life and nature study –outdoor and indoor; The 2-D and 3-D objects and the structural possibilities, use of colour and textural values, form and content compositions, use of suitable objects. Exercises based on traditional formats

Module II
Creative composition exercise from traditional paintings and imagination emphasizing on individual creative sense, transformation of simple shapes into well-balanced unique visual presentation.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Artist's Handbook by Ray Smith

References:
- Art Class ,Copy Right 1999 by Harper Collins Publishers
- Artist's Encyclopedia by John Quick

PHOTOGRAPHY - III

Course Code: FNA2321 **Credit Units: 02**

Course Objective:
This course is designed to provide an adequate training on photography emphasizing on handling the camera, techniques and equipments. Advanced experiments on nature and indoor subjects based on various kinds of light effects.

Course Contents:

Module I
Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

Module II
Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

PRINT MAKING - III

Course Code: FNA2322 **Credit Units: 02**

Course Objective:
This course in designed for learning basic techniques in print making, surface printing relief media and use of printing equipments and tools. This course provides training on technical method of making relief blocks with linoleum, cardboard, plywood and also making blocks using various metal sheets.

Course Contents:

Module I
Creative experimentation with different colour combinations and paper surface. Printing exercises using relief blocks made from various materials based on different layouts, basically working on silkscreen.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S. Lumdsen
- Manal of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach

COMPUTER GRAPHICS – I

Course Code: FNA2323 **Credit Units: 02**

Course Objective:
Introduction to Design software related to designs.

Course Contents:

Module I
Application of Coral Draw software.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Computer Graphics, Edward Angel

PAINTING METHODS AND MATERIALS - I

Course Code: FNA2324 **Credit Units: 02**

Course Objective:
The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I
Importance of method & materials.
Permanence and deterioration of paint.

Module II
Nature and characteristic of drawing and painting media such as Pencil, crayon, charcoal, pen and ink, water color, gouache, pastel and oil paint.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Method and Materials by Lynton Lamb.
  - A manual of Painting Materials & Techniques by Mark David Goattsegen

References:
- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy
- Color by Edith Anderson Feisner.

DRAWING FOR 2D ANIMATION - I

Course Code: FNA2325 **Credit Units: 04**

Course Objective:
The objective of this course is to develop 2D animation skills such as sketching and drawing for animation, basic principles of animation etc.

Course Contents:

Module I
Sketching and scribble drawings from life and movies.

Module II
Constructive concept of a cartoon character and line of action.

Module III
Perspective and animation principles.

Module IV
Detail study of human forms, animal forms and birds.

Module V
Animation exercises

No. of works to be done – 10

Examination Scheme:

Components	**P**	**C**	**A**	**EE**
Weightage (%)	10	15	5	70

Text & References:

- Human Machine, Bridgeman.
- Anatomy & Drawing, Victor Parrade
- Anatomy in Drawing, Andrew Lumis
- Dynamic Figure Drawing, Burn Hoggarth
- Human watching, Edward Maybridge
- Animal watching, Edward Maybridge.
- How to Animate Film Cartoons-Preston Blair

HISTORY OF ANIMATION – I

Course Code: FNA2326 **Credit Units: 02**

Course Objective:
The objective of this course is to provide in depth knowledge on historical background of animation which is to lay the foundation of the animation. Course focuses on the evolution of Animation Industry and the stages of its growth.

Course Contents:

Module I
Evolution of Animation.
Contribution of various countries in the development of modern animation era.

Module II
Animation history related to Walt Disney and other big companies that contributed in the development of modern animation era.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Enchanted Drawings: The History of Animation by Charles Solomon of Mice and Magic: A History of American Animated Cartoons; Revised and Updated (Plume Books) by Leonard Maltin and Jerry Beck

BOOK ART – I

Course Code: FNA2327 **Credit Units: 03**

Course Objective:
Objective of this course is to focus on drawing skills in print media as a form of book art such as illustration, comic strips, cartoon and caricature etc.

Course Contents:

Module I
Creating story concepts and characters (Manual)

Module II
Story boarding and character designing (Manual)

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Story Boarding 101 (A crash course in professional story boarding), Michael Wise Production, James Fraoli
- Prepare to Board! (Create Story and Characters for Animated Features and Shorts) by: Nancy Beiman

DIGITAL IMAGING – I

Course Code: FNA2328 **Credit Units: 02**

Course Objective:
The course objective is to develop graphic skill and designing concept in order to create digital work using various tools of the software.

Course Contents:

Module I
Basics of Adobe Photoshop.
Getting familiar with Adobe Photoshop tools and its application

Module II
Basics of Illustrator
Getting familiar with Adobe Illustrator tools and its application.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Adobe Photoshop CS4. Classroom in a Book : Adobe Creative Team
- Photoshop CS4 Digital Classroom : Jennifer Smith & Aquent Creative team

Adobe Illustrator CS3 Classroom in a Book (Book & CD-ROM) by Adobe Creative Team

PHOTOGRAPHY - III

Course Code: FNA2329 **Credit Units: 02**

Course Objective:
Objective of this course is to develop observation skill through photography which is very useful while making animation projects and short animation movies.

Course Contents:

Module I
Rules of Photography
Learning Camera and its basic components (Digital SLR& Beta Camera)

Module II
Learning the use of Camera Angles, Shots and lighting techniques while doing photography

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The Digital Photography Book by Scott Kelby
- The Photography Book by Ian Jeffrey
- The Photographer's Eye: Composition and Design for Better Digital Photos

PAINTING – I

Course Code: FNA2330 **Credit Units: 02**

Course Objective:
This is an intensive training to equip the students with a great skill for original and creative visual expression using different painting mediums and tools. Mastery of technical aspects provides essential foundation for the learners, though it is only means, not the end. Painting is the visual expression of thoughts, dreams and experiences. It is an introductory exposure to different schools, traditions, techniques and media of painting practiced through the ages.

Course Contents:

Module I: Still Life
Painting Study (Monochrome)from selected well-arranged objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values, colour balance and colour perspective.

Module II: Painting from life: portraiture and full figure
Head study and full figure study (monochrome) same as drawing from life models (male & female)

Module III: Landscape
Outdoor study using different painting mediums (water colours/pastel/acrylic etc).

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Notes on the techniques of Painting by Hilaire Hiler
- Painting Course by Ronald Pearsall

References:
- Big book of drawing and painting by Francisco Asensio Cerver.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.

Syllabus – Fourth Semester

HISTORY OF ART - IV

Course Code: FNA2401 **Credit Units: 02**

Course Objective:
The objective of teaching history of art is to acquaint the students with visual cultures from the earliest time to the present. The course is designed on the conviction that the learners can understand its relation to his own time and the technology at his command through an awareness of the relationship to his artistic predecessors.

Course Contents:
Module I
Gupta Period

Module II
Java Art

Module III
Byzantine period
Romanesque period

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Indian Art
- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy

Western:
- Art of Mankind by Van Loon
- Civilization of Mankind by Van Loon
- History of Art by Janson

References:
- Art through the ages by Helen Gardener
- Concise History of Art-Vols. 1 & 2 by Gerrmain. Bazin.
- History of Indian and Indonesian Art by A. K. Coomaraswamy
- The Art and Architecture of Indian by Benjamin Rowland.
- The Story of Indian Art by S. K. Bhattacharya.
- 5000 Years of Indian Art by Shivaramaurti
- A History of Fine Arts in India and West by Edith Tomory
- Introduction of Chinese Art by Lawrence Binyon
- History of Indian and Indonesian Art by Bejamin Rowland.
- Concise History of Art Vols. 1&2 by Germain Bazin
- Italian Painters of the Renaissance by Bernard Berenson

AESTHETICS - II

Course Code: FNA2402 **Credit Units: 02**

Course Objective:
This course is essential for all the students acquiring fine arts skill to improve their sense of beauty. An artist must have a clear concept regarding theory of beauty to execute their idea in proper way.

Course Contents:

Module I
Development of theories of Rasa, Dhvani, Bhava, Alankar, Auchitya, Riti, Guna-Dosh, Vyanjana etc.

Module II
Detail study on the applications of Rasa theories in Indian Art. Related study on Western art.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Introductory Reading in Aesthetics by John Hospers

References:
- Aesthetic by Beneditto Croce
- History of Aesthetics by Bosanquet
- Philosophy of Beauty by E. F. Carritt
- Art Now by Herbert Read

SPECIALISATION – SCULPTURE
STUDY FROM LIFE - II

Course Code: FNA2403 **Credit Units: 03**

Course Objective:
The objective of sculptural study from life is to learn human forms in details. It provides the skill to sculpt human figure in realistic way based on anatomy, planes, body masses, balance, posture and rhythm.

Course Contents:

Module I
Life Drawing:- Bust & Portrait:- Study of Human Portrait and bust using different drawing tools to study blocks, posture and rhythm, unity of body parts, inter-related force of lines, foreshortening and finishing.

Module II
Head Study Male & Female, Building of Armature study in clay and direct plaster.

Module III
Understanding of structure and proportion and detail modeling of full figure. Waste mould technique & casting in PoP.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Modeling a Likeness in Clay, Daisy Grubbs

References:
- Anatomy, Walter Foster
- The Sculptor's Handbook, Prof H. F. Ten Holt

COMPOSITION - II

Course Code: FNA2404 **Credit Units: 03**

Course Objective:
The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I
Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II
Building of armature for direct work in plaster or cement on the given topic.

Module III
Waste mould and piece mould technique and casting in wax.

No. of works to be done – 6

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

CARVING - II

Course Code: FNA2405 **Credit Units: 01**

Course Objective:
The course is designed to improve the skills in working with these two mediums based on textural values and technical differences chiseling out artist's own expressions.

Course Contents:

Module I
To make the small maquettes on creative theme, and the concept of mix-media.

Module II
Uses of various carving tools on the given medium. Emphasis on techniques. Enlargement of the maquettes to create the final work.

Module III
Finishing & installing the final work.

No. of works to be done – 6

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Dictionary of tools by R. A Salaman.
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Contemporary Stone Sculpture, Dona Z. Meliach
- Methods and Materials of Sculpture by David Raid.
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

MURAL - II

Course Code: FNA2406 **Credit Units: 02**

Course Objective:
This course is to train the learners about working on wall surface using various mediums emphasizing technical aspects in details. Mural is a permanent work wall inside or outside. It provides professional experience and good knowledge of handling fundamentals of working on vertical wall surface.

Course Contents:

Module I
Making suitable layout designing for mural work as per the basic technical aspects of working on wall surface, which is to be viewed from wide eye level.

Module II
Practical mural work on board using painting mediums.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

PHOTOGRAPHY - II

Course Code: FNA2407 **Credit Units: 02**

Course Objective:
This course is to provide a training on photography emphasizing on creative techniques using basic equipments. Experiments on nature and indoor subjects using specific Light arrangements.

Course Contents:

Module I
Indoor project on photography experimenting with light effects.

Module II
Outdoor project exploring various possibilities.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

CERAMICS - II

Course Code: FNA2408 **Credit Units: 02**

Course Objective:
This course is designed to provide basic training on ceramics emphasizing on basic techniques.

Course Contents:

Module I
Slab work, wheel work, coil work and tile making in different textures and designs.

Module II
Ceramic clay body making.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

ASSEMBLAGE - II

Course Code: FNA2409 **Credit Units: 02**

Course Objective:
This course is designed to provide basic training on assemblage.

Course Contents:

Module I
Practical assemblage training on working surface according to the layout.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

SCULPTURE METHODS AND MATERIALS - II

Course Code: FNA2410 **Credit Units: 02**

Course Objective:
The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I
Types of clay, Plaster of Paris, Cement & its properties

Module II
Nature and types of wood its growth and process of seasoning use of various tools and equipments.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Dictionary of tools by R. A Salaman.
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Contemporary Stone Sculpture, Dona Z. Meliach
- Methods and Materials of Sculpture by David Raid.
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

SPECIALISATION – APPLIED ARTS
DRAWING AND ILLUSTRATION – II

Course Code: FNA2411 **Credit Units: 02**

Course Objective:
Drawing exercises are must to develop creative ability, which is essential for any artist. It is to develop accurate sense of observation and skills of graphic presentation.

Course Contents:

Module I
Detailed portrait study and human figure, practicing planes, volume, and perspective in figure and foreshortening.

No. of works to be done – 15

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980

DESIGN – IV

Course Code: FNA2412 **Credit Units: 03**

Course Objective:
This course provides a clear concept of various aspects of designing. It is specially planned for a graphic artist to enable students to develop a commercial skill in design work.

Course Contents:
Module II
Introduction to product poster.

Module I
Show cards and other exercises of creative concept.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.

LETTERING AND TYPOGRAPHY – II

Course Code: FNA2413 **Credit Units: 02**

Course Objective:
Study of letter forms as design form: spacing, study of basic type faces, study of fundamentals of layout and their practical application, preparation of simple typographical layout for News Papers.

Course Contents:

Module I
Preparation of typographical layout, logo design, Book jacket and Book Cover.

No. of works to be done – 09

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Letter Assembly in Printing-D. Wooldridge

References:
- INFA Press and Advertising Year Book

COMPUTER GRAPHICS - II

Course Code: FNA2414 **Credit Units: 02**

Course Objective:
Introduction to Design Softwares

Course Contents:

Module I
Working with Coral Draw software for various design purpose.

Module II
Introduction to Adobe Photoshop CS4 or later version for various design purpose.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Computer Graphics, Edward Angel

PRINTING TECHIQUES - II

Course Code: FNA2415 **Credit Units: 02**

Course Objective:
This course in designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental serigraphy on various surfaces.

Course Contents:

Module I
Exploring various texture of different surface by using various printing surfaces with serigraphy.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Serigraphy: Silk Screen Techniques for the Artist, Kenneth W. Auvil
- Silk Painting : The Artist's Guide to Gutta and Wax Resist Techniques

ADVERTISING THEORY – II

Course Code: FNA2416 **Credit Units: 02**

Course Objective:
The objective of this courses to provide knowledge on Advertising Background, planning, and strategy.

Course Contents:

Module I: Advertising Process
Advertising Impact
Advertising and Psychology
Effeteness of Advertising
Advertising and Buyer Behavior
Speed and response

Module II: Advertising Strategy Planning and organization
Advertising Strategy
Advertising Planning
Advertising Situations
Factors Influencing Organizational Features

Module III: Tools of Promotional mix
Advertising, Publicity, Sales promotion, Personal Selling and Public Relation
Differences between Advertising & Personal Selling
Advertising & Public Relation
Advertising & Sales Promotion
Advertising & Publicity

Module IV: The Advertising Budget
Budget and Budget making process
Methods of advertising budget Appropriation
Retail Advertising Budget and Retail Budget Attrition

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:
Text:
- Advertising Hand Book, D. V. Gandhi
- Economics Advertising, B. B. Chipling
- Modern Advertising, Hapner

References:
- Global Marketing & Advertising Understanding Cultural Paradoxes by Marieke K De Mooij.
- Effective Advertising: Understanding when, How and why advertising works by Gerard J Tellis
- Commonsense Direct Marketing by Drayton Bird
- The Advertising Business: Operations Creativity Media Planning, Integrated Communications by John Philip Jones.
- Advertising and the Mind of the Consumer: what works, what doesn't and why by Max Sutherland, Alice K Sylvester

SPECIALISATION – PAINTING
DRAWING - IV

Course Code: FNA2417 **Credit Units: 02**

Course Objective:
The objective of Drawing Exercise is to learn to approach art in most direct way. It is an introduction to various aspects and techniques of drawing exploring variety of drawing tools and mediums such as pencil, charcoal, crayons, ink and colour. This exercise provides accuracy in observation and great opportunity to study and experiment expressive force and spontaneity of line work. Drawing is the most significant basic skill of visual representation of real world.

Course Contents:

Module I: Still Life
Drawing with pen and ink. Still life with pen and ink.

Module II: Landscape/ Nature Study (outdoor)
Nature with pen and ink

Module III: Life drawing with charcoal /pencil.

No. of works to be done – 20

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:
- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.

PAINTING - IV

Course Code: FNA2418 **Credit Units: 03**

Course Objective:
This is an intensive and advanced training to equip the students with a great skill for original and creative visual expression using different painting mediums and tools. Mastery of technical aspects provides essential foundation for the learners, though it is only means, not the end. Painting is the visual expression of thoughts, dreams and experiences. It is an introductory exposure to different schools, traditions, techniques and media of painting practiced through the ages.

Course Contents:

Module I: Still Life
Painting Study (Monochrome) from selected well arranged objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values, colour balance and colour perspective.
- Still life : multi-colour with water colour

Module II: Painting from life
Portraiture and full figure: Head study and full figure study (monochrome) same as drawing from life models (male & female)
- Portrait : multi-colour technique

Module III: Landscape
Copy work from traditional paintings.
Copy work (traditional painting)

Module IV: Mix Media
Copy work (Indian & western) from traditional paintings and opaque colour technique

No. of works to be done – 16

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Notes on the techniques of Painting by Hilaire Hiler
- Painting Courseby Ronald Pearsall

References:
- Big book of drawing and painting by Francisco Asensio Cerver
- by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.

COMPOSITION – II

Course Code: FNA2419 **Credit Units: 02**

Course Objective:
Composition exercise is the most important to learn and study theory of composition, individual approach to the possibilities. Experimenting innovative arrangement of the thing around to create unique visual presentation improves artistic sense and concept of beauty.

Course Contents:

Module I
Composition, arrangement of objects, figures and architectures.

Module II
Creative composition exercise from imagination emphasizing on individual creative sense, transformation of simple shapes into well-balanced unique visual presentation with experimentation.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick

References:
- Big book of drawing and painting by Francisco Asensio Cerver
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.

MURAL - I

Course Code: FNA2420 **Credit Units: 02**

Course Objective:
The objective of this course is to train the learners how to work on wall surface using various mural mediums emphasizing technical aspects in details. Mural is a permanent work on building walls inside or outside. It provides professional experience and good knowledge of handling fundamentals of working on vertical wall surface using specific materials.

Course Contents:

Module I
Making suitable layout designing for mural work as per the basic technical aspects of working on wall surface, which is to be viewed from wide eye level.

Module II
Practical mural work on board using painting mediums.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

PRINT MAKING - II

Course Code: FNA2421 **Credit Units: 02**

Course Objective:
This course in designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I
Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II
Advanced experimentation with monochrome & multi-color lithography etching – intaglio/photo process, advanced print making, use of multicolor relief print and mixed media.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manal of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach

PAINTING METHODS AND MATERIALS - II

Course Code: FNA2422 **Credit Units: 02**

Course Objective:
The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of artwork practically.

Course Contents:

Module I
Nature and characteristics of Drawing and Painting Media such as Pencils, Crayons, Charcoal, Pen and Ink, Water Colour, Gouache, Pastels and Oils.

Module II
Introduction to murals and Print making media.

Module III
Folk Art of India

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- A manual of Painting Materials & Techniques
- Method and Materials by Lynton Lamb.

References:
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- A manual of Painting Materials & Techniques
- Color by Edith Anderson Feisner.

DRAWING FOR 2D ANIMATION - II

Course Code: FNA2428 **Credit Units: 04**

Course Objective:
The objective of this to course introduction animation concepts, pre-production & production technique

Course Contents:

Module I
Detail study of various forms in sketching.

Module II
Advance Animation

Module III
Effects animation and cycle animation.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Human Machine, Bridgeman.
- Anatomy & Drawing, Victor Parrade
- Anatomy in Drawing, Andrew Lumis
- Dynamic Figure Drawing, Burn Hoggarth
- Human watching, Edward Maybridge
- Animal watching, Edward Maybridge.
- Survival kit for animators- Richard Williams

HISTORY OF ANIMATION – II

Course Code: FNA2423 **Credit Units: 02**

Course Objective:
The objective of this course is to explain the students about the evolution of animation and contribution of various countries in evolution of modern animation era.

Course Contents:

Module I
American and Canadian Animation.
Asian Animation (India, China, Philippines & Japan).

Module II
Asian history of Animation.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Cartoons: One Hundred Years of Cinema Animation by Giannalberto Bendazzi.

BOOK ART-II

Course Code: FNA2424 **Credit Units: 03**

Course Objective:
Objective of this course is to focus on how to apply drawing skills in print media as a form of book art such as illustration, comic strips, cartoon and caricature digitally.

Course Contents:

Module I
Creating a story and character concepts (Digital).

Module II
Story boarding and character designing (Digital).

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Story Boarding 101 (A crash course in professional story boarding), Michael Wise Production, James Fraoli
- Exploring Story Boarding (Design exploration series) by: Wendy Tumminello.

DIGITAL IMAGING-II

Course Code: FNA2425 **Credit Units: 02**

Course Objective:
The course objective is to inculcate the concept of motion graphics and 2D animation skills using any 2D animation software, so as to infuse life into character, environments and lots more. Using the software, you are enabled to create digital animation exercises by implementing classical animation skills and principles in your work.

Course Contents:

Module I
Introduction to the software and its interface.
Learning the tools of the software and its application.

Module II
Learning the concept of key and frame by frame animation.
Creating projects on various topics.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Adobe Flash CS3 Professional Classroom in a Book. : Adobe Creative Team

PHOTOGRAPHY-IV

Course Code: FNA2426 **Credit Units: 02**

Course Objective:
Objective of this course is to enhance observation skills through photography which further help in drawing and creating CG elements using software.

Course Contents:

Module I
Learning different types of photography with define set of lighting conditions.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

PAINTING-II

Course Code: FNA2427 **Credit Units: 02**

Course Objective:
Learning colour techniques of transparent and opaque representing still life and social themes.

Course Contents:

Module I: Still Life
Still life with multicolor in transparent water colour technique.

Module II: Painting from life: portraiture and full figure
Developing opaque colour treatment on figurative composition based on social themes.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Water colour painting step by step, Arthur Z Guptill, Waston Gaoptill, New York, 1967.

References:
- Drawing and Painting the natural environment, Barely Sheaks, Warcester, Massachusetts, 1974
- Painting sea and sky, Jean Khanbegian, Grosset and Dunlop, New York, 1967

PRACTICAL TRAINING EVALUATION - I

Course Code: FNA2535 **Credit Units: 03**

Course Objective:
It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.
Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.
Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

BFA (Applied Art)
- Practical work in concerned subject
- Visualization
- Concept of designing

BFA (Painting)
- Concept
- Different technique of painting

BFA (Animation)
- Apply the principle of animation, animation using software
- Short animation clip

Examination Scheme:

Project Report:	60
Viva Voce:	40
Total:	**100**

HISTORY OF ART-V

Course Code: FNA2501 **Credit Units: 02**

Course Objective:
The objective of teaching history of art is to acquaint the students with visual cultures from the earliest time to the present. The course is designed on the conviction that the learners can understand its relation to his own time and the technology at his command through an awareness of the relationship to his artistic predecessors.

Course Contents:
Module I
Pallava Period
Chola Period
Chalukya Period
Rastrakuta Period
Chandela Period

Module II
Gothic Period

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:
Text:
Indian Art
- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy

Western:
- Art of Mankind by Van Loon
- Civilization of Mankind by Van Loon
- History of Art by Janson

References:
- Art through the ages by Helen Gardener
- Concise History of Art-Vols. 1 & 2 by Gerrmain. Bazin.
- History of Indian and Indonesian Art by A. K. Coomaraswamy
- The Art and Architecture of Indian by Benjamin Rowland.
- The Story of Indian Art by S. K. Bhattacharya.
- 5000 Years of Indian Art by Shivaramaurti
- A History of Fine Arts in India and West by Edith Tomory
- Introduction of Chinese Art by Lawrence Binyon
- History of Indian and Indonesian Art by Bejamin Rowland.
- Concise History of Art Vols. 1&2 by Germain Bazin
- Italian Painters of the Renaissance by Bernard Berenson
- Art Now by Herbert Read
- Grassroot of Art by Herbert Read
- History of Modern Art by H. H. Arnason
- History of Painting by Janson
- History of Western by Eric Newton

AESTHETICS-III

Course Code: FNA2502 **Credit Units: 02**

Course Objective:
This course is essential for all the students acquiring fine arts skill to improve their sense of beauty. An artist must have a clear concept regarding theory of beauty to execute their idea in proper way.

Course Contents:

Module I
Fundamentals of Indian art based on Hindu Silpa Texts.

Module II
Detail studies related to Rasa- Nishpathi.

Module III
Sadanga- The six limbs of Indian Art.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Introductory Reading in Aesthetics by John Hospers

References:
- Aesthetic by Beneditto Croce
- History of Aesthetics by Bosanquet
- Philosophy of Beauty by E. F. Carritt
- Art Now by Herbert Read

SPECIALISATION– SCULPTURE
STUDY FROM LIFE - III

Course Code: FNA2503 **Credit Units: 03**

Course Objective:
The objective of sculptural study from life is to learn human forms in details. It provides the skill to sculpt human figure in realistic way based on anatomy, planes, body masses, balance, posture and rhythm.

Course Contents:

Module I:
Life Drawing:- Bust & Portrait:- Study of Human Portrait and bust using different drawing tools to study blocks, posture and rhythm, unity of body parts, inter-related force of lines, foreshortening and finishing.

Module II
Head Study Male & Female, Building of Armature study in clay and direct plaster.

Module III
Understanding of structure and proportion and detail modeling of full figure. Waste mould technique & casting in PoP.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Modeling a Likeness in Clay, Daisy Grubbs

References:
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- The Sculptor's Handbook, Prof H. F. Ten Holt

COMPOSITION - III

Course Code: FNA2504 **Credit Units: 02**

Course Objective:
The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I
Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II
Building of armature for direct work in plaster or cement on the given topic.

Module III
Waste mould and piece mould technique and casting in wax.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

METAL CASTING - I

Course Code: FNA2505 **Credit Units: 02**

Course Objective:
This course provides the knowledge on working with metals.

Course Contents:

Module I
Methods of casting – lost wax and sand process.

No. of works to be done – 03

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

MURAL - III

Course Code: FNA2506 **Credit Units: 02**

Course Objective:
This course is to innovative training to work on wall surface using various mediums emphasizing technical aspects. It provides professional exposure and good knowledge of handling mural materials to work on wall surface.

Course Contents:

Module I
Designing for mural work as per the advanced technique of working on wall surface with tempera, acrylic, encaustic, fiber glass etc.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Painting Murals: Image, Ideas & Techniques by Patrica Seligman
- Paintings Murals Fast & Easy: 21 (Design for walls, canvas you can paint with a sponge) by Terrence Tse, Theodore
- Paintings Murals Step by Step by Charles Grund.

PHOTOGRAPHY - III

Course Code: FNA2507 **Credit Units: 02**

Course Objective:
The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments on nature, depending upon time and mood. It also provides experimental experience on indoor subjects.

Course Contents:

Module I
Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

CERAMICS - III

Course Code: FNA2508 **Credit Units: 02**

Course Objective:
This course is to provide training on creative aspects on ceramics.

Course Contents:

Module I
Slab work, wheel work, coil work and tile making in different textures and designs.

Module II
Ceramic claybody making

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and Materials by Barry Midgley.

ASSEMBLAGE - III

Course Code: FNA2509 **Credit Units: 02**

Course Objective:
This course is designed to provide experimental training on assemblage.

Course Contents:

Module I
Methods of various assemblage techniques

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

SCULPTURE METHODS AND MATERIALS - III

Course Code: FNA2510 **Credit Units: 02**

Course Objective:
The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I
Analysis of fundamentals of sculpture in various media.

Module II
Enlarging and reducing devices. Taking points for copying sculpture.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

SPECIALISATION– APPLIED ARTS
DRAWING AND ILLUSTRATION – III

Course Code: FNA2511 **Credit Units: 02**

Course Objective:
Drawing exercises are must to develop creative ability which is essential for any artist. It is to develop accurate sense of observation and skills of graphic presentation. Exercises on illustration for various needs of the clients.

Course Contents:
Module I
Study of human figure draped and undraped to study volume, proportion, mass, weight, and anatomy with the aid of light and shade.

Module II
Developing compositions through studies working in colour mediums.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980

DESIGN – V

Course Code: FNA2512 **Credit Units: 03**

Course Objective:
This course provides a clear concept of various aspects of designing. It is specially planned for a graphic artist to enable students to develop a commercial skill in design work. To understand the needs of visual communications.

Course Contents:

Module I
Comparatively study of different types of Indoor layouts like Designing for press, Brouchers and magazine advertisements etc.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.

PACKAGING – I

Course Code: FNA2513 **Credit Units: 02**

Course Objective:
This will be student's first introduction to various packaging design according to the environment, occasions and need. Students will do small basic level layouts exercises to understand design of packaging.

Course Contents:

Module I
Study the basic layouts of Label Design, Box design and shopping Bags and their practical application.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Packaging Art for Export, Nduka Nwosu
- Packaging: The art of the right proposition: An artistic from : Groser (HTML), Nicola Gordon-Seymour

COMPUTER GRAPHICS – III

Course Code: FNA2514 **Credit Units: 02**

Course Objective:
To understand Computer Software related to Design.

Course Contents:

Module I
Tools interface and applications of Adobe Photoshop CS4 (or above) and Use of Adobe Photoshop CS4 (or above) software to create different types of layouts.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle

PRINTING TECHNIQUES-III

Course Code: FNA2515 **Credit Units: 02**

Course Objective:
This course in designed for learning basic techniques in print making, surface printing relief media and use of printing equipment and tools. This course provides training on technical method of making relief blocks.

Course Contents:

Module I
Originals for reproduction (monochrome, line originals)
Photographic materials and equipments.
Line negative making.
Line block-making

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle

TEXTILE DESIGN-I

Course Code: FNA2516 **Credit Units: 02**

Course Objective:
To enable creation of various types of textile designs and patterns

Course Contents:

Module I
Fundamental of Textile Design: Motif, Repeat & Design Concept, Setting of Repeat & Change or Repeat into Design.

Module II

Design for Weaving:
a. Weaving Texture
b. Stripe & Check Effect
c. Floral Design

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

ADVERTISING THEORY - III

Course Code: FNA2517 **Credit Units: 02**

Course Objective:
This course is to acquaint students about the introduction of Advertising agency, creativity in advertising .the role of advertising media and technical limitation in designing

Course Contents:

Module I: Creativity in Advertising
Advertising creativity and activities in creative design process
Copywriting
Classification of copy
Components of an advertising copy
Various stages of layout and their functions
Selecting themes and appeals
Role of color in Advertisement

Module II: Advertising Media
Media planning and buying
Other promotional media and methods

Module III: Various media of Advertising
Print Advertising
Direct Mail advertising
Broadcasting media

Module IV: Measuring Advertising Effectiveness
Role of measuring advertising effectiveness
Pre-Test and Post Test of Advertising copy
Communication effect of Advertisement

Module V: Advertising Agency
Advertising Agency – An Introduction
History of Advertising Agency
The structure of an Ad agency
Functions and services
Agency Client Relationship
Types of ad agencies

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:
Text:
- Advertising Hand Book, D. V. Gandhi
- Modern Advertising, Hapner
- Economics Advertising, B. B. Chipling

References:

- Global Marketing & Advertising Understanding Cultural Paradoxes by Marieke K De Mooij.
- Effective Advertising: Understanding when, How and why advertising works by Gerard J Tellis
- Commonsense Direct Marketing by Drayton Bird
- The Advertising Business: Operations Creativity Media Planning, Integrated Communications by John Philip Jones.
- Advertising and the Mind of the Consumer: what works, what doesn't and why by Max Sutherland, Alice K Sylvester

SPECIALISATION – PAINTING
DRAWING - V

Course Code: FNA2518 **Credit Units: 02**

Course Objective:
The objective of Drawing Exercise is to practice the basic technique in direct way emphasizing on various aspects and techniques of drawing in advanced concept, exploring and experimenting variety of drawing tools and mediums in traditional way as well as innovative way. This exercise provides accuracy in observation and great opportunity to face the challenge and experiment possibilities in line work.

Course Contents:

Module I: Still Life
Study of selected assorted objects in advanced drawing techniques using various drawing tools based on eye level, relative proportion, perspective, structure, form, volume, texture, source of light and its effect, balance and also tonal values in analytical process.

Module II: Landscape/ Nature Study (outdoor)
Advanced training in landscape drawing depending upon artist's observation, concept of addition and elimination, simplification. Study from nature as a controlled design, difference of handling near and distant objects.

Module III: Life Drawing- Portraiture
Advanced drawing study of human heads based on proportion, masses and specific feature and character using various media with emphasize on manner of finished execution.
Life Drawing-Full Figure: Advanced drawing study from full human figure based on structure of human form and anatomy using life models

Module IV: Sketching
Quick sketches in limited time from life and nature exploring innovative possibilities emphasizing on advanced techniques - Outdoor and indoor.

No. of works to be done – 20

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:
- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.

PAINTING - V

Course Code: FNA2519 **Credit Units: 03**

Course Objective:
Painting is a visual experience with various medium and techniques .learning the fundamental methods of painting will lead to an individual style of painting .developing skill and experimenting different media of painting working in water colour , acrylic and oil colour technique.

Course Contents:

Module I: Still Life
Advanced Painting Study in water colour from selected assorted objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values with appropriate colour balance and colour perspective.

Module II: Painting from life
Portraiture: Advanced study of human head using colours. The knowledge of advanced techniques of colour application

Module III: Landscape
Figurative composition with opaque colour treatment.

Module IV: Mix Media
Experimentation with various painting mediums exploring innovative techniques to represent thoughts in creative form. Use of various tools like roller, spetuta etc.

No. of works to be done – 16

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Notes on the techniques of Painting by Hilaire Hiler
- Method and Materials by Lynton Lamb.
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- A manual of Painting Materials & Techniques by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.

COMPOSITION – III

Course Code: FNA2520 **Credit Units: 02**

Course Objective:
Composition exercise is the most important to learn and study theory of composition, individual approach to the possibilities. Experimenting innovative arrangement of the thing around to create unique visual presentation improves artistic sense and concept of beauty.

Course Contents:

Module I
Composition, arrangement of objects, figures and architectures.

Module II
Creative composition exercise from imagination emphasizing on individual creative sense, transformation of simple shapes into well-balanced unique visual presentation with experimentation.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick

References:
- Big book of drawing and painting by Francisco Asensio Cerver
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.

PHOTOGRAPHY- III

Course Code: FNA2521 **Credit Units: 02**

Course Objective:
The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments on nature, depending upon time and mood. It also provides experimental experience on indoor subjects.

Course Contents:

Module I
Basic use of camera, observation according to photographic angles, selection of subject, composition exploring indoor and outdoor situations including effects of light.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

PRINT MAKING- III

Course Code: FNA2522 **Credit Units: 02**

Course Objective:
This course in designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I
Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II
Advanced experimentation with monochrome & multi-color lithography etching – intaglio/photo process, advanced print making, use of multicolor relief print and mixed media and further experimentation.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manal of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach

TRADITIONAL PAINTING-I

Course Code: FNA2523 **Credit Units: 02**

Course Objective:
To introduce Indian traditional art and painting techniques and styles

Course Contents:

Module I
Rajasthani Miniature
Mughal Miniature
Pahari Miniature
Nathdwara and Tanjore Paintings

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

PAINTING METHODS AND MATERIALS - III

Course Code: FNA2524 **Credit Units: 02**

Course Objective:
The Course is planned to provide technical knowledge of various mediums, techniques and tools used for different kinds of artwork practically.

Course Contents:

Module I
Preparation of canvas
Streching and framing of canvas & Traditional and Folk Paintings making Process etc.

Module II
Lithography, silkscreen and etching methods and experimental approach.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The painter's handbook by Stan Smith & Prof. H. F. Tenhalt
- Materials and methods of painting by Lynton Lamb

References:
- Artists Techniques by Dr. Kohei Aida
- A manual of painting Materials and techniques by Mark Daid Gaottsegen
- Notes on the techniques of painting by Hilaire Hiler

SPECIALISATION – ANIMATION
COMPUTER ANIMATION – I

Course Code: FNA2525 **Credit Units: 03**

Course Objective:
Introduction of 3D and its Prospectus and possibilities in visual world of Animation. The course is designed to focus of the elements of modeling, texturing, lighting and camera angles using 3 D Animation software.

Course Contents:

Module I
Introduction to 3D Animation software's its basics and its interface.

Module II
Modeling (Organic, Inorganic, Props Modelling)

Module III
Texturing (UV Unwrapping and Digital Texturing) Lighting & Cameras

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Introducing Maya 2009; by Dariush Derakhshani
- Disney Animation the Illusion of Life: Disney
- Learning Autodesk Maya 2009 (The Modeling & Animation Handbook) by: Autodesk Maya Press
- Stop Staring (Facial Modeling & Animation Done Right) by Jason Osipa

CLAY MODELING – I

Course Code: FNA2526 **Credit Units: 02**

Course Objective:
Objective of this course is to develop visualization to observe things in 3-dimension way so that students can understand mass, volume etc while doing digital modeling. It also helps student to understand anatomy and muscles flow of human form.

Course Contents:

Module I
Basic 3D Shapes
Applying Animation Principles on Clay

Module II
Creating Human Mannequin using Paper and Clay.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Exploring character design - Kevin Hedgpeth, Stephen Missal - Art
- 3-D Human Modeling And animation by Peter Ratner - Performing Arts
- Modeling the Figure in Clay by Bruno Lucchesi

DIGITAL IMAGING – III

Course Code: FNA2527 **Credit Units: 02**

Course Objective:
The course objective is to impound web designing skills using the right set of digital tools of the web designing software. This enables you to create personal and commercial websites with full of interactivity.

Course Contents:

Module I
Basics of Corel Draw
Getting familiar with tools and its Application

Module II
Creating web sites using Flash and others

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Corel DRAW X4: The Official Guide by Gary David Bouton
- Macromedia Flash Mx- by Chrissy Rey
- Action Script 3.0 for Adobe Flash CS4. Proessional Classroom in a Book. : Adobe Creative Team

SCRIPT WRITING – I

Course Code: FNA2528 **Credit Units: 02**

Course Objective:
This course will provide a skill to prepare storylines and depicting the story as par characters. The course will enhance the visualization power of the student in terms of developing self created ideas.

Course Contents:

Module I
Illustration of a story and Character Designing (Manual)

Module II
Character designing and creating Story Boards as per the Frames. (Manual)

No. of works to be done – 06

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

Text & References:

- The Screen Writer's Bible: A complete guide to writing formatting, and selling your script-David Trottier

PHOTOGRAPHY - IV

Course Code: FNA2529 **Credit Units: 02**

Course Objective:
The objective of this course is to provide advanced exposure on photography highlighting on all possible creative aspects on natural subjects and also indoor subjects.

Course Contents:

Module I
Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**C**	**A**	**EE**
Weightage (%)	10	15	5	70

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

PAINTING-II

Course Code: FNA2530 **Credit Units: 02**

Course Objective:
This is an intensive and advanced training to equip the students with a great skill for original and creative visual expression using different painting mediums and tools. Mastery of technical aspects provides essential foundation for the learners, though it is only means, not the end. Painting is the visual expression of thoughts, dreams and experiences. It is an introductory exposure to different schools, traditions, techniques and media of painting practiced through the ages.

Course Contents:

Module I: Still Life
Painting Study (Monochrome) from selected well arranged objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values, colour balance and colour perspective.
- Still life : multi-colour with water colour

Module II: Painting from life
Portraiture and full figure: Head study and full figure study (monochrome) same as drawing from life models (male & female)
- Portrait : multi-colour technique

Module III: Landscape
Copy work from traditional paintings.
Copy work (traditional painting)

Module IV: Mix Media
Copy work (Indian & western) from traditional paintings and opaque colour technique

No. of works to be done – 16

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Notes on the techniques of Painting by Hilaire Hiler
- Painting Courseby Ronald Pearsall

References:
- Big book of drawing and painting by Francisco Asensio Cerver
- by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.

PROJECT-I

Course Code: FNA2532 **Credit Units: 03**

Course Objective:
The objective of this course is to help the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issue, involving a systematic approach to gathering and analysis of information/data, leading to production of a structured Report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Finding – 25 marks
Chapter 4: Conclusion & Recommendations – 10 marks
Chapter 5: Bibliography – 05 marks

Selection of the Topic for the project by taking following points into consideration:

- Suitability of the topic
- Relevance of the Topic
- Time available at the disposal

Examination Scheme:

Components	**Project Report**	**PowerPoint Presentation & Viva**
Weightage (%)	75	25

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Note:-
Marking is completely based on submitted project Report

Syllabus - Sixth Semester

DISSERTATION-I

Course Code: FNA2637 **Credit Units: 06**

Course Objective:
This course is to continue the research work to put the collected materials together for developing the body of the dissertation on the particular subject.
Putting up the necessary photographs, reproductions with the text materials.

Course Contents:

Module I
Preparing the final paper along with necessary photographs, reproductions with detail information.

Module II
Submission and review of printed dissertation paper.

Examination Scheme:

Components	**PR**	**PS**	**V**
Weightage (%)	70	15	15

(**V-** Viva**; PR-** Project Report**; PS;** Presentation)

HISTORY OF ART - VI

Course Code: FNA2601 **Credit Units: 02**

Course Objective:
To acquaint the students with cultures from the past to the present. The course is designed on the conviction that the learners can understand its relation to his own time bringing awareness about his artistic predecessors

Course Contents:

Module I: Indian Art History
Orissa
Hoysala
Rajput Miniature
Mughal Miniature

Module II: Western Art History
Rennaissance [Proto, Early, High] Painters and Sculptors

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Indian

- Fundamentals of Indian Art by S N Dasgupta
- History of Indian art by AK Coomaraswamy

Western

- History of Art by Janson
- Art through the ages by Helen Gardener

AESTHETICS - IV

Course Code: FNA2602 **Credit Units: 02**

Course Objective:
The objective is to teach about fundamentals of Indian art based on Hindu silpa texts such as Vishnudharmotara-puran, Samaranaa, Sutracharana, Sukranitisara and Silparatham.

Course Contents:

Module I
Detailed studies related to Rasa-Nishpathi.
Sadanga-the six limbs of Indian Art.

Module II
Inter-relationship amongst the arts.
Theories related to the origin and creation of Art, namely, Communications, expression, and release of emotion.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Aesthetic Meaning according to Abhinava Gupta

References:
- Aesthetic by Beneditto Croce
- History of Aesthetics by Bosanquet
- Philosophy of Beauty by E. F. Carritt
- Art Now by Herbert Read

SPECIALISATION – SCULPTURE
STUDY FROM LIFE - IV

Course Code: FNA2603 **Credit Units: 02**

Course Objective:
The objective of sculptural study from life is to learn human forms in details. It provides the skill to sculpt human figure in realistic way based on anatomy, planes, body masses, balance, posture and rhythm.

Course Contents:

Module I
Life Drawing:- Bust & Portrait:- Study of Human Portrait and bust using different drawing tools to study blocks, posture and rhythm, unity of body parts, inter-related force of lines, foreshortening and finishing.

Module II
Head Study Male & Female, Building of Armature study in clay and direct plaster.

Module III
Understanding of structure and proportion and detail modeling of full figure. Waste mould technique & casting in PoP.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Modeling a Likeness in Clay, Daisy Grubbs

References:
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- The Sculptor's Handbook, Prof H. F. Ten Holt

COMPOSITION - IV

Course Code: FNA2604 **Credit Units: 02**

Course Objective:
The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I
Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II
Building of armature for direct work in plaster or cement on the given topic.

Module III
Waste mould and piece mould technique and casting in wax.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

METAL CASTING - II

Course Code: FNA2605 **Credit Units: 02**

Course Objective:
The course is designed to improve the skills in working with these two mediums based on textural values and technical differences chiseling out artist's own expressions.

Course Contents:

Module I
Making maquettes in wax or clay alongwith addition, alteration & modification depending upon the layout. Enlargement of the maquette in round or relief

Module II
Student will learn the process of sand casting.

Module III
Finishing, grinding, buffing, and polishing.

No. of works to be done – 03

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Contemporary Stone Sculpture, Dona Z. Meliach
- Dictionary of tools by R. A Salaman.
- Methods and Materials of Sculpture by David Raid.
- The Sculptor's Handbook, Prof H. F. Ten Holt
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

MURAL - IV

Course Code: FNA2606 **Credit Units: 02**

Course Objective:
This course is to provide advanced training to work on wall surface using various mediums emphasizing all possible techniques. It provides professional exposure and professional knowledge of handling mural materials.

Course Contents:

Module I
Practical mural work on slab using mosaic tiles

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

PHOTOGRAPHY - IV

Course Code: FNA2607 **Credit Units: 02**

Course Objective:
The objective of this course is to provide advanced exposure on photography highlighting on all possible creative aspects on natural subjects and also indoor subjects.

Course Contents:

Module I
Introduction to the process of developing and printing, films and their sensitivity. Basic knowledge of photo printing papers and various chemicals.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

CERAMICS - IV

Course Code: FNA2608 **Credit Units: 02**

Course Objective:
This course is to provide training on creative techniques on ceramics.

Course Contents:

Module I
Creating innovative texture and design on claywork.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

ASSEMBLAGE - IV

Course Code: FNA2609 **Credit Units: 02**

Course Objective:
This course is designed to provide creative experimental training on assemblage.

Course Contents:

Module I
Methods of technical assemblage aesthetically

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

SCULPTURE METHODS AND MATERIALS - IV

Course Code: FNA2610 **Credit Units: 02**

Course Objective:
The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I
Types of clay, Plaster of Paris, Cement & its properties

Module II
Nature and types of wood its growth and process of seasoning use of various tools and equipments.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy

SPECIALISATION – APPLIED ARTS
DRAWING AND ILLUSTRATION – IV

Course Code: FNA2611 **Credit Units: 02**

Course Objective:
Drawing exercises are to learn accurate observation and skills of graphic presentation, and various exercises on illustrations.

Course Contents:

Module I
Illustrate children story book.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980

DESIGN – VI

Course Code: FNA2612 **Credit Units: 03**

Course Objective:
This course provides a clear concept of various aspects of designing. It is specially planned for a graphic artist to enable students to develop a commercial skill in design work.

Course Contents:

Module I
Comparatively study of different types of outdoor layouts like Hording, bus shelter, Poster etc

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.

PACKAGING - II

Course Code: FNA2613 **Credit Units: 02**

Course Objective:
Making of various packaging according to products environment and needs

Course Contents:

Module I
Advanced exercises on packaging according to various shapes and styles.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Packaging Art for Export by Nduka Nwosu
- Packaging: The art of the right proposition: An artistic from: Groser (HTML) – Nicola Gordon-Seymour

PRINTING TECHNIQUES-IV

Course Code: FNA2614 **Credit Units: 02**

Course Objective:
This course in designed for learning basic techniques in print making, surface printing relief media and use of printing equipment and tools. This course provides training on technical method of making relief blocks.

Course Contents:

Module I
Originals for reproduction (Monochrome, half tone originals)
Half tone negative –making.
Half tone block making.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle

COMPUTER GRAPHICS – IV

Course Code: FNA2615 **Credit Units: 01**

Course Objective:
To work on design related software's for various purpose.

Course Contents:

Module I
Tools interface and Applications of Flash software.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle

TEXTILE DESIGN-II

Course Code: FNA2616 **Credit Units: 02**

Course Objective:
To enable creation of various types of textile designs and patterns.

Course Contents:

Module I
Fundamental of Textile Design: Motif, Repeat & Design Concept, Setting of Repeat & Change or Repeat into Design.

Module II

Design for Block Printing :
- Design for Block Printing
- Design for Screen Printing

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

ADVERTISING THEORY - IV

Course Code: FNA2617 **Credit Units: 02**

Course Objective:
This course is to acquaint students about Printing process, how the international advertising works, public relation and future of advertising.

Course Contents:

Module I: Basic Principles of Printing Processes
Line /Half tone copy
Relief or Letter Press (Introduction, Principle & Plate Making
Intaglio or Gravure (Introduction, Principle & Cylinder Making

Module II: Off Set & Four Colour Process Reproduction
- Planography or Offset (Introduction, Principle & Plate Making, Two Cylinder
- Three Cylinder & Four Cylinder Press System
- Colour mixing principles
- Colour separation method

Module III: International Advertising

Module IV: Public Relation
Definition of Public Relation
Comparison between Advertising & Public Relation
Need & Scope of Public Relation
Basic elements of Public Relation
Objectives of Public Relation
Public Relation Advertising

Module V: Future of advertising in developing countries
Relevance of marketing approach to national goals
Advertising regulation
Stage of development

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Advertising Hand Book, D. V. Gandhi
- Modern Advertising, Hapner
- Economics Advertising, B. B. Chipling

References:

- Global Marketing & Advertising Understanding Cultural Paradoxes by Marieke K De Mooij.
- Effective Advertising: Understanding when, How and why advertising works by Gerard J Tellis
- Commonsense Direct Marketing by Drayton Bird
- The Advertising Business: Operations Creativity Media Planning, Integrated Communications by John Philip Jones.
- Advertising and the Mind of the Consumer: what works, what doesn't and why by Max Sutherland, Alice K Sylvester

SPECIALISATION – PAINTING
DRAWING - VI

Course Code: FNA2618 **Credit Units: 02**

Course Objective:
This course will be found on learning pen & ink drawing technique depicting various objects and nature. It is to devlop skill in handling black and white distribution, tonal various and texture which will lead to expertise in visualization.

Course Contents:

Module I: Still Life in pen & ink
Study of selected assorted objects in advanced drawing techniques using various drawing tools based on eye level, relative proportion, perspective, structure, form, volume, texture, source of light and its effect, balance and also tonal values in analytical process.

Module II: Landscape/ Nature Study (outdoor) in pen & ink
Advanced training in landscape drawing depending upon artist's observation, concept of addition and elimination, simplification. Study from nature as a controlled design, difference of handling near and distant objects.

Module III: Life Drawing- Portraiture in pen & ink
Advanced drawing study of human heads based on proportion, masses and specific feature and character using various media with emphasize on manner of finished execution.
Life Drawing-Full Figure: Advanced drawing study from full human figure based on structure of human form and anatomy using life models.

No. of works to be done – 20

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:
- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.

PAINTING - VI

Course Code: FNA2619 **Credit Units: 03**

Course Objective:
This is an intensive and advanced training in painting using variety of painting mediums and tools. Mastery of technical aspects of painting provides advanced knowledge for the learners. It is an exposure to different schools, traditions, techniques and media of painting practiced through the ages in details.

Course Contents:

Module I: Still Life
Creative composition in acrylic or oil colour on canvas.

Module II: Painting from life
Portraiture and full figure: Advanced study of human head and full figure using colours. The knowledge of advanced techniques of colour application in monochrome and full colour.

Module III: Landscape
Exploring outdoor painting to capture the various moods of nature.

Module IV: Mix Media
Experimentation with various painting mediums exploring innovative techniques to represent thoughts and dreams in creative form.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Notes on the techniques of Painting by Hilaire Hiler
- Painting Courseby Ronald Pearsall

References:
- Big book of drawing and painting by Francisco Asensio Cerver by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.

COMPOSITION - IV

Course Code: FNA2620 **Credit Units: 02**

Course Objective:
The objective of composition exercise is to study theory of composition, individual approach to the possibilities. Exploration of creative composition of the real world and imaginary world in unique visual presentation, to improve concept of creative sense.

Course Contents:

Module I
Composition Exercises working on still life, life and nature study – outdoor and indoor. The 2-D and 3-D objects, pictorial space, forms sub division and grouping. Use of colour and textural values

Module II
Creative composition exercise based on individual layouts using various painting mediums giving more stress on oil on canvas also on acrylic.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.

MURAL - II

Course Code: FNA2621 **Credit Units: 02**

Course Objective:
This course is to innovative training to work on wall surface using various mediums emphasizing technical aspects. It provides professional exposure and good knowledge of handling mural materials to work on wall surface.

Course Contents:

Module I
Designing for mural work as per the advanced techniques of working on wall surface with tiles, Arrangement of tiles and fixing on board for final execution.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Painting Murals: Image, Ideas & Techniques by Patrica Seligman
- Paintings Murals Fast & Easy: 21 (Design for walls, canvas you can paint with a sponge) by Terrence Tse, Theodore
- Paintings Murals Step by Step by Charles Grund.

PRINT MAKING-II

Course Code: FNA2622 **Credit Units: 01**

Course Objective:
This course in designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I
Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II
Advanced experimentation with monochrome & multi-color lithography etching – intaglio/photo process, advanced print making, use of multicolor relief print and mixed media and further experimentation.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manal of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach

PAINTING METHODS AND MATERIALS - IV

Course Code: FNA2623 **Credit Units: 02**

Course Objective:
The Course is planned to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I
Classification and variation of colours.
Chemical factors and cause of changing colours.

Module II
Techniques of fresco painting
Tempara Techniques

Module III
Cataloging, Concept of art galleries and auction houses.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The painter's handbook by Stan Smith & Prof. H. F. Tenhalt
- Materials and methods of painting by Lynton Lamb

References:
- Artists Techniques by Dr. Kohei Aida
- A manual of painting Materials and techniques by Mark Daid Gaottsegen
- Notes on the techniques of painting by Hilaire Hiler

SPECIALISATION – ANIMATION
COMPUTER ANIMATION – II

Course Code: FNA2624 **Credit Units: 03**

Course Objective:
Objective of this course is to undergo Maya deformers, rigging, animation, dynamics, lighting, rendering so the student can have complete knowledge of the software.

Course Contents:

Module I
Deformers, Rigging, Animation

Module II
Dynamics, Lighting & Rendering

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Mastering Maya 2009 by Eric Kelly
- Character Animation Fundamentals (Digital) by Chris Kirshbaum.
- Character Rigging (Digital) Carlo Sansonctti
- Mental Ray. Global Illumination (Rendering Techniques) by Matt Hartle

CLAY MODELING – II

Course Code: FNA2625 **Credit Units: 03**

Course Objective:
Objective of this course is to teach to visualize in 3-dimension way so that student can understand mass, volume etc while doing digital modeling. It also helps student to know about anatomy and muscles flow of human form.

Course Contents:

Module I
Creating 3D models using clay
Morphing of 3D Models

Module II
Creating a short Clay Animation.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Exploring character design - Kevin Hedgpeth, Stephen Missal - Art
- 3-D Human Modeling and animation by Peter Ratner - Performing Arts

SCRIPT WRITING – II

Course Code: FNA2626 **Credit Units: 02**

Course Objective:
Objective of this course to know about story, story concept and scripting according to characters and their roles.

Course Contents:

Module I
Illustration of a story and Character Designing (Digital)

Module II
Character design and creating Story Boarding as per the Frames.
Background and layout planes. (Digital)

No. of works to be done – 08

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Scripting to screening
- The Complete Book of Scriptwriting by: J. Michael Straczynski

DIGITAL IMAGING – IV

Course Code: FNA2627 **Credit Units: 02**

Course Objective:
Video editing is the process of editing segments of video footage, special effects and sound recordings.
The objective is to edit a raw footage collected from a live shoot and Computer Graphics (Moving and still images) in order to get a final output.

Course Contents:

Module I
Basics of Editing software and tools
Learning and implementing the concept of editing

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Adobe Premiere Pro CS4 Classroom in a Book by Adobe Creative Team
- Adobe Premiere Pro for Dummies by Keith Underdahl

PHOTOGRAPHY-VI

Course Code: FNA2628 **Credit Units: 02**

Course Objective:
The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments on figurative, depending upon time and mood. It also provides experimental experience on indoor subjects.

Course Contents:

Module I
Composition exploring portrait situations including effects of light. Setting up studio lights and experimentation.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

PAINTING-II

Course Code: FNA2629 **Credit Units: 02**

Course Objective:
This is an intensive and advanced training to equip the students with a great skill for original and creative visual expression using different painting mediums and tools. Mastery of technical aspects provides essential foundation for the learners, though it is only means, not the end. Painting is the visual expression of thoughts, dreams and experiences. It is an introductory exposure to different schools, traditions, techniques and media of painting practiced through the ages.

Course Contents:

Module I: Still Life
Painting Study (Monochrome) from selected well-arranged objects along with drapery; emphasizing on composition, eye level, structure, relative proportion and perspective, source of light and its effect, tonal and textural values, colour balance and colour perspective.
- Still life : multi-colour with water colour

Module II: Painting from life
Portraiture and full figure: Head study and full figure study (monochrome) same as drawing from life models (male & female)
- Portrait : multi-colour technique

Module III: Landscape
Copy work from traditional paintings.
Copy work (traditional painting)

Module IV: Mix Media
Copy work (Indian & western) from traditional paintings and opaque colour technique

No. of works to be done – 16

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Notes on the techniques of Painting by Hilaire Hiler
- Painting Courseby Ronald Pearsall

References:
- Big book of drawing and painting by Francisco Asensio Cerver
- by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- The portrait by Norbert Schneider.

Syllabus – Seventh Semester

HISTORY OF MODERN ART - I

Course Code: FNA2701 **Credit Units: 02**

Course Objective:
The objective of teaching history of art is to acquaint the students with visual cultures from the earliest time to the present. The course is designed on the conviction that the learners can understand its relation to his own time and the technology at his command through an awareness of the relationship to his artistic predecessors.

Course Contents:
Module I: Indian Art
Company School
Kalighat
Calcutta School
Progressive Art Group, Shilpi Chakra
Indian Art Collages and Galleries

Module II: Western Art
Mannerism (El Greco, Tintoretto)
Baroque (Rembrandt, Vermeer, Rubens)

Module III
Post-Impressionism, Expressionism & Symbolism.

Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
Indian
- Fundamental of Indian Art by S. N. Dasgupta
- History of Indian and Indonesian Art by A. K. Coomaraswamy

Western
- History of Art by Janson
- Art through the ages by Helen Gardener

References:
- The Art and Architecture of Indian by Benjamin Rowland.
- The Story of Indian Art by S. K. Bhattacharya.
- 5000 Years of Indian Art by Shivaramaurti
- A History of Fine Arts in India and West by Edith Tomory
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy
- Aesthetics by Beneditto Croce
- History of Aesthetics by Bosanquet
- Art of Mankind by Van Loon
- Civilization of Mankind by Van Loon

- Concise History of Art-Vols. 1 & 2 by Gerrmain. Bazin.
- Introduction of Chinese Art by Lawrence Binyon
- History of Indian and Indonesian Art by Bejamin Rowland.
- Concise History of Art Vols. 1&2 by Germain Bazin
- Italian Painters of the Renaissance by Bernard Berenson
- Art Now by Herbert Read
- Grassroot of Art by Herbert Read.
- History of Modern Art by H. H. Arnason.
- History of Painting by Janson.
- History of Western Painting by Eric Newton.

PRACTICAL TRAINING EVALUATION-II

Course Code: FNA2735 **Credit Units: 02**

Course Objective:
The Practical Training can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. The students have to prepare a project and give a presentation highlighting the following:

BFA (Applied Art)
- Organizational structure
- Design Development
- Software's used for designing
- Type of printing machines used
- Industry feedback

BFA (Painting)
- About Senior Artist and his/her history, work style etc.
- Student's independent work style.

BFA (Animation)
- Organizational structure
- Demo reel
- Software's used for 2D / 3D animation
- Personal review of the students management skill
- Animation studio feedback

Assessment Scheme:

Continuous Evaluation: (based on Internship File and the observations of the faculty guide/ supervisor)	15%
Feedback from Company/ Organization:	25%
Final Evaluation: (Based on Internship Report, Viva/ Presentation)	60%

SPECIALISATION – SCULPTURE
STUDY FROM LIFE - V

Course Code: FNA2702 **Credit Units: 02**

Course Objective:
The objective of sculptural study from life is to learn human forms in details. It provides the skill to sculpt human figure in realistic way based on anatomy, planes, body masses, balance, posture and rhythm.

Course Contents:

Module I
Life Drawing:- Bust & Portrait:- Study of Human Portrait and bust using different drawing tools to study blocks, posture and rhythm, unity of body parts, inter-related force of lines, foreshortening and finishing.

Module II
Head Study Male & Female, Building of Armature study in clay and direct plaster.

Module III
Understanding of structure and proportion and detail modeling of full figure. Waste mould technique & casting in PoP.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Modeling a Likeness in Clay, Daisy Grubbs

References:
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- The Sculptor's Handbook, Prof H. F. Ten Holt

COMPOSITION - V

Course Code: FNA2703 **Credit Units: 02**

Course Objective:
The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I
Detailed and advance sketches in clay of given subjects and the enlargement in round and relief exploring various possible techniques of moulding and casting, direct building processes.

Module II
Building of armature for direct work in plaster or cement on the given topic.

Module III
Waste mould and piece mould technique and casting in wax.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

METAL CASTING - III

Course Code: FNA2704 **Credit Units: 02**

Course Objective:
The course is designed to improve the skills in working with these two mediums based on textural values and technical differences chiseling out artist's own expressions.

Course Contents:

Module I
Making maquettes in wax or clay alongwith addition, alteration & modification depending upon the layout. Enlargement of the maquette in round or relief.

Module II
Student will learn the process of sand casting

Module III
Finishing, grinding, buffing, polishing

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Contemporary Stone Sculpture, Dona Z. Meliach
- Dictionary of tools by R. A Salaman.
- Methods and Materials of Sculpture by David Raid.
- The Sculptor's Handbook, Prof H. F. Ten Holt
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

MURAL - V

Course Code: FNA2705 **Credit Units: 02**

Course Objective:
This course is to provide an advanced training on Mural.

Course Contents:

Module I
Experimentation on mural work in professional way with direct and indirect methods, designs, materials and techniques including Mosaic tiles, Fresco, Encaustic and assemblage along with glaze, distemper, plastering and installing on wall.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

PHOTOGRAPHY - V

Course Code: FNA2706 **Credit Units: 02**

Course Objective:
This course is to provide an advanced training on photography.

Course Contents:

Module I
Advanced training on photography capturing various moods from nature & indoor subjects with special light effects emphasizing on different types of lances to explore experimental photographic techniques.

No. of works to be done – 20

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

CERAMICS - V

Course Code: FNA2707 **Credit Units: 02**

Course Objective:
This course is to provide training on creative techniques on ceramics.

Course Contents:

Module I
Working on 3D creative form, introduction to glazing.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

ASSEMBLAGE - V

Course Code: FNA2708 **Credit Units: 02**

Course Objective:
This course is designed to provide creative experimental training on assemblage.

Course Contents:

Module I
Advanced creative assemblage.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

SCULPTURE METHODS AND MATERIALS - V

Course Code: FNA2709 **Credit Units: 02**

Course Objective:
The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I
System of indigenous casting foundry practice, metals and alloys.

Module II
Coppers and its alloys, metals and alluminium etc. melting points of different metals. Properties of bronze preparation of modeling was and reins, finishing and technical treatments.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy

DESIGN - VII

Course Code: FNA2710 **Credit Units: 05**

Course Objective:
Students will learn the various exercises of Design according to the promotion of products and services.

Course Contents:

Module I
Promotional campaign for any product (indoor as well as out door advertisement)

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.

PACKAGING - III

Course Code: FNA2711 **Credit Units: 03**

Course Objective:
Various Packaging Designs.

Course Contents:

Module I
3D forms in thermo coal & card board etc.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Packaging Art for Export by Nduka Nwosu
- Packaging: The art of the right proposition: An artistic from: Groser (HTML) – Nicola Gordon-Seymour

DRAWING AND ILLUSTRATION-V

Course Code: FNA2712 **Credit Units: 02**

Course Objective:
Drawing exercises are to learn accurate observation and skills of graphic presentation, and various exercises on illustrations.

Course Contents:

Module I
Illustrate Graphic Novels and Book/Magazine Covers.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980

COMPUTER GRAPHICS – V

Course Code: FNA2713 **Credit Units: 02**

Course Objective:
To work on design related software's for various purpose.

Course Contents:

Module I
Advance study of Flash software and Applications.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle

PHOTOGRAPHY-V

Course Code: FNA2714 **Credit Units: 02**

Course Objective:
The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments in darkroom on light control, developing and fixing the pictures. It also provides experimental experience on indoor and outdoor subjects.

Course Contents:

Module I
Experiments on indoor and outdoor subjects. Post Production research in dark room.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

HISTORY OF DESIGN-I

Course Code: FNA2715 **Credit Units: 02**

Course Objective:
History of Graphic Design provides an overview of the historical styles, movements, people, and events of design to help inspire one to design more creative, appropriate, and intelligent solutions to advertising and design problems.

Course Contents:

Module I
Medieval, Illuminated Manuscript
• Rococo
• Victorian
• Wood Type Poster
• Arts & Crafts, Mission, Craftsman
• Art Nouveau
• Minimalism
• Cubism
• Futurism
• Surrealism
• Constructivism
• De Stijl, Mondrian
• Propaganda poster
• Art Deco, Art Moderne
• Beck map (not a transit map)
• Fifties, Doo Wop
• International Typographic Style
• Lubalin type treatment
• Sixties
• New Wave, Post Modern
• Macrap
• Punk, Deconstructivism
• Information Graphics (not USA Today)
• Millennium
• Ornament

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:

SPECIALISATION – PAINTING
DRAWING - VII

Course Code: FNA2716 **Credit Units: 03**

Course Objective:
Advanced drawing exercise is an exposure to various creative aspects and contemporary techniques of drawing exploring all available drawing tools and mediums such as pencil, charcoal, crayons, ink, colour and brush. This exercise provides accuracy in observation and wide opportunity to study and experiment variety of significant possibilities of line work.

Course Contents:

Module I: Portrait study
Portrait study with charcoal from model, life study.

Module II: life study
Life study from a model in different media of drawing**.**

Module III: Full Figure
Advanced drawing study of human head and full body (male & female) exploring complex detailing and finishing from different viewpoints and angles using suitable drapery background and surrounding.

Module IV: creative and indivisual composition using pen and ink

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:
- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.

PAINTING & COMPOSITION - I

Course Code: FNA2717 **Credit Units: 05**

Course Objective:
Painting is an activity which requires a long time involvement to achieve excellence. This stage to explore one's own ideas and style. Studying various schools of art, traditional to modern and contemporary. This stage is to focus in one particular style of his or her own after learning various techniques of paintings. The students would produce/create a number of works of art, paintings and drawings in a fashion of specializing in the subject. It is to specialize in thinking and imagination which create good art.
Advanced exercise on composition work provides thorough knowledge on theory of composition, individual approach to the possibilities and experimental innovative aspects to create unique visual presentation enriched with artistic and aesthetic value. Working with figurative and non-figurative arrangement of objects.

Course Contents:
Module I
Sketching/making layouts based on life experience, culture and people
Medium: Pastel (dry/oil)/water colour.

Module: II
Painting on individual compositions based on the layouts
Medium: Acrylic/oil/tempara on canvas/paper/board.

Module III
Composition Exercises working on objects from real life and nature. Creative transformation of real world according to the possibilities (2-D & 3-D), use of colour and textural values, form and individual expression

Module IV
Creative composition exercise from imagination emphasizing on individual vision and concept, complete pictorial interpretation, theme, expression of moods, symbolism, dramatization, and distortion for emotional effect. Project on independent creative work.

No. of works to be done – 16

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Notes on the techniques of Painting by Hilaire Hiler
- Method and Materials by Lynton Lamb.
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- A manual of Painting Materials & Techniques by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.

MURAL - III

Course Code: FNA2718 **Credit Units: 02**

Course Objective:
This course is for innovative training to work on wall surface using various mediums emphasizing technical aspects. It provides professional exposure and good knowledge of handling mural materials to work on wall surface.

Course Contents:

Module I
Designing for mural work as per the advanced techniques of working on wall surface with tiles .arrangement of tiles and fixing on board.

Module II
Relief mural in P.O.P & mix media.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Painting Murals: Image, Ideas & Techniques by Patrica Seligman
- Paintings Murals Fast & Easy: 21 (Design for walls, canvas you can paint with a sponge) by Terrence Tse, Theodore
- Paintings Murals Step by Step by Charles Grund.

PRINT MAKING - III

Course Code: FNA2719 **Credit Units: 02**

Course Objective:
This course in designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I
Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II
Advanced experimentation with monochrome & multi-color lithography, etching – intaglio/photo process, aquatint, mezzotint, advanced print making, use of multicolor relief print and mixed media and further experimentation.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manal of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach

PAINTING METHODS AND MATERIALS - V

Course Code: FNA2720 **Credit Units: 02**

Course Objective:
This course is designed to provide a thorough knowledge of methods and technical aspects of drawing and painting work. It helps the students to handle the materials and tools in scientific way.

Course Contents:

Module I
Technique of Jaipur Murals.
Ceramics, glass and terra-cotta tiles.

Module II
Various modern techniques in Painting and Printmaking.
Restoration and Preservation.

Module III
Exhibition Display and Lighting.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The painter's handbook by Stan Smith & Prof. H. F. Tenhalt
- Materials and methods of painting by Lynton Lamb

References:
- Artists Techniques by Dr. Kohei Aida
- A manual of painting Materials and techniques By Mark Daid Gaottsegen

COMPUTER ANIMATION-III

Course Code: FNA2721 **Credit Units: 03**

Course Objective:
Objective of this course is to undergo Maya deformers, rigging, animation, dynamics, lighting, rendering so the student can have complete knowledge of the software.

Course Contents:

Module I
Dynamics, Lighting & Rendering

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Mastering Maya 2009 by Eric Kelly
- Character Animation Fundamentals (Digital) by Chris Kirshbaum.
- Character Rigging (Digital) Carlo Sansonctti
- Mental Ray. Global Illumination (Rendering Techniques) by Matt Hartle

CLAY MODELING-III

Course Code: FNA2722 **Credit Units: 03**

Course Objective:

Course Contents:

No. of works to be done –

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Exploring character design - Kevin Hedgpeth, Stephen Missal - Art
- 3-D Human Modeling and animation by Peter Ratner - Performing Arts

CLAY ANIMATION-I

Course Code: FNA2723 **Credit Units: 02**

Course Objective:

Course Contents:

Module I

No. of works to be done –

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Acting for Animators, Revised edition: A complete guide to performance Animation by Ed Hooks Action! Acting lessons for CG Animators by John Kundert-Gibbs

DIGITAL IMAGING – V

Course Code: FNA2724 **Credit Units: 02**

Course Objective:
The course objective is to instill the concept of composting in students which is the process of combining different visual elements into one to give a complete one final scene.

Course Contents:

Module I
Basics of Compositing software and tools
Learning and implementing the concept of compositing.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Combustion Ground Rules -Michael Todd Peterson
- Adobe After Effects CS4 Classroom in a Book

PHOTOGRAPHY-V

Course Code: FNA2725 **Credit Units: 02**

Course Objective:
The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments in darkroom on light control, developing and fixing the pictures. It also provides experimental experience on indoor and outdoor subjects.

Course Contents:

Module I
Experiments on indoor and outdoor subjects. Post Production research in dark room.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

PAINTING-III

Course Code: FNA2726 **Credit Units: 02**

Course Objective:
Painting is an activity which requires a long time involvement to achieve excellence. This stage to explore one's own ideas and style. Studying various schools of art, traditional to modern and contemporary. This stage is to focus in one particular style of his or her own after learning various techniques of paintings. The students would produce/create a number of works of art, paintings and drawings in a fashion of specializing in the subject. It is to specialize in thinking and imagination which create good art.
Advanced exercise on composition work provides thorough knowledge on theory of composition, individual approach to the possibilities and experimental innovative aspects to create unique visual presentation enriched with artistic and aesthetic value. Working with figurative and non-figurative arrangement of objects.

Course Contents:
Module I
Sketching/making layouts based on life experience, culture and people
Medium: Pastel (dry/oil)/water colour.

Module: II
Painting on individual compositions based on the layouts
Medium: Acrylic/oil/tempara on canvas/paper/board.

Module III
Composition Exercises working on objects from real life and nature. Creative transformation of real world according to the possibilities (2-D & 3-D), use of colour and textural values, form and individual expression

Module IV
Creative composition exercise from imagination emphasizing on individual vision and concept, complete pictorial interpretation, theme, expression of moods, symbolism, dramatization, and distortion for emotional effect. Project on independent creative work.

No. of works to be done – 16

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Notes on the techniques of Painting by Hilaire Hiler
- Method and Materials by Lynton Lamb.
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- A manual of Painting Materials & Techniques by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.

PROJECT - II

Course Code: FNA2732 **Credit Units: 03**

FOR ANIMATION SPECIALIZATION

Course Objective:
The objective of this course is to help the student in their preparation of their Show Reel and let them understand the pipeline procedure of the industry by working in groups.

Methodology
Students are advised to work in small groups and make a short animation clip.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Note: - Marking is based on submitted project work (Show reel)

Syllabus – Eighth Semester

HISTORY OF ART - VIII

Course Code: FNA2801 **Credit Units: 02**

Course Objective:
The objective of teaching history of art is to acquaint the students with visual cultures from the earliest time to the present. The course is designed on the conviction that the learners can understand its relation to his own time and the technology at his command through an awareness of the relationship to his artistic predecessors.

Course Contents:

Module I: Indian Art
Ravi Verma
Madras School
Progressive Artist Group

Module II: Western Art
Rococo (Reynolds, Hogarth)
Classisim (David, Ingres)

Module III
Cubism, Fauvism, Surrealism & Abstractionism.

Examination Scheme:

Components	CT	P	A	EE
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
Indian
- Fundamental of Indian Art by S. N. Dasgupta
- History of Indian and Indonesian Art by A. K. Coomaraswamy

Western
- History of Art by Janson
- Art through the ages by Helen Gardener

References:
- The Art and Architecture of Indian by Benjamin Rowland.
- The Story of Indian Art by S. K. Bhattacharya.
- 5000 Years of Indian Art by Shivaramaurti
- A History of Fine Arts in India and West by Edith Tomory
- Dance of Shiva by &Transformation of Nature in Art by A. K. Coomaraswamy
- Aesthetics by Beneditto Croce
- History of Aesthetics by Bosanquet
- Art of Mankind by Van Loon
- Civilization of Mankind by Van Loon
- Concise History of Art-Vols. 1 & 2 by Gerrmain. Bazin.
- Introduction of Chinese Art by Lawrence Binyon
- History of Indian and Indonesian Art by Bejamin Rowland.

- Italian Painters of the Renaissance by Bernard Berenson
- Art Now by Herbert Read
- Grassroot of Art by Herbert Read.
- History of Modern Art by H. H. Arnason.
- History of Painting by Janson.
- History of Western Painting by Eric Newton.

PORTFOLIO DEVELOPMENT AND PRESENTATION WITH EXHIBITIONS

Course Code: FNA2837 **Credit Units: 5**

Course Objective:
Portfolio Development & Presentation is for the students who are in the final stage of specialization in a particular subject. The students are to prepare a portfolio which contains all type of works relating to the subjects studied by them.

Course Contents:
Submission & Presentation

Module I
As decided by faculty.

Examination Scheme:

Components	**C**	**P**	**A**	**EE (Presentation, Report & Viva)**
Weightage (%)	15	10	5	70

<u>FOR ANIMATION SPECIALIZATION</u>

Course Objective:
The objective of this course is to help the student in their preparation of their Demo Reel and let them understand the pipeline procedure of the industry by working in groups.

Course Contents:

Methodology
Students are advised to work on individual short animation clip.

Examination Scheme:

Components	**P**	**C**	**A**	**FP**
Weightage (%)	10	15	5	70

Note: - Marking is based on submitted project work (Demo reel)

SPECIALISATION – SCULPTURE
STUDY FROM LIFE - VI

Course Code: FNA2802 **Credit Units: 02**

Course Objective:
The objective of sculptural study from life is to learn human forms in details. It provides the skill to sculpt human figure in realistic way based on anatomy, planes, body masses, balance, posture and rhythm.

Course Contents:

Module I
Drawing- study of full human figure based on human anatomy, proportion, planes and masses.

Module II
Study of Full Figure of Male & Female in clay, building of armature emphasizing on detail modeling and texture.

Module III
Waste mould technique, casting in plaster of Paris and cement.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Human Figure, Walter Foster
- Anatomy, Walter Foster

References:
- Modeling a Likeness in Clay, Daisy Grubbs
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- The Sculptor's Handbook, Prof H. F. Ten Holt

COMPOSITION - VI

Course Code: FNA2803 **Credit Units: 02**

Course Objective:
The Objective of Composition exercise is the key to study theory of composition in sculptural 3 Dimensional representations of thoughts and concepts. This work provides a meaningful knowledge on creative expression.

Course Contents:

Module I
Sketches in clay of given subjects and the enlargement in round and relief with two of more human figure, birds animals, moulding and casting, direct building processes. Plaster, Cement and terracotta.

Module II
Building of armature for direct work in plaster or cement on the given topic.

Module III
Waste mould and piece mould technique and casting in wax.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The Sculptor's Handbook, Prof H. F. Ten Holt

References:
- Encyclopedia of Sculpture by John Mills
- Modeling a Likeness in Clay, Daisy Grubbs
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

METAL CASTING - IV

Course Code: FNA2804 **Credit Units: 02**

Course Objective:
The course is designed to improve the skills in working with these two mediums based on textural values and technical differences chiseling out artist's own expressions.

Course Contents:

Module I
Taking a waste or piece moulds in PoP. Casting in this mould with wax and fixing runners and risers and preparation of mould for firing.

Module II
Firing of the mould in a kiln. And pouring of molten metal.

Module III
Breaking open the mold and cutting of runners and risers. Grinding buffing and polishing and patina.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Contemporary Stone Sculpture, Dona Z. Meliach
- Dictionary of tools by R. A Salaman.
- Methods and Materials of Sculpture by David Raid.
- The Sculptor's Handbook, Prof H. F. Ten Holt
- The Complete Guide to Sculpture. Modeling and Ceramics. Techniques and materials by Barry Midgley.

MURAL-IV

Course Code: FNA2805 **Credit Units: 02**

Course Objective:
This course is to provide an advanced training on Mural.

Course Contents:

Module I
Experimentation on mural work in professional way with direct and indirect methods, designs, materials and techniques including Mosaic tiles, Fresco, Encaustic and assemblage along with glaze, distemper, plastering and installing on wall.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

PHOTOGRAPHY-IV

Course Code: FNA2806 **Credit Units: 02**

Course Objective:
This course is to provide an advanced training on photography.

Course Contents:

Module I
Advanced training on photography capturing various moods from nature & indoor subjects with special light effects emphasizing on different types of lances to explore experimental photographic techniques in dark room and out door.

No. of works to be done – 20

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

CERAMICS-IV

Course Code: FNA2807 **Credit Units: 02**

Course Objective:
This course is to provide training on creative techniques on ceramics.

Course Contents:

Module I
Working on 3D creative form, introduction to glazing.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

ASSEMBLAGE-IV

Course Code: FNA2808 **Credit Units: 02**

Course Objective:
This course is designed to provide creative experimental training on assemblage.

Course Contents:

Module I
Advanced creative assemblage.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The complete guide to Sculpture, Modeling and Ceramics: Techniques and materials by Barry Midgley.

SCULPTURE METHODS AND MATERIALS-IV

Course Code: FNA2809 **Credit Units: 02**

Course Objective:
The Course is planned for detailed training on methods and materials to work with through the edges. It is to provide technical knowledge of various mediums, techniques and tools used for different kinds of art work practically.

Course Contents:

Module I
System of indigenous casting foundry practice, metals and alloys.

Module II
Coppers and its alloys, metals and aluminum etc. melting points of different metals. Properties of bronze preparation of modeling was and reins, finishing and technical treatments.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Fundamental of Indian Art by S. N. Dasgupta
- Dance of Shiva by A. K. Coomaraswamy
- Transformation of Nature in Art by A. K. Coomaraswamy

DESIGN-VIII

Course Code: FNA2810 **Credit Units: 05**

Course Objective:
Students will learn the various exercises of Design according to the promotion of products and services.

Course Contents:

Module I
Promotional campaign for any product (indoor as well as out door advertisement)

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London.

PACKAGING-IV

Course Code: FNA2811 **Credit Units: 03**

Course Objective:
Various Packaging Designs

Course Contents:

Module I
3D forms in thermo coal & card board etc.

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Packaging Art for Export by Nduka Nwosu
- Packaging: The art of the right proposition: An artistic from: Groser (HTML) – Nicola Gordon-Seymour

DRAWING AND ILLUSTRATION-VI

Course Code: FNA2812 **Credit Units: 02**

Course Objective:
Drawing exercises are to learn accurate observation and skills of graphic presentation, and various exercises on illustrations.

Course Contents:

Module I
Illustrate Graphic Novels and Book/Magazine Covers.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Anatomy & Drawing, Victor Perard, Pitman Publishing, New York, 1955

References:
- The Art of Drawing Heads and Hands, Walter Brooks, M. Grumbacher, New York, 1966.
- Figure Drawing, Victor Perard, Grosset and Dunlop, New York, 1956.
- Drawing Hands, Carl Sheek, Grosset and Dunlop, New York, 1959
- Children Picture Books, Magazines.
- The art of humorous illustrations, Nick Meglin
- Germany in winter time, Mario De Mirando, Tata Press, 1980

COMPUTER GRAPHICS-VI

Course Code: FNA2813 **Credit Units: 02**

Course Objective:
To work on design related software's for various purpose.

Course Contents:

Module I
Advance study of Flash software and Applications.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Color Harmony for the Web, Cailin Boyle

PHOTOGRAPHY-VI

Course Code: FNA2814 **Credit Units: 02**

Course Objective:
The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments in darkroom on light control, developing and fixing the pictures. It also provides experimental experience on indoor and outdoor subjects.

Course Contents:

Module I
Experiments on indoor and outdoor subjects. Post Production research in dark room.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

HISTORY OF DESIGN-II

Course Code: FNA2815 **Credit Units: 02**

Course Objective:
History of Graphic Design provides an overview of the historical styles, movements, people, and events of design to help inspire one to design more creative, appropriate, and intelligent solutions to advertising and design problems.

Course Contents:

Module I
Medieval, Illuminated Manuscript
• Rococo
• Victorian
• Wood Type Poster
• Arts & Crafts, Mission, Craftsman
• Art Nouveau
• Minimalism
• Cubism
• Futurism
• Surrealism
• Constructivism
• De Stijl, Mondrian
• Propaganda poster
• Art Deco, Art Moderne
• Beck map (not a transit map)
• Fifties, Doo Wop
• International Typographic Style
• Lubalin type treatment
• Sixties
• New Wave, Post Modern
• Macrap
• Punk, Deconstructivism
• Information Graphics (not USA Today)
• Millennium
• Ornament

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:

DRAWING-VIII

Course Code: FNA2816 **Credit Units: 03**

Course Objective:
Advanced drawing exercise is an exposure to various creative aspects and contemporary techniques of drawing exploring all available drawing tools and mediums such as pencil, charcoal, crayons, ink, colour and brush. This exercise provides accuracy in observation and wide opportunity to study and experiment variety of significant possibilities of line work.

Course Contents:

Module I: Portrait study
Portrait study with charcoal from model, life study.

Module II: life study
Life study from a model in different media of drawing**.**

Module III: Full Figure
Advanced drawing study of human head and full body (male & female) exploring complex detailing and finishing from different viewpoints and angles using suitable drapery background and surrounding.

Module IV: creative and indivisual composition using pen and ink

No. of works to be done – 08

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- An Introduction to Drawing by James Horton in association with the Royal Academy of Arts.

References:
- Grassroot of Art by Herbert Read
- How to draw and paint by Hazel Harrison ,from Art School
- Human Figure by Walter Foster
- Anatomy by Walter Foster
- Heads by Walter Foster
- Figure Drawing by Patricia Monahan with Albany Wiseman
- Human Anatomy by James Horton
- Big book of Drawing and painting by Francisco Asensio Cerver.

PAINTING & COMPOSITION-II

Course Code: FNA2817 **Credit Units: 05**

Course Objective:
Painting is an activity which requires a long time involvement to achieve excellence. This stage to explore one's own ideas and style. Studying various schools of art, traditional to modern and contemporary. This stage is to focus in one particular style of his or her own after learning various techniques of paintings. The students would produce/create a number of works of art, paintings and drawings in a fashion of specializing in the subject. It is to specialize in thinking and imagination which create good art.
Advanced exercise on composition work provides thorough knowledge on theory of composition, individual approach to the possibilities and experimental innovative aspects to create unique visual presentation enriched with artistic and aesthetic value. Working with figurative and non-figurative arrangement of objects.

Course Contents:
Module I
Sketching/making layouts based on life experience, culture and people
Medium: Pastel (dry/oil)/water colour.

Module: II
Painting on individual compositions based on the layouts
Medium: Acrylic/oil/tempara on canvas/paper/board.

Module III
Composition Exercises working on objects from real life and nature. Creative transformation of real world according to the possibilities (2-D & 3-D), use of colour and textural values, form and individual expression

Module IV
Creative composition exercise from imagination emphasizing on individual vision and concept, complete pictorial interpretation, theme, expression of moods, symbolism, dramatization, and distortion for emotional effect. Project on independent creative work.

No. of works to be done – 16

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Notes on the techniques of Painting by Hilaire Hiler
- Method and Materials by Lynton Lamb.
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- A manual of Painting Materials & Techniques by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.

MURAL-IV

Course Code: FNA2818 **Credit Units: 02**

Course Objective:
This course is for innovative training to work on wall surface using various mediums emphasizing technical aspects. It provides professional exposure and good knowledge of handling mural materials to work on wall surface.

Course Contents:

Module I
Designing for mural work as per the advanced techniques of working on wall surface with tiles .arrangement of tiles and fixing on board.

Module II
Relief mural in P.O.P & mix media.

No. of works to be done – 04

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Painting Murals: Image, Ideas & Techniques by Patrica Seligman
- Paintings Murals Fast & Easy: 21 (Design for walls, canvas you can paint with a sponge) by Terrence Tse, Theodore
- Paintings Murals Step by Step by Charles Grund.

PRINT MAKING-IV

Course Code: FNA2819 **Credit Units: 02**

Course Objective:
This course in designed for learning techniques in print making, surface relief printing using printing equipment and tools. This course provides technical training on method of making experimental relief blocks on various surfaces.

Course Contents:

Module I
Exploring various texture of different surface by using materials including metal sheets like zinc plate and aluminum sheet.

Module II
Advanced experimentation with monochrome & multi-color lithography, etching – intaglio/photo process, aquatint, mezzotint, advanced print making, use of multicolor relief print and mixed media and further experimentation.

No. of works to be done – 10

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- The art of the print by Fritz Eicherberg
- The bite of print by Frank and Dorothy Gettein
- The art of Print by Earl G. Mueller
- The art of Etching by E.S.Lumdsen
- Manal of woodcut printmaking by J. Hillier
- Screen Process Printing by Schwalbach

PAINTING METHODS AND MATERIALS-VI

Course Code: FNA2820 **Credit Units: 02**

Course Objective:
This course is designed to provide a thorough knowledge of methods and technical aspects of drawing and painting work. It helps the students to handle the materials and tools in scientific way.

Course Contents:

Module I
Technique of Jaipur Murals.
Ceramics, glass and terra-cotta tiles.

Module II
Various modern techniques in Painting and Printmaking.
Restoration and Preservation.

Module III
Exhibition Display and Lighting.

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- The painter's handbook by Stan Smith & Prof. H. F. Tenhalt
- Materials and methods of painting by Lynton Lamb

References:
- Artists Techniques by Dr. Kohei Aida
- A manual of painting Materials and techniques By Mark Daid Gaottsegen

COMPUTER ANIMATION-IV

Course Code: FNA2821 **Credit Units: 03**

Course Objective:
Objective of this course is to undergo Maya deformers, rigging, animation, dynamics, lighting, rendering so the student can have complete knowledge of the software.

Course Contents:

Module I
Advance Lighting, Rendering and Compositing.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Mastering Maya 2009 by Eric Kelly
- Character Animation Fundamentals (Digital) by Chris Kirshbaum.
- Character Rigging (Digital) Carlo Sansonctti
- Mental Ray. Global Illumination (Rendering Techniques) by Matt Hartle

CLAY MODELING-IV

Course Code: FNA2822 **Credit Units: 03**

Course Objective:

Course Contents:

No. of works to be done –

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Exploring character design - Kevin Hedgpeth, Stephen Missal - Art

3-D Human Modeling and animation by Peter Ratner - Performing Arts

CLAY ANIMATION-II

Course Code: FNA2823 **Credit Units: 02**

Course Objective:

Course Contents:

Module I

No. of works to be done –

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Acting for Animators, Revised edition: A complete guide to performance Animation by Ed Hooks Action! Acting lessons for CG Animators by John Kundert-Gibbs

DIGITAL IMAGING-VI

Course Code: FNA2824 **Credit Units: 02**

Course Objective:
The course objective is to instill the concept of composting in students which is the process of combining different visual elements into one to give a complete one final scene.

Course Contents:

Module I
Basics of Compositing software and tools
Learning and implementing the concept of compositing.

No. of works to be done – 06

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Combustion Ground Rules -Michael Todd Peterson
- Adobe After Effects CS4 Classroom in a Book

PHOTOGRAPHY-VI

Course Code: FNA2825 **Credit Units: 02**

Course Objective:
The objective of this course is to provide an experimental exposure on photography highlighting on creative aspects. Experiments in darkroom on light control, developing and fixing the pictures. It also provides experimental experience on indoor and outdoor subjects.

Course Contents:

Module I
Experiments on indoor and outdoor subjects. Post Production research in dark room.

No. of works to be done – 12

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:
- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow
- Photomechanic & Printing by J.S. Mertle & Gordon
- Photo techniques by Lee Frost
- Location Photography Secrets by Andy Snow

PAINTING-IV

Course Code: FNA2826 **Credit Units: 02**

Course Objective:
Painting is an activity which requires a long time involvement to achieve excellence. This stage to explore one's own ideas and style. Studying various schools of art, traditional to modern and contemporary. This stage is to focus in one particular style of his or her own after learning various techniques of paintings. The students would produce/create a number of works of art, paintings and drawings in a fashion of specializing in the subject. It is to specialize in thinking and imagination which create good art.
Advanced exercise on composition work provides thorough knowledge on theory of composition, individual approach to the possibilities and experimental innovative aspects to create unique visual presentation enriched with artistic and aesthetic value. Working with figurative and non-figurative arrangement of objects.

Course Contents:
Module I
Sketching/making layouts based on life experience, culture and people
Medium: Pastel (dry/oil)/water colour.

Module: II
Painting on individual compositions based on the layouts
Medium: Acrylic/oil/tempara on canvas/paper/board.

Module III
Composition Exercises working on objects from real life and nature. Creative transformation of real world according to the possibilities (2-D & 3-D), use of colour and textural values, form and individual expression

Module IV
Creative composition exercise from imagination emphasizing on individual vision and concept, complete pictorial interpretation, theme, expression of moods, symbolism, dramatization, and distortion for emotional effect. Project on independent creative work.

No. of works to be done – 16

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Big book of drawing and painting by Francisco Asensio Cerver
- Notes on the techniques of Painting by Hilaire Hiler
- Method and Materials by Lynton Lamb.
- Artist's Handbook by Ray Smith
- Artist's Encyclopedia by John Quick
- A manual of Painting Materials & Techniques by Mark David Goattsegen
- Art Class, Copy Right 1999 by Harper Collins Publishers.
- Images of the human body by Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Courseby Ronald Pearsall
- The portrait by Norbert Schneider.
- Color by Edith Anderson Feisner.

FASHION DESIGN
(Skill Track)

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
VFD2152	Design Eco-System	1	-	4	3
VFD2252	Fashion Design Research	1	-	4	3
VFD2352	Design Preparatory Process	1	-	4	3
VFD2452	Prototype Garment Development	1	-	4	3
VFD2552	Design Development	1	1	2	3
VFD2652	Health & Safety Equilibrium	1	-	4	3
	TOTAL				**18**

FASHION DESIGN

Syllabus - Semester First

DESIGN ECO-SYSTEM

Course Code: VFD2152 **Credit Units: 03**

Course Objectives:
The aim of the course is to provide Performance Criteria, Knowledge & Understanding and skills & abilities required to organize/maintain work areas and activities to ensure tools and machines are maintained as per norms to a Fashion Designer.

Course Contents:
Module-I: Maintain the work area
(1) Handle materials, drawing and pattern drafting tools, equipment and the system for computer designing with care (2.) Use correct handling procedures. (3.) Use materials to minimize waste (4.) Use of measuring devices effectively

Module-II: Maintain the work Tools
(1) Maintain tools and equipment (2) Carryout running maintenance within agreed schedules (3) Carryout maintenance and/or cleaning within one's responsibility (4) Report unsafe equipment and other dangerous occurrences (5) working a comfortable position with the correct posture.

Module-III: Maintain the work equipment.
(1) Use cleaning equipment and methods appropriate for the work to be carried out (2)Dispose of waste safely in the designated location (3) Carryout cleaning according to schedules and limits of responsibility

Module-IV: Maintain the Self and work Computers
(1.) Request for up gradation of system or software's when required for effective working (2.) Always a backup file to be maintained when working on various design software's (3.) All soft copies of design work to be maintained in files as well for future reference (4.) Personal hygiene and duty of care. (5.) Safe working practices and organizational procedures. (6.) Limits of your own responsibility,
(7.) Ways of resolving with problems within the work area. (8.) The production process and the specific work activities that relate to the whole process (9.)The importance of effective communication with colleagues (10) the lines of communication, authority and reporting procedures

Module-V: Case Study (Compulsory)
Industrial visit and case presentation

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

Text:

- Giolleo and Berks, fashion Production Terms
- Grig Hazer, Fantastic Fit For Everybody

References:

- Tracy Diane and Tom Cassidy, Colour Forecasting
- J Chuter, Introduction to Clothing Production Management.
- Apparel Online, Apparel Views, Clothesline, Moda, Vogue, Simplicity etc
- Rosemar Varley, Retail Product Management: Buying And Merchandising, Routledge, 2006
- Jay Diamond, Ellen Diamond, Contemporary Visual Merchandising, Prentice Hall PTR, 2010

Syllabus - Semester Second

FASHION DESIGN-RESEARCH

Course Code: VFD2252 **Credit Units: 03**

Course Objectives: The aim of the course is the development of design concepts for commercial production. The Initial process includes conducting market research and trend analysis for the particular season and identifying a theme for the collection; then creating a mood board and color board based on the theme, develop an entire range according to the business plan and as per the theme board.

Course Contents:

Module-I: Designing Fashion Design Research

(1) Review previous 10 years trends and their impact in terms of accuracy. (2) Research on fashion trends and identify the emerging theme (3.) Product range and previous designs developed by the business are reviewed to assess relevance to current design.

Module-II: Conduct fashion design research

(1) Business processes and client goals are identified. (2.) Research is conducted on target market, materials, designs, processes and marketing materials according to the needs of the design. (3.) Quality standards for designs are identified.

Module-III: Design Brief

(1) Design themes and style requirements of design are determined (2) Budget, cost points and timing constraints are identified. (3) Requirements for use of fabrics, materials, suppliers and production processes are determined. (4) Client Requirements are confirmed with the client

Module-IV: Organize fashion design research.

(1) Analyze the market trends and targets for the season (2) Rule-based decision-making processes (3) Complete accurate well written work with attention to detail

Module-V: Case Presentation (Compulsory)

Case presentation with complete mood boards and design presentation for the following season.

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

References:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Gavin Ambrose & Paul Harris, Design Thinking, AVA Publishing, Switzerland.
- Harry B. Watton, “New Product Planning”, Prentice Hall Inc., 1992.
- Jacob Solinger, “Apparel Manufacturing Handbook”, Reinhold Publications, 1998.
- Introduction to research in education, Ary Hort Reinhart,1982
- Research methodology by C. R Kothari, Published by Wiley Eastern Ltd, New Delhi,2000
- Design Research: Methods and Perspectives, edited by Brenda Laurel
- Lateral Thinking: Creativity Step by Step, Edward De Bono, 1970.
- How Customers Think: Essential Insights into the Mind of the Market – Gerald Zaltman
- Five Minds for the Future – Howard Gardner
- Harry Nystrom, “Creativity and Innovation”, John Wiley & Sons, 1979.

Syllabus - Semester Third

DESIGN PREPARATORY PROCESS

Course Code: VFD2352 **Credit Units: 03**

Course Objectives:
The aim of the course is to designs a clothing range and gets it finalized to make the prototype garments.

Course Contents:
Module-I: Determine key criteria for design brief
(1) Determined Design themes and style. (2) Recognizing and adapting to cultural differences in the workplace, including modes of behavior and interactions (3.) Identify improvements.

Module-II: Technical Aspects
(1.) To do the design by hand sketches or by Computer Aided Design (CAD). (2.) Garment construction techniques and processes. (3.) Detailed knowledge of a range of fabrics and trims

Module-III: Financial Aspects
(1) An understanding on the cost process involved in making an apparel (2) Costing of created designs / product ensembles with knowledge of sale ability of a product designed (3) Knowledge of Intellectual Property Rights with respect to designs.

Module-IV: Pre proto Analyses
(1) Provide opinions on work in a detailed and constructive way (2) communicate with others in the company and to clients in writing (3) Clarification on the design to be developed with the team members

Module-V: Case Presentation (Compulsory)
Case presentation for any two constructed garment with their technical details i.e. Teck-pack and Coasting

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(**A**-Attendance**; CS**-Case Study**; CT**-Class Test**; EE-**End Semester Examination)

Text:
- Winifred Aldrich, CAD in Clothing and Textiles
- Corel Draw 11 for Windows: Visual Quick Start Guide
- From Sue Chastain, your guide to Graphics software
- David Huss, Gary W. Priester, Corel Draw Studio Techniques.
- Corel Draw 10 for Windows: Visual Quick Start Guide.
- Linnea Dayton, Cristen Gillespie, The Photoshop Cs/Cs2 Wow!

Syllabus - Semester Fourth

PROTOTYPE GARMENT DEVELOPMENT

Course Code: VFD2452 **Credit Units: 03**

Course Objectives:
The aim of the course is about how technical package is made after garment range confirmation and process of how prototype garment is made for entire collection

Course Contents:
Module-I: Confirming Design Brief
(1) Create techpack which clearly conveys all guidelines for development of the sample (2) Appropriate personnel are consulted with to confirm feasibility and appropriateness of techpack (3.) Sketches, drawings and samples are used to illustrate design requirements, as appropriate. (4) Given techpacks on the range to be finalised

Module-II: Specify Design Processes
(1.) Required involvement of sampling merchandiser, patternmaker, and tailor are identified, finalized and briefed about the collection (2.) Monitoring procedures and checking points are determined. (3.) Design development personnel selected are briefed and time constraints met (4.)

Module-III: Proto- Type Construction
(1) Construct the prototype and given to concerned dept for better understanding on the product, if required

Module-IV: Implement Design Processes
(1.) Development of sample is monitored to ensure budget and time constraints are met (2) Problems or inconsistencies in sample are identified and addressed. (3) Communicate with others in the company and to clients in writing (4) Evaluate the prototype sample.

Module-V: Case Presentation (Compulsory)
Case presentation for actually constructed garment with their technical details and Coasting

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

Text:
- By Gillian Holman, Pattern cutting made easy
- Dorothy Wood, The Practical Encyclopaedia of Sewing

Reference:
- Leila Aitken, Step by step dress making course
- Amaden-Crawford, A Guide to Fashion Sewing

Syllabus - Semester Fifth

DESIGN DEVELOPMENT

Course Code: VFD2552 **Credit Units: 03**

Course Objectives:
The aim of the course is about how to review the prototype garment developed for the collection

Course Contents:
Module-I: Evaluate Design Process
(1) Analyze the prototype sample along with the design team (2) coordinate along with design team to check sample against the techpack given to the sampling merchandiser, the look and feel and fit of the sample (3.) Identify the prototype for the feasibility of the garment in terms of sourcing of the fabric and the trims available for the span of production.

Module-II: Evaluate Development Process
(1.) Identify various products testing to proceed with prototype (2.) Incorporate modification of the sample until approved for final production. (3.) Get approval on the prototype/final techpack, agreement finalized with the client

Module-III: Complete Documentation
(1) Document Design brief, development processes and outcomes (2) Complete Documentation processes, including filing and storing, Construct the prototype and given to concerned dept for better understanding on the product, if required

Module-IV: Organization Process
(1) Organization's policies, procedures and priorities for your area of work and your role and responsibilities in carrying out your work. (2) Limits of your responsibilities when coordinating with other department. (3) Your specific work requirements and who these must be agreed with

Module-V: Industrial Case (Compulsory)
Developing Standard Operating Procedure for an Fashion Design Team

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

Text
- Tracy Diane and Tom Cassidy, Colour Forecasting

References:
- Mike Easey, Fashion Marketing
- Maria Constantino, Fashion Marketing and PR
- V. D Dudeja, Professional Management of Fashion Industry
- Julia Kuo, 20 Ways to Draw a Dress and 44 Other Fabulous Fashions and Accessories

Syllabus - Semester Sixth

HEALTH AND SAFETY EQUILIBRIUM

Course Code: VFD2652 **Credit Units: 03**

Course Objectives:
The aim of the course is to provide Performance Criteria, Knowledge, Understanding, Skills and Abilities required to comply with health, safety and security requirements at the workplace and Covers procedures to prevent, control and minimize risk to self and others.

Course Contents:
Module-I: Comply with Health Requirements at Work
1) Comply with health and safety related instructions applicable to the work place (2) Use and maintain personal protective equipment as per protocol (3) Carry out own activities in line with approved guidelines and procedures. (4) Maintain a healthy lifestyle and guard against dependency on intoxicants (5) Follow environment management system related procedures

Module-II: Comply with Safety Requirements at work
Identify and correct (if possible) malfunctions in machinery and equipment (2.)Report any service malfunctions that cannot be rectified. (3.) Store materials and equipment in line with manufacturer's and organizational requirements (4) safely handle and move waste and debris (5) Minimize health and safety risks to self and others due to own actions (6) Seek clarifications, from supervisors or other authorized personnel in case of perceived risks (7) Monitor the workplace and work processes for potential risks and threats

Module-III: Comply with Security Requirements at work
(1) Carry out periodic walk through to keep work area free from hazards and obstruction (2) Report hazards and potential risks/ threats to supervisors or other authorized personnel (3) Participate in mock drills/ evacuation procedures organized at the workplace (4) Undertake first aid, fire fighting and emergency response training (5) Take action based on instructions in the event of fire, emergencies or accidents. (6) Follow organization procedures for shutdown and evacuation when required

Module-IV: Organization Process
(1) To know and understand: (A) Occupational health and safety risks and methods. (B) Proper disposal system for waste and by-products (c) Signage related to health and safety and their meaning (2) limits of your responsibilities when coordinating with other department. (3) Identification, handling and storage of hazardous substances (4) effects of alcohol, tobacco and drugs

Module-V: Industrial Case (Compulsory)
Ill-effects of alcohol and tobacco (on Employ) – physiology & performance

Examination Scheme:

Components	A	CS	CT	EE
Weight age (%)	05	10	15	70

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

Text:

- Susan B. Kaiser, The social psychology of clothing and personal adornment, Macmillan, 1985
- Anthony Gonzalez (2007): Cosmetology,Global Media Publications

References:

- Avis. M. Dry, The Psychology of Jung, Methuen & Co., London, 1961.
- Horn, Marilyu J, The Second Skin, Houghton Miffin Co., USA, 1968.
- Claudia Piras & Bernhard Roetzel, Ladies: A guide to fashion and style, Dumonte Monte, 2002.
- Vincent Brome, Jung, Granada Publishing, London, 1978.
- Flugel, J.C. The psycho-analytical study of the family, The Hograth Press &INPA, London, 1950.
- Rona Berg,Beauty: The new basics, Workman Publishing Company Inc., 2000.
- Solomon, Consumer Behavior: In Fashion, Pearson Education India.
- Small Business Safety Management Series OSHA 2209-02R 2005

FASHION MANAGEMENT

Programme Structure

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits
FDT2151	Fashion Art Illustration and Model Drawing	3	-	-	3
FDT2251	Fashion Theory	3	-	-	3
FDT2351	Computer Aided Manufacturing	3	-	-	3
FDT2451	Fashion Management	3	-	-	3
FDT2551	Fashion Forecasting	3	-	-	3
FDT2651	Fashion Retailing & Visual Merchandising	3	-	-	3
	TOTAL				**18**

FASHION MANAGEMENT

Syllabus - Semester First

FASHION ART ILLUSTRATION AND MODEL DRAWING

Course Code: FDT2151 **Credit Units: 03**

Course Objective:
The study of this course develops the student's ability to visualize the ideas and putting them in concepts for fashion garments. It gives an understanding to different illustration techniques and explores other media for creating concepts through practical assignments. Whereas Model Drawing is introduced with the concept of drawing normal figures in movement and different postures.

Course Content:

Module I : Sketching of Block and Flesh Figures
Module II : Photo Analysis
Module III : Rendering of Prints into flat illustration
Module IV : Detailed drawing of Basic Styles
Module V : Draping of Garments
Module VI : Introduction to Garment Drawing
Module VII : Use of different colour medium

Submission of practical work records - (Compulsory)

Examination Scheme:

Components	A	H	R	EE
Weightage (%)	05	10	15	70

(**A** - Attendance**; H -**Home Assignment**; R-** Practical work records**; EE-**End Semester Examination)

Text & References:
Text:

- By Kathryn McKelvey, Fashion Source book.

References:

- Fashion Design and Illustrations
- By Patrick John Ireland, Introduction to Fashion Design
- By BinaAbling, Model Drawing
- By BinaAbling, Fashion Sketch Book

Syllabus - Semester Second

FASHION THEORY

Course Code: FDT2251 **Credit Units: 03**

Course Objective:
To provide a broad foundation to acquire the knowledge of fashion theory and its growth which develop the students' potential for professional activities that demand considerable independence or for fashion research work.

Course Contents:
Module-I: Fashion Development
Origin of the Fashion**,** Effect of Industrial Revolution on Fashion; Mass production of clothing; Introduction of Retailing; Changes caused by communications, leisure, and Industry; Effect of world War-i; Effect of depression on Fashion; Effect of world War –ii; Reactionary Postwar Fashion; Fashion at 1960s; Anti fashion at 1970s; Fashion 1980s; Fashion 1990s.

Module-II: Fashion Evaluation & Adoption.
Introduction - Fashion Cycles, Length of Fashion Cycles**; Adoption-** Traditional Fashion adaption (Trickle – Down Theory), Reverse Adaption (Trickle-up or Bottom-up Theories), Mass Dissemination (Trickle-across Theory); James Laver and Laws on the Timeline of Style

Module-III: Study of International Fashion Centers.
France, Italy, England, Germany, Canada, United States.

Module-IV: Applied Learning Assignments.
Visit fashion malls and analyze current fashion styles and find social, economical, technological influence on it. Also refer the fashion magazines and newspapers for trend review. Make a report with views and reasons.

Examination Scheme:

Components	A	L	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; L-** Learning Assignments**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:
- By Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.

References:
- By Phyllis Tortora, The Fairchild's Dictionary of Fashion
- By S. A Hussain, Variety- Fashion for Freedom
- By Sandra J.Keiser & Myrna B.Garner, Beyond Design, Fairchild publication.
- By G. J Sumathi, Elements of Fashion & Apparel Design.
- By Solomon, Consumer Behavior: In Fashion, Pearson Education India.

List of Magazines
Apparel online, Fiber 2 Fashion, Cosmopolitan. Marie Claire, Elle, Vogue, Harper's Bazaar, In Style, Glamour, Lucky, Allure, W Magazine.

Syllabus - Semester Third

COMPUTER-AIDED MANUFACTURING (CAM)

Course Code: FDT2351 **Credit Units: 03**

Course Objective:
This module makes the student know-how the Computer Applications in the Fashion & Apparel Industry.

Course content:

Module I : Adobe Photoshop - Functions of Tools & Working on layers
Module II : Photo-editing & its usage
Module III : Demo on 'TUKA cad' Module
Module IV : Mode conversation through editing
Module V : Demo on 'Opti Tex'
Module VI : Rendering & filter effects along tutorials

Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:

- By Corel DRAW 11 for Windows: Visual Quick start Guide
- By Sue Chastain, your guide to Graphics software
- By David Huss, Gary W. Priester ,Corel DRAW Studio Techniques, McGraw-Hill Osborne Media, 1998
- By CorelDraw 10 for Windows: Visual Quick Start Guide.
- By Linnea Dayton, Cristen Gillespie, The Photoshop Cs/Cs2 Wow!

References:

- Illustrated Encyclopedia of Costume and Fashion,
- By Jill B. Treadwell, Edited: Donald Treadwell, Public Relations Writing: Principles in Practice, SAGE, 2004

Syllabus - Semester Fourth

FASHION MANAGEMENT

Course Code: FDT2451 **Credit Units: 03**

Course Objective:
The objective of this course is to impart knowledge about fashion global market, fashion brand management, different pricing strategies, and necessary for successful employment in apparel businesses.

Course Contents:
Module-I: Fashion for global market
Social, Cultural, Economic, Demographic factors relating to branded and licensed products, Analyzing potential or global market, identify target consumers and competition, market research and testing, customization
Module-II: Fashion Marketing Concepts
The concept of marketing, Utility, Marketing functions and related activities, The concepts of market segmentation and niche marketing, The marketing mix, The channels of distribution used in the fashion industry, Marketing and merchandising
Module-III: Economics in the Fashion Industry
The concept of economic goods/services, The concept of economic resources, The concept of supply and demand, Cost and retail, Gross profit and net profit.
Module-IV: Fashion Promotional Mix
Types of media used in fashion retail advertising, The importance of special promotional events
Module-V: Consumer Demand for Fashion Marketing
Consumer Groups **-** Demographic Trends & Psychographic Trends, Consumer spending – Personal Income, Disposable Income, Discretionary Income, Purchasing Power, Factors influencing consumer behaviour.
Module-VI: Pricing strategies & Decisions
Concept and importance of pricing, Factors affecting pricing decisions, Methods of pricing
Module-VII: Fashion Brand Management
Types and relevance of branding, Fashion & brand positioning, launching strategies, distribution, marketing
campaigns for brand introduction
Examination Scheme:

Components	A	H	CT	EE
Weightage (%)	05	10	15	70

(**A-**Attendance**; H -**Home Assignment**; CT-**Class Test**; EE-**End Semester Examination)

Text & References:
Text:
- By V. D Dudeja, Professional Management of Fashion Industry

References:
- By Mike Easey , Fashion marketing
- By Philips Kotler, Marketing management
- By Maria Constantino, Fashion Marketing and PR
- By Nicholas Alexender, international Retailing
- By V. D Dudeja, Professional Management of Fashion Industry
- By Lynda Gamans, Retailing Principles

Syllabus - Semester Fifth

FASHION FORECASTING

Course Code: FDT2551 **Credit Units: 03**

Course Objective:
The students are made to start their work with the collection of data regarding fashion forecasting, trend analysis
and presentations. They are then made to forecast the fashion trend and dictate fashion in their very own way.

Course Contents:
Module-I: Concept of fashion forecasting (Theory)
Awareness of fashion fairs and fashion centers, Knowledge of creative writing, Reading of fashion forecast magazine, Sources of information, Role of Exhibitions and Fashion shows

Module-II: Fashion Forecasting Process (Theory)
Market Research- Consumer research, Shopping, Sales records; Evaluating the collections- Similar Ideas indicate fashion trends, Trends for target market; Fashion services – Collection reports, Trend books, consulting, Color services, Television/Video services , News letter services, Web sites, Directories and reference books, Fashion Magazines and news papers, Catalogs. Design Sources- Historic inspirations, Folk influences, Vintage clothing shops, Museums, Libraries and bookstores, Arts, Fabrics/Textiles, Travel, Form follows function, The street scene, The turn of the century, innovations and technologies.

Module-III: Applied Learning Assignments. (Practical)

Market Research	-	On site visits to fashion retailers and cloth markets and study the market trends and collect various cloth samples, catalogs etc.
Forecasting Exploration	-	Students will explore a variety of sources like Magazines, News papers, Internet sites and in-site, their market research reports etc. to become familiar with apparel, textile, color, style, and general culture and consumer forecasting resources. Each student will identify and report trends found to class.
Preparation of story boards	-	Students will prepare story boards for specific target.
Presentation of designs	-	Students will prepare fashion forecast for different seasons.
Final Presentation	-	Each student have to submit their Research file in a standard format guided by the faculty for the final evaluation.

Course Evaluation:

Components	A	C	A & F	P	Viva	Total
Weightage (%)	**10**	**20**	**20**	**25**	**25**	**100**

(**A -** Attendance, **C -** Concept Development, **A & F -** Analysis & Findings, **P** – Presentation)

References:

- By Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- By Tracy Diane and Tom Cassidy, Colour Forecasting
- By Kathryn Mc Kelvey, Fashion Design Process, Innovation and Practice

List of Magazines
Apparel online, Fiber 2 Fashion, Cosmopolitan. Marie Claire, Elle, Vogue, Harper's Bazaar, In Style, Glamour, Lucky, Allure, W Magazine.

Syllabus - Semester Sixth

FASHION RETAILING AND VISUAL MERCHANDISING

Course Code: FDT2651 **Credit Units: 03**

Course Objectives:
The aim of the course is to provide an integrated curriculum frame work within which students are able to acquire a range of knowledge and transferable skills relevant to employment in retail industry.

Course Contents:

Module-I: Introduction to Fashion Retailing & Strategies
Fashion Retailing-Definition, Concept, Importance, Functions – Indian Retails vs. Global Scenario, **Retail Location**- Factors affecting location decision, Site Selection. **Retail Directions** -Value directed retailing; Service oriented retailing, Unique Merchandising, Shopping as entertainment, Street retailing, Global expansion of retailing; **Types of Retail operations** – (1) Specialty stores- Single brand or Private label retailers, Secondary spin-offs, (2) Department stores, (3) Mass Merchants – Discounters, Off-Price retailers, Outlet stores, Warehouse clubs, (4) Promotional stores, (5) Non store retailing - Mail order merchants, Party plan retailing, Electronic retailing, Television shopping, Online shopping.

Module-II: Fashion Retail Functions & Organizations
Retailing Functions – Merchandising, Store operations, Marketing, Sales Promotion, Finance, Real estate or Store planning, Human resources **Organizations –** (1) Shopping Centers – Traditional Malls, Diversified Malls, Value centers, Outlet Malls, Transportation centers, Recreational Malls, Town center malls; (2) The small stores, (3) The large stores, (4) Store with in a store – In store designer boutiques, Leased departments; (5) Multiple -unit stores – Chain stores, Department store groups, corporate ownerships. **Retail Buying –** Buyer's role, Duties & responsibilities of a retail buyer

Module-III: Introduction to Visual Merchandising
Visual Merchandising - Definition, Concept, Importance; **Store Planning –** Store Image, Target customers, Seasonal Visual merchandising, **Store Design –** (1) Windows – Special event windows, Fashion message windows, Direct-sell windows; (2) Interiors - Apparel fixtures, Folding and stacking, Accessories display **Managing Visual Merchandising Elements -** Mannequins, Standards Manuals, Presentation packages, Tele communications, Designer / Brand in-store shops

Module-IV: General Principles of IPR
Introduction to Intellectual Property 1.1 Concept of Intellectual Property 1.2 Kinds of Intellectual Property 1.3 Economic importance of Intellectual Property 2. **Philosophical Justification of Intellectual Property Western Theories on Private and IP** 2.1 Locke's Labour Theory of Property 2.2 Hegel's Personality Theory of Property 2.3 Marxian Theory on Private Property and IP. 3. **Indian Theory on Private Property** 3.1 Constitutional Aspects of Property 3.2 Constitutional Protection of Property and IP 4**. International Scenario** Introduction to the leading international instruments concerning intellectual property rights: the Berne Convention, Universal Copyright Convention, the Paris Convention, TRIPS, the World Intellectual Property Rights Organization (WIPO) and the UNESCO 5. **Economic Development and IPR Protection**

6.Enforcement of Industrial Property in General 6.1 Civil Court Procedures 6.2 Criminal Actions: 7.**Counterfeiting Intellectual Property Rights and Human Rights** 7.1 Right to Health as Basic Human Rights and IPR 7.2 Right to Food as Basic Human Rights and IPR
Need for Protection of Industrial Designs 8.1 Introduction 8.2 Justification for Protecting Design 9. **Subject Matter of Protection and Requirements** 9.1 Copyright on Registered Design 92 Industrial and International Exhibition 10. **The Designs Act, 2000** 10.1 Procedure for obtaining Design Protection 10.2 Revocation, Infringement and Remedies

Module-V: Capstone Project (Compulsory)
Model of Online retailing in Indian Fashion Retail Industry- Establishment and Procedural Working

Examination Scheme:

Components	**A**	**CS**	**CT**	**EE**
Weight age (%)	**05**	**10**	**15**	**70**

(**A-**Attendance**; CS-**Case Study**; CT-**Class Test**; EE-**End Semester Examination)

Reference:

- Gini Stephens Frings (1999): Fashion: From concept to consumer, Prentice-Hill Inc.
- Dickerson Kitty G., Inside The Fashion Business, Pearson Education India, 2004
- Swati Bhalla & Anuraag S., Visual Merchandising, Tata McGraw-Hill Education, 2010
- Diamond, Fashion Retailing: A Multi-Channel Approach , Pearson Education India, 2007
- Rosemar Varley, Retail Product Management: Buying And Merchandising, Routledge, 2006
- Jay Diamond, Ellen Diamond, Contemporary Visual Merchandising, Prentice Hall PTR, 2010

Amity Institute of Design (Fine Arts)

Master of Fine Arts

FLEXILEARN
-Freedom to design your degree

Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus – First Semester

SPECIALISATION - APPLIED ARTS

VISUALIZATION - I

Course Code: FNA4101 **Credit Units: 08**

Course Objective:
Additionally for MFA students, to develop further an ability to pursue independent research and articulate ideas in writing through a sound understanding of a range of historical, theoretical and philosophical approaches to art and an understanding of the relevance of these to their work

Course Contents:

Module I
Introduction to Visualization

Module II
Execution of ONE advertising campaigns on consumer's Institutional (Services), related with any of the appropriate medias including Print, Television, Transit etc. and in various techniques available

Module III
Photography module:
a) Product Shoot
b) Models shoot
c) Creative photography
These shoots are to be utilized in the campaign making process by the students.

Module IV
Advanced learning of Corel draw and Photoshop software

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- The Art of Human Illustration, Nick Meglin.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs.
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

GRAPHIC DESIGNING - I

Course Code: FNA4102 **Credit Units: 08**

Course Objective:
Graphic designing is a creative field of work which involves imagination in communicating with users It deals with working with object, shape, text, images etc, It is uses to create corporate identity. Brochures, advertisements, print media, product, packaging and icon etc. The objective of this course is to make the students professionals and fully equipped with the software. So that the software's become just a more tool for hem to execute the finished artworks

Software's introduced:
Adobe Illustrator: Adobe Photoshop, Corel Draw

Course Contents:

Module I
To edit photographs, create artistic imagery

Module II
To create illustrations, logos

Module III
Product window display for interactive media

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B. Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

TV GRAPHICS - I

Course Code: FNA4103 **Credit Units: 08**

Course Objective:
The design for programmes, station identifies signs, symbols, commercial advertisement, trade-marks and short films etc.

Course Contents:

Module I
Stations identify signs, symbols, commercial advertisement, trade-marks and short films etc.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B. Meggs
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

ILLUSTRATION - I

Course Code: FNA4104 **Credit Units: 08**

Course Objective:
Advance studies in illustration for graphic expression.

Course Contents:

Module I
Forming of individual style in illustration and cartooning.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin.
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B. Meggs.
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

ADVERTISING AND MARKETING RESEARCH - I

Course Code: FNA4105 **Credit Units: 02**

Course Objective:
The programme of post graduate studies in advanced Advertising and Marketing, currents trends, Importance of research in Product, market and marketing, branding and packaging. Adverting concepts, advertising and Media functions.

Course Contents:
Module I
Market and Marketing Concepts
Key concepts in marketing
Role of Marketing in Business.
Market Segmentation

Module II: Marketing Communication- An overview
Marketing communication
Marketing communication mix
Factors Affecting the Marketing communication mix
Marketing Communication Process

Module III: Role of Advertising as Communication
The Communication Model
Advertising as Communication
Advertising role in shaping or mirroring the society

Module IV: Advertising and Media
Basic Media strategy
Television as an advertising medium.
The contemporary radio Industry
The newspaper and advertising
Advertising and consumer magazines – magazines as National advertising medium
Transit advertising

Module V: Marketing Research
The Role of Research in Marketing
Marketing research Process
Ethics in Market research

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:
- Innovation in Marketing, T, Levit.
- Environment of Marketing Behaviour, Halloway and Hawrock.
- Advertising Hand Book, D. V. Gandhi
- Modern Advertising, Hepner
- Economic of Advertising, B. Chiplin
- International Handbook of Advertising
- Advertising Procedure, Kleppner's.
- Advertising Management, Donald R. Cooper, PamelaS. Schindler

SPECIALISATION – PAINTING

DRAWING - I

Course Code: FNA4106 **Credit Units: 08**

Course Objective:
The course is to develop professional drawing skill through anatomical study of human figure. This drawing activity is to learn creating big sized drawing on bigger space to capture life size drawing. The drawing exercise to be done from a model in front is called life study.
Secondly this course is also to execute creative drawing based on life experience or to depict socio cultural aspect or conceptualization of new ideas.

Course Contents:

Module I: Life Study
Life study from life model

Module II: Creative Drawing
Creative drawing (figurative/non-figurative)

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Big book of Drawing and painting, Francisco Asensio Cerver

References:
- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton

CREATIVE PAINTING - I

Course Code: FNA4107 **Credit Units: 08**

Course Objective:
Life study in acrylic or oil colour on canvas from life model to exercise figurative painting technique, colour and tonal variation to create three dimensional human figure. An approach to achieve professional level realistic painting skill.
After life study the students are to give the task of innovative and experimental work. This is to execute acrylic or oil colour painting on canvas based on given themes or on themes will be chosen by the students themselves to achieve individual or original style of rendering painting. It is to explore various mediums of painting with new ideas and perception.

Course Contents:

Module I: Life Study
Life Study from life model.

Module II: Creative Painting
Painting based on social or individual experience based themes.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Notes on the techniques of Painting, Hilaire Hiler
- A Concise History of Modern Painting, 1974 Thames & Hudson, London

References:
- Big book of drawing and painting, Francisco Asensio Cerver
- Method and Materials, Lynton Lamb.
- Artist's Handbook, Ray Smith
- Artist's Encyclopedia, John Quick
- A manual of Painting Materials & Techniques, Mark David Goattsegen
- Art Class, Copy Right 1999, Harper Collins Publishers.
- Images of the human body, Pepin Van Roojen.
- Painting Course, Ronald Pearsall
- The portrait, Norbert Schneider.
- Color, Edith Anderson Feisner.
- History of Painting, Janson.
- History of Western Painting, Eric Ne

MURAL (PAINTING) - I

Course Code: FNA4108 **Credit Units: 08**

Course Objective:
The objective of this course is to provide working knowledge on wall surface. It gives a detail exposure about all kinds of mural techniques.

Course Contents:

Module I
Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II
Preparing the base and surface

Module III
Final work followed by the installation

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry

PORTRAITURE - I

Course Code: FNA4109 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced training on portrait painting exploring all mediums.

Course Contents:

Module I
Portrait study in oil on canvas

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Big book of Drawing and painting, Francisco Asensio Cerver

References:
- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison ,from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton

HISTORY OF ART (PAINTING) – I

Course Code: FNA4110 **Credit Units: 02**

Course Objective:
The objective of this course is to provide knowledge on historical aspects (Indian and western) of art.

Course Contents:

Module I
Analytical study of Pre Independence Indian Art

Module II
Western Art: Cubism, Fauvism, Surrealism and abstract Expressionism.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Gerrmain. Bazin.

References:
- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Bejamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.

SPECIALIZATION- SCULPTURE

CREATIVE DRAWING - I

Course Code: FNA4111 **Credit Units: 08**

Course Objective:
The course is to develop professional drawing skill through anatomical study of human figure. This drawing activity is to learn creating big sized drawing on bigger space to capture life size drawing. The drawing exercise to be done from a model in front is called life study.
Secondly this course is also to execute creative drawing based on life experience or to depict socio cultural aspect or conceptualization of new ideas.

Course Contents:

Module I: Life Study
Life study from life model

Module II: Creative Drawing
Creative drawing (figurative/non-figurative)

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Big book of Drawing and painting, Francisco Asensio Cerver

References:
- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton

HISTORY OF ART – 20th CENTURY ART (SCULPTURE) - I

Course Code: FNA4112 **Credit Units: 02**

Course Objective:
The objective of this course is to provide knowledge on historical aspects (Indian and western) of art.

Course Contents:

Module I
Analytical study of Pre Independence Indian Art

Module II: Western Art
Cubism, Fauvism, Surrealism and abstract Expressionism

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Gerrmain. Bazin.

References:
- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Bejamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.

PORTRAITURE SCULPTURE-I

Course Code: FNA4113 **Credit Units: 08**

Course Objective:
This is to provide about working on realistic sculpture.

Course Contents:

Module I
Realistic sculpture study supported by preparatory studies and techniques

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:
- History of Sculpture, George Henry Chase and Chander Rathforn.
- Four steps towards

MURAL (SCULPTURE) - I

Course Code: FNA4114 **Credit Units: 08**

Course Objective:
The objective of this course is to provide working knowledge on wall surface. It gives a detail exposure about all kinds of mural techniques.

Course Contents:

Module I
Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II
Preparing the base and surface

Module III
Final work followed by the installation**.**

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry

CREATIVE SCULPTURE - I

Course Code: FNA4115 **Credit Units: 08**

Course Objective:
This is to provide professional experience about working on sculpture using various materials.

Course Contents:

Module I
Abstract Composition supported by preparatory studies and techniques.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:
- History of Sculpture, George Henry Chase and Chander Rathforn.
- Four steps towards

REPORT AND VIVA (Specialization Specific)

Course Code: FNA4237 **Credit Units: 01**

Course Objective:
This course has an aim to be as one of the most important aspects in the process of artistic growth and for enrichment of knowledge. This will lead for awareness of contemporary art scene. The students will be given the task to prepare report on various art exhibitions and museum visits near their neighborhood.
This is to provide professional exposure for the researchers.

Course Contents:

Module I
Visiting ad-agencies, museums and exhibitions

Module II
Preparing reports on visits with visual proof.

Examination Scheme:

Components	**PR**	**PS**	**V**
Weightage (%)	70	15	15

(**V**-Viva; **PR**-Project Report; **PS**-Presentation)

VISUALIZATION - II

Course Code: FNA4201 **Credit Units: 08**

Course Objective:
MFA Program grounded in hands-on making, entrepreneurial strategies, and social and environmental engagement. The realization of work for a specific community or client, and entrepreneurism that connects making a living with making a difference.

Course Contents:

Module I: Social Campaign
Take any burning issue of today's world. It can be regarding exploitation, poverty, human rights, Industrialization, women related issues or any other. Conduct a comprehensive research into its prevalence,
In the society- its origin, its extent, myths related to it, what measures are being taken to eradicate it, what more can be done etc.

Module II
Photography module for the application of social campaign effectively.

Module III
Design the social campaign for either magazine or newspaper according to the subject requirement.

Module IV
Introduction to Illustrator and Flash software.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

GRAPHIC DESIGNING - II

Course Code: FNA4202 **Credit Units: 08**

Course Objective:
The focus of this course is on refining design work and preparation for the professional world. Projects focus on advanced issues of representation

Software's introduced:
Adobe Flash

Course Contents:

Module I
Use Adobe Photoshop and Adobe Illustrator to create Promotional campaign for print/broadcast media

Module II
Graphic design for web with software flash etc

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

***References*:**
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

TV GRAPHICS - II

Course Code: FNA4203 **Credit Units: 08**

Course Objective:
The design for programmes, station identifies signs, symbols, commercial advertisement, trade marks and short films etc.

Course Contents:

Module I
Station identify signs, symbols, commercial advertisement, trade marks and short films etc.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

***References*:**
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

ILLUSTRATION - II

Course Code: FNA4204 **Credit Units: 08**

Course Objective:
Advance studies in illustration for graphic expression.

Course Contents:

Module I
Emphasis on forming of individual style in illustration and cartooning

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

***References*:**
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

ADVERTISING AND MARKETING RESEARCH - II

Course Code: FNA4205 **Credit Units: 03**

Course Objective:
A program that focuses on the creation, execution, transmission, and evaluation of commercial messages in various media intended to promote and sell products, services, and brands; and that prepares individuals to function as advertising assistants, technicians, and managers. It focuses on the various advertising and marketing communication methods.

Course Contents:

Module I: Function and role of Advertising agency
The agency
How agencies developed
The traditional agency organization
The full- service agencies
Client- agency relationship
Other advertising services

Module II: Personal selling
Types of personal selling
Personal Selling Process
Personal selling and marketing communication mix
Advertising and Personal selling

Module III: Consumer Buying Behavior
How does consumer behavior work
Cultural and social influences on consumer decisions
Psychological influences on consumer decisions
Behavioral influences on consumer decisions
The consumer decision process

Module IV: Public Relations
Public Opinion
Reputation: Goodwill and Trust
Comparing PR and Advertising
Public Relation Tools:

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Innovation in Marketing, T, Levit.
- Environment of Marketing Behaviour, Halloway and Hawrock.
- Advertising Hand Book, D. V. Gandhi
- Modern Advertising, Hepner
- Economic of Advertising, B. Chiplin
- International Handbook of Advertising
- Advertising Procedure, Kleppner's.
- Advertising Management, Donald R. Cooper, PamelaS. Schindler

SPECIALIZATION - PAINTING
DRAWING - II

Course Code: FNA4206 **Credit Units: 08**

Course Objective:
Drawing portraiture in this stage will help to enhance professional skill in drawing.
This exercise to make drawing with various mediums from life model is essential. It is to obtain self confidence of making life size portrait and head study.
After the portrait/head study students to be ensured required freedom to create creative drawing based on social themes or abstract compositions of their choice which lead to develop one's own individual creative style and perception in drawing.
The drawing style is necessarily to be related with the style of painting has been developed by the individuals.

Course Contents:

Module I: Portrait Study
Portrait from life model.

Module II: Creative Drawing
Creative drawing to be based on the element like observation, distortion, simplification, symbolic, experimentation, photo-realistic or conceptual.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.

CREATIVE PAINTING - II

Course Code: FNA4207 **Credit Units: 08**

Course Objective:
This course is for exploring most individualistic style of painting, experimenting with various mediums and ideas. The students will work in figurative/non-figurative compositions. They can work with any medium which provides them a kind of comfort or skill in oil /acrylic colour on canvas/ water colour / tempara on paper / mix-media and so on.
This course also experiments with new media, conceptual art like installation art/video art. Installation/video art introduces to a widely practiced medium in the contemporary art scene. This new medium which is unconventional in nature has modern approach which goes beyond studio practice. It is to develop skill of the craft and has potential to express intense feelings and sensibilities. It deals with new material for displaying social message in particular.

Course Contents:

Module I: Creative Painting
Creative painting (figurative/non-figurative) based on social or individual themes.

Module II: Installation/video art
Creating conceptual art in installation/video art medium

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Big book of drawing and painting, Francisco Asensio Cerver
- Notes on the techniques of Painting, Hilaire Hiler
- Method and Materials, Lynton Lamb.
- Artist's Handbook, Ray Smith
- Artist's Encyclopedia, John Quick
- A manual of Painting Materials & Techniques, Mark David Goattsegen
- Art Class, Copy Right 1999, Harper Collins Publishers.
- Images of the human body, Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Course by Ronald Pearsall
- The portrait, Norbert Schneider.
- Color, Edith Anderson Feisner.

MURAL (PAINTING) - II

Course Code: FNA4208 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work.

Course Contents:

Module I
Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II
Preparing the base and surface

Module III
Final work followed by the installation**.**

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry

PORTRAITURE - II

Course Code: FNA4209 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced training on portrait painting exploring all mediums.

Course Contents:

Module I
Portrait study in oil on canvas

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Big book of Drawing and painting, Francisco Asensio Cerver

References:
- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison ,from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton

HISTORY OF ART (PAINTING) - II

Course Code: FNA4210 **Credit Units: 03**

Course Objective:
The objective of this course is to provide knowledge on historical aspects (Indian and western) of art.

Course Contents:

Module I
Analytical study of post-independence (1947-1970) and Contemporary (1970-2000) of Indian Art.

Module II: Western Art
Post modern period and contemporary art.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Gerrmain. Bazin.

References:
- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Bejamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.

SPECIALIZATION - SCULPTURE

CREATIVE DRAWING - II

Course Code: FNA4211 **Credit Units: 08**

Course Objective:
Drawing portraiture in this stage will help to enhance professional skill in drawing.
This exercise to make drawing with various mediums from life model is essential. It is to obtain self confidence of making life size portrait and head study.
After the portrait/head study students to be ensured required freedom to create creative drawing based on social themes or abstract compositions of their choice which lead to develop one's own individual creative style and perception in drawing.
The drawing style is necessarily to be related with the style of painting has been developed by the individuals.

Course Contents:

Module I: Portrait Study
Portrait from life model

Module II: Creative Drawing
Creative drawing to be based on the element like observation, distortion, simplification, symbolic, experimentation, photo-realistic or conceptual

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.

PORTRAITURE SCULPTURE-II

Course Code: FNA4212 **Credit Units: 08**

Course Objective:
This is to provide about working on realistic sculpture.

Course Contents:

Module I
Realistic study work supported by preparatory studies and techniques.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT-** Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:
- History of Sculpture, George Henry Chase and Chander Rathforn.

MURAL (SCULPTURE) - II

Course Code: FNA4213 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work.

Course Contents:

Module I
Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II
Preparing the base and surface

Module III
Final work followed by the installation**.**

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry

CREATIVE SCULPTURE - II

Course Code: FNA4214 **Credit Units: 08**

Course Objective:
This is to provide professional experience about working on sculpture using various materials.

Course Contents:

Module I
Abstract Composition supported by preparatory studies and techniques.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:
- History of Sculpture, George Henry Chase and Chander Rathforn.

HISTORY OF ART – 20th CENTURY ART (SCULPTURE) - II

Course Code: FNA4215 **Credit Units: 03**

Course Objective:
The objective of this course is to provide knowledge on historical aspects (Indian and western) of art.

Course Contents:

Module I
Analytical study of post-independence (1947-1970) and Contemporary (1970-2000) of Indian Art.

Module II
Western Art: Post modern period and contemporary art.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Gerrmain. Bazin.

References:
- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art. S. K. Bhattacharya.
- 5000 Years of Indian Art. Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Bejamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art. H. H. Arnason.

DISSERTATION AND VIVA - I

Course Code: FNA4337 **Credit Units: 02**

Course Objective:

PAINTING-
This course is about research work on a particular school of art, artist so on. It is for enrichment of professional knowledge through detail study and research about the field and artist as well. It focuses to put authentic information with analytical approach.
This paper is to be submitted in a form of a report, printed with necessary and authentic reproductions, photographs, or images as illustrations.

Portfolio development is also a part of this course. This project compiles the selected art works have been executed during MFA programme (first and second year both). The portfolio development project has the purpose of preparing students for future prospects in the professional field.

APPLIED ARTS & SCULPTURE-
This is to provide professional exposure for the researchers.

Course Contents:

Module I
a. Research work on the given topic from various sources like art institutes, galleries, libraries so on.
b. Collecting materials like notes, photographs and reproductions.

Module II
Portfolio development project (compiling of selected art works).

Examination Scheme:

Components	**PR**	**PS**	**V**
Weightage (%)	70	15	15

(**V**-Viva; **PR**-Project Report; **PS**-Presentation)

VISUALIZATION - III

Course Code: FNA4301 **Credit Units: 08**

Course Objective:
There will be students advanced understanding of design in relation to advertising. Students will do intensive exercises to understand design, market trends, target audience, consumer behavior. Each and every media will be explored. Learn new ways of thinking, processing and communicating ideas, emotions, and experiences through your discipline.

Course Contents:

Module I
Execution of ONE advertising Campaigns on consumer's product or Institutional (Services)
Related with any of the appropriate Medias including Print, Television, Transit etc. and in various techniques available.

Module II
Perform the simple exercises on the software's, they will explore flash and illustrator software's in their campaign making process.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

GRAPHIC DESIGNING - III

Course Code: FNA4302 **Credit Units: 08**

Course Objective:
The focus of this course is to equip students with knowledge of designing campaign for media.

Software's introduced:
Adobe Flash

Course Contents:

Module I
Product and social advertisement for electronic media in the help of i.e adobe flash/Web design software.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

TV GRAPHICS - III

Course Code: FNA4303 **Credit Units: 08**

Course Objective:
The design for programmes, station identify signs, symbols, commercial advertisements, trade marks and short films etc.

Course Contents:

Module I
The design for programmes, station identify signs, symbols, commercial advertisement, trade marks and short films etc.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

ILLUSTRATION - III

Course Code: FNA4304 **Credit Units: 08**

Course Objective:
Illustration for books meant for different age groups. Comprehensive illustration for book animation.

Course Contents:

Module I
Advance studies in illustration for graphic expression. Emphasis on forming of individual style in illustration, cartooning.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

ADVERTISING AND BUSINESS ORGANIZATION - I

Course Code: FNA4305 **Credit Units: 03**

Course Objective:
The objective of this course for detailed study of advertising management, modern marketing concepts and consumer supremacy. Buying motives and habits. Promotion-sales promotion, Relations, beliefs, values and customs in advertising

Course Contents:

Module I: Advertising Management
Overview of Advertising Management
Advertising and IMC process
Advertising and Campaign Management
Advertising Goals

Module II: Sales and Promotions strategy
Trade Promotions
Consumer Promotions
Reasons behind Growing Importance of Sales Promotions.
Effectiveness of Sales Promotions.
Objective and Planning of sales and promotion.
Identifying Synergies between various types of promotions.
Understanding the impact of sales and promotion activities on channel members.

Module III: Direct Marketing
Pros and Cons of direct marketing
Direct Marketing and Direct response advertising
Tools of Direct Marketing: Direct Media, Direct Mail, Telemarketing, Mass media advertising.

Module IV: Developing the Marketing Planning Program
Price Decision
Distribution channel Decision
Developing Promotional Strategies
Push or Pull

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Innovation in Marketing, T, Levit.
- Environment of Marketing Behaviour, Halloway and Hawrock.
- Advertising Hand Book, D. V. Gandhi
- Modern Advertising, Hepner
- Economic of Advertising, B. Chiplin
- International Handbook of Advertising
- Advertising Procedure, Kleppner's.
- Advertising Management, Donald R. Cooper, PamelaS. Schindler

SPECIALIZATION – PAINTING

DRAWING - III

Course Code: FNA4306 **Credit Units: 08**

Course Objective:
Drawing is not only one of the most significant aspects for painting students but also is a complete medium in itself. Working in one particular style and media is advisable in this stage.
Drawing is a medium which deals with black and white composition in various drawing mediums like pen and ink, charcoal etc. In this stage a student needs to work on own individual style.
Rendering creative drawing after experimenting with various techniques and possibilities of using different mediums for exploring individual perception in the medium

Course Contents:

Module I: Creative Sketching
Making layouts

Module II: Creative Drawing
Creative drawing (figurative/ non-figurative)

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.

CREATIVE PAINTING - III

Course Code: FNA4307 **Credit Units: 08**

Course Objective:
The course is to maintain a sense of painting as a language that simultaneously upholds tradition and seeks innovation. Painting from observation, formal structure, narrative content. Painting as a means of individual expression are qualities that are valued. Students work both figuratively and abstractly. The course is structured to emphasize individual studio work that is assessed through one on one and group critiques.
This course is to develop an intense ethos towards studio practice that makes for a stimulating work environment.

Course Contents:

Module I
Painting in oil / acrylic colour on canvas (figurative /non-figurative)

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Big book of drawing and painting, Francisco Asensio Cerver
- Notes on the techniques of Painting, Hilaire Hiler
- Method and Materials, Lynton Lamb.
- Artist's Handbook, Ray Smith
- Artist's Encyclopedia, John Quick
- A manual of Painting Materials & Techniques, Mark David Goattsegen
- Art Class, Copy Right 1999, Harper Collins Publishers.
- Images of the human body, Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Course, Ronald Pearsall
- The portrait. Norbert Schneider.
- Color, Edith Anderson Feisner.

MURAL (PAINTING) - III

Course Code: FNA4308 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work including mixed materials.

Course Contents:

Module I
Preparing suitable layout for mural followed by modification required according to the materials to be used

Module II
Preparing the base and surface

Module III
Final work followed by the installation**.**

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry

PORTRAITURE - III

Course Code: FNA4309 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced training on portrait painting exploring all mediums.

Course Contents:

Module I
Portrait study in oil on canvas

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Big book of Drawing and painting, Francisco Asensio Cerver

References:
- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison ,from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton

ART CRITICISM (PAINTING) - I

Course Code: FNA4310 **Credit Units: 03**

Course Objective:
The objective of this course is to provide Critical Study of Art.

Course Contents:

Module I
Importance and necessary criticism. Evaluation of art works.

Module II
Understanding of Modern and post modern art trends in eastern and western of view.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Gerrmain. Bazin.

References:
- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Bejamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.

SPECIALIZATION – SCULPTURE

CREATIVE SCULPTURE - III

Course Code: FNA4311 **Credit Units: 08**

Course Objective:
This is to provide professional experience about working on sculpture using various materials.

Course Contents:

Module I
Abstract Composition supported by preparatory studies and techniques.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A-**Attendance; **PT-** Portfolio; **HA-**Home Assignment; **CT-**Class Test)

Text & References:

Text:
- Art Now, Herbertb Read
- Sculpture Today, Kinston parker

References:
- History of Sculpture, George Henry Chase and Chander Rathforn.
- Four steps towards

PORTRAITURE SCULPTURE-III

Course Code: FNA4312 **Credit Units: 08**

Course Objective:
This is to provide about working on realistic sculpture.

Course Contents:

Module I
Realistic study work supported by preparatory studies and techniques.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Art Now, Y Herbert Read
- Sculpture Today, Kinston parker

References:
- History of Sculpture. George Henry Chase and Chander Rathforn.
- Four steps towards

MURAL (SCULPTURE) - III

Course Code: FNA4313 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work including mixed materials.

Course Contents:

Module I
Preparing suitable layout for mural followed by modification required according to the materials to be used.

Module II
Preparing the base and surface.

Module III
Final work followed by the installation**.**

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Ajanta Murals, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry

ART CRITICISM (SCULPTURE) - I

Course Code: FNA4315 **Credit Units: 03**

Course Objective:
The objective of this course is to provide Critical Study of Art.

Course Contents:

Module I
Importance and necessary criticism. Evaluation of art works.

Module II
Understanding of Modern and post modern art trends in eastern and western of view.

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Gerrmain. Bazin.

References:
- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Bejamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.

DISSERTATION AND VIVA - II

Course Code: FNA4437 **Credit Units: 06**

Course Objective:
This course is to continue the research work to put the collected materials together for developing the body of the dissertation on the particular subject.
Putting up the necessary photographs, reproductions with the text materials.

Course Contents:

Module I
Preparing the final paper along with necessary photographs, reproductions with detail information.

Module II
a. Submission of printed dissertation paper.
b. Reviewing dissertation paper.

Examination Scheme:

Components	**PR**	**PS**	**V**
Weightage (%)	70	15	15

(**V**-Viva; **PR**-ProjectReport; **PS**-Presentation)

SPECIALIZATION – APPLIED ARTS

VISUALIZATION - IV

Course Code: FNA4401 **Credit Units: 08**

Course Objective:
Encouraging a cross-disciplinary studio environment in which the workshop is a lab to collaboratively explore design and making processes, the Program welcomes students from a wide range of creative backgrounds to make original work with an applied purpose. Applied art transform ideas into symbols to convey specific messages for and in the public.

Course Contents:

Module I: Preparation of a project and presentation
This subject focuses on defining, researching and producing a project work with a formal structure for research and exploration in deciding upon any one topic chosen by the students. These projects are formally presented by all MFA students reflecting on their time and experience within the Program.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

GRAPHIC DESIGNING - IV

Course Code: FNA4402 **Credit Units: 08**

Course Objective:
Understanding of graphic designing for campaign for media & develop skill for portfolio presentation.

Course Contents:

Module I
Conceptual campaign for any brand/social issue

Module II
Portfolio Development and presentation

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

TV GRAPHICS - IV

Course Code: FNA4403 **Credit Units: 08**

Course Objective:
The design for programmes, station identify signs, symbols, commercial advertisements, trade marks and short films etc.

Course Contents:

Module I
The design for programmes, station identify signs, symbols, commercial advertisement, trade marks and short films etc.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

ILLUSTRATION - IV

Course Code: FNA4404 **Credit Units: 08**

Course Objective:
Illustration for books meant for different age groups. Comprehensive illustration for book animation.

Course Contents:

Module I
Advance studies in illustration for graphic expression. Emphasis on forming of individual style in illustration, cartooning.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Graphic design & reproduction techniques, Peter Croy
- Artists and illustration's encyclopedia, John Quick

References:
- The Art of Human Illustration, Nick Meglin,
- Corporate Graphics, Mike Quon
- A History of Graphic Design, Philip B Meggs,
- Graphic Arts Manual, Irwing E. Field, Arne Press, New York, 1980
- Design Graphics, C. L. Martin, Macmillan Co. London

ADVERTISING AND BUSINESS ORGANIZATION - II

Course Code: FNA4405 **Credit Units: 03**

Course Objective:
The objective of this course includes instruction in International advertising, visual communication, advertising design and production methods, campaign methods and techniques, Advertising messages, related principles of creative process, and applicable technical and equipment skills

Course Contents:

Module I: The Effective Advertising Messages
The Art and Science of Creative Advertising
Creative thinking
The creative process: How to get an Idea
Creative Strategy: Message Objective, Head and Heart Strategies, Messages that drive perception, Message that touches emotions, Message that persuade.

Module II: Visual Communication
Visual Impact
Layout and Design
Print Production: Print Media Requirement, Art Production
Effective Web Design

Module III: International Advertising
Importance of international Markets
Role of International Advertising
Advantages and disadvantages of global Marketing and Advertising
Decision Areas in International Advertising

Module IV: Evaluating the Social, Ethical and Economic Aspect of Advertising
Social and Ethical Criticism of Advertising
Economic Effects of Advertising

Module V: Brand Management
Brands and their Significance: Attributes, Benefits, Values, Target User, Personality, Culture, Categories of Brands
Brand equity: Managing Brand Equity
Brand Loyalty: Brand Associations
International Branding Considerations

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

- Innovation in Marketing, T, Levit.
- Environment of Marketing Behaviour, Halloway and Hawrock.
- Advertising Hand Book, D. V. Gandhi
- Modern Advertising, Hepner
- Economic of Advertising, B. Chiplin
- International Handbook of Advertising
- Advertising Procedure, Kleppner's.
- Advertising Management, Donald R. Cooper, PamelaS. Schindler

SPECIALIZATION – PAINTING

DRAWING - IV

Course Code: FNA4406 **Credit Units: 08**

Course Objective:
This course of drawing is in the final stage of learning in an art institute. Students are provided required space and freedom to express themselves. The drawings to be executed in this stage to focus on confined and individual perception. The drawings may be creating in a series, therefore, all the drawings to have a kind of continuation. This stage is after experimenting various techniques and possibilities of using different mediums for exploring individual and innovative ideas. Working in one particular style and media is advisable in this stage.

Course Contents:

Module I: Creative Sketching
Making layouts

Module II: Creative Drawing
Drawing figurative / non-figurative compositions.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Y. Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.

CREATIVE PAINTING - IV

Course Code: FNA4407 **Credit Units: 08**

Course Objective:
The course emphasizes the development of a sustained artistic practice through exploration, experimentation, and intensive studio work and study. Opportunities to investigate areas beyond one's concentration are made available.
The course is also to refine the technical aspect like developing individual style of colour application and introduce new treatment of theme and concept as reflection of life experience and social awareness.

This is to render conceptual art to explore new media of creative art like installation art or video art.

Course Contents:

Module I
Painting in oil / acrylic colour on canvas (figurative /non-figurative).

Module II: Installation/video art
Creating conceptual art in installation/video art medium.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Big book of drawing and painting, Francisco Asensio Cerver
- Notes on the techniques of Painting, Hilaire Hiler
- Method and Materials, Lynton Lamb.
- Artist's Handbook, Ray Smith
- Artist's Encyclopedia, John Quick
- A manual of Painting Materials & Techniques, Mark David Goattsegen
- Art Class, Copy Right 1999, Harper Collins Publishers.
- Images of the human body, Pepin Van Roojen.
- A Concise History of Modern Painting, 1974 Thames & Hudson, London
- Painting Course, Ronald Pearsall
- The portrait, Norbert Schneider.
- Color, Edith Anderson Feisner.

MURAL (PAINTING) - IV

Course Code: FNA4408 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work including mixed materials.

Course Contents:

Module I
Preparing suitable layout for mural followed by modification required according to the materials to be used.

Module II
Preparing the base and surface.

Module III
Final work followed by the installation**.**

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Ajanta Murals published by Indian Archeology Dept.
- Techniques of Indian paintings and Murals published by Indian Archeology Dept.
- Decorative Murals by Donna Dewberry

PORTRAITURE - IV

Course Code: FNA4409 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced training on portrait painting exploring all mediums.

Course Contents:

Module I
Portrait study in oil on canvas.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Big book of Drawing and painting, Francisco Asensio Cerver

References:
- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Herbert Read
- How to draw and paint, Hazel Harrison ,from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton

ART CRITICISM (PAINTING) - II

Course Code: FNA4410 **Credit Units: 03**

Course Objective:
The objective of this course is to provide Critical Study of Art.

Course Contents:

Module I
History of criticism, Development of Art History as Human Discipline, Visual Analysis and Psycho-analytic point of View on Art.

Module II
Critical References on Painting and Sculpture (Indian and Western)

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Gerrmain. Bazin.

References:
- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Bejamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.

SPECIALIZATION - SCULPTURE

CREATIVE DRAWING - IV

Course Code: FNA4411 **Credit Units: 08**

Course Objective:
This course of drawing is in the final stage of learning in an art institute. Students are provided required space and freedom to express themselves. The drawings to be executed in this stage to focus on confined and individual perception. The drawings may be creating in a series, therefore, all the drawings to have a kind of continuation. This stage is after experimenting various techniques and possibilities of using different mediums for exploring individual and innovative ideas. Working in one particular style and media is advisable in this stage.

Course Contents:

Module I: Creative Sketching
Making layouts

Module II: Creative Drawing
Drawing figurative / non-figurative compositions.

Examination Scheme:

Components	A	PT / HA / CT	End Term Exam	
			Project (Display & Viva)	Exam (Practical)
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- An Introduction to Drawing, James Horton in association with the Royal Academy of Arts.
- Grassroot of Art, Y. Herbert Read
- How to draw and paint, Hazel Harrison, from Art School
- Human Figure, Walter Foster
- Anatomy, Walter Foster
- Heads, Walter Foster
- Figure Drawing, Patricia Monahan with Albany Wiseman
- Human Anatomy, James Horton
- Big book of Drawing and painting, Francisco Asensio Cerver.

PORTRAITURE SCULPTURE-IV

Course Code: FNA4412 **Credit Units: 08**

Course Objective:
This is to provide about working on realistic sculpture.

Course Contents:

Module I
Realistic study work supported by preparatory studies and techniques.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

Text:
- Art Now, Herbert Read
- Sculpture Today, Kinston parker

References:
- History of Sculpture, George Henry Chase and Chander Rathforn.
- Four steps towards

MURAL (SCULPTURE) - IV

Course Code: FNA4413 **Credit Units: 08**

Course Objective:
The objective of this course is to provide advanced techniques of working knowledge on wall surface. It gives a professional exposure about all kinds of mural work including mixed materials.

Course Contents:

Module I
Preparing suitable layout for mural followed by modification required according to the materials to be used.

Module II
Preparing the base and surface.

Module III
Final work followed by the installation**.**

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A**-Attendance; **PT**- Portfolio; **HA**-Home Assignment; **CT**-Class Test)

Text & References:

- Ajanta Murals published, Indian Archeology Dept.
- Techniques of Indian paintings and Murals, Indian Archeology Dept.
- Decorative Murals, Donna Dewberry

CREATIVE SCULPTURE - IV

Course Code: FNA4414 **Credit Units: 08**

Course Objective:
This is to provide professional experience about working on sculpture using various materials.

Course Contents:

Module I
Abstract Composition supported by preparatory studies and techniques.

Examination Scheme:

Components	**A**	**PT / HA / CT**	**End Term Exam**	
			Project (Display & Viva)	**Exam (Practical)**
Weightage (%)	5	25	30	40

(**A-**Attendance; **PT-** Portfolio; **HA-**Home Assignment; **CT-**Class Test)

Text & References:

Text:
- Art Now, Herbertb Read
- Sculpture Today, Kinston parker

References:
- History of Sculpture, George Henry Chase and Chander Rathforn.
- Four steps towards

ART CRITICISM (SCULPTURE) - II

Course Code: FNA4415 **Credit Units: 03**

Course Objective:
The objective of this course is to provide Critical Study of Art.

Course Contents:

Module I
History of criticism, Development of Art History as Human Discipline, Visual Analysis and Psycho-analytic point of View on Art.

Module II
Critical References on Painting and Sculpture (Indian and Western)

Examination Scheme:

Components	**CT**	**P**	**A**	**EE**
Weightage (%)	15	10	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Text & References:

Text:
- Civilization of Mankind, Van Loon
- History of Art, Janson
- Art through the ages, Helen Gardener
- Concise History of Art-Vols. 1 & 2, Gerrmain Bazin.

References:
- Fundamental of Indian Art, S. N. Dasgupta
- Art of Mankind, Van Loon
- History of Indian and Indonesian Art, A. K. Coomaraswamy
- The Art and Architecture of Indian, Benjamin Rowland.
- The Story of Indian Art, S. K. Bhattacharya.
- 5000 Years of Indian Art, Shivaramaurti
- A History of Fine Arts in India and West, Edith Tomory
- Introduction of Chinese Art, Lawrence Binyon
- History of Indian and Indonesian Art, Bejamin Rowland.
- Concise History of Art Vols. 1&2, Germain Bazin
- Italian Painters of the Renaissance, Bernard Berenson
- Art Now, Herbert Read
- Grassroot of Art, Herbert Read.
- History of Modern Art, H. H. Arnason.

PAINTING ARTS

Programme Structure-2021

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
FNA2151	Basics of Drawing and Asian Landscape	1	-	4	3
FNA2251	Basics of Drawing and Monochrome Folk Composition	1	-	4	3
FNA2351	Advanced Drawing and Illustration of Indian Temple Sculpture	1	-	4	3
FNA2451	Advanced Drawing with Ink & Brush Illustration	1	-	4	3
FNA2551	Advanced Drawing & Illustration with Mural Art	1	-	4	3
FNA2651	Advanced Drawing & Illustration with Visual Design	1	-	4	3
	TOTAL				**18**

PAINTING ARTS

Syllabus - Semester First

BASICS OF DRAWING AND ASIAN LANDSCAPE

Course Code: FNA2151 **Credit Units: 03**

Course Objective:
Drawing is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Also the objective of this course is to acquire experience in basic knowledge to explore painting techniques too. Structured exercises on painting include basic colour theory and pictorial composition, which enables students to be confident in the use and manipulation of colour. It also provides a clear idea of different painting practices. Like water colours and opaque colours.

Course Contents:

Module I: Basics of Drawing
Object drawing to explore basic drawing tool 'Pencil'. Suggestion of solidity by line work as well as light and shade, realization for rhythmic relationship between lines, mass, volume and texture, emphasis on various visual experiences. Quick Sketching to increase hand eye coordination and improving vision and observation skills.
a) Learning basic elements of drawing.
b) Object drawing.

Module II: Asian Landscape
Landscape drawing and rendering using pencil, charcoal pencil or colour pencils. Understanding the basic fundamentals of Asian style landscapes.
Works to be done:

1. Sketches – 5
2. Landscape-5

Examination Scheme:

Components	PT	CT	A	EE (Practical)
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Syllabus - Semester Second

BASICS OF DRAWING AND MONOCHROME FOLK COMPOSITION

Course Code: FNA2251 **Credit Units: 03**

Course Objective:
Drawing is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Also the objective of this course is to acquire experience in basic knowledge to explore Indian folk painting style & techniques too. Structured exercises on painting include basic colour theory, theme and pictorial composition, which enables students to be confident in the use and manipulation of colour of the folk traditions also provides a clear idea of different folk painting practices.

Course Contents:

Module I: Basics of Drawing
Object drawing to explore basic drawing tool 'Pencil'. Suggestion of solidity by line work as well as light and shade, realization for rhythmic relationship between lines, mass, volume and texture, emphasis on various visual experiences. Quick Sketching to increase hand eye coordination and improving vision and observation skills.
a) Learning basic elements of drawing.
b) Object drawing.

Module II: Monochrome Folk Composition
Indian folk style paintings in monochrome colours using any 2 mediums.

Works to be done:

1. Sketches – 5
2. Folk Paintings-5

Examination Scheme:

Components	PT	CT	A	EE (Practical)
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Syllabus - Semester Third

ADVANCED DRAWING AND ILLUSTRATION OF INDIAN TEMPLE SCULPTURE

Course Code: FNA2351 **Credit Units: 03**

Course Objective:

Drawing is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Also the objective of this course is to acquire experience in basic knowledge to explore temple art & techniques too. It also provides a clear idea of different illustration/painting techniques. Also understanding the structural formation of objects as well as architectural structures is to be taught.

Course Contents:

Module I:
Quick Sketching to increase hand eye coordination and improving vision and observation skills.

a). Indian sculpture drawing like Buddhashirsha, dancing girl of Mohenjo-Daro
b) Ancient architectural composition like Kailas temple, Konark temple

Module II: Illustration of Indian Temple Sculpture

Illustrations and drawings related to the Indian Temple Sculpture of whole India. Understanding the various parts and formation along with architectural structure.

Works to be done:

1. Sculpture drawing – 05
2. Indian Architectures composition -- 05

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Syllabus - Semester Fourth

ADVANCED DRAWING WITH INK & BRUSH ILLUSTRATION

Course Code: FNA2451 **Credit Units: 03**

Course Objective:

Illustration and composition is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Also the objective of this course is to acquire experience in basic knowledge to explore illustrative techniques too. It also provides a clear idea of different Illustration style & techniques with ink and brush. Like transparent colours and opaque colours.

Course Contents:

Module I: Illustration and Composition
Quick Sketching to increase hand eye coordination and improving vision and observation skills.

a) Theme based figure composition in ink
b) Poster making composition for social cause.

Module II: Ink and color Composition
Illustrations and composition using ink and color. Both single & multi-colour techniques.

Works to be done:

1. Illustration and Composition -- 05
2. Ink and color Composition --05

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Syllabus - Semester Fifth

ADVANCED DRAWING & ILLUSTRATION WITH MURAL ART

Course Code: FNA2551 **Credit Units: 03**

Course Objective:

Drawing is the basic element of learning art. Drawing study of human figure based on proportion, masses, specific feature and character using various media with emphasize on manner of finished execution. Structured exercises on mural painting include basic Indian style application and composition, which enables students to be confident in the use and manipulation of Indian mural themes, style & techniques. Mural Art techniques are taught to liberate the students in context of mediums of expression.

Course Contents:

Module I: Life Study
Life study and figurative composition using different mediums of drawing**.**
a) Quick Sketching of Human Figure
b) Figure drawing Composition

Module II: Mural
Illustrations and drawing as murals on wall or board in single/multi-colour.

Works to be done:

1. Sketches – 05
2. Mural - 1

Examination Scheme:

Components	**PT**	**CT**	**A**	**EE (Practical)**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

Syllabus - Semester Sixth

ADVANCED DRAWING & ILLUSTRATION WITH VISUAL DESIGN

Course Code: FNA2651 **Credit Units: 03**

Course Objective:

Drawing is the basic element of learning art. Drawing exercises are to acquire accurate sense of observation and skills to present representational art. Practice figurative drawing through observation. Also the objective of this course is to acquire experience in basic knowledge to explore illustration as well as visual design styles & techniques too. It also provides a clear idea of different design techniques and mediums. Other techniques like visual design are taught to help them develop a visual sense of design in general.

Course Contents:

Module I: Life Study
a) Figure Sketching
b) Life study and figurative composition using different mediums of drawing.

Module II: Illustration with Visual Design

a) Illustrations and drawings using the basic elements of Visual Design along with developing a better sense of color & form coordination to represent the subject.
b) Creative composition exercise based on individual layouts using various painting mediums.

Works to be done:

1. Drawings – 05
2. Illustrations – 1
3. Painting - 1

Examination Scheme:

Components	**PT**	**CT**	**A**	**EE (Practical)**
Weightage (%)	10	15	5	70

(**A**-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination; **PT**- Portfolio)

ANIMATION

Programme Structure-2021

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
ANI2152	Introduction to Multimedia and its Application	2	-	2	3
ANI2252	Creating 2D Animation	2	-	2	3
ANI2352	3D Modeling & Texturing	1	-	4	3
ANI2452	Maya Modeling & Texturing	1	-	4	3
ANI2552	Scripting & Storyboarding	1	1	2	3
ANI2652	VFX	2	-	2	3
	TOTAL				**18**

ANIMATION

Syllabus - Semester First

ANI2152	INTRODUCTION TO MULTIMEDIA & ITS APPLICATION	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/ Exposure	Basic computer skills				
Co-requisites	None				

Catalog Description

Students will learn the basic concepts and skills required to develop effective graphics for the Web and various business publications. Students will learn the basic tools used in Adobe Photoshop/Illus-trator to create and edit images. Students will learn how to optimize images and save images in properfile formats. Students will learn color selection and conversion as it relates to both Web and business publications. Techniques of digital image capture and photo retouching will also be explored.

Course Objectives

The objective of this course is-

- To teach the idea about screen resolution, picture assembling and color combination.
- To train the basic element which are used in creating a design/logo/creative work
- To teach the tools of image editing, drawing and special effects.
- To guide the logic behind imagination or visualization of creative ideas and graphics usingAdobe Photoshop & Illustrator.

Course Outcomes

On completion of this course, the students will be able to

CO1. Create poster, leaflets, logo or design the given reference object or self-visualize poster for Visual Communication.

CO2. Create advertisement for digital and print media.

CO3. Develop their graphic designs and desk-top publishing.

CO4. Manipulate professional photographs and images.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Graphics using line, Graphics by combining basic shapes. Make a perfect crop-ping of some images using Photoshop. Prepare a cut-out of images using Pho- toshop; use back ground for images. Colour adjustment of images. Convert a B & W image into colour.	L1, L2	12
MODULE 2: Vector Graphics (Designing, Color Theory, Vector Designing & Editing, TextFormatting): Interface**:** working with menus, toolbars, Dockers. Document Setup: Setting Page Size& Orientation, Document Navigation Rulers & Guide- lines:	L3	18

Status Bar. Text: Formatting, Text Layout, Skewing and rotating, Creating drop shadow, Text to Path, Extruding text. Objects: Grouping & locking objects, Combining & breaking apart, Transforming & Shaping, Cutting objects apart, Trim, weld & Intersection of objects. Lines & Curves: Using freehand & Bezier tool, Line properties, Arrowheads Eraser & artist media tools Nodes & Paths. Color& Fills: Solid Color, Color Palettes, Eyedropper & Paint bucket, Foun- tain, Fills, Patterns, Texture Fills, Interactive Mesh Fill. Special effects: Enve- lopes, Blends, Perspective, Shadow Objects, Power clip Command, Transpar- ency, Distortion, Contour, Lens Docker. Complex Shapes: Polygon & Stars Spirals Printing Menu.		
MODULE 3: Raster Graphics (Designing, Color Theory, Raster Designing & Editing, text Formatting: Adobe Photoshop, Colour modes, Colour, Using the tools, Select-ing and using a tool from the toolbox, Using the tool options bar and other palettes, Customizing the workspace, Using Photoshop Help, Viewing and ed-iting files in Adobe Bridge, Embedding information for easy identification, Au-tomating routine tasks, Resolution and image size, Straightening and cropping an image, Making automatic adjustments, Manually adjusting the tonal range, Replacing colors in an image, etc.	L4, L6	18

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text books:

- Annesa Hartman (2009), *Exploring Adobe Illustrator CS4*, United States, Cengage Learning, Inc Andrew Faulkner and Conrad Chavez (2018), *Adobe Photoshop CC Classroom*, San Francisco:Adobe Press.

References books:

- Jim Krause (2004), *Design basic Index*, United States : HOW Books

Modes of Evaluation: Class Test/ Assignment/ End Term Examination/ Case Presentation
Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	1	1	1	1	--	--
CO2	--	1	--	1	1	--	--	1
CO3	--	--	1	1	--	1	--	1
CO4	1	1	1	--	--	1	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Syllabus - Semester Second

ANI2252	CREATING 2D ANIMATION	L	T	P	C
Version 1	2021	2	-	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces students to the art and concept of two dimensional or 2D computer animation. 'D' stands for dimension and refers to animation which is conducted on a two- dimensional plane, unlike the real world where everything is seen and experienced on a three dimensional plane. This course primarily focusses on the theoretical aspects of two dimensional animation and is reinforced though many hours of hands-on lab training designed to right from the start, train the students to be industry ready. The intention of thiscourse is to provide a gradual introduction to animation concepts which are further refined in semester III, when the students will delve into 3D animation

Course Objectives:
The objective of this course is to:

- Enable the students to comprehend principles of animation using a field basedapproach
- To familiarize students with all aspects of software, both at the beginner as well asadvanced level
- To instill in the students such a level of confidence that they can tackle projects at anear professional level by having a holistic knowledge of all software related to 2D animation.

Course Description
This course covers all aspects of two-dimensional animation, normally known as '2D' animation in industry jargon. Beginning from first principles of animation like scaling, exaggeration, squash and stretch etc., they move on to first becoming familiar with different graphical interfaces as well as learning an eclectic mix of software that equip them with tools needed to create the kind of creative content that they wish to create.

The course is graded in terms of intensity as well as complexity and considerable emphasisis placed on design and typographic basics that form building blocks of good animation.

Course Outcomes:
On completion of this course, the students will be
CO1. Completely proficient with all aspects of at least two 2D animation software, notably Adobe Animate CC (now Animate) and Adobe After Effects
CO2. Be able to visualise, script, storyboard and create smart and relevant 2D animations
CO3. Be able to produce quality motion graphics for the Television Industry using a variety of 2D animation tools and third party plug-ins.
CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professional quality work can be outputted and exported.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Fundamentals of Animation What is animation? How is 2D animation different from other forms of animation. How are Animate CC and After Effects different from drawing and 3D packages? The various components that will be covered in Module Iare: • The Animate CC Interface • Animate CC tools and menu commands • Animate CC and Photoshop – an integrated workflow • Frame-by-frame animation in Animate CC • Onion skinning – why it is needed • Exploring the Timeline • Animating through action script • Motion tweening in Animate CC	L1, L2	8
MODULE 2: After Effects: The Industry package This Unit moves out from the Animate CC interface, tools and dialogues intothe domain of After effects. Since this package is used heavily by the Television Industry, many examples from this medium will be used to illustrate hard-to-grasp concepts. Various components of After Effects that will be taught in this module are: • The After Effects interface: Moving about and navigation in AfterEffects • AE tools and panels; how to customise and optimise them • Keyboard shortcuts - how to use and customize • Creating your first composition • The Timeline - navigation, panels and scope of the timeline • Project windows and assets; moving assets from project totimeline • Use of keyframes to create simple animations • Illustration of first principles of animation - ease in, out and easyease • Frame rates, speeding up and slowing down of animation - usingthe Graph editor • Rendering and compression concepts; Different kinds of movieformats • Outputing your first movie; Settings and how they can be tweaked	L2, L3	5
MODULE 3: After Effects and Animate – Intermediate This unit is a continuation of the earlier unit. Here we go into greater depthof the various tools, filters effects and presets that can be used. Round tripping between After Effects and Animate as well as importing assets fromvarious different format types (Photoshop as well as Illustrator Files) are discussed and explained. Since After Effects is known as a 2.5 type animation, this concept is explained; how After Effects although it is a straight 2D package, can simulate 3D and the illusion of 'fake depth' by usingcameras, lights and third party effects such as Element 3D. Students are expected at the end of	L2, L3	8

this unit to design their own logos and animate themin this software package		
MODULE 4: Post-Production In this Module, all the salient features of both Animate and After Effects arerecapped and similarities and differences discussed. In this module very little theory is imparted. Students are expected to prepare a comprehensiveAnimateCC and After Effects project each, which is closely monitored and supervised by the faculty in charge. The goal is to get the students as industry ready as possible and to ensure that at least one professional looking project in both software packages is designed and executed.	L3, L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- Williams, Richard. *The Animation Survival Kit*. Expanded Ed. 2009.
- Whitaker, Harold. *Timing for Animation*. Focal Press, 2002

Reference Books

- Schenk, Sonja. Long, Ben. *The Digital Filmmaking Handbook*. Fourth Edition.
- Gyncild, Brie. *Adobe After Effects CC: Classroom in a Book : the Official TrainingWorkbook from Adobe Systems*. 2014 Ed.

Modes of Evaluation: Practical/ Home Assignment/ Class Test/ Written Examination
Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	2	1	3	..	..	..	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	..	..	..	2	3	1	1
CO5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Syllabus - Semester Third

ANI2352	3D MODELING & TEXTURING	L	T	P	C
Version	JULY 2021	1	-	4	3
Pre-requisites/Exposure	Basic understanding of computer and software interface				
Co-requisites					

Catalog Description
This course is the introduction to the 3d computer graphics world. In this course students will get to know about the possibilities of the 3d art and design. Student will start from the very basics of creating sphere, box, circle, line… etc

Course Objectives
The objective of this course is to

- To give a basic understanding of 3D visualization and to understanding how to start with Blender interface.
- To give hands on experience of Blender and create a foundation for the advance 3d visualization.
- To provide a detailed understanding of 3d character modeling.

Course Outcomes
On completion of this course, the students will be able to
CO1. Understand how 3d software interface work.
CO2. Learn various ways of modeling the objects.
CO3. Understand how character mesh flow help while animating and designing a character.

Course Content

Modules	Blooms level*	Number of hours
Module 1 Introduction to Blender 3d, Interface of Blender 3d, Basics of Blender 3dModeling, Exporting, Using the menus. Floating and docking, Using dragand drop feature, Introduction to different workspaces. Geometry, sub objects, Extruding, welding, bridging etc. Recognizing the workspaces.	L1, L3	24
Module 2 Introduction to modifiers and modifier gizmos. Familiarity with commonmodifier like bend, editpoly, Xform wave, lathe symmetry etc.	L1, L3	12
Module 3 This module focuses on the development of 3D interiors and environment. Use of different modelling techniques like sculpting and polygon modellingare explained with many real world references. Also how to use backgroundimages as references objects for creating the 3D model are explained and demonstrated in this module	L1, L3	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- *John M. Blain (2019). The Complete Guide to Blender Graphics: Computer Modeling & Animation, Fifth Edition, Cloudtail India*

Reference Books

- Kelly L. Murdock (2014). *Autodesk 3ds Max Bible*, India: Wiley
- Dariush Derakhshani (2007). *Introducing 3Ds Max 9: 3D for Beginners*, India: Wiley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	HA	CT	A	EE
Weightage (%)	10	15	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A:Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	-	1	3	--	--	--	1	1	--	2
CO2	2	-	1	3	--	--	--	1	1	--	2
CO3	2	-	1	3	--	--	--	1	1	--	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Syllabus - Semester Fourth

ANI2452	MAYA MODELING & TEXTURING	L	T	P	C
Version	JULY 2021	1	-	4	3
Pre-requisites/ Exposure	Basic skills of computer				
Co-requisites					

Catalog Description

Course introduces students to the foundations of character/object modeling & texturing which is the process of adding mesh and controls to a character that allows a creative model to animate it in a proper manner. The course prepared to candidate for an advanced work in3-D modeling & Texturing. In this section, student will get an introductory look at the processes in Maya. Student will use a Project-based approach as we cover the fundamentalsof Maya looks at commonly used tools, and talk about some time-saving tips and techniquesgleaned from production experience.

Course Objectives

The objective of this course is-

- To train the proper knowledge of surfaces which used for modeling in TV serials, filmsand other commercials.
- To train the basic mesh flow system in modeling.
- To teach the tools of modeling, merit and demerit of modeling and designing.
- To guide the visualize the story and their character, assets and other part of design andthen impart it in modeling through various tools of Maya software.

Course Outcomes

On completion of this course, the students will be able to

CO1. Model or design the given reference object or character for TV episodes and films.

CO2. Create and design the required models and color for advertisement project or any other commercials.

CO3. Develop their own show reel in 3D including modeling, coloring and texturingappropriate shading network.

CO4. Develop and represent the 3D models and environment on their own visualize story.

CO5. Manage and make any big project management in terms of man power requirementalong with budgeting of big animation film project.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to the interface of Maya. Hotkeys. Using the spacebar. Manipulating a view. Creating objects. Simple primitives. Lights, cameras, selecting objects, types of selection, single selection, adding and subtracting selection, edit menu selection options. Marquee selection, Lasso selection, selection mask	L1, L2	24
MODULE 2: Using hyper shade, relationship editor, hyper graph and outliner. The channel box. Duplicating objects, pivot points, introduction to snapping-2D snapping and 3D snapping. Using	L3, L6	15

layers. Introduction to textures and materials.		
MODULE 3: Modeling a 3D character, understanding edge flow of face and body in order to achieve a smoother bends while animating, unwrapping and texturing the characterand understanding use of Photoshop while creating realistic textures.	L3, L6	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books:

- Kelly L. Murdock (2015), *Autodesk Maya 2015*, Buchanan: SDC publishing LLC.

References:

- Lee Lanier (2012), *Maya Professional Tip and Techniques*, United States: John Wiley and Sons Publications**.**

Modes of Evaluation: Class Test/ Assignment/ End Term Examination/ Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End SemesterExamination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	1	1	1	1	1
CO2	1	1	--	1	1	1	1	1
CO3	1	1	--	1	1	--	--	1
CO4	1	1	--	1	--	--	--	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Syllabus - Semester Fifth

ANI2552	SCRIPTING AND STORYBOARDING	L	T	P	C
Version 1	2021	1	1	2	3
Pre- requisites/Exposure					
Co-requisites					

Catalog Description
In this course, students learn the rudiments of scripting and storyboarding as well explore the differences between the different formats. They are introduced to the meaning of conceptualizing a treatment and style for a film, the differences between scripting for Ads and short films as compared to scripting for feature films as well as the different types of scripts like treatment, script, shoot and edit scripts, screenplays and finally meticulously prepared scripts which are better known as storyboards

Course Objectives:
The objective of this course is to:

- Help students improve their writing style, especially with reference to film, video andInternet
- Enable students to write creative and cohesive scripts in a variety of programmeformats such as News bulletins, Ads, PSAs, promos, fiction and documentaries
- To build a sound foundational structure of film grammar so that they can translate filmic elements into narrative structures and visualise scenic elements with ease

Course Description
This course equips the learner with skills in three distinct areas. To polish their writing styles, structures and grammar so that the student can write not only well but also in a lexically and grammatically correct manner. The second objective is to build a sound theoretical foundational of filmic elements by deconstruction of popular scenes from films and expound on the principles behind the success of these scenes, so that the learner can translate prose elements into visual narratives. The third objective is to enable the learner to conceptualise, visualise and translate these abstract ideas into a concrete text in the form of storyboards and scripts – both shooting as well as edit scripts. The entire course takes the advantage of a huge repository of good audio visual material so that every theoretical construct can be supplemented and illustrated with examples drawn from filmic and broadcast domains.

Course Outcomes:
On completion of this course, the students will be
CO1. Able to write quickly effectively and well in a variety of styles
CO2. Be able to translate abstract ideas into shootable scenes
CO3. Be able to understand client briefs and producer requirements
CO4. Proficient at every aspect of writing for fiction and non-fiction

Modules	Blooms level*	Number of hours
MODULE 1: Pre-Production Research This unit focuses essentially of all aspects of pre-production. Methods of research, scouring for sources of material, collating and compiling material. Research indoors as well as outdoors. Preparing and completing a “rekky”, techniques of preliminary interview of people. Understanding the	L1, L2	6

requirements of the documentary or film are also covered in this module		
MODULE 2: Concept & Treatment In this module, students learn all about conceptualizing an idea, abstract concept, trying new and novel methods of treatment; Soliloquy; integrating one comprehensive document out of several different text material, and writing client specific briefs form the core of this module	L2, L3	4
MODULE 3: Fundamentals of Film Grammar This very important module unravels the mysteries of film shooting and filmic editing. The fundamentals of shot composition, camera angles, cameraaesthetics, constructing and deconstructing a film. Dialogue creation; creative use of sound and optimizing the use of the sound studio, as well as techniques developed by the great masters of documentary and cinematic narrative, all form the backbone of this vitally essential module	L2, L3	8
MODULE 4: Writing the Script This module explains and teaches the actual writing process. How all the different ingredients of pre production research, visualization, film grammarand principles come together to form a compelling narrative. Students learnabout writing prose, writing scene and shot descriptions, development of a character, plot points, digetic and non-digetic sound, meaning of clima, anti-climax and other structural elements that make up a well interwoven script	L2, L3, L5	8
MODULE 5: Screenplays and Storyboarding This is almost a completely practical unit, where students are taken through the entire process of writing a script and have to prepare on an individual basis scripts and storyboards in a variety of formats. Thus they have toprepare a script for a news bulletin; a storyboard for an Ad; A storyboard for a PSA; a script for non-fiction short film and one for a short documentary. Some of the exercises will be test exercises while others will be assessed andgraded	L3, L4, L6	4

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- King, Stephen. *On Writing: A Memoir of the Craft*. Simon and Schuster, 2012
- Douglas, Pamela. *Writing the TV Drama Series: How to Succeed as a ProfessionalWriter in TV*. 2018

Reference Books:

- Truby, John. *The Anatomy of Story: 22 Steps to Becoming a Master Storyteller*. Faberand Faber, Inc. 2008
- Strunk Jr., William. White, E. *Elements of Style*. Fourth edition. 1999

Modes of Evaluation: Practical/ Home Assignment/ Class Test/ Written Examination
Examination Scheme:

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1											
CO2											
CO3											
CO4											

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Syllabus - Semester Sixth

ANI2652	VFX	L	T	P	C
Version	2021	2	-	2	3
Pre- requisites/ Exposure					
Co-requisites					

Catalog Description

This VFX course will take you through the fundamental concepts of VFX Compositing in Nuke, and how to learn nuke the interface. The course is focused primarily on the 2D & 3D aspects of compositing to get you started. It involves replacing a background, color correcting and blending the foreground and background, motion tracking the background to the foreground, and seamlessly bringing it all together. And learn how to Render CGI in passes, footage, and all of the elements necessary to compositea CG shot.

Course Objectives

The objective of this course is to

- To impart working knowledge of Advance VFX & Compositing
- To impart knowledge into Compositing of 3D Passes and 3D motion tracking
- To Impart Knowledge of Rotoscoping & Color grading techniques

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create an Multi-pass CG compositing

CO2. Create 2D compositing using Rotoscoping.

CO3. Identify and describe VFX & Compositing.

Course Contents

Modules	Blooms level*	Number of hours
MODULE 1 – 2D Compositing & Rotoscoping • Additive color theory • Image formats / resolutions / colors • 2d Tracking • Rotopaint and Rotoscoping • Keyframe animation • Introduction to Chroma Keying / Greenscreen removal • Camera traits (Lens distortion, grain, sensor noise) • Cleanplating and removal	L1, L2, L3	20
MODULE 2 – CGI Compositing • Matching color tones, darks, highlights of an image • Compositing elements / FX into a shot • Integrating a CGI (Computer Generated Image) render into areal scene • How to use the normals AOV to fine tune CG. • Use ID passes to correct different geometries	L1, L3	20
MODULE 3 – Color Grading		

• Color correction / color grading techniques • Advanced Color Grading Techniques • Day to Night Tips and Techniques • Fundamentals of Light and Physics • Image Frequency Separation and Uses • Advanced Color Remap Techniques	L1, L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension;L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Digital Compositing with Nuke (2012) : United Kingdom: Focal Press

Reference Books

- Nuke 101: Professional Compositing and Visual Effects (Digital Video & Audio Editing Courses) : Pearson

Modes of Evaluation: Class Test/ Assignment/ End Term Examination/ Case Presentation

Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Amity School of Communication

Bachelor of Science - Animation & Visual Graphics

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Science - Animation & Visual Graphics

ANI2152	**Introduction to Multimedia & Its Application**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure	Basic computer skills				
Co-requisites	None				

Catalog Description

Students will learn the basic concepts and skills required to develop effective graphics for the Web and various business publications. Students will learn the basic tools used in Adobe Photoshop/Illus- trator to create and edit images. Students will learn how to optimize images and save images in proper file formats. Students will learn color selection and conversion as it relates to both Web and business publications. Techniques of digital image capture and photo retouching will also be explored.

Course Objectives

The objective of this course is-

1. To teach the idea about screen resolution, picture assembling and color combination.
2. To train the basic element which are used in creating a design/logo/creative work.
3. To teach the tools of image editing, drawing and special effects.
4. To guide the logic behind imagination or visualization of creative ideas and graphics usingAdobe Photoshop & Illustrator.

Course Outcomes

On completion of this course, the students will be able to

CO1. Create poster, leaflets, logo or design the given reference object or self-visualize poster forVisual Communication.
CO2. Create advertisement for digital and print media.
CO3. Develop their graphic designs and desk-top publishing.CO4.
Manipulate professional photographs and images.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Graphics using line, Graphics by combining basic shapes. Make a perfect crop-ping of some images using Photoshop. Prepare a cut-out of images using Pho-toshop; use back ground for images. Colour adjustment of images. Convert a B & W image into colour.	L1, L2	12
MODULE 2: Vector Graphics (Designing, Color Theory, Vector Designing & Editing, Text Formatting): Interface**:** working with menus, toolbars, Dockers. Document Setup: Setting Page Size& Orientation, Document Navigation Rulers & Guide-lines: Status Bar. Text: Formatting, Text Layout, Skewing and rotating, Creating drop shadow, Text to Path, Extruding text. Objects: Grouping & locking objects, Combining & breaking apart, Transforming & Shaping, Cutting objects apart, Trim, weld & Intersection of objects. Lines & Curves: Using freehand & Bezier tool, Line properties, Arrowheads Eraser & artist media tools Nodes & Paths. Color& Fills: Solid Color, Color Palettes, Eyedropper & Paint bucket, Foun- tain, Fills, Patterns, Texture Fills, Interactive Mesh Fill. Special effects: Enve- lopes, Blends, Perspective, Shadow Objects, Power clip Command, Transpar- ency, Distortion, Contour, Lens Docker. Complex Shapes: Polygon & Stars Spirals Printing Menu.	L3	18
MODULE 3: Raster Graphics (Designing, Color Theory, Raster Designing & Editing, text Formatting: Adobe Photoshop, Colour modes, Colour, Using the tools, Select- ing and using a tool from the toolbox, Using the tool options bar and other palettes, Customizing the workspace, Using Photoshop Help, Viewing and ed- iting files in Adobe Bridge, Embedding information for easy identification, Au- tomating routine tasks, Resolution and image size, Straightening and cropping an image, Making automatic adjustments, Manually adjusting the tonal range, Replacing colors in an image, etc.	L4, L6	18

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text books:

Annesa Hartman (2009), *Exploring Adobe Illustrator CS4*, United States, Cengage Learning, Inc Andrew Faulkner and Conrad Chavez (2018), *Adobe Photoshop CC Classroom*, San Francisco:Adobe Press.

References books:

Jim Krause (2004), *Design basic Index*, United States *:* HOW Books

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	1	1	1	1	--	--
CO2	--	1	--	1	1	--	--	1
CO3	--	--	1	1	--	1	--	1
CO4	1	1	1	--	--	1	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2106	Design Software	L	T	P	C
Version 1	2021	2	1	2	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This unit is designed to initiate the student into the rudiments of design and application of design in all walks of life that we see all around us. The student will learn and imbibe important typographic principles, use of fonts and fontography, use of color, color harmonies and tonal balance. The vitally important role that symmetry, balance, images – both vector as well as bitmaps, play in creating a harmonious and aesthetically appealing composition will all be explained with real world examples of practical design being implemented in advertising and mass communication.

Course Objectives:

The objective of this course is to:

1. Enable the students to comprehend principles of design using a blended learning approach
2. To familiarize students with all aspects of software, both at the beginner as well as atan intermediate level
3. To integrate seamlessly both theoretical as well as practical aspects of design such thatthe learner is able to instantly identify design principles incorporated in the physical realm, be it print, net, web, film or television.

Course Description

This course covers all aspects of designs from the traditional orthodox straightforward design principles to contemporary design principles and application. Not only are the traditional fields such as print and broadcast design covered but also newer areas like UI/UX and game design also are briefly covered in this course. By and large however, it is meant to teach print design and layout basics through a well interwoven thought out course that embeds practical constructional projects at every stage of theoretical

information imparted. Students are taught to think critically and question traditionalconcepts as well as come up with their own models and ideas.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least three print design software, notablyAdobe Photoshop, Illustrator and In Design. They will also be conversant with Corel Draw, at a basic level.

CO2. Be able to visualise and conceptualise layouts for print, web and Multimedia.

CO3. Be proficient at delivery of design projects, both at a conceptual level and at theexecution stage.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professionalquality work can be outputted and exported.

Modules	Blooms level*	Number of hours
MODULE 1: Manual and Computer Aided Design Differences between traditional design, primarily for print as compared to designing for the web, the internet, and for television and film will be compared and contrasted, and how these inherent differences can be optimized for a specific media will be explained and expounded upon. The importance of computer as a design tool as well as the different software currently prevailing in the industry are also highlighted and a broad overview imparted of each software with its distinguishing features	L1, L2	4
MODULE 2: What is Design? Design Elements, Design Principles. How elements and principles helps in design. Where and how these elements and principles are applicable. How do different design elements combine and collaborate together to create an overall 'look' and feel for the published output – be it a web page, a brochure or a billboard hoarding.	L2, L3	6
MODULE 3: Typography History of fonts, Sizes of fonts, Classification of fonts, True Type and Open type. Breakdown of a word into typographical elements and ligatures, designing a custom font from scratch, all form part of this particular module. Each concept that is explained is generously illustrated with practical	L2, L3	6

examples drawn from mixed media		
MODULE 4: Hardware and Software From more theoretical concepts like Typography and design principles we move to the more practical aspects of implementing design on the ground through use of immersive technologies. Important aspects of hardware, notably the computer and accessories like printers, scanners and other input/output devices are explained. The student is also taken through the gamut of design software that exist that take full advantage of the computer's multitasking and multi-threading capabilities. In this module, only an overview of Digital Publishing software is given. In the next two modules, the most popular design software are explained at length	L2, L3,	6
MODULE 5: Fundamentals of Design Software The Editing of images, selection and cropping, integration of text with graphics, as well as the importance of resolution, image size, pixel depth, and the different sizes for print, web, broadcast and internet mediums such as Youtube are all covered in this module. Also the different image file formats such as jpg, png, tiff etc along with transparency and scaling are also explained. From technical definitions we move on to the software itself, covering all basic aspects of industry standard software like Photoshop, Illustrator, Corel Draw and Adobe InDesign	L3, L4	8
MODULE 6: Design Software – Intermediate level This module covers the above software in more detail and depth with overlying emphasis being given to integration of practical projects that employ all the theoretical knowledge imparted. Once a set of topics is taught, application of the same is demonstrated through several practical exercises that are not only structured but also graded in terms of complexity and applicability.	L3,L4	6
TOTAL TEACHING HOURS		36

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- Sarkar, N. M. Art & Print Production. 2013 Ed.
- Krug, Steve. *Don't Make Me Think: A Common Sense Approach to Web Usability*.New Riders Publishing, California. 2nd Edition
- Bauer, Peter. Adobe Photoshop CC For Dummies. Wileys. 2nd Edition
- Wood, Brian. *Adobe Illustrator CC Classroom in a Book* (2019 Release), Adobe Press.First Edition. December 2018.

Reference Books:

- Anton, Kelly Kordes. Cruise, John. *Adobe InDesign CC Classroom in a Book* (2017 release). December 2016.
- Norman, Don. *The Design of Everyday Things: Revised and Expanded Edition*.November 2013.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination
Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	1	2	1	3	..	..	..	1	1	1	3
CO 2	1	2	3	3	..	..	..	1	1	1	3
CO 3	1	2	1	3	..	..	..	1	3	1	3
CO 4	1	1	3	1	..	..	..	2	3	1	1
CO 5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2107	STOP MOTION	L	T	P	C
Version	JULY 2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This is an introductory course designed to gradually initiate students into the fine art of animation through a thorough grasp of foundational principles of character and objectanimation using drawing and object animation.

Course Objectives:
The objective of this course is to understand basic principles of animation from the groundup. They learn about the foundation of creating animation through moving objects or people on a frame-by-frame basis. The objective is explain through demonstration fundamental motion principles that will help them create more realistic and convincing animations. This is done through:

1. Demonstrating through step-by-step processes, first principles of animation
2. Explaining real world situations and how animation can be achieved through bothphysical means as well as through software
3. Enabling students to manipulate objects in 3D space to create simple but realistic animation

Course Description

This course will help students enhance outcomes beyond just creative and artistic expression. This is an introductory course in stop-motion animation, a medium that requires a wide array of technical skills. We consider such techniques as sculpting, two part molds, foam rubber casting, armature configuration, set design, and lighting for small spaces. Through motion and movement tests, students explore the way in which three-dimensional objects move through space.

Course Outcomes:
On completion of this course, the students will be
CO1. Able to work with both inanimate objects as well as animated objects (humanbeings, animals) to create simple animation.
CO2. Relate to software designed to create 2D animation more easily.

CO3. Work with team members more fluidly as stop motion is rarely accomplished throughindividual effort alone.

CO4. Creatively adapt to different work environments as they learn to create animationunder very real constraints.

Modules	Blooms level*	Number of hours
MODULE 1: Module I: Introduction to Stop Motion Stop-motion basic technique, Mix equal parts digital camera, computer, and imagination. Introduction to many ways to go about shooting, editingand finalizing a stop-motion short film. Introduction and explanation of popular stop motion software such as Stop Motion Pro and DragonFrame.	L1, L2	8
MODULE 2: Elements of Stop Motion Sculpting heads demo; make head armatures; Making moulds. Demo moulding and casting heads, casting multiples; Planning on creating your first animation project. Sets, backgrounds to be used. If human or animal models will be used, how will they be rigged. Planning on movements within the set	L2, L3	5
MODULE 3: Creation of Stop Motion Projects This module focuses on both planning and execution of a Stop Motion Project. Students work at developing a set, developing characters that will exist within the set as well as planning movement and complex interactions within the set. Attention is also paid to lighting and cinematic techniques like slow and fast motion	L2, L3, L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

Schenk, Sonja; Long, Ben. *The Digital Filmmaking Handbook*.
Priebe, Ken A. *The Art of Stop-Motion Animation*. 1st Edition

Reference Books

Weynand, Diana. *Apple Pro Training Series: Final Cut Pro X*
Jago, Maxim. *Adobe Premiere Pro CC Classroom in a Book*. 2018 edition

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination
Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	1	1	2	3	1	1	2	3
CO 2	1	1	2	1	1	1	1	3
CO 3	3	2	1	1	2	3	2	1
CO 4	2	2	1	1	2	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

AMITY UNIVERSITY HARYANA
Amity Education Valley, Gurgaon (Manesar)
Course Manual

Name of Institution: Amity School of Communication
Programme:**BSc. Animation – Semester-1**
Batch: 2021-2024
Prerequisite: Basics of Art History and Sketching & Drawing

L	T	P	C
1	1	2	3

Course/ Course Credit: Basics of Art History and Sketching & Drawing **Credit-3**	**Course code: ANI2108**
Faculty Name: Asok Biswas	**Semester: 1**
Designation: Assistant Professor (G-III)	**Email: abiswas1@ggn.amity.edu**

1. **Course Overview:**
Art is a form of communication, it is an interactions between the elements and principles of art help artists to organize sensorially pleasing works of art while also giving viewers a framework within which to analyze and discuss aesthetic ideas. Art is a highly diverse range of human activities engaged in creating visual, auditory, or performed artifacts— artworks—that express the author's imaginative or technical skill, and are intended to be appreciated for their beauty or emotional power. This course will cover the fundamentals of drawing with a focus on shapes. It will address line, tone, volume, space, scale, proportion and artistic expression. An emphasis on "process" will direct the momentum of this course. The course is graded in terms of intensity as well as complexity and considerable emphasis the concept of Illustration techniques and visualization power. It will provide the learning of the principles of art include movement, unity, harmony, variety, balance, contrast, proportion *and* pattern. *The elements include* texture, form, space, shape, color, value and line. The various interactions between the elements and principles of art help artists to organize sensorially pleasing works of art while also giving viewers a framework within which to analyze and discuss aesthetic ideas.
2. **Course Coverage:**
MODULE 1:
Introduction to pose to pose sketching (action analysis). Rapid sketching from live models,
Introduction to Acting, Modeling, Sketching from Acting, Sketching from live models,

Introduction to Rapid Sketching Techniques, Sketching from Memory, live action. Basics ofActing - Style breaking, Movements.

MODULE 2:

Shading in different angles of pencil strokes, formatting in different textures with pencil, shading, simple objects in drawing, simple shapes of geometrical shapes, roadsides, rivers,perspective in lines in landscapes, different head shapes, characters, human anatomy.

3. Learning Outcomes:

On completion of this course, the students will be able to

CO1: Able to know the concept of art with Shapes, Lines and FormsCO2:
Able to learn about Lights, Shades, Tone and Colors.
CO3: Basic concept on Rhythm, Consistency and Balance.
CO4: Knowledge on basic drawing of Organic, Leaving and Non Leaving objects.
CO5: Apply the aesthetic value and observation techniques on further complete Composition.

4. At the end of the course students will be able to:

1. To impart knowledge of Pose to Pose drawing, Rapid Sketching Techniques.
2. To impart knowledge of basic concepts of Sketching from Memory, live action.
3. To develop the concept on basics of Acting - Style breaking, Movements
4. To increase to thought on Shading in different angles of pencil strokes, simple shapes ofgeometrical shapes
5. To enrich knowledge and skills on Human Anatomy.

5. Resources:

Text Books

Text

- *Thomas C. Wang* (1977). *Pencil Sketching*, UK: John Wiley **&** Sons.
- *Catharine Slade* (1997). *The Encyclopedia of Illustration Techniques*, New York: Martin Salisbury

- *Catharine Slade* (2011). *The Manual of Illustration Techniques*, UK: A & CBlack Publishers Ltd.

Reference

- *Darrel Rees* (2008). *How to be an Illustrator***,** USA: Dell Publishing Company.

6. Detailed Session Plan:

7. Total No of Sessions –20

Module-1:

Session	**Topics**	**Pedagogical Technique/s Used**	**Additional Readings/ Assignments/Websites/Linksto online resources**	**Assessment criteria** (based on specific Pedagogical Technique)
1	Introduction to Pose to Pose drawing	Lecture	Hand-Outs and PPts	Peer Discussion
2	Action analysis	Lecture	Hand-Outs and PPts	Peer Discussion
3	About the Rapid sketching from live models	Lecture	Hand-Outs and PPts	Peer Discussion
4-6	Basic Introduction to Acting, Modeling, Sketching	Lecture	Hand-Outs and PPts	Peer Discussion
7-8	Concept of sketching from live models	Lecture	Hand-Outs and PPts	Peer Discussion
9	Introduction to Rapid Sketching Techniques	Lecture	Hand-Outs and PPts	Peer Discussion

10	Basics of Acting - Style breaking, Movements	Lecture	Hand-Outs and PPts	Peer Discussion
11	Sketching from Memory, live action			

Module-2:

Session	**Topics**	**Pedagogical Technique/s Used**	**Additional Readings/ Assignments/Websites/Linksto online resources**	**Assessment criteria** (based on specific Pedagogical Technique)
12	How to prepare a Composition	Lecture	Hand-Outs and PPts	Peer Discussion
13	Shading in different angles of pencil strokes	Lecture	Hand-Outs and PPts	Peer Discussion
14	About the formatting in different textures with pencil	Lecture	Hand-Outs and PPts	Peer Discussion
15	Concept of Lighting and Shading technique	Lecture	Hand-Outs and PPts	Peer Discussion
16	Simple shapes of geometrical shapes	Lecture	Hand-Outs and PPts	Peer Discussion
17	Composition on roadsides, rivers	Lecture	Hand-Outs and PPts	Peer Discussion
18	**Perspective in lines in landscapes**	Lecture	Hand-Outs and PPts	Peer Discussion

19	Idea on different head shapes, characters	Lecture	Hand-Outs and PPts	Peer Discussion
20	Concept of human anatomy	Lecture	Hand-Outs and PPts	Peer Discussion

8. Assessment Scheme:

Components	**Project (P)**	**Case Discussion/ Presentation/Analysis (C)**	**Class Test (CT)**	**Attendance (A)**	**External Evaluation (EE)**
Weightage (%)	**5**	**10**	**10**	**5**	**70**

9. CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	1	2	1	2	..	..	..	1	2	1	3
CO 2	1	3	3	3	..	..	..	1	1	1	2
CO 3	1	1	1	3	..	..	..	1	3	2	3
CO 4	1	1	2	1	..	..	..	2	1	1	1
CO 5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

10. Components to Choose From – MOOCS, Day with Expert, **Case Study**, Teach Back, Quiz, Mini Survey, Simulation/Games, Brain Storming/Argumentation, Flipped Classroom. However, this list is not exhaustive. Faculty may use any other suitable pedagogical technique to ensure optimal learning.

11. Detailed Session Plan:
Module I:

Learning Outcome/s: ***Students will be able:***

- To describe the Meaning of Pose to Pose Sketching
- To explain the process of Rapid sketching from live models
- To define about the Acting, Modeling, Sketching, Sketching from live models etc.
- To understand the Sketching from Memory, live action, Style breaking, Movements.

Question(s) for discussion in class:

1. What is Pose to Pose Sketching technique, describe it.
2. Describe the process of Live action.
3. Explain the purpose of simple objects in drawing, usages of simple shapes of geometricalshapes
4. Sketching from Memory, what does it means?
5. Describe the Style breaking, Movements.

Module II:

Learning Outcome/s: Students will be able:

- To describe the Meaning and Definition of Basic Sketching technique
- To explain the usages of Shapes, Colors and Form for an Illustration
- To define about the Basic Landscape Composition of roadsides, rivers.
- To understand the head shapes, characters, human anatomy.

Question(s) for discussion in class:

1. What are perspective scenes in composition technique?
2. Describe the process of Story adaptation.
3. Explain the purpose of simple objects in drawing, usages of simple shapes of geometricalshapes.
4. Describe the 7.5 Head Human Anatomy study.

ANI2101	TYPOGRAPHY	L	T	P	C
Version	2014	1	0	4	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Is typography an art? That's like asking if photography is an art. Some photographers and typographers use techniques that raise their work to the level of art. But at their core, both photography and typography have a utilitarian function. The aesthetic component is separate.Being an effective typographer is more about good skills than good taste. And students will develop the skills.

Course Objectives

A reader rarely notices great typography, but its absence is keenly missed. Poor techniquewill kill even your best concept. This module will introduce you to fundamentals of Typography, concepts and give you an opportunity to polish and improve your designs

Course Outcomes:

On completion of this course, the students will be able to-

CO1: Know the Rules of Typography and proof checking processCO2:
Able to learn construction of different Fonts.
CO3: Basic concept on terminologies of Typography and utilisation.
CO4: Knowledge on Implementation of Group of fonts for different layouts.
CO5: Apply the aesthetic value and observation techniques on further type design project.

Modules	Bloom s level*	Number of hours
MODULE 1: Brief Historical overview, What is a Font?, Types classifications Type Categories: Serif; Sans Serif; Display; Script; Pi Type Terminology Type Families: Basic & Extended; Font Names; Ligatures; Text vs Display ;Text vs Display; Bold Parts of Letters & the Optical Baseline Noticing the Differences Between Similar Typefaces Positive & Negative Space of	L1, L2	10
Type Figure-Ground with Type Stretching or Squeezing Type? ExpertSets :Lining & Oldstyle Figures, Swashes & Glyph Substitution		

MODULE 2: The Creative Brief :Project Name, Objectives, Target Audience, User Needs, Personality, Tone & Mood, Current Target Audience Mind Set, Key Target Audience Insights, Design Approach & Strategies •Choosing an Effective Typeface •The Personality/Mood of a Typeface •Emotive Words •Researching Type Online •Legibility vs Readability	L1, L3	14
MODULE 3: Designing with Type, Ligatures, White Space, Layout Hierarchy •Grids •Creating Contrasts with Type Typeface, Weight, Size, Typeface Width; Caps.Soft/Hard;Straight/Oblique;Horizontal/Vertical;Few/Many;Order/Chaos;Color or Shade; Positive/Negative •Type Color	L1	11

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books
Text

- Figure Drawing Design and Invention: Micheal Humpton
- Animal Anatomy of Artist: Eliot Goldfinger
- A Reader in Animation Studies: Edited by Jayne Pilling

Reference

- Animation Insider: Workflow Edition
- The Animated Man *Life of Walt Disney*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	3	..	..	..	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	..	..	..	2	3	1	1
CO5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2105	INTRODUCTION TO VISUAL COMMUNICATION	L	T	P	C
Version	2014	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this subject we will look at the practices of visual communication design as a distinct discipline from other forms of visual arts. We will discuss the purposes, approaches and role of visual communication in our everyday life, and the common misconceptions. It explores thedifferent levels on which a piece of visual communication could be viewed and read, through analyzing of sender and receiver processes. We will examine the design process, looking at how a designer typically approaches a design problem and how he/she thinks. These issues will be discussed through the perspective of a design educator, based on a student-centered approach to studio learning. The discussions will be supported by examples of design briefs, student projects, teaching approaches and assessment methods.

Course Objectives

Seeing comes before words. We learn to see and recognize before we learn to speak. When we grow older as adults, the way we see things is affected by what we know and what we believe. Visual communication applies the fundamentals of major art forms for professionalproblem-solving. It is the conveyance of ideas and information in forms that can be read or looked upon. This unit will introduce students to the history, forms, elements, theories, meaning, and principles of visual communication. Students will be given basic grounding through conventional classes, through use of ICT materials, ppts reinforced with practical exercises which will lay a creative and conceptual framework for the remaining courses in BJMC.

Course Outcomes (COs):

On completion of this course, the students will be able to
CO1: Knowing about the Picture mapping process
CO2: Understanding the utility of Visual forms sign and symbols.CO3:
Production process of visual identity.
CO4: Impact of Visuals for a successful communication.
CO5: Developing the scene of visual media reading representation and relation building for thesociety.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Visual Communication Defining an image and visual communication (VC) VC as integral part of human communication Human Vision and 2 dimensional images Human beings have highly developed seeing rather than hearing abilities Historical trends and developments: from painting toinstallation art, from naturalism to impressionism to neo-realism, high-art and low-art, role of visual technologies, debates related to artand social reality Science, Human beings, and Visual Information: how human body receives information: senses, brain, stimuli, heart, and body parts.	L1, L2	10
MODULE 2: Basics of Visual Communication Some Fields: chemical imaging, data, information, software, volume,and product visualization, technical drawing etc some Image Types: computer graphics, map, pictograph, photograph, moving image, table, drawing, diagram, ideogram, illustration, etc Contemporary applications: cartography, spatial analysis, graphics, visual perception and analytics, advertising, politics, entertainment, business etc Medium: digital, paper, electronic, electrical, web Elements: line, shape, colour, space, form, depth, texture, light & shade, dimension, grey-scale, interactions of elements, continuity, and & proximity etc Principles of design: contrast, harmony, proportion, balance, and movement	L1, L3	14
MODULE 3: Power, Visual Representation & Society Human beings and visual information processing mechanism: registering selected information, processing thoughts and feelings, storing information and acting or speaking according to the information processed and stored. Gestalt and constructivism. Early theories that explain the mechanics. Modern theories that involve signs, intellect, and the mind Consumer culture (from 19th-21st century) & growth of VC: changes in ways of seeing, ways of being seen & ways of telling Concept of gaze: desire, voyeurism, critique of male gaze, and interactive gaze, masculine and feminine identities Experience of images (signs: indexical, symbolic, and iconic), context in which images are interpreted (medium, form, socio-economic dimensions) and ways in which they are interpreted (cliché, stereotype, convention) Politics of representation of mediatedimages: video's sensation, dreams, and manipulation; film's logic and rhetoric; advertising image's shock and seduction; political image's public image, public relations, and propaganda; and media image's persuasion and violence.	L1	11

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

Text

- Lester, Paul Martin. *Visual Communication: Images with Messages*. 6th ed. Wadsworth, Cengage Learning.

- Davis, Meredith. Hunt, Jamer (2017). *Visual Communication Design: An Introductionto Design Concepts in Everyday Experience*. 1st Edition. Bloomsbury Visual Arts

- Visual Communication: From Theory to Practice: Jonathan Baldwin and Lucienne Roberts

Reference

- Sturken, Marita & Cartwright, Lisa (2001) *Practices of Looking: An Introduction toVisual Culture*, Oxford University Press:

- Hall, Stuart (1997) *Representation: Cultural Representations and Signifying Practices*. Open University Press/Sage Publications: London.

- Barry, Ann Marie (1997) *Visual Intelligence: Perception, Image, and Manipulation inVisual Communication*. State University New York Press: NY.

- Berger, John (1972). *Ways of Seeing*. Penguin and BBC: London

- Smith, Kenneth Louis (2005). *Handbook of Visual Communication- theory methodsand media*. Routledge: London.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: CasePresentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	2	1	--	--
CO3	2	1	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	2	1	--	--
CO5	1	--	1	1	1	2	--	1	1	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2134	WORKSHOP/CERTIFICATION (DISCIPLINE SPECIFIC)	L	T	P	C
Version	2014	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

1. Equip the students with the hands on experience with experts in a particular discipline.
2. Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activitiesconducted in a particular discipline of animation industry.
CO2: Understand the concepts and apply the same in a particular discipline.

Modules	Blooms level*	Number of hours
MODULE 1: Major Themes For Workshop • The workshop may be conducted on any of the following major themes: • Acting for animation	L1, L4, L3, L6	No Contact Hours

• Lighting • Photography • Digital Painting • Matt Painting • Clay Animation • Composting • Painting / Oil / Water • These themes are merely indicative and the trainer may choose any recent and relevant topic of study. GUIDELINES FOR WORKSHOP • The procedure for earning credits from workshop consists ofthe following steps: • Relevant study material and references will be provided bythe trainer in advance. • The participants are expected to explore the topic in advanceand take active part in the discussions held • Attending and Participating in all activities of the workshop • Group Activities have to be undertaken by students as guidedby the trainer. • Evaluation of workshop activities would be done through testand quiz at the end of the workshop. • Submitting a write up and showing the final output which focuses on the learning outcome from the workshop. • METHODOLOGY • The methodology followed at the workshop could be based onany one or more of the following methods: • Case Study • Simulation • Group Activity		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	5	30	30	35	100

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2252	**CREATING 2D ANIMATION**	L	T	P	C
Version 1	2021	1	0	2	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course introduces students to the art and concept of two dimensional or 2D computer animation. ‘D’ stands for dimension and refers to animation which is conducted on a two- dimensional plane, unlike the real world where everything is seen and experienced on a three dimensional plane. This course primarily focusses on the theoretical aspects of two dimensional animation and is reinforced though many hours of hands-on lab training designed to right from the start, train the students to be industry ready. The intention of thiscourse is to provide a gradual introduction to animation concepts which are further refined in semester III, when the students will delve into 3D animation

Course Objectives:

The objective of this course is to:

1. Enable the students to comprehend principles of animation using a field based approach
2. To familiarize students with all aspects of software, both at the beginner as well as advanced level
3. To instill in the students such a level of confidence that they can tackle projects at anear professional level by having a holistic knowledge of all software related to 2D animation.

Course Description

This course covers all aspects of two-dimensional animation, normally known as '2D' animation in industry jargon. Beginning from first principles of animation like scaling, exaggeration, squash and stretch etc., they move on to first becoming familiar with different graphical interfaces as well as learning an eclectic mix of software that equip them with tools needed to create the kind of creative content that they wish to create.

The course is graded in terms of intensity as well as complexity and considerable emphasisis placed on design and typographic basics that form building blocks of good animation.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least two 2D animation software, notablyAdobe Animate CC (now Animate) and Adobe After Effects

CO2. Be able to visualise, script, storyboard and create smart and relevant 2D animations

CO3. Be able to produce quality motion graphics for the Television Industry using a varietyof 2D animation tools and third party plug-ins.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professionalquality work can be outputted and exported.

Modules	Blooms level*	Number of hours
MODULE 1: Fundamentals of Animation What is animation? How is 2D animation different from other forms of animation. How are Animate CC and After Effects different from drawing and 3D packages? The various components that will be covered in Module I are: • The Animate CC Interface • Animate CC tools and menu commands • Animate CC and Photoshop – an integrated workflow • Frame-by-frame animation in Animate CC • Onion skinning – why it is needed • Exploring the Timeline • Animating through action script • Motion tweening in Animate CC	L1, L2	8
MODULE 2: After Effects: The Industry package This Unit moves out from the Animate CC interface, tools and dialogues into the domain of After effects. Since this package is used heavily by the Television Industry, many examples from this medium will be used to illustrate hard-to-grasp concepts. Various components of After Effects that will be taught in this module are: • The After Effects interface: Moving about and navigation in AfterEffects • AE tools and panels; how to customise and optimise them • Keyboard shortcuts - how to use and customize	L2, L3	5

• Creating your first composition • The Timeline - navigation, panels and scope of the timeline • Project windows and assets; moving assets from project to timeline • Use of keyframes to create simple animations • Illustration of first principles of animation - ease in, out and easy ease • Frame rates, speeding up and slowing down of animation - using the Graph editor • Rendering and compression concepts; Different kinds of movie formats • Outputing your first movie; Settings and how they can be tweaked		
MODULE 3: After Effects and Animate – Intermediate This unit is a continuation of the earlier unit. Here we go into greater depth of the various tools, filters effects and presets that can be used. Round tripping between After Effects and Animate as well as importing assets from various different format types (Photoshop as well as Illustrator Files) are discussed and explained. Since After Effects is known as a 2.5 type animation, this concept is explained; how After Effects although it is a straight 2D package, can simulate 3D and the illusion of 'fake depth' by using cameras, lights and third party effects such as Element 3D. Students are expected at the end of this unit to design their own logos and animate themin this software package	L2, L3	8
MODULE 4: Post-Production In this Module, all the salient features of both Animate and After Effects are recapped and similarities and differences discussed. In this module very little theory is imparted. Students are expected to prepare a comprehensive AnimateCC and After Effects project each, which is closely monitored and supervised by the faculty in charge. The goal is to get the students as industry ready as possible and to ensure that at least one professional looking project in both software packages is designed and executed.	L3, L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- Williams, Richard. *The Animation Survival Kit*. Expanded Ed. 2009.
- Whitaker, Harold. *Timing for Animation*. Focal Press, 2002

Reference Books

- Schenk, Sonja. Long, Ben. *The Digital Filmmaking Handbook*. Fourth Edition.
- Gyncild, Brie. *Adobe After Effects CC: Classroom in a Book : the Official Training Workbook from Adobe Systems*. 2014 Ed.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination
Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	1	3	..	..	..	1	1	1	3
CO2	1	2	3	3	..	..	..	1	1	1	3
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	..	..	..	2	3	1	1
CO5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2202	WEB DESIGN AND DEVELOPMENT	L	T	P	C
Version	JULY 2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
This will help us understand the importance of the web as a medium of communication and understand the principles of creating an effective web page, including an in-depth consideration of information architecture. Too also become familiar with graphic design principles that relate to web design and learn how to implement these theories into practice.
Course Objectives

The module is structured for the students to learn the basic layout making process of Webpage. They will able to understand the developing a thought process to making a layout, Principle of Web page design elements. Understanding the proper Fonts for thecontemporary web pages, knowledge about the design edition software like Adobe Dreamweaver. Understanding of HTML and Design Table both for an Applet.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Knowing about the Web designing process for a professional template
CO2: An idea about the aesthetic sense of Wordpress and Blok development technique.CO3: To develop the process of content writing as well as the proper Font style setup. CO4: Description on the HTML table and how it works.
CO5: Application of URL for any embedding purpose or hyperlink.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Web Design and Development Workflow that Works Whether or not you are new to Web site design and development, if you comprehend the overall picture;understand the workflow process and best practices for design; learn the software and technology; and can maintain a site that competes and communicates effectively on the Web, then you can	L2, L3	8

launch your new or renewed career with confidence for great success. But all that does sound intimidating! So, in this introductorycourse to the Web Design and Development Certificate program, we'll go step-by-step through what it will take for you to become that top notch professional who stands apart in your field.		
MODULE 2: WordPress Creating a Dynamic Website Students will learn how to set-up a WordPress website and develop the site to include a menu system with navigation bars, widgets for posts and comments, theme, calendar, and interactive forms. The class will be lecture style with some hands –on. If the student as established a WordPress site thestudent may use their site for the lessons. Some practice on a WordPress site is offered.	L2, L3	8
MODULE 3: HTML and CSS (Basics) Hypertext Markup Language (HTML) and Cascading Style Sheets (CSS) are inseparable languages that together describe the structureand display of pages on the World Wide Web! This class introduces you to the syntax and explores techniques using both languages to create and format headings, body text, hyperlinks, images, tables, forms and more. You'll also learn to control the format and layout ofelements on web pages using CSS stylesheets. Toward the end of the class you'll do several multi-column page layouts with an embedded video element. You can't design professional websites without knowing these critical technologies. **Examination Scheme:**	L2, L3	8
MODULE 4: Creating Website Students will learn to create website using WordPress or Using HTML coding for simple website. Understanding the layout of a website. Managing the content based on the goal of website.	L3, L4	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books
Text

- Web Designer A Biginers: Wendy Willard
- Mastering HTML, CSS & Javascript Web Publishing: Loura Lemay
- Web Designing and Development: Tanweer Alam
- Web Designing: Hridesh Bhardwaj

Reference

(A: Assignment; CT: Class Test; A: Attendance; EE: End Term Examination) Text and References: Text Web ReDesign 2.0: Workflow that Works (2nd Edition) by Kelly Goto and Emily Cotler WordPress For Dummies, 4th Edition by Lisa Sabin-Wilson and Matt MullenwegHead First HTML and CSS by Elisabeth Robson and Eric Freeman Adobe Dreamweaver CS6 Classroom in a Book by Adobe Creative Team References White Space is Not Your Enemy: byRebecca Hagen and Kim Golombisky Introducing HTML5 (2nd Edition) by Bruce Lawson and Remy Sharp.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	1	2	1	3	..	..	..	1	1	1	3
CO 2	1	2	3	3	..	..	..	1	1	1	3
CO 3	1	2	1	3	..	..	..	1	3	1	3
CO 4	1	1	3	1	..	..	..	2	3	1	1
CO 5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2209	**UI & UX Design**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure	Basic computer skills				
Co-requisites	None				

Catalog Description
The UI/UX Design brings a design-centric approach to user interface and user experience design, and offers practical, skill-based instruction centered around a visual communications perspective, rather than on one focused on marketing or programming alone. Students will learn to summarize and demonstrate all stages of the UI/UX development process, from user research to defining a project's strategy, scope, and information architecture, to developing sitemaps and wireframes. You'll learn current best practices and conventions in UX design and apply them to create effective and compelling screen-based experiences for websites or apps. User interface and user experience design is a high-demand field, but the skills and knowledge you will learn in this Specialization are applicable to a wide variety of careers, from marketing to web design to human-computer interaction.

.**Course Objectives**
The objective of this course is-

1. To teach about the UX design & Frameworks
2. To train the basic elements of User-centric design
3. Learn the visual elements of User Interface Design
4. To teach the tools of prototyping and user-testing.

Course Outcomes
On completion of this course, the students will be able toCO1.
Create User persona, User flows and UX strategy CO2.
Create app & website Wireframes
CO3. Develop workable prototypes using Adobe XDCO4.
Conduct user-testing.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: UX Design Fundamentals This hands-on module examines how content is organized and structured tocreate an experience for a user, and what role the designer plays in creating and shaping user experience. You will be led through a condensed process that acts as a roadmap for developing robust UI/UX design: from ideation and sitemapping, to the creation of paper and digital prototypes. Building onthe design skills learned in Visual Elements of User Interface Design, you will apply this methodology to produce a digital prototype for a multi-screen appof your own invention.	L1, L2	10
MODULE 2: Visual Elements of User Interface Design This design-centric module examines the broad question of what an interface is and what role a designer plays in creating a user interface. Learning how to design and articulate meaning using color, type, and imagery is essential to making interfaces function clearly and seamlessly. Through a series of lecturesand visual exercises, you will focus on the many individual elements and components that make up the skillset of an interface designer. By the end of this course, you will be able to describe the key formal elements of clear, consistent, and intuitive UI design, and apply your learned skills to the design of a static screen-based interface.	L3	18
MODULE 3: Wireframes to Prototypes This module is focused on the application of the early UX research to actual user interfaces: the creation of wireframes, high-fidelity mockups, and clickable prototypes. Along the way we will also discuss: - Responsive web design and mobile web challenges - Mobile-first approach - Web typography	L4, L6	20

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text books:
UX Design: A Field Guide To Process And Methodology For Timeless User Experience(2021), Steven Miller.
Adobe XD Classroom in a Book (2020 release) , Brian Wood : Adobe Press.
References books:
Sprint: How To Solve Big Problems and Test New Ideas in Just Five Days *:* transworldBooks

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	1	1	1	1	--	--
CO2	--	1	--	1	1	--	--	1
CO3	--	--	1	1	--	1	--	1
CO4	1	1	1	--	--	1	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

AMITY UNIVERSITY HARYANA
Amity Education Valley, Gurgaon (Manesar)
Course Manual

Name of Institution: Amity School of Communication

Programme:**BSc. Animation – Semester-2**
Batch: 2019-2022
Prerequisite: PRODUCTION PIPELINE

L	T	P	C
1	1	2	3

Course/ Course Credit: VPP/ Credit-2	**Course code: ANI2210**
Faculty Name: Asok Biswas	**Semester: 3**
Designation: Assistant Professor (G-III)	**Email: abiswas1@ggn.amity.edu**

1. Course Overview:

The Storytelling through video or animated show reel is an art is a form of communication, it is an interaction between the elements and principles of art help artists to organize sensorially pleasing works of art while also giving viewers a framework within which to analyze and discussaesthetic ideas. Art is a highly diverse range of human activities engaged in creating visual, auditory, or performed artifacts artworks that express the author's imaginative understanding or technical skill, and are intended to be appreciated for their beauty or emotional power. Stories are a transfer of education, and a developer of culture. They're a way of introducing emotion into a situation.

This course explores the output production of video and show reel used to create a short or feature film in animation studios. Beginning from the story writing, scripting, story boarding andvideo production etc, they move on to first becoming familiar with different genre of story and storytelling process as well as learning about different phases of Audio Visual production. The course is graded in terms of intensity as well as complexity and considerable emphasis the concept of story building and visualization power.

2. Course Coverage:

MODULE 1:

Directing and Analyzing a film, Animation film techniques, Film language in action, Adaptationof film language into animation. Student project-Character Designs, Overview, Working with a script/screenplay, Camera angles.

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MODULE 2:

Working with storyboard, Field size, Design and rendering the scenes layout and composition, Pans, Trucks and Multiple Pans, Scene planning, Realistic touches; character interaction with thescene and the backgrounds

MODULE 3:
Analyse of film layouts, Design and layouts, clean of up of BGs and BG painting, Sound concepts and effects for the film, The sound track, Sound equipment and theory, Dialogue and Voice-over, Exposure-sheet doping, reading the Sound track. Editing- Image and voice, sound FX and Music.Using of continuity editing to shorten real time to screen time. Here is an edit listthat makes the action move faster but yet maintains the illusion of continuity the number in parenthesis is shot length in seconds.

3. Learning Outcomes:

On completion of this course, the students will be able to

CO1: Know the Film analyses technique of different aspect of Film genreCO2:
Able to learn about Storytelling and Storytelling process.
CO3: Basic concept on Audio Visual Production.
CO4: Knowledge on basic of Super Imposition, Tittering, Color Correction etcs.
CO5: Apply the aesthetic value and observation techniques on further film production.

4. At the end of the course students will be able to:

1. To impart knowledge of basic concept of Story Writing and Scripting.
2. To impart knowledge of basic concepts of Story boarding, Film studies and Production phases.
3. To enrich knowledge and skills as a film maker and film language reading technique, they will also able to apply the technique of Super Imposition VFX Chroma Kye, production process and overall aesthetic value for a Fiction and Nonfiction Film.

5. Resources:

Text Books

Text

- *Bastian Clevé* (1994), *Film Production Management,* Burlington: Focal Press.
- *Blain Brown* (2016). *Cinematography: Theory and Practice,* New York: Focal Press.
- *Steven Ascher* (2012). *The filmmaker's handbook,* UK: PLUME.

Reference

- *Syd Field* (2005). *Screenplay – The Foundations of Screenwriting*, New York:Dell Publishing Company.
- *J. Michael Straczynski* (1996). *The Complete Book of Scriptwriting***,** USA: Writers DigestBooks.
- *Gary H. Anderson* (1998). *Video Editing and Post Production, Fourth Edition*, NewYork: Focal Press.

6. **Detailed Session Plan:**
7. **Total No of Sessions –24**

Module-1:

Session	**Topics**	**Pedagogical Technique/s Used**	**Additional Readings/ Assignments/Websites/Linksto online resources**	**Assessment criteria** (based on specific Pedagogical Technique)
1	Introduction to Film Production	Lecture	Hand-Outs and PPts	Peer Discussion
2	History of Film Production	Lecture	Hand-Outs and PPts	Peer Discussion
3	About the film analyses	Lecture	Hand-Outs and PPts	Peer Discussion
4	About the basic Story Plot, Cast and Characters	Lecture	Hand-Outs and PPts	Peer Discussion
5-8	Film adaptation techniques, Sequence and Scene	Lecture	Hand-Outs and PPts	Peer Discussion
9	Types of Screenplay	Lecture	Hand-Outs and PPts	Peer Discussion
10	Types of Camera Angles	Lecture	Hand-Outs and PPts	Peer Discussion

Module-2:

Session	**Topics**	**Pedagogical Technique/s Used**	**Additional Readings/ Assignments/Websites/Linksto online resources**	**Assessment criteria** (based on specific Pedagogical Technique)
11	How to prepare a Fieldand composition	Lecture	Hand-Outs and PPts	Peer Discussion
12	Basic logic ofa Storyboard	Lecture	Hand-Outs and PPts	Peer Discussion
13	About the theory of Scene Planning	Lecture	Hand-Outs and PPts	Peer Discussion
14	Casting of Characters	Lecture	Hand-Outs and PPts	Peer Discussion
15	Design and rendering	Lecture	Hand-Outs and PPts	Peer Discussion
16	Trucks and Multiple Pans	Lecture	Hand-Outs and PPts	Peer Discussion
17	Body Language	Lecture	Hand-Outs and PPts	Peer Discussion
18	Character Interaction	Lecture	Hand-Outs and PPts	Peer Discussion
19	Realistic touches	Lecture	Hand-Outs and PPts	Peer Discussion
20	BG of a Plot	Lecture	Hand-Outs and PPts	Peer Discussion

Module-3:

Session	**Topics**	**Pedagogical Technique/s Used**	**Additional Readings/ Assignments/Websites/Linksto online resources**	**Assessment criteria** (based on specific Pedagogical Technique)
21-22	Analyse a film layouts, Design and layouts	Lecture	Hand-Outs and PPts	Peer Discussion and Presentation
23	Sound Effects, Dialogue and Voice-over	Lecture	Hand-Outs and PPts	Peer Discussion and Case Presentation
24	Exposure-sheet doping	Lecture	Hand-Outs and PPts	Peer Discussion and Presentation

8. Assessment Scheme:

Components	**Project (P)**	**Case Discussion/ Presentation/Analysis (C)**	**Class Test (CT)**	**Attendance (A)**	**External Evaluation (EE)**
Weightage (%)	**5**	**10**	**10**	**5**	**70**

9. **Components to Choose From –** MOOCS, Day with Expert, **Case Study**, Teach Back, Quiz, Mini Survey, Simulation/Games, Brain Storming/Argumentation, Flipped Classroom. However, this list is not exhaustive. Faculty may use any other suitable pedagogical techniqueto ensure optimal learning.

10. CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	1	2	1	2	..	..	..	1	2	1	3
CO 2	1	2	3	2	..	..	..	2	1	1	1

CO 3	2	1	1	3	..	..	..	1	1	2	3
CO 4	1	2	2	1	..	..	..	2	1	2	1
CO 5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

11. Detailed Session Plan:

Module I:

Learning Outcome/s: ***Students will be able:***

- To describe the Meaning and Definition of Film Analyses
- To explain the imposition of sound like voice, BG music and vocal music in the film
- To define about the Scripting, Screenplay and Storyboard etc.
- To build a Character for a film and process of casting for character in a film.

Question(s) for discussion in class:

1. What is value of Sound for a Film?
2. Describe the process of Story adaptation.
3. Explain the purpose of Scripting, Screenplay and Storyboard
4. Describe the process of Casting Character for a film.

Module II:

Learning Outcome/s: Students will be able:

- To describe About the Frame and its composition with different camera angles andshoots.
- To enrich technical operation of a film camera for the Pan Trucks and Multiple Pans,Dolly, Wide and Tally etc.
- To plan for a film and Location characters and costumes and budget.
- To Compose a Stablishing shot with the proper background sets
- To describe the reading a film thought
- To describe The creative pert of a composition like Sets, Props, Background etc..
- To explain Sound imposition technique for a film.
- To be able to use BG score music, Folly Sound, Dialogues dubbing etc.

Question(s) for discussion in class:

1. Write a critical note on Analysis technique of a Film.
2. Describe issue of Scene Composition
3. Write a note on Camera Shots.
4. Explain each concept of Back Ground Sound and Sound effects.
5. Explain the Voice overing.

Module III:
Learning Outcome/s: Students will be able:

- To describe the concept of Researching Type Online.
- To explain the essential using voiceover Instrumental and Live sound in a film
- To Present a Dope sheet for a film project
- To explain the concept of Sound and Foley.
- To describe the Sound Designing and editing process
- To explain about the Video Editing process

Question(s) for discussion in class:

1. What is basic deference between a Live Sound and Non Live Sound?
2. What is difference between Dope Sheet and Comic Strip?
3. Explain the Foley Sound.
4. Explain the usages of Sets and Props for a shoot.
5. What is three phase of Film Production? Explain.

AMITY UNIVERSITY HARYANA
Amity Education Valley, Gurgaon (Manesar)
Course Manual

Name of Institution: Amity School of Communication
Programme:**BSc. Animation – Semester-1**

Batch: 2020-2023
Prerequisite: FUNDAMENTALS OF CLASSICAL ANIMATION

L	T	P	C
1	1	2	3

Course/ Course Credit: FCA / Credit-3	**Course code: ANI2211**
Faculty Name: Asok Biswas	**Semester: 1**
Designation: Assistant Professor (G-III)	**Email: abiswas1@ggn.amity.edu**

Course Objective:

Animation is the process of designing, drawing, making layouts and preparation of photographic sequences which are integrated in the multimedia and gaming products. Animation involves the exploitation and management of still images to generate the illusion of movement. A person whocreates animations is called animator. He use various computer technologies to capture the still images and then to animate these in desired sequence. Animation is a method in which pictures are manipulated to appear as moving images. Animation is the capturing of sequential, static images—drawings or photos of inanimate objects—and playing them in rapid succession to mimic real world motion. If you've ever seen a flip book, you know how it works. This course provides students the fundamental skills to produce traditional style animation as well as puppet animation and the knowledge of the principles of animation to be built upon in subsequent courses leading up to the Portfolio course. Students can also apply skills learned in this class in other areas including motion graphics, stop motion and basic traditional animation.

Course Content:

Module 1: Historical perspective of animation, with references to related arts such as shadowart, live cinema action, puppetry and comics. Stick drawing techniques of different human action, Animatic study, Human emotion-expressions, Light and shade techniques, Shadow study, Procedure to production, Importance of Anticipation, exaggeration and exposition, An Introduction to make a show reel of classical animation.

Module 2: Animation is the process of making the illusion of motion and change by means of the rapid display of a sequence of static images that minimally differ from each other. The illusion—as in motion pictures in general—is thought to rely on the phi phenomenon. Animatorsare artists who specialize in the creation of animation. About fundamentals like Exaggeration,

Attitude, Silhouettes, Boundary breaking exercises and warm ups, gesture drawing, Line drawingand quick sketches, Drawing from observation, memory and imagination. Screenings include a wide range of commercial and experimental works produced throughout the world.

Module 3:

The 12 Principles of Animation is a group of key teachings for the professional animator. While technology and industries have evolved with new and different ideas being integrated into animation, the principles can still be seen in movies and web design today. Assess and critique past and current animation trends, Demonstrate progress in basic drawing and animation skills, Critically analyze your creative work and the work of others, Uponsuccessful completion of the 2D Animation program, students will be able to Define and apply design principles and theories to animation production Identify and apply the 12 principles of animation Demonstrate skills in the use of industry standard tools for animation Create traditional and computer generated animation based on current industry trends and practices with25 Frame Per Second.

6. **Detailed Session Plan:**

7. **Total No of Sessions –24**
   Module-1:

Session	**Topics**	**Pedagogical Technique/s Used**	**Additional Readings/ Assignments/Websites/Linksto online resources**	**Assessment criteria** (based on specific Pedagogical Technique)
1	Introduction to Pose to Pose drawing	Lecture	Hand-Outs and PPts	Peer Discussion
2	Action analysis	Lecture	Hand-Outs and PPts	Peer Discussion
3	About the Rapid sketching from live models	Lecture	Hand-Outs and PPts	Peer Discussion
4-6	Basic Introduction to Acting, Modeling, Sketching	Lecture	Hand-Outs and PPts	Peer Discussion

7-10	Concept of The illusion—as in motion pictures in general—is thought to rely onthe phi phenomenon	Lecture	Hand-Outs and PPts	Peer Discussion
9	Introduction to Rapid Sketching Techniques	Lecture	Hand-Outs and PPts	Peer Discussion
10	Basics of Acting - Style breaking, Movements	Lecture	Hand-Outs and PPts	Peer Discussion
11	Sketching from Memory, live action			

Module-2:

Session	**Topics**	**Pedagogical Technique/s Used**	**Additional Readings/ Assignments/Websites/Linksto online resources**	**Assessment criteria** (based on specific Pedagogical Technique)
12	The illusion—of a motion pictures	Lecture	Hand-Outs and PPts	Peer Discussion
13	Animation is the process of making the illusion of motion and change	Lecture	Hand-Outs and PPts	Peer Discussion
14	About the rapid display of a sequence of static images concept	Lecture	Hand-Outs and PPts	Peer Discussion

15	Concept of Animators are artists who specialize in the creation of animation	Lecture	Hand-Outs and PPts	Peer Discussion
16	About fundamentals like Exaggeration, Attitude, Silhouettes, Boundary breaking exercises	Lecture	Hand-Outs and PPts	Peer Discussion
17	Animators are artists who specialize in the creation of animation	Lecture	Hand-Outs and PPts	Peer Discussion
15-18	Drawing from observation, memory and imagination	Lecture	Hand-Outs and PPts	Peer Discussion
19	Idea on different head shapes, characters	Lecture	Hand-Outs and PPts	Peer Discussion
20	Concept of wide range of commercial and experimental works produced throughout the world	Lecture	Hand-Outs and PPts	Peer Discussion

Module-3:

Session	Topics	Pedagogical Technique/s Used	Additional Readings/ Assignments/Websites/Linksto online resources	Assessment criteria (based on specific Pedagogical Technique)
21	About the The 12 Principles of Animation	Lecture	Hand-Outs and PPts	Peer Discussion
22	Usages of 12 Principles of Animation	Practical	Hand-Outs and PPts	Peer Discussion
23	Critically analyze your creative work and the work of others, Upon successful completion of the 2D Animation program	Lecture	Hand-Outs and PPts	Peer Discussion
24	About the industry standard tools for animation Create traditional and computer generated animation	Lecture	Hand-Outs and PPts	Peer Discussion

Examination Scheme,

Components	A	CT	A	EE
Weightage (%)	10	15	5	70

8. CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	2	1	1	..	..	..	2	2	1	2
CO 2	1	2	3	2	..	..	..	1	1	1	2
CO 3	2	1	1	1	..	..	..	1	3	2	3
CO 4	1	1	1	1	..	..	..	2	1	2	1
CO 5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

(A: Assignment; CT: Class Test; A: Attendance; EE End Term Examination).

Text and References:

Text

The Animator's Survival Kit (Revised Edition): A Manual of Methods, Principles and Formulasfor Classical, Computer... by Richard Williams; Acting for Animators: by Ed Hooks; Animationfrom Pencils to Pixels: Classical Techniques for the Digital Animator: by Tony White; How to Make Animated Films: Tony White's Complete Master class on the Traditional Principles of Animation: by Tony White.

References

Hollywood cartoons: by Michael Barrier; Art in Motion: Animation Aesthetics: by Maureen Furniss; The Animation Book: A Complete Guide to Animated Filmmaking from Flip: by Kit Laybourne. Online Youtube reference of Aaron Blaise popularly known as The Art of Aaron Blaise https://www.youtube.com/watch?v=WKDBOw780Ww ; https://www.youtube.com/watch?v=TQc4MU-gsiQ, How To Animate Disney Characters - 2D Animation Tutorial- https://www.youtube.com/watch?v=zxWFzgUNiVE

9. Components to Choose From – MOOCS, Day with Expert, **Case Study**, Teach Back, Quiz, Mini Survey, Simulation/Games, Brain Storming/Argumentation, Flipped Classroom. However, this list is not exhaustive. Faculty may use any other suitable pedagogical technique to ensure optimal learning.

10. Detailed Session Plan:

Module I:

Learning Outcome/s: Students will be able:

- To describe the Meaning Movement cycle
- To explain the 12 Principles of Animation
- To define about the Acting, Modeling, Voice over and dialogues from non-live modelsetc.
- To understand the traditional and computer generated animation

Question(s) for discussion in class:

1. What is a Run Cycle.
2. Describe the 12 Principles of Animation.
3. Explain the process of Drawing from Live Action
4. Using of Dialogues?
5. Describe the Rule breaking, in animation process.

Module II:

Learning Outcome/s: Students will be able:

- To describe the Meaning of Concept of wide range of commercial and experimentalworks
- To explain the basic characteristics of Human characters
- To define the Output process of any show reel.
- To understand the About the industry standard tools for animation

Question(s) for discussion in class:

1. What is process of commercial animation?
2. Describe the Character Parenthetical Action.
3. Explain the concept of drawing from observation, memory shapes.
4. Describe about Industrial techniques

Module III:

Learning Outcome/s: Students will be able:

- To describe the Meaning of 12 Principles of Animation
- To explain about successful completion of the 2D Animation

- To define the Output process of any show reel.
- To understand the About the industry standard tools for animation

Question(s) for discussion in class:

5. What are perspective scenes in composition technique?
6. Describe the process of Story adaptation.
7. Explain the purpose of simple objects in drawing, usages of simple shapes of geometricalshapes.
8. Describe the 7.5 Head Human Anatomy study.

ANI2201	DIGITAL PHOTOGRAPHY	L	T	P	C
Version	2021	1	0	2	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course will help students take great photographs. Composition; People & nature; Lighting &color; Learn how to display pictures. Understand the mechanics of imaging; unleash your creative potential.

Course Objectives

The objective of this course is to

This course is designed from a photographic viewpoint.

1. Learn how to take great photographs. Composition. People & nature. Lighting & color.
2. Learn how to display your pictures. Understand the mechanics of imaging.
3. To become a proficient at the technical aspect of photographing with a digital camera.
4. To learn to shoot with digital cameras maximizing the quality of the output.
5. To develop the habit of looking closely at the visible world around you in order to represent it in terms of aesthetics, beauty and truth.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Student recognizes and understands the basic technical, aesthetic and expressiveconcepts of photography.

CO2. Student demonstrates a competency with a digital photographic work flow by theproduction of photographs in response to class assignments.

CO3. Lighting, High-Key Lighting, Rule of Visual Weight, Visual Composition Tools,

Color Management, RAW Workflow,

CO4. Student demonstrates an appreciation and understanding of photography as a means ofvisual and artistic expression by the production of photographs.

CO5. Student develops the ability to speak about photographs, through class critiques and bygiving an oral presentation on a photographer of his or her choice.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Inside the digital camera: Image sensor and types, In-Built memory and memory cards. The Principles of Photography: The General Principlesof Photography.	L1, L3	6
MODULE 2: Types of cameras: Miniature Cameras, medium format cameras, large format camera and digital cameras. Comparative study of digital and analogue (SLR) camera. Advantages and applications of digital photography. Lenses: Normal, wide, tele, zoom, PC and TS lens. Working of a lens and angle of view of a lens.	L1, L3	9
MODULE 3: Films & Camera Accessories Camera Controls: Shutter speed aperture exposure control, auto winder or motorized camera, depth of field, selective focus. Exposure Meter: Incident meter and reflected meter. Metering System: Center weighted Spot and Matrix metering. Filters: UV Filter, Polarizing filter, Special effect filters and tripod. Composition: Creative Composition, rule of thirds and Golden section. Managing Your Digital Assets: Managing digital cameras, Cleanness, Precautions, Managing Images printouts, Burning CDs. Camera mounts accessories. Camera care Difference between multicamera and single camera setup.	L1,L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

1. Scott Kelby.(2016), *Photoshop Book for Digital Photographers*, San Francisco:Adobepress
   Corbett Bill.(2017), *A simple guide to 35mm photography*, San Francisco :Misc

Reference Books

1. David Taylor.(2015), *Digital Photography Complete Course*, Penguin Random House
2. David McKay.(2016), *Photography Demystified: Your Guide to Gaining CreativeControl and Taking Amazing Photographs*- Penguin Random House

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	--	--	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2212	Online Certification (Minimum 30 Hours)	L	T	P	C
Version	2021	0	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The future belongs to those who create. Whether it's to inform, persuade, entertain, or inspire, success in the digital age means communicating in visually rich and interactive ways.With a firm grasp on the world's most powerful creative tools certification of Adobe CreativeCloud & Autodesk 3DS Max and Maya

Course Objectives

The objective of this course is to
1. Equip the students with the industry-recognized certification that demonstrates mastery in. software's
2. Provide a platform to learn and prove their digital media skills to prospective employers.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Proof of competency in specific digital media tools. CO2:
Increased confidence in one's digital media abilities.

Modules	Blooms level*	Number of hours
MODULE 1: Certifications that can be taken – • Adobe Certified Professional • Autodesk Certified User • Unity Certified User certification	L1, L4, L3, L6	No Contact Hours

• Course with certificate from coursera.org or edex.adobe.com		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	NA	NA	NA	NA	NA

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2233	**WORKSHOP/CERTIFICATION (DISCIPLINE SPECIFIC)**	L	T	P	C
Version	2021	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

1. Equip the students with the hands on experience with experts in a particular discipline.
2. Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activitiesconducted in a particular discipline of animation industry.
CO2: Understand the concepts and apply the same in a particular discipline.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Major Themes For Workshop • The workshop may be conducted on any of the following major themes: • Acting for animation	L1, L4, L3, L6	No Contact Hours

• Lighting • Photography • Digital Painting • Matt Painting • Clay Animation • Composting • Painting / Oil / Water • These themes are merely indicative and the trainer may choose any recent and relevant topic of study. GUIDELINES FOR WORKSHOP • The procedure for earning credits from workshop consists ofthe following steps: • Relevant study material and references will be provided bythe trainer in advance. • The participants are expected to explore the topic in advanceand take active part in the discussions held • Attending and Participating in all activities of the workshop • Group Activities have to be undertaken by students as guidedby the trainer. • Evaluation of workshop activities would be done through testand quiz at the end of the workshop. • Submitting a write up and showing the final output which focuses on the learning outcome from the workshop. • METHODOLOGY • The methodology followed at the workshop could be based onany one or more of the following methods: • Case Study • Simulation • Group Activity		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	5	30	30	35	100

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2352	3D MODELING & TEXTURING	L	T	P	C
Version	JULY 2021	1	1	2	3
Pre-requisites/Exposure	Basic understanding of computer and software interface				
Co-requisites					

Catalog Description

This course is the introduction to the 3d computer graphics world. In this course students will get to know about the possibilities of the 3d art and design. Student will start from the very basics of creating sphere, box, circle, line… etc

Course Objectives

The objective of this course is to

1. To give a basic understanding of 3D visualization and to understanding how to start with Blender interface.
2. To give hands on experience of Blender and create a foundation for the advance 3d visualization.
3. To provide a detailed understanding of 3d character modeling.

Course Outcomes

On completion of this course, the students will be able toCO1.
Understand how 3d software interface work.
CO2. Learn various ways of modeling the objects.
CO3. Understand how character mesh flow help while animating and designing a character.

Course Content

Modules	Blooms level*	Number of hours
Module 1 Introduction to Blender 3d, Interface of Blender 3d, Basics of Blender 3d Modeling, Exporting, Using the menus. Floating and docking, Using drag and drop feature, Introduction to different workspaces. Geometry, sub objects, Extruding, welding, bridging etc. Recognizing the workspaces.	**L1,L3**	**24**
Module 2 Introduction to modifiers and modifier gizmos. Familiarity with common modifier like bend, editpoly, Xform wave, lathe symmetry etc.	**L1,L3**	**12**

Module 3 This module focuses on the development of 3D interiors and environment. Use of different modelling techniques like sculpting and polygon modelling are explained with many real world references. Also how to use background images as references objects for creating the 3D model are explained and demonstrated in this module	**L1,L3**	**12**

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- *John M. Blain (2019). The Complete Guide to Blender Graphics: Computer Modeling & Animation, Fifth Edition, Cloudtail India*

Reference Books

- Kelly L. Murdock (2014). *Autodesk 3ds Max Bible*, India: Wiley
- Dariush Derakhshani (2007). *Introducing 3Ds Max 9: 3D for Beginners*, India: Wiley

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**HA**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A:Attendance

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	2	-	1	3	--	--	--	1	1	--	2
CO 2	2	-	1	3	--	--	--	1	1	--	2
CO 3	2	-	1	3	--	--	--	1	1	--	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2301	LIGHTING AND RENDERING	L	T	P	C
Version	2021	1	0	4	3
Pre-requisites/Exposure	3D Modelling & Texturing				
Co-requisites	None				

Catalog Description

In this subject, student will get an introductory look at the processes in 3Ds Max lighting. Student will use a project-based approach as we cover the virtual 3D lighting system of 3DsMax, look at commonly used attributes and properties of various light, and talk about some time-saving tips and techniques gleaned from production experience.

Course Objectives

The objective of this course is-

1. To teach the techniques of making realistic lighting for TV serials and other commercials.

2. To train the 3D lighting uses various lights available in 3Ds Max lighting and mental ray including shaders.
3. To teach the realistic rendering process of scene which used for film or any other Advertisement.
4. To guide the visualize the lighting mood for given story and their scenes and shots andthen getting output in terms of video or stills using rendering techniques.

Course Outcomes

On completion of this course, the students will be able to-

CO1. Light the given scene or shot for TV episodes and films.
CO2. Put light for exterior, interior or any kind of scene using fill light, main light and backlight.
CO3. Get realistic output in the form of video or still using mental ray, software, and hardwarerendering.

CO4. Develop the proper realistic shader effect, given them glow effect, high quality renderin HD format..

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Lighting tools in 3D software; 3D lighting tutorial, different types of 3D lights found in 3D application, and methods for easily aiming and controlling lights. specialized attributes found in certain light types, different types of shadows available in 3D software, how depth can be added for mood to our scenes though the use ofvolumetric light rays, as well as many other lighting tools and concepts that will help you establish a solid foundation in 3D lighting	L1, L2	16
MODULE 2: The core rendering tools and features of 3D lighting that every rendering artist needsto be familiar with foundational knowledge of rendering in 3D software lighting by talking about many of the key tools, features and concepts that every rendering artistin 3D lighting really needs to be familiar with. I resolve some rendering-related issues that student may encounter, strong workflow practices that will be extremely beneficial to them as an emerging render artist.	L4,L6	22

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text books:

- *John M. Blain (2019). The Complete Guide to Blender Graphics: Computer Modeling & Animation, Fifth Edition, Cloudtail India*

Additional Texts:

- Prof. Sham Tickoo (2019), *Autodesk 3ds Max 2019: A Beginners Guide*, Delhi: BPB Publications
- Kelly L. Murdock (2013), *Autodesk 3ds Max 2013 Bible*, Buchanan: SDC Publishing LLC

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE-End SemesterExamination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	1	1	--	1	1	--
CO2	--	1	--	1	1	--	1	1
CO3	1	1	--	--	--	1	--	1
CO4	1	1	1	--	--	1	--	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2302	RIGGING AND ANIMATION	L	T	P	C
Version	JULY 2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
In this series of tutorials we will take an introductory look into rigging tools and techniques in3D Max.

Course Objectives

The objective of this course is to

1. To impart working knowledge of Rigging in Blender and automate the basic riggingsystem.
2. To impart knowledge of Animation in Blender for Humanoid and non-organic objects.
3. To Impart Knowledge of Animation Controllers of Rigging and usage of Dope Sheet.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create detailed Rigging system of Humanoid and non-organic objects for animation

CO2. Create Animation using Keyframes and Rigging system for smooth and effective lopping animations i.e. Walk cycle, Run Cycle and more.

CO3. Usage Dope Sheet for animation timing and create Ease-in & Ease-Out using grapheditor.

Modules	Blooms level*	Number of hours
MODULE 1 Introduction to automated rigging systems and methods. Embeddingsmall scripts in the hierarchy control system to save time and facilitate handling. Advanced rigging. Vertex weighting techniques. Understanding the basics, which include everything from how to establish solid naming conventions to how to utilize 3d bone and IK handle tools. Cover more complicated topics like setting up a enhanced IK rig, using expressions to create a counter twist rig that preserves volume, as well as skinning techniques. Also learn how 3d software interface can be customized to work faster.	L1, L3	24
MODULE 2 Animation, multimedia & virtual reality: Fundamental key frame animation, repeating animation over time, Hierarchical linking, Keyframe, Parameters Out-of-Range, Setting Animation Keys, Animating the Rotation of the Dummy Object, Creating a Continuously Looping Animation.	L1, L3	12
MODULE 3 Advanced Animation: The Fundamentals of Hierarchical Linking, Animation controllers, Track View Dope Sheet, Ease curves, Controllers, Constraints, Graph editors, Ease curves.	L1, L3	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- *John M. Blain (2019). The Complete Guide to Blender Graphics: Computer Modeling & Animation, Fifth Edition, Cloudtail India*

Reference Books

1. Mastering Autodesk 3ds Max 2013 by Jeffrey Harper

2. 3ds Max 9 Bible (by Kelly L. Murdock)
3. Kelly L. Murdock (2013), *Autodesk 3ds Max 2013 Bible*, Buchanan: SDC PublishingLLC

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	2	1	--	2	--	--	2	2	1	1	3
CO 2	2	1	--	2	--	--	3	2	1	1	--
CO 3	2	1	--	2	--	--	3	2	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2305	Audio-Video Post Production	L	T	P	C
Version 1	2021	1	0	4	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course, students explore different media forms such as commercials, PSAs, movie scenes, documentaries, and music videos. Skills learned will include preproduction planningand writing, production, post-production, camera techniques, equipment use, video editingsimple 2D graphics, and sound editing. Emphasis will be placed on developing not onlypractical tangible skills in understanding film grammar and film literacy but also toencourage the students to think creatively as well as critically, integrating currenttechnologies with past ones and have a general understanding of all the three Ps ofProduction

Course Objectives:

The objective of this course is to:

1. Help students understand basic tenets of film grammar, shot compositions and framing
2. Broaden their horizons of knowledge of analog as well as digital post-production
3. To infuse sound practical skills in the domain of post-production, both of video and inaudio post. Students will emerge at the end of this course, industry ready

Course Description

This course equips the learner with the full vocabulary related to video and audiotechnology. It will help him/her gain an understanding about the history of A/V, pre- production, production, and postproduction. It will also provide comprehensive coverage of digital and analog video systems, hardware and software applications, and communication and networking components. It will also wal k them through the plethora of storage devices available currently ranging all the way from traditional mechanical hard disks to SSD Drives, RAID systems, and the newest NVME drives. Will also teach the how to optimize these storage devices so that they edit in a fast, seamless and integrated network of components. Effective translation of scripts into meaningful short and long films will also be a major component of this course. Latest elements of

audio-video production such as formats for the mobile platform and software related tothis unique form of small device editing will also be discussed, compared and evaluated.

Course Outcomes:

On completion of this course, the students will be

CO1. Able to think creatively and critically in terms of post-production

CO2. Be able to quickly translate scripts of all formats of production into videos or audiofiles that are crisp and compelling

CO3. Be proficient with all the different formats of audio/video (encoding, decoding etc) sothat products are created of not only high audio/video quality but also play smoothly on any platform

CO4. Be able to work in a team environment, understand client briefs and develop a professional rapport with the producer and other team members so that translation ofscript to completed video becomes an effortless exercise

Modules	Blooms level*	Number of hours
MODULE 1: Pre-Production This unit familiarizes students with all aspects of pre-production notably of scripts, and translation of scripts, conceptual treatments and ideas into practical shooting scripts and shot breakdowns. Deconstruction of scenes from movies, as well as all aspects of shot compositions, dialogue editing, differences between editing for film and for other formats like news and documentaries will form the backbone of this unit.	L1, L2	6
MODULE 2: Production This deals with the actual production techniques of shooting films both outdoors and indoors. Since this is primarily a course on post-production, shooting techniques that will enable editors to work effectively with all the footage shot will take precedence and the importance of logging on location, continuity, ensuring uniformity of technical formats, frame rates, as well as selecting the right kind of shooting equipment such as broadcast cameras or DSLRs or high end digital shooting equipment such as Blackmagic Cine will also be explained. Also the importance of shooting in RAW or LOG format are explained as well as the problems as well as advantages of both are explained with copious examples of such footage.	L2, L3	8

MODULE 3: Post-Production This is the main module of this whole course, hence this unit employs several theoretical as well as many contact hours of practical aspects. All aspects of different software related to editing are explained. The advantages and disadvantages of each are explained and also their suitability for which program format are highlighted. The different codecs used in editing are discussed, the importance of compressed and uncompressed formats are explained, how to bring footage into your software, ingest or capture as they are known, how to edit elements on the timeline and finally how to export to variety of formats both for broadcast as well as for Youtube, Vimeo and social media platforms are explained and demonstrated. Classical principles of continuity which have been explained theoretically so far, are put to practical use in this format. Many practical exercises graded in variety as well as in complexity are embedded into this module	L2, L3	8
MODULE 4: Digital formats and Evolving Technologies This module focuses exclusively on digital formats and technologies. The constantly changing and evolving techniques are examined at length as well as how to take classical techniques of editing and editing grammar and employ them on new platforms such as mobiles, palmtops, iPads, as well as working with new input devices like graphic tablets and touch screen as opposed to traditional mouse oriented methods, are also delineated. Creation of videos for new platforms of viewing like Youtube, Netflix and other OTTs are also discussed in depth. The unit ends with looking at new evolving techniques such as voice operated and activated systems and remote editing with client through hyperfast bandwidths.	L2, L3,L5	6
MODULE 5: Integration of graphics/animation with Editing Although this is not a course on animation, the importance of using appropriate and creative graphics, both still and animated are discussed and demonstrated with numerous online examples, examples taken from videos, serials and movies and also the different motion graphic software that exist in the market such as Adobe After Effects and how simple animations created in software like these can be integrated into a video project are explained briefly and supplemented with practical exercises.	L3, L4,L6	4
TOTAL TEACHING HOURS		32

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- Goodman, Robert M. McGrath, Patrick. *Editing Digital Video (Digital Video and Audio Series)*. McGraw Hill, 2002.
- Dancyger, Ken. *The Technique of Film and Video Editing: History, Theory, andPractice*. Focal Press. 5th Ed.

Reference Books:

- Sobel, Jeff. Apple Pro Training Series: *Sound Editing in Final Cut Studio*. Peachpit Press. 2010
- Pittman, Simon. *Editing Audio Using Audacity*. 1st Ed. 2013.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination
Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO 1	1	2	3	1	--	--	--	1	2	3	1
CO 2	1	1	3	2	--	--	--	2	1	2	1
CO 3	1	1	2	3	--	--	--	1	1	1	3
CO 4	3	2	1	1	--	--	--	3	3	2	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2335	**Project** (with presentation & evaluation)	L	T	P	C
Version	2021	0	0	0	3
Pre-requisites/Exposure	2D Animation				
Co-requisites	None				

Catalog Description
In this subject, student will create animated clips and videos. After selecting this option a Faculty Guide will be allocated to the student by HOI and concern student will have to work with allocated faculty guide for proper guidance to complete this project. Student can choose topic as per his/her area of interest & as per the suggestion given by Faculty guide.
Course Objectives

The objective of this course is-

1. To guide the techniques of creating animated clips, graphic design.

2. To supervise quality of project this based on concept.

3. To teach the tools and equipment which are used in making graphic designing, animation commercials.
4. To assist for getting the required output of project as per client satisfaction.

Course Outcomes
On completion of this course, the students will be able to-CO1.
Identify the 12 principles of animation
CO2. Create accurate and ethically appealing computer generated animationCO3.
Describe characteristics of well-designed and executed animation CO4.
Demonstrate progress in basic drawing and animation skills
Course Content

Modules	**Blooms level***	**Number of hours**
2D **Graphic designing** **Animation clip**	L6	36

Project Report: In this report student will have give details of his/her Topic with proper Introduction, Industry overview along with proper details of his/her area. For example if he/she is working on 2D animation or clip art so they must give details on these. Following points should be covered in it: The project itself on the computer, Report comprising of: Title page, Concept note/ Ideation, Storyboard, Objectives, Methodology, Learning Outcome, Conclusion		
Presentation & Viva: Students will have to make a Presentation (based on their Project Report)and it will be followed by a Viva Voice in front of a Panel of two or three faculty members.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books:
Richard Williams (2012), The Animator's Survival Kit, United States: Farrar, Straus and Giroux.
References:
Kit Laybourne (1979), The Animation Book, United States: Three Rivers Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	Report	Viva
Weightage (%)	70	30

T- Timely Submission, CC- Content Clarity, Comp- Comprehensiveness, O- Originality, PP- Project Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	--	--	1	1
CO2	--	--	--	--	--	--	1	1
CO3	--	--	--	1	--	--	1	1
CO4	1	1	1	1	--	--	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2304	**DESIGN THINKING**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description –

The objective is to teach students an overview of design thinking and work with a model containing four key questions and several tools to help you understand design thinking as a problemsolving approach. We also look at several stories from different organizations that used design thinking to uncover compelling solutions.

Course Objectives

The objective of this course is to

1. To impart working knowledge of what design thinking is and when to use it.
2. To impart knowledge use design thinking to generate innovative ideas.
3. To Impart Knowledge of to prepare to see and take action when opportunity arises

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create the process of using design thinking to generate and test ideasCO2. How to use design thinking to generate innovative ideas,
CO3. Identify and describe various design thinking process and methods.

Modules	**Blooms level***	**Number of hours**
MODULE 1 - What Is Design Thinking? Students will begin by unpacking what we mean by design thinking and why it is more effective than traditional methods when the goal is innovation. We'll also examine what kinds of challenges are best-suited for design thinking and learn about the Visualization tool, which helps bring ideas to life. By the end of this module, you'll have a better understanding of what we mean by design thinking, when to use it, and how to use the Visualization tool.	L1, L2, L3	20

MODULE 2 - Design Thinking's Phases Learn about the five phases of design thinking - • Empathise • Define • Ideate • Prototype • Test	L1, L3	20
MODULE 3 - Experimentation By the end of this module, you'll understand how to apply the "what wows?" and"what works?" questions, and how to use the Learning Launch tool	L1, L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. The Design Thinking Toolbox (2020): A Guide to Mastering the Most Popular and Valuable Innovation Methods , United States: Wiley Press

Reference Books

1. Sprint: How To Solve Big Problems and Test New Ideas in Just Five Days *:* transworldBooks

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2308	Online Certification (Minimum 30 Hours)	L	T	P	C
Version	2021	0	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The future belongs to those who create. Whether it's to inform, persuade, entertain, or inspire, success in the digital age means communicating in visually rich and interactive ways.With a firm grasp on the world's most powerful creative tools certification of Adobe CreativeCloud & Autodesk 3DS Max and Maya

Course Objectives

The objective of this course is to
1. Equip the students with the industry-recognized certification that demonstrates mastery in. software's
2. Provide a platform to learn and prove their digital media skills to prospective employers.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Proof of competency in specific digital media tools. CO2:
Increased confidence in one's digital media abilities.

Modules	Blooms level*	Number of hours
MODULE 1: Certifications that can be taken – • Adobe Certified Professional • Autodesk Certified User • Unity Certified User certification	L1, L4, L3, L6	No Contact Hours

• Course with certificate from coursera.org or edex.adobe.com		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	NA	NA	NA	NA	NA

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2233	**WORKSHOP/CERTIFICATION (DISCIPLINE SPECIFIC)**	L	T	P	C
Version	2014	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

1. Equip the students with the hands on experience with experts in a particular discipline.
2. Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activitiesconducted in a particular discipline of animation industry.
CO2: Understand the concepts and apply the same in a particular discipline.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Major Themes For Workshop • The workshop may be conducted on any of the following major themes: • Acting for animation	L1, L4, L3, L6	No Contact Hours

• Lighting • Photography • Digital Painting • Matt Painting • Clay Animation • Composting • Painting / Oil / Water • These themes are merely indicative and the trainer may choose any recent and relevant topic of study. GUIDELINES FOR WORKSHOP • The procedure for earning credits from workshop consists ofthe following steps: • Relevant study material and references will be provided bythe trainer in advance. • The participants are expected to explore the topic in advanceand take active part in the discussions held • Attending and Participating in all activities of the workshop • Group Activities have to be undertaken by students as guidedby the trainer. • Evaluation of workshop activities would be done through testand quiz at the end of the workshop. • Submitting a write up and showing the final output which focuses on the learning outcome from the workshop. • METHODOLOGY • The methodology followed at the workshop could be based onany one or more of the following methods: • Case Study • Simulation • Group Activity		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	5	30	30	35	100

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2452	MAYA MODELING & TEXTURING	L	T	P	C
Version	JULY 2021	1	1	2	3
Pre-requisites/Exposure	Basic skills of computer				
Co-requisites					

Catalog Description

Course introduces students to the foundations of character/object modeling & texturing which is the process of adding mesh and controls to a character that allows a creative model to animate it in a proper manner. The course prepared to candidate for an advanced work in3-D modeling & Texturing. In this section, student will get an introductory look at the processes in Maya. Student will use a Project-based approach as we cover the fundamentalsof Maya looks at commonly used tools, and talk about some time-saving tips and techniquesgleaned from production experience.

Course Objectives

The objective of this course is-

1. To train the proper knowledge of surfaces which used for modeling in TV serials, filmsand other commercials.
2. To train the basic mesh flow system in modeling.
3. To teach the tools of modeling, merit and demerit of modeling and designing.
4. To guide the visualize the story and their character, assets and other part of design andthen impart it in modeling through various tools of Maya software.

Course Outcomes

On completion of this course, the students will be able to

CO1. Model or design the given reference object or character for TV episodes and films.
CO2. Create and design the required models and color for advertisement project or any other commercials.

CO3. Develop their own show reel in 3D including modeling, coloring and texturingappropriate shading network.
CO4. Develop and represent the 3D models and environment on their own visualize story.
CO5. Manage and make any big project management in terms of man power requirementalong with budgeting of big animation film project.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to the interface of Maya. Hotkeys. Using the spacebar. Manipulating a view. Creating objects. Simple primitives. Lights, cameras, selecting objects, types of selection, single selection, adding and subtracting selection, edit menu selection options. Marquee selection, Lasso selection, selection mask.	L1, L2	24
MODULE 2: Using hyper shade, relationship editor, hyper graph and outliner. The channel box. Duplicating objects, pivot points, introduction to snapping-2D snapping and 3D snapping. Using layers. Introduction to textures and materials.	L3,L6	12
MODULE 3: Modeling a 3D character, understanding edge flow of face and body in order to achieve a smoother bends while animating, unwrapping and texturing the characterand understanding use of Photoshop while creating realistic textures.	L3, L6	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books:
Kelly L. Murdock (2015), *Autodesk Maya 2015*, Buchanan: SDC publishing LLC.
References:
Lee Lanier (2012), *Maya Professional Tip and Techniques*, United States: John Wiley andSons Publications**.**

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	C	CT	A	EE	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End SemesterExamination

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	1	1	1	1
CO2	1	1	--	1	1	1	1	1
CO3	1	1	--	1	1	--	--	1
CO4	1	1	--	1	--	--	--	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2401	MAYA LIGHTING & RENDERING	L	T	P	C
Version	JULY 2021	1	1	2	3
Pre-requisites/Exposure	Maya Modelling				
Co-requisites					

Catalog Description

In this subject, student will get an introductory look at the processes in Maya lighting. Student will use a project-based approach as we cover the virtual 3D lighting system of Maya, look at commonly used attributes and properties of various light, and talk about sometime-saving tips and techniques gleaned from production experience.

Course Objectives

The objective of this course is-

1. To teach the techniques of making realistic lighting for TV serials and other commercials.

2. To train the 3D lighting uses various lights available in Maya and mental ray includingshaders.
3. To teach the realistic rendering process of scene which used for film or any other Advertisement.
4. To guide the visualize the lighting mood for given story and their scenes and shots andthen getting output in terms of video or stills using rendering techniques.

Course Outcomes

On completion of this course, the students will be able to-

CO1. Light the given scene or shot for TV episodes and films.
CO2. Put light for exterior, interior or any kind of scene using fill light, main light and backlight.
CO3. Get realistic output in the form of video or still using mental ray, software, and hardwarerendering.

CO4. Develop the proper realistic shader effect, given them glow effect, high quality render inHD format.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Lighting tools in Maya ; Maya lighting tutorial, different types of 3D lights found in Maya, and methods for easily aiming and controlling lights. specialized attributes found in certain light types, different types of shadows available in Maya, how depth can be added for mood to our scenes though the use of volumetric light rays, as well as many other lighting tools and concepts that will help you establish a solid foundation in Maya	L1, L2	24
MODULE 2: The core rendering tools and features of Maya that every rendering artist needs to be familiar with foundational knowledge of rendering in Maya by talking about many of the key tools, features and concepts that every rendering artist in Maya really needs to be familiar with. I resolve some rendering-related issues that student may encounter, strong workflow practices that will be extremely beneficial to them as an emerging render artist.	L3, L4, L6	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books:
Kelly L. Murdock (2015), *Autodesk Maya 2015*, Buchanan: SDC publishing LLC.
References:
Lee Lanier (2012), *Maya Professional Tip and Techniques*, United States: John Wiley andSons Publications**.**

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**	
					Practical	Theory
Weightage (%)	5	10	10	5	20	50

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE-End SemesterExamination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	1	1	1	--
CO2	--	1	--	1	1	--	1	1
CO3	1	1	--	1	--	--	--	1
CO4	1	1	1	--	--	1	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2405	**DIGITAL COMPOSITING**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description
The objective is to teach students about different concepts involved in digital compositing,which will help them to apply these entire concepts practically.

Course Objectives

The objective of this course is to
1. To impart working knowledge of basics Image & video Compositing & color correction
2. To impart knowledge into Image tracking and stabilization for seamless composting.
3. To Impart Knowledge of basics of digital compositing formats, Aspect Ratio, color bitsand video formats.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create digital compositing of Images & video for finished Post Production.
CO2. Create match move composites for seamless chrome key effects and 3d camera tracking.
CO3. Identify and describe various video Formats, Aspect Ratio, color depth bits, & filmformats.

Modules	Blooms level*	Number of hours
MODULE 1 Basic Image Manipulation and Compositing: Terminology, Color Manipulations, Spatial filters, geometric transformations, Expression Language, Filtering Algorithms, motion blur, Multi source Operators, Matte Image, The Integrated Matte Channel, Masks, Compositing With Pre multiplied Images, Morphing, Matte creation and manipulation: Rotoscoping, Procedural matte extraction, matte manipulations, Time and	L1, L2, L3	10

Temporal Manipulations: Apparent Motion, Temporal Resolution, Temporal Artifacts, Changing the Length or Timing of a Sequence, Key Framing.		
MODULE 2 Image Tracking and Stabilization: Tracking an Element into a Plate, Choosing the Feature to Track, Limiting the Search Area, Human Intervention, Using Tracking Curves Manually, Tracking Multiple Points, Stabilizing a Plate, Camera tracking, Interface Interactions: Workflow, the evolution of Interactivity, Methods of representing thecompositing process, Timelines, Curve Editors, Working With Proxy Images, Image Viewing and Analysis Tools.	L1, L3	20
MODULE 3 Film Formats: Aspect Ratio: Non square Pixels, Deciding on aResolution for an Aspect Ratio, Format Conversion Pipeline, Format Conversion Example, Film Formats: 35mm Formats ,16mm Formats, Specialized Film Formats, Video Formats: Fields, Color Resolution, Gamma, Common video formats, Other Formats, Working with nonsquare pixels, converting and combining formats	L1, L3	18

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Steve Wright (2010). *Digital Compositing for Film and Video*, United Kingdom: Routledge

Reference Books

1. Ron Ganbar (2014). *Nuke 101: Professional Compositing and Visual Effects*, UnitedStates: Peachpit Press

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2406	**INTRODUCTION TO GAME DEVELOPMENT**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Students will learn to build the skills necessary to design and development games. The Introduction to Game Development focuses on both the theory and practice of game making.From a technical standpoint, student create game projects in the latest Unity 2020 game engine, include a 2D Shooter, 2D Platformer, First-Person Shooter, and 3D Platformer.
Students will learn to import 3d models with texture & Materials from 3D software's i.e.Maya and learn the basics of c# for interactive games.

Course Objectives

The objective of this course is to

1. To impart working knowledge of Importing 3D assets into the game engine.
2. To impart knowledge into unity 3D scripting using C# .
3. To Impart Knowledge of publishing from Unity 3D for multiple device

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create & assemble 2D & 3D assets into unity 3d game engine.CO2.
Create C# scripts for the 2D & 3D interactions.
CO3. Identify and describe various 3D Formats and publishing for different platforms

Modules	Blooms level*	Number of hours
MODULE 1 - Introduction to Unity • Getting to Know the Unity Editor • The Project Dialog • The Unity Interface • Dimensions and Coordinate Systems	L1, L2, L3	12

• The Basics of Models • Built-In 3D Objects • Importing Models • Textures, Shaders, and Materials • Lights and Cameras		
MODULE 2 – Unity Scripting • Scripts • Creating Scripts • Attaching a Script • Anatomy of a Basic Script • The Using Section • The Class Declaration Section • The Class Contents • Variables • Creating Variables • Variable Scope • The if / else Statement • The if / else if Statement • Methods • Anatomy of a Method • Writing Methods • Using Methods • Input • Input Basics • Input Scripting	L1, L3	20
MODULE 3 – Animation, Audio, collisions and publish - • Rigidbodies • Collision • Colliders • Prefab Basics • Prefab Terminology • Prefab Structure • The Animation • Animation Types • Creating an Animator • The Animator View • The Idle Animation • Parameters	L1, L3	16

• States and Blend Trees • Managing Scenes • Establishing Scene Order • Switching Scenes • Per-Platform Settings • Building Your Game • Build Settings • Game Settings		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Unity 2018 Game Development In 24 Hours, Sams Teach Yourself Third Edition, United Kingdom: Pearson

Reference Books

1. Mastering Unity Scripting: Learn advanced C# tips and techniques to make professional-grade games with Unity (2015) : Packt Press

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	1	--	2	--	--	2	2	1	2	3

CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2407	MOTION GRAPHICS	L	T	P	C
Version 1	2014	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In media today, there is perhaps not a single course which is untouched by motion graphics. Keeping this widely used tool in mind, this course covers the latest in concepts and techniques in the creation and production of motion design animation using software designed specifically for this purpose such as Animate CC and Adobe After Effects. The course will cover different kinds of motion designs, concept and storyboard and computer generation of motion design sequences. The course will be profusely illustrated from scenes and sequences employing heavy use of motion graphics, both from the Hollywood as well asBollywood Motion Picture Industry.

Course Objectives:

The objective of this course is to:

1. Enable the students to comprehend principles of motion design using a judicious mix oftheory and practical work
2. To familiarize students with every aspect of motion design software, both at thebeginner as well as advanced level
3. To instill in the students such a level of confidence that they can tackle projects at a professional level by having a basic knowledge of all software related to Motion Design software, and intensive knowledge of some selected software such as After Effects.

Course Description

This course covers the plethora of motion design software, moving from very basic design software to very specific software, such as Nuke or Mocha for example, that havebeen created for very specific tasks. This entire course, since it is designed for an industry that requires very high quality work in the shortest possible time, is heavily weighted in favour of practical exercises that are given to the students at regular

intervals and that progress from basic to intermediate and finally to advanced. Scenes and sequences from movies are deconstructed to filter out the essential ingredients of motion graphics like compositing, rotoscoping, match moving etc. so that a conceptual framework for practical execution of projects is established.

The course is graded in terms of intensity as well as complexity and equal emphasis is placed on conceptualization and visualization as well as execution, so that students can emerge with a portfolio that is only technically brilliant but also creative.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least three to four software, notablyAdobe After Effects, Nuke, Fusion and Mocca, used heavily in the industry

CO2. Be able to visualise, script and storyboard visual effects for both the Broadcast aswell as the film industry

CO3. Be able to execute both short and long sequences with precision and quality which iscomparable to work being done in the industry

CO4. Be able to work in a team and in a networked environment, using IT tools effectivelyto reach a wide audience in an online environment

Modules	Blooms level*	Number of hours
MODULE 1: Fundamentals of Graphics, Animation and Motion Graphics What is Motion Graphics? How is it different from other forms of animation. 2D and 3D animation software. Why is it assuming so much importance in present day movies? What packages are currently being used in the industry and advantages and disadvantages of each. Deconstruction of scenes from movies (Hollywood, Bollywood and International), explanation of how certain effects were created and demonstrating in the computer lab a scaled down version of certain selected effects.	L1, L2	4
MODULE 2: After Effects: General Motion Graphics tool This Unit moves out from creative and conceptual dialogues into the domain of After effects. Since this package is used heavily by the Television Industry, many examples from this medium will be used to illustrate hard-to-grasp concepts. Various components of After Effects that will be taught in this module are:	L2, L3	6

• The After Effects interface: Moving about and navigation in AfterEffects • AE tools and panels; how to customise and optimise them • Keyboard shortcuts - how to use and customize • Creating your first composition • The Timeline - navigation, panels and scope of the timeline • Project windows and assets; moving assets from project to timeline • Use of keyframes to create simple animations • Illustration of first principles of animation - ease in, out and easy ease • Frame rates, speeding up and slowing down of animation - using the Graph editor • Rendering and compression concepts; Different kinds of movie formats • Outputting your first movie; Settings and how they can be tweaked		
MODULE 3: Compositing and Match moving in After Effects This unit is a continuation of the earlier unit. Here we go into greater depth of the various tools, filters effects and presets that can be used. Round tripping between After Effects and Editing software such as Premiere and/or Final Cut Pro, this unit talks about green screen, chroma keying, masks and mattes for compositing stills and videos. Common problems encountered such as fast moving footage or color fringing are discussed and creative solutions offered. Also compositing is demonstrated in two or three software such as After Effects, Nuke and/or Fusion, and the reason why a particular software is chosen for a particular task is explained. In this unit, also match moving, locking still image or animation on a target, using 2D and 3D cameras, as well as planar tracking software like Mocca are covered in detail. Again to make the students industry, common problems encountered when using these highly specialized software are discussed, examined and students are encouraged to come up with creative solutions to fix these problems. A case study approach rather than classroom rote learning will be adopted both in this as well as the next unit.	L2, L3,L4	8
MODULE 4: Rotoscoping, Particle Animation. Liquid and Pyrotechnics In this Module, very specific effects used in films like particle effects, rotoscoping, liquid effects, dynamic simulations using soft and rigid bodies, as well as pyrotechnics – fire and smoke effects as well as explosion effects are dealt with at length. This unit is almost completely practical and theory is only used to augment and strengthen student's knowledge, rather than it being a substitute for imparting practical skills. Figuring out how to deal with hardware and exporting issues when rendering heavy and complex scenes is also discussed and explained.	L3, L4	8

MODULE 5: Assembling effects This module, although slightly different is the sense that it is more focused on editing, brings all the skills learnt in the previous modules onto the editing platform. Students learn how to combine and compile sequences, the different editing codecs, how to export both high quality videos as well as compressed videos and how to add music and sound effects to their sequences to maximize impact of the visual effects that they have created using a single or combination of different software.	L3, L4,L5	6
TOTAL CONTACT HOURS		**32**

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- Ron, Brinkmann. *The Art and Science of Digital Compositing: Techniques for Visual Effects, Animation and Motion Graphics: The Morgan Kaufmann Series in Computer Graphics*. 2008

- Byrne, Bill. *The Visual Effects Arsenal: VFX Solutions for the Independent Filmmaker*. Focal Press 1st Edition. 2009

Reference Books

- Dodds, David. *Hands-On Motion Graphics with Adobe After Effects CC: Develop your skills as a visual effects and motion graphics artist*. Pakt Publishing. 2019.

- Lanier, Lee. *Digital Compositing with Nuke*. Focal Press. 2012

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO 1	1	2	1	3	..	..	..	1	1	1	3
CO 2	1	2	3	3	..	..	..	1	1	1	3
CO 3	1	2	1	3	..	..	..	1	3	1	3
CO 4	1	1	3	1	..	..	..	2	3	1	1
CO 5	..	..	..	..	..	..	..	..	..	..	..

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2408	Online Certification (Minimum 30 Hours)	L	T	P	C
Version	2021	0	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The future belongs to those who create. Whether it's to inform, persuade, entertain, or inspire, success in the digital age means communicating in visually rich and interactive ways.With a firm grasp on the world's most powerful creative tools certification of Adobe CreativeCloud & Autodesk 3DS Max and Maya

Course Objectives

The objective of this course is to
1. Equip the students with the industry-recognized certification that demonstrates mastery in. software's
2. Provide a platform to learn and prove their digital media skills to prospective employers.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Proof of competency in specific digital media tools. CO2:
Increased confidence in one's digital media abilities.

Modules	Blooms level*	Number of hours
MODULE 1: Certifications that can be taken – • Adobe Certified Professional • Autodesk Certified User • Unity Certified User certification	L1, L4, L3, L6	No Contact Hours

• Course with certificate from coursera.org or edex.adobe.com		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	NA	NA	NA	NA	NA

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2233	**WORKSHOP/CERTIFICATION (DISCIPLINE SPECIFIC)**	L	T	P	C
Version	2014	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

1. Equip the students with the hands on experience with experts in a particular discipline.
2. Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activitiesconducted in a particular discipline of animation industry.
CO2: Understand the concepts and apply the same in a particular discipline.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Major Themes For Workshop • The workshop may be conducted on any of the following major themes: • Acting for animation	L1, L4, L3, L6	No Contact Hours

• Lighting • Photography • Digital Painting • Matt Painting • Clay Animation • Composting • Painting / Oil / Water • These themes are merely indicative and the trainer may choose any recent and relevant topic of study. GUIDELINES FOR WORKSHOP • The procedure for earning credits from workshop consists ofthe following steps: • Relevant study material and references will be provided bythe trainer in advance. • The participants are expected to explore the topic in advanceand take active part in the discussions held • Attending and Participating in all activities of the workshop • Group Activities have to be undertaken by students as guidedby the trainer. • Evaluation of workshop activities would be done through testand quiz at the end of the workshop. • Submitting a write up and showing the final output which focuses on the learning outcome from the workshop. • METHODOLOGY • The methodology followed at the workshop could be based onany one or more of the following methods: • Case Study • Simulation • Group Activity		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	5	30	30	35	100

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2552	**MAYA PARTICLES AND DYNAMICS**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Learn a how to create dynamic simulations and effects in Maya

Course Objectives

The objective of this course is to

1. To impart working knowledge of Particles & Dynamics for creating simulations for creative and realistic effects

2. To impart working knowledge of Physics simulations using Soft, Rigid & n-cloth effectsand animations.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create creative simulations for advertisements to render realistic water, honey,fireworks and more.
CO2. Create and utilize space warps & forces of 3DS Max like gravity and wind with particleflow
CO3. Create realistic physics-based animations using 3DS Max Particles & Dynamics simulations.

Modules	Blooms level*	Number of hours
MODULE 1 Create a Particle Flow Source and use how to navigate the ParticleView interface. Learn how to use many of the most commonly used	L1, L3	16

operators to create a particle system that fits specific needs in the projects.		
MODULE 2 Learn how to utilize space warps like gravity and wind with particle flow to modify the behaviours of our particle systems. Learn how to apply collisions to our particles and even cause there particles to spawn new particles when they collide with a deflector.	L1, L3	16
MODULE 3 Dynamics in learning section can help guide you through learning many of the tools available to you. By the end of this learning path student will have a very solid understanding of the different particle and dynamics systems within 3ds Max and how you can use them to create there own simulations.	L1, L3	16

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. DariushDerakhshani, Randi L. Derakhshani and Jon McFarland (2007). Introducing3ds Max 9: 3D for Beginners, United States: Sybex.

Reference Books

1. Jeffrey Harper (2007). Mastering Autodesk 3ds Max 2013, United States: Sybex.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO1	**PO 2**	**PO3**	**PO 4**	**PO 5**	**PO6**	**PO 7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	--	2	--	--	2	2	2	1	3
CO2	2	1	--	2	--	--	3	2	2	1	--
CO2	2	1	--	2	--	--	3	2	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2505	**MAYA RIGGING AND ANIMATION**	L	T	P	C
Version	JULY 2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Student will also learn how Maya's interface can be customized to work faster. By the end of the section, student will be comfortable enough to utilize Maya's rigging features to rig their own assets.

Course Objectives

The objective of this course is to

1. To impart working knowledge of Rigging in Autodesk Maya and automate the basicrigging system.

2. To impart knowledge of Animation in Autodesk Maya for Humanoid and non-organicobjects.

3. Working with Autodesk Maya in Dope Sheet & Graph Editor.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Create detailed Rigging system of Humanoid and non-organic objects for Cinematic animations

CO2. Create Animation using Keyframes and Rigging system for smooth and effective lopping animations i.e. Walk cycle, Run Cycle and more. And effectively use graph editor& Dope sheets for ease-in & ease-out animations.

Modules	Blooms level*	Number of hours
MODULE 1 Student will also learn how Maya's interface can be customized to work faster. By the end of the section, student will be comfortable enough to utilize Maya's rigging features to rig their own assets!	L1, L3	24
MODULE 2 The intuitive and fun animation tools of Maya. How to set up animation preferences and create key frames, to learning how animation can be modified from Maya's Timeline and Graph Editor. Learn how to animate objects along a path, how to work non-linearly and non-destructively with the help of the Trax Editor and animation layers. how to animate with constraints and even cover helpful tips on how to improve your productivity.	L1, L3	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. The Art of Maya: An Introduction to 3D Computer Graphics by Autodesk Maya Press

Reference Books

1. Maya Professional Tip and Techniques; Lee Lanier; John Wiley and Sons

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1	2	1	--	2	--	--	2	2	1	1	3
CO 2	2	1	--	2	--	--	3	2	1	1	--
CO 3	2	1	--	2	--	--	3	2	1	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2506	**GAME DEVELOPMENT WITH AR VR**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Students will learn how to design, develop, troubleshoot, and publish your own mobile VR applications inUnity for Google Daydream, Gear VR, or Oculus Go devices. Using the very latest techniques recommended by Unity's VR engineers and Augmented Reality, or AR, will transform how we see and interact with the world. And the hardware that makes AR possible is the smartphone that you may already have in your pocket. In Game Development with AR VR, you'll learn how to develop your own mobile AR applications in Unity for iOS and Android devices. You'll learn about the features offered by Unity's AR Foundation, and about additional features in ARKit and ARCore.

Course Objectives

The objective of this course is to

1. To impart working knowledge of basics AR & VR
2. To impart knowledge into Image tracking and ground plane tracking using AR Foundation by Unity 3D.
3. To Impart Knowledge of basics of gaze control, Recasting, & lean touch controls.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1.
Create sample AR Furniture App for IOS & Android
CO2. Create VR environment with Interactions for Google Card board.CO3.
Identify and describe Mixed Reality & its Applicatios.

Modules	Blooms level*	Number of hours
MODULE 1 – Introduction to XR • What is Virtual Reality (VR)	L1, L2, L3	8

• What is Augmented reality(AR) • What is Mixed Reality • Modern VR/AR experiences • History • Hardware • Software • Interaction fundamental		
MODULE 2 – Unity AR Foundation • Installing AR Foundation package into Unity 3D • Importing Models for AR App • Setup the Unity 3d for AR App • Creating UI and Application Functions • Implementation of ARKIT for IOS • Implementation of ARCORE for IOS • Publish App from Unity3D for IOS & Android	L1, L3	20

MODULE 3 – VR for Google Cardboard
• Design
  ○ The Concept
  ○ The Rules
  ○ The Requirements
• The Arena
  ○ Creating the Arena
  ○ Texturing
  ○ Finish the Arena
• App Entities
  ○ The Model
  ○ Animations
  ○ The Model texures
• The Control Objects
  ○ The Goals
  ○ Interaction using Gaze and VR inputs
  ○ The Scene Controller's
	L1, L3	20

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Complete Virtual Reality and Augmented Reality Development with Unity: Leverage the power of Unity and become a pro at creating mixed reality applications (2019), United Kingdom: Packt Publication

Reference Books

1. UX for XR: User Experience Design and Strategies for Immersive Technologies (Design Thinking) : APress

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Relateds

ANI2535	**Project** (with presentation & evaluation)	L	T	P	C
Version	2014	0	0	0	3
Pre-requisites/Exposure	2D Animation				
Co-requisites	None				

Catalog Description
In this subject, student will create animated clips and videos. After selecting this option a Faculty Guide will be allocated to the student by HOI and concern student will have to work with allocated faculty guide for proper guidance to complete this project. Student can choose topic as per his/her area of interest & as per the suggestion given by Faculty guide.
Course Objectives

The objective of this course is-

1. To guide the techniques of creating animated clips, graphic design.

2. To supervise quality of project this based on concept.

3. To teach the tools and equipment which are used in making graphic designing, animation commercials.
4. To assist for getting the required output of project as per client satisfaction.

Course Outcomes
On completion of this course, the students will be able to-CO1.
Identify the 12 principles of animation
CO2. Create accurate and ethically appealing computer generated animationCO3.
Describe characteristics of well-designed and executed animation CO4.
Demonstrate progress in basic drawing and animation skills
Course Content

Modules	**Blooms level***	**Number of hours**
2D **Graphic designing** **Animation clip**	L6	36

Project Report: In this report student will have give details of his/her Topic with proper Introduction, Industry overview along with proper details of his/her area. For example if he/she is working on 2D animation or clip art so they must give details on these. Following points should be covered in it: The project itself on the computer, Report comprising of: Title page, Concept note/ Ideation, Storyboard, Objectives, Methodology, Learning Outcome, Conclusion		
Presentation & Viva: Students will have to make a Presentation (based on their Project Report)and it will be followed by a Viva Voice in front of a Panel of two or three faculty members.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books:
Richard Williams (2012), The Animator's Survival Kit, United States: Farrar, Straus and Giroux.
References:
Kit Laybourne (1979), The Animation Book, United States: Three Rivers Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	Report	Viva
Weightage (%)	70	30

T- Timely Submission, CC- Content Clarity, Comp- Comprehensiveness, O- Originality, PP- Project Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	--	--	1	1
CO2	--	--	--	--	--	--	1	1
CO3	--	--	--	1	--	--	1	1
CO4	1	1	1	1	--	--	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2507	Scripting and Storyboarding	L	T	P	C
Version 1	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this course, students learn the rudiments of scripting and storyboarding as well explore the differences between the different formats. They are introduced to the meaning of conceptualizing a treatment and style for a film, the differences between scripting for Ads and short films as compared to scripting for feature films as well as the different types of scripts like treatment, script, shoot and edit scripts, screenplays and finally meticulously prepared scripts which are better known as storyboards

Course Objectives:
The objective of this course is to:

1. Help students improve their writing style, especially with reference to film, video andInternet
2. Enable students to write creative and cohesive scripts in a variety of programmeformats such as News bulletins, Ads, PSAs, promos, fiction and documentaries
3. To build a sound foundational structure of film grammar so that they can translate filmicelements into narrative structures and visualise scenic elements with ease

Course Description
This course equips the learner with skills in three distinct areas. To polish their writing styles, structures and grammar so that the student can write not only well but also in a lexically and grammatically correct manner. The second objective is to build a sound theoretical foundational of filmic elements by deconstruction of popular scenes from films and expound on the principles behind the success of these scenes, so that the learner can translate prose elements into visual narratives. The third objective is to enable the learner to conceptualise, visualise and translate these abstract ideas into a concrete text in the form of storyboards and scripts – both shooting as well as edit

scripts. The entire course takes the advantage of a huge repository of good audio visual material so that every theoretical construct can be supplemented and illustrated with examples drawn from filmic and broadcast domains.

Course Outcomes:

On completion of this course, the students will be

CO1. Able to write quickly effectively and well in a variety of styles
CO2. Be able to translate abstract ideas into shootable scenes
CO3. Be able to understand client briefs and producer requirements
CO4. Proficient at every aspect of writing for fiction and non-fiction

Modules	Blooms level*	Number of hours
MODULE 1: Pre-Production Research This unit focuses essentially of all aspects of pre-production. Methods of research, scouring for sources of material, collating and compiling material. Research indoors as well as outdoors. Preparing and completing a "rekky", techniques of preliminary interview of people. Understanding the requirements of the documentary or film are also covered in this module	L1, L2	6
MODULE 2: Concept & Treatment In this module, students learn all about conceptualizing an idea, abstract concept, trying new and novel methods of treatment; Soliloquy; integrating one comprehensive document out of several different text material, and writing client specific briefs form the core of this module	L2, L3	4
MODULE 3: Fundamentals of Film Grammar This very important module unravels the mysteries of film shooting and filmic editing. The fundamentals of shot composition, camera angles, camera aesthetics, constructing and deconstructing a film. Dialogue creation; creative use of sound and optimizing the use of the sound studio, as well as techniques developed by the great masters of documentary and cinematic narrative, all form the backbone of this vitally essential module	L2, L3	8
MODULE 4: Writing the Script This module explains and teaches the actual writing process. How all the different ingredients of pre production research, visualization, film grammar and principles come together to form a compelling narrative. Students learn about writing prose, writing scene and shot descriptions, development of a character, plot points, digetic and non-digetic sound, meaning of clima, anti-climax and other structural elements that make up a well interwoven script	L2, L3,L5	8

MODULE 5: Screenplays and Storyboarding This is almost a completely practical unit, where students are taken through the entire process of writing a script and have to prepare on an individual basis scripts and storyboards in a variety of formats. Thus they have toprepare a script for a news bulletin; a storyboard for an Ad; A storyboard for a PSA; a script for non-fiction short film and one for a short documentary. Some of the exercises will be test exercises while others will be assessed andgraded	L3, L4,L6	4
TOTAL TEACHING HOURS		30

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

- King, Stephen. *On Writing: A Memoir of the Craft*. Simon and Schuster, 2012
- Douglas, Pamela. *Writing the TV Drama Series: How to Succeed as a Professional Writer in TV*. 2018

Reference Books:

- Truby, John. *The Anatomy of Story: 22 Steps to Becoming a Master Storyteller*. Faberand Faber, Inc. 2008
- Strunk Jr., William. White, E. *Elements of Style*. Fourth edition. 1999

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination
Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO 1											
CO 2											
CO 3											
CO 4											

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2508	**Online Certification (Minimum 30 Hours)**	L	T	P	C
Version	2021	0	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The future belongs to those who create. Whether it's to inform, persuade, entertain, or inspire, success in the digital age means communicating in visually rich and interactive ways.With a firm grasp on the world's most powerful creative tools certification of Adobe CreativeCloud & Autodesk 3DS Max and Maya

Course Objectives

The objective of this course is to
1. Equip the students with the industry-recognized certification that demonstrates mastery in. software's
2. Provide a platform to learn and prove their digital media skills to prospective employers.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Proof of competency in specific digital media tools. CO2:
Increased confidence in one's digital media abilities.

Modules	Blooms level*	Number of hours
MODULE 1: Certifications that can be taken – • Adobe Certified Professional • Autodesk Certified User • Unity Certified User certification	L1, L4, L3, L6	No Contact Hours

• Course with certificate from coursera.org or edex.adobe.com		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	NA	NA	NA	NA	NA

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2533	WORKSHOP/CERTIFICATION (DISCIPLINE SPECIFIC)	L	T	P	C
Version	2014	0	0	0	1
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Course Objectives

The objective of this course is to

1. Equip the students with the hands on experience with experts in a particular discipline.
2. Provide a platform to learn and perform in activity based academic events.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in various themes/activitiesconducted in a particular discipline of animation industry.
CO2: Understand the concepts and apply the same in a particular discipline.

Modules	Blooms level*	Number of hours
MODULE 1: Major Themes For Workshop • The workshop may be conducted on any of the following major themes: • Acting for animation	L1, L4, L3, L6	No Contact Hours

• Lighting • Photography • Digital Painting • Matt Painting • Clay Animation • Composting • Painting / Oil / Water • These themes are merely indicative and the trainer may choose any recent and relevant topic of study. GUIDELINES FOR WORKSHOP • The procedure for earning credits from workshop consists ofthe following steps: • Relevant study material and references will be provided bythe trainer in advance. • The participants are expected to explore the topic in advanceand take active part in the discussions held • Attending and Participating in all activities of the workshop • Group Activities have to be undertaken by students as guidedby the trainer. • Evaluation of workshop activities would be done through testand quiz at the end of the workshop. • Submitting a write up and showing the final output which focuses on the learning outcome from the workshop. • METHODOLOGY • The methodology followed at the workshop could be based onany one or more of the following methods: • Case Study • Simulation • Group Activity		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

As required to perform the activities.

Reference Books

As required to perform the activities.

Modes of Evaluation:

Examination Scheme:

Components	**Attendance**	**Active Participation**	**Multiple Choice Questions/ Quiz**	**Solving the Case/Assignment/ Write Up**	**Total**
Weightage (%)	5	30	30	35	100

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	--	2	3	1	2
CO2	1	1	2	--	--	--	--	2	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2652	**VFX**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This VFX course will take you through the fundamental concepts of VFX Compositing in Nuke, and how tolearn nuke the interface. The course is focused primarily on the 2D & 3D aspects of compositing to get you started. It involves replacing a background, color correcting and blending the foreground and background, motion tracking the background to the foreground, and seamlessly bringing it all
together. And learn how to Render CGI in passes, footage, and all of the elements necessary to compositea CG shot.

Course Objectives

The objective of this course is to
1. To impart working knowledge of Advance VFX & Compositing
2. To impart knowledge into Compositing of 3D Passes and 3D motion tracking
3. To Impart Knowledge of Rotoscoping & Color grading techniques

Course Outcomes (COs):
On completion of this course, the students will be able toCO1.
Create an Multi-pass CG compositing
CO2. Create 2D compositing using Rotoscoping.CO3.
Identify and describe VFX & Compositing.

Modules	Blooms level*	Number of hours
MODULE 1 – 2D Compositing & Rotoscoping • Additive color theory • Image formats / resolutions / colors	L1, L2, L3	20

• 2d Tracking • Rotopaint and Rotoscoping • Keyframe animation • Introduction to Chroma Keying / Greenscreen removal • Camera traits (Lens distortion, grain, sensor noise) • Cleanplating and removal		
MODULE 2 – CGI Compositing • Matching color tones, darks, highlights of an image • Compositing elements / FX into a shot • Integrating a CGI (Computer Generated Image) render into a real scene • How to use the normals AOV to fine tune CG. • Use ID passes to correct different geometries	L1, L3	20
MODULE 3 – Color Grading • Color correction / color grading techniques • Advanced Color Grading Techniques • Day to Night Tips and Techniques • Fundamentals of Light and Physics • Image Frequency Separation and Uses • Advanced Color Remap Techniques	L1, L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Digital Compositing with Nuke (2012) : United Kingdom: Focal Press

Reference Books

1. Nuke 101: Professional Compositing and Visual Effects (Digital Video & Audio Editing Courses) : Pearson

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**H**	C	**CT**	**A**	**EE**
Weightage (%)	10	-	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C:Case Presentation

CO, PO and PSO Mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	1	--	2	--	--	2	2	1	2	3
CO2	1	1	--	2	--	--	3	--	1	2	--
CO3	1	1	--	2	--	--	3	--	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2635	PROJECT INTERNSHIP	L	T	P	C
Version	2021	0	0	0	3
Pre-requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description
Course Objectives
There are certain phases of every Intern's professional development that cannot be effectivelytaught in the academic environment. These facets can only be learned through direct, onthe- job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalise efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal class room situations. These attributes are intellectual ability, professional judgment and decision makingability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc.

The objective of this course is to
1. Provide hands on learning experience to work on an industry-oriented/research project.
2. Provide a platform to the students to develop their research skills and its application in Production filed to execute a final project.

Course Outcomes (COs):

On completion of this course, the students will be able to CO1:
Describe and apply skills on real research problems.CO2:
Assess and develop a solution to research problems.
CO3: Select the appropriate field for himself/herself in the media industry.

Modules	Blooms level*	Number of hours
Major Themes for Project The project may be based on any of the following Production House or	L1, L3, L5, L6	No Contact

AD Agencies: 1. Print Media and Package Industry 2. Film and TV Production 3. Advertising Agency 4. Event and Social Gathering 5. Multimedia Production House 6. Social Media Production **Guidelines for Project** It must be based on either Industry or Research. The student will workunder the guidance of a Faculty Guide that will be assigned by HOI. Student can choose topic as per his/her area of interest under the guidance of the Faculty guide. The student may also choose to undertake a live project in any of themajor media streams. **Project Report/Portfolio: 75 Marks** Before the end of the semester, the student will be expected to submit a project report. The project report shall have the following components. Title page Index Introduction Industry Overview Objectives Methodology Findings Conclusion Annexure (questionnaires, if any) Bibliography In case the student undertakes a live project, he/she will have to submit the portfolio instead of the project report. The portfolio will carry 75 marks. **Presentation & Viva: 25 Marks** Student will make a presentation (based on Project Report) and it will be followed by a Viva Voce in front of a Panel of one internal expertand one external expert.		Hours

The Steps of a Project Report **STEP I:** Selection of the topic for the project by taking followingpoints into consideration: Suitability of the topic, Relevance of the topic, Time available at the disposal, Feasibility of data collection within the given time limit,Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.) **STEP II**: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor. **STEP III**: Collection of information and data relating to the topic and analysis of the same. **STEP IV** : Writing the report dividing it into suitable chapters **STEP V**: The following documents are to be attached with the Final Project Report. • Approval letter from the supervisor (Annexure-IA) • Student's declaration (Annexure-IB) • Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution. **Guidelines for evaluation:** • Each of the students has to undertake a Project/Live Project individually under the supervision of a teacher and to submitthe same following the guidelines stated below. • Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound. • Failure to submit the Project Report/Portfolio or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report/Portfolio and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules). • No marks will be allotted on the Project Report/Portfolio unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report/Portfolio. • Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books
Depending upon the chosen specialization by the students.

Reference Books
Depending upon the chosen specialization by the students.

Modes of Evaluation:

Chapter Scheme and distribution of marks (for Project Report):
Chapter 1: Introduction with statement of objectives, limitations of the study & hypothesis –10 marks
Chapter 2: Literature Review/Conceptual Framework/ National/International Scenario – 20marks
Chapter 3: Research Design – 10 marks
Chapter 4: Findings& Results -- 20 marks
Chapter 5: Conclusion & Recommendations -- 10 marks
Chapter 6: Bibliography -- 05 marks

Examination Scheme:

Components	**Project Report**	**Power Point Presentation & Viva**
Weightage (%)	75 Marks	25 Marks

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

ANI2637	**Professional Project**	L	T	P	C
Version	JULY 2021	3	3	4	8
Pre-requisites/Exposure	Graphics, animation and Vfx				
Co-requisites	None				

Catalog Description

In this subject, student will get a specialisation in Maya lighting & rendering. Student will use a project-based approach where they shall put various lights as story required. Here a bunch oflights can be used at a time for creating specific situation and lighting to fulfil the project requirement. Student will also render this file for getting an output either in the form of imagesequences or in video form. The rendering type depended upon required quality of project, it may be either software rendering or VRAY or mental ray rendering. Virtual 3D lighting systemof Maya, look at commonly used attributes and properties of various light, and talk about some time-saving tips and techniques gleaned from production experience

Course Objectives

The objective of this course is-

1. To guide the techniques of creating realistic 3D lighting for given project.

2. To supervise the light quantity and position, direction, amount, and other attributes of lightrequired in project. .
3. To teach the realistic rendering process of scene for getting video output or image sequence output.
4. To assist for getting the required output of project as per client satisfaction.

Course Outcomes

On completion of this course, the students will be able to-

CO1. Create light mood and intensity as per requirement for making any project.

CO2. Put light for exterior, interior or any kind of scene using rig light, fill light, main light andback light, even VRAY and mental ray light.

CO3. Get realistic output in the form of video or still images using VARY, mental ray, software,and hardware rendering.

CO4. Develop the proper realistic texture effect, shader effect, given them glow effect, highquality render in HD format.

Course Content

Modules	Blooms level*	Number of hours
1. Modeling, Texturing, Lighting & Rendering **2. Animation** **3. VFX** **4. Gaming** **5. UX / UI** **6. Graphics** **7. Motion Graphics** **8. Video Editing**	L5, L6	120
Project Report: In this report student will have give details of his/her Topic with proper Introduction,Industry overview along with proper details of his/her area. For example if he/she isworking on 2D animation or clip art so they must give details on these. Following points should be covered in it: 3. The project itself on the computer 4. Report comprising of: Title page, Concept note/ Ideation, Storyboard, Objectives, Methodology, LearningOutcome, Conclusion		
Presentation & Viva Students will have to make a Presentation (based on their Project Report) and it willbe followed by a Viva Voice in front of a Panel of two or three faculty members.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books:
Kelly L. Murdock (2015), *Autodesk Maya 2015*, Buchanan: SDC publishing LLC.
References:
Lee Lanier (2012), *Maya Professional Tip and Techniques*, United States: John Wiley andSons Publications**.**

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**T**	**CC**	**Comp**	**O**	**PP**
Weightage (%)	5	25	20	5	45

T- Timely Submission, CC- Content Clarity, Comp- Comprehensiveness, O- Originality, PP- Project Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	1	--	1	--	--	1	1
CO2	--	2	1	--	--	--	1	1
CO3	--	2	--	1	--	--	1	1
CO4	--	1	1	1	--	--	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Amity School of Communication

Bachelor of Arts Journalism & Mass Communication

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelors of Arts (Journalism & Mass Communication) Duration: 3 Year

Program Overview

The most important and revolutionary changes in mass media, globally speaking, have occurred with the arrival of the satellite communication and ushering in of the internet age. Besides, radical transformation brought in printing technology, ably supported by computers and internet have completely altered the mass media scene in the entire world. Every medium of mass communication has assumed tremendous potential and immense power to become an effective science and art and a veritable academic discipline. Today, all media of mass communication are taking rapid strides in their respective areas of operation what Marshall McLuhan predicted several years ago, has become a reality. The world has indeed become a 'global village'. Radio, television, newspapers, magazines, films and digital media….everything is available instantly all over the world just for the asking. Bachelors of Arts in Journalism and Mass Communication in Amity University Haryana provides in depth knowledge in every aspect of Journalism and Mass Communication.

Bachelors of Arts in Journalism and Mass Communication program provides a sound knowledge of various concepts and models of Journalism and Mass Communication in all domains of life. It not only develops the ability to analyze complex social problems and resolve them through communication but also gives an exposure to the principles and practices of design and development of communication strategies and systems for all domains of knowledge.

Programme Outcomes (PO's)

PO1:Critical Thinking: Identify, classify, describe, review and criticize the communication theories and concepts from different perspectives.

PO2:Effective Communication: Apply, interpret, produce, schedule, modify create and write clearly in person and through different media in one or more languages and make it meaningful for the world by connecting people, ideas, books, media and technology.

PO3:Social Interaction: Demonstrate, dramatize, illustrate, and relate views of others on different ideas and situations, mediate disagreements and help reach conclusions through effective interactions in group settings of the society.

PO4:Effective Citizenship: Discover, analyze, and question authorities for social concerns and volunteer for nation development with the ability to resolve issues and participate in social activities as a responsible citizen.

PO5:Ethics: Criticize, appraise, assess, justify and summarize decisions analyzing various dimensions of the situation and accept the moral responsibility for the action taken.

PO6:Environment and Sustainability: Analyze, argue, judge and interpret the impact of professional and social communication and decisions in a global, economic, environmental and societal contexts for sustainability in which they operate.

PO7:Self-directed and Life-long Learning: Recognize the need for and acquire the ability to engage in independent and life-long learning having self-motivated attitude for research and development for his/her professional growth and also for the betterment of the society as a whole.

Program Specific Outcome (PSOs):

PSO1: Describe and apply fundamental knowledge of Journalism and Mass Communication courses to interpret and criticize essential areas of communication, politics, economics, science & technology and media &society.

PSO2: Apply knowledge of various software and strategies in the fields of designing and planning different communication plans & campaigns.

PSO3: Work professionally in the industry or to pursue higher studies in Journalism & Mass Communication and interdisciplinary programs by applying principles of management, research, ethics, environmental and social issues.

PSO4: Apply the principles of problem solving, creative thinking, group dynamics, team building, leadership skills, decision making skills, contributing to overall personality and career development.

PSO1	PSO2	PSO3				PSO4	
Describe and apply fundamental knowledge of Journalism and Mass Communication courses to interpret and criticize essential areas of communication, politics, economics, science & technology and media &society.	Apply knowledge of various software and strategies in the fields of designing and planning different communication plans & campaigns.	Work professionally in the industry or to pursue higher studies in Journalism & Mass Communication and Interdisciplinary Programs by applying principles of Management, Research, Ethics, Environmental and Social Issues.					Apply the principles of problem solving, creative thinking, group dynamics, team building, leadership skills, decision making skills, contributing to overall personality and career development.
1	2	3	4	5	6	7	8
Fundamental Courses	**Production/Designing/Planning**	**Interdisciplinary domain**	**Managementdomain**	**NTCC (non-teaching credit courses)**	**Ethics/ Env. & social issues**	**Practical/Hands-on Practice/Industry Oriented**	**Value added courses**
Understanding Mass Communication	Computer Graphics and Animation	News and Contemporary Issues	Media Laws and Management	Summer Internship Evaluation -I	Environmental Studies	Project (With Presentation & Evaluation)	Foreign Languages
Advertising Principles and Planning	Media Production Portfolio	Web Designing	Brand Management	Summer Internship Evaluation -II	Personality, Nationalism and Human Values	Multimedia Journalism	Understanding Self for Effectiveness
Electronic Communication: Radio & TV	Basic Photography		Public Relations	Internship/ Dissertation		Professional Project	Effective Listening
Introduction to Visual Communication	Digital Marketing	National & International Issues and Affairs	Corporate Communication			TV Production and Presentation	Problem Solving and Creative Thinking
Introduction to Culture & Society	Print Media Design & Production	Mass Communication Research	Event Management			Data Journalism	Presentation Skills

Basic Photography	Advertising Principles & Planning	Digital Photography					Reading &Comprehens io n
Print Media Reporting and Writing	Print Media Specialized Reporting and feature Writing	Media Planning & Buying					Group Dynamics and Team Building
	TV Journalism						Corporate Communicatio n
	News & Contemporary Issues						Stress and Coping Strategies
Developmen t Communicat ion	Public Relations						Employability Skills
Readings in Media	TV Production and Presentation						Individual Society and Nations
Mass Communic ation Research-I	Film Theory & Practice-I						Workplace Communicatio n
Media Analysis	Corporate Communication						Interpersonal Communicatio n and Relationship Management
	Mass Communication Research-II						
	Advertising Design						
	Multimedia Journalism						
	New Media						
	Film Theory & Practice-II						

JRN2151	PRINT MEDIA – REPORTING & EDITING	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course aims at introducing the students to the world of journalism – news and news handling in context of print media. It deals with basic news elements, news writing and also the news room set up. Editing is also an integral part of the course.

Course Objectives

The objective of this course is to

1. Introduce the history and evolution of journalism in the Indian context.
2. Explain and apply the concepts related to news and news writing.
3. Explain the nuances of editing including caption writing and headline writing.
4. Describe and apply designing principles for newspaper designing.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Explain the role of newspapers during freedom struggle.

CO2: Describe the newsroom set up and its functioning.

CO3: Explain various aspects of news and apply the news writing principles.

CO4: Apply principles of editing, headline writing and caption writing.

CO5: Apply principles of newspaper designing.

Modules	Blooms level*	Number ofhours
MODULE 1: History of Journalism Journalism in pre independence era in India, Role of English and Vernacular Press during Freedom Struggle, Growth of Journalism post independence.	L1	4
MODULE II: Growth and Development of Press Emergence of newspapers, magazines and publication houses, Growth of Indian news agencies	L1	3
MODULE III: The Newsroom Set up Various departments in Editorial Set-up, Hierarchy in the Newsroom, Qualities and Responsibilities of a Reporter, Sources and Beats	L1, L2	8
MODULE IV: News Reporting What is news, News value and Sources of News, Basic Elements of News, Writing a News Report, Types of Leads and BodyText, Interviewing Skills required for Reporting, Types of Reporting	L1, L3	12
MODULE V: Editing News Role and Functions of Desk, Role of Copy Editor, Electronic Copy Editing, Rewriting, Writing headlines and Captions, Understanding the Importance of Style Guides, Newspaper Design & Layout	L1, L3	9

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

1. Parthasarathy,Rangaswami (2000).*Basic Journalism*, Delhi: McMillan IndiaLtd.
2. Kamath,MV (2009).*The Journalist's Handbook*, Noida: Vikas Publishing House PvtLtd
3. Dary,David (1973).*How to Write News for Broadcast and Print Media*, New York:Tabb Books.
4. Sarkar,N.N. (2008).*Art and Production*, New Delhi:SagarPublication.
5. Shrivastava, KM (2015). *News Reporting and Editing*, Delhi: SterlingPublishers

Reference Books

1. Mencher, Melvin(2010). *News Reporting and Writing*, New York:McGraw-HillEducation
2. Krishnaswamy, KV (2016). *Writing and Editing News*, New Delhi: Orient BlackswanPrivate Limited
3. Pabbock, Bruce (1993), *Graphics for Desktop Publisher*, US: MisPress
4. Julian Harriss, Kelly Leiter & Stanley Johnson (eds.) (1992). *The CompleteReporter: Fundamentals of News Gathering, Writing, andEditing,*Boston:Allyn/Bacon
5. Harcup, Tony (2014). *Oxford Dictionary of Journalism*, Oxford :Oxford UniversityPress

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	--	2	3	1	--	2	2	--	--	--
CO2	--	--	--	--	2	--	--	2	--	2	3
CO3	2	1	--	1	1	--	1	--	--	--	--
CO4	2	1	3	2	1	2	--	2	1	1	1
CO5	2	1	--	2	2	3	2	2	1	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2101	ADVERTISING PRINCIPLES & PLANNING	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes various concepts of advertising. It includes concepts of advertising scenario in India, organizational structure and brand positioning etc. The aim of this course is to explore various creative fields and ethics involved in planning advertisements.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of creative fields involved in making advertisements.
2. Provide an overview of advertising planning and brand positioning.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define integrated marketing communication and advertising management.

CO2: Describe and apply various aspects of advertising such as ad campaigns, celebrity endorsement and embedded advertisements to create advertisements.

CO3: Describethe working process of advertising agencies and evaluate advertising effectiveness.

CO4: Describe social and regulatory aspects of Advertising such as ASCI code of advertising practice and ethics in advertising.

Modules	Blooms level*	Number of hours
MODULE 1: Advertising Management Communication Basics: Communication and marketing; Communication process; Communication response hierarchy models; Cognitive processing of communication; EKB model; Marketing communication mix; Integrated marketing communication – an introduction; Advertising - Its importance and nature; Advertising and publicity; Advertising management process; Advertising	L1, L3	14

objectives; DAGMAR Approach; Determination of Target Audience and positioning; Advertising budget – factors influencing budget decision and methods.		
MODULE 2: Advertising Message and Media Decisions Creativity and advertising; Creative process; Creative appeals and execution styles; Developing advertising copy for print ad - headline, body copy, logo, illustration and layout. Media Decisions – Types of media, Advertising through Internet and interactive media; Developing media plan; media selection and scheduling.	L1, L3	16
MODULE 3: Organization and Evaluation of Advertising Efforts Centralized and decentralized systems; In-house agency arrangements; Advertising agencies – selection, compensation and appraisal of advertising agency; managing advertising agency relations; IMC services; Reasons for evaluating Advertising Effectiveness; Advertising testing process - Before and after advertising tests and techniques.	L1, L3	12
MODULE 4: Advertising in India Social and regulatory aspects of advertising in India. Recent developments and issues in advertising, ASCI Code of Advertising Practice, Ethics in Advertising.	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Jaishri N. Jethwaney (1999). *Advertising*, New Delhi, Phoenix Publishing House Pvt. Ltd.
2. Chunawalla, S.A. &Sethia, K.C (2002). *Foundation of Advertising Theory & Practice*, 7th ed., Himalaya Publishing House.
3. David Ogilvy (1985). *Ogilvy on Advertising*, 1st ed., New York, Vintage Books: A Division of Random House.
4. Rathor, B. S. (2003). *Advertising Management*, 11th ed., New Delhi, Himalaya Publishing House.

Reference Books

1. Batra Rajeev, John G Myers & Aaker David A. (1995). *Advertising Management*, 4th ed., New Delhi, Prentice Hall of India.
2. Frank Jefkins (2003). *Advertising*, Macmillan India Limited.
3. J. Thomas Russell (2008). *Advertising Procedure*, 17th ed., Pearson Prentice Hall

4. Lewis Herschell Gordon (1994). *The Complete Advertising and Marketing Handbook*, Chennai, East West Books (Madras) Pvt. Ltd.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

ExaminationScheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	1	2	--	--
CO2	1	1	--	--	--	--	--	1	2	--	--
CO3	1	1	--	--	--	--	--	1	2	--	--
CO4	1	1	--	--	--	--	--	1	2	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2102	Computer Graphics & Animation	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Basic Knowledge of Computer Interface				
Co-requisites					

Catalog Description

This unit will give students a broad knowledge of the basics of computer usage in publication houses. How to work with computers, what are the design software? Students will study the design and layout of pages, taking into consideration the choice of typeface and positioning and choice of color, images and text. Their work will include practical projects as well as investigations into current design and editing practices in a variety of print forms.

Course Objectives

The objective of this course is to

1. Give the better understanding of computer applications.
2. Learn desktop publishing concepts.
3. Learn how to create a magazine, catalog and documents with better formats.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the interface of basic computer application.
CO2. Create books, magazine designs and other documents with good layout.
CO3. Describe the digital production flow of a magazine.

Course Content

Modules	Blooms level*	Number of hours
Module I: Basics of Computer Hardware/Software, Input devices/ Output devices. Windows, MSOffice: - Ms Word, Ms Power Point, Networking: - Lan, Wan concept.	L1,	12

Module II: Desk Top Publishing What is DTP (Desk Top Publishing)? How it is linked with computers. Newspaper, Magazine, Book publishing is part of DTP. Software: page design packages (e.g. Adobe PageMaker, Adobe Indesign. "InDesign is a newer version of PageMaker") to be used for design and layout purposes, text: generation and preparation for use, display, digital typesetting, editing, creation of headlines using appropriate font, creation of pages, importation and movement of copy and images, selection and cropping of photographs and graphics, use of text wrap, anchored graphics and rules, various palettes, master pages, Animation templates etc.	L1,L3	24
Module III: Graphics Creation Creating graphics in tools like Adobe Photoshop. Understanding the raster graphics. Editing images using tools like colour correction, highlights, white balance, levels and contrast. Exporting graphics in different formats like JPG, PNG, PDF, etc. Creating graphics for magazine, promotion, information, documentation, etc.	L3,	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. M.C. Sharma (2003). *Desktop Publishing on PC*, Delhi: BPB Publications.
2. Adobe Creative Team (2019). *Adobe InDesign CC Classroom in a book*, Adobe Press

Reference Books:

1. Daryl & Moen (2000). *Newspaper Layout & Design, US:* Iowa State Press
2. P K Sinha (2004). *Fundamental of Computer*, Delhi: BPB Publication

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

ExaminationScheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	1	--	--	--	--	--	-	1	--	--
CO2	-	1	--	--	--	--	--	-	1	--	--
CO3	-	1	--	--	--	--	--	-	1	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2103	UNDERSTANDING MASS COMMUNICATION	L	T	P	C
Version	2021	2	1	-	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Students will be introduced to the basic aspects of human communication and especially mass communication. Mass Media industries have developed in unprecedented ways and they have been discussed systematically by thinkers so that we can make sense of how they influence the society and vice versa. While in other subjects, students will learn about contemporary forms, in this course they will also be introduced to the traditional modes of communication in India. With this basic grounding in place, students will be able to evaluate mass media within a wider context. They will be taught by using various teaching aids such as case studies, practical exercises, class presentations, screenings, and readinggroups

Course Objectives

The objectives of this course are:

1. To understand the concept of MassCommunication.
2. To analyze the elements involved in the process of MassCommunication.
3. To evaluate the significance of Mass Communication as a media forBroadcasting.
4. To assess and examine characteristics of different kinds of media and its applicationto the contemporarysociety.
5. To criticize prevailing theories of Mass Communication and establishingtheir significance to the presentworld.

Course Outcomes

On completion of this course, the students will be able to

CO1. Interpret various elements and forms of communication and determine its significance into human lives as an integral part of it.

CO2. Identify different forms of traditional Media as a tool of Mass Communication and analyze its future challenges along with limitations in relation to contemporary societal needs.

CO3. Distinguish various theories of Mass Communication around development, and assessing its interrelation to culture, behavior change, social transformation and; human rights principles during different eras in comparison to present.

Modules	Blooms level*	Number ofhours
MODULE 1: Introduction to Communication Process and elements of communications, Levels of communication, Barriers to effective communication, Future of communication studies, Forms and Functions of communication	L1, L2, L4	12
MODULE 2: Traditional Media Introduction to traditional media, Oral Tradition of story-telling since early civilization Influence on contemporary forms of mass communication, Types: street theatre, puppetry, music, dance/ballads, folk and tribal art, local fairs, Case studies of each form Strengths and limitations, Relationship with the society: tool for political, social, economic, and health awareness, Present Scenario	L1, L4	12
MODULE 3: Understanding Mass Communication Definition and forms of mass communication, Growth of mass media in India, History of Western mass media, Four eras in mass communication theories, Era of mass society theory (1850-1940), Era of scientific	L1, L3, L4, L5, L6	12

perspective on mass media (1940-1950), Era of limited effects (1950-1960), Era of cultural criticism (1960-1980), Ongoing Debates about mass media		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Mc Quail, Denis (2005). Mc *Quail's Mass Communication Theory*: New Delhi, Sage Publications.

Reference Books.

1. Stanley, J Baran & Dennis, K Davis (2002). *Mass Communication Theory: Foundations, Ferment, and Future*: Singapore, Thomason Asia PvtLtd
2. N, Andal (2005) *Communication Theories and Models*: Bangalore, Himalaya Publishing House.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**P**	**CT**	**H**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance, P: Project

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**

CO1	1	2	2	3	-	2	1	1	3	2	1
CO2	2	1	1	2	2	3	1	1	3	2	2
CO3	1	1	2	2	2	1	1	1	3	2	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2104	INTRODUCTION TO VISUAL COMMUNICATION	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

In this subject we will look at the practices of visual communication design as a distinct discipline from other forms of visual arts. We will discuss the purposes, approaches and role of visual communication in our everyday life, and the common misconceptions. It explores the different levels on which a piece of visual communication could be viewed and read, through analyzing of sender and receiver processes. We will examine the design process, looking at how a designer typically approaches a design problem and how he/she thinks. These issues will be discussed through the perspective of a design educator, based on a student-centered approach to studio learning. The discussions will be supported by examples of design briefs, student projects, teaching approaches and assessmentmethods.

Course Objectives

Course Objective: Seeing comes before words. We learn to see and recognize before we learn to speak. When we grow older as adults, the way we see things is affected by what we know and what we believe. Visual communication applies the fundamentals of major art forms for professional problem-solving. It is the conveyance of ideas and information in forms that can be read or looked upon. This unit will introduce students to the history, forms, elements, theories, meaning, and principles of visual communication. Students will be given basic grounding through conventional classes and practical exercises in the form of scrapbooks so as to prepare them for undertaking the remaining courses in BA (J&MC).

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Know about the Picture mapping process

CO2: Describe the utility of Visual forms sign and symbols.

CO3: Explain the production process of visual identity.

CO4: Explain the impact of Visuals for a successful communication.

CO5: Developing the scene of visual media reading representation and relation building for the society.

Modules	Blooms level*	Number ofhours
MODULE 1: Introduction to Visual Communication Defining an image and visual communication (VC) VC as integral part of human communication Human Vision and 2 dimensional images Human beings have highly developed seeing rather than hearing abilities Historical trends and developments: from painting to installation art, from naturalism to impressionism to neo-realism, high-art and low-art, role of visual technologies, debates related to art and social reality Science, Human beings, and Visual Information: how human body receives information: senses, brain, stimuli, heart, and body parts.	L1, L2	10
MODULE 2: Basics of Visual Communication Some Fields: chemical imaging, data, information, software, volume, and product visualization, technical drawing etc Some Image Types: computer graphics, map, pictograph, photograph, moving image, table, drawing, diagram, ideogram, illustration, etc Contemporary applications: cartography, spatial analysis, graphics, visual perception and analytics, advertising, politics, entertainment, business etc Medium: digital, paper, electronic, electrical, web Elements: line, shape, colour, space, form, depth, texture, light & shade, dimension, grey-scale, interactions of elements, continuity, and & proximity etc Principles of design: contrast, harmony, proportion, balance, and movement	L1, L3	14
MODULE 3:Power, Visual Representation & Society Human beings and visual information processing mechanism:registering selected information, processing thoughts and feelings, storing information and acting or speaking according to the information processed and stored. Gestalt and constructivism, which are sensual,are early theories that explain the mechanics while semiotics andcognitive,	L1	11

which are perceptual, are more advanced modern theories that involve signs, intellect, and the mind Consumer culture (from 19th-21st century) & growth of VC: changes in ways of seeing, ways of being seen & ways of telling Concept of gaze: desire, voyeurism, critique of male gaze, and interactive gaze, masculine and feminine identities Experience of images (signs: indexical, symbolic, and iconic), context in which images are interpreted (medium, form, socio-economic dimensions) and ways in which they are interpreted (cliché, stereotype, convention) Politics of representation of mediated images: video's sensation, dreams, and manipulation; film's logic and rhetoric; advertising image's shock and seduction; political image's public image, public relations, and propaganda; and media image's persuasion and violence Examination Scheme:		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

1. Barry, Ann Marie (1997).*Visual Intelligence: Perception, Image, and Manipulation in Visual.*
2. Louis,Smith Kenneth (2005).*Handbook of Visual Communication- theory methods and media, Routledge,*London.

Reference

1. Sturken, Marita & Cartwright, Lisa (2001).*Practices of Looking: An Introduction to Visual Culture,* Oxford UniversityPress.

2. Hall, Stuart (1997).*Representation: Cultural Representations and SignifyingPractices*, Open University Press/sage Publications:London.

3. Berger, John (1972). *Ways of Seeing,* Penguin and BBC,London.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	2	1	--	--
CO3	2	1	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	2	1	--	--
CO5	1	--	1	1	1	2	--	1	1	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2105	INTRODUCTION TO CULTURE & SOCIETY	L	T	P	C
Version	2021	2	1	-	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Before stepping out into the field of mass communication and journalism, studentsneeds to have basic knowledge, curiosity, and awareness of politics, history, economics, and society. Various teaching methods and streams will be to make the students aware of contemporary issues so that they not only have opinions but also can intelligently analyze them from a broad perspective. Classes will be conducted in interesting and interactive ways where examples will be drawn from real life situations.

Course Objectives

The objective of this course is to

1. Differentiate between culture andsociety.
2. Distinguish between biological and cultural explanations of humanbehavior.
3. Compare and contrast cultural universalism, cultural relativism &ethnocentrism.
4. Examine the policy of multiculturalism as a solution to the problem ofdiversity.
5. Understand the basic elements of culture: values, beliefs, andnorms.
6. Discuss the distinction between high culture, pop culture, and postmodern culture.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Describe and analyze the historical background of India Pre and Post Independence.

CO2. Building an understanding of Indian Constitution and Polity and establishing a sense of analyzing issues in broader sense.

CO3. Equip students with a broadly-based knowledge of the operation of the national and world economicaffairs and associated organizations.

0CO4.Demonstrate and volunteer for national development with the ability to debate and suggest solutions to national social issues.

CO5. Analyze guiding parameters of national and global science and technology policy.

Modules	Blooms level*	Number ofhours
MODULE 1: (History) What do you know of Indian history? Main periods in Indian history Stories of some main events & personalities Colonial Rule Struggle for Independence Modern Independent India Division of States and the ongoing debates on autonomies of state Post-Liberalization India	L1, L3	9
MODULE 2: (Politics) Parliamentary, Presidential, and Monarchy Single party, two party and Coalition Governments Federal and Centralized System 3 wings of the Government: Judiciary, Legislation, and Executive Chief national personalities figuring in current news Bi-polar and uni-polar world after fall of communism Chief international personalities figuring in current news International debates in the media in last 5 years Role of UN umbrella over past 10 years	L1, L3	6
MODULE 3: (Economics) India a mixed economy –feudalism, socialism, and capitalism Industrial and agricultural economies Developing, Developed, and Under-Developed economies	L1,L3	8

Role of Private and Public Enterprise in the economy Role of Banks: RBI, World Bank, Asian Development Bank Regional economic groupings and their functioning The European Union and its expansion World Economic Forum Indian Economy: Growth Patterns		
MODULE 4: (Society) What is Globalization and its cultural impact Global warming and environment Naxalism and Marxism Family, marriage, and gender relationships Cultural shifts in Indian society Urbanization & migration Reservation & Positive Affirmation New Age Spiritualism/ Health Growth of Entertainment Industry Shifts in the Indian Sports Scenario **The New Normal Post-Covid World**	L1, L3	8
MODULE 5: (Science and Scientific Temper) Nanotechnology Latest developments in bio-technology Nobel Prizes in Science Debates on Cloning Debates on Nuclear Non-Proliferation Criminalization of politics Modern day debates on War and warfare	L1, L3	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Hodkinson Paul (2011).*Media, Culture and Society*, London: Sage PublicationsLtd.

2. David Oswell (2006).*Culture and Society: An Introduction to Cultural Studies*, London: Sage PublicationsLtd.

Reference Books

1. Hodkinson Paul (2017).*Media, Culture and Society: An Introduction*, London: Sage Publications Ltd.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	--	3	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2106	NEWS AND CONTEMPORARY ISSUES	L	T	P	C
Version	2021	2	1	-	3
Pre-requisites/Exposure	General understanding of news and current affairs				
Co-requisites					

CatalogDescription

The course helps students understand different social, economic and political issues and policies and their implications and impact on society. The study concentrates on and analyses the latest happenings in the national and international arena as well as world organizations. The students discuss and debate contemporary national and global social and political issues facing the world and the Indian polity.

Course Objectives

- To equip students with a broadly-based knowledge of the operation of the national and worldaffairs;
- To develop a comparative analysis of new ideas and different policies and international relations;
- To understand, analyze and debate why countries clash; equip students with the concepts and functioning of national and world organizations, their growth and progress as well as internationalunderstandings;
- To develop in students a critical awareness of various media available for reporting;and
- To understand and debate guiding parameters of national and internationalpolitics.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Critically identify the basic structure of the world polity and prevailing issues.

CO2: Write, design and communicate clearly through different media to convey socially and politically significant stories about India.

CO3: Equip students with a broadly-based knowledge of the operation of the national and world economicaffairs and associated organizations.

CO4: Analyze guiding parameters of national politics of India.

CO5: Demonstrate and volunteer for national development with the ability to debate and suggest solutions to world problems in the area of science and technology.

Modules	Blooms level*	Number ofhours
MODULE1:INTERNATIONALSCENE Daily international news, background stories, chief personalities involved, events' relevance, significant actions taken by UN, and conflicting issues and nations.	L1, L2	8
MODULE 2: DOMESTIC ISSUES Daily domestic news, background stories, chief personalities involved, events' relevance, significant bills, acts and Constitutional amendments passed by the Indian Parliament, Supreme Court rulings at least during the last five years.	L1, L2	8
MODULE 3: ECONOMIC ISSUES AND PROBLEMS Regional economic groupings and their functioning, European Union, the World Bank, Asian Development Bank, World Economic Forum, Profile of the Indian economy, Top world economies	L1, L2	8
MODULE 4: DISCUSSION AND DEBATE ON IMPORTANT NATIONAL AND INTERNATIONAL ISSUES AND EVENTS Globalization, Global Warming, Parliamentary and Presidential forms of government, Indian Constitution, International clashes, Criminalization of Politics, Restructuring United Nations, and other relevant issues that get Currency.	L1, L2	6
MODULE 5: SCIENCE AND TECHNOLOGY LEAP Space and planetary probes, US, Russian, Indian, European andChinese Space programs, Nanotechnology, Developments in bio-technology, Nuclear energy and related issues, Nobel Prize awardees and theirwork.	L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Resources:

- Year Book, Publications Division, Government of India
- World EncyclopediaAmericana
- Manorama YearBook

b) AdditionalResources:

- The Times ofIndia
- The HindustanTimes
- TheHindu
- General newspapers reading anddiscussion.

c) Other resources:

https://www.jagranjosh.com
https://blog.feedspot.com › international_relations_blogs
https://www.worldaffairsjournal.com
https://www.un.org › sections › issues-depth › global-issues-overview

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	1	2	1	1	2	2	1	2	--
CO2	1	1	2	2	2	--	--	2	1	2	2
CO3	1	1	2	2	2	--	--	2	1	2	--
CO4	1	2	--	--	--	--	--	2	1	3	--
CO5	1	2	3	3	2	1	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

SECOND SEMESTER

JRN2251	**BASIC PHOTOGRAPHY**	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This unit introduces to the basic techniques of photography and it's applications in Mass Media with specialization in specific area. This course gives an opportunity to the student to get accustomed to this universal language of expression and communication and exhibit their skills to explore, understand the significance and utility of photographs as an effective medium of communication.

Course Objectives

The objective of this course is to

1. Learn to shoot with digital cameras maximizing the quality of theoutput.
2. Appreciate more about the "Photographer's Art" through the study of historic and contemporarytrends.
3. Develop the habit of looking closely at the visible world around you in order to represent it in terms of aesthetics, beauty andtruth.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Operate Cameras in Manual Mode, Zone System, Multiple Exposures

CO2. Demonstrate knowledge of Depth of Field Preview, Lens Compression, Avoiding Lens Distortion, Panoramas,

CO3. Demonstrate knowledge of Lighting ; High-Key Lighting, Rule of Visual Weight, Visual Composition Tools,Colour Management, RAW Workflow,

CO4.Operate Advanced Camera Settings, Dust Specks, Noise, Lens Corrections, Chromatic Aberration, Sharpening, Printing.

Modules	Blooms level*	Number ofhours
MODULE I: Introduction to photography Brief History of photography, Uses of Photography, Principles of Photography Light and its quality, Types of Light, Camera Terminology	L1, L3	10
MODULE 2: Camera Elements of a Camera – view finder, lens,iris, shutter, film chamber, light metre Exposure Modes, Light Metering, Effects of various ISO settings, Lens options, using Shutter Speeds Camera Designs – A. pinhole camera, B. view camera, C. compact camera, D. T L R E. S L R, F. Instant/Polaroid camera, G. digital camera, Exposure control in camera	L1, L3	6

MODULE 3: Still Films & Camera Accessories Film formats & their use Lenses - prime & zoom lens	L1,L3	10

a. angle ofview b. Aperture & f-no. c. Depth of field, how depth of fieldworks d. Depth offocus e. Lens care Cameraaccessories		
MODULE 4: Photography & Darkroom Practical Outdoor Photography Assignments Portfolio and Presentation, Preparing Resume Photography Techniques: Light, Content, and Sharing	L1, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Langford Michael. (2013), *Basic Photography*; Burlington: FocalPress
2. Corbett Bill. (2002), *A simple guide to 35mm photography*,Sydney:4C Publishing Pty Ltd.

Reference Books

1. Stephen G. Anchell (2004). The Darkroom Cookbook; Burlington: FocalPress
2. Naomi Rosenblum (2008).*A World History of Photography*,New York, AbbevillePress.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	--	--	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2201	PRINT MEDIA -- SPECIALIZED REPORTING& FEATURE WRITING	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Print Media – Reporting & Editing				
Co-requisites					

Catalog Description

After introducing the basics of newspaper reporting and editing in the first semester, this course discusses the nuances of specialization in news. The course introduces the concept of beat reporting and also deals with the subtle differences between reporting on politics, business, sports, crime etc. The course also describes the investigative reporting in detail with discussion on relevant case studies. The course also explains the finer points of specialized journalistic writing.

Course Objectives

The objective of this course is to

1. Introduce beat reporting and discuss the finer points of specializedwriting.
2. Explain how reporting is different for various beats like crime, health, education, politicsetc.
3. Provide knowledge regarding investigative reporting and itstools.
4. Provide understanding for different types of journalisticwriting.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe differences and similarities between different journalistic beats.

CO2: Describe and apply various concepts of beat reporting.

CO3: Explain investigative reporting in depth; especially sting operations.

CO4: Apply conceptual knowledge to write different types of features and reviews.

CO5: Argue if sting journalism is a healthy practice in a democracy.

Modules	Blooms level*	Number ofhours
MODULE 1: City Reporting Covering a news beat, coverage of various beats: crime, education, health, civic affairs and local government	L1, L2	12
MODULE II: National Reporting Political reporting(political structure in India, covering political parties/events/rallies/elections), Parliament reporting (Parliament structure, reporting on legislature), covering the government (PIB, ministries), legal reporting (Structure in jurisdiction of courts, reporting court hearings,precautions)	L2, L3	8
MODULE III: Business & Sports Reporting Basic business knowledge and business bodies, corporate reporting, covering economic policy (Ministry of Commerce, Finance, Industry, Company Affairs, and other infrastructure ministries), stock market coverage, how to develop good sports writing skills, covering local, national internal level events		
MODULE IV:Investigative Reporting Definition and elements, tools of investigative reporting, importance of sources, sting operations and latest trends, relevant case studies: Indian and international	L1, L5	9
MODULE IV: Feature Writing How to write a feature, different types of features, book reviews and film reviews	L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

TextBooks

1. Sharma, Seema (2005) *Journalism:Reporting*, New Delhi: Anmol Publications Pvt.Ltd.
2. Fox, Walter (2001)*Writing the News: A Guide for Print Journalists*, New Jersey: Wiley-Blackwell
3. Mencher, Melvin (1989)*Basic News Writing*, U.S.A. : William C. BrownPublication
4. Rajan, Nalini (2007) *21st Century Journalism in India*, New Delhi : SageIndia
5. Rick Wilber & Randy Miller (2002*) Modern Media Wring*, Belmont :Wadsworth PublishingCompany

Reference Books

1. Hough,George A. (1995) *News Writing*, Boston : HoughtonMiller
2. Fink,Conrad C. (2001*) Sports Writing: The Lively Game*, New Jersey : Wiley-Blackwell
3. Keeble,Richard (2001)*The Newspaper Handbook*, Abingdon : Routledge
4. Kamath,MV (2012*) Journalism Reporting*, Noida : VikasPublication
5. Rosenauer,Kenneth L (2004)*Storycrafting: A Process Approach to Writing News*,New Jersey:WileyBlackwell

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

ExaminationScheme:

Components	**H**	**C**	**CT**	A	**EE**
Weightage (%)	5	5	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	1	1	2	--	1	--	1	--
CO2	2	2	2	1	1	2	--	1	--	1	2
CO3	2	1	1	1	1	3	2	1	--	2	3
CO4	--	1	--	3	2	2	--	1	--	1	2
CO5	3	2	1	1	1	--	3	1	--	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2202	ELECTRONIC COMMUNICATION: RADIO & TV	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The basic concepts and fundamental elements of Radio and TV production will be introduced to the students in this unit. The working mechanism of Video camera, principles of composition, need and role of lighting will be discussed and practically demonstrated. The purpose of the whole exercise is to familiarize the students with the broadcast equipment and inculcate in them the creative techniques to use them. This unit will also focus on enhancing the writing skills of the student. Writing being an integral part of journalism, the students will get an opportunity to write for various mediums and genres.

Course Objectives

The objective of this course is to

1. Equip students with concepts of creative fields involved in electronicmedia
2. Provide an overview of TV and Radiojournalism.
3. Familiarize the students with the broadcast equipment and inculcate in them the creative techniques to usethem

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Detail establishment of Electronic media as a medium of communication.

CO2. Demonstrate usage of audio equipments.

CO3. Demonstrate use of video camera and Lighting

equipments.

CO4. Plan production steps for a TV & Radio programme.

CO5. Practicing Script Writing for Radio and Television

Program Production.

Modules	Blooms level*	Number ofhours
Module I: Introduction Electronic Media as a Medium of Mass Communication Characteristics of Electronic Communication Growth and Development of Electronic Media in India Public v/o Private Broadcasting Status of Radio and Television in India	L1, L3	5
Module II: Basics of Sound Basics of sound: frequency, amplitude, wavelength Radio frequencies: AM and FM transmission General audio and sound microphone techniques Types of microphones Construction of microphones Positioning of microphones Mixers Considerations in Indoor and Outdoor recording Common audio problems Importance of speech (or human voice) in broadcast media Voice modulation Sound effects and its functions Importance of music & background score in visual imagination Various Kinds of Audio Studios	L1, L3	7
Module III: Basics of Camera and Lighting Working of the camera Types of camera Camera Mounts Camera accessories Camera movements, shots & angles Camera Care	L1,L3	9

Principles of composition *and visual grammar* Difference between multi-camera and single camera set up Videotape Formats – *S-VHS, VHS, U-matic, Betacam&Betacam-SP, MINI-DV*, DVCAM, DVC PRO, HD Difference between natural and artificial lighting Use of natural light and reflectors Factors that influence lighting needs Bouncing light Studio lighting instruments: Types of lights Basic lighting set up: Three point lighting Technical: - Color Temperature, Light intensity, *Filters* Lighting tips Taking Care of Lights and Yourself		

MODULE 4: Production Pre-Production: Planning for the production Idea generation Research: location, budget, people, access, permission, insurance, resources, Set designing: floor plan etc. Formats of Radio Programs: News bulletins, live talk shows, Interviews, Radio features, Radio Documentaries, Jingles, RadioPlays, Commentaries and magazines, Music Countdown, Music Reviews, Phone-ins, Commercials Formats of Television Programs Production: Process and Execution Post-Production Terminology	L1, L5	9
MODULE 5: Writing for Radio & TV Basics of Writing for Electronic Media Differences between writing for radio, TV Writing for different formats of Broadcast Media Conventions of Writing Writing for Radio - Writing for the Human Ear and Imagination Writing Script for different genres of Television: Writing and Thinking Visually	L1, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Donald, Ralph & Spann, T (2000), *Fundamentals of Television Production;Lowa:Lowa state universitypress.*
2. Herbert Zettl.(2014), *Television Production Handbook*; California, Wadsworth Publishing.

Reference Books

1. Dr. Bradley E. Schultz. (2004) *Broadcast News Producing,NewDelhi,sagepublications.*
2. David Keith Cohler. (1993),*Broadcast Journalism: A Guide for the Presentation of Radio and TelevisionNews,UP*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	--	--	--	1	2	1	2	--
CO2	1	1	--	--	--	--	1	2	1	--	--
CO3	1	1	--	--	--	--	1	2	1	--	--
CO4	1	1	--	--	--	--	1	2	1	--	--
CO5	1	--	1	1	1	2	1	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2203	MEDIA PLANNING AND BUYING	L	T	P	C
Version	2021	2	1	-	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course comes under an interdisciplinary domain which describes various concepts of media planning and media buying. It includes marketing and negotiation skills and concepts of selection of media mix and substantial marketing and advertising research etc. The aim of the course is to explore various creative fields involved in the placement ofadvertisements.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of creative fields involved in media planning and buying for advertisements.
2. Provide an overview of the process of selecting and buying of media mix for the placement of advertisements.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe media planning and select the media mix.

CO2: Describe and distinguish various media forms.

CO3: Select and apply research data to develop media strategy process.

CO4: Apply software to create media plans and schedules.

Modules	Blooms level*	Number ofhours
MODULE 1: MEDIA PLANNING Introduction to Media Planning (MP), Defining Media Planning, Objectives of MP, Importance of MP in the current scenario, Developing Media Strategy- the Media Mix, Factors influencing media strategy decisions.	L1, L2	10
MODULE 2: MEDIA: AN OVERVIEW Media types characteristics of major media forms, Internet- the big medium, ATL & BTL Media, Electronic Media, Outdoor Advertising, and Transit Advertising.	L1, L2	6
MODULE 3: MEDIA PLANNING PROCESS Matching Media & Market- Geographical Selectivity, Reach & Frequency, Media Briefing, Media Scheduling, Media Plan & Strategy Development Process, Media Budgeting (Traditional &Modern Methods), Media Buying Functions, New Trends in Media Buying.	L2, L3	10
MODULE 4: MEDIA PLANNING SOFTWARE Online Media Monetization Online Media Targeting Online Analytics AD Formats IRS, TAM, MAP, RAM, AdEx	L3, L5	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Croteam, David; Hoynes, William D (2005). The Business of Media. CorporateMedia and the Public Interest. SAGE Publications,Inc.
2. Albarran, Alan B (2002). Media Economic (Understanding markets, Industriesand Concepts).Wiley-Blackwell.
3. Kelley Larry D, Jugenheimer Donald W, (2009).Advertising Media Planning: ABrand Management Approach. PhiLearning.
4. Jack Z. Sissors, Roger B. Baron, (2010). Advertising Media Planning, Tata McgrawHill Education PrivateLimited.

Reference Books

1. Menon, Arpita; (2010).Media Planning and Buying. Tata Mcgraw Hill EducationPrivate Limited.
2. Katz, Helen; (Jun 2010. The Media Handbook: A Complete Guide to Advertising Media Selection, Planning, Research, and Buying.Routledge.
3. Sissors, Jack Z., Goodrich, William B. (1996). Media Planning Workbook,McGraw-Hill Humanities/SocialSciences/Langua.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**P**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; P: Project

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	2	2	1	--
CO2	1	3	--	--	--	--	--	--	2	1	--
CO3	2	1	--	--	--	--	--	--	2	1	--
CO4	2	1	--	--	--	--	--	--	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2230	READINGS IN MEDIA	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The objective of this concentration elective on readings in media is to inculcate analytical bent of mind in students. This will also encourage reading habit along with value addition to the existing understanding of the subject. The exercise will help media students not only develop understanding of different important issues but also give an insight into content handling. Critical analysis of different genres of write ups would help broaden the intellectual horizon of the student.

Course Objectives

The objective of this course is to

1. Develop reading habits and inculcate analytical bent of mind instudents.
2. Provide power of critical analysis of different genres of writeups

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and analyse information and relevance of the issue in detail.

CO2: Criticize and write thematically correct content with unique writing style.

Modules	Blooms level*	Number ofhours
MODULE 1: Methodology The student shall be given high quality news articles, editorials and relevant national/international stories from newspapers and newsmagazines. He/she shall be required to critically review the same in terms of content, media handling and content presentation etc. The student may also be asked to critique any non-fiction book. The given assignments are required to be submitted in the form of reports. He/she will be assessed on the basis of the assignment reports and viva voce. In order to earn the credits, the student will be required to submit reports on thefollowing: Book Review (1) Editorial (1) News articles published on the edit page of a national/international daily (2) Cover story of a national/international newsmagazine (1) The report submissions will be followed by viva voce by a panel of 2 faculty members. The guide will be allocated to the students for discussion and approval of books and submission of required reports.	L1, L2, L3, L4	No Contact Hours

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

According to the chosen area.

Reference Books

According to the chosen area.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

The student will be required to submit Five asignments in all as per the details mentioned above. Each assignment will carry equal marks (20 marks each) The marks break up for each assignment will be as follows:

Components	**Written Reports**	**Viva Voce**
Weightage (%)	15	5

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	--	1	--	2	--
CO2	1	1	1	--	--	--	--	1	--	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2232	PROJECT (with Presentation & Evaluation)	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description

This concentration elective will help the student develop a critical and analytical eye when it comes to understanding issues/trends related to media. It will provide a platform to the student to interrogate and review various media concepts. The live project will help in giving hands-on training to the communication students.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to work on an industry-oriented/researchproject.
2. Provide a platform to the students to develop their research skills and itsapplication.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and apply skills on real research problems.

CO2: Assess and develop a solution to research problems.

CO3: Select the appropriate field for himself/herself in the media industry.

Modules	Blooms level*	Number ofhours
Major Themes for Project The project may be based on any of the following major media streams: 1. PrintMedia 2. ElectronicMedia 3. Advertising 4. EventManagement 5. Corporate Communication & PublicRelations 6. BrandManagement 7. NewMedia 8. Photography **Guidelines for Project** It must be based on either Industry or Research. The student will work under the guidance of a Faculty Guide that will be assigned by HOI. Student can choose topic as per his/her area of interest under the guidance of the Faculty guide. The student may also choose to undertake a live project in any of the major media streams. **Project Report/Portfolio: 75 Marks** Before the end of the semester, the student will be expected to submit a project report. The project report shall have the following components. Title page Index Introduction Industry Overview Objectives Methodology Findings Conclusion Annexures (questionnaires, if any)	L1, L3, L5, L6	No Contact Hours

Bibliography In case the student undertakes a live project, he/she will have to submit the portfolio instead of the project report. The portfolio will carry 75 marks. **Presentation & Viva: 25 Marks** Student will make a presentation (based on Project Report) and it will be followed by a Viva Voce in front of a Panel of one internal expert and one external expert. **The Steps of a Project Report** **STEP I:** Selection of the topic for the project by taking following points into consideration: Suitability of the topic,Relevance of the topic, Time available at the disposal, Feasibility of data collection within the given time limit, Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.) **STEP II**: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor. **STEP III**: Collection of information and data relating to the topic and analysis of the same. **STEP IV** : Writing the report dividing it into suitable chapters **STEP V**: The following documents are to be attached with the Final Project Report. • Approval letter from the supervisor(Annexure-IA) • Student's declaration(Annexure-IB) • Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation /Institution. **Guidelines for evaluation:** • Each of the students has to undertake a Project/Live Project individually under the supervision of a teacher and to submit the same following the guidelines statedbelow.		

• Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hardbound. • Failure to submit the Project Report/Portfolio or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report/Portfolio and appear at the Viva-Voce Examination in the subsequent years (within the time period as per UniversityRules). • No marks will be allotted on the Project Report/Portfolio unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report/Portfolio. • Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation:

Chapter Scheme and distribution of marks (for Project Report):

Chapter 1: Introduction with statement of objectives, limitations of the study & hypothesis – 10

Chapter 2: Literature Review/Conceptual Framework/ National/International Scenario – 20 M

Chapter 3: Research Design – 10 marks

Chapter 4: Findings& Results -- 20 marks

Chapter 5: Conclusion & Recommendations -- 10 marks

Chapter 6: Bibliography -- 05 marks

Examination Scheme:

Components	**Project Report**	**Power Point Presentation & Viva**
Weightage (%)	75 Marks	25 Marks

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2236	MEDIA PRODUCTION PORTFOLIO	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This subject is an attempt to inculcate professional writing skills and knowledge in flowering buds of the media department. The subject will give hands on experience on different aspects of media writing to the students. The students may choose the option of this subject from their concentration electives.

Course Objectives

The objective of this course is to

1. Equip the students with the hand on experience on different aspects of mediawriting.
2. Provide an overview of different zones of technical writing skills in mediaindustry.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and review media writings.

CO2: Write and Summarize methodologically in media industry.

Modules	Blooms level*	Number ofhours
MODULE 1: Major Areas of Writings The Media Production Portfolio has the following topics for writing: No. of items PressRelease 1 Feature 2 Editorial/Article 1 NewsStory 2 NewsAnalysis 1 AdCopy (TV/radio/print) 1 Letterto Editor 2 MovieReview 1 **Guidelines for Media Production Portfolio:** The following procedure should be followed for the credits: 6. Thorough reading of relevant study material andreferences. 7. Students will choose the current topics for every area ofwriting. 8. Students will discuss the topics with the guide and will take the approval. 9. Students will use the formal writing pattern i.e. 12 font size, 1.5 line spacing and Times NewRoman. 10. Students will have to make proper formal document thatincludes • TitlePage • Table ofContents • Acknowledgement • Writeups	L1, L2, L3, L6	No Contact Hours

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

10. Ganesh T. K. (2008). *Essentials of Mass Media Writing*. AuthorsPress.
11. Schement, Jorge Reina (2002). *Encyclopedia of communication and information.* USA, MacmillanReference.
12. Filak Vincent F. (2018). Dynamics of Media Writing: Adapt and Connect, 2nd edition. CQPress.

Reference Books

10. Fink,Conrad C. (2001*) Sports Writing: The Lively Game*, New Jersey : Wiley-Blackwell
11. Keeble,Richard (2001)*The Newspaper Handbook,* Abingdon : Routledge
12. Kamath,MV (2012*) Journalism Reporting,* Noida : VikasPublication
13. Rosenauer,Kenneth L (2004)*Storycrafting: A Process Approach to Writing News*,New Jersey:WileyBlackwell

Examination Scheme:

Components	**Complete Work**	**Creativity**	**Relevance**	**Clarity**	**Comprehensiveness**	**Originality**	**Presentation**
Weightage (%)	10	15	15	15	15	15	15

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	2	2	--	--	2	1	2	--
CO2	1	1	--	2	2	--	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

THIRD SEMESTER

JRN2351	TV JOURNALISM	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Electronic Communication				
Co-requisites					

Catalog Description
Students will comprehend Television Journalism better. The basic attributes and skill set needed to pursue a television journalistic path will be learnt and tested. The subject will focus on a lot of hands on training in the studio and outdoor

Course Objectives:

- To learn, illustrate and apply journalistic skill sets fortelevision.
- Differentiate, interpret and apply the nuances of outdoor and indoor shoot in a television news story..
- Assess the functioning of a TVstation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend and apply the essentials of live reporting.
CO2: Create a television news story in a team.
CO3: Relate to the hierarchy and functioning of a television news organization
CO4: Critically assess and analyze feature and hard news programme.

Course Content

Modules	Blooms level	Number of hours
Module I: Basics of TV journalism Qualities of TV journalist, developing sources of news gathering, Process of a news report from the idea till its final implementation, Precautions during reporting, live reporting and presenting the final story Different styles of functioning for different beats. Basic Interview Skills: different types of interviews, approach, arrangements, research. Stages of production: pre, shoot and post.	**L1,L2, L3**	**12**

Module II: Functioning of a TV organization Modern TV newsroom: Input/output and Assignment Desks. Hierarchy of a TV set up, Television Personnel – director, floor manager, audio technician, controller, cameraman, Role of a producer, Technical Process of news from initial stages to telecast. Working process involved during live bulletin and recorded programme, Role/ contribution of each department and personnel, Hierarchy of a news organization Professional terminologies.TV news production desk and its functions.PTC: Opening, bridge and closing	**L1,L2**	**12**
Module III: TV Tools, Reporters and Production Different types of PTC, OBs, Facing the Camera, Team members and their role. Single and multi-camera shooting. Shooting for fiction and non-fiction. Process and elements of EFP (Electronic Field Production) and ENG (Electronic News Gathering). OB (Outdoor Broadcast) Van, Satellite Phone. News Production & News Transmission.	**L3, L6**	**12**

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Schultz, B., (2005). *Broadcast News Production*, (London), SAGEPublications
2. Zettl, H., (2009). *Television Production Handbook*, WadsworthPublishing
3. Boyd,A.;Stewart,P. &Alexander,R., (2000). *Broadcast Journalism*,(London)FocalPress.

ReferenceBooks

1. Belavadi,V. (2013). *Video Production*, New Delhi,OUP.
2. Cohler, D. K.(1985). *Broadcast journalism: A guide for the presentation of radio and television news*, Prentice Hall

3. Gormly, E. K.(2010). *Writing and Producing Television News*,(London) Wiley-Blackwell

Examination Scheme:

Components	**H**	**P**	**CT**	**A**	**EE**
Weight age (%)	5	10	10	5	70

H-Home Assignment, P- Project, CT- Class Test, A- Attendance, EE- End Semester Examination

Course Mapping CO, PO, PSOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		**1**							**1**		
CO2	**1**	**1**							**1**	**2**	
CO3			**1**						**1**	**2**	
CO4						**1**			**1**		**2**

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2301	MASS COMMUNICATION RESEARCH - I	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This Course would give students an understanding of Basic Research and its importance. It would give them a basic knowledge about the concepts of research.

Course Objectives

The objective of this course is to

1. Familiarize students with ethical issues in educational research, including those issues that arise in using quantitative and qualitativeresearch.
2. Explain primary characteristics of quantitative research and qualitativeresearch.
3. Train students in developing a researchproblem.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Explain understanding of basic research concepts

CO2. Examine research problems and apply methods of research design

CO3.Select right samplingfor a research problem

CO4.Demonstrate knowledge of measure and scaling techniques

CO5. Apply statistical tools for data analysis for quantitative and qualitative studies.

Modules	Blooms level*	Number ofhours
MODULE 1: An Introduction to Research Research: Meaning and definition, objectives of research Types of Research – Basic & Applied Research Qualitative & Quantitative Research Significance of Research, Criteria for a good Research Problems encountered by researchers in India.	L1, L3	10
MODULE 2: Research Problem & Research Design Defining the Research Problem Selection of a problem Techniques involved in defining a problem Research Design: Meaning, definition & need of a research design. Research designs used for different types of Research	L1, L3	6
MODULE 3: Sampling Sampling: Definition & need, concept of population, sample & its characteristics, sample size & sample unit. Census & Sample Survey, steps in a sample design Criteria for selecting a sampling procedure. Types of Sampling Designs : Probability Sample & Non Probability Sampling & its further types.	L1,L3	10
MODULE 4: Measurement & Scaling Techniques Measurement in Research, Measurement Scales Nominal, Ordinal, Interval & Ratio Scale Sources of Error in Measurement, Scaling: Meaning of scaling Important scaling techniques: Rating Scales, Arbitrary Scales, Differential Scales (Turnstone-type-scales), Summated (Likert Scale) Cumulative scales & Factor Scales.	L1, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Kothari. C.R. (1990), *Research Methodology*, New Delhi: New agePublishers.
2. Deepak Chawla and NeenaSondhi.(2016),Research Methodology: Concepts and Cases: Concepts &Cases, New Delhi:Vikas PublishingHouse.

Reference Books

1. Kothari. C.R. (1990), *Research Methodology: Methods and Techniques*,New Delhi: New agePublishers.
2. Ram Ahuja.(2001),*Research Methods*, New Delhi:RawatPublications

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3		2	--	--	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN 2302	DEVELOPMENT COMMUNICATION	L	T	P	C
Version	2021	2	1	-	3
Pre-requisites/Exposure					
Co-requisites					

Catalogue Description
This course will develop an understanding of developmental issues in the mind of the students and make them understand the importance of the subject. This way they can contribute to the development of the country as future mass communicators.

Course Objectives

The objective of this course is to

1. Provide an overview of development communication concepts and indicatorsof development, theories andissues;
2. Explain the role of mass media in development and designing messages and co-relating different approaches in variedsituations.

Course Outcome
At the end of the course, students develop capabilities of:

CO1.Explain the development issues, theories and paradigms of developmentand problems of underdeveloped and developing economies;

CO2. Describe the relationship between communication and development;

CO3. List the roles of communication and media in the development of societies;

CO4. Describe in historical perspective, key development issues brought about by communicationtechnologies;

CO5. Explain how the media and communication systems bring public attention to critical social issues.

Modules	Blooms level*	Number ofhours
MODULE 1: Concept and Indicators of Development Definition, meaning and process of development, Theories and paradigms of development, developed and underdeveloped economies, MNCs and foreign aid, Basic needs model, Indicators of development, Participation in development.	L1, L2	12
MODULE 2: Development Theories and Issues Diffusion of innovation, Empathy, theory of Magic multiplier, Development support communication, extension approach, Health and welfare, Women empowerment, Watershed management, Participation in development and tacking issues like unemployment, illiteracy.	L1, L2	12
MODULE 3: Media and Development Role of communication in development, message designs, Use of print, radio and TV in national context, Cyber media, Traditional media, NGOs and their role in development, Panchayati Raj, Farming urban sanitation, slum development, working for tribals, Wild Life and forest conservation.	L1, L2	12

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Gandelsonas, C. (2002). *Communicating for Development: Experience in the Urban Environment*. London:ITDG.
2. Kumar,K. (1994). *Communication approaches to participation and development: Challenging the assumptions andperspectives*.
3. White, A. Nair and J, Ashcroft (eds) Participator Communication. London,Sage.
4. Mefalopulos, P. (2008). *Development Communication Sourcebook: Broadening the Boundaries of Communication.* Washington: World BankPublications.
5. Melkote, S.R. (1991) *Communication for development in the third world: Theory and Practice.* New Delhi,Sage.

Reference Books

1. Narula, Uma. (1999). *Development Communication – Theory and Practice*.
2. Har AnandNwosu, P; Onwumechili, C; M'Bayo,R. (1995).*Communication & the Transformation of Society: A Developing Regions Perspectives.* New York:UPA.
3. Rogers, E. M. (1976). *Communication and Development: The Passing of the Dominant Paradigm.* Communication Research, Vol. 3, No. 2, (pp. 213 – 240). Available at http://crx.sagepub.com/cgi/reprint/3/2/213
4. Y.So, Alvin. (1990). *Social Change and Development: Modernization, Dependency, and World-system Theories*. California: Sage
5. Rajasunderam, C.V. (1994). *Participatory development communication: A West African agenda.* Ottawa: International Development Research Centre/Penang, Malaysia: Southbound Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/CasePresentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	1	2	1	1	2	1	2	2	--
CO2	1	1	2	2	2	--	--	1	2	2	2
CO3	1	1	2	2	2	--	--	1	2	2	--
CO4	1	2	--	--	--	--	--	1	2	3	--
CO5	1	2	3	3	2	1	--	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2303	DIGITAL PHOTOGRAPHY	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

After being exposed to the basics of photography in the first semester, the students will be eager to try their hands in the comparatively new area of digital photography and imaging. They will be able to start maintaining their portfolios and will be required to make digital presentations and undertake practicalassignments.

Course Objectives

The objective of this course is to

1. Equip students with the concepts of creativephotography
2. Train students in digital imaging and camerahandling

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Explain the basic technical, aesthetic and expressive concepts of photography.

CO2. Demonstrate competency with a digital photographic work flow by the production of photographs in response to class assignments.

CO3. Describe knowledge digital imaging

CO4.Demonstrates editing techniques for digital image manipulation.

CO5. Apply photographic knowledge to create portfolios.

Modules	Blooms level*	Number ofhours
MODULE 1: Artificial Lighting & its control Nature of Light, Flash and their types. Electronic flash & its synchronization, Effect of one, two & three point lighting system, Symmetrical Balanced Image.	L1, L3	6
MODULE 2: Subject & Composition Variation for various genres Portrait, Product, Wildlife, Nature & landscapes, Night photography,Commercial Photography,Social documentary and Photojournalism, Fashion Photography.How photos are used today.	L1, L3	8
MODULE 3: Understanding Digital Photography Digital Image Construction (Size & Resolution of Digital Images), Representation of digital image: Resolution – Pixel Depth, Uses, Advantages and Limitations of Digital over Conventional Photography Image Sensors (CCD and CMOS), Formats of a Digital Image Types of Digital Cameras	L1,L3	8
MODULE4: Digital Image Manipulation Advantage and Disadvantage of Digital Photographs Exposure: Correct exposure and its determination, exposure meters Types and function, exposure tables. Printing and Sharing Digital Images	L1,L3	8
MODULE 5: Advanced Photography Practicals Practicing Outdoor Photography Photography Assignments and Projects Developing Personal Digital Portfolio Digital Image Manipulation using various computer software	L1,L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Scott Kelby.(2016), *Photoshop Book for Digital Photographers*,San Francisco: Adobe press.
2. Corbett Bill. (2017), *A simple guide to 35mm photography*, San Francisco:Misc.

Reference Books

1. David Taylor.(2015), *Digital Photography Complete Course*, Penguin RandomHouse.
2. David McKay.(2016),*Photography Demystified: Your Guide to Gaining Creative Control and Taking Amazing Photographs*- Penguin RandomHouse.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	1	2	2	1	--
CO2	1	1	--	--	--	--	1	2	2	1	--
CO3	1	1	--	--	--	--	1	2	2	1	--
CO4	1	1	--	--	--	--	1	2	2	1	--
CO5	1	--	1	1	1	2	1	2	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2304	PUBLIC RELATIONS	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The objective of the course is to provide a broad introduction to the principles of public relations practice in India. The course details different facets of public relations in theory and practice in both public and private sectors. It begins with the PR basics and shifts its focus on larger PR dimensions. It teaches techniques of written presentation for a range of specific purposes focusing chiefly on the importance of the overall campaign brief of writing objectives, internal and external communication, issuing statements and press releases, dealing with crisisetc.

Course Objectives

The objective of this course is to

1. Introduce public relations basics to thestudents.
2. Describe how PR industry works inIndia.
3. Explain the nuances of PR writing.
4. Explain how public relations can be effectively used for socialdevelopment.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Explain the basics of public relations.

CO2: Plan a publicity campaign, press conference etc.

CO3: Create PR writing for different stakeholders.

CO4: Explain how PR can be effectively used for social development.

CO5: Review relevant PR laws and talk about the ethical concerns in the profession of public relations.

Modules	Blooms level*	Number ofhours
MODULE 1: Basics of Public Relations Definitions and concepts, Role and Objectives of PR, Public Relations in India, Changing trends in PR, Internal & External PR, Globalisation& PR, and Event& CrisisManagement.	L1, L2	8
MODULE II: Public Relations & Media Affairs Planning Publicity Campaign, Media Relations & Media Planning, Making Press Kit, Organising Press Conference, Advertising & Publicity Campaigns.	L2, L3	12
MODULE III: PR Writing Writing for Press, Press Release, Writing Company Profile, Contents for the Newsletter.	L3	8
MODULE IV: PR for Social Development Public Relations, NGOs & Socio-economic Development, Public Relations in Journalism and Advertising, Public Relations Laws and Ethics.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Centre, Allen H. & Jackson, P (2013). *Public Relation Practices*, US:Pearson
2. Jethwaney, Jaishri& Sarkar, NN (2015). Public Relations, New Delhi: Sterling Publishers
3. Seitel, Fraser P (2016). *The Practice of Public Relations*, US:Pearson
4. Moore, H. Frazier (1985). *Public Relations: Principles, Cases and Problems*, US: Irwin Professional Publishing

Reference Books

1. Bernays, Edward L. (2014). *Public Relations*, US: SnowballPublishing
2. Sachdeva, Iqbal S. (2009). *Public Relations: Principles and Practices*, New Delhi: Oxford UniversityPress
3. Mehta, D S (1980). *Handbook of Public Relations in India*, Delhi: Allied Publishers Pvt Ltd
4. Vilanilam, J V (2011). *Public Relations in India*, New Delhi: SagePublishing

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	2	2	2	3	1	1	2	--
CO2	--	1	1	1	2	1	2	1	1	1	1
CO3	--	1	1	2	2	3	2	--	1	1	2
CO4	2	2	1	1	2	2	3	--	1	1	1
CO5	--	--	2	2	1	2	3	--	1	3	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2330	READINGS IN MEDIA	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The objective of this concentration elective on readings in media is to inculcate analytical bent of mind in students. This will also encourage reading habit along with value addition to the existing understanding of the subject. The exercise will help media students not only develop understanding of different important issues but also give an insight into content handling. Critical analysis of different genres of write ups would help broaden the intellectual horizon of the student.

Course Objectives

The objective of this course is to

1. Develop reading habits and inculcate analytical bent of mind instudents.
2. Provide power of critical analysis of different genres of writeups

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and analyse information and relevance of the issue in detail.

CO2: Criticize and write thematically correct content with unique writing style.

Modules	Blooms level*	Number ofhours
MODULE 1: Methodology The student shall be given high quality news articles, editorials and	L1, L2, L3, L4	No Contact Hours

relevant national/international stories from newspapers and newsmagazines. He/she shall be required to critically review the same in terms of content, media handling and content presentation etc. The student may also be asked to critique any non-fiction book. The given assignments are required to be submitted in the form of reports. He/she will be assessed on the basis of the assignment reports and viva voce. In order to earn the credits, the student will be required to submit reports on thefollowing: Book Review (1) Editorial (1) News articles published on the edit page of a national/international daily (2) Cover story of a national/international newsmagazine (1) The report submissions will be followed by viva voce by a panel of 2 faculty members. The guide will be allocated to the students for discussion and approval of books and submission of required reports.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

According to the chosen area.

Reference Books

According to the chosen area.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

The student will be required to submit Five asignments in all as per the details mentioned above. Each assignment will carry equal marks (20 marks each) The marks break up for each assignment will be asfollows:

Components	**Written Reports**	**Viva Voce**
Weightage (%)	15	5

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	--	1	--	2	--
CO2	1	1	1	--	--	--	--	1	--	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2332	PROJECT (with Presentation & Evaluation)	L	T	P	C
Version	2021	1	-	4	3
Pre-requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description

This concentration elective will help the student develop a critical and analytical eye when it comes to understanding issues/trends related to media. It will provide a platform to the student to interrogate and review various media concepts. The live project will help in giving hands-on training to the communication students.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to work on an industry-oriented/researchproject.
2. Provide a platform to the students to develop their research skills and itsapplication.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and apply skills on real research problems.

CO2: Assess and develop a solution to research problems.

CO3: Select the appropriate field for himself/herself in the media industry.

Modules	Blooms level*	Number ofhours
Major Themes for Project The project may be based on any of the following major media streams: 9. PrintMedia 10. ElectronicMedia 11. Advertising 12. EventManagement 13. Corporate Communication & PublicRelations 14. BrandManagement 15. NewMedia 16. Photography **Guidelines for Project** It must be based on either Industry or Research. The student will work under the guidance of a Faculty Guide that will be assigned by HOI. Student can choose topic as per his/her area of interest under the guidance of the Faculty guide. The student may also choose to undertake a live project in any of the major media streams. **Project Report/Portfolio: 75 Marks** Before the end of the semester, the student will be expected to submit a project report. The project report shall have the following components. Title page Index Introduction Industry Overview Objectives Methodology Findings Conclusion Annexures (questionnaires, if any)	L1, L3, L5, L6	No Contact Hours

Bibliography In case the student undertakes a live project, he/she will have to submit the portfolio instead of the project report. The portfolio will carry 75 marks. **Presentation & Viva: 25 Marks** Student will make a presentation (based on Project Report) and it will be followed by a Viva Voce in front of a Panel of one internal expert and one external expert. **The Steps of a Project Report** **STEP I:** Selection of the topic for the project by taking following points into consideration: Suitability of the topic,Relevance of the topic, Time available at the disposal, Feasibility of data collection within the given time limit, Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.) **STEP II**: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor. **STEP III**: Collection of information and data relating to the topic and analysis of the same. **STEP IV** : Writing the report dividing it into suitable chapters **STEP V**: The following documents are to be attached with the Final Project Report. • Approval letter from the supervisor(Annexure-IA) • Student's declaration(Annexure-IB) • Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation /Institution. **Guidelines for evaluation:** • Each of the students has to undertake a Project/Live Project individually under the supervision of a teacher and to submit the same following the guidelines statedbelow.		

• Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hardbound. • Failure to submit the Project Report/Portfolio or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report/Portfolio and appear at the Viva-Voce Examination in the subsequent years (within the time period as per UniversityRules). • No marks will be allotted on the Project Report/Portfolio unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report/Portfolio. • Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation:

Chapter Scheme and distribution of marks (for Project Report):

Chapter 1: Introduction with statement of objectives, limitations of the study & hypothesis – 10 marks

Chapter 2: Literature Review/Conceptual Framework/ National/International Scenario – 20 marks

Chapter 3: Research Design – 10 marks

Chapter 4: Findings& Results -- 20 marks

Chapter 5: Conclusion & Recommendations -- 10 marks

Chapter 6: Bibliography -- 05 marks

Examination Scheme:

Components	**Project Report**	**Power Point Presentation & Viva**
Weightage (%)	75 Marks	25 Marks

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2336	MEDIA PRODUCTION PORTFOLIO	L	T	P	C
Version	2021	1	-	4	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This subject is an attempt to inculcate professional writing skills and knowledge in flowering buds of the media department. The subject will give hands on experience on different aspects of media writing to the students. The students may choose the option of this subject from their concentration electives.

Course Objectives

The objective of this course is to

1. Equip the students with the hand on experience on different aspects of mediawriting.
2. Provide an overview of different zones of technical writing skills in mediaindustry.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and review media writings.

CO2: Write and Summarize methodologically in media industry.

Modules	Blooms level*	Number ofhours
MODULE 1: Major Areas of Writings The Media Production Portfolio has the following topics for writing: No. of items PressRelease 1 Feature 2 Editorial/Article 1 NewsStory 2 NewsAnalysis 1 AdCopy (TV/radio/print) 1 Letterto Editor 2 MovieReview 1 **Guidelines for Media Production Portfolio:** The following procedure should be followed for the credits: 11. Thorough reading of relevant study material andreferences. 12. Students will choose the current topics for every area ofwriting. 13. Students will discuss the topics with the guide and will take the approval. 14. Students will use the formal writing pattern i.e. 12 font size, 1.5 line spacing and Times NewRoman. 15. Students will have to make proper formal document thatincludes • TitlePage • Table ofContents • Acknowledgement • Writeups	L1, L2, L3, L6	No Contact Hours

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Ganesh T. K. (2008). *Essentials of Mass Media Writing*. AuthorsPress.
2. Schement, Jorge Reina (2002). *Encyclopedia of communication and information.* USA, MacmillanReference.
3. Filak Vincent F. (2018). Dynamics of Media Writing: Adapt and Connect, 2nd edition. CQPress.

Reference Books

1. Fink,Conrad C. (2001*) Sports Writing: The Lively Game*, New Jersey : Wiley-Blackwell
2. Keeble,Richard (2001)*The Newspaper Handbook*, Abingdon : Routledge
3. Kamath,MV (2012*) Journalism Reporting*, Noida : VikasPublication
4. Rosenauer,Kenneth L (2004)*Storycrafting: A Process Approach to Writing News*, New Jersey:WileyBlackwell

Examination Scheme:

Components	**Complete Work**	**Creativity**	**Relevance**	**Clarity**	**Comprehensiveness**	**Originality**	**Presentation**
Weightage (%)	10	15	15	15	15	15	15

CO PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	2	2	--	--	2	1	2	--
CO2	1	1	--	2	2	--	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

FOURTH SEMESTER

JRN 2451	**TV PRODUCTION AND PRESENTATION**	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

A comprehensive course to introduce students into the multilayered field of TV Production and presentation. Designed to give exposure to the students to both the theoretical as well as practical side of TV production, both in the field and in the Studio.

Course Objectives:

The module is structured for the students to move further into TV journalism. It shall explore strategies to handle key areas within broadcast journalism. The skill for anchoring and presentation will be honed after explaining the nuances and essentials of the task. This module will also familiarize them with all that is needed for outdoor production and the role of important departments on location. From this unit onwards, they will be exposed to essentials of specialized coverage in the field of current affairs, sports, businessetc.

Course Description:

This course is broken up into three modules which cover all most all aspects of TV production and news presentation, into one tightly packed comprehensive programme. Students learn from faculty as well as from experts in the field, the rigours of TV Production and slick news presentation, through a balanced mix of theoretical constructs and practical field and studio exercises, graded in terms of intensity and complexity.

Course Outcomes:

On completion of this course, the students will be able to

:**CO1.** Explain role of an anchor and presentation techniques

CO2. Demonstrate knowledge of TV editing

CO3. Apply understanding of various reporting beats in TV

Modules	Blooms level*	Number ofhours
MODULE 1: **Anchoringandpresentation**Qualitiesofananchor; Roleofstyling(makeuptechniques) Anchoringaccordingtoprogramformats; Newsanchoring,Entertainment,currentaffairs,magazineshowsetc. Anchoringtechniques:liveshows&recordedprogrammesDiscussingdifferentnewsanchorsoftheindustry; Usingtheteleprompter; Piecetocamera	L1, L2	14
MODULE 2: Editing(Post-production) Basic FCP (Final Cut Pro) Tools of Editing Basic Transitions, Sequencing shots; Concept of montage and Continuity; Role of the editor; Ingest and digitize footage; Overlay and underlay of sound;Ethics involved in editing; Importance of File footage and archival footage	L2, L3	12
MODULE 3: Specializedcoverage Current Affairs; Documentaries and Features; Business and stock market reporting; Sports coverage; Legal reporting and Judiciary; election based coverage; Political & parliamentary coverage	L2, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Spann, Thomas (2004).*Fundamental of Television Production*
2. Belavadi, Vasuki(2013).*Video Production OxfordPress*

Reference Books

1. Harman, Doug (2013).*The Digital FilmmakingHandbook.*
2. Jago, Maxim(2018).*Adobe Premiere Pro CC Classroom in aBook.*

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	3	3	1	2	2
CO2	1	1	2	1	3	1	2	2
CO3	3	2	1	1	3	1	2	2
CO4	1	2	2	1	3	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2401	FILM THEORY AND PRACTICE – I	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Various components of film making will be covered resulting in learning and practical outcome. A theoretical analysis of some films by stalwarts of world cinema will be screened. Students will also learn the camera movements in theory and practical. The students will learn about film narrative and scriptwriting.

Course Objectives

The objective of this course is to

1. The impart knowledge on the basics of filmmaking and cinema techniques forstudents.
2. To build the capability of students to analyze a film and what it conveyscinematically.
3. To impart knowledge to identify film theories and filmappreciation.
4. To build the capability of students to make short films, keeping in mind the finer nuances of filmmaking.
5. To broaden knowledge to world and regional cinema periodically throughout thecourse.

Course Outcomes

On completion of this course, the students will be able to;

CO1: Produce short films, starting with ideation, scriptwriting, shooting and editing.

CO2: Apply the elements of Mise-en-scene in their film making.

CO3: Write Film reviews.

CO4: Critically analyse selected classics.

Course Content

Modules	Blooms Level*	Number of hours
Module I – Language of Cinema: World space and screen space Continuity: Space and Time Cinema movements, angles and shots Different screen elements & Mise-en-scene Continuous action, compression and expansion of time and concepts of editing Dimensions of Sound: on-screen & off-screen, digetic& non-digetic, sync and non-sync, Sound effects and silence, dialogues, ambient sound, background score & musical tracks.	**L1, L2, L3**	**10**
Module II- Stages of film production Development stage Pre-production. Production. Post-production Distribution, promotion & Release.	**L2,L3**	**8**
Module III- Scriptwriting Narrative composition: 3 plot structure Characterization & Dramatic structure Scriptwriting formats, step outline & shot break script Screenplay, Storyboarding & shooting script Script selection Writing proposal	**L2,L3, L4**	**8**
Module IV: - Film Theories Early experiments and image lantern How to view/read the movie Narrative and Non narrative Film Genre Early Indian cinema and Golden era Evolution of documentary films Case study of famous movies: Roshomon, Citizen cane, PatherPanchali, Sholey, Charulata, Gone with the windetc.	**L4,L5,L6**	**10**

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books:

1. Bordwell, D & Thompson, K (1979). *Film Art an Introduction,* (New York) Mc Graw Hill.
2. Miller, W. (1997). *Screenwriting for film and television,*(UK)Pearson.
3. Monaco, J. (1977). *How to read a film,* (New York) Oxford UniversityPress.

ReferenceBooks:
https://www.youtube.com/watch?v=lRo2IqYbEaE

https://www.youtube.com/watch?v=kavxsXhzD48

https://www.youtube.com/watch?v=wFiP-

E1zTRchttps://www.youtube.com/watch?v=FiUIP

K4V_40

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE-EndSemesterExam

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		**1**							**1**		
CO2		**1**							**1**		
CO3						**1**				**1**	
CO4						**1**				**1**	

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2402	CORPORATE COMMUNICATION	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	PUBLIC RELATIONS				
Co-requisites					

Catalog Description

Various components like corporate philosophy, identity, citizenship and philanthropy will be learnt and discussed by the students. Image and its management and enhancement which is the core of corporate communication will also be explained. Direct marketing, issue support and crisis management will be learnt. Public affairs and political PR and lobbying as a weapon in the hand effective communicators will be discussed. To develop an understanding of the role of event management, in the today's fast changing trends. The modules given below will provide complete understanding of the different kinds of events, their organization and how corporate communication plays a role. This subject marks the beginning and serves as an introduction to the Event Management and its relatedaspects.

Course Objectives

The objective of this course is to

1. To impart knowledge of basic concept of corporate communication and its application in anorganization.
2. To impart knowledge of basic concepts of event management and its relevance in corporatecommunication.
3. To apply knowledge and skills as communication practitioner to resolve issues and crisis situations using various specificstrategies.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Define and describe corporate communication and its various elements: Corporate Culture, Corporate Philosophy and Corporate Identity, Citizenship andPhilanthropy.

CO2. Describe and summarise various concepts in Corporate Communication such as Image Management, Issue Management, Crisis Management, Media Management, Direct Marketing and Celebrity Management.

CO3. Describe and summarise Public Affairs, Political PR, Lobbying, Desktop Publishing (DTP) and GroupCommunication.

CO4. Define and classify different types of event and to describe the relationship between Events, Advertising and PR.

CO5. Explain and write about various departments of an event management company, marketing of an event and brand positioning throughevents.

Modules	Blooms level*	Number ofhours
MODULE 1: CORPORATE COMMUNICATION Introduction, Importance and Functions, Elements of Corporate Communication: Corporate Philosophy, Culture, Corporate Identity, Citizenship and Philanthropy.	L1, L2	8
MODULE 2: Concepts of Corporate Communication Image Management, Direct Marketing, Network Marketing, Issue Management, Crisis Management, Disaster Management, Media Management, EventManagement.	L1, L2	17
MODULE 3: Concepts of Corporate Communication Celebrity Management, Public Affairs, Political PR, Lobbying, Desktop Publishing (DTP), Group Communication	L1, L2	5
MODULE 4: Introduction to Events Defining Event and Event Management, Different Kinds of Events, Relationship between- Events, Advertising and Public Relations.	L1, L2	3
MODULE 5: Marketing of Different Kinds of Events Departments in an Event Management Company, Marketing of an Event, Brand Positioning through Events	L2, L3	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Wagen Lynn Van Der (2010). *Event Management,* Australia, Pearson Higher Education.
2. Argenti Paul A and Forman Janis (2003). *The Power of Corporate Communication,* Tata McgrawHill
3. Menon, Mridula (2004). *Development Communication & Media Debate,* Kanishka PublishingHouse.

Reference Books

1. Kundra S (2005). *Media Management,* New Delhi, Anmol Publication Pvt.Ltd.
2. Martin G. Dennis & Robert D. Coons (2011). *Media Flight Plan,* 5th ed., Deer Creek Publishing.
3. Albarran, Alan B (1996). *Media Economics: Understanding markets, Industriesand Concepts,* 1st ed., Ames, Lowa State UniversityPress.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	2	1	1	2	2	1	2	--
CO2	1	1	2	2	2	--	--	2	1	2	2
CO3	1	1	2	2	2	--	--	2	1	2	--
CO4	1	2	--	--	--	--	--	2	1	3	--
CO5	1	2	3	3	2	1	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2403	MEDIA LAWS AND MANAGEMENT	L	T	P	C
Version	2021	2	1	-	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Today Media business is one of the most challenging and competitive kind of industries among all. Therefore, it is important for the Students of mass communication to know about its management and how the ownership has changed in recent times. Media has to operate given within the framework of ethics and laws. Hence it's important for the student to know and learn about media laws and ethics as well. Furthermore, since it is a core subject, we will go deep into the subject and provide a working knowledge to the students about the increasing use of digital and online media in all industries today. Course module will be supplemented by practical projects/assignments from time to time.

Course Objectives

The objective of this course is to

1. Impart knowledge of basic concept of media management and its application andrelevance as anindustry.
2. Apply knowledge of basic differences between Print, Broadcast and Online media inthe present globalizedworld.
3. Apply knowledge and skills required as a media practitioner and analyze communication strategies of the media giants in India and around theworld.
4. Engage in life-long learning and self-motivated initiatives in research for thedevelopment of the innovative plans in media Management and to carry professional ethicsup.

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe management of Media as an Industry and its Organizational Structure, Media Conglomerates and Pattern of Media.

CO2. Describe the growth and development of various forms of media including Print, Broadcast and online and compare the difference among all also analyze the problems and future prospects of Indian Media vis a vis Global media.

CO3. Identify and describe various concepts and drivers of change in the media industry in the era of globalization and be aware of contemporary challenges in managing the media mergers and acquisitions and measuring their impact at large.

CO4. Equip the student with basic understanding of the provision of various media Laws and Regulations prevailing and their application into the area of Journalism per say.

Modules	Blooms level*	Number ofhours
MODULE 1: (**Media Management: An Introduction**) Media as an industry and profession, Journalists becoming managers, Ownership patterns of mass media: Print and Broadcast Media, Organizational structure: Different Departments, General Management, Control and co-ordination, Hierarchy.	L1, L2 , L4	6
MODULE 2: (Contemporary Practices in Media Management) Media ventures: Growth of Indian Print Media Business, Growth of Indian TV Industry, and Resurgence of Radio Industry, The Indian Film Industry Problems, process and prospects of Indian Media Business Media Industry: Changing commercial equations vis-à-vis market and audience. **Growth of Indian Digital Media Industry and changing pattern of media consumption.**	L1, L3	7
MODULE 3: (Media and Globalization) Foreign equity in Indian media, The concept of global media, Global Media Giants and their selected holdings, Globalization of media and its impact.	L1, L2 , L4	5

MODULE 4: (Media Laws and Regulation Bodies) Laws governing media: The Contempt of Courts Act, Defamation, The Copyright Act (Concept of piracy), Right to Information Act, The Official Secrets Act, Right to privacy, Freedom of media, The code of media Ethics and **Regulatory Bodies. Self-Censorship.**	L1, L2,L3, L4	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. Thomas, J.P. (2009). Media Management Manual: A Handbook for Television and Radio Practitioners in Countries in Transition. New Delhi:UNESCO
2. Media Management in the Age of Giants. Herrick. Dennis.H.
3. Williams, G. (2003). Media ownership and Democracy. London: PlutoPress.

b) AdditionalTexts:

1. Albarran, A.B., Arrese, A. (Eds.). (2003). Time and Media Markets. Mahwah, New Jersey: Lawrence Erlbaum Associates.
2. Sohnetal. (1999). Media management: A case book approach. Mahwah, New Jersey: Lawrence Erlbaum Associates.

c) Other readings:

1. Hoskins. C. etal. (2004). Media Economics: Applying Economics to New and Traditional Media. Sage.London.
2. Lavine J. etal (1998). Managing Media Organizations. Longman. New York.

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**2**	**2**	**1**	**2**	**-**	**1**	**2**	**1**	**1**	**-**	**1**
CO2	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**1**	**-**	**-**
CO3	**2**	**1**	**-**	**1**	**2**	**1**	**2**	**1**	**1**	**-**	**2**
CO4	**2**	**1**	**-**	**1**	**1**	**2**	**2**	**-**	**1**	**1**	**1**

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2432	PROJECT (with Presentation & Evaluation)	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description

This concentration elective will help the student develop a critical and analytical eye when it comes to understanding issues/trends related to media. It will provide a platform to the student to interrogate and review various media concepts. The live project will help in giving hands-on training to the communication students.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to work on an industry-oriented/researchproject.
2. Provide a platform to the students to develop their research skills and itsapplication.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and apply skills on real research problems.

CO2: Assess and develop a solution to research problems.

CO3: Select the appropriate field for himself/herself in the media industry.

Modules	Blooms level*	Number ofhours
Major Themes for Project The project may be based on any of the following major media streams: 17. PrintMedia 18. ElectronicMedia 19. Advertising 20. EventManagement 21. Corporate Communication & PublicRelations 22. BrandManagement 23. NewMedia 24. Photography **Guidelines for Project** It must be based on either Industry or Research. The student will work under the guidance of a Faculty Guide that will be assigned by HOI. Student can choose topic as per his/her area of interest under the guidance of the Faculty guide. The student may also choose to undertake a live project in any of the major media streams. **Project Report/Portfolio: 75 Marks** Before the end of the semester, the student will be expected to submit a project report. The project report shall have the following components. Title page Index Introduction Industry Overview Objectives Methodology Findings Conclusion Annexures (questionnaires, if any)	L1, L3, L5, L6	No Contact Hours

Bibliography In case the student undertakes a live project, he/she will have to submit the portfolio instead of the project report. The portfolio will carry 75 marks. **Presentation & Viva: 25 Marks** Student will make a presentation (based on Project Report) and it will be followed by a Viva Voce in front of a Panel of one internal expert and one external expert. **The Steps of a Project Report** **STEP I:** Selection of the topic for the project by taking following points into consideration: Suitability of the topic,Relevance of the topic, Time available at the disposal, Feasibility of data collection within the given time limit, Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.) **STEP II**: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor. **STEP III**: Collection of information and data relating to the topic and analysis of the same. **STEP IV** : Writing the report dividing it into suitable chapters **STEP V**: The following documents are to be attached with the Final Project Report. • Approval letter from the supervisor(Annexure-IA) • Student's declaration(Annexure-IB) • Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation /Institution. **Guidelines for evaluation:** • Each of the students has to undertake a Project/Live Project individually under the supervision of a teacher and to submit the same following the guidelines statedbelow.		

• Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hardbound. • Failure to submit the Project Report/Portfolio or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report/Portfolio and appear at the Viva-Voce Examination in the subsequent years (within the time period as per UniversityRules). • No marks will be allotted on the Project Report/Portfolio unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report/Portfolio. • Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation:

Chapter Scheme and distribution of marks (for Project Report):

Chapter 1: Introduction with statement of objectives, limitations of the study & hypothesis – 10 marks

Chapter 2: Literature Review/Conceptual Framework/ National/International Scenario – 20 marks

Chapter 3: Research Design – 10 marks

Chapter 4: Findings& Results -- 20 marks

Chapter 5: Conclusion & Recommendations -- 10 marks

Chapter 6: Bibliography -- 05 marks

Examination Scheme:

Components	**Project Report**	**Power Point Presentation & Viva**
Weightage (%)	75 Marks	25 Marks

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2404	DIGITAL MARKETING	L	T	P	C
Version	2021	2	-	2	3
Pre-Requisites/ Exposure					
Co-Requisites					

Catalog Description

This course aims at introducing students to the recent practices in the field of Digital Marketing. It equips them with a practical exposure to latest software, necessary skills and analytical mindset for making a successful career in Digital Marketing.

Course Objectives

The objective of this course is to

1. Introduce the concept of Digital Marketing
2. Explain and apply the important concepts related to SEO, SEM and SMM.
3. Describe the process of Creating and promoting online content.
4. Understand and apply the knowledge about analytics.

Course Outcomes

On completion of this course students will be able to

CO1: Understand and create online business plan

CO2: Explain concepts related to SEO and SEM

CO3: Describe and create social media marketing plans

CO4: Describe how content marketing works and create content for online platforms

CO5: Analyze and apply data related to digital marketing trends

Modules	Bloom's Level*	Number of hours
Module 1: Introduction to Digital Marketing Deciding Online Goals, Creating Online presence- Marketing, Analyzing and Adapting; Understanding working of a website, Fundamentals of creating websites, Do's and Don'ts of a website, Online business-strategic planning, Understanding e-commerce, Online payments and orders, Re-targeting	L1,L3	8
Module 2: Online Search Basic of Search engine, Working of a search engine, Organic Vs Paid Search, Introduction to SEO-Plan and Process, Selecting keywords, Web pages and SEO, Introduction to SEM, SEM Auction, Essentials of good keywords, Ways to improvise on keywords, expanding local reach, Introduction to international marketing and export	L1, L2	10
Module 3: Social Media Basics of Social Media, selecting appropriate social media sites, developing social media plans, Social Media	L1,L3	12

advertising, Ways to analyze success on Social Media, Do's and Don'ts of Social Media Marketing, Understanding mobile web and mobile apps,Introduction for advertising on mobile, Search campaigns for mobile, Display campaigns for mobile, Social media campaigns for mobile, Video for mobile		
Module 4:Content Marketing Introduction to content marketing, Understanding online customers, Choosing the right format for content, Writing for online audiences, Promoting the content, Measuring success in content marketing, Creating marketing emails, Designing email campaigns, Measuring success in email marketing, Influencer Marketing, Understanding ad networks, How retargeting works	L1,L3	8
Module 5: Analytics Understanding web analytics,Meeting goals with web analytics, Succeeding with analytics, Web analytics and organic search, Tools to measure SEM, disintegration of data for insights, Using online video for online strategy, Promotion of videos, Measuring video performance,Using data to understand audiences, Understanding the Data Cycle and application of data for success, Presenting data effectively	L1,L4	10

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

Text Book

1. Kingsnorth, S. (2019). *Digital marketing strategy* (2nd ed.). United Kingdom: Kogan Page.
2. Kotler, P., Kartajaya, H., & Setiawan, I. (2016). *Marketing 4.0* (1st ed.). Wiley.
3. Kotler, P., Kartajaya, H., & Setiawan, I. (2021). *Marketing 5. 0* (1st ed.). Newark: John Wiley & Sons, Incorporated.
4. Gupta, S. (2020). *Digital marketing* (2nd ed.). 2020: McGraw Hill.

Reference Books

1. Bhatia, P. (2019). *Social Media & Mobile Marketing* (1st ed.). Wiley.
2. Martin, G. (2018). *The essential social media marketing handbook* (1st ed.). India: Rupa Publications India.
3. Sammis, K., Lincoln, C., Pomponi, S., Ng, J., Gassmann Rodriguez, E., & Zhou, J. (2016). *Influencer marketing for dummies* (1st ed.). India: Wiley.

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		1	3				3		1	2	
CO2		1	3				3		1	2	
CO3		1	3				3		1	2	
CO4		1	3				3		1	2	
CO5		1	3				3		1	2	

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2406	ADVERTISING DESIGN	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Fundamentalsof Advertising				
Co-requisites					

Catalog Description

The course provides students a broad knowledge of the skills required to combine all the elements necessary to create an attractive design for advertisements. They will learn the terminology used in layout and design. The students will study the design for advertising layouts, graphics, taking into the consideration the choice of typeface and positioning and choice of colors, images and text. Their work will include practical project as well as investigations into current advertisingdesign.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of technical fields involved in designingadvertisements.
2. Provide an overview of software for designing ofadvertisements.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define and identify various elements of advertisements for building brandimage.

CO2: Describe and apply various aspects of advertising in terms of print ads for communication.

CO3: Describe the development process of advertising campaigns and various elements of ad campaign.

CO4: Use various software for designing andlayout.

CO5: Explain the relevance of computers in designing and create any advertisement ordesign using computer as a basictool.

Modules	Blooms level*	Number ofhours
MODULE 1: Building Brand Image Corporate Identity: Study and Usage of Types & Fonts, Color Schemes, Punch Line etc. Corporate Stationary: Logo, Logotype, Letterhead Design, Business Card, Envelop, Catalogues, Brochures, DigitalPosters. Calendar Design, Difference between Corporate and Personal Stationary.	L1, L2	10
MODULE 2: Communicating through Multiple Media Different types of advertising: Press ad, Hoardings, Interior & Exterior Signage, Danglers and Banners etc. Choice and use of images and colours. Digital and print produces integrated design solutions. How different choice of typography is useful in making of layout. Choice of smart fonts makes attractive and reader friendly advertisements. How can one make design, which will stand out from the rest? Howrelevant images are manipulated for making up of an effective design.	L1, L3	6
MODULE 3: Concept of Advertising Campaign Advertising Campaign: Concept development for advertisements. To provide the valuable experience of developing advertising campaigns, from creative to presentation. Study of various existing campaigns. Practical work on developing an advertising campaign involving various facets of all the mediums. Working on campaign elements- Tagline, Visuals, Copy, Spot Colours, Process Colours, and Colour Management for Images.	L2, L5	6
MODULE 4: Relevant Software of Computer Photoshop, PageMaker, Coral Draw, & Illustrator, its relevant usage indifferent in different design forms. Different Software are used for different purpose with proper impact. Which software is to be used for making layouts, creating vector graphics/images and raster images?	L3	10
MODULE 5: Computer and Advertising How computer and advertising is synonym to each other, To create any ad	L2, L5	4

or design computer is a basic tool. It is smarter and faster to execute layouts. Working examples of the same to be discussed.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Jaishri N. Jethwaney (1999). *Advertising*, New Delhi, Phoenix Publishing House Pvt. Ltd.
2. Chunawalla, S.A. &Sethia, K.C (2002). *Foundation of Advertising Theory & Practice*, 7th ed., Himalaya PublishingHouse.
3. David Ogilvy (1985). *Ogilvy on Advertising*, 1st ed., New York, Vintage Books: A Division of RandomHouse.
4. Rathor, B. S. (2003). *Advertising Management*, 11th ed., New Delhi, Himalaya Publishing House.

Reference Books

1. Batra Rajeev, John G Myers & Aaker David A. (1995). *Advertising Management*, 4th ed., New Delhi, Prentice Hall ofIndia.
2. Frank Jefkins (2003). *Advertising*, Macmillan India Limited.
3. J. Thomas Russell (2008). *Advertising Procedure*, 17th ed., Pearson PrenticeHall
4. Lewis Herschell Gordon (1994). *The Complete Advertising and Marketing Handbook*, Chennai, East West Books (Madras) Pvt.Ltd.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	2	1	2	--
CO2	1	1	--	--	--	--	--	2	1	2	--
CO3	1	1	--	--	--	--	--	2	1	2	--
CO4	1	1	--	--	--	--	--	2	1	2	--
CO5	1	1	--	--	--	--	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2407	BRAND MANAGEMENT	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes various concepts of advertising and brand management. It includes concepts of tools of marketing and communication revolve around launching, building and sustaining brands. The aim of this course is to explore various creative branding strategies and brand positioning decisions involved in managing a brand in the market.

Course Objectives

The objective of this course is to

1. Equip the students with the creative branding strategies involved in launching, building and sustainingbrands.
2. Provide an overview of brand positioning and marketing ofbrands.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define and describe various basic concepts related to brands.

CO2: Describe and apply various positioning strategies to take important brand decisions.

CO3: Describe and classify various branding strategies.

Modules	Blooms level*	Number ofhours
MODULE 1: Concept of a Brand Evolution of Brands, Company, Brands & Products, Brand Differentiation,BrandEquity,BrandExtension,BrandPerspectives-	L1, L2	12

Visual/Verbal. Positioning, Value, Brand Image, Value Added, Perceptual Appeal & Personality Perspectives.		
MODULE 2: Important Brand Decisions Brand Positioning- Attribute Benefit, Application, User, Competitor, Price/Quality & Product Category Positioning, Building brands in the new economy, Brand Image & Verbal Identity, Packaging & Labelling	L2, L3	9
MODULE 3: Branding Strategies Product Branding, Line Branding, Range Branding, Umbrella Branding, Source/Double Branding, Endorsement Branding.	L1, L2	3

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Harsh V Verma (2008). *Brand Management: Text and Cases*, ExcelBooks.
2. Keller, Kevin Lane, Parameswaran and Jacob (1998). *Strategic Brand Management*, PearsonEducation.
3. S. A. Chunawalla (2004). *Compendium of Brand Management*, Mumbai: Himalaya PublishingHouse.

Reference Books

1. Philip Kotler. *Marketing Management*, PearsonEducation.
2. Magazines- Business World, Time & BrandReporter.
3. Brand Equity- a Wednesday Supplement with EconomicTimes.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	3	--	--	--	--	--	2	1	3	--
CO2	1	1	2	--	--	--	--	2	1	3	--
CO3	1	1	2	--	--	--	--	2	1	3	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2408	WEB DESIGNING	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The power of the Internet has penetrated every nook and cranny of our lives. Journalism has also been revolutionized with the inclusion of the World Wide Web for news gathering and news dissemination. Aspiring journalists today need to be familiar with cyber journalism and basics of web designing. The course curriculum has been designed keeping this end in view.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of Internet &Web.
2. Provide an overview of Design Patterns & WebGraphics
3. Provide deep understanding of HTML &CSS.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define and classify W3, Internet & Ethics of web

CO2: Describe and apply various aspects of Web Designing with Design Patterns

CO3: Describe the working process of basics HTML & CSS

Modules	Blooms level*	Number ofhours
MODULE 1: Introduction to Internet Internet- Introduction, History, Benefits, limitations and Ethics, Future of the Web, W3C, Internet tool kits - server, IP address, URL, ISP, networking, browsers, Search Engine, Domain, Domain name etc. Classification of Websites. Home page,hyperlinks	L1, L2	6
MODULE 2: Web Designing Web Design Guidelines, Customer-Centered Design Process; Knowing your Customers Planning your Website, Design Patterns, Basic HTML, CSS & Dreamweaver	L1, L3	8
MODULE 3: Web Graphics Introduction & Image optimization, size, resolution and number of Colours, Creating. Homepage, File formats, Image mapping, Image manipulation (Effects)	L1, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Harley Hahn(1994). *Harley Hahn teaches the Internet*, United States:McGraw-Hill OsborneMedia.
2. Towers, J. Tarin (). *Macromedia Dreamweaver Mx advanced*, United States:Peachpit Press.

Reference Books

1. Hartman, Patricia(2001). *Flash 5 Visual Jumpstart*, United States:Sybex.
2. N. N. Sarkar(2013), *Art and production; Art and production*, United States: Oxford UniversityPress.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Project

Examination Scheme:

Components	**H**	P	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; P: Project

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	--	--	--	--	2	2	2	1	3
CO2	1	1	--	--	--	--	3	--	2	1	--
CO3	1	1	--	--	--	--	3	--	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

FIFTH SEMESTER

JRN2551	NEW MEDIA	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The power of the Internet has penetrated into the every parts of life today so, Journalism is not any exception. It has also been revolutionized with the inclusion of the World Wide Web for newsgathering and news dissemination. Aspiring journalists today need to be familiar with cyber journalism and the basics of web designing. Also, it is important to understand the hugest impact of online media and news dissemination though it, how media is not only making but also changing opinion in present times. It has become a major source of news. Gone are the days, when people used to wait for newspaper for getting information on certain news or even go to watch television for current updates. In the era of smart phones, everything is in our hand and just a click away. Almost every big and small media houses are online through streaming channels, apps, or even on YouTube. Even many independent news portals are in existence today and doing pretty well with full fledged websites of their own. So, in the midst of this scenario for a budding journalist should have basics knowledge for this medium, 'more you know better it is' is the tagline today. After studying this course students will be aware of not only writing and skills part of it but also, the ethical and legal aspect of the same through the course. Besides, the concept of convergence and its technological uses have been described in coursecurriculum.

Course Objectives

The objective of this course is to

1. Impart basic knowledge of the term New Media and convergence and its applicationin different areas of onlinemedia.

2. Spread the knowledge regarding the dissemination of news through digitalplatforms including News portal, online news channels, YouTube and socialmedia.
3. Apply knowledge and skills as a communicator via World Wide Web and also,analyze its huge impact among thereceivers.
4. Impart knowledge regarding writing for digital media, ethics of online media, andits virtue and iniquity as a newsmedium.

Course Outcomes

On completion of this course, the students will be able to

CO1. Analyze and apply knowledge about the coverage of various genres including disaster, science and technology, environment, poverty and gender.
CO2. Describe convergence in media and its effects on various classes and communities; also, develop knowledge about language and writing skills for various formats of new media and business and technical skills in media convergence.
CO3. Write about cyber journalism and explore how it is different from other news mediums and online media and correlate advertising tools and its impact on globalization, cyber laws, concept of e-governance and World Wide Web.

Modules	Blooms level*	Number ofhours
MODULE 1: : Specialized coverage – II Disaster & crises coverage, Science and Technology, Environment, Poverty, and Gender	L1, L2, L4	12
MODULE 2: Convergence What is convergence?, Emergence of convergence and its effects on broadcast media, Language, structure and technology of new media, Creative, Business, Technical Skills in Convergence Media Programming	L1, L3, L4,L6	12
MODULE 3: Cyber Media Cyber Journalism: History of Internet, Comparison of cyber media with Print, TV & Radio, Writing for Web Media, Online as a publishing medium Online as an advertising tool, Why Print & Electronic Media networks are	L1,L3, L4, L6	12

going on the Net, Impact of Web Journalism on reading habits of people and media industry, Analysis of important Indian news-based websites, Impact of globalization on Web Journalism, Cyber Laws and debates, Concept of E-Governance & E-Learning, Finding information on the World WideWeb Writing forblogs		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. The language of New Media; Lev Manovich, MIT Press,2011.
2. Understanding New Media; E. Siapera, Sage,2011.
3. Online Journalism: Reporting, Writing, and Editing for New Media; RichardCraig.

Reference Books:

1. Cyber law: The Law of the Internet and Information Technology; BrianCraig, Pearson Education,2012.
2. E-governance: concepts and case studies; CSR Prabhu, Prentice Hall of india,2004.

Other Readings:

1. https://www.academia.edu/1710229/The_Three-Dimensional_Concept_of_New_Media_Notes_on_New_Media_Studies
2. https://www.docsity.com/en/characteristics-and-types-of-new-media/2231386/
3. http://download.nos.org/srsec335new/ch21.pdf
4. https://www.tutor2u.net/sociology/reference/what-are-the-new-mediaTthe

Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**2**
CO2	**2**	**1**	**2**	**1**	**-**	**1**	**2**	**2**	**1**	**2**	**-**
CO3	**2**	**2**	**-**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**2**

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2501	DATA JOURNALISM	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course will acquaint students with the basics of cleaning, analyzing and interpreting information in tabular form – rows and columns. It will challenge them to improve their understanding of numbers and quantification, as well as offer tools and frameworks for presenting data to audiences.

Course Objectives

The objective of this course is to provide an overview to students about cleaning analysing and interpretating information which can be projected through storytelling in the form of inforgraphics.

Course Outcomes (COs):

CO1: Identify data-based news stories

CO2: Apply the basics of Data journalism as per its relevance in News industry

CO3: Explore sources of Data collection to support news stories.

CO4: Critically analyse the collected data for desired story treatment

CO5: Infer data through patterns, trends and relationship

CO6: Transform data into news stories through visualization techniques to be industry ready professional.

Modules	Blooms level*	Number of hours
MODULE 1: (Introduction) Basics and Best Practices of Data Journalism, Key Tools used in Data Journalism, Data Team and Ways to Get a Story, Trends and Future of Data Journalism Review, Advantages and disadvantages	L1, L3	11
MODULE 2:(Data Source) Web as a Data Source and Data Newswire, Finding Data from Government Websites to Social Media, Strategic Searching - Alerts to Regular Sources of Information, Search Engine Techniques, Data Laws and Sources — Global and Regional	L1, L3	14

MODULE 3: (Analysis and Interpretation) Data Analysis & Interpretation, Overview- Data Analysis and Transformations, Sorting, Filtering, New Variables with Functions in Excel, Summarizing Data with Pivot Tables, Finding Story Ideas with Data	L1, L2, L4	13
MODULE 4: (Visual Elements) Basics of Visual - Elements, Composition and Principles, Color Psychology, Stages and Ways of Visualizing Data, Correct bad formatting, Misspellings, Invalid Values and Duplicates, Creating your Own Visualization Using lnfographics, Datawrapper	L1, L3, L5	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Jonathan Gray, L. B. (2012). *The Data Journalism Handbook.* O Reilly.
2. Oliver Hahn, F. S. (2018). *Digital Investigative Journalism: Data, Visual Analytics and Innovative Methodologies in International Reporting.* Springer International Publishing,Palgrave Macmillan.

Reference Books

1. Touriño, A. C. (2017). Nerd Journalism: How Data and Digital Technology Transformed News Graphics. UniversitatOberta de Catalunya.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

O, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	--	--	--	--	1	1	--	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	1	--	--	--	1	1	3	--	--
CO4	1	1	--	3	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--
CO6	1	2	--	--	--	--	--	1	2	2	3

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2502	FILM THEORY AND PRACTICE – II	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Film Theory and Practice -I				
Co-requisites					

Catalogue Description

This will focus on the production and marketing techniques of films. This course will also allow students to analyze the elements of filmmaking, which included editing, sound and documentary filmmaking. Students will participate in collaborative learning class projects. Students will examine the way films synthesize all elements to make a work of art. Cultural implications inherent in film productions and in the "reading" of cinema as a text-of famous film directors, both national and international- will be analyzed by students

Course Objectives

The objective of this course is to

1. Impart in-depth knowledge and application of the technical elements of filmmaking.
2. Students to comprehend the methods film marketing in contemporarytimes.
3. Broaden knowledge of cultural implication associated with filmproduction.
4. Analyses and "read" documentaryfilms

Course Outcomes

On completion of this course, the students will be able to;

CO1: Identify elements of editing; acquire and apply these techniques.

CO2: Demonstrate knowledge in the area of documentary films and reflect on its relation to films as a socialinstitution

CO3: Analyze marketing strategies in the current structure of the film industry and technological development

Course Content

Module	Blooms Level	Number of hours
Module 1:Editing Technique Digital and Analog. Differences and similarities. The move towards all digital systems and studios. Linear and Non Linear editing. Online and offline editing. Technical Director Vs Creative Director, Basic Transitions, Match' Cut, Jump Cut, cut-in & cut aways.Example with National and International Cinema. Movements in Cinema. Intellectual Editing & Montage Theory. Techniques of editing: Action sequence, comedy sequence, Romantic sequence, conversation. Use of graphics and Animation Basics of FCP	L1,L3	12
Module 2: Documentary Film Producing a documentary Types of documentary filmsScripting documentary film Post-production techniques of documentaries Narration and voice-over styleImportance of Research in documentary film	L1,L4,L3	12
Module 3: Funding, Marketing ,Promotions & Union Memberships Pitching the producer & distributors Packaging of final product Marketing and promotion strategies Exhibition & film festival Funding agencies and financial issues Associations and Guilds Changing audience perceptions and tastes Strategies to garner profit: Multi theatre or single theatre release Structure of the film industry	L1,L3	11

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. Bordwell, D. & Thompson, K (2010). *Film History: An Introduction*, (New York) Mc GrawHill
2. Eisenstein, S. (1969).*Film Form: Essays in Film Theory*,Harcourt
3. Ondatjee, M. (2002). *The Conversations: Walter Murch and the Art of Editing Film*, (New York) Penguin Random HouseLLC.

Reference Books:

1. Arnheim,R.(1957).*Film as Art, (USA)* University of CaliforniaPress
2. Dancyger, K. (2011).*The Technique of Film and Video Editing: History, Theory and Practice,* (Burlington**)** FocalPress

ExaminationScheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	**5**	**10%**	**10%**	**5%**	**70**

P- Project, C-Case Discussion/Presentation/Analysis, CT-Class Test, A-Attendance, EE-End SemesterExamination.

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1							1		1		--
CO2						1			1		--
CO3				1					1	2	--
CO4	1							1	1		--
CO5							1		1		

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2506	MASS COMMUNICATION RESEARCH-II	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Mass Communication Research- I				
Co-requisites					

Catalog Description

This course equips students with the necessary knowledge and skills to complete a large-scale dissertation project required for a Master's award in research. This course improves students' abilities in several key areas, enabling them to develop an advanced understanding of various research philosophies, methods, data analyses and presentation styles.

Course Objectives

The objective of this course is-

1. To familiarize participants with basic of research and the researchprocess.
2. To enable the participants in conducting research work and formulating research synopsis andreport.
3. To familiarize participants with Statistical packages such asSPSS/EXCEL.
4. To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation to the data sets so as to solve the business/Researchproblem.

Course Outcomes

On completion of this course, the students will be able to-

CO1. Explain various kinds of concepts of research methods

CO2. Apply marketing research tools and produce a research report.

CO3. Describe concepts of advertising research.

CO4. Produce a research project

Course Content

Modules	Blooms level*	Number ofhours
MODULE 1: Communication Research Theories Brief introduction to main communication models Three traditions in communication research: Users and gratification, lifestyle, and reception analysis	L1, L2	6
MODULE 2: Marketing Research Concepts & definitions Stages & process Strengths & limitations Relationship with marketing management Applications of market research Case Studies Field trip to market research companies & submit a research report	L3	8
MODULE III: Advertising Research Concept & definitions Importance of advertising research Strengths & limitations	L2	5
MODULE IV: Main Project Students have a choice to choose from qualitative or quantitative project mixed approach to doing research.	L3	5

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Kothari, C. R (1990) *Research Methodology: Methods and Techniques,* New Delhi: WishwaPrakashan.

References Books

1. K N Krishnaswamy, A.I. Sivakumar and M Mathirajan (2006). *Management Research Methodology: Integration of Methods and Techniques*. Pearson Education: NewDelhi
2. Bell, Judith (2005) (4th edn.) *Doing your Research Project: A Guide for First-Time Researchers in Education and Social Science*, Buckingham: Open UniversityPress.

3. David J. Luck and Ronald S. Rubin (1987) *Marketing Research, Prentice-Hall*: Englewood Cliffs,NJ.
4. Roger D. Wimmer and Joseph R. Dominick (2005) (8 edn.) *Mass Media Research*, London: WadsworthPublishing.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**Q**	**P**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

Q-Quiz, P- Project, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	2	--	1	--	2	1	2
CO2	3	1	--	--	--	--	--	--	2	1	2
CO3	--	2	--	2	--	2	--	--	2	1	2
CO4	1	1	--	--	--	--	3	--	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2535	SUMMER INTERNSHIP EVALUATION-II	L	T	P	C
Version	2021	-	-	-	3
Pre-requisites/Exposure	All courses taught in the previous semesters				
Co-requisites					

Catalog Description

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students‟ intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to thestudents.
2. Provide a platform to the students to hone their skillsets.
3. Provide students a learning experience where they get to work in the media industry and learn the ‘tricks of thetrade.’
4. Provide an out-of-classroom training environment to thestudents.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in a particular discipline of media industry.

CO2: Use and Relate activities learnt by the students in academics and industry.

Modules	Blooms level*	Number ofhours
General Guidelines: Every student of BA (J&MC) shall be required to undergo a practical training in a media organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the semester examinations. The candidates shall be required to undergo training in the various areas of the media organization concerned. The work done by the candidate during the training period shall be submitted in form of a training report. The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the next semester. The report has to be type written in font Times New Roman, 12 points, line spacing on both sides of the paper, Spiral Bound. The report should comprise a maximum of 80 to 100 pages and has to be submitted in twocopies. **Components of the Report** The outcome of Summer Internship is the Project Report. A project report should have the following components: • **Cover Page:** This should contain the title of the report with the name of the name of the media organization where the student interned, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of theUniversity. • **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during his/her internship. • **TableofContent:**Page-wiselistingofthemaincontentsinthe report, i.e., different Chapters and its main Sections along with	L1, L4, L3, L6	No Contact Hours

their page numbers. • **Body of the Report:** The body of the report should have these four logicaldivisions ***Introduction:*** This will cover the overview of the media organization in which the student has interned, rationale/ need / justification for interning with the organization, expectations from the internship and Chapter Planning. ***Conceptual Framework / National and International Scenario*:** (relating to the media domain in which the organization functions). ***Work Profile/ Assignments Handled by the Student* :**(using the tools and techniques mentioned in the methodology). ***Conclusion and Recommendations and Skill Sets Learnt during Internship:*** In this section, the concluding observations based on the main findings and suggestions are to be provided. • **Bibliography or References:** This section will include the list of books and articles which have been used in the project work, and in writing a projectreport. • **Annexures**: Questionnaires (if any), relevant reports,etc. **Chapter Scheme** Chapter I: Introduction 20 marks Chapter II: Conceptual Framework/National/International Scenario 5 marks Chapter III: Work profile/ assignments handled by the student 35 marks Chapter IV: Conclusion and Recommendations and skill sets learnt during internship 15 marks		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books
NA

Reference Books
NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**Report**	**Power Point Presentation & Viva**
Weightage (%)	75	25

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	2	2	3	1	1	1	1	--
CO2	--	2	2	2	1	2	1	1	1	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2503	EVENT MANAGEMENT	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course gives a further insight to the students, on the latest yet very important element of marketing communications- Event Management. With the traditional forms of communication becoming saturated, event management has emerged as an effective alternate for brand awareness. The students will essentially be taken through fundamentals of event management, concept and design, logistics, marketing and promotion, stagecraft.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of creative fields and activities in eventmanagement.
2. Provide an overview of events as an alternate for brandawareness.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define and explain various pre, during and post event activities in event management.

CO2: Describe and illustrate various themes for different events.

CO3: Describe and apply various processes for organizing an event.

CO4: Describe and assess basic two way evaluation process for any event.

Modules	Blooms level*	Number ofhours
MODULE 1: Activities in Event Management 5 C's of Event Designing, Scheduling, Pre, During and Post Event Activities, Logistic, Suppliers, Technical Requirements- Lighting, Audio/Video.	L1, L2	10

MODULE 2: Event Theme Venue, Target Audience, Layout, Theme, Backdrop, Banner, Décor.	L2, L3	10
MODULE 3: Entertainment Catering, Various Media for Event Promotion, Understanding the Relevance of each Media to Event Promotion, Comparison and Strengths and Weaknesses of Each, Sponsorships, Event Marketing and Event Promotion	L2, L3	10
MODULE 4: Event Evaluation Basic Evaluation Process, Establishing tangible objectives and sensitivity in evaluation, Evaluation from Event Organizer's Point of View, Evaluation from Client's Point of View	L2, L6	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Wagen Lynn Van Der (2010). *Event Management,* Australia, Pearson Higher Education.
2. Wakhlu, Savita Bhan (2000). *Managing Presentations: Communicating with Impact*, 1st ed., Sage Publications Pvt.Ltd.
3. Palmer Scott (2000). *Essential Guide to Stage Management, Lighting andSound,* Hodder & Stoughton.
4. Walters Graham (1997). *Stage Lighting: Step-by-Step (Stage and Costume),* A & C BlackPublications.

Reference Books

1. Parker, W. Oren & Wolf, R. Craig (2008). *Scene Design and Stage Lighting,* 9th ed., WadsworthPublishing.
2. Gaur,SanjayaSingh&Saggere,Sanjay.V(2003).*EventMarketing&Management,* Delhi, Vikas Publishing Pvt. Ltd.

3. Hoyle, Leonard H (2002). *Event Marketing: How to Successfully Promote Events, Festivals, Conventions and Expositions*, New York, John Wiley & SonsLtd.
4. Angus, Robert B and Gundersen, Norman, A (2002). *Planning, Performing and Controlling Projects: Principles and Applications*, 3rd ed., Pearson PrenticeHall.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	10	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	2	--	--	--	--	--	1	2	--
CO2	1	2	2	--	--	--	--	--	1	2	--
CO3	1	2	2	--	--	--	--	--	1	2	--
CO4	1	--	2	--	--	--	--	--	1	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2504	MULTIMEDIA JOURNALISM	L	T	P	C
Version 1	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Understanding the narrative and production characteristics of all formats involved is a basic requirement for today's information professional. This course therefore will expose students to the skills needed for creating information content in various formats, using multimedia and ICT tools such as computers, Internet, digital audio recorders, video recorders, cameras and mobile phones to tell stories and their effects on journalism's role in society. Not only will this course inform the learner how to use these enabling technologies to maximum advantage but some information of the technologies behind these Web based, ICT and communication tools will also be imparted. Students apart from learning production basics like scripting, shooting and editing, will also learn software related to this workflow. Basics of software such as Adobe Photoshop, Illustrator, Dreamweaver, Premiere Pro and Audition for basic image, sound and video editing will form the foundational aspects of this course. At the same time, the basic tenets of journalism, principles of good communication and ethics of the media will, at no stage be sidelined or subsumed because of the tools that are used to package good stories.

Course Objectives:

The objective of this course is to:

1. Enable the students to write well, effectively and visually
2. enable students to translate theoretical concepts and ideas into a form that can be visualised, shot and edited into a complete story or package
3. Enable students to master the basics of multimedia tools that are used to deliver a finished audio or video product
4. Teach students to work in a team environment, understand client briefs or channel requirements and churn out compelling stories

Course Description

This course integrates both the theoretical tenets of journalism and practical ICT and

media tools into one comprehensive multimedia package that can be re purposed into a variety of media platforms

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all the principles as well as the different types of reporting and writing and industry requirements

CO2. Be able to visualise, script and write for different media platforms like Web, Internet, print, as well as audio-visual (broadcast) media

CO3. Be completely proficient with tools and techniques related to audio-visual production

CO4. Be able to work in a team and in a networked environment, using ICT tools effectively to reach a wide audience in an online and offline environment

Modules	**Blooms level***	**Number of hours**
MODULE 1: Fundamentals of Journalism and it's evolving nature What we understand by Journalism. Brief history of journalism. Understand its growth over time from a n expression of nationalistic and patriotic sentiment to a systematic and informed model of written and audio-visual communication. Principles of good writing and reporting. Some of the risks that are prevalent in certain specialised reporting like crime beats or war journalism. Examples of brilliant journalism that have been wake up calls internationally. Different tools and styles that are needed for different media such as Web, Print and Broadcast Journalism	L1, L2	4
MODULE 2: Basics of Image, Sound and Video editing This Unit focuses on teaching students the basics of web, multimedia and audio-visual production. Editing of images in packages such as Photoshop, Lightroom and Affinity Photo are taught so students can	L2, L3	6

integrate well edited images in different media platforms, be it for print, web pages or videos for broadcast or YouTube. Differences between bitmaps and vectors; advantages and disadvantages of each; Basics of industry standard package like Illustrator are also imparted. Fundamental tools related to vector image editing are also taught. Techniques of properly recording audio; editing the audio and then syncing it to video form a core element of this section. Students learn the basics of audio editing software like Adobe Audition or Audacity. Once students are comfortable with still image editing, audio editing, and basics of video production like frame rates, image resolutions, codecs etc., then they are introduced to essential elements of audio video editing using a package like Adobe Premiere or Final Cut Pro (for those who are Mac users)		
MODULE 3: Writing for print and broadcast. Scripts, Storyboarding and content writing This unit focuses more on the writing aspects. Now that students have a fairly good idea of production and multimedia techniques and are able to write to the visual, elements of style and those ingredients that are peculiar to the broadcast medium such as run down scripts; camera blocking and shot compositions and storyboarding are explained with numerous examples. Videos of News packages, documentaries and fiction stories, so that students are able to write in a variety of styles and formats. Also aspects of video journalism such as crime reporting and editing, sports beats, current affairs reporting and other unique journalistic requirements also form an essential part of this module	L2, L3, L4	8
MODULE 4: Packaging and Post-production In this Module, all the skills of image editing, audio and video editing as well as writing in different formats for different media all converge together to create a single unified product which is the audio video report or the news story or documentary. Students employ all practical skills garnered to produce one or more stories for television, for	L3, L4	8

webcasts, podcasts as well as for print. Whatever format may be required by the respective media, be it a brochure for print, a slideshow, a radio production or a news package, all these production elements are brought together, refined and tweaked to produce a professional looking and sounding project		
TOTAL CONTACT HOURS		**32**

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

Bull, Andy. *Multimedia Journalism: A Practical Guide*. Routledge. 2nd Edition. 2016

Hernandez, Richard Koci. Rue, Jeremy. *The Principles of Multimedia Journalism: Packaging Digital News*. 1st Edition. 2015

Reference Books

Saddik, El. Abdulmotaleb. *Interactive Multimedia Learning: Shared Reusable Visualization-based Modules*. Springer. 2001

Costello, Vic. *Multimedia Foundations Core Concepts for Digital Design*. Taylor and Francis 2nd Edition. 2016

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	2	1	3	3	2	1	1	1	3
CO2	2	1	3	2	3	2	1	1	1	1	3

CO3	3	1	2	3	3	2	1	1	1	1	2
CO4	1	1	1	2	2	3	1	1	1	1	3
CO5	--	--	--	--	--	--	--	--	--	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2505	NATIONAL AND INTERNATIONAL ISSUES AND AFFAIRS	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	General understanding of news and current affairs				
Co-requisites					

Catalog Description

The course helps students understand different social, economic and political issues and policies and their implications and impact on society. The study concentrates on and analyses the latest happenings in the national and international arena as well as world organizations. The students master and discuss and debate contemporary national and global social and political issues facing the world and the Indian polity.

Course Objectives

The objective of this course is:

- To equip students with a broadly-based knowledge of the operation of the national and worldaffairs;
- To develop a comparative analysis of new ideas and different policies and international relations;
- To understand and analyze as well as debate why countries go to war; equip students with the concepts and functioning of national and world organizations, their growth and progress as well as internationalunderstandings;
- To develop in students a critical awareness of various media available for reporting;and
- To understand and debate guiding parameters of national and internationalpolitics.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Critically identify the basic structure of the internationally relevant organizations.

CO2: Write, design and communicate clearly through different media to convey socially and politically significant national and international organizations.

CO3: Explain and write about Indian foreign policy and forecast social and political fall outs.

Modules	Blooms level*	Number ofhours
MODULE 1: INTERNATIONAL ORGANIZATIONS Introduction, United Nations Organization, International Red Cross, Interpol	L1, L2	12
MODULE 2: INTERNATIONAL GROUPINGS G – 8, Non-aligned Movement, Commonwealth Central Bureau of Investigation (CBI), Election Commission (EC), Central Vigilance Commission (CVC), National Human Rights Commission	L1, L2, L3	12
MODULE 3: INDIAN FOREIGN POLICY India and issue of permanent sear in UN Security Council, India's relation with different countries including US, UK, Nepal, Sri Lanka, Pakistan, Middle East, Maldives, etc.	L1, L2, L3	12

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

.Resources:

b) Main Resource:

- Year Book, Publications Division, Government of India
- World EncyclopediaAmericana
- Manorama YearBook

c) AdditionalResources:

- The Times ofIndia
- The HindustanTimes
- TheHindu

- General newspapers reading anddiscussion.

d) Other resources:
https://www.jagranjosh.com
https://blog.feedspot.com › international_relations_blogs
https://www.worldaffairsjournal.com
https://www.un.org › sections › issues-depth › global-issues-overview

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	1	2	1	1	2	2	2	1	--
CO2	1	1	2	2	2	--	--	2	2	1	2
CO3	1	1	2	2	2	--	--	2	2	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

SIXTH SEMESTER

JRN2601	PROFESSIONAL PROJECT OR DISSERTATION	L	T	P	C
Version	2021	4	-	10	9
Pre-requisites/Exposure	ALL COURSES STUDIED IN THE PREVIOUS SEMESTERS				
Co-requisites					

Catalog Description

By the final semester, students have learnt about all the aspects of mass communication. This course aims at providing an opportunity to put this knowledge to use in a professional manner. The course introduces the students to the professional world of media and research. After learning the intricacies of mass media and its various mediums, it is trusted that the students will now be competent to decide a particular area of interest. The objective of the course is to help the students focus on a specific stream of mass media which they would want to specializein.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to thestudents.
2. Provide a platform to the students to hone their skillsets.
3. Provide students a learning experience where they get to work on an industry-oriented researchproject.
4. Enable the students to understand the research process and be aware of researchobligations andpitfalls.
5. Provide an out-of-classroom training environment to thestudents.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe and apply skills on real research problems.

CO2: Assess and develop a solution to research problems.

CO3: Select the appropriate field for himself/herself in the media industry.

Modules	Blooms level*	Number ofhours
Project Outlines The students can opt for any of the following specialized area: • Print • Advertising • PublicRelations • Photography • ElectronicCommunication **PRINT** Students can jointly bring out a journal with each one attending to a specific function of its production like reporting, editing, sub-editing, design and layout, photography and graphics. ADVERTISING The students will use their understanding of all advertising concepts learnt in the previous semesters to do a practical exercise. Students will act as brand managers of a new brand being launched. They will be required to study the following elements for the product category assigned to them: Market Research to determine the situation analysis Segmenting the market and selecting a segment for their new brand Identifying target audience Positioning their brand. This will involve a detailed study of the positioning of the competitive brands Developing the media strategy, including the communication mix Developing the creative strategy Creative strategy to follow a complete campaign creative presentation. This will include development of TV Commercials, print ads, radio ads and POP material.	L1, L3, L5, L6	12

PUBLIC RELATIONS & EVENTS PR specialization can be undertaken in these differentareas Crisis casestudies PR in Non- Governmental organizations Cross- culturalPR Internal PR department in corporate situation **EVENTS** Event specialization can be undertaken as a consolidation of various elements of event management. The student will conceptualize and develop an original project which will incorporate the following aspects. Designing of an event Event logistics and Stage management Marketing and promotions of the event (Topics other than listed can also be chosen in consultation with the concerned faculty) **PHOTOGRAPHY** Student can choose any two subjects for Specialization: Photojournalism Travel Photography Portrait Photography Product & Table-topPhotography GlamourPhotography Wild lifePhotography Students have to get themselves registered with the faculty concerned and take up project work in a systematic manner, planning, exposing in colour as well as in B & W processing, contact sheet, enlargements and presentation in a portfolio. These projects have a direct bearing on the career prospects of students as well as the image of the Photography Department of ASCO, therefore, the decision of faculty in every stage of assignment would be considered final and binding.		

ELECTRONIC COMMUNICATION (The Student can choose between creating and analyzing a topic in radio or television as part of this specialization) **RADIO** Students can do specialization in the different areas of Radio production Viz. Various Formats, News, Talk shows, Spots and commentaries, Radio documentary, Radio features, Various music formats- classical, countdown shows, contemporary hit radio, music on demand, oldies, artist spotlights, request and dedication showsetc. Commercials/Jingles/ PSAs **TELEVISION** The students can choose a specific area of TV production in which they want to specialize, viz. TV Journalism, Reporting, Anchoring, Editing, Camera, Documentary Film making, Feature Films, Short Film, Ad Film making, Entertainment Based programming etc. The above specialization will be conducted by guides and mentors responsible for a group of students and will include industry training, research and dissertation.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,L6-Evaluation

Text Books

Depending upon the chosen specialization by the students.

Reference Books

Depending upon the chosen specialization by the students.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**Timely Submission of Report**	**Content Comprehensiveness**	**Content Clarity**	**Content Originality**	**Presentation & Viva**
Weightage (%)	5	20	25	5	45

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3	2	3	--	2	3	2	1	2
CO2	1	2	3	2	3	--	2	--	2	1	2
CO3	1	2	3	2	3	--	2	3	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2637	INTERNSHIP	L	T	P	C
Version	2021	-	-	-	8
Pre-requisites/Exposure	All courses taught in the previous semesters				
Co-requisites					

Catalog Description

The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students‟ intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to thestudents.
2. Provide a platform to the students to hone their skillsets.
3. Provide students a learning experience where they get to work in the media industry and learn the ‘tricks of thetrade.’
4. Provide an out-of-classroom training environment to thestudents.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Memorize and Outline the processes and functions involved in a particular discipline of media industry.

CO2: Use and Relate activities learnt by the students in academics and industry.

Modules	Blooms level*	Number ofhours
General Guidelines: Every student of BJMC shall be required to undergo a practical training in a media organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the semester examinations. The candidates shall be required to undergo training in the various areas of the media organization concerned. The work done by the candidate during the training period shall be submitted in form of a training report. The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the next semester. The report has to be type written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise a maximum of 80 to 100 pages and has to be submitted in twocopies. **Components of the Report** The outcome of Summer Internship is the Project Report. A project report should have the following components: **1) Cover Page:** This should contain the title of the report with the name of the name of the media organization where the student interned, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University. **2) Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during his/her internship.) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.	L1, L4, L3, L6	No Contact Hours

) **Body of the Report:** The body of the report should have these four logicaldivisions i) ***Introduction:*** This will cover the overview of the media organization in which the student has interned, rationale/ need / justification for interning with the organization, expectations from the internship and ChapterPlanning. **j)** ***ConceptualFramework/NationalandInternationalScenario*****:** (relating to the media domain in which the organization functions). k) ***Work Profile/ Assignments Handled by the Student*** **:**(using the tools and techniques mentioned in themethodology). l) ***Conclusion and Recommendations and Skill Sets Learnt during Internship:*** In this section, the concluding observations based on the main findings and suggestions are to beprovided. **5) Bibliography or References:** This section will include the list of books and articles which have been used in the project work, and in writing a project report. **6) Annexures**: Questionnaires (if any), relevant reports,etc. **Chapter Scheme** Chapter I: Introduction 20 marks Chapter II: Conceptual Framework/National/International Scenario 5 marks Chapter III: Work profile/ assignments handled by the student 35 marks Chapter IV: Conclusion and Recommendations and skill sets learnt during internship 15 marks		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books
NA

Reference Books
NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**Report**	**Power Point Presentation & Viva**
Weightage (%)	75	25

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	2	2	3	1	1	1	1	--
CO2	--	2	2	2	1	2	1	1	1	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN2602	MEDIA ANALYSIS	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Various components like identifying media ethics, the problems that one faces during newsgathering and reporting, recognize traditional media combine it to give marginalized communities a voice. To be able to raise a voice regarding issues that affect society. To be able to analyze the commercialization of media, so that one does what benefits the society at large Understand regulations that come with the introduction of the BroadcastLaws.

Course Objectives

The objective of this course is to

1. Classify and identify the sociological and cultural debates about the media and society through a number of casestudies
2. Apprise and distinguish advance knowledge of the changing role of the mass media in a global context
3. Recognize a critical understanding of the concepts of mediaethics
4. Relate with the knowledge of production, communication and interpretation of meaning in traditional and newmedia
5. Describe and interpret the key approaches to theorizing and analyzing media

Course Outcomes (COs)

On completion of this course, the students will be able to

CO1:Describe techniques of news gathering.

CO2: Analyse recent issue in media business.

CO3: Examine alternate media.

CO4: Discuss current issues related with current broadcasting policy in India

Course Content

Modules	**Blooms level***	**Number ofhours**
Module I: Problems and Issues of News Gathering • Objectivity; • Introduction to defamation; • Activism injournalism; • Embeddedreporters; • Credibility ofsources; • Pressures on media – internal, governmental, advertising, PR	**L1,L2**	**10**
Module II::Commercialization of media Media Trials • Changing equations in media business – Mergers & Acquisitions, Cross media holdings, Newtrends; • MediaEthics	**L1,L2**	**10**
Module III:Alternate media Citizen journalism; • Blogs as alternatemedia; • Community media.	**L1, L2**	**8**
Module IV:Broadcast Regulations • Overview of Broadcastlaw; • Evolution of Broadcastbill; • Cable TV regulationact	**L1,L2**	**8**

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Khandekar, V.K., (2003). *The Indian Media Business*,(New Delhi), SAGEPublication
2. Ranganathan, M.;Rodriques, U.M., (2010). *Indian Media in the Globalised World*, (New Delhi) SAGEPublication

Reference Books

1. Singhal, A. & Rogers, E.M.(2001).*India's Communication Revolution-From Bullock Carts to Cyber Marts, (*New Delhi) SAGEPublications.
2. Hiarvard,S . (2003).*Mediain Globalised Society 2003: Northern Lights- Film and Media Studies Yearbook* (Copenhagen), Museum TusculanumPress
3. Biswasroy, P. K., (1993). *Media Management in india*, (NewDelhi) Kanishka Publishing House
4. Bhargava, G.S. (1991). *Government Media: Autonomy and After, Institute of Social Sciences and Concept Publication.*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

- **ExaminationScheme**

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	2	-	-	-	1	-	-	-
CO2	-	-	1	-	-	-	2	1	-	-	-
CO3	-	-	-	-	1	-	-	1	-	2	-
CO4	-	-	1	-	-	2	-	1	2	-	2
CO5	-	-	-	-	-	-	1	1	-	-	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JOURNALISM

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
JRN2151	Print Media- Reporting and Editing	2	-	2	3
JRN2251	Basic Photography	2	-	2	3
JRN2351	TV Journalism	2	-	2	3
JRN2451	TV Production and Presentation	2	-	2	3
JRN2551	New Media	2	1	-	3
JRN2651	Media Analysis	3	-	-	3
	TOTAL				**18**

JOURNALISM

Syllabus - Semester First

PRINT MEDIA – REPORTING AND EDITING

Course Code: JRN2151 **Credit Units : 03**

Course Objective:
This unit is aimed at introducing the students to the world of journalism- news and its handling in context of print media. It deals with basic news elements, news structure as also the newsroom set up. The student is to be taught about agency and magazine journalism. Editing is an integral part of this unit.

Course Contents:

Module I: History of Journalism
Journalism in pre-independence era in India
Role of English and vernacular press during freedom struggle
Growth of journalism post independence

Module II: Growth and development of press
Emergence of newspapers, magazines and publication houses
Emergence and growth of Indian news agencies

Module III: The newsroom Set-up
Various departments in Editorial set-up
Hierarchy in the Newsroom
Qualities and responsibilities of a reporter
Sources and beats

Module III: News Reporting
What is News, News Value and Sources of News
Basic elements of News
Writing a News Report
Types of leads & Body text
Interviewing skills required for reporting
Types of Reporting

Module IV: Editing News
Role and functions of desk
Role of copy editor
Electronic Copyediting
Rewriting
Writing Headlines and captions
Understanding the importance of style guides
Newspaper design & Layout

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	5	15	5	70

Components Codes

Project	P
Case Discussion/Presentation/Analysis	C
Class Test	CT
Attendance	A
End Semester Examination	EE

Text & References:

- History of India Journalism; Natarajan, J.
- History of Indian press: Growth of Newspaper in India; Ahuja, B.N.
- Journalism Reporting; Sharma, Seema
- Communication for Development In the Third world; Melkote, Srinivas R.
- Editing; Ahuja, B.N. &Chhabra, S.S
- News Reporting & Writing, A.L. Lawrenz;
- Handbook of Journalism & Mass Communication
- Vir Bala Aggarwal, V.S. Gupta

Syllabus - Semester Second

BASIC PHOTOGRAPHY

Course Code: JRN2251 **Credit Units: 03**

Course Objective:
This unit introduces to the basic techniques of photography and it's applications in Mass Media with specialization in specific area. This course gives an opportunity to the student to get accustomed to this universal language of expression and communication and exhibit their skills to explore, understand the significance and utility of photographs as an effective medium of communication.

Course Contents:
Module I: Introduction to photography
Brief History of photography
Uses of Photography
Principles of light
How photography works

a. image capturing
b. film processing
c. print processing

Module II: Camera
Elements of a Camera (Introduction) – view finder, lens, iris, shutter, film chamber, light metre
Camera Designs –

a. pinhole camera,
b. view camera,
c. compact camera,
d. T L R
e. S L R,
f. Instant/Polaroid camera,
g. digital camera

Exposure control in camera

Module III: Films & Camera Accessories
Film formats & their use
Lenses - prime &zoom lens

a. angle of view
b. Aperture & f-no.
c. Depth of field, how depth of field works
d. Depth of focus
e. Lens care

Camera accessories

Module IV: Photography & Darkroom Practicals
Outdoor Photography Assignments
Introduction to Darkroom Equipments and their uses
Developing & Printing B&W Films
Developing, Printing and Enlarging B&W Prints
Portfolio and Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

<u>Components Codes</u>

Project	P
Case Discussion/Presentation/Analysis	C
Class Test	CT
Attendance	A
End Semester Examination	EE

Text & References:

- Basic Photography; Langford, Michael (Focal Press)
- Photography, Handbook, Wright, Terence
- Photography, History; Spira, s f
- A simple guide to 35mm photography; Corbett, Bill
- The Darkroom Cookbook; Anchell, Stephen G.

Syllabus - Semester Third

TV JOURNALISM

Course Code: JRN2351 **Credit Units: 03**

Course Objective:
Students will move further into broadcast journalism in India. The unit will cover the process of how news develops and is moulded into essentials of any medium (Radio or TV) over a chain of processes. The basic attributes and skill set needed to pursue a journalistic path will also de debated and discussed. The unit will encourage students to identify the similarities and differences between key processes in both the mediums. The organizational set up will also be communicated for a better understanding of the functioning of a broadcast media organization.

Course Contents:

Module I: Basics of TV journalism
Qualities of a journalist
Developing sources of news gathering
Process of a report from the idea till its final implementation
Essentials during reporting
Live reporting and presenting the final story
Different styles of functioning for different beats
Basic Interview Skills: different types of interviews, approach, arrangements, research
Stages of production: pre, shoot and post.

Module II: Functioning of a TV organization
Hierarchy of a TV set up
Television Personnel – director, floor manager, audio technician, controller, cameraman
Role of a producer
Technical Process of news from initial stages to telecast.
Working process involved during live bulletin and recorded programme
Role/ contribution of each department and personnel
Hierarchy of a news organization
Professional terminologies

Module III: Outdoor production
Basic shooting according to shooting script
Team members and their role
*P*recautions and safety features while shooting
Single and multi-camera shoot
Shooting for fiction
Shooting for non-fiction
Building a sequence in the camera and without external editing
Process and elements of EFP (Electronic Field Production) and ENG (Electronic News Gathering)
OB (Outdoor Broadcast) Van
Satellite Phone

Examination Scheme:

Components	H	C	CT	A	EE
Weight age (%)	5	5	15	5	70

Components Codes

Home Assignment	H
Case Discussion/Presentation/Analysis	C
Class Test	CT
Attendance	A
End Semester Examination	EE

Texts & References:

- Television Production Handbook; Zettl, Herbert
- Video production, BelavadiVasuki
- Writing and Production Television News; Gormly, Eric K.
- Broadcast News Production; Schultz, Brad
- Digital Broadcasting Journalism; Sharma, Jitendra K.
- Broadcast journalism; Boyd, Andrew
- Broadcast journalism; Cohler, David Keith
- Television & Social change in Rural India; Johnson, Kirk
- Producing Public Television, Producing Public Culture; Dornfeld, Barry

Syllabus - Semester Fourth

TV PRODUCTION AND PRESENTATION

Course Code: JRN2451 **Credit Units: 03**

Course Objective:
The module is structured for the students to move further into TV journalism. It shall explore strategies to *handle* key areas within broadcast journalism.
The skill for anchoring and presentation will be honed after explaining the nuances and essentials of the task. This module will also familiarize them with all that is needed for outdoor production and the role of important departments on location. From this unit onwards, they will be exposed to essentials of specialized coverage in the field of current affairs, sports, business etc.

Course Contents:
Module I: Anchoring and presentation
Qualities of an anchor
Role of styling (makeup techniques)
Anchoring according to program formats
News anchoring, Entertainment, current affairs, magazine shows etc
Anchoring techniques: live shows & recorded programmes
Discussing different news anchors of the industry
Using the teleprompter
Piece to camera

Module II: Editing (Post-production)
Basic FCP (Final Cut Pro) Tools of Editing
Basic Transitions (cut, dissolve, fade, wipe)
Sequencing shots
Concept of montage
Continuity vs. non continuity
Linear vs. non linear editing
Role of the editor
Ingest and digitize
Overlay and underlay of sound
Ethics involved in editing
Importance of File footage and archival footage
From finished product to broadcasting

Module III: Specialized coverage I
Current Affairs
Documentaries and Features
Business and stock market reporting
Sports coverage
Legal reporting and Judiciary
Psephology and election based coverage
Political & parliamentary coverage

Examination Scheme:

Components	**P**	**H**	**CT**	**A**	**EE**
Weight age (%)	5	5	15	5	70

Components Codes

Project	P
Home Assignment	H
Class Test	CT
Attendance	A
End Semester Examination	EE

Texts & References:

- Television Production Handbook; Zettl, Herbert
- Video production, BelavadiVasuki
- Writing and Production Television News; Gormly, Eric K.
- Broadcast News Production; Schultz, Brad
- Digital Broadcasting Journalism; Sharma, Jitendra K.
- Broadcast journalism; Boyd, Andrew
- Broadcast journalism; Cohler, David Keith
- Television & Social change in Rural India; Johnson, Kirk
- Producing Public Television, Producing Public Culture; Dornfeld,

Syllabus - Semester Fifth

NEW MEDIA

Course Code: JRN2551 **Credit Units: 03**

Course Objective:
Apart from discussing specialized coverage, *the concept of* convergence will be explored in this semester. The power of the Internet has penetrated every nook and cranny of life. Journalism has also been revolutionized with the inclusion of the World Wide Web for newsgathering and news dissemination. Aspiring journalists today need to be familiar with cyber journalism and the basics of web designing. The course curriculum has been designed, keeping this end in view

Course Contents:

Module I: Specialized coverage – II
Disaster & crises coverage
Science and technology
Environment, Poverty, and Gender

Module II: Convergence
What is convergence?
Emergence of convergence and its effects on broadcast media
Language, structure and technology of new media
Creative, Business, Technical Skills in Convergence Media Programming

Module III: Cyber Media
Cyber Journalism: History of Internet
Comparison of cyber media with Print, TV, Radio.
Writing for Web Media
Online as a publishing medium
Online as an advertising tool
Why Print & Electronic Media networks are going on the Net?
Impact of Web Journalism on reading habits of people and media industry.
Analysis of important Indian news-based websites
Impact of globalization on Web Journalism
Cyber Laws and debates
Concept of e-governance & e-learning
Finding information on the World Wide Web
Writing for blogs

Examination Scheme:

Components	**P**	**C**	**CT**	**EE**
Weightage (%)	5	5	15	70

<u>Components Codes</u>

Project	P
Case Discussion/Presentation/Analysis	C
Class Test	CT
End Semester Examination	EE

Text & References:

- Journalism Online, Mike Ward
- The Internet Complete Reference; Harley Hahn
- The Web Writer's Guide, Koppel
- The Ethics of Cyber space; Hamelink, Cees J.
- E-government; Bhatnagar, Subhash
- Cyber Media Journalism Emerging Technologies; Chakravarthy, Jagadish

Syllabus - Semester Sixth

MEDIA ANALYSIS

Course Code: JRN2651 **Credit Units: 03**

Course Objective: The objective of this course is to provide a clear understanding of trends, movements and principles of journalism, problems and issues in newsgathering.

Course Contents:

Module-I: Problems and Issues in Newsgathering Objectivity Introduction to defamation Activism in journalism Embedded reporters Credibility of sources Pressures on media – internal, governmental, advertising, PR

Module-II: Commercialization of media, Media trials, Changing Equations in media business – mergers & acquisitions, cross media holdings, new trends Media ethics

Module-III: Alternate media Citizen Journalism Blogs as alternate media Community media

Module-IV: Broadcast Regulations Overview of Broadcast law Evolution of Broadcast Bill Cable TV Regulation Act

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

Texts & References:

Text

- Mass communication In India; Keval J. Kumar
- Communication for Development In the third world; Melkote, Srinivas R.

References

- India's communication Revolution; Singhal, A. & Rogers, E. M.
- Media in a Globalised Society; Stig Hiarvard
- Media Management in India; Prassana K Biswasroy
- Government Media, Autonomy and After; G S

Amity School of Communication

Master of Arts Journalism & Mass Communication

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Master of Arts Journalism & Mass Communication

Programme Overview

MA J&MC programme offered by Amity University Haryana is a two-year post graduate programme which encompasses different aspects of journalism and mass communication in depth. The programme imparts not only theoretical knowledge but also lays equal emphasis on technical skills and hands on training. The curricullum of the programme is such designed that it covers all important streams of mass communication. In order to make students industry-ready, two internships form an integral part of the programme. The programme provides a sound foundation to students who wish to be a part of the media industry or make a carreer in the field of academics.

The Master of Arts (Journalism and Mass Communication) is a professionally taught and managed post-graduate course, aimed at creating industry ready students. Students are suitably and competently equipped with a plethora of skills and knowledge database, ready to take on all the challenges and demands that the journalism and media industry makes on those who enter it.

Programme Outcomes (PO's)

On completion of the Masters of Arts (Journalism & Mass Communication) programme, the student will be:

PO1: **Critical Thinking:** Identify, classify, describe and critique communication theories and concepts from different perspectives.

PO2:**Effective Communication**: Apply, interpret, produce, schedule, modify, create and write clearly in person and through different media in one or more languages and make it meaningful for the world by connecting people, ideas, books, media and technology.

PO3: **Social Interaction**: Demonstrate, dramatize, illustrate, and relate views of others on different ideas and situations mediate disagreements and help reach conclusions through effective interactions in group settings of the society.

PO4: **Effective Citizenship**: Discover, analyze, and question authorities for social concerns and volunteer for nation development with the ability to resolve issues and participate in social activities/discussions as a responsible citizen.

PO5: **Ethics:** Criticize, appraise, assess, justify and summarize decisions analyzing various dimensions of the situation and accept the moral responsibility for the action taken.

PO6: **Environment and Sustainability**: Analyze, argue, judge and interpret the impact of professional and social communication and decisions in a global, economic, environmental and societal contexts for sustainability in which they operate.

PO7:**Self-directed and Life-long Learning**: Recognize the need for and acquire the ability to engage in independent and life-long learning having self-motivated attitude for research and development for his/her professional growth and also for the betterment of the society as a whole.

Program Specific Outcome (PSOs):

On completion of the Master of Arts (Journalism & Mass Communication) Programme, the student will be able to:

PSO1: Apply fundamental knowledge of mass communication courses to understand essentials of mass media.

PSO2: Apply theoretical, technical and practical knowledge in varied fields of media and mass communication.

PSO3: Work professionally or to take-up career in industries or to pursue higher studies in mass communication and interdisciplinary programs by applying principles of management, ethics, communication and social issues.

PSO4: Apply the principles of problem solving, creative thinking, group dynamics, team building, leadership skills, decision making skills, contributing to overall personality and career development.

PSO1	PSO2	PSO3					PSO4
Apply fundamental knowledge of mass communication courses to understand essentials of mass communication.	Apply theoretical, technical and practical knowledge in varied fields of media and mass communication.	Work professionally or to take-up career in industries or to pursue higher studies in mass communication and interdisciplinary programs by applying principles of management, ethics, communication and social issues.					Apply the principles of problem solving, creative thinking, group dynamics, team building, leadership skills, decision making skills, contributing to overall personality and career development.
1	2	3	4	5	6	7	8
Basic Courses	**Production/Designing/Planning**	**Interdisciplinary domain**	**Management domain**	**NTCC (non-teaching credit courses)**	**Ethics/ social issues**	**Practical/Hands-on Practice/Industry Oriented**	**Value added courses**
Introduction to Mass Communication	Design Software	History, Culture & Society	Media Planning & Brand Management	Term Paper 1	Media Laws & Ethics	Dissertation	Basics of Communication
Print Journalism – Reporting & Editing	Advertising Planning & Strategy	Development Communication	Mass Media & Industry	Term Paper II	Media Analysis	Professional Project	Self Development& Interpersonal Skills
Media Arts I : Radio & TV	Print Design & Visualization			Summer Internship Evaluation			Foreign Business Language- I
Advertising: Concepts & Principles	Media Arts III: Film						Corporate Communication
Introduction to Photography	Digital Media Production						Behavioural Communication & Relationship Management
Specialized Reporting & Feature Writing	Media Arts IV: Cyber Media						Foreign Business Language - II
Media Arts II: Radio & TV							Interpersonal Communication
Public Relation & Corporate Communication							Leading Through Teams
Advanced Photography							Foreign Business Language III
							Cross Cultural Communication
							Professional Excellence

FIRST SEMESTER

JRN4101	**INTRODUCTION TO MASS COMMUNICATION**	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Students will be introduced to the basic aspects of human communication and especially mass communication. Mass Media industries have developed in unprecedented ways due to changes in the society, economy, and technologies. There has been a corresponding change in the way the role of mass communication has been understood. Theories have mostly responded to developments in the Western society but they help us to interpret how these industries interact with the society in the past, present, and future. While in other subjects, students will learn about contemporary forms, in this course they will be introduced to the traditional modes of communication and expression in India which have worked closely with local communities. With this basic grounding in place, students will be able to evaluate mass media within a wider context. Students will be introduced to new ideas through case studies, practical exercises, class presentations, screenings, and reading groups.

Course Objectives

The objective of this course is to

1. Explain theories of mass communication process and the mass media industries.
2. Help students become more skilled and knowledgeable consumers of media content.
3. Enhanced understanding of mass communication theory toward improving their own media literacy skills.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Describe of theories on communication

CO2. Explain significance of tradition media

CO3. Describe evolution of mass communication theories

Modules	**Blooms level***	**Number of hours**
MODULE 1: Introduction to Communication Process and elements of communications, Levels of communication: individual, group, organizational, mass communication, international and intercultural, Barriers to effective communication, Future of communication studies, Brief introduction to main communication models: wartime to postwar period, Three traditions in communication research: Users and gratification, lifestyle, and reception analysis Forms and Functions of communication	L1	13
MODULE 2: Traditional Media Introduction to traditional media, Oral Tradition of story-telling since early civilization, Influence of TM on all forms of mass communication in India, Types: street theatre, puppetry, music, dance, folk and tribal art, local fairs, Elements and case studies of each form, Strengths and limitations, Relationship with the society, Present Scenario, Tool for political, social, economic, and health awareness	L1	11
MODULE 3: Introduction to Mass Communication Definition and forms of mass communication, History of Western mass media, Four eras in mass communication theories, Era of mass society theory (1850-1940), Era of scientific perspective on mass media (1940-1950), Era of limited effects (1950-60s), Era of cultural criticism (1960s-1980s), Ongoing Debates, Growth of mass media in India	L1	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Rosengren Erik Karl (2000) *Communication: An Introduction*, London Sage Publications.
2. Denis Mc Quail (2005) (5th edn) Mc Quail‘s *Mass Communication Theory*, New Delhi Vistaar Publications.

Reference Books

1. Dr. Andal N. (2005) *Communication Theories and Models*, Himalaya Publishing House: Bangalore
2. Baran J Stanley & Davis K Dennis(2002) (2nd edn) *Mass Communication Theory: Foundations, Ferment, and Future, Singapore:* Thomason Asia Pte Ltd

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	2	3	--	--	1	1	1	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4102	**Print Journalism – Reporting & Editing**	L	T	P	C
Version	2021	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes various aspects of print journalism. The course begins with the history of Indian Press. It introduces basics of journalism and news reporting and editing. The aim of this course is to explore various dimensions of print journalism in concept and practice.

Course Objectives

The objective of this course is to

1. Provide an overview of the fundamentals of Print Journalism.
2. Introduce the students to the most important aspects of print journalism – reporting & editing.
3. Describe the growth of Press in India.
4. Outline the mechanics of newspaper designing

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Outline the history of print journalism in India.

CO2: Describe and apply various concepts of print journalism such as news, news values, style guides, reporting, editing, newspaper designing etc.

CO3: Describe the process of news reporting and editing.

CO4: Apply newspaper layout and design techniques

Modules	Blooms level*	Number of hours
MODULE 1: History of Press in India Press in pre-independent India, Growth of Press post independence, Role of English and vernacular press during freedom struggle, Emergence of newspapers, magazines and publication houses, Growth of Indian news agencies	L1, L2	10
MODULE II: Reporting What is journalism, What is News, News Values & Sources of News, Basic Elements of News, Qualities and responsibilities of a reporter, Interviewing skills required for reporting, Types of reporting, Structure of news report, Lead and types of leads, Body text, Newsroom set up, News Agencies	L1, L2, L3, L4	6
MODULE III:Editing Copy Editing, Role and functions of copyeditor, Newsroom, Desk management, Tools of editing, Editing marks and symbols, Editing on line, Rewriting, Headlines and captions, Style guides and importance	L1, L2, L3	6
MODULE IV: Mechanics of Newspaper Layout and Design Photo editing: Choosing a picture, Creative cropping, Giving captions, Relationship between newspaper content and design, Tools and techniques of layout designing, front page make up, types and typefaces, use of white space in layout designing, importance of dummy	L3, L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Parthasarathy,Rangaswami (2000).*Basic Journalism*, Delhi: McMillan India Ltd.
2. Kamath,MV (2009).*The Journalist's Handbook*, Noida: Vikas Publishing House Pvt Ltd
3. Dary, David (1973).*How to Write News for Broadcast and Print Media*, New York: Tabb Books.

4. Sarkar, N.N. (2008).*Art and Production*, New Delhi: Sagar Publication.

Reference Books

1. Melvin Menchor, *Basic News Variety*, Universal Book
2. Alder Elizabeth (1991)*Print that Works*, Boulder: Bull Publication, Colorado
3. Pabbock,Bruce T., *Graphics for Desktop Publisher*, US: National Text Book
4. Julian Harris, Kelly Leiter & Stanley Johnson (eds.) (1992)*The Complete Reporter: Fundamentals of News Gathering, Writing, and Editing*, Boston:Allyn/Bacon

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

ExaminationScheme:

Components	**H**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	--	1	1	2	3	--	1	--	3	--
CO2	1	1	2	2	1	2	1	1	2	2	--
CO3	--	2	2	--	2	--	3	1	--	2	--
CO4	2	1	2	1	1	--	2	1	2	2	3
CO5	1	1	2	2	1	2	--	1	2	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN 4103	MEDIA ARTS I: RADIO & TV	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Today broadcasting media is one of the most ruling media in day to day life. TV and Radio plays a very vital role in dissemination of the information and to communicate with the masses not only to cover the national issues but also to go for parachute coverage. This course outline helps students to develop the basic concepts and fundamentals for the broadcasting media not only textual but also hands on practice for the Television as well as Radio.

Course Objectives

The objective of this course is to

1. Impart knowledge of basic working of Radio and TV as a medium of mass communication, also to apply knowledge of basic anatomy and working of the Radio and TV in India as well as in global domain.
2. Apply knowledge and skills required to know about the different broadcasting instruments in Television and Radio broadcasting Industry.
3. Engage in life-long learning and hands on technical expertise in handling the Basics of Camera, Light, Sounds and other equipment's .

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the different characteristics of Sounds – in film productions for both fiction and Non-fictions.

CO2. Identify and describe various concepts and instruments used for the capturing of Sound in broadcasting media.

CO3. Equipping the students with skills to be able to work on the lighting part- to understand the aesthetical approaches of lighting and different kinds and functions of lighting in the varied environment.

CO4. Analyze the different dimensions and applications of editing for making the raw footage to the finished one.

CO5. Demonstrate hands-on experience on anatomy of Video Camera, different kinds of video productions equipments and to learn the rules of the compositions.

CO6. Analyze the different approaches and aesthetical approaches in Film making and TV Productions.

Modules	Blooms level*	Number of hours
MODULE 1: Audio and Sound: The Characteristics The basic attributes: Loudness, Frequency, Intensity, Pitch, Amplitude, and Timbre, Sound Aesthetics- Spatial Hearing, Sound Isolation, Sound perspective (mono and stereo), Importance of speech in broadcast media, Sound and its functions, Functions of sound in relation to picture, Acoustics and psychoacoustics.	L1, L2	6
MODULE 2: Sound and Technical Approaches Types of microphones, Directionality and pick-up patterns, Cardioid, Omni directional, super-cardiod and hyper-cardiod, Quadraphonic and surround sound, Construction of mikes- dynamic mics and condenser mics, Positioning of mics- floor stand, hidden mics, camera mics, wireless mics.	L1, L4	6
MODULE 3: Lighting: The Fundamentals Nature, quality, lighting for TV, Colour temperature, Lighting instruments, Three point lighting, Creative additions to lighting for different genres.	L1, L2,	6
MODULE 4: Editing techniques Editing; principles and techniques, Continuity and non-continuity editing, Linear and non-linear editing	L1, L2, L3,	6
MODULE 5: Anatomy of Video Camera	L1, L3	6

The basic structure of a Video Camera, Working mechanism and basic parts of camera, Types of camera, Camera Mounts.		
MODULE 6: Broadcast: Rules and Approaches Camera movements & angles, shots, Composition principles, TV as a Medium of close ups, Role of sound / voice over in TV programs, TV as a medium of glamour, immediacy, democratizing, Infotainment.	L1, L2, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. Boyd, A. (1997). Broadcast Journalism: Techniques of Radio and TV news. Boston: Focal Press.

2. Belavadi, V. (2013). Video production. New Delhi: Oxford University Press.

3. Hakemulder, J. R., Jonge, F. A., & Singh, P. P. (2005). Broadcast Journalism. New Delhi. India: Anmol Publications.

4. Millerson, G., &Millerson, G. (1999). Television Production. Oxford: Focal Press. 13 edition.

Reference Books:

1. Trewin, J. (2003). Presenting on TV and Radio: An Insider's Guide. Amsterdam: Elsevier.

2. Utz, P. (2006). Today's Video. Jefferson, NC: McFarland.

3. Zettl, H. (2005). Television Production Handbook, Cengage Learning.

Other Books:

1. Chantler, P., & Stewart, P. (2003). Basic Radio Journalism. Amsterdam: Focal Press.
2. Chatterji, P. C. (1987). Broadcasting in India. New Delhi: Sage Publications.

3. Luthra, H. R. (1986). Indian Broadcasting. New Delhi: Publications Division, Ministry of Information and Broadcasting, Govt. of India.

4. McLeish, R. (1999). Radio Production: A manual for broadcasters. Oxford: Focal Press.

5. Shrivastava, K. M. (1990). Radio & TV Journalism. Sterling.

6. Sharma, R. (2012). Breakout nations: In pursuit of the next economic miracles. New York: W.W. Norton &.

7. Pavarala, V., & Malik, K. K. (2007). Other voices: The Struggle for Community Radio in India. Thousand Oaks, CA: Sage Publications.

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**2**	**2**	**2**	**-**	**1**	**-**	**-**	**1**	**2**	**3**	**3**
CO2	**2**	**1**	**1**	**2**	**1**	**-**	**-**	**1**	**2**	**3**	**3**
CO3	**2**	**2**	**2**	**-**	**1**	**-**	**-**	**1**	**2**	**3**	**2**
CO4	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**1**	**2**	**3**	**2**
CO5	**2**	**2**	**2**	**-**	**1**	**-**	**-**	**1**	**2**	**3**	**2**
CO6	**2**	**1**	**2**	**1**	**1**	**-**	**-**	**1**	**2**	**3**	**3**

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4104	ADVERTISING: CONCEPTS AND PRINCIPLES	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course will focus on basics concepts of advertising, its role & functions. The purpose of this course is to offer cutting-edge thinking on Advertising and explain how advertising works in the real world. The elaborative content will provide strong knowledge base to the students about Advertising and will enhance their critical and creative skills.

Course Objectives

The objective of this course is to:

1. Equip the students with advertising environment by understanding, identifying and analyzing important concepts.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Comprehend role and functions of advertising.

CO2: Identify various types of advertising and structure with in advertising agency.

CO3: Analyze role of various department of agency and making of a campaign.

CO4: Comprehend the role of Segmentation, Targeting and position in campaign planning

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Definition and key concepts of advertising, Advertising Types, Role and Functions	L1, L2	10
MODULE 2: Advertising as a tool of marketing The Marketing Planning ,Relationship of Marketing with Advertising ,Situation Analysis to the Marketing Mix, Market Share, Target Segment, Positioning, Developing Advertising from Marketing	L1, L3	7

Objectives		
MODULE 3: Understanding advertising agencies Advertising Agencies, Types of Advertising Agencies, Advertising agency structure, Functions of various departments, Workflow in An Agency, Pitching , Account Planning, Media Planning, Copy Writing	L1,L2,L4	7
MODULE 4: Segmenting, Targeting and Positioning (STP) strategy Market Segmentation, Markets, market segments and niches, Meeting editorial needs, Basis for segmenting consumer markets, Targeting strategies, Undifferentiated targeting, Differentiating targeting, Niche targeting, Various positioning strategies, Benefit approach, Price – Quality approach, User approach, Product category approach, Competitor approach	L1,L2,L3	11

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Jethwaney, J. & Jain, S (2006). *Advertising* (6th Ed). Oxford University Press.
2. Chunawalla, Sethia, S. (2015). *Foundation of Advertising* (8th ed., Vol. 1). Himalaya Publications.

Reference Books

1. Mohan, M. (2008). *Advertising Management* (2008 ed., Vol. 8th, p. 429). McGraw Hill Education (India) Private Limited.
2. Thomas, C., & Guinn, O. (1999). *Advertising* (1st ed., p. 694). South-Western College Pub.
3. Wells, Moriaty, Burnett. (2006).*Advertising Principles & Practice* (7 Ed) Pearson Prentice Hal.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	1	2	--	--
CO2	1	1	--	--	--	--	--	1	2	--	--
CO3	1	1	--	--	--	--	--	1	2	--	--
CO4	1	1	--	--	--	--	--	1	2	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4105	INTRODUCTION TO PHOTOGRAPHY	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Photographs are an effective communication medium and students will explore this immensely artistic as well as highly technical media in this unit. The importance of photographs, techniques and utility of photography and it‘s applications in mass media will be made clear to them. The unit will expose them to the intricacies of developing, printing and enlarging photographs.

Course Objectives

Course Objectives

The objective of this course is to

1. Learn to shoot with digital cameras maximizing the quality of the output.
2. Appreciate more about the "Photographer's Art" through the study of historic and contemporary trends.
3. Develop the habit of looking closely at the visible world around you in order to represent it in terms of aesthetics, beauty and truth.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Operate Cameras in Manual Mode, Zone System, Multiple Exposures

CO2. Demonstrate knowledge of Depth of Field Preview, Lens Compression, Avoiding Lens Distortion, Panoramas,

CO3. Demonstrate knowledge of Lighting ; High-Key Lighting, Rule of Visual Weight, Visual Composition Tools, Colour Management, RAW Workflow,

CO4. Operate Advanced Camera Settings, Dust Specks, Noise, Lens Corrections, Chromatic Aberration, Sharpening, Printing.

.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and applications Historical background, stages of development Requirement and utility of photographs Principles of light Working of Photography	L1, L3	10
MODULE 2: Camera & Accessories Various still photography cameras & its types (Including pinhole, view camera, compact camera, T.L.R., S.L.R., digital camera, D-SLRs) Lenses, its type ,Exposure Control in SLRs Aperture ,Shutter ,Films, its types and sizes	L1, L3	6
MODULE 3: Aesthetics of Photography Depth-of-field Composition & its Rules Outdoor & indoor lighting	L1,L3	10
MODULE 4: Photography Practicals Handling of camera, studio lights Practicing outdoor, indoor in B. & W. and Colour Developing, Printing and Enlarging (B. & W.) Assignments / Portfolio /Presentations	L1, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Langford Michael. (2013), *Basic Photography*; Burlington: Focal Press
2. Corbett Bill. (2002), *A simple guide to 35mm photography*, Sydney:4C Publishing Pty Ltd

Reference Books

1. Stephen G. Anchell (2002). The Darkroom Cookbook; Burlington: Focal Press
2. Naomi Rosenblum. (2008),*A World History of Photography*,New York, Abbeville Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	--	--	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4106	**DESIGN SOFTWARE**	L	T	P	C
	2021	2	1	2	4
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This unit is designed to initiate the student into the rudiments of design and application of design in all walks of life that we see all around us. The student will learn and imbibe important typographic principles, use of fonts and fontography, use of color, color harmonies and tonal balance. The vitally important role that symmetry, balance, images – both vector as well as bitmaps, play in creating a harmonious and aesthetically appealing composition will all be explained with real world examples of practical design being implemented in advertising and mass communication.

Course Objectives:

The objective of this course is to:

5. Enable the students to comprehend principles of design using a blended learning approach
6. To familiarize students with all aspects of software, both at the beginner as well as at an intermediate level
7. To integrate seamlessly both theoretical as well as practical aspects of design such that the learner is able to instantly identify design principles incorporated in the physical realm, be it print, net, web, film or television.

Course Description

This course covers all aspects of designs from the traditional orthodox straightforward design principles to contemporary design principles and application. Not only are the traditional fields such as print and broadcast design covered but also newer areas like UI/UX and game design also are briefly covered in this course. By and large however, it is meant to teach print design and layout basics through a well interwoven thought out course that embeds practical constructional projects at every stage of theoretical information imparted. Students are taught to think critically and question traditional concepts as well as come up with their own models and ideas.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least three print design software, notably Adobe Photoshop, Illustrator and In Design. They will also be conversant with Corel Draw, at a basic level.

CO2. Be able to visualise and conceptualise layouts for Print, Web and Multimedia.

CO3. Be proficient at delivery of design projects, both at a conceptual level and at the execution stage.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professional quality work can be outputted and exported.

Modules	Blooms level*	Number of hours
MODULE 1: Manual and Computer Aided Design Differences between traditional design, primarily for print as compared to designing for the web, the internet, and for television and film will	L1, L2	4

be compared and contrasted, and how these inherent differences can be optimized for a specific media will be explained and expounded upon. The importance of computer as a design tool as well as the different software currently prevailing in the industry are also highlighted and a broad overview imparted of each software with its distinguishing features		
MODULE 2: What is Design? Design Elements, Design Principles. How elements and principles helps in design.Where and how these elements and principles are applicable. How do different design elements combine and collaborate together to create an overall 'look' and feel for the published output – be it a web page, a brochure or a billboard hoarding.	L2, L3	6
MODULE 3: Typography History of fonts, Sizes of fonts, Classification of fonts, True Type and Open type. Breakdown of a word into typographical elements and ligatures, designing a custom font from scratch, all form part of this particular module. Each concept that is explained is generously illustrated with practical examples drawn from mixed media	L2, L3	6
MODULE 4: Hardware and Software From more theoretical concepts like Typography and design principles we move to the more practical aspects of implementing design on the ground through use of immersive technologies. Important aspects of hardware, notably the computer and accessories like printers, scanners and other input/output devices are explained. The student is also taken through the gamut of design software that exist that take full advantage of the computer's multitasking and multi-threading capabilities. In this module, only an overview of Digital Publishing software is given. In the next two modules, the most popular design software are explained at length	L2, L3,	6
MODULE 5: Fundamentals of Design Software The Editing of images, selection and cropping, integration of text with graphics, as well as the importance of resolution, image size, pixel depth, and the different sizes for print, web, broadcast and internet mediums such as Youtube are all covered in this module. Also different image file formats such as jpg, png, tiff etc along with transparency and scaling are also explained. From technical definitions we move on to the software itself, covering all basic aspects of industry standard software like Photoshop, Illustrator, Corel Draw and Adobe InDesign	L3, L4	8
MODULE 6: Design Software – Intermediate level	L3,L4	6

This module covers the above software in more detail and depth with overlying emphasis being given to integration of practical projects that employ all the theoretical knowledge imparted. Once a set of topics is taught, application of the same is demonstrated through several practical exercises that are not only structured but also graded in terms of complexity and applicability.		
TOTAL TEACHING HOURS		36

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

- Sarkar, N. M. Art & Print Production. 2013 Ed.
- Krug, Steve. *Don't Make Me Think: A Common Sense Approach to Web Usability*. New Riders Publishing, California. 2nd Edition
- Bauer, Peter. Adobe Photoshop CC For Dummies. Wileys. 2nd Edition
- Wood, Brian. *Adobe Illustrator CC Classroom in a Book* (2019 Release), Adobe Press. First Edition. December 2018.

Reference Books:

- Anton, Kelly Kordes. Cruise, John. *Adobe InDesign CC Classroom in a Book* (2017 release). December 2016.
- Norman, Don. *The Design of Everyday Things: Revised and Expanded Edition*. November 2013.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2	3	..	..	..	1	3	3	2

CO2	1	2	2	3	..	..	..	1	3	3	1
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	..	..	..	2	3	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4107	HISTORY, CULTURE AND SOCIETY	L	T	P	C
Version	2021	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Before stepping out into the field of mass communication and journalism, students need to have basic knowledge, curiosity, and awareness of politics, history, economics, and society. Various teaching methods and streams will be introduced (such as quizzes and debates) to make the students aware of contemporary issues so that they not only have opinions but also can intelligently analyze them in a broad perspective.

Course Objectives

The objective of this course is to provide an overview to students about politics, history, economics, social and science & technology.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Describe history of India; pre & post.

CO2. Explain Indian parliamentary structure & constitution.

CO3. Describe various issues related with Indian economy.

CO4.Explain the concepts of globalization and societal structure.

CO5. Describe aspects of science and technology in India.

Modules	Blooms level*	Number of hours
MODULE 1: (History) What do you know of Indian history? Main periods in Indian history	L1, L3	8

Stories of some main events & personalities, Colonial Rule, Struggle for Independence, Modern Independent India, Division of States and the ongoing debates on autonomies of state, Post-Liberalization India Screening of Chanakya & Bharat EkKhoj.		
MODULE 2:(Politics) Parliamentary, Presidential, and Monarchy, Single party, two party and Coalition Governments, Federal and Centralized System, 3 wings of the Government: Judiciary, Legislation, and Executive, Chief national personalities figuring in current news, Important bills, Parliamentary Acts and Constitutional amendments passed by Indian Parliament over past 5 years, Important Supreme Court rulings over past five years Bi-polar and uni-polar world after fall of communism, Chief international personalities figuring in current news, Regions of conflict in the world Role of UN umbrella over past 10 years	L1, L3	6
MODULE 3: (Economics) India a mixed economy –feudalism, socialism, and capitalism, Industrial and agricultural economies, Developing, Developed, and Under-Developed economies, Role of Private and Public Enterprise in the economy, Role of Banks: RBI, World Bank, Asian Development Bank, Regional economic groupings and their functioning, The European Union and its expansion, World Economic Forum, Indian Economy: Growth Patterns	L1,L3	8
MODULE 4: (Society) Globalization and its cultural impact, Global warming and environment Naxalism and Marxism, Family, marriage, and gender relationships, Cultural shifts in Indian society, Urbanization & migration, Growth of Entertainment Industry, Shifts in the Indian Sports Scenario, Criminalization of politics 13,Reservation& Positive Affirmation New Age Spiritualism/ Health	L1, L3	8
MODULE 5: (Science and Scientific Temper) Modern day debates on War and warfare ,Debates on Nuclear Non-Proliferation, Nanotechnology, Latest developments in bio-technology Nobel Prizes in Science, Debates on Cloning	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Jawaharlal Nehru. (2008),*Discovery of India,* New Delhi,Penguin.
2. BipanChandra.(2009),*History of Modern India* DelhiOrient BlackSwan

Reference Books

1. Ramesh Singh. (2001) *Indian Economy* ,USA McGraw Hill

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

O, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	1	--	--	--	1	1	3	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4201	**ADVERTISING PLANNING AND STRATEGIES**	L	T	P	C
Version	2021	2	1	0	3
Pre-					

requisites/Exposure	
Co-requisites	

Catalog Description

This course describes all the nitty gritty of advertising. It includes steps in developing an advertising plan, consumer behavior, preferences and compulsions. The aim of this course is to explore various creative advertising strategies and ethics involved in advertising.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of creative fields and strategies involved in making advertisements.
2. Provide an overview of consumer behavior and ethics in advertising.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Identify and develop various steps in advertising plan.

CO2: Describe the decision making process as consumer behaviour and apply to create advertising plan.

CO3: Apply and describe ASCI code of advertising practice and ethics in advertising.

CO4: Classify and apply advertising strategies to create advertisements.

Modules	Blooms level*	Number of hours
MODULE 1: The Advertising Plan Steps involved in developing an advertising plan Situation analysis, Identify target audience, Determine communication objective, The Creative Plan: Copywriting, The Media Plan: selecting the communication channel, Determining the advertising budget, Deciding on the communication mix, Evaluation	L2, L5	10
MODULE 2: Advertising and Consumer Behaviour The Decision Process: Low-Involvement Decision Process, High-Involvement Decision Process, Stages in the Decision Process	L1, L3	8

MODULE 3: Advertising and Ethics ASCI Code of Advertising Practice, Truth in Advertising, Advertising to Children, Advertising Controversial Products	L1, L3	8
MODULE 4: How Advertising Works Rational to Emotional Approaches, Advertising Strategies: Generic, Preemptive, USP, Positioning, Brand Image Approach, Resonance, Affective, Concepts of an Advertising Brief, Study of various elements of a brief and how advertising evolves out of a brief.	L1, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Jaishri N. Jethwaney (1999). *Advertising*, New Delhi, Phoenix Publishing House Pvt. Ltd.
2. Chunawalla, S.A. &Sethia, K.C (2002). *Foundation of Advertising Theory & Practice*, 7th ed., Himalaya Publishing House.
3. David Ogilvy (1985). *Ogilvy on Advertising*, 1st ed., New York, Vintage Books: A Division of Random House.
4. Rathor, B. S. (2003). *Advertising Management*, 11th ed., New Delhi, Himalaya Publishing House.

Reference Books

1. Batra Rajeev, John G Myers & Aaker David A. (1995). *Advertising Management*, 4th ed., New Delhi, Prentice Hall of India.
2. Frank Jefkins (2003). *Advertising*, Macmillan India Limited.
3. J. Thomas Russell (2008). *Advertising Procedure*, 17th ed., Pearson Prentice Hall
4. Lewis Herschell Gordon (1994). *The Complete Advertising and Marketing Handbook*, Chennai, East West Books (Madras) Pvt. Ltd.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance.

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	--	2	1	2	--
CO2	1	--	--	--	--	--	--	2	1	--	--
CO3	1	2	--	--	3	--	--	2	1	2	--
CO4	1	1	1	2	3	--	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN 4202	**PRINT DESIGN AND VISUALISATION**	L	T	P	C
Version	2021	2		2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course prepares the students for a career in the print industry. It comprises of modules that move from theoretical concepts like page sizes, resolutions etc to using software to craft print publications for newspapers and the advertising industry.

Course Objectives:

The primary objectives of this course are to:

- Introduce students to design concepts like layout, use of positive-negative space etc.
- Familiarize them with the juxtaposition of fonts, images and text to create compelling print material for publication
- Teach them how to effectively use software to create advertisements, banners and magazine layouts for printing and publication

Course Description

This course moves seamlessly from the definition and description of layout and design theoretical concepts to the actual realization of these concepts in print. Various concepts and jargon used by the print industry are explained and demonstrated, culminating in the use of software to translate design concepts into visually appealing printed material. Fundamentals of advertising and media campaigns are also an integral part of this course

Course Outcomes:

On completion of this course, the students will be able to:

CO1. Describe various style sheets for print media.

CO2. Comprehend how images, text and fonts interact to create pleasing layouts.

CO3. Use different design software to edit and accomplish print related tasks

CO4. Use design skills and knowledge of software to create one or more professionally designed projects.

Modules	Blooms level*	Number of hours
MODULE 1: Module I: House Styles What is style sheet? How to create style sheets? Style guide: examples from newspapers, magazines; own guide produced for new publication. Styles: choice of typeface and masthead, choice and use of images and color, positioning of articles and images on the page, use of headlines in an appropriate font, point size, number of lines etc., text manipulation, juxtaposition of text/images/advertising, Typography.	L1, L2	8
MODULE 2: Comparison in newspapers and magazines What is the difference between Newspaper & Magazine layouts? What needs to be taken care when creating layouts for Fashion feature or Business articles or News pages. Which software is to be used - for making layouts, creating vector graphics and raster images? Proper utilization of design elements and principles in layouts.	L2, L3	6
MODULE 3: Advertising concepts Corporate Identity: Usage of Types & Fonts, Color schemes, Punch line, Orientation. Corporate Stationary: Logo, Letterhead design, Business Cards, Envelopes, Catalogues, Brochures, Digital Posters, Calendar Design. Communicating through multiple media: Digital and print	L2, L3	6
MODULE 4: Relevant software to design advertisements Advertising campaigns: Developing advertising campaigns from concept to creation, from creative to presentation. Photoshop, PageMaker, Corel Draw, Illustrator and their relevant usage in creating different forms of design for advertisements and campaigns.	L2, L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

- Sarkar, N.N(2001). *Art and Print Production*. 6th Ed.
- Lupton, Ellen(2015). *Graphic Design: The New Basics*. 2nd Ed.

Reference Books

Moggridge, Bill(2010). Designing Media. The MIT Press.
Shaoqiang, Wang(2018). *Page Design: Printed Matter and Editorial Design*.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	3	-	-	-	2	1	2	3
CO2	3	2	3	3	-	-	-	2	1	2	3
CO3	1	2	1	3	-	-	-	2	1	2	2
CO4	1	3	2	3	-	-	-	2	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4203	**Specialized Reporting And Feature Writing**	L	T	P	C
Version	2021	2	-	2	3
Pre-requisites/Exposure	Print Journalism – Reporting & Editing				
Co-requisites					

Catalog Description

After introducing the basics of newspaper reporting and editing in the first semester, this course describes the issues of specialization in news. The course introduces the concepts of beat reporting and also deals with the subtle differences between reporting on politics, business, sports, crime etc. The course also describes the nuances of investigative reporting with discussion on relevant case studies.

Course Objectives

The objective of this course is to

1. Introduce beat reporting and discuss the finer points of specialized writing.
2. Explain how reporting is different for various beats like crime, health, education, politics etc.
3. Provide knowledge regarding investigative reporting and its tools.
4. Provide understanding for different types of journalistic writing.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe differences and similarities between different journalistic beats.

CO2: Describe and apply various concepts of beat reporting.

CO3: Explain investigative reporting in depth; especially sting operations.

CO4: Apply conceptual knowledge to write different types of features and reviews.

CO5: Argue if sting journalism is a healthy practice in a democracy.

Modules	Blooms level*	Number of hours
MODULE 1: Beat Reporting Covering a news beat, coverage of various beats: crime, education, health, civic affairs and local government, political reporting(political structure in India, covering political parties/events/rallies/elections), parliament reporting (parliament structure, reporting on legislature), covering the government (PIB, ministries), legal reporting (Structure in jurisdiction of courts, reporting court hearings, precautions)	L1, L2	12
MODULE II: Business and Sports reporting Basic business knowledge and business bodies, corporate reporting, covering economic policy (Ministry of Commerce, Finance, Industry, Company Affairs, and other infrastructure ministries), stock market coverage, how to develop good sports writing skills, covering local, national internal level events, entertainment and lifestyle reporting	L2, L3	8
MODULE III: Investigative Reporting Definition and elements, tools of investigative reporting, importance of sources, sting operations and latest trends, relevant case studies: Indian and international	L1, L5	9
MODULE IV: Feature Writing How to write a feature, different types of features, book reviews and film reviews	L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Sharma, Seema (2005) *Journalism:Reporting*, New Delhi: Anmol Publications Pvt. Ltd.

2. Fox, Walter (2001)*Writing the News: A Guide for Print Journalists*, New Jersey: Wiley-Blackwell
3. Mencher, Melvin (1989)*Basic News Writing*, U.S.A. : William C. Brown Publication
4. Rajan, Nalini (2007) *21st Century Journalism in India*, New Delhi : Sage India
5. Rick Wilber & Randy Miller (2002*) Modern Media Wring*, Belmont : Wadsworth Publishing Company

Reference Books

1. Hough, George A. (1995) *News Writing*, Boston : Houghton Miller
2. Fink, Conrad C. (2001*) Sports Writing: The Lively Game*, New Jersey : Wiley- Blackwell
3. Keeble,Richard (2001)*The Newspaper Handbook*, Abingdon : Routledge
4. Kamath,MV (2012*) Journalism Reporting,* Noida : Vikas Publication
5. Rosenauer,Kenneth L (2004)*Storycrafting: A Process Approach to Writing News*, New Jersey: Wiley Blackwell

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; a: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	--	3	2	3	--	2	1	2	2	--
CO2	2	1	2	1	2	--	2	1	2	2	2
CO3	3	2	--	2	2	3	--	1	2	2	2
CO4	--	1	2	2	2	2	2	1	2	2	2
CO5	--	--	1	1	1	2	--	1	3	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4204	MEDIA ARTS2: RADIO AND TV	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Various components of television production will be taught through praxis. Students will know about how a television organization operates and the finer nuances of reporting. Students will do on camera interviews and learn how to work in a PCR and studio.

Course Objectives

The objective of this course is to

1. Give students the opportunity to study the contemporary conventions and practices in Television and Radio Journalism.
2. Identify and examine key principles involved and required in news broadcasting.
3. Train the student in basics of news and feature reporting, writing and programming

Course Outcomes

On completion of this course, the students will be able to

CO1. Write scripts in different formats different genres; Radio and Television.

CO2. Describe roles & functions of various TV Newsroom

CO3. Demonstrate qualities of TV Journalist

Module	Blooms Level	Number of Hours
Module I: Writing For Media Writing styles for Broadcast Medium TV - Writing for visuals, Conversational Writing Terminology Script, screen play, story board, script formats Writing for different formats Radio- Writing for ear Style, Radio scripts for different formats, Jargon and terminology	**L1, L3**	**12**

Module II :Introduction to TV Journalism Basic contours and characteristics of TV news journalism. TV news room- hierarchy, role of each element in hierarchy The news process from field reporting to packaging and going on Air Various technical departments Functioning of each department Designations of technical staff Equipments or hardwares for a news channel Utility of each Importance of technical functioning in a news channel Coordinating with the newsroom Professional terminologies Functioning while working on a live bulletin and recorded programme TV news bulletin; rundown, stacking, blocking	**L1,L3**	**12**
Module III: Television Reporting: the human angle Qualities and attributes of a broadcast reporter. Essentials during reporting Live reporting and working on a story Different functioning for different beats Interviewing skills The news Anchor- qualities, role and responsibilities.	**L2, L3**	**11**

Text Books:

1. Page, D. & Crawley, W. (2001).*Satellites over South Asia*, (New Delhi) Sage Publications Ltd.
2. Sexena, G. (1996)*Television in India: Changes and Challenges*, (New Delhi) Vikas Publishing
3. Monroe, E. &Verhulust, S. (2001). Broadcasting *reforms in India: Media Law from a Global Perspective*, (New Delhi), Oxford University Press

References:

https://www.youtube.com/watch?v=Xs0K4ApWl4g
https://www.youtube.com/watch?v=6lKehR9HENE
https://www.youtube.com/watch?v=6PXORQE5-CY
https://www.youtube.com/watch?v=p8636YkEhU4
https://www.youtube.com/watch?v=Yaj2PXRswxI
https://www.youtube.com/watch?v=vtU_N57MZf8
https://www.youtube.com/watch?v=W8PBRBlW50I

Other Readings:

- Handout: Television:

Web Resources: (IF ANY)

- http://www.bbc.co.uk/radio4/factual/indiasroute66.shtml
- http://www.radiomirchi.com/
- **http://www.aljazeera.com/**

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	-	-	-	-	1	2	-	-
CO2	-	1	-	-	-	-	-	1	-	2	-
CO3	-	-	-	1	-	-	1	1	2	-	-
CO4	-	-	-	1	-	-	1	1	-	-	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

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JRN4206	PUBLIC RELATIONS AND CORPORATE COMMUNICATION	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is designed to help students understand the concepts of public relations (PR) and corporate communication practices. The students will understand the PR relations scenario and significance in India both in public and private organizations. They will get to analyze about different techniques of effective PR practices, producing and disseminating press material and releases. They will also explore how PR techniques are applicable in corporate communication for successful products and media management.

Course Objectives

The objectives of this course are to:

1. Define and analyse PR and its concept
2. Apply PR applications in different fields (political, social and public).
3. Explain PR campaigns its planning, organizing and evaluation.
4. Explain corporate communication and its relationship with PR strategies.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define and classify various concepts of Public Relation and distinguish its need for effective employee & community relations.

CO2: Describe and apply various aspects of planning a PR campaigns, targeting audience and managing media utilizing research as an effective tool.

CO3: Apply PR tools such as Press releases, Backgrounders, catalogues, Brochures, Journals, annual reports, writing company profile newsletter and organizing Press conferences.

Assessing its relation with Socio –Economic development, Journalism, Advertising, associated organizations such as PRSI and laws and ethics.

CO4: Identify Corporate Communication: its philosophy, culture, corporate identity, citizenship and Philanthropy, Image management, direct marketing, network marketing, issue management and Celebrity endorsement.

CO5: Apply tools of designing for corporate communication

Modules	Blooms level*	Number of hours
MODULE 1: Public Relations Basics of Public Relations: Evolution and History of PR Definitions and Concepts: PR definition and PR w.r.t allied disciplines Political and financial PR, PR as management function. Role and Objectives of PR (need of PR for effective employee & community relations) Publics in public relations: Internal and External PR, targeting the correct public. Public Relations in India and other developing countries. Globalisation& PR: Changing trends in PR	L1, L2	8
MODULE 2: Public Relations and Media Affairs Planning Process in PR: Research –Brief Intro of qualitative and Quantitative research methods and Media Planning, Implementation and Evaluation of Campaign and techniques, program budget & assessing results Event and Crisis management Media Relations (Understanding the Media, Media events and facility visit, principles of good media relations	L1, L3	7
MODULE 3: PR tools Press releases, Backgrounders, catalogues, Brochures, Journals, annual reports, writing company profile, Newsletter (types & contents)	L1,L2, L3,L6	7

Making press kit, organizing press conference (Role & importance, press reception and conference organization) Public Relations & Socio –Economic development Public Relations in Journalism and Advertising Public Relations Laws and Ethics PRSI, origin, Objectives and Achievements		
MODULE 4: Corporate Communication PR vs Corporate Communication Introduction, its need, importance and functions Elements of corporate communication: corporate philosophy, culture, corporate identity, citizenship and philanthropy Important concepts in corporate communication: Image management, direct marketing, network marketing, Issue management, Celebrity endorsement	L1,L2	7
MODULE 5: Tools of Corporate Communication Desktop Publishing (DTP) Corporate Communication through websites, designing of website Annual Reports: Budget, timing and general concepts of the annual report, essentials of designing a report Types of leaflets, formal and informal invitations, Designing of leaflets, invitations Blogs, Pod casting, chat rooms, social networking sites and current TV: Impact of citizen journalism and "Transparency" on Corporate communications practice	L1, L3,L5,L6	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

1. Gregory Anne (1999). Planning and Managing a Public Relations campaign: A step by Step guide. The institute of Public Relations: London. Kogan.
2. Cutli M Scott and Centre H Centre (1990). Effective Public Relations. (1990). Prentice Hall.

Reference Books

1. Sahai Baldev (2002). Public Relations a Scientific Approach. Scope Publication: New Delhi.
2. Mehta S D (2006) Handbook of Public Relation in India. Allied Publisher: New Delhi.
3. Kaul J N (1998). Public Relations in India. NyayPrakashan: Calcutta.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Practical, CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3	2	1	-	-	1	2	2	-
CO2	1	1	1	1	1	-	-	1	2	2	-
CO3	1	2	2	2	1	-	-	1	2	2	-
CO4	1	2	1	1	1	-	-	1	2	2	-
CO5	1	2	2	2	1	-	-	1	2	2	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4207	**Advanced Photography**	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes how to develop a unique photographic vision using a combination of aesthetics and technology. Using both practical's and theoretical teaching methods and blending traditional processes with current digital technologies, the photographic curriculum provides aspiring photographers with the breadth of experience and knowledge required to succeed in today's market place

Course Objectives

After Being exposed to the basics of photography in the first semester, the students will be eager to try their hands in the comparatively new area of digital photography and imaging. They will be able to start maintaining their portfolios and will be required to make digital presentations and undertake practical assignments.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Demonstrate Lighting essentials for creating incredible images, their importance and purpose of the main light in Photography.
CO2: Analyse aesthetics for various genres of photography.
CO3: Describe concepts of digital photography and imaging.
CO4: Apply techniques of Photo manipulation.
CO5: Produce portfolio in the genre of their choice.

Modules	Blooms level*	Number of hours
Module I: Advanced lighting and Composition Lighting and its control (source, Contents & Direction of light) Electronic Flash & Its synchronization One, Two- & Three-Point Lighting Working on the subject (Changing proximity, varying angle, tightly framing subjects)	L1,L2	8
Module II: Aesthetics Variations for various beats Portrait Wildlife, Nature and Landscapes Night Photography Journalism (Photography for newspapers and magazines)	L1,L2,L4	6
Module III: Understanding Digital Photography Digital Imaging Construction (Size, Resolution of Digital Images) Uses, Advantages and Limitations of Digital over conventional Photography image sensors (CCD and CMOS) Formats of a Digital Image Types of Digital Cameras	L1,L2	6
Module IV: Digital Image and Manipulation Problems with Digital Photographs Commonly used image editors Editing images with Adobe Photoshop and Photoshop Elements Printing and sharing Digital Images	L1,L2,L3	6
Module V: Advanced Photography Practical's Practicing outdoor Photography Photography Assignment and Projects Developing personal Digital Portfolio Digital Image Manipulation using various computer software	L1,L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Langford Michael. (2013), *Basic Photography*; Burlington: Focal Press

2. Corbett Bill. (2002), *A simple guide to 35mm photography*, Sydney:4C Publishing Pty Ltd

Reference Books

1. Stephen G. Anchell, The Darkroom Cookbook; Burlington: Focal Press
2. Naomi Rosenblum. (2008),*A World History of Photography*,New York, Abbeville Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	A	15	70

CT: Class Test, EE: End Semester Examination; A: Attendance; P: Practicals

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	2	--	--	--	--	--	1	2	2	2
CO2	--	2	--	--	--	--	--	1	2	2	2
CO3	--	2	--	--	--	--	--	1	2	2	2
CO4	--	2	--	--	--	--	--	1	--	2	2
CO5	--	--	--	--	--	--	1	1	2	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4209	MEDIA PLANNING AND BRAND MANAGEMENT	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course comes under a management domain which describes various concepts of media planning and brand management. It includes marketing and negotiation skills and concepts of selection of media mix and substantial marketing and branding research etc. The aim of the course is to explore various creative fields involved in the placement of advertisements and branding strategies and brand positioning decisions involved in managing a brand in the market.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of creative fields involved in media planning and buying for advertisements.
2. Provide an overview of the process of selecting and buying of media mix for the placement of advertisements.
3. Equip the students with the creative branding strategies involved in launching, building and sustaining brands.
4. Provide an overview of brand positioning and marketing of brands.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe media planning and select the media mix.

CO2: Describe and distinguish various media forms.

CO3: Select and apply research data to develop media strategy process.

CO4: Identify and explain media buying and complexities in media buying.

CO5:Define and describe various basic concepts related to brands.

CO6: Describe and classify various branding strategies.

Modules	Blooms level*	Number of hours
PART-I **MODULE 1: Media Planning** Planning is the strategic formulation of activities design to carry out the goals or objectives of the advertising program. The Planner decisions are directed by a series of questions: Whom is the campaign directed to Where will the campaign directed to When will the campaign run What degree of target coverage and repetition of exposure are necessary Integrating science with creatively in advertising Role of media in the Marketing Framework Media Planning Framework Developing Media Strategy- the media mix, Factors influencing media strategy decision Media availability & economics	L1, L2	10
MODULE 2: Overview Media types characteristic of major media forms Electronic Media- The global goose Outdoor Advertising- They do not circulate market circulate around them Transit Advertising Internet- new born medium for the millennium	L1, L2	3
MODULE 3: Matching Media & Market Geographical Selectivity, Reach & Frequency Maximizing Advertising Exposure Media Briefing Media Scheduling What patterns of exposure works best Timing the effective exposure and finding time opportunities to communicate and Media Budget	L1, L3	4
MODULE 4: Selecting and Buying Acceptable Media	L1, L2	3

Media Buying Functions New Media Increasing Complexity in Media Buying		
PART-II **MODULE 5: Brand Management** Evolution of Brands Brand & Products Brand Perspectives Brand Differentiation Brand Positioning Brand Image Brand Equity Brand Extension	L1, L2	12
MODULE 6: Branding Strategies Closing Branding Strategies Product Branding, Line Branding, Range Branding, Umbrella Branding, Source/Double Branding Endorsement Branding	L1, L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Croteam, David; Hoynes, William D (2005). The Business of Media. Corporate Media and the Public Interest. SAGE Publications, Inc.
2. Albarran, Alan B (2002). Media Economic (Understanding markets, Industries and Concepts). Wiley-Blackwell.
3. Kelley Larry D, Jugenheimer Donald W, (2009).Advertising Media Planning: A Brand Management Approach. Phi Learning.

4. Jack Z. Sissors, Roger B. Baron, (2010). Advertising Media Planning, Tata Mcgraw Hill Education Private Limited.
5. Harsh V Verma (2008). *Brand Management: Text and Cases*, Excel Books.
6. Keller, Kevin Lane, Parameswaran and Jacob (1998). *Strategic Brand Management*, Pearson Education.
7. S. A. Chunawalla (2004). *Compendium of Brand Management*, Mumbai: Himalaya Publishing House.

Reference Books

1. Menon, Arpita; (2010).Media Planning and Buying. Tata Mcgraw- Hill Education Private Limited.
2. Katz, Helen; (Jun 2010. The Media Handbook: A Complete Guide to Advertising Media Selection, Planning, Research, and Buying. Routledge.
3. Sissors, Jack Z., Goodrich, William B. (1996). Media Planning Workbook, McGraw-Hill Humanities/Social Sciences/Langua.
4. Philip Kotler. *Marketing Management*, Pearson Education.
5. Magazines- Business World, Time & Brand Reporter.
6. Brand Equity- a Wednesday Supplement with Economic Times.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, EE: End Semester Examination; A: Attendance; P: Project

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	2	2	1	--
CO2	1	3	--	--	--	--	--	--	2	1	--
CO3	2	1	--	--	--	--	--	--	2	1	--
CO4	2	1	--	--	--	--	--	--	2	1	--
CO5	1	3	--	--	--	--	--	2	3	1	--
CO6	1	1	2	--	--	--	--	2	3	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4210	**Media Trends and Technology**	L	T	P	C
Version	2021	1	1		2
Pre-Requisites/ Exposure					
Co-Requisites					

Catalog Description

Media industry is dynamic in nature. The technological advancements in media ensure that new innovative tends keep emerging. This course aims to introduce students to the contemporary trends and practices in the field of mass media. It will equip students with the advanced skills that assure to make them industry-ready.

Course Objectives

The objective of this course is to

1. Understand the changes and new trends in media industry.
2. Explain use of technology in online news platforms/ formats.
3. Describe the practices in mobile journalism.
4. Understand the emerging trend of drone journalism.
5. Describe ways to curb fake news.

Course Outcomes

On completion of this course students will be able to

CO1: Understand the changes in mass media to new media technology

CO2: Apply the concepts of Mobile Journalism and create content for mobile.

CO3: Describe the ethical practices in Drone Journalism.

CO4: Understand and apply tools to verify fake news.

Modules	**Bloom's Level***	**Number of hours**
Module 1: Convergence in Media-New Media Technology Introduction to media convergence; Overview of recent trends in mass media; Developments due to media convergence in Print media, Television, Cinema, Radio; Online News Reporting; Social Media- social engineering web, Social media platforms-toolkit, Twitter storm; New Media Laws and Cyber Security; Storytelling:Visual, Audio, and Video	L1,L2	6
Module 2: Mobile Journalism Introduction to Mobile Journalism; Advantages and Disadvantages; Scope, Opportunities and challenges; Tools used for mobile journalism; Creating content for mobile	L1, L3	7

journalism; Using social media platforms: AI,AR,VR; Blogging-microblogging, live blogging, Vlogs,		
Module 3: Drone Journalism Introduction to Drone Journalism; Uses and Advantages of Drone Journalism: Using Drones for News Reporting, Digital Terrorism; Devices used for Drone Journalism; Ethical guidelines and Laws: Issues related to trespassing and privacy	L1,L2	5
Module 4: Verification of Online Content Paid News; Misinformation, Disinformation; How False narratives are created; Ways fake news is spread; Effects of fake news; Tools to verify online content; News Analysis; Case Studies: Combating fake news in India	L1,L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

Text Book

1. Lugmayr, A., Lugmayr, A., & Dal Zotto, C. (2016). *Media Convergence Handbook - Vol. 1* (1st ed.). Springer-Verlag Berlin Heidelberg.
2. Burum, I. (2021). *The Mojo Handbook: Theory to Praxis*. Routledge.
3. Gynnild, A., &Uskali, T. (2018). *Responsible drone journalism*. Milton Park, Abingdon, Oxon: Routledge, an imprint of the Taylor & Francis Group.
4. Zimdars, M., & McLeod, K. (2020). *Fake news* (1st ed.). The MIT Press.

Reference Books

1. Burum, I., Quinn, S., & Quinn, S. (2015). *MOJO* (1st ed.). Routledge.
2. Chamberlain, P. (2017). *Drones and journalism. How the media is making use of unmanned aerial vehicles*. Basingstoke: Taylor & Francis Ltd.
3. Shu., & Baumann. (2020). *Disinformation, Misinformation, and Fake News in Social Media*. [S.l.]: Springer International Publishing.

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**

CO1	1	2					3	2			3
CO2	1	2			3		2	2		3	3
CO3	1	1						3	1		
CO4	2	3						3	2	3	
CO5	3	2			1			2	2	3	

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4301	MEDIA ARTS- III: FILM	L	T	P	C
Version	2021	2		2	3
Pre-requisites/Exposure	Media Arts 2: Radio and TV				
Co-requisites					

Catalogue Description: The finer nuances of cinema will be the core of this subject. Praxis is the method of all various production processes taught. Students will learn how to analyze and critiques various classics so as to understand human communication.

Course Objectives

The objective of this course is to

- Give students the opportunity to be able to interpret the language of filmmaking and its techniques.
- Train students in analyzing documentary films against mainstream commercial film genres.

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Course Outcomes:

On completion of this course, the students will be able to

CO1: Analyze cinema as an art form and human communication.
CO2: Interpret Classics and use it as reference to make films in the digital age.
CO3: Identify and critique factors that influence making successful cinema.
CO4: Examine different genres, apply the production methods in making a short film.

Course Content

Module	Blooms Level	Number of Hours
Module I: Introduction Language of cinema Shots, camera angles, movements Mise-en-scène Dimensions of Sound:sync and non-sync, soundeffets, and silence, dialogues, ambiant sound. Narrative Composition: 3 plot structure, Characterization&Dramatic Structure Ideation and Visualization, Screen Play, Storyboarding	L1, L2	10

Module II: **Production Overview** Three stages of Film Production: Pre-production, Production, Post Production Lighting Art Direction Departments and their role Role and importance of the director Division of roles between creative and technical personnel	L2,L3	10
Module III: **Aesthetics of film** Sound as a metaphor Importance of silence Miscen scene and interpretations Continuity vs discontinuity Film space and screen space Changing dimensions of pace and rhythm	L2,L4	8
Module IV: **Learning Outcome/s :** **Film Genres** Narrative and non narrative Fiction: romance, comedy, family drama, suspense thriller Documentary Film and its sub-genres The bollywood masala	L2,L4	8

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Resources:

a) Main text:

- Monaco, J. (1977). *How to read a film*, (New York) Oxford University Press

Nicholas, B. (1976).*Movies and Methods Volume 1*, (Berkeley) University of California Press

Nicholas, B. (1985).*Movies and Methods Volume 2*, (Berkeley) University of California Press

b) Additional Texts:

- Rabiger, M., (1987). *Directing the Documentary*, (Burlington) Focal Press
- Bordwell, D.; Thomson, K.,(1990). *Film Art: An Introduction* (New York) McGraw Hill
- Denzin, K. N. (1995).*The Cinematic Society*, SAGE Publication.
- Kabir, N.M., (2006). *Guru Dutt: A Life in Cinema*, (New Delhi) OUP

c) Other readings:

- Handout: Sound: Its Nature in Cinema, Arun Khopkar, (FTII)
- Handout: "Genre Cinema", Rick Altman
- Handout: Film History: An outline, Suresh Chabaria (FTII)

Assessment Scheme (more columns may be added for assessment):

Components	**Presentation/ Short film**	**Attendance**	**Quiz/CT**	**External Evaluation**
Weightage (%)	**10**	**5**	**15**	**70**

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	-	1	-	-	-	-	-	2	1	-	-
CO2	1	-	-	-	-	-	-	-	1	-	-
CO3	1	-	-	-	-	-	-	2	1	-	-
CO4	-	2	-	-	-	-	1	-	1	-	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4304	**Media Laws & Ethics**	L	T	P	C
Version	2021	2	-	-	2
Pre-requisites/Exposure	Print Journalism – Reporting & Editing Specialized Reporting & Feature Writing				
Co-requisites					

Catalog Description

Today's media is increasingly market driven, and the students in this course will learn about regulations and practices in media houses. The course talks in details about legal implications of news and other issues and laws which rule the everyday lives of newsmen. The course discusses in details various ethical issues.

Course Objectives

The objective of this course is to

1. Describe in detail various regulations like Contempt of Court, Right to Information, IPR to the future journalists.
2. Explain the importance and relevance of media ethics
3. Provide knowledge about the relevant constitutional framework such as freedom of speech and expression

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Explain the differences and importance of media laws and ethics.

CO2: Explain in detail relevant laws for reporting.

CO3: Describe codes of conduct for reporting, as given by different regulatory bodies.

CO4: Distinguish between different types of sources.

CO5: Recognize if the news report is legally safe.

Modules	Blooms level*	Number of hours
MODULE 1: Reporting Defining ethics, truth, fairness & objectivity, sources of information, Case Studies: Aarushi and the Indian Media	L1, L2	5
MODULE II: Constitutional Framework Constitutional Provisions on Freedom of Speech and Expression, Constitutional Restrictions on Freedom of Speech and Expression, Law on Morality, Obscenity and Censorship	L1, L2	6
MODULE III: Media Laws Contempt of Court, Defamation, Right to Privacy, Intellectual Property Rights, Right to Information (Official Secrets Act, 1923, Evidence Act, 1872), Cinematograph Act	L2, L3	11
MODULE IV: Media Ethics Editorial Content & Integrity, Editorial & Advertorial, Meeting Advertisers' Needs, Press Council Guidelines, Broadcast Regulation, Sting Journalism, Case Studies: Uma Khurana Sting Operation, Other Relevant Case Studies	L1, L3	14

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Hakemulder, R. Jan (2010). *Media Ethics & Laws*, Gaziabad: Anmol Publications Pvt Ltd
2. Neelamalar, M. (2009). *Media Law and Ethics*, New Delhi: Prentice Hall India Learning Private limited
3. Divan, Madhavi G., (2018), *Facets of Media Law*, Delhi: Eastern Book Company
4. Thakurta, Paranjoy Guha (2015). *Media Ethics: Truth, Fairness and Objectivity*, Delhi: Generic

Reference Books

1. Cristians, Clifford G (2016), *Media Ethics: Cases and Moral*, New York:Taylor and Francis
2. Ravindran, R K (1999), *Media & Society*, Delhi: Commonweath Publishers
3. Nanda, Vartika (2018), *Media Laws & Ethics: An Introduction to Legal and Ethical Issues in Journalism* ,New Delhi: Kanishka Publishers Distributers

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	2	2	1	1	--	3	2	3	1	--
CO2	1	2	--	1	3	--	3	2	2	1	3
CO3	2	2	--	1	1	3	--	3	2	1	--
CO4	3	--	3	--	2	--	--	3	2	1	--
CO5	1	2	--	--	3	--	2	2	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4305	**DEVELOPMENT COMMUNICATION**	L	T	P	C
Version	2021	2		2	3
Pre-requisites/Exposure	2021				

Co-requisites	None

Catalogue Description:

This course will help the students to understand the concept of Development Communication which is an interdisciplinary field, combining studies on culture, media, communication and development. This course will theoretically and practically make students explore communication as a process of social change within the local and global context. This course will highlight the importance of development communication as a connector between people, culture and their journey's specifically the marginalised.

Course Objectives

The objective of this course is to

1. To understand various development communication concepts, theories and principles.
2. Be conversant with the different dimensions of communication and development for social change.
3. Focus on advocacy and communication for sustainable social change.
4. Enhance and align to the capacity in participatory methodologies and communication techniques.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Recognize the principles of development communication.
CO2: Evaluate the relationship between communication and development
CO3: Analyze and evaluate key development issues
CO4: Analyze how the communication systems and methods bring attention to critical social issues
CO5: Develop communication material for broadcast media with understanding of other folk media like puppetry, theatre, etc for effective communication.

Course Content

Modules	Blooms level*	Number of hours
MODULE 1: Introduction • Definition, nature, and concept of development. • Historical overview of development • Indicators of development • Models of development (Gandhian, Western, Eastern, Schumaker, Communist) Problems and issues in development • Development dichotomies- socio-economic gap and its implications • Gap between developed and developing societies: Gap and its implications	L1, L2	8

MODULE 2: Development Paradigm • **Modernization Paradigm**: (Modernization and Development, Communication and Media in the Modernization Paradigm, Approaches in the Modernization Paradigm, Social Marketing , Health Promotion and Health Education, Entertainment Education, Criticism of Modernisation). • **Dependency Paradigm**: (Historical Context ; Dependency and Development/Underdevelopment; Communication and Media in the Dependency Paradigm; Criticisms of the Dependency Paradigm) • **Alternative development**: (Approaches, Communication & Media)	. L1, L2, L6	9
MODULE 3:Participation and Development : Empowerment, Self-reliance • The Participatory Model ; Two major approaches to participatory communication ; Mixed approaches / Points of Convergence • Typologies of Participation, • Communication and Media in Participatory Paradigm; Women in Participator Communication ; • Criticisms of Participatory Paradigm	L1, L2, L5, L6	7
MODULE 4:Case Studies/ Documentaries • Ecological Struggles and Anti-dam movements – Case Studies/ films • Studies in Grassroots Communication and Community Media – Case Studies with use of folk media • Online Activism: ICT and social change .	L4, L5, L6	6
Module 5 • Communication planning and design for development in India • Media Assistance in Development • Development in the age of globalization • Digital divide and development	L3, L6	6

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Resources:

a) **Main text:**

- Melkote, S.R. (1991) Communication for development in the third world: Theory and Practice. New Delhi, Sage.

- Rogers, E. M. (1976). Communication and Development: The Passing of the Dominant Paradigm. Communication Research, Vol. 3, No. 2, (pp. 213 – 240). Available at http://crx.sagepub.com/cgi/reprint/3/2/213
- Servaes, J. (1995). Development Communication- for whom and for what?
- Syed A. Rahim, "Participatory Development Communication as a Dialogical Process," in
  Development Communication: Philosophical Premises
- Sangeeta Kamat, Development Hegemony: NGOs and the State in India, Oxford University Press, 2002. Ch.1: "Development Discourse and the Terrain of Non-Party Political Formations."
- K.Sadanandan Nair and Shirley White, "Participatory Message Development: A Conceptual
  Framework," in White, et al.
- Baviskar, A. (2019). Nation's body, river's pulse: Narratives of anti-dam politics in India. *Thesis Eleven*, *150*(1), 26-41.

b) Additional Texts:

- Arturo Escobar, "The Problematization of Poverty: the tale of Three Worlds and Development," in Escobar, Encountering Development: The Making and Unmaking of the Third World, Princeton University Press, 1995.

- Communication for Social Change Consortium, Who Measures Change: An Introduction to Participatory Monitoring and Evaluation of Communication for Social Change

- Vinod Pavarala and Kanchan K. Malik, "Introduction: The Politics of Community Radio in
  India" in Pavarala and Malik, Other Voices: the struggle for community radio in India, 2007.

- Vinod Pavarala and Kanchan K. Malik, "Revitalising Civil Society: Forging Counterpublics with Community Radio," in Pavarala and Malik, Other Voices: the struggle for community
  radio in India, 2007

- K. Sadanandan Nair and Shirley White, "Trapped: Women Take Control of Video Storytelling," in White (ed), Participatory Video: Images that Transform and Empower, Sage: 2003. 12

- Padma Guidi, "Guatemalan Mayan Women and Participatory Visual Media," in White (ed), Participatory Video: Images that Transform and Empower, Sage: 2003.

Other

- Documentaries to be shown in class
- Articles from Down to Earth, Yojna and Economic & Political Weekly

Examination Scheme:

Components	P	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	2	1	1	2	2	1	2	--
CO2	1	1	2	2	2	--	--	2	1	2	2
CO3	1	1	2	2	2	--	--	2	1	2	--
CO4	1	2	--	--	--	--	--	2	1	3	--
CO5	1	2	3	3	2	1	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN 4306	**DIGITAL MEDIA PRODUCTION**	L	T	P	C
Version	2021	1	0	4	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course introduces the students to the vast field of digital media production. Not only does it provide an overview of all aspects of production, but it also introduces them to the new formats of digital and mobile media, the apps associated with them and how to produce the best possible videos in the shortest possible time.

Course Objectives:

The primary objectives of this course are to:

1. Introduce students to concepts of pre, production and post-production
2. Cover all aspects of scripting as well as hardware and software related to production
3. Synthesize traditional production methods with new digital formats and optimal use of this new format for seamless audio visual production

Course Outcomes:

On completion of this course, the students willable to:

CO1. Describe all aspects of media production

CO2. Explain various format of animation; stop motion, go-motion, 2D, 3D etc.

CO3. Apply macromedia flash 5 for creating animations

CO4. Use sound editing techniques for producing animations

Modules	Blooms level*	Number of hours
MODULE 1: Module I: Concept of Graphics and Animation Understanding graphics. Types of Graphics. Understanding animation. Difference between graphics and animation. Conventional aspects of graphics and animation, new forms of animation/recent trends.	L1, L2	8
MODULE 2: Formats Stop Motion and Go animation, different forms of animation, 2D, 3D, Cell, Clay (Making sets), etc. Concept definition and Uses.	L1, L2	6
MODULE 3: Applications of Macromedia Flash Keyframe Onion Skinning Importing BMP and JPG images Multi-layering Importing sound	L2, L3	4
MODULE 4:Fundamentals of Sound editing Types of Sound formats- WAVE, MP3 Mixing of Stereo, Mono and Multi-track sound Mixing the composed sound with the animation	L2, L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

- Simmons, Ian. Computer dictionary

- Kindem, Gorham. Musburger, Robert B. *Introduction to Media Production: The Path to Digital Media Production*. 4th Edition
- Rich, Jason R. Ultimate Guide to YouTube for Business, Kindle Edition.

Reference Books:

- *Making Media: Production, Practices, and Professions.* Amsterdam University Press
- Kindem, Gorham Anders. Musburger, Robert B. *Introduction to Media Production: From Analog to Digital.* Focal Press, 2001

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	3	-	-	-	2	1	2	2
CO2	2	1	1	3	-	-	-	2	1	2	2
CO3	1	1	2	3	-	-	-	3	1	2	2
CO4	3	2	1	1	-	-	-	3	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN 4307	**MASS MEDIA& INDUSTRY**	L	T	P	C
Version	2021	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

A knowledge of mass media as a corporate enterprise is essential for a complete understanding of mass communication. Today's media is increasingly market driven, and the students will learn about the various branches in the mass media industry and various aspects of the industry such as ownership patterns, legal issues and laws, and organizational structure.

Course Objectives

1. To impart knowledge and understanding of the mass media industries.
2. To build an awareness of mass media industries and their functioning, so that meaningful media content can be made.

Course Outcomes

On completion of this of this course students will be able to :

CO1: Analyze the complex relationship between mass media organisations the diverse set of individual, social, and professional practices.

CO2: Describe mass media as a system of interrelated forces, including historical foundations, technological advances, economic dynamics, and regulatory constraints.

CO3: Examine concerns related with media & globalization.

Course Content

Modules	**Blooms Level***	**Number of hours**
Module I: Media as an industry Journalists becoming managers Ownership patterns in Print Media Ownership patterns in Broadcast Media Organizational structure Fieldtrip to media industries	**L1,L2**	**10**
Module II: Contemporary Practices Overview of Indian Media Market Growth of the Indian Print Business: Problems and Prospects Growth of the Television Industry: Problems and Prospects Radio Industry: Growth, Problems and Opportunities Indian Film Industry: Growth and success story, problems and prospects Overview of the Indian Music Industry	**L2,L1**	**12**
Module III: Media and Globalization Foreign equity in Indian media The concept of global media Global Media Giants Critical analysis of	**L1,L2**	**12**

media globalization		

***Bloom's Level:**

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Resources:

1. Herrick, D.H.,(2012). *Media management in the age of Giants*, University of New Mexico Press
2. Khandekar, V.K., (2003). *The Indian Media Business*,(New Delhi), SAGE Publication
3. Aggarwal, V.(2001). *Handbook of Journalism and Mass Communication*,(New Delhi)Concept Publishing

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	P	A	CT	EE
Weightage (%)	10	5	15	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Exam

CO, PO and PSO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**1**	**-**
CO2	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**1**	**-**
CO3	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**-**

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4308	**COMMUNICATION RESEARCH**	L	T	P	C
Version	2021	2	0	2	3
Pre-Requisites/ Exposure					
Co-Requisites					

Catalog Description

This course is designed to introduce students to social research methods in the Communication discipline so that they can read, conduct and analyze empirical research. They will be able to understand and apply different principles and techniques of research methods. They will have a better understanding of research process and its importance in various fields. Students will be able to develop hypothesis related to communication studies and statistically analyze data. The course emphasizes on both quantitative and qualitative research methods.

Course Objectives

The objective of this course is to

1. Understand the importance and research and application of different types of research methods.
2. Describe various techniques of data collection and data analysis.
3. Understand and apply the research report writing methods.
4. Describe Media Research Ethics.

Course Outcomes

On completion of this course students will be able to

CO1: Understand and critically analyze research studies.

CO2: Understand and create research design and apply different research methods.

CO3: Explain different methods of data collection and analyze dataset.

CO4: Develop research problem and Hypothesis and apply statistical operations to analyze.

CO5: Write a research report in a systematic format and understand research ethics.

Modules	**Bloom's Level***	**Number of hours**
Module 1: Introduction to Communication Research Concept and definition of Research; Process of Research; Approaches to research Problem, qualitative and quantitative approach to research, quantitative approach-scientific/ hypothetic-Deductive methods, Experimental Design, Exploring a population; qualitative approach, Ethnography, Phenomenology; Mixed Methodology; Areas of Communication Research; Research Design and its types; Formulation of Research problem; Scope of Communication Research	L1,L2	12
Module 2: Research Methods Types of Research Methods: Census, Case study, Content analysis, Focused Group studies, Survey, Observation,	L1, L2	12

interviews, research tools, schedule, questionnaire; field work; Sampling- Probabilistic sampling and non-probabilistic sampling; Sources and methods of data collection: coding, classification, tabulation, Minimizing errors in recording source data		
Module 3: Data Analysis Statistical Terms used in Communication Research; Measures of Central Tendency; Importance of averages of statistical analysis; Levels of significance, Content Analysis; Different types of scales used in communication research; Problems in scaling; Readership survey, Television audience measurement and television rating, public opinion poll, pre-election and exit poll	L1,L3	12
Module 4: Research Ethics and Report Writing Code of Ethics; Ethical Principles to be followed by researchers; plagiarism, self-plagiarism, tools to avoid plagiarism and references management; Sequence in report writing; formats of research reports; format of dissertation; Important Media and Communication Research journals	L1,L2	12

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

Text Book

1. C R Kothari : Research Methodolgy: Methods & Techniques WishwaPrakashan, New Delhi, 1996 2. Judith Bell : Doing Your Research Project, Viva Books Private Limited, 1999

3. Wimmer Roger D, Dominick Joseph R : Mass Media Research, Thompson, New York, 2004

4. Philip Mayer : Precision Journalism : A reporters' introduction to social science methods, Rowman and Littlefield, Lanham, MD, 2005

Reference Books

1. Sharon Lorio : Qualitative Research in Journalism : Taking it to the streets, Lawrence Erlbaum, Mahwah: NJ, 2004

2. Uma Joshi : Media Research- Cross Sectional Analysis, Authors Press, 2002

3. G K Parthasarthy : Electronic Media and Communication Research Methods, Authors Press, New Delhi, 2006

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2					3	2			3
CO2	1	2			3		2	2		3	3
CO3	1	1						3	1		
CO4	2	3						3	2	3	
CO5	3	2			1			2	2	3	

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4335	**SUMMER INTERNSHIP EVALUATION**	L	T	P	C
Version	2021	-	-	-	6
Pre-requisites/Exposure	All courses studied in the previous semesters				
Co-requisites					

Catalog Description

After the second semester, all students of MAJMC are required to undertake an internship which is evaluated in the third semester. While internship introduces the students to the professional world of media, this course aims at providing an opportunity the students to showcase their learnings during internship in a professional manner.

Course Objectives

The objective of this course is to

1. Provide an opportunity to the students to discuss their learnings.
2. Evaluate the learning experience of the students during internship.
3. Enable the students to share the skills acquired during the course of internship.
4. Enable the students to understand nuances of formal report writing.

Provide hands on learning experience to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Recognize the expectations of the media industry.

CO2: Assess his/her suitability in his/her desired areas of specialization.

CO3: Have firsthand experience regarding how the media industry functions.

CO4: Explain and understand the latest technology being used in the media industry.

Modules	**Blooms level***	**Number of hours**
All students of MA J&MC shall be required to undergo a practical training in a media organization for 4-6 weeks after the second semester. The students are required to undergo training in the various areas of the media organization concerned. The work done by the student during the training period shall be submitted in the form of a report in the third semester. The last date of the receipt of the internship report in the department shall be at least 15 working days before the commencement of the end term exams. **Guidelines for Internship** Duration of Internship: 4-6 Weeks There are certain phases of every intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or an institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. The primary objectives of internship are: • To provide an out-of-the classroom training environment for the students and provide opportunities for them to apply the knowledge and skills that they have learnt in real life working environment. • To enable the students to be exposed to more real life work situations and prepare them for their career. The students will submit their **Internship Reports** at least 15 working days before the commencement of the end term exams (as per the date decided upon by the HoI in consultation with the Programme Co ordinator). The Internship Report aims to encourage students to keep a personal record of their learning and achievement throughout the training. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the	L3, L4, L5, L6	No Contact hours

course modules and from the workplace to demonstrate learning and personal development. The Internship report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization. The Internship report submission will be followed by a PowerPoint Presentation on their internship experience as per the date decided by the HoI in consultation with the Porgramme Co ordinator. The **layout guidelines** for the Internship File: • A4 size Paper • Font: Arial (10 points) or Times New Roman (11 points) • Line spacing: 1.5 • Top and Bottom margins: 1 inch/2.5 cm; left and right margins: 1.25 inches/ 3 cm The Internship report should include 1. Title Page 2. Table of Contents 3. Internship Experience Certificate 4. Acknowledgements 5. Main Body 6. Appendices The **Main Body** will have **different sections/chapters** and will include the following items which will be evaluated for the final assessment:- An analysis of the company/stream in which the student has interned Student's expectations from internship Student's work profile/assignments handled during the course of internship A research report that the student has prepared on a project assigned to him/her by the organization (if applicable) Skill set (technical skills & soft skills) learnt during the internship Overall internship experience **Guidelines for Evaluation** • All students are required to undertake internship report writing under the supervision of a teacher and to submit the same following the guidelines stated below. • Language of the report and presentation & viva-voce examination should be English. The internship report must be typed and hard bound. • Failure to submit the report or failure to make the presentation followed by viva-voce examination will be treated as absence in the examination. The student shall submit the report and make a PowerPoint Presentation		

	followed by appear viva voce examination in the subsequent years (within the time period as per University Rules). • No marks will be allotted for the report unless the student appears for the presentation and the viva-voce examination. Similarly, no marks will be allotted for presentation & viva voce examination unless the student submits his/her report. • Evaluation will be done jointly by one internal expert and one external expert with equal weightage, i.e. average marks of the internal and external experts will be allotted to the student.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

NA

Reference Books

NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme (For Dissertation):

Examination Scheme:

Components	Report	Presentation	Viva Voce	Industry Feedback
Weightage (%)	50	25	20	5

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	3	1	2	2	3	1	2	2	1	2
CO2	--	--	2	2	1	2	1	2	2	1	2
CO3	2	3	2	2	1	2	1	2	2	1	2
CO4	--	1	1	2	--	--	2	--	2	1	3
CO5	2	1	--	--	1	--	1	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4402	MEDIA ARTS – IV: CYBER MEDIA	L	T	P	C
Version	2021	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

No aspect of today's world has been able to escape the influence of the World Wide Web. Journalism has also been revolutionized with the inclusion of the Internet for newsgathering and news dissemination. The students are made familiar with online organization, process and strategies as well as Internet tool kits, servers and other aspects of the virtual world. The scope of this subject is too vast to merit a detailed or in depth analysis, so a broad overview of the various issues and aspects related to the subject are discussed. Furthermore, since it is a core subject, we go deep into the subject and provide an empirical knowledge to students about the increasing use of digital and online media in all kinds of media industries today.

Course Objectives

The objective of this course is to

- Impart knowledge of basic concepts of Cyber Media. Difference between media as traditionally understood and the Digital platform.
- Apply knowledge of basic principles related to online media. Some myths that exist about Blogging and Online Reading Platforms to be demystified as well as the difference highlighted.
- Impart knowledge and details about how online media Industry functions and to understand various ways of generating revenue via use of cyber media.

Course Outcomes

On completion of this course, the students will be able to

CO1. Identify and describe various online organization, process and strategies as well as various components of Internet as revenue generation tool kits, servers and other aspects of the virtual world and analyze the difference between traditional and New Media platforms.
CO2. Develop the various formats of writing for cyber media e.g. writing online, blog writing, writing for advertisements and online publishing mediums vis a vis traditional styles of writing also equipping the student with the knowledge of media laws in principles and applications as well.

CO3.Demonstrate hands-on experience as content marketers using journalistic and digital techniques for designing a website with the help of various design patterns, HTML and Dreamweaver.

Modules	Blooms level*	Number of hours
Module I: (**Introduction to Internet**) Internet-history and development, WWW, W3C, revenue generation Internet tool kits - server, IP address, URL, ISP, networking, browsers, Search Engine, Domain, Domain name, home page, hyperlinks, etc	L1, L2, L3	10
Module II: (Cyber Journalism) Comparison of Cyber Media with Print, TV, Radio mediums, Online as a publishing medium (main features), Basic rules of online writing, content writing, blog writing, advertising on net, Print & Electronic Media networks are going on the Net, Impact of Web Journalism and reading habits, Web Journalism as a career, Cyber Laws.	L1, L2, L4, L5	13
Module III: (Web Designing) Web Design Guidelines, Planning your Website, Design Patterns, Basic HTML, Dream weaver	L1, L3,L5, L6	13

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books:

1. Briggs Mark (2002). *Journalism 2.0: How to Survive and Thrive*.

2. Wardrip Noah Fruin& Montfort Nick (2003). *The New Media Reader*.

3. Kumar. Suresh (2005). *Internet Patrakarita*, Delhi, Takshila Publication.

4.Ward. Mike (2008). *Journalism Online*.

Reference Books:

1. Hahn, Harley (2008). *The Internet Complete Reference*.
2. Jaiswal A. & Wiley Dreamtech (2002).*Fundamentals of computer Information technology today*.
3. Ronal Dewolk (2000). *Introduction to Online Journalism*, Allyn& Bacon.
4. Towers, J. Tarin (2001). *Macromedia Dreamweaver Max advanced*.
5. Michael M. Mirabito (2015), *New Communication Technologies: Application*, Barbara.

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**2**	**2**	**1**	**2**	**-**	**-**	**2**	**1**	**2**	**2**
CO2	**1**	**2**	**1**	**2**	**2**	**-**	**-**	**2**	**1**	**2**	**2**
CO3	**1**	**2**	**2**	**2**	**1**	**-**	**-**	**2**	**1**	**2**	**2**

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4403	MEDIA ANALYSIS	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure	Introduction to Mass Communication; Print Journalism – Reporting &Editing; History, Culture & Society; Mass Media & Industry				
Co-requisites					

Catalog Description

The objective of the course is to provide a clear understanding of the growth of print media in India, trends, movements and principles of journalism, problems and issues in news gathering. It emphasizes on various theories of media, culture and society while encouraging students to become critical consumers of the media and engaged citizens in the society. It also offers directions for surveying the cultural landscape and tools for critiquing the media's influence on democratic life and consumer culture.

Course Objectives

The objective of this course is to

1. Describe in detail the evolution and growth of mass media.
2. Derive a relationship between culture and media.
3. Explain and critique various theories of media, culture and society.
4. Initiate a discussion on democratic expression vs commercial culture.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe the evolution of mass media.

CO2: Explain and critique different theories of media, culture and society.

CO3: Describe growth of different media industries.

CO4: Analyse the impact of commercial culture on the media industry.

CO5: Critique the evolving culture of journalism and latest trends in news gathering.

Modules	Blooms level*	Number of hours
MODULE 1: Culture and Evolution of Mass Culture Oral & Written Communication, Printed Communication, Electronic & Digital Communication, Defining Culture and Media Culture, Cultural Turn in Media Research	L1, L2	8
MODULE II: Theories of Media, Culture & Society Overview, Marshall McLuhan: The Medium is the Message, Harold Innis: The Bias of Communication, McLuhan: Understanding Media, Social Marketing Theories, Knowledge Gap, Agenda Setting, Spiral of Silence, Media Systems, Dependency Theory, Cultivation Analysis, Case Studies: The Comodification of Culture, Advertising: The Ultimate Cultural Commodity	L2, L4	16
MODULE III: Media Industries & Culture Newspapers & the Rise of Modern Journalism, Sound Recording & Popular Music, Popular Radio & Broadcasting, Television/Cable and the Power of Visual Culture, Movies & the Impact of Images	L2, L4	9
MODULE IV: Democratic Expression vs Commercial Culture Advertising & Commercial Culture, Public Relations & Framing of Message, Media Economics & the Global Marketplace, the Culture of Journalism: Value, Ethics & Democracy Trends in Newsgathering: Activism, Citizen Journalism, Pressures on Media	L1, L2, L4	15

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Basu, Durga Das (2010). *Law of the Press*, Delhi: Lexis Nexis
2. Aggarwal, VirBala, Gupta, V.S. (2012). *Handbook of Journalism and Mass Communication*, Delhi: Neha Publishers & Distributors
3. Kumar, Keval J. (1994). *Mass Communication in India*, New Delhi: Jaico Publishing House

Reference Books

1. Ravindran, R.K (1999). *Media and Society, Delhi:* Commonwealth Publishers
2. Singhal, Arvind & Rogers, Everett M. (2000). *India's Communication Revolution: From Bullock Carts to Cyber Marts*, New Delhi: Sage India

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	--	--	3	3	--	--	2	--	1	--
CO2	1	2	3	--	--	2	2	2	3	1	--
CO3	--	--	--	3	2	3	--	2	--	1	--
CO4	2	--	2	2	1	--	2	--	--	1	--
CO5	1	--	2	3	1	--	2	2	2	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4435	**INTERNSHIP**	L	T	P	C
Version	2021	-	-	-	6
Pre-requisites/Exposure	All courses studied in the previous semesters				
Co-requisites					

Catalog Description

By the final semester, students have learnt about all the aspects of mass communication. This course aims at providing an opportunity to put this knowledge to use in a professional manner. The course introduces the students to the professional world of media.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to the students.
2. Provide a platform to the students to hone their skill sets.
3. Provide students a learning experience where they get to work in the media industry and learn the 'tricks of the trade.'
4. Provide an out-of-classroom training environment to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Recognize the expectations of the media industry.

CO2: Assess his/her suitability in his/her desired areas of specialization.

CO3: Have firsthand experience regarding how the media industry functions.

CO4: Explain and understand the latest technology being used in the media industry.

Modules	Blooms level*	Number of hours
All students of MA J&MC shall be required to undergo a practical training in a media organization for 4-6 weeks. The candidate shall be required to undergo training in the various areas of the media organization concerned. The work done by the student during the training period shall be submitted in the form of a report. The last date of the receipt of the internship report in the department	L3, L4, L5, L6	No Contact hours

shall be at least 15 working days before the commencement of the end term exams. **Guidelines for Internship** Duration of Internship: 4-6 Weeks There are certain phases of every intern's professional development that cannot be effectively taught in the academic environment. These facets can only be learned through direct, on-the-job experience working with successful professionals and experts in the field. The internship program can best be described as an attempt to institutionalize efforts to bridge the gap between the professional world and the academic institutions. Entire effort in internship is in terms of extending the program of education and evaluation beyond the classroom of a university or an institution. The educational process in the internship course seeks out and focuses attention on many latent attributes, which do not surface in the normal classroom situations. These attributes are intellectual ability, professional judgment and decision making ability, inter-disciplinary approach, skills for data handling, ability in written and oral presentation, sense of responsibility etc. The primary objectives of internship are: To provide an out-of-the classroom training environment for the students and provide opportunities for them to apply the knowledge and skills that they have learnt in real life working environment. To enable the students to be exposed to more real life work situations and prepare them for their career. The students will be at least 15 working days before the commencement of the end term exams (as per the date decided upon by the HoI in consultation with the Programme Co ordinator), the students will submit their **Internship Reports**. The Internship File aims to encourage students to keep a personal record of their learning and		

achievement throughout the training. It can be used as the basis for lifelong learning and for job applications. Items can be drawn from activities completed in the course modules and from the workplace to demonstrate learning and personal development. The Internship report will assess the student's analytical skills and ability to present supportive evidence, whilst demonstrating understanding of their organization, its needs and their own personal contribution to the organization. The Internship report submission will be followed by a PowerPoint Presentation on their internship experience as per the date decided by the HoI in consultation with the Porgramme Co ordinator. The **layout guidelines** for the Internship File: A4 size Paper Font: Arial (10 points) or Times New Roman (11 points) Line spacing: 1.5 Top and Bottom margins: 1 inch/2.5 cm; left and right margins: 1.25 inches/ 3 cm The Internship report should include Title Page Table of Contents Internship Experience Certificate Acknowledgements Main Body Appendices The **Main Body** will have **different sections/chapters** and will include the following items which will be evaluated for the final assessment:- An analysis of the company/stream in which the student has interned Student's expectations from internship		

Student's work profile/assignments handled during the course of internship A research report that the student has prepared on a project assigned to him/her by the organization (if applicable) Skill set (technical skills & soft skills) learnt during the internship Overall internship experience **Guidelines for Evaluation** • All students are required to undertake internship report writing under the supervision of a teacher and to submit the same following the guidelines stated below. • Language of the report and presentation & viva-voce examination should be English. The internship report must be typed and hard bound. • Failure to submit the report or failure to make the presentation followed by viva-voce examination will be treated as absence in the examination. The student shall submit the report and make a PowerPoint Presentation followed by appear viva voce examination in the subsequent years (within the time period as per University Rules). • No marks will be allotted for the report unless the student appears for the presentation and the viva-voce examination. Similarly, no marks will be allotted for presentation & viva voce examination unless the student submits his/her report. • Evaluation will be done jointly by one internal expert and one external expert with equal weightage, i.e. average marks of the internal and external experts will be allotted to the student.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books
NA

Reference Books

NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme (For Dissertation):

Examination Scheme:

Components	Report	Presentation	Viva Voce	Industry Feedback
Weightage (%)	50	25	20	5

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	3	1	2	2	3	1	2	2	1	2
CO2	--	--	2	2	1	2	1	2	2	1	2
CO3	2	3	2	2	1	2	1	2	2	1	2
CO4	--	1	1	2	--	--	2	--	2	1	3
CO5	2	1	--	--	1	--	1	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4437	**DISSERTATION/PROFESSIONAL PROJECT**	L	T	P	C
Version	2021	-	-	-	7
Pre-requisites/Exposure	All courses studied in the previous semesters				
Co-requisites					

Catalog Description

By the final semester, students have learnt about all the aspects of mass communication. This course aims at providing an opportunity to put this knowledge to use in a professional manner. The course introduces the students to the professional world of media and research.

The course provides an option to the students to either work on a dissertation or undertake a professional project under the supervision of a senior faculty member.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to the students.
2. Provide a platform to the students to hone their skill sets.
3. Provide students a learning experience where they get to work on either an industry-oriented professional project or a research project and learn the 'tricks of the trade.'
4. Provide an out-of-classroom training environment to the students.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Recognize the expectations of the media industry.

CO2: Assess his/her suitability in his/her desired areas of specialization.

CO3: Have firsthand experience regarding how the media industry functions.

CO4: Explain and understand the latest technology being used in the media industry.

CO5: Describe and apply various steps to be followed for undertaking a professional project.

Modules	Blooms level*	Number of hours
Every student of MA J&MC shall be required to undertake either a hands on project or a scholarly research under the guidance of an assigned supervisor. **Dissertation:** The student shall be required to undertake a research based scholarly project under the guidance of a supervisor, who shall be assigned by the institution. The last date of the receipt of the report in the department shall be at least ten working days before the commencement of the end term exams. **Guidelines for Dissertation** The primary purpose of dissertation is to introduce the final semester	L3, L4, L5, L6	No Contact hours

students to the processes of scholarly research and writing under the guidance of an assigned supervisor. Through this research experience involved in the process of dissertation, students gain exposure to research methodology and its various tools & techniques. It usually requires the use of advanced concepts with a sound understanding of theoretical underpinnings. The primary objectives of dissertation are: • To enable the students to apply their theoretical and methodological understanding and skills into devising researchable ideas • To design and execute a meaningful research report (dissertation) that demonstrates spatial thinking and uses the knowledge and skills learned during the programme • To enable the students to understand the research process and be aware of research obligations and pitfalls. The **layout guidelines** for the dissertation are: • A4 size Paper • Font: Arial (10 points) or Times New Roman (11 points) • Line spacing: Preferably 1.5 • Top and Bottom margins: 1 inch/2.5 cm; left and right margins: 1.25 inches/ 3 cm The dissertation should include Cover Page Table of Contents Certificate of originality by the Supervisor Acknowledgements Main Body References Appendices The **Main Body** will have **different sections/chapters** and will include		

the following items which will be evaluated for the final assessment:- Introduction Scope of the study Conceptual Background Research Objectives & Questions Hypothesis (wherever applicable) Limitations of the study Review of Literature Research Design & Methods Results & Discussion Conclusion References The dissertation should be submitted to the supervisor at least ten working days before the commencement of the end-term exams (as per the date decided upon by the supervisor). The dissertation submission will be followed by a PowerPoint Presentation on their research as per the date decided by the HoI in consultation with the research supervisor. **Examination Scheme:** **Dissertation Submission by Student 50** **Presentation & Viva 45** **Research Paper Publication 05** **Total 100** **Professional Project:** The students opting for professional project can choose amongst the broad categories of television, radio, print, advertising, public relation, development communication, digital media and photography. They will devote time and attention to the chosen specific area and attempt to comprehensively understand it through making projects, presentations, reports, and assignments on the topic.		

The duration of the project will be 8 weeks and the students will be expected to submit their project to the school through the assigned faculty guide. **SPECIALIZATION (ANY ONE)** *RADIO* **Course Objective:** Students can do specialization in the different areas of Radio production Viz. Various Formats, News, Talk shows, Spots and commentaries, Radio documentary, Radio features, various music formats- classical, countdown shows, contemporary hit radio, music on demand, oldies, artist spotlights, request and dedication shows etc. Commercials/Jingles/ PSAs *TELEVISION* **Course Objective:** The students can choose a specific area of TV production in which they want to specialize, viz. TV Journalism, Reporting, Anchoring, Editing, Camera, Documentary Film making, Feature Films, Short Film, Ad Film making, Entertainment Based programming etc. *PRINT* **Course Objective:** Students can jointly bring out a journal with each one attending to a specific function of its production like reporting, editing, sub-editing, design and layout, photography and graphics. *ADVERTISING* **Course Objective:**		

The students will use their understanding of all advertising concepts learnt in the previous semesters to do a practical exercise. Students will act as brand managers of a new brand being launched. They will be required to study the following elements for the product category assigned to them: Market Research to determine the situation analysis Segmenting the market and selecting a segment for their new brand Identifying target audience Positioning their brand. This will involve a detailed study of the positioning of the competitive brands Developing the media strategy, including the communication mix Developing the creative strategy Creative strategy to follow a complete campaign creative presentation. This will include development of TV Commercials, print ads, radio ads and POP material. *PUBLIC RELATIONS* **Course Objective:** PR specialization can be undertaken in these different areas Crisis case studies PR in Non- Governmental organizations Cross- cultural PR Internal PR department in corporate situation *PHOTOGRAPHY* **Course Objective:** Student can choose any two subjects for Specialization: Photojournalism Travel Photography		

Portrait Photography Product & Table-top Photography Glamour Photography Wildlife Photography DEVELOPMENT COMMUNICATION The focus of the professional project will be an approach to communication for social change that has people controlling the means and content of the communication process. Any topic that is chosen will be to highlight the utilization of power of communication as a catalyst for social development. 1) Students to plan a Communication Design and Implementation strategy for projects that bring about change in society. You could work on any one of the UN sustainable Development Goals towards 2030. **Or** 2) Volunteering your time with a NGO (governmental or private); Intern with CSR department and prepare a report based on a theoretical perspective studied in class or look at the participatory approach that has been adopted for the programmes being implemented. **Or** 3) Make a documentary on an NGO, Community Radio Station, Skill Development center, ASHA workers. DIGITAL MEDIA Students can work on different aspects of digital media such as Cyber Security & E-governance Fake News Creating blogs & vlogs on different online platforms Multimedia Convergence Journalism Analysis of news aggregators Mobile Journalism **Examination Scheme:** a) Duration of summer Project 8 weeks b) Total marks for summer project 100 marks		

Break-up of marks I) Timely Submission 5 marks II) Content i) Clarity 25 marks ii) Comprehensiveness 20 marks iii) Originality 5 marks c) Project Presentation & Viva 45 marks		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books
NA

Reference Books

NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme (For Dissertation):

Components	Report	Presentation & Viva	Research Paper Publication
Weightage (%)	50	45	05

Examination Scheme (For Professional Project):

Components	Timely Submission	Content	Project Presentation

			& Viva
Weightage (%)	5	50	45

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	--	3	1	2	2	3	1	2	2	1	2
CO2	--	--	2	2	1	2	1	2	2	1	2
CO3	2	3	2	2	1	2	1	2	2	1	2
CO4	--	1	1	2	--	--	2	--	2	1	3
CO5	2	1	--	--	1	--	1	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books
NA

Reference Books

NA

Examination Scheme (For Dissertation):

Components	Report	Presentation & Viva	Research Paper Publication
Weightage (%)	50	45	05

Examination Scheme (For Professional Project):

Components	**Timely Submission of Report**	**Content Comprehensiveness**	**Content Clarity**	**Content Originality**	**Presentation & Viva**

Weightage (%)	5	20	25	5	45

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	3	1	2	2	3	1	2	2	1	2
CO2	--	--	2	2	1	2	1	2	2	1	2
CO3	2	3	2	2	1	2	1	2	2	1	2
CO4	--	1	1	2	--	--	2	--	2	1	3
CO5	2	1	--	--	1	--	1	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Post Graduate Diploma in Journalism & Mass Communication

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Post Graduate Diploma in Journalism & Mass Communication

Overview

PGDJMC programme offered by Amity University Haryana is a one-year post graduate diploma which encompasses different aspects of journalism and mass communication. The curricullum of the programme is such designed that it imparts both theoritical as well as practical knowledge. In order to make students industry-ready, students are required to undertake a project apart from other practical assignments .

The Post Graduate Diploma in Journalism and Mass Communication is a professionally taught and managed post-graduate course, aimed at creating industry ready students. Students are suitably and competently equipped with a plethora of skills and knowledge database, ready to take on all the challenges and demands that the journalism and media industry makes on those who enter it.

Programme Outcomes (PO's)

On completion of the Post Graduate Diploma in Journalism & Mass Communication, the student will be:

Programme Outcomes (PO's)

PO1: Critical Thinking: Identify, classify, describe and critique communication theories and concepts from different perspectives.

PO2: Effective Communication: Apply, interpret, produce, schedule, Demonstrate, dramatize, illustrate, and relate views of others on different ideas and situations, mediate disagreements and help reach conclusions through effective interactions in group settings of the society.

PO4: Effective Citizenship: Discover, analyze, and question authorities for social concerns and volunteer for nation development with the ability to resolve issues and participate in social activities/discussions as a responsible citizen.

PO5: Ethics: Criticize, appraise, assess, justify and summarize decisions analyzing various dimensions of the situation and accept the moral responsibility for the action taken.

PO6: Environment and Sustainability: Analyze, argue, judge and interpret the impact of professional and social communication and decisions in a global, economic, environmental and societal contexts for sustainability in which they operate.

PO7:Self-directed and Life-long Learning: Recognize the need for and acquire the ability to engage in independent and life-long learning having self-motivated attitude for research and development for his/her professional growth and also for the betterment of the society as a whole.

Program Specific Outcome (PSOs):

On completion of the Post Graduate Diploma in Journalism & Mass Communication, the student will be able to:

PSO1: Apply fundamental knowledge of mass communication courses to understand essentials of mass media.

PSO2: Apply theoretical, technical and practical knowledge in varied fields of media and mass communication.

PSO3: Work professionally or to take-up career in industries or to pursue higher studies in mass communication and interdisciplinary programs by applying principles of management, ethics, communication and social issues.

PSO4: Apply the principles of problem solving, creative thinking, group dynamics, team building, leadership skills, decision making skills, contributing to overall personality and career development.

PSO1	PSO2	PSO3		PSO4	
Apply fundamental knowledge of mass communication courses to understand essentials of mass communication.	Apply theoretical, technical and practical knowledge in varied fields of media and mass communication.	Work professionally or to take-up career in industries or to pursue higher studies in mass communication and interdisciplinary programs by applying principles of management, ethics, communication and social issues.			Apply the principles of problem solving, creative thinking, group dynamics, team building, leadership skills, decision making skills, contributing to overall personality and career development.
1	2	3	4	5	6
Basic Courses	**Production/Designing/Planning**	**<u>Interdisciplinary domain</u>**	**<u>Management domain</u>**	**Practical/Hands-on Practice/Industry Oriented**	**Value added courses**
Introduction to Mass Communication	Design Software	History, Culture & Society	Media Planning & Brand Management	Project	Basics of Communication
Print Journalism – Reporting & Editing	Advertising Planning & Strategy				Self Development & Interpersonal Skills
Media Arts I : Radio & TV	Print Design & Visualization				Foreign Business Language 1
Advertising: Concepts & Principles					Corporate Communication
Introduction to Photography					Behavioral Communication & Relationship Management
Specialized Reporting & Feature Writing					Foreign Business Language - II
Media Arts II: Radio & TV					
Public Relation & Corporate Communication					
Advanced Photography					

JRN3101	**INTRODUCTION TO MASS COMMUNICATION**	L	T	P	C
Version	**2021**	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Students will be introduced to the basic aspects of human communication and especially mass communication. Mass Media industries have developed in unprecedented ways due to changes in the society, economy, and technologies. There has been a corresponding change in the way the role of mass communication has been understood. Theories have mostly responded to developments in the Western society but they help us to interpret how these industries interact with the society in the past, present, and future. While in other subjects, students will learn about contemporary forms, in this course they will be introduced to the traditional modes of communication and expression in India which have worked closely with local communities. With this basic grounding in place, students will be able to evaluate mass media within a wider context. Students will be introduced to new ideas through case studies, practical exercises, class presentations, screenings, and reading groups.

Course Objectives

The objective of this course is to

1. Explain theories of mass communication process and the mass media industries.
2. Help students become more skilled and knowledgeable consumers of media content.
3. Enhanced understanding of mass communication theory toward improving their own media literacy skills.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Describe of theories on communication

CO2. Explain significance of tradition media

CO3. Describe evolution of mass communication theories

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Communication Process and elements of communications, Levels of communication: individual, group, organizational, mass communication, international and intercultural, Barriers to effective communication, Future of communication studies, Brief introduction to main communication models: wartime to post-war period, Three traditions in communication research: Users and gratification, lifestyle, and reception analysis Forms and Functions of communication	L1	13
MODULE 2: Traditional Media Introduction to traditional media, Oral Tradition of story-telling since early civilization, Influence of TM on all forms of mass communication in India, Types: street theatre, puppetry, music, dance, folk and tribal art, local fairs, Elements and case studies of each form, Strengths and limitations, Relationship with the society, Present Scenario, Tool for political, social, economic, and health awareness	L1	11
MODULE 3: Introduction to Mass Communication Definition and forms of mass communication, History of Western mass media, Four eras in mass communication theories, Era of mass society theory (1850-1940), Era of scientific perspective on mass media (1940-1950), Era of limited effects (1950-60s), Era of cultural criticism (1960s-1980s), Ongoing Debates, Growth of mass media in India	L1	12

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Rosengren Erik Karl (2000) *Communication: An Introduction*, London Sage Publications.
2. Denis Mc Quail (2005) (5th edn) Mc Quail's *Mass Communication Theory*, New Delhi Vistaar Publications.

Reference Books

1. Dr. Andal N. (2005) *Communication Theories and Models*, Himalaya Publishing House: Bangalore
2. Baran J Stanley & Davis K Dennis(2002) (2nd edn) *Mass Communication Theory: Foundations, Ferment, and Future, Singapore:* Thomason Asia Pte Ltd

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	2	3	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3102	Print Journalism – Reporting & Editing	L	T	P	C
Version	**2021**	1	1	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes various aspects of print journalism. The course begins with the history of Indian Press. It introduces basics of journalism and news reporting and editing. The aim of this course is to explore various dimensions of print journalism in concept and practice.

Course Objectives

The objective of this course is to

1. Provide an overview of the fundamentals of Print Journalism.
2. Introduce the students to the most important aspects of print journalism – reporting & editing.
3. Describe the growth of Press in India.
4. Outline the mechanics of newspaper designing

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Outline the history of print journalism in India.

CO2: Describe and apply various concepts of print journalism such as news, news values, style guides, reporting, editing, newspaper designing etc.

CO3: Describe the process of news reporting and editing.

CO4: Apply newspaper layout and design techniques

Modules	Blooms level*	Number of hours
MODULE 1: History of Press in India Press in pre-independent India, Growth of Press post-independence, Role of English and vernacular press during freedom struggle, Emergence of newspapers, magazines and publication houses, Growth of Indian news agencies	L1, L2	10
MODULE II: Reporting What is journalism, What is News, News Values & Sources of News, Basic Elements of News, Qualities and responsibilities of a reporter, Interviewing skills required for reporting, Types of reporting, Structure of news report, Lead and types of leads, Body text, Newsroom set up, News Agencies	L1, L2, L3, L4	6
MODULE III:Editing Copy Editing, Role and functions of copyeditor, Newsroom, Desk management, Tools of editing, Editing marks and symbols, Editing on line, Rewriting, Headlines and captions, Style guides and importance	L1, L2, L3	6
MODULE IV: Mechanics of Newspaper Layout and Design Photo editing: Choosing a picture, Creative cropping, Giving captions, Relationship between newspaper content and design, Tools and techniques of layout designing, front page make up, types and typefaces, use of white space in layout designing, importance of dummy	L3, L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Parthasarathy, Rangaswami (2000).*Basic Journalism*, Delhi: McMillan India Ltd.
2. Kamath,MV (2009).*The Journalist's Handbook*, Noida: Vikas Publishing House Pvt Ltd
3. Dary, David (1973).*How to Write News for Broadcast and Print Media*, New York: Tabb Books.

4. Sarkar, N.N. (2008).*Art and Production*, New Delhi: Sagar Publication.

Reference Books

1. Melvin Menchor, *Basic News Variety*, Universal Book
2. Alder Elizabeth (1991)*Print that Works*, Boulder: Bull Publication, Colorado
3. Pabbock,Bruce T., *Graphics for Desktop Publisher*, US: National Text Book
4. Julian Harris, Kelly Leiter & Stanley Johnson (eds.) (1992)*The Complete Reporter: Fundamentals of News Gathering, Writing, and Editing*, Boston:Allyn/Bacon

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

ExaminationScheme:

Components	**H**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	--	1	1	2	3	--	1	--	3	--
CO2	1	1	2	2	1	2	1	1	2	2	--
CO3	--	2	2	--	2	--	3	1	--	2	--
CO4	2	1	2	1	1	--	2	1	2	2	3
CO5	1	1	2	2	1	2	--	1	2	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN 3103	MEDIA ARTS I: RADIO & TV	L	T	P	C
Version	**2021**	2	0	2	3
Pre-requisites/Exposure	Media Arts I: Radio & TV				
Co-requisites					

Catalog Description

Today broadcasting media is one of the most ruling media in day to day life. TV and Radio plays a very vital role in dissemination of the information and to communicate with the masses not only to cover the national issues but also to go for parachute coverage. This course outline helps students to develop the basic concepts and fundamentals for the broadcasting media not only textual but also hands on practice for the Television as well as Radio.

Course Objectives

The objective of this course is to

1. To impart knowledge of basic working of Radio and TV as a medium of mass communication, also to apply knowledge of basic anatomy and working of the Radio and TV in India as well as in global domain .
2. To apply knowledge and skills required to know about the different broadcasting instruments in Television and Radio broadcasting Industry.
3. To engage in life-long learning and hands on technical expertise in handling the Basics of Camera, Light, Sounds and other equipment's .

Course Outcomes

On completion of this course, the students will be able to

CO1. Describe the different characteristics of Sounds – in film productions for both fiction and Non-fictions.
CO2. Identify and describe various concepts and instruments used for the capturing of Sound in broadcasting media.

CO3. Equipping the students with skillsto be able to work on the lighting part- to understand the aesthetical approaches of lighting and different kinds and functions of lighting in the varied environment.
CO4. Students would be able to analyze the different dimensions and applications of editing for making the raw footage to the finished one.
CO5. Demonstrate hands-on experience on anatomy of Video Camera, different kinds of video productionequipment and to learn the rules of the compositions.
CO6. Analyze the different approaches and aesthetical approaches in Film making and TV Productions.

Modules	Blooms level*	Number of hours
MODULE 1: Audio and Sound: The Characteristics The basic attributes: Loudness, Frequency, Intensity, Pitch, Amplitude, and Timbre, Sound Aesthetics- Spatial Hearing, Sound Isolation, Sound perspective (mono and stereo), Importance of speech in broadcast media, Sound and its functions, Functions of sound in relation to picture, Acoustics and psychoacoustics.	L1, L2	6
MODULE 2: Sound and Technical Approaches Types of microphones, Directionality and pick-up patterns, Cardioid, Omnidirectional, supercardiod and hypercardiod, Quadraphonic and surround sound, Construction of mikes- dynamic mics and condenser mics, Positioning of mics- floor stand, hidden mics, camera mics, wireless mics.	L1, L4	6
MODULE 3:Lighting: The Fundamentals Nature, quality, lighting for TV, Colour temperature, Lighting instruments, Three point lighting, Creative additions to lighting for different genres.	L1, L2	6
MODULE 4: Editing techniques Editing; principles and techniques, Continuity and non-continuity editing, Linear and non-linear editing	L1, L2, L3	6
MODULE 5: Anatomy of Video Camera The basic structure of a Video Camera, Working mechanism and basic parts of camera, Types of camera, Camera Mounts.	L1, L3	6
MODULE 6: Broadcast: Rules and Approaches Camera movements & angles, shots, Composition principles, TV as a Medium of close ups, Role of sound / voice over in TV programs, TV as a medium of glamour, immediacy, democratizing, Infotainment.	L1, L2, L5	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Resources: (APA Style)

a) Main Text:

1. Boyd, A. (1997). Broadcast Journalism: Techniques of Radio and TV news. Boston: Focal Press.
2. Belavadi, V. (2013). Video production. New Delhi: Oxford University Press.
3. Hakemulder, J. R., Jonge, F. A., & Singh, P. P. (2005). Broadcast Journalism. New Delhi. India: Anmol Publications.
4. Millerson, G., & Millerson, G. (1999). Television Production. Oxford: Focal Press. 13th Ed.

b) Additional Texts:

1. Trewin, J. (2003). Presenting on TV and Radio: An Insider's Guide. Amsterdam: Elsevier.
2. Utz, P. (2006). Today's Video. Jefferson, NC: McFarland.
3. Zettl, H. (2005). Television Production Handbook, Cengage Learning.

c) Other readings:

1. Chantler, P., & Stewart, P. (2003). Basic Radio Journalism. Amsterdam: Focal Press.
2. Chatterji, P. C. (1987). Broadcasting in India. New Delhi: Sage Publications.
3. Luthra, H. R. (1986). Indian Broadcasting. New Delhi: Publications Division, Ministry of Information and Broadcasting, Govt. of India.
4. McLeish, R. (1999). Radio Production: A manual for broadcasters. Oxford: Focal Press.
5. Shrivastava, K. M. (1990). Radio & TV Journalism. Sterling.
6. Sharma, R. (2012). Breakout nations: In pursuit of the next economic miracles. New York: W.W. Norton &.
7. Pavarala, V., & Malik, K. K. (2007). Other voices: The Struggle for Community Radio in India. Thousand Oaks, CA: Sage Publications.

Components	P	CT	A	EE
Weightage (%)	10	15	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- End Semester Examination

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	**2**	**2**	**2**	**-**	**1**	**-**	**-**	**1**	**2**	**2**	**3**
CO2	**2**	**1**	**1**	**2**	**1**	**-**	**-**	**1**	**2**	**2**	**3**
CO3	**2**	**2**	**2**	**-**	**1**	**-**	**-**	**1**	**2**	**2**	**2**
CO4	**2**	**2**	**2**	**2**	**1**	**-**	**-**	**1**	**2**	**2**	**2**
CO5	**2**	**2**	**2**	**-**	**1**	**-**	**-**	**1**	**2**	**2**	**2**
CO6	**2**	**1**	**2**	**1**	**1**	**-**	**-**	**1**	**2**	**2**	**3**

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3104	ADVERTISING: CONCEPTS AND PRINCIPLES	L	T	P	C
Version	**2021**	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The course will focus on basics concepts of advertising, its role & functions. The purpose of this course is to offer cutting-edge thinking on Advertising and explain how advertising works in the real world. The elaborative content will provide strong knowledge base to the students about Advertising and will enhance their critical and creative skills.

Course Objectives

The objective of this course is to:

1. Equip the students with advertising environment by understanding, identifying and analyzing important concepts.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Comprehend role and functions of advertising.
CO2: Identify various types of advertising and structure with in advertising agency.
CO3: Analyze role of various department of agency and making of a campaign.
CO4: Comprehend the role of Segmentation, Targeting and position in campaign planning

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Definition and key concepts of advertising, Advertising Types,	L1, L2	10

Role and Functions		
MODULE 2: Advertising as a Tool of Marketing The Marketing Planning ,Relationship of Marketing with Advertising ,Situation Analysis to the Marketing Mix, Market Share, Target Segment, Positioning, Developing Advertising from Marketing Objectives	L1, L3	7
MODULE 3: Understanding advertising agencies Advertising Agencies, Types of Advertising Agencies, Advertising agency structure, Functions of various departments, Workflow in An Agency, Pitching , Account Planning, Media Planning, Copy Writing	L1,L2,L4	7
MODULE 4: Segmenting, Targeting and Positioning (STP) strategy Market Segmentation, Markets, market segments and niches, Meeting editorial needs, Basis for segmenting consumer markets, Targeting strategies, Undifferentiated targeting, Differentiating targeting, Niche targeting, Various positioning strategies, Benefit approach, Price – Quality approach, User approach, Product category approach, Competitor approach	L1,L2,L3	11

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Jethwaney, J. & Jain, S (2006). *Advertising* (6th Ed). Oxford University Press.
2. Chunawalla, Sethia, S. (2015). *Foundation of Advertising* (8th ed., Vol. 1). Himalaya Publications.

Reference Books

1. Mohan, M. (2008). *Advertising Management* (2008 ed., Vol. 8th, p. 429). McGraw Hill Education (India) Private Limited.
2. Thomas, C., & Guinn, O. (1999). *Advertising* (1st ed., p. 694). South-Western College Pub.
3. Wells, Moriaty, Burnett. (2006).*Advertising Principles & Practice* (7 Ed) Pearson Prentice Hal.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	1	2	--	--
CO2	1	1	--	--	--	--	--	1	2	--	--
CO3	1	1	--	--	--	--	--	1	2	--	--
CO4	1	1	--	--	--	--	--	1	2	--	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3105	INTRODUCTION TO PHOTOGRAPHY	L	T	P	C
Version	**2021**	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Photographs are an effective communication medium and students will explore this immensely artistic as well as highly technical media in this unit. The importance of photographs, techniques and utility of photography and it‘s applications in mass media will be made clear to them. The unit will expose them to the intricacies of developing, printing and enlarging photographs.

Course Objectives

Course Objectives

The objective of this course is to

1. Learn to shoot with digital cameras maximizing the quality of the output.
2. Appreciate more about the "Photographer's Art" through the study of historic and contemporary trends.
3. Develop the habit of looking closely at the visible world around you in order to represent it in terms of aesthetics, beauty and truth.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Operate Cameras in Manual Mode, Zone System, Multiple Exposures

CO2. Demonstrate knowledge of Depth of Field Preview, Lens Compression, Avoiding Lens Distortion, Panoramas,

CO3. Demonstrate knowledge of Lighting ; High-Key Lighting, Rule of Visual Weight, Visual Composition Tools, Colour Management, RAW Workflow,

CO4. Operate Advanced Camera Settings, Dust Specks, Noise, Lens Corrections, Chromatic Aberration, Sharpening, Printing.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and applications Historical background, stages of development Requirement and utility of photographs Principles of light Working of Photography	L1, L3	10
MODULE 2: Camera & Accessories Various still photography cameras & its types (Including pinhole, view camera, compact camera, T.L.R., S.L.R., digital camera, D-SLRs) Lenses, its type ,Exposure Control in SLRs Aperture ,Shutter ,Films, its types and sizes	L1, L3	6
MODULE 3: Aesthetics of Photography Depth-of-field Composition & its Rules Outdoor & indoor lighting	L1,L3	10
MODULE 4: Photography Practicals Handling of camera, studio lights Practicing outdoor, indoor in B. & W. and Colour Developing, Printing and Enlarging (B. & W.) Assignments / Portfolio /Presentations	L1, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Langford Michael. (2013), *Basic Photography*; Burlington: Focal Press
2. Corbett Bill. (2002), *A simple guide to 35mm photography*, Sydney:4C Publishing Pty Ltd

Reference Books

1. Stephen G. Anchell(2002). The Darkroom Cookbook; Burlington: Focal Press
2. Naomi Rosenblum. (2008),*A World History of Photography*,New York, Abbeville Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	--	--	--	--	1	1	2	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN4106	**Design Software**	L	T	P	C
Version 1	2021	2	-	2	3

Pre-requisites/Exposure	
Co-requisites	

Catalog Description

This unit is designed to initiate the student into the rudiments of design and application of design in all walks of life that we see all around us. The student will learn and imbibe important typographic principles, use of fonts and fontography, use of color, color harmonies and tonal balance. The vitally important role that symmetry, balance, images – both vector as well as bitmaps, play in creating a harmonious and aesthetically appealing composition will all be explained with real world examples of practical design being implemented in advertising and mass communication.

Course Objectives:

The objective of this course is to:

5. Enable the students to comprehend principles of design using a blended learning approach
6. To familiarize students with all aspects of software, both at the beginner as well as at an intermediate level
7. To integrate seamlessly both theoretical as well as practical aspects of design such that the learner is able to instantly identify design principles incorporated in the physical realm, be it print, net, web, film or television.

Course Description

This course covers all aspects of designs from the traditional orthodox straightforward design principles to contemporary design principles and application. Not only are the traditional fields such as print and broadcast design covered but also newer areas like UI/UX and game design also are briefly covered in this course. By and large however, it is meant to teach print design and layout basics through a well interwoven thought out course that embeds practical constructional projects at every stage of theoretical information imparted. Students are taught to think critically and question traditional concepts as well as come up with their own models and ideas.

Course Outcomes:

On completion of this course, the students will be

CO1. Completely proficient with all aspects of at least three print design software, notably Adobe Photoshop, Illustrator and In Design. They will also be conversant with Corel Draw, at a basic level.

CO2. Be able to visualise and conceptualise layouts for Print, Web and Multimedia.

CO3. Be proficient at delivery of design projects, both at a conceptual level and at the execution stage.

CO4. Be able to work in a team delegating different aspects of production to team members and also exchange notes and monitor each others work, so that professional quality work can be outputted and exported.

Modules	Blooms level*	Number of hours
MODULE 1: Manual and Computer Aided Design Differences between traditional design, primarily for print as compared to designing for the web, the internet, and for television and film will be compared and contrasted, and how these inherent differences can be optimized for a specific media will be explained and expounded upon. The importance of computer as a design tool as well as the different software currently prevailing in the industry are also highlighted and a broad overview imparted of each software with its distinguishing features	L1, L2	4
MODULE 2: What is Design? Design Elements, Design Principles. How elements and principles helps in design.Where and how these elements and principles are applicable. How do different design elements combine and collaborate together to create an overall 'look' and feel for the published output – be it a web page, a brochure or a billboard hoarding.	L2, L3	6
MODULE 3: Typography History of fonts, Sizes of fonts, Classification of fonts, True Type and Open type. Breakdown of a word into typographical elements and ligatures, designing a custom font from scratch, all form part of this particular module. Each concept that is explained is generously illustrated with practical examples drawn from mixed media	L2, L3	6

MODULE 4: Hardware and Software From more theoretical concepts like Typography and design principles we move to the more practical aspects of implementing design on the ground through use of immersive technologies. Important aspects of hardware, notably the computer and accessories like printers, scanners and other input/output devices are explained. The student is also taken through the gamut of design software that exist that take full advantage of the computer's multitasking and multi-threading capabilities. In this module, only an overview of Digital Publishing software is given. In the next two modules, the most popular design software are explained at length	L2, L3,	6
MODULE 5: Fundamentals of Design Software The Editing of images, selection and cropping, integration of text with graphics, as well as the importance of resolution, image size, pixel depth, and the different sizes for print, web, broadcast and internet mediums such as Youtube are all covered in this module. Also different image file formats such as jpg, png, tiff etc along with transparency and scaling are also explained. From technical definitions we move on to the software itself, covering all basic aspects of industry standard software like Photoshop, Illustrator, Corel Draw and Adobe InDesign	L3, L4	8
MODULE 6: Design Software – Intermediate level This module covers the above software in more detail and depth with overlying emphasis being given to integration of practical projects that employ all the theoretical knowledge imparted. Once a set of topics is taught, application of the same is demonstrated through several practical exercises that are not only structured but also graded in terms of complexity and applicability.	L3,L4	6
TOTAL TEACHING HOURS		36

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

- Sarkar, N. M. Art & Print Production. 2013 Ed.
- Krug, Steve. *Don't Make Me Think: A Common Sense Approach to Web Usability*. New Riders Publishing, California. 2nd Edition
- Bauer, Peter. Adobe Photoshop CC For Dummies. Wileys. 2nd Edition

- Wood, Brian. *Adobe Illustrator CC Classroom in a Book* (2019 Release), Adobe Press. First Edition. December 2018.

Reference Books:

- Anton, Kelly Kordes. Cruise, John. *Adobe InDesign CC Classroom in a Book* (2017 release). December 2016.
- Norman, Don. *The Design of Everyday Things: Revised and Expanded Edition*. November 2013.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2	3	..	..	..	1	3	3	2
CO2	1	2	2	3	..	..	..	1	3	3	1
CO3	1	2	1	3	..	..	..	1	3	1	3
CO4	1	1	3	1	..	..	..	2	3	1	1

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

		L	T	P	C
JRN4107	**HISTORY, CULTURE AND SOCIETY**				

Version	2021	2	0	0	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Before stepping out into the field of mass communication and journalism, students need to have basic knowledge, curiosity, and awareness of politics, history, economics, and society. Various teaching methods and streams will be introduced (such as quizzes and debates) to make the students aware of contemporary issues so that they not only have opinions but also can intelligently analyze them in a broad perspective.

Course Objectives

The objective of this course is to provide an overview to students about politics, history, economics, social and science & technology.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1. Describe history of India; pre & post.

CO2. Explain Indian parliamentary structure & constitution.

CO3. Describe various issues related with Indian economy.

CO4.Explain the concepts of globalization and societal structure.

CO5. Describe aspects of science and technology in India.

Modules	**Blooms level***	**Number of hours**
MODULE 1: (History) What do you know of Indian history? Main periods in Indian history	L1, L3	6

Stories of some main events & personalities, Colonial Rule, Struggle for Independence, Modern Independent India, Division of States and the ongoing debates on autonomies of state, Post-Liberalization India		
MODULE 2:(Politics) Parliamentary, Presidential, and Monarchy, Single party, two party and Coalition Governments, Federal and Centralized System, 3 wings of the Government, Chief national and international personalities figuring in current news, Important bills, Parliamentary Acts and Constitutional amendments passed by Indian Parliament over past 5 years, Important Supreme Court rulings over past five years, Regions of conflict in the world, Role of UN over past 10 years	L1, L3	5
MODULE 3: (Economics) India a mixed economy –feudalism, socialism, and capitalism, Industrial and agricultural economies, Developing, Developed, and Under-Developed economies, Role of Private and Public Enterprise in the economy, Role of Banks: RBI, World Bank, Asian Development Bank, Indian Economy: Growth Patterns	L1,L3	4
MODULE 4: (Society) Globalization and its cultural impact, Global warming and environment, Cultural shifts in Indian society, Urbanization & migration, Growth of Entertainment Industry, Shifts in the Indian Sports Scenario, Criminalization of politics,Reservation	L1, L3	5
MODULE 5: (Science and Scientific Temper) Modern day debates on War and warfare,Debates on Nuclear Non-Proliferation, Latest developments in technology Nobel Prizes in Science	L1, L2	4

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Jawaharlal Nehru. (2008),*Discovery of India*, New Delhi,Penguin.
2. Bipan Chandra.(2009),*History of Modern India* DelhiOrient BlackSwan

Reference Books

1. Ramesh Singh. (2001) *Indian Economy* ,USA McGraw Hill

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**H**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	--	--	--	--	1	1	2	--	--
CO2	1	1	--	--	--	--	1	1	2	--	--
CO3	1	1	1	--	--	--	1	1	3	--	--
CO4	1	1	--	--	--	--	1	1	2	--	--
CO5	1	--	1	1	1	2	1	1	2	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

SECOND SEMESTER

JRN3201	ADVERTISING PLANNING AND STRATEGIES	L	T	P	C
Version	2021	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes all the nitty-gritty of advertising. It includes steps in developing an advertising plan, consumer behavior, preferences and compulsions. The aim of this course is to explore various creative advertising strategies and ethics involved in advertising.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of creative fields and strategies involved in making advertisements.
2. Provide an overview of consumer behavior and ethics in advertising.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Identify and develop various steps in advertising plan.

CO2: Describe the decision making process as consumer behaviour and apply to create advertising plan.

CO3: Apply and describe ASCI code of advertising practice and ethics in advertising.

CO4: Classify and apply advertising strategies to create advertisements.

Modules	Blooms level*	Number of hours
MODULE 1: The Advertising Plan	L2, L5	10

Steps involved in developing an advertising plan Situation analysis, Identify target audience, Determine communication objective, The Creative Plan: Copywriting, The Media Plan: selecting the communication channel, Determining the advertising budget, Deciding on the communication mix, Evaluation		
MODULE 2: Advertising and Consumer Behaviour The Decision Process: Low-Involvement Decision Process, High-Involvement Decision Process, Stages in the Decision Process	L1, L3	8
MODULE 3: Advertising and Ethics ASCI Code of Advertising Practice, Truth in Advertising, Advertising to Children, Advertising Controversial Products	L1, L3	8
MODULE 4: How Advertising Works Rational to Emotional Approaches, Advertising Strategies: Generic, Pre-emptive, USP, Positioning, Brand Image Approach, Resonance, Affective, Concepts of an Advertising Brief, Study of various elements of a brief and how advertising evolves out of a brief.	L1, L3	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Jaishri N. Jethwaney (1999). *Advertising*, New Delhi, Phoenix Publishing House Pvt. Ltd.
2. Chunawalla, S.A. & Sethia, K.C (2002). *Foundation of Advertising Theory & Practice*, 7th ed., Himalaya Publishing House.
3. David Ogilvy (1985). *Ogilvy on Advertising*, 1st ed., New York, Vintage Books: A Division of Random House.
4. Rathor, B. S. (2003). *Advertising Management*, 11th ed., New Delhi, Himalaya Publishing House.

Reference Books

1. Batra Rajeev, John G Myers & Aaker David A. (1995). *Advertising Management*, 4th ed., New Delhi, Prentice Hall of India.
2. Frank Jefkins (2003). *Advertising*, Macmillan India Limited.

3. J. Thomas Russell (2008). *Advertising Procedure*, 17th ed., Pearson Prentice Hall
4. Lewis Herschell Gordon (1994). *The Complete Advertising and Marketing Handbook*, Chennai, East West Books (Madras) Pvt. Ltd.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, P: Project, EE: End Semester Examination; A: Attendance.

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	--	2	1	2	--
CO2	1	--	--	--	--	--	--	2	1	--	--
CO3	1	2	--	--	3	--	--	2	1	2	--
CO4	1	1	1	2	3	--	--	2	1	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN 3202	PRINT DESIGN AND VISUALISATION	L	T	P	C
Version	**2021**	2	-	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description:

This course prepares the students for a career in the print industry. It comprises of modules that move from theoretical concepts like page sizes, resolutions etc to using software to craft print publications for newspapers and the advertising industry.

Course Objectives:

The primary objectives of this course are to:

- Introduce students to design concepts like layout, use of positive-negative space etc.
- Familiarize them with the juxtaposition of fonts, images and text to create compelling print material for publication
- Teach them how to effectively use software to create advertisements, banners and magazine layouts for printing and publication

Course Description

This course moves seamlessly from the definition and description of layout and design theoretical concepts to the actual realization of these concepts in print. Various concepts and jargon used by the print industry are explained and demonstrated, culminating in the use of software to translate design concepts into visually appealing printed material. Fundamentals of advertising and media campaigns are also an integral part of this course

Course Outcomes:

On completion of this course, the students will be able to:

CO1. Describe various style sheets for print media.

CO2. Comprehend how images, text and fonts interact to create pleasing layouts.

CO3. Use different design software to edit and accomplish print related tasks

CO4. Use design skills and knowledge of software to create one or more professionally designed projects.

Modules	Blooms level*	Number of hours
MODULE 1: Module I: House Styles What is style sheet? How to create style sheets? Style guide: examples from newspapers, magazines; own guide produced for new publication. Styles: choice of typeface and masthead, choice and use of images and color, positioning of articles and images on the page, use of headlines in an appropriate font, point size, number of lines etc., text manipulation, juxtaposition of text/images/advertising, Typography.	L1, L2	8
MODULE 2: Comparison in newspapers and magazines What is the difference between Newspaper & Magazine layouts? What needs to be taken care when creating layouts for Fashion feature or Business articles or News pages. Which software is to be used - for making layouts, creating vector graphics and raster images? Proper utilization of design elements and principles in layouts.	L2, L3	6
MODULE 3: Advertising concepts Corporate Identity: Usage of Types & Fonts, Color schemes, Punch line, Orientation. Corporate Stationary: Logo, Letterhead design, Business Cards, Envelopes, Catalogues, Brochures, Digital Posters, Calendar Design. Communicating through multiple media: Digital and print	L2, L3	6
MODULE 4: Relevant software to design advertisements Advertising campaigns: Developing advertising campaigns from concept to creation, from creative to presentation. Photoshop, PageMaker, Corel Draw, Illustrator and their relevant usage in creating different forms of design for advertisements and campaigns.	L2, L3	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

- Sarkar, N.N(2001). *Art and Print Production*. 6th Ed.
- Lupton, Ellen(2015). *Graphic Design: The New Basics*. 2nd Ed.

Reference Books

Moggridge, Bill(2010). Designing Media. The MIT Press.
Shaoqiang, Wang(2018). *Page Design: Printed Matter and Editorial Design*.

Modes of Evaluation: Practical/Home Assignment/Class Test/Written Examination

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Project, CT: Class Test, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	3	-	-	-	2	1	2	3
CO2	3	2	3	3	-	-	-	2	1	2	3
CO3	1	2	1	3	-	-	-	2	1	2	2
CO4	1	3	2	3	-	-	-	2	1	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3203	Specialized Reporting And Feature Writing	L	T	P	C
Version	**2021**	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

After introducing the basics of newspaper reporting and editing in the first semester, this course describes the issues of specialization in news. The course introduces the concepts of beat reporting and also deals with the subtle differences between reporting on politics, business, sports, crime etc. The course also describes the nuances of investigative reporting with discussion on relevant case studies.

Course Objectives

The objective of this course is to

1. Introduce beat reporting and discuss the finer points of specialized writing.
2. Explain how reporting is different for various beats like crime, health, education, politics etc.
3. Provide knowledge regarding investigative reporting and its tools.
4. Provide understanding for different types of journalistic writing.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe differences and similarities between different journalistic beats.

CO2: Describe and apply various concepts of beat reporting.

CO3: Explain investigative reporting in depth; especially sting operations.

CO4: Apply conceptual knowledge to write different types of features and reviews.

CO5: Argue if sting journalism is a healthy practice in a democracy.

Modules	Blooms level*	Number of hours
MODULE 1: Beat Reporting Covering a news beat, coverage of various beats: crime, education, health, civic affairs and local government, political reporting(political structure in India, covering political parties/events/rallies/elections), parliament reporting (parliament structure, reporting on legislature), covering the government (PIB, ministries), legal reporting (Structure in jurisdiction of courts, reporting court hearings, precautions)	L1, L2	12
MODULE II: Business and Sports reporting Basic business knowledge and business bodies, corporate reporting, covering economic policy (Ministry of Commerce, Finance, Industry, Company Affairs, and other infrastructure ministries), stock market coverage, how to develop good sports writing skills, covering local, national internal level events, entertainment and lifestyle reporting	L2, L3	8
MODULE III: Investigative Reporting Definition and elements, tools of investigative reporting, importance of sources, sting operations and latest trends, relevant case studies: Indian and international	L1, L5	9
MODULE IV: Feature Writing How to write a feature, different types of features, book reviews and film reviews	L3	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Sharma, Seema (2005) *Journalism: Reporting*, New Delhi: Anmol Publications Pvt. Ltd.
2. Fox, Walter (2001)*Writing the News: A Guide for Print Journalists*, New Jersey: Wiley-Blackwell
3. Mencher, Melvin (1989)*Basic News Writing*, U.S.A. : William C. Brown Publication

4. Rajan, Nalini (2007) *21st Century Journalism in India*, New Delhi : Sage India
5. Rick Wilber & Randy Miller (2002*) Modern Media Wring*, Belmont : Wadsworth Publishing Company

Reference Books

1. Hough, George A. (1995) *News Writing*, Boston : Houghton Miller
2. Fink, Conrad C. (2001*) Sports Writing: The Lively Game*, New Jersey : Wiley- Blackwell
3. Keeble,Richard (2001)*The Newspaper Handbook*, Abingdon : Rutledge
4. Kamath,MV (2012*) Journalism Reporting*, Noida : Vikas Publication
5. Rosenauer,Kenneth L (2004)*Storycrafting: A Process Approach to Writing News*, New Jersey: Wiley Blackwell

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	5	15	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	--	3	2	3	--	2	1	2	2	--
CO2	2	1	2	1	2	--	2	1	2	2	2
CO3	3	2	--	2	2	3	--	1	2	2	2
CO4	--	1	2	2	2	2	2	1	2	2	2
CO5	--	--	1	1	1	2	--	1	3	2	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3204	MEDIA ARTS - II: RADIO & TV	L	T	P	C
Version	**2021**	2	0	2	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

Various components of television production will be taught through praxis. Students will know about how a television organization operates and the finer nuances of reporting. Students will do on camera interviews and learn how to work in a PCR and studio.

Course Objectives

The objective of this course is to

1. Give students the opportunity to study the contemporary conventions and practices in Television and Radio Journalism.
2. Identify and examine key principles involved and required in news broadcasting.
3. Train the student in basics of news and feature reporting, writing and programming

Course Outcomes

On completion of this course, the students will be able to

CO1. Write scripts in different formats different genres; Radio and Television.

CO2. Describe roles & functions of various TV Newsroom

CO3. Demonstrate qualities of TV Journalist

Course Content

Module	Blooms Level	Number of Hours
Module I: Writing For Media Writing styles for Broadcast Medium TV - Writing for visuals, Conversational Writing	**L1, L3**	**12**

Terminology Script, screen play, story board, script formats Writing for different formats Radio- Writing for ear Style, Radio scripts for different formats, Jargon and terminology		
Module II: Introduction to TV Journalism Basic contours and characteristics of TV news journalism. TV news room- hierarchy, role of each element in hierarchy The news process from field reporting to packaging and going on Air Various technical departments Functioning of each department Designations of technical staff Equipments or hardwares for a news channel Utility of each Importance of technical functioning in a news channel Coordinating with the newsroom Professional terminologies Functioning while working on a live bulletin and recorded programme TV news bulletin; rundown, stacking, blocking	**L1,L3**	**12**
Module III: Television Reporting: the human angle Qualities and attributes of a broadcast reporter. Essentials during reporting Live reporting and working on a story Different functioning for different beats Interviewing skills The news Anchor- qualities, role and responsibilities.	**L2, L3**	**11**

Text Books:

1. Page, D. & Crawley, W. (2001).*Satellites over South Asia*, (New Delhi) Sage Publications Ltd.
2. Sexena, G. (1996) *Television in India: Changes and Challenges*, (New Delhi) Vikas Publishing
3. Monroe, E. & Verhulust, S. (2001). Broadcasting *reforms in India: Media Law from a Global Perspective*, (New Delhi), Oxford University Press

References:

https://www.youtube.com/watch?v=Xs0K4ApWl4g
https://www.youtube.com/watch?v=6lKehR9HENE
https://www.youtube.com/watch?v=6PXORQE5-CY
https://www.youtube.com/watch?v=p8636YkEhU4
https://www.youtube.com/watch?v=Yaj2PXRswxI
https://www.youtube.com/watch?v=vtU_N57MZf8
https://www.youtube.com/watch?v=W8PBRBlW50I

Other readings:

- Handout: Television:

Web Resources: (IF ANY)

- http://www.bbc.co.uk/radio4/factual/indiasroute66.shtml
- http://www.radiomirchi.com/
- **http://www.aljazeera.com/**

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**C**	**CT**	**A**	**EE**
Weightage (%)	5	10	10	5	70

P- Project, C- Case Discussion/Presentation/Analysis, CT- Class Test, A- Attendance, EE- EndSemesterExam

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	-	-	-	-	1	2	-	-
CO2	-	1	-	-	-	-	-	1	-	2	-
CO3	-	-	-	1	-	-	1	1	2	-	-
CO4	-	-	-	1	-	-	1	1	-	-	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3206	PUBLIC RELATIONS AND CORPORATE COMMUNICATION	L	T	P	C
Version	**2021**	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course is designed to help students understand the concepts of public relations (PR) and corporate communication practices. The students will understand the PR relations scenario and significance in India both in public and private organizations. They will get to analyze about different techniques of effective PR practices, producing and disseminating press material and releases. They will also explore how PR techniques are applicable in corporate communication for successful products and media management.

Course Objectives

The objectives of this course are to:

1. Define and analyse PR and its concept
2. Apply PR applications in different fields (political, social and public).
3. Explain PR campaigns its planning, organizing and evaluation.
4. Explain corporate communication and its relationship with PR strategies.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Define and classify various concepts of Public Relation and distinguish its need for effective employee & community relations.

CO2: Describe and apply various aspects of planning a PR campaigns, targeting audience and managing media utilizing research as an effective tool.

CO3: Apply PR tools such as Press releases, Backgrounders, catalogues, Brochures, Journals, annual reports, writing company profile newsletter and organizing Press conferences. Assessing its relation with Socio – Economic development, Journalism, Advertising, associated organizations such as PRSI and laws and ethics.

CO4: Identify Corporate Communication: its philosophy, culture, corporate identity, citizenship and Philanthropy, Image management, direct marketing, network marketing, issue management and Celebrity endorsement.

CO5: Apply tools of designing for corporate communication

Modules	Blooms level*	Number of hours
MODULE 1: Public Relations Basics of Public Relations: Evolution and History of PR Definitions and Concepts: PR definition and PR w.r.t allied disciplines Political and financial PR, PR as management function. Role and Objectives of PR (need of PR for effective employee & community relations) Publics in public relations: Internal and External PR, targeting the correct public. Public Relations in India and other developing countries. Globalisation & PR: Changing trends in PR	L1, L2	8
MODULE 2: Public Relations and Media Affairs Planning Process in PR: Research –Brief Intro of qualitative and Quantitative research methods and Media Planning, Implementation and Evaluation of Campaign and techniques, program budget & assessing results Event and Crisis management Media Relations (Understanding the Media, Media events and facility visit, principles of good media relations	L1, L3	7

MODULE 3: PR tools Press releases, Backgrounders, catalogues, Brochures, Journals, annual reports, writing company profile, Newsletter (types & contents) Making press kit, organizing press conference (Role & importance, press reception and conference organization) Public Relations & Socio –Economic development Public Relations in Journalism and Advertising Public Relations Laws and Ethics PRSI, origin, Objectives and Achievements	L1,L2, L3,L6	7
MODULE 4: Corporate Communication PR vs Corporate Communication Introduction, its need, importance and functions Elements of corporate communication: corporate philosophy, culture, corporate identity, citizenship and philanthropy Important concepts in corporate communication: Image management, direct marketing, network marketing, Issue management, Celebrity endorsement	L1,L2	7
MODULE 5: Tools of Corporate Communication Desktop Publishing (DTP) Corporate Communication through websites, designing of website Annual Reports: Budget, timing and general concepts of the annual report, essentials of designing a report Types of leaflets, formal and informal invitations, Designing of leaflets, invitations Blogs, Pod casting, chat rooms, social networking sites and current TV: Impact of citizen journalism and "Transparency" on Corporate communications practice	L1, L3,L5,L6	7

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

1. Gregory Anne (1999). Planning and Managing a Public Relations campaign:A step by Step guides. The institute of Public Relations: London. Kogan.
2. Cutli M Scott and Centre H Centre(1990). Effective Public Relations. (1990). Prentice Hall.

Reference Books

1. Sahai Baldev(2002). Public Relations a Scientific Approach. Scope Publication: New Delhi.
2. Mehta S D(2006)Handbook of Public Relation in India. Allied Publisher: New Delhi.
3. Kaul J N(1998). Public Relations in India. Nyay Prakashan: Calcutta.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**CT**	**A**	**EE**
Weightage (%)	10	15	5	70

P: Practical, CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3	2	1	-	-	1	2	2	-
CO2	1	1	1	1	1	-	-	1	2	2	-
CO3	1	2	2	2	1	-	-	1	2	2	-
CO4	1	2	1	1	1	-	-	1	2	2	-
CO5	1	2	2	2	1	-	-	1	2	2	-

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3207	Advanced Photography	L	T	P	C
Version	**2021**	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course describes how to develop a unique photographic vision using a combination of aesthetics and technology. Using both practical's and theoretical teaching methods and blending traditional processes with current digital technologies, the photographic curriculum provides aspiring photographers with the breadth of experience and knowledge required to succeed in today's market place

Course Objectives

After Being exposed to the basics of photography in the first semester, the students will be eager to try their hands in the comparatively new area of digital photography and imaging. They will be able to start maintaining their portfolios and will be required to make digital presentations and undertake practical assignments.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Demonstrate Lighting essentials for creating incredible images, their importance and purpose of the main light in Photography.

CO2: Analyse aesthetics for various genres of photography.

CO3: Describe concepts of digital photography and imaging.

CO4: Apply techniques of Photo manipulation.

CO5: Produce portfolio in the genre of their choice.

Modules	Blooms level*	Number of hours
Module I: Advanced lighting and Composition Lighting and its control (source, Contents & Direction of light) Electronic Flash & Its synchronization One, Two- & Three-Point Lighting Working on the subject (Changing proximity, varying angle, tightly framing subjects)	L1,L2	8
Module II: Aesthetics Variations for various beats Portrait Wildlife, Nature and Landscapes Night Photography Journalism (Photography for newspapers and magazines)	L1,L2,L4	6
Module III: Understanding Digital Photography Digital Imaging Construction (Size, Resolution of Digital Images) Uses, Advantages and Limitations of Digital over conventional Photography image sensors (CCD and CMOS) Formats of a Digital Image Types of Digital Cameras	L1,L2	6
Module IV: Digital Image and Manipulation Problems with Digital Photographs Commonly used image editors Editing images with Adobe Photoshop and Photoshop Elements Printing and sharing Digital Images	L1,L2,L3	6
Module V: Advanced Photography Practical's Practicing outdoor Photography Photography Assignment and Projects Developing personal Digital Portfolio Digital Image Manipulation using various computer software	L1,L3	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis,

L6-Evaluation

Text Books

1. Langford Michael. (2013), *Basic Photography*; Burlington: Focal Press
2. Corbett Bill. (2002), *A simple guide to 35mm photography*, Sydney:4C Publishing Pty Ltd

Reference Books

1. Stephen G. Anchell, The Darkroom Cookbook; Burlington: Focal Press
2. Naomi Rosenblum. (2008),*A World History of Photography*,New York, Abbeville Press.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**
Weightage (%)	10	A	15	70

CT: Class Test, EE: End Semester Examination; A: Attendance; P: Practicals

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	2	--	--	--	--	--	1	2	2	2
CO2	--	2	--	--	--	--	--	1	2	2	2
CO3	--	2	--	--	--	--	--	1	2	2	2
CO4	--	2	--	--	--	--	--	1	--	2	2
CO5	--	--	--	--	--	--	1	1	2	2	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3210	**MEDIA TRENDS & TECHNOLOGY**	L	T	P	C
Version	2021	1	1		2
Pre-Requisites/ Exposure					
Co-Requisites					

Catalog Description

Media industry is dynamic in nature. The technological advancements in media ensure that new innovative tends keep emerging. This course aims to introduce students to the contemporary trends and practices in the field of mass media. It will equip students with the advanced skills that assure to make them industry-ready.

Course Objectives

The objective of this course is to

1. Understand the changes and new trends in media industry.
2. Explain use of technology in online news platforms/ formats.
3. Describe the practices in mobile journalism.
4. Understand the emerging trend of drone journalism.
5. Describe ways to curb fake news.

Course Outcomes

On completion of this course students will be able to

CO1: Understand the changes in mass media to new media technology

CO2: Apply the concepts of Mobile Journalism and create content for mobile.

CO3: Describe the ethical practices in Drone Journalism.

CO4: Understand and apply tools to verify fake news.

Modules	**Bloom's Level***	**Number of hours**
Module 1: Convergence in Media-New Media Technology Introduction to media convergence; Overview of recent trends in mass media; Developments due to media convergence in Print media, Television, Cinema, Radio; Online News Reporting; Social Media- social engineering web, Social	L1,L2	6

media platforms-toolkit, Twitter storm; New Media Laws and Cyber Security; Storytelling:Visual, Audio, and Video		
Module 2: Mobile Journalism Introduction to Mobile Journalism; Advantages and Disadvantages; Scope, Opportunities and challenges; Tools used for mobile journalism; Creating content for mobile journalism; Using social media platforms: AI,AR,VR; Blogging-microblogging, live blogging, Vlogs,	L1, L3	7
Module 3: Drone Journalism Introduction to Drone Journalism; Uses and Advantages of Drone Journalism: Using Drones for News Reporting, Digital Terrorism; Devices used for Drone Journalism; Ethical guidelines and Laws: Issues related to trespassing and privacy	L1,L2	5
Module 4: Verification of Online Content Paid News; Misinformation, Disinformation; How False narratives are created; Ways fake news is spread; Effects of fake news; Tools to verify online content; News Analysis; Case Studies: Combating fake news in India	L1,L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation
Examination Scheme

Components	H	C	CT	A	EE
Weightage (%)	5	10	10	5	70

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

Text Book

1. Lugmayr, A., Lugmayr, A., & Dal Zotto, C. (2016). *Media Convergence Handbook - Vol. 1* (1st ed.). Springer-Verlag Berlin Heidelberg.
2. Burum, I. (2021). *The Mojo Handbook: Theory to Praxis*. Routledge.
3. Gynnild, A., & Uskali, T. (2018). *Responsible drone journalism*. Milton Park, Abingdon, Oxon: Routledge, an imprint of the Taylor & Francis Group.
4. Zimdars, M., & McLeod, K. (2020). *Fake news* (1st ed.). The MIT Press.

Reference Books

1. Burum, I., Quinn, S., & Quinn, S. (2015). *MOJO* (1st ed.). Routledge.
2. Chamberlain, P. (2017). *Drones and journalism. How the media is making use of unmanned aerial vehicles*. Basingstoke: Taylor & Francis Ltd.
3. Shu., & Baumann. (2020). *Disinformation, Misinformation, and Fake News in Social Media*. [S.l.]: Springer International Publishing.

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2					3	2			3
CO2	1	2			3		2	2		3	3
CO3	1	1						3	1		
CO4	2	3						3	2	3	
CO5	3	2			1			2	2	3	

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3209	**MEDIA PLANNING AND BRAND MANAGEMENT**	L	T	P	C
Version	**2021**	2	1	0	3
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

This course comes under a management domain which describes various concepts of media planning and brand management. It includes marketing and negotiation skills and concepts of selection of media mix and substantial marketing and branding research etc. The aim of the course is to explore various creative fields involved in the placement of advertisements and branding strategies and brand positioning decisions involved in managing a brand in the market.

Course Objectives

The objective of this course is to

1. Equip the students with concepts of creative fields involved in media planning and buying for advertisements.
2. Provide an overview of the process of selecting and buying of media mix for the placement of advertisements.
3. Equip the students with the creative branding strategies involved in launching, building and sustaining brands.
4. Provide an overview of brand positioning and marketing of brands.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Describe media planning and select the media mix.

CO2: Describe and distinguish various media forms.

CO3: Select and apply research data to develop media strategy process.

CO4: Identify and explain media buying and complexities in media buying.

CO5:Define and describe various basic concepts related to brands.

CO6: Describe and classify various branding strategies.

Modules	**Blooms level***	**Number of hours**
PART-I **MODULE 1: Media Planning** Planning is the strategic formulation of activities design to carry out the goals or objectives of the advertising program. The Planner decisions are directed by a series of questions: Whom is the campaign directed to Where will the campaign directed to	L1, L2	10

When will the campaign run What degree of target coverage and repetition of exposure are necessary Integrating science with creatively in advertising Role of media in the Marketing Framework Media Planning Framework Developing Media Strategy- the media mix, Factors influencing media strategy decision Media availability & economics		
MODULE 2: Overview Media types characteristic of major media forms Electronic Media- The global goose Outdoor Advertising- They do not circulate market circulate around them Transit Advertising Internet- new born medium for the millennium	L1, L2	3
MODULE 3: Matching Media & Market Geographical Selectivity, Reach & Frequency Maximizing Advertising Exposure Media Briefing Media Scheduling What patterns of exposure works best Timing the effective exposure and finding time opportunities to communicate and Media Budget	L1, L3	4
MODULE 4: Selecting and Buying Acceptable Media Media Buying Functions New Media Increasing Complexity in Media Buying	L1, L2	3
PART-II **MODULE 5: Brand Management** Evolution of Brands Brand & Products Brand Perspectives Brand Differentiation Brand Positioning Brand Image Brand Equity Brand Extension	L1, L2	12
MODULE 6: Branding Strategies Closing Branding Strategies Product Branding, Line Branding,	L1, L2	4

Range Branding, Umbrella Branding, Source/Double Branding Endorsement Branding		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Croteam, David; Hoynes, William D (2005). The Business of Media. Corporate Media and the Public Interest. SAGE Publications, Inc.
2. Albarran, Alan B (2002). Media Economic (Understanding markets, Industries and Concepts). Wiley-Blackwell.
3. Kelley Larry D, Jugenheimer Donald W, (2009).Advertising Media Planning: A Brand Management Approach. Phi Learning.
4. Jack Z. Sissors,Roger B. Baron, (2010). Advertising Media Planning, Tata Mcgraw Hill Education Private Limited.
5. Harsh V Verma (2008). *Brand Management: Text and Cases*, Excel Books.
6. Keller, Kevin Lane, Parameswaran and Jacob (1998). *Strategic Brand Management*, Pearson Education.
7. S. A. Chunawalla (2004).*Compendium of Brand Management*, Mumbai: Himalaya Publishing House.

Reference Books

1. Menon, Arpita; (2010).*Media Planning and Buying.* Tata Mcgraw- Hill Education Private Limited.
2. Katz, Helen; (Jun 2010. *The Media Handbook: A Complete Guide to Advertising Media Selection, Planning, Research, and Buying*. Routledge.
3. Sissors, Jack Z., Goodrich, William B. (1996). *Media Planning Workbook*, McGraw-Hill Humanities/Social Sciences/Langua.
4. Philip Kotler. Marketing Management, Pearson Education.
5. Magazines- Business World, Time & Brand Reporter.
6. Brand Equity- a Wednesday Supplement with Economic Times.

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**P**	**A**	**CT**	**EE**

Weightage (%)	10	5	15	70

CT: Class Test, EE: End Semester Examination; A: Attendance; P: Project

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	2	2	1	--
CO2	1	3	--	--	--	--	--	--	2	1	--
CO3	2	1	--	--	--	--	--	--	2	1	--
CO4	2	1	--	--	--	--	--	--	2	1	--
CO5	1	3	--	--	--	--	--	2	3	1	--
CO6	1	1	2	--	--	--	--	2	3	1	--

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

JRN3232	**Project**	L	T	P	C
Version	**2021**	-	-	-	2
Pre-requisites/Exposure					
Co-requisites					

Catalog Description

The objective of the course is to develop a critical and analytical eye when it comes to understanding issues/trends related to media. It aims at providing a platform to the students to interrogate and review various media concepts. The course helps in giving hands-on training to the students.

Course Objectives

The objective of this course is to

1. Provide hands on learning experience to the students.
2. Provide a platform to the students to hone their skill sets.
3. Provide students a learning experience in an out-of-classroom training environment.
4. Enable the students to understand the research process and be aware of research obligations and pitfalls.

Course Outcomes (COs):

On completion of this course, the students will be able to

CO1: Recognize the expectations of the media industry.
CO2: Assess his/her suitability in his/her desired areas of specialization.
CO3: Describe how the media industry functions.
CO4: Describe and apply various steps to be followed for undertaking scholarly projects.

Modules	**Blooms level***	**Number of hours**
Every student of PGD J&MC shall be required to undertake an industry/research based project in the second semester. The student will work under the guidance of a faculty guide who shall be assigned by the HoI. The student may choose to undertake a project in any of the major media streams such as print, electronic media, advertising, photography etc. In case the student undertakes a live project, he/she shall submit a portfolio instead of the project report. The work done by the student shall be submitted in the form of a report. **SPECIALIZATION (ANY ONE)** ***RADIO*** **Course Objective:** Students can do specialization in the different areas of Radio production Viz. Various Formats, News, Talk shows,	L2, L3, L4, L5, L6	No Contact Hours

Spots and commentaries, Radio documentary, Radio features, various music formats- classical, countdown shows, contemporary hit radio, music on demand, oldies, artist spotlights, request and dedication shows etc. Commercials/Jingles/ PSAs ***TELEVISION*** **Course Objective:** The students can choose a specific area of TV production in which they want to specialize, viz. TV Journalism, Reporting, Anchoring, Editing, Camera, Documentary Film making, Feature Films, Short Film, Ad Film making, Entertainment Based programming etc. ***PRINT*** **Course Objective:** Students can jointly bring out a journal with each one attending to a specific function of its production like reporting, editing, sub-editing, design and layout, photography and graphics. *ADVERTISING* **Course Objective:** The students will use their understanding of all advertising concepts learnt in the previous semesters to do a practical exercise. Students will act as brand managers of a new brand being launched. They will be required to study the following elements for the product category assigned to them: Market Research to determine the situation analysis		

Segmenting the market and selecting a segment for their new brand Identifying target audience Positioning their brand. This will involve a detailed study of the positioning of the competitive brands Developing the media strategy, including the communication mix Developing the creative strategy Creative strategy to follow a complete campaign creative presentation. This will include development of TV Commercials, print ads, radio ads and POP material. ***PUBLIC RELATIONS*** **Course Objective:** PR specialization can be undertaken in these different areas Crisis case studies PR in Non- Governmental organizations Cross- cultural PR Internal PR department in corporate situation ***PHOTOGRAPHY*** **Course Objective:** Student can choose any two subjects for Specialization: Photojournalism Travel Photography Portrait Photography Product & Table-top Photography Glamour Photography Wildlife Photography		

Students have to get themselves registered with the faculty concerned and take up project work in a systematic manner, planning, exposing in colour as well as in B & W, processing, contact sheet, enlargements and presentation in a portfolio. These projects have a direct bearing on the career prospects of students as well as the image of the Photography Department of ASCO, therefore, the decision of faculty in every stage of assignment would be considered final and binding. **Examination Scheme:** Duration of summer Project - 8 weeks Total marks for summer project - 100 marks Break-up of marks Timely Submission 5 marks Content i) Clarity 25 marks ii) Comprehensiveness 20 marks iii) Originality 5 marks c) Project Presentation 45 marks		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

NA

Reference Books

NA

Modes of Evaluation: Class Test/Assignment/End Term Examination/Case Presentation

Examination Scheme:

Components	**Project Report/ Portfolio**	**Presentation & Viva**
Weightage (%)	75	25

CT: Class Test, H: Home Assignment, EE: End Semester Examination; A: Attendance; C: Case Presentation

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	--	2	2	2	--	2	3	2	1	3
CO2	--	3	2	2	2	2	3	--	2	1	2
CO3	--	2	2	2	2	2	3	3	2	1	2
CO4	2	2	3	--	2	--	2	--	3	1	2

1: Strongly Related, 2: Moderately Related and 3: Weakly Related

Amity Law School

Bachelor of Arts, Bachelor of Law (Honors) (BA, LLB)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

HISTORY-I

Course Code: LAW2101 **Credit Units: 04**

Course Objective:
Study of law relating to India is not complete without understanding history and development of law and legal institutions. Hence, the study of History is imperative to a student of law to understand the development and evolution of legal principles and legal institutions in a particular socio-economic context in History. Since India is a country rich in history and traditions, therefore, a student of law should be exposed to the ancient social order and religious philosophy as well as to the system of disputes settlement mechanism existing in those days.
The medieval period has also its influence in the development of legal system. The British / Colonial rule in India was an event, which had also its influence in the growth of judicial and legislative institutions in India, as such the students have to be taught in order to give an insight and awareness as to how the present legal, constitutional, legislative and judicial systems had emerged from the ancient and modern currents of history.

Course Contents:

Module I: Introduction
History: Meaning and Methodology, Relationship between Law and History, Sources of ancient Indian Law and Medieval Law .

Module II: Polity, State and Administration
Ancient India: Vedic Polity, Mauryan State, Gupta Polity ;Medieval India: Chola Village Administration, Delhi Sultanat, Mughal State (Mansabdari System and Administrative Apparatus); Theory of Kingship and Nature of State in Ancient andMedieval India**:** Concept of State and Government in ancient India, Concept of Justice and Law in ancient India, Concept of 'Danda'; Administrative Concepts: Brahmanic, Buddhist, Kautilyan, Turko-Afgan Concept.

Module III: Society and Economy
Social Institutions in Ancient India: Varna, Jati, Gotra, Pravara, Family, Slavery, Position of Woman, Changes in Medieval period; Reformation in Medieval and Modern Times:
Bhakti Movement : Nanak, Kabir ; Socio Religious Movement 19th century: Raja Ram Mohan Roy, Dayananda Saraswati, Muslim Reform Movement (Sir Syyed Ahmad Khan),Backward Class Movements (B.R. Ambedkar, Jotiba Phule); Economic Structure: Vedic Economy, Mauryan Economy, Post- Mauryan Economy and Gupta Economy, Iqtadari System, Agrarian Reforms and economic regulation of Alauddin Khilji, Indian Economy during British Rule and Drain of Wealth.

Module IV: Legal Systems and Institutions Ancient India and Medieval India
Thinkers: Manu, Brihaspati, Yajnavalkya, Narada, Katyayan; Judicial System: Types of court: Pratishita, Apratishta, Mudrita, Sasita, Guilds, Panchayats, Kantakasodhana, Dharmasthiyaa; Procedures: Appointment of judges, Trial, Witness, Pleaders, Secret agents, wergild and Punishment, Role of Judges and Investigation; Salient features of Islamic Criminal Law: Judicial organization, King, Chief Qazi, Judicial Officers, Investigative Process and Punishments; Law with regard to non-Muslims in Medieval India; Evolution of Judicial Setup: changes introduced by Akbar.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- H.V. Sreeniwasmurthy – History (for law students)
- Habib & Nizami – Comprehensive History of India, Vol. V and VI
- Bipan Chandra – India's Struggle for Independence (Penguin)
- A.S.Tripathi – Jurisprudence
- T.Rama Jois – Ancient Legal thought
- A.L. Basham – Wonder that was India, Part-I
- S.A.A. Rizvi – Wonder that was India, Part –II
- Satish Chandra- Medieval India (Vol. I-III)
- E.H. Carr, "What Is History?"

POLITICAL SCIENCE-I

Course Code: LAW2102 **Credit Units: 04**

Course Objective:
Political Science is considered to be the 'mother science' of Law and as such the two have an intimate relationship. A student of law is expected to have an insight and understanding as to how Law Functions. Thus the students are introduced to the concepts on which the edifice of humanity rests. State being the central theme is prime focus of the study. The course involves the study of Political Obligation-an integral part of the modern democratic theory. The Thoughts of various western and Indian Political Thinkers has also been incorporated. It helps in bringing out the understanding of their views that exists in legal sphere.

Course Contents:

Module I: Introduction
Nature and scope of Political Science-conceptual analysis, Relationship of Political Science with other disciplines – History, Economics, Sociology, Political Science: Its relevance to the study of Law.

Module II: State and Sovereignty
Concept and theories of origin of State: DIvine Theory, Force Theory, Theory of Social Contract and Evolutionary Theory; Diverse notions of state: Legal, Plural, Liberal, Ideal, Welfare State; Sovereignty: Concept and types of Sovereignty and challenges to Sovereignty, Theories of Sovereignty: Pluralist, Legal, Monistic Theory

Module III: Political Concepts
Rights: Concept and theories; Liberty and Equality: Concept and their relation; Justice: Concept and types; Property: Concept and theories

Module IV: Political Obligation
Political obligation: Concept and its basis; Political Ideologies: Liberalism, Democratic Socialism, Marxism, Totalitarianism, Individualism.

Module V: Western and Indian Political Thinkers
Foreign thinkers: Plato and Aristotle; Indian thinkers: Kautilya, Gandhi and Nehru.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Coker, Francis W, Recent Political Thought.
- Jain, M.P. Political Theory, Liberal and Marxian
- Sabine, George H and Thorson, A History of Political Theory
- Verma, S.P., Modern Political Theory
- Gauba, O.P., Political Theory
- Ray Amal and Mohit Bhattacharya, Political Theory, Ideas and Institutions
- Germany, Deep & Deep Publications
- J.C. Johari, Principles of Political Science
- Harold J. Laski, Grammar of Politics.
- Eddy Asirvatham & K.K. Misra, Political Theory, S. Chand & Company Ltd., Delhi
- A.C. Kapur, Principles of Political Science, S.Chand & Company Ltd., Delhi
- Myneni, Political Science for Law Students, Allahabad Law Agency
- R.L. Gupta, Political Theory
- Vishoo Bhagwan, Indian Political thinker
- Amal Ray & Bhattacharya, Political Theory: Ideas and Institution

ENGLISH-I

Course Code: LAW2103 **Credit Units: 03**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative and aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond from different perspectives.

Course Contents:

Module I: Functional Grammar: Patterns and Usage
Tenses and composition, Correction of sentences, Basic Transformatives: Active and Passive voices, Direct and Indirect speech, Connectives, Modifiers, Questions,
Negatives; Reported Speech, Fill in the correct word.

Module II: Composition writing and comprehension of texts
Comprehension of Legal Texts, Paragraph and Précis writing, Legal Letters and Formal Correspondence, Procedure of Note taking and making, Drafting of reports and projects, Abstracts and summary.

Module III: Short Stories
Of studies, by Francis Bacon; Dream Children, by Charles Lamb; The Necklace, by Guy de Maupassant; A Shadow, by R.K. Narayan; Glory at Twilight, Bhabani Bhattacharya.

Module IV: Poems
All the World is a Stage, by Shakespeare; To Autumn, by Keats; O! Captain,
My Captain, Walt Whitman; Where the Mind is Without Fear, Rabindranath Tagore; Psalm of Life, H.W. Longfellow.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Geffrey Leech and Jan Svartvik, A communicative Grammar of English.
- A.J. Thomson and A.V. Martinet, A practical English grammar.
- Webster's New Dictionary of Synonyms.
- A.S. Hornby and R.M. Mackin, Oxford Progressive English alternative course book.
- I.L.A. Hill, English Language course for colleges Book II & Book III.
- Department of English Lucknow University, (Oxford) Exercises in English Composition.
- Aiyer's Law Terms and Phrases.
- Biswas Encyclopedia Law Dictionary.
- Black's Law Dictionary.
- I.L.A. Hill, English Language course for colleges, Book II and III.
- Michael McCarthy and Felicity O'Dell, English Vocabulary in use.
- Raymond Murphy, English Grammar in use intermediate to upper intermediate.
- Martin Hewings, Advanced Grammar in use.
- Michael McCarthy, Felicity O'Dell and Ellen Shaw, American English VOCABULARY in use.
- Cambridge International Dictionary of Idioms.
- Denial Jones, English Pronouncing Dictionary.
- Liz Hamp - Lyons and Ben Heasley, Study Writing.
- L.A. Hill and other (Oxford), English Language Course from Colleges, Book-I, II and III.
- A.A.S. Horney and R.M. Mackin (Oxford), Oxford Progressive English Alternative Course.
- N.S. Prabhu and W.W. Bhaskar (Macmillan India, English through reading.
- Current English Usage, Oxford's An Advanced Learning Dictionary.
- English Grammer, Wren and Martin.

LEGAL METHOD

Course Code: LAW2104 **Credit Units: 04**

Course Objective:
This paper focuses on orientation of students to legal studies from the point of view of basic concepts of law and legal system.

Course Contents:

Module I: Meaning and Classification of Laws
Meaning, Definition, Functions: Justice, Stability and Peaceful Change; Classification of laws: Public and Private Law, Substantive and Procedural Law, Municipal and International Law.

Module II: Sources of Law
Custom; Precedent, Ratio, Obiter; Legislation

Module III: Basic Concepts of Indian Legal System
Common Law, Essentials of a Valid Law, Constitution as the Basic Law, Rule of Law, Separation of Powers, Judicial system in India, **Principles of Equity**.

Module IV: Legal Writing and Research
Legal materials: Case law, Statutes, Reports, Journals, Manuals, Digests etc.; Importance of legal research ; Techniques of Legal Research : Doctrinal, Empirical Research, Legal writings and citations.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Glanville Willains – Learning the law
- Avtar Singh – Jurisprudence (Legal Theory)
- B.N.M. Tripathi – An Introduction to Jurisprudence and Legal theory
- Benjamin N. Cardozo, The Nature of Judicial Process
- LI Publication – Indian Legal System
- ILI Publication in Legal Research and Methodology

LAW OF CONTRACT-I

Course Code: LAW2105 **Credit Units: 04**

Course Objective:
Whatever may be the nature of a given society, the contractual relations, as are obtained in that society, are governed by certain principles which are more or less of a general and basic nature. In India these general principles are included in the statute of the Indian Contract Act. 1872. This course is designed to acquaint a student with the conceptual and operational parameters of these various general principles of contractual relations. Specific enforcement of contract is an important aspect of the law of contracts. Analysis of the kinds of contracts that can be specifically enforced and the methods of enforcement forms a significant segment of this study.

Course Contents:

Module I: Formation of Contract
Meaning and nature of contract, Offer / Proposal (Definition, Communication, Revocation, General/Specific offer, Invitation to treat), Acceptance (Definition, Communication, Revocation, Tenders / Auctions). 'E'Contract

Module II: Consideration and Capacity
Consideration (Definition, Essentials, Privity of contract), Capacity to enter into a contract (Minor's position, Nature / effect of minor's agreements).

Module III: Validity of Contract
Unlawful consideration and object, Free Consent, Coercion, undue influence, Misrepresentation, Fraud, Mistake, Contingent contract, Quasi contracts, Effect of void, voidable, valid, illegal, unlawful and uncertain agreements contracts.

Module IV: Discharge and Performance of Contract
Discharge of Contracts, Performance, Time and Place of performance, Impossibility of performance and frustration, Breach – Anticipatory & Present.

Module V: Remedies
Damages, Remoteness etc., Injunction, Specific performance, Quantum Merit.

Module VI: Specific Relief Act, 1963
Recovery of property, Specific performance of contracts, Rescission of Contract, Declaratory Decree, Injunctions: Temporary and Perpetual, Mandatory.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Anson - Law of Contract
- Pollock and Mulla - Indian Contract Act
- Avtar Singh - Indian Contract Act
- Bangia - Law of Contract and Specific Relief
- Cheshire and Fifoot - Law of Contract.

MICRO ECONOMICS-I

Course Code: LAW2106 **Credit Units: 04**

Course Objective:
This course is designed to expose first –year students, who may be new to economics, the basic principles of microeconomic theory. The emphasis would be on thinking like an economists & the course will illustrate how microeconomic concepts can be applied to analyze real life situations.

Course Contents:

Module I: Exploring the Subject Matter of Economics
Why study economics? The scope and method of economics; scarcity and choice; questions of what, how and for whom to produce and how to distribute output

Module II: Supply and Demand: How Markets Work, Markets and Welfare
Individual demand and supply schedules and the derivation of market demand and supply; shifts in demand and supply curves; the role prices in resource allocation; Elasticity of Demand — price, income and cross; Consumer's surplus

Module III: Consumer's Behavior
Utility-cardinal and ordinal approaches, Indifference curves; budget constraints;. Consumer's equilibrium (Hicks and Slutsky); Giffin goods; Compensated demand; Revealed preference theory; Engel curve.

Module IV: Theory of Production and Costs:
Technology, Isoquants, production with one and more variable inputs, Returns to scale, short run and long run costs, cost curves in the short run and long run, total, average, and marginal product, cost minimization and expansion path, elasticity of substitution.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

(A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination)

Text & References:
Text:

- C. Snyder and W. Nicholson, Fundamentals of Microeconomics, Cengage Learning (India), 2010.
- B. Douglas Bernheim and Michael D. Whinston, Microeconomics, Tata McGraw-Hill (India), 2009
- Ahuja H.L. (2010) Principles of Microeconomics, 18th Edition, S. Chand& Co. Ltd.
- Robert S. Pindyk and D.L. Rubinfeld, (2000), Microeconomics, 3rd edition, Prentice Hall India.
- Ferguson & Gould(1989) Micro Economic Theory, 6th edition, all India Traveller Bookseller.
- Koutsoyiannis, A. (1990), Modern Microeconomics, Macmillan

References:

- N. Gregory Mankiw (2007), Economics: Principles and Applications, 4th edition, India edition by South-Western, a part of Cengage Learning, Cengage Learning India Private
- Karl E. Case and Ray C. Fair (2007), Principles of Economics, 8th edition, Pearson Education Inc., ISBN 81-317-1587-6.(hereafter Case & Fair, 2007, 8e).
- Joseph E. Stiglitz and Carl E. Walsh (2006), Economics, International Student Edition, 4th Edition, W.W. Norton & Company, Inc., New York, ISBN 0-393-92622-2. (hereafter Stiglitz & Walsh, 2006, 4e).Limited, ISBN-13:978-81-315-0577-9 (hereafter Mankiw, 2007, 4e).M.L. Trivedi (2002) Managerial Economics- Theory & Applications, Tata McGraw Hill
- W.J. Baumol, Economic Theory & Operations Analysis, Prentice Hall.
- Jhingan M.L.(2008) Microeconomic Theory,4th edition, Konark, Delhi.

Syllabus - Second Semester

HISTORY-II

Course Code: LAW2201 **Credit Units: 04**

Course Objective:
This Course has been designed to acquaint the student with the systematic and methodological development of Courts, legislature and legal profession. The knowledge of these institutions is imperatively significant in order to understand pre and post colonial nature of Courts, Legislature and legal profession in India. The student shall be given insights to understand the critical analysis whether the birth, growth and development of Courts, Legislature and legal profession of India with the advent of colonial rule in India was scientific or unscientific and it is bane or boon. Besides, legal education like education is an important instrument of social control that enriches human life, materially as well as culturally.

Course Contents:

Module I: Early Developments (1600- 1836)
Emergence of East India Company, Development of Legislative Authority under charters ; Administration of Justice in Presidency Towns (Settlements: Surat, Madras, Bombay and Calcutta) (1639 to 1726); Mayor's Court under charter 1726 and 1753 (Its genesis, working and defects);Statutes: Regulating Act, 1773; Pitts India Act, 1784; The Act of Settlement 1781; Supreme Court of Calcutta and some Landmark cases: Raja Nanad Kumar, Kamaluddin, Patna Case, and Cossijurah; Warren Hastings: Judicial Plans of 1772, 1774 and 1780; Lord Cornwallis: Judicial Plans of 1787, 1790 and 1793; Lord William Bentinck (With special focus on Appraisal of Criminal law) .

Module II: Evolution of Law and Legal Institutions
Development of Civil and Personal Laws in Mofussils: Special emphasis on Justice, equity and good conscience; Codification of Laws: Charter of 1833, The First Law Commission, the Charter of 1853, The Second Law Commission; Establishment of High Courts, 1861 ;Privy Council : Appeals and working, Appraisal of Privy Council; Federal Court: Under the Government of India Act 1935.

Module III: Constitutional History
The Indian Councils Act, 1861; The Indian Councils Act, 1892; The Indian Councils Act, 1909; The Government of India Act 1919; The Government of India Act, 1935.

Module IV: Legal Profession and Education
Present Judicial System; Legal Practitioners Act of 1879, The Chamber and Indian Bar Committer of 1951; The Advocates Act of 1961: Provisions and Disciplinary powers; Law Reporting: Theory of Precedents, Features of Law reporting from 1773 to 1950; Legal Education: History and Basic Aims of Legal Education.

Module V: Emergence of Indian Nationalism
Indian National Congress (Moderates, Extremists);Revolutionaries in India and Abroad ;Political Movements of Gandhi (Non-Cooperative, Civil Disobedience, and Quit India Movements); Problem of communalism and partition of India ;Indian Independence Act 1947.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- M.P. Jain – Outlines of Indian Legal History
- V.D. Kulshrehtha – Landmarks of Indian Legal and Constitutional History

POLITICAL SCIENCE-II

Course Code: LAW2202 **Credit Units: 04**

Course Objective:
The contents of the Course are designed to have a critical understanding of the forms of Government, their working and the principles on which they are based. Introducing the organs of the Government, a comparative study of various organs will also be dealt with. Conceptual insights into theory and practice of representation, public opinion and Rule of Law will also be disseminated comprehensively.

Course Contents:

Module I: Organs of Government
Legislative, Executive, Judiciary, A comparative study of interaction of various organs of government in different forms of governance.

Module II: Political Organization
State and Government, Forms of Government: unitary, Federal, Quasi – Federal, Parliamentary Presidential.

Module III: Organic and institutional Balances
Doctrine of separation of powers and system of checks and balances with reference to U.S.A. and India, Principles of independence of judiciary and judicial review in Parliamentary, Presidential and other forms of government; Role and significance of Political institutions : Political parties, Pressure groups and interest groups.

Module IV: Concepts
Democracy: Concepts and characteristics; Representation: Theory and practice of mass representation, Types of Representation: Territorial, Proportional, Functional, Minority Representation; Public Opinion: Concept and formation; Rule of Law *vis-à-vis* rule of life.

Module V: Institutions and Political Processes operating in India
Indian party system: Evolution and nature; New social factors: Caste, Religion and Region.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Coker, Francis W, Recent Political Thought.
- Jain M.P., Political Theory Liberal and Marxian
- Sabine, George H. and Thorson, A History of Political Theory
- Verma S.P., Modern Political Theory
- Gauba O.P., Political Theory
- Ray Amal and Mohit Bhattacharya, Political Theory, Ideas and Institutions
- Germany, Deep & Deep Publications
- J.C. Johari, Principles of Political Science
- L.S. Rathore and S.A.H. Haqqi, Political Theory and Organisation.
- Eddy Asirvatham & K.K. Misra ‘Political Theory’; S. Chand & Company Ltd., Delhi
- A.C. Kapur ‘Principles of Political Science’; S. Chand & Company Ltd., Delhi
- Myneni ‘Political Science for Law Students’; Allahabad Law Agency
- R.L. Gupta ‘Political Theory’
- Vishoo Bhagwan ‘Indian Political thinker’;
- Amal Ray & Bhattacharya ‘Political Theory: Ideas and Institution.

ENGLISH-II

Course Code: LAW2203 **Credit Units: 03**

Course Objective:
Efficiency of advocacy depends upon communication skills to a substantial extent. The student should be conversant with legal terminology. A student should be equipped with writing skills of and presentation skills which are essential for effective advocacy.

Course Contents:

Module I: Introduction of Legal Language
Legal maxims (Introduction and meaning), & Foreign legal words.

Module II: Translation and usage of words
Translation of legal Para from Hindi to English and vice versa, one legal word-substitute, Usage of common Hindi and Urdu words used in Courts.

Module III: Presentation skills
Presentation Skills: Speeches, Preparing presentation material, Planning the talk, Preparing visual aids, Delivering presentation, Managing your audience, Question and Answers, Introduction, summing up, vote of thanks and repertoire.

Module IV
Communication for the Courts: including drafting of moot memorials.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Successful Communications, Mlara Treece (Allyn and Bacon).
- Effective Technical Communication, M. Ashraf Rizvi.
- English Pronouncing Dictionary Danial Jones.
- Language and the Law, Longman, 1996, London, Gibbons and Johns.
- Language and the Law, Annual Review of Applied Linguistics (1999) 19, 156-73, Gibbons and Johns.
- Communication and Style in Legal Language, Indian Bar Review, Vol. 10 (3): 1993, Kelkar, Ashok R.
- Language and the Law, in FREEMAN, pp. 1350-53, Williams, Glanville.

LAW OF CONTRACT-II

Course Code: LAW2204 **Credit Units: 04**

Course Objective:
This course shall be taught after the students have been familiarized with the general principles of Contract in which the emphasis is on understanding and appreciating the basic essentials of a valid Contract and on the existence of Contractual relationship in various instances. Obviously, Contract Law assumes special significance to suit changes in society. These special Contracts are studied in the light of statutory provisions and decisional Law. With the invent of globalization in various sectors of economy today and are in need of specialized legal Professionals due to huge contractual requirements, joint venture Partnerships and the like, Therefore, this Course of Special Contracts provides an insight into the justification for special statutory provisions for certain kind of Contracts.

Course Contents:

Module I: Indemnity and Guarantee/Bailment and Pledge
Meaning, Distinction between Indemnity and Guarantee, Right / Duties of Indemnifier, Indemnified and Surety, Discharge of Surety, Kinds of Guarantee, Bailment and Pledge: Meaning and Distinction, Rights and Duties of Bailor/Bailee, Pawnor/Pawnee, Lien, Termination of Bailment.

Module II: Agency
Definitions of Agent and Principal, Appointment of an Agent, Authority of an Agent, Creation of agency: by agreement, Ratification and law, Relation of principal / agent, subagent and substituted agent, Ratification of Agents Authority, Revocation of Agency Authority, Effects of Agency on Contracts with third person, Personal Liability of agents, Termination of agency.

Module III: Sale of Goods Act 1930
Contract of Sale: Nature and definition, Conditions and Warranties, Transfer of Property and Title, Performance of the contracts, rights of unpaid seller, suit for breach of contract.

Module IV: The Indian Partnership Act, 1932
Nature of partnership firm, Relations of partners to one another and outsiders, Rights /Duties of partners *inter se*, Partnership Property: Relations of Partners to third parties, Liability for holding out, Minor as a partner; Incoming and outgoing partners, Dissolution of Partnership Firm, Modes of Dissolution, Consequences of dissolution, Registration of firms and effects of non registration.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Texts & References:

- Pollock and Mulla, Indian Contract Act
- Avtar Singh, Indian Contracts Act
- Mulla, D. F., Indian Partnership Act
- Desai, T.R., Law of Contracts and Partnership sale of good Act
- R.K. Bangia, Sales of Goods Act, 1930
- Avtar Singh, Sales of Good Act
- Avtar Singh, Indian Partnership Act.
- K. Sukumaran, Pollock & Mulls - The Indian Partnership Act

MICRO ECONOMICS-II

Course Code: LAW2205 **Credit Units: 04**

Course Objective:
The main objective of the course is to provide a deeper knowledge on some specific field of Microeconomics such as game theory, factor pricing, oligopoly & welfare Economics.

Course Contents:

Module I: Decision theory under Uncertainty: Utility Functions and Expected Utility
Risk aversion and risk preference, insurance and investor's choice.
Asymmetric information- Adverse selection and moral hazard

Module II: Oligopoly
Analysis of Cournot & Stackelberg, Collusive Oliogopoly and application of Prisoner's Dilemma of Nash equilibrium

Module III: Market Structure
Review of perfect competition and monopoly; Pricing with market power; price discrimination, peak load pricing, two-part tariff; monopolistic competition and oligopoly.

Module IV: Factor Pricing
Derived demand for a single input and multiple inputs in competitive & imperfect competition markets, firm demand and industry demand, collective bargaining and exploitation rent & quasi rent.

Module V: Welfare Economics
Conditions of Pareto optimality in pure exchange and with production, optimality of perfect competition

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	10	5	10	70

A-Attendance; **P**-Project; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination
Text & References:

Text:
- W.J. Baumol, 'Economic Theory and Operations Analysis'4th edition, Prentice hall
- Ahuja H.L (2010) Principles of Microeconomics,18th edition,S.Chand & Co. Ltd.
- Ferguson, 'Microeconomic Theory', Cambridge University Press.

References:
- A K Koutsyanni's, 'Modern Microeonomics', Macmillan.
- L.M.B. Cabral, (2000) Introduction to Industrial Organization, MIT Press.
- P.K. Dutta (1999) Strategies and Games: Theory and Practice, MIT Press.
- Formson & Gould – Microeconomic Theory

Syllabus - Third Semester

SOCIOLOGY-I

Course Code: LAW2301 **Credit Units: 04**

Course Objective:
The objective of this paper is to focus on basic concepts of sociology relevant for understanding the Society and Social Thought.

Course Contents:

Module I: Introduction
Sociology: Definition, Nature and Scope of Sociology; Relevance of Sociology for the study of Law; c. Relation with other social sciences: History, Anthropology and Political Science; Contributions of eminent Sociologists August Comte, Emile Durkheim, Herbert Spencer, Talcott Parson.

Module II: Marriage, Family, Kinship
Marriage: Meaning, Features, Functions, Types; Family: Definition, Functions of family, Types; Kinship: Definition, Classification, Degree and Forms.

Module III: Basic concepts
Society; CommModuley; Association; Institution.

Module IV: Social Change in India
Meaning; Nature or Characteristics of Social Change; Factors of Social Change: Biological, Education, Technological, Social Legislation; Customs and Law: Differences, Compliment and supplement each other.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Harlambos, M. Sociology: Themes and Perspectives; Oxford University Press, 1980
- Bottomore, T.B. Sociology: A Guide to Problems and Literature; Blackie and Sons India Ltd; 1971
- Horton. P.B. and C.L. Hunt Sociology; McGrew- Hill book Company, Singapore, 1984.
- Giddens, A. Sociology; Polity Press, UK; 1993
- Shankar Rao, Introduction to Sociology.
- Davis, K. Human Society; Surjeet Publications, India; 2000
- Desai, N. and M. Krishnaraj Women and Society in India; Ajanta Publications; 1987
- De Mellow, R.C. Identity and Social Life: Psychological Issues; International University Press, 1978
- Mac Iver and Page Society: An Introductory Analysis ; Mac Millan India Ltd., New Delhi
- Myneni Sociology; Allahabad Law Agency, Faridabad; 2004Goode, W.J. and P.K. Hatt Methods in Social Research; McGraw- Hills; New York; 1952.

MACRO ECONOMICS-I

Course Code: LAW2302 **Credit Units: 04**

Course Objective:
The objective of this paper is to make the student to understand how the business organizations work by applying economic principles in their business management. The course will attempt to relate theory to practice and try to instill in students the ability to apply basic microeconomic concepts to the understanding of everyday phenomena.

Course Contents:

Module I: Nature and Methodology of Economics
Definition, Nature of economics, Micro and Macro economics; Basic economic problems, Economic problems, Economic laws and Government laws, Dynamic *v.* Static; Methodology: Inductive v. Deductive methods; Economics and Law.

Module II: Consumer Behavior and utility analysis
Utility Analysis: law of diminishing marginal utility. Law of equi-marginal utility; Law of demand and supply, Application of demand and supply: Tax floor and ceiling; Elasticity of demand and supply; Marshallian Scissors, Consumer's surplus.

Module III: Theory of Production and Market structure
Factors of Production, Laws of returns, Returns to scale; Forms of entrepreneurial organization; Cost curves and revenue concepts; Market: Meaning and classifications, equilibrium of the firm and industry; Price and output determination under perfect, monopoly, monopolistic competitions, oligopoly and duopoly.

Module IV: Factor Pricing
The General Theory of factor pricing ; Wage determination, exploitation of labour, role of trade unions, Minimum Wage Act ; Theory of Rent, Quasi rent ; Theory of Interest: Classical, Neo Classical and Loanable Fund Theory, Liquidity Preference Theory; Theory of Profit.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Texts & References:

- I.C. Dhingra, Principles of Microeconomics- Sultan Chand & Sons
- H.L. Ahuja- Microeconomics
- Baumol, W.J. Economic Theory and Operations Analysis, Prentice Hall of India, New Delhi.
- Bach, G.L, Economics, Prentice Hall of India, New Delhi.
- Gould, J.P. and Edward P.L, Microeconomic Theory, Richard, Irwin. Homewood.
- Koutsoyiannis, A, Modern Microeconomics, Macmillan.
- Lipsey, R.G. and K.A. Chrystal, Principles of Economics, Oxford University Press, Oxford.

CONSTITUTIONAL LAW-I

Course Code: LAW2303 **Credit Units: 04**

Course Objective:
The course aims at analyzing constitutional institutions, its powers, limitations and interrelationships with one another and seeks to mould a frame of mind in the student to appreciate and assess constitutional policy and changes for the future.

Course Contents:

Module I: Fundamental Rights and Directive Principles, and Fundamental Duties
Idea of Fundamental Rights and their importance, against whom the Fundamental rights are available? Definition of 'State'? Law in Art. 13, Directive Principles; Nature and reasons for incorporation, inter-relationship between fundamental rights and directive principles, judicial policy towards Directive principles from Champakam to Minerva Mills and thereafter, Art. 51-A (K) and its correlation with Art. 21-A.

Module II: Freedom and Personal Liberty
Freedom of speech and expression and of press; Is Right to Information inclusive in Freedom of Speech and Expression? Freedom of Assembly, Freedom of Association, Freedom of Movement, Freedom to reside and settle, Freedom of profession/Business, etc. Art. 19: Are these freedoms absolute? Rights of an accused: Double Jeopardy, Self-incrimination and retrospective punishment, Art. 20; Right to life and personal liberty: Meaning of personal liberty, Procedure established by Law, Before Maneka Gandhi, Maneka Gandhi and thereafter, Art. 21; preventive detention and constitutional safeguards: Art. 22; Right to education Art. 21-A.

Module III: Equality and Protective Discrimination
Equality before Law and equal protection of Laws, meaning, constitutional provisions Arts 14, 15, 16, 17, 29 (2), 325: Total conspectus, Classification for differential treatment, prohibited grounds of discrimination: Arts. 15(1), (2), (3), 16 (2), (3), 29 (2); Protective Discrimination in favour of SC / ST and other backward classes and recent trends eg. Schedule IX and Reservation Policy, Women and children Art. 15, 15(3), 15(4), 15(5) Abolition of titles – Arts. 18.

Module IV: Secularism
Concept of Secularism, Indian Constitutional provisions, Indian concept of Secularism, Freedom of religion, Scope: Arts. 25, 26, Limits of Freedom, Religion and State in India, State Control and non-interference with religion; Minority rights: Why? Scope: Meaning and Minority, Minority right to educational institutions and judicial attitude.

Module V: Judicial Process under the constitution
Judicial Review : Nature of Judicial Review, Arts. 32, 136, 141, 226, 227.
Judges: Appointments, conditions of service, etc; Public Interest Litigation.
Supreme Courts Original and Advisory Jurisdiction.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India..

LAW OF CRIMES-I (INDIAN PENAL CODE SECTION 1-120B)

Course Code: LAW2304 **Credit Units: 04**

Course Objective:
Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Introduction to Substantive Criminal Law: Extent and operation of the Indian Penal Code, Definition of Crime, Fundamental elements of crime, Stages in commission of a crime, Intention, Preparation, Attempt.

Module-II: Punishment: Theories: Deterrent, Retributive, Preventive, Expiatory and Reformative Theory. Punishment under the IPC: Fine, Imprisonment, Capital Punishment.

Module-III: General Explanations and Exceptions: Definitions, Constructive joint liability, Mistake, Judicial and Executive acts, Accident, Necessity, Infancy, Insanity, Intoxication, Consent, Good faith, Private defence

Module-IV: Abetment and Criminal Conspiracy

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.

FAMILY LAW-I

Course Code: LAW2305 **Credit Units: 04**

Course Objective:
This Course aims at providing adequate Sociological perspective so that the basic concepts relating to family are expounded in their social setting. It is designed to address the various aspects of Hindu Law and strives to give an overview of some of the current problems arising out of the foundational inequalities in the various family concepts.

Course Contents:

Module I: Introduction (Sources, Schools and Joint Hindu Family)
Sources and Schools of Hindu Law; The Concept, Formation and incidents of Joint Hindu Family of Mitaksharaand Dayabhaga; The Coparcenaries : It's formation and various incidents of Joint Hindu Family of Mitakshara and Dayabhaga; Karta of the Joint Family : His position, powers, privileges and obligation.

Module II: Hindu Marriage (Vivah) and Matrimonial Remedies (The Hindu Marriage Act, 1955)
Hindu Marriage: Nature, concept, Essential conditions & Prohibitions; Void & Voidable Marriages; Divorce: Customary and Judicial- Matrimonial fault theory, irretrievable breakdown and of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation.

Module III: Alimony, maintenance, Adoption and Guardianship (The Hindu Adoption and Maintenance Act, 1956 and The Hindu Minority and Guardianship Act, 1956)
Maintenance of neglected wives, divorced wives, minor children, disabled children and parents under sections 125, 127 of Code of Criminal Procedure, 1973; Alimony : Temporary Permanent; Maintenance: Pendente Lite and permanent and maintenance for Divorced Hindu women under The Hindu Adoption and Maintenance Act, 1956; The Hindu Minority and Guardianship Act, 1956,

Module IV: Law of Succession, inheritance and Partition among Hindus (The Hindu Succession Act, 1956)
Property under Mitakshara Law and Dayabhaga: Formation and Incidents; Devolution of interest in MitaksharaCoparcenaries, Coparcenaries with reference to the provisions of Hindu Succession Act, 1956, Succession to property of Hindu female dying intestate under the Hindu Succession Act, 1956, Disqualifications relating to succession; Partition and Re-union**.**

Module V: Dispositions of Property under Hindu Law
Testamentary Disposition (Will): Definition and basis, Capacity of the Legatee, Formalities of a Will; subject matter of Will, Restrictions on testamentary power of disposition, interpretation of the Will, Revocation of the Will; Disposition inter vivos (Gift).

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal.

THE CODE OF CRIMINAL PROCEDURE

Course Code: LAW2311 **Credit Units: 04**

Course Objective:
In the absence of effective enforcement machinery, the substantive Criminal Law which defines offences and provides punishments for them, would be almost worthless. Therefore, the need of the Code of Criminal Procedure. The present course intends at acquainting the students with the various pre judicial and judicial procedures. This course also includes the rights and duties of those proceeded against and the powers, duties and restraints on those administering the criminal judicial process.

Course Contents:
Module I: Introduction
The importance of Fair Trial - constitutional perspectives of fair trial: Articles 14, 20, 21, Section – 2: Definitions; classes of Criminal Courts: Sections 6 to 13 including their powers and jurisdiction. The organization of Police, Prosecutor, Defense Counsel and Prison Authorities alongwith their duties, functions and powers.

Module II: Pre – Trial processes
FIR, Arrest and Bail provisions, bonds, process to compel appearances and production of things, search and seizure – search warrants, search without warrants, police search during investigations, general principles of search, seizure and constitutional aspects of validity of search and seizure proceedings.

Module III: Charge and common features relating to Trials
Form of Charge, joinder of charges, alteration of charge, basic rule regarding charge and its trial, withdrawal of charges, effect of error in the charge. Language of Courts, decision on evidence partly recorded by one judge or magistrate and partly by another, summary procedure to deal with certain cases of perjury and certain kinds of contempt of court, evidence in inquiries and trials, general provisions as to inquiries and trials, provisions as to accused persons of unsound mind.

Module IV: Criminal Trials and Execution Proceedings
Trial before Court of Sessions, Trail of warrant case by magistrate, Trial of Summons Case, Summary Trial, Judgment, submission of death sentence for confirmation, execution, suspension, remission and commutation of sentences.

Module V: Review Procedures
Appeal, Review and Reference

Module VI: Miscellaneous
Maintenance of wives, children and parents, Transfer of criminal cases, Irregular proceedings, Limitations for taking cognizance, Security for keeping peace and for good behavior, Disputes as regarding immovable property, Probation of Offenders Act

Module VII
Juvenile Justice (Care & Protection of Children) Act 2000. Concept of juvenile delinquency, juvenile court system, treatment and rehabilitation of juveniles, law for protection of juvenile offenders. Juvenile Justice (Care &Protection of Children) Act 2014.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratan Lal and Dheeraj Lal, Criminal Procedure Code
- D.D. Basu, Criminal Procedure Code
- R.V. Kelkar, Lectures on Criminal Procedure Code
- R.V. Kelkar, Code of Criminal Procedure
- Chandrasekharan Pillai (ed.) Kelkar's Outlines of Criminal Procedure (2001), Eastern, Lucknow.

SUMMER INTERNSHIP EVALUATION-I

Course Code: LAW2335 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The break up of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Fourth Semester

SOCIOLOGY-II

Course Code: LAW2401 **Credit Units: 04**

Course Objective:
The Objective of this paper is to focus on basic concepts of sociology relevant for understanding Indian Society and Social Issues.

Course Contents:

Module I: Features of Indian Society
Caste and Varna: Meaning and Difference; Hindu Philosophy: Basic Tenets of Hinduism, The Ashramas and The Purusharthas; Diversity: Linguistic, Racial, Ethnic and Religious.

Module II: Marriage, Family and Kinship
Kinship: Descent: Rules of descent, Concepts: Phratry, Moiety, Clan, Lineage; Family: Forms: Nuclear and joint, merits and demerits, causes for the changes in Joint Family; Marriage: Rules of Marriage and Tribal Marriage.

Module III: Man and Society
Man and Society: Relationship; Socialization: Meaning and Stages; Agencies of Socialization: Family, School, Peer Group, Educational Institutions.

Module IV: Social Problems and Legislative measures
Communalism; Alcoholism and Drug Addiction; Terrorism; Dowry; Scheduled Castes and Scheduled Tribes.

Module V: Social Deviance
Meaning and Factors facilitating deviance; Forms of crime: Juvenile Delinquency, White Collar Crime, Corruption, Organized crime; Theories of Deviant behavior with special reference to Sutherland's theory of differential association.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Harlambos, M. Sociology: Themes and Perspectives; Oxford University Press, 1980
- Bottomore, T.B. Sociology: A Guide to Problems and Literature; Blackie and Sons India Ltd; 1971
- Horton. P.B. and C.L. Hunt Sociology; McGrew- Hill book Company, Singapore, 1984
- Giddens, A. Sociology; Polity Press, UK; 1993
- Shankar Rao, Introduction to Sociology.
- Mandelbaum, D.G. Society in India; Volume I and Volume II; Popular Prakashan, Mumbai; 1992
- Ember & Ember, Social Anthropology
- Lucy Mair,Introduction to Social Anthropology
- Bhushan, V. and D.R. Sachdeva An Introduction to Sociology; Kitab Mahal, Allahabad; 1999
- Beteille, A. Caste, Class and Power: Changing Patterns of Stratification in a Tanjore Village; Oxford University Press, New Delhi; 2002
- Singh, Y. Social Change in India: Crisis and Resilience; Har - Anand Publications Pvt. Ltd. New Delhi; 1993
- Srinivas, M.N. Social Change in Modern India; Orient Longman Ltd. 1980
- Vir, Dharam Kinship, Family and Marriage: Changing Perspectives (Edited); New Academic Pub. New Delhi; 2006.
- Ram Ahuja, Social Problems.

MACRO ECONOMICS-II

Course Code: LAW2402 **Credit Units: 04**

Course Objective:
The objective of this paper to understand the issues related to economic development and planning and International trade and enables them to have a broader perspective while dealing with these issues as a policy maker.

Course Contents:

Module I: Economic development
Concepts of economic development and growth, determinants of economic growth, obstacles to economic growth, Vicious circle of poverty, Strategy of economic development: Balanced and unbalanced growth, Inequalities of income and wealth.

Module II: Economic planning
Economic planning: meaning, forms of planning, objectives & significance and rationale of planning, features of planned economy, Five year plans: Strategy of plans, critical appraisal of plans, Public v. Private Sector.

Module III: International trade
Liberalization & Globalization: Argument for and against, Economic Reforms: Banking, Money market, capital market and International Trade Reforms, Special Economic Zones, Foreign Direct Investment.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Rudra Dult & Sundran, “Indian Economy: S. Chand & Co., Ltd. New Delhi.
- Mishra & Puri,” Economic development & Planning, Himalaya Publishing House, Mumbai.
- M.L. Thinghan, “Money, Banking, International Trade & Public Finance.
- Meier & Baldwin, economic Development: Theory, History & Policy.” Harper & Row London.
- M. Todaro, ‘Economic Development in the Third World, Longman, New York.
- I.C. Dhingra, Indian Economy & Environment & Policy, Sultan Chand & Sons New Delhi.
- M.L. Seth, Money Banking, International Trade & Public Finance, Laxmi Narain Agarwal, Agra

CONSTITUTIONAL LAW-II

Course Code: LAW2403 **Credit Units: 04**

Course Objective:
The course material seeks to introduce the student to the relevance of inalienable fundamental rights and restrictions in the Constitution of India and the principles that ought to guide policy making in India. The student is expected to appreciate the text and the juristic discourse by reference to landmark case laws, juristic opinion and vibrant classroom discussions as the subject raises issues, conflict of interests and dilemmas in a pulsating democracy with changing dynamic priorities in a developing country like India.

Course Contents:
Module I: Distribution of powers between Centre and States – (Arts. 245-281)
Legislative Powers, Administrative Powers, Financial Powers, Relevant Doctrines: Territorial nexus, Harmonious construction, Pith and substance, Repugnancy: Overview of Panchayati Raj Provisions (Art. 243), Freedom of Trade and Commerce.

Module II: Union and State Executive, legislature and Judiciary
Union Executive, President: Appointment, Election, Removal, conditions of service; Powers of president focus on ordinance, pardon, emergency; Assessment of relevance of presidential office on governance; Council of ministers and Prime minister: Appointment, Conditions, functioning, collective responsibility, dismissal of cabinet minister; Office of Attorney General: Significance, Appointment, functions, Conditions; State executive, Governor: Appointment, Removal, Powers, State cabinet dismissal; governors role in the context of centre state relations. (Art 79-122).
Union Legislature: Lok Sabha, Composition, functioning, membership, qualifications and disqualifications, Dissolution of, Effect; Bills : Procedure for the passage; Privileges of legislature; State legislature: functioning, dissolution ; Anti defection law and its impact. (Arts. 168-212).
Union Judiciary: Supreme Court Judges: Appointment, removal, impeachment; jurisdiction of Supreme Court: Original, appellate, advisory, Court of Record; Assessment of independence of judiciary; State judiciary: High Court Judges: Appointment, transfer, removal, promotion; High Court jurisdiction, Art. 226, writs; Subordinate judiciary. (Arts. 124 -147) (Arts. 214 to 237).

Module III: Emergency Provisions
National, State and financial Provisions.

Module IV: Miscellaneous
Official Language, Language of Courts, Trade, Commerce and Intercourse in India, Services Under the Union and State, Elections, Parliamentary, Privileges and Schedules, etc .

Module V: Amendment of the Constitution
Amendment of Constitution, Doctrine of basic Structure.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India.

ADMINISTRATIVE LAW

Course Code: LAW2404 **Credit Units: 04**

Course Objective:
Administrative law is as old as the administration itself. However, the form in which we find it today, Administrative is described a most outstanding legal development of the twentieth century. The reason for this development can only be attributed to a change of philosophy as regards the role and function of the State. The change in the concept of State from 'laissez faire' to a 'welfare state' has led to emergence of state activities in almost all spheres of human life. With the phenomenal increase in the area of state operation, the State was bound to take over a number of functions which were earlier left to private enterprise. In order to ensure that such functions are performed effectively and further due to certain other factors namely contingency, expertise etc. administrative agencies are given extraordinary powers and functions such as to make rules and deciding disputes apart from its wide discretionary powers. Obviously, this necessitated a new set of laws to check the possible abuses of such extraordinary powers on the part of administration. The courts in India and abroad in the course of time have developed various doctrines and methods to deal with such p[problems. However, there is no end to this journey. The field is still open for new changes.
The main thrust of administrative law has been to study the nature of functions and powers exercised by the authorities on whom they have been conferred on and the study of remedies available to common man in case the limits of exercising power are transferred by such an authority. The focus or the centre point of this study, as usual as in cases of the study of other branches of public law, is the rights of individual *wis a wis* the public interest.

Course Contents:
Module I: Evolution, Nature and scope of Administrative law
Definitions, scope, classification and reason for the growth of administrative law; Relationship between constitutional law and administrative law; doctrine of Separation of Powers and its application in administrative law; Doctrine of Rule of law and application in administrative law.

Module II: Legislative function of Administration
Delegated legislation: Necessity for delegated legislation, classification of delegated legislation and its requirement, constitutionality of delegated legislation, All form of control of delegated legislation i.e. Parliamentary, Procedural and Judicial control (doctrine of ultra vires).

Module III: Judicial function of Administration
Reason for Administrative adjudication; Tribunals and classification of Tribunals; Principles of Natural Justice; Ombudsman: Lokpal, Lokayukta; Central Vigilance Commission (CVC).

Module IV: Administrative discretion
Need and legality and abuses; Constitutional objections and discretion, failure to exercise discretion; Doctrine of proportionality; Legitimate expectation.

Module V: Judicial control of administrative action
Courts as the final authority to determine the legality of Administrative actions ; Public Interest Litigation and the principle of *locus standi*, laches, Judicial review ; scope and extent, statutory appeals, writs.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- M.P. Jain and S.N. Jain: Principles of Administrative Law.
- I.P. Massey: Administrative Law.
- C.K. Talewani: Lectures on Administrative Law.
- De Smith: Judicial Review of Administrative Action.
- H.W.R. Wade: Administrative Law
- S.P. Sathe: Administrative Law.

FAMILY LAW-II

Course Code: LAW2405 **Credit Units: 04**

Course Objective:
Family Law II Course is mainly devoted to the study of Muslim Personals Law relating to Marriage, Maintenance, Dower, Adoption & Guardianship, Divorce, Hiba, Pre-emption, Succession, and disposition of Property. The main objective of the course is to provide an indepth knowledge of the Laws governing Muslims.

Course Contents:

Module I: Introduction (Sources, Schools and Muslim Marriage (Nikah)
Sources and Schools of Muslim Law**:** Shia and Sunni; Muslim Marriage: Nature and concepts of Muslim Marriage, Essential conditions of a valid marriage, prohibitions/ disabilities, classification of marriage and effects of valid, irregular, void marriage.

Module II: Dower and Matrimonial Remedies (Dower, Restitution, Separation and Divorce)
Dower : Concept and Nature; Divorce under Muslim personal Law, Nullity of marriage;Option of puberty; Restitution of conjugal rights; Judicial separation; Grounds for divorce under Muslim Law; Bars to matrimonial relief under Muslim Law; Grounds for Divorce under Indian Dissolution of Muslim Marriage Act 1939.

Module III: Alimony, maintenance and Adoption & Guardianship (Hizanat)
Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves vide sections 125, 127 of Code of Criminal Procedure, 1973;Alimony and maintenance as an independent remedy, Maintenance (Nafaqa) for Muslim Women under the Muslim Women Protection of Right on Divorce Act, 1986; Guardianship under Muslim Law.

Module IV: Law of Succession and inheritance among Muslims
General rules of succession; inclusion and exclusion of inheritors to the property. Classification of heirs under Hanafi and IthmaAsharia School and their shares and distribution of property.

Module V: Dispositions under Muslim Law, Waqf and Pre- Emption
Wasiyat : Testamentary Disposition and various incidents of wasiyat. Disposition inter vivos (Gift), Gift (Hiba), Musha, Revocation of Gifts; Distinction between Hiba, Ariya, Sadaqa&Wakf, Hiba-bil-Sharatful- ewaz, Gift during death illness (Marz-ul-maut).
Waqf :Meaning, Kinds, Objects,purpose, Requisites and various incidents of waqf.
Pre-emption – Origin, Definition, Classification, Subject matter, formalities, effects, constitutional validity.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal .

LAW OF CRIMES-II (INDIAN PENAL CODE SECTION- 121-511)

Course Code: LAW2406 **Credit Units: 04**

Course Objective:
Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Offences affecting the Human body: Offences affecting life, causing miscarriage, or injuries to unborn children, Offences of hurt, of wrongful restraint and wrongful confinement, Offences of criminal force and Assault, offences of kidnapping and Abduction

Module-II: Offences against Women: Obscene acts and songs, Outraging the modesty of women, Rape, Cruelty by husband or relatives of husband, Offences relating to marriage

Module-III: Offences against Property: Theft, Extortion, robbery and dacoity, Criminal misappropriation and criminal breach of trust, Cheating, Mischief, Criminal trespass

Module-IV: Defamation and offences relating to documents and property marks: Defamation**,** Forgery**,** Counterfeiting.

Module-V: Offences against State, Public Tranquillity, Public Servants, Religion

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.

Syllabus - Fifth Semester

SOCIOLOGY-III

Course Code: LAW2501 **Credit Units: 04**

Course Objective:
The Objective is this paper is to focus on basic concepts of sociology relevant for understanding law and bring out the relationship between law and society and Indian Society.

Course Contents:
Module I: Basic Concepts
Social groups: Meaning, Characteristics and Classification: Primary and Secondary Groups (Cooley's Classification); Status and Roles: Meaning, Characteristics; Social Stratification: meaning, features and types of social stratification

Module II: Basics: Society and Law
Meaning and types of Legitimacy; Law as a subsystem of society; Concept of social organization; Concept of social disorganization.

Module III: Social Control
Social Control: Meaning and Function; Distinction between formal and informal social control; Informal Agencies of social control-customs, folkways, mores and religion; Formal Agencies: Law, Public opinion, Media, and Coercion.

Module IV: Social Change in India
Jajmani System: Merits, Demerits and Changes; Internal social processes of change: Sanskritization; External sources: Modernization and Westernization.

Module V: Marriage
Hindu marriage: A Religious Sacrament, Recent Trends and factors affecting Hindu Marriage; Muslim Marriage: Preconditions, Conditions of Invalid Marriage, Divorce.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Harlambos, M. Sociology: Themes and Perspectives; OxfordUniversity Press, 1980.
- Bottomore, T.B. Sociology: A Guide to Problems and Literature; Blackie and Sons India Ltd; 1971.
- Horton. P.B. and C.L. Hunt Sociology; McGrew- Hill book Company, Singapore, 1984.
- Giddens, A. Sociology; Polity Press, UK; 1993.
- Shankar Rao, Introduction to Sociology.
- Mandelbaum, D.G. Society in India; Volume I and Volume II; Popular Prakashan, Mumbai; 1992.
- Ember & Ember, Social Anthropology.
- Lucy Mair, Introduction to Social Anthropology.
- Bhushan, V. and D.R. Sachdeva An Introduction to Sociology; Kitab Mahal, Allahabad; 1999
- Beteille, A. Caste, Class and Power: Changing Patterns of Stratification in a TanjoreVillage; OxfordUniversity Press, New Delhi; 2002
- Singh, Y. Social Change in India: Crisis and Resilience; Har-Anand Publications Pvt. Ltd. New Delhi; 1993
- Srinivas, M.N. Social Change in Modern India; Orient Longman Ltd. 1980

LAW OF EVIDENCE

Course Code: LAW2502 **Credit Units: 04**

Course Objective:
This paper is to orient students with importance of evidence for establishment of claims and the related rules and principles.

Course Contents:

Module I: Definitions and Relevancy of Facts
Evidence and its relationship with the substantive and procedural laws ;Definitions : Facts, facts in issue, relevant, evidence proved, disproved, not proved, oral and documentary evidence ;Relevancy and admissibility; Doctrine of *res gestae ;*Conspiracy.

Module II: Admissions, confessions and statements by person who cannot be called as witnesses:
Definition of admission, who can make admissions by or on their behalf, proof of admission against the persons making them and admissions in civil cases. (Section 17-23, 31); Definition, relevance and consideration of confessions (section 24-30); Dying declaration (Section 32 and Section 33). **Opinion of Third Persons (Sec. 45 to 51) & Character Evidence (Sec. 52 to 55).**

Module III: Documentary Evidence
Primary and Secondary Evidence, Proof and verification of documents; Public documents and presumption as to documents.

Module IV: Production and Effect of Evidence
Burden of proof (Sections 101-114); Estoppels (Section 115); Competence of witnesses (Sections 118-120).

Module V: Examination of Witnesses (Sections 135-166) and Rejection of evidence (Section 167)
Examination –in-chief : Cross Examination, Re-examination; Leading questions; Hostile witnesses; Refreshing memory; Judge's power to put questions or order production.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Ratanlal and Dheerajlal : Law of Evidence
- Monir Field : Law of Evidence
- Batuklal : Law of Evidence
- Avtar Singh : Evidence Law
- Bare Act : Indian Evidence Act, 1872

CODE OF CIVIL PROCEDURE

Course Code: LAW2503 **Credit Units: 04**

Course Objective:
This paper is to help a law student to acquire a thorough knowledge of procedural aspects of working of civil courts and other machineries.

Course Contents:

Module I: Initial steps in a suit
Jurisdiction and place of suing; Institution of suit, cause of action, joinder, non-joinder and mis-joinder of parties; Summons; Pleadings: Meaning, object, General rules, Amendment of pleadings; Plaint and written statement: Particulars, set off and counter claim; Admission return and rejection; Discovery, Inspection and production of documents; Appearance and non-appearance of parties, ex-parte proceedings; First hearing: Meaning, object, framing of issues, omission to frame issues, disposal of suit in the first hearing; Trial: Summoning and attendance of witnesses, summons to produce documents, adjournment, hearing of suit.

Module II: Significant Terms and Definitions
Definitions: Decree, Judgment, Order, Foreign Court, Foreign Judgment, Mesne, Profits, Affidavit, Suit, Plaint, Written Statement, Suit of civil nature ;Important Concepts: Res Sub-Judice, Resjudicata, Restitution, Caveat, Inherent powers of courts.

Module III: Interim Orders
Commissions, Arrest before judgment, Attachment before judgment, Temporary Injunctions, Interlocutory orders, Receiver, Security of costs.

Module IV: Suits in Particular Cases
Suits by or against Government, Suits by Indigent persons, Interpleader Suit, Summary Procedure, Suits relating to public nuisance. Execution Proceedings

Module V: Law of Limitation
Definitions, period of limitation, plaintiff, defendant; and in foreign countries, limitation of suits, appeals, and application, computation of period of limitation.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla's Code of Civil Procedure, Universal, Delhi
- C.K. Thakkar's (Takwani), Code of Civil Procedure
- Majumdar, P.K. and Kataria, R.P., Commentary on the Code of Civil Procedure, 1908, universal, Delhi.

LABOUR LAW-I

Course Code: LAW2504 **Credit Units: 04**

Course Objective:
The course aims at imparting to the students an indepth understanding of Labour Laws in India by recourse to relevant judicial pronouncements in this regard.

Course Contents:

Module I: Regulation of Trade Union & Unfair Labour Practices
History of Trade Union Movement in India and need to form Trade Union, Workers Right to form Union vis-à-vis Indian Constitution; the Membership of Trade Union, Closed shop and Union shop, Registration of Trade Union, Remedies in case of non-registration and cancellation of registration of union, Privileges and Protection of registered Trade Union form certain acts and omissions, Unfair labour practices and victimization.

Module II: Collective Bargaining:
Concept and importance of collective bargaining, Pre-requisites for collective bargaining, Process of administering collective agreement (Negotiation, Mediation, & Voluntary arbitration & Compulsory Arbitration.), Duration and enforcement of bipartite Agreement (Secs. 18, 19, Industrial Disputes Act, 1947), Pressurization: Strike, Go-Slow, wok to rule, Gherao and Lockout.

Module III: Regulation of Industrial Disputes
Define the concept of Industry, Industrial Dispute and workman, Power of Government to refer Industrial Disputes for adjudication: The Adjudicatory Machinery, Award and its binding nature, Judicial review of Awards, The concept of lay-off, retrenchment and procedure and compensation relating to lay-off and retrenchment.

Module IV: Standing Orders
Concept, Nature and scope of standing orders under Industrial Employment (Standing Order) Act, 1946, Formulation of Standing Orders and its Certification process, Modification: Modification and temporary application of Model Standing Order, Interpretation and Legal status of Standing Orders.

Module V: Discipline in Industries
Doctrine of hire and fire in the context of social welfare, Fairness in disciplinary process: Meaning of misconduct, Right to know: The Charge Sheet, Right to defend; Domestic enquiry notice, evidence, cross examination, unbiased enquiry officer and reasoned decision, Punishment of misconduct, Prenatal (permission) and Postnatal (Approach) control during pendency of proceeding (Sec. 33 of industrial and Disputes Act).

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- O.P. Malhotra, Law of Industrial Disputes.
- Indian Law Institute, Labour Law and Labour Relations.
- K.D. Srivastava, Commentary of Industrial Employment (S.C.) Act, 1946.
- S.C. Srivastava, Industrial Relation and Labour Law.
- Report of National Commission on Labour, 1969.
- Industrial Disputes Act, 1947.
- R.B. Sethi & R.N. Dwivedi, Law of Trade Union.

PROPERTY LAW

Course Code: LAW2505 **Credit Units: 04**

Course Objective:
The subject imparts to the student an understanding of the law in India relating to transfer of immovable property and the norms and doctrines that aid in carrying out secure transactions in this regard.

Course Contents:

Module I: Jurisprudential Basis (Sections 5-21)
Concept and meaning of property – New property, Kinds of property – movable and immovable property, tangible and intangible property,

Module II: Sale of Immovable Property
Doctrine of Election Sec. 35, Fraudulent Transfer Sec. 53 ; Sale of immovable property (Secs. 54 – 55). (Sale, Contract of Sale; Contract to sell; Rights and Liabilities of buyer and seller).

Module III: Specific Transfers
Mortgages of immovable Property: Secs. 58 – 77 (Kinds of mortgage, Rights and Liabilities of the mortgagor and mortgagee, Marshalling and Contribution (Secs. 81 – 82), Redemption (Secs. 91 – 96).

Module IV: Leases
Leases (Secs. 105 – 117): Definition, Leases how made, Rights and Liabilites of lesser and lessee, Charges (Section, 100 – 104).

Module V: Easements
Creation of Easements (Secs. 4 – 7), Nature and characteristics of Easements, Extinction, Suspension and Revival of Easements (Secs. 37–51), Riparian Rights, Licenses (Secs. 52 – 64).

Module VI
Indian Stamp and Registration Act.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Transfer of Property Act.
- Shukla, S.N., Transfer of Property Act.
- Shah, S.M., Transfer of Property Act.
- Tripathi, Lectures on Indian Easement Act.
- Jain, J.D., Indian Easement Act.

SUMMER INTERNSHIP EVALUATION-II

Course Code: LAW2535 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Sixth Semester

HISTORY-III

Course Code: LAW2601 **Credit Units: 04**

Course Objective:
The objective of this paper is to familiarize students of law with the history of Europe as many international laws/human rights/humanitarian laws emanate from developments in Europe.

Course Contents:

Module I: Europe from 1740-1815
Industrial revolution in England; The French Revolution: Reasons, Girondins and Jacobins, The Directory; Napoleonic Era and Europe.

Module II: Europe from 1815-1850
Vienna Settlement and the Concert of Europe: Role of Metternich; The Democratic and Nationalist aspirations of Europe: Independence of Belgium; Developments in Great Britain, France, Portugal, Italy, Germany, Austria-Hungry; Working Class Movement: Socialism and Marx; Women's Movement.

Module III: Europe from 1850-1871
Crimean War (1853-56); Russia; The Unification of Italy; The Unification of Germany ; Near Eastern Question.

Module IV: Europe from 1871-1945 (Imperialism and Colonialism)
France after 1870: Third Republic and its Constitution ; German Empire ; Partition of Africa, Militant Nationalism and the armament race ; International Relations and event leading to First World War : League of Nations ; Interwar years and the Second World War ; Humanitarian Concerns and Moduleed Nations.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Joll, James, Europe since 1815
- Ketelby, C.D.M., A History of Modern Times from 1789
- Thomson, David, Europe Since Napoleon
- Burns, Edward McNall, et.al, World Civilizations, Volumes B and C.

POLITICAL SCIENCE-III

Course Code: LAW2602 **Credit Units: 04**

Course Objective:
This paper focuses on understanding the basic concepts and theories of International Relations and the merging issues in relations between states.

Course Contents:

Module I: International Relations, Diplomacy, Balance of Power and Collective Security
International Relations: Meaning, Nature and Practice, The role of National Interest and Ideology in the formation of foreign policy; Diplomacy: Meaning, Nature, Objectives, Types of diplomacy and its importance; Balance of Power; Collective Security.

Module II: Moduleed Nation Organization (U.N.O.) and Disarmament
U.N.O. and its organ; Disarmament.

Module III: Cold War and Terrorism
Cold War: Origin, Causes, Impact on International Relations; Terrorism in International Relations.

Module IV: International Economic Order and Various Organizations
International Economic Order; Role of I.M.F, W.T.O. and World Bank; Regional Organizations: SAARC, ASEAN and E.U.

Module V: Non – Alignment and Indian Foreign Policy
Indian Foreign Policy with special reference to its neighbouring countries.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- J.C. Johari : International Relations and Politics
- Rumki Basu : The Moduleed Nations
- Palmer and Perkins : International Relations
- Goldstein : International Relation
- Dr. Mahendra Kumar : Theory and Practice of International Politics
- Prakash Chander and Prem Arora: Comparative politics and International Relations.

COMPANY LAW

Course Code: LAW2603 **Credit Units: 04**

Course Objective:
The paper aims to make the student familiar and to provide insight into formation and winding up of companies beside corporate administrations.

Course Contents:

Module I: Company
Definition, Characteristics, Lifting of Corporate Veil; Types of Companies;
Formation of a Company: Promoters, Pre-incorporation Contracts, Provisional Contracts,

Module II: Memorandum of Association, Articles of Association and Prospectus
Memorandum of Association; Articles of Association; Prospectus: Issues, contents, Kinds, liability for misstatements, Shelf Prospectus, Statement in lieu of Prospectus.

Module III: Share Capital
Issue and allotment of shares, SEBI guidelines on allotment, Issue of shares at premium and at discount, Share Certificate, Demat system ; Forfeiture and surrender of Shares, Transfer & Transmission of shares; Provisions relating to payment of dividend, Investor's Education and Protection Fund.

Module IV: Corporate Administration
Directors: kinds, powers and duties; Insider trading; Meetings kinds and procedure; The balance of powers within companies: Majority control and minority protection, Prevention of oppression, and powers of court and Central Government,

Module V: Winding up of Companies
Kinds, consequences and reasons of winding up; Role of the court; Liability of past members; Payment of liabilities; Reconstruction and amalgamation.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Avtar Singh : Indian Company Law
- Shah S. M : Lectures on Company Law
- Saharay H.K.: Company Law, 5th Edn.

LAW OF TORT (MOTOR VEHICLES ACT AND CONSUMER PROTECTION ACT, 1986)

Course Code: LAW2604 **Credit Units: 04**

Course Objective:
This course aims to introduce the student to the specialized discipline of tort law that is one of the most litigated areas of law in west. In India this realm is on the verge of a lot of litigational activity. The course covers Consumer Protection Act as well as Motor Vehicle Act which are carved out from the general principles of tort.

Course Contents:
Module I: Introduction to Tort
Nature and Definition of Torts ; Tort distinguished from Contract, Quasi-Contract, Crime : Conditions of liability including *damnum sine injuria*, *injuria sine damnum*; Remoteness of damages; Maxims: *Ubijus ibi remedium*, *Res ipsa loquitor*, etc.; Justification in Tort - *Volenti non-fit Injuria*, Necessity, Plaintiff's default**,** Act of God, Inevitable accidents, Private defences, Judicial and Quasi – Judicial Acts, Parental and quasi-parental authority.

Module II: Actions in Tort
Assault, Battery, False Imprisonment, Malicious Prosecution; Defamation-Libel, Slander including defenses in an action for defamation. ; Vicarious Liability; Liability of State; Doctrine of Sovereign ImmModuley.

Module III: Negligence
Negligence including contributory negligence and other defenses: Absolute liability/Strict liability, Rules in Ryland v. Fletcher **;** Principles for the application of the rule and defenses; Enterprises engaged in hazardous activities – M.C. Mehta v. Union of India; Nuisance; Trespass.

Module IV: Consumer Protection
The concept of a Consumer and Consumer Dispute, definition of 'consumer' under the consumer Protection Act, 1986: The Aims and Objectives of the Consumer Protection Act, 1986. Shift from Caveat Emptor to Caveat Venditor, Consumer Protection Councils under the Consumer Protection Act 1986. Redressal mechanism under the Consumer Protection Act, 1986; The District Forum, The State Commission; The National Commission. Why a consumer may institute proceedings.

Module V: Motor Vehicles
Motor Vehicles Claims and compensation: Relevant provisions of the relating Motor Vehicles Act relating to the liability and assessment of compensation: Liability without fault in certain cases : voidance of contracts restrictive of liability: Special provisions and scheme of compensation in case of hit and run motor accidents: offences penalties and procedure: Insurance of Motor Vehicles against third party risks(Sec. 145 – 152): Claims tribunals: Sec. 165-176: Special provisions as to payment of compensation on structured formula basis: Claims on non structured basis: Method of calculating compensation evolved by the courts(study with reference to relevant judgments): Defences: Changing parameters of negligence and burden of proof.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Winfield and Jolowicz, Tort
- Law of Torts, Universal law Publishing Company, Dr. S.P. Singh
- The Law of Torts: Ratanlal & Dhirajlal,
- Winfield, Law of Torts,
- Dr. D.N. Saraf, Law of Consumer Protection in India,
- Dr. Avtar Singh, Law of Consumer Protection in India, Dr. Gurjeet Singh, The law of Consumer Protection in India.
- Motor Vehicle Laws, Universal Law Publishing Company.

LABOUR LAW-II

Course Code: LAW2605 **Credit Units: 04**

Course Objective:
The paper is to focus on wage policies, compensation for learn caused during the course of employment and working conditions of employees.

Course Contents:

Module I: Minimum Wages Act, 1948
Concept of Labour Welfare, Classification and Importance, Labour welfare activities, Concept of minimum wage, fair wage, living wage and need based minimum wage, Constitutional validity of the Minimum wages Act, 1948, Procedure for fixation and revision of minimum wages, Fixation of minimum rates of wage by time rate or by piece rate, Procedure for hearing and deciding claims.

Module II: Payment of Wages Act, 1936
Object, scope and application of the Act, Definition of wage, Responsibility for payment of wages, Fixation of wage period, Time of payment of wage, Deductions which may be made from wages, Maximum amount of deduction.

Module III: Workmen's Compensation Act, 1923
Definition of dependant, workman, partial disablement and total disablement, Employer's liability for compensation: Scope of arising out of and in the course of employment, Doctrine of notional extension, When employer is not liable, Employer's Liability when contract or is engaged, Amount of compensation, Distribution of Compensation, Procedure in proceedings before Commissioner, Appeals.

Module IV: Factories Act, 1948 & Social Security
Concept of "factory", "manufacturing process" "worker" and "occupier" : General duties of occupier, Measures to be taken in factories for health, safety and welfare of workers, Working hours of adults, Employment of young person and children, Annual leave with wages, Additional provisions regulating employment of women in factory, Social Security of Workmen ; Concept and scope of social security : Origin of Social Security in India, Claim and Adjudication of Disputes under Employee's State Insurance Act. 1948.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- S.C. Srivastava, Commentaries on factories Act, 1948, Universal Law Publishing House, Delhi
- H.L. Kumar, Workmen's Compensation Act, 1923.

CYBER LAWS

Course Code: LAW2606 **Credit Units: 04**

Course Objective:
With the advent of information technology law and Right to Information Law, new strides and strategies in legal justice education have come up. There is a need that Law students must also be acquainted with these new developments if a law student has to find a comfortable berth in the competitive legal market as a Law Professional as well as legal manager. Therefore, there seems to be an impending need to generate e-Legal Justice Education that exposes the students to have deep insights into the complexities of information technology and right to information. Objectives of this course, therefore, are understanding the legal recognition and procedure, Digital signatures, legal recognition of cyber authorities and Cyber appellate tribunal, legal implications of new varieties of offences and penalties under the Information Technology Act, 2000. A student of law should also be given the understanding of copy right issues, TRIPS agreements, application of patents to computer technology, etc. Besides, the course also aims at developing insights into the Right to Information Act, 2005 and its grey areas.

Course Contents:

Module I: Introduction (Need, Role and various aspect related to Cyber Law)
Need and role of Cyber; Jurisprudence of Cyber Law in India; Free speech and expression on Internet &Privacy; issues, Right to data protection, Cyber Law &Protection of Domain name.

Module II: Cyber Jurisdiction, Investigation & Cyber Forensics
Cybercrimes: Extradition and Jurisdictional issues; Investigation of Cyber Offences: Cyber equipment's& Cyber Cell; Cyber Forensics: provisions, need and role in cyber investigation.

Module III: Electronic Governance, Cyber space &IPR issues
Legal aspect of Electronic Governance; IPR Issues: An Overview, Patent, Copyright and Trademark& other related Issues in Cyberspace.

Module IV: Cyber Legislations (Laws, National and International treaties & Conventions)
Cyber Legislation: An Indian and International Regime; The Information Technology 2000, The Provisions relating to- Legal recognition of – Digital & Electronic Signature, Secure E- records and Signature, E- signature Certificates, Certifying Authorities, Cyber, Appellate Tribunal and Miscellaneous Provisions.

Module V: Cyber Crimes (Civil & Criminal)
Cyber Crimes and Cyber Victimization; Cyber Offences: Types & the provisions for Penalties mentioned in IT Act, 2000; Cyber Pornography, Cyber Terrorism, Cyber Tort and Cyber defamation etc.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Nandan Kamath, Universal Law Publishing Company and E –commerce: Law relating to computers Internet.
- K.K. Kumar, Dominant Publication: Cyber Law
- B.L. Wadhera : Patent, trademarks, Copyrights
- Ganguly (LMH): Intellectual Property Rights.

Syllabus - Seventh Semester

HUMAN RIGHTS LAW

Course Code: LAW2701 **Credit Units: 05**

Course Objective:

Learning about human rights is largely cognitive, including human rights history, documents, and implementation mechanisms. All segments of society need to understand the provisions of the UDHR and how these international standards affect governments and individuals. They also need to understand the interdependence of rights, both civil and political and social, economic, and cultural. The course analyses International instruments on human rights, provisions of the Indian Constitution and protection of Human Rights Act emphasizing the role of NHRC and HRC. The Course include the study on the role of media, NGO and Human rights education at the grass root level to protect the basic rights of the people.

Course Contents:

Module I: The concept of Human Rights
Theoretical foundations of Human Rights- meaning, basic concept and origin of Human Rights,- Sources and significance of Human Rights-Different definitions of Human Rights-Classification of Human Rights.-Theories of Human Rights- Historical development of the concept of Human Rights- Concept of natural law and the concept of natural Rights- Human Rights in legal tradition- International law and National law.

Module II: UN and Human Rights
International documents related to Human Rights- Universal declaration of Human rights- Individual Rights and Group Rights- Significance and limitations- International Covenant on Civil and Political Rights,1966-International Covenant on Economic, Social and Cultural Rights,1966- Specific Conventions dealing with Human Rights-Importance and binding effect of above documents on the member countries of UN-Impact and implementation of Human Rights norms in India-Human Rights norms reflected in the Fundamental Rights under the Constitution of India- Directive principles legislative and administrative implementation of Human Rights norms-Implementation of Human Rights norms through judicial process. Regional arrangements –EU- Inter American System.

Module III: Human Rights under the Constitution and Different legislation in India
Provisions to ensure Human Rights to woman and children in India-Human Rights granted to Scheduled Castes and Scheduled Tribes and other socially and economically backward communities- Human Rights of prisoners

Module IV: Enforcement of Human Rights
Organs under the UN- International commissions of Human Rights- Amnesty International- American system and European system-Role of the Judiciary in India- Statutory Commissions- Woman's Commission- Minority Commission- SC/ST Commission.

Module V: Human Rights Commissions and Human Rights
Protection of Human Rights Act,1993- National Human Rights Commission- State Human Rights Commisions- Role of Media- Role of NGO's- Human Rights Education

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Jack Donnelly, Universal Human Rights in Theory and Practice (Cornell University Press, 2013)
- David P. Forsythe, Encyclopedia of Human Rights: Vol. 1 (Oxford University Press, 2009)
- Beth A. Simmons, Mobilizing for Human Rights: International Law in Domestic Politics (Cambridge University Press, 2009)
- D.D. Basu, Human Rights in Constitutional Law, Lexis Nexis, 2008 (3rd Edn)
- Upendra Baxi, The Future of Human Rights, Oxford University Press, 2012 (3rd
- Edn)
- Thomas Buergenthal, International Human Rights in a Nutshell, West Publisher
- Company, 2009 (4th Edn)
- Henry Steiner & Philip Alston, International Human Rights in Context: Law,
- Politics, Morals: Text and Materials, Oxford University Press, 2008
- S. K. Kapoor, International Law and Human Rights, Central Law Agency, 2014
- M. K. Sinha, Implementation of Basic Human Rights, Lexis Nexis, 2013

ENVIRONMENTAL LAW

Course Code: LAW2702 **Credit Units: 05**

Course Objective:
This paper provides the study of environmental laws covering legislations related to it and protection of forest and wild life.

Course Contents:

Module I: Environmental Law: International and National Perspective
Introduction: Environment and Environment Pollution: Problem and prospects; constitutional Perspective Right to Evolution and Application, Co relation between: Directive Principles of State Policies and Fundamental Degrees, Fundamental Rights and Directive Principles of State Policy; International Norms :Sustainable Development :Precautionary Principle, Polluter Pays Principle, Agenda 21, Inter generational equity, Public Trust Doctrine, Principle of no fault liability : Absolute Liability; Environment Protection through Public Interest Litigation, Remedies under various other laws.

Module II: Prevention and Control of Water and Air Pollution
The Water (Prevention and Control of Pollution) Act, 1974:Water Pollution : Definition, Central and State Pollution Control Boards: Constitution, Powers and Functions, Water Pollution Control Areas, Sample of effluents : Procedure; Restraint order, Consent requirement : Procedure, Grant/Refusal, Withdrawal, Citizen Suit Provision; Air (Prevention and Control of Pollution) Act, 1981: Air Pollution: Definition, Central and State Pollution Control Boards: Constitution, Powers and functions, Air Pollution Control Areas; Consent Requirement : Procedure, Grant/Refusal, Withdrawal, Sample of effluents – Procedure; Restraint order.

Module III: Protection of Forests and Wild Life
Indian Forest Act, 1927: Kinds of forest: Private, Reserved, Protected and Village Forests, The Forest (Conservation) Act, 1980; The Wild Life (Protection) Act, 1972: Authorities to be appointed and constituted under the Act, Hunting of Wild Animals, Protection of Specified Plants, Protected Area, Trade or Commerce in wild animals, animal articles and trophies; Its prohibition.

Module IV: Special Environmental Legislations
Environmental (Protection) Act, 1986, Public Liability Insurance Act, 1991, The National Environment Tribunal Act, 1995, The National Appellate Environmental Authority Act, 1997.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Environmental Law & Policy in India – Shyam Diwan, Armin Rosencranz
- Environmental Law in India – P. Leelakrishnan
- PIL and Environmental Protection-Geetanjali Chandra
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The IndianForest Act, 1927
- The Forest (Conservation) Act, 1980
- The Wild Life Protection Act, 1972
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The National Environment Tribunal Act, 1995
- The National Environment Appellate Authority Act, 1997

JURISPRUDENCE

Course Code: LAW2703 **Credit Units: 05**

Course Objective:
The objective of the course is to create an understanding of basic legal concepts and provide an insight to the student into philosophical, ideological and theoretical foundations of the discipline of law with special reference to Indian legal system.

Course Contents:
Module I: Introduction
Nature and scope of Jurisprudence**,** State, Sovereignty and Law: Sources of Law: Custom, Precedent, Legislation, Equity.

Module II: Schools of Jurisprudence – I
Natural Law, Analytical positivism, Pure Theory, Historical Jurisprudence, Sociological Jurisprudence, Economic Approach, Legal Realism, Theories of justice: Aristotle, Rawls, Distributive Justice in India.

Module III: Concepts of Rights and Duties
Rights and Duties, Types, Theories, Critique of Rights and Duties, Contemporary issues in Rights.

Module IV: Concepts of Ownership and Possession:
Evolution of concept of possession, ownership, Essentials of ownership, Corpus and Animus, Res Nulius and Res Possessionis

Module V: Indian Perspectives in Jurisprudence
Classical and Medieval Influences, Modern Trends study with reference to judicial pronouncements with state policy.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Bodenheimer, Jurisprudence – The Philosophy and Method of Law (1996), Universal, Delhi.
- Fitzgerald, (ed.) Salmond on Jurisprudence (1999) Tripathi, Bombay
- W. Friedmann, Legal Theory (1999) Universal, Delhi
- V.D. Mahajan, Jurisprudence and Legal theory (1996 re-print), Eastern, Lucknow
- M.D.A. Freeman (ed.) Lloyd's Introduction to Jurisprudence, (1994), Sweet & Maxwell
- Paton G.W. Jurisprudence (1972) Oxford, ELBS
- H.L.A. Hart, The Concepts of Law (1970) Oxford, ELBS
- Roscoe Pond, Introduction to the Philosophy of Law (1998 Re-print) Universal, Delhi
- Dias, Jurisprudence (1994 First Indian re-print), Adithya Books, New Delhi
- Dhyani S.N., Jurisprudence: Jurisprudence and Indian Legal theory
- Dhyani S. N., Fundamentals of Jurisprudence
- Jayakumar N. K., Lectures in Jurisprudence, Butterworths
- Justice Markandey Katju, Law in the Scientific Era, Universal
- Justice J. S. Verma, Dimensions of Justice, Universal
- Justice Rama Jois, Seeds of Modern Public Law in Ancient Indian Jurisprudence
- Justice Rama Jois, Eternal Values in Ancient Law.

PUBLIC INTERNATIONAL LAW

Course Code: LAW2704 **Credit Units: 05**

Course Objective:
The objective of this paper is to provide knowledge to the students regarding the Public International Law to enable them to deal with the transnational legal order.

Course Contents:

Module I: Introduction
Definition and Basis of International Law, Subjects of International Law, Relationship between International Law and Municipal Law.

Module II: Sources of International Law
Custom, Treaties, General Principles of law, Juristic Works, General Assembly Resolutions, Other sources (Conventions).

Module III: State Recognition, State Jurisdiction and Law of the Sea
State Recognition: Recognition of states, Recognition of governments, *De facto* and *De jure* Recognition, Types of Recognition: Implied Recognition, Conditional Recognition, Collective Recognition; Withdrawal of Recognition, The legal effects of recognition; **State Jurisdiction:** Basics of Jurisdiction, Principles of Jurisdiction, Exemption from Jurisdiction: Diplomatic ImmModuleies and Privileges, Armed Forces, Public Ships; **Law of the Sea:** First and Second Law of the Sea Conventions :Third Law of the Sea Convention {UNCLOS III (Moduleed Nations Convention on the Law of The Sea), Maritime Zones; Territorial Waters, Contiguous Zone, Exclusive Economic Zone, Continental Shelf High Seas; Sea Bed Authority, Deep Sea Bed Mining and International Sea – Bed Area.

Module IV: Conflict Resolution, War and Neutrality of States
Modes of Settlement of Disputes: Peaceful means, Coercive means; War: Laws of War, Humanitarian Laws: Rules of neutrality.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Oppenheim, International Law, Vol. – 1.
- J.G. Strake, Introduction to International Law.
- Grieg, International Law.
- R.C. and Hingorani, Modem International Law.
- H.O. Aggarwal, International Law.
- S.K. Kapoor, International Law.
- Bowell, The Law of Internationals Institution.
- Verma, S.K., An Introduction of Public International Law.

ARBITRATION AND ALTERNATE DISPUTE RESOLUTION

Course Code: LAW2705 **Credit Units: 05**

Course Objective:
The course material imparts to the students an understanding of the concept of alternate methods of resolving disputes in addition to the traditional court oriented processes. It focuses on an analytical study of arbitration law and practice in India and the relevant institutions monitoring the same. The paper also focuses on other alternate dispute resolving mechanisms through State mediatory services under the supervision of the courts.

Course Contents:

Module I: Introduction
Alternative Dispute Resolution (ADR): Concept and Need and International and National initiatives in India; IIC, UNCITRAL, KSID.
Arbitration and Conciliation Act, 1996
General Provisions, Definitions, receipt of written communications, waiver of right to object, extent of Judicial Intervention, Administration Assistance; Arbitration agreement, power to refer parties to arbitration where there is an arbitration agreement, Interim measures by court.

Module II: Composition of Arbitral Tribunal
Composition, Jurisdiction, Conduct of Arbitral Proceedings: Settlement, form and contents of arbitral award, termination of proceedings, correction and interpretation of awards, additional award.

Module III: Recourse against Arbitral Award
Application for setting aside Arbitral Award, Finality and enforcement of Arbitral Award, appealable orders, Miscellaneous, Deposits, Lien on Arbitral Award and Deposits as to costs, Arbitration agreement not to be discharged by death of party thereof, Provisions in case of insolvency, Jurisdiction, limitation, Limitations, Enforcement of certain Foreign Awards.

Module IV: Techniques of ADR – I
Negotiation / Consultation, Mediation, Good offices, Conciliation: Nature, Scope and Methods.
Legal Services: Meaning and scope in Legal Aid and Advice, Lok Adalats-nature, scope, procedure and functioning.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Rao, P.C., Arbitration and Conciliation Act, 1996, Universal Law Book Co., Pvt. Ltd., (1997)
- Rao P.C. & Sheffield William, Alternative Dispute Resolution
- Sujan, M.A., Law relating to Arbitration and conciliation.
- Kawatra, G.K., The New Law of Arbitration and conciliation
- Chaudhary, S.K. Roy, Law of Arbitration Conciliation, 4th Ed. Eastern Book
- Saharay H.K., Law of Arbitration (197) (Revised Print)

Statutory Material:
- Arbitration and Conciliation Act, 1996.
- Legal Services Authority Act, 1987.
- UNCITRAL

SUMMER INTERNSHIP EVALUATION-III

Course Code: LAW2735 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Eighth Semester

INVESTMENT AND COMPETITION LAW

Course Code: LAW2801 **Credit Units: 05**

Course Objective:
This paper focuses on the investment and competition laws of India inn the contest of new economic order.

Course Contents:

Module I: Competition Law
Background, Prohibitions, Competition Commission of India.

Module II: Corporate Finance and regulatory framework
Security Contract (Regulation) Act 1956, SEBI Act 1992, Depositories Act 1996, The Securitisation and Reconstruction of Financial Assets and enforcement of security Interest Act, 2002.

Module III: Regulatory framework for foreign trade, multinational companies
Foreign Trade (Development & Regulation) Act 1992, UNCTAD Draft Model on Trans – national Corporations, Control and regulation of foreign companies in India, Foreign collaborations and joint ventures.

Module IV: Foreign Exchange Management
Background, Policies, Authorities.

Module V
Role of Information Technology in the investment market, functioning of demat A/c portal. Investment through internet and virtual banking.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Competition Act 2002
- Security Contract (Regulation) Act 1956
- SEBI Act 1992
- Depositories Act 1996
- Foreign Trade (Development & Regulation) Act 1992,
- Foreign Exchange Management Act, 1999
- Taxman's Student's Guide to Economic Laws

TAXATION LAW

Course Code: LAW2802 **Credit Units: 05**

Course Objective:
Power to tax has been described as the power to destroy. This idea is being floated often whenever the State introduces a new tax. Is this true? Is it not necessary that in order to raise revenue and place the economy on solid foundation, the taxing power should be conferred on the State? The power to tax shall not go unregulated. In this context of a federal structure the distribution of the taxing powers assumes added significance. Obviously, a study of the Constitutional framework on taxation becomes important. Along with this, an analysis of the different laws enacted in exercise of these powers with their safeguards and remedies sheds light on the mechanics of the taxation by the Union and the States.

Course Contents:

Module I: General Principles of Taxation Laws
History and Development of Tax Laws in India, Fundamental Principles relating to Tax Laws, Taxing power and constitutional limitations, Distinction between: Tax, Fee and Cess; Tax avoidance and Tax evasion .

Module II: Basic concepts of Income Tax
Income, Previous Year, assessment Year, Person, Assesee and Total Income, Income not included in the Total Income. Residential status, Clubbing of Income, Tax planning, Rate of Income Tax, Heads of Income, Salaries, Income from House Property, Income from Business or Profession, Capital Gains, Income from Other sources, Deductions under the Income Tax Act, 1961, Income Tax Authorities: Power and Functions, Filing of returns and procedure for assessment, Offences and Penal Sanctions .

Module III: Value Added Tax
Meaning and importance of VAT, Difference between VAT and Sales Tax, West Bengal Value Added Tax Act, 2003, Criticisms and limitations of Vat system.

Module IV: Service Tax
Taxable Service, Meaning and importance of Service Tax, Valuation of Taxable Service, Offences and Penalities.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Iyengar, Sampath (1998), Law of Income Tax New Delhi, Bharath Law House.
- Jain, Narayan (2004) How to Handel Income Tax Problems, Book Corporation.
- Palkivala, N.A. (1999), The Law & Practice of Income Tax, Nagpur: Wadha Publication.
- Parameswaran, K. (1987), Power of Taxation under the Constitution, Eastern Book Company.
- Sharma, Remesh (1998), Supreme Court on Direct Taxes, New Delhi: Bharath Law House.
- Singh S.D. (1973), Principles of Law of Sales Tax, Eastern Book Company.
- V. Ramachandran & T.A. Ramakrishnan (eds.) (2000), A.N. Aiyar's Indian Tax Laws, Chennai: Company Law Institute of India Pvt. Ltd.

INTERPRETATION OF STATUTES

Course Code: LAW2803 **Credit Units: 05**

Course Objective:
Judicial interpretation involves construction of words, phrases and expressions. In their attempt to make the old and existing statutes contextually relevant, courts used to develop certain rules, doctrines and principles of interpretation. The course material seeks to impart to the students, the necessary skills to interpret the statutes with a judicial mind set.

Course Contents:

Module I: Rules of Interpretation
Commencement, repeal and revival of a statute; Rules of interpretation: Liberal rule, mischief rule and golden rules, Harmonious construction.

Module II: Principles of interpretation
Ejusdem of Generis, Noscitur – A Socius, Reddendo Singula Singlis., Expressio Unius Est exclusion Alteriu, UI Res Magis Valent Quam Pereat, Contemporanea Espositio Est Optima Et Protissima Lege.

Module III: Internal Aids to Interpretation

Module IV: External Aids to Interpretation

Module V
Construction of Penal Statutes, Mens rea in statutory offences, Principles to be applied in interpreting the Constitution, Strict construction of taxing statues and its limitations.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Maxwell, Interpretation of Statutes.
- Sarup, Interpretation Statues.
- G.P. Singh, Principles of Statutory Interpretation.
- V.P. Sarathi, The Interpretation of Statutes.
- Bindra, Interpretation of Statutes.

INTERNATIONAL TRADE LAW

Course Code: LAW2804 **Credit Units: 05**

Course Objective:
To acquaint the Students about the basic aspects of International Trade Law, including the WTO and it's different principles and Agreements.

Course Contents:

Module I: Contract of Sale
Uniform Rules on Contract of Sale, Types of Sale Contract - CIF, FOB, C & F Contract, Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856, International Conventions Governing Bill of lading
Addition of Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856 and International Conventions Governing Bill of Lading in Module I.
Addition of Background Role and Structure of WTO, and difference between GATT & WTO in Module IV

Module II: Payment for International Sales
Letters of Credit, Bills of Exchange, and function and connected issues.

Module III: Settlement of Disputes
Arbitration, Enforcement of Arbitral Awards.

Module IV: World Trade organization (WTO) and General Agreement on Tariffs and Trade (GATT)
Background of formation of WTO, Role of WTO in International Trade, Difference of GATT and WTO, Structure of WTO.
Basic Principles: MFN, Treatment, National Treatment and Non-Discrimination, Exceptions to MFN : Tariff Bindings, Regional Trade Agreements, Escape Clause, Safeguard Measures, Quantitative Restrictions, Anti-dumping and counter-vailing duties.

Module V: WTO and Multilateral Agreements
Trade Related Investment Measures (TRIMS), General Agreement on Trade in Services (GATS), Trade Related aspects of Intellectual Property Rights (TRIPS).

Module VI: Dispute Settlement Mechanism under WTO

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Basic Texts of GATT and WTO.
- Jackson, John, H. (1997) Law of International Trading System, The MIT Press.
- Jackson, John, H. (1997) World Trade and Law of GATT, The MIT Press.
- Dam, K. W. (1970) The GATT Law and International Economic Organisations, Chicago University Press
- Koul, A.K. (2001) World Trade Organisation, Satayam Publication.
- Internet Sources :www.wto.org, www.uncitral.org.
- Text of the Indian Arbitration and Conciliation Act, 1996.

LAND LAWS

Course Code: LAW2805 **Credit Units: 05**

Course Objective:
The legislative power to make laws relating to land and land ceiling is in the state list. Different States have enacted their own laws on this subject. The Constitutional perspectives relating to this subject have to be taught as an essential part of this course. The provisions in the Constitution in Part III, IV and XII as well as those in Schedule VII relating to distribution of legislative powers over land are essentially to be taught with emphasis.

Course Contents:
Module I: Punjab Land Revenue Act1887 (Applicable over Punjab and Haryana), Definition of Key Words, Revenue Officers: Their Power and Functions, Preparation of Revenue Record: Like Documents of Jamabandi, Girdawari, Mutation, Intkaal, SijraNasab (Pedigree Table) Sirjra Axe(Map of the Village), Assessment of Land Revenue, Collection of Land Revenue, Concepts & Procedure of Partitions.

Module II: Punjab Land Revenue Act,1887:
Records-Of-Rights and Annual Records, Collection Of Land Revenue, Recovery of other Demands by Revenue-officers, Partition, **Assessment** and other relevant provisions.

Module III: Haryana Rent Control Act, 1973
Definitions (Sec. 1-4), Rights & Duties of Tenants, Rights and Duties of Landlords, Grounds of Ejectment of Tenants.
Haryana Panchayati Raj Act ,1994 (Sec. 1 to 54) (Chapter 1 to 6) Definition of Key Words, Constitution of Gram Sabha and Gram Panchayat, Gram Panchayat's Duties, Functions and Powers, Finance and Taxation, Control of Gram Panchayat, Sources of Income and Expenditure of Gram Panchayat.

Module IV: Haryana Panchayati Raj Act 1994,
PanchayatiSamiti (Chapter 7 To 11) And Sec. 55 To 116) Definition of Key Words, Conduct of Business of PanchayatSamities, Servant of PanchayatSamities, Duties and Powers of PanachayatSamiti, Finance and Taxation, Sources of Income of PanchayatSamiti, Control of PanchayatSamiti

Module V: Delhi Land Laws
Real Estate Development and Apartment ownership
Delhi Apartment Ownership Act, 2009,

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, poverty and development, Prof. M.L. Upadhayay.
- Upendra Baxi, Towards a Sociology of Indian Law, pp. 25-65 (1986)
- Atul Kohli, The state and Poverty in India (1987)
- Francine R. Frankel, India's Political Economy, 1947-77 (1988)
- L.H. Rudolph and S.H. Rudolph, The Political Economy of Lakshmi (1987)
- Mohammad Ghouse, "Nehru and Agrarian reform" in Rajeev Dhavan and Thomas Paul (eds.)
- Nehru and the Constitution (1992), Thripathi
- Walter C. Neale, Developing Rural India Policies and Progress (1990) Allied
- Alice, Jacob, Land Reform and Rural Change 6-19 (1992), Land Reforms in India: a Review.
- IASSI quarterly 1992, Vol. X, Numbers 3 and 4.
- B.R. Beotra, Law of Forests (Central and State) 6th Edition 1999, The Law Book Company.
- A. Krishnan, Forest Laws in India, 1998, Asia Law House
- Srivastava, Encyclopedia on forest, 1998, Asia Law House
- Padala Rami Reddy, Forest Laws, 1989, Asia Law House Baden Powel, Manual of Jurisprudence for Forests Officers (1982)

Syllabus - Ninth Semester

DRAFTING, PLEADING AND CONVEYANCING

Course Code: LAW2901 **Credit Units: 05**

Course Objective:
The course aims at acquainting the students about the various fundamentals of drafting to develop the skills of pleading and convenyancing.

Course Contents:

Module I: Fundamentals Rules of Pleadings
Meaning: Pleading and Conveyancing, Plaint structure, written statement, Affidavit and Conveyancing, Verification of pleading, Object of verification, Amendment of Pleadings.

Module II: General Principles of Civil Pleadings
Suit for Part-performance of the contract ; Suit for specific performance of the contract; Suit for recovery of money given on Interest (Money suit); Suit of damages ; Suit for restitution of conjugal rights; Maintenance suit by wife; Application under Section 13 Hindu Marriage Act (Divorce); Suit for recovery of rent or eviction of tenant; Interpleader suit; Suit for malicious prosecution ; Suit under Section 13 of Negotiable Instruments Act; Application under Order 6 Rule 17 of Code of Civil Procedure (Amendment of Pleadings); Appeal (First); Execution Petition; Revision; Application for Temporary Injunction Order 39 Rule 2 of Code of Civil Procedure.

Module III: General Principles of Criminal Pleadings
Complaint; Application for Bail (Section 436, 437 of Code of Criminal Procedure); Application for Anticipatory Bail (Section 438 of Code of Criminal Procedure Code); Accused's reply; Criminal Appeal (Appeal against conviction).

Module IV: Conveyancing
Notice and Reply to notice; General power of attorney; Special power of Attorney; Writ petitions: *Habeas Corpus, Mandamus, Certiorari, Quo warranto*; Sale deed; Partnership deed; Lease deed/ Rent deed; Promissory note; Gift deed; Adoption deed; Will; Affidavit ; Mortgage – deed.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Conveyancing – N.S. Bindra
- Conveyancing – A.N. Chaturvedi
- Mogha's Law of Pleading
- Conveyancing – D'Souza

INTELLECTUAL PROPERTY RIGHTS

Course Code: LAW2902 **Credit Units: 05**

Course Objective:
The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Patent Law (1970), Copy Right Law (1957) and Designs Act of 2000 which invariably form the part of Intellectual Property Law and shall comprise of the following.
The importance of this branch of the law is to be sufficiently realized in the Indian legal education. These areas are now internationally conceptualized as representing intellectual property. It is often the case that while the law of patents and trademarks is referred to as industrial property, the law relating to copyright is named intellectual property. While both these terms could be suitably invoked, we here speak of intellectual property as signifying all the three bodies of the law as well as the law on industrial designs.
Unlike other forms of property, intellectual property refers to regimes of legal recognition of, primarily, the products of the mind or imagination. The subject matter of property relations is here preeminently based on mental labour. The law relating to intellectual property protects the right to mental labour.
The law confers rights of proprietary nature on relative intellectual labour primarily on the basis that it is in the interests of society and state to promote creativeness and inventiveness. Limited monopoly provides incentive for greater inventive and innovative efforts in society. An important aspect of the exploration in this course would be ways in which the laws strike a fair balance between the interests and rights of the intellectual labourers on the one hand and organized industrial enterprises on the other. Another dimension is a study of the ways in which this regime of laws militates against, or favours, comm. Moduley property in national cultures. As concerns 'modernization' crucial questions arise in the field of copyright protection in computer software and hardware, internet, electronic music and scientific research. Both copyright, trademarks, design and patent law here relate basically to the law of unfair competition and constitute an aspect of consumer protection and welfare not only in the context of national perspectives but also in view of the waves of globalization already set in. Both from the standpoint of human resources development, modernization and justice it is important that the law students get sufficient insights in Intellectual Property Law.

Course Contents:

Module I: Introduction
Intellectual Property, Concept and Philosophy, Need for Private Rights versus Public Interests, Advantages and Disadvantages of IPR.

Module II: Patent
Development of patent law, Rationale for patent protection**,** Nature and definition, Types of patentable subject matter, Patentability criteria, non-patentable inventions, Rights of patentee, Procedure for granting a patent, Grounds for opposition, Transfer of patent rights, Compulsory Licenses, Acquisition, Surrender, Revocation, restoration, Patent infringement and remedies, Bio patents and software patents, Official Machinery, Controller, Powers and Functions, Patent in pharmaceutical industry, Patent cooperation treaty, Paris convention.

Module III: Copyright
History, Concept of copyright, conditions for grant of copyright, extent of rights exception to copyright protection, fair use provision, assignment and licensing, Compulsory licensing and statutory licensing, Collective administration, Copyright board and office, powers and functions, Moral rights: Neighboring rights; infringement penalties and remedies, Appeals, Berne Convention, Universal Copyright Convention - WIPO Copyright Treaty: WIPO Phonograms and Performances treaty, TRIPS with respect to Copyright and Neighboring rights.

Module IV: Designs, Protection, Historical development, Rationale
Designs Act of 2000: Meaning of Design, Conditions for grant of protection, Ambit of Protection, Exceptions, Registration of Designs, Cancellation, Copyright in Registered Designs, Enforcement, Infringement and remedies, Powers and duties of Controller.

Module V: Trademarks

Evolution, Functions, Objective, Definition, Kinds of Marks, Domain names, Registration, Concurrent registration, Procedure for registration, Relative and absolute grounds of refusal, opposition and its grounds, Assignment, transmission and licensing of Trademarks, Infringement, Penalties and Remedies, Withdrawal of protection, Passing off, Official machinery for regulation administration and Redressal, Registrar, Difference between Trade Mark, **Trade Secret, Traditional Knowledge** and Geographical Indications, TRIPS on Trademarks, Madrid Agreement for The Repression of False or Deceptive Indications of Source on Goods, 1891- Madrid Agreement for the International Registration of Marks, 1891 and protocol relating to that agreement 1989.

Module VI: Plant Varieties Protection Act, 2001

Objectives, Rationale,Registry, Official machinery, registration, Criteria of fulfillment Exclusions, Benefit sharing, Farmers rights, CommModuley Rights, compulsory license Redressal fora, Appellate tribunal, Infringement, offences and penalties; Geographical indications of Goods (Registration and Protection Act, 1999**:** History, Definition, Rationale, Functioning, official Machinery,Registry,Rights conferred, Registration Procedure. Redressal Machinery, Appeal, Passing off, Offences, penalties and Procedure.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:

- D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
- B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights

LAW, POVERTY AND DEVELOPMENT

Course Code: LAW2903 **Credit Units: 05**

Course Objective:
The objective of this paper is to provide an understanding of basic concepts of poverty and development and their relationship with law.

Course Contents:

Module I: Understanding Poverty and Development
Poverty: Meaning and Concept, Relative Dimensions, Measurement and Determinants, Issues related to Poverty in India; Development: Perspectives, Developmental index.

Module II: Constitutional Guarantees for the Poor
Equality and Protective Discrimination, Right to Basic Needs and Welfare, Abolition of Untouchability and Protection of Civil Rights, Right to Development.

Module III: Criminal Justice System and the Poor
Treatment of the poor by Police, Inability to get Bail, Problems of Poor Under trials, Working of free legal aid schemes. .

Module IV: Impoverishment of Women, Children and Disabled Persons
Deprivations of women under family laws, Problems of women workers in organized and unorganized sectors, Child labour, Approaches to disability and rights of the disabled persons, Right to education and dignity.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:

- Law, Poverty and Development – Upendra Baxi
- State and Poverty in India – Atul Kohli
- The Poverty Question (Search for Solution) – Yogesh Atal
- Poverty, Rural Development and Public Policy - Amarendra

PROFESSIONAL ETHICS

Course Code: LAW2904 **Credit Units: 05**

Course Objective:
The Course has been designed to acquaint the students of Law about the Professional Ethics and Professional etiquettes that are essentially significant for an advocate to observe while at the Bar. Accountability and transparency are imperative to the profession. Besides, the conducive and cordial Bar- Bench relations can send a good message concerning the richness of the Legal profession. With this background cue, the course aims at developing insights of the students about the professional parameters.

Course Contents:

Module I: Historical Introduction
Historical introduction to legal profession in India – Barristers, Vakils, High Court Pleaders, Advocates, etc. The All India Bar Committee, 1951 and the passing of Indian Advocates Act, 1961. The Advocates Act 1961: Definitions Section 2, Constitution and function of State Bar Councils, Bar Council of India, Terms of Office, various sub-committees including Disciplinary Committee and the qualification for their membership. Power to make rules Sections 3 to 15 – Chapter –II.

Module II: The Advocate's Act, 1961
The Advocate Act, 1961.
Admission and enrolment of Advocate – Senior and other Advocates,
Common role of Advocates, Qualifications and Disqualifications for enrolment and procedure thereof, Chapter – III Section 16 to 28.
Rights to Practice: Monopoly of representation, Exclusion of advocates from certain cases, self representation by litigants. Chapter IV Secs. 29 to 34.
Professional and other misconduct, Principles for determining misconduct,
Disciplinary Committees of State Bar Council and the Bar Council of India,
Punishment of advocates for misconduct, Appeals to the Supreme Court,
Chapter – V – Secs. 35 to 44.

Module III: Legal Profession
Nature of Legal Profession, Need for an Ethical Code of Rights: privileges and duties of Advocates, Preparation of a case and fees of an Advocate, under – cutting, Bar against soliciting work and advertisement, Bar against touting, refusal of briefs, accountability to the client, confidentiality communication between Advocates to compromise, Study of Code of Ethics prepared by the Bar Council of India.

Module IV: Contempt of Courts Act, 1971
Contempt of Courts Act, 1971,
What is Contempt? Civil and criminal contempt, punishment for contempt.
Procedures in contempt cases. High Court Rules and the Supreme Court
Rules to regulate contempt proceedings.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Sanjeev Rao, Indian Advocates Act, 1971.
- M.P. Jain, Indian Legal History (Chap. On Legal Profession).
- Krishna Murthy Iyer's Book on Advocacy.
- The Contempt of Courts Act, 1971.
- Journal of Bar Council of India.

PRIVATE INTERNATIONAL LAW

Course Code: LAW2905 **Credit Units: 05**

Course Objective:
The course equips the student to deal with dispute involving a foreign element in personal, civil and commercial matters *i.e.* increasing in frequency as a result of a globalized economic and social environment.

Course Contents:

Module I: Introduction
Application and subject matter of Private International Law, Distinction with Public International Law, Characterization and theories of characterization, Concept of Renvoi, Application of foreign law, Domicile, Jurisdiction of courts.

Module II: Family Law and Adoptions
Material and formal validity of marriage under Indian and English law, Choice of law and jurisdiction of courts in matrimonial causes: dissolution of marriage, grounds of divorce, restitution of conjugal rights, recognition of foreign judgment, Recognition of foreign adoptions, Adoption by foreign parents, Jurisdiction under Indian and English law.

Module III: Civil and Commercial matters
Tort, Theories of foreign tort, Contract, Theory of Proper Law of Contract, Ascertaining the applicable law, Property.

Module IV: Indian Law relating to foreign judgment
Basis of recognition; Recognition and Enforcement of Foreign Judgments, Finality, Failure, Direct execution of foreign judgments, decrees.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Dr. Paras Diwan :Private International Law
- Cheshire : Private International Law
- Morris : Private International Law

ELECTION LAW

Course Code: LAW2906 **Credit Units: 05**

Course Objective:
The objective of this paper is to acquaint the students with the election laws governing the elections of the Houses of the Parliament and the State Legislatures as well as to the offices of President and Vice President**.**

Course Contents:

Module I: Introduction
Election: Meaning and Process, Constitutional Mandate, Laws governing elections, Election disputes, Election to the Offices of the President and Vice President. .

Module II: Election Commission
Composition, Functions, Powers**;** Delimitation of Constituencies, Preparation and Revision of Electoral Rolls.

Module III: Qualifications and Disqualifications of Candidates
Constitutional and Statutory Provisions**:** Disqualifications of sitting members, Nomination and Candidature, Voters Right to Information; Anti Defection Law (Tenth Schedule to the Constitution of India).

Module IV: Corrupt Practices in the Election Law; Electoral Offences

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Manual of Election Law in India – Dev Inder
- Chawla's Elections Law & Practice - P.C. Jain & Kiran Jain
- Election Laws and Practice in India- R.N. Choudhry
- Corrupt Practices in Election Law – K.C. Sunny
- How India Votes – Election Laws, Practice and Procedure – V.S. Rama Devi & S.K. Mendiretta
- V.N. Shukla's The Constitution of India – M.P. Singh.

Statutory Reading:
- Relevant Provisions of the Constitution of India
- The Representation of the People Act, 1951.
- The Representation of the People Act, 1950.
- The Presidential and Vice-Presidential Elections Act, 1952
- The Election Commission (Condition of service of Election Commissioners and Transaction of Business) Act, 1991.
- The Delimitation Act, 2002.

BANKING AND INSURANCE LAWS

Course Code: LAW2907 **Credit Units: 05**

Course Objective:
This course acquaints students with banking system of India and teaches them the various aspects and rights that exists for them in banking and insurance sector.

Course Contents:

Module I: Banking System in India
Kinds of banks and their functions; Banking Regulation Laws: Reserve Bank of India Act, 1934, Banking Regulation Act, 1949; Relationship between banker and customer: Legal Character, Contract between banker & customer, Banks duty to customers; The Banking Ombudsman Scheme, 1995; Liability under Consumer Protection Act, 1986.

Module II: Lending, Securities and Recovery by Banks
Principles of Lending ; Position of Weaker Sections; Nature of Securities and Risks Involved ; Recovery of debts with and without intervention of courts / tribunal: Recovery of Debts due to Banks and Financial Institutions Act, 1993, Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interests Act, 2002.

Module III: Banking Frauds
Nature of Banking Frauds; Legal Regime to Control Banking Frauds; Recent Trends in Banking: Automatic Teller Machine and Internet Banking, Smart Cards, Credit Cards.

Module IV: Insurance Law
Nature of Insurance Contracts; Kinds of Insurance: Life Insurance, Medi claim, Property Insurance, Fire Insurance, Motor Vehicles Insurance (with special reference to third party insurance; Constitution, Functions and Powers of Insurance Regulatory and Development Authority; Application of Consumer Protection Act, 1986.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Banking Law & Negotiable Instruments Act – Sharma and Nainta
- Banking System, Frauds and Legal Control – R.P. Namita
- Law of Insurance – M.N. Mishra
- Handbook of Insurance and Allied Laws – C. Rangarajan
- Banking Law & Practice in India – M.L. Tannan.

INTERNATIONAL HUMANITARIAN AND REFUGEE LAW

Course Code: LAW2908 **Credit Units: 05**

Course Objective:
The objective of this paper is to make students aware of the principles of International Humanitarian and Refugee Laws.

Course Contents:

Module I: Historical Development of International Humanitarian Law
History and evolution, Growth, Character of International Humanitarian Law.

Module II: Geneva Conventions, 1949
Geneva Convention I, Geneva Convention II, Geneva Convention III and Geneva Convention IV, 1949, Additional Protocol I to Geneva Conventions, 1977, Additional Protocol II to Geneva Conventions II 1977.

Module III: Enforcement Machinery
War Crimes, Serious breaches of International Humanitarian Law, International Criminal Court (ICC).

Module IV: Refugees under International Law
Who is a refugee?, Convention Relating to the Status of Refugees, 1933, Convention on Status of Refugees, 1951, The 1967 Protocol, The AALCC Principles 1966, The OAU Convention 1969.

Module V: Implementation and Monitoring of the Rights of Refugees
Status of the UNHCR 1950, Cartegena Declaration 1984.

Module VI: Treatment of Refugees under Indian Laws
Draft SAARC Convention.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Ingrid Detter, The Law of War, (Cambridge, 2000)
- A. Roberts and R. Guelff, eds., Documents on the Laws of War (Oxford, 2000)
- Legality of the Threat or Use of nuclear weapons, Advisory Opinion, ICJ Reports (1996)
- M.K. Balachandran and Rose Verghese (eds.) – International Humanitarian Law ICRC (1997)
- Ravindra Pratap, “India’s Attitude towards IHL”, in Mani (ed.) International Humanitarian Law in South Asia (Genava: ICRC, 2003)
- Guy S. Goodwin – The Refugee in International Law (Oxford, 2000)
- A. Vibeke Eggli, Mass Refugee Influx and the Limits of Public International Law (The Hague: Nijhoff, 2002).

CRIMINOLOGY

Course Code: LAW2909 **Credit Units: 05**

Course Objective:
The course is intended to introduce students to the broad study of criminology. It is to give a broad overview to the scope of criminology, to the ideas which have influenced the area of the subject and to the practical uses and impact to which these have been, or might be put.

Course Contents:

Module I: Introduction to Crime & Criminology
Definition and Scope, Criminology & other Social-Science; Legal, Social and Psychological aspects of crime, Traditional crimes; Organized Crimes, Socio Economic Crimes, Modern Crimes; Corruption, Cyber Crimes Environmental Crimes Terrorism and insurgency ; Specific theories: Classical School and Neoclassical School; Positive School; Cartographic School; Sociological theories : Social Structural Theories and Social Process Theories; Economic Theories of Crime .

Module II: Juvenile Delinquency
Concept & Causes,Pre delinquency stages: Truancy and Vagrancy, Main features of juvenile Justice Act, (New & Old), Institutional Services like Observation homes, Juvenile Homes, Special Homes & Juvenile Aftercare Services.

Module III: Punishment
History & Theories of Punishment, Capital Punishment, Historical Development from Punishment to Correction and Reformation, Prison System In India; Correctional Programmes in jail; Alter care services, Probation & Parole.

Module IV: Impact on Society
Social Disorganization and Social Problems, Victimless Crimes: Alcoholism, Drug Addiction, Beggary, Commercial Sex, Suicide; Crimes related to Family: Dowry death, Domestic Violence, Child Abuse.

Module V: Victimology
Concept, origin & Development, Need to study victims, U.N. Declaration on the basic principles of justice for victims of crimes and abuse of power, Victim's rights in India: Fair Access to Justice, Restitution, Compensation and assistance to victims, Human Rights Protection.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Sutherland and Crssey – Criminology
- Ahmed Siddique – Criminology
- Mrs. Vedkumari – Juvenile Justice

MEDIA LAWS

Course Code: LAW2910 **Credit Units: 05**

Course Objective:
Media connotes radio, television, print, film and the internet and has become an important industry which provides the dual function of information and entertainment. The constitution of India has ensured that media performs its function as the watchdog of modern democracy effectively but within reasonable limits. This course introduces the legal framework governing the different aspects and streams of media industry and the specific laws applicable to the people servicing the industry. With the help of examples and where necessary case studies from selected constitutional provisions, legislation and judicial proceedings and decisions, the historical and current debates and issues in media laws will be taught to the students.

Course Contents:

Module I: Introduction to Media Laws
What is media law?
Need for Media Laws, Statutory Laws, Civil Laws: Law of Torts (Defamation & Negligence) & Consumer Protection Act 2006, Criminal Laws (defamation/Obscenity/Sedition) R. v. Hicklin LR 3 QB 360, Ranjit D. Udeshi v. State of Maharashtra (AIR 1965 SC 881)

Constitutional Framework:
Freedom of speech & expression(Art. 19) Maneka Gandhi v. Union of India, Romesh Thapar v. State of Madras, Indian Express v. Union of India (1985) 1 SCC 641.
Issues of Privacy (Art.21) Kharak Singh v. State of UP (1964) 1 SCR 332, Gobind v. State of MP (1975) 2 SCC 148, Judicial Interpretation of Media freedom and its limits (including Contempt of Court & Judicial Activism) .

Module II: Media Laws
Right to Information Act 2005/Official Secrets Act 1923
Broadcast Sector:
Prasar Bharti Act 1990
Broadcasting Bill 2006
Cinematography Act 1952 (Sec.51/14(d)/57/62A)
(Case Study: K. A. Abbas v. UOI; Bobby Art International v. Om Pal Singh Hoon)
Cable TV Networks (Regulation) Act of 1995
Cine Workers & Cinema Theatre Workers (Regulation of Employment) Act 1981
Cine Workers Welfare Cess Act 1981

Internet & Law:
Evolution of Internet as a New Media
IT Act of 2000 & Media
Regulatory commissions of New Media
Indian Telegraph Act of 1885

Advertisement & Law:
Advertisement act of 1954
Indecent Representation (Prohibition) Act 1986
Case Study: Hamdard Dawakhana v. UOI; Tata Press Ltd. V. Mahanagar Telephone Nigam Ltd.

Print Media & Law:
Press Council Act, 1978
Cable television Network (Regulation) Act 1995
The working Journalists and other Newspaper employees (Conditions of Service and Miscellaneous Provisions) Act 1955
Press Council Guidance
Case study: Sakal Papers Ltd. v. Union of India AIR 1962 SC 305, Bennet Coleman and Co. v. Union of India AIR 1973 SC 106

Examination Scheme:

Components	P	A	C	CT	EE
Weightage (%)	5	5	10	10	70

Text & References:

- Hakemulder, R Jan. Jonge, Fay AC De & Singh, P.P.(1998) Media Ethics and Law, Anmol Publications Private Limited, New Delhi
- Divan Govadia Madhavi 92006) Facets of media Laws (1st Edn) Eastern Book Company, Lucknow
- Campbell, dennis & Cotter, Susan (1998) Copyright Infringement, Center for International Legal Studies, Kluwer Law Internatiional, London
- Pandey,J.N. (2003) Constitutional Law of India, Central Law Agency, Allahabad
- Shukla, V.N. (1982) Constitution of India, eastern Book Company, Lucknow
- E. Price, Monroe & Veerhulst, Stefaan G. (2001) Broadcasting reform in India; Media Law from a Global Perspective, Oxford Universuty Press, New Delhi
- Iyer, Venkat (2000) (2nd Edn) Mass Media Laws and regulations in India, Asian Media Information and Communication Centre, Singapore
- Basu, Durga Das (1996) Law of the Press in India, Prentice Hall of India, New Delhi
- Christain G Clifford & others (2005) (7th Edn) Media Ethics – Cases & Moral reasoning, Pearson Education, London
- Shrivastava, KM (2005) Media Ethics – Veda to Gandhi & Beyond, Publications Division, New Delhi

CORRUPTION LAWS

Course Code: LAW2911 **Credit Units: 05**

Course Objective:
To update the students about corruption laws that have already been formed. The main aim of the course is to make the students aware of the laws prevalent and the legal remedies available

Course Contents:

Module I: Introduction to Corruption Laws
Introduction- definition of corruption,
Genesis of corruption- Historical Background, corruption in ancient time, corruption in Mahabharata need for integrating
Nature of corruption, various types of corruption- in kind, cash or in service Individual Corruption, Institutional Corruption. Why and how of corruption – Nexus between Position of a Public servant and corruption consequences and ill effects

Module II: Offences by Public Servant
Offences under the Prevention of Corruption Act, 1988,
Corruption by Public servant- Prevention of Corruption Act 1988-
Definition of Public Servant sec 2(cc)
Categories of public servant- person in the pay of the Government- a person in the service of the Government a person remunerated by fees or commission for the performance of any public duty by the Government.
Sec 7: public Servant taking gratifications other legal remuneration in respect of an official act.
Gratification: legal remuneration, meaning of holding out as a Public Servant – whether covered under the Act.
Sec 8: Gratification by person other than public servant – to influence pubic servant by corrupt or illegal means.
Sec 9: Gratification by person other than Public Servant- to influence public servant- and not by corruptor illegal means.
Sec10, Sec11, Sec 12: Habitual committing of offence under Sec 8, 9, 12, 14.
Sec 15 Attempt
Sec 16 Fine Criteria
Sec 13 Criminal Misconduct by Public Servant.
Bribe giver Guilty or Abetment?
Investigation and Trial under the Act
Sec 17 Persons authorized to investigate.
Sec 19 Sanction for prosecution
Sec 20 presumptions under the Act.
Sec 3, 4, 5: Special Judges Court- procedure and powers of Special Judge.

Module III: Commission of Enquiry Acts
Section 6 Summary Trial. Commission of Enquiry Act 1952
Composition, function and role of CAG
The Central Vigilance Commission
Central Bureau of Investigation its role, function and Jurisdiction.
Proposed Lok Pal Bill ,its various drafts , legality of sting operations , provision relating to corruption cases of judges , Immunity of legislations and parliamentarians . Law on whistle blowers

Module IV: Money Laundering & National Investigative Agency Act
The Prevention of Money Laundering Act 2002, General Principles, Confiscation of Property earned through crime Sec5
Sec 171-B of IPC Bribery – Offences relating to elections.
Sec 171-C
Sec 171- D Undue influence and Impression at election
Sec 171- E Punishment for Bribery
Sec 171- F Punishment for Influence and Personating at an election.
National Investigative Agency Act 2009

Module V: International Effort
International Efforts
The United Nations Directions
The Convention on Combating Bribery of Foreign Public Officials
UN Convention against Transnational Organized Crime.
UN Convention against Corruption (UNCAC)

Examination Scheme:

Components	**P**	**A**	**C**	**CT**	**EE**
Weightage (%)	5	5	10	10	70

Text & References:
- Prevention of Corruption Act, 1988
- Prevention of Money laundering Act, 2002
- National Investigative Agency act, 2009
- Un Conventions

SUMMER INTERNSHIP EVALUATION-IV

Course Code: LAW2935 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The break up of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Tenth Semester

LEGAL WRITING

Course Code: LAW2001 **Credit Units: 7**

Course Objective:
The course material equips the student with skills in the methodology essential to execute a research assignment on topics related to law.

Course Contents:

Module I: Research Methodology
Doctrinal, Non-doctrinal Empirical methods of executing research project.

Examination Scheme:

Components	V	A	TP
Weightage (%)	25	05	70

Note: 'TP' stands for project report prepared

Text & References:
- Legal research & Methodology: Indian Law Institute, Edited by Dr, S.K. Verma & M. Afzal Vani.

CONTEMPORARY LAWS

Course Code: LAW2002 **Credit Units: 04**

Course Objective:
To update the students with Contemporary Laws and new Legislation keeping in mind the ever changing requirements and complexities of Law in relation to its applicability to life.

Course Contents:

Module I: Consumer Protection Act and Competition Act
Historical background of the Market being a seller's Market. Changing to a buyer's Market – Consumer and Public friendly legislation Definition of Consumer and Unfair Trade Practices- Definition of Competition and Anti Competition Steps- Forums for indications of rights and prescribed remedies in both the Acts.

Module II: Rights to Information Act
As an antithesis to the Official Secrets Act; Extension of Article 19 of the Constitution of India; Definition of Information; appropriate authority; what is information can be given and what cannot be given (Sec – 6,7,8) Hierarchy under the Act; Penalties and Fine.

Module III: Information Technology Act
To provide a Legal Framework and Legal Machinery for Electronic Data interchange and Electronic Communication – Electronic Commerce- Electronic filing having digital signatures – Authorities issuing digital signatures – Computer Contaminant -Computer viruses- Penalty and Damage to Computer/Computer System (Sec- 43) – Forum –Sec -48 –Computer Related Offences-Sec 66, 66A to Sec 66F, 67, 67A to Sec 67 C.

Module IV: Legal Services Authorities Act - Historical background – J.Krishna Iyer and J.P.N. Bhagwati Committee- Legal Aid –a duty of the State – Directive Principles of State Policy- Constitution of National Legal Services Authority and State Legal Services Authorities – Their Duties and Responsibilities - -Eligibility for seeking Legal Aid – Lok Adalats- Alternative Disputes Resolution Mechanism – Permanent Lok Adalats.

Module V: Supreme Court Rules/High Court Rules… - Concept of Advocate or record – Filing in Supreme Court through Advocate or Record only- Filing Format – Central Agency –SLP filling under Article 136 of The Constitution OF India –Corative Petition/ Review Petition in chambers. High Court Rules- Original Side –Appreciate Side –Filing –Service – Registry – Publication of notices- Delegated Power to Judicial Registers for recording Evidence etc.

Note: 1. Registration Act and Stamp act can be combined with Transfer of Property.
2. Advocates Act and Bar Council of India Rules can be combined with Professional Ethics.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:
- Basic Texts of GATT and WTO.
- International Trade Law- Dr S.R Myneni
- Understanding International Trade Law- Simone Schnitzer
- Guide to the WTO and GATT, Economics,Law and Politics- Autar Krishnen Koul.
- Internet Sources :www.wto.org

MOOT COURT/ INTERNSHIP

Course Code: LAW2003 **Credit Units: 14**

Course Objective:
This course relates to litigation advocacy and as such this shall be simulation course that shall have two parts. First part shall focus on preparation for trial and trial strategies. It shall also disseminate techniques of examination-in-chief cross examination and re-examination of witnesses, argumentation in courts, bail application, injunction application, etc. The second part shall focus on writing briefs in civil suits and criminal cases, appellate briefs in civil and criminal cases, and writ matters, memorial writings and arguing before the appropriate forums. The students shall be given a case to argue, that shall help to articulate their argumentative zeal as well as capacity.

Course Contents:

Module I: Moot Court
Bench Memorial, Court Craft: Presentation of case, Interaction with Bench, Question Answer Court etiquette and mannerism section.

Module II: Internship
Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The report and diary to be certified and submitted for evaluation.

Module III: Corporate Legal Training
Corporate communication skills and client interaction and etiquette in corporate law work environment.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	05	70

Amity Law School

Bachelor of Business Administration, Bachelor of Law (Honors) (BBA, LLB)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

MANAGEMENT FOUNDATIONS

Course Code: LAW2109 **Credit Units: 03**

Course Objective:
The aim of the course is to orient the students in theories and practices of Management so as to apply the acquired knowledge in actual business practices. This is a gateway to the real world of management and decision-making.

Course Contents:

Module I: Introduction
Concept, Nature, Scope and Functions of Management, Levels of Management, Evolution and Foundations of Management Theories - Classical and Neo - Classical Theories, Systems Approach to organization, Modern Organization Theory.

Module II: Management Planning Process
Planning objectives and characteristics, Hierarchies of planning, the concept and techniques of forecasting, Decision making – concepts & process, MBO, concept and relevance.

Module III: Organization
Meaning, Importance and Principles, Departmentalization, Span of Control, Types of Organization, Authority, Delegation of Authority.

Module IV: Staffing
Meaning, Job analysis, Manpower planning, Recruitment, Transfers and Promotions, Appraisals, Management Development, Job Rotation, Training, Rewards and Recognition.

Module V: Directing
Motivation, Co-ordination, Communication, Directing and Management Control, Decision Making, Management by objectives (MBO) the concept and relevance.

Module VI: Management Control
Coordination, Meaning, Nature, Features, Objectives and Process of Management Control, Techniques and Behavioural Aspects of Management control.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Essential of Management, Koontz O' Donnel

References:
- Management, Stoner, Freemand & Gilbert
- Principles & practice of Mgmt., L.M. Prasad
- Management Today, Burton & Thakur
- Principles & Practices of Mgmt., C.B. Gupta

FINANCIAL ACCOUNTING

Course Code: LAW2110 **Credit Units: 03**

Course Objective:
To understand the basics of accounting and concepts of double entry system. The students will be given a detailed grounding on recording of transactions and preparation of final accounting statements for business organizations

Course Contents:
Module I: Introduction to Accounting
Understanding the meaning, nature, functions and usefulness of accounting, branches of accounting, accounting equation, accounting concepts and Generally Accepted Accounting Principles. Difference between Indian GAAP and US GAAP

Module II: Recording of Transactions and Subsidiary Books
Concept of double entry system. Understanding the Accounting cycle. Preparation of voucher, journal, ledger and trial balance and numerical on the same. Preparation of subsidiary books including purchase book, sales book, purchase returns book and sales return books and numerical on the same. Cash book, types of cash book and balancing of cashbook. Numerical on single column cashbook, double column cashbook, triple column cashbook and petty cash book.

Module III: Reconciliation of Bank Accounts
Causes for difference in the balance as per pass book and balance as per cashbook.Procedure for preparation of bank reconciliation statement when there is favorable balance and in case of overdraft and numerical on the same.

Module IV: Financial Statements
Preparation of trading account, manufacturing account, profit and loss account and balance sheet along with adjustments and numerical on the same and non-profit making organizations an overview.AS-1,AS-21**(no numerical)**

Module V: Accounting For Partnership
Introduction to partnership accounts, partnership deed.**Admission of a new partner**-Revaluation account, Computation of new profit sharing ratio and sacrificing ratio, Proportionate capital, Treatment of goodwill in partnership accounts and its valuation.**Retirement and Deathof a partner:** Determining the gaining ratio, Revaluation of assets and liabilities, Reserve, Final payment to retiring partner, Treatment and adjustment of goodwill. Numericals on preparation of various accounts in case of retirement and death of a partner.**Dissolution of the firm:** Circumstances leading to dissolution of partnership, Settlement of the accounts, Capital ratio on insolvency, Insolvency of all partners and Garner Vs Murray decision.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:

- Maheshwari, S.N., Advanced Accountancy Volume-I, Ninth Edition, Vikas Publishing House Pvt. Ltd.

References:

- Grewal, T. S., Shukla, M .C, Advanced Accountancy, Sixteenth Edition, Sultan Chand and Sons.
- Tulsian, P.C, Financial Accounting 2005, Pearson Education.
- Narayanaswamy, R. Financial Accounting-A Managerial Perspective Second Edition, Prentce Hall India.
- Ramachandran, N., Kakani, R.K., Financial Accounting for Management, 2006, Tata McGraw Hill Publishing Company Limited.

ENGLISH-I

Course Code: LAW2103 **Credit Units: 03**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative and aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond from different perspectives.

Course Contents:

Module I: Functional Grammar: Patterns and Usage
Tenses and composition, Correction of sentences, Basic Transformatives: Active and Passive voices, Direct and Indirect speech, Connectives, Modifiers, Questions,
Negatives; Reported Speech, Fill in the correct word.

Module II: Composition writing and comprehension of texts
Comprehension of Legal Texts, Paragraph and Précis writing, Legal Letters and Formal Correspondence, Procedure of Note taking and making, Drafting of reports and projects, Abstracts and summary.

Module III: Short Stories
Of studies, by Francis Bacon; Dream Children, by Charles Lamb; The Necklace, by Guy de Maupassant; A Shadow, by R.K. Narayan; Glory at Twilight, Bhabani Bhattacharya.

Module IV: Poems
All the World is a Stage, by Shakespeare; To Autumn, by Keats; O! Captain,
My Captain, Walt Whitman; Where the Mind is Without Fear, Rabindranath Tagore; Psalm of Life, H.W. Longfellow.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Geffrey Leech and Jan Svartvik, A communicative Grammar of English.
- A.J. Thomson and A.V. Martinet, A practical English grammar.
- Webster's New Dictionary of Synonyms.
- A.S. Hornby and R.M. Mackin, Oxford Progressive English alternative course book.
- I.L.A. Hill, English Language course for colleges Book II & Book III.
- Department of English Lucknow University, (Oxford) Exercises in English Composition.
- Aiyer's Law Terms and Phrases.
- Biswas Encyclopedia Law Dictionary.
- Black's Law Dictionary.
- I.L.A. Hill, English Language course for colleges, Book II and III.
- Michael McCarthy and Felicity O'Dell, English Vocabulary in use.
- Raymond Murphy, English Grammar in use intermediate to upper intermediate.
- Martin Hewings, Advanced Grammar in use.
- Michael McCarthy, Felicity O'Dell and Ellen Shaw, American English VOCABULARY in use.
- Cambridge International Dictionary of Idioms.
- Denial Jones, English Pronouncing Dictionary.
- Liz Hamp - Lyons and Ben Heasley, Study Writing.
- L.A. Hill and other (Oxford), English Language Course from Colleges, Book-I, II and III.
- A.A.S. Horney and R.M. Mackin (Oxford), Oxford Progressive English Alternative Course.
- N.S. Prabhu and W.W. Bhaskar (Macmillan India, English through reading.
- Current English Usage, Oxford's An Advanced Learning Dictionary.
- English Grammer, Wren and Martin.

LEGAL METHOD

Course Code: LAW2104 **Credit Units: 04**

Course Objective:
This paper focuses on orientation of students to legal studies from the point of view of basic concepts of law and legal system.

Course Contents:

Module I: Meaning and Classification of Laws
Meaning, Definition, Functions: Justice, Stability and Peaceful Change; Classification of laws: Public and Private Law, Substantive and Procedural Law, Municipal and International Law.

Module II: Sources of Law
Custom; Precedent, Ratio, Obiter; Legislation. ;

Module III: Basic Concepts of Indian Legal System
Common Law, Essentials of a Valid Law, Constitution as the Basic Law, Rule of Law, Separation of Powers, Judicial system in India, **Principles of Equity**.

Module IV: Legal Writing and Research
Legal materials: Case law, Statutes, Reports, Journals, Manuals, Digests etc.; Importance of legal research ; Techniques of Legal Research : Doctrinal, Empirical Research, Legal writings and citations.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Glanville Willains – Learning the law
- Avtar Singh – Jurisprudence (Legal Theory)
- B.N.M. Tripathi – An Introduction to Jurisprudence and Legal theory
- Benjamin N. Cardozo, The Nature of Judicial Process
- LI Publication – Indian Legal System
- ILI Publication in Legal Research and Methodology

LAW OF CONTRACT-I

Course Code: LAW2105 **Credit Units: 04**

Course Objective:
Whatever may be the nature of a given society, the contractual relations, as are obtained in that society, are governed by certain principles which are more or less of a general and basic nature. In India these general principles are included in the statute of the Indian Contract Act. 1872. This course is designed to acquaint a student with the conceptual and operational parameters of these various general principles of contractual relations. Specific enforcement of contract is an important aspect of the law of contracts. Analysis of the kinds of contracts that can be specifically enforced and the methods of enforcement forms a significant segment of this study.

Course Contents:

Module I: Formation of Contract
Meaning and nature of contract, Offer / Proposal (Definition, Communication, Revocation, General/Specific offer, Invitation to treat), Acceptance (Definition, Communication, Revocation, Tenders / Auctions). 'E'Contract

Module II: Consideration and Capacity
Consideration (Definition, Essentials, Privity of contract), Capacity to enter into a contract (Minor's position, Nature / effect of minor's agreements).

Module III: Validity of Contract
Unlawful consideration and object, Free Consent, Coercion, undue influence, Misrepresentation, Fraud, Mistake, Contingent contract, Quasi contracts, Effect of void, voidable, valid, illegal, unlawful and uncertain agreements contracts.

Module IV: Discharge and Performance of Contract
Discharge of Contracts, Performance, Time and Place of performance, Impossibility of performance and frustration, Breach – Anticipatory & Present.

Module V: Remedies
Damages, Remoteness etc., Injunction, Specific performance, Quantum Merit.

Module VI: Specific Relief Act, 1963
Recovery of property, Specific performance of contracts, Rescission of Contract, Declaratory Decree, Injunctions: Temporary and Perpetual, Mandatory.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Anson - Law of Contract
- Pollock and Mulla - Indian Contract Act
- Avtar Singh - Indian Contract Act
- Bangia - Law of Contract and Specific Relief
- Cheshire and Fifoot - Law of Contract.

E-COMMERCE

Course Code: COM2103 **Credit Units: 03**

Course Objective:
In the changed business environment of today, it has become imperative for businesses to understand, appreciate and learn to create their presence in cyber space. This course focuses on exposing the students to the world of e-commerce, the opportunities, and the threats and teaches them the strategies of making businesses viable and successful.

Course Contents:

Module I: E-Commerce Concept
Meaning, definition, concept, features, function of E-Commerce, E-Commerce practices v/s traditional practices, scope and basic models of E-Commerce, limitations of E-Commerce, precaution for secure E-Commerce, proxy services. Concept of EDI, difference between paper based Business and EDI Based business, Advantages of EDI, Application areas for EDI, Action plan for Implementing EDI, Factors influencing the choice of EDI, Software Concept of Electronic Signature, Access Control.

Module II: Types of E-Commerce
Meaning of B2C, B2B, C2C, P2P. Applications in B2C- E-Banking, E-Trading. E-Auction - Introduction and overview of these concepts. Application of B2B- E-distributor, B2B service provider, benefits of B2B on Procurement, Just in time delivery. Consumer to consumer and peer to peer business model Introduction and basic concepts.

Module III: E-Marketing
Traditional Marketing V/S E-Marketing, Impact of Ecommerce on markets, Marketing issue in E-Marketing, Promoting your E-Business. Direct marketing, one to one marketing.

Module IV: E-Finance
Areas of E-Financing, E-Banking, traditional v/s E-Banking, operations in E-Banking. E-Trading-Stock marketing, trading v/s E-Trading, Importance of E-Trading, Advantages of E-trading, operational aspects of E-Trading.

Module V: E-Payment
Transactions through Internet, Requirements of E-Payment system, Post paid payment system- Credit card solutions, cyber cash Internet cheques. Instant Paid payment system- Debit card, direct debit. Prepaid payment system- Electronic cash, digicash, Netcash, cybercash, smart cards.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Electronic Commerce from Vision to fulfilment, Third Edition, Elias M Awad, Pearson Education

References:
- Electronic Commerce – A manager's Guide, Ravi Kalakota & Andrew B. Shinston, PearsonEducation.
- Electronic Commerce - Technologies & Applications, Bhaskar Bharat, Tata McGraw Hill.
- Global E-Commerce, University Press, J. Christopher & T.H.K. Clerk.

BUSINESS MATHEMATICS

Course Code: MGT2104 **Credit Units: 03**

Course Objective:
The course is designed to orient the students towards the basic concepts of mathematics and its applications in the business world.

Course Contents:
Module I: Set Theory & Mathematical Induction
Theory of Sets; Meaning; elements; types; presentation and equality of sets; subsets; super sets & power sets; finite, countable or infinite sets; union; intersection; compliment & difference of sets; Venn diagrams; Cartesian product of sets; cardinality; inclusion – exclusion principle; applications of set theory; mathematical induction

Module II: Techniques of counting
Basic counting principle; Factorial notation; Binomial coefficient; Pascal's triangle; Permutations and Combination; Permutation with restriction; Circular permutation and Combination with restriction; Concept of tree diagram

Module III: Logarithms & Sequence – A.P.; G.P.
Indices & Logarithms; Definition and properties, common logarithms; Arithmetic and Geometric Progression- General term, summation, Business Application.

Module IV: Matrices & Determinants
Matrices; concepts and types; properties; addition; multiplication; transpose and inverse of matrix; algebra of matrices; adjoint of a matrix; determinants; properties of determinants; solution of simultaneous Linear Equations; business applications of matrices; Homogeneous System of Linear equations; Condition for Uniqueness for the homogeneous system; Solution using inverse of the coefficient matrix; Problems

Module V: Differentiation & Differential Calculus
Differentiation - definition, derivatives of Algebraic, Logarithmic and exponential function, Business application of differentiation; Optimization using calculus; Point of inflexion absolute and local optima

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Singh J K & Singh S K, Business Mathematics, second edition, Brijwasi book distributors and publishers

References:
- Gupta S P, Statistical Methods, S. Chand & Co.
- Raghavachari M, 2005, Mathematics for Management, Tata Mc. GrawHill
- Piskunov N, Differential & Integral Calculus, Moscow MIR Publishers
- Sancheti & Kapoor, Business Mathematics, Sultan Chand & Sons

ECONOMIC SYSTEM AND SOCIETY

Course Code: ECO2104 **Credit Units: 03**

Course Objective:
This course will reflect the socio-economic change in historical perspective, capitalism as an economic system, structure of capitalism and capitalism in global context.

Course Contents:

Module I
Analyzing Socio-Economic Change in Historical Perspective

Module II
Capitalism as an economic system
Origins, nature and structure of capitalism; Accumulation and crisis; Alternative perspectives on capitalism.

Module III
The transition from feudalism to capitalism

Module IV: The evolving structure of capitalism
Monopoly capitalism, The modern corporation: divorce between ownership and control; The institutional diversity of capitalism; Alternative perspectives on the role of state.

Module V: Capitalism in Global Context
Multinational corporations and their impact on the developing economics; imperialism.

Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

ATT-Attendance; **P**-Project; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination
Text & References:

Text:
- J. Schumpeter (1942), Capitalism, Socialism and Democracy, George Allen and Unwin (1976 edition).
- T. Bottomore (1985), Theories of Modern Capitalism, Allen & Unwin. Chapters on Weber & Schumpeter.

References:

- D. Foley (1983), "Commodity", in T. Bottomore et al(ed.), The Dictionary of Marxist Thought., OUP, (Indian edition, Maya Blackwell, 2000)
- R. Blackburn (ed.) (1972), Ideology in Social Science, Chapter 8, Fontana
- Rodney Hilton(ed.) The Transition from Feudalism to Capitalism, Introduction
- P. Hirst and J. Zeitiln (1997), "Flexible Specialization: Theory and Evidence in the Analysis of Industrial Change", in R. Boyer et al (ed.), Contemporary Capitalism, Cambridge University Press.

READINGS IN MANAGEMENT

Course Code: MGT2130 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. The selection of the book will be department specific so that it can be discipline specific.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Evaluation:

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: MGT2131 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Credit rating
   - Risk management
   - Subprime meltdown and its after effect with case study from Indian industry
   - Corporate frauds
   - Micro finance institutions in India
   - Carbon Trading
   - IFRS
   - Celebrity Endorsement in real estate
   - Social media marketing
   - Green marketing
   - Sustainable branding practices
   - Relationship management
   - CSR
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Examination Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2132 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	– 25 marks
Chapter 4: Conclusion & Recommendations	– 10 marks
Chapter 5: Bibliography	– 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

a) *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c) *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
d) *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	**Power Point Presentation & Viva**	**Total**
75 marks	25 marks	100

WORKSHOP

Course Code: MGT2133 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Examination Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Syllabus - Second Semester

MARKETING MANAGEMENT

Course Code: LAW2208 **Credit Units: 03**

Course Objective:
The main objective of this course is to give students an elementary knowledge of the fundamentals in the field of marketing. The focus will be both on developing and helping them imbibe basic marketing principles and establishing an appreciation of contemporary realities. However, in order to do justice to the varying diversity of a real market place, the course shall be taught over two semesters- semester III and IV. In semester III, emphasis will be on the core concepts in marketing, thereby giving the students an understanding of the environment in which marketing works.

Course Contents:

Module I: Introduction to Marketing
Meaning of marketing, Core concepts of marketing, Evolution and its role in the changing business environment, various marketing management philosophies, viz., the production concept, the product concept, selling concept and the marketing concept, The newer definitions of marketing- societal marketing and relationship marketing, strategies planning in marketing, formulation of marketing plan.

Module II: Analyzing marketing opportunities
Internal and External Marketing Environment Analysis, Introduction to Marketing Information System and Marketing Research, BCG matrix, GE 9 cell model, Intensive growth strategies.

Module III: Studying Consumer Behaviour and Selecting Markets
Buying Behaviour for Consumer Markets and Industrial Markets, Types of Buying Situations, Buying Decision Process and Factors Affecting Buyer Behaviour, Consumer Adoption Process, Concept of Market Segmentation, Bases for segmenting Consumer and Business markets, Approaches for Targeting, Differentiation and Positioning.

Module IV: Product Mix Strategy
Product: concept & levels, Classification of products consumer and industrial, product differentiation, product mix, Product Life Cycle and various strategies, Branding: concept and challenges, brand decisions. Packaging and labeling.

Module V: Product Development Decision and Pricing
Product Line Decision, New Product Development: Challenges & Process, Consumer Adoption Process, Diffusion of Innovation, Setting the price, Understanding various pricing strategies and their application.

Module VI: Distribution and Logistics Decision and Integrated Communication
Nature of Marketing Channels, Channel Functions and Flows, Channel Design and Management Decisions, Channel Dynamics. Introduction to Wholesaling, Retailing and Logistics, Marketing communication mix and Introduction to various elements of integrated marketing communications briefly.

Module VII: Emerging Marketing Paradigms
Concept of E-marketing, Global marketing, Mobile marketing, Kiosk marketing, Green marketing, Tele marketing, Multi level marketing, Rural marketing.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:

- Marketing Management, Philip Kotler, Eleventh Edition

References:

- Principles of Marketing, Philip Kotler and Gray Armstrong
- Marketing Management, Michael R. Czinkota and Masaaki Kotabe
- Marketing, Charles W. Lamb, Joseph F. Hair, and Carl McDaniel
- Fundamentals of Marketing, Stanton, Ezel, etc.

HUMAN RESOURCE MANAGEMENT

Course Code: LAW2209 **Credit Units: 03**

Course Objective:
The objectives of this course are to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India.

Course Contents:

Module I: Fundamentals of HRM
Introduction, Concept and Functions, Scope and Significance of Human Resource Management, Personnel to HRM, Overview of basic HRM Model, Role and Responsibilities of the Human Resource Manager and essentials of Sound HR Policies.

Module II: Acquisition of Human Resources
Objectives, Policies and Process of Human Resource Planning, Job Analysis, Recruitment (process, methods: internal, external), Selection (process, tests, interviews), Induction, Placement.

Module III: Development of Human Resources
Training and Development(process, methods: On-the job, Off-the job), Evaluation of training(Kirkpatrick model) and Performance Appraisal(concept, significance, process, methods-Graphic rating scales, essays, confidential report, BARS,360 Degree, etc, errors during appraisal, reducing errors).

Module IV: Maintenance of Human Resources
Job Evaluation: concept, process, compensation: concept, components, Designing and Administering the Wage and Salary Structure, Grievance Procedure and Handling.

Module V: Retention and Separation Processes
Procedure of separation: Discharge, Retirement, Layoff, Retrenchment, VRS, Promotion and Transfer, exit interview, attrition and retention (concept, significance, determinants and strategies).

Module VI: Current Issues in HRM
Increased concern for HRM(Sound IR, dual career couples, flexi-working hours, work-from home facility), International Human Resource Management-Managing inter country differences, SHRM, talent management, Employee engagement, competency mapping, HR accounting-cases Indian organizations, HRIS, HR audit.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Garry Dessler, Human Resource Management, Pearson Publications

References:
- Edward, B Flippo, Personnel Management, Mc Graw hill International Ed.
- Dale Yoder, Personnel Management and Industrial Relation,
- Monappa & Sayiaddin, Personnel Management, Vikas Publishing Company
- Desimone; Human Resource Development, Thomson Learning
- VSP Rao, Human Resource Management, Excel Publications
- K Aswathappa; Human Resource and Personnel Management; McGraw- Hill Companies
- Bohlander; Managing Human Resources; Thomson Learning. Ed. 13 2004

ENGLISH-II

Course Code: LAW2203 **Credit Units: 03**

Course Objective:
Efficiency of advocacy depends upon communication skills to a substantial extent. The student should be conversant with legal terminology. A student should be equipped with writing skills of and presentation skills which are essential for effective advocacy.

Course Contents:

Module I: Introduction of Legal Language
Legal maxims (Introduction and meaning), & Foreign legal words.

Module II: Translation and usage of words
Translation of legal Para from Hindi to English and vice versa, one legal word-substitute, Usage of common Hindi and Urdu words used in Courts.

Module III: Presentation skills
Presentation Skills: Speeches, Preparing presentation material, Planning the talk, Preparing visual aids, Delivering presentation, Managing your audience, Question and Answers, Introduction, summing up, vote of thanks and repertoire.

Module IV
Communication for the Courts: including drafting of moot memorials.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Successful Communications, Mlara Treece (Allyn and Bacon).
- Effective Technical Communication, M. Ashraf Rizvi.
- English Pronouncing Dictionary Danial Jones.
- Language and the Law, Longman, 1996, London, Gibbons and Johns.
- Language and the Law, Annual Review of Applied Linguistics (1999) 19, 156-73, Gibbons and Johns.
- Communication and Style in Legal Language, Indian Bar Review, Vol. 10 (3): 1993, Kelkar, Ashok R.
- Language and the Law, in FREEMAN, pp. 1350-53, Williams, Glanville.

LAW OF CONTRACT-II

Course Code: LAW2204 **Credit Units: 04**

Course Objective:
This course shall be taught after the students have been familiarized with the general principles of Contract in which the emphasis is on understanding and appreciating the basic essentials of a valid Contract and on the existence of Contractual relationship in various instances. Obviously, Contract Law assumes special significance to suit changes in society. These special Contracts are studied in the light of statutory provisions and decisional Law. With the invent of globalization in various sectors of economy today and are in need of specialized legal Professionals due to huge contractual requirements, joint venture Partnerships and the like, Therefore, this Course of Special Contracts provides an insight into the justification for special statutory provisions for certain kind of Contracts.

Course Contents:

Module I: Indemnity and Guarantee/Bailment and Pledge
Meaning, Distinction between Indemnity and Guarantee, Right / Duties of Indemnifier, Indemnified and Surety, Discharge of Surety, Kinds of Guarantee, Bailment and Pledge: Meaning and Distinction, Rights and Duties of Bailor/Bailee, Pawnor/Pawnee, Lien, Termination of Bailment.

Module II: Agency
Definitions of Agent and Principal, Appointment of an Agent, Authority of an Agent, Creation of agency: by agreement, Ratification and law, Relation of principal / agent, subagent and substituted agent, Ratification of Agents Authority, Revocation of Agency Authority, Effects of Agency on Contracts with third person, Personal Liability of agents, Termination of agency.

Module III: Sale of Goods Act 1930
Contract of Sale: Nature and definition, Conditions and Warranties, Transfer of Property and Title, Performance of the contracts, rights of unpaid seller, suit for breach of contract.

Module IV: The Indian Partnership Act, 1932
Nature of partnership firm, Relations of partners to one another and outsiders, Rights /Duties of partners *inter se*, Partnership Property: Relations of Partners to third parties, Liability for holding out, Minor as a partner; Incoming and outgoing partners, Dissolution of Partnership Firm, Modes of Dissolution, Consequences of dissolution, Registration of firms and effects of non registration.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Texts & References:
- Pollock and Mulla, Indian Contract Act
- Avtar Singh, Indian Contracts Act
- Mulla, D. F., Indian Partnership Act
- Desai, T.R., Law of Contracts and Partnership sale of good Act
- R.K. Bangia, Sales of Goods Act, 1930
- Avtar Singh, Sales of Good Act
- Avtar Singh, Indian Partnership Act.
- K. Sukumaran, Pollock & Mulls - The Indian Partnership Act

ANALYSIS AND DESIGN OF BUSINESS SYSTEM

Course Code: MGT2204 **Credit Units: 03**

Course Objective:
The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: The systems development Environment. (Information system development life cycle)
System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology modeling tool)
Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)
Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System & Database Design
System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Database Design, Database Management System – an introduction, Overview of Data Models, Relational Database Model – Well structured relations, Keys, Schema & Subschema, Structure, Facilities & Users, Constraints, Anomalies, Functional Dependency, Normalization, Roles & Duties of System Administration.

Module V: System Implementation & Operation (System Management)
Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing
System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:

- Essentials of System Analysis & Design, Second Edition, Valacich George Hoffer, Prentice-Hall India

References:

- Analysis and Design of information systems, James A. Senn
- Computer Based Information Systems, Kroeber, Donald W. and Watron, Hugh J.
- Systems Analysis & Design, E. M. Awad.
- Systems Analysis and Design – An Applied Approach, Dennis Wixom, Wiley

INNOVATION & CREATIVITY MANAGEMENT

Course Code: MGT2205 **Credit Units: 03**

Course Objective:
To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations is demanding such an approach.

Course Contents:

Module I:
Innovation Management- Introduction, characteristics, Components, Types, Models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing innovation, Nurturing innovation in e-business.

Module II:
Organizing for Innovation- Organizational theories and structures, traits of innovative organizations, current trends, factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, creativity crushers, fostering innovation climate and culture, The creativity Hit List.

Module III:
Research and Development management- Significance, Prerequisites, Process, Technology development approaches, management of R &D, In source to open source environment, R&D in small industry, Managing Creative employees, significance and challenges of managing creative employees, Traits of a creative person, motivation to creativity, strategies for unblocking creativity, factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, creative thinking, Tradition vs creative thinking.

Module IV:
Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, writing techniques, techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, new product development, packaging and positioning innovations, beyond product innovation, New product failures.

Module V:
Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.

Module VI:
Legal aspects of innovation- IPR, Indian Patents Act, trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	**CT 1**	**HA**	**V**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
Text:

- Krishnamarcharyulu and Lalitha, *Innovation Management*, Himalaya Publishing House, New Delhi- 2007

References:

- Plsek**,** *Creativity, Innovation and Quality***,** Prentice Hall of India, New Delhi-2003

SALIENT PEDAGOGICAL FEATURES-

1. Classroom teaching to focus on enhancing out of the box thinking.
2. Assignments: Practical tasks emphasising on honing up creative thinking.
3. Case study analysis: To enable students to appreciate the application of concepts in real life environment.
4. Active student participation in class discussions.
5. Role plays to boost spontaneity.

HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: MGT2206 **Credit Units: 03**

Course Objective:
The aim of this course is to facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way. Recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the Moral issues involved in Management areas and to provide an understanding of the interface between Social, Technological and Natural environments.

Course Contents:

Module I: Human Values
Morals, Values, Types of values, evolution of human values, Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character, Challenges at Work place

Module II: Values in Management
Relevance of values in Management, need for values in global change, values for managers, holistic approach for managers in decision making, problems related to stress in corporate management

Module III:
Workplace Rights and Responsibilities: Organizational complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behavior in large corporation.
Work environment: Ethical and legal considerations, Organizational responses to offensive behavior and harassment. Ethics in a Global Context.

Module IV: Industrial Integrity
The epitome of industrial success, Integrity and organization, Exploring learning process of integrity, Consequences of lack of integrity.

Examination Scheme:

Components	CPA	Viva	HA	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text &References:
R R Gaur, R Sangal, G P Bagaria, 2010, *A Foundation Course in Human Values and Professional Ethics*, Excel Books

References:

- Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
- E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
- A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
- PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
- A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.

READINGS IN MANAGEMENT

Course Code: MGT2230 **Credit Units: 02**

Course Objective:
The objective of this concentration elective is to inculcate reading habit along with value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. The selection of the book will be department specific so that it can be discipline specific.

Guidelines:
The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

- Content
- Writing style
- Information/learning
- Content handling
- Characters(if any)
- Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16

Evaluation:

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: MGT2231 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

EVALUATION

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2232 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	– 25 marks
Chapter 4: Conclusion & Recommendations	– 10 marks
Chapter 5: Bibliography	– 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions
a) *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c*) Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
d) *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:
- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

WORKSHOP

Course Code: MGT2233 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

- Relevant study material and references will be provided by the trainer in advance.
- The participants are expected to explore the topic in advance and take active part in the discussions held
- Attending and Participating in all activities of the workshop
- Group Activities have to be undertaken by students as guided by the trainer.
- Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
- Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Syllabus - Third Semester

ORGANISATIONAL BEHAVIOUR

Course Code: LAW2309 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize the students with the behavioural patterns of Human beings at individual and group levels.

Course Contents:

Module I: Understanding Human Behaviour
Concept, Nature and Significance of Human Behaviour, Factors Affecting Human Behaviour, Levels of Human Behaviour; Disciplines contributing to OB.

Module II: Individual Behaviour
Individual Differences; Personality and Theories of Personality; Perception; Learning and Behaviour reinforcement, Values.

Module III: Motivation & Attitude
Concept, Significance and Theories of Motivation, Motivation and Behaviour, Motivation at Work, Attitudes, Meaning and nature, Formation and change in attitudes, Job related attitudes.

Module IV: Interpersonal Behaviour, Power & Politics
Interpersonal Dimensions of Behaviour; Transactional Analysis Implications of TA, Organizational communication, making communication effective, Power: Concept, determinants, types; Organizational Politics: Tactics, Impression Management.

Module V: Group Behaviour and Leadership
Group Behaviour; Types, Functions, Determinants of Group Behaviour, Inter Group Problems, Leadership: Nature and Significance of Leadership, Leadership Styles, Theories of Leadership; Trait Theory, Behavioural Theory, Managerial Grid.

Module VI: Change and Conflicts
Organizational conflict, Nature and types of conflict, Management of organizational conflict, Approaches to conflict management, Organizational culture, Learning and maintaining organizational culture, Organizational change, Planned change, Resistance to change, Organization development, Definition, Need for organization development, Organization development process.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:
Text:
- Stephen Robbins, Organisational Behaviour, 15th Edition PHI.

References:
- K. Ashwathappa, (2005) Organisational Behaviour, Tata McGrae Hill
- Keith Davis, Organisational Behaviour, Tata Mc Graw-Hill
- Keith Davis, Human Behaviour at Work, Tata McGraw-Hill

FINANCIAL MANAGEMENT

Course Code: LAW2310 **Credit Units: 03**

Course Objective:
To take decisions which are effective, a manager in any of the functional areas be it Marketing, HR or IT requires a thorough cost and benefit analysis and a feel for Finance so as to look at the long term implications of his/her decision. This course is a "nut and bolts" course on Finance where the basic Financial decisions will be explained through problems and exercises, thus giving the student an understanding and a feel for Financial decision making.

Course Contents:
Module I: Introduction to Financial Management
Evolution of Financial Management, Key activities of Finance Manager Changing Role of Finance Managers, Key Decision Areas in Financial Management, Objectives of the firm.

Module II: Financial Statement Analysis
Introduction, objectives of financial statement analysis, Techniques-Ratio analysis, Comparative analysis and limitations of financial statement analysis, AS-20 (no numerical)

Module III: Valuation Concepts
Concept of Time value of Money, Process of Compounding and Discounting, Future Value of a Single amount, Future Value of an Annuity, Present Value of a Single Amount, Present Value of an Annuity, Cost of capital, Weighted average cost of capital, Leverage Analysis

Module IV: Financing Decision
Capital structure, Factors affecting Capital Structure decisions, Theory of Capital Structure Decisions, MM Theory, NI, NOI and Traditional theory, Pecking order theory.

Module V: Investment Decision
Basics of Capital Budgeting, Types of capital budgeting decisions, Estimating cash flows for project appraisal, Green capital budgeting, Non-discounted Cash Flow Techniques: Payback Period, ARR, Discounted Cash Flow Techniques: NPV, IRR, PI. Risk Analysis of Capital Budgeting: Risk adjusted discount rate, Certainty Equivalent Approach.

Module VI: Working Capital Management
Meaning and importance of adequate working capital, Excess or Inadequate working capital, Determinants of working capital requirement, Cash management, Receivable management and Inventory management – Sources of working capital.

Module VII: Dividend Decisions
Importance of dividend decisions, Theories of Dividend decisions: Irrelevance theory, Optimal dividend decision, Relevance theory, Determinants of dividend policy: Bonus Shares, Stock Splits & Buyback of shares. Tax considerations.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:
Text:

- Pandey, I. M, (2010), Financial Management. 10th Edition, Vikas Publishing House Pvt. Ltd.

References:

- Van Horne, J.C (2008), Financial Management & Policy, 13th Edition, Prentice Hall
- Chandra, P., Fundamentals of Financial Management, Sixth Edition, Tata McGraw Hill.
- Brearly R.A. and Myers, S.C. Principles of Corporate Finance, 8th Edition, Tata Mc-Graw Hill

CONSTITUTIONAL LAW-I

Course Code: LAW2303 **Credit Units: 04**

Course Objective:
The course aims at analyzing constitutional institutions, its powers, limitations and interrelationships with one another and seeks to mould a frame of mind in the student to appreciate and assess constitutional policy and changes for the future.

Course Contents:
Module I: Fundamental Rights and Directive Principles, and Fundamental Duties
Idea of Fundamental Rights and their importance, against whom the Fundamental rights are available? Definition of 'State'? Law in Art. 13, Directive Principles; Nature and reasons for incorporation, inter-relationship between fundamental rights and directive principles, judicial policy towards Directive principles from Champakam to Minerva Mills and thereafter, Art. 51-A (K) and its correlation with Art. 21-A.

Module II: Freedom and Personal Liberty
Freedom of speech and expression and of press; Is Right to Information inclusive in Freedom of Speech and Expression? Freedom of Assembly, Freedom of Association, Freedom of Movement, Freedom to reside and settle, Freedom of profession/Business, etc. Art. 19: Are these freedoms absolute? Rights of an accused: Double Jeopardy, Self-incrimination and retrospective punishment, Art. 20; Right to life and personal liberty: Meaning of personal liberty, Procedure established by Law, Before Maneka Gandhi, Maneka Gandhi and thereafter, Art. 21; preventive detention and constitutional safeguards: Art. 22; Right to education Art. 21-A.

Module III: Equality and Protective Discrimination
Equality before Law and equal protection of Laws, meaning, constitutional provisions Arts 14, 15, 16, 17, 29 (2), 325: Total conspectus, Classification for differential treatment, prohibited grounds of discrimination: Arts. 15(1), (2), (3), 16 (2), (3), 29 (2); Protective Discrimination in favour of SC / ST and other backward classes and recent trends eg. Schedule IX and Reservation Policy, Women and children Art. 15, 15(3), 15(4), 15(5) Abolition of titles – Arts. 18.

Module IV: Secularism
Concept of Secularism, Indian Constitutional provisions, Indian concept of Secularism, Freedom of religion, Scope: Arts. 25, 26, Limits of Freedom, Religion and State in India, State Control and non-interference with religion; Minority rights: Why? Scope: Meaning and Minority, Minority right to educational institutions and judicial attitude.

Module V: Judicial Process under the constitution
Judicial Review : Nature of Judicial Review, Arts. 32, 136, 141, 226, 227.
Judges: Appointments, conditions of service, etc; Public Interest Litigation.
Supreme Courts Original and Advisory Jurisdiction.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India..

LAW OF CRIMES - I (INDIAN PENAL CODE SECTION 1-120B)

Course Code: LAW2304 **Credit Units: 04**

Course Objective:
Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Introduction to Substantive Criminal Law: Extent and operation of the Indian Penal Code, Definition of Crime, Fundamental elements of crime, Stages in commission of a crime, Intention, Preparation, Attempt.

Module-II: Punishment: Theories: Deterrent, Retributive, Preventive, Expiatory and Reformative Theory. Punishment under the IPC: Fine, Imprisonment, Capital Punishment.

Module-III: General Explanations and Exceptions: Definitions, Constructive joint liability, Mistake, Judicial and Executive acts, Accident, Necessity, Infancy, Insanity, Intoxication, Consent, Good faith, Private defence

Module-IV: Abetment and Criminal Conspiracy

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow

FAMILY LAW-I

Course Code: LAW2305 **Credit Units: 04**

Course Objective:
This Course aims at providing adequate Sociological perspective so that the basic concepts relating to family are expounded in their social setting. It is designed to address the various aspects of Hindu Law and strives to give an overview of some of the current problems arising out of the foundational inequalities in the various family concepts.

Course Contents:

Module I: Introduction (Sources, Schools and Joint Hindu Family)
Sources and Schools of Hindu Law; The Concept, Formation and incidents of Joint Hindu Family of Mitaksharaand Dayabhaga; The Coparcenaries : It's formation and various incidents of Joint Hindu Family of Mitakshara and Dayabhaga; Karta of the Joint Family : His position, powers, privileges and obligation.

Module II: Hindu Marriage (Vivah) and Matrimonial Remedies (The Hindu Marriage Act, 1955)
Hindu Marriage: Nature, concept, Essential conditions & Prohibitions; Void & Voidable Marriages; Divorce: Customary and Judicial- Matrimonial fault theory, irretrievable breakdown and of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation.

Module III: Alimony, maintenance, Adoption and Guardianship (The Hindu Adoption and Maintenance Act, 1956 and The Hindu Minority and Guardianship Act, 1956)
Maintenance of neglected wives, divorced wives, minor children, disabled children and parents under sections 125, 127 of Code of Criminal Procedure, 1973; Alimony : Temporary Permanent; Maintenance: Pendente Lite and permanent and maintenance for Divorced Hindu women under The Hindu Adoption and Maintenance Act, 1956; The Hindu Minority and Guardianship Act, 1956,

Module IV: Law of Succession, inheritance and Partition among Hindus (The Hindu Succession Act, 1956)
Property under Mitakshara Law and Dayabhaga: Formation and Incidents; Devolution of interest in MitaksharaCoparcenaries, Coparcenaries with reference to the provisions of Hindu Succession Act, 1956, Succession to property of Hindu female dying intestate under the Hindu Succession Act, 1956, Disqualifications relating to succession; Partition and Re-union**.**

Module V: Dispositions of Property under Hindu Law
Testamentary Disposition (Will): Definition and basis, Capacity of the Legatee, Formalities of a Will; subject matter of Will, Restrictions on testamentary power of disposition, interpretation of the Will, Revocation of the Will; Disposition inter vivos (Gift).

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal

THE CODE OF CRIMINAL PROCEDURE

Course Code: LAW2311 **Credit Units: 04**

Course Objective:
In the absence of effective enforcement machinery, the substantive Criminal Law which defines offences and provides punishments for them, would be almost worthless. Therefore, the need of the Code of Criminal Procedure. The present course intends at acquainting the students with the various pre judicial and judicial procedures. This course also includes the rights and duties of those proceeded against and the powers, duties and restraints on those administering the criminal judicial process.

Course Contents:
Module I: Introduction
The importance of Fair Trial - constitutional perspectives of fair trial: Articles 14, 20, 21, Section – 2: Definitions; classes of Criminal Courts: Sections 6 to 13 including their powers and jurisdiction. The organization of Police, Prosecutor, Defense Counsel and Prison Authorities alongwith their duties, functions and powers.

Module II: Pre – Trial processes
FIR, Arrest and Bail provisions, bonds, process to compel appearances and production of things, search and seizure – search warrants, search without warrants, police search during investigations, general principles of search, seizure and constitutional aspects of validity of search and seizure proceedings.

Module III: Charge and common features relating to Trials
Form of Charge, joinder of charges, alteration of charge, basic rule regarding charge and its trial, withdrawal of charges, effect of error in the charge. Language of Courts, decision on evidence partly recorded by one judge or magistrate and partly by another, summary procedure to deal with certain cases of perjury and certain kinds of contempt of court, evidence in inquiries and trials, general provisions as to inquiries and trials, provisions as to accused persons of unsound mind.

Module IV: Criminal Trials and Execution Proceedings
Trial before Court of Sessions, Trail of warrant case by magistrate, Trial of Summons Case, Summary Trial, Judgment, submission of death sentence for confirmation, execution, suspension, remission and commutation of sentences.

Module V: Review Procedures
Appeal, Review and Reference

Module VI: Miscellaneous
Maintenance of wives, children and parents, Transfer of criminal cases, Irregular proceedings, Limitations for taking cognizance, Security for keeping peace and for good behavior, Disputes as regarding immovable property, Probation of Offenders Act

Module VII
Juvenile Justice (Care & Protection of Children) Act 2000. Concept of juvenile delinquency, juvenile court system, treatment and rehabilitation of juveniles, law for protection of juvenile offenders. Juvenile Justice (Care &Protection of Children) Act 2014.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratan Lal and Dheeraj Lal, Criminal Procedure Code
- D.D. Basu, Criminal Procedure Code
- R.V. Kelkar, Lectures on Criminal Procedure Code
- R.V. Kelkar, Code of Criminal Procedure
- Chandrasekharan Pillai (ed.) Kelkar's Outlines of Criminal Procedure (2001), Eastern, Lucknow.

MERGERS AND ACQUISITIONS

Course Code: ECO2304 **Credit Units: 03**

Course Objective:
The main objective of this course is to familiarize the students with the basic aspects of mergers and acquisitions.

Course Contents:
Module I: Mergers and Acquisitions – Overview
Introduction – Forms of Corporate Restructuring, Expansion, Mergers and Acquisitions, Tender Offers, Joint Ventures, Sell Offs, Spin Offs, Split Offs, Split Ups, Divestitures, Equity Carve outs, Corporate Control, Premium Buy Backs, Standstill Agreements, Anti Takeover Amendments, Proxy Contests, Changes in Ownership Structures, Share Repurchases, Exchange Offers, Leveraged Buy, out, Going Private, Issue Raised by Restructuring, History of Merger Movements.

Module II: Mergers and Acquisitions
Economic Rationale for Major Types of Mergers, Horizontal Mergers, Vertical Mergers, Conglomerate Mergers, Concentric Mergers.

Module III: Theories of Mergers
Efficiency Theories, Differential Efficiency, Inefficient Management, Operating Synergy, Pure Diversification, Financial Synergy, Strategic Realignment to Changing Environments, Undervaluation, Information and Signaling, Agency Problems and Managerialism , Takeovers as a Solution to Agency Problems

Module IV: Divestment of Public Sector Undertakings and Leveraged Buy-outs
General Economic and Financial Factors illustration of an LBO
Takeover Defenses
Anti-Takeover Amendments, Any case study

Examination Scheme:

Components	CT	C	HA	A	EE
Weightage (%)	10	10	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text & References:
Text:
- Timothy J Galpin and Mark Herndon, (2007), The Complete Guide to Mergers and Acquisitions: Process Tools to Support M & A Integration at Every Level.
- Patrick A Gaughan (Wiley Finance), Mergers – What Can Go Wrong and How to Prevent it.

References:
- Mergers and Acquisitions – Fred Weston
- M & A and Corporate Restructuring - Patrick A Gaughan (Wiley Finance Series)

INDUSTRIAL PSYCHOLOGY

Course Code: MGT2305 **Credit Units: 03**

Course Objective:
This course is designed to provide an overview of I/O Psychology including individual, group, and organizational issues resulting in enhanced understanding of the world of business and related career concerns. The main aim is to create awareness about the role and importance of Psychological factors and processes in the world of work

Course Contents:

Module I: Introduction
Nature and scope of organizational Psychology, History and development of field, Major problems of Industrial Psychology, Current trends in organizational Psychology

Module II: Types of Psychology
Mental psychology, Male & Female psychology, Impact on behavior and efficiency

Module III: Test of Psychology
Types of Tests, Effectiveness of these tests, Measures to control the tests steps to improve the psychology

Module IV: Individual and group behavior
Interaction and psychology involved in individuals, Improving psychology, Group Dynamics, Characteristics of group behavior, Attitude measurement, Methods of measuring attitudes,
Leadership and supervision, Theories of Leadership.

Module V: Performance Management
Performance appraisal- Introduction, types, importance, Training and development- Introduction, significance and categories/types.

Examination Scheme:

Components	C	HA/P	CT	V	A	EE
Weightage (%)	10	5	5	5	5	70

C - Case Discussion/ Presentation; HA - Home Assignment; P - Project; S - Seminar; V - Viva; Q - Quiz; CT - Class Test; A - Attendance; EE - End Semester Examination

Text &References:

- Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
- Blum & Naylor (2004) Industrial Psychology. Its Theoretical & Social Foundations CBS Publication.

References:

- Aamodt, M.G. (2012) Industrial/Organizational Psychology : An Applied Approach (7th edition) Wadsworth/Thompson : Belmont, C.A.
- Aswathappa K. (2008). Human Resource Management (fifth edition) New Delhi : Tata McGraw Hill.

TERM PAPER

Course Code: MGT2331 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Management practices
   - Talent management
   - HR cases from Indian any industry
   - Employee motivation
   - Managerial competencies
   - Employability skills
   - Industrial relations
   - Knowledge management
   - Social media
   - Green marketing
   - Six Sigma
   - Sustainable branding practices
   - Training and development
   - Relationship management
   - CSR
   - Performance management system
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Presentation & Viva	Total
30	30	20	20	100

PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2332 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

(Annexure I B)

Declaration

I .....hereby declare that the Project Work with the title (in block letters).....
submitted by me for the partial fulfilment of the degree of BBA is my original work and has not been submitted earlier to any other University /Institution for the fulfilment of the requirement for any course of study.

I also declare that no chapter of this manuscript in whole or in part has been incorporated in this report from any earlier work done by others or by me. However, extracts of any literature which has been used for this report has been duly acknowledged providing details of such literature in the references.

Signature of supervisor:

Signature of the student
Name:
Registration No

Place:
Date:

WORKSHOP

Course Code: MGT2333 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:

- Accounting
- Finance
- Human Resources
- Marketing
- Economics
- Operations
- Supply Chain Management

These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions to be held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:

- Case Study
- Business Game
- Simulation
- Group Activity
- Role Play
- Business Planning
- Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

SUMMER INTERNSHIP EVALUATION-I

Course Code: LAW2335 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The break up of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Fourth Semester

BUSINESS ENVIRONMENT

Course Code: LAW2409 **Credit Units: 03**

Course Objective:
The aim of the course is to orient the students towards the basic concepts of Indian and global business environment.

Course Contents:
Module I: Overview of Business Environment
Meaning and types of business environment, Internal and external environment, Micro and macro environment, Factors (Cultural, social, Political economic legal, demographic and technological) effecting business environment.

Module II: Indian Industrial environment
Industrial policy up to 1991, New industrial policy, Liberalisation, Privatisation and Globalization process in India, Disinvestment, Industrial sickness, MRTP act 1969, Competition law2002, Foreign Exchange Regulation Act and Foreign Exchange Management Act (FERA and FEMA).

Module III: Financial Environment
Indian money and capital markets: meaning, functions and constituents, Stock exchange- importance and functions, SEBI, Capital market reforms and development, Industrial financial institutions (IDBI, SIDBI, ICICI, IFCI etc.).

Module IV: Labour Environment
Labour legislation in India, Social security benefits, Industrial disputes- causes and preventive measures, Settlement of disputes, International Labour Organisation (ILO), Trade union- meaning and functions, Trade Union Act.

Module V: Economic Planning and Development
Planning in India- needs and objectives, five year plans, planning commission, 11th five year plan, Green and white revolution- achievements and failures, Second green revolution, foreign trade policy 2009, Export processing zones, Export oriented units, Special economic zones (EPZ's, EOU's, SEZ's) and trading houses in India.

Module VI: Global Environment
Bretton woods system, features of Uruguay round of negotiations, GATT/ WTO- role, functions and ministerial conferences, IMF, World Bank (International Bank for Reconstruction and Development), Regional economic cooperation institutions, SAARC, EU, NAFTA and ASEAN.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Francis Cherunillum, International Environment, Himalaya Publications.

References:
- Bedi Suresh, Business Environment, Excel Books, N. Delhi
- Shaikh Saleem, Business Environment, Pearson Education
- Bhatia H.L, International Economics, Vikas Publications
- Mishra S.K, and Puri V.K, Indian Economy, Himalaya Publishing House
- Sundharam K.P.M, Money, Banking and International trade, S. Chand & Co. New Delhi
- Rudra Dutta and Sundharam, Indian Economy, S. Chand & Co. New Delhi
- Luthans, Comparative International Management, Tata McGraw-Hill.

RESEARCH METHODOLOGY AND REPORT PREPARATION

Course Code: MGT2410 **Credit Units: 03**

Course Objective:
To provide an exposure to the students pertaining to the nature and extent of research orientation, which they are expected to possess when they enter the industry as practitioners. To give them an understanding of the basic techniques and tools of marketing research. To train the students in evaluating and developing the marketing information system.

Course Contents:

Module I: Introduction
Nature and scope of marketing research, Marketing research as input in decision making process, Marketing research and marketing information system. Applications of marketing research, Planning a research project, Problem identification and formulation of Research Design, introduction to Research Design, Market research on the Internet.

Module II: Data collection methods
Attitudes measurement and scaling techniques, Ratio, Interval, Ordinal and nominal scales, Likert's scale, Thurstone scale, Semantic differentiation method. Observation methods and questionnaire method, Questionnaire design, Steps in constructing a questionnaire, Types of questions, introduction to Projective techniques and perceptual mapping.

Module III: Sampling
Sampling decisions, Sampling frame, Sample selection methods - Probability and non probability, Sample size, sampling error and error in sampling. Application of sampling methods to marketing problems.

Module IV: Data Collection Field Force
Data collection field force, Fieldwork procedure, common sources of error in the fieldwork, minimizing fieldwork errors, Tabulation of collected data.

Module V: Data Analysis
Data analysis-1, Test of significance Z, t, F and chi-square, Data analysis-II, Correlation and regression techniques, Data analysis – III – Cluster Analysis, Introduction to Statistical Package

Module VI: Report Writing
Research presentation and research process examination; Report writing - Types of research report. Examination of the research procedure, Selected applications of marketing research, identifying market segments, Product research, Advertising research**.**

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Luck, David J and Rubin, Ronald S., Marketing Research, Seventh edition, Prentice Hall of India

References:
- Aaker, David A; Kumar V and George S., Marketing Research, Sixth edition, John Wiley & Sons
- Boyd, Harper W, Westphall, Ralph & Stasch, Stanely F, Market Research – Text & Cases, Richard D. Irwin Inc. Homewood, Illinois.

CONSTITUTIONAL LAW-II

Course Code: LAW2403 **Credit Units: 04**

Course Objective:
The course material seeks to introduce the student to the relevance of inalienable fundamental rights and restrictions in the Constitution of India and the principles that ought to guide policy making in India. The student is expected to appreciate the text and the juristic discourse by reference to landmark case laws, juristic opinion and vibrant classroom discussions as the subject raises issues, conflict of interests and dilemmas in a pulsating democracy with changing dynamic priorities in a developing country like India.

Course Contents:
Module I: Distribution of powers between Centre and States – (Arts. 245-281)
Legislative Powers, Administrative Powers, Financial Powers, Relevant Doctrines: Territorial nexus, Harmonious construction, Pith and substance, Repugnancy: Overview of Panchayati Raj Provisions (Art. 243), Freedom of Trade and Commerce.

Module II: Union and State Executive, legislature and Judiciary
Union Executive, President: Appointment, Election, Removal, conditions of service; Powers of president focus on ordinance, pardon, emergency; Assessment of relevance of presidential office on governance; Council of ministers and Prime minister: Appointment, Conditions, functioning, collective responsibility, dismissal of cabinet minister; Office of Attorney General: Significance, Appointment, functions, Conditions; State executive, Governor: Appointment, Removal, Powers, State cabinet dismissal; governors role in the context of centre state relations. (Art 79-122).
Union Legislature: Lok Sabha, Composition, functioning, membership, qualifications and disqualifications, Dissolution of, Effect; Bills : Procedure for the passage; Privileges of legislature; State legislature: functioning, dissolution ; Anti defection law and its impact. (Arts. 168-212).
Union Judiciary: Supreme Court Judges: Appointment, removal, impeachment; jurisdiction of Supreme Court: Original, appellate, advisory, Court of Record; Assessment of independence of judiciary; State judiciary: High Court Judges: Appointment, transfer, removal, promotion; High Court jurisdiction, Art. 226, writs; Subordinate judiciary. (Arts. 124 -147) (Arts. 214 to 237).

Module III: Emergency Provisions
National, State and financial Provisions.

Module IV: Miscellaneous
Official Language, Language of Courts, Trade, Commerce and Intercourse in India, Services Under the Union and State, Elections, Parliamentary, Privileges and Schedules, etc .

Module V: Amendment of the Constitution
Amendment of Constitution, Doctrine of basic Structure.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:
- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India.

ADMINISTRATIVE LAW

Course Code: LAW2404 **Credit Units: 04**

Course Objective:
Administrative law is as old as the administration itself. However, the form in which we find it today, Administrative is described a most outstanding legal development of the twentieth century. The reason for this development can only be attributed to a change of philosophy as regards the role and function of the State. The change in the concept of State from 'laissez faire' to a 'welfare state' has led to emergence of state activities in almost all spheres of human life. With the phenomenal increase in the area of state operation, the State was bound to take over a number of functions which were earlier left to private enterprise. In order to ensure that such functions are performed effectively and further due to certain other factors namely contingency, expertise etc. administrative agencies are given extraordinary powers and functions such as to make rules and deciding disputes apart from its wide discretionary powers. Obviously, this necessitated a new set of laws to check the possible abuses of such extraordinary powers on the part of administration. The courts in India and abroad in the course of time have developed various doctrines and methods to deal with such p[problems. However, there is no end to this journey. The field is still open for new changes.
The main thrust of administrative law has been to study the nature of functions and powers exercised by the authorities on whom they have been conferred on and the study of remedies available to common man in case the limits of exercising power are transferred by such an authority. The focus or the centre point of this study, as usual as in cases of the study of other branches of public law, is the rights of individual *wis a wis* the public interest.

Course Contents:
Module I: Evolution, Nature and scope of Administrative law
Definitions, scope, classification and reason for the growth of administrative law; Relationship between constitutional law and administrative law; doctrine of Separation of Powers and its application in administrative law; Doctrine of Rule of law and application in administrative law.

Module II: Legislative function of Administration
Delegated legislation: Necessity for delegated legislation, classification of delegated legislation and its requirement, constitutionality of delegated legislation, All form of control of delegated legislation i.e. Parliamentary, Procedural and Judicial control (doctrine of ultra vires).

Module III: Judicial function of Administration
Reason for Administrative adjudication; Tribunals and classification of Tribunals; Principles of Natural Justice; Ombudsman: Lokpal, Lokayukta; Central Vigilance Commission (CVC).

Module IV: Administrative discretion
Need and legality and abuses; Constitutional objections and discretion, failure to exercise discretion; Doctrine of proportionality; Legitimate expectation.

Module V: Judicial control of administrative action
Courts as the final authority to determine the legality of Administrative actions ; Public Interest Litigation and the principle of *locus standi*, laches, Judicial review ; scope and extent, statutory appeals, writs.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- M.P. Jain and S.N. Jain: Principles of Administrative Law.
- I.P. Massey: Administrative Law.
- C.K. Talewani: Lectures on Administrative Law.
- De Smith: Judicial Review of Administrative Action.
- H.W.R. Wade: Administrative Law
- S.P. Sathe: Administrative Law.

FAMILY LAW-II

Course Code: LAW2405 **Credit Units: 04**

Course Objective:
Family Law II Course is mainly devoted to the study of Muslim Personals Law relating to Marriage, Maintenance, Dower, Adoption & Guardianship, Divorce, Hiba, Pre-emption, Succession, and disposition of Property. The main objective of the course is to provide an indepth knowledge of the Laws governing Muslims.

Course Contents:

Module I: Introduction (Sources, Schools and Muslim Marriage (Nikah)
Sources and Schools of Muslim Law**:** Shia and Sunni; Muslim Marriage: Nature and concepts of Muslim Marriage, Essential conditions of a valid marriage, prohibitions/ disabilities, classification of marriage and effects of valid, irregular, void marriage.

Module II: Dower and Matrimonial Remedies (Dower, Restitution, Separation and Divorce)
Dower : Concept and Nature; Divorce under Muslim personal Law, Nullity of marriage;Option of puberty; Restitution of conjugal rights; Judicial separation; Grounds for divorce under Muslim Law; Bars to matrimonial relief under Muslim Law; Grounds for Divorce under Indian Dissolution of Muslim Marriage Act 1939.

Module III: Alimony, maintenance and Adoption&Guardianship (Hizanat)
Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves vide sections 125, 127 of Code of Criminal Procedure, 1973;Alimony and maintenance as an independent remedy,Maintenance (Nafaqa) for Muslim Women under the Muslim Women Protection of Right on Divorce Act, 1986; Guardianship under Muslim Law.

Module IV: Law of Succession and inheritance among Muslims
General rules of succession; inclusion and exclusion of inheritors to the property. Classification of heirs under Hanafi and IthmaAsharia School and their shares and distribution of property.

Module V: Dispositions under Muslim Law, Waqf and Pre- Emption
Wasiyat : Testamentary Disposition and various incidents of wasiyat. Disposition inter vivos (Gift), Gift (Hiba), Musha, Revocation of Gifts; Distinction between Hiba, Ariya, Sadaqa&Wakf, Hiba-bil-Sharatful- ewaz, Gift during death illness (Marz-ul-maut).
Waqf :Meaning, Kinds, Objects,purpose, Requisites and various incidents of waqf.
Pre-emption – Origin, Definition, Classification, Subject matter, formalities, effects, constitutional validity.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal .

LAW OF CRIMES - II (INDIAN PENAL CODE SECTION- 121-511)

Course Code: LAW2406 **Credit Units: 04**

Course Objective:
Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Offences affecting the Human body: Offences affecting life, causing miscarriage, or injuries to unborn children, Offences of hurt, of wrongful restraint and wrongful confinement, Offences of criminal force and Assault, offences of kidnapping and Abduction

Module-II: Offences against Women: Obscene acts and songs, Outraging the modesty of women, Rape, Cruelty by husband or relatives of husband, Offences relating to marriage

Module-III: Offences against Property: Theft, Extortion, robbery and dacoity, Criminal misappropriation and criminal breach of trust, Cheating, Mischief, Criminal trespass

Module-IV: Defamation and offences relating to documents and property marks: Defamation**,** Forgery**,** Counterfeiting.

Module-V: Offences against State, Public Tranquillity, Public Servants, Religion

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.

BUSINESS INFORMATION AND DATA BASE SYSTEM

Course Code: MGT2404 **Credit Units: 03**

Course Objective:
The aim of this course is to introduce the students to the managerial issues relating to information systems, its role in organization and how information technology can be leveraged to provide business value.

Course Contents:

Module I:
MIS need and concepts, characteristics, Typology of MIS, Structure of MIS. Planning for MIS, System Development Methodologies, Conceptual and detailed designs of MIS, System Implementation strategies and process, System Evaluation and Maintenance.

Module II:
Introduction to data base management system- Data versus information, record, file; data dictionary, database administrator, functions and responsibilities, file-oriented system versus databases system.

Module III:
Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, Data, Warehousing and Data Mining.

Module IV:
Database system architecture- Introduction, schemas, sub schemas and instances; data base architecture, data independence, mapping, data models, types of database systems.

Module V:
Data base security- Threats and security issues, firewalls and database recovery; techniques of data base security; distributed data base.

Examination Scheme:

Components	**C**	**H**	**CT**	**V**	**A**	**EE**
Weightage (%)	5	5	10	5	5	70

Text & References:

- James, A. O'Brien, *Introduction to Information Systems,* Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2005.
- Kenneth C. Laudon and Jane P. Laudon, *Management Information Systems*, Prentice-Hall of India, New Delhi, 9th Edition, 2006.

References:

- Navathe, *Data Base System Concepts* 3rd, McGraw Hill.
- Date, C.J., *An Introduction to Data Base System* 7ed, Addision Wesley.
- Singh, C.S., *Data Base System*, New Age Publications, New Delhi.

PERSONAL FINANCIAL PLANNING

Course Code: MGT2405 **Credit Units: 03**

Course Objective:

Post Liberalization, India has witnessed a phenomenal growth in her GDP. With the advent of MNC's, and growth in private business, individuals income and saving pattern has changed. Therefore the need arises to manage these funds in a manner that it is no more called as savings but addressed as a need for Personal financial planning. This course is essential for every student irrespective of the specialization as every individual needs to plan his finances.

Course Contents:

Module I: Introduction to personal financial planning and personal accounting

Concept of Personal Financial Planning: Need, Significance, Scope; Ethical issues in Personal Financial Planning; Changing per capita investors. Need to maintain Accounts, Methods: Traditional & Using Electronic Media. Applying for PAN & filing of Income Tax returns.

Module II: Investment Avenues

Real Assets: Investment in Real Assets: Real Estate, Precious Metals, Other Fixed assets. Their relative merits & demerits. Change in their returns over the past few years.

Financial Assets: Investments in securities: Through IPO, Secondary Market. Investment in G-sec; Debt instruments, Post Office instruments, Insurance Policies, Mutual Funds, Certificate of Deposits, Foreign Market.

Module III: Introduction to Income tax and Income from salary

Introduction to Income tax act 1961 and Finance Act. Previous year, Assessment year, Income, Total Income, Gross Total Income, Capital and Revenue Receipts / Expenditures, Exempted Incomes, Residential Status and incidence of Tax.

Salary, Exemption:- Leave encashment, Gratuity, Pension, Annuity, Pension fund, Allowance (HRA, Entertainment, Special allowance – dependent of expense ad not dependent on expenae, perquisites – rent free accommodation, Leave travel concession, medical facility), Deductions 80c to 80u.). Sections (2(9), 2(31), 2(7), 2(24), 3, 6, 14, 288A, 288B, 2(17), 4, 9, 45, 9(1)(ii), 9(1)(iv), 9(1)(v), 10, 11, 12, 17(1), 22,

Module IV: Income from house property, capital gains and other sources

Income from House Property(Types of house property, Exempted house property income, Computation of GAV and NAV, Treatment of unrealized, recovered and arrears of rent), Capital Gains and other Sources (Short term & Long term capital gain, Cost of acquisition, Cost of improvement, Index cost, Income that are taxed under other sources, Deduction under other sources, Tax treatment of lotteries, puzzles. Sections 23, 24, 2528, 30, 31, 32.

Module V: Tax planning

Concept, significance and problems of tax planning, Tax evasion and tax avoidance, Individual Taxation Slabs, Wealth Tax, Gift Tax, Capital Gains Tax, Service tax, Recent Tax saving schemes

Module VI: Retirement & Goal Planning

Concept of risk assessment of individual, Introduction to portfolio management, Retirement planning & investment: Income generation after retirement, liability management, anticipation of expenses. Investment for major goals: House, Family, Education, Medical, Wealth Management/ Financial Advisory companies. Their role, significance & growth.

Examination Scheme:

Components	P-1	C-1	CT-1	Attendance	EE1
Weightage (%)	10	5	10	5	70

Text & References:

Text:

- Chandra P, Investment analysis and Portfolio Management, 3rd edition, Tata McGraw Hill
- Lal & Vashisht, Direct Taxes, 29th Edition, Tata McGraw Hill.

References:

- V.K.Bhalla, Security analysis and Portfolio Management, 16th edition, S.Chand

SALES AND DISTRIBUTION MANAGEMENT

Course Code: MGT2406 **Credit Units: 03**

Course Objective:
The major objective of this course is to acquaint the students with the theory and practice of Management of Sales Operations.

Course Contents:

Module I: Introduction
Sales management- Concept, Objectives and functions. Evolution of sales management. Nature and role of Sales Manager's job. Sales management as a career. Emerging trends in sales management.

Module II: Sales Organization
Purpose of sales organization. Setting sales organization. Types of sales organization. Coordination of selling functions with other marketing activities. Sales forecasting.

Module III: Controlling sales effort
Sales Budget: Purpose and budgetary procedure. Quotas: Concept, Objectives and Types. Sales Territory: Concept and procedure of devising sales territories, Routing and Scheduling of Sales force. Sales Audit.

Module IV: Managing Sales Force
Concept of sales force management. Recruitment and Selection of sales personnel (domestic and international perspective). Cross Cultural challenges. Sales training. Compensating and motivating sales personnel. Controlling and evaluating sales personnel.

Module V: Distribution Management and channel control
Distribution channels: Concept and need. Distribution Channel Strategy. Managing distribution channel. Features of effective channel design. Channel Conflict: Concept and stages. Conflict management.

Module VI: Logistics Management
Objectives of logistics. Concept of logistics planning: inventory management decisions, transportation decisions, Location decisions.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Still Cundiff, Sales Management Decision Strategies, Fifth Edition, Printice Hall.
- Panda Tapan K., Sahadev Sunil, Sales and Distribution Management, 2005, Oxford University Press.

References:
- Kapoor Ramneek, Fundamentals of Sales Management, 2005, McMillan.
- Sudha GS, Sales & Advertising Management, 2005, Indus Valley Publications.
- Walker, Churchill Ford, Management of Sales Force

TERM PAPER

Course Code: MGT2431 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

EVALUATION

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2432 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:
Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	**Power Point Presentation & Viva**	**Total**
75 marks	25 marks	100

WORKSHOP

Course Code: MGT2433 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

EVALUATION

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

LAW OF EVIDENCE

Course Code: LAW2502 **Credit Units: 04**

Course Objective:
This paper is to orient students with importance of evidence for establishment of claims and the related rules and principles.

Course Contents:

Module I: Definitions and Relevancy of Facts
Evidence and its relationship with the substantive and procedural laws ;Definitions : Facts, facts in issue, relevant, evidence proved, disproved, not proved, oral and documentary evidence ;Relevancy and admissibility; Doctrine of *res gestae ;*Conspiracy.

Module II: Admissions, confessions and statements by person who cannot be called as witnesses:
Definition of admission, who can make admissions by or on their behalf, proof of admission against the persons making them and admissions in civil cases. (Section 17-23, 31); Definition, relevance and consideration of confessions (section 24-30); Dying declaration (Section 32 and Section 33). **Opinion of Third Persons (Sec. 45 to 51) & Character Evidence (Sec. 52 to 55).**

Module III: Documentary Evidence
Primary and Secondary Evidence, Proof and verification of documents; Public documents and presumption as to documents.

Module IV: Production and Effect of Evidence
Burden of proof (Sections 101-114); Estoppels (Section 115); Competence of witnesses (Sections 118-120).

Module V: Examination of Witnesses (Sections 135-166) and Rejection of evidence (Section 167)
Examination –in-chief : Cross Examination, Re-examination; Leading questions; Hostile witnesses; Refreshing memory; Judge's power to put questions or order production.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Ratanlal and Dheerajlal : Law of Evidence
- Monir Field : Law of Evidence
- Batuklal : Law of Evidence
- Avtar Singh : Evidence Law
- Bare Act : Indian Evidence Act, 1872

CODE OF CIVIL PROCEDURE

Course Code: LAW2503 **Credit Units: 04**

Course Objective:
This paper is to help a law student to acquire a thorough knowledge of procedural aspects of working of civil courts and other machineries.

Course Contents:

Module I: Initial steps in a suit
Jurisdiction and place of suing; Institution of suit, cause of action, joinder, non-joinder and mis-joinder of parties; Summons; Pleadings: Meaning, object, General rules, Amendment of pleadings; Plaint and written statement: Particulars, set off and counter claim; Admission return and rejection; Discovery, Inspection and production of documents; Appearance and non-appearance of parties, ex-parte proceedings; First hearing: Meaning, object, framing of issues, omission to frame issues, disposal of suit in the first hearing; Trial: Summoning and attendance of witnesses, summons to produce documents, adjournment, hearing of suit.

Module II: Significant Terms and Definitions
Definitions: Decree, Judgment, Order, Foreign Court, Foreign Judgment, Mesne, Profits, Affidavit, Suit, Plaint, Written Statement, Suit of civil nature ;Important Concepts: Res Sub-Judice, Resjudicata, Restitution, Caveat, Inherent powers of courts.

Module III: Interim Orders
Commissions, Arrest before judgment, Attachment before judgment, Temporary Injunctions, Interlocutory orders, Receiver, Security of costs.

Module IV: Suits in Particular Cases
Suits by or against Government, Suits by Indigent persons, Interpleader Suit, Summary Procedure, Suits relating to public nuisance. Execution Proceedings

Module V: Law of Limitation
Definitions, period of limitation, plaintiff, defendant; and in foreign countries, limitation of suits, appeals, and application, computation of period of limitation.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla's Code of Civil Procedure, Universal, Delhi
- C.K. Thakkar's (Takwani), Code of Civil Procedure
- Majumdar, P.K. and Kataria, R.P., Commentary on the Code of Civil Procedure, 1908, universal, Delhi.

LABOUR LAW-I

Course Code: LAW2504 **Credit Units: 04**

Course Objective:
The course aims at imparting to the students an indepth understanding of Labour Laws in India by recourse to relevant judicial pronouncements in this regard.

Course Contents:

Module I: Regulation of Trade Union & Unfair Labour Practices
History of Trade Union Movement in India and need to form Trade Union, Workers Right to form Union vis-à-vis Indian Constitution; the Membership of Trade Union, Closed shop and Union shop, Registration of Trade Union, Remedies in case of non-registration and cancellation of registration of union, Privileges and Protection of registered Trade Union form certain acts and omissions, Unfair labour practices and victimization.

Module II: Collective Bargaining:
Concept and importance of collective bargaining, Pre-requisites for collective bargaining, Process of administering collective agreement (Negotiation, Mediation, & Voluntary arbitration & Compulsory Arbitration.), Duration and enforcement of bipartite Agreement (Secs. 18, 19, Industrial Disputes Act, 1947), Pressurization: Strike, Go-Slow, wok to rule, Gherao and Lockout.

Module III: Regulation of Industrial Disputes
Define the concept of Industry, Industrial Dispute and workman, Power of Government to refer Industrial Disputes for adjudication: The Adjudicatory Machinery, Award and its binding nature, Judicial review of Awards, The concept of lay-off, retrenchment and procedure and compensation relating to lay-off and retrenchment.

Module IV: Standing Orders
Concept, Nature and scope of standing orders under Industrial Employment (Standing Order) Act, 1946, Formulation of Standing Orders and its Certification process, Modification: Modification and temporary application of Model Standing Order, Interpretation and Legal status of Standing Orders.

Module V: Discipline in Industries
Doctrine of hire and fire in the context of social welfare, Fairness in disciplinary process: Meaning of misconduct, Right to know: The Charge Sheet, Right to defend; Domestic enquiry notice, evidence, cross examination, unbiased enquiry officer and reasoned decision, Punishment of misconduct, Prenatal (permission) and Postnatal (Approach) control during pendency of proceeding (Sec. 33 of industrial and Disputes Act).

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- O.P. Malhotra, Law of Industrial Disputes.
- Indian Law Institute, Labour Law and Labour Relations.
- K.D. Srivastava, Commentary of Industrial Employment (S.C.) Act, 1946.
- S.C. Srivastava, Industrial Relation and Labour Law.
- Report of National Commission on Labour, 1969.
- Industrial Disputes Act, 1947.
- R.B. Sethi & R.N. Dwivedi, Law of Trade Union.

PROPERTY LAW

Course Code: LAW2505 **Credit Units: 04**

Course Objective:
The subject imparts to the student an understanding of the law in India relating to transfer of immovable property and the norms and doctrines that aid in carrying out secure transactions in this regard.

Course Contents:

Module I: Jurisprudential Basis (Sections 5-21)
Concept and meaning of property – New property, Kinds of property – movable and immovable property, tangible and intangible property,

Module II: Sale of Immovable Property
Doctrine of Election Sec. 35, Fraudulent Transfer Sec. 53 ; Sale of immovable property (Secs. 54 – 55). (Sale, Contract of Sale; Contract to sell; Rights and Liabilities of buyer and seller).

Module III: Specific Transfers
Mortgages of immovable Property: Secs. 58 – 77 (Kinds of mortgage, Rights and Liabilities of the mortgagor and mortgagee, Marshalling and Contribution (Secs. 81 – 82), Redemption (Secs. 91 – 96).

Module IV: Leases
Leases (Secs. 105 – 117): Definition, Leases how made, Rights and Liabilites of lesser and lessee, Charges (Section, 100 – 104).

Module V: Easements
Creation of Easements (Secs. 4 – 7), Nature and characteristics of Easements, Extinction, Suspension and Revival of Easements (Secs. 37–51), Riparian Rights, Licenses (Secs. 52 – 64).

Module VI
Indian Stamp and Registration Act.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Mulla, D.F., Transfer of Property Act.
- Shukla, S.N., Transfer of Property Act.
- Shah, S.M., Transfer of Property Act.
- Tripathi, Lectures on Indian Easement Act.
- Jain, J.D., Indian Easement Act.

CONSUMER BEHAVIOUR

Course Code: MGT2503 **Credit Units: 03**

Course Objective:
To develop an understanding of how consumers behave and use the knowledge to adopt appropriate marketing strategies.

Course Contents:

Module I: Introduction
Consumer Behaviour: Definition and significance. Understanding consumer and market. Difference in individual buyer behaviour and organizational buyer behaviour. Market segmentation: lifestyle and demographic segmentation, usage segmentation, benefit segmentation. Product positioning.

Module II: Environmental influences
Culture: Meaning and Characteristics. Cross Cultural understanding of Consumer Behaviour. Subculture. Social Groups: Meaning and formation of a group. Reference groups. Influence of reference groups on consumer behaviour. Family: Lifecycle and it's significance on consumer behaviour. Family purchase decision process.

Module III: Personal influence and Diffusion of Innovation
Concept, nature and significance of personal influence. Opinion leadership and its role in consumer behaviour. Concept of product adoption and adoption process. Diffusion of innovation and process of diffusion.

Module IV: Individual determinants of Consumer Behaviour
Personality and self concept and it's relevance in consumer behaviour. Motivation: Nature and role of motives and their significance in marketing. Information processing: Concept and Process. Attitudes: Characteristics, functions and it's importance in buyer behaviour.

Module V: Consumer Decision process
Consumer decision process model. Problem Recognition, Search and Evaluation, Purchasing Process. Post-purchase Behaviour: Post Purchase evaluation and Product disposition.

Module VI: Organizational buyer behaviour
Nature of Organizational Buying. Factors influencing organizational buyer behaviour. Types of decision situations. Organizational buyers decision process.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:
- Loudon David L. & Della Bitta Albert J. Consumer Behaviour, Fourth Edition, Tata McGraw Hill.

References:
- Schiffman and Kanuk, Consumer Behaviour, Eighth Edition, Printice Hall.
- Hawkins, Best, Coney, Consumer Behaviour, Building Marketing Strategy, Ninth Edition, Tata McGraw Hill.

SERVICE MARKETING

Course Code: MGT2504 **Credit Units: 03**

Course Objective:
The course has been designed to familiarize students with characteristics of services, their design and delivery and the complexities of handling intangibles.

Course Contents:

Module I: Services an Overview
Services: concept, characteristics. Marketing of goods v/s marketing of services. Significance of services marketing. Role of services sector in economy. Growth of service sector. Services- Global and Indian Scenario. Introduction to service marketing mix; classification of services.

Module II: Consumer Behaviour in Services
Consumer decision-making process. Consumer Expectations: Concept. Factors influencing customer expectation of services. Service encounter and moments of truths. Managing Customer Satisfaction. Service failure and recovery.

Module III: Service Quality & Productivity
Managing service operations. Concept of productivity in service context. Approaches to improve productivity. Managing service demand and capacity: Understanding capacity constraints, understanding demand patterns. Strategies for matching demand and supply; service blueprinting, physical evidence & servicescape.

Module IV: Service Quality
Concept of service quality, Gap model of service quality, measuring & improving service quality, concept of SERVQUAL system, concept of CRM & enhancing quality through it. Introduction to Six Sigma.

Module V: Managing service personnel
Role of service personnel and developing customer-focused personnel. Job characteristics. Internal marketing, strategies for delivering quality through people.

Module VI: Pricing and Distribution for services
Price determinants, pricing modifications. Approaches to pricing services. Pricing strategies linking to value definitions. Customer-focused pricing. Channel structures, distribution-growth options.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Clow Kenneth E. and Kurtz David L., Services marketing operations, management and strategy, biztantra innovations in management, John Willey & Sons

References:
- Valarie A Zeithaml and mary J Bitner, Services Marketing, Third Edition, Tata McGraw Hill Companies
- Christopher lovelock, Service Marketing (people, technology and strategy), 2001, Fifth Edition, Pearson Education.
- Rampal M.K., Gupta S.L., Service Marketing, 2006 Galgotia Publishing Company.

INTERNATIONAL MARKETING

Course Code: MGT2505 **Credit Units: 03**

Course Objective:
After giving students an introduction of marketing management, it is necessary to give them an overview about the international scenario keeping in view the ever growing importance of international market.

Course Contents:

Module I: Introduction
Meaning, scope and challenges of international marketing. International dimensions of marketing, international marketing v/s domestic marketing. Benefits of International Marketing.

Module II: Global Business Environment
WTO and its impact on international business operations. Tariff and non-tariff barriers. Regional economic groupings and their significance.

Module III: International Marketing Environment
International marketing environment- Geographical, demographic, economic, political, legal, socio cultural environment- Elements of culture. Cultural challenges Business customs and practices. Emerging markets and marketing challenges.

Module IV: Planning for International Marketing
International Marketing Research and Information System. Modes of entering into foreign markets. International Product Life Cycle. International market segmentation, targeting and positioning.

Module V: International Marketing Decisions
International pricing strategy- Factors influencing price, pricing methods. Global Branding Decisions. International distribution – Types and functions of foreign distribution channels; distribution logistics. Promotion Decisions- International advertising, selection of media, challenges of international advertising, personal selling publicity and sales promotion.

Module VI: The Indian Scenario
The Export Import Scene in India. EXIM Policy. Export Documentation, Export Procedure

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:
- Onkvist Sak Onkvist, Shaw John J. International Marketing Analysis & Strategy, Third Edition, Prentice Hall.

References:
- Graham Cateora, International Marketing, Twelfth Edition, Tata McGraw Hill.
- Keegan Warren J. Global Marketing Management, Seventh Edition, Prentice Hall.

TERM PAPER

Course Code: MGT2531 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

EVALUATION

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2532 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

- *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
- *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
- *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
- *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

WORKSHOP

Course Code: MGT2533 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

EVALUATION

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

FINANCIAL SERVICES

Course Code: MGT2506 **Credit Units: 03**

Course Objective:
The aim of the course is to orient the student to the recent changes in the financial institutions and financial services industry and their link to economic development. The financial institutions and services are changing rapidly. A course that merely describes the existing institutions and services will not prepare you for the change. Thus you must familiarize yourself with the services available in the industry today and understand why they are the way they are and why they are changing. An Indian perspective will be given.

Course Contents:

Module I: Financial Services
Role of Financial Services in economic development. Evolution of Financial Services Sector in India. Marketing of Financial Services (Introduction)

Module II: Venture Capital
Venture Capital Financing, International Experiences in Venture Capital Financing, Venture Capital Financing in India, Pitfalls to be avoided. Preparation & evaluation of Business Plan

Module III: Factoring & Forfaiting
Factoring Services - Features Merits and Demerits, Cost Benefit Analysis. Forfaiting: Features, merits & Limitations

Module IV: Leasing and Hire Purchase
Development of Leasing and Hire Purchase, Types of Leasing, Pricing Methodology and Financial analysis, Taxation, Legal Framework for Leasing and Hire Purchase Companies

Module V: Mutual funds
The concept & Role of M/Fs, History of M/Fs in India, Types of M/Fs, Fund Structure & constituent, Selecting the right Investment Products for Investors, Comparison of Investment products, Measuring of Risk In M/Fs, Recommending model Portfolios & selecting the right funds.

Module VI: Credit rating & other financial services
Credit rating concept of Credit rating, Types of credit rating, Advantages and Disadvantages of credit rating, Credit rating agencies and their methodology and process, Individual Credit rating, Sovereign Credit Rating Practices. Custodial Services, Credit Cards

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Khan, M. Y. Indian Financial System, Tata McGraw Hill
- Khan, M.Y. Financial Services, Tata McGraw Hill

References:
- Bhole L.M, Financial Institutions and Markets: Structure, Growth & Innovations, Tata McGraw Hill
- Pnadey,I.M. Ninth Edition, Financial Management, Vikas Publishing House Pvt. Ltd.

PRINCIPLES OF INVESTMENT MANAGEMENT

Course Code: MGT2507 **Credit Units: 03**

Course Objective:
The course aims at equipping the undergraduate students with financial tools, which help in making decisions for investment in financial securities. It is also aimed at imparting a basic understanding of the influence of changing economic scenario on the decisions and important theories and models, techniques and regulations underlying these decisions.

Course Contents:

Module I: Introduction to Investments
Investments: Introduction, Avenues for Investment including introduction to derivatives, Investments and Speculation, Features of a Good Investment programme, Process of Investment Decision Making, Risks involved in Investments including the concept of beta, Principle of Dominance.

Module II: The Stock Markets in India
Nature and Functions of the Stock Market, OTCEI & BSE, NSE & Role of Depositories, Market Indices, The Brokerage Business

Module III: Valuation of Securities
Bond Valuation and Analysis, Preference share Valuation and Analysis, Equity Share Valuation

Module IV: Security Analysis
Fundamental Security Analysis, Technical Security Analysis

Module V: Portfolio Analysis and Management
Portfolio Analysis: Risk and Return, Portfolio Choice: Utility Theory and Indifference Curves, Markowitz: Portfolio Selection Model, Capital Asset Pricing Model, Sharpe's Single Index Model and Portfolio Evaluation Treynor, Sharpe and Jensen.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Sharpe, William F. Alexander and Bailey, Investments, Sixth Edition Prentice - Hall, India

References:
- Fisher, Donald E & Jordan, Ronald., Securities Analysis & Portfolio Management:, Sixth Edition, Prentice Hall
- Haugen, Robert. Modern Investment Theory, Fifth Edition, Prentice Hall
- Bhalla, V. K. Investment Management, S. Chand & Co.

FINANCIAL DERIVATIVES

Course Code: MGT2508 **Credit Units: 03**

Course Objective:
This course attempts to give an overview of the derivatives market with special reference to India. A financial manager must understand how derivatives can be used to the advantage of the firm. An introduction to Derivatives will equip the students to understand the mechanics of this highly intriguing & innovative field of study

Course Contents:

Module I: Introduction to financial derivatives
Introduction to derivative trading, Characteristics of derivatives, Underlying assets (Equity Bonds/loans, Foreign Currency, and Commodity), Importance of derivatives as an investment option, introduction to types of derivatives, Participants in derivatives market (Hedgers, Speculators, Arbitrageurs). Evolution of Derivative markets in India.

Module II: Forwards & Futures
Forward contracts: Limitations of forward markets, Differences between forwards and futures, Futures terminology, pricing of futures contract, Introduction to currency futures, Interest rate futures, Treasury bond futures, Eurodollar futures, commodity futures, Index futures & Stock Futures (Hedging, speculation and arbitrage).

Module III: Options: Fundamentals
Terminology - call, put, writer, buyer, premium, intrinsic value, time value, expiry date, settlement date, strike price, ATM, OTM & ITM, Options positions(payoff graphs), Types of Stock options, futures options vs spot options, Options on stock Indices, currencies & futures, Warrants & executive stock options, Exotic options

Module IV: Principles of trading & Hedging with Options
Option Valuation: The BS-Merton Model (Solving for BS model, assumption application and criticism), Trading strategies - Option trading using bull and bear spreads (payoff graphs)

Module V: Swaps
Terminology:- LIBOR, MIBOR, Swap basis, Interest rate swaps, Determining LIBOR/MIBOR swap zero rates, Currency swaps: Various types of swaps & features, Introduction to Swaptions.

Module VI: Recent Developments
New Derivative contracts including Credit Derivatives, Weather Derivatives, Energy Derivatives, etc. Role of derivatives in the economic meltdown of 2007 - 2008, Major Derivative mishaps in the world including The Barrings Bank disaster, The Sumitomo corporation scandal, the Swiss Bank scam

Examination Scheme:

Components	P-1	C-1	CT-1	Attendance	EE1
Weightage (%)	10	5	10	5	70

Text & References:

Text:
- Hull, John C, An introduction to futures and options markets, Second Edition Prentice Hall of India

References:
- Gupta, S .L., Financial Derivatives Theory, Concepts and Problem 2005, Prentice - Hall, India

ORGANISATIONAL DEVELOMENT AND CHANGE

Course Code: MGT2509 **Credit Units: 03**

Course Objective:
It aims to provide a conceptual input of meaning, characteristics, process and influences of organizational development and change management. It gives comprehensive overview of human capital from the prospective of organizational excellence in the light of transitional phase of Indian Industries. It gives the imperatives, assumptions, role and skills of O.D. specialists through experiential learning methods it facilitates teamwork, team building and the concepts of transformational Leadership.

Course Contents:

Module I: Organizational Development
Nature, basic assumptions, characteristics & importance, values and assumption.

Module II: Organizational Development Process
Steps involved in OD, Role of Managers, Factors affecting OD.

Module III: Implementation of Change Models
Lewin's force field analysis, Kotler's eight step model, action research model.

Module IV: Structural and Comprehensive OD interventions
Classification of OD interventions: Human Process, Techno structural, HRM, Strategic interventions, Evaluation and institutionalization of interventions.

Module V: Change Management
Need for the change, Factors causing change, environmental, Technological, Leagal, Political, Social and cultural factors of change, Models and Techniques involved in change management, Total Quality Management, Business Process Reengineering, Learning Organization.

Module VI: OD Process
OD process, Role & styles of OD practitioners, contemporary OD issues for today's managers.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:
- French W L & Bell, Organizational Development, Prentice Hall of India
- Ravishankar S & Mishra R.K., Organizational Development, Visison Books Pvt. Ltd.

References:
- Pereek U &Rao T V, Designing &Managing HR System, Oxford &IBH Publishing company
- Pereek U & Rao T V Making Organization Roles Effective, TATA McGraw Hill

TRAINING AND DEVELOPMENT

Course Code: MGT2510 **Credit Units: 03**

Course Objective:
The objective of the course is to help students acquire and enhance their knowledge of how to plan, develop, carry out, and evaluate training and executive development programmes in Business Organizations.

Course Contents:

Module I: Introduction
Meaning and definition of training, Training vs education, Culture and Context, Introduction to training Strategy.

Module II: Process of Training
Establishing objectives, training need assessment, designing the programs, training methods, trainers and training styles, Introduction to Management Development program.

Module III: Evaluation of Training & Development
Training Evaluation – Need for evaluation, Measuring Training Effectiveness, Concept of Return on Investment, Cost – Benefit Analysis, Models of Training Evaluation.

Module IV: Training Systems
Action Research for better training, knowledge management, career development, succession planning, diversity training, orientation training.

Module V: Changes in Training Needs for Modern Organizations
Concept and Need for Learning Organizations, Training for Trainers, Leadership, Team Playing and Group Dynamics, Basics of Sensitivity Training, Computer Based Training.

Module VI: Development
Executive Development – significance & nature, identifying development needs and setting objectives. Techniques of development and advantages. Role of HRD in 21st Century.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:
- Lynton R.P and Pareek U (1990). Training for Development. Vistaar Publications, New Delhi

References:

- Goldstein, Training in Organizations, Thomson Learning
- Pareek Udai, Training and Development, Tata McGraw Hill.
- Srivastava, S., Recruitment, Selection & Retention, ABS Course pack, 1999.
- Wexley, K & Lathan Gary, Developing & Training HR in Organization. P. Hall, 2002.

INTERNATIONAL HUMAN RESOURCE MANAGEMENT

Course Code: MGT2511 **Credit Units: 03**

Course Objective:
The main objective of this course is to explore the dynamics of global business development and to prepare the students about examining significant business investment opportunities and maximization of returns in context with human resources.

Course Contents:

Module I: Internationalization
Broad overview of International Human Resource Management features, elements, benefits and limitations, Domestic and International HRM, Factors influencing the global work environment.

Module II: Strategic Human Resource Management
Strategic HRM, Aims of SHRM, Integrating the business and HR strategies, Formulating HR strategy, Content of HR strategies, Relationship between International Strategy and SIHRM.

Module III: Cross-Cultural Management
Cultural diversity in consortia formation, Developing cognitive framework to appreciate the impact of culture on managerial behaviour, Introduction, Understanding Culture, Key Concepts, Determinants of Cultural Identity, Frameworks for Mapping the Culture, Concept of Geert Hofstede

Module IV: International Recruitment, Training and Rewards
Recruiting from Host country, Reward strategies for international execution, the expatriate approach, international values and reward policy, designing rewards for the international business unit, Training Global executives.

Module V: Performance Management and Compensation in International Business
Context for international performance management, framework for performance management, Compensation, issue of double taxation.

Module VI: Best HR Practices
Emerging Trends, North America, South America, some key pointers, Northern Europe, Value based management in Nordic countries, China emerging economy,, Japan – a culture of enfolding relationship, Trends and Future of HR in high performing Co., Essay on Dream Organisational.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:
- Dowling, Peter; Title: International human resource management - Managing people in a multinational context; Publisher: Thompson.

References:
- By Monir H. Tayeb International Human Resource Management: A Multinational Company Perspective, Oxford University Press.
- By Paul Sparrow, Chris Brewster, Hilary Harris; Pub. Taylor and Francis, Globalizing Human Resource Management; Oxford University Press.

SUMMER INTERNSHIP EVALUATION-II

Course Code: LAW2535 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Sixth Semester

COMPANY LAW

Course Code: LAW2603 **Credit Units: 04**

Course Objective:
The paper aims to make the student familiar and to provide insight into formation and winding up of companies beside corporate administrations.

Course Contents:

Module I: Company
Definition, Characteristics, Lifting of Corporate Veil; Types of Companies;
Formation of a Company: Promoters, Pre-incorporation Contracts, Provisional Contracts,

Module II: Memorandum of Association, Articles of Association and Prospectus
Memorandum of Association; Articles of Association; Prospectus: Issues, contents, Kinds, liability for misstatements, Shelf Prospectus, Statement in lieu of Prospectus.

Module III: Share Capital
Issue and allotment of shares, SEBI guidelines on allotment, Issue of shares at premium and at discount, Share Certificate, Demat system ; Forfeiture and surrender of Shares, Transfer & Transmission of shares; Provisions relating to payment of dividend, Investor's Education and Protection Fund.

Module IV: Corporate Administration
Directors: kinds, powers and duties; Insider trading; Meetings kinds and procedure; The balance of powers within companies: Majority control and minority protection, Prevention of oppression, and powers of court and Central Government,

Module V: Winding up of Companies
Kinds, consequences and reasons of winding up; Role of the court; Liability of past members; Payment of liabilities; Reconstruction and amalgamation.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Avtar Singh : Indian Company Law
- Shah S. M : Lectures on Company Law
- Saharay H.K.: Company Law, 5th Edn.

LAW OF TORT (MOTOR VEHICLES ACT AND CONSUMER PROTECTION ACT, 1986)

Course Code: LAW2604 **Credit Units: 04**

Course Objective:
This course aims to introduce the student to the specialized discipline of tort law that is one of the most litigated areas of law in west. In India this realm is on the verge of a lot of litigational activity. The course covers Consumer Protection Act as well as Motor Vehicle Act which are carved out from the general principles of tort.

Course Contents:
Module I: Introduction to Tort
Nature and Definition of Torts ; Tort distinguished from Contract, Quasi-Contract, Crime : Conditions of liability including *damnum sine injuria*, *injuria sine damnum*; Remoteness of damages; Maxims: *Ubijus ibi remedium*, *Res ipsa loquitor*, etc.; Justification in Tort - *Volenti non-fit Injuria*, Necessity, Plaintiff's default**,** Act of God, Inevitable accidents, Private defences, Judicial and Quasi – Judicial Acts, Parental and quasi-parental authority.

Module II: Actions in Tort
Assault, Battery, False Imprisonment, Malicious Prosecution; Defamation-Libel, Slander including defenses in an action for defamation. ; Vicarious Liability; Liability of State; Doctrine of Sovereign ImmModuley.

Module III: Negligence
Negligence including contributory negligence and other defenses: Absolute liability/Strict liability, Rules in Ryland v. Fletcher **;** Principles for the application of the rule and defenses; Enterprises engaged in hazardous activities – M.C. Mehta v. Union of India; Nuisance; Trespass.

Module IV: Consumer Protection
The concept of a Consumer and Consumer Dispute, definition of 'consumer' under the consumer Protection Act, 1986: The Aims and Objectives of the Consumer Protection Act, 1986. Shift from Caveat Emptor to Caveat Venditor, Consumer Protection Councils under the Consumer Protection Act 1986. Redressal mechanism under the Consumer Protection Act, 1986; The District Forum, The State Commission; The National Commission. Why a consumer may institute proceedings.

Module V: Motor Vehicles
Motor Vehicles Claims and compensation: Relevant provisions of the relating Motor Vehicles Act relating to the liability and assessment of compensation: Liability without fault in certain cases : voidance of contracts restrictive of liability: Special provisions and scheme of compensation in case of hit and run motor accidents: offences penalties and procedure: Insurance of Motor Vehicles against third party risks(Sec. 145 – 152): Claims tribunals: Sec. 165-176: Special provisions as to payment of compensation on structured formula basis: Claims on non structured basis: Method of calculating compensation evolved by the courts(study with reference to relevant judgments): Defences: Changing parameters of negligence and burden of proof.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Winfield and Jolowicz, Tort
- Law of Torts, Universal law Publishing Company, Dr. S.P. Singh
- The Law of Torts: Ratanlal & Dhirajlal,
- Winfield, Law of Torts,
- Dr. D.N. Saraf, Law of Consumer Protection in India,
- Dr. Avtar Singh, Law of Consumer Protection in India, Dr. Gurjeet Singh, The law of Consumer Protection in India.
- Motor Vehicle Laws, Universal Law Publishing Company.

LABOUR LAW-II

Course Code: LAW2605 **Credit Units: 04**

Course Objective:
The paper is to focus on wage policies, compensation for learn caused during the course of employment and working conditions of employees.

Course Contents:

Module I: Minimum Wages Act, 1948
Concept of Labour Welfare, Classification and Importance, Labour welfare activities, Concept of minimum wage, fair wage, living wage and need based minimum wage, Constitutional validity of the Minimum wages Act, 1948, Procedure for fixation and revision of minimum wages, Fixation of minimum rates of wage by time rate or by piece rate, Procedure for hearing and deciding claims.

Module II: Payment of Wages Act, 1936
Object, scope and application of the Act, Definition of wage, Responsibility for payment of wages, Fixation of wage period, Time of payment of wage, Deductions which may be made from wages, Maximum amount of deduction.

Module III: Workmen's Compensation Act, 1923
Definition of dependant, workman, partial disablement and total disablement, Employer's liability for compensation: Scope of arising out of and in the course of employment, Doctrine of notional extension, When employer is not liable, Employer's Liability when contract or is engaged, Amount of compensation, Distribution of Compensation, Procedure in proceedings before Commissioner, Appeals.

Module IV: Factories Act, 1948 & Social Security
Concept of "factory", "manufacturing process" "worker" and "occupier" : General duties of occupier, Measures to be taken in factories for health, safety and welfare of workers, Working hours of adults, Employment of young person and children, Annual leave with wages, Additional provisions regulating employment of women in factory, Social Security of Workmen ; Concept and scope of social security : Origin of Social Security in India, Claim and Adjudication of Disputes under Employee's State Insurance Act. 1948.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- S.C. Srivastava, Commentaries on factories Act, 1948, Universal Law Publishing House, Delhi
- H.L. Kumar, Workmen's Compensation Act, 1923.

CYBER LAWS

Course Code: LAW2606 **Credit Units: 04**

Course Objective:
With the advent of information technology law and Right to Information Law, new strides and strategies in legal justice education have come up. There is a need that Law students must also be acquainted with these new developments if a law student has to find a comfortable berth in the competitive legal market as a Law Professional as well as legal manager. Therefore, there seems to be an impending need to generate e-Legal Justice Education that exposes the students to have deep insights into the complexities of information technology and right to information. Objectives of this course, therefore, are understanding the legal recognition and procedure, Digital signatures, legal recognition of cyber authorities and Cyber appellate tribunal, legal implications of new varieties of offences and penalties under the Information Technology Act, 2000. A student of law should also be given the understanding of copy right issues, TRIPS agreements, application of patents to computer technology, etc. Besides, the course also aims at developing insights into the Right to Information Act, 2005 and its grey areas.

Course Contents:
Module I: Introduction (Need, Role and various aspect related to Cyber Law)
Need and role of Cyber; Jurisprudence of Cyber Law in India; Free speech and expression on Internet &Privacy; issues, Right to data protection, Cyber Law &Protection of Domain name.

Module II: Cyber Jurisdiction, Investigation & Cyber Forensics
Cybercrimes: Extradition and Jurisdictional issues; Investigation of Cyber Offences: Cyber equipment's& Cyber Cell; Cyber Forensics: provisions, need and role in cyber investigation.

Module III: Electronic Governance, Cyber space &IPR issues
Legal aspect of Electronic Governance; IPR Issues: An Overview, Patent, Copyright and Trademark& other related Issues in Cyberspace.

Module IV: Cyber Legislations (Laws, National and International treaties & Conventions)
Cyber Legislation: An Indian and International Regime; The Information Technology 2000, The Provisions relating to- Legal recognition of – Digital & Electronic Signature, Secure E- records and Signature, E- signature Certificates, Certifying Authorities, Cyber, Appellate Tribunal and Miscellaneous Provisions.

Module V: Cyber Crimes (Civil & Criminal)
Cyber Crimes and Cyber Victimization; Cyber Offences: Types & the provisions for Penalties mentioned in IT Act, 2000; Cyber Pornography, Cyber Terrorism, Cyber Tort and Cyber defamation etc.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Nandan Kamath, Universal Law Publishing Company and E –commerce: Law relating to computers Internet.
- K.K. Kumar, Dominant Publication: Cyber Law
- B.L. Wadhera : Patent, trademarks, Copyrights
- Ganguly (LMH): Intellectual Property Rights.

BRAND MANAGEMENT

Course Code: MGT2602 **Credit Units: 03**

Course Objective:
The objective of the course is to help the students understand and appreciate the theoretical concepts of brands. To generate the ability to apply the concepts in real life.

Course Contents:

Module I: Introduction
Meaning and importance of brands. Brands v/s products. Challenges and opportunities of branding. Concept of Brand Equity. Brand management process. Role of CRM in building brands.

Module II: Brand Positioning and value
Sources of brand equity. Brand Building. Implications of brand building. Brand positioning: Brand value. Internal branding.

Module III: Brand Marketing
Criteria for choosing Brand elements. Building brand equity: Product strategy, pricing strategy. Integrated marketing communication. Celebrity endorsements. Concept of co-branding

Module IV: Brand Performance and Branding strategies
Brand value chain, Brand equity management system. Brand hierarchy. Designing branding strategy. Brand extension: Concept, Advantages and disadvantages. Evaluating opportunities of brand extension. Branding strategy over PLC.

Module V: Managing Brands
Reinforcing Brands. Brands revitalization Managing brands internationally, advantages and disadvantages of global marketing. Standardization v/s customization. Global Brand strategy.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:
- Keller Kevin Lane, Strategic Brand Management: Building, Measuring and Managing Brand Equity, Second Edititon, Printice Hall.

References:
- Jean Noel Kampferer, Kogan Page, Strategic Brand Management, Second Edition
- Understanding Brands, Cowley D.

ADVERTISING AND SALES PROMOTION

Course Code: MGT2603 **Credit Units: 03**

Course Objective:
The objective of the course is to familiarize students with advertising concepts and strategies, the methods and tools used. Enabling them to develop advertising strategies and plans and to develop the judgment parameters required in product management, to evaluate advertising.

Course Contents:
Module I: Introduction
Role of Promotion in Marketing Mix. Components of promotion mix viz Advertising Publicity, Personal selling, Public relations and Sales promotion. Concept of integrated marketing communication.

Module II: Advertising
Need, scope objectives and importance of advertising, Strengths and Weaknesses of Advertising as a Promotion Tool, role of advertising in current market, advertising and society- latest trends in advertisements different types of advertisements.

Module III: Advertising Campaign Planning
Setting advertising goals and objectives- The DAGMAR Approach. Message strategies and tactics-Creative approaches, Copywriting and testing. Advertising copy design. Copy layout, Advertising appeals and themes, Classification of advertisement copies-Essentials of a good copy Ethics in advertising.

Module IV: Advertising Media and Agencies
Types of media, media planning and scheduling. Advertising budgets. Approaches to advertising budgeting. Measuring advertising effectiveness. Advertising business in India. Rural advertising. Legal and ethical aspects of advertising, Advertising and society. Advertising in international perspective.

Module V: Sales Promotion
Need, scope objectives and importance of sales promotion. Management of sales Promotion at the consumer, trade and sales force levels. Strengths and weaknesses of Sales Promotion.

Module VI: Sales Promotion Strategy
Planning and designing sales promotion programme with specific reference to sales contest, trade in discount coupons etc. sales display and merchandising. Latest trends in sales promotion.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Belch and Belch, Advertising and Promotion, Sixth Edition, Tata McGraw Hill

References:
- Batra Rajeev, Aaker, David A and Myere John G. Advertising Management, Fifth Edition, Pearson Education
- Advertising Management – Chunawalla

RETAIL MANAGEMENT

Course Code: MGT2604 **Credit Units: 03**

Course Objective:
Keeping in view the growth of retail industry, the course has been designed to familiarize students with the basics of retail industry and give them an overview about rural marketing practices.

Course Contents:

Module I: Introduction
Nature, scope and importance of retailing, retail competition theories, Retail management process, Influence of changing environment on retailing viz demographic changes, lifestyle changes, technology changes (e-business), Retail Environment.

Module II: Consumer Behavior in Retailing
Consumer Behavior in retailing, Buying decision process in retailing, Types of buying decision, market segmentation for retailing, generational cohorts.

Module III: Retail Marketing Strategy& Customer Service
Types of retailers, multichannel retailing, Retail strategy concept & its elements, Strategic retail planning process, Retail Pricing, Retail Promotion tool, Customer Loyalty Programme, global retailing growth strategies & international market entry strategies, Advantages through customer service, Customer evaluation of service quality, GAP model for improving service.

Module IV: Merchandise management
Retail Information system & supply chain management, Concept of merchandise management. Planning Merchandise – organizing buying process, developing an assortment plan, allocating merchandise to stores meeting vendors and establishing strategic relations with them, branding strategies for retail (e.g., private labels).

Module V: Store management & visual merchandising
Store layout & space planning, atmospherics, Choosing store location, visual merchandising, Recruitment, selection, Training, motivation, Compensation and Control of store employees.

Module VI: Rural Retailing
Introduction to rural retailing, Relevance, Importance and the Emerging Scenario of Rural markets, Major problem areas in rural retailing, Strategies for Rural Retailing, Social and sustainability aspects of rural retailing.

Examination Scheme:

Components	**P-1**	**C-1**	**CT-1**	**EE-1**
Weightage (%)	10	10	20	60

Text & References:
Text:
- Levy & Weitz, Retailing Management, Fifth edition, Tata McGraw Hill,
- Kashyap Pradeep, Raut Siddhartha, The Rural Marketing Book, 2006, Biztantra.

References:
- Retailing management, Swapna Pradhan, 3rd edition Tata McGrawhill.
- Retail Marketing Management, David Gilbert.
- Barry Berman & Joel R. Evans, Retail Management, A Strategic Approach, Ninth Edition, Pearson Education.

TERM PAPER

Course Code: MGT2631 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.
A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary business issue and the topic will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.
4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)
   - Credit rating
   - Risk management
   - Subprime meltdown and its after effect with case study from Indian industry
   - Corporate frauds
   - Micro finance institutions in India
   - Carbon Trading
   - IFRS
   - Celebrity Endorsement in real estate
   - Social media marketing
   - Green marketing
   - Sustainable branding practices
   - Relationship management
   - CSR
   - Balanced Score Card
   - Corporate Governance
   - Employee retention
   - NGOs.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT (WITH PRESENTATION & EVALUATION)

Course Code: MGT2632 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction	– 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario	– 25 marks
Chapter 3: Presentation, Analysis & Findings	-- 25 marks
Chapter 4: Conclusion & Recommendations	-- 10 marks
Chapter 5: Bibliography	-- 05 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report

Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings

Chapter 4: Conclusion and Recommendations.

Step V: The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for evaluation:

Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below:

- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bounded.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Evaluation Scheme:

Project Report	Power Point Presentation & Viva	Total
75 marks	25 marks	100

WORKSHOP

Course Code: MGT2633 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and the trainer may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

CORPORATE TAX PLANNING

Course Code: MGT2605 **Credit Units: 03**

Course Objective:
To provide understanding of Direct Tax including Rules pertaining there to and application to different business situations. To understand principles underlying the Service Tax and concepts of VAT.

Course Contents:

Module I: Introduction to Tax Management
Concept of tax planning, Tax avoidance and tax evasions, Corporate taxation.

Module II Income from business
Residential Status of companies, Taxable income under Business and Profession, Computation of Profit and Gains from business profession, Deemed business profits, Assessment of Retail Business, Deemed incomes (cash credit, unexplained investments, un explained money and other assets, unexplained expenditures, investments and valuable articles not fully disclosed in books of accounts).

Module III: Deductions allowed under business and profession
Deduction Expressly allowed section 30-35, Depreciation deduction calculation, Setoff and carry forward of unabsorbed depreciation section 32(2). Determining Actual Cost43(1), Set-off and Carry Forward Losses, Bonus or commission to employees section, Interest on borrowed capital, Insurance premium 36(1(i)), Employees contribution to provident fund, Bad debts 36, Revenue expenditure incurred by statutory corporation, Banking transaction tax, Security transaction tax, Commodity transaction tax, provision for adminisibility of general deduction 37(1),

Module IV: International accounting and Taxation
Analysis of foreign financial statement, Accounting standard: US GAAP, Indian GAAP, IAS, IFRS. Transfer Pricing – Meaning, measurement, strategic considerations Norms & Practices, tax havens, Double taxation agreement among countries, Tax implication of activities of foreign enterprise in India: Mode of entry and taxation respectively.

Module V: Indirect tax - concepts and general principles
Service tax - Charge of service tax and taxable services, Valuation of taxable services, Payment of service tax and filing of returns.
VAT – Introduction, Calculation of VAT Liability including input Tax Credits, Small Dealers and Composition Scheme, VAT Procedures, Central Sales Tax.

Module VI: Tax Planning and Financial Management Decisions
Tax planning relating to capital structure decision, Dividend policy, Inter – corporate, dividends and bonus shares, Tax provisions relating to free trade zones, Infrastructure sector and backward areas, Tax incentives for exports. Tax deductions and collection at source, Advance payment of tax.

Examination Scheme:

Components	P-1	C-1	CT-1	Attendance	EE1
Weightage (%)	10	5	10	5	70

Text & Reference:
Text:
- Lal & Vashisht, Direct Taxes, 29th Edition, Pearson

References:
- Singhania & Singhania, Income Tax, 39th Edition, Taxmann

BANKING AND FINANCIAL INSTITUTIONS

Course Code: MGT2606 **Credit Units: 03**

Course Objective:
The aim of the course is to orient the finance students to the change in the banking industry. The financial industry much like the computer industry is changing rapidly. The students will be familiarized with institutions of today and developing an understanding why they are the way they are, and why they are changing is the core aim of the course. An Indian perspective will be added but conceptually the Global frameworks will be used.

Course Contents:
Module I: Introduction
Money, Process of Capital Formation., Banking and Financial Institutions and economic development, Role of Development Banks in Industrial Financing.

Module II: Banking System & Operations.
Banking system and structure in India- Types of banks in operation and their functions, Retail and Wholesale Banking, Near Banks, Rural Banking. Cooperative Banking. Universal Banking, NBFCs-
International Banking- financing exporters and importers – Important ECGC Policies and guarantees governing export financing) Banking Operation: An overview Principles of Lending, Study of Borrowers & Project Evaluation Criteria

Module III: Banking Sector Reforms
Provisions of Banking Regulation Act, Prudential Norms - Narsimhan Committee Recommendations, Regulatory Institutions RBI & SEBI, Basle Committee Recommendations, Asset Liability Management in Commercial Banks.

Module IV: Insurance Institutions
Introduction to Insurance – Elements of Insurance Risk, Principles of Insurance, Types of Insurance – Life Insurance and General Insurance Products including unit linked plans, Re-insurance, Bancassurance- concepts, critical issues & functional aspects. Role of Insurance companies in Industrial Financing.

Module V: Financial Inclusion
Concept, Financial Inclusion in India: Challenges, Scope of Financial Inclusion in banking activities & financial services.
Micro Finance as a tool of Financial inclusion: Evolution: Grameen Model, Self Help groups.
Progress in India, Principles of microfinance- institutional structures and delivery mechanisms. Enforcement and savings

Module VI: Trends in Banking
Banking Innovations. Marketing of banking services; Banking Technology - Internet banking, ATMs, mobile banking; Banking Technology - ECS, debit, credit and smart cards
Securitization (SARFAECI Act, SPV, ARC)

Examination Scheme:

Components	P-1	C-1	CT-1	Attendance	EE1
Weightage (%)	10	5	10	5	70

Text & References:
Text:

- Khan,M. 3rd Reprint, 1998, Financial Institutions and Markets, Tata McGraw Hill Publishing Company Limited.

References:

- Cornett and Sauunders, 1999, Fundamentals of Financial Institutions Management, 1999 McGraw Hill Publishing Company Limited.
- Bhole L.M., Third Edition, Financial Institutions and Markets; Structure, Growth and Innovations, Third Edition. Tata McGraw Hill Publishing Company Limited.
- Patahak.V Bharati Second Edition, The Indian Financial System Pearson Education

ADVANCED CORPORATE FINANCE

Course Code: MGT2607 **Credit Units: 03**

Course Objective:
The basic objective of this course is to acquaint the students with the latest developments in the field of corporate finance. This course will be a step above Financial Management II where they will learn advanced topics related to behavioural finance, corporate restructuring & corporate governance

Course Contents:

Module I: Introduction
Objectives of Corporate finance. Shareholder wealth maximization. Agency Problems, Management Compensation & measurement of Performance

Module II: Valuation Concepts
Valuation Models, Application of Valuation Model, EVA/MVA, Balanced scorecard and other methods/measures of financial performance.

Module III: Corporate restructuring
Differential Efficiency & Financial Synergy: Theory of Mergers**,** Operating Synergy & Pure Diversification: Theory of mergers**,** Costs and Benefits of Merger**,** Evaluation of Merger as a Capital Budgeting Decision**,** Poison Pills,Turnaround Strategies, Tax Planning relating to mergers and Amalgamation

Module IV: Corporate Governance& Business Ethics
Implementation of Corporate Governance**,** Ethics and finance, Ethical practices in market place, corporate responsibility, social audit and ethical investing.

Module V: Behavioural Finance
Introduction and Expected Utility, Non-Expected Utility Preferences, A review of classical probability theory, Beliefs, Biases and Heuristics, Preferences and Anomalies in the Financial markets

Module VI: Strategic Cost management
Financial aspects of supply chain management, Operations management perspective on Costs, Strategic cost analysis (using activity based costing, target costing and life cycle costing) and product pricing at Different stages of product's life cycle

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Brealey and Myers, Priciples of Corporate Finance, Eighth Edition, Tata McGraw Hill Publishing Company Limited.

References:
- Ross, Westerfield and Jaffe, Seventeenth Edition, Tata McGraw Hill.
- Quiry, P., Dallocohio, M., YannLE Fur,.Antonio Salvi, Seventh Edition, John Wiley and Sons

INDUSTRIAL RELATIONS AND LABOUR LAW

Course Code: MGT2608 **Credit Units: 03**

Course Objective:
The objective of the course is to acquaint students with the origin and importance of Labour laws governing general functioning of employees in an organisation and also to educate student with the important provisions under these laws .This will enable them to develop the right perspective of this delicate responsibility to deal with union constructively and to maintain industrial democracy.

Course Contents:

Module I: Basic Concepts
Industrial Relations, Industrial Peace, Industrial unrest and Industrial Discipline

Module II: Laws Relating to Industry
The factories Act, 1948 - Definition - Approval licencing and registration of factories - Notice by occupier, Health, and welfare measures - weekly holidays. Leave with wages, Employment of women and young person - Penalties and returns. The Industrial Disputes Act, 1947 - Definition – conciliation, court of enquiry and voluntary process for the settlement of industrial disputes - power of the Govt. under ID Act - Instrument of economic coercion - Strike & lock out, Lay off Retrenchment, Transfer and closures - Discharge and Dismissal - Managements prerogative during pendency of proceeding – Work Committee, arbitration and adjudication.

Module III: Laws Relating to Remuneration
The Payment of Wages Act, 1936 - Definition - Rules for payment of wages and deductions from wage. The Minimum Wages Act 1948 - Fixing of minimum wages, Procedure for raising minimum wage - Concept of living wages, Fair wage and minimum wage. The Employees State Insurance Act 1948 - Definition - Applicability of the Act - Insurable workmen - Contribution Benefit - Penalties. The Employees Provident Fund and Miscellaneous Provisions Act, 1952 and Employees family pension scheme - definition - Coverage of the organization and employees under the Act - Employees Provident Fund and pension fund scheme - Calculation of contribution withdrawal of Provident Fund amount - Penalties for offence. The Payment of Gratuity Act, 1972 - Definition - Scope and Coverage of the Act - Eligibility criteria - Calculation of Gratuity Nomination. The Payment of Bonus Act 1965 - Applicability of Act - Coverage of employee - Calculation of bonus Rate of Payable bonus - available surplus - allocable surplus.

Module IV: Laws Relating to Trade Union
The Trade Union Act 1926. Statutory Definition - Registration of TU Immoduley granted to Registered Trade Union - Recognition of TU.

Module V: Compensation and Insurance
The workmen's compensation Act 1923 - Definition - Rules regarding workmen's compensation - Defense available to employer and employees, The Maternity Benefit Act 1961.

Module VI: Misc Acts
The Industrial Employment (standing order) Act 1946 - Scope and coverage of the Act - Concept of standing order - its certification process - Modification - interpretation and enforcement of standing orders.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:

- P L Malik, Handbook of Labour and Industrial Law Eastern Book Publication 9th Edition 2005

References:

- R. C. Chawla and K.C. Garg, "Industrial Law", Ludhiana, Kalyani Publishers, 1993.
- P.L. Malik, "Industrial Law", Lucknow, Eastern Book Co., 1995.19th edition reprinted 2006
- J.K. Bareja, "Industrial Law", New Delhi, Galgotia Publishing Co., 2001.
- M.Y. Pylee and George Simon, "Industrial Relations and Personnel Management", New Delhi, Vikas Publishing House, 1996.
- P. Subba Rao, "Essentials of Human Resource Management and Industrial Relations: Text, Cases and Games", Mumbai, Himalaya, 2000.
- S.C. Shrivastava, "Industrial Relations and Labour Laws", New Delhi, Vikas Publishing House, 2000 Fourth revised Edition. Reprinted 2006

PERFORMANCE MANAGEMENT SYSTEM

Course Code: MGT2609 **Credit Units: 03**

Course Objective:
This course will help students understand the significance of appraisal for an organization and individuals. It will develop an understanding of various Performance Appraisal tools and their applications and potential appraisal. Further it will develop a right perspective in them towards managing and improving performance.

Course Contents:

Module I: Overview of Performance Management
Employee Motivation & Needs (Vroom's & Adam's Theory of Motivation), Performance Appraisal: The past & the future, Human Resource Development & Performance Appraisal, Planning Performance & Role Clarity, Accountability and Effectiveness.

Module II: Process of Performance Appraisal
Measuring Performance Appraisal – Objectives & Indicators, Methods of Appraisal – Contemporary & Modern methods, Performance feedback & counseling, PMS.

Module III: 360 degree Feedback
Definition, methodology, advantages/disadvantages of Feedback, RSDQ Model, and Criteria for success, Experiences in 360 appraisals.

Module IV: Potential Appraisal
Concept, difference between performance appraisal and potential appraisal, Competency mapping & potential appraisal –case studies

Module V: Performance Management in application
Performance Management and development, Performance Management and Pay, Creating High Performance organization.

Module VI: Emerging Concerns & Performance Management
Appraisal for future – going beyond tangible performance, HR Scorecard.

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:

Text:
- T.V. Rao; Performance Management and Appraisal; Jaico Publication
- Dinesh K. Srivastava, "Strategies for Performance Management", New Delhi, 2005, Excel Books,

References:
- K Aswathappa; Human Resource and Personnel Management; McGraw- Hill Companies
- Desimone; Human Resource Development Thomson Learning

COMPENSATION AND REWARD MANAGEMENT

Course Code: MGT2610 **Credit Units: 03**

Course Objective:
The objective of this course is to familiarize students with the dynamics of wage and salary administration and current trends in India.

Course Contents:
Module I: Introduction
Overview of Compensation Management, Wage and Salary Administration – Nature, Importance, Philosophy, Objectives, Definition, Goals Role of various parties – Employees, Employers, Unions & Government and Legislations for compensation.

Module II: Developing Compensation Programs
Job Evaluation, Basic systems Time wage, Piece wage, Incentives, Wage payments and Total Salary Structure, Compensation Surveys, Hay Plan, Developing Competitive Compensation Programs, Developing Salary Structures

Module III: Derivatives of Compensation
Pay for Performance, Merit pay and Performance Appraisal, Performance based rewards, Performance Criteria Choices, and Competency Mapping & Developing Performance Matrix, Performance based Compensation Schemes.

Module IV: Incentive Plans
Incentive Plans: individual and group incentive plans, Productivity Gain sharing plans, Profit Sharing Plans, Non - Financial and Financial incentives, Measuring Cost- to – Company (CTC).

Module V: Employee Benefits
Employee Benefits: Supplemented Pay benefits (pay for time not worked) insurance benefits, Retirement benefits, Employees' service benefits, Introduction to ESOPs, Flexible benefits and Benefit Surveys.

Module VI: Current Trends
Current Trends in Compensation and Reward Management

Examination Scheme:

Components	CT	HA	C	V	A	EE
Weightage (%)	10	5	5	5	5	70

Text & References:
Text:
- Garry Dressler, "Personnel / Human Resource Management", London, Prentice Hall, 1994.
- William B. Werther Jr. and Keith Davis "Human Resource Management". New Jersey: McGraw Hill. (1993)
- Milkovich & Newman, Compensation, Irwin/McGraw-Hill 8th Ed.

References:
- Frans Poets, The Art of HRD – Job Evaluation & Remuneration, Crest Publishing, Volume7 1st Edition
- Michael Armstrong, Helen Murlis, The Art of HRD – Reward Management, Crest Publishing
- Michael Armstrong, Employee Reward, (University Press)
- P. Zingheim, The New Pay, Linking Employee & Organization Performance, Schuster, (Jossey-Bass)
- Sara Rynes, Compensation in Organization, Gerhart (Jossey BASS)
- Wendell L French, "Human Resource Management", USA, Houghton Mifflin Company, 1994.
- David D. Decenzo and Stephen P. Robbins, "Human Resource Management", New Delhi, Prentice Hall, 3rd Edn., 1988.

Syllabus - Seventh Semester

HUMAN RIGHTS LAW

Course Code: LAW2701 **Credit Units: 05**

Course Objective:

Learning about human rights is largely cognitive, including human rights history, documents, and implementation mechanisms. All segments of society need to understand the provisions of the UDHR and how these international standards affect governments and individuals. They also need to understand the interdependence of rights, both civil and political and social, economic, and cultural. The course analyses International instruments on human rights, provisions of the Indian Constitution and protection of Human Rights Act emphasizing the role of NHRC and HRC. The Course include the study on the role of media, NGO and Human rights education at the grass root level to protect the basic rights of the people.

Course Contents:

Module I: The concept of Human Rights
Theoretical foundations of Human Rights- meaning, basic concept and origin of Human Rights,-Sources and significance of Human Rights-Different definitions of Human Rights-Classification of Human Rights.-Theories of Human Rights- Historical development of the concept of Human Rights-Concept of natural law and the concept of natural Rights- Human Rights in legal tradition-International law and National law.

Module II: UN and Human Rights
International documents related to Human Rights- Universal declaration of Human rights- Individual Rights and Group Rights- Significance and limitations- International Covenant on Civil and Political Rights,1966-International Covenant on Economic, Social and Cultural Rights,1966- Specific Conventions dealing with Human Rights-Importance and binding effect of above documents on the member countries of UN-Impact and implementation of Human Rights norms in India-Human Rights norms reflected in the Fundamental Rights under the Constitution of India- Directive principles legislative and administrative implementation of Human Rights norms-Implementation of Human Rights norms through judicial process. Regional arrangements –EU- Inter American System.

Module III: Human Rights under the Constitution and Different legislation in India
Provisions to ensure Human Rights to woman and children in India-Human Rights granted to Scheduled Castes and Scheduled Tribes and other socially and economically backward communities-Human Rights of prisoners

Module IV: Enforcement of Human Rights
Organs under the UN- International commissions of Human Rights- Amnesty International- American system and European system-Role of the Judiciary in India- Statutory Commissions- Woman's Commission- Minority Commission- SC/ST Commission.

Module V: Human Rights Commissions and Human Rights
Protection of Human Rights Act,1993- National Human Rights Commission- State Human Rights Commisions- Role of Media- Role of NGO's- Human Rights Education

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Jack Donnelly, Universal Human Rights in Theory and Practice (Cornell University Press, 2013)
- David P. Forsythe, Encyclopedia of Human Rights: Vol. 1 (Oxford University Press, 2009)
- Beth A. Simmons, Mobilizing for Human Rights: International Law in Domestic Politics (Cambridge University Press, 2009)
- D.D. Basu, Human Rights in Constitutional Law, Lexis Nexis, 2008 (3rd Edn)
- Upendra Baxi, The Future of Human Rights, Oxford University Press, 2012 (3rd
- Edn)
- Thomas Buergenthal, International Human Rights in a Nutshell, West Publisher
- Company, 2009 (4th Edn)
- Henry Steiner & Philip Alston, International Human Rights in Context: Law,
- Politics, Morals: Text and Materials, Oxford University Press, 2008
- S. K. Kapoor, International Law and Human Rights, Central Law Agency, 2014
- M. K. Sinha, Implementation of Basic Human Rights, Lexis Nexis, 2013

ENVIRONMENTAL LAW

Course Code: LAW2702 **Credit Units: 05**

Course Objective:
This paper provides the study of environmental laws covering legislations related to it and protection of forest and wild life.

Course Contents:

Module I: Environmental Law: International and National Perspective
Introduction: Environment and Environment Pollution: Problem and prospects; constitutional Perspective :Right to Evolution and Application, Co relation between: Directive Principles of State Policies and Fundamental Degrees, Fundamental Rights and Directive Principles of State Policy; International Norms :Sustainable Development :Precautionary Principle, Polluter Pays Principle, Agenda 21, Inter generational equity, Public Trust Doctrine, Principle of no fault liability : Absolute Liability; Environment Protection through Public Interest Litigation, Remedies under various other laws.

Module II: Prevention and Control of Water and Air Pollution
The Water (Prevention and Control of Pollution) Act, 1974:Water Pollution : Definition, Central and State Pollution Control Boards: Constitution, Powers and Functions, Water Pollution Control Areas, Sample of effluents : Procedure; Restraint order, Consent requirement : Procedure, Grant/Refusal, Withdrawal, Citizen Suit Provision; Air (Prevention and Control of Pollution) Act, 1981: Air Pollution: Definition, Central and State Pollution Control Boards: Constitution, Powers and functions, Air Pollution Control Areas; Consent Requirement : Procedure, Grant/Refusal, Withdrawal, Sample of effluents – Procedure; Restraint order.

Module III: Protection of Forests and Wild Life
Indian Forest Act, 1927: Kinds of forest: Private, Reserved, Protected and Village Forests, The Forest (Conservation) Act, 1980; The Wild Life (Protection) Act, 1972: Authorities to be appointed and constituted under the Act, Hunting of Wild Animals, Protection of Specified Plants, Protected Area, Trade or Commerce in wild animals, animal articles and trophies; Its prohibition.

Module IV: Special Environmental Legislations
Environmental (Protection) Act, 1986, Public Liability Insurance Act, 1991, The National Environment Tribunal Act, 1995, The National Appellate Environmental Authority Act, 1997.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Environmental Law & Policy in India – Shyam Diwan, Armin Rosencranz
- Environmental Law in India – P. Leelakrishnan
- PIL and Environmental Protection-Geetanjali Chandra
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The IndianForest Act, 1927
- The Forest (Conservation) Act, 1980
- The Wild Life Protection Act, 1972
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The National Environment Tribunal Act, 1995
- The National Environment Appellate Authority Act, 1997

JURISPRUDENCE

Course Code: LAW2703 **Credit Units: 05**

Course Objective:
The objective of the course is to create an understanding of basic legal concepts and provide an insight to the student into philosophical, ideological and theoretical foundations of the discipline of law with special reference to Indian legal system.

Course Contents:

Module I: Introduction
Nature and scope of Jurisprudence**,** State, Sovereignty and Law: Sources of Law: Custom, Precedent, Legislation, Equity.

Module II: Schools of Jurisprudence – I
Natural Law, Analytical positivism, Pure Theory, Historical Jurisprudence, Sociological Jurisprudence, Economic Approach, Legal Realism, Theories of justice: Aristotle, Rawls, Distributive Justice in India.

Module III: Concepts of Rights and Duties
Rights and Duties, Types, Theories, Critique of Rights and Duties, Contemporary issues in Rights.

Module IV: Concepts of Ownership and Possession:
Evolution of concept of possession, ownership, Essentials of ownership, Corpus and Animus, Res Nulius and Res Possessionis

Module V: Indian Perspectives in Jurisprudence
Classical and Medieval Influences, Modern Trends study with reference to judicial pronouncements with state policy.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Bodenheimer, Jurisprudence – The Philosophy and Method of Law (1996), Universal, Delhi.
- Fitzgerald, (ed.) Salmond on Jurisprudence (1999) Tripathi, Bombay
- W. Friedmann, Legal Theory (1999) Universal, Delhi
- V.D. Mahajan, Jurisprudence and Legal theory (1996 re-print), Eastern, Lucknow
- M.D.A. Freeman (ed.) Lloyd's Introduction to Jurisprudence, (1994), Sweet & Maxwell
- Paton G.W. Jurisprudence (1972) Oxford, ELBS
- H.L.A. Hart, The Concepts of Law (1970) Oxford, ELBS
- Roscoe Pond, Introduction to the Philosophy of Law (1998 Re-print) Universal, Delhi
- Dias, Jurisprudence (1994 First Indian re-print), Adithya Books, New Delhi
- Dhyani S.N., Jurisprudence: Jurisprudence and Indian Legal theory
- Dhyani S. N., Fundamentals of Jurisprudence
- Jayakumar N. K., Lectures in Jurisprudence, Butterworths
- Justice Markandey Katju, Law in the Scientific Era, Universal
- Justice J. S. Verma, Dimensions of Justice, Universal
- Justice Rama Jois, Seeds of Modern Public Law in Ancient Indian Jurisprudence
- Justice Rama Jois, Eternal Values in Ancient Law.

PUBLIC INTERNATIONAL LAW

Course Code: LAW2704 **Credit Units: 05**

Course Objective:
The objective of this paper is to provide knowledge to the students regarding the Public International Law to enable them to deal with the transnational legal order.

Course Contents:

Module I: Introduction
Definition and Basis of International Law, Subjects of International Law, Relationship between International Law and Municipal Law.

Module II: Sources of International Law
Custom, Treaties, General Principles of law, Juristic Works, General Assembly Resolutions, Other sources (Conventions).

Module III: State Recognition, State Jurisdiction and Law of the Sea
State Recognition: Recognition of states, Recognition of governments, *De facto* and *De jure* Recognition, Types of Recognition: Implied Recognition, Conditional Recognition, Collective Recognition; Withdrawal of Recognition, The legal effects of recognition; **State Jurisdiction:** Basics of Jurisdiction, Principles of Jurisdiction, Exemption from Jurisdiction: Diplomatic ImmModuleies and Privileges, Armed Forces, Public Ships; **Law of the Sea:** First and Second Law of the Sea Conventions :Third Law of the Sea Convention {UNCLOS III (Moduleed Nations Convention on the Law of The Sea), Maritime Zones; Territorial Waters, Contiguous Zone, Exclusive Economic Zone, Continental Shelf High Seas; Sea Bed Authority, Deep Sea Bed Mining and International Sea – Bed Area.

Module IV: Conflict Resolution, War and Neutrality of States
Modes of Settlement of Disputes: Peaceful means, Coercive means; War: Laws of War, Humanitarian Laws: Rules of neutrality.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Oppenheim, International Law, Vol. – 1.
- J.G. Strake, Introduction to International Law.
- Grieg, International Law.
- R.C. and Hingorani, Modem International Law.
- H.O. Aggarwal, International Law.
- S.K. Kapoor, International Law.
- Bowell, The Law of Internationals Institution.
- Verma, S.K., An Introduction of Public International Law.

ARBITRATION ANDALTERNATE DISPUTE RESOLUTION

Course Code: LAW2705 **Credit Units: 05**

Course Objective:
The course material imparts to the students an understanding of the concept of alternate methods of resolving disputes in addition to the traditional court oriented processes. It focuses on an analytical study of arbitration law and practice in India and the relevant institutions monitoring the same. The paper also focuses on other alternate dispute resolving mechanisms through State mediatory services under the supervision of the courts.

Course Contents:

Module I: Introduction
Alternative Dispute Resolution (ADR): Concept and Need and International and National initiatives in India; IIC, UNCITRAL, KSID.
Arbitration and Conciliation Act, 1996
General Provisions, Definitions, receipt of written communications, waiver of right to object, extent of Judicial Intervention, Administration Assistance; Arbitration agreement, power to refer parties to arbitration where there is an arbitration agreement, Interim measures by court.

Module II: Composition of Arbitral Tribunal
Composition, Jurisdiction, Conduct of Arbitral Proceedings: Settlement, form and contents of arbitral award, termination of proceedings, correction and interpretation of awards, additional award.

Module III: Recourse against Arbitral Award
Application for setting aside Arbitral Award, Finality and enforcement of Arbitral Award, appealable orders, Miscellaneous, Deposits, Lien on Arbitral Award and Deposits as to costs, Arbitration agreement not to be discharged by death of party thereof, Provisions in case of insolvency, Jurisdiction, limitation, Limitations, Enforcement of certain Foreign Awards.

Module IV: Techniques of ADR – I
Negotiation / Consultation, Mediation, Good offices, Conciliation: Nature, Scope and Methods.
Legal Services: Meaning and scope in Legal Aid and Advice, Lok Adalats-nature, scope, procedure and functioning.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Rao, P.C., Arbitration and Conciliation Act, 1996, Universal Law Book Co., Pvt. Ltd., (1997)
- Rao P.C. & Sheffield William, Alternative Dispute Resolution
- Sujan, M.A., Law relating to Arbitration and conciliation.
- Kawatra, G.K., The New Law of Arbitration and conciliation
- Chaudhary, S.K. Roy, Law of Arbitration Conciliation, 4th Ed. Eastern Book
- Saharay H.K., Law of Arbitration (197) (Revised Print)

Statutory Material:
- Arbitration and Conciliation Act, 1996.
- Legal Services Authority Act, 1987.
- UNCITRAL

INDIAN FEDERALISM

Course Code: LAW2706 **Total Credit: 5**

Module 1: Concept of Federalism; Multi-Culturalism and Preservation of Separate Identities in a common political community; Sociological Roots of federalism in a Diverse Society like India

Module 2: Different Tiers of Governance; Distribution of Responsibilities; Shared Rule – Self Rule Concept; Differences over Distribution of Functions; Resolution of Conflicts

Module 3: Fiscal Federalism; Fiscal Imbalance and Fiscal Equalisation;

Module 4: Formation of Indian states; Urban and Rural Local-governing bodies and decentralized governance (Panchayat Raj, in India)

Module 5: Patterns of federal government - U.S.A., Australia, Canada, India, Plural aspects of Indian Federalism: Jammu & Kashmir, Punjab, Assam.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text and References:

- Michael Burgess Comparative Federalism: Theory and Practice, 2006
- Ronald Watts, Comparing Federal Systems, 1999
- Daniel Elazar, Exploring Federalism, 1987
- Rasheeduddin Khan, Federal India: A Design for Change, 1992
- Akhtar Majeed, Federal India: A Design for Good Governance, 2005
- Granvile Austin, Working A Democratic Constitution, 1999
- BPR Vithal and M L Sastry, Fiscal Federalism in India, 2001
- Duchacek, Ivo, Comparative Federalism: The Territorial Dimensions of Politics, New York:
- Hort, Rinchart and Winston, Inc., 1970.
- Elazer, Daniel J., ed., Federal Systems of the World: A Handbook of Federal , Confederal and
- Autonomy Arrangements (2nd edition), Essex: Longman groups, 1994.
- Ghai, Yash ed., Autonomy and Ethnicity: Negotiating Competing Claims in Multi-Ethnic States,
- Cambridge: Cambridge University Press, 2000.

FORENSIC SCIENCE-I

Course Code: LAW2707 **Credit Units: 05**

Course Objective:

Forensic Science is science related to the law. It is the scientific method of gathering and examining information about the past which is then used in a court of law. It is applied science and consists of a range of different disciplines which often require different underpinning science knowledge. It continues to evolve and is now applicable to crime disruption and crime prevention as well as crime detection and the identification of victims in mass disasters.

The course focuses on the following objectives:
1. Developing an understanding and appreciation for the Forensic Sciences.
2. Brief description of crime scene investigation alongwith its various techniques and significance of physical evidences.
3. Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountetred.
4. Developing an understanding of handwritting and typewritting alongwith its analysis.

Course Contents:
Module I: Introduction to Forensic Sciences
Brief description of Forensic Sciences, historical development of forensic sciences in India and forensic lab, laws and principles of forensic science, mobile forensic units their distribution in India.

Module II: Crime Scene Investigation
Definition, types- mobile, indoor and outdoor crime scene, various searching techniques used for locating physical evidence at crime scene, recording the scene , reconstruction of crime scene- modus operendii, role of investigating officer.

Module III: Physical Evidences in Forensic Science
Definition, collecting, packaging, prevention and forwading of evidences, fingerprint its characterstics, classsification, developmental techniques- chemical developmental techniques.

Module IV: Introduction to Questioned Documents
Questined documents, types, disputed documents, security documents, bank notes, tampered documents, age of the documents and ink analysis, examinations of the fake currencies, instrumentations.

Module V: Handwriting and Typewritting Analysis
Handwritting identification forged and disguises handwritting, typewritting identification, general equipments for examinations

Module VI: Tool marks and other impressions
Definitions, types and decipherment of tool marks and techniques; examination of tool marks; introduction to tyre marks: its nature and types, skid marks tread marks; footprints and shoeprints types significance and examinations.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Sharma. B.R., Forensic Science in Criminal Investigations and trials (3rd Edn) Universal Law Publishing Co. Ltd
- Nath.S, Fingerprint Identification CRC Press 2nd Edn, 2002
- Fisher, B, Techiniques of Crime Scene Investigation 6th Edn CRC Press,
- Albert, S. Osborn, Questioned Documents, 2nd Edn, Universal Law Publishing Delhi, 1998

OFFENCES AGAINST CHILD AND JUVENILE OFFENCE
HUMAN RIGHT LAW

Course Code: LAW2708 **Credit Units: 05**

Course Objective: To impart knowledge and expertise in legal and social issues relating to juvenile justice system in India, and sensitize about juvenile crimes and justice delivery system.

Course Contents:

Module I: Definition and concepts of term child and Juvenile. Causes of offence against child, International protection to child and convention, Offences against Child, Child abuse, Child labour and forced labour , Kidnapping, abduction , Abetment of suicide of child, Sale of obscene objects to young.

Module II: Concepts of: juvenile in conflict with laws, neglected juvenile, Determining factors of juvenile in conflict with laws: differential association, anomie, economic pressure, peer group influence, gang sub-culture, and class differentials.

Module III: Legislative Approaches , Constitutional provisions, Relevant provisions of the Juvenile Justice (Care and Protection of Children) Act, 2000, Relevant provisions of Protection of Children from Sexual Offences Act, 2012.

Module IV: Child and Criminal Liability, Crimes committed by child, Crimes committed by others in relation to children, Implementation of social policy through criminal sanctions in relation to child, Variation of procedure in case of child offender, Judicial proceedings in criminal cases relating to children, Protection of Children from Sexual Offences.

Module V: Judicial Contribution and Preventive Strategies, Social action litigation concerning juvenile justice, recent judicial decisions, Role of legal profession in juvenile justice system, State welfare programs: health, nutrition, ICWS, grant-in-aid, and compulsory education, Role of community, family, voluntary bodies, and individuals.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Bhattacharya, S.K.; Juvenile Justice: An Indian Scenario; Regency Publications
- Kumar, K. and Rani, Punam; Offences Against Children: Socio Legal Perspective; Regency Publications
- Josine Junger-Tas and Decker, Scott H.; International Handbook of Juvenile Justice; Springer
- Dunkel, Frieder; Juvenile Justice Systems in Europe: Current Situation and Reform Developments; Forum Verlag Godesberg

LAW AND MEDICINE-I

Course Code: LAW2709 **Credit Units: 05**

Course Objective:

The course aims to provide the students the knowledge about the interrelationship between law and medicine and complex legal and ethical issues involved in the field of medicine and medical profession. The course include the doctor-patient relationship and its legal dimensions, medical negligence, socio-legal issues involved in the new technologies in medical science and biotechnology as well. As medico-legal issues became a consumer issue as well as a fundamental rights violation the course will help the students to have knowledge in laws related to medicine and analyse the issues in a better way.

Course Contents:

Module I: Introduction
Inter-relationship between law and medicine-issues involved and legal control- Doctor-Patient relationship- Constitutional perspective and penal provisions- Indian penal Code- Directive principles- Right to life- Right to health and emergency medical care.

Module II: Regulation of medical and Paramedical profession
Medical profession in India- Para medical profession- Regulatory authorities- Self regulation- medical Ethics- WHO declarations- Declaration of Geneva- Helsinki declaration- Regulatory authorities created by statutes- Regulations under medical Degrees Act, 1916- Pharmacy Act, 1948- Indian medical Councils Act- education regulations- Medical Council of India- Disciplinary Control- Hospital and research centers- Responsibility to patients- Duty to take care- Medical examination- Informed consent- Confidentiality- Access to medical records.

Module III: Liability of Professional Negligence
Medical negligence- Negligence in diagnosis, treatment- Duty to warn- Civil negligence and criminal negligence- Vicarious liability- negligence of students and nurses- Liability of Doctors and Hospitals under the Consumer protection Act, 1986.

Module IV: regulation of Manufacture, Storage and sale of Medicines
Drugs and Cosmetic Act, 1940-Production, storage and sale of drugs- Advertisement drugs and Magic remedies Act, 1954- penalties.-Access to medicine and Public health.

Module V: Medical Science and Technologies
Boitechnology-Bioethics-Genetic Engineering- Cloning-Human genome project- Biomedicine Convention- Invirto fertilization(IVF)- Selective reproduction- Surrogacy- Euthanasia- abortion- Medical termination of pregnancy Act- Indian penal Code-Stem cell therapy and research- Transplantation of Human organs- Organ Transplantation Act, 1994- Human Subjects Research- Helsinki declaration- Schedule Y, Drugs and Cosmetic Act1940- ICMR Code- AMA code of Ethics- WHO Good Clinical Practices.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Vijay Malik – Drug and Cosmetic Act, 1940, Eastern Book Company, 24th Edition, 2014
- Anoop K. Kaushal – Medical Negligence & Legal Remedies, Universal Publishing House, 2nd Edition, 2004
- Dr. Jagdish Singh – Medical negligence Compensation, Bharat Law House, 3rd Edition, 2007

- P K. Dutta – Drug Control, Eastern Law House, 3rd Edition, 1997.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries.* New York:
  Oxford University Press, 2005.
- Annas, George J. Michael A. Gordin. *The Nazi Doctors and the Nuremberg Code: Human Rights in*
  Human Experimentation. New York: Oxford University Press, 1995.
- Dworkin, Ronald. *Life's Dominion: An Argument about Abortion, Euthanasia, and Individual Freedom.*
  New York: Alfred A. Knopf, 1993.
- Dr. Lily Srivastava, Law & Medicine (Universal Law Publishing, 2006)
- W. Noel Keyes, Bioethical and Evolutionary Approaches to Medicine and the Law (American Bar Association, 2007)
- Cynthia Ho, Access to Medicine in the Global Economy: International Agreements on Patents and Related Rights (Oxford University Press, 21-Apr-2011)

SUMMER INTERNSHIP EVALUATION-III

Course Code: LAW2735 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Eighth Semester

INVESTMENT AND COMPETITION LAWS

Course Code: LAW2801 **Credit Units: 05**

Course Objective:
This paper focuses on the investment and competition laws of India inn the contest of new economic order.

Course Contents:

Module I: Competition Law
Background, Prohibitions, Competition Commission of India.

Module II: Corporate Finance and regulatory framework
Security Contract (Regulation) Act 1956, SEBI Act 1992, Depositories Act 1996, The Securitisation and Reconstruction of Financial Assets and enforcement of security Interest Act, 2002.

Module III: Regulatory framework for foreign trade, multinational companies
Foreign Trade (Development & Regulation) Act 1992, UNCTAD Draft Model on Trans – national Corporations, Control and regulation of foreign companies in India, Foreign collaborations and joint ventures.

Module IV: Foreign Exchange Management
Background, Policies, Authorities.

Module V
Role of Information Technology in the investment market, functioning of demat A/c portal. Investment through internet and virtual banking.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Competition Act 2002
- Security Contract (Regulation) Act 1956
- SEBI Act 1992
- Depositories Act 1996
- Foreign Trade (Development & Regulation) Act 1992,
- Foreign Exchange Management Act, 1999
- Taxman’s Student’s Guide to Economic Laws

TAXATION LAW

Course Code: LAW2802 **Credit Units: 05**

Course Objective:
Power to tax has been described as the power to destroy. This idea is being floated often whenever the State introduces a new tax. Is this true? Is it not necessary that in order to raise revenue and place the economy on solid foundation, the taxing power should be conferred on the State? The power to tax shall not go unregulated. In this context of a federal structure the distribution of the taxing powers assumes added significance. Obviously, a study of the Constitutional framework on taxation becomes important. Along with this, an analysis of the different laws enacted in exercise of these powers with their safeguards and remedies sheds light on the mechanics of the taxation by the Union and the States.

Course Contents:

Module I: General Principles of Taxation Laws
History and Development of Tax Laws in India, Fundamental Principles relating to Tax Laws, Taxing power and constitutional limitations, Distinction between: Tax, Fee and Cess; Tax avoidance and Tax evasion .

Module II: Basic concepts of Income Tax
Income, Previous Year, assessment Year, Person, Assesee and Total Income, Income not included in the Total Income. Residential status, Clubbing of Income, Tax planning, Rate of Income Tax, Heads of Income, Salaries, Income from House Property, Income from Business or Profession, Capital Gains, Income from Other sources, Deductions under the Income Tax Act, 1961, Income Tax Authorities: Power and Functions, Filing of returns and procedure for assessment, Offences and Penal Sanctions .

Module III: Value Added Tax
Meaning and importance of VAT, Difference between VAT and Sales Tax, West Bengal Value Added Tax Act, 2003, Criticisms and limitations of Vat system.

Module IV: Service Tax
Taxable Service, Meaning and importance of Service Tax, Valuation of Taxable Service, Offences and Penalities.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Iyengar, Sampath (1998), Law of Income Tax New Delhi, Bharath Law House.
- Jain, Narayan (2004) How to Handel Income Tax Problems, Book Corporation.
- Palkivala, N.A. (1999), The Law & Practice of Income Tax, Nagpur: Wadha Publication.
- Parameswaran, K. (1987), Power of Taxation under the Constitution, Eastern Book Company.
- Sharma, Remesh (1998), Supreme Court on Direct Taxes, New Delhi: Bharath Law House.
- Singh S.D. (1973), Principles of Law of Sales Tax, Eastern Book Company.
- V. Ramachandran & T.A. Ramakrishnan (eds.) (2000), A.N. Aiyar's Indian Tax Laws, Chennai: Company Law Institute of India Pvt. Ltd.

INTERPRETATION OF STATUTES

Course Code: LAW2803 **Credit Units: 05**

Course Objective:
Judicial interpretation involves construction of words, phrases and expressions. In their attempt to make the old and existing statutes contextually relevant, courts used to develop certain rules, doctrines and principles of interpretation. The course material seeks to impart to the students, the necessary skills to interpret the statutes with a judicial mind set.

Course Contents:

Module I: Rules of Interpretation
Commencement, repeal and revival of a statute; Rules of interpretation: Liberal rule, mischief rule and golden rules, Harmonious construction.

Module II: Principles of interpretation
Ejusdem of Generis, Noscitur – A Socius, Reddendo Singula Singlis., Expressio Unius Est exclusion Alteriu, UI Res Magis Valent Quam Pereat, Contemporanea Espositio Est Optima Et Protissima Lege.

Module III: Internal Aids to Interpretation

Module IV: External Aids to Interpretation

Module V
Construction of Penal Statutes, Mens rea in statutory offences, Principles to be applied in interpreting the Constitution, Strict construction of taxing statues and its limitations.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Maxwell, Interpretation of Statutes.
- Sarup, Interpretation Statues.
- G.P. Singh, Principles of Statutory Interpretation.
- V.P. Sarathi, The Interpretation of Statutes.
- Bindra, Interpretation of Statutes.

INTERNATIONAL TRADE LAW

Course Code: LAW2804 **Credit Units: 05**

Course Objective:
To acquaint the Students about the basic aspects of International Trade Law, including the WTO and it's different principles and Agreements.

Course Contents:

Module I: Contract of Sale
Uniform Rules on Contract of Sale, Types of Sale Contract - CIF, FOB, C & F Contract, Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856, International Conventions Governing Bill of lading
Addition of Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856 and International Conventions Governing Bill of Lading in Module I.
Addition of Background Role and Structure of WTO, and difference between GATT & WTO in Module IV

Module II: Payment for International Sales
Letters of Credit, Bills of Exchange, and function and connected issues.

Module III: Settlement of Disputes
Arbitration, Enforcement of Arbitral Awards.

Module IV: World Trade organization (WTO) and General Agreement on Tariffs and Trade (GATT)
Background of formation of WTO, Role of WTO in International Trade, Difference of GATT and WTO, Structure of WTO.
Basic Principles: MFN, Treatment, National Treatment and Non-Discrimination, Exceptions to MFN : Tariff Bindings, Regional Trade Agreements, Escape Clause, Safeguard Measures, Quantitative Restrictions, Anti-dumping and counter-vailing duties.

Module V: WTO and Multilateral Agreements
Trade Related Investment Measures (TRIMS), General Agreement on Trade in Services (GATS), Trade Related aspects of Intellectual Property Rights (TRIPS).

Module VI: Dispute Settlement Mechanism under WTO

Evaluation Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:

- Basic Texts of GATT and WTO.
- Jackson, John, H. (1997) Law of International Trading System, The MIT Press.
- Jackson, John, H. (1997) World Trade and Law of GATT, The MIT Press.
- Dam, K. W. (1970) The GATT Law and International Economic Organisations, Chicago University Press
- Koul, A.K. (2001) World Trade Organisation, Satayam Publication.
- Internet Sources :www.wto.org, www.uncitral.org.
- Text of the Indian Arbitration and Conciliation Act, 1996.

LAND LAWS

Course Code: LAW2805 **Credit Units: 05**

Course Objective:
The legislative power to make laws relating to land and land ceiling is in the state list. Different States have enacted their own laws on this subject. The Constitutional perspectives relating to this subject have to be taught as an essential part of this course. The provisions in the Constitution in Part III, IV and XII as well as those in Schedule VII relating to distribution of legislative powers over land are essentially to be taught with emphasis.

Course Contents:
Module I: Punjab Land Revenue Act1887(Applicable over Punjab and Haryana),Definition of Key Words, Revenue Officers: Their Power and Functions, Preparation of Revenue Record: Like Documents of Jamabandi, Girdawari, Mutation, Intkaal, SijraNasab (Pedigree Table) Sirjra Axe(Map of the Village), Assessment of Land Revenue, Collection of Land Revenue, Concepts & Procedure of Partitions.

Module II: Punjab Land Revenue Act,1887:
Records-Of-Rights and Annual Records, Collection Of Land Revenue, Recovery of other Demands by Revenue-officers, Partition, **Assessment** and other relevant provisions.

Module III: Haryana Rent Control Act, 1973
Definitions (Sec. 1-4), Rights & Duties of Tenants, Rights and Duties of Landlords, Grounds of Ejectment of Tenants.
Haryana Panchayati Raj Act ,1994 (Sec. 1 to 54) (Chapter 1 to 6) Definition of Key Words, Constitution of Gram Sabha and Gram Panchayat, Gram Panchayat's Duties, Functions and Powers, Finance and Taxation, Control of Gram Panchayat, Sources of Income and Expenditure of Gram Panchayat.

Module IV: Haryana Panchayati Raj Act 1994,
PanchayatiSamiti (Chapter 7 To 11) And Sec. 55 To 116) Definition of Key Words, Conduct of Business of PanchayatSamities, Servant of PanchayatSamities, Duties and Powers of PanachayatSamiti, Finance and Taxation, Sources of Income of PanchayatSamiti, Control of PanchayatSamiti

Module V: Delhi Land Laws
Real Estate Development and Apartment ownership
Delhi Apartment Ownership Act, 2009,

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, poverty and development, Prof. M.L. Upadhayay.
- Upendra Baxi, Towards a Sociology of Indian Law, pp. 25-65 (1986)
- Atul Kohli, The state and Poverty in India (1987)
- Francine R. Frankel, India's Political Economy, 1947-77 (1988)
- L.H. Rudolph and S.H. Rudolph, The Political Economy of Lakshmi (1987)
- Mohammad Ghouse, "Nehru and Agrarian reform" in Rajeev Dhavan and Thomas Paul (eds.)
- Nehru and the Constitution (1992), Thripathi
- Walter C. Neale, Developing Rural India Policies and Progress (1990) Allied
- Alice, Jacob, Land Reform and Rural Change 6-19 (1992), Land Reforms in India: a Review.
- IASSI quarterly 1992, Vol. X, Numbers 3 and 4.
- B.R. Beotra, Law of Forests (Central and State) 6th Edition 1999, The Law Book Company.
- A. Krishnan, Forest Laws in India, 1998, Asia Law House
- Srivastava, Encyclopedia on forest, 1998, Asia Law House
- Padala Rami Reddy, Forest Laws, 1989, Asia Law House Baden Powel, Manual of Jurisprudence for Forests Officers (1982)

WOMEN AND CRIMINAL LAW

Course Code: LAW2806 **Credit Units: 05**

Objectives: Women had suffered in the society since centuries and even after 50 years of Adoption of the Constitution, for women, equality appears to be a distant mirage to be reached. Effective political representation of women in Legislature and other forums too has become a difficult proposition to be acceptable. Breach of her personality, through various forms of violence, too has not subsided. The course intends to educate about the legal provisions enacted to ameliorate these situations with special emphasis on Indian Municipal Law, its scope and to evaluate the existing provisions.

Module-I
Women in Pre-Constitution Period: Social and Legal Inequality; Social Reform Movement in India; Legislative response in India. Women & children in Post-Constitution Period, Provisions of Constitution of India Preamble, Art.14, 15, 23, and Part IV Legal Measures in relating to Child Labour Women and Political Representation

Module-II
Different Personal Laws- Unequal Position of Indian Women-Uniform Civil Code; Sex Inequality in Inheritance Rights: Right of Inheritance by birth for Sons and not for Daughters; Inheritance under Christian Law; Inheritance under Muslim Law; Matrimonial Property Law; Right of Women to be Guardian of her minor sons and daughters.

Module-III
Law of Divorce - Christian Law-Discriminatory Provision; Muslim Law- Inheritance divorce. Women and Social Legislation: Dowry Prohibition Law; Sex Determination Test, Law relating to Prevention of Immoral Trafficking in Women Act.

Module-IV
Women and Criminal Law: Adultery; Rape; Outraging the Modesty of Women; Kidnapping; Sati Prohibition Law; Law relating to Domestic Violence; Law relating Eve Teasing; Indecent Representation of Women Act.

Module-V
Women and Employment: Factories Act- Provisions relating to women; Maternity Benefit Act; Equal Remuneration Act; Law Relating to Sexual Harassment at Working Place; N.C.W-Aims, Functions and Performance.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

PRESCRIBED BOOKS:

- Indu Prakash Singh- Women, Law and Social Change in India.
- Paras Dewan- Dowry and Protection to Married Women.
- S.P.Sathe- Towards Gender Justice.
- Dwarka Nath Mitter- Position of Women in Hindu Law
- Shaukat Nasir- Muslim Women and their Rights.

REFERENCE MATERIAL:

- Relevant Provisions of Constitution of India.
- Relevant Provisions of Indian Penal Code.
- S.125, Criminal Procedure Code.
- National Commission on Women Act, 1990.
- Matrimonial Property- Private Members Bill Introduced in Parliament Towards Equality- Report of Committee on the Status of Women (Govt. of India) Chapter IV and Section IV, General Conclusions and Recommendations

PROBATION AND PAROLE

Course Code: LAW2807 **Credit Units: 05**

Course Objective:
This course will introduce the student to the emerging discipline of community corrections. This alternative has become an integral resource to the criminal justice system.

Course Contents:
Module I: Theories of Punishment: (i) Deterrent Theory (ii) Retributive Theory (iii) Preventive Theory (iv) Reformative Theory Efficacy of Punishment: Early stages-Medieval Period, Modern or New Penology, Essentials of an ideal system of Penal Policy.

Module II: Concept of Correction Genesis and evolutions, objectives and theories of correction - various types of correctional methods.
Institutional Correction Origin and development of Indian Prison System, daily routine - prison as an institution, scientific classification of prisons and prisoners.

Module III: Treatment of correction of offenders. The need for reformation and rehabilitation of offenders, Undergoing punishment/imprisonment, Classification of offenders through modern diagnostic techniques, The role of psychiatrists and Socials workers in the prison., Vocational and religions education and apprenticeship programmes for the offenders, Group counseling & Resocialization programmes, Participation of inmates in community service.

Module IV: Non-Institutional Methods Open air jails, Admonition, fine, probation and parole. Half way houses - organization and significance.
Recent trends in corrections Role of voluntary agencies in prevention of crime and treatment of offenders - Discharged prisoners' aid society. After care and rehabilitation, Need, importance and services in India - Pre-release and premature release., Attitude of the community towards released offender, Prisoner Aid Society and other Voluntary Organization governmental Action.

Module V: The place of probation in penal policy – public participation in probation, Legislations on Parole and probation in India, Probation of Offenders Act, 1958, Section 360 of the Criminal Procedure Code, 1973

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Martin Wasik, Emmins On Sentencing (1998) 2.
- Hall J., Law, Social Science and Criminal Theory
- J.M.Sethna, Society and the Criminal, 1980
- Siddique, Criminology-Problems and Perspectives, 1997
- Sutherland,E H,Cressey.D R,Criminology A. Siddique, Criminology (1984) Eastern, Lucknow.
- Law Commission of India, Forty-Second Report Ch. 3 (1971)
- K.S. Shukla, "Sociology of Deviant Behaviour" in 3 ICSSR Surveys of Sociology and Social Anthropology 1969-179 (1986)
- Tapas Kumar Banerjee, Background to Indian Criminal Law (1990)
- Bhattacharya S.K. (1986) Probation system in India,
- Mans Publications, New Delhi. 2. Bhattacharya,
- S.K. (1985) Social defence: An Indian perspective, Manas publications.

FORENSIC SCIENCE-II

Course Code: LAW2808 **Credit Units: 05**

Course Objective:
Forensic science is science related to the law. It is the scientific method of gathering and examining information about the past which is then used in a court of law. It is applied science and consists of a range of different disciplines which often require different underpinning science knowledge. It continues to evolve and is now applicable to crime disruption and crime prevention as well as crime detection and the identification of victims in mass disasters.
The course focuses on the following objectives:
1. Developing and understanding the concept of forensic anthropology
2. Breif description on the ballistic its analysis and reconstruction
3. Developing an understanding to wounds and its medco-legal aspect.
4. Developing an understanding on explosives and its crime scene investigations.

Course Contents:

Module I: Forensic Anthropology
Definition, scope, and application; time since death: assessing and determing the time and cause of death, study of burned bones and bones fragments; identification.

Module II: Ballistics
Definition, Indian Arms Act, forensic importance, classification of firearms; ammunition; range of fire; firearms injuries, analysis and reconstuction.

Module III: Wounds and its medico-legal aspects
Introduction to wounds; determining the age of the injury and its medico-legal aspect, injuries due to blunt forces, injuries due to sharp forces, miscellaneous injuries.

Module IV: Explosives and Explosion Scene Investigation
Explosive Act: nature and classification, composition and characterstics of explosives, pyrotechnics, IEDs, specific approach to scene of explosion, post-blast residue collection, reconstruction of sequences of events; evaluation and assessment of scence of explosion and its examination.

Module V: Advanced fingerprint and other impression
Fingerprint in personal identification, examination on the basis of poroscopy and its significances; evaluation of fingerprints on the basis of edgescopy and its significance in fingerprint field, Palmer, Planter and other impression its evaluation**.**

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Sharma. B.R., Forensic Science in Criminal Investigations and trials (3rd Edn) Universal Law Publishing Co. Ltd
- Nath.S, Fingerprint Identification CRC Press 2nd Edn, 2002
- Fisher, B, Techiniques of Crime Scene Investigation 6th Edn CRC Press,
- Albert, S. Osborn, Questioned Documents, 2nd Edn, Universal Law Publishing Delhi, 1998
- James, S. H. and Nordby, J.J (Eds), Fornsic Science- An Introduction to Scientific and Investigation Techniques CRC Press, London, 2003.

LAW AND MEDICINE-II

Course Code: LAW2809 **Credit Units: 05**

Course Objective:

The course aims to provide the students the knowledge about the interrelationship between law and medicine and complex legal and ethical issues involved in the field of medicine and medical profession. The course include the ethical and legal issues in population control, surrogate motherhood, HIV/AIDS, the rights of the unborn, AID and Law, mental health and medical experimentation on human beings.

Course Contents:

Module I: Population control and community health
Law, Practice and Society- Causes for Population Explosion- National Population Policy, 2000- Terminal methods female sterilization and male sterilization- State Imposed sterilization and its legal validity- Population control and Right to family and Right to privacy.

Module II: Surrogate Motherhood and the Rights of the Unborn
Surrogacy in foreign countries- Motherhood Debated-Legality of contract- problems-Refusal to accept the child-health Tourism and sanctity of woman's life- ICMR Code- The Unborn-Introduction- Right of an Unborn Chile-Prenatal Diagnosis (and Amniocentesis)-Miscarriage

Module III: AIDS
Rights, Freedom and duties of HIV/AIDS Patients- Privacy and Public health- Liberty and Security-Movement- Marriage and Finding a family- Right to work- Education for an infected person-Protection of children infected or born to infected parents- Right against degrading Treatment-Equality before law- access to medicine

Module-IV
International Norms- general Provision-Consent-Human Genome-Scientific Research-Donors for Transplantation Purposes-Prohibition of Financial gain and Disposal of a part of the Human Body

Module-V
Mental Health- Historical Background-types of Causes of Mental Illness- Development of the Human being and mental health-Prevention of Mental Illness and Treatment-Alcoholism and Drug Addiction- Mental health Act- Admission and discharge to mental hospital legal issues

Module-VI
Experiments of Human Beings- The concept-Kinds of Experiments-Subject of Experimentation-controls-Clinical Trials-Studies in special Populations-Informed consent-Special Studies of Bioavailability and Bioequivalence-Ethics committee- Stem cell research- International documents and Indian laws-Ethical norms on experimentation

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Vijay Malik – Drug and Cosmetic Act, 1940, Eastern Book Company, 24th Edition, 2014
- Anoop K. Kaushal – Medical Negligence & Legal Remedies, Universal Publishing House, 2nd Edition, 2004
- Dr. Jagdish Singh – Medical negligence Compensation, Bharat Law House, 3rd Edition, 2007
- P K. Dutta – Drug Control, Eastern Law House, 3rd Edition, 1997.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries.* New York:Oxford University Press, 2005.

- Annas, George J. Michael A. Gordin. *The Nazi Doctors and the Nuremberg Code: Human Rights in Human Experimentation.* New York: Oxford University Press, 1995.
- Dworkin, Ronald. *Life's Dominion: An Argument about Abortion, Euthanasia, and Individual Freedom.* New York: Alfred A. Knopf, 1993.
- Dr. Lily Srivastava, Law & Medicine (Universal Law Publishing, 2006)
- W. Noel Keyes, Bioethical and Evolutionary Approaches to Medicine and the Law (American Bar Association, 2007)
- Cynthia Ho, Access to Medicine in the Global Economy: International Agreements on Patents and Related Rights (Oxford University Press, 21-Apr-2011)

Syllabus - Ninth Semester

DRAFTING, PLEADING AND CONVEYANCING

Course Code: LAW2901 **Credit Units: 05**

Course Objective:
The course aims at acquainting the students about the various fundamentals of drafting to develop the skills of pleading and convenyancing.

Course Contents:

Module I: Fundamentals Rules of Pleadings
Meaning: Pleading and Conveyancing, Plaint structure, written statement, Affidavit and Conveyancing, Verification of pleading, Object of verification, Amendment of Pleadings.

Module II: General Principles of Civil Pleadings
Suit for Part-performance of the contract ; Suit for specific performance of the contract; Suit for recovery of money given on Interest (Money suit); Suit of damages ; Suit for restitution of conjugal rights; Maintenance suit by wife; Application under Section 13 Hindu Marriage Act (Divorce); Suit for recovery of rent or eviction of tenant; Interpleader suit; Suit for malicious prosecution ; Suit under Section 13 of Negotiable Instruments Act; Application under Order 6 Rule 17 of Code of Civil Procedure (Amendment of Pleadings); Appeal (First); Execution Petition; Revision; Application for Temporary Injunction Order 39 Rule 2 of Code of Civil Procedure.

Module III: General Principles of Criminal Pleadings
Complaint; Application for Bail (Section 436, 437 of Code of Criminal Procedure); Application for Anticipatory Bail (Section 438 of Code of Criminal Procedure Code); Accused's reply; Criminal Appeal (Appeal against conviction).

Module IV: Conveyancing
Notice and Reply to notice; General power of attorney; Special power of Attorney; Writ petitions: *Habeas Corpus,Mandamus,Certiorari,Quo warranto*; Sale deed; Partnership deed; Lease deed/ Rent deed; Promissory note; Gift deed; Adoption deed; Will; Affidavit ; Mortgage – deed.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Conveyancing – N.S. Bindra
- Conveyancing – A.N. Chaturvedi
- Mogha's Law of Pleading
- Conveyancing – D'Souza

INTELLECTUAL PROPERTY RIGHTS

Course Code: LAW2902 **Credit Units: 05**

Course Objective:
The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Patent Law (1970), Copy Right Law (1957) and Designs Act of 2000 which invariably form the part of Intellectual Property Law and shall comprise of the following.
The importance of this branch of the law is to be sufficiently realized in the Indian legal education. These areas are now internationally conceptualized as representing intellectual property. It is often the case that while the law of patents and trademarks is referred to as industrial property, the law relating to copyright is named intellectual property. While both these terms could be suitably invoked, we here speak of intellectual property as signifying all the three bodies of the law as well as the law on industrial designs.
Unlike other forms of property, intellectual property refers to regimes of legal recognition of, primarily, the products of the mind or imagination. The subject matter of property relations is here preeminently based on mental labour. The law relating to intellectual property protects the right to mental labour.
The law confers rights of proprietary nature on relative intellectual labour primarily on the basis that it is in the interests of society and state to promote creativeness and inventiveness. Limited monopoly provides incentive for greater inventive and innovative efforts in society. An important aspect of the exploration in this course would be ways in which the laws strike a fair balance between the interests and rights of the intellectual labourers on the one hand and organized industrial enterprises on the other. Another dimension is a study of the ways in which this regime of laws militates against, or favours, commModuley property in national cultures. As concerns 'modernization' crucial questions arise in the field of copyright protection in computer software and hardware, internet, electronic music and scientific research. Both copyright, trademarks, design and patent law here relate basically to the law of unfair competition and constitute an aspect of consumer protection and welfare not only in the context of national perspectives but also in view of the waves of globalization already set in. Both from the standpoint of human resources development, modernization and justice it is important that the law students get sufficient insights in Intellectual Property Law.

Course Contents:

Module I: Introduction
Intellectual Property, Concept and Philosophy, Need for Private Rights versus Public Interests, Advantages and Disadvantages of IPR.

Module II: Patent
Development of patent law, Rationale for patent protection**,** Nature and definition, Types of patentable subject matter, Patentability criteria, non-patentable inventions, Rights of patentee, Procedure for granting a patent, Grounds for opposition, Transfer of patent rights, Compulsory Licenses, Acquisition, Surrender, Revocation, restoration, Patent infringement and remedies, Bio patents and software patents, Official Machinery, Controller, Powers and Functions, Patent in pharmaceutical industry, Patent cooperation treaty, Paris convention.

Module III: Copyright
History, Concept of copyright, conditions for grant of copyright, extent of rights exception to copyright protection, fair use provision, assignment and licensing, Compulsory licensing and statutory licensing, Collective administration, Copyright board and office, powers and functions, Moral rights: Neighboring rights; infringement penalties and remedies, Appeals, Berne Convention, Universal Copyright Convention - WIPO Copyright Treaty: WIPO Phonograms and Performances treaty, TRIPS with respect to Copyright and Neighboring rights.

Module IV: Designs, Protection, Historical development, Rationale
Designs Act of 2000: Meaning of Design, Conditions for grant of protection, Ambit of Protection, Exceptions, Registration of Designs, Cancellation, Copyright in Registered Designs, Enforcement, Infringement and remedies, Powers and duties of Controller.

Module V: Trademarks

Evolution, Functions, Objective, Definition, Kinds of Marks, Domain names, Registration, Concurrent registration, Procedure for registration, Relative and absolute grounds of refusal, opposition and its grounds, Assignment, transmission and licensing of Trademarks, Infringement, Penalties and Remedies, Withdrawal of protection, Passing off, Official machinery for regulation administration and Redressal, Registrar, Difference between Trade Mark, **Trade Secret, Traditional Knowledge** and Geographical Indications, TRIPS on Trademarks, Madrid Agreement for The Repression of False or Deceptive Indications of Source on Goods, 1891- Madrid Agreement for the International Registration of Marks, 1891 and protocol relating to that agreement 1989.

Module VI: Plant Varieties Protection Act, 2001

Objectives, Rationale,Registry, Official machinery, registration, Criteria of fulfillment Exclusions, Benefit sharing, Farmers rights,CommModuley Rights, compulsory license Redressal fora, Appellate tribunal, Infringement, offences and penalties; Geographical indications of Goods (Registration and Protection Act, 1999**:** History, Definition, Rationale, Functioning, official Machinery,Registry,Rights conferred, Registration Procedure. Redressal Machinery, Appeal, Passing off, Offences, penalties and Procedure.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:

- D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
- B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights

LAW, POVERTY AND DEVELOPMENT

Course Code: LAW2903 **Credit Units: 05**

Course Objective:
The objective of this paper is to provide an understanding of basic concepts of poverty and development and their relationship with law.

Course Contents:

Module I: Understanding Poverty and Development
Poverty: Meaning and Concept, Relative Dimensions, Measurement and Determinants, Issues related to Poverty in India; Development: Perspectives, Developmental index.

Module II: Constitutional Guarantees for the Poor
Equality and Protective Discrimination, Right to Basic Needs and Welfare, Abolition of Untouchability and Protection of Civil Rights, Right to Development.

Module III: Criminal Justice System and the Poor
Treatment of the poor by Police, Inability to get Bail, Problems of Poor Under trials, Working of free legal aid schemes. .

Module IV: Impoverishment of Women, Children and Disabled Persons
Deprivations of women under family laws, Problems of women workers in organized and unorganized sectors, Child labour, Approaches to disability and rights of the disabled persons, Right to education and dignity.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:
- Law, Poverty and Development – Upendra Baxi
- State and Poverty in India – Atul Kohli
- The Poverty Question (Search for Solution) – Yogesh Atal
- Poverty, Rural Development and Public Policy - Amarendra

PROFESSIONAL ETHICS

Course Code: LAW2904 **Credit Units: 05**

Course Objective:
The Course has been designed to acquaint the students of Law about the Professional Ethics and Professional etiquettes that are essentially significant for an advocate to observe while at the Bar. Accountability and transparency are imperative to the profession. Besides, the conducive and cordial Bar- Bench relations can send a good message concerning the richness of the Legal profession. With this background cue, the course aims at developing insights of the students about the professional parameters.

Course Contents:

Module I: Historical Introduction
Historical introduction to legal profession in India – Barristers, Vakils, High Court Pleaders, Advocates, etc. The All India Bar Committee, 1951 and the passing of Indian Advocates Act, 1961. The Advocates Act 1961: Definitions Section 2, Constitution and function of State Bar Councils, Bar Council of India, Terms of Office, various sub-committees including Disciplinary Committee and the qualification for their membership. Power to make rules Sections 3 to 15 – Chapter –II.

Module II: The Advocate's Act, 1961
The Advocate Act, 1961.
Admission and enrolment of Advocate – Senior and other Advocates,
Common role of Advocates, Qualifications and Disqualifications for enrolment and procedure thereof, Chapter – III Section 16 to 28.
Rights to Practice: Monopoly of representation, Exclusion of advocates from certain cases, self representation by litigants. Chapter IV Secs. 29 to 34.
Professional and other misconduct, Principles for determining misconduct,
Disciplinary Committees of State Bar Council and the Bar Council of India,
Punishment of advocates for misconduct, Appeals to the Supreme Court,
Chapter – V – Secs. 35 to 44.

Module III: Legal Profession
Nature of Legal Profession, Need for an Ethical Code of Rights: privileges and duties of Advocates, Preparation of a case and fees of an Advocate, under – cutting, Bar against soliciting work and advertisement, Bar against touting, refusal of briefs, accountability to the client, confidentiality communication between Advocates to compromise, Study of Code of Ethics prepared by the Bar Council of India.

Module IV: Contempt of Courts Act, 1971
Contempt of Courts Act, 1971,
What is Contempt? Civil and criminal contempt, punishment for contempt.
Procedures in contempt cases. High Court Rules and the Supreme Court
Rules to regulate contempt proceedings.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Sanjeev Rao, Indian Advocates Act, 1971.
- M.P. Jain, Indian Legal History (Chap. On Legal Profession).
- Krishna Murthy Iyer's Book on Advocacy.
- The Contempt of Courts Act, 1971.
- Journal of Bar Council of India.

PRIVATE INTERNATIONAL LAW

Course Code: LAW2905 **Credit Units: 05**

Course Objective:
The course equips the student to deal with dispute involving a foreign element in personal, civil and commercial matters *i.e.* increasing in frequency as a result of a globalized economic and social environment.

Course Contents:

Module I: Introduction
Application and subject matter of Private International Law, Distinction with Public International Law, Characterization and theories of characterization, Concept of Renvoi, Application of foreign law, Domicile, Jurisdiction of courts.

Module II: Family Law and Adoptions
Material and formal validity of marriage under Indian and English law, Choice of law and jurisdiction of courts in matrimonial causes: dissolution of marriage, grounds of divorce, restitution of conjugal rights, recognition of foreign judgment, Recognition of foreign adoptions, Adoption by foreign parents, Jurisdiction under Indian and English law.

Module III: Civil and Commercial matters
Tort, Theories of foreign tort, Contract, Theory of Proper Law of Contract, Ascertaining the applicable law, Property.

Module IV: Indian Law relating to foreign judgment
Basis of recognition; Recognition and Enforcement of Foreign Judgments, Finality, Failure, Direct execution of foreign judgments, decrees.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Dr. Paras Diwan :Private International Law
- Cheshire : Private International Law
- Morris : Private International Law

ELECTION LAW

Course Code: LAW2906 **Credit Units: 05**

Course Objective:
The objective of this paper is to acquaint the students with the election laws governing the elections of the Houses of the Parliament and the State Legislatures as well as to the offices of President and Vice President**.**

Course Contents:

Module I: Introduction
Election: Meaning and Process, Constitutional Mandate, Laws governing elections, Election disputes, Election to the Offices of the President and Vice President. .

Module II: Election Commission
Composition, Functions, Powers**;** Delimitation of Constituencies, Preparation and Revision of Electoral Rolls.

Module III: Qualifications and Disqualifications of Candidates
Constitutional and Statutory Provisions**:** Disqualifications of sitting members, Nomination and Candidature, Voters Right to Information; Anti Defection Law (Tenth Schedule to the Constitution of India).

Module IV: Corrupt Practices in the Election Law; Electoral Offences

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Manual of Election Law in India – Dev Inder
- Chawla's Elections Law & Practice - P.C. Jain & Kiran Jain
- Election Laws and Practice in India- R.N. Choudhry
- Corrupt Practices in Election Law – K.C. Sunny
- How India Votes – Election Laws, Practice and Procedure – V.S. Rama Devi & S.K. Mendiretta
- V.N. Shukla's The Constitution of India – M.P. Singh.

Statutory Reading:
- Relevant Provisions of the Constitution of India
- The Representation of the People Act, 1951.
- The Representation of the People Act, 1950.
- The Presidential and Vice-Presidential Elections Act, 1952
- The Election Commission (Condition of service of Election Commissioners and Transaction of Business) Act, 1991.
- The Delimitation Act, 2002.

BANKING AND INSURANCE LAWS

Course Code: LAW2907 **Credit Units: 05**

Course Objective:
This course acquaints students with banking system of India and teaches them the various aspects and rights that exists for them in banking and insurance sector.

Course Contents:

Module I: Banking System in India
Kinds of banks and their functions; Banking Regulation Laws: Reserve Bank of India Act, 1934, Banking Regulation Act, 1949; Relationship between banker and customer: Legal Character, Contract between banker & customer, Banks duty to customers; The Banking Ombudsman Scheme, 1995; Liability under Consumer Protection Act, 1986.

Module II: Lending, Securities and Recovery by Banks
Principles of Lending ; Position of Weaker Sections; Nature of Securities and Risks Involved ; Recovery of debts with and without intervention of courts / tribunal: Recovery of Debts due to Banks and Financial Institutions Act, 1993, Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interests Act, 2002.

Module III: Banking Frauds
Nature of Banking Frauds; Legal Regime to Control Banking Frauds; Recent Trends in Banking: Automatic Teller Machine and Internet Banking, Smart Cards, Credit Cards.

Module IV: Insurance Law
Nature of Insurance Contracts; Kinds of Insurance: Life Insurance, Medi claim, Property Insurance, Fire Insurance, Motor Vehicles Insurance (with special reference to third party insurance; Constitution, Functions and Powers of Insurance Regulatory and Development Authority; Application of Consumer Protection Act, 1986.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Banking Law & Negotiable Instruments Act – Sharma and Nainta
- Banking System, Frauds and Legal Control – R.P. Namita
- Law of Insurance – M.N. Mishra
- Handbook of Insurance and Allied Laws – C. Rangarajan
- Banking Law & Practice in India – M.L. Tannan.

INTERNATIONAL HUMANITARIAN AND REFUGEE LAW

Course Code: LAW2908 **Credit Units: 05**

Course Objective:
The objective of this paper is to make students aware of the principles of International Humanitarian and Refugee Laws.

Course Contents:

Module I: Historical Development of International Humanitarian Law
History and evolution, Growth, Character of International Humanitarian Law.

Module II: Geneva Conventions, 1949
Geneva Convention I, Geneva Convention II, Geneva Convention III and Geneva Convention IV, 1949, Additional Protocol I to Geneva Conventions, 1977, Additional Protocol II to Geneva Conventions II 1977

Module III: Enforcement Machinery
War Crimes, Serious breaches of International Humanitarian Law, International Criminal Court (ICC).

Module IV: Refugees under International Law
Who is a refugee?, Convention Relating to the Status of Refugees, 1933, Convention on Status of Refugees, 1951, The 1967 Protocol, The AALCC Principles 1966, The OAU Convention 1969.

Module V: Implementation and Monitoring of the Rights of Refugees
Status of the UNHCR 1950, Cartegena Declaration 1984.

Module VI: Treatment of Refugees under Indian Laws
Draft SAARC Convention.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ingrid Detter, The Law of War, (Cambridge, 2000)
- A. Roberts and R. Guelff, eds., Documents on the Laws of War (Oxford, 2000)
- Legality of the Threat or Use of nuclear weapons, Advisory Opinion, ICJ Reports (1996)
- M.K. Balachandran and Rose Verghese (eds.) – International Humanitarian Law ICRC (1997)
- Ravindra Pratap, “India’s Attitude towards IHL”, in Mani (ed.) International Humanitarian Law in South Asia (Genava: ICRC, 2003)
- Guy S. Goodwin – The Refugee in International Law (Oxford, 2000)
- A. Vibeke Eggli, Mass Refugee Influx and the Limits of Public International Law (The Hague: Nijhoff, 2002).

CRIMINOLOGY

Course Code: LAW2909 **Credit Units: 05**

Course Objective:
The course is intended to introduce students to the broad study of criminology. It is to give a broad overview to the scope of criminology, to the ideas which have influenced the area of the subject and to the practical uses and impact to which these have been, or might be put.

Course Contents:

Module I: Introduction to Crime & Criminology
Definition and Scope, Criminology & other Social-Science; Legal, Social and Psychological aspects of crime, Traditional crimes; Organized Crimes, Socio Economic Crimes, Modern Crimes; Corruption, Cyber Crimes Environmental Crimes Terrorism and insurgency ; Specific theories: Classical School and Neoclassical School; Positive School; Cartographic School; Sociological theories : Social Structural Theories and Social Process Theories; Economic Theories of Crime .

Module II: Juvenile Delinquency
Concept & Causes, Pre delinquency stages: Truancy and Vagrancy, Main features of juvenile Justice Act, (New & Old), Institutional Services like Observation homes, Juvenile Homes, Special Homes & Juvenile Aftercare Services.

Module III: Punishment
History & Theories of Punishment, Capital Punishment, Historical Development from Punishment to Correction and Reformation, Prison System In India; Correctional Programmes in jail; Alter care services, Probation & Parole.

Module IV: Impact on Society
Social Disorganization and Social Problems, Victimless Crimes: Alcoholism, Drug Addiction, Beggary, Commercial Sex, Suicide; Crimes related to Family: Dowry death, Domestic Violence, Child Abuse.

Module V: Victimology
Concept, origin & Development, Need to study victims, U.N. Declaration on the basic principles of justice for victims of crimes and abuse of power, Victim's rights in India: Fair Access to Justice, Restitution, Compensation and assistance to victims, Human Rights Protection.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Sutherland and Crssey – Criminology
- Ahmed Siddique – Criminology
- Mrs. Vedkumari – Juvenile Justice

MEDIA LAWS

Course Code: LAW2910 **Credit Units: 05**

Course Objective:
Media connotes radio, television, print, film and the internet and has become an important industry which provides the dual function of information and entertainment. The constitution of India has ensured that media performs its function as the watchdog of modern democracy effectively but within reasonable limits. This course introduces the legal framework governing the different aspects and streams of media industry and the specific laws applicable to the people servicing the industry. With the help of examples and where necessary case studies from selected constitutional provisions, legislation and judicial proceedings and decisions, the historical and current debates and issues in media laws will be taught to the students.

Course Contents:

Module I: Introduction to Media Laws
What is media law?
Need for Media Laws, Statutory Laws, Civil Laws: Law of Torts (Defamation & Negligence) & Consumer Protection Act 2006, Criminal Laws (defamation/Obscenity/Sedition) R. v. Hicklin LR 3 QB 360, Ranjit D. Udeshi v. State of Maharashtra (AIR 1965 SC 881)

Constitutional Framework:
Freedom of speech & expression(Art. 19) Maneka Gandhi v. Union of India, Romesh Thapar v. State of Madras, Indian Express v. Union of India (1985) 1 SCC 641.
Issues of Privacy (Art.21) Kharak Singh v. State of UP (1964) 1 SCR 332, Gobind v. State of MP (1975) 2 SCC 148, Judicial Interpretation of Media freedom and its limits (including Contempt of Court & Judicial Activism) .

Module II: Media Laws
Right to Information Act 2005/Official Secrets Act 1923
Broadcast Sector:
Prasar Bharti Act 1990
Broadcasting Bill 2006
Cinematography Act 1952 (Sec.51/14(d)/57/62A)
(Case Study: K. A. Abbas v. UOI; Bobby Art International v. Om Pal Singh Hoon)
Cable TV Networks (Regulation) Act of 1995
Cine Workers & Cinema Theatre Workers (Regulation of Employment) Act 1981
Cine Workers Welfare Cess Act 1981

Internet & Law:
Evolution of Internet as a New Media
IT Act of 2000 & Media
Regulatory commissions of New Media
Indian Telegraph Act of 1885

Advertisement & Law:
Advertisement act of 1954
Indecent Representation (Prohibition) Act 1986
Case Study: Hamdard Dawakhana v. UOI; Tata Press Ltd. V. Mahanagar Telephone Nigam Ltd.

Print Media & Law:
Press Council Act, 1978
Cable television Network (Regulation) Act 1995
The working Journalists and other Newspaper employees (Conditions of Service and Miscellaneous Provisions) Act 1955
Press Council Guidance
Case study: Sakal Papers Ltd. v. Union of India AIR 1962 SC 305, Bennet Coleman and Co. v. Union of India AIR 1973 SC 106

Examination Scheme:

Components	P	A	C	CT	EE
Weightage (%)	5	5	10	10	70

Text & References:

- Hakemulder, R Jan. Jonge, Fay AC De & Singh, P.P.(1998) Media Ethics and Law, Anmol Publications Private Limited, New Delhi
- Divan Govadia Madhavi 92006) Facets of media Laws (1st Edn) Eastern Book Company, Lucknow
- Campbell, dennis & Cotter, Susan (1998) Copyright Infringement, Center for International Legal Studies, Kluwer Law Internatiional, London
- Pandey,J.N. (2003) Constitutional Law of India, Central Law Agency, Allahabad
- Shukla, V.N. (1982) Constitution of India, eastern Book Company, Lucknow
- E. Price, Monroe & Veerhulst, Stefaan G. (2001) Broadcasting reform in India; Media Law from a Global Perspective, Oxford Universuty Press, New Delhi
- Iyer, Venkat (2000) (2nd Edn) Mass Media Laws and regulations in India, Asian Media Information and Communication Centre, Singapore
- Basu, Durga Das (1996) Law of the Press in India, Prentice Hall of India, New Delhi
- Christain G Clifford & others (2005) (7th Edn) Media Ethics – Cases & Moral reasoning, Pearson Education, London
- Shrivastava, KM (2005) Media Ethics – Veda to Gandhi & Beyond, Publications Division, New Delhi

CORRUPTION LAWS

Course Code: LAW2911 **Credit Units: 05**

Course Objective:
To update the students about corruption laws that has already been formed. The main aim of the course is to make the students aware of the laws prevalent and the legal remedies available

Course Contents:

Module I: Introduction to Corruption Laws
Introduction- definition of corruption,
Genesis of corruption- Historical Background, corruption in ancient time, corruption in Mahabharata need for integrating
Nature of corruption, various types of corruption- in kind, cash or in service Individual Corruption, Institutional Corruption. Why and how of corruption – Nexus between Position of a Public servant and corruption. consequences and ill effects

Module II: Offences by Public Servant
Offences under the Prevention of Corruption Act, 1988,
Corruption by Public servant- Prevention of Corruption Act 1988-
Definition of Public Servant sec 2(cc)
Categories of public servant- person in the pay of the Government- a person in the service of the Government a person remunerated by fees or commission for the performance of any public duty by the Government.
Sec 7: public Servant taking gratifications other legal remuneration in respect of an official act.
Gratification: legal remuneration, meaning of holding out as a Public Servant – whether covered under the Act.
Sec 8: Gratification by person other than public servant – to influence pubic servant by corrupt or illegal means.
Sec 9: Gratification by person other than Public Servant- to influence public servant- and not by corruptor illegal means.
Sec10, Sec11, Sec 12: Habitual committing of offence under Sec 8, 9, 12, 14.
Sec 15 Attempt
Sec 16 Fine Criteria
Sec 13 Criminal Misconduct by Public Servant.
Bribe giver Guilty or Abetment?
Investigation and Trial under the Act
Sec 17 Persons authorized to investigate.
Sec 19 Sanction for prosecution
Sec 20 presumptions under the Act.
Sec 3, 4, 5: Special Judges Court- procedure and powers of Special Judge.

Module III: Commission of Enquiry Acts
Section 6 Summary Trial. Commission of Enquiry Act 1952
Composition, function and role of CAG
The Central Vigilance Commission
Central Bureau of Investigation its role, function and Jurisdiction.
Proposed Lok Pal Bill ,its various drafts , legality of sting operations , provision relating to corruption cases of judges , Immunity of legislations and parliamentarians . Law on whistle blowers

Module IV: Money Laundering & National Investigative Agency Act
The Prevention of Money Laundering Act 2002, General Principles, Confiscation of Property earned through crime Sec5
Sec 171-B of IPC Bribery – Offences relating to elections.
Sec 171-C
Sec 171- D Undue influence and Impression at election
Sec 171- E Punishment for Bribery
Sec 171- F Punishment for Influence and Personating at an election.
National Investigative Agency Act 2009

Module V: International Effort
International Efforts
The United Nations Directions
The Convention on Combating Bribery of Foreign Public Officials
UN Convention against Transnational Organized Crime
UN Convention against Corruption (UNCAC)

Examination Scheme:

Components	**P**	**A**	**C**	**CT**	**EE**
Weightage (%)	5	5	10	10	70

Text & References:
- Prevention of Corruption Act, 1988
- Prevention of Money laundering Act, 2002
- National Investigative Agency act, 2009
- Un Conventions

SUMMER INTERNSHIP EVALUATION-IV

Course Code: LAW2935 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data form where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Tenth Semester

LEGAL WRITING

Course Code: LAW2001 **Credit Units: 8**

Course Objective:
The course material equips the student with skills in the methodology essential to execute a research assignment on topics related to law.

Course Contents:

Module I: Research Methodology
Doctrinal, Non-doctrinal Empirical methods of executing research project.

Examination Scheme:

Components	**V**	**A**	**TP**
Weightage (%)	25	05	70

Note: 'TP' stands for project report prepared

Text & References:
- Legal research & Methodology: Indian Law Institute, Edited by Dr, S.K. Verma & M. Afzal Vani.

CONTEMPORARY LAWS

Course Code: LAW2002 **Credit Units: 04**

Course Objective:
To update the students with Contemporary Laws and new Legislation keeping in mind the ever changing requirements and complexities of Law in relation to its applicability to life.

Course Contents:

Module I: Consumer Protection Act and Competition Act
Historical background of the Market being a seller's Market. Changing to a buyer's Market – Consumer and Public friendly legislation Definition of Consumer and Unfair Trade Practices- Definition of Competition and Anti Competition Steps- Forums for indications of rights and prescribed remedies in both the Acts.

Module II: Rights to Information Act
As an antithesis to the Official Secrets Act; Extension of Article 19 of the Constitution of India; Definition of Information; appropriate authority; what is information can be given and what cannot be given (Sec – 6,7,8) Hierarchy under the Act; Penalties and Fine.

Module III: Information Technology Act
To provide a Legal Framework and Legal Machinery for Electronic Data interchange and Electronic Communication – Electronic Commerce- Electronic filing having digital signatures – Authorities issuing digital signatures – Computer Contaminant -Computer viruses- Penalty and Damage to Computer/Computer System (Sec- 43) – Forum –Sec -48 –Computer Related Offences-Sec 66, 66A to Sec 66F, 67, 67A to Sec 67 C.

Module IV: Legal Services Authorities Act - Historical background – J.Krishna Iyer and J.P.N. Bhagwati Committee- Legal Aid –a duty of the State – Directive Principles of State Policy- Constitution of National Legal Services Authority and State Legal Services Authorities – Their Duties and Responsibilities - -Eligibility for seeking Legal Aid – Lok Adalats- Alternative Disputes Resolution Mechanism – Permanent Lok Adalats.

Module V: Supreme Court Rules/High Court Rules… - Concept of Advocate or record – Filing in Supreme Court through Advocate or Record only- Filing Format – Central Agency –SLP filling under Article 136 of The Constitution OF India –Corative Petition/ Review Petition in chambers. High Court Rules- Original Side –Appreciate Side –Filing –Service – Registry – Publication of notices- Delegated Power to Judicial Registers for recording Evidence etc.

Note: 1. Registration Act and Stamp act can be combined with Transfer of Property.
2. Advocates Act and Bar Council of India Rules can be combined with Professional Ethics.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:
- Basic Texts of GATT and WTO.
- International Trade Law- Dr S.R Myneni
- Understanding International Trade Law- Simone Schnitzer
- Guide to the WTO and GATT, Economics,Law and Politics- Autar Krishnen Koul.
- Internet Sources :www.wto.org

MOOT COURT/ INTERNSHIP

Course Code: LAW2003 **Credit Units: 14**

Course Objective:
This course relates to litigation advocacy and as such this shall be simulation course that shall have two parts. First part shall focus on preparation for trial and trial strategies. It shall also disseminate techniques of examination-in-chief cross examination and re-examination of witnesses, argumentation in courts, bail application, injunction application, etc. The second part shall focus on writing briefs in civil suits and criminal cases, appellate briefs in civil and criminal cases, and writ matters, memorial writings and arguing before the appropriate forums. The students shall be given a case to argue, that shall help to articulate their argumentative zeal as well as capacity.

Course Contents:

Module I: Moot Court
Bench Memorial, Court Craft: Presentation of case, Interaction with Bench, Question Answer Court etiquette and mannerism section.

Module II: Internship
Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The report and diary to be certified and submitted for evaluation.

Module III: Corporate Legal Training
Corporate communication skills and client interaction and etiquette in corporate law work environment.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	05	70

Amity Law School

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

FINANCIAL ACCOUNTING-I

Course Code: LAW2107 **Credit Units: 03**

Course Objective:
To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:

Module I
Financial Accounting Concepts, importance and scope, Single entry vs Double entry system of accounting. Journal, Ledger, Trial Balance, Errors and their rectification, Cash Book, Bank reconciliation statement.

Module II
Final accounts, receipts and payments, income and expenditure accounts, balance sheet.

Module III
Depreciation accounting and its methods, Inventory valuation and its methods. Accounting for Hire Purchase Transactions, Journal entries and ledger accounts in the books of Hire Vendors and Hire purchaser

Module IV
Inland Branches: Dependent branches only and ascertainment of profit by debtors method and stock and debtors method.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal,D “Advanced Accounting”, Part – 1, Taxmann Applied services, New Delhi

BUSINESS ORGANIZATION AND MANAGEMENT

Course Code: LAW2108 **Credit Units: 03**

Course Objective:
This course aims to provide students with an understanding of the principles and practices of organisation and management. This course enables students to understand the fundamental management theories and their evolution, identify the elements of the organizational environments, manage resources and develop the ability to make sound decision within an organization.

Course Contents:
Module I
Introduction to business, Business firms - Forms of organisation - sole proprietors, Partnership, Joint-Hindu family, Joint stock company, Co-operative organisations - Public Enterprises, BPO, E-commerce and M-commerce.

Module II: Management
Introduction - Meaning, nature and characteristics of Management - Scope and functional areas of management - Social responsibility of management and Ethics.

Module III: Planning
Nature importance and purpose of planning - Planning process, Objectives - Types of plans (Meaning only) - Decision-making – importance & steps.

Module IV: Organising & Staffing
Nature and purpose of organisation, Principles of organisation - Types of organization - Departmentation, committees - Centralisation Vs decentralisation of authority and responsibility - Span of Control - MBO and MBE(Meaning only) - Nature and importance of staffing - Process of selection & recruitment(in brief) – retaining (training and compensation).

Module V: Directing
Meaning and nature of directing - Leadership styles - Motivation theories (Maslow's, Herzberg, Mcgregors X & Y theory), Ouchi's Theory- communication meaning and importance, barriers to communication, types of communication - Coordination meaning and importance.

Module VI: Controlling
Meaning and steps in controlling - Essentials of a sound control system - Methods of establishing control(in brief) – Balance score card, Economic value added, Market value added.

Module VII: Management in perspective
Change Management, Knowledge Management, Learning organization, Managing Diversity, Corporate Governance.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Koontz & O'Donnell, Management.
- Drucker, Peter: Management Tasks, Responsibilities and Practices
- Basu, "Business Organisation and management", Tata Mcgraw Hill, New Delhi
- M.C. Shukla: Business Organisation & Management, S. Chand
- Rustum & Davan, Principles and practice of Management.
- Jagadish Prakash: Business Organisation & Management
- Newman, H. William Summer, Etc.: The process of Management

ENGLISH-I

Course Code: LAW2103 **Credit Units: 03**

Course Objective:
The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative and aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond from different perspectives.

Course Contents:
Module I: Functional Grammar: Patterns and Usage
Tenses and composition, Correction of sentences, Basic Transformatives: Active and Passive voices, Direct and Indirect speech, Connectives, Modifiers, Questions,
Negatives; Reported Speech, Fill in the correct word.

Module II: Composition writing and comprehension of texts
Comprehension of Legal Texts, Paragraph and Précis writing, Legal Letters and Formal Correspondence, Procedure of Note taking and making, Drafting of reports and projects, Abstracts and summary.

Module III: Short Stories
Of studies, by Francis Bacon; Dream Children, by Charles Lamb; The Necklace, by Guy de Maupassant; A Shadow, by R.K. Narayan; Glory at Twilight, Bhabani Bhattacharya.

Module IV: Poems
All the World is a Stage, by Shakespeare; To Autumn, by Keats; O! Captain,
My Captain, Walt Whitman; Where the Mind is Without Fear, Rabindranath Tagore; Psalm of Life, H.W. Longfellow.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Geffrey Leech and Jan Svartvik, A communicative Grammar of English.
- A.J. Thomson and A.V. Martinet, A practical English grammar.
- Webster's New Dictionary of Synonyms.
- A.S. Hornby and R.M. Mackin, Oxford Progressive English alternative course book.
- I.L.A. Hill, English Language course for colleges Book II & Book III.
- Department of English Lucknow University, (Oxford) Exercises in English Composition.
- Aiyer's Law Terms and Phrases.
- Biswas Encyclopedia Law Dictionary.
- Black's Law Dictionary.
- I.L.A. Hill, English Language course for colleges, Book II and III.
- Michael McCarthy and Felicity O'Dell, English Vocabulary in use.
- Raymond Murphy, English Grammar in use intermediate to upper intermediate.
- Martin Hewings, Advanced Grammar in use.
- Michael McCarthy, Felicity O'Dell and Ellen Shaw, American English VOCABULARY in use.
- Cambridge International Dictionary of Idioms.
- Denial Jones, English Pronouncing Dictionary.
- Liz Hamp - Lyons and Ben Heasley, Study Writing.
- L.A. Hill and other (Oxford), English Language Course from Colleges, Book-I, II and III.
- A.A.S. Horney and R.M. Mackin (Oxford), Oxford Progressive English Alternative Course.
- N.S. Prabhu and W.W. Bhaskar (Macmillan India, English through reading.
- Current English Usage, Oxford's An Advanced Learning Dictionary.
- English Grammer, Wren and Martin.

LEGAL METHOD

Course Code: LAW2104 **Credit Units: 04**

Course Objective:
This paper focuses on orientation of students to legal studies from the point of view of basic concepts of law and legal system.

Course Contents:

Module I: Meaning and Classification of Laws
Meaning, Definition, Functions: Justice, Stability and Peaceful Change; Classification of laws: Public and Private Law, Substantive and Procedural Law, Municipal and International Law.

Module II: Sources of Law
Custom; Precedent, Ratio, Obiter; Legislation. ;

Module III: Basic Concepts of Indian Legal System
Common Law, Essentials of a Valid Law, Constitution as the Basic Law, Rule of Law, Separation of Powers, Judicial system in India, **Principles of Equity**.

Module IV: Legal Writing and Research
Legal materials: Case law, Statutes, Reports, Journals, Manuals, Digests etc.; Importance of legal research ; Techniques of Legal Research : Doctrinal, Empirical Research, Legal writings and citations.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Glanville Willains – Learning the law
- Avtar Singh – Jurisprudence (Legal Theory)
- B.N.M. Tripathi – An Introduction to Jurisprudence and Legal theory
- Benjamin N. Cardozo, The Nature of Judicial Process
- LI Publication – Indian Legal System
- ILI Publication in Legal Research and Methodology

LAW OF CONTRACT-I

Course Code: LAW2105 **Credit Units: 04**

Course Objective:
Whatever may be the nature of a given society, the contractual relations, as are obtained in that society, are governed by certain principles which are more or less of a general and basic nature. In India these general principles are included in the statute of the Indian Contract Act. 1872. This course is designed to acquaint a student with the conceptual and operational parameters of these various general principles of contractual relations. Specific enforcement of contract is an important aspect of the law of contracts. Analysis of the kinds of contracts that can be specifically enforced and the methods of enforcement forms a significant segment of this study.

Course Contents:

Module I: Formation of Contract
Meaning and nature of contract, Offer / Proposal (Definition, Communication, Revocation, General/Specific offer, Invitation to treat), Acceptance (Definition, Communication, Revocation, Tenders / Auctions). 'E'Contract

Module II: Consideration and Capacity
Consideration (Definition, Essentials, Privity of contract), Capacity to enter into a contract (Minor's position, Nature / effect of minor's agreements).

Module III: Validity of Contract
Unlawful consideration and object, Free Consent, Coercion, undue influence, Misrepresentation, Fraud, Mistake, Contingent contract, Quasi contracts, Effect of void, voidable, valid, illegal, unlawful and uncertain agreements contracts.

Module IV: Discharge and Performance of Contract
Discharge of Contracts, Performance, Time and Place of performance, Impossibility of performance and frustration, Breach – Anticipatory & Present.

Module V: Remedies
Damages, Remoteness etc., Injunction, Specific performance, Quantum Merit.

Module VI: Specific Relief Act, 1963
Recovery of property, Specific performance of contracts, Rescission of Contract, Declaratory Decree, Injunctions: Temporary and Perpetual, Mandatory.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Anson - Law of Contract
- Pollock and Mulla - Indian Contract Act
- Avtar Singh - Indian Contract Act
- Bangia - Law of Contract and Specific Relief
- Cheshire and Fifoot - Law of Contract.

ECONOMIC SYSTEM AND SOCIETY

Course Code: ECO2104 **Credit Units: 03**

Course Objective:

This course will reflect the socio-economic change in historical perspective, capitalism as an economic system, structure of capitalism and capitalism in global context.

Course Contents:

Module I
Analyzing Socio-Economic Change in Historical Perspective

Module II
Capitalism as an economic system
Origins, nature and structure of capitalism; Accumulation and crisis; Alternative perspectives on capitalism.

Module III
The transition from feudalism to capitalism

Module IV: The evolving structure of capitalism
Monopoly capitalism, The modern corporation: divorce between ownership and control; The institutional diversity of capitalism; Alternative perspectives on the role of state.

Module V: Capitalism in Global Context
Multinational corporations and their impact on the developing economics; imperialism.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
Text:

- J. Schumpeter (1942), Capitalism, Socialism and Democracy, George Allen and Unwin (1976 edition).
- T. Bottomore (1985), Theories of Modern Capitalism, Allen & Unwin. Chapters on Weber & Schumpeter.

References:

- D. Foley (1983), “commodity”, in T. Bottomore et al(ed.), The Dictionary of Marxist Thought., OUP, (Indian edition, Maya Blackwell, 2000)
- R. Blackburn (ed.) (1972), Ideology in Social Science, Chapter 8, Fontana
- Rodney Hilton(ed.) The Transition from Feudalism to Capitalism, Introduction
- P. Hirst and J. Zeitiln (1997), “Flexible Specialization: Theory and Evidence in the Analysis of Industrial Change”, in R. Boyer et al (ed.), Contemporary Capitalism, Cambridge University Press.

READINGS IN MANAGEMENT

Course Code: MGT2130 **Credit Units: 02**

Objectives

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: COM2131 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT

Course code: COM 2132 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III : Collection of information and data relating to the topic and analysis of the same.
Step IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP

Course Code: COM2133 **Credit Units: 01**

Objectives

A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop

The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop

The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology

The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus - Second Semester

FINANCIAL ACCOUNTING-II

Course Code: LAW2206 **Credit Units: 03**

Course Objective:
To develop conceptual understanding of the fundamentals of financial accounting system which processes transactions and other events through a book-keeping mechanism to prepare financial statements, and also to impart skills in accounting for recording various kinds of business transactions.

Course Contents:

Module I
Consignment and Joint Venture Accounts:
(i) ***Consignments:*** Features, Accounting treatment in the books of the consignor and consignee.
(ii) ***Joint Ventures:*** Accounting procedures: Joint Bank Account, Records Maintained by Co- venturer of (a) all transactions (b) only his own transactions. (Memorandum joint venture account).

Module II
Accounting for bills of exchange - bills receivable and payable, acceptance, endorsement, discounting, dishonour and renewal of bills, accommodation bills.

Module III
Partnership
Admission of a partner: partenership deed, goodwill valuation and treatment. Sacrificing ratio.
Retirement and death of a partner: gaining ratio, goodwill treatment
Dissolution of partnership: revaluation of assets and liabilities. Legal Position, Accounting for simple dissolution,
Applications of rule in case of Garner Vs. Murray in case of insolvency of partner(s) (excluding piecemeal distribution and sale of a firm to a company).

Examination Scheme:

components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Dr. S.N. Maheswari, Financial Accounting
- BS Raman, Financial Accounting
- Grewal and Gupta, Advanced Accounting
- Radhaswamy and R.L. Gupta, Advanced Accounting
- S.Kr. Paul, Advanced Accounting
- P.C. Tulasian, Pearson Editions, Introduction to Accounting
- Jain & Narang, Financial Accounting
- Sehgal, A and Sehgal,D “Advanced Accounting”, Part – 1, Taxmann Applied services, New Delhi

BUSINESS MATHEMATICS

Course Code: LAW2207 **Credit Units: 04**

Course Objective:
To familiarize the students with basic mathematical tools and the application of the same to business and economic situations.

Course Contents:

Module-I:
Arithmetic Progressions, Geometric progressions and Harmonic Progressions: Definition of A.P, G.P and H.P. Simples Examples

Module-II: compound Interest and Annuities
Certain different types of interest rates; Concept of present value and amount of a sum; Types of annuities; Present Value and amount of an annuity, including the case of continuous compounding; valuation of simple loans and debentures; problems relating Sinking Funds.

Module III: Matrices and determinants
Definition of a matrix; Types of matrices; Algebra of matrices; properties of determinants; calculation of values of Determinants upto third order; Adjoint of a matrix, Finding inverse of a matrix; Rank of a matrix, Solution of system of linear equations by Cramer's Rule and Matrix Inverse Method (including not more than three variables).

Module IV: Differentiation
Definition; Derivative using first Principle; Method of Differentiation of sum, difference, product and Quotient of two functions; Derivative if compositive, inverse, exponential, Logarithmic, parametric and Implicit functions; second order derivative.

Module V: Maxima and minima
Case of one variable involving Second Order derivative; Average Cost, Average revenue functions, marginal cost, marginal revenue, Elasticity of demand.

Module VI: Integration
Integration as anti-derivative process; Standard forms; Method of Integration by substitution, by parts and by use of partial fractions. Definite integral and their properties; Finding areas in simple cases; Determination of Cost, revenue and demand function; Consumer's surplus and Producer's surplus.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Kumbhojkar G.V.: Business Mathematics
- Shantinarayan: Text Book of Matrics.
- Bhagwat K Pawate: Elements of Calculus.
- Soni R.S.: Business Mathematics, Pitamber Publishing House
- Kapoor V.K.: Business mathematics, Sultan Chand & Sons, Delhi.

ENGLISH-II

Course Code: LAW2203 **Credit Units: 03**

Course Objective:
Efficiency of advocacy depends upon communication skills to a substantial extent. The student should be conversant with legal terminology. A student should be equipped with writing skills of and presentation skills which are essential for effective advocacy.

Course Contents:

Module I: Introduction of Legal Language
Legal maxims (Introduction and meaning), & Foreign legal words.

Module II: Translation and usage of words
Translation of legal Para from Hindi to English and vice versa, one legal word-substitute, Usage of common Hindi and Urdu words used in Courts.

Module III: Presentation skills
Presentation Skills: Speeches, Preparing presentation material, Planning the talk, Preparing visual aids, Delivering presentation, Managing your audience, Question and Answers, Introduction, summing up, vote of thanks and repertoire.

Module IV
Communication for the Courts: including drafting of moot memorials.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Successful Communications, Mlara Treece (Allyn and Bacon).
- Effective Technical Communication, M. Ashraf Rizvi.
- English Pronouncing Dictionary Danial Jones.
- Language and the Law, Longman, 1996, London, Gibbons and Johns.
- Language and the Law, Annual Review of Applied Linguistics (1999) 19, 156-73, Gibbons and Johns.
- Communication and Style in Legal Language, Indian Bar Review, Vol. 10 (3): 1993, Kelkar, Ashok R.
- Language and the Law, in FREEMAN, pp. 1350-53, Williams, Glanville.

LAW OF CONTRACT-II

Course Code: LAW2204 **Credit Units: 04**

Course Objective:
This course shall be taught after the students have been familiarized with the general principles of Contract in which the emphasis is on understanding and appreciating the basic essentials of a valid Contract and on the existence of Contractual relationship in various instances. Obviously, Contract Law assumes special significance to suit changes in society. These special Contracts are studied in the light of statutory provisions and decisional Law. With the invent of globalization in various sectors of economy today and are in need of specialized legal Professionals due to huge contractual requirements, joint venture Partnerships and the like, Therefore, this Course of Special Contracts provides an insight into the justification for special statutory provisions for certain kind of Contracts.

Course Contents:

Module I: Indemnity and Guarantee/Bailment and Pledge
Meaning, Distinction between Indemnity and Guarantee, Right / Duties of Indemnifier, Indemnified and Surety, Discharge of Surety, Kinds of Guarantee, Bailment and Pledge: Meaning and Distinction, Rights and Duties of Bailor/Bailee, Pawnor/Pawnee, Lien, Termination of Bailment.

Module II: Agency
Definitions of Agent and Principal, Appointment of an Agent, Authority of an Agent, Creation of agency: by agreement, Ratification and law, Relation of principal / agent, subagent and substituted agent, Ratification of Agents Authority, Revocation of Agency Authority, Effects of Agency on Contracts with third person, Personal Liability of agents, Termination of agency.

Module III: Sale of Goods Act 1930
Contract of Sale: Nature and definition, Conditions and Warranties, Transfer of Property and Title, Performance of the contracts, rights of unpaid seller, suit for breach of contract.

Module IV: The Indian Partnership Act, 1932
Nature of partnership firm, Relations of partners to one another and outsiders, Rights /Duties of partners *inter se*, Partnership Property: Relations of Partners to third parties, Liability for holding out, Minor as a partner; Incoming and outgoing partners, Dissolution of Partnership Firm, Modes of Dissolution, Consequences of dissolution, Registration of firms and effects of non registration.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Texts & References:
- Pollock and Mulla, Indian Contract Act
- Avtar Singh, Indian Contracts Act
- Mulla, D. F., Indian Partnership Act
- Desai, T.R., Law of Contracts and Partnership sale of good Act
- R.K. Bangia, Sales of Goods Act, 1930
- Avtar Singh, Sales of Good Act
- Avtar Singh, Indian Partnership Act.
- K. Sukumaran, Pollock & Mulls - The Indian Partnership Act

COMPUTER APPLICATIONS IN BUSINESS

Course Code: COM2204 **Credit Units: 03**

Course Objective:
To provide computer skills and knowledge for commerce students, and to make them complacent with the use of new tools of IT.

Course Contents:
Module I
General features of a computer. Generation of computers. Personal computer, Workstation, Mainframe computer and super computers. computer applications – data processing, information processing, Application areas of computer.

Module II
Computer organization. Central processing module. Computer memory- primary memory and secondary memory. Secondary storage devices – magnetic and optical media. Input and output modules. OMR, OCR, MICR, scanner, mouse, Modem.

Module III
Computer hardware and software. Machine language and high level language. Application software. Computer program. Operating system. Computer virus, Antivirus and Computer security, Windows OS and its features.
Computer arithmetic. Binary, octal and hexadecimal number systems. Algorithm and flowcharts. Illustrations. Elements of database and its applications.

Module IV
Introduction to MS office Packages- Ms-Word – Editing a Document – Move and Copy text – Formatting text and paragraph – Finding and Replacing text and spelling checking – Using tabs, Tables, and other features, Enhancing document – using mail merge and other features.
Introduction to Worksheet- Getting started with excel – Editing Cells and using commands and functions – Moving And Coping, Inserting and Deleting Rows and Columns – Getting help and formatting a worksheet – Printing the worksheet – Creating Charts – using formulae and functions in excel. Introduction to Power Point Presentation

Module V
Computer Networks & Internet Technology
Introduction to Computer Networks, Networking Components, Classification and types of Networks, Network Topologies – Overview with Advantages and Disadvantages, Communication Channels, Client Server Architecture, LAN concepts.
Introduction to internet intranet and Extranet, Myths about the Internet, Basic concepts of internet, Domain Name Service, Internet Protocols and Addressing, Services of internet, Internet and support Technologies, Censorship and Privacy issues

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Craig Stinson "Running Microsoft Windows-98" – Microsoft press.
- Joshua C. Nossiter. " Using Excel – 5 for Windows"
- "Working with Word" – Aptech Computer Education
- "Power Point Presentation" – Aptech Computer Education.
- Malhotra, Computer Applications in Business
- Rajaraman V, Analysis and Design of Information System, Prentice Hall of India, New Delhi
- Murdick, RG and Ross, JE Information Systems for Modern Management
- Kanter, J, Management Oriented MIS, Prentice Hall of India
- Bhattacharya SK, Management Planning and Information Systems

ANALYSIS AND DESIGN OF BUSINESS SYSTEMS

Course Code: MGT2204 **Credit Units: 03**

Course Objective:
The course aims at preparing students conceptualize and define scope and domain of system analysis and design. It also focuses on system development life cycle using conventional and structural look.

Course Contents:

Module I: The systems development Environment. (Information system development life cycle)
System & its parts, Types of Systems, Characteristics of a System, System Analyst in system Development, Developing Systems- SDLC, Approaches to System Development (Prototyping, Joint Application Design (JAD), Participatory Design (PD)), System Development Models (Waterfall model & Spiral Model), System Planning & Selection (Identifying, Selecting, Initiating & Planning System Development Project).

Module II: System Planning and Selection (Graphic technology modeling tool)
Identifying and Selecting Projects (Identifying potential development projects, classifying and ranking projects, and selecting projects for development), Methods for project identification and selection, Evaluation criteria for classifying and ranking projects, Initiating and Planning System Development Projects (Process & performed Activities, Deliverables & Outcomes), Assessing Project Feasibility (Economic, Operational, Technical, Schedule, Legal & Contractual, Political Feasibility)

Module III: System & Data Analysis (Data Analyzing Modeling)
Determining System Requirements (Traditional Methods, Modern & Radical Methods), Structuring System Requirements (Process Modeling – DFD, Logic Modeling – Structured English & Decision Tables, Conceptual Modeling – ER Model), Data Analysis & Techniques (Interpretive, Coding, Recursive Abstraction and Mechanical Technique), Types of Analysis (Descriptive, Exploratory, Confirmatory and Predictive), Modeling Methodologies (Bottom Up method & Top Down Method), Generic and Schematic Data Modeling.

Module IV: System & Database Design
System Design (Design Objectives, Phases in Designing, Purpose of System Design), System Design Goals, Type of Design, Design Strategy, System Decomposition (Modeling, Connection and Coupling of a System), System Design Methodologies, Database Design, Database Management System – an introduction, Overview of Data Models, Relational Database Model – Well structured relations, Keys, Schema & Subschema, Structure, Facilities & Users, Constraints, Anomalies, Functional Dependency, Normalization, Roles & Duties of System Administration.

Module V: System Implementation & Operation (System Management)
Activities in implementing (Coding, Testing & Installation, Documentation, Training, Support, Maintenance), Types of testing, planning installation, approaches to installation, Documenting a system, Training and Supporting users, Types & Frequencies of Training Methods, Reasons of System Implementation Failures, Project Closedown, Conducting System Maintenance – Types of Maintenance (Corrective, Adaptive and Perfective Maintenance), effective maintenance, Evaluation of System's Success, System Enhancement, Quality Assurance in System Cycle.

Module VI: System Security and Auditing
System Security: Data Security, Backup & Recovery during System & Database failure, Ethical Issues in System Development, Threat and Risk Analysis, Audit, System Audit, System Audit Standards (Planning, Implantation and Reporting Standards), System Analysis and Programming (Overview, Role & Duties of System Experts as Analyst and Programmer).

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

Text:

- Essentials of System Analysis & Design, Second Edition, Valacich George Hoffer, Prentice-Hall India

References:

- Analysis and Design of information systems, James A. Senn
- Computer Based Information Systems, Kroeber, Donald W. and Watron, Hugh J.
- Systems Analysis & Design, E. M. Awad.
- Systems Analysis and Design – An Applied Approach, Dennis Wixom, Wiley

INNOVATION & CREATIVITY MANAGEMENT

Course Code: MGT2205 **Credit Units: 03**

Course Objective:
To develop an appreciation for new ideas and out of the box thinking so that students can successfully imbibe the habit of innovative and creative thinking in situations is demanding such an approach.

Course Contents:

Module I:
Innovation Management- Introduction, characteristics, components, Types, Models of Innovation process, Innovation Environment-Originators of Innovation, Key Drivers of Innovation, Factors influencing innovation, Nurturing innovation in e-business.

Module II:
Organizing for Innovation- Organizational theories and structures, traits of innovative organizations, current trends, factors influencing organizational design and size decisions, Need & Characteristics for creative organization, 7S framework, creativity crushers, fostering innovation climate and culture, The creativity Hit List.

Module III:
Research and Development management- Significance, Prerequisites, Process, Technology development approaches, management of R &D, In source to open source environment, R&D in small industry, Managing Creative employees, significance and challenges of managing creative employees, Traits of a creative person, motivation to creativity, strategies for unblocking creativity, factors influencing group creativity, Promoting group creativity, Left and right thinking, Linear and non-linear thinking process, creative thinking, Tradition vs creative thinking.

Module IV:
Individual creativity techniques- Inner and Directed creativity techniques, Group Creativity Techniques-creativity methods, writing techniques, techniques based on pictures, maps and networks, Product innovation-types of new products, Target markets for Disruptive Innovation, Technology strategies for innovation, new product development, packaging and positioning innovations, beyond product innovation, New product failures.

Module V:
Innovation Diffusion- Concept of diffusion and adaptation, diffusion types, Innovation diffusion theory, Innovation adoption by organizations, Innovation adoption across countries, Marketing strategy and the diffusion process.

Module VI:
Legal aspects of innovation- IPR, Indian Patents Act, trademark, Copyrights, Trade secrets, Towards Innovative Society-Innovation for social development, Spirit of innovation in India, Favourable and Unfavourable factors.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
Text:

- Krishnamarcharyulu and Lalitha, *Innovation Management*, Himalaya Publishing House, New Delhi- 2007

References:
- Plsek, *Creativity,Innovation and Quality*, Prentice Hall of India, New Delhi-2003

HUMAN VALUES AND PROFESSIONAL ETHICS

Course Code: MGT2206 **Credit Units: 03**

Course Objective:
The aim of this course is to facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way. Recognize the need for lifelong learning and have the knowledge and skills that prepare them to identify the Moral issues involved in Management areas and to provide an understanding of the interface between Social, Technological and Natural environments.

Course Contents:
Module I: Human Values
Morals, Values, Types of values, evolution of human values, Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Character, Challenges at Work place

Module II: Values in Management
Relevance of values in Management, need for values in global change, values for managers, holistic approach for managers in decision making, problems related to stress in corporate management

Module III:
Workplace Rights and Responsibilities: Organizational Complaint procedures. Government agencies. Resolving Employee concerns. Limits on acceptable behavior in large corporation.
Work environment: Ethical and legal considerations, Organizational responses to offensive behavior and harassment. Ethics in a Global Context.

Module IV: Industrial Integrity
The epitome of industrial success, Integrity and organization, Exploring learning process of integrity, Consequences of lack of integrity.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text &References:
Text

- R R Gaur, R Sangal, G P Bagaria, 2010, *A Foundation Course in Human Values and Professional Ethics*, Excel Books

References:
- Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
- E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
- A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
- Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
- PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
- A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.

READINGS IN MANAGEMENT

Course Code: MGT2230 **Credit Units: 02**

Objectives

The objective of this concentration elective is to inculcate reading habit alongwith value addition to the existing understanding of the subject. The book would be a kind of knowledge enhancer that would envision the student about some current thoughts related to the discipline. The book reading and its critical analysis would help broaden the intellectual horizon of the student. A contemporary and relevant book will be selected by the concerned department.

Guidelines

The student is expected to thoroughly go through the discipline related prescribed book with the objective of critically reviewing each aspect and character of the book. The student is supposed to have a detailed insight into the following:

1. Content
2. Writing style
3. Information/learning
4. Content handling
5. Characters(if any)
6. Thematic Clarity

The report is to be submitted in about 3000 words on A4 size sheets, Font 12pt., Times New Roman, 1.5 spacing. Headings in Font Size16.

Evaluation Scheme

Report on the Book in 3000 words	Written Test
50 marks	50 marks

TERM PAPER

Course Code: COM2231 **Credit Units: 02**

Objectives

The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of business management at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face

Guidelines:

1. The term paper will be related to the contemporary business issue and the topic will be given by the department.

2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.

3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

4. Examples of a few broad areas for Term Paper (List is indicative, not exhaustive)

- Credit rating
- Risk management
- Subprime meltdown and its after effect with case study from Indian industry
- Corporate frauds
- Micro finance institutions in India
- Carbon Trading
- IFRS
- Celebrity Endorsement in real estate
- Social media marketing
- Green marketing
- Sustainable branding practices
- Relationship management
- CSR
- Balanced Score Card
- Corporate Governance
- Employee retention
- NGOs.

Evaluation Scheme

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT

Course Code: COM2232 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following Components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III : Collection of information and data relating to the topic and analysis of the same.
Step IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1:Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,

Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.

Step V : The following documents are to be attached with the Final Project Report.

1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP

Course Code: COM2233 **Credit Units: 01**

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop \
The procedure for earning credits from workshop consists of the following steps:

1. Relevant study material and references will be provided by the trainer in advance.
2. The participants are expected to explore the topic in advance and take active part in the discussions held
3. Attending and Participating in all activities of the workshop
4. Group Activities have to be undertaken by students as guided by the trainer.
5. Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
6. Submitting a write up of atleast 500 words about the learning outcome from the workshop.

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Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	**30**	**30**	**30**	**100**

Syllabus - Third Semester

CORPORATE ACCOUNTING

Course Code: LAW2307 **Credit Units: 03**

Course Objective:
This course enables the students to develop awareness about Corporate Accounting in conformity with the Provision of companies' Act and latest amendments thereto with adoption of Accounting Standards that are likely to be introduced from time to time.

Course Contents:
Module I- Introduction to Corporate Accounts
Statutory records to be maintained by a company; Accounting for share capital transactions- issue of shares at par, at premium and at discount; forfeiture and re-issue of shares; buy-back of equity shares; redemption of preference shares - statutory requirements, disclosure in balance sheet; rights issue.

Module II
Issue & Redemption of debentures - accounting treatment and procedures; conversion of debentures into shares; Final accounts of Limited liability companies; Preparation of Profit & Loss account, Profit & Loss appropriation & Balance Sheet account in accordance with the provisions of existing companies act(excluding managerial remuneration).

Module III
Holding and subsidiary companies - accounting treatment and disclosures; consolidation of accounts.

Module IV
Valuation of Goodwill and shares
Good will- Meaning, definition, elements, types and methods of valuation of Goodwill, Methods of share valuation (Equity & preference shares).

Module V
Accounting treatment for amalgamation with reference to As-14 (excluding intercompany transactions & holdings), absorption and reconstruction of companies; internal & external reconstruction, Liquidation – Preparation of Liquidator's Statement of affairs, deficiency /surplus statement, calculation of pro rata treatment of uncalled capital.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:
- S.N. Maheswari, Financial Accounting
- Narayanaswamy, Financial Accounting
- SP Iyengar, Advanced Accountancy
- RL Gupta, Advanced Accountancy
- Jain and Narang, Corporate Accounting
- Tulsian, Advanced Accounting

STATISTICAL METHODS IN RESEARCH-I

Course Code: LAW2308 **Credit Units: 03**

Course Objectives:
To provide basic understanding of quantitative tools and their elementary application to business problems.

Module I- Introduction to Statistics
Basic Concepts, Primary & Secondary data, classification of data, Graphical representation of data, frequency distribution.

Module II- Central Tendency and Dispersion
Measures of central tendency; Mean, Median, Mode, Geometric mean and Harmonic mean; Measures of dispersion; Range, Mean Deviation, Standard Deviation, Coefficient of variation, Quartile Deviation, Skewness and Kurtosis; Difference between these measures and their interpretation.

Module III- Correlation & Regression
Correlation- Concepts and importance, Positive & Negative correlation, Karl-Pearson's coefficient of correlation, Rank correlation coefficient, Spurious correlation, Coefficient of determination.
Regression-Concept, Difference between correlation & regression.

Module IV- Time Series and Index numbers
Time Series- Introduction, Components of a time series, Multiplicative and additive models, Semi Average & Moving Average method;
Index Numbers- Concept, price relative, quantity relative, value relative, Laspeyre's, Passche's and Fisher's index numbers, Family Budget method, problems in construction and limitations of index numbers Tests for adequacy of index numbers.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:
Text:
- Fundamentals of Applied Statistics, V.K.Kapoor & S.C.Gupta, S. Chand & Sons, New Delhi.
- Theory and Problems of Statistics, M.R. Theory, McGraw-Hill Book, London.

References:
- Essential Mathematics for Economics, J. Black & J.F. Bradley, John Willey and Sons.
- Fundamental Method of Mathematical Economics, Chiang, McGraw-Hill New Delhi.
- Applied General Statistics. F.E. Croxton & D.J. Cowden, Prentice Hall, New Delhi.

CONSTITUTIONAL LAW-I

Course Code: LAW2303 **Credit Units: 04**

Course Objective:
The course aims at analyzing constitutional institutions, its powers, limitations and interrelationships with one another and seeks to mould a frame of mind in the student to appreciate and assess constitutional policy and changes for the future.

Course Contents:

Module I: Fundamental Rights and Directive Principles, and Fundamental Duties
Idea of Fundamental Rights and their importance, against whom the Fundamental rights are available? Definition of 'State'? Law in Art. 13, Directive Principles; Nature and reasons for incorporation, inter-relationship between fundamental rights and directive principles, judicial policy towards Directive principles from Champakam to Minerva Mills and thereafter, Art. 51-A (K) and its correlation with Art. 21-A.

Module II: Freedom and Personal Liberty
Freedom of speech and expression and of press; Is Right to Information inclusive in Freedom of Speech and Expression? Freedom of Assembly, Freedom of Association, Freedom of Movement, Freedom to reside and settle, Freedom of profession/Business, etc. Art. 19: Are these freedoms absolute? Rights of an accused: Double Jeopardy, Self-incrimination and retrospective punishment, Art. 20; Right to life and personal liberty: Meaning of personal liberty, Procedure established by Law, Before Maneka Gandhi, Maneka Gandhi and thereafter, Art. 21; preventive detention and constitutional safeguards: Art. 22; Right to education Art. 21-A.

Module III: Equality and Protective Discrimination
Equality before Law and equal protection of Laws, meaning, constitutional provisions Arts 14, 15, 16, 17, 29 (2), 325: Total conspectus, Classification for differential treatment, prohibited grounds of discrimination: Arts. 15(1), (2), (3), 16 (2), (3), 29 (2); Protective Discrimination in favour of SC / ST and other backward classes and recent trends eg. Schedule IX and Reservation Policy, Women and children Art. 15, 15(3), 15(4), 15(5) Abolition of titles – Arts. 18.

Module IV: Secularism
Concept of Secularism, Indian Constitutional provisions, Indian concept of Secularism, Freedom of religion, Scope: Arts. 25, 26, Limits of Freedom, Religion and State in India, State Control and non-interference with religion; Minority rights: Why? Scope: Meaning and Minority, Minority right to educational institutions and judicial attitude.

Module V: Judicial Process under the constitution
Judicial Review : Nature of Judicial Review, Arts. 32, 136, 141, 226, 227.
Judges: Appointments, conditions of service, etc; Public Interest Litigation.
Supreme Courts Original and Advisory Jurisdiction.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India..

LAW OF CRIMES - I (INDIAN PENAL CODE Section 1-120B)

Course Code: LAW2304 **Credit Units: 04**

Course Objective:
Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Introduction to Substantive Criminal Law: Extent and operation of the Indian Penal Code, Definition of Crime, Fundamental elements of crime, Stages in commission of a crime, Intention, Preparation, Attempt.

Module-II: Punishment: Theories: Deterrent, Retributive, Preventive, Expiatory and Reformative Theory. Punishment under the IPC: Fine, Imprisonment, Capital Punishment.

Module-III: General Explanations and Exceptions: Definitions, Constructive joint liability, Mistake, Judicial and Executive acts, Accident, Necessity, Infancy, Insanity, Intoxication, Consent, Good faith, Private defence

Module-IV: Abetment and Criminal Conspiracy

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.

FAMILY LAW-I

Course Code: LAW2305 **Credit Units: 04**

Course Objective:
This Course aims at providing adequate Sociological perspective so that the basic concepts relating to family are expounded in their social setting. It is designed to address the various aspects of Hindu Law and strives to give an overview of some of the current problems arising out of the foundational inequalities in the various family concepts.

Course Contents:

Module I: Introduction (Sources, Schools and Joint Hindu Family)
Sources and Schools of Hindu Law; The Concept, Formation and incidents of Joint Hindu Family of Mitaksharaand Dayabhaga; The Coparcenaries : It's formation and various incidents of Joint Hindu Family of Mitakshara and Dayabhaga; Karta of the Joint Family : His position, powers, privileges and obligation.

Module II: Hindu Marriage (Vivah) and Matrimonial Remedies (The Hindu Marriage Act, 1955)
Hindu Marriage: Nature, concept, Essential conditions & Prohibitions; Void & Voidable Marriages; Divorce: Customary and Judicial- Matrimonial fault theory, irretrievable breakdown and of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation.

Module III: Alimony, maintenance, Adoption and Guardianship (The Hindu Adoption and Maintenance Act, 1956 and The Hindu Minority and Guardianship Act, 1956)
Maintenance of neglected wives, divorced wives, minor children, disabled children and parents under sections 125, 127 of Code of Criminal Procedure, 1973; Alimony : Temporary Permanent; Maintenance: Pendente Lite and permanent and maintenance for Divorced Hindu women under The Hindu Adoption and Maintenance Act, 1956; The Hindu Minority and Guardianship Act, 1956,

Module IV: Law of Succession, inheritance and Partition among Hindus (The Hindu Succession Act, 1956)
Property under Mitakshara Law and Dayabhaga: Formation and Incidents; Devolution of interest in MitaksharaCoparcenaries, Coparcenaries with reference to the provisions of Hindu Succession Act, 1956, Succession to property of Hindu female dying intestate under the Hindu Succession Act, 1956, Disqualifications relating to succession; Partition and Re-union**.**

Module V: Dispositions of Property under Hindu Law
Testamentary Disposition (Will): Definition and basis, Capacity of the Legatee, Formalities of a Will; subject matter of Will, Restrictions on testamentary power of disposition, interpretation of the Will, Revocation of the Will; Disposition inter vivos (Gift).

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal

THE CODE OF CRIMINAL PROCEDURE

Course Code: LAW2311 **Credit Units: 04**

Course Objective:
In the absence of effective enforcement machinery, the substantive Criminal Law which defines offences and provides punishments for them, would be almost worthless. Therefore, the need of the Code of Criminal Procedure. The present course intends at acquainting the students with the various pre judicial and judicial procedures. This course also includes the rights and duties of those proceeded against and the powers, duties and restraints on those administering the criminal judicial process.

Course Contents:
Module I: Introduction
The importance of Fair Trial - constitutional perspectives of fair trial: Articles 14, 20, 21, Section – 2: Definitions; classes of Criminal Courts: Sections 6 to 13 including their powers and jurisdiction. The organization of Police, Prosecutor, Defense Counsel and Prison Authorities alongwith their duties, functions and powers.

Module II: Pre – Trial processes
FIR, Arrest and Bail provisions, bonds, process to compel appearances and production of things, search and seizure – search warrants, search without warrants, police search during investigations, general principles of search, seizure and constitutional aspects of validity of search and seizure proceedings.

Module III: Charge and common features relating to Trials
Form of Charge, joinder of charges, alteration of charge, basic rule regarding charge and its trial, withdrawal of charges, effect of error in the charge. Language of Courts, decision on evidence partly recorded by one judge or magistrate and partly by another, summary procedure to deal with certain cases of perjury and certain kinds of contempt of court, evidence in inquiries and trials, general provisions as to inquiries and trials, provisions as to accused persons of unsound mind.

Module IV: Criminal Trials and Execution Proceedings
Trial before Court of Sessions, Trail of warrant case by magistrate, Trial of Summons Case, Summary Trial, Judgment, submission of death sentence for confirmation, execution, suspension, remission and commutation of sentences.

Module V: Review Procedures
Appeal, Review and Reference

Module VI: Miscellaneous
Maintenance of wives, children and parents, Transfer of criminal cases, Irregular proceedings, Limitations for taking cognizance, Security for keeping peace and for good behavior, Disputes as regarding immovable property, Probation of Offenders Act

Module VII
Juvenile Justice (Care & Protection of Children) Act 2000. Concept of juvenile delinquency, juvenile court system, treatment and rehabilitation of juveniles, law for protection of juvenile offenders. Juvenile Justice (Care &Protection of Children) Act 2014.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ratan Lal and Dheeraj Lal, Criminal Procedure Code
- D.D. Basu, Criminal Procedure Code
- R.V. Kelkar, Lectures on Criminal Procedure Code
- R.V. Kelkar, Code of Criminal Procedure
- Chandrasekharan Pillai (ed.) Kelkar's Outlines of Criminal Procedure (2001), Eastern, Lucknow.

Syllabus - Fourth Semester

FINANCIAL MANAGEMENT

Course Code: LAW2407 **Credit Units: 03**

Course Objective:
To give insight into financial decision making and composition of different securities in the total Capital structure.

Course Contents:
Module I
Nature, Scope & Objectives of Financial Management, Goals of Financial Management, Time value of money, Concept of risk & return (including capital asset pricing model.

Module II
Financing Decisions: Operating & Financial leverage, Capital structure theories; NI, NOI and MM & Traditional Approach, Factors determining capital structure. Concept & measurement of cost of capital, weighed Average cost of capital.

Module III
Capital Budgeting Decisions: Capital budgeting process; estimation of relevant cash flows, Non-discounted& discounted cash flows techniques- pay back, ARR, NPV, IRR, and profitability index;
Module IV
Investment Decisions – capital budgeting – significance – techniques of evaluation of investment Proposals- payback method – return on investment method, net present value method – Case Studies

Module IV
Dividend Decisions – dividend policy – determinants of dividend policy – types of dividend policy – forms of dividend. Different Schools of thought on dividend policy (Gordon, Walter, MM).

Module V
Working Capital Management – meaning – importance of adequate working capital- excess or Inadequate working capital – determinants of working capital requirement – cash management, Receivable management and inventory management – sources of working capital.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:

- S N Maheshwari, Financial Management.
- Khan and Jain, Financial Management.
- Dorai Raj. S.N, Financial Management.
- Sharma and Sashi Gupta, Financial Management.
- I M Pandey, Financial Management.
- James C Vanhorne, Financial Management.
- Prasanna Chandra, Financial Management.
- PN Reddy & Appanaiah, Financial Management.

STATISTICAL METHODS IN RESEARCH-II

Course Code: LAW2408 **Credit Units: 03**

Course Objectives:
To provide basic understanding of quantitative tools and their elementary application to business problems.

Module I- Probability Theory
Independent, Dependent, Mutually Exclusive, Favourable, Exhaustive & Complementary events, Addition theorem, Conditional Probability, multiplication Theorem, Bayer's Theory.

Module II- Statistical Methods
Random Variable- Continuous & discrete; Discrete distribution- Binomial & Poisson, Bernoulli's trials; Continuous Distribution- Normal distribution, Properties of normal curve, importance & application

Module III- Tests of Hypothesis
Significance test: concepts and applications, acceptance and critical regions, null and alternative hypothesis, judgemental errors, level of significance. Power of a test, z test for testing of mean, proportion and equality of means, t- test.

Module IV- Decision Tree
Decision Theory: Decision making, under certainity, uncertainity & risk, Bayersian Analysis, Decision tree.

Examination Scheme:

Components	**A**	**CT**	**C**	**H**	**EE**
Weightage (%)	5	15	5	5	70

Texts and References:
Text:
- Fundamentals of Applied Statistics, V.K.Kapoor & S.C.Gupta, S. Chand & Sons, New Delhi.
- Theory and Problems of Statistics, M.R. Theory, McGraw-Hill Book, London.

References:
- Business Statistics, J.K. Sharma, Pearson Education.
- Statistical Methods, S.P.Gupta, S. Chand and Sons, New Delhi.
- Applied General Statistics. F.E. Croxton & D.J. Cowden, Prentice Hall, New Delhi.

CONSTITUTIONAL LAW-II

Course Code: LAW2403 **Credit Units: 04**

Course Objective:
The course material seeks to introduce the student to the relevance of inalienable fundamental rights and restrictions in the Constitution of India and the principles that ought to guide policy making in India. The student is expected to appreciate the text and the juristic discourse by reference to landmark case laws, juristic opinion and vibrant classroom discussions as the subject raises issues, conflict of interests and dilemmas in a pulsating democracy with changing dynamic priorities in a developing country like India.

Course Contents:
Module I: Distribution of powers between Centre and States – (Arts. 245-281)
Legislative Powers, Administrative Powers, Financial Powers, Relevant Doctrines: Territorial nexus, Harmonious construction, Pith and substance, Repugnancy: Overview of Panchayati Raj Provisions (Art. 243), Freedom of Trade and Commerce.

Module II: Union and State Executive, legislature and Judiciary
Union Executive, President: Appointment, Election, Removal, conditions of service; Powers of president focus on ordinance, pardon, emergency; Assessment of relevance of presidential office on governance; Council of ministers and Prime minister: Appointment, Conditions, functioning, collective responsibility, dismissal of cabinet minister; Office of Attorney General: Significance, Appointment, functions, Conditions; State executive, Governor: Appointment, Removal, Powers, State cabinet dismissal; governors role in the context of centre state relations. (Art 79-122).
Union Legislature: Lok Sabha, Composition, functioning, membership, qualifications and disqualifications, Dissolution of, Effect; Bills : Procedure for the passage; Privileges of legislature; State legislature: functioning, dissolution ; Anti defection law and its impact. (Arts. 168-212).
Union Judiciary: Supreme Court Judges: Appointment, removal, impeachment; jurisdiction of Supreme Court: Original, appellate, advisory, Court of Record; Assessment of independence of judiciary; State judiciary: High Court Judges: Appointment, transfer, removal, promotion; High Court jurisdiction, Art. 226, writs; Subordinate judiciary. (Arts. 124 -147) (Arts. 214 to 237).

Module III: Emergency Provisions
National, State and financial Provisions.

Module IV: Miscellaneous
Official Language, Language of Courts, Trade, Commerce and Intercourse in India, Services Under the Union and State, Elections, Parliamentary, Privileges and Schedules, etc .

Module V: Amendment of the Constitution
Amendment of Constitution, Doctrine of basic Structure.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Texts & References:

- V.N. Shukla, Constitution of India
- M.P. Jain – Indian Constitutional Law.
- H.M. Seervai – Constitutional Law of India.
- Durga Das Basu – Shorter Constitution.
- P.M. Bakshi – Constitution of India.
- J.N. Pandey – Constitution of India.

ADMINISTRATIVE LAW

Course Code: LAW2404 **Credit Units: 04**

Course Objective:
Administrative law is as old as the administration itself. However, the form in which we find it today, Administrative is described a most outstanding legal development of the twentieth century. The reason for this development can only be attributed to a change of philosophy as regards the role and function of the State. The change in the concept of State from 'laissez faire' to a 'welfare state' has led to emergence of state activities in almost all spheres of human life. With the phenomenal increase in the area of state operation, the State was bound to take over a number of functions which were earlier left to private enterprise. In order to ensure that such functions are performed effectively and further due to certain other factors namely contingency, expertise etc. administrative agencies are given extraordinary powers and functions such as to make rules and deciding disputes apart from its wide discretionary powers. Obviously, this necessitated a new set of laws to check the possible abuses of such extraordinary powers on the part of administration. The courts in India and abroad in the course of time have developed various doctrines and methods to deal with such p[problems. However, there is no end to this journey. The field is still open for new changes.
The main thrust of administrative law has been to study the nature of functions and powers exercised by the authorities on whom they have been conferred on and the study of remedies available to common man in case the limits of exercising power are transferred by such an authority. The focus or the centre point of this study, as usual as in cases of the study of other branches of public law, is the rights of individual *wis a wis*the public interest.

Course Contents:
Module I: Evolution, Nature and scope of Administrative law
Definitions, scope, classification and reason for the growth of administrative law; Relationship between constitutional law and administrative law; doctrine of Separation of Powers and its application in administrative law; Doctrine of Rule of law and application in administrative law.

Module II: Legislative function of Administration
Delegated legislation: Necessity for delegated legislation, classification of delegated legislation and its requirement, constitutionality of delegated legislation, All form of control of delegated legislation i.e. Parliamentary, Procedural and Judicial control (doctrine of ultra vires).

Module III: Judicial function of Administration
Reason for Administrative adjudication; Tribunals and classification of Tribunals; Principles of Natural Justice; Ombudsman: Lokpal, Lokayukta; Central Vigilance Commission (CVC).

Module IV: Administrative discretion
Need and legality and abuses; Constitutional objections and discretion, failure to exercise discretion; Doctrine of proportionality; Legitimate expectation.

Module V: Judicial control of administrative action
Courts as the final authority to determine the legality of Administrative actions ; Public Interest Litigation and the principle of *locus standi*, laches, Judicial review ; scope and extent, statutory appeals, writs.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- M.P. Jain and S.N. Jain: Principles of Administrative Law.
- I.P. Massey: Administrative Law.
- C.K. Talewani: Lectures on Administrative Law.
- De Smith: Judicial Review of Administrative Action.
- H.W.R. Wade: Administrative Law
- S.P. Sathe: Administrative Law.

FAMILY LAW-II

Course Code: LAW2405 **Credit Units: 04**

Course Objective:
Family Law II Course is mainly devoted to the study of Muslim Personals Law relating to Marriage, Maintenance, Dower, Adoption & Guardianship, Divorce, Hiba, Pre-emption, Succession, and disposition of Property. The main objective of the course is to provide an indepth knowledge of the Laws governing Muslims.

Course Contents:

Module I: Introduction (Sources, Schools and Muslim Marriage (Nikah)
Sources and Schools of Muslim Law**:** Shia and Sunni; Muslim Marriage: Nature and concepts of Muslim Marriage, Essential conditions of a valid marriage, prohibitions/ disabilities, classification of marriage and effects of valid, irregular, void marriage.

Module II: Dower and Matrimonial Remedies (Dower, Restitution, Separation and Divorce)
Dower : Concept and Nature; Divorce under Muslim personal Law, Nullity of marriage; Option of puberty; Restitution of conjugal rights; Judicial separation; Grounds for divorce under Muslim Law; Bars to matrimonial relief under Muslim Law; Grounds for Divorce under Indian Dissolution of Muslim Marriage Act 1939.

Module III: Alimony, maintenance and Adoption & Guardianship (Hizanat)
Maintenance of neglected wives, divorced wives, minor children, disabled children and parents who are unable to support themselves vide sections 125, 127 of Code of Criminal Procedure, 1973;Alimony and maintenance as an independent remedy,Maintenance (Nafaqa) for Muslim Women under the Muslim Women Protection of Right on Divorce Act, 1986; Guardianship under Muslim Law.

Module IV: Law of Succession and inheritance among Muslims
General rules of succession; inclusion and exclusion of inheritors to the property. Classification of heirs under Hanafi and IthmaAsharia School and their shares and distribution of property.

Module V: Dispositions under Muslim Law, Waqf and Pre- Emption
Wasiyat : Testamentary Disposition and various incidents of wasiyat. Disposition inter vivos (Gift), Gift (Hiba), Musha, Revocation of Gifts; Distinction between Hiba, Ariya, Sadaqa&Wakf, Hiba-bil-Sharatful- ewaz, Gift during death illness (Marz-ul-maut).
Waqf :Meaning, Kinds, Objects,purpose, Requisites and various incidents of waqf.
Pre-emption – Origin, Definition, Classification, Subject matter, formalities, effects, constitutional validity.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Principles of Hindu Law
- Paras Diwan, Modern Hindu Law
- Mulla, D.F., Principal of Mohammadan Law
- Fyzee, A.A.A., Outlines of Mohammadan Law
- Mahmood, T., Muslim Law of India
- Paras Diwan, Law of Intestate and Testamentary Succession (1998), Universal .

LAW OF CRIMES-II (INDIAN PENAL CODE SECTION- 121-511)

Course Code: LAW2406 **Credit Units: 04**

Course Objective:
Course on Law of Crimes aims at introducing students to the basic principles of criminal law. There has been a progressive as well as regressive change in the Indian society since Independence. A proper understanding of crimes and the causal factors for the occurrence of crime is extremely important in the larger context of India's development, if young law students are to use their knowledge and skills to build a just and humane society. The young law students are the would be lawyers and as such they must have an acquaintance with such knowledge to make criminal justice system serve the goals of social defense as well as social justice. Therefore, a study of the basic concepts of specific offences under the Indian Penal Code is imperative.

Course Contents:

Module-I: Offences affecting the Human body: Offences affecting life, causing miscarriage, or injuries to unborn children, Offences of hurt, of wrongful restraint and wrongful confinement, Offences of criminal force and Assault, offences of kidnapping and Abduction

Module-II: Offences against Women: Obscene acts and songs, Outraging the modesty of women, Rape, Cruelty by husband or relatives of husband, Offences relating to marriage

Module-III: Offences against Property: Theft, Extortion, robbery and dacoity, Criminal misappropriation and criminal breach of trust, Cheating, Mischief, Criminal trespass

Module-IV: Defamation and offences relating to documents and property marks: Defamation**,** Forgery**,** Counterfeiting.

Module-V: Offences against State, Public Tranquillity, Public Servants, Religion

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Ratanlal & Dhirajlal – The Indian Penal Code
- K. D. Gaur – A Text Book on Indian Penal Code
- S.N. Misra, Indian Penal Code
- B.M. Gandhi, Indian Penal Code (1996), Eastern, Nagpur.
- P.S. Achutan Pillai, Criminal Law (1995) Eastern, Lucknow.

Syllabus - Fifth Semester

COST ACCOUNTING

Course Code: LAW2507 **Credit Units: 03**

Course Objective:
To get an expert knowledge in the area of cost management and cost control to enable effective management decisions.

Course Contents:
Module I: Cost Accounting
Introduction – Meaning of Cost, costing and Cost Accounting – Comparison between Financial Accounts and Cost Accounts –Cost concepts and Classification of Costs – Cost Module – Cost Center, cost object –Preparation of cost sheet

Module II: Material Costing
Issue of materials, Methods of pricing of material issues- LIFO, FIFO- Weighed Average Method, Simple Average Method; Inventory Control- Concept & techniques like fixing of stock levels, EOQ, ABC analysis, perpetual & periodic inventory systems, material losses & their treatment.

Module III: Labour Costing
Control of labour cost – Labour Turn Turnover – Causes and effects of labour turnover – Meaning of Time and Motion Study, Merit Rating, Job Analysis, Time keeping and Time booking – Idle time, causes and treatment – Overtime – Methods of Wage Payment, Time rate and Piece Rate – Incentive Schemes – Halsey Premium Plan – Rowan Bonus Plan – Taylor's and Merrick's differential piece rate systems – Problems.

Module IV: Overhead Costing
Definition, Classification, allocation, apportionment & absorption of overhead, treatment of over & under absorption

Module V:
Costing Methods Introduction - Job Costing – Batch Costing – Contract Costing-
Process Costing – principles – distinction between Process and Job – Preparation of process accounts – treatment of normal loss – abnormal loss – abnormal gain – Joint and By-products. Service costing. Marginal costing- introduction, contribution, PVR, BEP Chart and Margin of safety.

Module VI:
Reconciliation of Cost and Financial Accounts - Need for reconciliation – Reasons for difference in profits – Problems on preparation of Reconciliation statements including Memorandum Reconciliation account.

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- N.K. Prasad: Cost Accounting
- Nigam & Sharma: Cost Accounting
- Khanna Pandey & Ahuja: Practical Costing
- M.L. Agarwal: Cost Accounting
- Jain & Narang: Cost Accounting
- S.P. Iyengar: Cost Accounting
- S.N. Maheshwari: Cost Accounting
- Horngren: Cost Accounting: A Managerial Emphasis
- M. N. Arora: Cost Accounting
- Dutta: Cost Accounting

MACRO ECONOMICS

Course Code: LAW2508 **Credit Units: 03**

Course Objective:
This course aims at introducing the fundamentals of Macroeconomic theories, policies and models in a historical perspective. It will enable the students to develop a critical insight on Classical and Keynesian macroeconomic models, to understand the relationship between inflation and employment by providing exposure to the constructions of Friedman, Phelps & Phillips.

Course Contents:
Module I: Introduction to Macroeconomics
The roots of macroeconomics, macroeconomic concerns, the role of government in the macro economy, the components of the macro economy, the methodology of macroeconomics

Module II: Introduction to National Income Accounting
Concepts of GDP and national income, approaches to calculating GDP, GDP and personal income, Nominal and real GDP, Limitations of the GDP concept, GDP and the black economy.

Module III: Schools of Macroeconomic Thoughts
Classical, Neo Classical and Keynesian Models.; Say's Law of Markets and Classical Theory of Employment

Module IV: Keynesian Model
Aggregate expenditure and equilibrium output; Consumption function; theory of investment-marginal efficiency of capital; saving and investment; The Investment Multiplier and its application to LDC's

Module V: Money in the Modern Economy
Theories of Demand for Money: Quantity Theory and Keynes approach. Baumol and Tobin Contributions and Friedman's restatement of quantity theory Characteristics of a monetary economy; the supply of money and overall liquidity position; credit creation

Module VI: Inflation
The causes of inflation, level of prices and the value of money, The Fisher effect, the cost of inflation.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
Text:
- Mc Connell. C.R & H.C. Gupta, "Introduction to Macro Economics", Tata McGraw Hill, Delhi
- Gardner Ackeley, "Macro Economics".

References:

- J.E. Stiglitz, and C.E. Walsh (2002), *Principles of Economics*, 3rd Edition, W.W. Norton & Company, New York.
- R. Stone and G. Stone (1962), *National Income and Expenditure*, Bowes and Bowes London.
- Lipsey & Chrystal- Principles of Economics
- K.K. Dewett: Modern Economic Theory, New Delhi, Shyamlal Charitable Trust.

LAW OF EVIDENCE

Course Code: LAW2502 **Credit Units: 04**

Course Objective:
This paper is to orient students with importance of evidence for establishment of claims and the related rules and principles.

Course Contents:

Module I: Definitions and Relevancy of Facts
Evidence and its relationship with the substantive and procedural laws ;Definitions : Facts, facts in issue, relevant, evidence proved, disproved, not proved, oral and documentary evidence ;Relevancy and admissibility; Doctrine of *res gestae ;*Conspiracy.

Module II: Admissions, confessions and statements by person who cannot be called as witnesses:
Definition of admission, who can make admissions by or on their behalf, proof of admission against the persons making them and admissions in civil cases. (Section 17-23, 31); Definition, relevance and consideration of confessions (section 24-30); Dying declaration (Section 32 and Section 33). **Opinion of Third Persons (Sec. 45 to 51) & Character Evidence (Sec. 52 to 55).**

Module III: Documentary Evidence
Primary and Secondary Evidence, Proof and verification of documents; Public documents and presumption as to documents.

Module IV: Production and Effect of Evidence
Burden of proof (Sections 101-114); Estoppels (Section 115); Competence of witnesses (Sections 118-120).

Module V: Examination of Witnesses (Sections 135-166) and Rejection of evidence (Section 167)
Examination –in-chief : Cross Examination, Re-examination; Leading questions; Hostile witnesses; Refreshing memory; Judge's power to put questions or order production.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Ratanlal and Dheerajlal : Law of Evidence
- Monir Field : Law of Evidence
- Batuklal : Law of Evidence
- Avtar Singh : Evidence Law
- Bare Act : Indian Evidence Act, 1872

CODE OF CIVIL PROCEDURE

Course Code: LAW2503 **Credit Units: 04**

Course Objective:
This paper is to help a law student to acquire a thorough knowledge of procedural aspects of working of civil courts and other machineries.

Course Contents:

Module I: Initial steps in a suit
Jurisdiction and place of suing; Institution of suit, cause of action, joinder, non-joinder and mis-joinder of parties; Summons; Pleadings: Meaning, object, General rules, Amendment of pleadings; Plaint and written statement: Particulars, set off and counter claim; Admission return and rejection; Discovery, Inspection and production of documents; Appearance and non-appearance of parties, ex-parte proceedings; First hearing: Meaning, object, framing of issues, omission to frame issues, disposal of suit in the first hearing; Trial: Summoning and attendance of witnesses, summons to produce documents, adjournment, hearing of suit.

Module II: Significant Terms and Definitions
Definitions: Decree, Judgment, Order, Foreign Court, Foreign Judgment, Mesne, Profits, Affidavit, Suit, Plaint, Written Statement, Suit of civil nature ;Important Concepts: Res Sub-Judice, Resjudicata, Restitution, Caveat, Inherent powers of courts.

Module III: Interim Orders
Commissions, Arrest before judgment, Attachment before judgment, Temporary Injunctions, Interlocutory orders, Receiver, Security of costs.

Module IV: Suits in Particular Cases
Suits by or against Government, Suits by Indigent persons, Interpleader Suit, Summary Procedure, Suits relating to public nuisance. Execution Proceedings

Module V: Law of Limitation
Definitions, period of limitation, plaintiff, defendant; and in foreign countries, limitation of suits, appeals, and application, computation of period of limitation.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla's Code of Civil Procedure, Universal, Delhi
- C.K. Thakkar's (Takwani), Code of Civil Procedure
- Majumdar, P.K. and Kataria, R.P., Commentary on the Code of Civil Procedure, 1908, universal, Delhi.

LABOUR LAW-I

Course Code: LAW2504 **Credit Units: 04**

Course Objective:
The course aims at imparting to the students an indepth understanding of Labour Laws in India by recourse to relevant judicial pronouncements in this regard.

Course Contents:

Module I: Regulation of Trade Union & Unfair Labour Practices
History of Trade Union Movement in India and need to form Trade Union, Workers Right to form Union vis-à-vis Indian Constitution; the Membership of Trade Union, Closed shop and Union shop, Registration of Trade Union, Remedies in case of non-registration and cancellation of registration of union, Privileges and Protection of registered Trade Union form certain acts and omissions, Unfair labour practices and victimization.

Module II: Collective Bargaining:
Concept and importance of collective bargaining, Pre-requisites for collective bargaining, Process of administering collective agreement (Negotiation, Mediation, & Voluntary arbitration & Compulsory Arbitration.), Duration and enforcement of bipartite Agreement (Secs. 18, 19, Industrial Disputes Act, 1947), Pressurization: Strike, Go-Slow, wok to rule, Gherao and Lockout.

Module III: Regulation of Industrial Disputes
Define the concept of Industry, Industrial Dispute and workman, Power of Government to refer Industrial Disputes for adjudication: The Adjudicatory Machinery, Award and its binding nature, Judicial review of Awards, The concept of lay-off, retrenchment and procedure and compensation relating to lay-off and retrenchment.

Module IV: Standing Orders
Concept, Nature and scope of standing orders under Industrial Employment (Standing Order) Act, 1946, Formulation of Standing Orders and its Certification process, Modification: Modification and temporary application of Model Standing Order, Interpretation and Legal status of Standing Orders.

Module V: Discipline in Industries
Doctrine of hire and fire in the context of social welfare, Fairness in disciplinary process: Meaning of misconduct, Right to know: The Charge Sheet, Right to defend; Domestic enquiry notice, evidence, cross examination, unbiased enquiry officer and reasoned decision, Punishment of misconduct, Prenatal (permission) and Postnatal (Approach) control during pendency of proceeding (Sec. 33 of industrial and Disputes Act).

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- O.P. Malhotra, Law of Industrial Disputes.
- Indian Law Institute, Labour Law and Labour Relations.
- K.D. Srivastava, Commentary of Industrial Employment (S.C.) Act, 1946.
- S.C. Srivastava, Industrial Relation and Labour Law.
- Report of National Commission on Labour, 1969.
- Industrial Disputes Act, 1947.
- R.B. Sethi & R.N. Dwivedi, Law of Trade Union.

PROPERTY LAW

Course Code: LAW2505 **Credit Units: 04**

Course Objective:
The subject imparts to the student an understanding of the law in India relating to transfer of immovable property and the norms and doctrines that aid in carrying out secure transactions in this regard.

Course Contents:

Module I: Jurisprudential Basis (Sections 5-21)
Concept and meaning of property – New property, Kinds of property – movable and immovable property, tangible and intangible property,

Module II: Sale of Immovable Property
Doctrine of Election Sec. 35, Fraudulent Transfer Sec. 53 ; Sale of immovable property (Secs. 54 – 55). (Sale, Contract of Sale; Contract to sell; Rights and Liabilities of buyer and seller).

Module III: Specific Transfers
Mortgages of immovable Property: Secs. 58 – 77 (Kinds of mortgage, Rights and Liabilities of the mortgagor and mortgagee, Marshalling and Contribution (Secs. 81 – 82), Redemption (Secs. 91 – 96).

Module IV: Leases
Leases (Secs. 105 – 117): Definition, Leases how made, Rights and Liabilites of lesser and lessee, Charges (Section, 100 – 104).

Module V: Easements
Creation of Easements (Secs. 4 – 7), Nature and characteristics of Easements, Extinction, Suspension and Revival of Easements (Secs. 37–51), Riparian Rights, Licenses (Secs. 52 – 64).

Module VI
Indian Stamp and Registration Act

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Mulla, D.F., Transfer of Property Act.
- Shukla, S.N., Transfer of Property Act.
- Shah, S.M., Transfer of Property Act.
- Tripathi, Lectures on Indian Easement Act.
- Jain, J.D., Indian Easement Act.

ACCOUNTING THEORY

Course Code: COM2502 **Credit Units: 04**

Course Objectives:

Course Contents:

Module I-

Accounting Theory: Meaning, need and structure development, Income measurement concept, valuation and capital maintenance concept, development of financial accounting standards in India and abroad.

Module II-

Corporate Reporting and Information disclosures: Concept of adequate disclosure, methods of disclosures, Indian company Law and disclosure practice. Current issues in corporate reporting: Reporting for investor and employees and social responsibility accounts, Social Accounting & Reporting. Revenue and Expenses recognition

Module III-

Productivity Accounting: Input output relationship and their Accounting. Human Resource Accounting: Concepts, Methods, Evaluation and Reporting.

Module IV-

Conceptual Framework of Accounting, Accounting Standards in India and Guidance, Notes on Various Accounting Aspects.

Module V-

Harmonization Accounting & Reporting: Nature of Harmonization, recommendation of the report of the advisory group on accounting and auditing RBI, International Accounting Standards Committee & International Accounting Standard Board (IASB), Obstacles in Harmonization

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Text & References:

Texts:

- Advanced accounts, Shukla & Grewal, S. Chand& Sons, Delhi
- An Introduction to Accounting Theory, L.S. Porwal, Tata McGraw Hill
- Corporate Financial Reporting, JawaharLal, Taxmann Publication(P) Ltd., New Delhi

References:

- Advanced Financial Accounting, B.D. Agarwal
- Advanced Accounts, H. Chakravarti
- Accounting Theory, R.K. Lele and JawaharLal, KitabMahal, Allahabad
- Advanced Account, Bissa, Chitlangi and Rajpurohit

ADVANCED CORPORATE ACCOUNTING

Course Code: COM2503 **Credit Units: 04**

Course Objectives:

Course Contents:

Module I-
Advanced problems on final Accounts of Companies, Disposal of Profit and Capitalization Of Profits Issue of Bonus Shares.

Module II-
Problems of Amalgamation, (AS-14) and Reconstruction, Aspects of Corporate Reconstructuring.

Module III-
Consolidated Accounts of Holding and Group Companies.

Module IV-
Preparation of Final Accounts of Banking Companies and Insurance Companies.

Module V-
Preparation of Final Accounts of electricity Companies and Double Account System.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts and References:
Texts:
- Advanced Accounts, Batliboi
- Advanced Accounts, R.R. Gupta

References:
- Advanced Accounts, Shukla & Grewal
- Advanced Accounts, S.N. Maheswari
- Accountancy, W. Pickles
- Advanced Accountancy, R.L. Gupta

CORPORATE TAX LAW AND PRACTICE

Course Code: COM2504 **Credit Units: 04**

Course Objectives:

Course Contents:

Module I-

Computation of total income in case of companies including non-residents, Co-operative Society

Module II-

Procedure for assessment: Section 139 to 148 (Return of Income)PAN, Assessments, Methods of Accounting, Accounting standards, Time limit for completion of Assessment, Rectification of mistake etc. Special procedure for assessment of search cases.

Module III-

Liability in Special Cases: Legal representatives, Representative assesses: provisions applicable to firms, AOP & BOI, executors succession, shipping companies. Recovery of tax in respect of non-resident, persons leaving India, person trying to alienate their property, discontinuation of business & profession

Module IV-

Collection and Recovery of tax, TDS, Advance payment of income tax, Interest u/s 234, Refunds and settlement of cases

Module V-

Appeals & Revision, Acquisition of Immovable properties, provisions to counter evasion of tax, Penalties, Offences and Prosecutions, Authorized representation and miscellaneous provisions.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:

Texts:

- Income Tax Act, Taxmann, New Delhi
- Income Tax Rules, Taxmann, New Delhi

References:

- Direct taxes, V.K. Singhania, Taxmann, New Delhi

Circulars and Notification issued by CBDT

BUSINESS TAXATION

Course Code: COM2505 **Credit Units: 04**

Course Objectives:

Course Contents:

Module I-

C.S.T.: Constitutional History, Definitions, principle for determining different sales, Registration of Dealer, Rate of Tax.

C.S.T.: Determination of Taxable turn-over, Computation of Tax, Liability, Different forms used under C.S.T.

Module II-

Value Added Tax Act: Definitions, incidence and levy of tax, Computation Registration of Dealer, Exemptions Determination of taxable turn-over, computation of tax liability.

Module III-

C.S.T./V.A.T. : Tax authorities, filling of returns, assessments, payment and recovery of tax, appeal, revision and rectification.

Module IV-

Wealth Tax Act : Definitions, incidence of tax, deemed assets. exempted assets, computation of net wealth, Valuation of assets, assessment, appeals, penalties.

Module V-

Indian Tax System: Central and State Powers of taxation, Distribution of revenue between Centre and State. Finance Commission constitution, functions and recommendations.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:

Texts:

- Indirect Taxes, V.K. Singhania, Taxmann , New Delhi
- Central Sales Tax Act 1956

References:

- Bare Act of Value Added tax
- Central Sales tax Rules
- An Introduction to Rajasthan and Central Sales Tax Act, B.L.Gupta

Wealth Tax Rules, Taxmann, New Delhi

SUMMER INTERNSHIP EVALUATION-II

Course code: LAW2535 **Credit Units: 03**

Objective:
The basic objective of a Summer Internship is to refine the practical exposure of the corporate functioning. This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the industry. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:
Every student of B.Com (Hons.) shall be required to undergo a practical training in an corporate organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.
The last date for the receipt of training report in the department shall be one month after the date of completion of training, i.e. at the beginning of the fifth semester.

Chapter Scheme
Chapter I: Introduction 20 marks
Chapter II: Conceptual Framework/National/International Scenario 5 marks
Chapter III: Presentation, Analysis and Findings 35 marks
Chapter IV: Conclusion and Recommendations 15 marks
The report has to be type written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 80 to 100 pages and has to be submitted in two copies.
Examination Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks

Components of the Report
The outcome of Summer Internship is the Project Report. A project report should have the following Components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) **Body of the Report:** The body of the report should have these four logical divisions
a) ***Introduction:*** This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b) ***Conceptual Framework / National and International Scenario*****:** (relating to the topic of the Project).
c***) Presentation of Data, Analysis and Findings*****:**(using the tools and techniques mentioned in the methodology).
d) ***Conclusion and Recommendations:*** In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.

Syllabus - Sixth Semester

MANAGEMENT ACCOUNTING

Course Code: LAW2607 **Credit Units: 03**

Course Objective:
To provide the students knowledge about the use of costing data for planning, control and decision making.

Course Contents:
Module I: Management Accounting
Nature & Scope: Meaning and Definition - Objectives of Management Accounting - Management Accounting and Financial Accounting - Management Accounting and Cost Accounting - Utility of Management Accounting - Limitations of Management Accounting - Position of Management Accountant in the Organisation.

Module II: Analysis and Interpretation of Financial Statements - I
Concept of Financial Statements and their Nature - Limitations of Financial Statements - Analysis and Interpretation - Tools - comparative Financial Statements -common size Statements - Trend Percentages
Ratio Analysis - Nature and Interpretation - Utility and Limitations of Ratios - Short-term Financial Ratios - Long-term Financial Ratios - Profitability Ratios - Proprietary and Yield Ratios - Turnover Ratios - DUPONT Control Chart

Module III: Cash Flow Analysis
Distinction of cash from funds-utility of cash flow statement construction of cash flow statement

Module IV: Responsibility Accounting and Standard Costing
Concept of Responsibility Accounting - Cost Centers and Profit Centers - Contribution by Segments

Module V: Budgets and Budgetary Control
Concept of Budgets and Budgetary Control - Nature and Objectives of Budgetary Control - Advantages and Limitations of Budgetary Control - Establishing a system of Budgetary Control - Preparation of Sales Budget, Selling and Distribution Cost Budget, Production Budget, Purchase Budget, Cash Budget etc. - Flexible Budgets and Master Budgets

Examination Scheme:

Components	A	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

- Dr. S.N. Maheswari , Management Accounting
- Sexana, Management Accounting
- Made Gowda, Management Accounting
- Dr. S.N. Goyal and Manmohan, Management Accounting
- B.S. Raman, Management Accounting
- R.S.N. Pillai and Bagavathi, Management Accounting
- Sharma and Gupta, Management Accounting
- J. Batty, Management Accounting
- Foster, Financial Statement Analysis, Pearson.
- PN Reddy & Appanaiah, Essentials of Management Accounting

FINANCIAL MARKETS, INSTITUTIONS AND FINANCIAL SERVICES

Course Code: LAW2608 **Credit Units: 03**

Course Objective:
To introduce students to different financial institutions, Markets and the services which are available in India

Course Contents:
Module I
Introduction to financial services; Merchant banking: Meaning, scope, functions, management of new issues, Indian experience, SEBI guidelines, Future of merchant banking in India.

Module II: Money, Prices, Exchange Rate and Interest Rates
Monetary expansion, Interest rates and exchange rates, Monetary expansion and prices, Real and nominal values, Inflation and interest rates, Inflation and exchange rates. The Indian financial system: Introduction, The pre 1951 period, the post 1951 period, Emerging horizon.

Module III: Commercial Banks
Evolution of modern commercial banks, Evolution of bank assets, liabilities and activities; Banking structure, Matching revenues and costs, capital adequacy; Accounting policies and related matters, Direct investments, and credit programmes. Central banking and monetary policy: Central banking functions; Money creation, process and control; monetary policy.

Module IV: Leasing financing
The concept, merits and demerits; Types; The Indian leasing scenario; Lease evaluation; Lease accounting.

Module V: Hire purchase
Meaning; James Raj Committee recommendation; RBI guidelines; Hire purchase and transport industry; Lease vs. Hire purchase; Problems and prospects of hire purchase in India.

Examination Scheme:

Components	A	CT	C	H	EE
Weightage (%)	5	15	5	5	70

Text & References:

- Gordon and Natarajan, Financial Markets and Services, Himalaya Publishing House.
- Khan, M.Y, Financial Services, Tata McGraw Hill.
- Jeff Madura, Financial Markets and Institutions, South-Western College Publishing.
- B.C Vasant Desai, The Indian Financial System, Himalaya Publishing House.
- Bhole L.M, Financial Institutions and Markets, Tata McGraw Hill.

COMPANY LAW

Course Code: LAW2603 **Credit Units: 04**

Course Objective:
The paper aims to make the student familiar and to provide insight into formation and winding up of companies beside corporate administrations.

Course Contents:

Module I: Company
Definition, Characteristics, Lifting of Corporate Veil; Types of Companies;
Formation of a Company: Promoters, Pre-incorporation Contracts, Provisional Contracts,

Module II: Memorandum of Association, Articles of Association and Prospectus
Memorandum of Association; Articles of Association; Prospectus: Issues, contents, Kinds, liability for misstatements, Shelf Prospectus, Statement in lieu of Prospectus.

Module III: Share Capital
Issue and allotment of shares, SEBI guidelines on allotment, Issue of shares at premium and at discount, Share Certificate, Demat system ; Forfeiture and surrender of Shares, Transfer & Transmission of shares; Provisions relating to payment of dividend, Investor's Education and Protection Fund.

Module IV: Corporate Administration
Directors: kinds, powers and duties; Insider trading; Meetings kinds and procedure; The balance of powers within companies: Majority control and minority protection, Prevention of oppression, and powers of court and Central Government,

Module V: Winding up of Companies
Kinds, consequences and reasons of winding up; Role of the court; Liability of past members; Payment of liabilities; Reconstruction and amalgamation.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Avtar Singh : Indian Company Law
- Shah S. M : Lectures on Company Law
- Saharay H.K.: Company Law, 5th Edn.

LAW OF TORT (MOTOR VEHICLES ACT AND CONSUMER PROTECTION ACT, 1986)

Course Code: LAW2604 **Credit Units: 04**

Course Objective:
This course aims to introduce the student to the specialized discipline of tort law that is one of the most litigated areas of law in west. In India this realm is on the verge of a lot of litigational activity. The course covers Consumer Protection Act as well as Motor Vehicle Act which are carved out from the general principles of tort.

Course Contents:
Module I: Introduction to Tort
Nature and Definition of Torts ; Tort distinguished from Contract, Quasi-Contract, Crime : Conditions of liability including *damnum sine injuria*, *injuria sine damnum*; Remoteness of damages; Maxims: *Ubijus ibi remedium*, *Res ipsa loquitor*, etc.; Justification in Tort - *Volenti non-fit Injuria*, Necessity, Plaintiff's default**,** Act of God, Inevitable accidents, Private defences, Judicial and Quasi – Judicial Acts, Parental and quasi-parental authority.

Module II: Actions in Tort
Assault, Battery, False Imprisonment, Malicious Prosecution; Defamation-Libel, Slander including defenses in an action for defamation. ; Vicarious Liability; Liability of State; Doctrine of Sovereign Immoduley.

Module III: Negligence
Negligence including contributory negligence and other defenses: Absolute liability/Strict liability, Rules in Ryland v. Fletcher **;** Principles for the application of the rule and defenses; Enterprises engaged in hazardous activities – M.C. Mehta v. Union of India; Nuisance; Trespass.

Module IV: Consumer Protection
The concept of a Consumer and Consumer Dispute, definition of 'consumer' under the consumer Protection Act, 1986: The Aims and Objectives of the Consumer Protection Act, 1986. Shift from Caveat Emptor to Caveat Venditor, Consumer Protection Councils under the Consumer Protection Act 1986. Redressal mechanism under the Consumer Protection Act, 1986; The District Forum, The State Commission; The National Commission. Why a consumer may institute proceedings.

Module V: Motor Vehicles
Motor Vehicles Claims and compensation: Relevant provisions of the relating Motor Vehicles Act relating to the liability and assessment of compensation: Liability without fault in certain cases : voidance of contracts restrictive of liability: Special provisions and scheme of compensation in case of hit and run motor accidents: offences penalties and procedure: Insurance of Motor Vehicles against third party risks(Sec. 145 – 152): Claims tribunals: Sec. 165-176: Special provisions as to payment of compensation on structured formula basis: Claims on non structured basis: Method of calculating compensation evolved by the courts(study with reference to relevant judgments): Defences: Changing parameters of negligence and burden of proof.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Winfield and Jolowicz, Tort
- Law of Torts, Universal law Publishing Company, Dr. S.P. Singh
- The Law of Torts: Ratanlal & Dhirajlal,
- Winfield, Law of Torts,
- Dr. D.N. Saraf, Law of Consumer Protection in India,
- Dr. Avtar Singh, Law of Consumer Protection in India, Dr. Gurjeet Singh, The law of Consumer Protection in India.
- Motor Vehicle Laws, Universal Law Publishing Company.

LABOUR LAW-II

Course Code: LAW2605 **Credit Units: 04**

Course Objective:
The paper is to focus on wage policies, compensation for learn caused during the course of employment and working conditions of employees.

Course Contents:

Module I: Minimum Wages Act, 1948
Concept of Labour Welfare, Classification and Importance, Labour welfare activities, Concept of minimum wage, fair wage, living wage and need based minimum wage, Constitutional validity of the Minimum wages Act, 1948, Procedure for fixation and revision of minimum wages, Fixation of minimum rates of wage by time rate or by piece rate, Procedure for hearing and deciding claims.

Module II: Payment of Wages Act, 1936
Object, scope and application of the Act, Definition of wage, Responsibility for payment of wages, Fixation of wage period, Time of payment of wage, Deductions which may be made from wages, Maximum amount of deduction.

Module III: Workmen's Compensation Act, 1923
Definition of dependant, workman, partial disablement and total disablement, Employer's liability for compensation: Scope of arising out of and in the course of employment, Doctrine of notional extension, When employer is not liable, Employer's Liability when contract or is engaged, Amount of compensation, Distribution of Compensation, Procedure in proceedings before Commissioner, Appeals.

Module IV: Factories Act, 1948 & Social Security
Concept of "factory", "manufacturing process" "worker" and "occupier" : General duties of occupier, Measures to be taken in factories for health, safety and welfare of workers, Working hours of adults, Employment of young person and children, Annual leave with wages, Additional provisions regulating employment of women in factory, Social Security of Workmen ; Concept and scope of social security : Origin of Social Security in India, Claim and Adjudication of Disputes under Employee's State Insurance Act. 1948.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- S.C. Srivastava, Commentaries on factories Act, 1948, Universal Law Publishing House, Delhi
- H.L. Kumar, Workmen's Compensation Act, 1923.

CYBER LAWS

Course Code: LAW2606 **Credit Units: 04**

Course Objective:
With the advent of information technology law and Right to Information Law, new strides and strategies in legal justice education have come up. There is a need that Law students must also be acquainted with these new developments if a law student has to find a comfortable berth in the competitive legal market as a Law Professional as well as legal manager. Therefore, there seems to be an impending need to generate e-Legal Justice Education that exposes the students to have deep insights into the complexities of information technology and right to information. Objectives of this course, therefore, are understanding the legal recognition and procedure, Digital signatures, legal recognition of cyber authorities and Cyber appellate tribunal, legal implications of new varieties of offences and penalties under the Information Technology Act, 2000. A student of law should also be given the understanding of copy right issues, TRIPS agreements, application of patents to computer technology, etc. Besides, the course also aims at developing insights into the Right to Information Act, 2005 and its grey areas.

Course Contents:
Module I: Introduction (Need, Role and various aspect related to Cyber Law)
Need and role of Cyber; Jurisprudence of Cyber Law in India; Free speech and expression on Internet &Privacy; issues, Right to data protection, Cyber Law &Protection of Domain name.

Module II: Cyber Jurisdiction, Investigation & Cyber Forensics
Cybercrimes: Extradition and Jurisdictional issues; Investigation of Cyber Offences: Cyber equipment's& Cyber Cell; Cyber Forensics: provisions, need and role in cyber investigation.

Module III: Electronic Governance, Cyber space &IPR issues
Legal aspect of Electronic Governance; IPR Issues: An Overview, Patent, Copyright and Trademark& other related Issues in Cyberspace.

Module IV: Cyber Legislations (Laws, National and International treaties & Conventions)
Cyber Legislation: An Indian and International Regime; The Information Technology 2000, The Provisions relating to- Legal recognition of – Digital & Electronic Signature, Secure E- records and Signature, E-signature Certificates, Certifying Authorities, Cyber, Appellate Tribunal and Miscellaneous Provisions.

Module V: Cyber Crimes (Civil & Criminal)
Cyber Crimes and Cyber Victimization; Cyber Offences: Types & the provisions for Penalties mentioned in IT Act, 2000; Cyber Pornography, Cyber Terrorism, Cyber Tort and Cyber defamation etc.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Nandan Kamath, Universal Law Publishing Company and E –commerce: Law relating to computers Internet.
- K.K. Kumar, Dominant Publication: Cyber Law
- B.L. Wadhera : Patent, trademarks, Copyrights
- Ganguly (LMH): Intellectual Property Rights.

ADVANCED ACCOUNTS

Course Code: COM2602 **Credit Units: 04**

Course Objectives:

Course Contents:
Module I-
Valuation of Assets: Inventories, Goodwill, Shares and Business, (AS-26).

Module II-
Investment Accounts: Accounting Standard 13, Accounting for Financial asset and Instrument.

Module III-
Agricultural Farm Accounting, Hotel Accounting, Accounting for inflation.

Module IV-
Fund Based Accounting, Introduction to Government Accounting, Corporate Social Accounting and Environmental Accounting.

Module V-
Value Added Statement, Economic Value Added (EVA) Statement, Human Resource Accounting.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P-** Project/Seminar/Quiz/Viva; **HA-**Home Assignment; **CT**-Class Test; **EE-**End Semester Examination

Texts & References:
Texts:
- Advanced Accounting, Batliboi
- Advanced Accounts, M.C. Shukla & T.S. Grewal
- Advanced Accountancy, R.L.Gupta

References:
- Advanced Accountancy, Jain & Narang
- Advanced Accountancy, H. Chakraborthy
- Advanced Accountancy, M.C.K. Nambiar

ADVANCED COST ACCOUNTING

Course Code: COM2603 **Credit Units: 04**

Course Objectives:

Course Contents:

Module I: Cost Book-Keeping
Non-integrated Accounting system, Accounting Ledgers And Control Accounts, Integrated Accounting, Reconciliation of Cost & Financial Accounts.

Module II: Process Costing
Basic Concept, Joint products and By-products, work-in-progress, (Equivalent production), inter-Process profits, Uniform Costing and inter firm comparisons.

Module III: Activity Based Costing
Problems of Traditional Costing, Cost analysis under ABC, Institution of ABC, Benefits and Weaknesses, Life Cycle Costing; Target Costing.

Module IV: Cost Management System
Total Quality Management, Benchmark, Back-flush Costing, Reengineering, Cost Reduction and value Analysis: Concept and Techniques.

Module V:
Service Costing, Marginal Costing, Standard Costing, Decision Making, Make or buy, Add or Drop, Operate/Shutdown, Sell/Process.

Examination Scheme:

Components	**A**	**P**	**HA**	**CTT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:
Text:
- Principles and Practice of Cost Accounting, N. K. Prasad
- Cost Accounting, C.D. Vashisht & V. K. Saxena, Sultan Chand& Sons, New Delhi.

References:
- Principles & Practice of Cost Accounting, Asish K Bhattacharyya ,Wheller Publishing, N. Delhi
- Management Accounting, J. Batty
- Advanced Cost Accounting & Cost System, M. Kishore Ravi
- Accounting For Management, Guru Prasad Murthy
- Decisional Phenomena And Management Accountants, Backer and Jucobson

INDIRECT TAXES INCLUDING GST

Course Code: COM2604 **Credit Units: 04**

Course Objectives: To provide students with adequate theoretical and working knowledge about GST and its practical application in unification of indirect tax system in India. The course intends to make students aware of the latest developments and changes being incorporated in GST at the systemic level and its implications in the process of economic and financial integration.

Course Contents:

Module I-

Origin of GST – Evolution of GST concept, How GST came into existence, GST Laws, Constitutional Perspectives – Cooperative Federalism in economic system, Application of GST in tax sharing – CGST/SGST/IGST, Classification of goods and services in GST assessment, Exemption from Tax, Composition levy.

Module II-

Basic Framework of GST – Unification of indirect tax system, GST Council – composition, objectives, functions and significance, Tax sharing and disbursement mechanism between the Centre and states, Responsibilities of various stakeholders – government, firms, traders, consumers,. Registration, Tax invoice, Returns.

Module III-

Administration of GST – GST Network, Registration, Tax Invoice, Credit & Debit Notes, Electronic way bill for interstate movement of goods, Computation of GST Liability, Input Tax Credit, Concept of times value of supply, Filing of Returns, Payment of Tax, Search, Seizure & arrest, Demand & Recovery, Offences & Penalties.

Module IV-

Safeguard Measures – Anti-profiteering clause, Reverse charge mechanism, Assessment & Audit, Inspection – Concept of HSN and SAC, Advance Ruling, Appeals & Revision, Implications on Tax terrorism, corruption, tax evasion and black money

Module V-

Comparative analysis between GST in India and other countries such as Canada, France, Australia and China, Advantages and Disadvantages.

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

A-Attendance; **P** -Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Text & References:

Text:

- GST Council, Government of India, Publications.
- Singh, Awdhesh (2018), *GST Made Simple: A Complete Guide to Goods and Services Tax in India*, Centax Publications.

References:

- Bhattacharjee Govind and Debasis Bhattacharya (2018), *GST and Its Aftermath – Is Consumer Really the King?* SAGE Publications.
- Garg, Rakesh (2016), *Handbook of GST in India: Concepts and Procedures*, Bloomsbury.

PUBLIC FINANCE AND TAX PRACTICES

Course Code: COM2605 **Credit Units: 04**

Course Objective:

Course Contents:
Module I:
Origin and Development of Public Finance
Meaning, public finance and federal finance, public finance and private finance, principle
Principles of Taxation and Government Expenditure
Benefit approach, allocation of public goods, ability to pay approach, excess burden of taxes

Module II:
Raising of Public Funds
Sources and classification of public revenues, incidences and shifting of taxes
Distribution of Public Funds
Effect on production, employment, distribution and stability, public debt and fiscal deficit

Module III:
Public Debt Management and Taxation
Development of Federal Finance in India
The constitutional arrangements, Finance Commissions

Module IV: Central and StateFinances
Sources and uses of funds, effects of Fiscal Policy, relation between planning and central budgeting
State Finances- Sources and uses of funds, issues of federalism

Module V: Financing of Five-year Plans
Changing scenario of Indian tax Structure, new economic policy since 1991
Indian Fiscal Policy and Deficit Financing

Examination Scheme:

Components	**A**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	15	5	5	70

A-Attendance; **P**-Project/Seminar/Quiz/Viva; **HA**-Home Assignment; **CT**-Class Test; **EE**-End Semester Examination

Texts & References:
Texts:
• R. Mursgrave, The Theory of Public Finance, McGraw Hill
• R. Mursgrave and P.B. Mursgrave, Public Finance in Theory and Practice, McGraw Hill
• J. M. Buchanan, Public Finance

References:
• Due and Friedlandar, Public Finance
• S. Ganguli, Public Finance, World Press
• B. M. Bhargava, Public Finance
• B. M. Bhargava, The Theory and Working of Union Public of India
• Vaish and Agarwal, Public Finance, Wiley Eastern

Syllabus - Seventh Semester

ENVIRONMENTAL LAW

Course Code: LAW2702 **Credit Units: 05**

Course Objective:
This paper provides the study of environmental laws covering legislations related to it and protection of forest and wild life.

Course Contents:
Module I: Environmental Law: International and National Perspective
Introduction: Environment and Environment Pollution: Problem and prospects; constitutional Perspective :Right to Evolution and Application, Co relation between: Directive Principles of State Policies and Fundamental Degrees, Fundamental Rights and Directive Principles of State Policy; International Norms :Sustainable Development :Precautionary Principle, Polluter Pays Principle, Agenda 21, Inter generational equity, Public Trust Doctrine, Principle of no fault liability : Absolute Liability; Environment Protection through Public Interest Litigation, Remedies under various other laws.

Module II: Prevention and Control of Water and Air Pollution
The Water (Prevention and Control of Pollution) Act, 1974:Water Pollution : Definition, Central and State Pollution Control Boards: Constitution, Powers and Functions, Water Pollution Control Areas, Sample of effluents : Procedure; Restraint order, Consent requirement : Procedure, Grant/Refusal, Withdrawal, Citizen Suit Provision; Air (Prevention and Control of Pollution) Act, 1981: Air Pollution: Definition, Central and State Pollution Control Boards: Constitution, Powers and functions, Air Pollution Control Areas; Consent Requirement : Procedure, Grant/Refusal, Withdrawal, Sample of effluents – Procedure; Restraint order.

Module III: Protection of Forests and Wild Life
Indian Forest Act, 1927: Kinds of forest: Private, Reserved, Protected and Village Forests, The Forest (Conservation) Act, 1980; The Wild Life (Protection) Act, 1972: Authorities to be appointed and constituted under the Act, Hunting of Wild Animals, Protection of Specified Plants, Protected Area, Trade or Commerce in wild animals, animal articles and trophies; Its prohibition.

Module IV: Special Environmental Legislations
Environmental (Protection) Act, 1986, Public Liability Insurance Act, 1991, The National Environment Tribunal Act, 1995, The National Appellate Environmental Authority Act, 1997.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Environmental Law & Policy in India – Shyam Diwan, Armin Rosencranz
- Environmental Law in India – P. Leelakrishnan
- PIL and Environmental Protection-Geetanjali Chandra
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The Indian Forest Act, 1927
- The Forest (Conservation) Act, 1980
- The Wild Life Protection Act, 1972
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The National Environment Tribunal Act, 1995
- The National Environment Appellate Authority Act, 1997

JURISPRUDENCE

Course Code: LAW2703 **Credit Units: 05**

Course Objective:
The objective of the course is to create an understanding of basic legal concepts and provide an insight to the student into philosophical, ideological and theoretical foundations of the discipline of law with special reference to Indian legal system.

Course Contents:

Module I: Introduction
Nature and scope of Jurisprudence**,** State, Sovereignty and Law: Sources of Law: Custom, Precedent, Legislation, Equity.

Module II: Schools of Jurisprudence – I
Natural Law, Analytical positivism, Pure Theory, Historical Jurisprudence, Sociological Jurisprudence, Economic Approach, Legal Realism, Theories of justice: Aristotle, Rawls, Distributive Justice in India.

Module III: Concepts of Rights and Duties
Rights and Duties, Types, Theories, Critique of Rights and Duties, Contemporary issues in Rights.

Module IV: Concepts of Ownership and Possession:
Evolution of concept of possession, ownership, Essentials of ownership, Corpus and Animus, Res Nulius and Res Possessionis

Module V: Indian Perspectives in Jurisprudence
Classical and Medieval Influences, Modern Trends study with reference to judicial pronouncements with state policy.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Bodenheimer, Jurisprudence – The Philosophy and Method of Law (1996), Universal, Delhi.
- Fitzgerald, (ed.) Salmond on Jurisprudence (1999) Tripathi, Bombay
- W. Friedmann, Legal Theory (1999) Universal, Delhi
- V.D. Mahajan, Jurisprudence and Legal theory (1996 re-print), Eastern, Lucknow
- M.D.A. Freeman (ed.) Lloyd's Introduction to Jurisprudence, (1994), Sweet & Maxwell
- Paton G.W. Jurisprudence (1972) Oxford, ELBS
- H.L.A. Hart, The Concepts of Law (1970) Oxford, ELBS
- Roscoe Pond, Introduction to the Philosophy of Law (1998 Re-print) Universal, Delhi
- Dias, Jurisprudence (1994 First Indian re-print), Adithya Books, New Delhi
- Dhyani S.N., Jurisprudence: Jurisprudence and Indian Legal theory
- Dhyani S. N., Fundamentals of Jurisprudence
- Jayakumar N. K., Lectures in Jurisprudence, Butterworths
- Justice Markandey Katju, Law in the Scientific Era, Universal
- Justice J. S. Verma, Dimensions of Justice, Universal
- Justice Rama Jois, Seeds of Modern Public Law in Ancient Indian Jurisprudence
- Justice Rama Jois, Eternal Values in Ancient Law.

PUBLIC INTERNATIONAL LAW

Course Code: LAW2704 **Credit Units: 05**

Course Objective:
The objective of this paper is to provide knowledge to the students regarding the Public International Law to enable them to deal with the transnational legal order.

Course Contents:
Module I: Introduction
Definition and Basis of International Law, Subjects of International Law, Relationship between International Law and Municipal Law.

Module II: Sources of International Law
Custom, Treaties, General Principles of law, Juristic Works, General Assembly Resolutions, Other sources (Conventions).

Module III: State Recognition, State Jurisdiction and Law of the Sea
State Recognition: Recognition of states, Recognition of governments, *De facto* and *De jure* Recognition, Types of Recognition: Implied Recognition, Conditional Recognition, Collective Recognition; Withdrawal of Recognition, The legal effects of recognition; **State Jurisdiction:** Basics of Jurisdiction, Principles of Jurisdiction, Exemption from Jurisdiction: Diplomatic ImmModuleies and Privileges, Armed Forces, Public Ships; **Law of the Sea:** First and Second Law of the Sea Conventions :Third Law of the Sea Convention {UNCLOS III (Moduleed Nations Convention on the Law of The Sea), Maritime Zones; Territorial Waters, Contiguous Zone, Exclusive Economic Zone, Continental Shelf High Seas; Sea Bed Authority, Deep Sea Bed Mining and International Sea – Bed Area.

Module IV: Conflict Resolution, War and Neutrality of States
Modes of Settlement of Disputes: Peaceful means, Coercive means; War: Laws of War, Humanitarian Laws: Rules of neutrality.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Oppenheim, International Law, Vol. – 1.
- J.G. Strake, Introduction to International Law.
- Grieg, International Law.
- R.C. and Hingorani, Modem International Law.
- H.O. Aggarwal, International Law.
- S.K. Kapoor, International Law.
- Bowell, The Law of Internationals Institution.
- Verma, S.K., An Introduction of Public International Law.

ARBITRATION ANDALTERNATE DISPUTE RESOLUTION

Course Code: LAW2705 **Credit Units: 05**

Course Objective:
The course material imparts to the students an understanding of the concept of alternate methods of resolving disputes in addition to the traditional court oriented processes. It focuses on an analytical study of arbitration law and practice in India and the relevant institutions monitoring the same. The paper also focuses on other alternate dispute resolving mechanisms through State mediatory services under the supervision of the courts.

Course Contents:

Module I: Introduction
Alternative Dispute Resolution (ADR): Concept and Need and International and National initiatives in India; IIC, UNCITRAL, KSID.
Arbitration and Conciliation Act, 1996
General Provisions, Definitions, receipt of written communications, waiver of right to object, extent of Judicial Intervention, Administration Assistance; Arbitration agreement, power to refer parties to arbitration where there is an arbitration agreement, Interim measures by court.

Module II: Composition of Arbitral Tribunal
Composition, Jurisdiction, Conduct of Arbitral Proceedings: Settlement, form and contents of arbitral award, termination of proceedings, correction and interpretation of awards, additional award.

Module III: Recourse against Arbitral Award
Application for setting aside Arbitral Award, Finality and enforcement of Arbitral Award, appealable orders, Miscellaneous, Deposits, Lien on Arbitral Award and Deposits as to costs, Arbitration agreement not to be discharged by death of party thereof, Provisions in case of insolvency, Jurisdiction, limitation, Limitations, Enforcement of certain Foreign Awards.

Module IV: Techniques of ADR – I
Negotiation / Consultation, Mediation, Good offices, Conciliation: Nature, Scope and Methods.
Legal Services: Meaning and scope in Legal Aid and Advice, Lok Adalats-nature, scope, procedure and functioning.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Rao, P.C., Arbitration and Conciliation Act, 1996, Universal Law Book Co., Pvt. Ltd., (1997)
- Rao P.C. & Sheffield William, Alternative Dispute Resolution
- Sujan, M.A., Law relating to Arbitration and conciliation.
- Kawatra, G.K., The New Law of Arbitration and conciliation
- Chaudhary, S.K. Roy, Law of Arbitration Conciliation, 4th Ed. Eastern Book
- Saharay H.K., Law of Arbitration (197) (Revised Print)

Statutory Material:
- Arbitration and Conciliation Act, 1996.
- Legal Services Authority Act, 1987.
- UNCITRAL

HUMAN RIGHTS LAW

Course Code: LAW2701 **Credit Units: 05**

Course Objective:
Learning about human rights is largely cognitive, including human rights history, documents, and implementation mechanisms. All segments of society need to understand the provisions of the UDHR and how these international standards affect governments and individuals. They also need to understand the interdependence of rights, both civil and political and social, economic, and cultural. The course analyses International instruments on human rights, provisions of the Indian Constitution and protection of Human Rights Act emphasizing the role of NHRC and HRC. The Course include the study on the role of media, NGO and Human rights education at the grass root level to protect the basic rights of the people.

Course Contents:

Module I: The concept of Human Rights
Theoretical foundations of Human Rights- meaning, basic concept and origin of Human Rights,-Sources and significance of Human Rights-Different definitions of Human Rights-Classification of Human Rights.-Theories of Human Rights- Historical development of the concept of Human Rights-Concept of natural law and the concept of natural Rights- Human Rights in legal tradition-International law and National law.

Module II: UN and Human Rights
International documents related to Human Rights- Universal declaration of Human rights- Individual Rights and Group Rights- Significance and limitations- International Covenant on Civil and Political Rights,1966-International Covenant on Economic, Social and Cultural Rights,1966- Specific Conventions dealing with Human Rights-Importance and binding effect of above documents on the member countries of UN-Impact and implementation of Human Rights norms in India-Human Rights norms reflected in the Fundamental Rights under the Constitution of India- Directive principles legislative and administrative implementation of Human Rights norms-Implementation of Human Rights norms through judicial process. Regional arrangements –EU- Inter American System.

Module III: Human Rights under the Constitution and Different legislation in India
Provisions to ensure Human Rights to woman and children in India-Human Rights granted to Scheduled Castes and Scheduled Tribes and other socially and economically backward communities-Human Rights of prisoners

Module IV: Enforcement of Human Rights
Organs under the UN- International commissions of Human Rights- Amnesty International- American system and European system-Role of the Judiciary in India- Statutory Commissions- Woman's Commission- Minority Commission- SC/ST Commission.

Module V: Human Rights Commissions and Human Rights
Protection of Human Rights Act,1993- National Human Rights Commission- State Human Rights Commissions- Role of Media- Role of NGO's- Human Rights Education

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Jack Donnelly, Universal Human Rights in Theory and Practice (Cornell University Press, 2013)
- David P. Forsythe, Encyclopedia of Human Rights: Vol. 1 (Oxford University Press, 2009)
- Beth A. Simmons, Mobilizing for Human Rights: International Law in Domestic Politics (Cambridge University Press, 2009)
- D.D. Basu, Human Rights in Constitutional Law, Lexis Nexis, 2008 (3rd Edn)
- Upendra Baxi, The Future of Human Rights, Oxford University Press, 2012 (3rd

- Edn)
- Thomas Buergenthal, International Human Rights in a Nutshell, West Publisher
- Company, 2009 (4th Edn)
- Henry Steiner & Philip Alston, International Human Rights in Context: Law,
- Politics, Morals: Text and Materials, Oxford University Press, 2008
- S. K. Kapoor, International Law and Human Rights, Central Law Agency, 2014
- M. K. Sinha, Implementation of Basic Human Rights, Lexis Nexis, 2013

INDIAN FEDERALISM

Course Code: LAW2706 **Credit Units: 5**

Module 1: Concept of Federalism; Multi-Culturalism and Preservation of Separate Identities in a common political community; Sociological Roots of federalism in a Diverse Society like India

Module 2: Different Tiers of Governance; Distribution of Responsibilities; Shared Rule – Self Rule Concept; Differences over Distribution of Functions; Resolution of Conflicts

Module 3: Fiscal Federalism; Fiscal Imbalance and Fiscal Equalisation;

Module 4: Formation of Indian states; Urban and Rural Local-governing bodies and decentralized governance (Panchayat Raj, in India)

Module 5: Patterns of federal government - U.S.A., Australia, Canada, India, Plural aspects of Indian Federalism: Jammu & Kashmir, Punjab, Assam.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text and References:

- Michael Burgess Comparative Federalism: Theory and Practice, 2006
- Ronald Watts, Comparing Federal Systems, 1999
- Daniel Elazar, Exploring Federalism, 1987
- Rasheeduddin Khan, Federal India: A Design for Change, 1992
- Akhtar Majeed, Federal India: A Design for Good Governance, 2005
- Granvile Austin, Working A Democratic Constitution, 1999
- BPR Vithal and M L Sastry, Fiscal Federalism in India, 2001
- Duchacek, Ivo, Comparative Federalism: The Territorial Dimensions of Politics, New York:
- Hort, Rinchart and Winston, Inc., 1970.
- Elazer, Daniel J., ed., Federal Systems of the World: A Handbook of Federal , Confederal and
- Autonomy Arrangements (2nd edition), Essex: Longman groups, 1994.
- Ghai, Yash ed., Autonomy and Ethnicity: Negotiating Competing Claims in Multi-Ethnic States,
- Cambridge: Cambridge University Press, 2000.

FORENSIC SCIENCE-I

Course Code: LAW2707 **Credit Units: 05**

Course Objective:

Forensic Science is science related to the law. It is the scientific method of gathering and examining information about the past which is then used in a court of law. It is applied science and consists of a range of different disciplines which often require different underpinning science knowledge. It continues to evolve and is now applicable to crime disruption and crime prevention as well as crime detection and the identification of victims in mass disasters.

The course focuses on the following objectives:
1. Developing an understanding and appreciation for the Forensic Sciences.
2. Brief description of crime scene investigation alongwith its various techniques and significance of physical evidences.
3. Develop an understanding on different types of questioned documents, the types of forgeries and disguise generally encountetred.
4. Developing an understanding of handwritting and typewritting alongwith its analysis.

Course Contents:
Module I: Introduction to Forensic Sciences
Brief description of Forensic Sciences, historical development of forensic sciences in India and forensic lab, laws and principles of forensic science, mobile forensic units their distribution in India.

Module II: Crime Scene Investigation
Definition, types- mobile, indoor and outdoor crime scene, various searching techniques used for locating physical evidence at crime scene, recording the scene , reconstruction of crime scene- modus operendii, role of investigating officer.

Module III: Physical Evidences in Forensic Science
Definition, collecting, packaging, prevention and forwading of evidences, fingerprint its characteristics, classification, developmental techniques- chemical developmental techniques.

Module IV: Introduction to Questioned Documents
Questined documents, types, disputed documents, security documents, bank notes, tampered documents, age of the documents and ink analysis, examinations of the fake currencies, instrumentations.

Module V: Handwriting and Typewritting Analysis
Handwritting identification forged and disguises handwritting, typewritting identification, general equipments for examinations

Module VI: Tool marks and other impressions
Definitions, types and decipherment of tool marks and techniques; examination of tool marks; introduction to tyre marks: its nature and types, skid marks tread marks; footprints and shoeprints types significance and examinations.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Sharma. B.R., Forensic Science in Criminal Investigations and trials (3rd Edn) Universal Law Publishing Co. Ltd
- Nath.S, Fingerprint Identification CRC Press 2nd Edn, 2002
- Fisher, B, Techiniques of Crime Scene Investigation 6th Edn CRC Press,
- Albert, S. Osborn, Questioned Documents, 2nd Edn, Universal Law Publishing Delhi, 1998

OFFENCES AGAINST CHILD AND JUVENILE OFFENCE
HUMAN RIGHT LAW

Course Code: LAW2708 **Credit Units: 05**

Course Objective: To impart knowledge and expertise in legal and social issues relating to juvenile justice system in India, and sensitize about juvenile crimes and justice delivery system.

Course Contents:

Module I: Definition and concepts of term child and Juvenile. Causes of offence against child, International protection to child and convention, Offences against Child, Child abuse, Child labour and forced labour , Kidnapping, abduction , Abetment of suicide of child, Sale of obscene objects to young.

Module II: Concepts of: juvenile in conflict with laws, neglected juvenile, Determining factors of juvenile in conflict with laws: differential association, anomie, economic pressure, peer group influence, gang sub-culture, and class differentials.

Module III: Legislative Approaches , Constitutional provisions, Relevant provisions of the Juvenile Justice (Care and Protection of Children) Act, 2000, Relevant provisions of Protection of Children from Sexual Offences Act, 2012.

Module IV: Child and Criminal Liability, Crimes committed by child, Crimes committed by others in relation to children, Implementation of social policy through criminal sanctions in relation to child, Variation of procedure in case of child offender, Judicial proceedings in criminal cases relating to children, Protection of Children from Sexual Offences.

Module V: Judicial Contribution and Preventive Strategies, Social action litigation concerning juvenile justice, recent judicial decisions, Role of legal profession in juvenile justice system, State welfare programs: health, nutrition, ICWS, grant-in-aid, and compulsory education, Role of community, family, voluntary bodies, and individuals.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Bhattacharya, S.K.; Juvenile Justice: An Indian Scenario; Regency Publications
- Kumar, K. and Rani, Punam; Offences Against Children: Socio Legal Perspective; Regency Publications
- Josine Junger-Tas and Decker, Scott H.; International Handbook of Juvenile Justice; Springer
- Dunkel, Frieder; Juvenile Justice Systems in Europe: Current Situation and Reform Developments; Forum Verlag Godesberg

LAW AND MEDICINE-I

Course Code: LAW2709 **Credit Units: 05**

Course Objective:

The course aims to provide the students the knowledge about the interrelationship between law and medicine and complex legal and ethical issues involved in the field of medicine and medical profession. The course include the doctor-patient relationship and its legal dimensions, medical negligence, socio-legal issues involved in the new technologies in medical science and biotechnology as well. As medico-legal issues became a consumer issue as well as a fundamental rights violation the course will help the students to have knowledge in laws related to medicine and analyse the issues in a better way.

Course Contents:

Module I: Introduction
Inter-relationship between law and medicine-issues involved and legal control- Doctor-Patient relationship- Constitutional perspective and penal provisions- Indian penal Code- Directive principles- Right to life- Right to health and emergency medical care.

Module II: Regulation of medical and Paramedical profession
Medical profession in India- Para medical profession- Regulatory authorities- Self regulation- medical Ethics- WHO declarations- Declaration of Geneva- Helsinki declaration- Regulatory authorities created by statutes- Regulations under medical Degrees Act, 1916- Pharmacy Act, 1948- Indian medical Councils Act- education regulations- Medical Council of India- Disciplinary Control- Hospital and research centers- Responsibility to patients- Duty to take care- Medical examination- Informed consent- Confidentiality- Access to medical records.

Module III: Liability of Professional Negligence
Medical negligence- Negligence in diagnosis, treatment- Duty to warn- Civil negligence and criminal negligence- Vicarious liability- negligence of students and nurses- Liability of Doctors and Hospitals under the Consumer protection Act, 1986.

Module IV: regulation of Manufacture, Storage and sale of Medicines
Drugs and Cosmetic Act, 1940-Production, storage and sale of drugs- Advertisement drugs and Magic remedies Act, 1954- penalties.-Access to medicine and Public health.

Module V: Medical Science and Technologies
Boitechnology-Bioethics-Genetic Engineering- Cloning-Human genome project- Biomedicine Convention- Invirto fertilization(IVF)- Selective reproduction- Surrogacy- Euthanasia- abortion- Medical termination of pregnancy Act- Indian penal Code-Stem cell therapy and research- Transplantation of Human organs- Organ Transplantation Act, 1994- Human Subjects Research- Helsinki declaration- Schedule Y, Drugs and Cosmetic Act1940- ICMR Code- AMA code of Ethics- WHO Good Clinical Practices.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Vijay Malik – Drug and Cosmetic Act, 1940, Eastern Book Company, 24th Edition, 2014
- Anoop K. Kaushal – Medical Negligence & Legal Remedies, Universal Publishing House, 2nd Edition, 2004
- Dr. Jagdish Singh – Medical negligence Compensation, Bharat Law House, 3rd Edition, 2007

- P K. Dutta – Drug Control, Eastern Law House, 3rd Edition, 1997.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries.* New York:
  Oxford University Press, 2005.
- Annas, George J. Michael A. Gordin. *The Nazi Doctors and the Nuremberg Code: Human Rights in*
  Human Experimentation. New York: Oxford University Press, 1995.
- Dworkin, Ronald. *Life's Dominion: An Argument about Abortion, Euthanasia, and Individual Freedom.*
  New York: Alfred A. Knopf, 1993.
- Dr. Lily Srivastava, Law & Medicine (Universal Law Publishing, 2006)
- W. Noel Keyes, Bioethical and Evolutionary Approaches to Medicine and the Law (American Bar Association, 2007)
- Cynthia Ho, Access to Medicine in the Global Economy: International Agreements on Patents and Related Rights (Oxford University Press, 21-Apr-2011)

Syllabus - Eighth Semester

INVESTMENT AND COMPETITION LAWS

Course Code: LAW2801 **Credit Units: 05**

Course Objective:
This paper focuses on the investment and competition laws of India in the contest of new economic order.

Course Contents:

Module I: Competition Law
Background, Prohibitions, Competition Commission of India.

Module II: Corporate Finance and regulatory framework
Security Contract (Regulation) Act 1956, SEBI Act 1992, Depositories Act 1996, The Securitisation and Reconstruction of Financial Assets and enforcement of security Interest Act, 2002.

Module III: Regulatory framework for foreign trade, multinational companies
Foreign Trade (Development & Regulation) Act 1992, UNCTAD Draft Model on Trans – national Corporations, Control and regulation of foreign companies in India, Foreign collaborations and joint ventures.

Module IV: Foreign Exchange Management
Background, Policies, Authorities.

Module V : Role Of IT
Role of Information Technology in the investment market, functioning of demat A/c portal. Investment through internet and virtual banking.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Competition Act 2002
- Security Contract (Regulation) Act 1956
- SEBI Act 1992
- Depositories Act 1996
- Foreign Trade (Development & Regulation) Act 1992,
- Foreign Exchange Management Act, 1999
- Taxman's Student's Guide to Economic Laws

TAXATION LAW

Course Code: LAW2802 **Credit Units: 05**

Course Objective:
Power to tax has been described as the power to destroy. This idea is being floated often whenever the State introduces a new tax. Is this true? Is it not necessary that in order to raise revenue and place the economy on solid foundation, the taxing power should be conferred on the State? The power to tax shall not go unregulated. In this context of a federal structure the distribution of the taxing powers assumes added significance. Obviously, a study of the Constitutional framework on taxation becomes important. Along with this, an analysis of the different laws enacted in exercise of these powers with their safeguards and remedies sheds light on the mechanics of the taxation by the Union and the States.

Course Contents:

Module I: General Principles of Taxation Laws
History and Development of Tax Laws in India, Fundamental Principles relating to Tax Laws, Taxing power and constitutional limitations, Distinction between: Tax, Fee and Cess; Tax avoidance and Tax evasion .

Module II: Basic concepts of Income Tax
Income, Previous Year, assessment Year, Person, Assesee and Total Income, Income not included in the Total Income. Residential status, Clubbing of Income, Tax planning, Rate of Income Tax, Heads of Income, Salaries, Income from House Property, Income from Business or Profession, Capital Gains, Income from Other sources, Deductions under the Income Tax Act, 1961, Income Tax Authorities: Power and Functions, Filing of returns and procedure for assessment, Offences and Penal Sanctions .

Module III: Value Added Tax
Meaning and importance of VAT, Difference between VAT and Sales Tax, West Bengal Value Added Tax Act, 2003, Criticisms and limitations of Vat system.

Module IV: Service Tax
Taxable Service, Meaning and importance of Service Tax, Valuation of Taxable Service, Offences and Penalities.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Iyengar, Sampath (1998), Law of Income Tax New Delhi, Bharath Law House.
- Jain, Narayan (2004) How to Handel Income Tax Problems, Book Corporation.
- Palkivala, N.A. (1999), The Law & Practice of Income Tax, Nagpur: Wadha Publication.
- Parameswaran, K. (1987), Power of Taxation under the Constitution, Eastern Book Company.
- Sharma, Remesh (1998), Supreme Court on Direct Taxes, New Delhi: Bharath Law House.
- Singh S.D. (1973), Principles of Law of Sales Tax, Eastern Book Company.
- V. Ramachandran & T.A. Ramakrishnan (eds.) (2000), A.N. Aiyar's Indian Tax Laws, Chennai: Company Law Institute of India Pvt. Ltd.

INTERPRETATION OF STATUTES

Course Code: LAW2803 **Credit Units: 05**

Course Objective:
Judicial interpretation involves construction of words, phrases and expressions. In their attempt to make the old and existing statutes contextually relevant, courts used to develop certain rules, doctrines and principles of interpretation. The course material seeks to impart to the students, the necessary skills to interpret the statutes with a judicial mind set.

Course Contents:

Module I: Rules of Interpretation
Commencement, repeal and revival of a statute; Rules of interpretation: Liberal rule, mischief rule and golden rules, Harmonious construction.

Module II: Principles of interpretation
Ejusdem of Generis, Noscitur – A Socius, Reddendo Singula Singlis., Expressio Unius Est exclusion Alteriu, UI Res Magis Valent Quam Pereat, Contemporanea Espositio Est Optima Et Protissima Lege.

Module III: Internal Aids to Interpretation

Module IV: External Aids to Interpretation

Module V
Construction of Penal Statutes, Mens rea in statutory offences, Principles to be applied in interpreting the Constitution, Strict construction of taxing statues and its limitations.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Maxwell, Interpretation of Statutes.
- Sarup, Interpretation Statues.
- G.P. Singh, Principles of Statutory Interpretation.
- V.P. Sarathi, The Interpretation of Statutes.
- Bindra, Interpretation of Statutes.

INTERNATIONAL TRADE LAW

Course Code: LAW2804 **Credit Units: 05**

Course Objective:
To acquaint the Students about the basic aspects of International Trade Law, including the WTO and it's different principles and Agreements.

Course Contents:

Module I: Contract of Sale
Uniform Rules on Contract of Sale, Types of Sale Contract - CIF, FOB, C & F Contract, Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856, International Conventions Governing Bill of lading
Addition of Special Trade Terms in International Sale Contract, Indian Bill of Lading Act 1856 and International Conventions Governing Bill of Lading in Module I.
Addition of Background Role and Structure of WTO, and difference between GATT & WTO in Module IV

Module II: Payment for International Sales
Letters of Credit, Bills of Exchange, and function and connected issues.

Module III: Settlement of Disputes
Arbitration, Enforcement of Arbitral Awards.

Module IV: World Trade organization (WTO) and General Agreement on Tariffs and Trade (GATT)
Background of formation of WTO, Role of WTO in International Trade, Difference of GATT and WTO, Structure of WTO.
Basic Principles: MFN, Treatment, National Treatment and Non-Discrimination, Exceptions to MFN : Tariff Bindings, Regional Trade Agreements, Escape Clause, Safeguard Measures, Quantitative Restrictions, Anti-dumping and counter-vailing duties.

Module V: WTO and Multilateral Agreements
Trade Related Investment Measures (TRIMS), General Agreement on Trade in Services (GATS), Trade Related aspects of Intellectual Property Rights (TRIPS).

Module VI: Dispute Settlement Mechanism under WTO

Evaluation Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Basic Texts of GATT and WTO.
- Jackson, John, H. (1997) Law of International Trading System, The MIT Press.
- Jackson, John, H. (1997) World Trade and Law of GATT, The MIT Press.
- Dam, K. W. (1970) The GATT Law and International Economic Organisations, Chicago University Press
- Koul, A.K. (2001) World Trade Organisation, Satayam Publication.
- Internet Sources :www.wto.org, www.uncitral.org.
- Text of the Indian Arbitration and Conciliation Act, 1996.

LAND LAWS

Course Code: LAW2805 **Credit Units: 05**

Course Objective:
The legislative power to make laws relating to land and land ceiling is in the state list. Different States have enacted their own laws on this subject. The Constitutional perspectives relating to this subject have to be taught as an essential part of this course. The provisions in the Constitution in Part III, IV and XII as well as those in Schedule VII relating to distribution of legislative powers over land are essentially to be taught with emphasis.

Course Contents:
Module I: Punjab Land Revenue Act1887(Applicable over Punjab and Haryana),Definition of Key Words, Revenue Officers: Their Power and Functions, Preparation of Revenue Record: Like Documents of Jamabandi, Girdawari, Mutation, Intkaal, SijraNasab (Pedigree Table) Sirjra Axe(Map of the Village), Assessment of Land Revenue, Collection of Land Revenue, Concepts & Procedure of Partitions.

Module II: Punjab Land Revenue Act,1887:
Records-Of-Rights and Annual Records, Collection Of Land Revenue, Recovery of other Demands by Revenue-officers, Partition, **Assessment** and other relevant provisions.

Module III: Haryana Rent Control Act, 1973
Definitions (Sec. 1-4), Rights & Duties of Tenants, Rights and Duties of Landlords, Grounds of Ejectment of Tenants.
Haryana Panchayati Raj Act ,1994 (Sec. 1 to 54) (Chapter 1 to 6) Definition of Key Words, Constitution of Gram Sabha and Gram Panchayat, Gram Panchayat's Duties, Functions and Powers, Finance and Taxation, Control of Gram Panchayat, Sources of Income and Expenditure of Gram Panchayat.

Module IV: Haryana Panchayati Raj Act 1994,
PanchayatiSamiti (Chapter 7 To 11) And Sec. 55 To 116) Definition of Key Words, Conduct of Business of PanchayatSamities, Servant of PanchayatSamities, Duties and Powers of PanachayatSamiti, Finance and Taxation, Sources of Income of PanchayatSamiti, Control of PanchayatSamiti

Module V: Delhi Land Laws
Real Estate Development and Apartment ownership
Delhi Apartment Ownership Act, 2009,

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Law, poverty and development, Prof. M.L. Upadhayay.
- Upendra Baxi, Towards a Sociology of Indian Law, pp. 25-65 (1986)
- Atul Kohli, The state and Poverty in India (1987)
- Francine R. Frankel, India's Political Economy, 1947-77 (1988)
- L.H. Rudolph and S.H. Rudolph, The Political Economy of Lakshmi (1987)
- Mohammad Ghouse, "Nehru and Agrarian reform" in Rajeev Dhavan and Thomas Paul (eds.)
- Nehru and the Constitution (1992), Thripathi
- Walter C. Neale, Developing Rural India Policies and Progress (1990) Allied
- Alice, Jacob, Land Reform and Rural Change 6-19 (1992), Land Reforms in India: a Review.
- IASSI quarterly 1992, Vol. X, Numbers 3 and 4.
- B.R. Beotra, Law of Forests (Central and State) 6th Edition 1999, The Law Book Company.
- A. Krishnan, Forest Laws in India, 1998, Asia Law House
- Srivastava, Encyclopedia on forest, 1998, Asia Law House
- Padala Rami Reddy, Forest Laws, 1989, Asia Law House Baden Powel, Manual of Jurisprudence for Forests Officers (1982)

WOMEN AND CRIMINAL LAW

Course Code: LAW2806 **Credit Units: 05**

Objectives: Women had suffered in the society since centuries and even after 50 years of Adoption of the Constitution, for women, equality appears to be a distant mirage to be reached. Effective political representation of women in Legislature and other forums too has become a difficult proposition to be acceptable. Breach of her personality, through various forms of violence, too has not subsided. The course intends to educate about the legal provisions enacted to ameliorate these situations with special emphasis on Indian Municipal Law, its scope and to evaluate the existing provisions.

Module-I
Women in Pre-Constitution Period: Social and Legal Inequality; Social Reform Movement in India; Legislative response in India. Women & children in Post-Constitution Period, Provisions of Constitution of India Preamble, Art.14, 15, 23, and Part IV Legal Measures in relating to Child Labour Women and Political Representation

Module-II
Different Personal Laws- Unequal Position of Indian Women-Uniform Civil Code; Sex Inequality in Inheritance Rights: Right of Inheritance by birth for Sons and not for Daughters; Inheritance under Christian Law; Inheritance under Muslim Law; Matrimonial Property Law; Right of Women to be Guardian of her minor sons and daughters.

Module-III
Law of Divorce - Christian Law-Discriminatory Provision; Muslim Law- Inheritance divorce. Women and Social Legislation: Dowry Prohibition Law; Sex Determination Test, Law relating to Prevention of Immoral Trafficking in Women Act.

Module-IV
Women and Criminal Law: Adultery; Rape; Outraging the Modesty of Women; Kidnapping; Sati Prohibition Law; Law relating to Domestic Violence; Law relating Eve Teasing; Indecent Representation of Women Act.

Module-V
Women and Employment: Factories Act- Provisions relating to women; Maternity Benefit Act; Equal Remuneration Act; Law Relating to Sexual Harassment at Working Place; N.C.W-Aims, Functions and Performance.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

PRESCRIBED BOOKS:

- Indu Prakash Singh- Women, Law and Social Change in India.
- Paras Dewan- Dowry and Protection to Married Women.
- S.P.Sathe- Towards Gender Justice.
- Dwarka Nath Mitter- Position of Women in Hindu Law
- Shaukat Nasir- Muslim Women and their Rights.

REFERENCE MATERIAL:

- Relevant Provisions of Constitution of India.
- Relevant Provisions of Indian Penal Code.
- S.125, Criminal Procedure Code.
- National Commission on Women Act, 1990.
- Matrimonial Property- Private Members Bill Introduced in Parliament Towards Equality- Report of Committee on the Status of Women (Govt. of India) Chapter IV and Section IV, General Conclusions and Recommendations

PROBATION AND PAROLE

Course Code: LAW2807 **Credit Units: 05**

Course Objective:
This course will introduce the student to the emerging discipline of community corrections. This alternative has become an integral resource to the criminal justice system.

Course Contents:
Module I: Theories of Punishment: (i) Deterrent Theory (ii) Retributive Theory (iii) Preventive Theory (iv) Reformative Theory Efficacy of Punishment: Early stages-Medieval Period, Modern or New Penology, Essentials of an ideal system of Penal Policy.

Module II: Concept of Correction Genesis and evolutions, objectives and theories of correction - various types of correctional methods.
Institutional Correction Origin and development of Indian Prison System, daily routine - prison as an institution, scientific classification of prisons and prisoners.

Module III: Treatment of correction of offenders. The need for reformation and rehabilitation of offenders, Undergoing punishment/imprisonment, Classification of offenders through modern diagnostic techniques, The role of psychiatrists and Socials workers in the prison., Vocational and religions education and apprenticeship programmes for the offenders, Group counseling & Resocialization programmes, Participation of inmates in community service.

Module IV: Non-Institutional Methods Open air jails, Admonition, fine, probation and parole. Half way houses - organization and significance.
Recent trends in corrections Role of voluntary agencies in prevention of crime and treatment of offenders - Discharged prisoners' aid society. After care and rehabilitation, Need, importance and services in India - Pre-release and premature release., Attitude of the community towards released offender, Prisoner Aid Society and other Voluntary Organization governmental Action.

Module V: The place of probation in penal policy – public participation in probation, Legislations on Parole and probation in India, Probation of Offenders Act, 1958, Section 360 of the Criminal Procedure Code, 1973

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Martin Wasik, Emmins On Sentencing (1998) 2.
- Hall J., Law, Social Science and Criminal Theory
- J.M.Sethna, Society and the Criminal, 1980
- Siddique, Criminology-Problems and Perspectives, 1997
- Sutherland,E H,Cressey.D R,Criminology A. Siddique, Criminology (1984) Eastern, Lucknow.
- Law Commission of India, Forty-Second Report Ch. 3 (1971)
- K.S. Shukla, "Sociology of Deviant Behaviour" in 3 ICSSR Surveys of Sociology and Social Anthropology 1969-179 (1986)
- Tapas Kumar Banerjee, Background to Indian Criminal Law (1990)
- Bhattacharya S.K. (1986) Probation system in India,
- Mans Publications, New Delhi. 2. Bhattacharya,
- S.K. (1985) Social defence: An Indian perspective, Manas publications.

FORENSIC SCIENCE-II

Course Code: LAW2808 **Credit Units: 05**

Course Objective:
Forensic science is science related to the law. It is the scientific method of gathering and examining information about the past which is then used in a court of law. It is applied science and consists of a range of different disciplines which often require different underpinning science knowledge. It continues to evolve and is now applicable to crime disruption and crime prevention as well as crime detection and the identification of victims in mass disasters.
The course focuses on the following objectives:
1. Developing and understanding the concept of forensic anthropology
2. Breif description on the ballistic its analysis and reconstruction
3. Developing an understanding to wounds and its medco-legal aspect.
4. Developing an understanding on explosives and its crime scene investigations.

Course Contents:

Module I: Forensic Anthropology
Definition, scope, and application; time since death: assessing and determing the time and cause of death, study of burned bones and bones fragments; identification.

Module II: Ballistics
Definition, Indian Arms Act, forensic importance, classification of firearms; ammunition; range of fire; firearms injuries, analysis and reconstuction.

Module III: Wounds and its medico-legal aspects
Introduction to wounds; determining the age of the injury and its medico-legal aspect, injuries due to blunt forces, injuries due to sharp forces, miscellaneous injuries.

Module IV: Explosives and Explosion Scene Investigation
Explosive Act: nature and classification, composition and characterstics of explosives, pyrotechnics, IEDs, specific approach to scene of explosion, post-blast residue collection, reconstruction of sequences of events; evaluation and assessment of scence of explosion and its examination.

Module V: Advanced fingerprint and other impression
Fingerprint in personal identification, examination on the basis of poroscopy and its significances; evaluation of fingerprints on the basis of edgescopy and its significance in fingerprint field, Palmer, Planter and other impression its evaluation**.**

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Sharma. B.R., Forensic Science in Criminal Investigations and trials (3rd Edn) Universal Law Publishing Co. Ltd
- Nath.S, Fingerprint Identification CRC Press 2nd Edn, 2002
- Fisher, B, Techiniques of Crime Scene Investigation 6th Edn CRC Press,
- Albert, S. Osborn, Questioned Documents, 2nd Edn, Universal Law Publishing Delhi, 1998
- James, S. H. and Nordby, J.J (Eds), Fornsic Science- An Introduction to Scientific and Investigation Techniques CRC Press, London, 2003.

LAW AND MEDICINE-II

Course Code: LAW2809 **Credit Units: 05**

Course Objective:

The course aims to provide the students the knowledge about the interrelationship between law and medicine and complex legal and ethical issues involved in the field of medicine and medical profession. The course include the ethical and legal issues in population control, surrogate motherhood, HIV/AIDS, the rights of the unborn, AID and Law, mental health and medical experimentation on human beings.

Course Contents:

Module I: Population control and community health
Law, Practice and Society- Causes for Population Explosion- National Population Policy, 2000- Terminal methods female sterilization and male sterilization- State Imposed sterilization and its legal validity- Population control and Right to family and Right to privacy.

Module II: Surrogate Motherhood and the Rights of the Unborn
Surrogacy in foreign countries- Motherhood Debated-Legality of contract- problems-Refusal to accept the child-health Tourism and sanctity of woman's life- ICMR Code- The Unborn-Introduction- Right of an Unborn Chile-Prenatal Diagnosis (and Amniocentesis)-Miscarriage

Module III: AIDS
Rights, Freedom and duties of HIV/AIDS Patients- Privacy and Public health- Liberty and Security-Movement- Marriage and Finding a family- Right to work- Education for an infected person-Protection of children infected or born to infected parents- Right against degrading Treatment-Equality before law- access to medicine

Module-IV
International Norms- general Provision-Consent-Human Genome-Scientific Research-Donors for Transplantation Purposes-Prohibition of Financial gain and Disposal of a part of the Human Body

Module-V
Mental Health- Historical Background-types of Causes of Mental Illness- Development of the Human being and mental health-Prevention of Mental Illness and Treatment-Alcoholism and Drug Addiction- Mental health Act- Admission and discharge to mental hospital legal issues

Module-VI
Experiments of Human Beings- The concept-Kinds of Experiments-Subject of Experimentation-controls-Clinical Trials-Studies in special Populations-Informed consent-Special Studies of Bioavailability and Bioequivalence-Ethics committee- Stem cell research- International documents and Indian laws-Ethical norms on experimentation

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Vijay Malik – Drug and Cosmetic Act, 1940, Eastern Book Company, 24th Edition, 2014
- Anoop K. Kaushal – Medical Negligence & Legal Remedies, Universal Publishing House, 2nd Edition, 2004
- Dr. Jagdish Singh – Medical negligence Compensation, Bharat Law House, 3rd Edition, 2007
- P K. Dutta – Drug Control, Eastern Law House, 3rd Edition, 1997.
- Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries.* New York:Oxford University Press, 2005.

- Annas, George J. Michael A. Gordin. *The Nazi Doctors and the Nuremberg Code: Human Rights in Human Experimentation.* New York: Oxford University Press, 1995.
- Dworkin, Ronald. *Life's Dominion: An Argument about Abortion, Euthanasia, and Individual Freedom.* New York: Alfred A. Knopf, 1993.
- Dr. Lily Srivastava, Law & Medicine (Universal Law Publishing, 2006)
- W. Noel Keyes, Bioethical and Evolutionary Approaches to Medicine and the Law (American Bar Association, 2007)
- Cynthia Ho, Access to Medicine in the Global Economy: International Agreements on Patents and Related Rights (Oxford University Press, 21-Apr-2011)

Syllabus - Ninth Semester

DRAFTING, PLEADING AND CONVEYANCING

Course Code: LAW2901 **Credit Units: 05**

Course Objective:
The course aims at acquainting the students about the various fundamentals of drafting to develop the skills of pleading and convenyancing.

Course Contents:

Module I: Fundamentals Rules of Pleadings
Meaning: Pleading and Conveyancing, Plaint structure, written statement, Affidavit and Conveyancing, Verification of pleading, Object of verification, Amendment of Pleadings.

Module II: General Principles of Civil Pleadings
Suit for Part-performance of the contract ; Suit for specific performance of the contract; Suit for recovery of money given on Interest (Money suit); Suit of damages ; Suit for restitution of conjugal rights; Maintenance suit by wife; Application under Section 13 Hindu Marriage Act (Divorce); Suit for recovery of rent or eviction of tenant; Interpleader suit; Suit for malicious prosecution ; Suit under Section 13 of Negotiable Instruments Act; Application under Order 6 Rule 17 of Code of Civil Procedure (Amendment of Pleadings); Appeal (First); Execution Petition; Revision; Application for Temporary Injunction Order 39 Rule 2 of Code of Civil Procedure.

Module III: General Principles of Criminal Pleadings
Complaint; Application for Bail (Section 436, 437 of Code of Criminal Procedure); Application for Anticipatory Bail (Section 438 of Code of Criminal Procedure Code); Accused's reply; Criminal Appeal (Appeal against conviction).

Module IV: Conveyancing
Notice and Reply to notice; General power of attorney; Special power of Attorney; Writ petitions: *Habeas Corpus,Mandamus,Certiorari,Quo warranto*; Sale deed; Partnership deed; Lease deed/ Rent deed; Promissory note; Gift deed; Adoption deed; Will; Affidavit ; Mortgage – deed.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Conveyancing – N.S. Bindra
- Conveyancing – A.N. Chaturvedi
- Mogha's Law of Pleading
- Conveyancing – D'Souza

INTELLECTUAL PROPERTY RIGHTS

Course Code: LAW2902 **Credit Units: 05**

Course Objective:
The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Patent Law (1970), Copy Right Law (1957) and Designs Act of 2000 which invariably form the part of Intellectual Property Law and shall comprise of the following.
The importance of this branch of the law is to be sufficiently realized in the Indian legal education. These areas are now internationally conceptualized as representing intellectual property. It is often the case that while the law of patents and trademarks is referred to as industrial property, the law relating to copyright is named intellectual property. While both these terms could be suitably invoked, we here speak of intellectual property as signifying all the three bodies of the law as well as the law on industrial designs.
Unlike other forms of property, intellectual property refers to regimes of legal recognition of, primarily, the products of the mind or imagination. The subject matter of property relations is here preeminently based on mental labour. The law relating to intellectual property protects the right to mental labour.
The law confers rights of proprietary nature on relative intellectual labour primarily on the basis that it is in the interests of society and state to promote creativeness and inventiveness. Limited monopoly provides incentive for greater inventive and innovative efforts in society. An important aspect of the exploration in this course would be ways in which the laws strike a fair balance between the interests and rights of the intellectual labourers on the one hand and organized industrial enterprises on the other. Another dimension is a study of the ways in which this regime of laws militates against, or favours, commModuley property in national cultures. As concerns 'modernization' crucial questions arise in the field of copyright protection in computer software and hardware, internet, electronic music and scientific research. Both copyright, trademarks, design and patent law here relate basically to the law of unfair competition and constitute an aspect of consumer protection and welfare not only in the context of national perspectives but also in view of the waves of globalization already set in. Both from the standpoint of human resources development, modernization and justice it is important that the law students get sufficient insights in Intellectual Property Law.

Course Contents:

Module I: Introduction
Intellectual Property, Concept and Philosophy, Need for Private Rights versus Public Interests, Advantages and Disadvantages of IPR.

Module II: Patent
Development of patent law, Rationale for patent protection**,** Nature and definition, Types of patentable subject matter, Patentability criteria, non-patentable inventions, Rights of patentee, Procedure for granting a patent, Grounds for opposition, Transfer of patent rights, Compulsory Licenses, Acquisition, Surrender, Revocation, restoration, Patent infringement and remedies, Bio patents and software patents, Official Machinery, Controller, Powers and Functions, Patent in pharmaceutical industry, Patent cooperation treaty, Paris convention.

Module III: Copyright
History, Concept of copyright, conditions for grant of copyright, extent of rights exception to copyright protection, fair use provision, assignment and licensing, Compulsory licensing and statutory licensing, Collective administration, Copyright board and office, powers and functions, Moral rights: Neighboring rights; infringement penalties and remedies, Appeals, Berne Convention, Universal Copyright Convention - WIPO Copyright Treaty: WIPO Phonograms and Performances treaty, TRIPS with respect to Copyright and Neighboring rights.

Module IV: Designs, Protection, Historical development, Rationale
Designs Act of 2000: Meaning of Design, Conditions for grant of protection, Ambit of Protection, Exceptions, Registration of Designs, Cancellation, Copyright in Registered Designs, Enforcement, Infringement and remedies, Powers and duties of Controller.

Module V: Trademarks

Evolution, Functions, Objective, Definition, Kinds of Marks, Domain names, Registration, Concurrent registration, Procedure for registration, Relative and absolute grounds of refusal, opposition and its grounds, Assignment, transmission and licensing of Trademarks, Infringement, Penalties and Remedies, Withdrawal of protection, Passing off, Official machinery for regulation administration and Redressal, Registrar, Difference between Trade Mark, **Trade Secret, Traditional Knowledge** and Geographical Indications, TRIPS on Trademarks, Madrid Agreement for The Repression of False or Deceptive Indications of Source on Goods, 1891- Madrid Agreement for the International Registration of Marks, 1891 and protocol relating to that agreement 1989.

Module VI: Plant Varieties Protection Act, 2001

Objectives, Rationale, Registry, Official machinery, registration, Criteria of fulfillment Exclusions, Benefit sharing, Farmers rights, CommModuley Rights, compulsory license Redressal fora, Appellate tribunal, Infringement, offences and penalties; Geographical indications of Goods (Registration and Protection Act, 1999**:** History, Definition, Rationale, Functioning, official Machinery, Registry, Rights conferred, Registration Procedure. Redressal Machinery, Appeal, Passing off, Offences, penalties and Procedure.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:

- D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
- B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights

LAW, POVERTY AND DEVELOPMENT

Course Code: LAW2903 **Credit Units: 05**

Course Objective:
The objective of this paper is to provide an understanding of basic concepts of poverty and development and their relationship with law.

Course Contents:

Module I: Understanding Poverty and Development
Poverty: Meaning and Concept, Relative Dimensions, Measurement and Determinants, Issues related to Poverty in India; Development: Perspectives, Developmental index.

Module II: Constitutional Guarantees for the Poor
Equality and Protective Discrimination, Right to Basic Needs and Welfare, Abolition of Untouchability and Protection of Civil Rights, Right to Development.

Module III: Criminal Justice System and the Poor
Treatment of the poor by Police, Inability to get Bail, Problems of Poor Under trials, Working of free legal aid schemes. .

Module IV: Impoverishment of Women, Children and Disabled Persons
Deprivations of women under family laws, Problems of women workers in organized and unorganized sectors, Child labour, Approaches to disability and rights of the disabled persons, Right to education and dignity.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:
- Law, Poverty and Development – Upendra Baxi
- State and Poverty in India – Atul Kohli
- The Poverty Question (Search for Solution) – Yogesh Atal
- Poverty, Rural Development and Public Policy - Amarendra

PROFESSIONAL ETHICS

Course Code: LAW2904 **Credit Units: 05**

Course Objective:
The Course has been designed to acquaint the students of Law about the Professional Ethics and Professional etiquettes that are essentially significant for an advocate to observe while at the Bar. Accountability and transparency are imperative to the profession. Besides, the conducive and cordial Bar- Bench relations can send a good message concerning the richness of the Legal profession. With this background cue, the course aims at developing insights of the students about the professional parameters.

Course Contents:

Module I: Historical Introduction
Historical introduction to legal profession in India – Barristers, Vakils, High Court Pleaders, Advocates, etc. The All India Bar Committee, 1951 and the passing of Indian Advocates Act, 1961. The Advocates Act 1961: Definitions Section 2, Constitution and function of State Bar Councils, Bar Council of India, Terms of Office, various sub-committees including Disciplinary Committee and the qualification for their membership. Power to make rules Sections 3 to 15 – Chapter –II.

Module II: The Advocate's Act, 1961
The Advocate Act, 1961.
Admission and enrolment of Advocate – Senior and other Advocates,
Common role of Advocates, Qualifications and Disqualifications for enrolment and procedure thereof, Chapter – III Section 16 to 28.
Rights to Practice: Monopoly of representation, Exclusion of advocates from certain cases, self representation by litigants. Chapter IV Secs. 29 to 34.
Professional and other misconduct, Principles for determining misconduct,
Disciplinary Committees of State Bar Council and the Bar Council of India,
Punishment of advocates for misconduct, Appeals to the Supreme Court,
Chapter – V – Secs. 35 to 44.

Module III: Legal Profession
Nature of Legal Profession, Need for an Ethical Code of Rights: privileges and duties of Advocates, Preparation of a case and fees of an Advocate, under – cutting, Bar against soliciting work and advertisement, Bar against touting, refusal of briefs, accountability to the client, confidentiality communication between Advocates to compromise, Study of Code of Ethics prepared by the Bar Council of India.

Module IV: Contempt of Courts Act, 1971
Contempt of Courts Act, 1971,
What is Contempt? Civil and criminal contempt, punishment for contempt.
Procedures in contempt cases. High Court Rules and the Supreme Court
Rules to regulate contempt proceedings.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Sanjeev Rao, Indian Advocates Act, 1971.
- M.P. Jain, Indian Legal History (Chap. On Legal Profession).
- Krishna Murthy Iyer's Book on Advocacy.
- The Contempt of Courts Act, 1971.
- Journal of Bar Council of India.

PRIVATE INTERNATIONAL LAW

Course Code: LAW2905 **Credit Units: 05**

Course Objective:
The course equips the student to deal with dispute involving a foreign element in personal, civil and commercial matters *i.e.* increasing in frequency as a result of a globalized economic and social environment.

Course Contents:

Module I: Introduction
Application and subject matter of Private International Law, Distinction with Public International Law, Characterization and theories of characterization, Concept of Renvoi, Application of foreign law, Domicile, Jurisdiction of courts.

Module II: Family Law and Adoptions
Material and formal validity of marriage under Indian and English law, Choice of law and jurisdiction of courts in matrimonial causes: dissolution of marriage, grounds of divorce, restitution of conjugal rights, recognition of foreign judgment, Recognition of foreign adoptions, Adoption by foreign parents, Jurisdiction under Indian and English law.

Module III: Civil and Commercial matters
Tort, Theories of foreign tort, Contract, Theory of Proper Law of Contract, Ascertaining the applicable law, Property.

Module IV: Indian Law relating to foreign judgment
Basis of recognition; Recognition and Enforcement of Foreign Judgments, Finality, Failure, Direct execution of foreign judgments, decrees.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:
- Dr. Paras Diwan :Private International Law
- Cheshire : Private International Law
- Morris : Private International Law

ELECTION LAW

Course Code: LAW2906 **Credit Units: 05**

Course Objective:
The objective of this paper is to acquaint the students with the lection laws governing the elections of the Houses of the Parliament and the State Legislatures as well as to the offices of President and Vice President**.**

Course Contents:

Module I: Introduction
Election: Meaning and Process, Constitutional Mandate, Laws governing elections, Election disputes, Election to the Offices of the President and Vice President. .

Module II: Election Commission
Composition, Functions, Powers**;** Delimitation of Constituencies, Preparation and Revision of Electoral Rolls.

Module III: Qualifications and Disqualifications of Candidates
Constitutional and Statutory Provisions**:** Disqualifications of sitting members, Nomination and Candidature, Voters Right to Information; Anti Defection Law (Tenth Schedule to the Constitution of India).

Module IV: Corrupt Practices in the Election Law; Electoral Offences

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Manual of Election Law in India – Dev Inder
- Chawla's Elections Law & Practice - P.C. Jain & Kiran Jain
- Election Laws and Practice in India- R.N. Choudhry
- Corrupt Practices in Election Law – K.C. Sunny
- How India Votes – Election Laws, Practice and Procedure – V.S. Rama Devi & S.K. Mendiretta
- V.N. Shukla's The Constitution of India – M.P. Singh.

Statutory Reading:
- Relevant Provisions of the Constitution of India
- The Representation of the People Act, 1951.
- The Representation of the People Act, 1950.
- The Presidential and Vice-Presidential Elections Act, 1952
- The Election Commission (Condition of service of Election Commissioners and Transaction of Business) Act, 1991.
- The Delimitation Act, 2002.

BANKING AND INSURANCE LAWS

Course Code: LAW2907 **Credit Units: 05**

Course Objective:
This course acquaints students with banking system of India and teaches them the various aspects and rights that exists for them in banking and insurance sector.

Course Contents:

Module I: Banking System in India
Kinds of banks and their functions; Banking Regulation Laws: Reserve Bank of India Act, 1934, Banking Regulation Act, 1949; Relationship between banker and customer: Legal Character, Contract between banker & customer, Banks duty to customers; The Banking Ombudsman Scheme, 1995; Liability under Consumer Protection Act, 1986.

Module II: Lending, Securities and Recovery by Banks
Principles of Lending ; Position of Weaker Sections; Nature of Securities and Risks Involved ; Recovery of debts with and without intervention of courts / tribunal: Recovery of Debts due to Banks and Financial Institutions Act, 1993, Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interests Act, 2002.

Module III: Banking Frauds
Nature of Banking Frauds; Legal Regime to Control Banking Frauds; Recent Trends in Banking: Automatic Teller Machine and Internet Banking, Smart Cards, Credit Cards.

Module IV: Insurance Law
Nature of Insurance Contracts; Kinds of Insurance: Life Insurance, Medi claim, Property Insurance, Fire Insurance, Motor Vehicles Insurance (with special reference to third party insurance; Constitution, Functions and Powers of Insurance Regulatory and Development Authority; Application of Consumer Protection Act, 1986.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Banking Law & Negotiable Instruments Act – Sharma and Nainta
- Banking System, Frauds and Legal Control – R.P. Namita
- Law of Insurance – M.N. Mishra
- Handbook of Insurance and Allied Laws – C. Rangarajan
- Banking Law & Practice in India – M.L. Tannan.

INTERNATIONAL HUMANITARIAN AND REFUGEE LAW

Course Code: LAW2908 **Credit Units: 05**

Course Objective:
The objective of this paper is to make students aware of the principles of International Humanitarian and Refugee Laws.

Course Contents:

Module I: Historical Development of International Humanitarian Law
History and evolution, Growth, Character of International Humanitarian Law.

Module II: Geneva Conventions, 1949
Geneva Convention I, Geneva Convention II, Geneva Convention III and Geneva Convention IV, 1949, Additional Protocol I to Geneva Conventions, 1977, Additional Protocol II to Geneva Conventions II 1977.

Module III: Enforcement Machinery
War Crimes, Serious breaches of International Humanitarian Law, International Criminal Court (ICC).

Module IV: Refugees under International Law
Who is a refugee?, Convention Relating to the Status of Refugees, 1933, Convention on Status of Refugees, 1951, The 1967 Protocol, The AALCC Principles 1966, The OAU Convention 1969.

Module V: Implementation and Monitoring of the Rights of Refugees
Status of the UNHCR 1950, Cartegena Declaration 1984.

Module VI: Treatment of Refugees under Indian Laws
Draft SAARC Convention.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Ingrid Detter, The Law of War, (Cambridge, 2000)
- A. Roberts and R. Guelff, eds., Documents on the Laws of War (Oxford, 2000)
- Legality of the Threat or Use of nuclear weapons, Advisory Opinion, ICJ Reports (1996)
- M.K. Balachandran and Rose Verghese (eds.) – International Humanitarian Law ICRC (1997)
- Ravindra Pratap, "India's Attitude towards IHL", in Mani (ed.) International Humanitarian Law in South Asia (Genava: ICRC, 2003)
- Guy S. Goodwin – The Refugee in International Law (Oxford, 2000)
- A. Vibeke Eggli, Mass Refugee Influx and the Limits of Public International Law (The Hague: Nijhoff, 2002).

CRIMINOLOGY

Course Code: LAW2909 **Credit Units: 05**

Course Objective:
The course is intended to introduce students to the broad study of criminology. It is to give a broad overview to the scope of criminology, to the ideas which have influenced the area of the subject and to the practical uses and impact to which these have been, or might be put.

Course Contents:

Module I: Introduction to Crime & Criminology
Definition and Scope, Criminology & other Social-Science; Legal, Social and Psychological aspects of crime, Traditional crimes; Organized Crimes, Socio Economic Crimes, Modern Crimes; Corruption, Cyber Crimes Environmental Crimes Terrorism and insurgency ; Specific theories: Classical School and Neoclassical School; Positive School; Cartographic School; Sociological theories : Social Structural Theories and Social Process Theories; Economic Theories of Crime .

Module II: Juvenile Delinquency
Concept & Causes, Pre delinquency stages: Truancy and Vagrancy, Main features of juvenile Justice Act, (New & Old), Institutional Services like Observation homes, Juvenile Homes, Special Homes & Juvenile Aftercare Services.

Module III: Punishment
History & Theories of Punishment, Capital Punishment, Historical Development from Punishment to Correction and Reformation, Prison System In India; Correctional Programmes in jail; Alter care services, Probation & Parole.

Module IV: Impact on Society
Social Disorganization and Social Problems, Victimless Crimes: Alcoholism, Drug Addiction, Beggary, Commercial Sex, Suicide; Crimes related to Family: Dowry death, Domestic Violence, Child Abuse.

Module V: Victimology
Concept, origin & Development, Need to study victims, U.N. Declaration on the basic principles of justice for victims of crimes and abuse of power, Victim's rights in India: Fair Access to Justice, Restitution, Compensation and assistance to victims, Human Rights Protection.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:
- Sutherland and Crssey – Criminology
- Ahmed Siddique – Criminology
- Mrs. Vedkumari – Juvenile Justice

MEDIA LAWS

Course Code: LAW2910 **Credit Units: 05**

Course Objective:
Media connotes radio, television, print, film and the internet and has become an important industry which provides the dual function of information and entertainment. The constitution of India has ensured that media performs its function as the watchdog of modern democracy effectively but within reasonable limits. This course introduces the legal framework governing the different aspects and streams of media industry and the specific laws applicable to the people servicing the industry. With the help of examples and where necessary case studies from selected constitutional provisions, legislation and judicial proceedings and decisions, the historical and current debates and issues in media laws will be taught to the students.

Course Contents:

Module I: Introduction to Media Laws
What is media law?
Need for Media Laws, Statutory Laws, Civil Laws: Law of Torts (Defamation & Negligence) & Consumer Protection Act 2006, Criminal Laws (defamation/Obscenity/Sedition) R. v. Hicklin LR 3 QB 360, Ranjit D. Udeshi v. State of Maharashtra (AIR 1965 SC 881)

Constitutional Framework:
Freedom of speech & expression(Art. 19) Maneka Gandhi v. Union of India, Romesh Thapar v. State of Madras, Indian Express v. Union of India (1985) 1 SCC 641.
Issues of Privacy (Art.21) Kharak Singh v. State of UP (1964) 1 SCR 332, Gobind v. State of MP (1975) 2 SCC 148, Judicial Interpretation of Media freedom and its limits (including Contempt of Court & Judicial Activism) .

Module II: Media Laws
Right to Information Act 2005/Official Secrets Act 1923
Broadcast Sector:
Prasar Bharti Act 1990
Broadcasting Bill 2006
Cinematography Act 1952 (Sec.51/14(d)/57/62A)
(Case Study: K. A. Abbas v. UOI; Bobby Art International v. Om Pal Singh Hoon)
Cable TV Networks (Regulation) Act of 1995
Cine Workers & Cinema Theatre Workers (Regulation of Employment) Act 1981
Cine Workers Welfare Cess Act 1981

Internet & Law:
Evolution of Internet as a New Media
IT Act of 2000 & Media
Regulatory commissions of New Media
Indian Telegraph Act of 1885

Advertisement & Law:
Advertisement act of 1954
Indecent Representation (Prohibition) Act 1986
Case Study: Hamdard Dawakhana v. UOI; Tata Press Ltd. V. Mahanagar Telephone Nigam Ltd.

Print Media & Law:
Press Council Act, 1978
Cable television Network (Regulation) Act 1995
The working Journalists and other Newspaper employees (Conditions of Service and Miscellaneous Provisions) Act 1955
Press Council Guidance
Case study: Sakal Papers Ltd. v. Union of India AIR 1962 SC 305, Bennet Coleman and Co. v. Union of India AIR 1973 SC 106

Examination Scheme:

Components	P	A	C	CT	EE
Weightage (%)	5	5	10	10	70

Text & References:

- Hakemulder, R Jan. Jonge, Fay AC De & Singh, P.P.(1998) Media Ethics and Law, Anmol Publications Private Limited, New Delhi
- Divan Govadia Madhavi 92006) Facets of media Laws (1st Edn) Eastern Book Company, Lucknow
- Campbell, dennis & Cotter, Susan (1998) Copyright Infringement, Center for International Legal Studies, Kluwer Law Internatiional, London
- Pandey,J.N. (2003) Constitutional Law of India, Central Law Agency, Allahabad
- Shukla, V.N. (1982) Constitution of India, eastern Book Company, Lucknow
- E. Price, Monroe & Veerhulst, Stefaan G. (2001) Broadcasting reform in India; Media Law from a Global Perspective, Oxford Universuty Press, New Delhi
- Iyer, Venkat (2000) (2nd Edn) Mass Media Laws and regulations in India, Asian Media Information and Communication Centre, Singapore
- Basu, Durga Das (1996) Law of the Press in India, Prentice Hall of India, New Delhi
- Christain G Clifford & others (2005) (7th Edn) Media Ethics – Cases & Moral reasoning, Pearson Education, London
- Shrivastava, KM (2005) Media Ethics – Veda to Gandhi & Beyond, Publications Division, New Delhi

CORRUPTION LAWS

Course Code: LAW2911 **Credit Units: 05**

Course Objective:
To update the students about corruption laws that has already been formed. The main aim of the course is to make the students aware of the laws prevalent and the legal remedies available

Course Contents:

Module I: Introduction to Corruption Laws
Introduction- definition of corruption,
Genesis of corruption- Historical Background, corruption in ancient time, corruption in Mahabharata need for integrating
Nature of corruption, various types of corruption- in kind, cash or in service Individual Corruption, Institutional Corruption. Why and how of corruption – Nexus between Position of a Public servant and corruption. consequences and ill effects

Module II: Offences by Public Servant
Offences under the Prevention of Corruption Act, 1988,
Corruption by Public servant- Prevention of Corruption Act 1988-
Definition of Public Servant sec 2(cc)
Categories of public servant- person in the pay of the Government- a person in the service of the Government a person remunerated by fees or commission for the performance of any public duty by the Government.
Sec 7: public Servant taking gratifications other legal remuneration in respect of an official act.
Gratification: legal remuneration, meaning of holding out as a Public Servant – whether covered under the Act.
Sec 8: Gratification by person other than public servant – to influence public servant by corrupt or illegal means.
Sec 9: Gratification by person other than Public Servant- to influence public servant- and not by corruptor illegal means.
Sec10, Sec11, Sec 12: Habitual committing of offence under Sec 8, 9, 12, 14.
Sec 15 Attempt
Sec 16 Fine Criteria
Sec 13 Criminal Misconduct by Public Servant.
Bribe giver Guilty or Abetment?
Investigation and Trial under the Act
Sec 17 Persons authorized to investigate.
Sec 19 Sanction for prosecution
Sec 20 presumptions under the Act.
Sec 3, 4, 5: Special Judges Court- procedure and powers of Special Judge.

Module III: Commission of Enquiry Acts
Section 6 Summary Trial. Commission of Enquiry Act 1952
Composition, function and role of CAG
The Central Vigilance Commission
Central Bureau of Investigation its role, function and Jurisdiction.
Proposed Lok Pal Bill ,its various drafts , legality of sting operations , provision relating to corruption cases of judges , Immunity of legislations and parliamentarians . Law on whistle blowers

Module IV: Money Laundering & National Investigative Agency Act
The Prevention of Money Laundering Act 2002, General Principles, Confiscation of Property earned through crime Sec5
Sec 171-B of IPC Bribery – Offences relating to elections.
Sec 171-C
Sec 171- D Undue influence and Impression at election
Sec 171- E Punishment for Bribery
Sec 171- F Punishment for Influence and Personating at an election.
National Investigative Agency Act 2009

Module V: International Effort
International Efforts
The United Nations Directions
The Convention on Combating Bribery of Foreign Public Officials
UN Convention against Transnational Organized Crime.
UN Convention against Corruption (UNCAC)

Examination Scheme:

Components	**P**	**A**	**C**	**CT**	**EE**
Weightage (%)	5	5	10	10	70

Text & References:
- Prevention of Corruption Act, 1988
- Prevention of Money laundering Act, 2002
- National Investigative Agency act, 2009
- Un Conventions

SUMMER INTERNSHIP EVALUATION-IV

Course Code: LAW2935 **Credit Units: 03**

It is a mode of Clinical Legal education Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The reports both by the student and the office together with diary where applicable to be certified will be submitted for evaluation

The Internship during the summer break is a compulsory course. There is a Internship Data from where students fill in the details of where they are interning with complete address and phone numbers Customized Legal Reference /Diary is provided to the students on payment. They maintain a day to day record of the work that they do at the place they are interning. They are expected to intern for a minimum 90 days. They submit their completed diary, certificate from the employer and also a report of their experience at work. After submission there is a Viva by concerned faculty. They assess the student on the kind of work they have done during internship, presentation of the work they have done and also on the practical knowledge they have gained

The Paper is marked out of 100 marks. The breakup of the marks is as follows:

1.	Diary submission	25 Marks
2.	Report and certificate	25 Marks
3.	Viva (Panel of External Examiners)	40 Marks
4.	Attendance (Regularity in meeting the supervisor)	10 Marks
	Total	**100**

Syllabus - Tenth Semester

LEGAL WRITING

Course Code: LAW2001 **Credit Units: 8**

Course Objective:
The course material equips the student with skills in the methodology essential to execute a research assignment on topics related to law.

Course Contents:

Module I: Research Methodology
Doctrinal, Non-doctrinal Empirical methods of executing research project.

Examination Scheme:

Components	**V**	**A**	**TP**
Weightage (%)	25	05	70

Note: 'TP' stands for project report prepared

Text & References:

- Legal research & Methodology: Indian Law Institute, Edited by Dr, S.K. Verma & M. Afzal Vani.

CONTEMPORARY LAWS

Course Code: LAW2002 **Credit Units: 04**

Course Objective:
To update the students with Contemporary Laws and new Legislation keeping in mind the ever changing requirements and complexities of Law in relation to its applicability to life.

Course Contents:

Module I: Consumer Protection Act and Competition Act
Historical background of the Market being a seller's Market. Changing to a buyer's Market – Consumer and Public friendly legislation Definition of Consumer and Unfair Trade Practices- Definition of Competition and Anti Competition Steps- Forums for indications of rights and prescribed remedies in both the Acts.

Module II: Rights to Information Act
As an antithesis to the Official Secrets Act; Extension of Article 19 of the Constitution of India; Definition of Information; appropriate authority; what is information can be given and what cannot be given (Sec – 6,7,8) Hierarchy under the Act; Penalties and Fine.

Module III: Information Technology Act
To provide a Legal Framework and Legal Machinery for Electronic Data interchange and Electronic Communication – Electronic Commerce- Electronic filing having digital signatures – Authorities issuing digital signatures – Computer Contaminant -Computer viruses- Penalty and Damage to Computer/Computer System (Sec- 43) – Forum –Sec -48 –Computer Related Offences-Sec 66, 66A to Sec 66F, 67, 67A to Sec 67 C.

Module IV: Legal Services Authorities Act - Historical background – J.Krishna Iyer and J.P.N. Bhagwati Committee- Legal Aid –a duty of the State – Directive Principles of State Policy- Constitution of National Legal Services Authority and State Legal Services Authorities – Their Duties and Responsibilities - -Eligibility for seeking Legal Aid – Lok Adalats- Alternative Disputes Resolution Mechanism – Permanent Lok Adalats.

Module V: Supreme Court Rules/High Court Rules… - Concept of Advocate or record – Filing in Supreme Court through Advocate or Record only- Filing Format – Central Agency –SLP filling under Article 136 of The Constitution OF India –Corative Petition/ Review Petition in chambers. High Court Rules- Original Side –Appreciate Side –Filing –Service – Registry – Publication of notices- Delegated Power to Judicial Registers for recording Evidence etc.

Note: 1. Registration Act and Stamp act can be combined with Transfer of Property.
2. Advocates Act and Bar Council of India Rules can be combined with Professional Ethics.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:
- Basic Texts of GATT and WTO.
- International Trade Law- Dr S.R Myneni
- Understanding International Trade Law- Simone Schnitzer
- Guide to the WTO and GATT, Economics,Law and Politics- Autar Krishnen Koul.
- Internet Sources :www.wto.org

MOOT COURT/ INTERNSHIP

Course Code: LAW2003 **Credit Units: 14**

Course Objective:
This course relates to litigation advocacy and as such this shall be simulation course that shall have two parts. First part shall focus on preparation for trial and trial strategies. It shall also disseminate techniques of examination-in-chief cross examination and re-examination of witnesses, argumentation in courts, bail application, injunction application, etc. The second part shall focus on writing briefs in civil suits and criminal cases, appellate briefs in civil and criminal cases, and writ matters, memorial writings and arguing before the appropriate forums. The students shall be given a case to argue, that shall help to articulate their argumentative zeal as well as capacity.

Course Contents:

Module I: Moot Court
Bench Memorial, Court Craft: Presentation of case, Interaction with Bench, Question Answer Court etiquette and mannerism section.

Module II: Internship
Specified period to be spent by the student with a law firm/court/Commissions/NGO's and like institutions working with the realm of law or connected therewith. The report and diary to be certified and submitted for evaluation.

Module III: Corporate Legal Training
Corporate communication skills and client interaction and etiquette in corporate law work environment.

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	05	70

HUMAN RIGHTS

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LAW2152	Concept and Theoretical Understanding of Human Rights	3	-	-	3
LAW2252	Systems, Organizations and Instruments of Human Rights	3	-	-	3
LAW2352	Contemporary Human Rights Situations and Issues	3	-	-	3
LAW2452	Specific Themes in Human Rights	3	-	-	3
LAW2552	Legislation Themes in Human Rights	3	-	-	3
LAW2652	Report Writing and Thesis Preparation (Human Rights)	3	-	-	3
	TOTAL				**18**

HUMAN RIGHTS

Syllabus - Semester First

CONCEPT AND THEORETICAL UNDERSTANDING OF HUMAN RIGHTS

Course Code: LAW2152 **Credit Units: 03**

Module-I: Introduction
History of Human Rights-17th-18th century-19th century-20th century- pre world wars- Post world wars- Philosophy of Human rights

Module-II: Principle and Theories of Human Rights
Classification of human rights- Three generations-Nature of Human rights- Legal Theories related to Human Rights- Legal documents related to Human Rights before the Second World War

Module-III: International Protection of Human Rights
Failure of League of Nations- United Nations Organisation- UN Charter- UN system and organs of the UN-Universal Declaration of Human Rights- International Covenant on Civil and Political Rights (**ICCPR**) - the International Covenant on Economic, Social and Cultural Rights (**ICESCR**)

Module-IV: Implementation of Human Rights at the International Level
Human Rights Council of the UN- Committees and organs protecting Human Rights- Role of UN General Assembly and Security Council – Individual Communication system

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Syllabus - Semester Second

SYSTEM, ORGANIZATIONAL AND INSTRUMENTS OF HUMAN RIGHTS

Course Code: LAW2252 **Credit Units: 03**

Module-I: UN and other Regional Organisation for the Protection of Human Rights
UN system of protection of Human Rights- EU and Human Rights- Protection under the Inter American System- African Charter – Arab Charter- Cultural Relativism and Universalism

Module-II: International Documents Related to Human Rights
Genocide Convention-Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) - Convention on the Elimination of All Forms of Racial Discrimination (CERD)- Convention on the Rights of Persons with Disabilities (CRPD)- Convention on the Rights of the Child (CRC)-United Nations Convention Against Torture (CAT)- International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families

Module-III: Basic Human Rights under the International Documents
Three generations of Rights- First generation Rights- Right to Equality- Right to life- Right to Speech- Freedom of Religion- Freedom from Torture

Module-IV: Second and Third generations of Rights
Rights related to dignity of individuals- Right to education- Right to food- Right to work-Right to livelihood- Right to Self Determination- Right to development- Rights of Indigenous people

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Syllabus - Semester Third

CONTEMPORARY HUMAN RIGHTS SITUATIONS AND ISSUES

Course Code: LAW2352 **Credit Units: 03**

Module-I: Indian Constitution and Human Rights
Concept of State- Concept of Law- Just fair and reasonableness- Fundamental Rights and Human Rights

Module-II: Fundamental Rights and International Covenant on Civil and Political Rights (ICCPR)
Right to Equality- Right to Freedom- - Right to Life- Freedom of Religion- Rights of Minorities- Right to Constitutional Remedies- Judicial pronouncement of the Courts in India

Module-III: Directive principles of State Policy and the International Covenant on Economic, Social and Cultural Rights (ICESCR)
Resources of a country and Implementation of Second Generation Rights- Positive Rights and negative rights- Enumerated Rights and Non Enumerated Rights-Directive principles of State Policy- International Covenant on Economic, Social and Cultural Rights (ICESCR)

Module-IV: Protection of Human Rights in India
Protection of Human Rights Act, 1993- National Human Rights Commission and State Commissions- Woman's Commission- Minority Commission- SC/ST Commission- Police atrocities- Violations against woman and other weaker sections- Role of NGOs- Human Rights education

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Syllabus - Semester Fourth

SPECIFIC THEMES IN HUMAN RIGHTS

Course Code: LAW2452 **Credit Units: 03**

Module-I: Morality, Ethics, Religion and Human Rights
Module-II: Terrorism and Human Rights
Module-III: Science and Technology and Human Rights
Module-IV: Human Rights of the Marginalized People

Rights of the Refugees- Prisoners of war- Under trials- Rights of the Differently abled- Sexual Minorities and Human Rights- HIV/AIDS- Access to Medicine- Protection of persons from enforced disappearance- Right against corruption- Right to development-Right to clean Environment

Examination Scheme:

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	5	5	70

Syllabus - Semester Fifth

LEGISLATION THEMES IN HUMAN RIGHTS

Course Code: LAW2552 **Credit Units: 03**

Module-I: Regional Human Rights Legislations
Module-II: National Human Rights Legislations
Module-III: Role of Judiciary-judicial Activism and P.I.L
Module-IV: Specific Human Rights issues in India and Role of legislation and Judiciary

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Syllabus - Semester Sixth

REPORT WRITING AND THESIS PREPARATION

Course Code: LAW2652 **Credit Units: 03**

1- **Field Report**
2- **Term Paper/ Study Report**
3- **Viva**

Examination Scheme:

Components	**Field Report**	**Term Paper/ Study Report**	**Viva**	**Total**
Weightage (%)	20	50	30	100

References:-

Agosín, Marjorie, ed. *Women, Gender, and Human Rights: A Global Perspective*. New Brunswick, NJ: Rutgers University Press, 2001.

Allen, Robin and Rachel Crasnow. *Employment Law and Human Rights.* New York: Oxford University Press, 2002.

Alston, Philip. *The United Nations and Human Rights: A Critical Appraisal*. Oxford, UK: Clarendon Press, 1992.

Alston, Philip. *Promoting Human Rights through Bills of Rights: Comparative Perspectives.* New York: Oxford University Press, 2000.

Alston, Philip, ed. *Labour Rights as Human Rights.* New York: Oxford University Press, 2005.

Alston, Philip and James Heenan. *Economic, Social and Cultural Rights: A Bibliography.* The Hague: Martinus Nijhoff, 2006.

Alston, Philip and James Crawford, eds. *The Future of UN Human Rights Treaty Monitoring.* Cambridge, UK: Cambridge University Press, 2000.

Alston, Philip, Stephen Parker and John Seymour, eds. *Children, Rights and the Law.* New York: Oxford University Press, 1993 (with corrections).

Alston, Philip and Mary Robinson, eds. *Human Rights and Development: Towards Mutual Reinforcement*. New York: Oxford University Press, 2005.

Anaya, S. James. *Indigenous Peoples in International Law*. New York: Oxford University Press, 1996.

Andreassen, Bård A. and Stephen P. Marks, eds. *Development as a Human Right: Legal, Political and Economic Dimensions.* Cambridge, MA: Harvard School of Public Health, François-Xavier Bagnoud Center for Health and Human Rights/Harvard University Press, 2006.

An-Na‘im, Abdullahi A., ed. *Human Rights in Cross-Cultural Perspectives: A Quest for Consensus.* Philadelphia, PA: University of Pennsylvania Press, 1992.

Annas, George J. *American Bioethics: Crossing Human Rights and Health Law Boundaries.* New York: Oxford University Press, 2005.

Askin, Kelly D. and Dorean M. Koenig, eds. *Women and International Human Rights Law*, 3 Vols., Ardsley, NY: Transnational Publ., 2000.
.

Bernhardt, Rudolf and John Anthony Jolowicz, eds. *International Enforcement of Human Rights.* Berlin: Springer-Verlag, 1987.

Broomhall, Bruce. *International Justice & The International Criminal Court: Between Sovereignty and the Rule of Law.* New York: Oxford University Press, 2003.

Brownlie, Ian and Guy S. Goodwin-Gill, eds. *Basic Documents on Human Rights*. New York: Oxford University Press, 5th ed., 2006.

Brysk, Alison, ed. *Globalization and Human Rights.* Berkeley, CA: University of California Press, 2002.

Cassese, Antonio. *Human Rights in a Changing World*. Cambridge, UK: Polity Press, 1990.

Chandler, David. *From Kosovo to Kabul and Beyond: Human Rights and International Intervention*. London: Pluto Press, 2006 ed.

Chesterman, Simon. *Just War or Just Peace? Humanitarian Intervention and International Law.* New York: Oxford University Press, 2001.

Clapham, Andrew. *Human Rights in the Private Sphere.* New York: Oxford University Press, 1994.

Clapham, Andrew. *Human Rights Obligations of Non-State Actors.* New York: Oxford University Press, 2006.

Claude, Richard Pierre and Burns H. Weston, eds. *Human Rights in the World Community: Issues and Action.* Philadelphia, PA: University of Pennsylvania Press, 2nd ed., 1992.

INTELLECTUAL PROPERTY RIGHTS

Programme Structure

Course Code	Course Title	Lectures (L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
LAW2151	Principles of IPR	1	-	4	3
LAW2251	Patent Law and Practices	1	-	4	3
LAW2351	Copyright Law and Practices	1	-	4	3
LAW2451	Trademark Law and Practices	1	-	4	3
LAW2551	Emerging Issues and Challenges	1	-	4	3
LAW2651	Future Aspects of Intellectual Property Rights	1	-	4	3
	TOTAL				**18**

INTELLECTUAL PROPERTY RIGHTS

Syllabus - Semester First

PRINCIPLES OF IPR

Course Code: LAW2151 **Credit Units: 03**

Course Contents

The course is designed to provide comprehensive knowledge to the students regarding the general principles of IPR, Concept and Theories, Criticisms of Intellectual Property Rights, International Regime Relating to IPR

Module I

Introduction to Intellectual Property Rights
Concept and Theories
Kinds of Intellectual Property Rights
Economic analysis of Intellectual Property Rights
Need for Private Rights versus Public Interests
Advantages and Disadvantages of IPR.

Module II

Criticisms of Intellectual Property Rights
Politics of Intellectual Property Rights
Third World Criticisms
Marxist Criticisms

Module III

International Regime Relating to IPR
TRIPS and other Treaties (WIPO,WTO, GATTS)

Examination Scheme

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:

- D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
- B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
- P. Narayanan (Eastern Law House), Intellectual Property Law
- N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow

Syllabus - Semester Second

PATENT LAW AND PRACTICES

Course Code: LAW2251 **Credit Units: 03**

Course Objective
The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Patent Law (1970), Historical development, Procedure for granting a patent, Infringement.

Module I

Research exemption Introduction to Patents
Overview
Historical development
Concepts, Novelty, Utility
Inventiveness/Non-obviousness

Module II

Patent Act 1970 – amendments of 1999, 2000, 2002 and 2005
Patentable subject matter, Patentability criteria, non-patentable inventions
Pharmaceutical products and process and patent protection
Software Patents
Patenting of Micro-organism

Module III

Rights of patentee
Procedure for granting a patent and obtaining patents
Grounds for opposition
Working of Patents, Compulsory License
Acquisition, Surrender, Revocation, restoration
Transfer of patent rights,

Module IV

Infringement
What Is Infringement? Direct, Contributory, and Induced
How Is Infringement Determined? Who Is an Infringer?
Official Machinery, Controller, Powers and Functions
Defences to Infringement

Examination Scheme

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Sookman, Computer Law, 1996
- N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow
- Dr. B.L. Wadhera, Law Relating to Patent, Trademarks, Copyright & Designs
- P. Narayanan (Eastern Law House), Intellectual Property Law

Syllabus - Semester Third

COPYRIGHT LAW AND PRACTICES

Course Code: LAW2351 **Credit Units: 03**

Course Objective
The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Copyright Law, 1957, Historical background and Development of Copyright Law, Infringement.

Module I

Copyright and Neighbouring Rights
Concept and Principles
Historical background and Development of Copyright Law
Leading International Instruments, Berne Convention, Universal Copyright Convention, International Copyright under Copyright Act
WIPO Phonograms and Performances treaty

Module II

Copyright Act, 1957
Terms of Copyright
conditions for grant of copyright,
extent of rights exception to copyright protection,
fair use provision, assignment and licensing,
Copyright in Literary, Dramatic and Musical ,Works, Sound Recording, Cinematograph Films,
Copyright in Computer Programme, Author Special Rights, Right of Broadcasting and performers,

Module III

Copyright Registrar and Copyright Board-Power and Procedure
Copyright Societies,
Ownership, Assignment, Licence, Translation of Copyright,
Compulsory Licences,
Infringement-Criteria of Infringement, Infringement of Copyright-Films,
Literary and Dramatic works, Importation and Infringement.

Examination Scheme

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights

Syllabus - Semester Fourth

TRADEMARK LAW AND PRACTICES

Course Code: LAW2451 **Credit Units: 03**

Course Objective
The course is designed to provide comprehensive knowledge to the students regarding Indian position of the Trademark Act, 1999, Historical development of the concept of trademark and trademark law, Registration of trademark, Infringement of trademark.

Module I

Historical development of the concept of trademark and trademark law-National and International
Introduction to Trademarks
Need for Protection.
Kinds of trademarks
Concept of Well known trademark

Module II

Registration of trademark
Grounds of refusal of registration
- Absolute ground
- Relative ground

Procedure of registration of trademark
opposition and its grounds

Module III

Infringement of trademark
Passing off
Deceptive similarity
Defences
Remedies for infringement and passing off
- Civil remedies
- Criminal remedies

Examination Scheme

Components	**P/S/V**	**CT**	**A**	**C**	**EE**
Weightage (%)	10	10	05	5	70

Text & References:

- P. Narayanan (Eastern Law House), Intellectual Property Law
- W. Cornish (Universal Publication), Intellectual Property Law
- R.K. Nagarjan, Intellectual Property Law
- Ganguli (Tata Megraw), Intellectual Property Rights

Syllabus - Semester Fifth

EMERGING ISSUES AND CHALLENGES

Course Code: LAW2551 **Credit Units: 03**

Course Objective
The course is designed to provide comprehensive knowledge to the students regarding the effect of IPR especially of patents on emerging issues like public health, climate, Domain Name Disputes and Cyber squatting, Bio piracy etc. and the ways to tackle this problem,

Module I

Public health and Intellectual Property Rights
Case study—Novartis Pharmaceuticals
Bayer Pharmaceuticals

Module II

TRIPS Flexibities and access to medicine
IPR and Climate change
Patents and Biotechnology

Module III

Traditional knowledge and IPR
Bio piracy
Domain Name Disputes and Cyber squatting

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- Merges, Patent Law and Policy: Cases and Materials, 1996
- Brian C. Reid, A Practical Guide to Patent Law, 2nd Edition, 1993
- Brinkhof (Edited), Patent Cases, Wolters Kluwer
- Prof. Willem Hoyng & Frank Eijsvogels, Global Patent Litigation, Strategy
- Hilarry Pearson and Clifford Miller, Commercial Exploitation of INtellectual Property

Status Prescribed :

- The Patent Act, 1970
- The Copyright Act, 1957
- The Trade Marks Act. 1999

Syllabus - Semester Sixth

FUTURE ASPECTS OF INTELLECTUAL PROPERTY RIGHTS

Course Code: LAW2651 **Credit Units: 03**

Course Objective
The course is designed to provide comprehensive knowledge to the students regarding the effect of IPR especially of patents on emerging issues like public health, climate, Domain Name Disputes and Cyber squatting, Bio piracy etc. and the ways to tackle this problem,

Module I
Concept of property in Cyberspace
Implications on intellectual property Rights: International & National legal preparedness
Application of copyright Act 1957,
Scope of protection of computer program
Applications of patents to computer technology

Module II
Competition Law and Intellectual Property Rights: Confronting Paradigms
Introduction
What is Competition Policy and Law?
IPRs and IPRs Policy.
Framing the Competition-IPRs Relationship.

Module III
Case study related to both modules.

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	05	5	70

Text & References:

- W.R. Cornish, Intellectual Property, Sweet & Maxwell, London (2000)
- Avtar Singh, Competition Law, Eastern Book Company
- Dr. H. K. Saharay, Textbook on Competition Law, Universal Publications
- Brinkhof (Edited), Patent Cases, Wolters Kluwer
- Hilarry Pearson and Clifford Miller, Commercial Exploitation of Intellectual Property

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

RESEARCH METHODOLOGY AND LEGAL WRITING

Course Code: LAW4101 **Credit Units: 03**

Course Objective:
The main objective of this course is to acquaint the students of Law with the method of social science research. This course is expected to provide the knowledge of technique of selection, collection and interpretation of primary and secondary data in socio –legal research.

Course Contents:
Module-I: Nature and Scope
1. Meaning and Objective of Legal Research.
2. Kinds of Research.
3. Doctrinal and Non-Doctrinal Methods of Research.
4. Stages of Research Process.

Module-II: Research Problem, Hypothesis and Research Design
1. Research Problem- Definition, Determination, Sources of Data.
2. Hypothesis- Meaning and Definition, Characteristics.
3. Research Design- Meaning and Essentials of Research Design; Forms of Research Design.
4. Testing of Hypothesis.
5. Sampling Design- Basic Assumption, Classification.

Module-III: Research Methods and Tools
1. Social and Legal Survey.
2. Case Analysis.
3. Questionnaire Schedule.
4. Observation and Interview.

Module-IV: Tabulation, Analysis, Interpretation, Reporting and Legal Writing
1. Classification and Tabulation of Data.
2. Analysis and Interpretation of Data.
3. Use of Statistical Methods and Computers in Legal Research.
4. Reporting and Method of Citations.
5. Ethics in Research.
6. Foundation of Writing.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Garg,B.L, Karadia, R. Agarwal, F and Agarwal, U.K 2002. An Introduction to Research Methodology, RBSA Publishers.
- Kothari, C.R, 1990. Research Methodology: Methods and Techniques. New Age International
- Sinha, S.C and Dhiman, A.K, 2002. Research Methodology, Ess Publications (2 Volumes)
- Trochim, W.M.K., 2005, Research Methods: The Concise Knowledge base, Atomic Dog Publishing,

COMPARATIVE PUBLIC LAW OR SYSTEM OF GOVERNANCE

Course Code: LAW4102 **Credit Units: 03**

Course Objective:
This course focuses on orientation of the students to understand the Constitutional Laws, their concept, constitutionalism and comparative Constitutional Law.

Course Contents:

Module-I: Public Law-Constitution and Administrative Law

1. Concept of Constitution
   - Meaning and Idea of Constitution, Nature and Goals.
   - Living Constitution.
   - Constitution as Supreme Law.

2. Study of Comparative Constitutional Law
   - Relevance.
   - Problems and Concerns in Using Comparison.
3. Constitutionalism
   - Concept, Distinction between Constitution and Constitutionalism.

   - Essential features of Constitutionalism -Written Constitution, Separation of Powers, Fundamental Rights, Independence of Judiciary and Judicial Review.

Module-II: Constitutional Foundations of Powers

1. Supremacy of Legislature in Law making.
2. Rule of Law
   - Dicey‟s concept of Rule of Law.
   - Modern concept of Rule of Law.
   - Social and economic rights as part of Rule of Law.
3. Separation of powers
   - Concept of separation of powers.
   - Checks and balances.
   - Separation of powers or separation of functions.
4. Forms of Governments
   - Federal and Unitary Forms.
   - Features, Advantages and Disadvantages.
   - Models of Federalism and Concept of Quasi-federalism.
   - Role of Courts in Preserving Federalism.
   - Parliamentary and Presidential Forms of Government.

Module-III: Constitutional Review

1. Methods of Constitutional Review
   - Judicial and Political Review
   - Concentrated and Diffused Review
   - Anticipatory and Successive Review
2. Concept and Origin of Judicial Review

3. Limitations on Judicial Review

Module-IV: Amendment of Constitution

1. Various Methods of Amendment
2. Limitations on Amending Power: Comparative Perspective
3. Theory of Basic Structure: Origin and Development

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Barendt, An Introduction to Constitutional Law (1998)
- Cane, Administrative Law (4th ed 2004)
- Finer, Comparative Government (1970)
- Loughlin, The Idea of Public Law (2003)
- Marks, The Riddle of All Constitutions: International Law, Democracy, and Critique of Ideology (2000)
- Where, Modern Constitutions (2nd ed 1966) Zines, Constitutional Change in the Commonwealth (1991)
- Seervai, Constitution of India (4th Edition)
- Above is a non-exhaustive list of books, which students may find helpful to refer:

CORPORATE & BUSINESS LAW (SPECIALISATION)

LAWS ON SECURITIES & FINANCIAL MARKETS

Course Code: LAW4103 **Credit Units: 02**

Course Objectives:
Laws on Securities and Financial Markets course provides a conceptual understanding and in-depth knowledge of securities laws and the regulatory framework concerning financial markets in India.

Course Contents:

Module-I: An Overview of Financial System

1. Constituents of financial system; significance, development and growth of financial and capital markets in India.
2. Financial reforms and present scenario.
3. Regulatory authorities governing financial and capital markets:
   - Securities and Exchange Board of India (SEBI).
   - The Securitization and Reconstruction of Financial Assets and Enforcements of Security Interest Act, 2002.

Module-II: Primary Market and Secondary Market

1. Primary and Secondary Markets: Meaning, significance, scope and developments in both the markets.
2. Difference between Primary and Secondary markets.
3. Issue of Capital SEBI Guidelines (Initial public offer).
4. Stock Exchanges:
   - Functions and significance of stock exchanges.
   - Regulatory framework and control.
   - Operations of stock exchanges.

Module-III: Capital Market and Money Market Instruments

1. Capital market instruments:
   - Equity shares, Preference shares, Sweat Equity shares, Non-voting shares, Debentures.
   - New instruments of capital market – pure, hybrid and derivatives.
2. Money market instruments:
   - Treasury bills, Commercial bills, Certificate of deposits.
   - New money market instruments.

Module-IV: Primary and Secondary Market Intermediaries

1. Primary Market :
   - Various agencies and institutions involved in Primary Market.
   - Role of intermediaries– merchant bankers, registrars, underwriters, bankers to issue, portfolio managers, debenture-trustees, etc.
   - Their rules, regulations and code of conduct framed by SEBI.
2. Secondary Market:
   - Secondary market intermediaries– stock brokers, sub-brokers, advisors.
   - Their rules, regulations and code of conduct framed by SEBI.

Module-V: Mutual Funds and Collective Investment Schemes

1. Mutual Funds
   - Introduction, definitions, types, risks involved performance evaluation
   - SEBI regulations for Mutual Funds.
2. Collective Investment Schemes
   - Introduction, definitions, types, risks involved and performance evaluation.
   - SEBI regulations for collective investment schemes.

Module-VI: Depository System

1. An analysis of the Depositories Act, 1996:
   - Constitution, role and functions of depository.
   - Depository participants, issuers and registrars.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- E. Gordon & H. Natarajan: Capital Market in India.Himalaya publishing House
- H.R. Machiirmu: Indian Financial system: Vikas publishing House Pvt. Ltd
- Guide to Indian Capital Market: Sanjeev Agarwal: Bharat Law House
- SEBI practice Manual: V.L. Iyer: Taxman Allied Service (P) Ltd
- M.Y. Khan: Indian Financial Systems: Tata McGraw Hill
- SEBI Manual :Taxman

CORPORATE GOVERNANCE

Course Code: LAW4104 **Credit Units: 02**

Course Objectives:
Corporate Governance is a set of customs, policies and processes by which an institution is governed. It is an important topic of strategic management, how a company is governed; influences, rights and relationships among the stakeholders and eventually how an organization is managed. This course will focus on the fundamentals of Corporate Governance from a varied prospect including the board of directors, investors and other stakeholders and assessing the effectiveness and execution of governance roles, regulators and responsibilities.

Course Contents:

Module-I:
1. Concepts, origin and development of Corporate Governance
   - Meaning of the term governance.
   - Kumarmangalam committee Report.
   - Naresh Chndra committee Report.
   - Cadboury Committee Report.
   - Rahul Bajaj Committee Report.
2. Meaning of "Corporate Governance".
   - Definitions of Corporate Governance.
   - Need for good Governance.
3. Problems in effective Governance.
   - Corporate Governance and Ethics.
   - Corporate Governance and financial accounting.

Module-II:
1. Legal and Policy Issues in Corporate Governance
   - Transparency and Disclosure.
   - Board and management structure.
   - Shareholders claim satisfaction and financial information.
2. Corporate Social Responsibility.

Module-III:
1. Corporate Governance in India
   - Listing Agreement Clause 49- SEBI Role.
   - Changes since liberalization.
   - Corporate Governance of Banks.
   - The Board of Directors.
   - The Role of Auditors.
   - Role of Regulatory Agencies.
   - The Role of International Economic Institutions.
   - Companies Act, 2013.
   - Policy document on Corporate Governance.
2. Overarching principles of Corporate Governance.

Module-IV:

1. International Corporate Governance
   - OECD Guidelines on Corporate Governance.
   - MNC/ TNC/ MNE Companies.
   - UNCTRIAL Model Law.
   - Governance and Development.

Module-V:

1. Role of judicial bodies on Governance and Accountability
   - Constitutional Law and principles on Corporate Governance.
   - Recent Case studies (India and International Corporate Law).

Examination Scheme:

Components	P/S/V	CT	A	C	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Larcker, David and Tayan, Brian, Corporate Governance Matters: A Closer Look at Organizational Choices and Their Consequences, (Pearson Education 2011) ISBN: 978-0-13-218026-9
- Monks, Robert A.G. and Minow, Nell, Corporate Governance, 5th Edition, (Wiley 2011) ISBN: 978-0-470-97259-5
- Goergen, Marc, International Corporate Governance, Prentice Hall (2012) ISBN: 9780273751250
- Rajput, Namita (Dr.) and Vasishth, Neeru (Dr.) Corporate Governance Values & Ethics with Case Studies, Taxman (2010) ISBN: 9788171946938
- Pandya, Prakash and Balakrishnan, R, Compliance Guide to Corporate, Taxman (2006) ISBN:8174967559
- K.R. Chandratre (Dr.)Manual of Corporate Law Compliance & Corporate Governance, Bharat Law House (2006) ISBN: 81-7737-111-8

INTELLECTUAL PROPERTY LAW

Course Code: LAW4105 **Credit Units: 02**

Course Objective

This Course is designed with the objective of acquainting students with the conceptual and operational parameters of Intellectual Property Law, the judicial interpretation and the new and emerging dimensions of the subjects. It also teaches them various aspects and rights that exist for them in emerging Intellectual Property Laws.

Course Contents:

Module-I:

1. Introduction to IPR
   - Introduction to various kinds of Intellectual Property Rights.
   - TRIPS & WTO

Module-II:

1. Patents
   - Meaning of Patents.
   - Subject matter of Patents.
2. Infringement of Patents and Remedies available
   - Patent of Addition, Rights of Patentee.
   - Transfer of Patents, revocation of Patents & leading Case Law.

Module-III:

1. Trademark
   - Introduction meaning and definition of Trademark,
   - Function and essentials of Trademark,
   - Similar and deceptive mark, principles of registration of Trademark,
2. Infringement of Trademark,
3. Passing off, Absolute & Relative Mark of Refusal & Leading Case Laws.

Module-IV:

1. Copyright
   - Meaning and definition of Copyrights.
   - Concept of Author and Owners of Copyrights.
   - Contract of Service and Contract for Service.
2. Infringement Under Section 51 of Copyrights Act 1957.
3. Fair dealing Under section 52.
4. Features of Copyrights and Remedies available & leading Case Laws.

Module-V:

1. Trade Secret
   - Meaning of Trade Secret.
   - Definition of Trade Secret and Leading Laws.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Chisum on Patents
- Intellectual Property, Dr. B.L. Wadhera

CONSTITUTIONAL & ADMINISTRATIVE LAW (SPECIALISATION)
FUNDAMENTAL RIGHTS AND DIRECTIVE PRINCIPLES

Course Code: LAW4106 **Credit Units: 02**

Course Objective:
This paper is designed with a view to educate the pupil about the Constitutional rights, duties and policies of the government underlining the relevant legislations which are having wider ramification on the interpretation of the provisions of the Constitution.

Course Contents:

Module-I: INTRODUCTION

1. Evolution of Fundamental Rights, impact of Universal Declaration of Human Rights and Constitutions of other countries on Fundamental Rights.
2. Concepts of Fundamental Rights, Bill of Rights, Natural Rights and Human Rights.
3. Preamble of the Constitution and its implication with reference to Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties.
4. Definition of State under Art.12, 13 - Inviolability of Fundamental Rights.
5. Doctrine of Waiver, Doctrine of Severability, Doctrine of Eclipse, scope of definition of law under Art.13.

Module-II: RIGHT TO EQUALITY

1. Relationship between Articles 14, 15, 16, 17, and 18.
2. Doctrine of Classification, Doctrine of Arbitrariness, Doctrine of Legitimate Expectation, Wendsbury Principle.
3. Prohibited grounds for discrimination (Art.15); special provisions relating to women; protective discrimination in favor of Backward Classes, Scheduled Castes and Scheduled Tribes; Development of case law.
4. Equality of Opportunity in the matters of public employment, reservations in public employment, residence as prerequisite for employment.
5. Untouchability, Abolition of Titles.

Module-III: RIGHT TO FREEDOM, RIGHT AGAINST EXPLOITATION

1. Six fundamental freedoms under Art.19 and reasonable restrictions under Art 19 (2) to (6); test to determine the reasonableness of restrictions; whether restriction includes deprivation and prohibition.
2. Rights of accused; Doctrine of ex-post -facto law; Doctrine of Double Jeopardy; privilege against self- incrimination.
3. Protection of life and personal liberty; right to education; safeguards against ordinary arrest and preventive detention; right against exploitation.
4. Ambit of religious freedom, cultural and educational rights.
5. Right to Constitutional remedies; Fundamental Rights vis-à-vis Armed Forces.
6. Martial Law and Armed Forces Special Powers Act.

Module-IV: DIRECTIVE PRINCIPLES OF STATE POLICY AND FUNDEMENTAL DUTIES

1. Relative importance of Directive Principles of State Policy (DPSP) and Fundamental Rights.
2. Nature of Directive Principles of State Policy; Justifiability of Directive Principles of State Policy.
3. Social security and welfare provisions under Directive Principles of State Policy; economic rights.
4. Directive Principles of State Policy that were read into Fundamental Rights.
5. Fundamental Duties – evolution, relationship between Fundamental Rights and Duties.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- H.M. Seervai, Constitutional Law of India – Vol. I &II
- V.N.Shukla , Constitution of India
- Subhash C Jain, The Constitution of India
- D.D. Basu, Commentaries on Constitutional Law of India, Vol. A to E
- M. Hidayatullah (Ed.), Constitution of India
- M.P.Jain, Indian Constitutional Law
- Subba Rao G C V, Indian Constitutional Law
- Pande G S, Constitutional Law of India
- Saharay H K, Constitution of India
- Pylee M.V, Our Constitution, government & politics
- Tope T K, Constitutional Law of India

CENTER STATE RELATION & CONSTITUTIONAL GOVERNANCE

Course Code: LAW4107 **Credit Units: 02**

Course Objective:
This paper aims at giving the students an insight into the federal structure as envisaged in the Constitution of India and focuses upon educating them about the Legislative, Administrative and Financial relations between the Centre and the States.

Course Contents:

Module-I: NATURE OF INDIAN POLITY

1. Introduction to the Constitution of India.
2. Constitutional Law---Constitutionalism.
3. Introduction to the concept of Federalism.
4. Historical evolution of Federal features in India.
5. Different forms of Governments-Unitary, Federal and Confederation, their features, merits, de-merits and distinction between them.
6. Nature of Indian Federalism –Dominant features of the Union over the States.
7. Judicial Perspective over the Indian Federalism.

Module-II: LEGISLATIVE RELATIONS BETWEEN THE CENTRE AND THE STATES

1. Doctrine of Territorial Nexus.
2. Delegated Legislation-permissible limits of delegation.
3. Scheme of distribution of legislative powers between Union and States.
4. Principles of interpretation of lists- Doctrine of Pith and Substance; Doctrine of Colorable Legislation; Doctrine of harmonious construction; Ancillary legislation
5. Residuary Powers.
6. Parliament‟s power to legislate on the State List.
7. Inconsistency between laws passed by Parliament and State legislature.

Module-III: ADMINISTRATIVE RELATIONS BETWEEN THE UNION AND STATES

1. Distribution of executive powers
2. Inter-governmental delegation of powers
3. Centre‟s directive to State &other Constitutional provisions
4. All India Services
5. Co-operative federalism; disputes relating to waters, Inter-State Council

Module-IV: FINANCIAL RELATIONS BETWEEN THE UNION AND THE STATES

1. Introduction to Allocation of taxing powers-Central Taxes, State Taxes, Concurrent Taxes, No tax outside the tax entries.
2. Funds-Consolidated and Contingency Funds.
3. Public Accounts.
4. Tax and Fees.
5. Restrictions on taxing powers.
6. Inter-Government Tax immunities.
7. Tax-sharing.
8. Grants-Grants-in-lieu; Grants-in-aids; Specific Purpose Grants.
9. Finance Commissions.
10. Borrowing Powers.

Module-V: SERVICES UNDER THE UNION AND THE STATES

1. Recruitment and Regulations of Conditions of Services.
2. Doctrine of Pleasure-Restrictions on Doctrine of Pleasure.
3. Constitutional Safeguards to Civil Servants.
4. Public Service Commission-Appointment of Member of Public Service Commission.
5. Functions of Public Service Commission.

Module-VI: EMERGENCY PROVISIONS

1. National Emergency.
2. State Emergency.
3. Financial Emergency.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- A.G. Noorani, (ed.), Centre State Relations in India, Bombay: Lesley Saehney Programme for Training, 1972.
- Ashok Chandra, Federalism in India.
- De JatindraRanjan, Development of Federalism in India, Gauhati :Bani Prakashani,1974
- Desai, Justice D.A. Prasad Anirudh, Centre And State Powers Under Indian Federalism
- Dr. Subhash C. Kashyap, The Framing of India‟s Constitution- A study & Constitution making since 1950- An Overview
- Dr. Subhash C. Kashyap, Constitution of India: Review and Reassessment
- Dr. Subhash C. Kashyap, Indian Constitution-Conflicts and Controversies
- Dr. Subhash C. Kashyap, Commentary on Constitution of India
- Dr.Subhash C. Kashyap, Our Constitution-An Introduction to India‟s Constitution and Constitutional Law, 5th edition reprint 2014.
- G.C.V Subbarao, Legislative powers in Indian Constitutional Law.
- Glanville Austin, The Indian Constitution: Cornerstone of a nation, Delhi; Oxford University Press.
- H.M. Seervai, Constitutional Law of India – Vol.I&II
- K.C.Wheare, Federal Government.
- K.P. Krishna Shetty, the Law of Union-State Relations and Indian Federalism.
- K.Subba Rao, the Indian Federation.
- Kabbur, A.S. Centre-State Relations in India, New Delhi: Trust Books, 2004
- Keith A.B. , Constitutional History of India
- L.M Singhvi, Union-State Relations in India
- M.P Jain, Outlines of Indian Legal History.
- M.P.Jain, Indian Constitutional Law
- M.V Pylee, Constitutional History of India
- Monica David, Indian Legal and Constitutional History, 1600-1949, Vimala Publications, 1968.New Delhi: Deep & Deep Publications, 1981
- O. P. Sharma, Financial Relations Between Centre & States and Local-Self Governments in India
- Pal, Chandra Centre-State Relations and Cooperative Federalism, New Delhi: Deep & Deep Publication, 1983
- Pande G S, Constitutional law of India

- Prasad, Anirudh Centre-State Relations in India, New Delhi: Deep & Deep Publications,1985.
- Pylee M.V Our Constitution government & politics
- Rama Jois M, Legal and Constitutional History of India.
- Rama Jois, Services under the States, Indian law Institute, New Delhi
- Saharay H K, Constitution of India
- SamaradityaPal,India‟s Constitution –origins and evolution (Constituent Assembly debates, Lok Sabha debates on constitutional amendments and Supreme Court judgments,2014
- Seetalvad‟s Lectures on Constitutional law
- Setalvad M.C, Constitutional History of India
- Shubh Narayan Singh, Centre state relations in India: major irritants & post-Sarkaria review
- Subba Rao G C V Indian Constitutional law
- Subbarao‟s Lectures on Constitutional law
- Telang‟s Lectures on Constitutional Law
- Tope T K ,Constitutional law of India by Justice Sujata Manohar, Eastern book company
- V.D. Sebastian, Indian Federalism: the Legislative Conflict.

Recommended Reading:

- Federalism In India, Benjamin N. Schoenfeld, Http://Www.Jstor.Org/Stable/42743497
- Federalism : A Conceptual Analysis, S. A. Paleker, The Indian Journal Of Political Science, Vol. 67, No. 2 (Apr.- June, 2006), Pp. 303-310, Indian Political Science Association, Http://Www.Jstor.Org/Stable/41856217
- United In Diversity? Asymmetry In Indian Federalism,LouiseTillin, Http://Www.Jstor.Org/Stable/4624781
- Coalition Government And Federal System In India, M.G. Khan Http://Www.Jstor.Org/Stable/41855780
- The Nature Of Indian Federalism: A Critique, H. M. Rajashekara,Http://Www.Jstor.Org/Stable/2645661
- The Indian Union And Emergency Powers, Krishna K. Tummala, Http://Www.Jstor.Org/Stable/1601275
- Finance Commission In A Federal Set-Up,VinodVyasulu, Http://Www.Jstor.Org/Stable/4404650
- Dr. B. R. Ambedkar And Making Of The Constitution: A Case Study Of Indian Federalism, K. H. CheluvaRaju,Http://Www.Jstor.Org/Stable/41855548
- Ramaswamy R. Iyer, Inter-State Water Disputes Act 1956: Difficulties And Solutions, Http://Www.Jstor.Org/Stable/4412360
- Federalism And Water Resources, Ramaswamy R. Iyer,Http://Www.Jstor.Org/Stable/4400999
- Ga.Akerlof,Centre-Statefiscalrelations In India -Www.Jstor.Org/Stable/29794022
- H. M. Rajasekhara, The Nature Of Indian Federalism: A Critique -Www.Jstor.Org/Stable/2645661
- Balveer Arora, India‟s Experience With Federalism: Lessons Learnt And Unlearnt, Www.Uni-Bielefeld.De/Midea/Pdf/Balveer.Pdfý

POLICE AND SECURITY ADMINISTRATION

Course Code: LAW4108 **Credit Units: 02**

Course Objective:

In every written constitution, provision is required to be made to equip the state to face grave threats to its existence arising from extra-ordinary circumstances created by war or external aggression or armed rebellion. Although "amidst the clash of arms, the laws are not silent" they do not speak the same language in war as in peace. Extra-ordinary circumstances warrant the invocation of extra-ordinary laws and such laws are known as emergency laws. They put greater fetters on individual liberty and also eclipse certain aspects of the due process. But in such circumstances, the democratic forces must assert that for survival of the State, the least possible liberty should be available. This course aims to familiarize the students with different aspects of such emergency powers and scrutinizing intellectual attitude towards such powers.

Course Contents:

Module-I: NATIONAL SECURITY, PUBLIC ORDERS AND RULE OF LAW

1. Emergency Detention in England - Civil Liberties.
2. Subjective satisfaction or objective assessment?
3. Pre-Independence law.

Module-II: EXCEPTIONAL LEGISLATIONS

1. COFEPOSA and other legislation to curb economic offenders.
2. TADA: "the draconian law"-comments of NHRC
3. Special courts and tribunals
4. Due process and special legislation

Module-III: MARTIAL LAW

1. Provisions in English Law
2. Provisions in the Indian Constitution

Module-IV: ACCESS TO COURTS AND EMERGENCY

1. Article 359: ups and downs of judicial review
2. Constitution (Forty-fourth), Amendment Act, 1978.
3. Constitution (Fifty-ninth) Amendment Act, 1988.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- G.O. Koppell "The Emergency, The Courts and Indian Democracy" 8 J.I.L.I. 287 (1966)
- H.M. Seervai, The Emergency, Future Safeguards and the habeas Corpus: A Criticism (1978)
- International Commission of Jurists, Status of Emergency and Human Rights (1984)
- N.C. Chatterji and Parameshwar Rao, Emergency and the Law (1966)

Syllabus - Second Semester

LAW & JUSTICE IN A GLOBALISING WORLD

Course Code: LAW4201 **Credit Units: 03**

Course Objective:
The title of the subject, as suggested in the UGC Guidelines dated 18 January 2013, does not seem to restrict its scope at the level of discussion of abstract concepts and theories. The part in the globalising world‟ is to be taken seriously and the idea of law and justice needs to be discussed in the specific context of globlisation. This essentially means creation of a better understanding of international law as well as an analysis of how and to what extent the existing and emerging legal framework at the international level ensures justice. This also includes study of institutional framework at the global level relevant in the context of global justice.

The issue of overlapping with some streams of specialisations such as human rights, and humanitarian law is not critical because these branches of law are not to be discussed in detail. Instead it will be discussed from a restricted angle – justice perspective. Moreover, the theories and concepts need to be linked with the contemporary reality and discussed in the light of these issues that will help the students to understand as well as analyse it effectively. In this background, the broad objectives of the subject are- Introduction and discussion of concepts and theories relating to law and justice in the specific context of the globalising world and examine whether international law promotes justice or perpetrates injustice. The students will also learn about the changes that may be advocated (if needed) to ensure a world order that ensures justice for all

Course Contents:

Module-I: Legal theories relevant in globalisation context

1. Globalisation – concept, history and development -various dimensions of globalisation (economic, cultural etc) – legal dimension of globalization.
2. Public International Law – nature, scope, contemporary relevance and challenges.
3. Globalisation - implications for law and justice:
   - Colonial/imperial era and global justice (imperial invasion/exploitation)
   - Post colonial situation – women‟s rights, self-determination, indigenous people‟s rights etc.
   - Globalisation of law – harmonization of law- emergence of global institutions (e.g. IPRs, protection of investors‟ rights, universal human rights).
   - Constitutionalism in international order.
   - Global environmental justice.
4. Law and justice at the global level – developing countries and Indian perspective [Case studies – strengthening IPR regime and investment law regime, exploitation of resources (including genetic resources) in the developing world; working of the UN Security Council].

Module-II: Global Justice Organisations and Movements

1. Global justice and international organisations
   - United Nations - humanitarian intervention, responsibility to protect, judicial review, Veto system, UN reforms.
2. International Financial Institutions (WTO, IMF, WB) – implications for global justice
   - Dominance of western countries.

- Western concepts being global concepts (e.g. IPR, Investment, human rights).
- Designing the domestic law and policies through International Law and loan conditionality.

3. Global movements – implications for law and justice
   - How global movements shape/influence/change international law to ensure justice?
   - Case studies – indigenous people's rights/women's rights/environmental justice/anti-privatisation movements (e.g. right to water movements)/human rights movements (access to medicine, farmers‟ rights etc.).
   - Indian perspective – anti-patent movements in India (e.g. Novartis case/gene campaign etc.)/ anti-FTA movements in India/Anti-IFI movements.

Module-III: Human Rights, Humanitarian Law and Criminal Justice

1. Emergence of International Human Rights Law
   - Deviation of traditional approach of International Law addressing only states.
   - International Bill of Rights and other HR treaties.
   - Universalism v. cultural relativism.
   - Humanitarian intervention and Responsibility to Protect – implications for law and justice
2. Humanitarian Law and International Criminal Law
   - History and development – overview of Hague and Geneva Conventions and the statute of the International Criminal Court.
   - Big country‟s impunity - Critique from realist point of view.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Springer: Encyclopedia of Global Justice 2012
- Brian Barry, Culture and Equality. Cambridge: Polity, 2001
- Duncan Bell (ed.) Ethics and World Politics. Oxford 2010.
- Allen Buchanan. Justice, Legitimacy, and Self-determination: Moral Foundations for International Law. Oxford 2004.
- Simon Caney, Justice Beyond Borders. Oxford:, 2005 Nicole Hassoun. 2008a. "World Poverty and Individual Freedom." American Philosophical Quarterly. Vol. 45, No. 2: 191-198.
- Andrew Hurrell. 2001. "Global Inequality and International Institutions." Global Justice. Thomas Pogge ed. Meta-philosophy Series in Philosophy A.T. Maroobian and BrianHuschle eds. Blackwell Publishing: Oxford.
- Martha Nussbaum, Frontiers of Justice. Cambridge, Mass.: Harvard University Press,2006.
- Thomas Pogge, World Poverty and Human Rights. Cambridge: Polity, 2002.
- John Rawls, The Law of Peoples. Cambridge, Mass.: Harvard University Press, 1999
- Amartya Sen, Development as Freedom. Oxford: 1999
- AmartyaSen:GlobalJusticehttp://www.lexisnexis.com/documents/pdf/20080806034945_large.pdf
- Amartya Sen The Idea of Justice 2009
- Amartya Sen: Development as Freedom 1999 Oxford
- Amartya Sen: Human and Public Action Oxford
- Journals of Oxford and Cambridge on global Justice
- Global Justice Net work: www.theglobaljusticenetwork.org/journal
- R PIERIK : Cosmopolitanism Global Justice and International Law Cambridge 2005
- American Journal of International Law and Proceedings of American Society of International Law
- THOMAS NAGEL, The Problem of Global Justicehttp://

as.nyu.edu/docs/IO/1172/globaljustice.pdf

- Anthony J. Langlois:Is global justice a mirage? European Journal of International Relations March2011 17: 145-157

DISSERTATION

Course Code: LAW4237 **Credit Units: 03**

Research Dissertations:

(a) Dissertations are in the nature of monographs based on students‟ own research work under their respective Guides.
(b) Length of Dissertations should be between 100-125 pages (typed in 12 points, double-spaced, on A-4 size paper, hard-bound).
(c) Title-page of the Dissertation should mention its title followed by the words "submitted to Amity Institute of Advanced Legal Studies in part fulfillment of requirements for LL.M (mention specialization here) Degree of Amity University Uttar Pradesh" and should bear the students name and year of submission.
(d) Contents-page of the Term Paper should give its chapter-plan consisting of proper headings and sub-headings. This will be followed by a Preface.
(e) Each chapter of the Dissertation should begin on a fresh page and references in the prescribed style (given below) for each chapter should be given at the end of that chapter.
(f) Table of Statutes, Table of Cases and Bibliography must be given in the Dissertation after the last chapter.

Assessment Scheme:

Dissertation

Continuous Evaluation: Based on the oral presentations [three], regularity and records etc. – 30%

Final Evaluation: Based on contents and layout of the report, conceptual framework, objectives and methodology and implications and conclusions. – 70%

Term Paper: Continuous Evaluation based on chapter-plan, general approach and two presentations – 30%

Final Evaluation: Based on the organization of the paper, objectives, comprehensiveness of the research, flow of the ideas, relevance of the material used. – 70%

Text & Références:

- Books: DW Bowett, *Law of International Institutions*, 4th ed, Delhi 2003, pp 11-13.
- Articles: GC Wadhwa, „Latest Trends in International Law‟, *Delhi Law Review* 2 (1992) p 223
- Reports: National Human Rights Commission, *Annual Report 1996-97*, p 212
- Codes & Acts: Hindu Marriage Act 1955, Sec. 14
- Cases: Sarla Mudgal v Union of India AIR 1995 SC 337

* To avoid repetition of references learn to use expressions like *ibid* and *id at.... &, supra and infra*, etc. Your Dissertation Guide will explain to you how to use these expressions.

CORPORATE & BUSINESS LAW (SPECIALISATION)

COMPETITION LAW

Course Code: LAW4202 **Credit Units: 02**

Course Objectives:

Competition Law course provides a conceptual understanding and in-depth knowledge of the Competition Act, 2002 and the regulatory framework concerning anti competitive agreements, abuse of dominant position and cartelization and other related matters that try to curb competition in India.

Course Contents:

Module-I: Introduction

1. Basic economic and legal principles.
2. Restraint of Trade Under Indian Contract Act.
3. Monopolistic Trade Practices, Restrictive Trade Practices.

Module-II: Development of Law from MRTP to Competition Act, 2002

1. Aims, Objective and salient features.
2. Comparison between MRTP Act & Competition Act.
3. Anti-Competitive Agreement, Abuse of Dominant Position, Combination.

Module-III: Competition Commission of India

1. Structure and function of Competition Commission of India.
2. Regulatory role.

Module-IV: Competition Appellate Tribunal

1. Composition, functions, powers & procedure.
2. Award Compensation, Power to punish for contempt, Execution of orders

Module-V: IPRs and Competition Law

1. Concept of IPRs, Transaction Involcing IPRs, Licensing IPRs, Protection offered by IPRs,
2. Territorial restraints

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References:

- Competition Act 2002
- Security Contract (Regulation) Act 1956
- SEBI Act 1992
- Depositories Act 1996
- Foreign Trade (Development & Regulation) Act 1992

INTERNATIONAL TRADE LAW

Course Code: LAW4203 **Credit Units: 02**

Course Objective:

This course aims to introduce the students to the specialized discipline of International Trade Law. It will acquaint the students with the basic aspects of International Trade Law including the WTO and its different principles and agreements.

Course Contents:

Module-I: INTRODUCTION TO INTERNATIONAL TRADE LAW

1. Meaning of International Trade Law.
2. Scope and subject covered under international Trade Law.

Module-II: Payment for International Sales

1. Letters of Credit, Bills of Exchange
2. Their functions and connected issues.

Module-III: World Trade organization (WTO) and General Agreement Tariffs and Trade (GATT) Background of formation of WTO, role of WTO in International Trade, Difference of GATT and WTO, Structure of WTO

1. Basic Principles: MFN Treatment, National Treatment and Non Discrimination and Exception to MFN.
2. Tariff and Bindings, Regional Trade Agreements, Escape clause, safeguard measures, quantitative restrictions, antidumping and counter- veiling duties.

Module-IV: International Trade Financing

1. Trade related investment measures (TRIMS).
2. General agreement on trade in services (GATS).
3. Trade related aspects on intellectual property rights (TRIPS).

Module-V: International Commercial Arbitration

1. Concept of Commercial Arbitration among different Countries.
2. Relation between India and World with regard to International Commercial Arbitration and its Legal effects.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & References

- Basic texts of GATT and WTO
- Jackson, John, H (1997) Law of International Trading System, The MIT Press
- Jackson, John, H (1997) World trade and Law of GATT, The MIT Press
- Dam, K.W (1970) the GATT Law and International Economic Organisation, Chicago University Press
- Koul, A.K (2001) World Trade Organisation Satayam Publication
- Internet Sources www.wto.org, www.uncitral.org
- Text of the Indian Arbitration and Conciliation Act, 1996

BANKING & INSURANCE LAW

Course Code: LAW4205 **Credit Units: 02**

Course Objective*:*

This course is designed with the objective of acquainting students with the conceptual and operational parameters of Banking law and Insurance Law, the judicial interpretation and the new and emerging dimensions of both Insurance as well as Banking sector. It also teaches the students the various aspects and rights that exist in the Banking and Insurance sector.

Course Contents:

Module-I: Banking System in India

1. Banking Regulation Laws: Reserve Bank of India Act, 1934, Banking Regulation Act, 1949.
2. Kinds of Banks and their functions; Relationship between banker and customer: Legal Character, Contract between banker & customer, Banks duty to customers.
3. The Banking Ombudsman Scheme, 1995 and the Liability under Consumer Protection Act, 1986.

Module-II: Lending, Securities and Recovery by Banks

1. Principles of Lending; Position of Weaker Sections.
2. Nature of Securities and Risks Involved.
3. Recovery of debts with and without intervention of courts / tribunal: Recovery of Debts due to Banks and Financial Institutions Act, 1993. Set up of Bank Debt Recovery Tribunals.

Module-III: Banking Frauds

1. Nature of Banking Frauds; Legal Regime to Control Banking Frauds;
2. Recent Trends in Banking: Automatic Teller Machine and Internet Banking, Smart Cards, Credit Cards.

Module-IV: Insurance Law

1. Nature of Insurance Contracts.
2. Kinds of Insurance:
   - Life Insurance, Medi claim, Property Insurance, Fire Insurance, Motor Vehicles Insurance (with special reference to third party insurance.
3. Insurance Regulatory And Development Authority Act, 2000;
   - Constitution, Functions and Powers of Insurance Regulatory and Development Authority;
4. Foreign Direct Investment (FDI) in Insurance sector and the Application of Consumer Protection Act, 1986.

Examination Scheme:

Components	**P/S/V**	**CT**	**C**	**A**	**EE**
Weightage (%)	10	10	5	5	70

Text & References:

- Banking Law & Negotiable Instruments Act – Sharma and Nainta
- Banking System, Frauds and Legal Control – R.P. Namita
- Law of Insurance – M.N. Mishra
- Handbook of Insurance and Allied Laws – C. Rangarajan
- Banking Law & Practice in India – M.L. Tannan.

CONSTITUTIONAL & ADMINISTRATIVE LAW (SPECIALIZATION)
ADMINISTRATIVE LAW

Course Code: LAW4206 **Credit Units: 02**

Course Objective:

This course introduces students to various aspects of Administrative Law by examining the interaction between Public Administration and the Law. The main objectives of this course are to enable the students to:

- Understand the basic nature of Public Administration, the Courts, and Administrative Law.
- Be able to distinguish between Rulemaking, Adjudication, and Judicial Review.
- Be familiar with how Legislative and Judicial values have been infused in the Administrative State.
- Understand the implications and importance of Administrative discretion.

Course Contents:

Module-I:

1. Evolution and significance of Administrative Law in various systems of governance-from ancient to modern.
2. Doctrine of Separation of Powers: Comparative survey-Common Law and Continental System: England, USA, France and India from Rigidity to Flexibility.
3. Rule of Law: Changing dimensions, Regulation of administrative process.

Module-II:

1. Delegated Legislation: Problems, Process and Control.
2. Judicial Review of Delegated Legislation.

Module-III:

1. Processual Fairness: Evolution and Significance of Natural Justice:
   a) England: Judicial Process, Doctrine of fairness and doctrine of legitimate expectation.
   b) U.S.: Due process and judicial decision.
   c) India : Through judicial decision-Doctrine of Fairness (Art.14, 19, 21).
2. Doctrine of Legitimate Expectation, Privilege against disclosure, official secrecy, Access to information and Right to Information Act.

Module-IV:

1. Global Administrative Law: Meaning, Scope and Relevance.
2. Global Administrative Law Challenges: Constitutional Issues/ Judicial Review.
3. Increased role of Global Institutions like UN, IMF, WB, WTO etc (Transperancy, Accountability & Democracy).

Module-V:

1. Control on Maladministration: Ombudsman, Commissions of Inquiry, Vigilance Commissions.
2. Investigative Agencies: The CBI, Inquiries by Legislative Committee, Legislative control, Judicial Inquiries.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & Reference Books

- Pater H. Schunk, Foundation of Administrative Law, 1994
- Friedman, The State and Rule of law in a mixed Economy.
- Ivor Jennings, Law & the Constitution
- Schwartz and Wade, Legal Control of Government
- De Smith, Judicial Review of Administrative Action, 1998
- D.D.Basu, Comparative Administrative Law, 1998
- K.S.Shukla and S.S.Singh, LokAyukta: A Socio-Legal Study, 1988
- Jain & Jain, Principles of Administrative Law

RELIGION DIVERSITY & LAW

Course Code: LAW4207 **Credit Units: 02**

Course Objective:
The course aims at imparting knowledge as well as an understanding about the multifarious nature of culture and religion in the Indian society in relation to the legal and Constitutional system of India. Basically, this course seeks to sensitize students about the existing nexus between law, religion and culture.

Course Contents:
Module-I: Introduction
1. Law: concept and significance.
2. Religion: role and significance.
3. Culture: forms and contribution.
4. Effect of culture and tradition on law: Law as an instrument of social change.

Module-II: Relationship between Law, Religion and Culture
1. Relationship between religion, culture and law.
2. Religion as a tool of unity and diversity.
3. Right to Freedom of Religion and legal reforms on secular lines; Status of languages in India: recognized and official languages; Status of marginalized communities in India; Constitutional guarantees to linguistic minorities.

Module-III: Law, Diversities and Contemporary Social Problems
1. Fundamentalism, Communalism and Terrorism.
2. Secularism, Formation of Linguistic states, Constitutional policies on language.
3. Marginalized communities and protective discrimination and affirmative action policies.
4. Role of the Constitution in preserving unity; Judicial trends.

Module-IV: Alternative Approaches
1. Jurisprudence of Sarvodaya and the role of Mahatma Gandhi.
2. Role of VinobhaBhave and Jayaprakash Narayan.
3. Socilaist thought on Law and Justice; Indian Marxist critiques on Law and Justice
4. Alternate social movements.
5. Alternative Dispute Resolution;LokAdalats and contemporary movements.

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & Reference Books:

- Galanter, Marc; Law and Society in Modern India; Oxford University Press
- Lingat, Robert; The Classical Law of India; Oxford University Press
- Baxi, Upendra; The Crisis of the Indian Legal System; Vikas Publishing House
- Basu, Durga Das; Introduction to the Constitution of India; LexisNexis
- Bhandari, M.K.; Basic Structure of Indian Constitution: A Critical Reconsideration; Deep and Deep Publication
- Robinson, Rowena; Sociology of Religion in India; Sage Publications
- Bhat, Ishwara; Law and Social Transformation; Eastern Book Company
- Tripathi; Law and Social Change: Indo-American Reflections; Indian Law Institute

MEDIA LAW

Course Code: LAW4208 **Credit Units: 02**

Course Objective:
This course discusses the principles of media law as they apply to the work of media and communications professionals in a variety of fields. Understanding the current and evolving state of media law is a challenging task, therefore this course will introduce students to the study of legal and ethical issues in the media. Students will develop an understanding and appreciation of these issues and the ability to analyze the important legal and ethical issues involved with the mass media industry.

Course Contents:

Module-I: Media & Public Policy

I. Disseminating the facets of Media

1. Understanding the concept of Media
2. History of Media Theories of Media
3. Evolution of Media

1. Media Legislation - British experience
2. Media Legislation in U.S.
3. Media Legislation in Indian Context

1. Freedom of Expression in Indian Constitution
2. Interpretation of Media freedom
3. Issues of Privacy
4. Right to Information
5. Case studies on Media and Free expression

Module-II: Media - Regulatory Framework

1. Legal Dimensions of Media
2. Self Regulation& Other Issues

Module-III: Convergence & New Media

1. Understanding Broadcast Sector
2. Legislative efforts on Broadcast sector
3. Opening of Airwaves
4. The New Media of Internet

Module-IV: Media – Advertisement & Law

1. Concept of Advertisement
2. Advertisement & Ethics
3. Advertisement Act of 1954

Examination Scheme:

Components	P/S/V	CT	C	A	EE
Weightage (%)	10	10	5	5	70

Text & Reference Books:

- N. Grover: Press and the Law.
- Basu: Laws of Press in India.
- K. S. Padhy: Battle for Freedom of Press in India.
- S. K. Aggarwal: Media and Ethics.
- M.P.Jai, Constitutional Law of India (1994) Wadhwa
- H.M.Seervai, Constitutional Law of India Vol.I (1991) Tripathi, Bombay
- Rajeev Dhavan "On the Law of the Press in India" 26 J.I.L.I. 288 (1984)
- Rajeev Dhavan, "Legitimating Government Rhetoric : Reflections on Some Aspects of the Second Press Commission" 26 J.I.L.I. 391 (1984)
- Soli Sorabjee, Law of Press Censorship in India (1976)
- Justice E.S. Venkatramaiah, Freedom of Press : Some Recent Trends (1984)
- D.D. Basu, The Law of Press of India (1980)

VIVA-VOCE EXAMINATION

The Viva-Voce Examination to be conducted for each student individually in 2nd Semester has two components of equal marks stated below:-

(i) **GENERAL LEGAL KNOWLEDGE**

(a) Foundational course common for all LLM programs-Study Paper-1: Research Methodology and Legal writing.

(b) Basic knowledge of the Constitution of India and all major civil, penal and procedural laws of the country.
(c) Latest legal issues of the day.

(ii) **AREAS OF SECIALIZATION**

(a) Study Papers of the students‟ respective areas of specialization – i. e., Constitutional Law or Business Law.

(b) Respective Research Dissertations.
(c) Leading Case Law in the area of specialization.
(d) Latest Legal Issues in the area of specialization.

Examination Scheme:

External Assessment by external expert:	70%
Internal Assessment by Internal Faculty:	30%
Total	**100%**

Text & References:

(a) Books

- Manish Arora, Legal GK – General Knowledge on Law (6th ed, 2008)
- Gopalan&Brindha, Viva General Knowledge (2008)
- Universal, Guide to LLB Entrance Test (19th ed, 2009)
- Universal, Practice Test Papers for Common Law Admission Test (2010)

(b) Legal News in leading English Dailies (Hindustan Times, Times of India, Indian Express, The Hindu)

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

ANATOMY AND PHYSIOLOGY-I

Course Code: MLT2107 **Credit Units: 03**

Course Objectives:

- To develop the knowledge of anatomical structures.
- To provide the basic understanding of human organ systems.
- To provide the concepts of interrelationship among different organ systems.

Course Contents:

Module-I

Anatomy: Definition, anatomical divisions, axis and planes, anatomical terms and structural organization of the human body.
Physiology: Definition and functions of different organ systems.
Cell: Structure and functions of mammalian cell and organelles.
Tissues: Structure, functions and classification.

Module-II

Skeletal System: Division, anatomy and function of skeleton; Histology of bone; Types of bones and joints; Bone marrow; Cartilage; Composition and function of synovial fluid.
Muscular system: Histology, classification and functions of muscles; mechanism of muscle contraction.

Module-III

Cardiovascular System: Structure and functions of heart and blood vessels, blood circulation, cardiac cycle, cardiac output, stroke volume and blood pressure; ECG.
Lymphatic System: Structure and functions of lymphoid organs; lymph vessels; compositions, function and circulation of lymph.

Module-IV

Digestive System: Structure and function of digestive organs, digestion and absorption of food, compositions and functions of various gastrointestinal secretions.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- B. D. Chaurasia, BD Chaurasia's Human Anatomy Regional and Applied Dissection and Clinical: Lower Limb Abdomen and Pelvis, Vol I, II and III, 7th Edition 2016, CBS Publishers & Distributors.
- K Simbulingam & P Simbulingam, Essential Medical Physiology, 6th Edition 2012, Jaypee Brothers Medical publishers (P) LTD.
- N Murgesh, Basic Anatomy and Physiology, 6th Edition 2011, Satya Publishers.
- Anne Waugh, Kathleen and J W Wilson, Ross and Wilson Anatomy and Physiology, 12th Edition 2014, Churchill Living Stone.
- H. G. Q. Rowett, Basic Anatomy and Physiology, 3rd Edition 1996, Murray Publishers Ltd.
- Gerard J. Tortora, Bryan H. Derrickson, Principle of anatomy and physiology, 14th Edition 2014, Wiley Publication.
- R S Winwood, Sears Anatomy & Physiology, 6th Edition, 1985, CRC Press.
- Elaine N. Marie, Essentials of Human Anatomy and Physiology, 11th Edition 2015, Pearsons

Benjamin Cummings.

HEMATOLOGY-I

Course Code: MLT2108 **Credit Units: 03**

Course Objectives:

- To impart the knowledge about the blood and blood formation in bone marrow.
- To provide the knowledge about handling of haematological apparatus.
- To impart the knowledge of routine haematology tests.
- To develop the understanding of advanced haematological techniques.

Course Contents:

Module-I

Hematology: Introduction and importance of hematology.
Blood: Definition, composition, functions of blood.
Blood cells: Shape, size, structure and functions of blood cells.
Haemopoiesis: Erythropoiesis, leucopoiesis and thrombopoiesis.

Module-II

Instruments and apparatus used in hematology laboratory: Neubauer chamber, pipettes, colorimeter, cell counter.
Hemoglobin: Formation, Degradation, types and functions.
Haemoglobinometry: Methods, principle, procedure, application and error analysis.
Anticoagulants and preservatives: Mode of action, composition, merits and demerits of EDTA, citrate, oxalate, heparin and sodium fluoride.
Blood collection: Capillary, venous and arterial method, order of blood draw, preservation of blood sample; Changes during blood storage.

Module-III

Blood cells count: Red blood cell, white blood cells, platelets, eosinophil and reticulocyte count.
ESR: Mechanism, methods, factors influencing and clinical significance.
PCV: Methods, principle, factors influencing and clinical significance.
Buffy coat: Preparation of buffy coat and its application.
Peripheral blood smear: Methods of preparation, importance and error analysis.
Staining: Methods, principle, composition and staining procedure and error analysis

Module-IV

Hemocytometer: Principle, procedure, application, precautions and clinical significance.
Red cell indices: Different parameters, calculations, color index and maturation index and clinical significance.
Automated cell counter: Principle, application and procedures.

Examination Scheme

Components	CA	A	ME	EE
Weightage(%)	15	5	10	70

Recommended books:

- Shrish M. Kawthalkar, Essential Hematology, 2nd Edition 2013, Jaypee Publication.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.

- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Harse Mohan, Text Book of Pathology 7th Edition 2015, Jaypee & Brothers Medical Publishers LTD.
- Richard A. McPherson, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22 Edition 2014 Elsevier.
- E M Keohane, L Smith, J Walenga, Rodak's Hematology: Clinical Principle and Application, 5th Edition 2015, Elseivier.
- John P. Greer ,Daniel A. Arber , Bertil E. Glader , Alan F. List , Robert T. Means, Frixos Paraskevas, George M. Rodgers , John Foerster, Wintrobe's Clinical Hematology 13th Edition 2013, Wolters Kluwer.
- Bernadette F. Rodak, George A. Fritsma, Kathryn Doig, Hematology: Clinical Principles and Applications, 4th Edition 2012. Saunders & Elseviers.

GENERAL MICROBIOLOGY

Course Code: MLT2109 **Credit Units: 03**

Course Objective:

- To provide the understanding of relationship between microorganisms and human health.
- To impart the knowledge about microbial pathogenicity, aseptic methods, cultivation and identification techniques in microbiology.

Course Contents:

Module-I

Microbiology: Introduction, importance and scopes, contribution of Antony Van Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch and Joseph Lister; golden era of microbiology; safety measures in microbiology.

Microorganisms: Classification and taxonomy; Classification and morphological characteristics of bacteria, viruses, fungi, protozoa and helminthes.

Module-II

Microscopy: Principle, parts, working, care and maintenance of compound, dark ground, fluorescent, phase contrast and electron microscope.

Normal micro flora: Importance of normal flora in human body

Microbial Pathogenicity: Virulence factors - antigenicity, toxicity, bacterial enzymes, **Infection:** Classification, sources, mode of transmission and portal of entry.

Module-III

Basic terminology: Antibacterial, bactericidal, bacteriostatic and germicide agents.

Sterilization: Definition and classification; Parts, working, care and handling of autoclave, hot air oven and laminar air flow; Sterilization indicators and calibration of equipments.

Disinfection: Definition, types, mode of action, properties and use of disinfectants and antiseptics, efficiency testing of disinfectants.

Module-IV

Culture media: Composition of culture media and broth, basal media, enriched media, enrichment media, selective media, differential media, transport media, anaerobic media.

Inoculation: Pouring, spreading, streaking, stroke, stab, slant and anaerobic culture methods; **C**olony characteristics**.**

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient Black Swan.
- Mark Gladwin , Trattler William , C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.

- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company Ltd.
- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, 10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.

GENERAL BIOCHEMISTRY-I

Course Code: MLT2103 **Credit Units: 03**

Course objectives:

- The course will impart the concept of structure and function of bio molecules.
- The subject emphasizes on knowledge about essential and non-essential bio molecules.

Course Contents:

Module-I:
Carbohydrates: Definitions, functions, classifications, structural aspects, biological importance, isomers, optical activity, epimers, enantiomers, anomers, mutarotation, reactions of monosaccharide, derivatives of monosaccharide, structures of disaccharides, homopolysaccharides and heteropolysaccarides and clinical aspects of carbohydrates.

Module-II:
Lipids: Definitions, functions, classification, fatty acids, essential fatty acids, triglycerides, phospholipids, glycolipids, lipoprotein, steroids and clinical aspects of lipids.

Module-III:
Proteins: Definitions, general functions, classifications and properties of amino acids, structure and properties of proteins, denaturation, classification of protein, plasma proteins and clinical aspects of protein.

Module-IV:
Nucleic acids: Introduction, structure of purine, pyrimidine, sugars, nucleoside and nucleotides, polynucleotide, Chargaff rule of DNA composition, DNA double helix, structure and types of RNA and clinical aspects of nucleic acid.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee & Brothers Medical Publishers (P) Ltd.
- D M Vasudevan, Sreekumari S, Kannan Vidhyanathan,Textbook of Biochemistry for Medical students, 8th Edition 2016, Jaypee & Brothers Medical Publishers (P) Ltd.
- S Ramakrishana, Test Book of Medical Biochemistry, 3rd Illustrated Edition 2004, Orient Longman
- S Chitiprol, Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee & Brothers Medical Publishers.
- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) Ltd.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) Ltd.

- David T Punmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Shivaraja Shankara YM, Shankara, Ganesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) Ltd.
- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis,7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt, Fundamentals Of Biochemistry: Life At The Molecular Level, 5th Edition 2016, John Wiley and Sons.

ANATOMY AND PHYSIOLOGY LAB-I

Course Code: MLT2110 **Credit Units: 01**

Course objectives:

- To provide the basic understanding of human organ systems.
- To impart the basic knowledge about the microscopic structure of different tissues and muscles.

List of experiments:

- Demonstration of human anatomy with the help of chart.
- Demonstration of different tissues with the help of permanent mounted slides.
- Demonstration of human digestive system with the help of model or chart.
- Demonstration of structural differences between skeletal, smooth and cardiac muscles using permanent mounts.
- Demonstration of various parts of circulatory system using models or chart.
- Demonstration of human bones and joints.
- Estimation of blood pressure with the help of BP apparatus
- Demonstration of pulse rate.
- Demonstration of heart rate.
- Demonstration of body temperature.

Examination Scheme

Components	**Internal Assessment**	**Attendance**	**Record**	**EE**
Weightage (%)	20	5	5	70

Recommended books:

- B. D. Chaurasia, BD Chaurasia's Human Anatomy Regional and Applied Dissection and Clinical: Lower Limb Abdomen and Pelvis, Vol I, II and III, 7th Edition 2016, CBS Publishers & Distributors.
- K Simbulingam & P Simbulingam, Essential Medical Physiology, 6th Edition 2012, Jaypee Brothers Medical publishers (P) Ltd.
- N Murgesh, Basic Anatomy and Physiology, 6th Edition 2011, Satya Publishers.
- Anne Waugh, Kathleen and J W Wilson, Ross and Wilson Anatomy and Physiology, 12th Edition 2014, Churchill Living Stone.
- H. G. Q. Rowett, Basic Anatomy and Physiology, 3rd Edition 1996, Murray Publishers Ltd.
- Gerard J. Tortora, Bryan H. Derrickson, Principle of anatomy and physiology, 14th Edition 2014, Wiley Publication.
- R S Winwood, Sears Anatomy & Physiology, 6th Edition, 1985, CRC Press.
- Elaine N. Marie, Essentials of Human Anatomy and Physiology, 11th Edition 2015, Pearsons Benjamin Cummings.

HEMATOLOGY LAB-I

Course Code: MLT2111 **Credit Units: 01**

Course objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical hematology laboratory.

List of experiments:

1. Preparation of anticoagulants vials.
2. Collection of Blood by various methods.
3. Estimation of hemoglobin.
4. To perform RBC count.
5. To perform WBC count.
6. To perform Platelets count.
7. To perform ESR and PCV.
8. Preparation of Romanosky stain.
9. Preparation and staining of peripheral blood smear.
10. Examination of blood cells morphology.

Examination Scheme

Components	**Internal Assessment**	**Attendance**	**Record**	**EE**
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Sood, Textbook of Medical Laboratory Technology, 1st Edition 2006, Jaypee Brothers Publishers, 2006.

CLINICAL TRAINING-I

Course Code: MLT2112 **Credit Units: 2**

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.
Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Hematology Lab
2. Microbiology Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

Syllabus - Second Semester

ANATOMY AND PHYSIOLOGY-II

Course Code: MLT2207 **Credit Units: 03**

Course Objectives:

- To develop the knowledge of anatomical structures.
- To provide the basic understanding of human organ systems.
- To provide the concepts of interrelationship among different organ systems.

Course Contents:

Module-I

Urinary System: Structure and functions of organs involved in urinary system, structure and functions of nephron, measurement and regulation of GFR, mechanism and composition of urine formation, physiology of excretion of urine.

Endocrine system: Histology and functions of different endocrine glands, hormones and their functions.

Module-II

Nervous system: Central Nervous System – structure and functions of brain and spinal cord; Peripheral Nervous System – structure and functions of cranial nerves and spinal nerves; Autonomic Nervous System – structure and functions of sympathetic system and parasympathetic system; Neurohumoral and neuro-muscle transmission, reflex action, electroencephalogram and nerve impulse; Secretion, composition and functions of CSF.

Special senses organs: Structure and functions of eyeball, ear, nose, tongue and skin, mechanism of vision, hearing, smell, taste, and sensation.

Module-III

Male reproductive system: Structure and functions of male reproductive organs, spermatogenesis.

Female reproductive system: Structure and functions of female reproductive organs, ovarian cycle, menstruation, fertilization and pregnancy.

Module-IV

Respiratory System: Structure and functions of different organs involved in respiratory system, gas exchange in the lungs, regulation of respiration, mechanism of respiration, respiratory muscles, composition and functions of pleural fluid; Various terms involved in respiratory System (Vital capacity, Total volume, Reserve volume, Total lung capacity).

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- B. D. Chaurasia, BD Chaurasia's Human Anatomy Regional and Applied Dissection and Clinical: Lower Limb Abdomen and Pelvis, Vol I, II and III, 7th Edition 2016, CBS Publishers & Distributors.
- K Simbulingam & P Simbulingam, Essential Medical Physiology, 6th Edition 2012, Jaypee Brothers Medical publishers (P) LTD.

- N Murgesh, Basic Anatomy and Physiology, 6th Edition 2011, Satya Publishers.
- Anne Waugh, Kathleen and J W Wilson, Ross and Wilson Anatomy and Physiology, 12thEdition 2014, Churchill Living Stone.
- H. G. Q. Rowett, Basic Anatomy and Physiology, 3rd Edition 1996, Murray Publishers Ltd.
- Gerard J. Tortora, Bryan H. Derrickson, Principle of anatomy and physiology, 14th Edition 2014, Wiley Publication.
- R S Winwood, Sears Anatomy & Physiology, 6th Edition, 1985, CRC Press.
- Elaine N. Marie, Essentials of Human Anatomy and Physiology, 11th Edition 2015, Pearsons Benjamin Cummings.

HEMATOLOGY-II

Course Code: MLT2208 **Credit Units: 03**

Course Objectives:

- To impart the knowledge about disorders of blood cells.
- To familiarize students about pathogenesis and laboratory diagnosis of various anemia.

Course Contents:

Module-I

Blood cell disorders: Morphological disorders of Blood cells; Physiological variation of erythrocytes, leucocytes and thrombocytes.

Bone Marrow: Introduction, collection, processing, indications and significance.

Module-II

Anemia: Introduction, causes, sign and symptoms, classification and laboratory diagnosis of anemia; Pathogenesis and laboratory diagnosis of iron deficiency anemia, pernicious anemia, megaloblastic anemia, aplastic anemia, sideroblastic anemia; anemia due to chronic renal failure and liver disease.

Module-III

Hemolytic Anemia: Pathogenesis and laboratory diagnosis of hereditary spherocytosis, hereditary elliptocytosis, thalassemia and sickle cell anaemia; other types of anemia- Glucose -6-phosphate dehydrogenase deficiency, pyruvate kinase deficiency, paroxysmal nocturnal haemoglobinuria, warm antibody type, cold antibody type, incompatible blood transfusion, hemolytic disease of new born.

Module-IV

Leukemia: Introduction, causes, sign & symptoms, classification and laboratory diagnosis; myeloid and lymphoid leukemia.

Examination Scheme

Components	CA	A	ME	EE
Weightage(%)	15	5	10	70

Recommended books:

- Shrish M. Kawthalkar, Essential Hematology, 2nd Edition 2013, Jaypee Publication.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Gidkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Harse Mohan, Text Book of Pathology 7th Edition 2015, Jaypee & Brothers Medical Publishers LTD.
- Richard A. McPherson, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22 Edition 2014 Elsevier.
- E M Keohane, L Smith, J Walenga, Rodak's Hematology: Clinical Principle and Application, 5th Edition 2015, Elseivier.
- John P. Greer ,Daniel A. Arber , Bertil E. Glader , Alan F. List , Robert T. Means, Frixos Paraskevas, George M. Rodgers , John Foerster, Wintrobe's Clinical Hematology 13th Edition 2013, Wolters Kluwer.
- Bernadette F. Rodak, George A. Fritsma, Kathryn Doig, Hematology: Clinical Principles and Applications, 4th Edition 2012. Saunders& Elseviers.

CLINICAL BACTERIOLOGY

Course Code: MLT2209 **Credit Units: 03**

Course Objective:

- To impart the knowledge of morphology, culture characteristics, pathogenicity, lab diagnosis and prophylaxis of major bacterial pathogens.
- To provide the understanding of special laboratory techniques.

Course Contents:

Module-I

Bacteriology: Introduction, bacterial reproduction, bacterial growth curve and factors effecting bacterial growth; Bacterial genetics- plasmid, mutation, transformation, transduction and conjugation.

Module-II

Gram negative bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Neisseria gonorrhoeae, Neisseria meningitides, Escherichia coli, Shigella, Klebsiella, Proteus, Yersinia, Salmonella, Vibrio, Aeromonas, Pseudomonas, Campylobacter, Bacteroides, Fusobacterium, Brucella, Haemophilus, Bordetella and Helicobacter pylori.

Module-III

Gram positive bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Staphylococci, Streptococci, Pneumococcus, Enterococcus, Bacillus, Corynebacterium, Clostridia, Mycobacterium, Actinomycetes and Listeria.

Miscellaneous bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Spirochetes, Rickettsiae, Chlamydia and Mycoplasma.

Module-IV

Staining: Gram stain, AFB stain, Albert's stain and special stains for spore, capsule and flagella.

Biochemical test: Catalase, coagulase, oxidase, indole, MR, VP, citrate, urease and triple sugar iron agar.

Special laboratory techniques: Antimicrobial susceptibility testing; Bacteriological examination of water, milk and air.

Examination Scheme

Components	CA	A	ME	EE
Weightage(%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Mark Gladwin , Trattler William , C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.

- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016,Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology,10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1st Edition 2008, Mc Grew Hill Medical.

GENERAL BIOCHEMISTRY-II

Course Code: MLT2210 **Credit Units : 03**

Course Objectives:

- To enable the students to know the functions of various bio molecules in the human body.
- To emphasize on deficiency of different vitamins and their recommended dietary allowance.
- To enhance the clinical importance of enzymes, vitamins, hormones and minerals.

Course Contents:

Module-I

Enzymes: Introduction, classification, chemical nature of enzymes, properties of enzymes, factors affecting enzyme activity, enzyme inhibitors, enzymes of diagnostic importance

Module-II

Vitamins: Introduction, classification of vitamins (fat soluble and water soluble), sources, recommended dietary allowance, deficiencies condition.

Module-III

Hormones: Introduction, classifications, mechanism of action, secondary messengers, role of various hormones, clinically important hormones.

Module-IV

Minerals: Introductions, general functions, classification, major characteristics of principal and trace elements, clinically important minerals.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee & Brothers Medical Publishers (P) LTD.
- D M Vasudevan, Sreekumari S, Kannan Vidhyanathan,Textbook of Biochemistry for Medical students, 8thEdition 2016, Jaypee & Brothers Medical Publishers (P) Ltd.
- S Ramakrishana, Test Book of Medical Biochemistry, 3rd Illustrated Edition 2004, Orient Longman.
- S Chitiprol, Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee & Brothers Medical Publishers.
- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) LTD.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) LTD.
- David T Punmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Shivaraja Shankara YM, Shankara, Ganesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) LTD.

- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis,7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt, Fundamentals Of Biochemistry: Life At The Molecular Level, 5th Edition 2016, John Wiley and Sons.

HAEMATOLOGY LAB-II

Course Code: MLT2211 **Credit Units: 01**

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical hematology laboratory.

List of experiments:

1. Demonstration of abnormal blood cells.
2. Demonstration of microcytic and hypochromic anemia.
3. Demonstration of macrocytic and normochromic anemia.
4. Demonstration of hemolytic anemia.
5. Demonstration of hemorrhagic anemia.
6. Demonstration myeloid leukemia.
7. Demonstration of lymphoid leukemia.
8. To perform osmotic fragility test.
9. To perform sickling test.
10. Demonstration of normal and abnormal bone marrow cells in permanent slides.

Examination Scheme

Components	**Internal Assessment**	**Attendance**	**Record**	**EE**
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Sood, Textbook of Medical Laboratory Technology,1st Edition 2006, Jaypee Brothers Publishers, 2006.

CLINICAL TRAINING-II

Course Code: MLT2212 **Credit Units: 2**

Course objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Bacteriology Lab
2. Hematology Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

NUTRITION

Course Code: MLT2205 **Credit Units: 03**

Course Objective: At the end of the course student would have gained the knowledge of the following: Balanced diet, protein, carbohydrates, vitamins, minerals, carotenoids and eye nutrition, Ocular aging and adverse effects of ocular nutritional supplements.

Course Contents:

Module I:

Introduction to Nutrition and Food Science, Food Groups and Food Pyramid; Balanced diet for different age groups and recommended dietary Allowances

Module II:

Assessment of Nutritional Status; Energy – Units, Metabolisms, Energy expenditure, and Energy imbalance; Digestion, absorption and transport of Food

Module III:

Proteins and eye; Lipids and eye; Carbohydrates and eye; Vitamins and eye; Minerals and trace elements and eye; Carotenoids and eye; Oxidative stress and the eye

Module IV:

Vitamin A, C and E deficiency; Nutrition and ocular aging; Contraindications, Adverse reactions and ocular nutritional supplements

Examination Scheme:

Components	**A**	**HA**	**CT**	**P**	**EE**
Weightage (%)	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Recommended books:

- M Swaminathan, Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co. Ltd, Bangalore, 2004.
- C Gopalan, BV Rama Sastri, SC Balasubramanian, Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad,2004.
- Frank Eperjesi & Stephen Beatty, Nutrition and The Eye, A Practical Approach, Elsevier Butterworth – Heinemann, USA, 2006.

MEDICAL TERMINOLOGY

Course Code: MLT2206 **Credit Units: 03**

Course Objectives: To use medical terms and abbreviations correctly related to medicine and health.

Course Contents:

Module-I

Introduction to Medical terminology: Origin of terms; Body structure & organization; Anatomical planes; Diseases & disorder terms; Diagnostic tests & equipments; Surgical procedural terms; Area of study & specialists; Signs, symptoms & related terms; Medical abbreviations.

Module-II

Medical Records & their utility: Definition and characteristics of 'Good' medical record; Required characteristics of entries in medical records and responsibility for medical record quality; Medical record forms and their content; Incomplete record control; Utility & functions of medical records in health care delivery system; Organizations & management of medical records department; Role of medical technologists in medical record keeping; Reports & returns in medical record system.

Module-III

Medico-Legal Aspects of Medical Records: Basic knowledge of legal aspects of Medical Records including Factories Act - Workmen compensation act, consumer protection act; Procedures of medical auditing & its importance in brief.

Examination Scheme:

Components	CD	CT1	SA	A	EE
Weightage (%)	5	10	10	5	70

Recommended books:

- Quick Medical Termonology: A self teaching guide.Shirley Soltesz Steiner, Natalie Pate Capps 5th Edition.
- Medical Terminology: A Living Language (5th Edition)," by Bonnie F. Fremgen and Suzanne S. Frucht.
- Basic Medical Terminology Concepts (2nd Edition) by Marilyn White Wilson.

Syllabus – Third Semester

IMMUNOLOGY & SEROLOGY

Course Code: MLT2307 **Credit Units: 03**

Course Objectives:

- To impart the basic knowledge of human immune system.
- To familiarize with various methods of antigen-antibody reactions.

Course Contents:

Module-I:

Immunity: Definition, types - Innate, acquired, local and herd immunity, opsonization and phagocytosis, relationship between innate and acquired immunity, vaccine and immunization.

Antigen: Antigen properties, structure and types; Adjuvant.

Antibody: Immunoglobulin – structure, classes, properties and function; Monoclonal and polyclonal antibody.

Module-II:

Immune Response: Humoral and cellular immune response; Major histocompatibility complex.

Cell and Organs of Immune System: Primary lymphoid organ, secondary lymphoid organ, T-lymphocytes, B-lymphocytes, cytokines.

Complement system: General properties and pathways.

Module-III:

Hypersensitivity: Definition and classification- Type-I, Type-II, Type-III and Type-IV.

Immunodeficiency Disorders: Definition and classification, humoral immunodeficiency, cellular immunodeficiency, disorders of phagocytosis and complement system.

Module-IV:

Antigen Antibody Reaction: General properties and types of antigen antibody reaction, precipitation reaction, agglutination reaction, complement fixation test, neutralization test, radio immuno assay, enzyme-linked immune-sorbent assay and immunofluorescence assay.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Dale Male, Jonathan Brostoff, David B Roth and Ivan Roitt Kuby Immunology, 7th Edition 2012, Mosby (Elsevier).
- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9thEdition 2013, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016,CBS Publishers & Distributors.
- B S Nagoba and D V Bedpathsk, Immunology, 1st Edition 2008, BI Publications.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.

- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Peter Lydyard, Alex Whelan, Michael Fanger, Instant Notes in Immunology 3rd Edition 2011, BIOS Scientific Publisher.
- William E. Paul, Fundamental Immunology 7th Edition 2013, Woulters Kluwar / Lippincott Williams & Wilkins.
- T Doan, R Mervold, S Visseli, C Waltenbough, Immunology 2nd Edition 2013, Woulters Kluwar / Lippincott Williams & Wilkins.

HAEMATOLOGY-III

Course Code: MLT2308 **Credit Units: 03**

Course Objectives:

- To familiarize students about mechanism of haemostasis and related disorders.
- To impart the knowledge of investigation required in coagulation study.
- To impart the understanding of pathogenesis, lab diagnosis and prevention of multiple myeloma and lymphoma.

Course Contents:

Module-I

Hemostasis: Introduction and mechanism of hemostasis, role of platelets in hemostasis, clotting factors and coagulation cascade- intrinsic, extrinsic and common pathway; Fibrinolytic system.

Module-II

Hemostatic disorders: Hemophilia, von Willebrand's syndrome, disseminated intravascular coagulation and other coagulation factor deficiencies, vitamin K deficiency, anticoagulant therapy, liver diseases, platelets disorders.

Module-III

Laboratory diagnosis: Principle, procedure, reference values and significance of – Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Prothrombin Time, Thrombin Time, Hess Test, Clot Retraction Time, Fibrinogen Degradation Product and assays for coagulation factors.
Coagulometer: Principle, working and applications.

Module-IV

Lymphoma and Multiple Myeloma: Introduction, Classification and pathogenesis, laboratory diagnosis, prevention and control.
LE cell: LE cell phenomena, various methods for diagnosis and clinical significance.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Shrish M. Kawthalkar, Essential Hematology, 2nd Edition 2013, Jaypee Publication.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Harse Mohan, Text Book of Pathology 7th Edition 2015, Jaypee & Brothers Medical Publishers LTD.
- Richard A. McPherson, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22 Edition 2014 Elsevier.
- E M Keohane, L Smith, J Walenga, Rodak's Hematology: Clinical Principle and Application, 5th Edition 2015, Elseivier.
- John P. Greer ,Daniel A. Arber , Bertil E. Glader , Alan F. List , Robert T. Means, Frixos Paraskevas, George M. Rodgers , John Foerster, Wintrobe's Clinical Hematology 13th Edition 2013, Wolters Kluwer.

- Bernadette F. Rodak, George A. Fritsma, Kathryn Doig, Hematology: Clinical Principles and Applications, 4th Edition 2012. Saunders & Elseviers.

CLINICAL PARASITOLOGY

Course Code: MLT2309 **Credit Units: 03**

Course Objectives:

- To impart knowledge about detrimental effects of parasites on human health.
- To develop understanding of life cycle, transmission, pathogenicity, and control strategies of clinically important parasites.
- To familiarize with techniques of sample collection and processing to diagnose parasitic infection.

Course Contents:

Module-I

Introduction of Parasitology: Introduction to clinical parasitology, general characteristics, morphology and classification of parasites, classification of hosts and vectors, relationship between parasites and host, mode of transmission of parasitic infections.

Module-II

Protozoology: Morphology, life cycle, pathogenicity, prevention and lab diagnosis of Entamoeba, Dientamoeba, Iodamoeba, Trichomonas, Trypnosomes, Leishmania, Giardia, Plasmodium, Isopaora, Balantidium and Toxoplasma.

Module-III

Helminthology: Morphology, life cycle, pathogenicity, prevention and lab diagnosis of-

i) Platyhelminthes: Diphyllobothrium, Taenia, Echinococcus, Hymenolepis, Schistosoma, Fasciola, Fasciolopsis, Clonorchis, Peragonimus.

ii) Nemathelminthes: Ascaris, Ancylostoma, Necator, Strongloides, Trichinella Enterobius, Trichurias, Wucherei, Brugia, Loa loa, Onchocerca, Dracunculus.

Module-IV

Diagnostic Methods: Collection, transportation, processing of different clinical specimens for parasitological examination, concentration techniques, rapid diagnostic techniques and permanent smears preparation techniques.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Arora & Arora, Text book of Medical parasitology, 4th Edition 2015, CBS Publishers.
- Saugata Ghosh, Paniker's text book of medical parasitology, 7th Edition 2013, Jaypee Brothers Medical Publishers.
- KD Chatterjee, Protozoology and Helminthology, 13th Edition 2009, CBS Publishers & Distributors pvt.
- Subhash Chandra Parija, Textbook of Medical Parasitology: Protozoology & Helminthology, 4th Edition 2013, All India Publishers & Distributors.
- T V Rajan, Textbook of Medical Parasitology, 1st Edition 2008, B I Publications.
- World Health Organization, Basic laboratory methods in medical parasitology, World Health Organization 1991. WHO Geneva.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Lynne S. Garcia, Diagnostic Medical Parasitology, 6th Edition 2016, ASM Press.

- David T. John, William A. Petri Jr., Markell and Voge's Medical Parasitology, 9th Edition 2006, Sunders Elseviers.

METABOLIC BIOCHEMISTRY

Course Code: MLT2310 **Credit Units: 03**

Course Objectives :

- The course will impart the concept of major metabolic processes.
- The subject emphasizes on importance and clinical aspects of metabolic pathways.

Course Contents:

Module-I

Carbohydrates metabolism: Glycolysis, Krebs cycle, gluconeogenesis, glycogenesis, glycogenolysis, HMP Shunt, bioenergetics regulations and clinical aspects.

Module-II

Lipids metabolism: Lipolysis, oxidation of fatty acid, biosynthesis of fatty acids, ketogenesis, ketogenolysis, cholesterol biosynthesis and clinical aspects.

Module-III

Amino acid metabolism: Transamination, deamination, metabolism of ammonia, urea cycle, regulation, relation with TCA cycle and clinical aspects.

Module-IV

Nucleic acids metabolism: Denovo and salvage pathway, purine and pyrimidine nucleotide breakdown and biosynthesis and clinical aspects.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee & Brothers Medical Publishers (P) LTD.
- D M Vasudevan, Sreekumari S, Kannan Vaidyanathan, Textbook of Biochemistry for Medical Students, 8th Edition 2016, Jaypee & Brothers Medical Publishers (P) LTD.
- S Ramakrishana, Test Book of Medical Biochemistry, 3rd Illustrated Edition 2004, Orient Longman.
- S Chitiprol, Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee & Brothers Medical Publishers.
- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) LTD.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) LTD.
- David T Punmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Shivaraja Shankara YM, Shankara, Ganesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) LTD.

- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis,7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger, Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt, Fundamentals Of Biochemistry: Life At The Molecular Level, 5th Edition 2016, John Wiley and Sons.

HAEMATOLOGY LAB-III

Course Code: MLT2311 **Credit Units: 01**

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical hematology laboratory.

List of Experiments:

1. To perform bleeding time.
2. To perform clotting time.
3. To perform prothrombin time.
4. To perform activated partial prothrombin time.
5. To perform thrombin time.
6. To perform Hess's test.
7. To perform clot retraction time.
8. To study LE cell phenomena.
9. To perform osmotic fragility test.
10. To perform reticulocyte counts.

Examination Scheme:

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Bain, Decie & Lewis Practical Hematology, 11th Edition 2016, Churchill Livingstone.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Sood, Textbook of Medical Laboratory Technology, 1st Edition 2006, Jaypee Brothers Publishers, 2006.

CLINICAL BIOCHEMISTRY LAB

Course Code: MLT2312 **Credit Units: 01**

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical biochemistry laboratory.

List of Experiments:

1. To perform blood glucose.
2. To perform blood urea.
3. To perform total bilirubin.
4. To perform total plasma protein.
5. To perform serum creatinine.
6. Estimation of serum calcium ion.
7. Estimation of serum uric acid.
8. To perform blood urea nitrogen.
9. Estimation of serum phosphate.
10. Estimation of serum phosphorus.

Examination Scheme:

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) Ltd.
- Shivaraja Shankara YM, ,araknahSL ,KM hsenaGaboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) Ltd.
- David T Punmmer, An Introduction to Practical Biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Sood,Textbook of Medical Laboratory Technology,1st Edition 2006,Jaypee Brothers Publishers, 2006.

CLINICAL TRAINING-III

Course Code: MLT2313 **Credit Units: 2**

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Serology Lab
2. Parasitology Lab
3. Biochemistry Lab
4. Hematology Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

HOSPITAL ADMINISTRATION

Course Code: MLT2305 **Credit Units: 03**

Course Objective: To develop understanding about the norms and standards for accreditation of the healthcare organization and adopt continuous evaluation to improve the quality of health care settings.

Course Contents:

Module-I

Hospital Organization: History & development of hospitals, types & sizes of hospitals, role & functions of hospital administrator and hospital information system.

Module-II

Financial Aspects: Cost & its classification; Theory of supply & demand; Break even analysis.

Module-III

Hospital Material Management: Types of stores in hospitals; Material cycle; Location & Layout of store premises.

Module-IV

Legal Aspects: Statutory obligations; Medical negligence; Prevention against litigation.

Module-V

Clinical services: OPD, IPD, OT, ICU and emergency services.
Support services: Laboratory, Radiology, Blood bank and CSSD.
Utility services: MRD, engineering and pharmacy etc.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Recommended Books:

- Yashpal Sharma, R. K. Sharma and L A Gomas. Hospital administration principles and practice, 1st edition 2013, Jaypee brothers publication.

LAB MANAGEMENT & SAFETY PROCESS

Course Code: MLT2306 **Credit Units: 03**

Course Objective: The students will aware about the ethics of a clinical laboratory and learn about good laboratory practice, safety measures and quality management in a clinical laboratory.

Course Contents:

Module-I

Quality control: Introduction to quality control, total quality management framework, quality laboratory processes, quality assurance, quality assessment, quality control, quality planning and quality improvement, costs of conformance and non conformance, appraisal costs, prevention costs, internal quality control, basic steps, sources of error and their correction methods, CAPA - corrective action & preventive action and sources of variation in laboratory results.

Module-II

External quality control: Quality control charts, Levy- Jennings and Cusum charts, external quality control, quality control programme, intrinsic and extrinsic and random errors, current trends in laboratory accreditation, ISO certificate, West guard rules and demonstration of various methods of quality control.

Module-III

Laboratory ethics: Ethical Principles and standards for a clinical laboratory professional – Duty to the patient, colleagues, other professionals and the society.

Laboratory accreditation: Good Laboratory Practice (GLP) Regulations and Accreditation – Introduction, aims and advantages of GLP and accreditation.

Module-IV

Laboratory safety measures: Awareness / Safety in a clinical laboratory, general safety precautions; HIV – pre and post-exposure guidelines; Hepatitis B & C – pre and Post-exposure guidelines; Drug resistant tuberculosis; Patient management for clinical samples collection, transportation and preservation of sample; Sample, purpose and methods of accountability.

Examination Scheme

Components	**P**	**A**	**ME**	**EE**
Weightage (%)	15	5	10	70

Recommended books:

- Textbook of Medical Lab Technology ,Sood, Jaypee Brothers Publications
- Fundamentals of urine and body fluid analysis (3rd ed.) - Brunzel, N. A

Syllabus - Fourth Semester

CLINICAL PATHOLOGY & CYTOLOGY

Course Code: MLT2405 **Credit Units: 03**

Course Objectives:

- To develop the knowledge about physical, chemical and microscopic examination of various clinical sample.
- To provide the understanding of collection, processing and clinical aspects of various body fluids.
- To develop the knowledge about various stains used in cytology.

Course Contents:

Module-I
Urine Analysis: Introduction, collection, handling, transportation, preservation and storage of urine; Physical, chemical and microscopic examinations with clinical significance; other specific tests and 24 hrs urine analysis.

Module-II
Stool analysis: Introduction, collection, preservation, transportation and clinical aspects of stool sample; Physical, chemical and microscopic examination with clinical significance.
Semen analysis: Introduction, composition and clinical aspects of semen, collection, preservation and transportation of semen sample; Physical, chemical and microscopic examinations with clinical significance.

Module-III
CSF analysis: Introduction, collection, transportation, processing and clinical indications of CSF analysis.
Synovial fluid analysis: Introduction, collection, transportation, processing and clinical indications of synovial fluid analysis.
Serous fluids analysis: Introduction, collection, transportation, processing and clinical indications of pleural, pericardial and peritoneal fluids analysis.

Module-IV
Cytology: Introduction to cytology and exfoliative cytology and clinical importance; Collection, preservation, transportation and processing of cytological specimens (Sputum, Bronchial brush, Esophageal and gastric brush, oral scraping, Breast aspiration and Nipple discharge, Cervical and veginal specimens).
Cytological stains: Introduction, composition and preparation of cytological stains; Staining procedure - Giemsa stain, Papanicolaou stain, PAS stain, Haematoxylin and eosin stain, Masson's trichrome stain and Ziehl-Neelsen stain.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- Medical Laboratory Science: Theory and practice by J. Ochei, Arundhati kolhatkar, 1st Ediotion 2000, Mcgraw Hill Education.
- P K Godkar, Text book of Medical Laboratory technology, 3rd Edition 2014, Bhalani Publication.
- Sabitri Sanyal & Arpana Bhattacharya, Clinical Pathology: A Practical Manual, 4th Edition 2008, Elsevier.
- Susan King Strasinger, Marjorie Schaub Di Lorenzo, Urinalysis and Body Fluids, 6th Edition 2014, F A Davids Company.
- Karen Munson Ringsrud, Jean Jorgenson Linné, Urinalysis and Body Fluids: A Colortext and Atlas, 1st Edition 1995, Mosby.
- Richard A. McPherson, John Bernard Henry , Matthew R. Pincus, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22nd Edition 2014, Elsevier/Saunders.
- Lillian A. Mundt, Kristy Shanahan, Graff's Textbook of Routine Urinalysis and Body Fluids, 2nd Edition 2016, Philadelphia : Wolters Kluwer/Lippincott Williams & Wilkins Health.
- Leopold G. Koss, Myron R. Melamed, Koss' Diagnostic Cytology and Its Histopathologic Bases, Volume 1, 5th Edition 2006, Lippincott Williams & Wilkins.
- Edmund S. Cibas, Barbara S. Ducatman, Cytology: Diagnostic Principles and Clinical Correlates. 4th Edition 2014, Saurenders and Elseviers.
- Gabrijela Kocjan, Fine Needle Aspiration Cytology: Diagnostic Principles and Dilemmas, 1st Edition 2005, Springer.

CLINICAL VIROLOGY AND MYCOLOGY

Course Code: MLT2406 **Credit Units: 03**

Course Objectives:

- To impart knowledge of diagnosis of viral diseases.
- To impart knowledge of diagnosis of fungal disease.
- To provide understanding of molecular method of diseases diagnosis.

Course Contents:

Module-I

Virology: General properties of viruses; Collection, transportation and storage of clinical samples; Cultivation of viruses; Molecular methods for virus diagnosis.

Module-II

Clinically important virus: Human immunodeficiency viruses, viral hepatitis, rabies virus, herpes viruses, influenza viruses, rubella, mumps, measles, rota virus, poliomyelitis, japanese encephalitis, dengue, chikungunya, human onocogenic viruses and kyasanur forest disease.

Module-III

Mycology: General properties, morphology, classification and cultivation of fungi; Types of mycoses; Lab diagnosis of fungal infections.

Module-IV

Common fungal infections: Dermatophytes, candidiasis, mycetoma, rhinosporidium, sporotrichosis, histoplasmosis, blastomycosis, coccidiodosis, paracoccidiodosis, cryptococcosis, aspergillosis, pencillosis, zygomycosis and pneumocystis.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Mark Gladwin , Trattler William , C. Scott, Mahan Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology,10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.

- Neal Chamberlain, Medical Microbiology: The Big Picture, 1St Edition 2008, Mc Grew Hill Medical.

DIAGNOSTIC BIOCHEMISTRY-I

Course Code: MLT2407 **Credit Units: 03**

Course Objectives:
- To enhance the knowledge of various diagnostic tests for human health.
- To impart the knowledge of biochemical parameters in metabolic disorders.

Course Contents:
Module-I
Haem catabolism and bilirubin metabolism: Bilirubin formation and excretion, Conjugated and un-conjugated bilirubin, Normal and abnormal values and clinical importance of serum bilirubin.
Clinically important Iso-enzymes: Creatine kinase, Lactate dehydrogenase, SGOT, SGPT, ALP, ACP.

Module-II
Liver function test: Introduction, normal ranges and clinical significance of albumin, aspartate transaminase, transaminases, alkaline phosphatase, lactate dehydrogenase, total bilirubin, direct bilirubin, gamma glutamyl transpeptidase, INR, 5' nucleotidase, coagulation test, clinical conditions.

Module-III
Pancreatic function test: Amylase, lipase, insulin, glucagon, clinical conditions.
Diabetes: Introduction and biochemical changes, types of diabetes, biochemical changes, role of insulin and glucagon, complications of diabetes, diabetes in relation to pregnancy and cardiovascular disease.
Diabetes profile: Oral glucose tolerance test and HbA1c.

Module-IV
Thyroid function test: T3 and T4, TSH, TRH, free T3 and T4, rT3 and rT4, Calcitonin, anti TSH, Thyroglobin, Iodine, clinical conditions
Infertility profile: Testosterone, Estrogen, Progesterone, Prolactin, Oxytocin, LH, FSH, clinical conditions

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee & Brothers Medical Publishers (P) LTD.
- D M Vasudevan, Sreekumari S ,Kannan Vaidyanathan, Textbook of Biochemistry for Medical Students, 8thEdition 2016, Jaypee & Brothers Medical Publishers (P) LTD.
- S Ramakrishana, Test Book of Medical Biochemistry, 3rd Illustrated Edition 2004, Orient Longman.
- S Chitiprol, Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee & Brothers Medical Publishers.
- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) LTD.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publication.

- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) LTD.
- David T Punmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Shivaraja Shankara YM, Shankara, Ganesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) LTD.
- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis,7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt, Fundamentals of Biochemistry: Life At The Molecular Level, 5th Edition 2016, John Wiley and Sons.

DIAGNOSTIC BIOCHEMISTRY LAB-I

Course Code: MLT2408 **Credit Units: 01**

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical biochemistry laboratory.

List of experiments:

1. To perform serum albumin and A: G ratio.
2. To perform serum ALP.
3. To perform SGPT.
4. To perform SGOT.
5. To perform serum amylase
6. To perform serum lipase.
7. To perform triiodothyronine hormone.
8. To perform tetraiodothyronine hormone.
9. To perform OGTT.
10. To perform HbA_1C.

Examination Scheme

Components	Internal Assessment	Attendance	Record	EE
Weightage(%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) Ltd.
- Shivaraja Shankara YM, Shankara, Ganesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) Ltd.
- David T Punmmer, An Introduction to Practical Biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Sood, Textbook of Medical Laboratory Technology,1st Edition 2006, Jaypee Brothers Publishers, 2006.

CLINICAL TRAINING-IV

Course Code: MLT2409 **Credit Units: 2**

Course Objectives: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Pathology Lab
2. Virology and Mycology Lab
3. Biochemistry Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

BASICS IN COMPUTER & PC PACKAGE

Course Code: MLT2410 **Credit Units: 03**

Course Objective:
This course aims at preparing the students to handle personal computers, learn basics of the current hardware, software and windows operating systems being used.

Course Contents:
Module-I
Computer Basics: History of computers, Definition of computers, Input Devices, storage devices, types of memory, and units of measurement, range of computers, generations of computers and characteristics of computers.

Module-II
System: Hardware, Software,, system definition, fundamentals of networking, internet, performing searches and working with search engines ,types of software and its applications.

Module-III
Office Application Suite: Word Processor, spread sheet, presentations, other utility tools Fundamentals of Linux /windows operating system, functions, interfaces and basic commands.

Module-IV
Special Applications: Use of database software for clinic records; Use of specialized software for optometric use.

List of practical:
- Various browsers, Search engines, E-mail
- Text document with multiple formatting option using specific office package
- Spread sheet using a specified office package
- Presentation on a specified topic using a specified office package.

Examination Scheme

Components	**A**	**HA**	**(CT)**	**V**	**P**
Weightage (%)	20	20	20	20	20

(CT-Class Test; V-Viva; HA - Home Assignment; P-Practical; A- Attendance)

MATHEMATICS AND BIOSTATISTICS

Course Code: MLT2411 **Credit Units: 03**

Course Objective: Students will be able to organize, summarize and display quantitative data; and also able to design valid and efficient studies to address public health and clinical problems.

Course Contents:

Module-I

Introduction: Statistical data and methods, types of tables, comparisons of tables, record, file sources of data, questionnaire design, design of sample survey, simple random sampling, stratified sampling, data coding and data verification.

Module-II

Data Presentation: Statistical tables, types of tables, comparisons, methods of presentation, graphic presentation, chart types, plotting a curve, rules for drawing curves, rules for drawing curves, bar charts, pictography, pie charts and histograms.

Module-III

Statistical Methods: Raw Data, frequency distribution, selecting number of classes, class limits, curves, cumulative frequency distribution, cumulative frequency distribution and gives, measures of central tendency, arithmetic mean, median, mode, harmonic mean, range, quartile deviation, average deviation, skewness and kurtosis.

Module-IV

Correlation, Regression, Probability and Sampling: Degree of correlation, correlation co-efficient, methods of concurrent deviation, co-efficient of rank correlation, partial correlation analysis, multiple correlation, simple and complex regression, Introduction to probability and sampling, addition rule, conditional probability, random variables, probability distribution and mathematical expectations.

Module-V

Testing of Hypothesis: Null Hypothesis, Alternate Hypothesis, level of significance, type 1 error, type2 error, testing of hypothesis of a single mean, two means, paired means for small and large samples.

Examination Scheme:

Components	CD	CT	SA	A	EE
Weightage	5	10	10	5	70

(CD= Class Discussion, CT = Class Test, SA= Short Assignments, A= Attendance. EE= External Examination)

Recommended books:

- Vijai Basotia (2008). Fundamentals of Statistics. Shree Niwas Publications
- Andy Field (Discovering Statistics Using SPSS (Introducing Statistical Methods S.) (2nd Edition). Sage Publications Ltd; 2nd edition
- Gupta & Kapoor-Fundamentals of Mathematical Statistics-Sultan Chand
- Kothari-Research Methodology.

Syllabus - Fifth Semester

HISTOPATHOLOGY

Course Code: MLT2507 **Credit Units : 04**

Course Objectives:

- To impart the knowledge of fixatives and tissue processing for histopathological examination.
- To impart the knowledge of microtomy and staining technique in histopathology laboratory.

Course Contents:

Module-I

Grossing: Introduction, histological specimens, labeling and reporting.
Fixation: Definition**,** classification, properties, composition, advantages and disadvantages of fixatives; Post chroming.
Decalcification: Importance, decalcifying agent**,** composition, advantages and disadvantages.

Module-II:

Tissue processing: Definition, importance, steps, dehydrating agents and dehydration process, clearing agents and clearing process.
Embedding: Embedding media, water soluble embedding media;

Module-III:

Microtome: Definition, types, care and use of microtome; Microtome knife, honing and stropping; Technique for sectioning, paraffin embedded tissue, frozen section; Errors in sectioning and remedies.
Mounting: Mounting media, advantages and disadvantages.

Module-IV:

Staining: Hematoxylin and eosin staining; Specific stain for collagen, reticulin, elastin, fat, amyloid, glycogen, mucin, iron and neuron.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- C F A Culling, Handbook of Histopathological and Histochemical Techniques, 3rd Edition 1974, Butterworth-Heinemann.
- Bancroft J. D and Gamble M, Theory & Practice of Histological Techniques, 6thEdition 2008, Churchill livingstone.
- H. Mohan, Text Book of Pathology 7th Edition 2015, Jaypee & Brothers Medical Publishers LTD.
- Leopold G. Koss, Myron R. Melamed, Koss' Diagnostic Cytology and Its Histopathologic Bases, Volume 1, 5th Edition 2006, Lippincott Williams & Wilkins.

- Edmund S. Cibas, Barbara S. Ducatman, Cytology: Diagnostic Principles and Clinical Correlates. 4th Edition 2014, Saurenders and Elseviers.
- Gabrijela Kocjan, Fine Needle Aspiration Cytology: Diagnostic Principles and Dilemmas, 1st Edition 2005, Springer.
- John A. Kiernan, Histological and Histochemical Methods: Theory and Practice, 4th Edition 2008, Scion Publishing Ltd.

IMMUNOHEMATOLOGY AND BLOOD TRANSFUSION

Course Code: MLT2508 **Credit Units: 03**

Course objectives:

- To impart the basic knowledge of blood group antigens and antibodies.
- To provide the concepts of donor screening and blood transfusion reactions.

Course Contents:

Module-I

Blood group system: Introduction and history of blood group systems, ABO blood group system and Rh system, blood group antigens and antibody, Sub groups, Bombay group, Red cell membrane structure,

Module-II

Phlebotomy and blood storage: blood bags and preservatives, donor selection criteria, blood collection procedure, component separation, cryoprecipitate, screening and storage of blood.

Pre-transfusion testing: blood grouping and typing, compatibility testing, coomb's test, D^u test and HLA type**.**

Module-III

Blood transfusion: Indication, types, apheresis, transfusion reactions, erythroblastosis fetalis, investigation of transfusion reaction.

Artificial blood: Clinical trials, blood substitutes and uses.

Module-IV

Blood banking: Organization, operation and administration of blood bank and blood donation camp; quality control in blood banking.

Advances in transfusion medicine: Cord blood bank, Automation, blood collection machine.

Examination Scheme

Components	**CA**	**A**	**ME**	**EE**
Weightage(%)	15	5	10	70

Recommended books:

- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- R N Makroo, Principle &Practice of transfussion medicine, 1st Edition 2014, Jain Books.
- Christopher D Hillyer, Beth, James, Transfusion Medicine & hemostasis: Clinical & Laboratory aspect, 2ndEdition 2013, Elsevier Healths.
- Richard A. McPherson, Henry's Clinical Diagnosis and Management by Laboratory Methods, 22nd Edition 2014, Elsevier.

BIOSTATISTICS AND QUALITY ASSURANCE

Course Code: MLT2509 **Credit Units: 03**

Course Objectives:

- To enable the student to understand the applications of statistics in diagnostic research.
- To impart the knowledge of hypotheses to estimate the possible risk factors of a disease.
- To enable to address public health and clinical problems in statistics forms.

Course Contents:

Module-I

Basic Biostatistics: Introduction, basic concept and clinical importance of biostatistics; Data classification, source of data, variables; Central tendency – mean, median, mode; Mode of dispersion – standard deviation, variance; Standard error, coefficient of variation and their importance; Normal distribution and t- test and its application.

Module-II

Sampling: Introduction: various methods, errors and distribution of sampling.

Hypothesis: Introduction, basic concept and importance of null hypothesis and alternate hypothesis.

Quality assurance system: Introduction and its application; Internal quality assurance and external quality assurance.

Module-III

Quality control: Introduction, basic concept and importance of quality control; Internal quality control and external quality control; Preparation quality control charts; Introduction, basic concept and application of Westguard rules; Biostatistics and its relation with laboratory quality control; Basic terminology- accuracy, precision, error, bias, sensitivity, specificity.

Module-IV

Automation: Introduction, basic principle and importance of automation; Phases of automation – pre-analytical, analytical and post analytical.

Examination Scheme

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- P. S. S. Sundar Rao, ni stnedutS rof launaM A :scitsitatsoiB ot noitcudortnI nA ,drahciR .J ,secneicS htlaeH3rd Edition 2004, Prentice Hall India Pvt. Limited.
- N Gurumani, An Introduction to Biostatistics, 2nd Edition 2011, MJP Publishers.
- Thomas Glover, noitcudortnI nA ,llehctiM niveK to Biostatistics, 3rd Edition 2015, Waveland Press, Elseviers.
- Shubhangi Tambweker, Handbook of Quality Assurance in Laboratry Medicine, 1st Edition 2009, BI Publications.
- Greg Cooper, Basic Lession in Laboratory Quality Control, QC Work Book, 2008, Bio-Rad Laboratories, Quality Systems Division.
- Huldah Bancroft, Introduction to Biostatistics, 1st Edition 1957, Hoeber-Harper.
- Wayne W. Daniel, Biostatistics: A foundation for analysis in the health sciences, 10th Edition 2012, John Wiley & Sons Inc.
- Richard A. McPherson, ,yrneH dranreB nhoJ sisongaiD lacinilC s'yrneH ,sucniP .R wehttaM meganaM dnaent by Laboratory Methods, 22nd Edition 2011, Saunders.

DIAGNOSTIC BIOCHEMISTRY-II

Course Code: MLT2510 **Credit Units: 04**

Course Objectives:
• To enhance the knowledge about the bio molecules and their role in human health.
• To impart the knowledge of analysis of biochemical parameters in metabolic disorders.
• To impart the knowledge of principles of biochemical tests and their clinical significance.

Course Contents:
Module-I
Renal function test: Glomerular Filtration Tests, tests for renal blood flow, tests of tubular function, other miscellaneous tests to assess renal function.
Lipoproteins: Formation of HDL, LDL, VLDL, circulation of lipoproteins, role in atherosclerosis, hyper and hypolipoproteinemia.

Module-II
Gastric function test: Patient preparation, principle and procedure of gastric analysis, fasting gastric juice analysis, post meal gastric analysis, post stimulation gastric analysis, clinical significance**.**
Intestinal malabsorption analysis: Principle, procedure of xylose absorption test, clinical significance of xylose absorption test.

Module-III
Acid base balance test: Buffer systems, acidosis and its pathophysiology, alkalosis and its pathophysiology, arterial blood gas test, metabolic panel, pulmonary function test.
Blood electrolytes: Sodium, potassium, magnesium, chloride and calcium.

Module-IV
Tumour markers: Biochemical changes in cancer, etiology of cancer, tumor markers, apoptosis and its role in carcinogens.
Toxicology: Drug abuse, lead, mercury, salicylates, aspirin, alcohol, illegal drugs, barbiturates.

Examination Scheme

Components	**CA**	**A**	**ME**	**EE**
Weightage (%)	15	5	10	70

Recommended books:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee & Brothers Medical Publishers (P) LTD.
- S Ramakrishana, Test Book of Medical Biochemistry, 3rd Illustrated Edition 2004, Orient Longman.
- D M Vasudevan, Sreekumari S, Kannan Vaidyanathan, Textbook of Biochemistry for Medical Students, 8th Edition 2016, Jaypee & Brothers Medical Publishers (P) LTD.
- S Chitiprol, Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee & Brothers Medical Publishers.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) LTD.
- David T Punmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGrew Hill.

- Shivaraja Shankara YM, Shankara, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) LTD.
- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis,7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt, Fundamentals Of Biochemistry: Life At The Molecular Level, 5th Edition 2016, John Wiley and Sons.

DIAGNOSTIC BIOCHEMISTRY LAB-II

Course Code: MLT2511 **Credit Units: 01**

Course Objectives:

- To impart the basic knowledge of principles, techniques and clinical importance of routine and selected laboratory procedures.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical biochemistry laboratory.

List of Experiments:

1. To perform serum total cholesterol.
2. To perform serum triglyceride.
3. To perform serum HDL, LDL and VLDL.
4. Determination of Acid Phosphatase.
5. To perform urea clearance test.
6. To perform creatinine clearance test.
7. Estimation of Lactate dehydrogenase .
8. Estimation of serum sodium.
9. Estimation of serum potassium.
10. To perform serum chloride.

Examination Scheme:

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- J. Ochei and A. Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Mannual of Basic Technique for Health Laboratory, 2nd Edition 2003, WHO Geneva.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee & Brothers Medical Publishers (P) Ltd.
- David T Punmmer, An Introduction to Practical Biochemistry, 3rd Edition 2004, Tata McGrew Hill.
- Sood,Textbook of Medical Laboratory Technology,1st Edition 2006,Jaypee Brothers Publishers, 2006.
- Shivaraja Shankara YM, Shankara, Ganesh MK, Laboratory Manual for Practical Biochemistry, 2nd Edition 2013, Jaypee & Brothers Medical Publishers (P) Ltd.

CLINICAL TRAINING-V

Course Code: MLT2512 **Credit Units: 2**

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Histopathology Lab
2. Immunohematology and Blood Transfusion Lab
3. Biochemistry Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

PREVENTIVE & SOCIAL MEDICINE

Course Code: MLT2505 **Credit Units: 03**

Course objective:

- To sensitize the students with the awareness of communicable and non – communicable diseases.
- To make the students capable of investigating and managing possible outbreaks or epidemics.

Course Contents:

Module-I

Health and Disease: Determinants of health, multi – factorial causation of disease host, agent, environment relationship primary, secondary and tertiary levels of prevention with examples related to few diseases of national importance; Natural history of disease; Mode of transmission of disease; Air – borne, vector and vehicle transmission; Methods of control with examples for control of each mode.

Disinfection: Introduction, disinfection of the infective materials received in the Laboratory by using the appropriate disinfection methods at the health centre level.

Module-II

Health services: Brief description of organization of health services at the centre and state levels; Primary health care – Definition, components and principles of primary health care, health for all indicators; Primary health centre – The functions, staffing pattern and the role of laboratory technicians in primary health centre, laboratory tests for use in health centre(see annexure for description).

Health Programmes: Family welfare programme; National programme for water supply and sanitation; Nutritional programmes; Immunization and universal immunization programme; National programmes of health and disease eradication /control; Disease eradication programme: leprosy & guniea worm; Disease control programmes – tuberculosis, malaria, filaria, S.T.D, goitre, cholera and other diarrhaeal diseases and natioanl programme for prevention of blindness including trachoma.

Module-III

Demography & Population control: Introduction; The factors influencing population growth, death rate, birth rate and methods of contraception.

Environmental sanitation: Methods of water purification and disinfection, collection of water samples, their transport and bacteriological analysis; Methods of excreta disposal.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Recommended books:

- Park's Textbook of Preventive and Social Medicine, by K. Park, 24th edition, Banarsidas Bhanot Publishers.

PROJECT

Course code: MLT2532 **Credit Units: 03**

Course objective:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:

Chapter 1: Introduction – 10 marks

Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks

Chapter 3: Presentation, Analysis & Findings -- 25 marks

Chapter 4: Conclusion & Recommendations -- 10 marks

Chapter 5: Bibliography -- 05 marks

Examination scheme:

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) **Cover Page:** This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) **Acknowledgement:** Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) **Table of Content:** Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Abstract: The body of the report should have summary of the project.
a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.
b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).
c) Presentation of Data, Analysis and Findings.
d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I: Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Methodology,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Syllabus - Sixth Semester

INTERNSHIP

Course Code: MLT2637 **Credit Units: 15**

Course Objectives:
The basic objective of internship is to provide first hand practical exposure of the medical laboratory and to acquaint students with the culture of medical lab. The internship training will also provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the laboratory. Thus, this internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the student's intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General guidelines:
Every student of under graduate courses will be required to undergo a practical training in a medical laboratory organization approved by the Institute for four months, after the end of the 5th semester examinations. The candidates shall be required to undergo training in the various areas like clinical pathology, clinical hematology, clinical microbiology, clinical biochemistry and blood banking labs of the concerned organization. The organization may assign a specific project to the student, which will be completed by him/her during the period of training. The work done by the student during the training period shall be submitted in the form of a report as per the guidelines provided by the department.

Chapter scheme for the internship project report:

Chapter I: Introduction	- 20 marks
Chapter II: Conceptual Framework/National/International Scenario	- 5 marks
Chapter III: Presentation, Analysis and Findings	- 35 marks
Chapter IV: Conclusion and Recommendations	- 15 marks

The report has to be written in font style – Times New Roman, font size – 12, line spacing on both sides of the paper – 1.5 and should be spiral bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

The components of internship project report:
The outcome of internship training is the project report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the student, name of the supervisor, year of submission of the project work and name of the University.
2) Acknowledgement: Various laboratory organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

a. Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), limitations of the study, and chapter planning.
b. Conceptual framework / national and international scenario: (relating to the topic of the project).

c. Presentation of data, analysis and findings: (using the tools and techniques mentioned in the methodology).
d. Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.

Guidelines for evaluation:

1. Each of the students has to undertake a project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
2. Language of project report and viva-voce examination should be in English. The project report must be typed and hard (spiral) bound.
3. Failure to submit the project report or failure to appear at the viva-voce examination will be treated as "Absent" in the examination. He /she have to submit the project report and appear at the viva-voce examination in the subsequent years (within the time period as per university rules).
4. No marks will be allotted on the project report unless a candidate appears at the viva-voice examination. Similarly, no marks will be allotted on viva-voce examination unless a candidate submits his/her project report.
5. Evaluation of the project work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
6. A candidate has to qualify in the project work separately, obtaining minimum marks of 40 (project report and viva-voce taken together).

Evaluation Scheme:

Internship Project Report	Power Point Presentation & Viva
75 marks	25 marks

Amity Institute of Stem Cell

Bachelor of Science - Molecular Medicine & Stem Cell Technologies

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Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

CELL BIOLOGY & GENETICS

Course Code: SCT2101 **Credit Units: 02**

Course Objective
The course offers understanding of the structure and function of cellular and subcellular components of cells and tissues, basic principles of genetics, classical, molecular and population genetics.

Course Contents

Module I: Cell and cellular organelles
Cell theory, prokaryotic and eukaryotic cells. Structure and function of cell wall, plasma membrane, nucleus, mitochondria, chloroplast, Nucleus, lysosomes, peroxisomes, golgi bodies, and transport across membranes. Cell locomotion, cytoskeleton, structure and function of cilia and flagella. Cell cycle: molecular events, cell division, mitosis and meiosis.

Module II: Cell signaling mechanisms and their significance
General mechanism of signaling and structures of the various types of receptors. Cell proliferation and cell death mechanisms, e.g. apoptosis, necrosis, autophagy, immunogenic and non-immunogenic cell death.

Module III: Genetics
Classical and molecular genetics, Mendelian principles of inheritance, human genetics. Extension of Mendelism: Allelic variations, influence of environment on expression, penetrance and expressivity, epistasis, pleiotropy. Chromosomal basis of inheritance, linkage, crossing over and chromosome mapping.

Module IV: Mutations and Development of Cancer
Mutation and mutagenic agents, types of mutations. Numerical and structural changes in chromosomes and human syndromes associated with them. Types of cancer, etiology of cancer, metastasis, tumor suppressor genes. Cytological role of p53 and p21 genes in cancer development. Introduction to cancer therapy approaches: chemotherapy, radiation therapy, immunotherapy.

Module V: Classical and modern concept of gene
Classical and modern concept of gene, pseudoallelism, position effect, intragenic crossing over & complementation (cistron, recon & nutron) Benzer's work on rII locus in T_2 bacteriophage. Genetics of Population: Hardy-Weinburg Law and its deviations.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
- Cell and Molecular Biology, DeRobertis, B.I. Publication Pvt. Ltd.
- Genetics, P.K. Gupta, Rastogi Publication
- Concepts of Genetics (Sixth Edition), William S. Klug and Michael R, Cummings, Pearson Education

References:

- Cell in Development and Inheritance, E.B. Wilson, Macmilian
- Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
- Essential Cell Biology : An Introduction to the Molecular Biology of the Cell, B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Roff, K. Robert, P. Walter and K. Roberts, Garland Publishing Company
- Molecular Cell Biology, H.Lodish, A.Berk, S.L. Zipursky, P. Matsudaura, D. Baltimore and J. Danell, W.H. Preeman and Company.
- Genetics, M.W. Strickberger, Prentice Hall College Division
- Genetics, P.J.Russell, Benjamin/Cummings
- Principles of Genetics, E J Gardner, John Wiley & Sons Inc.
- Genetics, R. Goodenough, International Thomson Publishing
- Introduction to Genetic Analysis, A.J. F. Griffiths, W.H. Freeman and Company
- Principles of Genetics, D.P. Snustad& M.J. Simmons, John Wiley and Sons Inc.
- Molecular Biology of the Gene (Fifth Edition), J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison – Wiesley Publishing

MICROBIOLOGY & VIROLOGY

Course Code: SCT2102 **Credit Units: 03**

Course Objective:
Students will learn about different types of bacteria, fungi, protozoa and viruses, their role in disease development as well as in useful applications in biotechnology.

Course Contents:

Module I:
Discovery of the microbial world, role of microorganisms in transformation of organic matter and in the causation of diseases, development of pure culture methods. Principles of microbial nutrition, culture media, theory and practice of sterilization, pure culture techniques.

Module II
Functional anatomy of bacteria: cell envelope, cell wall, cytoplasmic membrane, capsule, surface appendages, cytoplasm and cytoplasmic inclusions. Growth: Definition of growth, mathematical expression of growth, growth curve, synchronous growth, continuous culture, culture collection and maintenance of cultures. New approaches to bacterial taxonomy, classification including ribotyping, ribosomal RNA sequencing, characteristics of primary domains, taxonomy, nomenclature and Bergey's manual.

Module III
Metabolic diversity among microorganisms: photosynthesis in microorganisms, role of bacteriochlorophylls, carotenoids and phycobilins, Chemolithotrophy, hydrogen-iron-nitrite-oxidizing bacteria, nitrate and sulphate reduction, methanogenesis and acetogenesis, Fermentation.

Module IV:
Viruses: Bacterial, animal; structure of viruses; Reproduction and life cycle of RNA and DNA viruses; Viroids and prions. Algae and Fungi: Classification and Reproduction. Host-parasite relationship: Normal micro flora of skin, oral cavity, gastrointestinal tract, Respiratory infections; entry of pathogens into the host, types of toxins (Exo, endo, entro) and their mode of actions, Microbial pathogenesis: Disease reservoirs; Epidemiological terminologies; Infectious disease transmission; Sexually transmitted disease including AIDS, Food and water- borne diseases; pathogenic fungi.

Module V
Antimicrobial agents, sulfa drugs, antibiotics, penicillin and cephalosporins, broad spectrum antibiotics, antifungal antibiotics; mode of action.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L.Wheelis and P.R. Painter, Macmillian
- Microbiology VI Edition, M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill Microbiology by Prescott
- The microbes – An Introduction to their Nature and Importance, P.V. Vandenmark and B.L. Batzing, Benjamin Cummings.

References:

- The Microbial World, Roger Y. Stanier, Prentice Hall
- Microbiology, Tortora, Funke and Chase, Benzamin & Cummings
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers Principles of Microbiology, R.M. Atlas, WMC. Brown Publisher.

BIOCHEMISTRY

Course Code: SCT2103 **Credit Units: 02**

Course Objective

The course offers understanding of the relationships between structure and function of major classes of biopolymers. Students will learn the central metabolic processes and the role of enzymes in modulating different biological pathways. Understanding of the biochemical systems is essential for understanding normal cell functioning and maintenance of homeostasis in biological systems, as well as for the understanding of several disease conditions.

Course Contents

Module I

Water: Properties of water; acids, bases and buffers; covalent and non-covalent interactions in biological systems. Bioenergetics: First and second law, concept of free energy and chemical equilibrium, Henderson Hasselbalch equation. Buffering against pH Changes in Biological Systems: Phosphate buffer, Bicarbonate buffer, Protein buffer, Amino acid Buffer & Hemoglobin Buffer System. Cellular energy transactions: ATP-ADP cycle, role of mitochondria and chloroplast.

Module II

Carbohydrates: classification, structure and functions of monosaccharides, disaccharides and polysaccharides. Ring structure and mutarotation, stereo isomers and structural isomers. Carbohydrate metabolism: glycolysis and its regulation, Glycogen breakdown, synthesis, Regulation; Citric acid cycle and its regulation, amphibolic nature of Citric acid cycle; Electron transport System, oxidative phosphorylation and control of ATP production; Gluconeogenesis, glyoxylate pathway, Pentose phosphate pathway. Disorder/diseases of carbohydrate metabolism.

Module III

Lipids: Classification, structure and function: Simple, Compound & Derived lipids, Essential fatty acids. Fatty acid synthesis, origin of acetyl-Co A for fat synthesis, Elongation & desaturation of Fatty Acids. Lipids and biological membranes, lipoproteins, Phospholipids, Sphingolipids, Glycolipids; Lipid metabolism: digestion, absorption and transport. Activation & transport of fatty acid from cytosol to mitochondria for oxidation. Oxidation of saturated & unsaturated fatty acids. β, α, ω oxidation.; fatty acid metabolism: β, α, ω oxidation, biosynthesis and regulation; Formation and utilization of ketone bodies; Cholesterol and Arachidonic Acid metabolism. Disorder/ diseases of lipid metabolism.

Module IV

Amino acids and Proteins: Amino Acids: Classification, chemical and physical properties of amino acids. Amino acid metabolism: deamination, urea cycle, biosynthesis and breakdown non-essential amino acids (asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, proline, serine, Tyrosine). Disorders and diseases of amino acids metabolism.

Proteins: structure and function. Ramachandran plot, Primary, secondary, tertiary & quaternary structure of proteins. Glycoproteins: structure and function. *Vitamins and Coenzymes*: structure and function of water soluble vitamins. Enzymes: Introduction to kinetic and catalytic mechanisms; Regulation of enzyme activity; Effects of physical parameters on enzyme activity, enzyme inhibitors: types of inhibition.

Module V

Nucleic acids: nitrogenous bases, nucleotides, structure and properties of nucleic acids. Nitrogen fixation; Nucleotide Metabolism: metabolism of purines and pyrimidine, biosynthesis of nucleotide, coenzymes (NAD, NADP, FAD, FMN); Catabolism of heam and clinical significance of bilirubin.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Harper's Biochemistry, K. Robert, M.D. Murray, D.K. Granner, P.A. Mayes and V.I. Rodwell, McGraw-Hill/Appleton and Lange.
- Biochemistry, L. Stryer, W.H. Freeman and Company
- Tools of Biochemistry, T.G. Cooper, John Wiley and Sons Inc.

References:

- Cellular Biophysics I & II, Thomas F. Weiss 1995, MIT Press
- Biochemical calculations, I.H. Segal. Publisher, John Wiley and Sons
- Biochemistry, C.K. Mathews, K.E. Van Holde and K.G. Ahern, Benjamin / Cummings.
- Devlin's Textbook of Biochemistry with Clinical correlations, John Wiley and Sons Inc.
- Principles of Biochemistry, A.L. Lehninger, D.L. Nelson, M.M. Cox, Worth Publishing

STEM CELL TECHNOLOGY BASICS

Course Code: SCT2104 **Credit Units: 03**

Course Objective: The course is designed to give a broad overview of mammalian stem cells, different types of stem cells and their properties. The topics will cover the basic biology as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I:

Introduction to stem cells: Definition, properties, proliferation and, culture of stem cells, medical applications of stem cells, ethical and legal issues in use of stem cells.

Module II:

Stem Cell biology and therapy: types of stem cells, embryonic stem cell, Adult stem cell, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module III:

Gene Therapy: Introduction, history and evolution of Gene therapy, optimal disease targets. Genetic perspectives for Gene Therapy, Gene Delivery methods: Viral vectors and Non-viral Vectors. Failures and successes of gene therapy. Future prospects of gene therapy.

Module IV:

Applications of stem cells in cell replacement and gene therapy approaches. Stem cells in drug discovery.

Module V:

Regulatory and ethical considerations of stem cell and gene therapy. Assessing human stem cell safety, use of genetically godified gtem cells in experimental gene therapies.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

BIOTECHNIQUES & INSTRUMENTATION

Course Code: SCT2105 **Credit Units: 02**

Course Objective:
Students will learn about safe laboratory practices, bio-analytical instruments, principles of their proper functioning, and analysis methods applied to biological data obtained in experimental techniques.

Course Contents:

Module I
Sampling and sample preparation: Sample fixing for various analytical applications and sample processing. Principles of microscopy, Light, dark field, fluorescence microscope, confocal microscope, transmission and Scanning electron microscopy, microtomy and analysis and measurement of image. Fluorescence activated cell sorter (FACS) basic principles and applications.

Module II
Electrophoresis of DNA, RNA and proteins. Capillary electrophoresis, Two-dimensional electrophoresis, Southern blotting, Northern blotting, Immunoprecipitation, Western blotting. Sequencing, Next Generation Sequencing, RNA-Seq. etc.

Module III:
Centrifugation techniques: Introduction, Basic principle of sedimentation, centrifuges and their uses, Density gradient and analytical centrifugation.
Spectroscopy techniques: UV and visible spectroscopy, infrared and atomic absorption spectroscopy, fluorescence spectroscopy, mass spectrometry, MALDITOF, nuclear magnetic resonance and electron spin resonance spectroscopy.

Module IV:
Chromatography: Theoretical basis of chromatographic separations. Column, Thin layer, Paper, Normal phase and reverse phase chromatography, Ion-exchange, Affinity and Gas Chromatography, High performance liquid chromatography (HPLC) and GLC.

Module V
Principles of X-ray diffraction and X-ray Crystallography. Theory and application of UV-VIS, IR, NMR, Fluorescence, Atomic absorption spectroscopy; X-ray diffraction. Introduction to mass spectroscopy Radioisotopic techniques: Introduction to radioisotopes, detection, measurement and uses of radioisotopes, counting efficiency and autoradiography, biotechnological applications

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text:
- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:

- Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wi

BIOINFORMATICS-I

Course Code: SCT2106 **Credit Units: 01**

Course Objective:
The course offers a basic understanding of bioinformatics tools and technologies for understanding different biological pathways at systems level as well as for characterizing cross-talks between different pathways.

Course Contents:

Module I: Introduction and overview
The NCBI data model; sequence databases, sequence retrieval, sequence file formats, submitting DNA and protein sequences; classification of biological databases. Sequence databases (EMBL, GenBank, DDBJ, -UNIPROT, PIR, TrEMBL),

Module II: Sequence alignment
Global and local alignments, statistical significance of alignments, scoring matrices and gap penalties, position specific scoring matrices, programs and methods for Pairwise and multiple alignment, pattern searching programs, family and superfamily representation - Pfam, hidden Markov models.

Module III: Predictive methods using DNA and protein sequences
ESTs: construction, databases, clustering, gene discovery and identification, and functional classification. Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Cluster databases-An Introduction, Specialised databases (KEGG, etc), Database technologies (Flat-file), Protein identification tools, physical properties, motifs and patterns

Module IV: Structure databases
Structural databases - PDB and MMDB, structure file formats, Secondary and tertiary structure prediction methods in proteins, Internal and external coordinate system, software to visualize secondary and tertiary structural information in protein.folding classes, structure classification databases – SCOP and CATH;

Module V: Comparative genome analysis
Phylogenetic analysis, Evolutionary Models, Character and distance based Tree building methods; tree evaluation, phylogenetic analysis, parsimony, maximum likelihood trees; Trees-splits and metrics on trees, tree interpretation, Distance – additive, ultrametric and nonadditive distances.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Computer Science, J.G. Brookshear, Pearson, Addison Wesley
- Introduction to Bioinformation – T.Attawood
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F Quellette, Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag

CELL & MOLECULAR BIOLOGY LAB

Course Code: SCT2107 **Credit Units: 01**

Course Contents:

Module I
Microscopy: Light microscopy, Bright field, Phase contrast.
BSL I, BSLII, BSLIII laboratory facility development: design and regulatory requirements.

Module II
Cell culture: aseptic suspension and adherent cell culture techniques. Cell number enumeration and cell passage methods, and methods for characterization of cells in culture and cell proliferation.

Module III
Cell mounting techniques, and study of permanent slides of different types of cancer. Induction and characterization of apoptosis and necrosis. Cell mitosis and meiosis and karyotyping techniques.

Module IV
Bacterial culture techniques, bacterial transformation and transduction techniques, single cell clone isolation.

Module V
Study of physical and chemical mutagens on growth of *E. coli*, PTC test.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

BIOCHEMISTRY LAB

Course Code: SCT2108 **Credit Units: 01**

Course Contents

Module I
Preparation of solutions: Percentage solutions, Molar solutions, Normal solutions, Standardization of pH meter, preparation of buffers, emulsions. Spectroscopy: determination of absorption maxima (λmax) of a given solution. Colorimetric determination of pK and sugars (Molischs test, iodine test, Saliwanoff test, Fehlings test, Benedicts test, Bials test). Titration of weak acid-weak base.

Module II
Biochemical estimation: Cholestrol, free fatty acids, iodine number. Quantitative estimation of carbohydrates. Distinguish reducing and non-reducing sugars. Quantitative estimation of proteins. Estimation of nucleic acids

Module III
Biochemical estimation of proteins (Ninhydrin test, Biuret test, Xanthoprotein test). Isoelectric precipitation. Separation of sugars, fatty acids and amino acids by paper chromatography. Extraction of lipids from plant material Thin layer chromatography. Gel electrophoresis

Module IV
Biochemical estimation of DNA and RNA. Quantitative estimation of DNA and RNA by UV spectrophotometer. Determination of melting temperature of DNA from thermal denaturation characteristics.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Reference books

- Wilson and Walker "Principles and Techniques of Practical Biochemistry" 4 Edn., Cambridge Knew pros 1997.
- Plummer DT "An Introduction to Practical Biochemistry" III Edn., Tata

BIOTECHNIQUES & INSTRUMENTATION LAB

Course Code: SCT2109 **Credit Units: 01**

Course Contents:

Module I
Cell disruption techniques and cell fractionation.

Module II
Centrifugation: low speed and high speed. Density gradient centrifugation.

Module III
Spectrophotometer methods and analysis.

Module IV
Chromatography: Paper Chromatography and Thin Layer Chromatography

Module V
Electrophoresis: DNA, protein and RNA quantitation, SDS-PAGE and Agarose gel electrophoresis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

RESEARCH PRESENTATION

Course Code: SCT2110 **Credit Units: 01**

Course Objective:

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	**100**

TERM PAPER

Course Code: SCT2131 **Credit Units: 01**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

b) Begin by making a list of subject-headings under which you might expect the subject to be listed.

c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.

b) In research studies, notice the methods and procedures, results & conclusions.

c) Check cross references.

4. Outlining the paper

a) Review notes to find main subdivisions of the subject.

b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes

Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

Syllabus - Second Semester

MOLECULAR BIOLOGY

Course Code: SCT2201 **Credit Units: 02**

Course Objective:
Students will learn about the molecular mechanisms by which genetic information is stored in the nucleus of the cells, and it is effectively expressed for performing different cellular functions.

Course Contents:

Module I:
Replication of DNA and DNA Repair Mechanisms: Nucleic acids. DNA replication in phages, prokaryotes and eukaryotes, chromosomal structure and organization, origin of replication and replication machinery, DNA damage and repair mechanisms, excision repair systems, recombination and recombination repair systems.

Module II:
Mechanisms of mRNA Transcription and Gene Expression in Prokaryotes and Eukaryotes: Defining a gene, interrupted genes, structure and function of phage, prokaryotic and eukaryotic promoters, eukaryotic and prokaryotic transcription initiation, RNA polymerases and ancillary factors required for transcription initiation, elongation and termination. Regulation of gene expression in phages, viruses, prokaryotes and eukaryotes, regulatory elements such as operators, enhancers, insulators and trans-factors such as activators, repressors, trans-factors, general and tissue specific transcription factors. Lac operon, Ara operan regulation in Eukaryotes**.**

Module III:
Types of RNAs and Modifications in RNA: RNA processing, polyadenylation, 5' capping, splicing, structure and function of rRNAs, tRNAs, prokaryotic and eukaryotic ribosomes. Editing, Nuclear export of mRNA and mRNA stability.

Module IV:
Protein Translation Mechanisms: Prokaryotic and Eukaryotic translation and translation machinery: Mechanisms of initiation, elongation, termination and regulation of translation; co-and post-translational modifications of proteins. Signal peptides and protein translocation. ,

Module V:
Antisense, SiRNA, ShRNA and Ribozyme technology: Antisense RNA. Molecular mechanism of antisense molecules, inhibition of spilicing, polyadenylation and translation, disruption of RNA structure and capping. Gene silencing, RNA interference. Biochemistry of Ribozyme, hammerhead, hairpin and other ribozymes, strategies for designing ribozymes, applications of antisense and ribozyme technologies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Concepts of Genetics, W.S. Klug, and M.R. Cummings 2004, Pearson Education
- Genome, T.A. Brown, John Willey & Sons Inc.
- Molecular Biology of the Cell. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Publishing
- Gene VIII, Benjamin Lewin 2005, Oxford University Press

References:

- Molecular Cell Biology, H. Lodish, A.Berk, S. Zipursky, P Matsundaira, D.Baltimore and J.E. Barnell, W.H. Freeman and Company.
- Molecular Cloning: A Laboratory Manual (3-Vilcume set), J. Sambrook, E.F. Fritsch and T. Maniatis, Cold spring Harbor Laboratory Press.
- Molecular Biology of the Gene, J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison-Wesley Publishing.

IMMUNOLOGY-I

Course Code: SCT2202 **Credit Units: 02**

Course Objective:
The will learn about the innate and adaptive immune responses; antigens, major histocompatibility complexes and their role in generation of immune response and transplant rejection; generation and regulation of immune system, and cell-mediated cytotoxicity.

Course Contents:
Module I:
Types of immunity: innate, acquired, active and passive; clonal nature of immune response; lymphoid organs; Nature and Biology of antigens and superantigens; types, structure and function of antibodies.

Module II:
Major histocompatibilty complexes (MHC) and their role in immune response generation and transplant immunology; B cell receptor (BCR) and T cell receptor (TCR); antibody diversity and mechanisms of antibody diversity generation; complement system.

Module III:
Cells of the immune system: Hematopoiesis and differentiation; lymphocyte trafficking, B-and T-Lymphocytes; innate lymphoid cells; macrophages, dendritic cells, natural killer, lymphokines and lymphokine activated killer cells, eosinophils, neutrophils and mast cells

Module IV:
Regulation of immune response: Antigen processing and presentation, activation of B and T lymphocytes, cytokines and their role in immune regulation, T cell regulation and MHC restriction, immunological tolerance

Module V:
Cell mediated toxicity: Mechanism of T cell and NK cell mediated lysis and macrophage mediated cytotoxicity.
Immunological methods and Techniques: Immuno-diffusion, immuno-electrophoresis, Cross reactivity, Precipitation and Agglutination reaction; ELISA, RIA, fluorescence activated cell sorter.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

HUMAN DEVELOPMENTAL BIOLOGY

Course Code: SCT2203 **Credit Units: 03**

Course Objective: Students will learn about the fundamental process of human embryology and developmental biology and progression of pluripotent stem cells through different phases of development.

Course Contents:
Module-I: Basics principles of human embryogenesis: gametogenesis, fertilization and embryo development.

Module-II:
Ectoderm, mesoderm and endoderm development. Organogenesis during human development.

Module-III:
Molecular regulation of embryogenesis and organogenesis processes during human development. Epigenetics mechanisms and their role in human development process.

Module-IV:
Different types of stem cells, process and mechanism of stem cell subset development and their spatial organization during human development. Role of epigenetic mechanisms in human stem cell homeostasis and differentiation.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**
- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

BIOINFORMATICS-II

Course Code: SCT2204 **Credit Units: 01**

Course Objective:
It enables the students to access biological information networks and databases in order to understand the different techniques of biotechnology to build detection systems especially in the prevention and treatment of human diseases.

Course Contents:

Module I: Data Models and Database Management Systems
File systems vs. DBMS, advantages of DBMS**,** Levels of abstraction and data independence; Data models and their comparison; Entity relationship model -concepts, design, keys and features; Relational model - introduction, structure of the relational databases, integrity constraints, Relational algebra and calculus - selection and projection, set operations, renaming, Joins, Division etc.

Module II: Introduction to Biological scripting languages: BioJava
BioJava modules for sequence alignment, data mining, structure alignment.

Module III: BioPerl & BioPython
BioPerl & BioPython modules for sequence alignment, data mining, structure alignment,

Module IV: Introduction to R Programming
Introduction to R Programming R basics; Data structures in R; R programming fundamentals; Working with data in R; Strings and Dates in R;

Module V: R/Bioconductor for advanced biological data analysis
Overview of the Bioconductor; Pre-processing microarray data; Differential gene expression; Distances, prediction, and cluster analysis; Annotation and metadata Visualization; GO;

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text:
- Data Mining: Concept and techniques, J. Han and M. Kamber, Morgan Kaufman.
- Database Management, P.C. Desai.
- Bioinformatics and Computational Biology Solutions Using R and Bioconductor (Statistics for Biology and Health)" by Vincent Carey and Sandrine Dudoit
- Statistics and Data Analysis for Microarrays Using R and Bioconductor by Sorin Drăghici

References:

- Introduction to Database Systems, C.J. Date, Addison Wesley Publishing.
- BioJava - www.biojava.org;
- BioPerl - www.bioperl.org;
- BioPython - www.biopython.org;
- R Programming Language: http://cran.r-project.org/;
- Bioconductor: http://www.bioconductor.org ;

BIOSTATISTICS

Course Code: SCT2205 **Credit Units: 03**

Course Objective:
Students will learn about the statistical methods and application of statistical methods applied to biological data obtained in experimental techniques.

Course Contents:

Module I
Preliminary concepts of Statistics and Biostatistics; Measures of Central Tendency: Mean, Median, Mode Measures of Dispersion: Range, Standard deviation, Variance

Module II:
Probability: Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module III:
Types of Probability Distributions: Introduction to Normal Distribution, Bernoulli Distribution, Uniform Distribution, Binomial Distribution, Poisson distribution, Exponential Distribution

Module IV:
Correlation & Regression: Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples. Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line

Module V:
Hypothesis Testing: Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications. One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test. Normal test for sample mean and population mean, Normal test for two sample means. Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chi-square test, Coefficient of contingency, Yates' correction for continuity. Analysis of Variance: One way and Two-way (only Examples)

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.

References:

- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.

ENZYMOLOGY AND ENZYME TECHNOLOGY

Course Code: SCT2206 **Credit Units: 02**

Course Objective:
The course aims to provide an understanding of the principles and application of proteins, secondary metabolites and enzyme biochemistry in therapeutic applications and clinical diagnosis. The theoretical understanding of biochemical systems would certainly help to interpret the results of laboratory experiments.

Course Contents:

Module I:
Enzymes & Enzyme Kinetics: Introduction and scope, Nomenclature, Mechanism of Catalysis. Single substrate steady state kinetics; Michaelis Menten equation, Linear plots, King-Altman's method; Inhibitors and activators; Multisubstrate systems; ping-pong mechanism, Alberty equation, Sigmoidal kinetics and Allosteric enzymes

Module II
Immobilization of Enzymes; Advantages, Carriers, adsorption, covalent coupling, cross-linking and entrapment methods, Micro-environmental effects.

Module III:
Enzyme reactors: Reactors for batch/continuous enzymatic processing, choice of reactor type; idealized enzyme reactor systems, Mass transfer in enzyme reactors: Steady state analysis of mass transfer and biochemical reaction in enzyme reaction.

Module IV:
Bioprocess Design: Physical parameters, reactor operational stability, Immobilized cells.

Module V:
Future trends: Enzyme catalysis in organic media; catalytic antibodies and non protein biomolecules as catalysts, biocatalysts from extreme thermophilic and hyper thermophilic Archae and Bacteria.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text:

- Biotechnological Innovations in Chemical Synthesis, R.C.B. Currell, V.D. Mieras, Biotol Partners Staff, Butterworth Heinemann.
- Enzyme Technology, M.F. Chaplin and C. Bucke, Cambridge University Press.
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis, R.A. Copeland, John Wiley and Sons Inc.

References:

- Enzymes Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palner.
- Enzyme Kinetics: Behaviour and Analysis of Rapid Equilibrium and Steady State Enzyme Systems, I.H. Segel, Wiley-Interscience.
- Industrial Enzymes & their applications, H. Uhlig, John Wiley and Sons Inc.

MOLECULAR BIOLOGY LAB

Course Code: SCT2207 **Credit Units: 01**

Course Contents:

1. Genomic DNA isolation from plant and animal cells.
2. RNA isolation.
3. Whole cell protein isolation and analysis on SDS-PAGE.
4. DNA, RNA and protein quantification by spectrophotometric analysis.
5. Restriction mapping and analysis on native-PAGE.
6. Studies of gene regulation.
7. Induction of gene.
8. PCR, RT-PCR, Real time PCR.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

MICROBIOLOGY & VIROLOGY LAB

Course Code: SCT2208 **Credit Units: 01**

Course Contents:

1. Preparation of solid and liquid media.
2. Isolation and maintenance of organisms by plating, streaking and serial dilution.
3. Preparation of slant cultures.
4. Growth curve measurement of bacterial population by turbidometry.
5. Measurement of bacterial population by dilution method. Techniques for isolation of pure cultures.
6. Isolation of heterotrophs and autotrophs, isolation and enumeration of microbial population in soil and water.
7. Effect of temperature, pH, carbon and nitrogen sources on growth of bacteria.
8. Microscopic examination of bacteria by gram staining.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

IMMUNOLOGY-I LAB

Course Code: SCT2209 **Credit Units: 01**

Course Contents:

1. Blood film preparation and identification of cells.
2. Immuno-diffusion.
3. Hemagglutination, agglutination inhibition.
4. Rocket immune-electrophoresis.
5. Western blotting, ELISA.
6. Epitope prediction using Immuno-informatics tool.
7. Isolation of peripheral blood mononuclear cells (PBMC).
8. Cell phenotype analysis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner

BIOINFORMATICS-II LAB

Course Code: SCT2210 **Credit Units: 01**

Course Contents:

Module I
Database creation using DDL and DML. Defining the primary and secondary keys. Implementation of selection, projection and joins (internal and external) with MySQL

Module II
Introduction to Linux Shell Programming, Running BioJava Scripts

Module III
Running BioPerl and BioPython Scripts

Module IV
Programming in R basic scripts

Module V
R/Bioconductor programming for DEGs, Visualization and annotation.

Examination Scheme:

IA			**EE**			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner

SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR / WORKSHOP)

Course Code: SCT2211 **Credit Units: 01**

Students will learn about methods, tools and resources for literature search on a particular topic, and how to build, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	**100**

Syllabus - Third Semester

STEM CELL BIOLOGY, HUMAN ANATOMY AND PHYSIOLOGY

Course Code: SCT2301 **Credit Units: 03**

Course Objective: Students will learn about the basic organization of adult somatic cells, human anatomy and normal physiology, basic principles and mechanisms that dictate maintenance of pluripotency in pluripotent stem cells and their differentiation into adult stem cells, somatic cells, tissues and organs.

Course Contents:

Module-I:

Cell, cell organelles and their organization, cell proliferation and cell death mechanisms in somatic cells and stem cells. Cell division mechanisms in somatic cells and pluripotent stem cells.

Module-II:

Introduction to epigenetics and its role in maintenance of pluripotency and differentiation of pluripotent stem cells into different somatic cell lineages.

Module-III:

Basics of human anatomy & physiology and role of pluripotent stem cells and adult stem cells in maintenance of normal human physiology.

Module-IV:

Effect of breach in normal cellular physiology and hoemostasis on human development. Role of healthy diet in epigenetics and epigenetic reprogramming. Metabolic reprogramming in normal physiology and disease development.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

MOLECULAR MEDICINE

Course Code: SCT2302 **Credit Units: 03**

Course Objective
The students will be exposed to basic concepts related with human health development of different types of infectious and non-infectious diseases.

Course Contents
Module I: Medical Biotechnology
History and scope of medical biotechnology, current status and future prospects.

Module II: Classification of genetic diseases
Chromosomal disorders – Numerical disorders e.g. trisomies & monosomies, Structural disorders e.g deletions, duplications, translocations & inversions, Chromosomal instability syndromes. Gene controlled diseases – Autosomal and X-linked disorders, Mitochondrial disorders.

Module III: Molecular basis of human diseases
Mechanism of disease development, Genetic susceptibility, Identification of targets for diagnosis and therapy: Acquired diseases, cardiovascular diseases, Neurological diseases, Hematology, Cancer. Pathogenic mutations: Gain of function mutations: Oncogenes, Huntingtons Disease, Pittsburg variant of alpha 1 antitrypsin. Loss of function: Tumour Suppressor. Dynamic Mutations - Fragile- X syndrome, Myotonic dystrophy. Mitochondrial diseases.

Module IV: Traditional and Modern Tools for Detection of Genomic Abnormalities
Classical gene mapping techniques, next generation sequencing technology.

Module V: Nucleic acid based Therapy
Gene silencing technology, siRNA, Aptamers, antisense oligodeoxynucleotides (AS-ODN), Ribozymes, Peptide Nucleic Acids, Zinc Finger Nucleases (ZFNs), Talen, CRISPR.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (August 15, 2000) ISBN-10: 0896037983
- Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon Sales Rank: #287831 in Books
- Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank
- Principles of Biostatistics by Marcello Pagano , Kimberlee Gauvreau
- Essentials of Epidemiology in Public Health, Second Edition by Ann Aschengrau, George R., III Seage
- Designing Clinical Research: An Epidemiologic Approach, by Stephen B. Hulley, Steven R. Cummings
- Journal articles and reviews

IMMUNOLOGY-II

Course Code: SCT2303 **Credit Units: 02**

Course Objective:
Role of antibody engineering in biomedical applications and the importance of immune-genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I: Antigen, antibody definitions, properties and utility
Antigens and Antibodies: Factors responsible for immunogenicity, Epitopes, Adjuvants, superantigens, Antigen Presentation and processing, Structure and function of antibody, Antibody classes, Passive antibody therapy, Monoclonal antibody, Antibody engineering, Generation of antibody diversity

Module II: Autoimmunity, Hypersensitivity and Immunodeficiency
Tolerance and Autoimmunity, Types and mechanism of autoimmune diseases, Hypersensitive reactions, Transplantation types, Immunological basis of graft rejection. Primary and secondary immunodeficiency, AIDS

Module III: Tumor immunology, Immunity to infectious agents
Immune response to viral infections, Tumor immunity and Tumor antigens, Immunodiagnostics (diagnosis of infectious diseases)

Module IV: vaccines
General consideration, ideotype network hypothesis, Synthetic vaccines: Active and passive immunization, Vaccine types (Live but attenuated, Killed, Subunit, Recombinant, DNA and Peptide).

Module V: Hybridoma technology and its applications
Fusion of myeloma cells with lymphocytes

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

RECOMBINANT DNA TECHNOLOGY

Course Code: SCT2304 **Credit Units: 02**

Course Objective:
A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR for the cloning and expression of genes can be obtained through the course.

Course Contents:

Module I
Purification of DNA from bacterial, plant and animal cells, manipulation of purified DNA. Introduction of DNA into living cells, transformation, transduction, electroporation, micro-injection.

Module II
Introduction to gene cloning and its uses, tools and techniques: plasmids, cosmids, transposons and other vectors, DNA, RNA, cDNA, viral and non-viral vectors.

Module III
Clinical applications of recombinant technology; Erythropoietin; Insulin analogs and its role in diabetes; Recombinant human growth hormone; Streptokinase and urokinase in thrombosis; Recombinant coagulation factors, Monoclonal antibodies and their role in cancer; Role of recombinant interferons; Immunostimulants; Immuno-supressors in organ transplants; Role of cytokine therapy in cancers.

Module IV
Analysis of DNA by Southern blotting, Analysis of RNA by Northern blotting, Analysis of proteins by Western blot techniques, Dot blots and slot blots, RFLP, AFLP.
PCR: Basic principles and its modification application and uses.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:
- Gene cloning and DNA analysis by T.A. Brown

References:
- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc
- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press
- Molecular Biology of gene by Watson, Baker, Bell, Gann, Levine, Losick
- DNA Science by Micklos Freyer
- Principles of Gene manipulation and Genomics by Primrose and Twyman

NANO-BIOTECHNOLOGY AND NANO-MEDICINE

Course Code: SCT2305 **Credit Units: 02**

Course Objective:
Students will learn basic concepts, techniques and technologies involving nanomaterials, and their applications for biotechnology and medical applications.

Course Contents:
Module I:
Introduction to Nanotechnology: Historical perspective of development and applications of nanostructured materials, physical environmental regulations governing nanomaterials, and rules governing health and safety regulations for chemicals and nanomaterials.

Module II:
Investigation and manipulation of nano-materials: Principle and applications of electron microscope, scanning probe microscope, optical microscope, Fourier transform Infrared spectroscopy, X-ray photoelectron spectroscopy, and X-ray diffraction for nanoscience and technology.

Module III:
Nanostructures for medicinal applications and toxicity: Introduction to nanomedicine and nanobiotechnology materials; their applications, therapeutic and commercial implications. Micro- and nanoscale control of cellular environment for tissue engineering. Nanoparticle contrast agents for molecular magnetic resonance imaging. Nano-material-based cancer therapeutics.

Module IV:
Safety and regulatory issues associated with nanomaterials: Nanomaterial cytotoxicity and geno-toxicity analysis, in-vivo-tests and assays. Biological barriers to nanocarrier-mediated delivery of therapeutic and imaging agents.

Module V:
Societal implications of nanoscience: From first industrial revolution to nano-revolution. Implications of nanosceicne and nanotechnology for society, nano policies, nano arms race, public perception and public involvement in nano discourse. Harnessing nanotechnology for economical and social development

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Texts:

- Nanobiotechnology: Concepts, Applications and Perspectives by Christof M. Niemeyer and Chad A. Mirkin, First Wiely 2006, ISBN: 978-3-527-60591-0.
- Nanobiotechnology II: More Concepts and Applications by Chad A. Mirkin and Christofer M. ZNiemeyer, Wiely 2007, ISBN: 978-3-527-31673-1.
- Nano-The essentials- Understanding the nanoscience and technology by T. Pradeep, Tata McGraw-Hill Publishing Company Limited 2008, ISBN-10:0-07-154829-7/0071548297.

GENOMICS & PROTEOMIC ALGORITHMS

Course Code: SCT2306 **Credit Units: 02**

Course Objective:
The course involves a basic understanding of computer and bioinformatics tools and skills in the field of biology.

Course Contents:

Module I: Essential Probability and Statistical Models
Conditional Probability, Bayesian Probability, HMM, Profile HMM, Mapping and Sequencing Algorithms

Module II: Similarity Searching Algorithms
Global and local alignments, statistical significance of alignments, scoring matrices and gap penalties, position specific scoring matrices, programs and methods for Pairwise and multiple alignment, pattern searching programs,

Module III: Gene Predictive Methods
family and superfamily representation - Pfam, hidden Markov models Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Gene finding,

Module IV: Classification algorithms
Phylogenetic analysis, Evolutionary Models, Character and distance based Tree building methods; tree evaluation, phylogenetic analysis, parsimony, maximum likelihood trees; Trees-splits and metrics on trees, tree interpretation, Distance – additive, ultrametric and nonadditive distances.

Module V: Proteomics Algorithms
Algorithms for Secondary, tertiary structure prediction methods, docking, protein-protein, protein-DNA interaction algorithms, minimization and simulation algorithms, peptide sequencing problem, .

Module VI: Comparative genome analysis
Algorithmic basis of reconstruction of metabolic pathways; genome rearrangements with inversions, signed inversions, functional classification.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Gusfield, Dan. *Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology*. Cambridge, UK: Cambridge University Press, 1997. ISBN: 0521585198.
- Waterman, Michael. *Introduction to Computational Biology: Maps, Sequences, and Genomes*. Boca Raton, FL: CRC Press, 1995. ISBN: 0412993910.
- Durbin, Richard, Graeme Mitchison, S. Eddy, A. Krogh, and G. Mitchison. *Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids*. Cambridge, UK: Cambridge University Press, 1997. ISBN: 0521629713.
- Jones, Neil, and Pavel Pevzner. *An Introduction to Bioinformatics Algorithms*. Cambridge, MA: MIT Press , 2004. ISBN: 0262101068.

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F Quellette, Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag

IMMUNOLOGY-II LAB

Course Code: SCT2307 **Credit Units: 01**

Course Contents:

Module I
Identification of blood group. Blood film preparation and identification of cells.

Module II
Isolation of serum. Purification of lgG through affinity chromatography

Module III
Immunohistochemistry. Lymphoid organs and their microscopic organization.

Module IV
WIDAL Test

Module V
Radial Immuno-diffusion Test. Ouchterlony Double diffusion Test. DOT, Sandwich ELISA.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

RECOMBINANT DNA TECHNOLOGY LAB

Course Code: SCT2308 **Credit Units: 01**

Course Objective:
The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I
Study of cloning (GFP cloning)

Module II
Design and execution of PCR, RT-PCR, quantitative RT-PCR

Module III
Study of Southern hybridiosation

Module IV
Study of RAPD

Module V
Site directed mutagenesis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

GENOMICS & PROTEOMIC ALGORITHMS LAB

Course Code: SCT2309 **Credit Units: 01**

Course Contents:

Module I
Three dimensional Structures – In silico study – large molecular complexes RNA polymerase II, ribosome, unstructured proteins

Module II
Microarray and Microarray data analysis, DNA sequencing methods, next generation sequencing.

Module III
Comparison of two given genomes

Module IV
Inference of protein function from structure

Module V
Gene finding tools and Genome annotation.

Examination Scheme:

IA			**EE**			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

NANO-BIOTECHNOLOGY & NANO-MEDICINE LAB

Course Code: SCT2310 **Credit Units: 01**

Course Objective:
This course offers understanding of generation of nano particles, their characterization and applications.

Course Contents:

1. Demonstration about occupational health and safety (OHS) and workplace health and safety (WHS) in nanotechnology.
2. Preparation of aqua regia, its handling and role in washing glass-wares for metal nanoparticles sysnthesis.
3. Optimization of temperature for metal nanoparticle preparations using biological materials.
4. Synthesis of silver nanoparticles and analysis of their surface Plasmon resonance (SPR) properties.
5. Neem extract mediated silver nanoparticle synthesis and analysis of their optical properties.
6. Dye degradation using silver nanoparticles synthesized in experiments 4 and 5.
7. Preparation of metal oxide nanoparticles and their characterization.
8. Interactions of silver nanoparticles with red blood cells.
9. Interaction of silver nanoparticles with bacterium and their antimicrobial properties.
10. Preparation of nanoparticles containing polymeric films.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR/ WORKSHOP)

Course Code: SCT2311 **Credit Units: 01**

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	**100**

FERMENTATION TECHNOLOGY

Course Code: SCT2312 **Credit Units: 02**

The course will educate students about use microorganism to produce various compounds of commercial interest. The student will be exposed to various techniques available for large scale cultivation of microorganisms.

Course Contents:

Module I

Introduction to fermentation process, Batch and Continuous production systems of cultivation, Solid-state fermentation process.

Module II

Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III

Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV

Production of fermented dairy products

Module V

Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Principles of Fermentation Technology by P.F. Stanbury, A. Whitaker, and S.J. Hall, Aditya Books (P) LTD.
- Industrial Microbiology by L.E.Casida, JR. New Age International (P) LTD.
- Biotechnology, A Text book of Industrial Microbiology, W. Crueger and A. Crueger, Sinauer Association.

References:

- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Biochemical Engineering Fundamentals, J.E. Bailey and D.F. Ollis, McGraw-Hill
  Protein Purification, M.R. Ladisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society ***Text:*** Industrial Microbiology – Cassida
  Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescot & Duhn.

Syllabus - Fourth Semester

HUMAN PLURIPOTENT STEM CELL CULTURE & DIFFERENTIATION METHODS

Course Code: SCT2401 **Credit Units: 02**

Course Objective: The objective of this paper is to provide students greater understanding of methodologies for generation of different cell lineages from pluripotent stem cells, and their phenotypic and functional characterization.

Course Contents:

Module-I:
History of human pluripotent stem cell development: isolation of human embryonic stem cells, generation of human induced pluripotent stem cells (iPSC).

Module-II:
Methodologies for pluripotent stem cell culture, characterization of pluripotency. Methods for differentiation of PSC into different lineages, e.g. RBCs, platelets, lung cells, heart cells, neuronal cells, and their functional characterization.

Module-III:
Methods to engineer pluripotent stem cells for treatment of genetically impaired conditions/diseases: Viral and non-viral vector-mediated gene delivery, homologous gene recombination-mediated genome engineering, CRISPR/TALEN-mediated gene editing.

Module-IV:
Stem cell-based organogenesis, xeno-free culture systems for stem cell-based therapeutics, Immunogenicity of PSC, 3D-culture systems and bioreactors for stem cell culture and differentiation.

Module-V:
Ethical, regulatory and safety issues affective pluripotent stem cell-based cell replacement therapies. Technological challenges towards development of pluripotent stem cell-based cell replacement therapies. Methodologies and recent advances in development of stem cell-based clinical trials.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

CANCER BIOLOGY & CANCER THERAPEUTICS

Course Code: SCT2402 **Credit Units: 02**

Course Objective: The objective of this paper is to provide students greater understanding of different approaches for T cell-based and antibody-based cancer immunotherapy approaches.

Course Contents:

Module I

Biology and mechanism of cancer development. Chemotherapy, radiation therapy, immunotherapy of cancer.

Module II

History of Vaccine Development, Definition of Vaccine, Evolution of Vaccines, Process development for vaccines, Manufacturing of vaccines, Various aspects of vaccines, process development and manufacturing.

Module III

Clinical development of vaccines, Clinical end-point: Evolution of vaccines, General specifications and pharmaceuticals release criteria for the existing vaccines, Cold chain management of vaccines, Current vaccine research: Immune checkpoint strategies in cancer immunotherapy.

Module IV

Engineered anti-tumor immunity: T cell receptor (TCR) and chimeric antigen receptor technology development and TCR/CAR-engineered anti-tumor immunity.

Module V

Antibody-based cancer immunotherapy. Antibodies as drug carriers.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (August 15, 2000) ISBN-10: 0896037983
- Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon Sales Rank: #287831 in Books
- Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank
- Principles of Biostatistics by Marcello Pagano , Kimberlee Gauvreau
- Essentials of Epidemiology in Public Health, Second Edition by Ann Aschengrau, George R., III Seage
- Designing Clinical Research: An Epidemiologic Approach, by Stephen B. Hulley, Steven R. Cummings
- Journal articles and reviews

PRECLINICAL ANIMAL MODELS

Course Code: SCT2403 **Credit Units: 02**

Course Objective:
The application of Animal Biotechnology covers major areas related to commercial applications. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I
Historical perspectives, sterilization methods, organ culture - culture techniques, plasma clot, raft methods, agar gel, grid method, organ engineering. Cell culture substrates, cultural media, natural and artificial media, initiation and maintenance of cell cultures, cell culture products, cryopreservation techniques, immobilized cultures

Module II
In vitro fertilization and embryo transfer

Module III
Somatic cell hybridization, hybridoma technology. Animal genetic engineering, vectors, gene transfer methods: microinjection, virus mediated and other methods of gene transfer

Module IV
Transgenic animals with new traits, transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutics. Animal models for cancer research.

Module V
Bioethical issues related to utilization of animals in ,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References

- Cell Culture LabFAx, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication

MOLECULAR MODELING & DRUG DEVELOPMENT

Course Code: SCT2404 **Credit Units: 02**

Course Objective:
The above course will be aimed to identify and design drugs that could be potentially useful in the identification of the candidate drugs, which have efficacy in cell culture or animal models, and thus the most effective compounds could be employed based on the above results for being moved through preclinical studies to clinical trials.

Course Contents:

Module I: Drug targets classification
DNA, RNA, post-translational, processing enzymes, metabolic enzymes involved in nucleic acid synthesis, G-protein coupled receptors (monomeric transmembrane proteins), small molecule receptors, neuropeptide receptors, ion channels (monomeric multi-transmembrane) proteins, ligand-gated ion channels (oligomeric transmembrane proteins), transporters (multi-transmembrane proteins).

Module II: Target discovery and validation strategies
Genomics (new target discovery), biological activity directed and other types of screening, natural products, combinatorial chemistry; General overview of validation techniques.Drug Discovery: Drug design-Ligand based, Structure based, Active site identification, rational drug discovery High throughput screening, Structure Activity Relationship (SAR), Quantitative Structure Activity Relationship (QSAR), Computer assisted drug designing (CADD).

Module III: Structure-based design
Drug design to discovery and development, drug metabolism, toxicity and pharmacokinetics, toxicology considerations, problems and drawbacks on drug discovery and development.
'de novo' design methodologies : indirect drug design, pharmacophore development and receptor mapping, combinatorial libraries and new strategies and recent technologies in drug design.

Module IV: Basic concepts of Drug Delivery
Introductory lecture (1-2), Concepts of Bio availability, Process of drug absorption, Pharmacokinetic processes, Timing for optimal therapy, Drug delivery considerations for the new biotherapeutics
Basic terminologies in drug delivery and drug targeting, Drug release, Drug targeting, Doses forms, Various routes of administration of drugs (just introduction), Strategies for enhanced therapeutic efficacies (Basic principles)

Module V: Delivery of Genetic material
New generation technologies in Drug delivery and targeting
Nanotechnology / Nanobiotechnology, Use of biosensors and challenge of chronopharmacology, Microchips and controlled drug delivery, genetically engineered cell implants in drug delivery.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Drug Delivery and Targeting, A.M. Hillery, A.W. Lloyd and J. Swarbrick, Harwood Academic Publisher
- Pharmaceutical Dosage Forms and Drug Delivery Systems, H.C. Ansel, L.V. allen and N.G. Popovich, Lippincott Williams and Wilkins Publisher

References:

- Introduction to Biophysical Methods for Protein and Nucleic Acid Research, J.A. Glasel and M.P. Deutscher, Academic Press.
- Principles of Drug Action, W.B. Pratt and P. Taylor, Churchill Livingston.
- Principles of Medicinal Chemistry, W.O. Foye, T.L. Lemke, and D.A. Williams, Williams and Wilkins
- Side Effects and Drug Design, E.J. Lien, Marcel Dekker.
- The Anticancer Drugs, W.B. Pratt, R.W. Ruddon, W.D. Ensminger, and J. Maybaum, Oxford University Press.

PLANT BIOTECHNOLOGY AND ITS APPLICATIONS IN MOLECULAR MEDICINE

Course Code: SCT2405 **Credit Units: 02**

Course Objective:
The application of Plant Biotechnology covers major areas related to commercial applications. Regeneration of plants through *in vitro* techniques offers a practical strategy for micro propagation. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I
Historical perspective of plant tissue culture.
Tissue culture lab and organization
Sterilisation techniques
Types of nutrient media and media composition
Plant regeneration pathways
Role of phytohormones
Cell culture techniques- cell, tissue, organ cultures, callus culture, suspension culture
Culture techniques Callus culture, cell culture and protoplast cultures.

Module II
Organogenesis and somatic embryogenesis.
Applications of plant tissue and cell culture.
Micropropagation, pathogen free plants. production haploids,
Somaclonal variation.preservation of germplasm.

Module III
Genetic engineering in plants, - transformation vectors
Gene transfer techniques-vector meditated and vector less gene transfer.
Transgenic plants transgene integration and expression

Module IV
Transgenic crop with new traits-herbicide tolerance, insect and disease resistance,
Therapeutic proteins and compounds
Oral vaccines
Production of secondary metabolites via tissue culture
Bioethics of plant genetic engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P.McGarvy and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Adacemic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences

MOLECULAR IMMUNOLOGY LAB

Course Code: SCT2406 **Credit Units: 01**

Course Objective:
Students will learn methods for isolation, culture and maintenance of immune cells, for example T cell lines, human primary T cells and antigen presenting cells. Students will also learn nuances of antigen-specific immune response generation, antigen processing and presentation, cell phenotype analysis, cell proliferation, cell death and cytotoxicity assays.

Course Contents:

1. Culture of immortalized immune cell lines, for example Jurkat, T2-A2 etc.
2. Isolation of CD4 and CD8+ T cells from human peripheral blood.
3. Cell phenotype analysis, calculation of CD4:CD8 ratio in normal healthy individual blood.
4. Isolation and characterization of antigen presenting cells.
5. Activation of T cells by non-specific stimulus as well as by engaging their T cell receptor (TCR).
6. Cell proliferation assay.
8. Generation, and phenotypic and functional characterization of antigen-specific T cell response.
9. B cell culture and hybridoma technology.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

MOLECULAR MODELING & DRUG DEVELOPMENT LAB

Course Code: SCT2407 **Credit Units: 01**

Course Objective:
The above course will enable the student to handle in silico drug designing , docking , modeling and simulation using various software such as Schrodinger Biologics Suite, Spdbviewer, Modeller, Desmond and few other online resources. The students gains insights into the life cycle of drug development.

Course Contents:

1. Protein Structural Visualization
2. Homology Modeling
3. Drug Docking
4. Pharmacophore Designing
5. QSAR studies
6. Basics of molecular simulation studies

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR/ WORKSHOP)

Course Code: SCT2408 **Credit Units: 01**

Course Objective:

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	**100**

WORKSHOP / CERTIFICATION

Objectives
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two way. The trainer has to make sure that the aspect covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop
The workshop may be conducted on any of the following major themes:
Accounting
Finance
Human Resources
Marketing
Economics
Operations
Supply Chain Management
These themes are merely indicative and other recent and relevant topics of study may be included.

Guidelines for Workshop
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the trainer in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the trainer.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of at least 500 words about the learning outcome from the workshop.

Methodology
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study

Business Game
Simulation
Group Activity
Role Play
Business Planning
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
5	**35**	**30**	**30**	**100**

Syllabus - Fifth Semester

HUMAN PLURIPOTENT STEM CELLS-BASED THERAPEUTICS

Course Code: SCT2501 **Credit Units: 02**

Course Objective: The objective of this paper is to familiarize students with different therapeutic areas that can benefit with pluripotent stem cell-based therapies.

Course Contents:
Module-I:
Principles of cell replacement therapy and application of pluripotent stem cells in cell replacement therapy.

Module-II:
Application of pluripotent stem cells in neuronal disease management and treatment.

Module-III:
Application of pluripotent stem cells in ocular and cardiovascular diseases management and treatment.

Module-IV:
Application of pluripotent stem cells in treatment of autoimmune complications and cancer management and treatment.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

SYSTEMS BIOLOGY

Course Code: SCT2502 **Credit Units: 02**

Course Objective:
The course offers different tools and technologies for systems biology analysis, interpretation of data and development of hypothesis based on interpretations. Students will get acquainted with the diversity of different organisms and models and mathematical frameworks used in systems biology, and their application to a range of biological systems and processes.

Course Contents:

Module-I:
Concepts and working principles of System Biology.

Module-II:
The multi-scale and multi-disciplinary nature of Systems Biology. Introduction to System Biology platforms. Proprietary system Biology platform. Practical applications of System Biology in Life Sciences.

Module-III:
Microarray data analysis - Microarray analysis platforms - Introduction to Concepts and principles of Microarray technology - Application of Microarrays in Life Sciences.

Module-IV:
Different Markup languages used in systems biology. Introduction to NGS technology. Current research topics within the field

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Texts & References
Texts:

- System Biology: Computational Systems Biology (Hardcover) by Andres Kriete (Editor), Roland Eils (Editor)
- Stochastic Modelling for Systems Biology. ISBN-10 1-58488-540-8 and ISBN-13 978-158488-540-5
- Microarray Data Analysis: Gene Expression Data Analysis. A Beginner's Guide By: Helen Causton (Imperial College), J Quackenbush and AlvisBrazma (The European Bioinformatics Institute)
- A Practical Approach to Microarray Data Analysis (Hardcover) by Daniel P. Berrar (Editor), Werner Dubitzky (Editor), Martin Granzow (Editor)

ETHICS OF BIOMEDICAL RESEARCH, INTELLECTUAL PROPERTY (IP), IP RIGHTS (IPR)

Course Code: SCT2503 **Credit Units: 03**

Course Objective

The aim of this course is to develop the understanding of relevance, business Impact and protection of Intellectual Property along with the types of Intellectual Property Rights: Patents, Trademarks, Copyrights, Industrial Designs, Geographical Indications and International Conventions, Biosafety and Bioethics

Course Contents

Module I: Basic Principles and Acquisition of Intellectual Property Rights

Basic Principles of Patent Law, Patent Application procedure, Drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark and Design Rights, International Background of Intellectual Property

Module II: Ownership and Enforcement of Intellectual Property Rights

Patents-Objectives, Rights, Assignments, Defences in case of Infringement. Copyright-Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defences for infringement. Trademarks-Objectives, Rights, Protection of goodwill, Infringement, Passing off, Defences. Designs-Objectives, Rights, Assignments, Infringements, Defences of Design Infringement, Enforcement of Intellectual Property Rights - Civil Remedies, Criminal Remedies, Border Security measures, Practical Aspects of Licensing - Benefits, Determinative factors, important clauses, licensing clauses.

Module III: Biotechnology and Intellectual Property Rights

Objective, Evolution, Basic Structure of Gene Techniques, Applications, Commercial Potential of Biotech Inventions, Rationale for Intellectual Property Protection. Patenting Biotechnology Inventions-Objective, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions. Plant Varieties Protection-Objectives, Justification, International Position, Plant Varieties Protection in India Protection of Geographical Indications Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Module IV

Biosafety and Bioethics Management-Key to environmentally responsible use of biotechnology. Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques. Biosafety: History, evolution and concept of biosafety; need and application of biosafety in laboratories and industries; biosafety guidelines and regulations, international and national norms of biosafety; Implementation of biosafety guidelines; Classification and Description of Biosafety levels. Good laboratory practice (GLP) and Good manufacturing practice (GMP), Use of GMO's and their release, GM products, issues in use of GMO's, risk for animal/human/agriculture and environment owing to GMOs. Bioethics: Introduction and need of bioethics, its relation with other branches, types of risk associated with genetically modified microorganisms, Ethical Issues involving GMOs; ethics related to human cloning, human genome project, prenatal diagnosis, agriculture and animal rights, data privacy of citizens health; ethical issues in India and abroad through case studies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text

- Intellectual Property Rights by Birgitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Science Industries by Graham Dutfield, Ashgate Publishing

References

- WIPO Intellectual Property Handbook
- Intellectual Property by William Rodelph Cornish, David Clewelyn
- Globalising Intellectual Property Rights by Duncan Matthews
- Journals and Current magazines

CLINICAL TRIAL DESIGN

Course Code: SCT2504 **Credit Units: 03**

Course Objective:
Students will learn about the process a drug reaches to public, especially the development of clinical trials for testing the specificity, efficacy and toxicity of different drug candidates/ therapeutic molecules.

Course Contents:
Module-I:
History & Background of Origin of Clinical Research: Thalidomide tragedy, Sulphanilamide disaster, WMA Declaration of Helsinki- Ethical Principles for Medical Research Involving Human Subjects, The Belmont Report. Terminology in clinical research, Preclinical phases, First in human trials, Single ascending dose and multiple ascending dose studies, Exploratory clinical trials, Confirmatory clinical trials, post marketing surveillance

Module-II:
Types of trials: Pharmacoepidemiology, Meta-analysis, Case control study, Prevention Trials, diagnostic trial, Treatment trial, Case cohort study, Observational studies, Quality of life trials.
Fundamentals of Trial Design – Randomized clinical trial, uncontrolled trials, protocol development, end points, Patient selection, sources and control of bias, Randomization, sample size and power

Module-III:
Clinical Research Organization Structure and Functions: Definition, fundamental operations of CRO, Role and responsibilities of CRO, Organogram of CRO, basic documentation in CRO, Site Management organizations (SMO), Central Lab, Research Management Organizations and differences between Contract Research Organization/Site Management Organization/Research Management Organization, Functions of Quality Assurance and Quality Control Departments, Bioanalytical Departments, Clinical Project Management, Regulatory affairs, Medical Writing and Data Management, Biostatistics

Module-IV:
Study Execution Process- Study design, Feasibility, Overview of National regulatory applications, CR professional training and development, preparations and planning for clinical trials, CRF and monitoring, Training and site management**,** Budget Management of Clinical trials on Harmonization of technical requirements for registration of Pharmaceuticals for human use guidelines (ICH-GCP).

Module-V: Regulatory Requirements for Clinical Trials
Indian Council Of Medical Research- Ethical Guidelines for Biomedical Research on Human participants (ICMR), Indian Good Clinical Practices
· **International Regulatory bodies and Guidelines**:
o ***US Food and Drug Administration(USFDA):*** The FDA and Food Drug and Cosmetics Act, New drug development and approval : the principal steps
o ***India****:* Regulatory laws, Schedule Y, registration of new drugs, requirements for registration, regulatory environment and practices
o ***Medicines and Healthcare Products Regulatory Agency (MHRA)***: Overview of regulatory environment/ background, regulatory authorities, regulatory requirements and procedures
o ***European Agency for Evaluation of medicinal Products(EMEA)***: National registration , the decentralized procedures, mutual recognition procedures
o ***Brazil*****:** Overview of regulatory affairs

Good Laboratory practices(GLP) : Organization and Personnel, Quality assurance program, Facilities, Equipments, reagents and Materials, Standard operating procedures, Storage of Records and Reports
Council for International Organizations of Medical Science (CIOMS) guidelines: CIOMS International Ethical guidelines for biomedical research involving human subjects, Principles Of Medical Ethics Relevant To The Protection Of Prisoners Against Torture (1983).

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text

- Intellectual Property Rights by Birgitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Science Industries by Graham Dutfield, Ashgate Publishing

References

- WIPO Intellectual Property Handbook
- Intellectual Property by William Rodelph Cornish, David Clewelyn
- Globalising Intellectual Property Rights by Duncan Matthews
- Journals and Current magazines

STEM CELLS AND REGENERATIVE MEDICINE LAB

Course Code: SCT2505 **Credit Units: 01**

Course Contents:

Module-I:
Stem cell isolation and characterization.

Module-II:
Generation of iPSC lines and characterization of their pluripotency profile and genome stability (Stem Cell Keryotype analysis).

Module-III:
Differentiation of iPSC into somatic cell lineages and characterization of stem cell-derived somatic cell populations.

Module-IV:
Functional characterization of stem cell-derived somatic cell populations.

Module-V:
Recent advances in stem cell therapeutics and stem cell-based drug discovery.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:
***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer.

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

SUMMER INTERNSHIP EVALUATION

Course Code: SCT2535 **Credit Units: 06**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➢ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➢ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➢ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➢ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➢ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➢ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

➢ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➢ **Future prospects**

➢ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➢ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infec*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	**100**

TERM PAPER

Course Code: SCT2531 **Credit Units: 01**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

e) Begin by making a list of subject-headings under which you might expect the subject to be listed.

f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

d) Get facts, not just opinions. Compare the facts with author's conclusion.

e) In research studies, notice the methods and procedures, results & conclusions.

f) Check cross references.

4. Outlining the paper

c) Review notes to find main sub-divisions of the subject.

d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

g) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

h) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

i) Check for proper spelling, phrasing and sentence construction.

j) Check for proper form on footnotes, quotes, and punctuation.

k) Check to see that quotations serve one of the following purposes:

(iv) Show evidence of what an author has said.

(v) Avoid misrepresentation through restatement.

(vi) Save unnecessary writing when ideas have been well expressed by the original author.

l) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

8) Title page
9) Table of contents
10) Introduction
11) Review
12) Discussion & Conclusion
13) References
14) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

e) summary of question posed
f) summary of findings
g) summary of main limitations of the study at hand
h) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: 40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR/ WORKSHOP)

Course Code: SCT2506 **Credit Units: 01**

Course Objective:

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	**50**
Presentation	**50**
Total	**100**

MEDICAL WRITING

Course Code: SCT2507 **Credit Units: 01**

Course Objective
To develop understanding of information and library science research issues in the domain of bioinformatics through review of journal articles, invited talks, and critical group discussions of methods. The main objectives for this course are to develop: familiarity with information and library science-oriented problems in the biomedical sciences, an understanding of research methods in the biomedical domain, critical thinking and evaluation skills and presentation and summarization skills.

Course Contents
Module I
Introduction: Science, Scientific Field and Biological research. Role of a researcher in different stages of a project, Routes to research funding (academic and commercial)

Module II
Research – Definition – Importance and Meaning of research – Characteristics of research – Types of Research – Steps in research – Identification, Selection and formulation of research problem – Research questions – Research design – Formulation of Hypothesis – Review of Literature.

Module III: Sampling techniques
Sampling theory – types of sampling – Steps in sampling – Sampling and Non-sampling error – Sample size – Advantages and limitations of sampling. Collection of Data: Primary Data – Meaning – Data Collection methods – Secondary data – Meaning - Relevance's, Limitations and cautions. Statistics in Research.

Module IV
Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Module V
Case studies of areas of current research. Formulating a research plan and its presentation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Statistical Methods By S.P. Gupta

***References*:**
- Research Methodology Methods and Techniques by C.R. Kothari
- Statistics(Theory and Practice) by B.N. Gupta
- Research Methodology Methods and statistical Techniques by Santosh Gupta
- Scientific journals and magazines

Syllabus - Sixth Semester

PROJECT/ DISSERTATION

Course Code: SCT2637 **Credit Units: 12**

Course Objective:
The students are expected to utilize their scheduled periods by undertaking the project that would be completed during the semester

Every student shall undertake a major Project. The major Project shall be undertaken in some biotechnology industry or laboratory of repute. Each student shall be assigned to a faculty who shall continuously monitor the progress of the Project in the concerned laboratory or industry. The faculty, in consultation with the concerned scientist of the industry/laboratory, shall decide the topic of the project. At the conclusion of the project the student shall submit a seminar and a dissertation. The dissertation shall be evaluated by the internal faculty/examiner. The student then shall have to appear for the viva voce examination.

GUIDELINES FOR PROJECT FILE
Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include
- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout
The report should contain the following components:

➢ **Title or Cover Page**
The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)
Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➢ **Abstract**
A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➢ **Table of Contents**
Titles and subtitles are to correspond exactly with those in the text.

➢ **Introduction**
Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➢ **Materials and Methods**
This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➢ **Results and Discussion**
Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

➢ Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

➢ **Conclusion**
A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➢ **Future prospects**

➢ **Appendices**
The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➢ **References / Bibliography**
This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples
For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book

Kowalski, M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation:	50
Viva Voce:	50
Total:	**100**

ANALYSIS OF BUSINESS OF SCIENCE AND ALTERNATIVE CAREERS IN MOLECULAR MEDICINE & REGENERATIVE MEDICINE

Course Code: SCT2601 **Credit Units: 01**

Course Objective:
Students will be provided study material on business aspects of science/biotechnology. Material may include papers, articles, webinars etc.

Examination Scheme:
Assignment/Project/Viva: 100

INDUSTRY TRENDS AND CAMPUS RECRUITMENT EVENTS AND CAREER COUNSELING

Course Code: SCT2602 **Credit Units: 01**

Course Objective:
Students will be provided study material on Molecular Medicine and Stem Cell Technology Industry trends. Material may include papers, articles, webinars etc..

Examination Scheme:
Assignment/project: 100

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

SEMESTER – I

Principal of Nutrition

Course Code: DAN2151 **Credit Units: 03**

Module I

Nutrition - General introduction, Classification of nutrients, Functions of food, social function of food, psychological functions of food.
Energy - Definition of Kilocalories, Joule, energy value of foods, determination, physiological fuel values, SDA of foods, determination of energy requirements of body, basal metabolic rate determination, factors influencing BMR, Recommended Dietary Allowances for energy.

Carbohydrates - functions, source, digestion, absorption and utilization, dietary fiber and health.

Module-II

Protein - Classification, functions, sources and requirements, digestion, absorption and Utilization, Deficiency due to shortage of protein and energy – PCM, kwashiorkor
Fats and Lipids - Classification, functions, sources, requirement, digestion, absorption and utilization

Module-III

Vitamins – Fat soluble vitamins –A, D, E and K- functions, source, requirements, deficiency disorders. Water soluble vitamins –The B-complex vitamins – Thiamine, Riboflavin, Niacin, Folic acid, Biotin, Pantothenic acid and Vitamin C - functions, source, requirements and deficiency disorders.

Module-IV

Minerals - General functions in the body, classification- macro and micro minerals. Micro minerals – Iron, Fluorine, Zinc, copper, Iodine -functions, absorption, utilization, requirements, deficiency and toxicity. Macro minerals – Calcium & phosphorus - functions, absorption, utilization, requirements, deficiency and toxicity.

Module-V

Water Balance – Functions of water, water distribution, maintenance of water and electrolyte balance, regulation of acid-base balance in the body.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCE:

1. Essential of food & Nutrition –Vol. 1 M. Swaminathan, Bappco, Bangalore.

2. Human Nutrition and Dietetics –Davidson S. Passmore

3. Normal and Therapeutic Nutrition- Corinne .H.Robinson & Marilyn Lawler

4. Contemporary Nutrition - Gordon M. Wardlaw, Paul Insel et, al., (2000) Mosby, Chicago.

5. Nutrition- concepts and controversies- Eleanor Whitney –Eighth Edition (2000)

6. Basic principles of Nutrition- Seema Yadav, First edition (1997)

7. Essentials of Nutrition and Diet therapy -Sue Rodwell Williams, fifth edition, Times Mirror Mosby College Publishing, 1990.

8. Understanding Nutrition -Whitney P.N. and Roes S.R., West Publication Co, 1996.

SEMESTER – I

Food Science-I

Course Code: DAN2101 **Credit Units: 03**

Module-I

Food group: Basic 4, 5&7food groups; functional food groups-energy yielding, body building and protective foods (only sources and not properties and functions)food pyramid

Module-II

Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting , broiling, cooking under pressure. Stages of sugar cookery, crystallization and factors affecting crystallization.

Module-III

Cereals - Structure, composition of rice, wheat, effects of cooking on parboiled and raw rice, principles of starch cookery, gelatinization, flours-types, formation of dough and batter, hydration, rheological properties and development of gluten.

Module-IV

Pulses and Legumes – Varieties of pulses & legumes, composition, nutritive value, cooking quality of pulses, germination and its effect.

Module-V

Vegetables - Classification, composition, nutritive value, selection and preparation for cooking, methods and principles involved in cooking, and medicinal value of vegetables.

Fruits - Classification, composition, nutritive value, changes during ripening, methods and effects of cooking, enzymatic browning and medicinal value of fruits.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCE:

1.Food Science, Chemistry and Experimental Foods by M. Swaminathan.

2.Food Science by Norman.N.Potter.

3.Experimental Study of Foods by Griswold R.M.

4.Food Science by Helen Charley.

5.Foundation of Food Preparation by A.G. Peckam.

6.Modern Cookery for teaching and trade, volume I&II ,Thangam Philip. Orient Longmans Ltd.

7.Food Fundamentals by MacWiliams, John Willy and son's, New York.

8.Food Facts & Principles by Shakunthala manay & Shadakhraswamy.

9.Food Science by Srilakshmi , second edition,2002.

SEMESTER – I
Nutritional Biochemistry

Course Code: DAN2102 **Credit Units: 04**

Module I:

Membrane Structure, Enzymes and Biologic Oxidation: Membrane Structure and functions, Transport of metabolites across membranes, Definition, importance, nomenclature and classification of enzymes, Factors affecting enzyme activity.

Coenzymes and cofactors, Enzyme inhibition and regulation. Importance of biologic oxidation, Components of electron transport chain, Oxidative phosphorylation and ATP generation.

Module II:
Carbohydrates: Chemistry and Metabolism
1. Definition, importance, classification and properties of carbohydrates
2. Carbohydrate metabolism (a) Glycolysis (b) Citric acid cycle (c) Glycogenesis (d) Glycogenolysis (e) Gluconeogenesis (f) Hexose Monophosphate shunt

Module III:
Lipids: Chemistry and Metabolism
1. Importance, classification and properties of lipids 2. Lipid metabolism (a) Oxidation of fatty acids (b) Fatty acid synthesis (c) Metabolism of unsaturated fatty acids (d) Metabolism of triglycerides, (e) Chain elongation and desaturase system. 3. Types of lipoproteins and their functions.

Module IV:
Amino acids and Proteins: Chemistry and Metabolism
1. Classification of amino acids
2. Structure of proteins – primary, secondary, tertiary and quarternary structures
3. Biologically important peptides
4. Functions of proteins
5. General reactions: Transamination, deamination and decarboxylation reactions
6. Urea cycle

Module V:
Nucleic acids and Nucleoproteins–Chemistry and metabolism
1. Chemistry and biological importance of nucleic acids
2. Nucleoproteins
3. Catabolism of purines, formation of uric acid and its relationship to Gout
4. Protein biosynthesis – translation, transcription and post translation events

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	**5**	**10**	**8**	**7**	**70**

References:

1. Principles of Biochemistry – A.L. Lehniger
2. Satyanarayana U and Chakrapani U (2010). Biochemistry. Books and Allied (P) Ltd., Kolkata
3. Weil JH (1990). General Biochemistry (6th ed.). Published by Wiley Eastern Ltd, New Delhi
4. Murray R, Rodwell V, Bender D, Botham KM, Weil PA, Kennelly PJ (2009). Harper's Illustrated Biochemistry (28th ed.) Published by McGraw-Hill Medical.
5. Conn EE and Stumpf PK, Bruening G and Doi RH (2006). Outlines of Biochemistry (5th ed.). Published by Wiley India Pvt. Ltd.
6. Mahansan, R. (2009). Practical Biochemistry. Published by Vayau Edu.
7. Hames BD and Hooper NM (2003). Biochemistry. (2nd ed). Published by Viva books private limited, New Delhi, India
8. Sharma S (1993). Practical Biochemistry (1st ed.). Published by Jaipur : Classic Publishing House.
9. Plummer D T (2008). An introduction to Practical Biochemistry (3rd ed.). Published by Tata McGraw Hill.

SEMESTER – I

Food Science – I Lab

Course Code: DAN2103 **Credit Units: 02**

Note: One recipe in each food group indicating best method of cooking

Food group Grouping of foods, discussion on nutritive value,

Sensory Evaluation

1. Cereals:

a) Microscopic study of different starches.

b) Methods of combining starch and boiling water.

C) Study of effects of moist heat on starch.

d) Preparation of white sauces and soups.

e) Gluten formation.

2. Pulses -
Effect of hard water, soft water, alkali, papaya on texture and cooking time of grams and dhals.

3. Vegetables -
Effect of shredding, dicing, acids, alkali, covering, steaming arid pressure cooking on the different pigments and acceptability of vegetables.

4. Fruits -
Study of different methods of preventing enzymatic browning of fruits. Pectin content of fruits.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER – I

Nutritional Biochemistry– Lab

Course Code: DAN2104 **Credit Units: 02**

1. Qualitative tests for sugars-glucose, fructose, lactose, maltose and galactose.
2. Qualitative estimation of reducing sugars.
3. Qualitative tests for proteins.
4. Qualitative tests for minerals.
5. Quantitative estimation of Calcium.
6. Quantitative estimation of Phosphorous.
7. Quantitative estimation of Vitamin-C.
8. Deamination Experiments
9. Estimation of total nitrogen in foods (Micro or Macro Kjeldahl methods)
10. Lipid extraction
11. Determination of Iodine value.
12. Estimation of Iron.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

AMITY UNIVERSITY HARYANA

Amity Medical School
B.Sc Home Science (Honours)
Semester –II

Syllabus (Semester system) w.e.f. 2013-16

EXAMINATION DISTRIBUTION SCHEME

Paper Theory	Name	Maximum marks	Exam Duration
DAN2251	Family Meal Management	70 (30*)	3 hrs
DAN2201	Food Science II	70 (30*)	3 hrs
DAN2202	Food Microbiology	70 (30*)	3 hrs

*** Internal Assessment = 30 each**

Total = 280 + 120 = 400

PRACTICAL EXAM DISTRIBUTION

Paper Practical	Name	Max Marks	Exam Duration
DAN2203	Food Science II Lab	70 (30*)	4 hrs
DAN2204	Food Microbiology Lab	70 (30*)	4 hrs

*** Internal Assessment = 30 each**

Total = 140 + 60 = 200

Total Marks Distribution = 300 + 200 = 500

SEMESTER – II
Family Meal Management

Course Code: DAN2251 **Credit Units: 03**

Module I
Protein quality - Definition of biological value, NPU, digestibility coefficient, PER definition and measurement. Reference protein, essential amino acids and mutual supplementation of dietary protein.
Fats : importance of essential fatty acids, their requirements and deficiency.

Basic Principles of Meal Planning - Basic meal pattern and its need to suit different income levels age and physiological stages.

Module II
Nutritional Needs during Pregnancy - Normal growth and weight change. Nutritional requirements, complications during various stages of pregnancy –
Nutrition during Lactation - Function of breast, physiology of lactation, hormonal control and relaxation, Milk output and factors affecting it, frequency of nursing- supply and demand, nutritional components of colostrum and mature milk. Nutritional requirements of lactating women.

Module III
Nutrition during Infancy - Growth and development, factors influencing growth, Advantages of breast feeding, difference between breast feeding and bottle feeding, factors to beconsidered in bottle feeding. Different types of milk formulae.
Weaning Foods - Weaning foods and commercially prepared baby foods. Uses of growth chart to monitor growth & development. Nutritional requirements of infants' upto one year. Weaning foods developed by different organizations. Problems of feeding in normal and premature infants.

Module IV
Nutritional needs of pre-school children (1-5 year) - Nutritional and food requirements of pre school children. Factors to be considered while planning meals for pre-school children. Eating problems of children and their management, preparation of supplementary foods using available low cost foods.
Nutrition for School children - Nutritional requirement, meal planning for school children, dental caries and packed lunch.

Module V
Nutrition during Adolescence - Physical Growth- changes and factors affecting height and weight, Nutritional requirement. Nutritional problems in adolescence- Iron deficiency anemia, anorexia nervosa and bulimia nervosa.
Nutritional needs of adults (men and women) – Nutrition and work efficiency. Menopausal and post menopausal women, hormonal changes, nutritional requirement of the adult in relation to occupation.
Nutrition During Old Age - Physiological changes in ageing- psycho-social and economic factors affecting eating behavior. Nutritional problems of aged and their management.
Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	100

REFERENCE:

1. Nutrition Trends in India -Vinodhini Reddy, Prahlad Rao, Govmth Sastry and Kashinath, NIN, Hyderabad, 1993.
2. Modern Nutrition in Health and Diseases- Shills, E.M. Olson, A.J. and Shike, Lea and Febiger
3. Dietetics -B. Srilakshmi, New Age International Pvt. Ltd, 2003.
4.NutritionScience-B.Srilakshmi,NewAgeInternationalPvt.Ltd., 2003.
5.Food,nutrition and diet therapy -Krause, Eleventh edition
6. Human Nutrition and Dietetics- Davidson S Passmore R, Brock JP, ELBS and Churchill, Livingstone.
7.Fundamentals of foods and Nutrition - Mudambi SR and Rajagopal M Y, Wiley Eastern Ltd.
8.ICMR- Nutritive value of Indian Foods, 1989.
9.Nutrition throughout the life cycle, Bonnie S.Worthinton, Roberts, Sue Rod well Williams., TheMcGraw- Hill company,1996.
10.Nutrition in the life span- Virginia Beal, John Wiley & sons New York.

SEMESTER – II
Food Science II

Course Code: DAN2201 **Credit Units: 03**

Module I

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and milk powder.

Module II

Egg - Structure, composition, selection, nutritive value, uses of egg in cookery, methods of cooking, foam formation and factors affecting foam formation.

Module III

Fleshy foods - Types of fleshy foods, meat structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, tenderness, methods of cooking meat and their effects.
Poultry – types, composition, nutritive value, selection, methods of cooking.
Fish - Structure, composition, nutritive value selection of fish, methods of cooking.

Module IV

Fats and Oils - Types of oils, function of fats and oils, shortening effects of oil, smoking point of oil, effect of heat on oil absorption and factors affecting absorption of oil.

Module V

Beverages - Classification, nutritive value, milk based beverages, fruit based beverages and preparation of carbonated beverages. Spices and Condiments - Uses and abuses.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCE:

1.Food Science, Chemistry and Experimental Foods by M. Swaminathan.
2.Food Science by Norman.N.Potter.
3.Experimental Study of Foods by Griswold R.M.
4.Food Science by Helen Charley.
5.Foundation of Food Preparation by A.G. Peckam.
6.Modern Cookery for teaching and trade, volume I&II ,Thangam Philip. OrientLongmans Ltd.
7.Food Fundamentals by MacWiliams, John Willy and son’s, New York.
8.Food Facts & Principles by Shakunthala manay & Shadakhraswamy.
9.Food Science by Srilakshmi , second edition,2002.

SEMESTER – II
Food Microbiology

Course Code: DAN2202 **Credit Units: 04**

Module I
Introduction and History of Microbiology - The theory of spontaneous generation, gene theory of disease, Louis pasteur's experiment. Different terminology of Heterotrophic nutrition, autotrophic nutrition, saprophytic, holozoic, host, culture, parasite.
Bacteria - Morphology, reproduction, growth curve, nomenclature, genera of bacteria important in food microbiology. Observation of motility of bacteria in bottle milk.
Mold - Morphology, reproduction, physiology and nutrition, genera of mold important in foods. Demonstration of mold growth in bread.

Module II
Yeast - Morphology, reproduction, classification, physiology and nutrition, process of hybridization, importance of yeast in food. Observation of yeast cells
Virus - Occurrence, morphology, reproduction, human viral disease caused by virus.
Algae - Occurrence, morphology, reproduction, importance of algae.
General principles underlying spoilage- fitness and unfitness of food for consumption, causes for spoilage, factors affecting kinds and number of micro organism in food, factors affecting the growth of micro organism in food.

Module III
Contamination and kinds of micro organisms causing spoilage of
Cereal products- grains, flour, baked products and cake.
Fruits and vegetables and their products- fruit juice, pickles.
Fleshy foods- meats, poultry and fish. Observation of milk spoilage.

Module IV
Contamination and kinds of micro organisms causing spoilage of
Eggs and milk and milk products- cream, milk frozen desserts and butter.
Fats and oils, bottled beverages, spices and condiments.
Food poisoning, food infection and food borne diseases.
Micro organism in air, air borne diseases.

Module V
Micro-organisms in Water - sources, bacteriological examinations, total count, test of E.Coli, purification of water, water borne diseases.
Micro organisms in sewage and sewage disposal.
Destruction of bacteria- sterilization, physical agents, light, desiccators, electricity, heat and chemical agents. Visit to micro lab to learn most probable number.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCE:

1. Frazier WC, Food Microbiology Mc Green Hill Book, 1985
2. Sullia SB and S Shantharam- " General Microbiology" Oxford and IBH Publishing Ltd., 1998.
3. Michael J. Pelczar, E.C.S.Cahn & Noel. R.Kruef- Microbiology.Tata McGraw- Hill Edition-1993.
4. Nicklin J. Graeme- Cook K, Page& Killington R- " Notes in Microbiology Bros Scientific Publishers- Preprinted 2001, 2002.
5. Eugene Rosenlarg & Irun R. Cohea- Microbial Biology- Holt- Saunders International Editions 1983.
6. James M.Jay ' Modern Food Microbiology International Thomson Publishing- Fifth Edn-1996.
7. Paul A.Ketchem- "Microbiology Concepts and applications Wiley International Edition-1942.
8. West BB wood-L Harger VT- Food Service in Institutions, John Wiley, 2003
9. Karls L Qauntity ,Food Sanitation, John Wiley, 1973

SEMESTER – II
Food Science II-Lab

Course Code: DAN2203 **Credit Units: 02**

1. **Eggs** -
   Coagulation of egg protein - factors, Egg white foam, effects of beating, sugar, acid and temperature
2. **Milk** cookery
   Coagulation of milk protein, panneer, cooking of vegetables in milk.
3. **FatsandOils** -
   Comparison of smoking temperature of some fats and oils.
4. S**ugar** and Jaggery -
   Different stages of crystallisation of sugar.
5. Experience in Baking (Group work) Cakes and biscuits.
6. Experience in preservation of foods (Group work) salting, pickling, preservation with sugar, jams, jellies, marmalades, squash, sauces and ketchup.
7. **Food adulteration** - Identification of common adulterants - Demonstration.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER – II
Food Microbiology- Lab

Course Code: DAN2204 **Credit Units: 02**

1. Demonstration of the different parts of the Microscope,the use and care of Microorgainism
2. Preparation of Bacterial smear,Simple staining
3. Preparation of Common Laboratory media for cultivation of Bacteria,Yeast & Mold
4. Microbiological Identification of Important Mould & Yeast - Rhizopus,Mucour,Aspergillus,Penicilliam,Sacromyces,Alternaria
5. Demonstration Of Micro biological analysis of water and Milk

Examination Scheme:

A				**EE**		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

AMITY UNIVERSITY HARYANA

Amity Medical School
B.Sc Home Science (Honours)
Semester –III

Syllabus (Semester system) w.e.f. 2013-16

EXAMINATION DISTRIBUTION SCHEME

Paper Theory	Name	Maximum marks	Exam Duration
DAN2351	Basic Dietetics	70 (30*)	3 hrs
DAN2301	Quantity Food Services	70 (30*)	3 hrs
DAN2302	Human Physiology	70 (30*)	3 hrs

*** Internal Assessment = 30 each**

Total = 280 + 120 = 400

PRACTICAL EXAM DISTRIBUTION

Paper Practical	Name	Max Marks	Exam Duration
DAN2303	Human Physiology Lab	70 (30*)	4 hrs

*** Internal Assessment =**

Total =

AREA ELECTIVE EXAM DISTRIBUTION

Paper	Name	Max Marks	Exam Duration
DAN2331	Research Paper		
DAN2332	Project		
DAN2333	Work Shop		
DAN2304	Food Science & Processing		

*** Internal Assessment =**

Total =

SEMESTER – III
Basic Dietetics

Course Code: DAN2351 **Credit Units: 03**

Module - I
Role of Dietician-hospital and community
Basic concepts in Diet Therapy
Therapeutic Adaptation of the normal diet

Module - II
Routine Hospital Diets- Regular diet, light diet, soft diet, full liquid diet and tube feeding.
Modifications of Diet -Febrile conditions, infections & surgical conditions.

Module - III
Diets of gastro intestinal disorders, renal diseases, liver diseases, obesity, cardio vascular disorders and diabetes mellitus.
Geriatrics - Role of diet.

Module - IV
Feeding infants & children - problems in feeding children in the hospital.
Feeding the patient - psychology of feeding the patient, assessment of patients needs.

Module - V
Nutrition & Diet Clinics - Patients check up and dietary counseling, education of the patient and follow up.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCE:
1.Krause and Mahan – Food ,Nutrition and Diet therapy, 6th Edition W.B. Saunders company, London
2. Normal and therapeutic nutrition –17th Edition, Robinson et. al ., Mac Millan Pub.Co., New York
3.ICMR(1989) Nutrient Requirements and recommended dietary allowances for Indians.
4.Antia FP (1987) Clinical Dietetics and Nutriton, Oxford University Press, New Delhi
5.Srilakshmi (2002) Dietetics, IVth Edition. New Age International (P) Limited, Publishers, New Delhi
6. Shubhangini. A. Joshi (2002) Nutrition and dietetics, Tata Mc Graw- Hill publishing company limited, New Delhi.
7. B. Srilakshmi (2002) Nutrition science, New age international (P) limited, New Delhi
8. Carolynn E.Town send and Ruth A. Roth (2002) Nutrition and Diet Therapy, Delmar publisher
9. Sue rod Williams, Nutrition and diet Therapy, Times Mirror Mosby College publishing,Boston, 1989.
10.The Indian journal of nutrition and dietetics, Avinashilingam Deemed University, Coimbatore

SEMESTER – III
Quantity Food Service

Course Code: DAN2301 **Credit Units: 04**

Module - I
Floor planning and layout – characteristics of typical food service facilities. Floor plan physical planning, space allocation for the various areas and flow of traffic through receiving, storage, preparation, service and dish washing areas. Working heights and dimensions of work centers, lighting, ventilation and pest – rodent control.

Module - II
Materials - Basic materials used in the manufacture of equipment, finishes and insulation. Strength and limitation of materials.

Module - III
Equipment - Equipment required for quantity food service-major and minor equipment with reference to food storage, preparation, service and cleaning. Factors influencing their selection and purchase. Arrangement of equipment in work centers, use, care and maintenance of equipment. Transition from traditional to modern equipment.

Module - IV
Meal Planning - Menu-principles involved in planning menu, types of menu.
Fuel: Cooking fuels-selection, advantages, limitations, safety measures and fuel saving techniques.

Module - V
Quantity food preparation – Selection, purchasing and storage of foods, standardization of recipe, portion control, utilization of left over foods.
Marketing of foods –Importance and need for advertisement.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCES:

1.Sethi and Mahan s.-Catering Management and integrated approach ,Johnwiley & Sons,New York .
2.Lillicarp DR – Food and Beverage Service ,Edward Arnold Pub.Malbourne .
3.Longnee K and Bieker CC – sanitary techniques in food service, Johnwiley & Sons,New York
4.Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York
5.Kotschevar LH and Terrell ME “Food Service Planning Layout and Equipment “, 2nd Edn.,John Wiley and sons ,New York ,1977.
6.Glow ,G.,”Catering Equipment and Systems Design ‘’ , Applied Science Publishers Ltd.,1977.
7.Unkelsbay,Nand Unkilesbay,k.”Energy management in Food service : Ellis Harwood Ltd.,England 1982.
8.West ,BB, Wood ,L.,Hargu VF and Shugart GS “Food service in Institutions”, Johnwiley & Sons,New York .
9.Kinton ,R and Ceserani ,V.”The Theroy of catering “, Arnold – Heinemam ,1985
10. Fundamentals of menu planning .Vanmost and Rein Hold Company , New york.
11.Marian C.Spears ,Food Service Organisation – Managerial and system approach ,prentice hall.inc.Osio,III rd edition ,1995

SEMESTER – III
Human Physiology

Course Code: DAN2302 **Credit Units: 04**

Module – I
Cell - Structure and functions
Tissues - Structure and functions
Digestive system - Anatomical consideration – structure & functions, Brief study of the organization of the digestion, absorption and assimilation of food.

Module – II
Blood, RBC,WBC, Platelets and Lymph. Blood coagulation, blood grouping and Rh factor.
Circulatory system - Heart structure and functions - cardiac cycle, pulse rate and measurement of blood pressure –definition and normal value (only).

Module – III
Respiratory system - Basic anatomy of the respiratory system, process of respiration, transport and exchange of oxygen and carbon di oxide in the body.
Endocrine glands - Structure and function of pituitary, thyroid, islets of langerhans and adrenal gland.

Module – IV
Reproductive system - Anatomy of the male and female reproductive organs. Menstrual cycle
Sense organs - Structure and function of eye, ear, nose, tongue and skin.

Module – V
Excretory system - Excretory organs - structure of kidney and functions, formation of urine, composition of urine.
Muscles - physiology of muscular action.
Central nervous system - Physiology of the nerve cell, parts of the central nervous system and function.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCE:
1. Chaterjee, C.C., Human Physiology, Vol-I&II Medical allied agency, Calcutta 1981.
2. Beat and Taylor, Living body. Mc.Graw hill company, Newyork.
3. Sathya Narayana, Essentials of Biochemistry(2000)
4. Saratha Subramanian,Text of Human Physiology(2000).
5. Stuart Ira Fox ,Human Physiology(2003)

SEMESTER – III
Human Physiology-Lab

Course Code: DAN2303 **Credit Units: 01**

1. Estimation of Hemoglobin
2. Determination of Blood Group
3. Collect biochemical reports of the patients and study the same and prepare field survey report
    a. Communicable diseases
    b. Non-Communicable diseases

4. Determination of Blood Clotting time
5. Cardiopulmonary Resuscitation
6. Blood Pressure determination

Examination Scheme:

A				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER – III
Research Paper-Concentration Elective

Course Code: DAN2331 **Credit Units: 02**

The students will be asked to do meta- analysis in brief(Article writing)

A **meta-analysis** refers to methods focused on contrasting and combining results from different studies, in the hope of identifying patterns among study results, sources of disagreement among those results, or other interesting relationships that may come to light in the context of multiple studies. In its simplest form, this is normally by identification of a common measure of effect size, of which a weighted average might be the output of a meta-analysis. The weighting might be related to sample sizes within the individual studies. More generally there are other differences between the studies that need to be allowed for, but the general aim of a meta-analysis is to more powerfully estimate the true effect size as opposed to a less precise effect size derived in a single study under a given single set of assumptions and conditions.

Examination Scheme:

A				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER – III
Project-Concentration Elective

Course Code: DAN2332 **Credit Units: 03**

Every student shall be allotted a project supervisor. The project supervisor shall be from the Department of Dietetics & Applied Nutrition.

The allotment of the project supervisor will be done during the semester. The topic of project will be finalized by the project supervisor. It is the responsibility of the project supervisor that the student is making the required progress in work.

The project must be completed and submitted in the form of a report by the end of the semester.

1. Individual Project
2. Any one diseases (Infection & fever, allergy, deficiency diseases, obesity)
3. Minimum five clinical cases
4. To present a report furnishing the following data

a) Hospital - lay out and organization

b) Medical profile

   a. general details
   b. family history, associated complications, drugs
   c. anthropometry and clinical status
   d. biochemical status
   e. biophysical status
   f. progress chart

c)Diet therapy

Examination Scheme:

A				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER – III
Workshop-Concentration Elective

Course Code: DAN2333 **Credit Units: 01**

It aims to provide a detailed insight on the simple practical aspects of the chosen topic by organising lectures followed by the group assignments .focus group discussion,Quiz ,debates and various modes of interactions .The registered participants will get participation certificate and one credit point.
Objectives
Potential trainers / participants will be able

Plan any low cost Nutritious recipe/Food product development
To plan general intervention strategies(action in order to improve eating habits)
Gather information on sensory evaluation or satisfaction level of the visitors/audience

Implementation:
This would be approximately 2 hours long after the completion of lectures. The student will ask the visitors to complete a form with details of their planned recipe including cost, nutritive value etc and its sensory evaluation. This information is necessary as it is important to have a complete idea of the acceptability to make their product better. They would be asked to fill the satisfaction scales/Feedback.This activity would be discussed in further depth during the workshop.

Examination Scheme:

A				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER – III
Food Processing-Area Elective

Course Code: DAN2304 **Credit Units: 03**

Module I
Cereals and Pulses
Milling of wheat - extraction of flour, refined wheat flour and pasta products
Milling of rice – parboiled rice, rice based instant food
Processing of corn, barley and millets – pearling, flaking and puffing, corn starch products, Malting
Pulses – Red gram, Bengal gram, black gram, green gram, soy based products, Decortication and dhal milling, elimination of toxic factors, fermentation and germination

Module II
Milk and Milk products
Collection, Standardization, pasteurization, homogenization, UHT processing, manufacture of paneer, khoa, curd, yogurt, cream, butter, cheese, ghee, flavoured milk, ice creams, dehydrated milk products

Module III
Fruits and vegetables
Harvesting, physiological and bio chemical changes during ripening, handling and storage, general methods of processing - extraction and pulping, raw material and product specifications and standards.

Module IV
Meat, poultry, fish and egg:
Ageing and tenderizing, curing, smoking and freezing of meat, fresh storage of meat. Meat based products: sausages, salaami, bacon. Fish processing and storage, pickling.
Egg: storage, frozen egg, dehydrated egg powder.
Others

Module V
a. nuts and oil seeds – pressing, solvent extraction, purifiction – degumming, refining, bleaching, deodourizing. Hydrogenation – margarines, shortenings
b. Spices – processing and extraction of essential oils and colours, storage and preservation
c. Tea, coffee and coco – Processing and storage

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCES:

1. Desrosier N W and Desrosier J N (1987) 'The Technology of Food Preservation', 4th Edition, CBS, New Delhi,
2. Fellows P J (2000) 'Food Processing Technology: Principles and Practice' 2nd edition CRC Woodhead Publishing Ltd., Cambridge.
3. Khetarpaul Neelam (2005) 'Food Processing and Preservation', Daya Publications, New Delhi.
4. Salunke D K and Kadam S S (1995) 'Hand book of Food Science and Technology: production, composition, storage and processing' Marcel Dekker INC, New York.
5. Sivasankar B (2002) 'Food Processing & Preservation' Prentice Hall, India.

AMITY UNIVERSITY HARYANA

Amity Medical School
B.Sc Home Science (Honours)
Semester –IV

Syllabus (Semester system) w.e.f. 2013-16

EXAMINATION DISTRIBUTION SCHEME

*** Internal Assessment = 30 each**

Total = 280 + 120 = 400

Paper Theory	Name	Maximum Marks	Exam Duration
DAN2451	Advanced Dietetics	70 (30*)	3 hrs
DAN2401	Food Service Mangement	70(30*)	3hrs
DAN2402	Quantity Food Services	70 (30*)	3 hrs
DAN2403	Clinical Nutrition	70 (30*)	3 hrs

PRACTICAL EXAM DISTRIBUTION

Paper Practical	Name	Max Marks	Exam Duration
DAN 2404	Food Service Management Lab	70 (30*)	4 hrs

*** Internal Assessment = 30 each**

Total = 70 + 30 = 100

Total Marks Distribution = 400 + 100 = 500

AREA ELECTIVE EXAM DISTRIBUTION

Paper	Name	Max Marks	Exam Duration
DAN2331	Research Paper		
DAN2432	Project		
DAN2433	Work Shop		
DAN2404	Fondation of Food Nutrition		

*** Internal Assessment =**

Total =

SEMESTER – IV
ADVANCED DIETETICS

Course code: DAN 2451 **Credit: 03**

MODULE I

Objectives of diet therapy - Role of a dietitian. Principles of diet preparation and counseling.

Normal diet in the hospitals –regular diet, liquid, semi liquid, light, soft diet, and bland diet.

Different types of Feeding - Basic concepts of oral feeding, tube feeding, IV feeding,
gastrostomy feeding.

MODULE II

Therapeutic diets for the following disorders:

a. Under weight - definition, etiology, treatment
b. Obesity - definition, etiology, treatment.
c. Diseases of the gastro intestinal tract-Peptic ulcer and duodenal ulcer, Dumping syndrome, constipation
d. Acute and chronic diarrhea -rehydration therapy.

MODULE III

Diseases of the liver and gall bladder (risk factors and diet therapy)
a) jaundice b) hepatitis c) cirrhosis d) fatty liver and diet therapy
Diseases of the cardio vascular system (risk factors and diet therapy)
a) atherosclerosis b) arteriosclerosis c) hypertension d) congestive heart failure

MODULE IV

Diabetes mellitus – causes, symptoms, bio-chemical changes, insulin, hypo-glycemic drugs, changes in the metabolism of carbohydrate, fat and protein, food exchange list, dietary management

Diseases of the kidney and urinary tract

a.Acute and chronic nephritis
b.Nephrotic syndrome
c.Renal failure
d.Urinary calculi
e.Uremia
Causes and dietary treatment of kidney diseases and dialysis.

Nutrition and cancer - Dietary guidelines for management.

MODULE V

Diet in Allergy - Definition, classification, common food allergy, test of allergy, diet therapy. Pre operative and post operative diets.

Diet in febrile conditions - Short duration e.g. Typhoid, Long duration e.g. Tuberculosis. Dietetic management of gout and phenyl ketonuria.

Diet in relation to deficiency diseases-Protein calorie deficiency, vitamin A deficiency and anemia.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Reference Books:

1.Krause and Mahan – Food ,Nutrition and Diet therapy, 6th Edition W.B. Saunders company, London
2. Normal and therapeutic nutrition –17th Edition, Robinson et. al ., Mac Millan Pub.Co., New York
3.ICMR(1989) Nutrient Requirements and recommended dietary allowances for Indians.
4.Antia FP (1987) Clinical Dietetics and Nutriton, Oxford University Press, New Delhi
5.Srilakshmi (2002) Dietetics, IVth Edition. New Age International (P) Limited, Publishers, New Delhi
6. Shubhangini. A. Joshi (2002) Nutrition and dietetics, Tata Mc Graw- Hill publishing company limited, New Delhi.
7. B. Srilakshmi (2002) Nutrition science, New age international (P) limited, New Delhi
8. Carolynn E.Town send and Ruth A. Roth (2002) Nutrition and Diet Therapy, Delmar
publisher
9. Sue rod Williams, Nutrition and diet Therapy, Times Mirror Mosby College publishing,Boston, 1989.
10.The Indian journal of nutrition and dietetics, Avinashilingam Deemed University, Coimbatore

SEMESTER – IV
FOOD SERVICE MANAGEMENT

Course code: DAN 2401 **Credits:03**

MODULE I

Different types of catering institutions and services, classifications of food service institutions according to
a. Function : Profit oriented, service oriented and public health facility oriented.
b. Method of processing : Conventional systems, Commissary system, fast food service system.
c. Service of food : Self service, tray service, waiter-waitress services

MODULE II
Organisation - Types and principles, organizational structure for catering institutions. Management - Definition, principles and techniques of effective management, leadership and managerial abilities. Tools of management-organisational chart, work study and work
improvement.

MODULE III
Personnel Management - Methods of selection, orientation, training, supervision and motivation of employees, importance of good human relations, legal aspects of catering.

MODULE IV
Cost control - Principles and methods of food cost control.
Financial management –Factors affecting food, labour, operating and overhead cost, budget, inventories.
Sanitation and safety-significance of hygienic management in food preparation and service, sterilization, pest control, garbage disposal.
Health care of food service personnel, safety measures to be adopted in foodservice.

MODULE V
Art in food service - Design selection-structural and decorative. Elements of design, principles of design, their application in food service institutions.
Color - Qualities of color, color schemes, flower arrangement-application of art principles in arranging flowers, styles and types.
Table service - Application of art in table service.
Home furnishing - With special reference to furniture and accessories, selection, factors to be considered and current trends.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Reference Books:
1.West ,BB, Wood “Food service in Institutions” ,Johnwiley & Sons,New York
2.Khan MA “Food service operations”, AVI publishing Company Inc.1987.
3..Sethi and Mahan S.-Catering Management and integrated approach, Johnwiley & Sons,New York .
4. Kotas R and Davis B “food cost control” Billing & Sons Ltd, Great Britian ,1976
5. Dr. B.K. Chakravati, “ A Technical guide to Hotel operation” , Metropolitan, New Delhi India.
6. Earl R. Palan and Judity A. Stadler (1986) Preparing for the food service Industry, AVI
Publishing& co

7. Mickey Warner (1989) Recreatoinal food service Management Van Nostrand Reinhold, Newyork.
8. J.M. Diwan (1997) Catering and food service Management, Common Wealth publishers.
9.Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York

SEMESTER – IV

Quantity Food Production

Course Code: DAN 2402 **Credit: 03**

Course content:

MODULE I
Aims and objectives of different food service outlets.
(a) Industrial (b) Institutional (c) Hospital.
MODULE II
Different food and beverage outlets. 5 types of services of food and beverage outlets.
Staff organization of different outlets
Manager, Hostess, Supervisor, Steward, waiter.
MODULE III
Menu planning - sequence of course - Indian (Regional i.e., North Indian, South Indian, West Indian and Gujarathis, Western and others)
Techniques of writing menus.
MODULE IV
Types of meals and styles of service, breakfast, lunch, dinner, afternoon tea, snacks (table 'd' hote and a la carte menu).
MODULE V
Plant and equipment management, maintenance, sanitation of plant, safety, security, garbage disposal pest control.
MODULE VI
Beverages - alcoholic and non-alcoholic-Hot and cold - classification of beverages, use and importance in meals and snacks, suitable glassware for beverage service.
MODULE VII
Use of bills and checks in control system outlets.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCES:

1. Food service system and Lewis J. Minor, Ronald F. Cichy, Avi Publishing Co.
2. Food service operations; Mahmood A. Khan, Avi Publishing Co. 1987.
3. Professional Dining Room Management, Conol A. King VNR, NY 1988.
4. Modern Restaurant Service, John Fuller, Hutchinson, 1983.
5. Table Layout and Decoration, Dorothy Tompkins. Ward Lock & Co. Ltd.,1969
6. Food and Bevarage Service, D.R. Lillicarp 2nd edn. BLBS, Reprinted 1989.
7. Food service in Institution, 6th edition, Besie B. West, Le Velle Wood Revised by Harger V. Shugant M.S. June Payne Palacio, Macmillan. Publishing Co. 1986.
8. Mass Catering WHO publication.
9. Avery - A.A. Modern Guide to food Service Equipment C.B.l. Publishing Inc. 1980.
10. Anderson F. Home Appliance Servicing Taraporewala Sons & Co. 1976.
11. Johnston J.B. Equipment for Modern Linings. The Macmillan Co. 1965.
12. Kotschevir, L. and TerrlI, M.E. Food Service Planning Layout and Equipment. John Wiley & Sons 1971.
13. Mohini Sethi and Surjet Malhan Catering Management, "An Integrated approach. Wiley Eastern Ltd. 1987.

SEMESTER – IV
CLINICAL NUTRITION

Course code: DAN 2403 **Credits:03**

MODULE-I
clinical nutrition - medical conditions food allergy - food intolerance & mal absorption syndrome - the role of personnel management in an organization - functioning of the hospital dietary department
MODULE-II
role of nutrition & medicine in sports science - technical - counseling - other skills required by a dietician - dietician`s ability to interpret pathological / clinical parameters in health & disease - pediatric and geriatric dietetics
MODULE-III
nutritional problems of cancer therapy - role of antioxidants in the prevention of disintegrative diseases - the dietitian - responsibilities in indian context - diet counseling - registered dietitian and the indian dietetic association.
MODULE-IV
Nutritional Management in the following conditions:
a. AIDS: Introduction, sign and symptoms, Transmittal routes and Nutritional Management
b. Arthritis: Osteoarthritis and Rheumatoid Arthritis
c. Polycystic ovarian disease (PCOD)

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

SEMESTER – IV
FOOD SERVICE MANAGEMENT LAB

Course Code: DAN2404 **Credit:01**

Practical experience is correlated with theory course and will be provided at Amity School of Medical, Gurgaon.

Contents:

- Standardisation of recipes
- Napkin folds
- Fruit and vegetable carving
- Table setting
- Quantity preparation and sale
- Visit to hospital food service
- Visit to Hotel food service
- Visit to Industrial canteen

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER-IV

RESEARCH PAPER-CONCENTRATION ELECTIVE

Course Code: DAN2431 **Credits:02**

Every student shall be allotted a research supervisor. The research supervisor shall be from the Department of Dietetics & Applied Nutrition.

The allotment of the research supervisor will be done during the semester. The topic of research will be finalized by the research supervisor. It is the responsibility of the research supervisor that the student is making the required progress in work.

The research work must be completed and submitted in the form of a report by the end of the semester.

The format of the research report is given below:

1. Research Objective
2. Literature Review
3. Research Methodology
4. Results and Analysis
5. Conclusions
6. References
7. Appendices – to include questionnaire, if any

SEMESTER-IV

PROJECT -CONCENTRATION ELECTIVE

Course Code: DAN2432 **Credits:03**

Every student shall be allotted a project supervisor. The project supervisor shall be from the Department of Dietetics & Applied Nutrition.

The allotment of the project supervisor will be done during the semester. The topic of project will be finalized by the project supervisor. It is the responsibility of the project supervisor that the student is making the required progress in work.

The project must be completed and submitted in the form of a report by the end of the semester.

1. Individual Project
2. Any one diseases (gastro intestinal disorders, renal diseases, liver diseases, cardio vascular disorders and diabetes mellitus,Cancer, Neurological Disorders,)
3. Minimum five clinical cases
4. To present a report furnishing the following data

a) Hospital - lay out and organization

b) Medical profile

a. general details
b. family history, associated complications, drugs
c. anthropometry and clinical status
d. biochemical status
e. biophysical status
f. progress chart

c) Diet therapy

Viva Voice

SEMESTER-IV

WORKSHOP-CONCENTRATION ELECTIVE

Course code: 2433 **Credit : 01**

- To understand the basic concept of data collection on Nutrition based studies.i.e Nutritional Assessment including anthropometrical measurements, food diaries & 24 dietary recall method etc
- To present and facilitate with support of more experienced trainers as per the contents
- To practice facilitation and Counseling techniques and know about basic Communication with regard to Diet consultation

Implementation:

This would be approximately 2 hours long after the completion of lectures. The student will be is asked to complete a form with details of their health goals, and previous and current health history. This information is necessary as it is important to have a complete health picture before making nutritional recommendations. They would be asked to fill the 24 dietary recall/Food Frequency/3 day food Dairy. This information is discussed in further depth during the workshop. Relevant Physical Parameters/ measurements would also be recorded. These include blood pressure, Height, Weight & BMI etc. The final part would comprise of discussing the recommended dietary and lifestyle changes that will help the students to achieve their health goal(s). Supplementation with specific nutrients may be recommended if necessary.

SEMESTER-IV

FOUNDATION OF FOODS & NUTRITION

Course Code: DAN 2405 **Credits: 03**

Module-I

- **Nutrition** - General introduction, Classification of nutrients, Functions of food, social function of food, psychological functions of food.
- **Energy -** Definition of Kilocalories, Joule, energy value of foods, determination, physiological fuel values, SDA of foods, determination of energy requirements of body, basal metabolic rate determination, factors influencing BMR, Recommended Dietary Allowances for energy.
- **Carbohydrates -** Classification, functions, source, digestion, absorption and utilization, dietary fiber and health.

Module-II

- **Protein** - Classification, functions, sources and requirements, digestion, absorption and Utilization, Protein quality - Definition of biological value, NPU, digestibility coefficient, PER definition and measurement. Deficiency due to shortage of protein and energy – PCM, kwashiorkor. Reference protein, essential amino acids and mutual supplementation of dietary protein.
- **Fats and Lipids** - Classification, functions, sources, requirement, digestion, absorption and utilization, importance of essential fatty acids, their requirements and deficiency.

Module-III

- **Vitamins** – Fat soluble vitamins –A, D, E and K- functions, source, requirements, deficiency disorders. Water soluble vitamins –The B-complex vitamins – Thiamine, Riboflavin, Niacin, Folic acid, Biotin, Pantothenic acid and Vitamin C - functions, source, requirements and deficiency disorders.

Module-IV

- **Minerals** - General functions in the body, classification- macro and micro minerals. Micro minerals – Iron, Fluorine, Zinc, copper, Iodine -functions, absorption, utilization, requirements, deficiency and toxicity. Macro minerals – Calcium & phosphorus - functions, absorption, utilization, requirements, deficiency and toxicity.

Module-V

- **Water Balance** – Functions of water, water distribution, maintenance of water and electrolyte balance, regulation of acid-base balance in the body.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Reference Books:

1. Essential of food & Nutrition –Vol. 1 M. Swaminathan, Bappco, Bangalore.

2. Human Nutrition and Dietetics –Davidson S. Passmore

3. Normal and Therapeutic Nutrition- Corinne .H.Robinson & Marilyn Lawler

4. Contemporary Nutrition - Gordon M. Wardlaw, Paul Insel et, al., (2000) Mosby, Chicago.

5. Nutrition- concepts and controversies- Eleanor Whitney –Eighth Edition (2000)

6. Basic principles of Nutrition- Seema Yadav, First edition (1997)

7. Essentials of Nutrition and Diet therapy -Sue Rodwell Williams, fifth edition, Times Mirror Mosby College Publishing, 1990.

8. Understanding Nutrition -Whitney P.N. and Roes S.R., West Publication Co, 1996.

AMITY UNIVERSITY HARYANA

Amity Medical School
B.Sc Home Science (Honours)
Semester –V

Syllabus (Semester system) w.e.f. 2013-16

EXAMINATION DISTRIBUTION SCHEME

*** Internal Assessment = 30 each**

Paper Theory	Name	Maximum marks	Exam Duration
DAN2551	Community Nutrition	70 (30*)	3 hrs
DAN 2501	Nutrition for Health & Fitness	70 (30*)	3 hrs
DAN 2502	Bakery	70(30*)	3 hrs
DAN 2503	Food Quality Control	70 (30*)	3 hrs

Total = 280 + 120 = 400

PRACTICAL EXAM DISTRIBUTION

Paper Practical	Name	Max Marks	Exam Duration
DAN 2504	Bakery Lab	70 (30*)	4 hrs
DAN 2505	Food Quality Lab	70 (30*)	4 hrs
DAN2535	Summer Internship	70 (30*)	

*** Internal Assessment = 30 each**

Total = 140 + 60 = 200

Total Marks Distribution = 400 + 200 = 600

SEMESTER-V
COMMUNITY NUTRITION

Course code: DAN 2551 **Credits:03**

MODULE I
Definition - Community, family, village and block
Meaning of Optimum Nutrition, Malnutrition- Under nutrition and over nutrition..
Characteristics of community- Demography, Vital statistics, IMR, MMR, morbidity. Causes of
malnutrition-Factors contributing to malnutrition in the community - food habits, customs and practices,availability of food, Socio-economic factors, Housing and hygienic conditions, population explosion.

MODULE II
Assessment of the nutritional status of the community -direct and indirect methods - Anthropometry, Clinical and Biochemical, Diet Surveys.
Nutritional problems of women and men- Anemia, Vitamin A deficiency, B-complex deficiency.
Nutritional problems of infants and children- PEM-Marasmus and Kwashiorkor, Vitamin A deficiency, B-complex deficiency diseases, anemia-incidence, prevalence, epidemiology and prevention , other problems- Goitre, fluorosis and Lathyrism-prevalence, causes and symptoms and programmes to control.

MODULE III
Nutrition intervention programmes - ICDS: Objectives and services, Noon meal programme, TINP, SNP, Vitamin A prophylaxis.
National Organization- Role of ICMR, NIN, NNMB & ICAR
International organization- WHO, FAO , UNICEF, DANIDA & World Bank.

MODULE IV
Home Science- Meaning and Objectives. Role of Home-Scientists in rural development-with reference to ongoing programmers like Family Welfare Programme, Adult Education for community-different methods, advantages and disadvantages. Nutrition education- merits and demerits of different methods, Concept of nutrition garden.

MODULE V
Communication- Principles, methods and classification. Advantages and limitations of different methods.
Audio-visual aids- Types, advantages and limitations.
Health care- delivery, challenges & strategies. Set up of PHC, school health services and employees state insurance.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Reference Books:
1. Jellife DN, Assessment of Nutritional Status of the community.

2. Ritchie JA, Teaching Nutrition FAO, 1979.
3. Rajalakshmi R, Applied Nutrition, Oxford and JBH Publishers, 1981.
4. Devadas RF, Nutrition in Tamil Nadu, Sanfam Publishers, Madras, 1972.
5. Mc.Laren S, Nutrition and the community, John Wiley & Sons, 1982.
6. Reddy AA, Extension Education, Srilakshmi Press, Baptla, 1971.
7. Dahama OP and Bhatnagar OP Eucation and Communication for development.Oxford IBH Publishing Co.,1980.
8. Savile AH, Extension in rural communities, Oxford University Press,1965.
9. Nutrition Science, Srilakshmi (2001).
10. Nutritional problem in India-PK Shukla,Prentice Hall, India.
11. Foundations of community Health Education, Mc Graw Hill,London.

SEMESTER-V

NUTRITION FOR HEALTH & FITNESS

Course code: DAN 2501 **Course credits: 05**

MODULE-I
Definition components of specific fitness and health status. Energy input & output , diet & Exercise .Nutrition exercise ,physical fitness & health inter-relationship.

MODULE-II
Review of different energy systems for endurance and power activity shifts in carbohydrate and fat metabolism. Mobilization of fat stores during exercise.

MODULE- III
Nutrition in sports: sports specific requirements. Diet manipulation, pre-game & Post game meal . Life style and dietary management of stress.

MODULE-IV
Significance of Physical fitness, nutrition and prevention of weight control, obesity, CV disorder and diabetes.

MODULE- V

Alternative systems for health and fitness like Yoga, meditation.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

SEMESTER-V

BAKERY

Course code: DAN 2502 **Credit: 04**

MODULE I

Baking - Definition, Principles of baking, classification of baked foods. Types of equipments in baking industry, cleaning and sanitizing methods of baking equipments, baking temperature of different products, operation techniques of different baking equipments.

MODULE II

Ingredients and Their Role in Baking - Flour, Yeast, sugar, egg, butter, salt, baking powder, colouring, flavouring agents. List of standard colouring and flavouring agents.

MODULE III

Preparation of baked foods - Quick breads, cakes and its varieties, different types of biscuits, **cookies and pastries.**

MODULE IV

Decoration of baked foods - Icing- Types of Icing used in different bakery product. Role of other ingredients used in icing.

MODULE V

Baking unit/ plant layout & design of a baking unit sanitation and hygiene. Types of packaging materials used for bakery products, method of packaging.

Reference Books:

1. Potter, N. Food Science, The AVI Publishing Co., Inc., West Port, Connecticut, 1975.
2. Baker's Handbook on practical Baking .Wheat Associates, USA, New Delhi.
3. Dubey, SC, Basic Baking Science and Craft, Jwalmukhi Job Press, Bangalore, 1979

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

SEMESTER -V
SUBJECT-FOOD QUALITY CONTROL

Course code: DAN 2503 **Credit: 04**

MODULE I
Principles of Quality control of food –Raw material control, processed control and finished product inspection. Leavening agents, classification, uses and optimum levels.
Food additives - Preservatives, colouring, flavouring, sequestering agents, emulsifiers, antioxidants.

MODULE II
Standardisation systems for quality control of foods-National and International standardization system, Food grades, Food laws-compulsory and voluntary standards.
Food adulteration - Common adulterants in foods and tests to detect common adulterants.

MODULE III
Standards for foods – Cereals and pulses, sago and starch, milk and milk products, Coffee, tea, sugar and sugar products.

MODULE IV
Methods for determining quality - Subjective and objective methods.
Sensory assessment of food quality-appearance, color, flavour, texture and taste, different methods of sensory analysis, preparation of score card, panel criteria, sensory evaluation room.

MODULE V
Food safety, Risks and hazards: Food related hazards, Microbial consideration in food safety,
HACCP-principles and structured approach. Chemical hazards associated with foods.

Reference Books:
1.Food science-Norman potter
2.Food Technology-Presscott.S.C.and Procter
3.Food chemistry-Meyer
4.Food science,Chemistry and experimental foods-M.Swaminathan
5.Food chemistry-Lee
6.Food science-Srilakshmi(2001)2nd edition, New age international publishers-(2001)
7.Rerfus.K.Guthrie-Food sanitation –3rd edition –Van Nostrand Reinhold Newyork 1988.
8.Mahirdra-S.N.-Food safety –A techno-legal analysis-Tata McGrawhill publishers 2000.
9.Manoranjan Kalia-Food processing and preservation.
10.Roday-Food hygiene and sanitation.
11.Indian Food industry,2000,Vol19:2

Examination Scheme

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

SEMESTER-V
BAKERY LAB

Course Code: DAN 2504 **Credit: 02**

1. Breads
2. Cakes
3. Biscuits and cookies
4. Pastries
5. Icing

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER-V
FOOD QUALITY CONTROL LAB

Course Code: DAN 2505 **Credits:02**

Course Content:
MODULE I
Organizing, preparing and serving food for three different meals for 50 members or more (list attached)
Setting up the restaurant - laying of table cloth changing, setting up the silver and other table arrangements.
Folding of serviettes correct use of waiter's cloth. Preparation for customers.

MODULE II
Serving and clearing practice, French and English service.
Service of beverages tea, coffee, juices and alcoholic beverages.
Laying for breakfast.

MODULE III
Tray service
Order taking, making out checks bills presentation of bills
Up keep and cleaning of cutlery, crockery, other equipment.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

AMITY UNIVERSITY HARYANA

Amity Medical School
B.Sc Home Science (Honours)
Semester –VI

Syllabus (Semester system) w.e.f. 2013-16

EXAMINATION DISTRIBUTION SCHEME

Paper Theory	Name	Maximum Marks	Exam Duration
DAN 2601	Food Preservation	70 (30*)	3 hrs
DAN 2602	Clinical & Therapeutic Nutrition	70(30*)	3 hrs

*** Internal Assessment = 30 each**

Total = 140 + 60 = 200

PRACTICAL EXAM DISTRIBUTION

Paper Practical	Name	Max Marks	Exam Duration
DAN 2603	Food Preservation Lab	70 (30*)	3 hrs
DAN 2604	Clinical & Therapeutic Nutrition Lab	70 (30*)	3 hrs
DAN2637	Internship	70 (30*)	

*** Internal Assessment = 30 each**

Total = 140 + 60 = 200

Total Marks Distribution = 200 + 200 = 400

SEMESTER VI

SUBJECT-FOOD PRESERVATION

Course Code: DAN 2601 **Credits: 04**

MODULE I

Food preservation - Definition, General Principles and Methods of Food Preservation- Classification of foods for processing. Preservation by addition of sugar- General principles and methods of preparation of jams, jellies and Marmalades, theory of gel formation. Preparation of preserves, squashes & syrups. Preservation by addition of salt- Pickling. Preparation of Indian Pickles, Sauerkraut. Status & scope of food processing industry in India in developing Entrepreneur.

MODULE II

Preservation by Use of High Temperature - Pasteurization, Sterilization and their types. Thermal death curve, calculation of process time, methods of heat transfer.

Canning - steps, types of cans, advantages, disadvantages.

Bottling - steps, advantages, disadvantages.

Food dehydration - concept of dehydration and sun drying. Types of driers- advantages, disadvantages. Principle of dehydration-heat and mass transfer.

MODULE III

Preservation by use of Low Temperature, Types - Common types of cold storage, refrigerationrequirement of refrigerated storage, characteristic of refrigerant, refrigeration during transport, defects in cold storage.

Freezing - Principles and methods of freezing, Freeze drying. Advantages and disadvantages.

MODULE IV

Preservation with chemicals

a. Mechanism of microbial inhibition, mechanism and action of preservatives in processed food

b. Inorganic & Organic preservatives.

c. Antibiotics

d. Mold inhibitors.

e. Antioxidants and its role.

MODULE V

Radiation of Foods

a. Sources of radiation, units of radiation

b. Mode of action of irradiation, radiation effect on proteins enzyme system

c. Microwave heating, properties of microwaves, applications in food processing and preservation.

Preservation of Semi moist foods:

a. Principles

b. Intermediate moist foods

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Reference Books:

1. The technology of food preservation- NV Desroisier
2. Food Science- Norman Potter
3. Food Technology- Prescott and Procter
4. Technology of food preservation -ICAR
5. Food Microbiology- W C Frazier
6. Preservation of Fruits and Vegetables- Siddappa S G, ICAR New Delhi
7. Shirley J. Vangarde and Margy Wood Burn, (1999) Food Preservation and Safety, Surabhi Publications, Jaipur.
8. D.K.Salunkhe,S.S.kadam-Handbook of vegetable science and technology,Marcel Dekker Inc,New York,2005.

SEMESTER VI

CLINICAL & THERAPEUTIC NUTRITION

Course code: DAN 2602 **Credits: 04**

MODULE I

Carbohydrates : Review of digestion, absorption and metabolism of carbohydrates, aerobic and anaerobic glycolysis, storage and utilisation of carbohydrates as energy source for physical activity.

MODULE II

Lipids : Review of digestion absorption and metabolism of fats and fatty acids, energy yield from dietary fats, storage, mobilisation of fat stores during exercises, production of Ketone bodies, Ketogenic diets.

MODULE III

Energy Metabolism : BMR, energy requirements for physical activity, relative body weight and influence of physical exercise on changes in body fat and body composition, utilization of energy by muscle tissue, shifts in lipid and carbohydrate, utilisation, in relation to exercise type, intensity and duration.

MODULE IV

Water and electrolyte balance : Water & electrolyte lossess and their replenishment; effect of dehydration.

MODULE V

Nutrient and Drug Interactions: Effect of drug therapy on absorption and utilisation onutrients.

MODULE VI

Diseases of the gastro - intestinal tract : Effect on digestion, absorption and nutritional status. **Implications for diet therapy**

- Diarrhoea, Constipation
- Gastritis and Ulcers.
- Colitis.
- Malabsorption syndromes.

MODULE VII

Liver Gallbladder & Pancreas: Etiology, symptoms, Metabolic and Nutritional Implications

- Hepatitis, Cirrhoses, Hepatic Coma
- Pancreatic
- Cholecystitits, Cholelithiasis

8. Renal System: Etiology, Symptoms, Metabolic and Nutritional Implications

- Nephritis
- Nephrotic Syndrome
- Renal Failure
- Renal Calculi

9. Disorders of Metabolism:

- Diabetes Mellitus
- Inborn Errors of Metabolism
- Gout

10. Cardiovascular system: - Etiology, Symptoms, Role of Specific nutrients, Clinical finding related to nutritional care. Hypertension, Atherosclerosis.

Examination Scheme

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

REFERENCES:

1. Antia F.P. "Clinical Dietetics" Nutrition 3rd 2000. Oxford University Press. New Delhi/Bombay.
2. Passmore, R. Eastwood M.A. "Human Nutrition & Dietetics" 8th Ed. 1986. ELBS Publ.
3. Robusseu C.H. & Wyley E.S. "Basic Nutrition & Diet Therapy" 6th Ed. 1989 Macmillan Pub New York.
4. Anderson L. & Others "Nutrition in Health & Disease" 1982 17,th ed J.B. Lippincott Cp. Philadelphia. Vocational Training Course - Clinical Nutrition

SEMESTER VI

SUBJECT-FOOD PRESERVATION LAB

Corse code: DAN 2603 **Credits: 01**

1. Methods of Food Preservation using salt and sugar.
2. Drying and Dehydration
3. Food Adulteration tests for some common foods.
4. Preservation and bottling of fruit and vegetable products.
5. Preservation by using chemicals
6. Sensory analysis of preserved and processed foods.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

SEMESTER VI

CLINICAL & THERAPEUTIC NUTRITION LAB

Course Code: DAN 2604 **Credits: 01**

Prepare the diet plans for the following diseases

MODULE I

Diseases of the gastrointestinal tract: Diarrhoea, Constipation, Gastritis and Ulcers, Colitis, Malabsorption syndromes.

Liver Gallbladder & Pancreas: Hepatitis, Cirrhosis, Hepatic Coma, Pancreatic, Cholecystitits, Cholelithiasis.

MODULE II

Renal System:

- Nephritis
- Nephrotic Syndrome
- Renal Failure
- Renal Calculi

Disorders of Metabolism:

- Diabetes Mellitus
- Inborn Errors of Metabolism
- Gout

MODULE III

Cardiovascular system: Hypertension and Atherosclerosis

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	15	15	20

Amity Medical School

Bachelor of Audiology & Speech Language Pathology

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor in Audiology & Speech Language Pathology

1.0 Nomenclature

As per UGC Notification of 2014, the nomenclature of the program shall be Bachelor in Audiology and Speech-Language Pathology. B. ASLP is the short form.

2.0 Objectives of the B.ASLP program

The objectives of the B.ASLP program are to equip the students with knowledge and skills to

- function as audiologists and speech-language pathologists in different work settings
- understand concepts in speech, language, communication, hearing and disability
- screen, evaluate, diagnose and assess the severity of different disorders related to speech, language, swallowing and hearing,
- manage speech, language, swallowing and hearing disorders across life span
- counsel persons with disorders of communication and their family members
- rehabilitate persons with speech, language, swallowing and hearing disorders
- prevent speech, language, swallowing and hearing disorders
- liaise with professionals in allied fields and other stake holders
- implement public awareness and education program,
- undertake advocacy measures on behalf of and for persons with speech language and hearing disorders

3.0 Duration of the program

a) The program shall be of 4 academic years including 1 year of internship and should be completed within six years from the date of admission.

b) An academic year consists of two semesters, and each semester shall extend over a minimum period of sixteen weeks excluding examination days. The semesters shall be spread out as follows:

Odd semester – 1	July – December
Odd semesters – 3, 5, 7	June – October/November
Even semesters – 2, 4, 6, 8	December – April

c) There shall be examinations at the end of each semester. There shall be a vacation of minimum 1 week after the examinations at the end of odd semesters and 3 weeks after the examinations at the end of even semesters.

d) Number of working days in a semester shall not be more than 100 days.

4.0 Eligibility for admission

a) The candidate applying for admission to B.ASLP program should have passed 10+2 examination or an equivalent examination conducted by the Pre University Board of Education of the respective State Government securing a minimum of 50% marks. Relaxation in the qualifying marks shall be as per rules and regulations of respective University / State/UTs or Central Government.

b) The applicant/candidate should have studied Physics, Chemistry, Biology and any one of Mathematics / Computer Science / Statistics / Electronics / Psychology.

c) Applicants shall not be older than 25 years on the 1st July of the year of admission.

5.0 Attendance

a) Minimum attendance shall be as stipulated by the respective University where the students are studying. However, attendance shall not be less than 80% in theory and 90% in Clinical/

Practicals in each semester to be eligible to appear for examination at the end of each semester.

b) Candidates who cannot appear for the examination for want of attendance will be declared as failed and will have to repeat the particular semester to be eligible to appear for exams subsequently.
c) Condonation of shortage of attendance in genuine cases shall be from the Vice-Chancellor of the respective University where the candidates are studying.

6.0 Criteria for passing

The student is required to obtain a minimum of 50% in each of the theory papers, internal assessment, practical and clinical exams for a pass. Students will not be able to appear for University theory exam if they do not pass in their practical, internal assessment or clinical component. Students will have to pass the clinical examination of the given semester to proceed to the next semester.

Carry-over of papers

6.1 Each paper should be successfully completed within 3 attempts including the first one.

6.2 Students can start internship after the 6thsemester exams. However, students who fail in their clinical exam of 6th semester will have to discontinue internship. The candidates are permitted to carry over the theory courses until the end of the program.

7.0 Clinical internship

All candidates shall complete a clinical internship of one academic year (10 months) after the 6th semester. The rules and regulations of clinical internship shall be as in Annexure 2.

8.0 Award of Degree

The University shall award the degree and issue certificate only after the candidates successfully complete all the University examinations and clinical internship.

Guidelines for implementation of Clinical Internship of B.ASLP program with effect from the academic session 2017-18

Objectives of the clinical internship are to:

a) facilitate transition from academic training to independent clinical responsibility,

b) provide additional inputs to attain and maintain competence in the clinical management of persons with communication disorders,

c) initiate group and individual action focusing on prevention/early identification and intervention in individuals with speech, hearing and language impairments at the level of the individual, family and community, and

d) provide training to understand professional responsibilities and ethical practices including :
   i) Rights and dignity of patients.
   ii) Consultation and referral to other professionals.
   iii) Conduct and professional obligations to peers/patients/families and the community at large.

Guidelines

1) Internship is mandatory

2) Duration: One academic year (10 months) split in to two semesters (VII & VIII).

3) Eligibility: Internship will start immediately after the candidate completes the academic and clinical training till the 6thsemester. Students can start internship after the 6thsemester exams. However, students who fail in their clinical exam of 6thsemester will have to discontinue internship.

4) Structure and duration of posting

   a) The respective parent institutions shall decide on the institutions where their students will be posted for internship. However, students can be posted for internship only at those institutions approved by the Rehabilitation Council of India.

   b) Students will do internship at their parent institute for one semester and at an institute(s) outside the parent institute for one semester. Internship can be done at institutes like hospitals, special educational centers/schools, centers where clinical facilities for management of ASD, cochlear implantation, AVT etc. are available, centers which undertake empowering of mothers, centers for CP, and centers for LD, etc. Attempts must be made to provide clinical training to students in a variety of set ups.

   c) It shall be mandatory to provide additional clinical training to students in such areas as management of neurologically afflicted persons, prevention and early intervention programs, community based rehabilitation, occupational health programs, structural abnormalities related to speech and hearing, etc.

5) Mode of supervision during internship: Supervision should generally be provided by a Speech-language Pathologist and Audiologist. However, in institute/centers where this is not feasible, supervision can be done by a specialist from an allied area like Otolaryngology, Neurology, Mental Health, Pediatrics, among others.

6) Maintenance of records by students: Every student shall maintain records of the number of hours of clinical work in different areas and institutions. This should be certified by the head of the

institution or his/her nominee where the student is undergoing internship.

7) Leave: Candidates should have an attendance of at least 90% during the internship period. Internship shall be extended by the number of days the student falls short of 90% attendance. Compensatory work for shortage of attendance must be completed before the final clinical exams of 8thsemester.

8) Stipend: As per the norms of the parent institute.

9) Grading and evaluation of student: All internees will be assessed based on their attendance, performance in the postings and presentation of log books. The mode of assessment and frequency of assessment will be prescribed by the institute. The student is required to repeat those postings in which his/her performance is below 40%.

10) Certification: The parent institute will award a certificate after successful completion of the internship and clinical examination (7.1 and 7.2 in the Scheme of examination). Supervised clinical hours spent during internship shall be included in the clinical competence certificate issued to students.

11) The University shall award the degree only after the successful completion of clinical internship.

Syllabus - First Semester

COMMUNICATION SCIENCES

Course Code: ASL2106 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand the

- basic concepts in speech, hearing, language and communication
- basic concepts of hearing sensitivity and acoustics

Course Contents:
Part-A: Speech-Language Pathology

Module-I: Speech, language and communication

a) Definitions of speech, language, communication, and their components
b) Distinctions, similarities and functions of communication, speech and language
c) Speech as an overlaid function
d) Speech chain
e) Normal development of speech & language
f) Pre-requisites and factors affecting speech-language development
g) Cultural and linguistic issues in communication; bi/multilingual issues

Module-II: Bases of speech and language

a) Overview of speech production – speech sub-systems
b) Speech mechanism as a sound generator, vocal tract, periodic and a periodic sounds
c) Acoustic theory of speech production
d) Social, cognitive, neurological, and genetic bases of speech and language

Part-B: Audiology

Module-III: Sound intensity and concept of decibel

a) acoustic energy and power, absolute and relative units – importance of reference
b) sound intensity and intensity levels –absolute and relative measurements and
c) Bel and decibels, sound pressure and decibel sound pressure levels, relationship between intensity and pressure
d) characteristics and application of decibels

Module-IV: Audibility & hearing

a) Hearing range –intensity and frequency
b) Up-down and staircase procedure of estimating minimum audible levels
c) Minimum audible pressure and field, Missing six dB and related issues
d) Reference equivalent threshold sound pressure levels and hearing levels
e) Sensation levels, Threshold of pain, Most comfortable levels

Module-V: Introduction to Audiology and Speech-language Pathology

Part-A: Speech and language

a) Historical aspects of the field of speech-language pathology
b) Development of speech and language pathology: Indian and global context

c) Scope of practice in speech-language pathology
d) Interdisciplinary nature of speech-language pathology

Part-B: Audiology

a) Audiology – historical aspects, development of instrumentation in audiology
b) Development of audiology: Indian and global context
c) Branches of audiology
d) Scope of audiology

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Bordon, G J., Harris, K S., & Raphael, L J. (2006). Speech science primer: Physiology, acoustics, & perception of speech. Lippincott-Williams & Wilkins.
- SubbaRao, T A. (1992). Manual for developing communication skills. NIMH. ISBN: 81-86594-03-5
- Speaks, C. E. (1999). Introduction To Sound: Acoustics for the Hearing and Speech Sciences (3 edition). San Diego: Cengage Learning.
- Martin, F. N., & Clark, J. G. (2014). Introduction to Audiology (12 edition). Boston: Pearson.
- Gelfand, S. A. (2009). Hearing: An Introduction to Psychological and Physiological Acoustics (5 edition). London: CRC Press.
- Khara L. Pence, T., Laura M. & Justice (2011). Language Development: From Theory to Practice (2nd Ed.), Allyn & Bacon Communication Sciences and Disorders
- Webb, W. G., & Adler, R. K. (2008). Neurology for the speech-language pathologist (5th ed.). St. Louis, Mo: Mosby/Elsevier.

ANATOMY AND PHYSIOLOGY OF SPEECH AND HEARING

Course Code: ASL2107 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand the

- anatomy of the auditory system
- anatomy of the speech mechanism
- physiology of hearing mechanism
- functioning of speech and swallowing mechanism

Course Contents:

Module-I: Introduction

a) General anatomical terms
b) Anatomical positions and planes of reference
c) Cells, tissues and muscles
d) Muscle connection and joints
e) Tissue - vascular and neural

Module-II: Embryology

a) Basic terminologies related to embryology
b) Development of external ear
c) Development of middle ear
d) Development of Inner ear and the auditory system
e) Five examples of embryonic anomalies affecting speech-language & hearing
f) Development of respiratory structures
g) Development of larynx
h) Development of facial region and palate
i) Development of tongue and teeth

Module-III: Anatomy and physiology of speech production systems and swallowing

a) Mechanisms of breathing with emphasis on speech breathing
b) Supportive frame work of larynx
c) Anatomy of larynx
d) Anatomy of oesophagus
e) Brief mechanisms of swallowing
f) Mechanisms of phonation
g) Anatomy of articulators and associated structures
h) Contribution of articulatory structures to speech production
i) Anatomy of resonatory mechanisms
j) Contribution of resonatory mechanisms to speech production

Module-IV: Anatomy and physiology of external and middle ear

a) Anatomy of the external ear
b) Physiology of external ear including localization
c) Head shadow effect, inter-aural intensity and time differences
d) Brief anatomy of temporal bone
e) Anatomy of tympanic membrane and associate structures
f) Anatomy of middle ear and ossicles
g) Anatomy of Eustachian tube and middle ear muscles
h) Physiology of Eustachian tube

i) Middle ear transformer action
j) Physiology of middle ear muscles

Module-V: Anatomy and physiology of labyrinth

a) Anatomy of bony and membranous labyrinth
b) Macro anatomy of cochlea
c) Micro anatomy of cochlea
d) Innervations and blood supply to cochlea
e) Overview of theories of hearing
f) Physiology of cochlea
g) Electrical potentials of the cochlea
h) Physiology of hearing through bone conduction
i) Overview to physiology of balancing mechanisms
j) Overview to anatomy of central auditory pathway
k) Overview to central auditory mechanism

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Seikel, J. A., King, D. W., & Drumright, D. G. (2010). Anatomy & Physiology for Speech, Language, and Hearing (4th edition). Delmar, Ceenage Learning, Division of Thomson Learning. NY.
- Zemlin, W. R. (2010). Speech and Hearing Science: Anatomy and Physiology: International Edition (4 edition.). Boston: Pearson.
- Chaurasia, B.D (2004). Human Anatomy, vol 3. Head Neck and Brain 4 th Eds, CBS Publishers and Distributors, New Delhi. ISBN 81-239-1157-2.
- Kelley, M., Wu, D., & Fay, R. R. (Eds.). (2005). Development of the Inner Ear (2005 edition.). New York: Springer.

CLINICAL PSYCHOLOGY

Course Code: ASL2108 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand the

- scope of clinical psychology and its significance for speech and hearing
- concept of normality, abnormality and classification of abnormal behavior
- cognitive, motor, emotional and social development
- theories of learning and therapy techniques based on learning principles
- neuropsychological assessment and rehabilitation
- application of neuropsychology in the field of speech and hearing
- basics of counselling

Course Contents:

Module-I: Introduction to psychology

a) Introduction to psychology: definition, history and schools of psychology
b) Scope of psychology
c) Meaning and definition of clinical psychology
d) Historical development, modern clinical psychology
e) Significance of clinical psychology in health sciences
f) Role of clinical psychology in speech and hearing
g) Concept of normality
h) Concept of abnormality
i) Models of mental disorders: biological, psychological social models

Module-II: Assessment procedures in clinical psychology

a) Methods in clinical psychology: case history, clinical interviewing, clinical observation, definition and types of psychological testing
b) Assessment of cognitive functions
c) Adaptive functions,
d) Personality
e) Behavioural assessment
f) Classification of abnormal behavior
g) History, need & rationale of classification
h) Current classificatory system: DSM, ICD

Module-III: Developmental psychology

a) Child and developmental psychology: meaning, definition and scope
b) Meaning of growth, development & maturation
c) Principles of child development
d) Motor development: general principals of motor development
e) Stages in motor development: early motor development, motor development during later childhood and adolescence, decline with age
f) Cognitive development: growth from early childhood to adolescence
g) Piaget's theory of cognitive development
h) Emotional development
i) Social development

Module-IV: Principles of learning and behaviour modification

a) Learning: meaning, definition and characteristics

b) Theories of learning: introduction
c) Pavlov's classical conditioning: experiments and principles
d) Skinner's operant conditioning: experiments and principles
e) Therapeutic techniques based on learning principles
f) Skill behavior techniques
g) Problem behavior techniques

Module-V: Neuropsychology and its relevance to study of speech

a) Neuropsychology: introduction and definition
b) Neuropsychological assessment
c) Neuropsychological rehabilitation
d) Application of neuropsychology in the field of speech and hearing
e) Counselling: introduction and definition
f) Types of counselling: directive and non- directive
g) Characteristics of a good counsellor

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Morgon C.T., King R.A., Robinson N.M. Introduction to Psychology. Tata McGraw Hill Publishing Co.
- Anastasi, A. (1999). Psychological testing, London: Freeman
- Baura, M (2004). Human Development and Psychlogy, Rehabiliation Council of India, New Delhi. ISBN: 81-7391-868-6
- Coleman J.C. Abnormal Psychology and Modern Life, Taraporevala Sons & Co.
- Gregory, R.J. (2000). Neuropsychological and geriatric assessment in Psychological Testing: History, Principles, and Applications (3rd ed.). New York: Allyn & Bacon.
- Hurlock, E.B. (1981). Child development. (VI Ed.). Mc Graw Hill International Book Co.
- Kline, P. (1993). The Handbook of Psychological Testing. Routledge
- Lezak, M., Loring, D.W., and Hannay, H.J. (2004). Neuropsychological Assessment. Fourth Edition. New York: Oxford University Press
- Siegal M.G. (Ed). (1987). Psychological Testing from Early Childhood Through Adolescence. International Universities Press.

LINGUISTICS AND PHONETICS

Course Code: ASL2109 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand

- different branches and aspects of linguistics
- characteristics and functions of language
- different branches of phonetics, applied linguistics, and phonology
- morphology, syntax, semantics, pragmatics
- acquisition of language and factors affecting it
- bi/multilingualism and related issues

Course Contents:

Module-I: Linguistics

a) Introduction to linguistics and different branches of linguistics: applied linguistics, sociolinguistics, psycholinguistics, metalinguistics, neurolinguistics and clinical linguistics
b) Language characteristics and functions, difference between animal communication systems and human language
c) Morphology – concepts of morph, allomorph, morpheme, bound free and compound forms, roots etc.
d) Processes of word formation, content and function words
e) Endocentric and exocentric constructions, form classes, grammatical categories
f) Inflection and derivation, paradigmatic and syntagmatic relationship
g) Principles and practices of morphemic analysis
h) Langue versus parole
i) Competence vs. performance

Module-II: Phonetics and Phonology

a) Introduction to phonetics
b) Articulatory, acoustic, auditory and experimental phonetics – an introduction
c) Articulatory classification of sounds – segmental and supra-segmental
d) Classification description and recognition of vowels and consonants
e) Pathological aspects of speech sound production
f) Transcription systems with special emphasis on IPA. Transcription of samples of normal and disordered speech
g) Introduction to phonology, classification of speech sounds on the basis of distinctive features and phonotactics
h) Application of distinctive feature theory to speech pathology and speech therapy, phonotactics, phonotactic patterns of English and Indian languages
i) Phonemic analysis – Principles and practices; their practical implications for speech pathologists
j) Common phonological processes - assimilation, dissimilation, metathesis, haplology, epenthesis, spoonerism, vowel harmony, nasalization, neutralization

Module-III: Morphology, syntax, semantics and applied linguistics

a) Morphology – concepts of morph, allomorph, morpheme, roots, compound forms - endocentric and exocentric constructions, free and bound morphemes, inflection and derivation, principles and practices of morphemic analysis
b) Syntax – different methods of syntactic analysis
c) IC analysis, phrase structure, grammar, transformational generative grammar
d) Introduction to the major types of transformations

e) Sentence types, notions about competence versus performance
f) Deep structure versus surface structure
g) Acceptability versus grammaticality language versus parole etc.
h) A brief introduction to semantics – semantic feature theory, pragmatics
i) Processes of word formation, content and function words, form classes, grammatical categories
j) Syntax – concepts of phrases and clauses, sentence and its types
k) Different methods of syntactic analysis – Immediate constituent analysis, Phrase structure, grammar, transformational generative grammar– deep structure versus surface structure, acceptability versus grammaticality; Introduction to the major types of transformations
l) Usefulness of morphemic and syntactic analysis in planning speech and language therapy
m) A brief introduction to semantics, semantic relations, semantic feature theory
n) A brief introduction to pragmatics and discourse.

Module-IV: Language acquisition

a) Issues in first language acquisition
b) Pre-linguistic stages, linguistic stages
c) Acquisition of phonology, morphology, syntax, semantics, and pragmatics
d) Language and cognition
e) A brief introduction to theories and models of language acquisition
f) Biological maturation theory, linguistic theory, behavioral theory, information processing theory, social interaction theory
g) An integrated approach to theories communicative competence and its development
h) Applied linguistics with special reference to communication disorders
i) Usefulness of morphemic and syntactic analysis in planning speech and language therapy

Module-V: Bi/multilingualism

a) Introduction to the language families of the world and India
b) Issues related to second language acquisition & factors influencing it
c) Inter-language theory, language transfer and linguistic interference
d) Differences between first and second language acquisition/learning
e) Bilingualism/Multilingualism
f) Metaphonology
g) Writing systems – types of writing
h) History of writing systems
i) Indian writing systems

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Ball & Martin (1995). Phonetics for speech pathology. Delhi: AITBS Publishes, India.
- Ball, Rahilly&Tench (1996). The phonetic transcription of disordered speech. San Diego: Singular Publishing Group Inc.
- Clark and Yallop (1999). An introduction to phonetics and phonology. Oxford: Blackwell Publishes Inc.
- Karanth, P (2003). Cross-Linguistic study of Acquired Reading Disorders. Sage Publications, New Delhi. ISBN : 0-306-48319-X
- Ladefoged, P. (1982). A course in phonetics. New York: Harcourt Brace Jovanorich Inc.
- Shriberg & Kent (1982). Clinical phonetics. New York: John Wiley & Sons.

ELECTRONICS AND ACOUSTICS

Course Code: ASL2110 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand the

- concept and types of power supply for biomedical instruments
- basic aspects of digital signal processing
- theoretical basis of acoustics required for audiologists
- functioning of computers and computing systems

Course Contents:

Module-I: Electronic components and power supply

a) Resistors, capacitors, inductors
b) Transformers and potentiometers,
c) Semiconductor diodes and transistors
d) Light emitting devices, seven segment displays, Liquid crystal displays
e) Principles of operations and working of Field Effect Transistors, Uni-junction transistors and thyristors
f) Introduction to linear and digital integrated circuits
g) Block diagram of a DC power supply
h) Linear regulated power supplies, line regulation and load regulation, specifications of a DC power supply unit, Switched Mode Power Supply
i) AC power supply, stabilizers, Uninterrupted Power Supply, and inverters
j) Basic electronic concepts such as Polarity, Grounding

Module-II: Introduction to acoustics

a) Vibrations and their characteristics
b) Sound - generation and propagation
c) Characteristics of sound
d) Amplitude, frequency and phase of pure tones
e) Amplitude, frequency and phase of complex tones (FFT and spectrum, relationship between time waveform, FFT and impulse response)
f) Reflection and absorption, acoustic impedance, reverberation
g) Impedance and admittance
h) Electro-mechano-acoustic transformers

Module-III: Acoustical treatment, transducers and basics of computers

a) Introduction to audiometric rooms
b) Absorption coefficient, Sabine's formula
c) Materials for construction of audiometric rooms
d) Lighting, grounding and other miscellaneous issues related to audiometric rooms
e) Evaluation of efficiency of sound proofing in the audiometric rooms
f) Amplifiers
g) Microphones, loudspeakers - types and function
h) Fundamentals of digital electronics, binary number system, Hex code, bit, byte, logic gates, counters, flip-flops etc.
i) Introduction to computers
j) Operating systems, hard ware, software, memory devices and other peripherals, care and preventive maintenance of computers

Module-IV: Digital signal processing

a) Digital signal processing –introduction and need
b) Analog to digital converters, sampling and quantization
c) Fundamentals of digital filtering
d) Infinite impulse response and finite impulse response filters
e) Time domain methods of speech processing
f) Frequency domain methods of speech processing
g) Linear predictive analysis of speech signals
h) Digital coding of speech signals
i) Automatic speech recognition
j) Speech synthesis

Module-V: Instrumentation in speech and hearing

a) Introduction to electronic instrumentation in speech and hearing
b) Electrodes, filters and preamplifiers
c) Principle of operations, block diagram, calibration, maintenance and troubleshooting of audiometers, immittance meters, oto-acoustic emissions, hearing aids, evoked potential system, speech and voice analyses systems, artificial larynx, electroglottograph

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Haughton, P., & Haughton, P. M. (2002). Acoustics for Audiologists (1st edition.). San Diego, Calif: Emerald Group Publishing Limited.
- Moser, P. (2015). Electronics and Instrumentation for Audiologists. Psychology Press.
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- Rout, N and Rajendran, S. (2014). Hearing aid trouble shooting and Maintenance, Published by National Institute for Empowerment of Persons with Multiple Disabilities, Chennai. Freely downloadable from http://niepmd.tn.nic.in/publication.php. ISBN 978-81-928032-1-0.
- Speaks, C. E. (1999). Introduction To Sound: Acoustics for the Hearing and Speech Sciences (3 edition.). San Diego: Cengage Learning.
- Villchur, E. (1999). Acoustics for Audiologists (1 edition.). San Diego, Calif: Delmar Cengage Learning.

RESEARCH METHODS AND STATISTICS

Course Code: ASL2111 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand the

- basic concept of research in the field of audiology and speech-language pathology
- design and execution of research
- ethical guidelines for conducting research

Course Contents:
Part-A: Research Methods

Module-I: Introduction to research methods

a) Meaning and purpose of research: meaning
b) Need for research in audiology and speech-language pathology
c) Funds/grants for research
d) Steps in research: identification, selection
e) Formulation of research questions: aims, objectives, statement of problem, hypothesis
f) Types of variables; types of sampling procedures (random and non-random);
g) Types/ methods of data collection and their advantages and disadvantages
h) Reliability and validity (internal and external validity)

Module-II: Research design in audiology and speech-language pathology

a) Types of research: survey, ex-post facto research, normative research, standard-group comparison
b) Experimental and quasi experimental research: group design & single subject design
c) Internal and external validity of research
d) Between groups vs. repeated measures design
e) Documentation of research: scientific report writing, different formats or styles (APA, AMA and MLA),
f) Ethics of research

Part-B: Statistics

Module-III: Introduction to statistics and data collection

a) Application of statistics in the field of Audiology and speech-language pathology.
b) Scales of measurement: nominal, ordinal, interval, ratio
c) Classification of data: class intervals, continuous and discrete measurement
d) Normal distribution: general properties of normal distribution, theory of probability, area under normal probability curve
e) Variants from the normal distribution: skewness and kurtosis
f) Measure of central tendency: mean, median, mode
g) Measures of variability: range, deviation (average and standard deviation), variance

Module-IV: Statistics and research designs

a) Choosing statistics for different research designs
b) Correlational techniques: Pearson's Product Moment Correlation Coefficient; Spearman's Rank order correlation coefficient
c) Statistical inference: concept of standard error and its use; the significance of statistical measures; testing the significance of difference between two means z-test, t-test; analysis of variance, post hoc tests,

d) Non-parametric tests: Chi-square test, Wilcoxon test, Mann-Whitney U test,
e) Reliability and validity of test scores: reliability and validity, Item analysis
f) Analysis of qualitative data
g) Software for statistical analysis

Module-V: Epidemiology

a) Basic epidemiologic concepts and principles
b) Epidemiologic data sources and measurements
c) Epidemiologic methods – questionnaire survey, screening, personal survey, testing
d) Media - their advantages and disadvantages
e) Incidence and prevalence of hearing, speech, language disorders as per different census (NSSO, WHO)

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Dane F. C. (2011). Sampling and Measurement. In Evaluating research: Methodology for people who need to read research. New Delhi: SAGE publication.
- Field, A. (n.d.). Discovering Statistics Using IBM SPSS (4th ed.). SAGE Publications.
- Hegde M. N. (2010). A course book on Scientific and professional writing for speech language pathology (4thEdition), Singapore: Delmar publication.
- Hegde, M. N. (2003). Clinical research in communicative disorders: Principles and strategies. (3rd Edition), Austin: Pro-ed
- Hesse-Biber, S. N. &Leavy, P. (2011). The Ethics of social research. In The Practice of qualitative research. (2nd Edition), New Delhi: SAGE publication.
- Jekel, F. J., Katz, L.D., & Elmore, G.J (2001). Basic Epidemiologic Concepts and Principles in epidemiology, Biostatistics, and Preventive Medicine (2nd Edition). Pennsylvian: Saunders
- Meline, T. (2010). A research primer for communication sciences and disorders. Singapore: Pearson publication.

Syllabus - Second Semester

NEUROLOGY

Course Code: ASL2206 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand

- basic concepts, anatomy and physiology of nervous system related to speech and hearing
- neural organization –different structures and functions of various systems
- neurosensory and neuromotor controls in speech, language and hearing mechanisms
- cerebral plasticity and dominance and its relevance for speech, language and hearing disorders
- various neural diseases, lesions, nutritional and metabolic conditions affecting speech, language and hearing
- basic principles and assessment procedures used in speech, language and hearing disorders associated with neurological conditions
- basic principles and management procedures used in speech, language and hearing disorders associated with neurological conditions

Course Contents:

Module-I: Anatomy and physiology of the nervous system

a) General introduction to basic neurological concepts
b) Organization of the neural system
c) Central, peripheral and autonomic neural system
d) Neural structures - applied anatomy and physiology
e) Cranial nerves and those important for speech, language, hearing and balance
f) Cerebral blood supply, nourishment and protection of the brain
g) General principles of neural organization
h) Transmission of information in neural system – nerve fibers, synaptic transmission, action potential, chemical transmission, excitatory and inhibitory potential & neuromuscular transmission
i) Cerebral plasticity and development of neural plasticity and cerebral dominance

Module-II: Neural organization of speech and hearing processes

a) Neurosensory organization of speech and hearing
b) Central auditory nervous system
c) Anatomy of oral sensation and oral sensory receptors
d) Neuromotor control of speech
e) The pyramidal, extra-pyramidal system, basal ganglia and cerebellar system
f) Lower and upper motor neuron
g) Alpha and gamma motor neurons
h) Sensory and motor examination, oral, peripheral and other reflexes
i) Swallowing mechanism and neural control
j) Screening and bedside neurological examination

Module-III: Neural disorders associated with speech and hearing disorders - I

a) Neural infections – meningitis, encephalitis
b) Developmental anomalies – spinal cord defects, syringomalacia and bulbia, Arnold chian malformations
c) Hydrocephalus – source and circulation of CSF, types and etiopathogenesis
d) UMN lesions –spastic dysarthria

e) LMN lesions –flaccid dysarthria
f) Mixed lesions
g) Extra pyramidal lesions – dyskinetic dysarthria
h) Cerebellum and cerebellar pathway lesions – ataxic dysarthria
i) Other diverse lesions and dysarthrias

Module-IV: Neural disorders associated with speech and hearing disorders - II

a) Cerebrovascular diseases – ischemic brain damage – hypoxic ischemic encephalopathy, cerebral infarction – intracranial hemorrhage – intracranial, subarachnoid
b) Trauma to the CNS – subdural hematoma, epidural hematoma, parenchymal brain damages
c) Demyelinating diseases – multiple sclerosis, perivenous encephalomyelitis, Dementia
d) Degenerative, metabolic and nutritional disorders – Alzheimer's disease, Parkinsonism
e) Metabolic, hereditary, acquired, neuronal storage disorders
f) Wilson's disease, Phenylketonuria
g) Nutritional – Wernicke's encephalopathy, pellagra
h) Alcoholic cerebellar degeneration
i) Clinical-pathological methods and Neuro-imaging
j) Tumors of the CNS – gliomas, embryonal tumors of meninges, metastasis, malignant tumors

Module-V: Speech-language and swallowing disorders

a) Central language mechanism and its disorders
b) Developmental motor speech disorders – cerebral palsy, muscular dystrophy
c) Neurologic disorders with primitive reflexes, diagnosis and management
d) Clinical neurological syndromes associated with speech and language disorders
e) Childhood language disorders associated with neurologic disorders
f) Swallowing associated with neurogenic disorders and assessing mastication and deglutition
g) Agnosia and other conditions associated with speech and hearing disorders
h) Cognitive disorders associated with neurologic disorders
i) General management principles and options for childhood neurogenic speech, language and hearing disorders
j) General management principles and options for adult neurogenic speech, language and hearing disorders

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Adams, R.D. &Sidman, R.L. (1968). Introduction to neuropathology. New Jersey: McGraw-Hill.
- Bhatnagar, S.C. (2012). Neuroscience for the Study of Communicative Disorders. Lippincott, Williams & Wilkins
- Garden, E. (1968). Fundamental of neurology, V Edn., Philadelphia: Sarenders Co.
- Webb, W. G., & Adler, R. K. (2008). Neurology for the speech-language pathologist (5th ed.). St. Louis, Mo: Mosby/Elsevier.
- Duffy, J. R. (2013). Motor Speech Disorders: Substrates, Differential Diagnosis, and Management (3rd Ed.). University of Michigan, Elsevier Mosby.

OTOLARYNGOLOGY

Course Code: ASL2207 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand the

- causes, signs, symptoms, pathophysiology and management of diseases of external, middle and inner ear leading to hearing loss, and
- causes, signs, symptoms, pathophysiology and management of diseases of laryngeal and articulatory systems

Course Contents:

Module-I: External and middle ear and their disorders

a) Clinical anatomy of the ear
b) Congenital anamolies
c) Diseases of the external ear
d) Tumors of the external ear
e) Perforation and ruptures of tympanic membrane
f) Eustachian tube dysfunction
g) Otitis media with effusion
h) Cholesteatoma and chronic suppurative otitis media
i) Otosclerosis
j) Trauma to temporal bone
k) Facial nerve and its disorder

Module-II: Inner ear and its disorders

a) Congenital anomalies
b) Meniere's Disorder
c) Ototoxicity
d) Presbyacusis
e) Disorders of vestibular system
f) Vestibular Schwannoma
g) Tinnitus and medical line of treatment
h) Pre-surgical medical and radiological evaluations for implantable hearing devices
i) Overview of surgical technique for restoration and preservation of hearing
j) Post-surgical care and complication of surgery for cochlear implants
k) Overview of surgical technique, post-surgical care and complication of surgeries for implantable bone conducted hearing aids and middle ear implant

Module-III: Oral cavity and its disorders

a) Anatomy of the oral cavity
b) Common disorders of the oral cavity
c) Tumors of the oral cavity
d) Cleft lip and palate – medical aspects
e) Clinical anatomy and physiology of pharynx
f) Inflammatory conditions of the pharynx, tonsils and adenoids
g) Tumors of the pharynx

Module-IV: Larynx and its disorders

a) Clinical anatomy of larynx

b) Difference between adult and infant larynx
c) Clinical examination of larynx
d) Stroboscopy - technique, procedure, interpretation and precautions
e) Congenital laryngeal pathologies
f) Inflammatory conditions of the larynx
g) Vocal nodule and other disorders of the vocal folds
h) Benign and malignant tumours of the larynx
i) Laryngectomy – overview of surgical procedure
j) Phono surgery and other voice restoration surgeries

Module-V: Esophagus and its disorders

a) Clinical anatomy and physiology of esophagus
b) Clinical examination of esophagus
c) Congenital anomalies of esophagus
d) Esophageal fistula
e) Inflammatory conditions of esophagus
f) Benign conditions of esophagus
g) Malignant conditions of the esophagus
h) Airway management procedures

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Chan, Y. and Goddard, J.C. (2015). K J Lee's Essential otolaryngology: head and neck surgery. (11th edition). New Delhi: Atlantic Publisher and Distributers
- Dhingra, P. L. (2013). Diseases of Ear, Nose and Throat (Sixth edition). Elsevier.
- O'Neill, J.P. and Shah, J.P. (2016). Self-assessment in otolaryngology. Amsterdam: Elsevier
- Postic, W.P., Cotton, R.T., Handler, S.D. (1997). Ear trauma. Surgical Pediatric Otolaryngology. New York: Thieme Medical Publisher Inc.
- Wackym, A. and Snow, J.B. (2015). Ballenger's otorhinolaryngology head and neck surgery. (18th edition). United States: McGraw-Hill Medical

SPEECH-LANGUAGE PATHOLOGY

Course Code: ASL2208 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to understand the

- different speech and language disorders
- basic concepts and tools required for diagnosing speech and language disorders
- basics of assessment procedures for speech and language disorders
- basic principles and intervention procedures for speech and language disorders
- clinical requirements to practice,
- different laws, social-cultural and ethical issues
- identification and prevention of speech and language disorders
- basic principles of providing counselling and guidance to clients and caregivers

Course Contents:

Module-I: Basic concepts and methods of diagnostics

a) Introduction to Speech Language Disorders
b) Definition and descriptions of delay, deviancy and disorders; impairment, disability and handicap
c) Incidence and prevalence of speech and language disorders
d) Causes of speech and language disorders
e) Basic principles in assessment, evaluation and appraisal
f) Tools for diagnosis- case history, interview, self-reports, questionnaire & observations
g) Diagnostic models – SLPM, Wepman, Bloom and Lahey
h) Types of diagnoses – Clinical diagnosis, direct diagnosis, differential diagnosis, diagnosis by treatment, diagnosis by exclusion, team diagnosis, instrumental diagnosis, provocative diagnosis, tentative diagnosis advantage/disadvantages
i) Characteristics of a diagnostic clinician
j) Organization and basic requirements for clinical set up and team approach
k) DSM, ICD classification and ICF

Module-II: Basic concepts and methods of therapeutics

a) Basic concepts and terminologies in speech therapeutics
b) General principles of speech and language therapy
c) Speech therapy set-up
d) Individual and group therapy
e) Procedures and types of for speech-language therapy
f) Approaches to speech and language therapy – formal, informal and eclectic approaches
g) Planning for speech and language therapy – goals, steps, procedures and activities
h) Importance of reinforcement principles and strategies in speech and language therapy, types and schedules of rewards and punishment
i) Individual and group therapy
j) AAC and other nonverbal methods of therapy

Module-III: Overview of basic assessment and management of speech disorders

a) Causes of speech disorders
b) Overview of assessment procedures for voice disorders; articulation and phonological disorders; and fluency disorders
c) Overview of management procedures for voice disorders; articulation and phonological disorders; and fluency disorders
d) Early identification and prevention of speech disorders

e) Basic concepts in assessment and management of swallowing disorders

Module-IV: Overview of basic assessment and management of language disorders

a) Types, characteristics and classification of language disorders
b) Causes of language disorders
c) Overview of assessment procedures for child language disorders; adult language disorders; and neurogenic language disorders
d) Overview of management procedures for child language disorders; adult language disorders; and neurogenic language disorders
e) Early identification and prevention of language disorders
f) Issues related to bi- /multilingualism

Module-V: Other issues in practice as a speech - language pathologist

a) Professional code of conduct – social, cultural and other ethical issues
b) Scope of practice –different set ups and prerequisites
c) Documentation of diagnostic, therapeutic and referral reports
d) Counselling, guidance, facilitation of parent participation and transfer of skills
e) Evaluation of therapy outcome and follow up
f) Evidence based practice
g) Community based rehabilitation
h) Role of itinerant speech therapist, Anganwadis, resource teachers etc.
i) PWD act, National Trust, Consumer protection Act, noise pollution Act and other public laws, RCI, ISHA and other organizations controlling the field
j) Facilities and concessions available for speech and hearing disabled

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Owens. Jr, Kimberly, A. Metz, F.E. (2014). 5th Ed. Introduction to Communication Disorders: A life span based Perspective. Pearson Communication Science and Disorders Series.
- Hegde, M. N., & Davis, D. (2005). Clinical methods and practicum in speech-language pathology (4th ed.). Australia; Clifton Park, NY: Thomson Delmar Learning.
- Shipley, K. G., & Roseberry-McKibbin, C. (2006). Interviewing and counselling in communicative disorders : Principles and procedures (3rd ed.). Austin, Tex: Pro-Ed.
- Brookshire, R. H. (2003). Introduction to neurogenic communication disorders (6th ed.). St. Louis, Mo: Mosby.
- Hulit, L.M., Marle. R., Kathleen, R. H., & Fowey (2010). Born to Talk. Pearson Communication Science and Disorders Series 5th Ed.
- Roth, F. P., & Worthington, C. K. (2005). Treatment resource manual for speech language pathology (3rd ed.). Australia; Clifton Park, NY: Thomson Delmar Learning.
- Shipley, K. G., & McAfee, J. G. (2004). Assessment in speech-language pathology: A resource manual (3rd ed.). Australia; Clifton Park, NY: Delmar Learning.
- Ysseldyke, J. E., & Algozzine, R. (2006). Teaching students with communication disorders : A practical guide for every teacher. Thousand Oaks, Calif.: Corwin Press

AUDIOLOGY

Course Code: ASL2209 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to

- understand and carryout experiments to measure differential sensitivity loudness and pitch
- take case history, administer the tuning fork tests and interpret the results
- administer pure tone audiometry including masking on clinical population and appreciate the theoretical back ground of it
- carryout different tests involved in speech audiometry appreciate the theoretical back ground
- carryout subjective calibration and daily listening checks of the audiometer
- get adequate theoretical information necessary to understand concepts involved in objective calibration

Course Contents:

Module-I: Differential sensitivity

a) Concept of differential sensitivity, just noticeable difference
b) Weber's fraction
c) Intensity discrimination
d) Frequency discrimination
e) Duration discrimination and temporal resolution
f) Applications of jnd's
g) Magnitude estimation and production
h) Loudness – equal loudness level contours and its application
i) Loudness scales - sone, phone, Steven's power law
j) Pitch- scales of pitch

Module-II: Case history and tuning fork tests

a) Need for case history
b) Basics of history taking
c) Essential factors to be included in case history for adults
d) Essential factors to be included in case history for children
e) Interpretation of case history
f) Audiological evaluation – rationale and purpose
g) Principles, procedure, interpretation, advantages and disadvantages of Rinne and Schwabach tuning fork test
h) Principles, procedure, interpretation, advantages and disadvantages of Weber and Bing tuning fork test
i) Audiometric version of Weber and Bing test

Module-III: Pure tone audiometry

a) Classification of audiometers, Parts of an audiometer, characteristics and specifications of transducers used (earphones, bone vibrators, loud speakers)
b) Audiogram- concept and symbols used
c) Clinical method of threshold estimation
d) Factors affecting air conduction threshold
e) Bone conduction thresholds- measurements, factors effecting
f) Permissible noise levels in the audiometric room

Module-IV: Speech audiometry

a) Importance and purpose
b) Different types of stimuli used in speech audiometry
c) Concept of phonetically and phonemically balanced
d) Speech detection thresholds – procedure and application
e) Speech reception thresholds – procedures and application
f) Word recognition scores –procedure and applications
g) PIPB function – procedure and applications
h) Factors affecting speech audiometry
i) BC speech audiometry – procedure and its application
j) Test materials available in various languages

Module-V: Clinical masking and instrumental calibration

a) Definition and different terminologies
b) Purpose and rationale of clinical masking
c) Different types of stimulus employed in clinical masking
d) Interaural attenuation and factors affecting interaural attenuation
e) When to mask and how much to mask – importance of adequate noise levels
f) Different procedures for masking
g) Masking for speech audiometry
h) Calibration definition and purpose
i) Daily listening checks and subjective calibration
j) Objective calibration of air conduction transducers
k) Objective calibration of bone conduction transducers
l) Frequency calibration

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Durrant, J. D., &Feth, L. L. (2012). Hearing Sciences: A Foundational Approach (1 edition.). Boston: Pearson.
- Emanuel, D. C., &Letowski, T. (2008). Hearing Science (1 edition.). Philadelphia: Lippincott Williams and Wilkins.
- Gelfand, S. A. (2009). Hearing: An Introduction to Psychological and Physiological Acoustics (5 edition.). London: CRC Press.
- Kaplan, H., Gladstone, V. S., & Lloyd, L. L. (1993). Audiometric Interpretation: A Manual of Basic Audiometry (2 edition.). Boston: Pearson.
- Katz, J. (2014). Handbook of Clinical Audiology (7th International edition edition.). Lippincott Williams and Wilkins.
- Martin, F. N., & Clark, J. G. (2014). Introduction to Audiology. Boston: Pearson.
- Silman, S., & Silverman, C. A. (1997). Auditory Diagnosis: Principles and Applications (Reissue edition.). San Diego: Singular Publishing Group

PRACTICALS IN SPEECH-LANGUAGE PATHOLOGY

Course Code: ASL2210 **Credit Units: 07**

Practicals

a) Demonstrate normal aspects of speech and analyse perceptually variations in voice, articulation and fluency in different recorded speech samples of typical individuals at different age groups (children, adults and older adults) and sex.
b) Demonstrate normal aspects of language and analyse perceptually variations in language in different recorded samples of typical individuals at different age groups (children, adults and older adults) and sex.
c) Demonstrate stress, rhythm and intonation and variations in rate of speech and analyse perceptually variations in prosody in different recorded samples of typical individuals at different age groups (children, adults and older adults) and sex.
d) Use IPA to transcribe spoken words.
e) Record a standard passage, count number of syllables and words, identify syllable structure, syntactic structures in the passage.
f) Oral mechanism examination on 5 normal children and 5 normal adults.
g) Prepare a chart and show the developmental stages of speech and language behavior.
h) Administer standardized tests for assessment of delayed speech and language development such as REEL, SECS, LAT, 3DLAT, ALD each on any 2 children.
i) Study the available normative data (Indian/Western) of speech such as respiratory, phonatory, resonatory and articulatory parameters.
j) Measure the following in 5 normal subjects: (a) Habitual frequency (b) Frequency range (c) Intensity (d) Intensity range (e) Phonation duration (f) rate of speech (g) Alternate Motion Rates and Sequential Motion Rates (h) s/z ratio.
k) Study the available normative data (Indian/Western) of language such as phonology, semantics, syntax, morphology and pragmatic measures.
l) Perceptual analysis of speech and language parameters in normal (2 children and 2 adults and persons with speech disorders (3 adults + 3 children).
m) Prepare a model diagnostic report of a patient with speech and language disorder.
n) Prepare a diagnostic and therapy kit.
o) Make a list of speech language stimulation techniques and other therapy techniques for various speech disorders.
p) Familiarize with the sources for referral and parent counseling procedures.
q) Prepare a report on the available audiovisual material and printed material/pamphlets relating to speech-language pathology, public education of communication and hearing disorders, etc.
r) Prepare a report on the available clinical facilities and clinical activities of the institute.

Clinical Practicum

a) Observe the evaluation process and counselling of at least 5 different speech and language disorders in children.
b) Observe the evaluation process and counselling of at least 5 different speech and language disorders in adults.
c) Take case history of a minimum of 10 individuals (5 normal & 5 clients with complaints of speech-language problems).
d) Observation of diagnostic procedures.

e) Observe various therapeutic methods carried out with children and adults with speech and language disorders.

Examination scheme:

Components	**CRW**	**C/P/A**	**CT**	**A**	**Viva**
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

PRACTICALS IN AUDIOLOGY

Course Code: ASL2211 **Credit Units: 07**

Practicals

Calculate/derive the answers for following

a) Calculate the relative intensities with different reference intensities.
b) Calculate decibels when sound intensities are doubled, increased by 4 times
c) Add decibels when two sounds with different intensities are produced simultaneously
d) Collect pictures of audiometers that existed between 1920 and 1990.

Perform the following experiments

a) Calculate reference equivalent sound pressure levels (RETSPL) for head phones and bone vibrator for any two frequencies using 30 participants.
b) Measure most comfortable level on 10 participants with normal hearing sensitivity.
c) Measure uncomfortable levels on 10 participants with normal hearing sensitivity.
d) Calculate the sensation levels of MCL and UCLs in above 10 participants.
e) Measure difference limen of intensity, frequency and duration on 10 normal hearing adults and plot it in graphical form and interpret the results.
f) Measure equal loudness level contours at minimum level, 40 dB SPL, 70 dB SPL (1 kHz) in 5 normal hearing adults.
g) Measure sone and mel in 5 normal hearing adults using scaling techniques.
h) Take case history on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry.
i) Administer different tuning fork tests on 5 simulated conductive and 5 sensori neural hearing loss individuals.
j) Carry out pure tone and speech audiometry on 10 normal hearing individuals.
k) Carry out clinical masking on 10 normal hearing individuals with simulated conductive hearing loss and carry out clinical masking on 5 individuals with conductive hearing loss and 5 individuals with sensori-neural hearing loss.
l) Carryout daily listening checks and subjective calibrations 20 times and observe objective calibration once
m) Perform otoscopy and draw the tympanic membrane of 10 healthy normal individuals
n) Measure difference limen of intensity, frequency and duration on 10 normal hearing adults and plot it in graphical form and interpret the results
o) Measure equal loudness level contours at minimum level, 40 dB SPL, 70 dB SPL (1 kHz) in 5 normal hearing adults
p) Measure sone and mel in 5 normal hearing adults using scaling techniques
q) Take case history on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry
r) Administer different tuning fork tests on 5 simulated conductive and 5 sensori neural hearing loss individuals
s) Carry out pure tone and speech audiometry on 10 normal hearing individuals.
t) Carry out clinical masking on 10 normal hearing individuals with simulated conductive hearing loss and carry out clinical masking on 5 individuals with conductive hearing loss and 5 individuals with sensori-neural hearing loss
u) Carryout daily listening checks and subjective calibration 20 times and observe objective calibration once

Clinical Practicum

a) Observe case history being taken on 5 adults and 5 children with hearing problem and correlate the information from case history to results of pure tone audiometry.
b) Administer different tuning fork tests on 5 conductive and 5 sensori neural hearing loss individuals.
c) Observe the pure tone audiometry being carried out on 30 clients.
d) Plot the audiogram, calculate the pure tone average and write the provisional diagnosis of observed clients.
e) Perform otoscopy (under supervision) on at least 1 client with following conditions: Tympanic membrane perforation, SOM, CSOM

Examination scheme:

Components	**CRW**	**C/P/A**	**CT**	**A**	**Viva**
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

Syllabus - Third Semester

VOICE AND ITS DISORDERS

Course Code: ASL2307 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to

- describe characteristics of normal voice and identify voice disorders
- explain etiology related to voice problems, and its pathophysiology
- assess voice disorders
- provide counselling and therapy to individuals with voice disorders

Course Contents:

Module-I: Basic concepts in voice and its production

a) Definition and functions of voice – biological and non-biological
b) Parameters of voice
c) Structures and function of respiratory system for the purpose of phonation
d) Laryngeal anatomy – Structural support of larynx, muscles, vocal fold microstructure, blood supply, and innervations
e) Vocal tract resonance and voice quality
f) Development of voice: Birth to senescence; structural and voice related changes
g) Aerodynamic myo-elastic theory of voice production
h) Voice mechanics – Physiologic, acoustic and aerodynamic correlates of voice
i) Pitch and loudness changing mechanism, voice registers and voice quality
j) Description of normal and abnormal voice: Parametric, pathologic/perceptual, social

Module-II: Characteristics and pathophysiology of voice disorders

a) Pathologies of the laryngeal mechanism: classification of voice disorders, incidence, and prevalence
b) Etiology of voice disorders: voice misuse and abuse, medical related etiologies, primary disorder etiologies and personality related etiologies
c) Pathologies of vocal fold cover (infective and trauma related secondary conditions) and muscular dysfunction
d) Non-organic voice disorders: functional disorders, psychosomatic- functional aphonia and physiological- voice abuse, puberphonia)
e) Congenital voice disorders
f) Neurological voice disorders
g) Voice problems in systemic illnesses and endocrine disorders
h) Voice problems in transgenders
i) Voice problems in the elderly
j) Voice problems in professional voice users: teachers and singers

Module-III: Assessment of voice

a) Referral sources, medical examination and team approach
b) Protocol for voice assessment: components and philosophies (ICF, ICD)
c) Clinical voice laboratory: principles of instrumental measurements – electrical error, electrical safety, hygiene safety; recording of data; storage; patented softwares, free wares
d) Perceptual evaluation of voice: GRBAS, CAPE -V
e) Visualization procedures- indirect laryngoscopy, video laryngoscopy & stroboscopy

f) Acoustic analysis of voice: F0 related measures, intensity related measures, quality related measures, phonetogram, DSI
g) Electroglottography and inverse filtering procedures
h) Aerodynamic analysis of voice: static & dynamic measures
i) Self-evaluation of voice : PROM, VHI, V-DOP
j) Reporting of voice findings, normative comparisons, differential diagnosis

Module-IV: Management of voice

a) Voice therapy orientation: basic principles, goal setting and approaches
b) Vocal hygiene and preventive counselling
c) Symptomatic voice therapy – voice facilitation techniques
d) Psychological approaches to voice therapy – psychoanalysis, rational emotive therapy and cognitive behavior therapy
e) Physiological approach – breathing and postural techniques
f) Holistic voice therapy approaches -1: accent therapy, confidential voice therapy,
g) Holistic voice therapy approaches - 2: vocal function exercises, resonant voice therapy, Lee Silverman voice therapy
h) Medical and surgical procedures in the treatment of benign vocal fold lesions: pharmaceutical effects on voice, phono surgery : re-innervation techniques, laryngeal framework surgeries, micro laryngeal excision
i) Professional voice care

Module-V: Intervention strategies for voice disorders

a) Vocal trauma related disorders
b) Functional voice disorders – inappropriate vocal components
c) Functional aphonia
d) Puberphonia/mutational falsetto
e) Muscle tension dysphonia
f) Sulcus vocalis
g) Vocal fold palsy
h) Spasmodic dysphonia
i) GERD/LPR
j) Benign vocal fold lesions requiring surgical intervention
k) Post-operative care for benign vocal fold lesions disorders
l) Documenting voice therapy outcomes

Practicals

a) Record phonation and speaking samples (counting numbers) from five children, adult men, adult women, geriatric men and geriatric women. Note recording parameters and differences in material.
b) Make inferences on age and sex differences across the samples obtained in the previous experiment using perceptual voice profiling. Make a note of differences in pitch, loudness, quality and voice control. Explain how voice reflects ones personality and other social needs.
c) Perform an acoustic voice analysis on phonation sample and generate a voice report based on acoustic findings. Compare findings between men & women.
d) Perform MPT and s/z ratio. Infer differences across age and sex.
e) Perform spirometry or any other appropriate aerodynamic procedure. Infer differences across age and sex.
f) Perform acoustic analysis on five abnormal voice samples.
g) Observe and document findings from five laryngeal examinations (pre-recorded or live) such as

VLS, stroboscopy or any other relevant.

h) Administer a PROM on five individuals.

i) Prepare a vocal hygiene checklist.

j) Demonstrate therapy techniques such as vocal function exercise, resonant voice therapy, digital manipulation, push pull, relaxation exercises.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Stemple, J. C., Glaze, L. E., & Gerdeman, B, K. (2014). Clinical voice pathology: Theory & Management (5th Ed.). San Diego: Plural publishers.
- Aronson, A.E. & Bless, D. M. (2009). Clinical Voice Disorders.(4th Ed.). New York: Thieme, Inc.
- Boone, D. R., McFarlane, S. C, Von Berg, S. L. & Zraick, R, I. (2013): The Voice and Voice Therapy. (9th Ed.). Englewood Cliffs, Prentice-Hall, Inc. New Jersy.
- Professional Voice: Assessment and Management. Proceedings of the national workshop on "Professional Voice: Assessment and management", 9-10 Dec 2010. All India Institute of Speech & Hearing, Mysore. 2010.
- Andrews, M. L. (2006). Manual of Voice treatment: Pediatrics to geriatrics (3rd Ed.). Thomson Delmar Learning.
- Colton, R. H, Casper, J. K. & Leonard, R. (2006). Understanding voice problems. Baltimore: Williams & Wilkins.
- Sapienza, C. M., & Ruddy, B H. (2013). Voice Disorders.(2nd Ed.). San Diego: Plural Publisher.
- Voice: Assessment and Management. Proceedings of the national workshop on "Voice: Assessment and management", 14-15 Feb 2008. All India Institute of Speech & Hearing, Mysore. 2008.

SPEECH SOUND DISORDERS

Course Code: ASL2308 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to

- describe normal speech sound development and characterization of individuals with speech sound disorders.
- perform phonological analysis and assessment of speech sound disorders.
- plan intervention for individuals with speech sound disorders.

Course Contents:

Module-I: Speech sound acquisition and development

a) Fundamentals of articulatory phonetics - phonetic description of vowels & consonants.
b) Phonology & phonological theories – generative phonology, natural phonology.
c) Phonology & phonological theories – non-linear phonology, optimality theory.
d) Methods to study speech sound acquisition – diary studies, cross sectional studies and longitudinal studies.
e) Speech sound acquisition
   i. birth to one year (development of infant speech perception, early speech production).
   ii. one to two years (consonant inventories, influence of phonological knowledge on vocabulary acquisition).
   iii. two to five years (growth of phonetic, phonemic, phonotactic inventory – consonants, clusters, phonological patterns).
   iv. above five years (speech sound mastery and development of literacy – phonological awareness).
   v. Factors influencing speech sound acquisition
f) Acoustics of speech sounds
g) Speech intelligibility, factors affecting speech intelligibility, assessment of speech intelligibility
h) Co articulation: types and effects
i) Phonological development in bilingual children.
j) Phonological development in Indian languages.

Module-II: Assessment of speech sound disorders - I

a) Current concepts in terminology and classification of speech sound disorders
   i. Organically-based speech sound disorders, childhood apraxia of speech.
   ii. Speech sound disorders of unknown origin, classification by symptomatology.
b) Factors related to speech sound disorders
   i. structure and function of speech & hearing and oro-sensory mechanisms.
   ii. cognitive – linguistic, psychosocial and social factors.
   iii. metalinguistic factors related to speech sound disorders.
c) Introduction to assessment procedures: aims of assessment, screening and comprehensive assessment.
d) Speech sound sampling procedures - issues related to single word and connected speech samples; imitation and spontaneous speech samples, contextual testing, recording of speech samples.
e) Review of tests in English and other Indian languages - Single word articulation tests, deep articulation of articulation, and computerized tests of phonology.
f) Influence of language and dialectal variations in assessment.

g) Transcription of speech sample - transcription methods –IPA and extension of IPA; broad and narrow transcription.

Module-III: Assessment of speech sound disorders - II

a) Introduction to independent and relational analysis.
b) Independent analyses – phonetic inventory, phonemic inventory and phonotactic inventory (utility of independent analysis for analysis of speech of young children and children with severe speech sound disorders).
c) Relational analyses – SODA, pattern analysis, (distinctive features, phonological process analysis).
d) Phonological processes analyses - language specific issues, identification and classification of errors.
e) Assessment of oral peripheral mechanism.
f) Speech sound discrimination assessment, phonological contrast testing.
g) Stimulability testing.
h) Determining the need for intervention – speech intelligibility and speech severity assessment.
i) Factors influencing target selection – stimulability, frequency of occurrence, developmental appropriateness, contextual testing, and phonological process analysis.
j) Case study – Documenting the assessment findings and determining the need for intervention.

Module-IV: Management – I

a) Basic considerations in therapy – target selection, basic framework for therapy, goal-attack strategies, organizing therapy sessions, individual vs. group therapy.
b) Treatment continuum – establishment, generalization and maintenance; measuring clinical change.
c) Facilitation of generalization.
d) Maintenance and termination from therapy.
e) Motor-based treatment approaches – Principles of motor learning.
f) Discrimination/ear training and sound contrast training.
g) Establishing production of target sound – imitation, phonetic placement, successive approximation, context utilization.
h) Traditional approach, contextual/sensory-motor approaches.
i) General guidelines for motor-based treatment approaches.
j) Use of technology in articulation correction.

Module-V: Management – II

a) Core vocabulary approach.
b) Introduction to linguistically-based treatment approaches- Distinctive feature therapy.
c) Minimal pair contrasts therapy.
d) Metaphon therapy, Cycles approach.
e) Broad-based language approaches.
f) General guidelines for linguistically-based approaches.
g) Phonological awareness and phonological disorders.
h) Phonological awareness intervention for preschool children.
i) Adapting intervention approaches to individuals from culturally and linguistically diverse backgrounds.
j) Role of family in intervention for speech sound disorders.

Practicals

a) List the vowels and consonants in your primary language and provide phonetic and acoustic descriptions for the speech sounds.
b) Identify the vowels and consonants of your language on the IPA chart and practice the IPA symbols by transcribing 25 words.

c) Make a list of minimal pairs (pairs of words which differ by only one phoneme) in English.
d) Make a list of minimal pairs in any language other than English.
e) Identify the stages of speech sound acquisition by observations from videos of children from birth to 5 years of age.
f) Record the speech of a two year old typically developing child, transcribe and analyze the speech sample.
g) Record the speech of one typically developing child from 3-5 years of age (include single word and connected speech samples), transcribe the sample, and perform phonological assessment.
h) Analyze transcribed speech samples of typically developing children – practice independent and relational analysis.
i) Practice instructions for phonetic placement of selected sounds.
j) Develop a home plan with activities for any one section of phonological awareness in English and in one Indian language.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Bernthal, J.E., Bankson, N.W., & Flipsen, P. (2013). Articulation and phonological disorders.(7th Ed.). Boston, MA: Pearson.
- Dodd, B. (2013). Differential diagnosis and treatment of children with speech disorder.(2nd Ed). NJ: Wiley.
- Rout, N (Ed)., Gayathri, P., Keshree, N and Chowdhury, K (2015). Phonics and Phonological Processing to Develop Literacy and Articulation; A Novel Protocol. A publication by NIEPMED, Chennai. Freely downloadable from
- http://niepmd.tn.nic.in/publication.php. ISBN 978-81-928032-9-5
- Vasanta, D. (2014). Clinical applications of phonetics and phonology. ISHA Monograph.Vol 14, No. 1.Indian Speech & Hearing Association.
- Velleman, S. L (2003). Resource guide for Childhood Apraxia of Speech.Delmar/Thomson Learning.
- Williams, A., McLeod, S., & McCauley, R. (2010). Interventions for speech sound disorders in children. Baltimore: Brookes.

DIAGNOSTIC AUDIOLOGY: BEHAVIOURAL TESTS

Course Code: ASL2309 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to

- choose individualized test battery for assessing cochlear pathology, retro cochlear pathology, functional hearing loss, CAPD, vestibular dysfunctions, tinnitus and hyperacusis
- independently run the tests and interpret the results to identify the above conditions and also use the information for differential diagnosis
- make adjustments in the test parameters to improve sensitivity and specificity of tests.
- make appropriate diagnosis based on the test results and suggest referrals.

Course Contents:

Module-I: Introduction to diagnostic audiology

a) Characteristics of a diagnostic test, difference between screening and diagnostic test, functions of a diagnostic test in Audiology
b) Need for test battery approach in auditory diagnosis and integration of results of audiological tests, cross-check principle
c) Concept of sensitivity, specificity, true positive, true negative, false positive, false negative, hit rate
d) Definition of behavioural and physiological tests and their characteristics in diagnostic audiology
e) Theories and physiological bases of recruitment
f) Theories and physiological bases of adaptation
g) Clinical indications for cochlear pathology, retro-cochlear pathology, central auditory processing disorders, functional hearing loss, vestibular disorders

Module-II: Tests to identify cochlear and retro cochlear pathology

a) ABLB, MLB and SISI tests
b) Behavioural tests of adaptation
c) Bekesy audiometry
d) Brief tone audiometry
e) PIPB function
f) Glycerol test
g) Test to identify dead regions of cochlea

Module-III: Tests to diagnose functional hearing loss

a) Behavioural and clinical indicators of functional hearing loss
b) Pure tone tests including tone in noise test, Stenger test, BADGE, puretone DAF
c) Speech tests including Lombard test, Stenger test, lip-reading test, Doerfler-Stewert test, Low level PB word test, Yes-No test, DAF test
d) Identification of functional hearing loss in children: Swinging story test, Pulse tone methods

Module-IV: Assessment of central auditory processing

a) Definition, different behavioral processes
b) Behavioral and clinical indicators of central auditory processing disorders
c) Bottle neck and subtlety principles and their implications in
d) Tests to detect central auditory processing disorders
e) Monaural low redundancy tests - filtered speech tests, time compressed speech test, speech-in-noise test, SSI with ICM, other monaural low redundancy tests.
f) Dichotic speech tests – Dichotic digit test, Staggered spondaic word test, Dichotic CV test, SSI with CCM, Competing sentence test, other dichotic speech tests.

g) Binaural interaction tests – RASP, BFT, MLD, other binaural interaction tests
h) Tests of Temporal processing – pitch pattern test, duration pattern tests, other temporal ordering tests, gap detection test, TMTF
i) Variables influencing the assessment of central auditory processing: Procedural and subject variables
j) Test findings of important tests in subjects with central auditory disorders: brainstem lesion, cortical, CAPD in children.

Module-V: Assessment of persons with vestibular disorder, tinnitus, hyperacusis

a) Introduction to structure and function of vestibular system
b) Vestibular ocular reflex and vestibulo spinal reflex
c) Overview on other systems involved in balance
d) Signs and Symptoms of vestibular disorders
e) Team in the assessment and management of vestibular disorders
f) Behavioral tests to assess vestibular functioning: Fukuda stepping test, tandem gait test, finger nose pointing, Romberg test, Sharpened Romberg test, Dix-Hallpike test, Log-roll test
g) Overview of tinnitus and hyperacusis and tests for assessment
h) Pitch matching, loudness matching, residual inhibition, Feldman masking curves
i) Johnson Hyperacusis Dynamic Range Quotient

Practicals

a) Administer ABLB, MLB and prepare ladder gram (ABLB to be administered by blocking one ear with impression material)
b) Administer classical SISI on 3 individuals and note down the scores
c) Administer tone decay tests (classical and its modifications) and note down the results (at least 3 individuals)
d) Administer Bekesy audiometry
e) Administer Brief tone audiometry
f) Plot PIPB function using standardized lists in any 5 individuals
g) Administer the tests of functional hearing loss (both tone based and speech based) by asking subject to malinger and having a yardstick of loudness.
g) Administer CAPD test battery to assess different processes on 3 individuals and note down the scores
h) Administer Fukuda stepping test, Tandem gait test, Finger nose pointing, Romberg test, Sharpened Romberg test, Dix-Hallpike test, Log-roll test on 5 of the individuals each and note down the observations.
i) Estimate the pitch and loudness of tinnitus in 2 persons with tinnitus (under supervision). Assess the residual inhibition in them.
j) Plot Feldman masking curves for a hypothetical case
k) Administer Johnson Hyperacusis Dynamic Range Quotient on any 2 of the individuals and note down the scores.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Gelfand, S. A. (2009). Essentials of Audiology. Thieme.
- Hall, J. W., & Mueller, H. G. (1996). Audiologists' Desk Reference: Diagnostic audiology principles, procedures, and protocols. Cengage Learning.
- Jerger, J. (1993). Clinical Audiology: The Jerger Perspective. Singular Publishing Group.
- Katz, J., Medwetsky, L., Burkard, R. F., & Hood, L. J. (Eds.). (2007). Handbook of Clinical Audiology (6th revised North American edition). Philadelphia: Lippincott Williams and Wilkins.
- Martin, F. N., & Clark, J. G. (2014). Introduction to Audiology (12 edition). Boston: Pearson.
- Roeser, R. J., Valente, M., & Hosford-Dunn, H. (2007). Audiology: Diagnosis. Thieme.
- Stach, B. A. (2010). Clinical audiology: an introduction (2nd ed). Clifton Park, NY: Delmar Cengage Learning.

AMPLIFICATION DEVICES

Course Code: ASL2310 **Credit Units: 05**

Course Objectives: After completing this course, students will be able to

- assess the candidacy for hearing aids and counsel accordingly
- evaluate the listening needs and select the appropriate hearing aid
- independently program digital hearing aids as per the listening needs of the client
- independently assess the benefit from the hearing aid using subjective and objective methods
- make all types of ear molds
- counsel the parents/care givers at all stages

Course Contents:

Module-I: Types of hearing aids

a) Historical development of hearing aids: development of concept of amplification, development of different types of amplification devices

b) Review of basic elements of hearing aids: Microphone, Amplifier, Receiver/vibrator, Cords, Batteries.

c) Classification and Types of hearing aids
   - Body level, ear level, in the ear, ITC, invisible in the canal, CIC
   - Binaural, pseudo binaural, monaural
   - Programmable, trimmer digital and digital hearing aids
   - Directional hearing aids, modular hearing aids
   - RIC hearing aids
   - Implantable hearing aids
   - Master hearing aids
   - CROS hearing aids

d) Group amplification – hard wired, induction loop, FM, infrared

e) Assistive listening devices – types and selection (Telephones, Television, typing technology)

Module-II: Technological aspects in hearing aids

a) Routing of signals, head shadow/baffle/diffraction effects

b) Output limiting and issues related to them: peak clipping, compression

c) Concept and use of compression in hearing aids: BILL, TILL, PILL, Wide Dynamic Range Compression, Syllabic Compression, Dual Compression

d) Signal processing in hearing aids – BILL, TILL, PILL

e) Signal enhancing technology

f) Noise reduction algorithms

g) Extended low frequency amplification, frequency lowering technology (transposition, compression)

h) Recent advances in hearing aids

Module-III: Electro-acoustic measurements for hearing aids

a) Purpose and Parameters to be considered: OSPL90, SSPL90,HFA SSPL90, Gain, Full on Gain, HFA Full on Gain, Reference test Gain, Basic Frequency Response, Total Harmonic distortion, Intermodulation Distortion, input Output functions, instrumentation, procedure, variables affecting EAM

b) Electro-acoustic measurements, BIS, IEC and ANSI standards

c) Environmental tests.

d) Care, maintenance and troubleshooting of hearing aids

e) Counselling and orienting the hearing aid user (Client and significant others)

Module-IV: Selection of hearing aids

a) Pre-selection factors; Prescriptive and comparative procedures; Functional gain and insertion gain methods; Use of impedance, OAEs and AEPs audiometry; Hearing aids for conductive hearing loss; Hearing aids for children; Hearing aids for elderly; Selection of non-linear programmable and digital hearing aids
b) Hearing aid programming
c) Methods for assessing hearing aid benefit
d) Real ear insertion measurements for verification of hearing aid benefit: REIG, REUR, REAR, REOR, RESR, REIG, REAG, RECD
e) Acoustic feedback in hearing aids

Module-V: Mechano-acoustic couplers (Ear molds)

a) Different types of molds
b) Procedure for hard molds and soft mold
c) UV curing methods
d) Special modifications in the ear molds: Vents (diagonal and parallel), deep canal molds, short canal, horns, Libby horn, reverse horn, acoustic modifier
e) Effects of mechano-acoustic couplers on the hearing aid output

Practicals

a) Listen to the output of different types and classes of hearing aids (monaural, binaural, analog, digital hearing aids), in different settings
b) Troubleshoot hearing aids: Check the continuity of the receiver cord using multi meter, measure the voltage of different sized batteries using multi meter, Check voltage of batteries different types and sizes
c) Carry out electroacoustic measurements for the body level and ear level hearing aids
d) Program the hearing aid for different configuration and degrees of hearing loss (at least 5 different audiograms) using different prescriptive formulae
e) Program the hearing aid for different listening situations (at least 3 different situations)
f) Vary the compression settings in a digital hearing aid and note down the differences in the output
g) Perform real ear insertion measurements using different hearing aids (body level and ear level, hearing aids of different gains)
h) Compare speech perception through conventional BTE and RIC hearing aids using a rating scale
i) Observe assistive listening devices such as telephone amplifier, vibro-tactile alarms, note down the candidacy and their utility.
j) Administer a questionnaire to assess hearing aid benefit on 2 persons using hearing aids.
k) Carry out a role play activity of counselling a hearing aid user
l) Ear Molds

- Take impression for the ear mold using different techniques, different methods and using different materials
- Make hard mold for any 2 ears
- Make soft mold for any 2 ears
- Make vent in hard molds you made

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Dillon. (2012). Hearing Aids (2 edition). Thieme Medical and Scientific Publisher.
- Hall, J. W., & Mueller, H. G. (1998). Audiologists' Desk Reference: Audiologic management, rehabilitation, and terminology. Singular Publishing Group.
- Kates, J. M. (2008). Digital Hearing Aids (1 edition). San Diego: Plural Publishing Inc.
- Metz, M. J. (2014). Sandlin's Textbook of Hearing Aid Amplification: Technical and Clinical Considerations. Plural Publishing.
- Mueller, H. G., Hawkins, D. B., & Northern, J. L. (1992). Probe Microphone Measurements: Hearing Aid Selection and Assessment. Singular Publishing Group.
- Mueller, H. G., Ricketts, T. A., & Bentler, R. A. (2007). Modern Hearing Aids: Pre-fitting Testing and Selection Considerations: 1 (1 edition). San Diego, CA: Plural Publishing Inc.
- Sandlin, R. E. (Ed.). (1989). Handbook of Hearing Aid Amplification: Clinical Considerations and Fitting Practices v. 2. Boston: Singular Publishing Group.
- Sandlin, R. E. (Ed.). (1993). Understanding Digitally Programmable Hearing AIDS. Boston: Allyn & Bacon.
- Tate, M. (2013). Principles of Hearing Aid Audiology. Springer.
- Taylor, B., & Mueller, H. G. (2011). Fitting and Dispensing Hearing Aids (1 edition). San Diego: Plural Publishing Inc.
- Valente, M. (2002). Hearing Aids: Standards, Options, and Limitations. Thieme.

CLINICALS IN SPEECH LANGUAGE PATHOLOGY-I

Course Code: ASL2311 **Credit Units: 07**

General considerations:
- Exposure is primarily aimed to be linked to the theory courses covered in the semester.
- After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc), and do (perform on patients/ client contacts) the following:

Know:
1. Procedures to obtain a speech language sample for speech & language assessment from children of different age groups such as, pre schoolers, kindergarten, primary school and older age groups.
2. Methods to examine the structures of the oral cavity/organs of speech.
3. The tools to assess language abilities in children (with hearing impairment, specific language impairment & mixed receptive language disorder).
4. Development of speech sounds in vernacular and linguistic nuances of the language.

Know-how:
1. To evaluate speech and language components using informal assessment methods.
2. To administer at least two standard tests for childhood language disorders.
3. To administer at least two standard tests of articulation/ speech sounds.
4. To assess speech intelligibility.

Show:
1. Analysis of language components – Form, content & use – minimum of 2 samples.
2. Analysis of speech sounds at different linguistic levels including phonological processes – minimum of 2 samples.
3. Transcription of speech language samples – minimum of 2 samples.
4. Analyse differences in dialects of the local language.

Do:
1. Case history - minimum of 5 individuals with speech & language disorders.
2. Oral peripheral examination - minimum of 5 individuals.
3. Language evaluation report – minimum of 5.
4. Speech sound evaluation report – minimum of 5.

Evaluation:
- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

CLINICALS IN AUDIOLOGY-I

Course Code: ASL2312 **Credit Units: 07**

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.
- After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/ client contacts) the following:

Know:

1. Methods to calibrate audiometer.
2. Materials commonly employed in speech audiometry.
3. Calculation pure tone average, % of hearing loss, minimum and maximum masking levels.
4. Different types of hearing loss and its common causes

Know-how:

1. To obtain detailed case history from clients or parents/guardians.
2. To carryout commonly used tuning fork tests.
3. To administer pure tone audiometry including appropriate masking techniques on adults using at least techniques
4. To administer tests to find out speech reception threshold, speech identification scores, most comfortable and uncomfortable levels on adults.

Show:

1. Plotting of audiograms with different degree and type with appropriate symbols – 2 audiograms per degree and type
2. Detailed case history taken and its analysis
3. Calculation degree, type and percentage of hearing loss on 5 sample conditions

Do:

1. Case history on at least 5 adults and 3 children with hearing disorders
2. Tuning fork test on at least 2 individuals with conductive and 2 individuals with sensori-neural hearing loss
3. Pure tone audiometry with appropriate masking on 5 individuals with conductive, 5 individuals SN hearing loss and 3 individuals with unilateral/asymmetric hearing loss – 5

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	**CRW**	**C/P/A**	**CT**	**A**	**Viva**
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

Syllabus - Fourth Semester

MOTOR SPEECH DISORDERS IN CHILDREN

Course Code: ASL2402 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to

- describe the characteristics of motor speech disorders in children such as cerebral palsy, childhood apraxia of speech and other childhood dysarthrias
- assess the speech and non-speech aspects associated with the above conditions
- plan and execute therapy strategies for children with motor speech disorders

Course Contents:

Module-I: Neuro-developmental processes in speech production and motor speech disorders

a) Review of neuro-anatomy (cerebral cortex, sub-cortical structures, brainstem, cerebellum, spinal cord & cranial nerves, pyramidal and extra-pyramidal systems)
b) Sensory-motor integration (spatial temporal planning, motor planning and feedback)
c) Anatomic development of speech production systems
d) Development of neural pathways of speech motor control (brain maturation, reflexes, sensory and motor)
e) Dysarthria in children – cerebral palsy – disorders of tone (spastic, flaccid): definition, etiology, characteristics and associated problems
f) Dysarthria in children – cerebral palsy – disorders of movement (hyperkinetic, hypokinetic) and disorder of balance (ataxia): definition, etiology, characteristics and associated problems
g) Dysarthria in children – lower motor neuron and other syndromes with motor speech disorders
h) Childhood apraxia of speech and nonverbal oral apraxia: definition, characteristics and classification

Module-II: Assessment of motor speech disorders in children

a) Case history and developmental neurological evaluation – primitive postural and oro-pharyngeal reflexes, cranial nerve examination
b) Assessment of oral sensory and motor capacity – Oral peripheral mechanism examination, neuro-muscular status
c) Assessment of speech sub-systems – quantitative and qualitative
d) Assessment of speech intelligibility and comprehensibility
e) Assessment of associated problem
f) Speech assessment with specific reference to childhood apraxia of speech – Phonetic and phonemic inventory, phonotactics and syllable sequencing, variability of errors, speech intelligibility, fluency and prosody
g) Test materials – checklist for childhood apraxia of speech, screening test for developmental apraxia of speech
h) Protocols for non-verbal and verbal praxis specific to Indian languages
i) Differential diagnosis- dysarthria and other developmental disorders
j) Differential diagnosis - childhood apraxia of speech and other developmental disorders

Module-III: Management of childhood dysarthria

a) Team approach in rehabilitation of motor speech disorders in children
b) Neuro-developmental therapy
c) Non speech oral-motor exercises: its application for children with dysarthria

d) Management of drooling
e) Behavioral management of respiratory, phonatory, resonatory and articulatory subsystems
f) Prosthetic appliances in treatment of childhood dysarthria
g) AAC in management of motor speech disorders- role of devices, AAC team, candidacy and pre-requisites, symbol selection, techniques, assessment for AAC, effective use of AAC
h) Case studies: Planning intervention for children with dysarthria

Module-IV: Management of childhood apraxia of speech

a) Principles of motor learning
b) Integral stimulation – dynamic temporal cueing
c) Multisensory and tactile cueing techniques (moto kinesthetic speech training, sensory motor approach, PROMPTS, Touch cue method & speech facilitation)
d) Gestural cueing techniques (signed target phoneme therapy, adapted cueing techniques, cued speech, visual phonics,& Jordon's gestures)
e) Miscellaneous techniques (melodic intonation therapy, multiple phonemic approach, & instrumental feedback)
f) Cognitive/conceptual/ linguistic /phonological remedial approaches - phonotactics
g) Other approaches: Vowel and diphthong remediation techniques (Northampton (Yale) vowel chart and Alcorn symbols), Nancy Kauffman's speech praxis treatment kit
h) Use of AAC in childhood apraxia of speech
i) Evidence-based practice in intervention for childhood apraxia of speech
j) Case studies: Planning intervention for childhood apraxia of speech

Module-V: Feeding and swallowing disorders in children

a) Embryology- periods and structures of development
b) Anatomical structures of swallowing- upper aero digestive system, anatomic difference between adults and children
c) Physiology of swallowing- swallow phases, neural control of swallowing, reflexes related to swallowing, suckling and sucking, airway and swallowing
d) Terms involved in dysphagia and development of feeding skills
e) Causes of dysphagia in children
f) Signs and symptoms of dysphagia in children
g) Assessment – inferences from neural developmental assessment, cranial nerve examination, assessment scales, nutritive and non-nutritive assessment, instrumental assessment (VFS, cervical auscultation), gastrointestinal evaluation
h) Management: positioning, oral- motor treatment, team approach, non oral feeding, transitional feeding, modifications in feeding
i) Role of speech-language pathologist in neonatal intensive care with reference to feeding and swallowing

Practicals

a) With the help of models, charts and software, identify the motor control centers in the brain.
b) Perform oro-motor examination in five children and adults and compare
c) Identify oro-motor reflexes (rooting, suckling, & phase bite) in 5 infants.
d) Demonstrate normal posture and breathing patterns required for varied speech tasks. Alter the postures and breathing patterns and notice changes in speech patterns.
e) Assess DDK rate in five typically developing children.
f) Rate intelligibility of speech in five typically developing children. Discuss factors that influenced speech intelligibility and their ratings.
g) Observe and record (a) physical status, (b) oral sensory motor abilities and vegetative skills, (c)

respiration, (d) phonation, (e) resonation, (f) articulation and (g) language abilities in five typically developing children. Compare these with observations made from children with motor speech disorders.

h) Perform oro-motor exercises – isotonic and isometric. Discuss strategies to modify exercises for children.

i) Identify from video the AAC system such as low technology vs high technology systems and different symbol system, that is, Bliss symbols, IICP symbols and different signing systems – Makaton.

j) Observe feeding and swallowing skills in different age groups of children: 2 newborns; 2 infants, 2 toddlers, and 2 older children. Identify the differences in feeding methods, food consistencies, texture, quantity, feeding habits, feeding appliances used by these children.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Arvedson, J.C., and Brodsky, L. (2002) (2nd Ed.). Pediatric swallowing and feeding. San Diego, Singular publishing.
- Caruso, F. J. and Strand, E. A. (1999). Clinical Management of Motor Speech Disordersin Children. New York: Thieme.
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- Love, R.J. (2000) (2nd Ed). Childhood Motor Speech Disorders. Allyn & Bacon.
- Love, R.J. and Webb, W.G. (1993). (2nd ed.) Neurology for the Speech-Language Pathologist. Reed Publishing (USA)
- Rosenthal. S., Shipp and Lotze (1995). Dysphagia and the child with developmental disabilities. Singular Publishing Group.
- Velleman, S. L (2003). Resource guide for Childhood Apraxia of Speech. Delmar/Thomson Learning

CHILD LANGUAGE DISORDERS

Course Code: ASL2406 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to

- explain the process of acquisition of language and factors that influence its development in children.
- identify and assess language delay and deviance in children.
- select appropriate strategies for intervention.
- counsel and provide guidance to parents/caregivers of children with language disorders.

Course Contents:

Module-I: Bases of language acquisition, development and disorders

a) Theories of language acquisition 1: Biological, Psycholinguistic/syntactic theory
b) Theories of language acquisition 2: Cognitive, social interaction/pragmatic, information processing, behavioral
c) Pre-cursors for normal development of language
d) Development of components of language from birth to two years (pre-linguistic/pre-symbolic to symbolic)
e) Development of components of language during preschool period
f) Development of components of language during early school age and beyond
g) Basic concepts and terminologies of language development in bilingual children – simultaneous versus sequential language acquisition, additive and subtractive bilingualism, process of second language acquisition, variables influencing second language acquisition
h) Development of language in culturally diverse environments and exceptional circumstances – neglect and abuse, twins, low-socio economic background
i) Over view of language disorders – definition and classification based on ICD, DSM
j) Application of ICF in language disorders

Module-II: Language disorders – definition, classification, causes, and characteristics

a) Intellectual disability: definition, classification, causes and characteristics
b) Autism spectrum disorders: definition, classification, causes and characteristics
c) Attention deficit hyperactive disorder: definition, classification, causes and characteristics
d) Language impairment - mixed receptive and expressive language disorder, specific language impairment: definition, classification, causes and characteristics
e) Learning disability: definition, classification, causes and characteristics
f) Acquired childhood aphasia: definition, classification, causes and characteristics
g) Sensory impairments and language disorders: types, causes and characteristics
h) Syndromic conditions leading to language difficulties: William syndrome, fragile x syndrome, Down syndrome
i) Other developmental disabilities: deaf-blind, cerebral palsy and multiple disabilities.

Module-III: Assessment of language in children

a) Preliminary components of assessment: Case history, screening, evaluation of environmental, linguistic & cultural variables.
b) Methods to assess children with language disorder: Formal versus informal assessment; types of assessment materials: assessment scales, observational checklists, developmental scales; standardization, reliability, validity, sensitivity and specificity of test materials
c) Informal assessment - pre-linguistic behavior, play, mother-child interaction
d) Language sampling: planning and collecting representative sample; strategies to collecting

language sample, audio-video recording, transcription

e) Analysis of language sample: Specific to various components of language such as phonology, morphology, syntax, semantics and pragmatics.
f) Test materials for assessing language skills: Assessment of Language Development (ALD), 3D-Language Assessment Test, Linguistic Profile Test, Com-DEALL checklist, other Indian and global tests
g) Test materials used for children with developmental delay, intellectual disability: Madras Developmental Program Scale, Bayley's Scale for infant and toddler development
h) Test materials used for children with autism spectrum disorder: Modified-Checklist for Assessment of Autism in Toddlers, Childhood Autism Rating Scale, Indian Scale for Assessment of Autism
i) Other test materials used for children with ADHD, ACA, LD (NIMH battery for assessment of Learning Disability)
j) Documenting assessment results: diagnostic report, summary report and referral report specific to disorder
k) Differential diagnosis of language disorders in children

Module-IV: Management of language disorders in children - I

a) General principles and strategies of intervention in children with language impairment – purpose of intervention, basic approaches to language intervention (developmental or normative approach, functional approach)
b) Types of service delivery models - Individuals versus group; direct versus tele-rehabilitation; structure of therapy session, setting the environment, furniture, seating arrangements
c) Reinforcement in language therapy, types and schedules of reinforcement
d) Choice of language for intervention, incorporating principles of multiculturalism into treatment activities
e) Choosing and framing goals and Objectives: SMART Objectives
f) Specific treatment techniques
    i. Incidental teaching, self-talk, parallel talk, expansion, extension, recasting, joint routines, joint book reading,
    ii. whole language, modifying linguistic input, communicative temptations
    iii. drill, modelling
    iv. Focused stimulation, vertical structuring, milieu teaching, and model
g) Caregivers and family in intervention: Structured and informal approaches

Module-V: Management of language disorders in children - II

a) Team approach to intervention
b) Augmentative and alternative communication – types (aided and unaided) and application in child language disorders
c) Specific approaches to management of children with Autism: PECS, Lovaas, TEACCH, Com-DEALL, ABA, Facilitated Communication
d) Approaches to management of children with LD
e) Strategies to facilitate language skills in children with disorders such as intellectual disability: Redundancy, chunking, chaining
f) Use of technology in language intervention
g) Home plan and counselling for children with language disorders
h) Documentation specific to the disorder: pre-therapy; lesson plan; SOAP notes
i) Documentation specific to the disorder: summary report, referral report
j) Decision making in therapy: transition to next objective, termination of therapy

Practicals

a) Record mother-child interaction of one typically developing child in the age range of 0-1, 1-2, 2-4, 4-6 and 6-8 years of age. Compare linguistically the out puts from the mother and the child across the age groups. Make inferences on socio cultural influences in these interactions.
b) Make a list of loan words in two familiar languages based on interaction with 10 typically developing children in the age range of 2-4, 4-6, 6-8 and 8-10 years. Discuss the influence of bi- or multilingualism on vocabulary.
c) Record a conversation and narration sample from 3 children who are in preschool kindergarten, and primary school. Perform a language transcription and analyze for form, content and use.
d) Administer 3D LAT, ALD, LPT, ComDEALL checklist on 2 typically developing children.
e) Draft a diagnostic report and referral letter for a child with language disorder.
f) Demonstrate general language stimulation techniques and discuss the clinical application.
g) Demonstrate specific language stimulation techniques with appropriate materials and discuss its clinical applications.
h) Draft Subjective Objective Assessment Plan (SOAP) for a pre-recorded sample of a 45 minute session of intervention for a child with language disorder.
i) Draft a lesson plan for a child with language disorder.
j) Draft a discharge summary report for a child with language disorder

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Roseberry-McKibbin, C. (2007). Language Disorders in Children: A multicultural and case perspective. Boston: Pearson Education, Inc.
- Paul, R. (2013). Language disorders from infancy through adolescence (4th ed.). St.Louis, MO: Mosby.Dwight, D.M. (2006). Here's how to do therapy: Hand-on core skills in speech language pathology. San Diego, CA: Plural Publishing
- Hegde, M.N. (2005). Treatment protocols for language disorders in children – Vol. 1
  2. San Diego: Plural Publishing
- Owens, R.E. (2008). Language development: An introduction (7th ed.). Boston: Pearsons
- Reed, V.A. (2004). An Introduction to children with language disorders (3rd Ed.) New York: Allyn & Bacon
- Rout, N and Kamraj, P (2014). Developing Communication - An Activity Book, A publication by NIEPMED, Chennai. Freely downloadable from http://niepmd.tn.nic.in/publication.php. ISBN 978-81-928032-41.

DIAGNOSTIC AUDIOLOGY: PHYSIOLOGICAL TESTS

Course Code: ASL2407 **Credit Units: 05**

Course Objectives: After completing this course, the students will be able to

- justify the need for using the different physiological tests in the audiological assessment
- independently run the tests and interpret the results to detect the middle ear, cochlear and retro cochlear pathologies and also differentially diagnose
- design tailor-made test protocols in immittance, AEPs and OAEs as per the clinical need
- make appropriate diagnosis based on the test results and suggest referrals.

Course Contents:

Module-I: Immittance Evaluation

a) Clinical significance of physiological tests in audiology
b) Immittance evaluation: Principle of immittance evaluation: Concept of impedance and admittance, their components,
c) Tympanometry: definition, measurement procedure, response parameters, their measurement and normative, classification of tympanogram, clinical significance of tympanometry
d) Eustachian tube functioning tests of tympanometry: basics of pressure equalization function of ET, Valsalva, Toynbee, William's pressure swallow, inflation-deflation test.
e) Overview on multicomponent and multi-frequency tympanometry
f) Overview on wide band reflectance and wide band tympanometry
g) Reflexometry: definition, acoustic reflex pathway, measurement procedure, clinical applications of acoustic reflexes, special tests

Module-II: Auditory evoked potentials (AEPs): Auditory brainstem response (ABR)

a) Introduction and classification of AEPs
b) Instrumentation
c) Principles of AEP recording techniques:
d) Auditory brainstem response generators
e) Protocol and procedure of recording auditory brainstem response
f) Factors affecting auditory brainstem responses
g) Clinical applications of ABR
h) ABR in the paediatric population
i) Role of ABR in infant hearing screening

Module-III: Overview of other AEPs

a) ECochG
b) Auditory Middle Latency Responses (AMLR) and their clinical applications
c) Auditory Long Latency Responses (Obligatory responses) and their clinical applications
d) Other long latency potentials such as P300, MMN, P600, N400, T-complex, CNV) and their clinical applications
e) ASSR: Instrumentation, recording and clinical applications
f) Brainstem responses to speech and other complex signals

Module-IV: Otoacoustic emissions

- Introduction to otoacoustic emissions
- Origin and classification of OAEs
- Instrumentation
- Procedure of OAE measurement: SOAE, TEOAEs, and DPOAEs

- Interpretation of results: SOAE, TEOAEs, and DPOAEs
- Clinical applications of OAEs: SOAE, TEOAEs, and DPOAEs
- Contralateral suppression of OAEs and its clinical implications

Module-V: Physiological tests for assessment of vestibular system

a) Electronystagmography: procedure, interpretation, clinical applications
b) Videonystagmography, videoocculograph
c) Vestibular Evoked Myogenic Potentials
d) Overview of Rotatory chair test, video Head Impulse Test,
e) Overview of Dynamic Posturography

Practicals

a) Measure admittance in the calibration cavities of various volumes and note down the observations
b) Calculate Equivalent ear canal volume by measuring static admittance in an uncompensated tympanogram (10 ears)
c) Do tympanogram in the manual mode and measure peak pressure, peak admittance and ear canal volume manually using cursor (10 ears).
d) Measure gradient of the tympanogram (10 ears)
e) Administer Valsalva and Toynbee and William's pressure swallow test(5 ears)
f) Record acoustic reflex thresholds in the ipsi and contra modes, (10 ears)
g) Plot Jerger box pattern for various hypothetical conditions that affect acoustic reflexes and interpret the pattern and the corresponding condition.
h) Carry out Acoustic reflex decay test and quatify the decay manually using cursor (5 individuals).
i) Trace threshold of ABR (in 5 dB nHL steps near the threshold) for clicks and tone bursts of different frequencies (2 persons) and draw latency intensity function.
j) Record ABR using single versus dual channels and, note down the differences
k) Record ABR at different repetition rates in 10/sec step beginning with 10.1/11.1 per second. Latency-repetition rate function needs to be drawn.
l) Record with each of three transducers (HP, insert phones and bone vibrator) and polarities and draw a comparative table of the same. Students should also record with different transducers without changing in the protocol in the instrument and calculate the correction factor required.
m) Record ASSR for stimuli of different frequencies and estimate the thresholds
n) Record TEOAEs and note down the amplitude, SNR, noise floor and reproducibility at octave and mid-octave frequencies. Note down the stimulus stability and the overall SNR (10 ears).
o) Record DPOAEs and note down the amplitude, SNR, noise floor and reproducibility at octave and mid-octave frequencies (10 ears)

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Hall, J. W., & Mueller, H. G. (1996). Audiologists' Desk Reference: Diagnostic audiology principles, procedures, and protocols. Cengage Learning.
- Hood, L. J. (1998). Clinical Applications of the Auditory Brainstem Response. Singular Publishing Group.
- Hunter, L., & Shahnaz, N. (2013). Acoustic Immittance Measures: Basic and Advanced Practice (1

edition). San Diego, CA: Plural Publishing.
- Jacobson, G. P., & Shepard, N. T. (2007). Balance Function Assessment and Management (1 edition). San Diego, CA: Plural Publishing Inc.
- Jacobson, J. T. (1985). The Auditory brainstem response. College-Hill Press.
- Katz, J., Medwetsky, L., Burkard, R. F., & Hood, L. J. (Eds.). (2007). Handbook of
- Clinical Audiology (6th revised North American ed edition). Philadelphia: Lippincott Williams and Wilkins.
- McCaslin, D. L. (2012). Electronystamography/Videonystagmography (1 edition). San Diego: Plural Publishing.
- Musiek, F. E., Baran, J. A., & Pinheiro, M. L. (1993). Neuroaudiology: Case Studies (1 edition). San Diego, Calif: Singular.
- Robinette, M. S., & Glattke, T. J. (Eds.). (2007). Otoacoustic Emissions: Clinical Applications (3rd edition). New York: Thieme.

IMPLANTABLE HEARING DEVICES

Course Code: ASL2408 **Credit Units: 05**

Course Objectives: After completing this course, the students will be able to

- assess candidacy for bone anchored hearing devices, middle ear implants, cochlear implants, and ABI
- select the appropriate device depending on the audiological and non-audiological findings
- handle post-implantation audiological management
- assess the benefit derived from implantation, and
- counsel the parents/care givers during different stages of implantation

Course Contents:

Module-I: Implantable hearing devices – basics

a) Need for implantable hearing devices
b) History of implantable hearing devices (bone anchored hearing devices, middle ear implants, cochlear implants, auditory brainstem implants and midbrain implants)
c) Candidacy for implantable hearing devices
d) Team involved in implantable hearing devices
e) Pre-implant counseling, Informed consent

Module-II: Bone anchored hearing devices and middle ear implants

a) Types, components
b) Surgical approaches, risks, complications
c) Audiological evaluations for candidacy, contraindications
d) Assessment of benefits

Module-III: Cochlear implant and brain stem implants – basics

a) Terminology, types, components and features
b) Bilateral, bimodal and hybrid cochlear implants
c) Factors related to selection of the device, funding sources
d) Surgical approaches, risks, complications
e) Audiological and non-audiological candidacy criteria, contraindications

Module-IV: Cochlear implants and brainstem implants

a) Signal coding strategies, classification, types
b) Intraoperative monitoring by audiologists
c) Objective measures: ESRT, ECAP, prom stim, EABR, aided cortical potentials
d) Post implant Mapping: schedule, pre-requisites, switch-on, mapping parameters, impedance, compliance, role of objective and subjective measures in mapping,
e) post mapping audiological evaluation
f) Assessment of benefits
g) Optimization of hearing aid on contralateral ear

Module-V: Implantable hearing devices - Counselling and troubleshooting; Rehabilitation

a) Post implant Counselling on care and maintenance and trouble shooting of the device
b) Overview of post implant rehabilitation including AVT
c) Factors affecting outcome of implantable devices in adults and children

Practicals

a) Watch videos of BAHA, middle ear implant, cochlear implant
b) Create hypothetical cases (at least 5 different cases) who are candidates for cochlear implantation. Make protocol for recording an EABR
c) List down the technological differences across different models of cochlear implants from different companies, their cost
d) Observation of mapping
e) Watching of videos on AVT
f) Watch video on cochlear implant surgery

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Clark, G., Cowan, R. S. C., & Dowell, R. C. (1997). Cochlear Implantation for Infants and Children: Advances. Singular Publishing Group.
- Cooper, H., & Craddock, L. (2006). Cochlear Implants: A Practical Guide. Wiley.
- Dutt, S. N. (2002). The Birmingham Bone Anchored Hearing Aid Programme: Some Audiological and Quality of Life Outcomes. Den Haag: Print Partners Ipskamp.
- Eisenberg, L. S. (2009). Clinical Management of Children with Cochlear Implants.Plural Publishing.
- Gifford, R. H. (2013). Cochlear Implant Patient Assessment: Evaluation of Candidacy, Performance, and Outcomes. Plural Publishing.
- Hagr, A. (2007). BAHA: Bone-Anchored Hearing Aid. International Journal of Health Sciences, 1(2), 265–276.
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- Kompis, M., &Caversaccio, M.-D.(2011). Implantable Bone Conduction Hearing Aids.Karger Medical and Scientific Publishers.
- Mankekar, G. (2014). Implantable Hearing Devices other than Cochlear Implants. Springer India.
- Møller A.R. (2006). Cochlear and Brainstem Implants (Vol. 64).
- Niparko, J. K. (2009). Cochlear Implants: Principles & Practices. Lippincott Williams & Wilkins.
- Ruckenstein, M.J. (Ed.).(2012). Cochlear Implants and Other Implantable Hearing Devices. Plural.
- Suzuki J.L. (1988). Middle Ear Implant: Implantable Hearing Aids (Vol. 4). KARGER.
- Thoutenhoofd, E. (2005). Paediatric cochlear implantation: evaluating outcomes. Whurr.
- Valente, M. (2002). Strategies for selecting and verifying hearing aid fittings. 2nd Edn. Thieme.

CLINICALS IN SPEECH-LANGUAGE PATHOLOGY-II

Course Code: ASL2409 **Credit Units: 07**

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester.
- After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc), and do (perform on patients/ client contacts) the following:

Know:

1. Speech & language stimulation techniques.
2. Different samples /procedures required to analyse voice production mechanism. (acoustic/ aerodynamic methods / visual examination of larynx/ self evaluation)
3. Different samples /procedures required to analyse speech production mechanism in children with motor speech disorders.

Know-how:

1. To administer at least two more (in addition to earlier semester) standard tests for childhood language disorders.
2. To administer at least two more (in addition to earlier semester) standard tests of articulation/ speech sounds.
3. To set goals for therapy (including AAC) based on assessment/test results for children with language and speech sound disorders.
4. To record a voice sample for acoustic and perceptual analysis.
5. To assess parameters of voice and breathing for speech.
6. Assessment protocol for children with motor speech disorders including reflex profile and swallow skills.
7. Counselling for children with speech-language disorders.

Show:

1. Acoustic analysis of voice – minimum of 2 individuals with voice disorders.
2. Simple aerodynamic analysis - minimum of 2 individuals with voice disorders.
3. Self evaluation of voice – minimum of 2 individuals with voice disorders.
4. Informal assessment of swallowing – minimum of 2 children.
5. Assessment of reflexes and pre linguistic skills - minimum of 2 children.
6. Pre –therapy assessment and lesson plan for children with language and speech sound disorders - minimum of 2 children each.

Do:

1. Case history - minimum of 2 individuals with voice disorders.
2. Case history - minimum of 2 children with motor speech disorders
3. Oral peripheral examination- minimum of 5 children
4. Apply speech language stimulation/therapy techniques on 5 children with language disorders (with hearing impairment, specific language impairment & mixed receptive language disorder)/speech sound disorders – minimum of 5 sessions of therapy for each child.
5. Exit interview and counselling - minimum of 2 individuals with speech language disorders.

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	**CRW**	**C/P/A**	**CT**	**A**	**Viva**
Weightage (%)	15	15	15	5	**50**

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

CLINICALS IN AUDIOLOGY-II

Course Code: ASL2410 **Credit Units: 07**

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.
- After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/ client contacts) the following:

Know:

- Indications to administer special tests
- Procedures to assess the listening needs
- National and international standards regarding electroacoustic characteristics of hearing aids

Know-how:

- To administer at least 1 test for adaptation, recruitment and functional hearing loss.
- Counsel hearing aid user regarding the use and maintenance hearing aids
- To troubleshoot common problems with the hearing aids
- To select test battery for detection of central auditory processing disorders.
- Select different types of ear moulds depending on type of hearing aid, client, degree, type and configuration of hearing loss

Show:

- Electroacoustic measurement as per BIS standard on at least 2 hearing aids
- How to process 2 hard and 2 soft moulds
- How to preselect hearing aid depending on listening needs and audiological findings on at least 5 clinical situations (case files)
- How select test battery depending on case history and basic audiological information – 3 situations

Do:

- Tone decay test – 2 individuals with sensori-neural hearing loss
- Strenger test – 2 individuals with unilateral/asymmetrical hearing loss
- Dichotic CV/digit, Gap detection test – 2 individuals with learning difficulty or problem in hearing in noise
- Hearing aid fitment for at least 5 individuals with mild to moderate and 3 individuals with mod-severe to profound
- Hearing aid selection with real ear measurement system on 3 individuals with hearing impairment

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	**CRW**	**C/P/A**	**CT**	**A**	**Viva**
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A-Attendance, Viva- Internal/External

Syllabus - Fifth Semester

FLUENCY AND ITS DISORDERS

Course Code: ASL2501 **Credit Units: 05**

Course Objectives: After completion of the course, the student will be able to

- understand the characteristics of fluency and its disorders
- evaluate and diagnose fluency disorders
- learn about the techniques for the management of fluency disorders

Course Contents:

Module-I: Fluency

a) Scope and definition of fluency
b) Factors influencing fluency
c) Definition and characteristics of features of suprasegmentals in speech: rate of speech, intonation. rhythm, stress and pause
d) Suprasegmental features in typical speech
e) Suprasegmental features in the speech of persons with fluency disorders
f) Developmental aspects of suprasegmentals of speech
g) Normal non-fluency

Module-II: Stuttering and other fluency disorders

a) Stuttering: Definition and causes for stuttering
b) Characteristics of stuttering: core and peripheral characteristics, primary and secondary stuttering, effect of adaptation and situation
c) Development of stuttering
d) Normal non fluency: characteristics and differential diagnosis
e) Theories of stuttering: organic, functional, neurogenic, diagnosogenic and learning
f) Cluttering: Definition, causes and characteristics
g) Neurogenic stuttering: Definition, causes and characteristics

Module-III: Assessment and differential diagnosis

a) Assessment of fluency disorders: stuttering, cluttering, neurogenic stuttering and normal non fluency:
b) Subjective methods: protocols and tests
c) Objective methods
d) Qualitative and quantitative assessment
e) Differential diagnosis of fluency disorders

Module-IV: Management of stuttering

a) Approaches to management
b) Changing scenario in management of stuttering
c) Different techniques and strategies used in management with their rationale
d) Relapse and recovery from stuttering
e) Issues of speech naturalness in stuttering

Module-V: Management of fluency-related entities

a) Management of cluttering: rationale, techniques and strategies
b) Management of neurogenic stuttering: rationale, techniques and strategies
c) Management of normal non-fluency: rationale, techniques and strategies
d) Relapse and recovery in cluttering and neurogenic stuttering. Changes in normal non-fluency
e) Prevention and early identification of stuttering, and cluttering

Practicals

a) Assess the rate of speech in 5 normal adults.
b) Record and analyse the supra segmental features in typically developing children between 2 and 5 years.
c) Record audio visual sample of 5 typically developing children and 5 adults for fluency analysis.
d) Listen/see samples of normal non fluency and stuttering in children and document the differences.
e) Identify the types of dysfluencies in the recorded samples of adults with stuttering.
f) Instruct and demonstrate the following techniques: Airflow, prolongation, easy onset shadowing techniques.
g) Record 5 speech samples with various delays in auditory feedback and analyse the differences.
h) Administer SPI on 5 typically developing children.
i) Administer SSI on 5 adults with normal fluency.
j) Administer self-rating scale on 10 adults with normal fluency.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Assessment and management of fluency disorders. Proceedings of the national workshop on "Assessment and management of fluency disorders", 25-26 Oct 2007. All India Institute of Speech & Hearing, Mysore. 2007.
- Bloodstein, O., & Ratner, N. B. (2008). A Handbook on Stuttering (6th Ed.).Clifton Park, NY, Thomson Demer Learning.
- Guitar, B. (2014). Stuttering-An Integrated Approach to its Nature and Treatment. 4th Ed. Baltimore, Lippincott Williams & Wilkins.
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- Ward, D. (2006). Stuttering and Cluttering: Frameworks for Understanding & Treatment. NY, Psychology Press.
- Yairi, E., & Seery, C. H. (2015). Stuttering - Foundations and Clinical Applications. 2nd Ed. USA, Pearson Education, Inc.

STRUCTURAL ANOMALIES AND SPEECH DISORDERS

Course Code: ASL2507 **Credit Units: 05**

Course Objectives: After completing the course, the student will be able to

- understand the characteristics of disorders with structural anomalies including speech
- evaluate and diagnose the speech characteristics seen in these disorders
- learn about the techniques for the management of speech disorders in these conditions

Course Contents:

Module-I: Speech characteristics of persons with cleft lip and palate

a) Types, characteristics and classification of cleft lip and palate
b) Causes of cleft lip and palate: genetic, syndrome and others
c) Velopharyngeal inadequacy: types, causes and classification
d) Associated problems in persons with cleft lip and palate: speech, language, feeding, dental and occlusion, hearing, psychological

Module-II: Assessment and management of cleft lip and palate speech

a) Team of professionals in the management of persons with cleft lip and palate: their roles in diagnosis and management.
b) Assessment of persons with cleft lip and palate for speech language functions:
c) Subjective assessment of speech characteristics and speech intelligibility: proforma, tests, scales and others.
d) Objective assessment of phonatory, resonatory and articulatory features
e) Diagnosis and differential diagnosis of speech related functions
f) Subjective assessment of language and communication functions
g) Reporting test results using Universal Parameters
h) Management of persons with cleft lip and palate
i) Surgical and prosthetic management
j) Techniques and strategies to correct speech sound disorders
k) Techniques and strategies to improve feeding
l) Counselling and guidance

Module-III: Structural anomalies of tongue and mandible - Characteristics, assessment and management

a) Types, classification and characteristics of structural anomalies of tongue and mandible
b) Causes for structural anomalies of tongue and mandible
c) Team of professionals in the management of persons with structural anomalies of tongue and mandible and their roles.
d) Associated problems in persons with structural anomalies of tongue and mandible:
    - Speech
    - Feeding
    - Dental and occlusion
    - Psychological and others
e) Management of persons with structural anomalies of tongue and mandible

    - Surgical and prosthetic management
    - Techniques and strategies to improve speech intelligibility
    - Techniques and strategies to improve feeding
    - Counselling and guidance for persons with glossectomy and mandibulectomy

Module-IV: Characteristics & assessment of laryngectomy

a) Causes, symptoms and classifications of laryngeal cancers
b) Team of professionals in the management of persons with laryngeal cancer
c) Surgery for laryngeal cancers: types and outcome
d) Associated problems in layngectomee individuals
e) Assessment of speech and communication skills of layngectomee individuals: Pre and post-operative considerations

Module-V: Management of speech and communication in laryngectomies

a) Esophageal speech: candidacy, types of air intake procedures, speech characteristics and its modification through techniques and strategies, complications and contraindications.
b) Tracheo-esophageal speech: candidacy, types of TEP, fitting of prosthesis, speech characteristics and its modification through techniques and strategies, complications and contraindications.
c) Artificial larynx: types, factors for selection, output characteristics, techniques for efficient use of artificial larynx, complications and contraindications.
d) Other remedial procedures: Pharyngeal speech, buccal speech, ASAI speech, gastric speech.

Practicals

a) Identify the different types of cleft lip and palate by looking at illustrations and images
b) Listen to 10 speech samples of children with cleft lip and palate and rate their nasality/ speech (articulation and cleft type errors) based on universal reporting parameters.
c) Identify the type of closure of velopharyngeal port for 5 normal individuals and 5 individuals with cleft lip and palate using videos of nasoendoscopy/ videofluroscopy.
d) Perform oral peripheral mechanism examination on 10 individuals and document the structure and functions of the articulators.
e) Analyse the different types of occlusion in 10 individuals.
f) Identify the type of glossectomy by looking at pictures/illustrations.
g) Identify the different types of prosthesis in the management of head and neck cancer.

h) Analyse the speech profile of 5 individuals with laryngectomy.
i) Identify parts of an artificial larynx and explore its use.
j) Prepare a checklist / pamphlet illustrating care of the stoma and T- tubes in vernacular.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Berkowitz. S. (2001). Cleft Lip and Palate: Perspectives in Management. Vol II. San Diego, London, Singular Publishing Group Inc.
- Falzone. P., Jones. M. A., & Karnell. M. P. (2010). Cleft Palate Speech. IV Ed., Mosby Inc.
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- Peterson-Falzone, S. J., Cardomone, J. T., &Karnell, M. P. (2006). The Clinician Guide to Treating Cleft Palate Speech. Mosby, Elsevier.
- Salmon . J & Shriley (1999). Alaryngeal speech rehabilitation for clinicians and by clinicians. ProEd
- Yvonne, E (Ed) (1983). Laryngectomy: Diagnosis to rehabilitation. London: Croom Helm Ltd

PEDIATRIC AUDIOLOGY

Course Code: ASL2508 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to

- describe auditory development
- list etiologies and relate them to different types of auditory disorders that may arise
- explain different hearing screening/identification procedures and their application
- elaborate on different aspects of paediatric behavioral and physiological / electrophysiological evaluation

Course Contents:

Module-I: Auditory development

a) Review of Embryology of the ear
b) Development of auditory system from periphery to cortex
c) Neuroplasticity
d) Prenatal hearing
e) Normal auditory development from 0-2 years
f) Infant speech perception
g) Incidence and prevalence of auditory disorders in children

Module-II: Auditory disorders

a) Congenital and acquired hearing loss in children
b) Permanent minimal and mild bilateral hearing loss
c) Impact on auditory skills, speech-language, educational and socio-emotional abilities
d) Moderate to profound sensorineural hearing loss
e) Unilateral hearing loss
f) Auditory Neuropathy Spectrum Disorders
g) Central auditory processing disorders
h) Pseudohypacusis
i) Auditory disorders in special population and multiple handicap

Module-III: Early identification of hearing loss

a) Principles of early hearing detection and intervention programs
b) Principles and history of hearing screening
c) Joint Committee on Infant Hearing position statement (2000, 2007,2013)
d) High risk register/ checklists for screening
e) Sensitivity and specificity of screening tests
f) Hearing screening in infants and toddlers: Indian and Global context
g) Hearing screening in preschool children: Indian and Global context
h) Hearing screening in school-age children (including screening for CAPD): Indian and Global context

Module-IV: Paediatric assessment I

a) Behavioral observation audiometry
b) Conditioned orientation reflex audiometry
c) Visual reinforcement audiometry, TROCA, play audiometry
d) Pure tone audiometry in children: Test stimuli, response requirement and reinforcement
e) Speech audiometry (SRT, SDT); Speech recognition and speech perception tests developed in India)

f) Bone conduction speech audiometry
g) Immittance evaluation in paediatric population
h) Central auditory processing disorders assessment

Module-V: Paediatric assessment II

a) Recording and interpretation of OAE in paediatric population
b) Factors affecting OAE in paediatric population
c) Recording and interpretation of click evoked and tone burst evoked ABR in paediatric population
d) Factors affecting ABR in paediatric population
e) Recording ASSR in paediatric population
f) Recording AMLR, ALLR in paediatric population
g) Assessment of hearing loss in special population
h) Diagnostic test battery for different age groups
i) Diagnosis and differential diagnosis

Practicals

a) Observe a child with normal hearing (0-2 years) in natural settings. Write a report on his/her responses to sound.
b) Observe a child with hearing impairment (0-2 years) in natural settings. Write a report on his/her responses to sound with and without his amplification device
c) Administer HRR on at least 3 newborns and interpret responses
d) Based on the case history, reflect on the possible etiology, type and degree of hearing loss the child may have.
e) Compare ABR wave forms in children of varying ages from birth to 24 months.
f) Observe live or video of BOA/VRA of a child with normal hearing and hearing loss and write a report on the instrumentation, instructions, stimuli used, procedure and interpretation.
g) Observe OAE in a child with normal hearing and a child with hearing loss. Write a report on the instrumentation, protocol used and interpretation
h) Observe ABR in a child with normal hearing and a child with hearing loss. Write down a report on the instrumentation, protocol used and interpretation
i) Observe immittance evaluation in a child with normal hearing and a child with hearing loss. Write a report on the instrumentation, protocol used and interpretation
j) Using role play demonstrate how the results of audiological assessment are explained to caregiver in children with the following conditions
    - Child referred in screening and has high risk factors in his history
    - Child with chronic middle ear disease
    - Child with CAPD
    - Child with severe bilateral hearing impairment

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Finitzo, T., Sininger, Y., Brookhouser, P., & Village, E. G. (2007). Year 2007 position statement: Principles and guidelines for early hearing detection and intervention programs. Paediatrics, 120(4), 898–921. http://doi.org/10.1542/peds.2007-2333
- Madell, J.R., & Flexer, C. (2008). Paediatric Audiology: Diagnosis, Technology, and Management. Ney York NY: Thieme Medical Publishers.
- Northern, J.L. and Downs, M.P. (2014). Hearing in Children. 6th Ed. San Diego: Plural Publishing.
- Seewald, R., and Thorpe, A.M. (2011). Comprehensive Handbook of Paediatric Audiology, San Diego: Plural Publishing. (core text book)
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AURAL REHABILITATION IN CHILDREN

Course Code: ASL2509 **Credit Units: 05**

Course Objectives: After completing this course the student will be able to

- describe the different communication options available for young children with hearing impairment
- explain the impact of hearing impairment on auditory development and spoken language communication
- describe factors that effect of acoustic accessibility and strategies to manage them at home and in classroom
- design activities for auditory learning at different levels
- enumerate how the needs of individuals with hearing impairment using sign language and spoken language as form of communication in India are being met

Course Contents:

Module-I: Auditory development, spoken communication and acoustic accessibility

a) Sensitivity period for auditory development
b) Impact of hearing impairment on auditory development, spoken language acquisition, parent child communication
c) Factors affecting auditory development
d) Hearing loss implications for speech perception: acoustics of speech
e) Optimizing hearing potential through hearing aids
f) Optimizing hearing potential through cochlear implants
g) Barriers to acoustic accessibility: distance, signal to noise ratio, reverberation
h) Managing the listening environment for infants, toddlers schools
i) Signal to noise ratio enhancing technologies personal FM, loop systems, desktop group systems, blue tooth connectivity

Module-II: Communication options

a) Detecting and confirming hearing loss
b) Parent support counselling, individual family service plan
c) Choosing communication options
d) Auditory oral approach
e) Auditory verbal therapy
f) Manual/sign language: Indian and Global context
g) Cued speech and total communication
h) Listening devices hearing aid/cochlear implant
i) Early intervention programs

Module-III: Optimal listening and learning environments infancy and early childhood

a) Involvement of family
b) Factors impacting family involvement, supporting families through information and education
c) Creating optimum listening and learning environment
d) Intervention: Assessment, auditory learning, listening and language facilitation techniques in infancy and early childhood
e) Issues with children with mild hearing loss, unilateral hearing loss,
f) Children with hearing loss, ANSD or APD: Children are intervened late
g) Children with hearing loss and other special needs
h) Listening and spoken language in school age: benefits of inclusion
i) Intervention at school age: Functional hearing assessment, communication assessment and intervention to integrate with academic targets

Module-IV: Auditory - speech reading training and literacy

a) Candidacy for auditory training and speech reading
b) Auditory training/learning four design principles skill, stimuli, activity, and difficulty level
c) Early training Objectives
d) Analytic and Synthetic training Objectives
e) Formal and informal training
f) Auditory training for infants and very young children
g) Outcomes of training
h) Speech and language and literacy characteristics
i) Speech language and literacy evaluation assessment
j) Speech language therapy

Module-V: Indian perspectives

a) Prevalence of hearing impairment in children
b) Education of the deaf in India historical perspectives
c) Available resources for education of the hearing impaired
d) Early intervention programs and centers
e) Schools for the hearing impaired; day schools, residential schools
f) Beyond school: college and vocational training
g) Training manpower resources for service delivery
h) Indian sign language
i) Training sign language interpreters
j) Cued speech in India
k) Assessment and therapy tools developed for individuals with hearing impairment in India.

Practicals

a) Watch documentaries such as “Sound and Fury” (2001). Write a reflection of why parents made communication choices for their children
b) Follow on links to the above film that shows the status of the children with hearing impairment after a few years.
c) Learn at least 50 signs across different categories of Indian sign language. Make a video of you signing 10 sentences. Have a class mate interpret them.
d) Interview a parent of a child with hearing impairment on how they adapted their child to wear the hearing aids and /or implant. What were the first responses to sound they observed and how language and speech develop?
e) Complete a functional auditory evaluation on one child with hearing loss. Do a speech and language evaluation and also write a report on the child strengths and weakness.

f) Design and demonstrate auditory learning activities at the four levels awareness, discrimination, identification and comprehension. Ensure that the activities encompass different skill level and difficulty levels.

g) Develop a short audio/film/pamphlet for parents in your local language on one of the following: teaching parent to trouble shooting the hearing aid/cochlear implant, establishing consistent use of listening device, activities to facilitate language across different age groups

h) Visit a school for the deaf. Document your observation about the acoustic environment in the class, strategies used by the teacher to promote listening and spoken language

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Fitzpatrick, E.M., and Doucet S.P. (2013) (Eds). Paediatric Audiologic Rehabilitation. Thieme, New York
- Hosford-Dumm, H., Roser, R., & Valente, M. (2007). Audiology Practice Management (2nd edition edition). New York: Thieme.
- Mardell, J., & Flexer, C. (2013). Paediatric Audiology: Diagnosis, Technology, and Management (2nd ed.). New York, NY: Thieme.
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- Schwartz, S., (2007) Choices in Deafness : a Parent's guide to Communication Options , 3rd edition Woodbine house Bethesda
- Status of Disability in India Hearing Impairment (2012) Rehabilitation Council of India, New Delhi

CLINICALS IN SPEECH LANGUAGE PATHOLOGY-III

Course Code: ASL2510 **Credit Units: 07**

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester.
- After completion of clinical postings in Speech –language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc.), and do (perform on patients/ client contacts) the following:

Know:

1. Procedures to assess speech fluency and its parameters using standardized tests for children and adults.
2. Differential diagnosis of motor speech disorders in children.
3. Procedures to assess individuals with cleft lip and palate, and other oro-facial structural abnormalities.
4. Procedures to assess laryngectomee and provide management options.

Know-how:

1. To administer at least two more (in addition to earlier semesters) standard tests for childhood language disorders.
2. To record a speech sample for analysis of fluency skills (including blocks & its frequency, rate of speech, prosody, etc.).
3. To assess posture and breathing for speech in children with motor speech disorders.
4. To consult with inter-disciplinary medical/rehabilitation team and counsel the individual/family regarding management options and prognosis.

Show:

1. Rating of cleft, speech intelligibility and nasality – minimum of 2 individuals with cleft lip and palate.
2. Language assessment - minimum of 2 individuals with cleft lip and palate.
3. Transcription of speech sample and assessment of percentage dis/dysfluency– minimum of 2 individuals with stuttering.
4. Assessment of rate of speech on various speech tasks – at least on 2 children & adults.

Do:

1. Voice assessment report - minimum of 2 individuals with voice disorders.
2. Fluency assessment report - minimum of 2 individuals with fluency disorders.
3. Oral peripheral examination on minimum of 2 individuals with cleft lip and palate.
4. Apply speech language stimulation/therapy techniques on 5 children with language disorders/speech sound disorders/ motor speech disorders – minimum 5 sessions of therapy for each child.

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

CLINICALS IN AUDIOLOGY-III

Course Code: ASL2511 **Credit Units: 07**

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.
- After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/ client contacts) the following:

Know:

- Different protocols in tympanometry and reflexometry.
- Different protocols used in auditory brainstem responses
- Protocols for screening and diagnostic otoacoustic emissions
- Tests to assess vestibular system
- Different indications for selecting implantable hearing devices
- Various speech stimulation and auditory training techniques

Know-how:

- To administer auditory brainstem responses for the purpose of threshold estimation and sight of lesion testing
- To administer high frequency tympanometry and calculate resonance frequency
- To administer high risk register
- To modify the given environment to suit the needs of hearing impairment

Show:

- Analysis of ABR waveforms – threshold estimation 5 and site of lesion 5
- Analysis of immittance audiometry and relating to other tests – 5 individuals with conductive and 5 individuals with sensori-neural hearing loss
- How to formulate select appropriate auditory training technique based on audiological evaluation

Do:

- Threshold estimation on 5 infants (< 2 years)
- TEOAE and DPOAE on 5 infants (<2 years)
- BOA on 5 infants (<2 years)
- VRA on 2 infants (6 month – 3 year)
- Conditioned play audiometry – 3 children (3-6 years)
- Hearing aid fitment on 1 infant (< 3 years) 2 children (3-6 years)
- Listening age of 3 children with hearing impairment
- Appropriate auditory training on 5 children with hearing loss

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Syllabus - Sixth Semester

MOTOR SPEECH DISORDERS IN ADULTS

Course Code: ASL2606 **Credit Units: 05**

Course Objectives: After completing the course, the student will be able to

- understand the characteristics of acquired motor speech disorders in adults
- evaluate and diagnose speech characteristics in acquired motor speech disorders
- learn about the techniques for the management of speech and related errors in acquired motor speech disorders

Course Contents:

Module-I: Causes & Characteristics of dysarthria

a) Definition, etiology and classification of acquired dysarthria
b) General, speech and feeding related characteristics of acquired dysarthria with and without genetic underpinnings:
c) Vascular lesions: dysarthria following stroke/CVA, cranial and peripheral nerve palsies
d) Infectious condition of the nervous system: dysarthria following meningitis, encephalitis, polyneuritis, poliomyelitis, neurosyphilis.
e) Traumatic lesions: Dysarthria following TBI.
f) Toxic conditions of the nervous system: Dysarthria following exogenic and endogenic toxic conditions of the nervous system.
g) Anoxia of the nervous system: Dysarthria following anoxic conditions
h) Metabolic disorders affecting nervous system: Dysarthria following metabolic conditions that affect the nervous system, Wilson's disease etc.
i) Idiopathic causes: Dysarthria following idiopathic causes
j) Neoplastic lesions of nervous system: Dysarthria following neoplastic lesions in the nervous system
k) Demyelinating and degenerative conditions: Huntington's Chorea, Parkinson's, Multiple Sclerosis, Motor Neuron Diseases

Module-II: Assessment and diagnosis of dysarthria

a) Subjective assessment of dysarthria:
    - Assessment of respiratory, phonatory, resonatory, articulatory errors
    - Assessment of prosodic features
    - Assessment of speech intelligibility
    - Scales, protocols and tests used for subjective assessment of dysarthria
b) Instrumental analysis of speech in dysarthria: Acoustic, kinematic and physiological
c) Advantages and disadvantages of subjective and instrumental procedures in the assessment of dysarthria in adults
    - Differential diagnosis of acquired motor speech disorders in adults:
    - Dysarthria and verbal apraxia
    - Dysarthria and functional articulation disorders
    - Dysarthria and aphasia
    - Apraxia of speech and aphasia
    - Dysarthria from other allied disorders such as agnosia, alexia, agraphia etc.
    - Apraxia from other allied disorders such as agnosia, alexia, agraphia etc.
    - Assessment of feeding, swallowing and related issues in persons with dysarthria

Module-III: Management of dysarthria

a) Management of acquired dysarthria
b) General principles in the management of dysarthria
c) Influence of medical, prosthetic and surgical procedures on the speech in persons with acquired dysarthria.
d) Facilitative approach: vegetative, sensorimotor and reflex based.
e) Systems approach: correction of respiratory, phonatory, resonatory, articulatory and prosodic errors.
f) Strategies to improve speech intelligibility and speech enhancement techniques
g) Strategies to improve feeding, swallowing behavior in persons with acquired dysarthria

Module-IV: Assessment and management of apraxia in adults

a) Definition, etiology and classification of acquired apraxia
b) Characteristics of nonverbal apraxia's in adults
c) Characteristics of verbal apraxia's in adults
d) Subjective assessment strategies: standard tests and scales, protocols and behavioral profiles
e) Instrumental analysis of the speech of apraxia in adults: Acoustic, Kinematic and Physiological
f) Management Approaches for verbal & nonverbal apraxia: principles and strategies

Module-V: Management related issues in motor speech disorders

a) Team involved in the management of persons with acquired dysarthria and apraxia
b) Issues related to maintenance and generalization of speech in dysarthria and apraxia
c) Counselling and guidance for persons with acquired dysarthria and apraxia
d) Augmentative and alternative strategies for persons with acquired dysarthria and apraxia

Practicals

a) Identify the cranial nerves and mention its origin and insertion from a picture/ model. Demonstrate methods to assess the cranial nerves.
b) Assess the respiratory system using speech and non-speech tasks in 10 healthy adults.
c) Assess the phonatory system using subjective and acoustic analysis in 10 healthy adults.
d) Looking at a video identify the clinical signs and symptoms of different neurological conditions resulting in Dysarthria.
e) Record the speech sample of 5 normal adults and compare with the audio sample of individuals with Dysarthria.
f) Administer Duffy's intelligibility rating scale on 5 healthy adults.
g) Administer Frenchay's Dysarthria Assessment on 5 healthy adults.
h) Demonstrate activities to improve the functions of speech subsystem.
i) Identify the signs of UMN and LMN based on a video.
j) Prepare a low tech AAC for functional communication for an individual with apraxia.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Brookshire, R. H. (2007). Introduction to Neurogenic Communication Disorders. University of Virginia, Mosby.
- Duffy, J. R. (2013). Motor Speech Disorders: Substrates, Differential Diagnosis, and Management (3rd Ed.). University of Michigan, Elsevier Mosby.
- Dworkin, P. J. (1991). Motor Speech Disorders: A Treatment Guide. St. Louis: Mosby.
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- Goldenberg, G. (2013). Apraxia: The Cognitive Side of Motor Control. Oxford University Press, UK.
- Lebrun, Y. (1997). From the Brain to the Mouth: Acquired Dysarthria and Dysfluency in Adults. Netherlands, Kluwer Academic Publishers.
- Murdoch, B. E. (2010). Acquired Speech and Language Disorders: A Neuroanatomical and Functional Neurological Approach (2nd Ed.). New Delhi, India: John Wiley & Sons.
- Papathanasiou, I. (2000) (Eds.). Acquired Neurogenic Communication Disorders – A Clinical Perspective, Chapters 5, 6 & 7. London, Whurr Publishers.
- Yorkston, K. M., Beukelman, D. R., Strand, E. A., & Hakel, M. (2010). Management of Motor Speech Disorders in Children and Adults (3rd Ed.). Austin, Texas; Pro-Ed Inc.

LANGUAGE DISORDERS IN ADULTS

Course Code: ASL2607 **Credit Units: 05**

Course Objectives: After completing the course, the student will be able to

- understand the characteristics of language disorders in adults
- evaluate and diagnose speech characteristics in adults with language disorders
- learn about the techniques for the management of speech and related errors in language disorders seen in adults

Course Contents:

Module-I: Neural bases of language

a) Correlates of language functions: Neuroanatomical Neurophysiological Neurobiological Cognitive
b) Neurolinguistic models of language processing Connectionist models Hierarchical models Global models Process models Computational models
c) Language process in bi/multilingualism
d) Language processing in right hemisphere

Module-II: Language disorders in adults

a) Definition, causes and characteristics of speech, language and cognition in Aphasia: cortical and subcortical Primary progressive aphasia Traumatic brain injury Right hemisphere damage Schizophasia Dementia
b) Differential diagnosis of various language disorders seen in adults.

Module-III: Assessment and diagnosis of language disorders

a) Assessment of the following in aphasia, primary progressive aphasia, traumatic brain injury, right hemisphere damage, schizophasia and dementia
b) Linguistic behaviour including speech: scales, tests, protocols.
c) Assessment of cognitive, social, behavioural characteristics
d) Medical Investigation: Neuroimaging

Module-IV: Management of language disorders

a) Medical, linguistic and programmed intervention for persons with Aphasia: cortical and subcortical Primary progressive aphasia Traumatic brain injury Right hemisphere damage Schizophasia Dementia

Module-V: Rehabilitation issues relating to adult language disorders

a) Team involved in the rehabilitation of persons with adult language disorders
b) Factors influencing the assessment and intervention for language in the context of bilingual and multilingual influences.
c) Factors influencing the assessment and management of language in persons who are preliterate, illiterate and literate.
d) Assessment of quality of life
e) Recovery patterns and prognosis in adults with language disorders
f) Age related influence in adults with language disorders
g) Counselling and guidance for adults with language disorders
h) Generalization and maintenance issues in adults with language disorders
i) Augmentative and alternative strategies for adults with language disorders

Practicals

a) Identify different lobes of in the brain by looking at a model/ image and label the language areas.
b) Administer a standardized test battery on 3 normal individuals to assess language and cognition.
c) Administer bilingual aphasia test on 3 healthy normal adults.
d) List the language characteristics in different types of aphasia from a video.
e) Analyse the speech, linguistic and non-linguistic features seen in Right hemisphere damaged individual from a video.
f) In a given brain model mark the subcortical structures involved in language processing/ production.
g) Demonstrate various facilitatory and compensatory therapy techniques in the management of aphasia.
h) Formulate activities to assess linguistic abilities in dementia and aphasia.
i) Counsel by a role play for a given profile of an individual with adult language disorder.
j) Prepare a counselling checklist /guideline that can be used with the family members of an individual with aphasia and traumatic brain injury.

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Chapey, R. (2008). Language Intervention strategies in aphasia and related neurogenic communication disorders. Philadelphia: Lippincott Williams and Wilkins
- Davis, G. A. (2014). Aphasia and related Communication Disorders. Pearson Education Inc.
- Edwards, S. (2005). Fluent Aphasia. Cambridge University Press.
- Laine, M. & Martin, N. (2006). Anomia: Theoretical and Clinical Aspects. Psychology Press.
- Lapointe, L. L. (2005). Aphasia and related neurogenic language disorders. (3rdEdn.). Thieme.
- Lapointe, L. L., Murdoch, B. E., & Stierwalt, J. A. G. (2010). Brain based Communication Disorders. Plural Publishing Inc.
- Stemmer, B., & Whitaker, H. A. (Eds.). (2008). Handbook of Neuroscience of Language. Elsevier.
- Whitworth, A., Webster, J., & Howard, D. (2005). A cognitive neuropsychological approach to assessment and intervention in aphasia: A clinician's guide. Psychology Press.

AURAL REHABILITATION IN ADULTS

Course Code: ASL2608 **Credit Units: 05**

Course Objectives: After completing this course, the student will be able to

a) describe the impact on the quality of life of adults with hearing impairment
b) explain the principles benefits and limitations of auditory training and speech reading
c) recognize factors that impair communication and suggest facilitative and repair strategies
d) identify components of aural rehabilitation program for adults (planning to outcome assessment)
e) identify strategies used with the older adult to implement a successful aural rehabilitation program
f) administer different tools for assessment of hearing handicap, attitudes and beliefs that can impact aural rehabilitation

Course Contents:

Module-I: Aural rehabilitation

a) Definition
b) Scope of aural rehabilitation in adults
c) Prevalence of hearing loss in children (global and Indian data)
d) Prevalence of hearing loss in adults (global and Indian data)
e) Relationship between audiometric data, hearing difficulties and amplification considerations
f) Limitations of audiometric data
g) Quality of life and impact on income, education, employment;
h) Assessing communication handicap : interviews, questionnaires
i) Vocational rehabilitation

Module-II: Listening training and speech reading for adults

a) Listening to speech with a hearing loss
b) Candidacy for auditory training
c) Listening training to improve speech perception
d) Listening training to improve music perception
e) Benefits of auditory training
f) Speech reading for communication
g) Characteristics of good lip readers versus good speech readers
h) Factors affecting speech reading
i) Assessing vision only auditory only processing
j) Traditional methods of speech reading training.

Module-III: Communication strategies

a) Factors that influence the reception of spoken message
b) Facilitative communication strategies
c) Repair strategies
d) Repairing a communication breakdown
e) Conversational styles
f) Communication strategies training formal instruction, guided learning, real world practice

Module-IV: Aural rehabilitation for adults

a) Principles of aural rehabilitation in adults
b) Psychological impact of hearing loss
c) Support through counselling
d) Orienting towards hearing aid use

e) Needs assessment for non-hearing and assistive technology for adults
f) Categories of assistive technology
g) Aural rehabilitation programs: Individual vs group
h) Components of aural rehabilitation program
i) Process of aural rehabilitation :
j) Communication under adverse listing conditions

Module-V: Aural rehabilitation for older adults

a) Influence of aging on the older adults: quality of life and psychological perspectives
b) Influence of aging on the older adults: quality of life and social perspectives
c) Auditory barriers to communication
d) Non auditory barriers to communication
e) Barriers to aural rehabilitation
f) Factors influencing hearing aid use by the older adult
g) Aural rehabilitation for different populations of older adult: independent and semi-independent older adult
h) Aural rehabilitation for different populations of older adult: dependent older adult
i) Aural rehabilitation in an old age home
j) Hearing aid orientation

Practicals

*All scales and tools available in Hull R. H; Introduction to aural rehabilitation

a) Listen to the speech recorded using hearing loss simulators (available on internet) and experience the sounds as heard by persons with different degrees of hearing loss. Write your observations on the same
b) Simulate hearing loss by plugging ears and administer sentence tests of word recognition. Write a report on the performance
c) Administer any three self-report questionnaires to three adults who have hearing loss and write a report of the relationship of their hearing loss to performance on the scale
d) Administer any three self-report questionnaires to three older adults who have hearing loss and write a report of the relationship of their hearing loss to performance on the scale

e) Administer any three self-report questionnaires to three adults who wear hearing aids and write a report of the relationship of their hearing loss to performance on the scale
f) Administer the hearing belief questionnaire (Saunders, 2013) on an adult. Identify the positive and negative attitude and behavior that may impact the success of aural rehabilitation
g) Design a session of aural rehab program (Objectives, activities, outcomes assessment) for adults recently fitted with cochlear implant, group of 4 older adults.
h) Design an individualised program for an executive using a hearing aid for the first time, and an adult moving from an analog to a digital hearing aid
i) Develop a pamphlet in your local language that would address any topic in aural rehabilitation

Examination Scheme:

Components	**CRW**	**PTB**	**CT**	**A**	**EE**
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Hull, R. H., (2014) ed. Introduction to Aural Rehabilitation 2nd edition Plural Publishing, San Diego Chapters 1, 2, 11 to 20
- Schow, R.L. & Nerbonne, M.A., (2012). Introduction to Audiologic Rehabilitation (6th edition), Allyn & Bacon, Boston.
- Tye-Murray, N., (2014). Foundations of Aural Rehabilitation: Children , adults and their family members 4th edition Plural Publishing San Diego Chapters 5-10

AUDIOLOGY IN PRACTICE

Course Code: ASL2609 **Credit Units: 05**

Course Objectives: After completing the course, the student will able to

- list and describe the highlights of legislations relating to hearing impairment and other disabilities
- incorporate ethical practices in professional service delivery.
- provide information on welfare measures, policies of government when needed
- describe different strategies to create awareness of hearing impairment and programs to address them
- explain the different clinical practice settings in audiology with reference to their requirement, protocols and role and responsibility of audiologist
- describe methods to measure the impact of noise on humans and strategies to address excessive noise exposure in industries and the community.
- describe terminology, technology and methods used in tele practice, and their application in audiological service delivery

Course Contents:

Module-I: Scope, legislation and ethics in audiology

a) Scope of practice in audiology (National – ISHA & International body - AAA)
b) Professional ethics (ISHA)
c) Legislations and conventions relating to disability: need and historical aspects
d) Classification of hearing impairment and disability certification,
e) Rehabilitation Council of India Act (1992) and its amendments
f) Person with Disability Act (1995)
g) National Trust Act (1999)
h) Right to Education (2012)
i) Biwako Millennium framework (2003) and Salamanca Statement 1994
j) UNCRPD
k) Concept of barrier free access and universal design relating to individuals with hearing impairment

Module-II: Hearing health and strategies for prevention of hearing impairment

a) Epidemiology of hearing disorders
b) ICD and ICF
c) Levels of prevention: Primary, secondary and tertiary
d) National programs and efforts national institutes
e) Welfare measures by Government,
f) Camps (planning, purpose, organizing and providing remedial measures)
g) Public education and information (media, radio broadcasts, street plays)
h) Hearing health and prevention programs (hearing help line, dangerous decibels, online hearing tests etc.)

Module-III: Audiological practice in different settings

a) Audiological Private practice
b) ENT clinics
c) Paediatric / neonatology clinic/departments
d) Neurology departments
e) Factories and Industry
f) Hearing aid dispensing centre/hearing aid industry
g) Rehabilitation centres such as DRC/CRCs

h) Schools for the hearing impaired
i) Cochlear implant clinics
j) Multiple handicap habilitation centre and others

Module-IV: Noise and hearing conservation in industry and community

a) Introduction to noise, types
b) Sources of noise in the industry and community
c) Effects of noise in the auditory system (outer, middle and inner ear)
d) Temporary threshold shift, permanent threshold shift, factors increasing the risk of NIHL
e) Non auditory effects of noise (physiological, psychological, stress, sleep, job productivity and accidents)
f) Legislations related to noise, permissible noise exposure levels, workers compensation, OSHA standards, Indian legislations related to noise
g) Instrumentation, measurement and procedure for measuring noise in industry
h) Instrumentation, measurement and procedure for measuring noise in community

i) Hearing conservation program (HCP), steps, record keeping,
j) Ear protective devices

Module-V: Scope and practice of tele audiology

a) Introduction to tele-health: definition, history of tele-health
b) Terminologies-tele-health, tele medicine, tele practice
c) Connectivity: internet, satellite, mobile data
d) Methods of tele-practice-store and forward and real time
e) Ethics and Regulations for tele-audiology
f) Requirements/Technology for tele- audiology: Web based platforms, Video conferencing, infrastructure
g) Manpower at remote end and audiologist end, training assistants for tele-audiology
h) Audiological screening using tele-technology : new born hearing screening, school screening, community screening, counselling
i) Diagnostic audiological services using tele-technology : video otoscopy, pure tone audiometry, speech audiometry, oto acoustic emission, tympanometry, auditory brainstem response.
Intervention / aural rehabilitation using tele-technology :hearing aid counselling and troubleshooting, tinnitus, counselling, aural rehabilitation services, AVT, and counselling

Practicals

a) Undertake the activities such as ‘Dangerous decibel” program (www.dangerousdecibels.org)
b) Noise measurement and attenuation measurement of ear protection devices.
c) Sound level meter measurement in different areas (generator room, audio rooms)
d) Speech in noise assessment for 10 subjects
e) Visit an audiologist in different practice settings and provide a report
f) Administer ICF protocols for patients with different disorders
g) Explore websites of national institutes, hearing aid companied, NGOs in disability field and describe the accessibility features and information provided
h) Remote control a PC based audiology equipment connected to internet using any authorized desktop sharing software
i) Develop one pamphlet/poster/ in local language that would address some aspect of audiology practice
j) Perform Accessibility ability of your institute/center and prepare a report

Examination Scheme:

Components	CRW	PTB	CT	A	EE
Weightage (%)	5	5	15	5	70

CRW- Clinical record writing, PTB- Proficiency in using test batteries, CT- Class test, A- Attendance, EE- End semester examination

Recommended Reading

- Audiology Telepractice; Editor in Chief, Catherine V. Palmer, Ph.D.; Guest Editor, Greg D. Givens, Ph.D. Seminars in Hearing, volume 26, number 1, 2005.
- Bergland, B., Lindwall, T., Schwela, D.H., eds (1999). Guidelines on Community noise http://www.who.int/docstore/peh/noise/guidelines2.html WHO 1999
- BIS specifications relating to Noise Measurements.- IS:7194-1973 Specification for assessment of noise exposure during work for hearing conservation purposes.
- Census of India information on disability
- Dobie, R. A (2001). Medical legal evaluation of hearing loss, 2nd Ed.
- Hearing health and strategies for prevention of hearing impairment WHO (2001). International classification of Functioning, Disability and Health. Geneva: WHO
- http://www.asha.org/Practice-Portal/Professional-Issues/Audiology-Assistants/Teleaudiology-Clinical-Assistants/
- http://www.asha.org/uploadedFiles/ModRegTelepractice.pdf
- IS:10399-1982 Methods for measurement of noise emitted by Stationary vehicles
- IS:6229-1980 Method for measurement of real-ear
- IS:9167-1979 Specification for ear protectors. 95
- IS:9876-1981 Guide to the measurement of airborne acoustical noise and evaluation of its effects on man- IS:7970-1981 Specification for sound level meters.
- IS:9989-1981 Assessment of noise with respect to community response.
- John Ribera. Tele-Audiology in the United States. In Clinical Technologies: Concepts, Methodologies, Tools and Applications (pp. 693-702), 2011. Hershey, PA: Medical Information Science Reference. doi:10.4018/978-1-60960-561-2.ch305
- Lipscomb, D. M. (1994). Hearing conservation – In industry, schools and the military.
- Mandke, K and Oza R.K (2014). Private practice in speech pathology and audiology, 2014 ISHA
- Philippe Valentin Giffard. Tele-Audiology. Tort, 2012. ISBN 6139256615, 9786139256617
- Rawool, V. W. (2012). Hearing conservation in occupational, recreational, educational and home setting. Thieme: New York
- RCI, PWD and National Trust, and Right to education act
- Richard Wootton, John Craig, Victor Patterson, editors. Introduction to telemedicine. Second edition. London: The Royal Society of Medicine Press Ltd. 2006. p. 206 ISBN: 1 85315 677 9.
- Salamanca statement and framework for action
- Scope of practice by RCI
- Swanepoel de W, Hall JW 3rd A systematic review of tele health applications in audiology. Telemed J E Health. 2010 Mar;16(2):181-200. doi: 10.1089/tmj.2009.0111.
- UNCRPD

CLINICALS IN SPEECH-LANGUAGE PATHOLOGY-IV

Course Code: ASL2610 **Credit Units: 07**

General considerations:
- Exposure is primarily aimed to be linked to the theory courses covered in the semester.
- After completion of clinical postings in Speech–language diagnostics, the student will know (concepts), know how (ability to apply), show (demonstrate in a clinical diary/log book based on clinical reports/recordings, etc.), and do (perform on patients/ client contacts) the following:

Know:
1. Procedures to assess motor speech disorders in adults.
2. Differential diagnosis of motor speech disorders in adults.
3. Procedures to assess individuals with adult language disorders, and other related abnormalities.

Know-how:
1. To administer at least two standard tests for adult language disorders.
2. To administer at least two standard tests/protocols for motor speech disorders in adults.
3. To record a sample for analysis of language and speech skills in adults with neuro-communication disorders.
4. To assess posture, breathing, speech and swallowing in adults with motor speech disorders.
5. To consult with inter-disciplinary medical/rehabilitation team and counsel the individual/family regarding management options and prognosis.

Show:
1. Language assessment - minimum of 2 individuals after stroke.
2. Associated problems in individuals after stroke and its evaluation.
3. Dysphagia assessment – minimum of 2 children & adults.
4. Goals and activities for therapy (including AAC) based on assessment/test results for adults with neuro-communication disorders.

Do:
1. Voice therapy - Minimum of 2 individuals with voice disorders.
2. Fluency therapy - Minimum of 2 individuals with fluency disorders.
3. Bed side evaluation of individuals with neuro-communication disorders – Minimum of 2 individuals.
4. Apply speech language stimulation/therapy techniques on 5 children with language disorders/speech sound disorders/ motor speech disorders – minimum 5 sessions of therapy for each child.

Evaluation:
- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	CRW	C/P/A	CT	A	Viva
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

CLINICALS IN AUDIOLOGY-IV

Course Code: ASL2611 **Credit Units: 07**

General considerations:

- Exposure is primarily aimed to be linked to the theory courses covered in the semester, however, not just limited to these areas.
- After completion of clinical postings in auditory diagnostics and auditory rehabilitation, the student will Know (concept), know how (ability to apply), show (demonstrate in a clinical diary/log book), and do (perform on patients/ client contacts) the following:

Know:

1. National and international standards related to noise exposure.
2. Recommend appropriate treatment options such as speech reading, AVT, combined approaches etc.

Know-how:

1. To carryout noise survey in Industry and community
2. To carryout mapping of cochlear implant in infants and children using both objective and subjective procedures
3. To trouble shoot cochlear implant

Show:

1. Analysis of objective responses like compound action potential, stapedial reflexes on at least 3 samples
2. Comprehensive hearing conservation program for at least 1 situation

Do:

1. AVT on at least 1 child with hearing impairment
2. Trouble shooting and fine tuning of hearing aids on at least 5 geriatric clients
3. At least one activity for different stages involved in auditory training

Evaluation:

- Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
- External evaluation: Spot test, OSCE, Record, Viva-voce, case work

Examination scheme:

Components	**CRW**	**C/P/A**	**CT**	**A**	**Viva**
Weightage (%)	15	15	15	5	50

CRW- Clinical record writing, C/P/A- Case discussion/presentation/analysis, CT- Class test, A- Attendance, Viva- Internal/External

Syllabus - Seventh Semester

CLINICALS IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY-I

Course Code: ASL2701 **Credit Units: 24**

CLINICALS IN SPEECH LANGUAGE PATHOLOGY

General: Clinical internship aims to provide clinical exposure and experience in different set ups. The students would not only carry out greater quantum of work, but also work varied clinical populations and in different contexts. Internship will provide greater opportunity for the students to liaise with professionals from allied fields. The intern is expected to demonstrate competence and independence in carrying out the following, among others:

1) Diagnosis and management of speech, language, and swallowing disorders across life span.
2) Report evaluation findings, counsel and make appropriate referrals.
3) Plan and execute intervention and rehabilitation programs for persons with speech language, communication, and swallowing disorders
4) Develop and maintain records related to persons with speech-language, communication, and swallowing disorders

CLINICALS IN AUDIOLOGY

General: Clinical internship aims to provide clinical exposure and experience in different set ups. The students would not only carry out greater quantum of work, but also work varied clinical populations and in different contexts. Internship will provide greater opportunity for the students to liaise with professionals from allied fields. The intern is expected to demonstrate competence and independence in carrying out the following, among others:

1) Diagnosis and management of hearing disorders across life span.
2) Report evaluation findings, counsel and make appropriate referrals.
3) Plan and execute intervention and rehabilitation programs for persons with hearing disorders
4) Develop and maintain records related to persons with hearing disorders
5) Engage in community related services such as camps, awareness programs specifically, and community based rehabilitation activities, in general.

Examination Scheme: Based on performance in clinical practicum.

Components	**DR**	**LP/TP**	**AT**	**CL**
Weightage (%)	30	30	20	20

DR-Daily Report, LP/TP-Lesson Plan/Therapy Plan, AT-Attendance, CL-Case Load

Syllabus - Eighth Semester

CLINICALS IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY-II

Course Code: ASL2801 **Credit Units: 24**

CLINICALS IN SPEECH LANGUAGE PATHOLOGY

General: Clinical internship aims to provide clinical exposure and experience in different set ups. The students would not only carry out greater quantum of work, but also work varied clinical populations and in different contexts. Internship will provide greater opportunity for the students to liaise with professionals from allied fields. The intern is expected to demonstrate competence and independence in carrying out the following, among others:

1) Engage in community related services such as camps, awareness programs specifically, and community based rehabilitation activities, in general.
2) Make appropriate referrals and liaise with professionals from related fields.
3) Gain experience in different set ups and be able to establish speech centres in different set-ups
4) Demonstrate that the objectives of the B.ASLP program have been achieved.
5) Advise on the welfare measures available for their clinical clientele and their families.
6) Advise and fit appropriate aids and devices for their clinical population.

CLINICALS IN AUDIOLOGY

1) Make appropriate referrals and liaise with professionals from related fields.
2) Gain experience in different set ups and be able to establish hearing centres in different set-ups
3) Demonstrate that the objectives of the B.ASLP program have been achieved.
4) Advise on the welfare measures available for their clinical clientele and their families.
5) Advise and fit appropriate aids and devices for their clinical population.

Examination Scheme: Based on performance in clinical practicum.

Components	DR	LP/TP	AT	CL
Weightage (%)	30	30	20	20

DR-Daily Report, LP/TP-Lesson Plan/Therapy Plan, AT-Attendance, CL-Case Load

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2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

GENERAL ANATOMY

Course Code: OPT2101 **Credit Units: 03**

Course Objective: At the end of the course, the student should be able to:

- Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
- Identify the microscopic structures of various tissues, and organs in the human body and correlate the structure with the functions.
- Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyse the integrative and regulative functions on the organs and systems.

Course Contents:

Module-I: Introduction to Anatomical terms organization of the of the human body

Human cell-structure, Tissue- Definition, Types, Characteristics, classification, location, functions and formation, Membranes & glands- classification & structure, Alterations in disease conditions

Module-II: The Skeletal and the Muscular System

Bones-Types, structure, blood supply and growth, ossification, Axial skeleton, Appendicular skeleton, Bones formation and growth ,Description of bones, Joints-Classification, structure ,Types and Structure of muscles ,Muscle groups and movement and alternations in disease conditions

Module-III: The Nervous System and Sensory Organs

Structure of Neuroglia and Neuron ,Somatic Nervous System, Structure of Brain, spinal chord, cranial nerves, peripheral nerves ,Autonomic Nervous System-Structure, Location ,Alternation in disease conditions ,The Structure of skin, eye, ear, nose tongue(Auditory and Olfactory apparatus) Structure of Auditory apparatus and Alternations in disease condition

Module-IV: The Circulatory, Respiratory and Digestive System

Blood Microscopic structure, composition, blood group, blood coagulation, Heart Structure of Blood Vessels ,Arterial, & venous System ,Lymphatic Channels. Structure organs of respiration, Muscles of respiration Intercostals& Diaphragm, Structure and accessory organs of alimentary tract, Structure of liver and pancreas and alteration in disease condition

Module-V: The Excretory, Endocrine and Reproductive System

Structure of organs of urinary, Structure of the Skin, Structure of ovaries, testes, thyroid, Parathyroid, Thymus, pancreas, supra renal and pituitary gland, Structure of Reproductive system

Record file of human anatomy various organs [as per curriculum] to be submitted for exam.

Examination Scheme:

Components	CT	HA	R	V	A	EE
Weightage (%)	10	5	5	5	5	70

(R: Record file; HA - Home Assignment, V-Viva; CT-Class Test; A- Attendance; EE-End Semester Examination)

Text & References:

Text books:

- Ross & Wilson, Anatomy & Physiology in Health & Illness, 11th Edition, Elsevier, 2010
- Tortora, Gerard J. &Derrikson, Brian H., Principles of anatomy & physiology, 12th Edition, Elsevier, John Wiley & Sons Inc, 2007
- KhuranaIndu, Arushi, Textbook of Anatomy & Physiology for nurses & Allied Health Sciences, CBS, 2010
- Anand M.K, VermaMeena, Anatomy & Physiology for nurses & Allied Health Sciences, 2nd Edition, Jaypee, 2010

Reference Books:

- Singh Inderbir, Human Embryology, 2010, Macmillan
- Dutta A K, Essentials of human anatomy, 4th Edition, Jaypee brothers
- Chaurasias, B D, Human Anatomy: Regional and Applied, 9th Edition, 2012
- Chaurasia B.D.: Handbook of general Anatomy, Third edition, CBS Publishers, New Delhi, 1996

GENERAL PHYSIOLOGY

Course Code: OPT2102 **Credit Units: 03**

Course Objectives: At the end of the course the student will be able to:

- Explain the normal functioning of various organ systems of the body and their interactions.
- Elucidate the physiological aspects of normal growth and development.
- Describe the physiological response and adaptations to environmental stresses.
- Know the physiological principles underlying pathogenesis of disease.

Course Contents:

Module-I: Cell Physiology
Tissue formation, repair, Membranes and glands-functions.

Module-II: Skeletal System, Muscular System and Nervous System
Bones-Functions and movements of bones of axial and appendicular skeleton, Joints and joint movements, Muscle movements, Muscle tone, physiology of muscle contraction, level and maintenance of posture, Functions of Neuralgia and neurons, Stimulus & nerve-impulse-definitions and mechanism, Functions of brain, spinal cord, cranial and spinal, Cerebrospinal fluid-Composition, circulation and function, Reflex action and reflexes, Autonomic functions-autonomic learning and biofeedback, Pain: somatic, visceral and referred pains.

Module-III: Circulatory System, Respiratory System, Digestive System & Excretory System
Blood formation, composition, blood groups, blood coagulation, Hemoglobin: Structure, Synthesis and breakdown, Variation of molecules, Functions of Heart Conduction, Cardiac cycle, circulation-Principles, Control factors influencing Blood pressure and Pulse, Functions of respiratory organs Physiology of respiration, Pulmonary ventilation, Volume, Mechanics of respiration Gaseous exchange in lungs, Carriage of oxygen and carbon-dioxide, Regulation of respiration, Functions of organs of digestive tract, Movement of alimentary tract, Digestion, Absorption of food, Function of liver, gall bladder and pancreas, Metabolism of carbohydrates, protein and fat, Functions of kidneys, ureters, urinary bladder and urethra, Composition of urine, Mechanism of urine formation, Function of skin, Regulation of body temperature, Fluid and electrolyte balance

Module-IV: Sensory Organs, Endocrine system, Reproductive System & Lymphatic and Immunological System, Functions of skin, eye, ear, nose tongue, Functions of Pituitary, pineal body, thymus, Thyroid, parathyroid, pancreas, Suprarenal, Placenta, ovaries and Testes, Reproduction of cells-DNA, Mitosis, Meiosis, spermatogenesis, cogenesis, Function of female reproductive organs; functions of breast, female sexual cycle, Introduction to embryology, Function of male reproductive organs, Male fertility system, Chromosomes-sex-determination, Nature of inheritance, Chromosomal aberrations, Mutation, Genetic counseling, Circulation of lymph, Immunity, Formation of T cells and B cells, Types of immune response, Antigens, Cytokines, Antibodies
Practical: demonstration / observation
Blood tests, test salivary digestion, examination of Urine, Clinical examination of respiratory system, Measurement of blood pressure and pulse rate

Examination Scheme:

Components	CT	HA	P	A	EE
Weightage (%)	10	5	10	5	70

(CT-Class Test; HA - Home Assignment, P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:
Text books:

- Ross & Wilson, Anatomy & Physiology in Health & Illness, 11th Edition, Elsevier, 2010
- Tortora, Gerard J. &Derrikson, Brian H., Principles of anatomy & physiology, 12th Edition, Elsevier, John Wiley & Sons Inc, 2007
- KhuranaIndu, Arushi, Textbook of Anatomy & Physiology for nurses & Allied Health Sciences, CBS, 2010
- Anand M.K, VermaMeena, Anatomy & Physiology for nurses & Allied Health Sciences, 2nd Edition, Jaypee, 2010

Reference Books:

- Singh Inderbir, Human Embryology, 2010, Macmillan
- Dutta A K, Essentials of human anatomy, 4th Edition, Jaypee brothers
- Chaurasias, B D, Human Anatomy: Regional and Applied, 9th Edition, 2012
- Chaurasia B.D.: Handbook of general Anatomy, Third edition, CBS Publishers, New Delhi, 1996

BASIC BIOCHEMISTRY-I

Course Code: OPT2103 **Credit Units: 03**

Course Objectives: At the end of the course, the student should be able to: demonstrate his Knowledge and understanding on:

- Structure, function and interrelationship of biomolecules and consequences of deviation from normal.
- Integration of the various aspects of metabolism, and their regulatory pathways.
- Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.

Course Contents:

Module-I: Carbohydrates:

Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)

Module-II: Proteins:

Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin, collagen)

Module-III: Lipids:

Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane

Module-IV: Vitamins:

General with emphasis on A, B2, C, E and inositol (requirements, assimilation and properties)

Module-V: Minerals:

Na, K, Ca, P, Fe, Cu and Se. (requirements, availability and properties)

Practical:

Estimation of blood and urine sugar, Reactions of monosaccharides, disaccharides and starch:

Glucose, Fructose, Galactose, Maltose, lactose, Sucrose ,Starch, Bio fluid of choice – blood, plasma, serum, Glucose, Protein, Urea, Creatinine, Bilirubin

Examination Scheme:

Components	CT	HA	P	A	EE
Weightage (%)	10	5	10	5	70

(CT-Class Test; HA - Home Assignment-,P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text book:

- S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

Reference Books:

- S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry,
- Orient Longman, Madras, 1990
- D.R. Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003
- As per faculty recommendation

PHYSICAL OPTICS

Course Code: OPT2104 **Credit Units: 03**

Course Objectives: The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

Course Contents:

Module-I: Nature of light
Light as electromagnetic oscillation – wave equation, Sources of light; Electromagnetic Spectrum, Polarized light; Intensity of polarized light; Malus' Law; polarizers and analyzers.

Module-II: Birefringence; ordinary and extraordinary rays.
Relationship between amplitude and intensity, Coherence; interference; constructive interference, destructive interference; fringes; fringe width, Double slits, multiple slits, gratings, Diffraction; diffraction by a circular aperture;

Module-III: Resolution of an instrument
Raleigh's criterion, Scattering; Raleigh's scattering; Tyndall effect, Fluorescence and Phosphorescence

Module-IV: Basics of Lasers
Coherence; population inversion; spontaneous emission; Einstein's theory of lasers.

Module-V: Radiometry
radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units, Inverse square law of photometry; Lambert's law, other units of light measurement; retinal illumination; Trolands

Practicals:
Determination of wavelengths of light from Mercury vapour lamp,Measurement of the resolving power of telescopes;; Demonstration of fluorescence and phosphorescence using crystals and paints.

Examination Scheme:

Components	CT	HA	P	A	EE
Weightage (%)	10	5	10	5	70

(CT-Class Test; HA - Home Assignment-,P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- Text Book:Subrahmanyan N, Brij Lal, A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

Reference Books:

- Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
- Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann, Massachusetts, USA, 2002.

GEOMETRICAL OPTICS-I

Course Code: OPT2105 **Credit Units: 03**

Course Objectives: The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

Course Contents:

Module-I: Nature of light

Light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index; Wavefronts – spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance; Refractive index; its dependence on wavelength

Module-II: Mirrors

Fermat's and Huygen's Principle – Derivation of laws of reflection and refraction (Snell's law) from these principles; Plane mirrors – height of the mirror; rotation of the mirror; Reflection by a spherical mirror – paraxial approximation; sign convention; derivation of vergence equation; Imaging by concave mirror & convex mirror; Reflectivity; transmittivity; Snell's Law; refraction at a plane surface; Glass slab; displacement without deviation; displacement without dispersion.

Module-III: Refraction

Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism; angular dispersion; dispersive power; Abbe's number, definition of crown and flint glasses; materials of high refractive index; Thin prism – definition; definition of Prism diopter; deviation produced by a thin prism; it dependence on refractive index; Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula; Paraxial approximation; derivation of vergence equation; Imaging by a positive powered surface; Imaging by a negative powered surface.

Module-IV: Effectivity

Vergence at a distance formula; effectivity of a refracting surface; Definition of a lens as a combination of two surfaces; different types of lens shapes; Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths; Newton's formula; linear magnification; angular magnification; Nodal Planes.

Module-V: Lenses

Thin lens as a special case of thick lens; review of sign convention; Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions; Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions; Prentice's Rule; System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points; System of more than two thin lenses; calculation of equivalent power using magnification formula

Practical:

Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index; Thin Prism – measurement of deviation; calculation of the prism diopter; Image formation by spherical mirrors; Convex lens - power determination using lens gauge, power determination using distant object

method; power determination using the vergence formula; Concave lens – in combination with a convex lens – power determination; Construction of a tabletop telescope – all three types of telescopes; Construction of a tabletop microscope.

Examination Scheme:

Components	**CT**	**HA**	**P**	**A**	**EE**
Weightage (%)	10	5	10	5	70

(CT-Class Test ; HA - Home Assignment-,P-Practical; A- Attendance; EE-End Semester Examination)
Text & References:

Text book:

- Milton Katz,Introduction to Geometrical Optics : World Scientific Publishing Co. Pre. Ltd.
- Subrahmanyam, Brijlal and Avadhanulu ,A Textbook of Optics Pub: S. Chand
- Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
- Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

Reference Books:

- Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
- Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

OPTOMETRIC PROCEDURES-I

Course Code: OPT2106 **Credit Units: 01**

Course Objectives: At the end of the course the students will be equipped with the introduction to certain concepts that would lay the foundation of the program

Course Content:
Module-I: Introduction to Optometry
Introduction to structure of eye.
Torch examination

Module-II: Scope of optometry
Historyof Optometry
Visit to Hospital / clinics
Introduction to various eye examination procedures

Module-III:
Visual Acuity
Refractive errors
Spectacle lenses and types

Module-IV:
History Taking;
Basic Eye Examination

Examination Scheme:

Components	**A**	**P**	**HA**	**V**	**EE**
Weightage (%)	5	20	25	20	30

(CT-Class Test ; V-Viva; P-Practical; A- Attendance; EE-End Semester Examination, HA= assignments)

Reference Book:
- Primary Care Optometry: Theodore Grosvenor, Theodore P. Grosvenor; Elsevier Health Sciences
- BHVI: Module I.
- Teachers reference notes

BASICS IN COMPUTER & PC PACKAGE

Course Code: OPT2107 **Credit Units: 02**

Course objective: This course aims at preparing the students to handle personal computers, Learn Basics of the current hardware and software being used .the student should be able to complete his optometry and other professional assignment like project work ,thesis presentation etc. he should be well versed in using e-mail, and internet .

Course Contents:

Module-I: Computer Basics

History of computers, Definition of computers, Input Devices, storage devices, types of memory, and units of measurement, range of computers, generations of computers. Characteristicsof computers.

Module-II: System

Hardware, Software,, system definition, fundamentals of networking, internet, performing searches and working with search engines ,types of software and its applications

Module-III: Office Application Suite

Word Processor, spread sheet, presentations, other utility tools Fundamentals of Linux /windows operating system, functions, interfaces, basic commands.

Module-IV: Special Applications

Use of database software for clinic records

Use of specialised software for optometric use

Practical:

Various browsers, Search engines, E-mail

Text document with multiple formatting option using specific office package

Spread sheet using a specified office package

Presentation on a specified topic using a specified office package

Examination Scheme:

Components	**A**	**HA**	**(CT)**	**VIVA**	**PRACTICAL**
Weightage (%)	20	20	20	20	20

(CT-Class Test; V-Viva; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

MATHEMATICS AND BIOSTATISTICS

Course Code: OPT2108 **Credit Units: 02**

Course Objective:
The objective of this course is to provide students with an understanding of basic concepts of Statistics and Probability Theory in the Medical and Health Sciences.

Course Contents:

Module I: Statistical Method
Collection, classification and tabulation of Data, Bar Diagrams and pi diagrams, Histogram, Frequency curve and Frequency Polygon, mean ,median, mode, standard deviation.

Module II: Correlation and Regression analysis
Relation between two variables, Scatter diagram, definition of correlations, curve fitting, principles of least squares, Two regression lines, Karl Pearson's coefficient of correlation, Rank correlation, tied ranks.

Module III: Probability Theory:
Random experiments, Sample space, Probability, conditional probability, Baye's theorem, Random variable, (discrete and continuous), Probability Distribution function (for continuous and random variable) Probability density function, cumulative probability function, Mathematical expectation, Variance.

Examination Scheme:

Components	CD	CT1	SA	A	EE
Weightage	5	10	10	5	70

(CD= Class Discussion, CT 1= Class Test, SA= Short Assignments, A= Attendance. EE= External Examination)

Text & References:

- Vijai Basotia (2008). Fundamentals of Statistics. Shree Niwas Publications
- Fundamentals of Biostatistics by Irfan A Khan
- An introduction to Biostatistics By PSS Sunder Rao
- Introduction to the practice of Statistics by Mooore and Mccabe
- Gupta &Kapoor-Fundamentals of Mathematical Statistics-Sultan Chand

Syllabus - Second Semester

BASIC BIOCHEMISTRY-II

Course Code: OPT2201 **Credit Units: 03**

Course Objectives:

- At the end of the course, the student should be able to: demonstrate his knowledge and understanding on:
- Integration of the various aspects of metabolism, and their regulatory pathways.
- Understand metabolic processes taking place in different ocular structures and fluids
- Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.

Course Contents:

Module-I: Clinical Biochemistry

Hormones and their receptors basic concepts in metabolic regulation with examples, insulin, glucagons and thyroxin. Blood sugar, urea, creatinine and Bilirubin, cholesterol etc and significance of their estimation.

Module-II: Ocular Biochemistry

Various aspects of the eye, viz. tears, cornea, lens, aqueous, vitreous, retina and pigment epithelium rhodopsin

Module-III

Quantitative exercises: Abnormal constituents in urine, sugar, proteins, ketones, blood and bile salts; Techniques: Electrophoresis, Chromatography, Preparation of - normal, molar and percentage solutions, buffers, PH determination; Demonstration: Laboratory test for Lipids, amino acid & protein, vitamins minerals, Antigens; Estimation of blood cholesterol, estimation of alkaline phosphate, salivary amylase (effect of PH, etc.)

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test;HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Textbook:

- S.Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

Reference Books:

- S. Ramakrishnan, K G Prasannan and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
- D R Whikehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania,2003]

OCULAR ANATOMY

Course Code: OPT2202 **Credit Units: 03**

Course Objectives:
At the end of the course, the student should be able to:

- Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
- Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.
- Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.
- To understand the basic principles of ocular embryology.

Course Contents:
Module-I:
Ocular Embryology
Orbit
Orbital Blood supply
Ocular Adnexa and Lacrimal system
Eye Lids
Extraocu;ar Muscles

Module-II:
Conjuctiva
Corne
Aqueous, anterior chamber, Angle structures
Uvea – Iris, ciliary body & Choroid
Crystalline lens

Module-III:
Vitreous
Retina
Sclera (episclera& sclera)
Optic Nerve
Visual Pathway

Module-IV
Detailed anatomy, cellular structure, vasculature, nerve supply for all the above coats, pupils, nerve supply for Pupillary actions, Pupillary pathway.
Cranial Nerves : Detailed study of each of the following nerves in terms of their nucluei, course, relationship within brain, effects of compression etc at different regions
Optic nerve
Oculomotor nerve
Trochlear nerve
Trigeminal nerve
Abducent nerve
Facial nerve

Practical: Eye dissection of bull's eye
Demonstration / identification of various ocular structures
Practical file of various ocular structures to be prepared by student

Examination Scheme:

Components	**A**	**HA**	**CT**	**R**	**EE**
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; R- Record File; A- Attendance; EE-End Semester Examination)

Text & References:
Text Book:

- AK Khurana, InduKhurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006
- As recommended by faculty

Reference Books:

- Wolff's Anatomy of the Eye & Orbit: Anthony J. Bron, Ramesh C. Tripathi, Brenda J. Tripathi
- L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.

OCULAR PHYSIOLOGY

Course Code: OPT2203 **Credit Units: 04**

Course Objectives: At the end of the course the student will be able to:

- Explain the normal functioning of all the structures of the eye and their interactions.
- Elucidate the physiological aspects of normal growth and development of the eye.
- Understand the phenomenon of vision.
- List the physiological principles underlying pathogenesis and treatment of disease of the eye.

Course Contents:

Module-I:
Protective mechanisms in the eye
Precorneal tear film, eyelids and lacrimation

Module-II:
Extrinsic Ocular muscles, their actions and control of their movements
Saccadic, smooth pursuit and Nystagmic eye movements

Module-III:
Corneal Physiology
Physiology of Aqueous humor and vitreous: Intra ocular pressure
Physiology of Iris and pupil
Physiology of Crystalline lens and accommodation – presbyopia

Module-IV:
Retina – structure and functions, dark and Light Adaptations, Visual cycle
Visual pathway, central and cerebral connections, lesions of pathway and effects

Module-V:
Pigments of the eye and photochemistry, electrophysiology
The visual stimulus, refractive errors
Visual acuity, vernier acuity and principle of measurement
Visual perception – Binocular vision, stereoscopic vision, optical illusions
Contrast visual acuity
Colour vision and colour defects. Theories and diagnostic tests

Module-VI
Eye movements
Tests for lachrymal secretion (Schirmer's)
Pupillary reflexes
Schiotz tonometry
Measurement of accommodation
Visual acuity measurement
Ophthalmoscopy and retinoscopy- Procedure demo
Light and dark adaptation
Binocular vision Grades assessment
Colour vision assessment
Contrast visual acuity
Electrophysiology

Examination Scheme:

Components	A	HA	CT	P+R	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P+R-Practical & Record File; A- Attendance; EE-End Semester Examination)

Text & References:
Text book:

- AK Khurana, InduKhurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006
- Recommendation As per faculty

Reference Book:

- RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001
- PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002
- RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001
- PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 11th edition, Mosby, 2002

GEOMETRICAL OPTICS-II

Course Code: OPT2204 **Credit Units: 04**

Course Objectives: The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses used in spectacle lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

Course Contents:

Module-I: Cylindrical Lenses

Image formation; relation between cylinder axis and line image orientation; Imaging due to two cylinders in contact with axes parallel; Two cylinders in contact with axes perpendicular; line images and their orientations to the cylinders' powers; interval of Sturm; circle of least confusion (CLC); spherical equivalent; position of CLC; Spherical lens and a cylindrical lens in contact; spherical equivalent; interval of Sturm and CLC; Spherocylindrical lens notations – plus/minus cylinder form, cross cylinder/meridian form; transformations between them; depth of focus; depth of field;

Module-II: Aberrations

Chromatic Aberrations; methods of removing chromatic aberrations; Abbe number; Monochromatic Aberrations – deviation from paraxial approximation; difference between ray aberrations and wavefront aberrations; Third order aberrations – spherical aberrations; coma; astigmatism; distortion and curvature of fields; Ways of minimizing spherical aberrations – pupil size, bending of lens, shape factor; Lens tilt – astigmatism; Higher order aberrations; introduction to Zernike Polynomials

Module-III: Telescopes & Microscopes

Telescopes – Keplerian, Galilean and Newtonian; position of cardinal points, entrance and exit pupils; magnifications; advantages and disadvantages; Microscopes – magnification; tube length.

Module-IV: Gullstrand's Schematic Eye (GSE)

Calculation of the power of the cornea, the lens and the eye; axial length; calculation of the position of the cardinal points; magnification; Purkinje images and their reflectances; Entrance and exit pupils for a 3mm pupil; ocular aberrations – spherical aberrations and coma; chromatic aberrations; Introduction to refractive errors - myopia and hyperopia; corneal curvature; axial length; far point; blur size calculations; corrections; astigmatism; blur size; circle of least confusion; correction; Object closer than at infinity; introduction to accommodation; far point; near point; presbyopia; spectacle and contact Lens corrections - comparison of magnification.

Practical- Demonstration:

Imaging by a cylindrical lens – relationship between cylinder axis and image orientation; Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations; Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text book:

- Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
- Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
- Recommendation as per faculty

Reference Books:

- Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
- Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

OPTOMETRIC PROCEDURES-II

Course Code: OPT2205 **Credit Units: 02**

Course Objectives: At the end of the course the students will be equipped with the basics knowledge about certain concepts, which would lay the foundation for their courses in the next semester

Course Content:

Module-I: Objective refraction

Principles of Retinoscopy, instrumentation brief and purpose; Retinoscopy demonstration and practical on model eyes.

Module-II: Examination of the anterior segment

Pupillary reflex test; Anterior segment examination with torch light – Slit lamp examination – demo, Tonometry.

Module-III: Examination of the posterior segment

Fundus demonstration by ophthalmoscopy, direct & indirect

Module-IV: Adjunct tests

Near point of convergence; cover test; Motilities; Visual field testing; Colour vision; IPD; Stereopsis; Contrast visual acuity

Examination Scheme:

Components	A	CT	PL	V	P	EE
Weightage	5	15	20	20	10	30

(CT-Class Test; A- Attendance; PL- Practical Lab Record; V- Viva; P- Performance; EE-End Semester Examination)

Text & References:

Text book:

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,

Reference Books:

- Benjamin Borish ,Clinical Refraction ,Butterworth Heinemann

CLINICS-I

Course Code: OPT2206 **Credit Units: 01**

Course Objective: This course aims to give student the basic knowledge of the theory and practical behind the basic clinical procedures. After completion, of course the student should have standard eye examination. Learn to write formal records and understand the preliminary eye testing

Course Content:
The practical will involve rotation in campus clinics, observation in eye hospitals and screening camps.
Unit of Competency:

Methods of ocular Examination-I
The ability to communicate effectively with a diverse group of patients with arrange of optometric conditions and needs.
The ability to use techniques in ocular examination and to understand the implication of findings in terms of subsequent examination techniques
History taking of an Ophthalmic care
Visual acuity testing – Distance, Near
Basic of eye examination
History Taking
Visual Acuity Estimation
Torch light Examination
Pupil Examination
Near point of accommodation
Near point of convergence
Extra ocular Motility and cover/ uncover test
Tear function test
Slit lamp examination – Demo
Retinoscopy procedure on model eyes
IPD

90 % attendance is compulsory in clinics .In case of any miss out the student will have to complete the clinical hours to be allowed for the end term exam

Examination Scheme:

Components	Attd.	Record File	Multiple Choice Questions/ Quiz	Viva	Practical	Total
Weightage	5	15	15	15	50	100

Text & References
Reference book:

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007

NUTRITION

Course Code: OPT2207 **Credit Units: 03**

Course Objective: At the end of the course student would have gained the knowledge of the following: Balanced diet. Protein, carbohydrates, vitamins, Minerals, carotenoids and eye, Nutrition and Ocular aging and adverse effects of ocular nutritional supplements.

Course Contents:
Module-I:
Introduction to Nutrition and Food Science, Food Groups and Food Pyramid; Balanced diet for different age groups, recommended dietary Allowances

Module-II:
Assessment of Nutritional Status; Energy – Units, Metabolisms, Energy expenditure, and Energy imbalance; Digestion, absorption and transport of Food

Module-III:
Proteins and eye; Lipids and eye; Carbohydrates and eye; Vitamins and eye; Minerals and trace elements and eye; Carotenoids and eye; Oxidative stress and the eye

Module-IV:
Vitamin A, C and E deficiency; Nutrition and ocular aging; Contraindications, Adverse reactions and ocular nutritional supplements
Ocular complications to nutritional deficiencies

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:
Text books:

- M Swaminathan: Hand book of Food and Nutrition, fifth edition, Bangalore printing & publishing Co.Ltd, Bangalore,2004
- C Gopalan, BV Rama Sastri, SC Balasubramanian: Nutritive Value of Indian Foods , National Institute of Nutrition, ICMR, Hyderabad,2004

Reference book:

- Frank Eperjesi & Stephen Beatty: Nutrition and the Eye A practical Approach, Elsevier Butterworth – Heinemann, USA, 2006

MEDICAL PSYCHOLOGY

Course Code: OPT2209 **Credit Units: 03**

Course Objective: This course describes the various applications of different PSYCHOLGY related issues to patient management

Course Contents:

Module-I
1. Introduction to Psychology
2. Intelligence Learning, Memory, Personality, Motivation
3. Body Integrity – one's body image

Module-II
4. The patient in his Millen
5. The self-concept of the therapist, Therapist-patient relationship – some guidelines

Module-III
6. Illness, its impact on the patient
7. Maladies of the age and their impact on the patient's own and others concept of his body image
8. Adapting changes in Vision
9. Why Medical Psychology demands commitment?

Examination Scheme:

Components	A	CT1	CT2	HA	Total
Weightage	5	30	30	35	100

(CT-Class Test; A-Attendance; HA-Home Assignment)

Text & References:
As recommended by the faculty.

PROJECT

Course code: OPT2232 **Credit Units: 03**

Course Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity.
The basics of Research methodology need to be understood
The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Course Contents:

Module-I:
Introduction to research methods, Variables in research, Reliability and validity in research, Conducting a literature review, Formulation of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Module-II:
Experimental and non experimental research designs, Sampling methods, Data collection methods- Observation method, Interview method, Questionnaires and schedules Construction

Module-III
Ethical Issues in Research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent

Module-IV:
Writing Research proposals, Development of conceptual framework in research

Module-V:
Basics of statistics in Research
Standard deviation, variance, T test, Regression, correlation

Examination Scheme:

Components	CP	V	A	ME	CT
Weightage	5	10	5	30	50

(CP – Class Performance; V-Viva; A- Attendance; ME- Mid-Term Exam, CT-Class Test)

Text & References:
Text books:

- Research Methodology: A Step By Step Guide For Beginners : Ranjit Kumar
- Research Methodology: Methods and Techniques : By C. R. Kothari

Syllabus - Third Semester

OCULAR MICROBIOLOGY

Course Code: OPT2301 **Credit Units: 02**

Course Objectives: The objectives of the course are:

- to prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites;
- to acquire knowledge of the principles of sterilisation and disinfection in hospital and ophthalmic practice;
- to understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections and
- To understand basic principles of diagnostic ocular Microbiology.

Course Contents:

Module-I:
Introduction to Microbiology; Types of Microorganisms; Physiology of Microorganisms – Nutrition, Enzymes, Metabolism and energy, Microbial Growth

Module-II:
Sterilization and disinfection in the laboratory; Control of Microbial Growth; Microbes versus Humans- The development of Infection, the disease process, pathogenicity and virulence

Module-III:
Ocular Bacteriology - Gram positive,(Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus, propionibacterium, actinomyces, Nocardia) Bacteria including acid fast bacilli (Mycobacterium tuberculosis, Mycobacterium leprae); Ocular Bacteriology - Gram negative Bacteria (pseudomonas, haemophiilus, Brucella, Neisseria, Moraxella); Spirochetes (Treponema, Leptospiraceae)

Module-IV:
Virology: Classification of Viruses in Ocular Disease, Rubella, Adenovirus, Oncogenic Viruses (HPV, HBV, EBV, Retroviruses), HIV.; Fungi : Yeasts, Filamentous, Dimorphic; Intracellular parasites - Chlamydia, Protozoa (Toxoplasmosis, Acanthamoeba); Helminths (Toxocariasis, Filariasis, Onchocerciasis, Trematodes)

Practical:
Students will visit the microbiology lab identify various microorganism; Practical demo of various culture media preparations and growth of microorganism on culture medias; Culture sensitivity test

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical/ record file ; A- Attendance; EE-End Semester Examination)

Text & References:

Text books:

- BURTON G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis, 1988.
- M J Pelczar (Jr),ECS Chan, NR Krieg : Microbiology ,fifth edition, TATA McGRAW-HILL Publisher, New Delhi,1993

Reference Books:

- KJ Ryan, CG Ray: Sherris Medical Microbiology- An Introduction to infectious Diseases, fourth edition, McGRAWHiLL Publisher, New Delhi, 1994
- MACKIE & McCartney Practical Medical Microbiology
- SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM)
- As per faculty recommendation

APPLIED OPTICS-I (Optometric Optics)

Course Code: OPT2302 **Credit Units: 03**

Course Objectives: Skills/knowledge to be acquired at the end of this course:
Measurement of lens power, lens centration using conventional techniques
Transposition of various types of lenses
Knowledge to identify different forms of lenses (equi- convex, planoconvex, periscopic, etc.)
Knowledge to select the tool power for grinding process.
Measurement of surface powers using lens measure.
Method of laying off the lens for glazing process.
Ophthalmic prism knowledge – effects, units, base-apex notation, compounding and resolving prisms.
Knowledge of prism and decentration in ophthalmic lenses
Knowledge of different types of materials used to make lenses and its characteristics
Knowledge lens designs – single vision, bifocals, progressive lens
Knowledge on tinted and protective lenses
Knowledge on special lenses like iseikonic, spectacle magnifiers.
Knowledge on spectacle frames – manufacture, materials

Course Contents:

Module-I: Revision of Basics
Introduction – Light, Mirror, Reflection, Refraction and Absorption; Prisms – Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel's prisms, rotary prims

Module-II:
Lenses – Definition, units, terminology used to describe, form of lenses; Vertex distance and vertex power, Effectivity calculations; Lens shape, size and types i.e. spherical, cylindrical and Sphero-cylindrical; Transpositions – Simple, Toric and Spherical equivalent; Prismatic effect, centration, decent ration and Prentice rule, Prismatic effect of Plano-cylinder and Sphero-cylinder lenses

Module-III:
Spherometer& Sag formula, Edge thickness calculations; Magnification in high plus lenses, Minification in high minus lenses; Tilt induced power in spectacles; Aberration in Ophthalmic Lenses

Module-IV:
The characteristics of Ophthalmic lens material properties (Refractive index, Specific gravity, UV Cutoff, Impact resistance-Drop ball test, Abbe value, Center thickness) :Power Specification (Measurement of Lens power) including Lensometry:Types of Ophthalmic Lenses

Module-V:
Spectacle Frame Nomenclature,Lens surfacing:Identification of Optical center of the given Lens:Marking Datum line for spherical and cylindrical lenses:Glazing of spectacle lenses (Fitting)

Practicals: Based on theory lectures
Unit of competency: Lens Identification and Centration.
The ability to interpret different types of lenses, Facial and frame measurements.
The ability to measure the lens power by different methods

Elements of competence:
A) Lens Identification: Biconvex, biconcave, Meniscus, Plano Convex and plano concave.
B) Geneva lens measure for surface power calculation
C) Lensometry and Hand neutralization
D) Identification of optical centre and datum line marks for spherical lens
E) Prism Power measurement with Lensometer
F) Lens Material Identification
G) Identification of different types of bifocal
H) IPD measurement (Monocular and binocular)

Examination Scheme:

Components	**A**	**HA**	**CT**	**P**	**EE**
Weightage	5	5	10	10	70

CT-Class Test; HA-Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- Text Books: Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1972

Reference Books:

- David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999
- C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996

VISUAL OPTICS-I

Course Code: OPT2303 **Credit Units: 04**

Course Objectives:
To understand the fundamentals of optical components of the eye
Upon completion of the course, the student should be able:
1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, colour vision and history taking

Course Contents:
Module-I: Review of Geometric Optics
Vergence and power, Object space and image space, Sign convention, Cardinal points, Magnification, Aberrations

Module-II: Optics of Ocular Structures
Cornea and aqueous, crystalline lens, Vitreous, Schematic and Reduced Eye

Module-III: Measurement of the optical constants of the eye
Curvature of cornea, Curvature of the lens, Measurement of Axial length, Axes of the eye

Module-IV: Basic Optometric Procedures
History taking in various cases, Visual Acuity, Color Vision, Maddox rod, filters,

Module-V: Refractive anomalies and their causes
Etiology of refractive anomalies, populating distributions of anomalies, Optical component measurements, Growth of the eye in relation to refractive errors
Practicals:
History taking
Visual acuity measurement
Measurement of corneal curvature
Study of Purkinje Images
Effects of lenses
Colour Vision Measurement,
Pinhole

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

CT-Class Test; HA - Home Assignment; A- Attendance; P-Practicals, EE-End Semester Examination

Text & References:
Text Books:
- A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
- AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998

Reference Books:
- WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006
- Primary Care Optometry- Theodore Grosvenor,4th edition, Butterworth

PATHOLOGY

Course Code: OPT2304 **Credit Units: 02**

Course Objective: At the end of the course students will acquire knowledge in the following aspects:

- Inflammation and repair aspects.
- Pathology of various eye parts and adnexa

Course Contents:

Module-I:

General Pathology : Principles; Pathophysiology of Ocular Angiogenesis

Module-II:

Ocular Infections; Pathology of cornea and Conjunctiva; Pathology of Uvea; Pathology of Glaucoma

Module-III:

Pathology of Retina; Pathology of retina in systemic disease/disorders

Module-IV:

Pathology of eyelids and Adnexa; Pathology of orbital space occupying lesions; Pathology of the optic nerve; Retinoblastoma; Pathology of Lens

Demonstration of various Histo-pathological slides during the course for better understanding of the concepts.

Examination Scheme:

Components	A	HA	CT1	CT2	EE
Weightage	5	5	10	10	70

CT-Class Test; HA - Home Assignment; A- Attendance; EE-End Semester Examination)

Text & References:

Text books:

- K S Ratnagar: Pathology of the eye & orbit, Jaypee brothers Medical Publishers, 1997

Reference books:

- CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, newDelhi, 2004.
- S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.

OCULAR DISEASES-I

Course Code: OPT2305 **Credit Units: 04**

Course Objective: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge
on the etiology,
epidemiology,
symptoms,
signs,
course sequelae of ocular disease,
diagnostic approach, and
Management of the ocular diseases.

Course Contents:

Module-I: Orbit

Applied Anatomy; Proptosis (Classification, Causes, Investigations); Enophthalmos; Developmental Anomalies; (craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome); Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis); Grave's Ophthalmopathy; Orbital tumors(Dermoids, capillary haemangioma, Optic nerve glioma); Orbital blowout fractures; Orbital surgery (Orbitotomy); Orbital tumors; Orbital trauma; Approach to a patient with proptosis

Module-II: Lids

Applied Anatomy; Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos); Oedema of the eyelid (Inflammatory, Solid, Passive edema); Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion,; Internal hordeolum, MolluscumContagiosum); Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis); Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma); Exopthalometry

Module-III: Conjunctiva & Lacrimal System

Applied Anatomy; Inflammations of conjunctiva (Infective conjunctivitis – bacterial, Chlamydial, viral , Allergic conjunctivitis, Granulomatous conjunctivitis; Degenerative conditions; Pinguecula, Pterygium, Concretions; Symptomatic conditions; Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration; Cysts and Tumors. Applied anatomy &phyiology of lacrimal system; Evaluation of the watering eye, causes of watering; Obstruction of Lacrimal drainage; Infection of Lacrimal Passages.

Module-IV: Cornea

Applied Anatomy and Physiology; Congenital Anomalies; (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea); Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative; Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic); Degenerations (classifications, Arcus senilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration); Dystrophies (Reis Buckler dystrophy,Recurrent corneal erosion syndrome, Granualrdystrophy,Lattice dystrophy, cornea guttata, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy); Keratoconus, Keratoglobus; Corneal oedema, Corneal opacity, Corneal vascularisation

Refractive procedures; Penetrating Keratoplasty; Corneal investigations; keratometry; Aberrometry; Pachymetry;Topography; Aesthesiometer; Tearscope; Specular microscope

Module-V: Lens

Applied Anatomy and Physiology ; Clinical examination; Classification of cataract; Congenital and Developmental cataract; Acquired (Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic); Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar; Management of cataract; Complications of cataract surgery; Displacement of lens: Subluxation, Displacement; Lens coloboma, Lenticonus, Microsperophakia.

Practicals:

Students will visit OPD clinic and record pathologies seen during the posting [under supervision of faculty]; Record file of ocular pathologies to be prepared [Faculty to decide]; At Least two Case presentation of pathologies seen during clinical posting; Assist ophthalmic surgeon while surgical procedures

Examination Scheme:

Components	**A**	**HA**	**CT**	**R**	**EE**
Weightage	5	5	10	10	70

CT-Class Test; HA - Home Assignment, R-Case records; A- Attendance; EE-End Semester Examination)

Text & References:

Text books:

- A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007

Reference Books:

- Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

CLINICAL OPTOMETRIC PROCEDURES

Course Code: OPT2306 **Credit Units: 03**

Course Objectives: At the end of the course the students will be skilled in knowing the purpose, set-up and devices required for the test, indications and contraindications of the test, step-by-step procedures, documentation of the findings, and interpretation of the findings of the various clinical optometry procedures.

Course Contents: Revision of skills and enhanced knowledge on skills as discussed in previous courses OP 1 and OP 2

Module-I: Case History
Case History Script

Module-II: Entrance Tests
Visual acuity and it's estimation
Colour vision
cover test, Extraocular motility
Hirschberg test,
Near point of accommodation, Near point of convergence
Stereopsis
WFDT
Pupils Examination
Visual field test-Confrontation, Amsler' grid
IPD

Module-III: Ocular Health Assessment
External examination of the eye, Lid Eversion
Tear function test-Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer),
Anterior segment examination with torch light – Slit lamp examination – demo
Photostress test
Corneal Sensitivity

Module-IV: Functional Test
Contrast acuity

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

CT-Class Test; HA - Home Assignment, P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:
Text books:

- T Grosvenor: Primary Care Optometry, 5th edition, Butterworth – Heinneman, USA, 2007.

Reference Books:

- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007

- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach,6th edition, Butterworth-Heinemann, 2007
- J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins,1991
- N B. Carlson , Dl Kurtz: Clinical Procedures for Ocular Examination,3rd edition, McGraw-Hill Medical, 2003

CLINICS-II

Course Code: OPT2307 **Credit Units: 01**

Course Objective: This course aims to give student the basic knowledge of the theory and practical behind the basic clinical procedures. After completion, of course the student should have standard eye examination. Learn to write formal records and understand the preliminary eye testing

Unit of Competency:
Methods of ocular Examination Part 2
The ability to communicate effectively with a diverse group of patients with arrange of optometric conditions and needs.
The ability to use techniques in ocular examination and to understand the implication of findings in terms of subsequent examination techniques

Elements of competence:
Module-I: Basic Eye examination and finding the refractive error.
History taking,
Visual acuity estimation
Retinoscopy on model eye.
Retinoscopy on human eye and neutralization.

Module-II: Anterior segment examination
External examination of the eye, Lid Eversion
Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer)
Pupillary reflex test
Slit lamp techniques.
Anterior segment examination with torch light
Slit lamp examination on live eye – demo
Corneal Sensitivity, HVID, Keratometry

Module-III: Visual field examination.
Visual field testing
Confrontation test, Amsler' grid

Module-IV: Miscellaneous test
Photostress test,
Colour vision
Direct Ophthalmoscopy

Examination Scheme:

Components	Attd.	Record File	Written Test	Viva	Practical	Total
Weightage	5	15	30	30	20	100

HOSPITAL ADMINISTRATION

Course Code: OPT2308 **Credit Units: 02**

Course Objective:
This course has been designed keeping in mind the requirement of scientific techniques and managerial skills for the modern day hospital administrators in a short time
The participant on successful completion of the course will be able to:
Understand clearly the basic concepts of management and hospital management.
Apply the managerial skill system in hospital.
Understand to manage finance, man and material resources in hospital.
Understand planning and management of Hospital and Health care services.
Understand planning of patient care and hospital support services.
Formulate a research project.

Course Contents:

MODULE-I: Introduction to management & Human Resource Development
Management principles and practices in Hospital
Human Resource Management
Organisational Behaviour

MODULE-II: Resource Management and Quality Control
Financial Management
Equipment and Material Management
Hospital Information System and Quality Management

MODULE-III: Hospital and Health care Services
Hospital and Health care System
Hospital Planning and Designing5
Legal aspect of Hospital Administration

MODULE-IV: Patient care and Support Services
Patient Care Services
Hospital Support Services
Hospital Utility Services

Examination Scheme:

Components	Attd.	Assignment	Multiple Choice Questions/ Quiz	Class Test	End-Term Exam	Total
Weightage	5	15	15	15	50	100

Text book/ Reference Book
As recommended by the faculty

BASIC ACCOUNTANCY

Course Code: OPT2309 **Credit Units: 02**

Course Objective: The course not only aims at training students to gain knowledge in the fields related to Accounting & Finance but also leads to the all-round development in establishing their own business. It will give learners an understanding of the theory behind the accounting process and will help learners make decisions in diverse accounting situations as is provides a logical framework for accounting practice. This course will be of great interest to entrepreneurs and business professionals who would like to get an understanding of the theory behind the accounting practices that we use day today.

Course Contents:

MODULE-I: Introduction to Principles of Accountancy
Understand the purpose of accounting
Understand financial terminology and concepts
Understand the accounting process and the accounting equation
Understand debits and credits
Prepare the trial balance
Understand the balance sheet and income statement
Prepare the general ledger and general journal

MODULE-II: Recording and presenting financial Data
Prepare the cashbook, bank reconciliation, and petty cash journals
Perform daily and monthly routines
Account for year-end adjustments
Extract a trial balance and draft a balance sheet and income statement
Prepare budgets and cash flow forecasts

Module-III: practical lab for tally software

Examination Scheme:

Components	A	ASG	CT1	CT2	EE
Weightage	5	15	15	15	50

(CT-Class Test; ASG-Assignment; A- Attendance; EE-End Semester Examination)

Text book/ Reference Book
As recommended by the faculty

MEDICAL LAWS AND ETHICS

Course Code: OPT2310 **Credit Units: 02**

Course Objective: The course not only aims at training students to gain knowledge in the fields related to Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum.

Course Contents:
Few of the important and relevant topics that need to focus on are as follows:
1. Medical ethics - Definition - Goal - Scope b
2. Introduction to Code of conduct
3. Basic principles of medical ethics –Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. Medico legal aspects of medical records –Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.
9. Professional Indemnity insurance policy
10. Development of standardized protocol to avoid near miss or sentinel events
11. Obtaining an informed consent.

Examination Scheme:

Components	**A**	**ASG**	**CT1**	**CT2**	**EE**
Weightage	5	15	15	15	50

(CT-Class Test; ASG-Assignment; A- Attendance; EE-End Semester Examination)

Text book/ Reference Book
As recommended by the faculty

TERM PAPER

Course Code: OPT2331 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Clinical Optometry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary Optometry topic and it will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

Examination Scheme:

Components	**Organization & relevance of content**	**Literature Review**	**Bibliography**	**Total**
Weightage	40	40	20	100

PROJECT

Course Code: OPT2332 **Credit Units: 02**

Course Objectives:
The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

Course Contents:
Module-I and II: Research Methodology
1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design
5. Types of Data
6. Research tools and Data collection methods
7. Sampling methods
8. Developing a research proposal

Module-III and IV: Biostatistics
1. Basics of Biostatistics
1.1 Introduction of Biostatistics
1.2 Measures of Morality
1.3 Sampling
1.4 Statistical significance
1.5 Correlation
1.6 Sample size determination.
1.7 Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion.
1.8 Theoretical distributions.
1.8.1 Binomial
1.8.2 Normal
1.8.3 Sampling –necessity of methods and techniques.
1.8.4 Chi. Square test (2 x 2)
2. Hospital Statistics
3. Use of computerized software for statistics

Examination Scheme:

Components	**A**	**ASG**	**CT1**	**CT2**	**EE**
Weightage	5	15	15	15	50

(CT-Class Test; ASG-Assignment; A- Attendance; EE-End Semester Examination)

Text book/ Reference Book
- Mausner & Bahn: Epidemiology-An Introductory text, 2nd Ed., W. B. Saunders Co.
- Richard F. Morton & J. Richard Hebd: A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
- Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

WORKSHOP

Course Code: OPT2333 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The trainer has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the major themes
The department may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the department in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the department.
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Hands on training
Simulation
Group Activity
Role Play
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Syllabus - Fourth Semester

APPLIED OPTICS-II (Dispensing optics)

Course Code: OPT2401 **Credit Units: 04**

Course Objectives: Skills/knowledge to be acquired at the end of this course:
Measurement of lens power , lens centration using conventional techniques
Ophthalmic prism knowledge – effects, units, base-apex notation, compounding and resolving prisms.
Method of laying off the lens for glazing process.
Knowledge of prism and decentration in ophthalmic lenses
Knowledge of different types of materials used to make lenses and its characteristics
Knowledge lens designs – Bifocals and Progressive lens
Knowledge on tinted and protective lenses
Knowledge on special lenses like iseikonic, spectacle magnifiers.
Knowledge on spectacle frames – manufacture, materials

Course Contents:

Module-I
The characteristics of lens material properties (Refractive index, specific gravity, UV cut off, impact resistance – include drop ball test, abbe value, Center thickness); Measurement of lens power; Quality control. Lens enhancements (Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating

Module-II
Lens types single vision; Lens types bifocal / multifocal; Lens notation; Lens power and thick lenses; Effectivity and high power lenses; Aberrations and lens design; Lens thickness.

Module-III
Ophthalmic prism; Absorptive lenses and lens coatings; Frames types and materials; Frame standard alignment and repairs done; Prescribing ophthalmic lenses; Facial Measurements; Frame Adjustment; Spectacle Delivery - on eye verification

Module-IV
Progressive lenses history and development; Prescribing PALs; Customized PAL designs; Dispensing PALs; Delivery of PALs; Troubleshooting PALs

Module-V
Pediatric Dispensing; Low Vision Aids; Lens enhancements (Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating

Practical to be conducted along with theory lectures
Lab visit will be undertaken to demonstrate different lab procedures.
Glazing and edging Hands on; A collection of different lens types and frames types should be done by students; Lens verification; Project report : lens and spectacle frames available in Indian market

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text Books:

- Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1972

Reference Books:

- David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission, 1999
- C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth-Heinemann, USA, 1996

VISUAL OPTICS-II

Course Code: OPT2402 **Credit Units: 03**

Course Objectives: To acquire a comprehensive theoretical understanding to the Optometric diagnostic procedures and the refractive conditions of the eye.
Course Outcome: Upon completion of the course, the student should be able:
1. To understand the fundamentals of optical components of the eye
2. To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction

Course Contents:
Module-I: Refractive conditions
Myopia
Hyperopia
Astigmatism
Anisometropia and Anisekonia
Presbyopia
Aphakia and Pseudophakia
Correction and Management of Amblyopia

Module-II: Accommodation
Far and near point of accommodation
Range and amplitude of accommodation,
Anomalies of accommodation
Relationship between accommodation and convergence; A/c ratio

Module-III: Objective Refraction
Retinoscopy – principles and methods
Retinoscopy – speed of reflex and optimum condition
Retinoscopy – dynamic/static
Review of objective refractive methods

Module-IV: Subjective Refraction
Subjective refractive methods
Cross cylinder method for astigmatism, Astigmatic Fan test
Duochrome, Transposition of lenses
Spherical equivalent
Prescribing prisms
Binocular balancing & refraction

Module-V: Effective power of spectacles; vertex distance effects
Ocular refraction versus spectacle refraction
Ocular accommodation versus spectacle accommodation
Spectacle magnification and relative spectacle magnification
Retinal image blur; depth of focus and depth of field

Tutorials: Case discussion on difficult situations on Retinoscopy
Practicals
I - History taking

II - Visual acuity measurement

III - Objective Refraction

Students are to neutralize 10cases (2 low myope, 2 low hyperope, 2 high myope, 2 Aphake, 2 astigmats with or without spherical errors). An initial practice session would be given and the students are to exhibit their competency in neutralizing to the nearest power. In case of gross errors the lab would be repeated. The students are to submit the report of their cases duly signed by their supervisor

IV - Subjective refraction

Students should perform fogging technique, Duochrome, cyclodamia, JCC, Binocular balancing and binocular refraction to determine the end point of refraction.

V - Measurement of accommodation

Students need to measure the far point, near point, range and amplitude of accommodation using various methods for 10 cases. Also needs to measure the negative and positive relative accommodation compare the values between the normals.

VI - Measurement of convergence

Students need to measure the near point of convergence, AC/A ratio for 10 patients

Examination Scheme:

Components	**A**	**HA**	**CT**	**P**	**EE**
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; A- Attendance; P-Practicals, EE-End Semester Examination)

Text & References:

Text Books:

- Abrams D: Duke elders Practice of Refraction, Edition 9, 1998
- Primary Care Optometry- Theodore Grosvenor,4th edition, Butterworth

Reference Books:

- WJ Benjamin: Borish's clinical refraction,2nd edition, Butterworth Heinemann, Missouri, USA,2006

OCULAR DISEASES-II

Course Code: OPT2403 **Credit Units: 04**

Course Objective: At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge
on the etiology,
epidemiology,
symptoms,
signs,
course sequelae of ocular disease,
diagnostic approach, and
Management of the ocular diseases.

Course Contents:

Module-I: Retina and Vitreous:

Applied Anatomy; Congenital and Developmental Disorders (Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery) ; Inflammatory disorders (Retinitis: Acute purulent , Bacterial, Virus, mycotic); Retinal Vasculitis (Eales's); Retinal Artery Occlusion (Central retinal Artery occlusion); Retinal Vein occlusion (Ischaemic, Non Ischaemic , Branch retinal vein occlusion); Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations; Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular oedema, Age related macular degeneration; Retinal Detachment: Rhegmatogenous, Tractional, Exudative); Retinoblastoma; LASERS in Ophthalmology; Fluorescein angiography; OCT

Module-II: Ocular Injuries:

Terminology: Closed globe injury (contusion, lamellar laceration) Open globe injury (rupture, laceration, penetrating injury, peforating injury); Mechanical injuries (Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis); Non Mechanical Injuries (Chemical injuries, Thermal, Electrical, Radiational); Clinical approach towards ocular injury patients

Module-III: Uveal Tract & Sclera

Applied Anatomy; Classification of uveitis; Etiology; Pathology ; Anterior Uveitis; Posterior Uveitis; Purulent Uveitis; Endophthalmitis; Panophthalmitis; Pars Planitis; Tumors of uveal tract(Melanoma); Episcleritis and scleritis; Clinical examination of Uveitis and Scleritis

Module-IV: Clinical Neuro-ophthalmology

Anatomy of visual pathway; Lesions of the visual pathway; Pupillary reflexes and abnormalities; Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robetson pupil, Adie's tonic pupil); Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy; Cortical blindness; Malingering; Nystagmus; Clinical examination

Module-V: Glaucoma

Applied anatomy and physiology of anterior segment; Clinical Examination; Definitions and classification of glaucoma; Pathogenesis of glaucomatous ocular damage; Congenital glaucomas; Primary open angle glaucoma; Ocular hypertension; Normal Tension Glaucoma; Primary angle closure glaucoma (Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure); Secondary Glaucomas; Management : common medications, laser intervention and surgical techniques; Glaucoma investigations and procedures; Confrontation Amsler grid; Tonometry-ApplanationSchiotz; Visual fields-; GTX,HRT; Provocative test; OCT

Practicals:
Students will visit OPD clinic and record pathologies seen during the posting [under supervision of faculty]; Record file of ocular pathologies to be prepared [Faculty to decide]; Atleast two Case presentations of pathologies seen during clinical posting

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:
Text books:

- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007

Reference Books:

- Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth-Heinemann, 2007

BASIC PHARMACOLOGY

Course Code: OPT2404 **Credit Units: 02**

Course Objective: At the end of the course students will be knowledgeable in the following:
Basic principles of Pharmacokinetics and Pharmacodynamics
Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage, and adverse effects.

Course Contents:

Module I: General Pharmacology

Mechanisms or drug action; Dose–response relationship; Pharmacokinetics of drug absorption, distribution, bio-transformation, excretion and toxicity; Factors influencing drug metabolism of drug action

Module-II: Action of Specific Agents

Depressants; Anti-coagulants; C.N.S. Stimulants and antidepressants; Diuretics and hypertensive agents; Cardiovascular drugs; Histamines and anti histamines; Serotonin; Prostaglandins

Module-III: Principles of ocular pharmacology

Preparation and packing of ophthalmic drugs; General principles of ocular pharmacology; Drug action and effectiveness; Drug safety; Factors influencing the objectively demonstrated response; Ocular penetration; Routes of general and ocular drug administration

Module-IV: Optometric Diagnostic Drugs

Optometric use of pharmaceuticals; Classification of drug use; Topical ophthalmic drugs; References and drug indices; Surface active drugs; Topical anaesthetics; Principles and classification of autonomic drugs; Sympathomimetics; Sympatholytics; Parasympathomimetics; Diagnostic use of autonomic drugs, Contact lens solutions

Module-V: Other Drug of Optometric Interest

Physical agents; Germicides and sterilizing agents; Over –the counter drugs; Dyes and stains
Preparation of ophthalmic drugs:
Ophthalmic drugs; Anti glaucoma; Sulphonamides; Antibiotics; Corticosteroids; Anesthetics; Proteolytic enzyme

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA - Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Textbook:

- K D TRIPATHI: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004
- Ashok Garg: Manual of Ocular Therapeutics, Jaypee, NewDelhi, 1996 Essentials of Medical Pharmacology by Tripathi
- Pharmacology &Pharmacotherapeutics by R. S. Satoskar
- Essentials of Pharmacotherapeutics by F. S. K. Barar

Reference Books:

- T J Zimmerman, K S Kooner, M Sharir, R D Fechtner: Text Book of Ocular Pharmacology, Lippincott-Raven, Philadelphia, 1997

OPTOMETRIC INSTRUMENTS

Course Code: OPT2405 **Credit Units: 02**

Course Objectives: Upon completion of the course, the student should be able to gain theoretical knowledge and practical skill in handling the ophthalmic instruments.

Course Contents:
Module-I
Refractive instruments; Test charts standards; Choice of test charts; Phoropter

Module-II
Pachymeter, specular microscope, OCT, FFA; Pupilometer; Ophthalmoscopes and related devices; Design of ophthalmoscopes – Direct and Indirect ophthalmoscope; Lensometer, Lens gauges or clock

Module-III
Slit Lamp; Tonometers; Keratometer and corneal topography, Aberrometry

Module-IV
Orthoptic Instruments (Synaptophore); Ultrasonography (A-Scan , B-Scan)

Practical: Demonstration of the instruments parts and procedure

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:
Text books:
- David Henson: Optometric Instrumentations, Butterworth- Heinnemann, UK, 1991

Reference books:
- P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo-Optical Instrumentation, 2002
- G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 1997

CLINICS-III

Course Code: OPT2406 **Credit Units: 03**

Course Contents:

Module-I:

Unit of competency: Refraction

An understanding of methods of assessing vision, Refraction in all Patients

The ability to relate facial anatomy to the fitting of optical appliances.

Elements of competence:

1.Recording VA

2.Practice of Streak Retinoscopy and dynamic retinoscopy.

3.Subjective refraction –

4.Initial sphere check.: fogging

5.Cylinder axis and power refinement: clockdial, fan, JCC,

6.Second sphere check , Duocchrome or bichrome test,

7.Binocular balance :prism balance, TIB,

8.cyclodeimia,

9.Slit refraction.

10.Presbyopic add determination

11.Writing prescription

12.Overview of the use of cycloplegic drugs.

Module-II

Unit of competency: Applied Optics:

The ability to dispensing appropriate appliances

The ability to interpret and dispense a prescription using appropriate lenses and facial frame measurements.

Elements of competence:

1.Frame types and nomenclature of frames. Know about special frame features and handling the frames.

2.Relationship between frame ,lenses and face

3.IPD measurement (with Scale and IPD ruler , Pupilometer)

4. Recommends and dispenses special optical appliances where appropriate(e.g. VDU users, Sports, safety, pediatric frames, recumbent, reversible, flips, trigeminal spectacles etc.)

5.Identification of tints & Coating on lens surface and its application ,associated advantage and disadvantages.

6.Taking and recording children's facial and frame measurement

7.Awareness of the dermatological effects of the materials to be able to advise patient accordingly.

8. Identifies possible errors in prescription and follows the appropriate course of action.

9. Identification of incomplete, inaccurate and ambiguous prescription.

10.when to modify and when to refer a new prescription

Module-III

Unit of competency: Progressive addition lens

Brief overview of PAL'S and clinical decision making.

An understanding of refractive prescribing and management decisions

Elements of competence:

1. Know Basic construction of progressive addition lens.

2. Frame selection for Progressive

3. Familiarity of different types of progressive lens design and clinical relevance .advantages and disadvantages of different types of lens.
4. Choosing the right type of progressive lens
5. Progressive lens fitting measurement
6. Progressive lens verification.
7. Progressive dispensing
8. Trouble shooting of progressive.
9.Familiarity of different brands of PAL's.

Module-IV:
Unit of competency: Comprehensive eye care:
The ability to identify and manage ocular abnormalities
The ability to identify sight threatening eye diseases
Recognizes common ocular abnormalities referred when appropriate
Recognizes adverse ocular reactions to medication
Assess symptoms and signs of neurological significance

Elements of competences:
1.Understands the risk factors for developing common ocular conditions including: Glaucoma, cataract, diabetic retinopathy and ARMD .
2. Recognizes, using appropriate technique/s, all of the following: Cataract, Glaucoma or glaucoma suspects ,Anterior eye disorders e.g. blepharitis, dry eye, meibomian gland dysfunction, lid lesions
AMD and macular abnormalities and Manages appropriately.
3. Manages patients presenting with cataract.
4. Evaluates glaucoma risk factors, to detect glaucoma and refer accordingly.
5. Recognize the patients presenting with macular degeneration .
6. Recognizes, evaluates and manages diabetic eye disease and refers accordingly.
7.Evaluates and manages patients presenting with symptoms of retinal detachment.
8. Recognizes ocular manifestations of systemic disease
9. Assesses symptoms and signs of neurological significance
10. Recognizes adverse ocular reactions to medication.

Module-V
Unit of competency: Ocular diseases 1.
The ability to identify and manage ocular abnormalities
The ability to identify sight threatening eye diseases
Recognizes common ocular abnormalities referred when appropriate
Recognizes adverse ocular reactions to medication

Elements of competences:
1. Interprets and investigates the presenting symptoms and sign of the patient.
2. Identifies external pathology and offers appropriate advice to patients not requiring referral.
- External eye and ocular surfaces : Lids, lashes, lumps/bumps and red eye
- Gives the correct advice /treatment and review period
- Aware of pharmaceutical agents available (legal status, indications, contraindications and side effects and uses appropriate sources of medicines information)
- Explains clearly to the patient and checks their understanding

3. Recognizes common ocular abnormalities
4. Understanding of symptoms associated with internal eye disease.
5. Manage patient presenting with Red eyes.

Examination Scheme:

Components	Attd.	Record File	Multiple Choice Questions/ Quiz	Viva	Practical	Total
Weightage	5	15	15	15	50	100

Text book/ Reference Book

- Grosvenor, Primary Care Optometry, Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- BHVI modules

OPHTHALMIC IMAGING

Course Code: OPT2407 **Credit Units: 03**

Course Objectives:
Identify corneal interface disease with imaging technology
Examine diagnostic capabilities of imaging for glaucoma
Analyze imaging data for change to determine when to escalate treatment for glaucoma in response to progression by imaging
Examine current imaging printouts to see how they can help diagnose retinal diseases at an earlier stage
Analyze the different OCT imaging platforms based upon their differences in hardware and software design for optimal ophthalmic care

Course Contents:

Module-I: Anterior segment imaging:
Orbscan: Basic science and clinical application.
Anterior Segment OCT: Principle and Interpretation.
Corneal Topography
Ophthalmic Photography: External eye photography, Slit lamp photography,

Module-II: Glaucoma Imaging:
Imaging of the optic nerve head: Basic science behind optic nerve head damage. Principle & role of different imaging system behind optic nerve head evaluation. (GDx, HRT)

Module-III: Retinal Imaging:
B- Scan
Fundus photography,
Basic science and role of OCT (Stratus and Spectral domain OCT) in retinal diagnosis.
Auto fluorescence and fundus fluorescence Angiogram: Optical Principle and basic science, Procedure, Role of angiogram in retinal diagnosis and clinical decision making..

Practical:
Demonstration , Observation and hands on of all the clinical ophthalmic imaging system

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Text & Reference

Text book:
- HV Nema,NitinNema, Diagnostic procedure in Ophthalmology, Jaypee, second edition 2009.
- David B. Henson, Optometric Instrumentation, Butterworths

Reference Books:
- Roger Steinert and David Huang, Anterior Segment Optical Coherence Tomography,Slack Incorporated.2008
- Carmen A puliafito, Michael R. hee Optical Coherence Tomography of Ocular disease,
- David B. Henson, Optometric Instrumentation, Butterworths.
- Bruce Muchnic, Clinical Medicine in Optometric practice, Mosby Elsevier 2008.
- MAcRae.S, Krueger,R.,Applegate,R.A.(2004) Wavefront Customized Visual Correction-the quest for super vision-II. London: Slack Inc.
- As per faculty recommendation

OPHTHALMIC ELECTRODIAGNOSTIC PROCEDURES

Course Code: OPT2408 **Credit Units: 03**

Course Objective: The objective of the course is to familiarize the student with the Electrophysiology Laboratory which performs several clinical tests, including the electroretinogram (ERG), electro-oculogram (EOG), visual evoked response (VER), color vision testing (CVT) and dark adaptometry (DA)

Course Contents:

Module-I: Electrophysiological investigations

Electro-oculogram (EOG) Measurement of retinal function with standardised eye movements.
Electroretinogram (ERG)
Macular or Focal Electroretinogram
Pattern Electroretinogram (PERG)
Flash Visually Evoked Cortical Potential (Flash VEP)
Pattern Appearance Visually Evoked Cortical Potential
Other non-standard procedures for recording VEP and ERG e. g., measurement of interocular beat frequencies, flicker and sweep VEPs, multi-focal ERG, fast oscillation.
Electromyogram (EMG)
Electro-nystagmography. For measurement of nystagmus and eye movements.

Module-II: Indications for Patient Referral

Tests Available
Patterns of Referral
Indications for Specific Tests
Standardised Electroretinogram, Electro-Oculogram and Visually, Evoked Potential

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Textbook:

- Ophthalmic Electrodiagnosis (Major Problems in Ophthalmology) N.R. Galloway

PERIMETRY

Course Code: OPT2409 **Credit Units: 03**

Course Objective: The aim of this course is to acquire skills in the visual filed examination of the eye. This course deals almost exclusively with manual and automated perimetry. Emphasis is on technical aspects of administering the automated test with skill; as well as on skillful interpretation of the result based on an understanding of the text.

Course Contents:

Module-I:

The field of vision
Normal field of vision
Retinal nerve fiber paths and the field of vision
Characteristics of visual field loss in glaucoma

Module-II:

Perimetric Parameters
Manual vs. Automated Perimetry
Advantages of Automated Perimetry
Static vs. Dynamic Perimetry
Target size and luminance
Testing Algorithms

Module-III:

Monitoring Fixation
Monocular vs. Binocular testing
Alternative perimetric targets
Interpretation of SAP
Patient and Test details
Displays of sensitivities across the visual field

Module-IV:

Summary measures of visual field performance
Establishing reliability of results
Identifying Glaucomatous VF Loss on SAP
Common perimetric errors

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Reference Book

- Automated static perimetry : Douglas R. Anderson

TERM PAPER

Course Code: OPT2431 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Clinical Optometry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary Optometry topic and it will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT

Course code: OPT2432 **Credit Units: 03**

Course Objectives:
The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

Course Contents:

Module-I and II: Research Methodology
1. Introduction to research methods
2. Identifying research problem
3. Ethical issues in research
4. Research design
5. Types of Data
6. Research tools and Data collection methods
7. Sampling methods
8. Developing a research proposal

Module-III and IV: Biostatistics
1. Basics of Biostatistics
1.1 Introduction of Biostatistics
1.2 Measures of Morality
1.3 Sampling
1.4 Statistical significance
1.5 Correlation
1.6 Sample size determination.
1.7 Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution. Measures of central tendency; measures of dispersion.
1.8 Theoretical distributions.
1.8.1 Binomial
1.8.2 Normal
1.8.3 Sampling –necessity of methods and techniques.
1.8.4 Chi. Square test (2 x 2)
2. Hospital Statistics
3. Use of computerized software for statistics

Evaluation Scheme:

Attendance	Assignment	CT1	CT 2	End-Term Evaluation	Total
5	15	15	15	50	100

Text book/ Reference Book
- Mausner & Bahn: Epidemiology-An Introductory text, 2nd Ed., W. B. Saunders Co.
- Richard F. Morton & J. Richard Hebd: A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
- Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

WORKSHOP

Course Code: OPT2433 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The department has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the various major themes: These themes are merely indicative and the department may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the department in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the department .
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Study
Hands on training
Simulation
Group Activity
Role Play
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Syllabus - Fifth Semester

CONTACT LENS-I

Course Code: OPT2501 **Credit Units -03**

Course Objectives: Upon completion of the course, the student should be able to:

- Understand the basics of contact lenses
- List the important properties of contact lenses
- Finalise the CL design for various kinds patients
- Recognize various types of fitting
- Explain all the procedures to patient
- Identify and manage the adverse effects of contact lens

Course Contents:

Module-I
Anatomy and physiology of anterior segment, History of contact lenses, Optics of contact lenses, comparison spectacles, Contact lens designs, Corneal oxygenation in contact lens wear

Module-II
Contact lens fabrication, Manufacturing of Rigid and soft Contact Lenses –Various methods
Pre fitting examination-steps, significance, recording of results, Instruments used for examination, Special investigation in pre-fitting examinations., Keratometry and corneal topography, Slit lamp examination, Discussion with patient, choice of lens type

Module-III
Examining the Prospective Contact Lens Patient, Selecting Lens Type, Wear Mode and Replacement Rate, Fitting Spherical GP Contact Lenses, Fitting Spherical Soft Contact Lenses, Correcting Astigmatism with Contact Lenses

Module-IV
Calculation and finalizing of contact lens parameters, Ordering contact lenses – writing a prescription to the laboratory, Checking and verifying contact lenses from laboratory,Modifications possible with rigid lenses

Practical:
History Taking role plays, Pre fitting evaluation, RGP CL insertion & Removal, Fitting assessment
Over refraction, Follow up examination, Patient instructions, Contact Lenses Do’s and don’ts, Instructions for care and maintenance

Practical:
History Taking role plays; Pre fitting evaluation; RGP CL insertion & Removal; Fitting assessment; Over refraction; Follow up examination; Patient instructions; Contact Lenses Do’s and don’ts ; Instructions for care and maintenance.

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & Reference:

Text books:

- IACLE modules A1 - 6,B2-9,C 1-4
- CLAO Volumes 1, 2, 3
- Text book of Contact Lenses 5th editionby Sinha Rajesh ,jaypee publication 2017
- Contact lens Primer :Jaypee Bros : Monica Chaudhry
- Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

LOW VISION CARE

Course Code: OPT2502 **Credit Units: 03**

Course Objectives: At the end of the course, the student will be knowledgeable in the following:

- Definition and epidemiology of Low Vision
- Clinical examination of Low vision subjects
- Optical, Non-Optical, Electronic, and Assistive devices.
- Training for Low Vision subjects with Low vision devices
- Referrals and follow-up

Course Contents:

Module-I

Definitions & classification of Low vision; Epidemiology of low vision [magnitude]

Module-II

Pre-clinical evaluation of low vision patients, functional needs assessment; Types of low vision aids – optical aids, non-optical aids & electronic devices ,Assistive technologies devices; Optics of low vision aids

Module-III

Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training; Paediatric Low Vision care

Module-IV

Low vision aids – dispensing & prescribing aspects; Visual rehabilitation & counselling prognostic & psychological factors; psycho-social impact of low vision; Legal aspects of Low vision in India; Eye Disorders & Low vision; Case Analysis

Practical:

Attending in low vision care clinic and history taking; Determining the type of telescope and its magnification (Direct comparison method & calculated method); Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers; Inducing visual impairment and prescribing magnification; Determining reading speed with different types of low vision aids with same magnification; Evaluation of low vision patient; Prescribing optical devices [How to use]; Prescribing of non-optical devices [how to use them]; Visit to blind school and rehabilitation centers; Establishing a low vision in clinic; Report on disability networks in India; Visit to clinics and prepare report on low vision patients

VISUAL REHABILITATION:

Module-I: Rehabilitation

History of Rehabilitation Optometry; Definition and Principles of Rehabilitation; Psychology in Optometric Rehabilitation; Pain and Suffering; Adaptation and Compensatory Adjustment; Human Motivation; Psychological Disturbance and Psychotherapy; Symptomatology of Visual Disorders

Module-II: Introduction to Optometry rehabilitation Practice

A Basis for Practice; Roles in Daily Life and Professional Practice

Module-III: Clinical Presentation and Case

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text books:

- Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
- Low vision : jaypee Bros : Monica Chaudhry
- E Vaithilingam: practice of Low vision – A guide book, Medical Research
- Foundation, 2000

Reference Books:

- Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
- Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
- A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

PUBLIC HEALTH & COMMUNITY OPTOMETRY

Course Code: OPT2503 **Credit Units: 02**

Course Objectives: At the end of the course students will be knowledgeable in the following areas:

- Community based eye care in India.
- Prevalence of various eye diseases
- Developing Information Education Communication materials on eye and vision care for the benefit of the public
- Organize health education programmes in the community
- Vision screening for various eye diseases in the community and for different age groups.

Course Contents:

Module-I

Public Health Concepts; Health systems; Public health and epidemiology

Module-II

Global blindness and visual impairment; Refractive error and low vision as public health issues; Socioeconomic implications of blindness and visual impairment

Module-III

Vision screening; Blindness prevention role of civil society organisations; Eye in primary health care; Contrasting between Clinical and community health programs

Module-IV

Vision 2020: The Right to Sight; Screening for eye diseases; National and International health agencies, NPCB

Module-V

Role of an optometrist in Public Health; Organization and Management of Eye Care Programs – Service Delivery models; Health manpower and planning & Health Economics

Module-VI

Optometrists role in school eye health programs; Basics of Tele Optometry and its application in Public Health; Information, Education and Communication for Eye Care programs

Practical: Students will participate in school screening program, one day screening camps, eye camps, eye banks, students will conduct eye donation camps and motivate and counsel public for eye donation.

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text Books:

- BHVI modules and student notes
- Community eye health journals

References:

- GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National programme for control of blindness, New Delhi, 2002
- Newcomb RD, Jolley JL : Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980

BINOCULAR VISION-I

Course Code: OPT2504 **Credit Units: 03**

Course Objectives: On successful completion of this module, a student will be expected to be able to:-

- Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extraocular muscles.
- Provide a detailed explanation of, and differentiate between the aetiology, investigation and management of binocular vision anomalies.
- Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

Course Contents:

Module-I
Binocular Vision and Space perception; Relative subjective visual direction; Retino motor value; Grades of BSV; SMP and Cyclopean Eye; correspondence, Fusion, Diplopia, Retinal rivalry; Horopter; Physiological Diplopia and Suppression; Stereopsis, Panum's area, BSV

Module-II
Revision: Anatomy of Extra Ocular Muscles; Physiology of Ocular movements; Center of rotation, Axes of Fick; Action of individual muscles

Module-III
Laws of ocular motility; Donder's and Listing's law; Sherrington's law; Hering's law; Uniocular& Binocular movements - fixation, saccadic & pursuits; Version &Vergence; Fixation & field of fixation

Module-IV
Near Vision Complex; Accommodation: Definition and mechanism (process), Methods of measurement, Stimulus and innervation, Types of accommodation, Anomalies of accommodation – aetiology and management; Convergence: Definition and mechanism, Methods of measurement, Types and components of convergence - Tonic, accommodative, fusional, proximal, Anomalies of Convergence – aetiology and management.

Module-V
Sensory adaptations: Confusion, Suppression, Investigations, Management, Blind spot syndrome; Abnormal Retinal Correspondence, Investigation and management; Eccentric Fixation, Investigation and management; Amblyopia: Classification and management

Practicals:
Binocular vision assessment, Stereopsis evaluation, Measurement of NPC and NPA, Measurement of AC/A Ratio, Measurement of convergence, Convergence insufficiency and management of cases, ARC-case discussion, Eccentric fixation –Diagnosis and discussion, Amblyopia management –case presentation

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Texts & References:

Text Books:

- Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
- Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

References:

- Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
- Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company
- Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

DISEASE OF EYE AND CLINICAL MEDICINE

Course Code: OPT2505 **Credit Units: 02**

Course Objectives: At the end of the course, students should get acquainted with the following:
Common Systemic conditions: Definition, diagnostic approach, complications and management options
Ocular findings of the systemic conditions
First Aid knowledge

Course Contents:
Module-I
Hypertension – Definition, classification, Epidemiology, clinical examination, complications, and management. Hypertensive retinopathy; Diabetes Mellitus – Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications, Diabetic Retinopathy; Thyroid DiseasePhysiology, testing for thyroid disease, Hyperthyroidism, Hypothroidism, Thyroiditis, Thyroid tumors, Grave's Ophthalmopathy; Acquired Heart Disease : Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm, Ophthalmic considerations

Module-II
Cancer; Connective Tissue Disease; Rheumatic arthritis; Systemic lupus erythematosus; Sjogren syndrome Behcet's syndrome; Tuberculosis – Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.

Module-III
Herpes virus (HERPES AND EYE); Hepatitis (Hepatitis A, B, C); Acquired Immunodeficiency Syndrome

Module-IV
Anaemia (Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations); Common Tropical Medical Ailments; Nutritional and Metabolic disorders: Myasthenia Gravis, Marfan's Syndrome

Practical: Visit to Hospital Medicine O.P.D / Ward, Neurology

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002
- Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999
- As recommended by Faculty

OCCUPATIONAL OPTOMETRY

Course Code: OPT2506 **Credit Units: 02**

Course Objectives: At the end of the course the students will be knowledgeable in the following aspects:

- in visual requirements of jobs;
- in effects of physical, chemical and other hazards on eye and vision;
- to identify occupational causes of visual and eye problems;
- to be able to prescribe suitable corrective lenses and eye protective wear and
- to set visual requirements, standards for different jobs.

Course Contents:

Module-I
Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc; Acts and Rules - Factories Act, WCA, ESI Act.

Module-II
Electromagnetic Radiation and its effects on Eye; Light – Definitions and units, Sources, advantages and disadvantages, standards; Color – Definition, Color theory, Color coding, Color defects, Color Vision tests

Module-III
Occupational hazards and preventive/protective methods; Task Analysis

Module-IV
Industrial Vision Screening – Modified clinical method and Industrial Vision test; Vision Standards – Railways, Roadways, Airlines

Module-V
Visual Display Units; Contact lens and work

Practical: Students will visit to hospital for various departments and their functioning; visit to sports stadium to know and counsel athletes for their vision requirements and help them in getting their best performance; Visit to different industries and study the vision requirements of different professionals; To prepare project report for vision requirement in different professions/departments; Case discussions on computer vision syndrome

Examination Scheme:

Components	**A**	**HA**	**CT**	**P**	**EE**
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text Books:

- R V North: Work and the eye, Second edition, Butterworth Heinnemann, 2001
- BHVI student notes

Reference Books:

- G W Good: Occupational Vision Manual available in the following website: www.aoa.org
- N.A. Smith:Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999
- G Carson, S Doshi, W Harvey:Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008
- The Eye and Sports Medicine Manual/International Academy of Sports Vision
- International Academy of Sports Vision-Sports Vision Manual

CLINICS-IV

Course Code: OPT2507 **Credit Units: 03**

Module-I
Unit Of competency: Contact lens -1.
The ability to select and fit the most appropriate lens for the planned use
The ability to Identify and manage after care
Elements of competence:
1.Recognize Contact lens types and material.
2.Pre fitting evaluation
3. Demonstrates an understanding of the range of rigid lens material and designs available
4. Appropriate choice of rigid lens parameter.
5. Fitting philosophies of rigid lens and fitting assessment.
6.Demonstrates an understanding of the type of astigmatism which require correction.
7.RGP lens adaptation
8.RGP lens wear and care including use of RGP lens care product.
9.Demonstrates an understanding of the range of soft lens materials and design available.
10.appropriate choices of soft lens , Fitting philosophies and fitting assessment.
11. Write appropriate order form for RGP and soft lenses
12. Instruct patient the technique of RGP, soft lens insertion, removal and other relevant handling instructions.

Module-II
Unit Of competency: Assessment of Binocular vision
The ability to assess the patient with anomalies of binocular vision
The ability to asses binocular status using objective and subjective means
Elements of competence:
1. Understand the different objective test available to asses deviation. E.g. cover & motility test
2. Different subjective test available to assess subjective deviation. E.g. fixation disparity
3. Identification of phoria and tropia
4. Measurement of fusional vergence range dist and near
5. Measureent of accommodative facility
6. Measurement of stereopsis
7. AC/A ratio (heterophoria and gradient method)
8. Synoptophore:
Measurement of SMP, FUSION And stereopsis
Angle of anomaly
ARC

Module-III:
Unit of competency: Low vision and rehabilitation:
The ability to assess a patient with low vision
The ability to advice, refer and provide after care to low vision patients
The ability to refer low vision Patients to other agencies where appropriate
Elements of competence:
1. Distance and near vision chart used for low vision
2. Assessment of visual function, including the use of Log MAR and other specialist charts, effects of illumination, contrast and glare.
3. Assessment of visual field of patient with reduced vision.

4. VA criteria for visual impairment, Low vision and visually handicap
5. Indication of binocular low vision aids
6. Knowledge of Optical and non optical devices
7. Identification of patients visual needs
8. Sign and symptoms of ocular and systemic pathologies.
9. Assessment of magnification for distance and near vision
10.Selection of Optical aids for distance and near.
11.Advises on the use of, and dispenses simple low vision aids :
Identifies which patients would benefit from low vision aids and advice ,
Understands the principles of magnification,
Field of view and working distance in relation to different aids Provides advice on the advantages and disadvantages of different types of simple low vision aids ,
Understands the mechanisms of prescribing magnification including acuity reserve ,
Gives correct instruction to a patient in the use of various aids, to include: Which specs to use with aid, Lighting required, Appropriate working distance
12.Training in use of aids
13.Low vision rehabilitation

Module-IV:
Unit of competency: Community Visit.
The ability to screen refractive error and knowledge of eye health disordered in community
The ability to impart information in a manner which is appropriate to the recipients.
Elements of competence:
1.School screening
2.Industrial Eye screening
3.Community eye services.

Evaluation Scheme:

Attendance	Record file	Written test	Viva	Practical	Total
5	15	30	30	20	100

Text book/ Reference Book

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- BHVI modules

SUMMER INTERSHIP EVALUATION-I

Course Code: OPT2535 **Credit Units: 02**

Objective:
The basic objective of a Summer Internship is to refine the practical exposure .This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the hospital / coporates. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:
Every student of Boptom shall be required to undergo a practical training in a organization approved by the Institute for minimum of four weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific tasks to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.

The last date for the receipt of training report AND CASE SHEETS in the department shall be one month after the date of completion of training, i.e. at the beginning of the fifth semester.

Evaluation Scheme:

Attendance	Overall Performance: grading by centre	Viva	Attendance	LOG book Report	Total
5	30	30	10	30	100

OCULAR PROSTHESIS

Course Code: OPT2508 **Credit Units: 03**

Course Objective:
This course aims at making the students equipped with the basics of Prosthesis and the various conditions where they are applied.

Course Contents:
- Basics on Prosthesis,
- Types of Prosthesis
- Indications,
- Techniques employed,
- Complications,
- Advancements and Results

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Reference Book
- J.H. Prince, Ocular Prosthesis, Livingstone, 1946

REFRACTIVE SURGERY

Course Code: OPT2509 **Credit Units: 03**

Course Objectives:

- Provide patients with unbiased, up-to-date advice concerning refractive surgery techniques
- Recognise the most appropriate tests for investigating suitable candidates pre-operatively and assessing visual performance post-operatively
- Recognise post-operative complications
- Appreciate the most appropriate management strategy for a given refractive surgery patient, communicating effectively with the patient and their surgeon
- Interpret and critically review research pertaining to refractive surgery.

Course Contents:

Module-I: Background – History of Refractive Surgery, Radial Keratotomy, Excimer Laser Photorefractive Keratectomy, Automated Lamellar Keratoplasty, Laser In Situ Keratoplasty , newer advances

Module-II: Refractive surgery Measurement – Peripheral Keratometry, Photokeratoscopy, Videokeratoscopy, Evaluation of Videokeratoscopy, Applications of Videokeratoscopy, Corneal topography reports, Corneal tomography reports.

Module-III: Principles of Microkeratomes- Types of Microkeratomes, Achieving the Optimal Flap, Risks & Complications, Flap Creation Using Femtosecond Laser, Advantages & Disadvantages of Femtosecond Laser Customized Ablation Procedures - Why Use Customized Ablation?, Technology Used for Customised Ablation, Customized Ablation Methods, Guidelines

Module-IV: Complications of Refractive Procedures- Microkeratome related complication, Laser Ablation related complications, Postoperative Complications, Management.

Module-V: Introduction to Phakic IOLs-and Types of Corneal Rings- Preoperative Evaluation & Inclusion Criteria, Surgical Procedures, Overview of Refractive Lens Exchange (RLE), Deciding to perform RLE, Retinal Risks of RLE, Avoiding Retinal Detachment, Informing Patient of Risks, Postoperative Issues, Problems of Phakic IOLs

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	15	15	50	100

Text & References:

Text books:

- Ioannis G. Pallikaris and Dimitrios S. Siganos (1998), LASIK, SLACK incorporated, NJ
- T Grosvenor: Primary Care Optometry,4th edition, Butterworth – heinneman,USA,2002
- Agarwal: Dr. Agarwal's Step by Step Lasik Surgery; Jaypee Brothers, medical Publishers, India (2005)
- Reference Books:
- Hanratty, M. (2005) Lasik: a handbook for optometrists. Oxford: Butterworth-Heinemann

- MacRae, S., Krueger, R., Applegate, R.A. (2004) Wavefront Customized Visual Correction - the quest for super vision-II. London: Slack Inc.
- Naroo, S.(2003) Refractive Surgery: Clinical Decision making in ophthalmic practice. Oxford: Butterworth Heinemann.
- Probst, L.E. (2001) LASIK - a color atlas and surgical synopsis. London: Slack inc.
- Sullivan, L.(2007) Step by step LASIK surgery (2nd Edition). London: Taylor and Francis

TERM PAPER

Course Code: OPT2531 **Credit Units: 02**

Course Objective:
The objective of this course is to judge the understanding as well as application of the knowledge gained by the students. The aim of the term paper is to provide the students with an opportunity to further enhance their knowledge in a sector of their choice by undertaking a significant practical unit of examining and analyzing various aspects of Clinical Optometry at a level commensurate with the learning outcomes of the various courses taken up them in the ongoing semester.

A term paper is primarily a record of intelligent reading in several sources on a particular subject. The students will choose the topic at the beginning of the session in consultation with the faculty assigned. At least one middle level or senior level person of a company from the chosen sector may be interviewed face to face.

Guidelines:
1. The term paper will be related to the contemporary Optometry topic and it will be given by the department.
2. The presentation of the term paper is scheduled to be held before the commencement of Semester examinations.
3. The paper will carry 100 marks that will be marked on the basis of understanding and organization of content based on the literature review. The Bibliography shall form an important part of the paper.

Evaluation Scheme:

Organisation and relevance of content	Literature Review	Bibliography	Total
40	40	20	100

PROJECT

Course code: OPT2532 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Abstract: The body of the report should have summary of the project.
a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.
b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).
c) Presentation of Data, Analysis and Findings
d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I: Selection of the topic for the project by taking following points into consideration:
Suitability of the topic.
Relevance of the topic
Time available at the disposal.
Feasibility of data collection within the given time limit.

Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Methodology,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor
2) Student's declaration
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:
Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

WORKSHOP

Course Code: OPT2533 **Credit Units: 01**

Course Objective:
A workshop is primarily an activity based academic event that is organized to provide the students a one to one and hands on experience on any aspect of their learning. The communication in a workshop has to be necessarily two ways. The department has to make sure that the aspects covered are practically practiced by the participants. The student will choose the option of workshop from amongst their concentration electives. The evaluation will be done by Board of examiners comprising of the faculties.

Major Themes for Workshop:
The workshop may be conducted on any of the major themes: These themes are merely indicative and the department may choose any recent and relevant topic of study.

Guidelines for Workshop:
The procedure for earning credits from workshop consists of the following steps:
Relevant study material and references will be provided by the department in advance.
The participants are expected to explore the topic in advance and take active part in the discussions held
Attending and Participating in all activities of the workshop
Group Activities have to be undertaken by students as guided by the department .
Evaluation of workshop activities would be done through test and quiz at the end of the workshop.
Submitting a write up of atleast 500 words about the learning outcome from the workshop.

Methodology:
The methodology followed at the workshop could be based on any one or more of the following methods:
Case Presentation
Hands on training
Simulation
Group Activity
Role Play
Quiz

Evaluation Scheme:

Attendance	Active Participation	Multiple Choice Questions/ Quiz	Solving the case/ Assignment/ Write up	Total
10	30	30	30	100

Syllabus - Sixth Semester

CONTACT LENS-II

Course Code: OPT2601 **Credit Units: 04**

Course Objectives: Upon completion of the course, the student should be able to:

- Review the basics of contact lenses
- List the important properties of contact lenses
- Finalise the CL design for various kinds patients
- Recognize various types of fitting
- Explain all the procedures to patient
- Identify and manage the adverse effects of contact lens

Course Contents:

Module-I: Prefitting examination

Review of Basics; Patient Selection; Pre screening for contact lens wear; Slit Lamp examination; Assessment of Cornea; Assessment of Tear film

Module-II: Contact lens fitting

Soft contact lens fitting; Soft Toric Contact Lens fitting; Rigid Contact lens fitting; Managing the Presbyope

Module-III: Extended wear contact lens

Cornea and Oxygen; Extended Wear and Silicone Hydrogel Lenses

Module-IV: Contact lens care

Contact lens After Care; Contact lens Care System

Module-V: Speciality contact lens

Therapeutic and Prosthetic contact lenses; Overview of Special considerations for fitting contact lenses; Business Aspects of Contact lens practice; Setting up a Contact lens clinics

Assignment: The student should consult all the manufacturers of RGP lenses and soft lenses and list down various products (Lenses, care products and accessories) available with them. Detailed parameters along with manufacturer recommendation should be noted. Also students will be encouraged to read books and journals and submit a report to the faculty. The topics of the same can be decided by the faculty.

Practical

Pre fitting evaluation; SCL insertion & Removal; Fitting assessment; Over refraction; Follow-up Examination; Toric contact lens fitting and assessment; Cosmetic contact lens fitting and assessment; Do's and don'ts for contact lenses; Care and maintenance; Special instructions for silicone hydrogels; Demonstration for bifocal ,multifocal lenses, scleral lenses, Orthokeratology; Patient communication workshop / role plays; Visit to contact lens manufacturing unit, Case Presentations (components of Practical exam); Video preparations (components of Practical exam)

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- IACLE modules 1 – 10
- Essential Contact Lens practice : Jane Veys, John Meyler , Ian Davies
- CLAO Volumes 1, 2, 3
- Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008
- Contact lens Primer : Monica Chaudhry : Jaypee Brothers

BINOCULAR VISION-II

Course Code: OPT2602 **Credit Units: 04**

Course Objective: The objective of this course is to inculcate the student with the knowledge of different types of strabismus its etiology signs and symptoms, necessary investigations and also management. The student on completion of the course should be able to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision. The student should be able to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

Course Contents:

Module-I:
Strabismus - Definition, Classification and etiology; Development of squint or ocular deviation; Adaptation to development of ocular deviation; Orthoptic instruments and their uses; Methods of examination

Module-II:
Anomalous Retinal Correspondence (ARC); Suppression; Amblyopia and eccentric fixation; Definition & Classification; Investigations; Management

Module-III:
Latent Strabismus (Heterophoria); Esotropia; Accommodative esotropia; Partially accommodative esotropia; Non accommodative esotropia; Microtropia; Recurrent esotropia; Secondary esotropia; Management of esotropia; esotropia associated with vertical deviation; Exotropia; Classification and etiology; Primary exodeviation; Dissociated exodeviation; Secondary exodeviation; Cyclo - Vertical Deviation; Comitant hyper deviation; Dissociated vertical deviation; Dissociated horizontal deviation; Elevation in adduction; Depression in adduction; Cyclodeviation

Module-IV:
A and V pattern; Paralytic Strabismus; Genetics and occurrence of squint and binocular vision problems; Special Forms of Strabismus; Retraction syndrome (Duane syndrome); Brown syndrome; Adherence syndrome; Strabismus fixus; Strabismus in high myopes; Fibrosis of extra ocular muscles; Graves' Endocrine ophthalmopathy; Acute orbital myositis; Cyclic heterotropia; Acquired motor fusion deficiency; Fracture of orbital floor; Fracture of medial orbital floor; Ocular Myasthenia gravis; Chronic progressive external ophthalmoplegia (Ocular myopathy of Von Graefe)

Module-V:
Nystagmus; Principle of non surgical treatment; Optical treatment; Pharmacological treatment; Orthoptics; Chemodenervation of extra ocular muscles – Botulinum Toxin; Principle of surgical treatment; Vision Training Programme (VTP)

Practicals:
History taking –Role play; Cover test; ocular motility demonstration and hands on various orthoptic instruments and procedures; Case discussion different types of strabismus; Visit to clinic and record cases

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

- Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
- Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
- Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company
- Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

GERIATRIC OPTOMETRY

Course Code: OPT2603 **Credit Units: 03**

Course Objectives:

- The student on taking this course should
- Be able to identify, investigate the age related changes in the eyes.
- Be able to counsel the elderly
- Be able to dispense spectacles with proper instructions.
- Have adequately gained knowledge on common ocular diseases.

Course Contents:

Module-I

Structural, and morphological changes of eye in elderly; Physiological changes in eye in the course of aging.

Module-II

Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)

Module-III

Optometric Examination of the Older Adult; Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye

Module-IV

Contact lenses in elderly; Pharmacological aspects of aging; Low vision causes, management and rehabilitation in geriatrics; Spectacle dispensing in elderly – Considerations of spectacle lenses and frames

Practical: Students will observe and record Geriatric cases actual clinical practice will be done during internship.

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text & References:

Text Books:

- A.J. ROSSENBLOOM Jr & M.W.MORGAN: Vision and Aging, Butterworth-Heinemann, Missouri, 2007.

Reference Books:

- OP Sharma: Geriatric Care – A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005
- VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998
- DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002

PEDIATRIC OPTOMETRY

Course Code: OPT2604 **Credit Units: 03**

Course Objectives: At the end of the course the student is expected to:

- have a knowledge of the principal theories of childhood development, and visual development
- have the ability to take a thorough paediatric history which encompasses the relevant developmental, visual, medical and educational issues
- be familiar with the accommodative-vergence system, the genesis of ametropia, the disorders of refraction, accommodation and vergence, and the assessment and management of these disorders
- be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus
- have a knowledge of the epidemiology of eye disease in children, the assessment techniques available for examining visual function of children of all ages and an understanding varied management concepts of paediatric vision disorders
- Have knowledge of the art of dispensing contact lens, low vision aids and referral to the surgeon or other specialists at the appropriate timing.
- have a capacity for highly evolved communication and co-management with other professionals involved in pediatric assessment and care

Course Contents:

Module-I:
The Development of Eye and Vision; History taking Paediatric subjects; Assessment of visual acuity; Normal appearance, pathology and structural anomalies of Orbit, Eye lids, Lacrimal system, Conjunctiva, Cornea, Sclera, Anterior chamber, Uveal tract, Pupil, Lens, vitreous and Fundus

Module-II
Oculomotor system, Refractive Examination; Determining binocular status; Determining sensory motor adaptability

Module-III
Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia; Remedial and Compensatory treatment of Strabismus and Nystagmus

Module-IV
Paediatric eye disorders: Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular; conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics; Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism

Module-V
Spectacle dispensing for children; Paediatric contact lenses

Practicals: Students will observe and record pediatric cases .clinical practice will be done during internship.

Examination Scheme:

Components	A	HA	CT	P	EE
Weightage	5	5	10	10	70

(CT-Class Test; HA- Home Assignment; P-Practical; A- Attendance; EE-End Semester Examination)

Text books :

- Paediatric Optometry - JEROME ROSNER, Butterworth, London 1982
- Paediatric Optometry – William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004

References:

- Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C. V Mosby Co. St. Louis, 1980.
- Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
- Clinical pediatric optometry.L J Press, B D Moore, Butterworth- Heinemann, 1993

CLINIC-V

Course Code: OPT2605 **Credit Units: 03**

Course Contents:

Module-I
Unit of competency: Contact lens II
The ability to select and fit the most appropriate lens for the planned use
The ability to Identify and manage after care
The ability to understand the techniques used in fitting complex contact lenses and advises patients requiring complex visual corrections.

Module-II
Unit of competency: Pediatric and geriatric optometry:

Pediatric:
Assess ocular health and systemic health conditions.
Identify risk factor of systemic diseases based on ocular findings.
Assess VA, ocular motility, pupil, Objective and subjective refraction.
Pediatric prescribing decision and their purpose. E.g. early onset myopia
investigation and management of children presenting with anomalies of binocular vision.

Geriatric:
Evaluate the functional status of the eye, vision system and account special demands and needs.
Assess ocular health and systemic health conditions.
Detect and diagnose ocular abnormalities and disease
Counsel and educate the patients regarding their visual, ocularand related systemic health care status including recommendations for treatment, management and future care.

Module-III:
Unit of competency: Squint Evaluation:
The ability to assess binocular status using objective and subjective tests
The ability to investigate and manage a patient presenting with heterophoria or heterotropia.
The ability to manage a patient presenting with an incomitant deviations
Demonstration of following Orthoptic instruments/methods and their uses –
Orthoptic Investigative & Therapeutic Procedure.
Cover and uncover test: Differentiate from phoria and tropia.
Measurement of angle of deviation: Subjectively (Synoptophore) and objectively (PBCT/ Modified Krimsky)

Module-IV: Vision Therapy:
The ability to understand different eye exercise procedure
Restoration of vision and maintain ocular alignments by means of different eye exercise

Module-V: Comprehensive eye examination

Evaluation Scheme:

Attendance	Record file	Written test	Viva	Practical	Total
5	15	30	30	20	100

Text book/ Reference Book

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- BHVI modules

VISUAL REHABILITATION

Course Code: OPT2606 **Credit Units: 03**

Course Objective:
Its aim is develop skills for those who want to work in a professional setting assisting adult populations who are blind/visually impaired and integrate compensatory skills and assistive technology that will enable them to live safe, productive, and independent lives.

Competencies acquired

Specific areas of instruction learned by Vision Rehabilitation Therapists will include:
Communication Systems (Braille, handwriting, recording skills, use of electronic reading systems, use of assistive technology and computer access technology, etc.).
Personal Management (grooming, hygiene, clothing organization, medical measurement, socialization skills, etc.)
Home Management (organization and labeling, repair and home maintenance, budgeting and record keeping, etc.)
Activities of Daily Living (cooking, cleaning, shopping, safety, money organization and management, etc.)
Leisure and Recreation (hobbies, woodworking, crafts, sports, etc.)
Psychosocial Aspects of Blindness and Vision Loss
Medical Management (assessment and instruction and training of adaptive medical equipment)
Basic Orientation and Mobility Skills (sighted guide, safety techniques, etc.)

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	25	15	40	100

Text & References:

As per the clinical supervisor

VISION THERAPY AND LEARNING DISABILITIES

Course Code: OPT2607 **Credit Units: 03**

Course Objective: Its aim is develop skills for those who want to work as a professional Vision therapist --The course on learning disabilities, vision therapy is specifically directed toward resolving visual problems which interfere with reading, learning and educational instruction.

Competencies acquired

Overview of Normal Child Development
The Relationship between Vision and Learning General Issues
Visual Efficiency Problems
Management of Visual Information Processing Problems
Vision Therapy Procedures for Developmental Visual Information Processing Problems
Interdisciplinary Management of Learning Problems Case Studies
The Role of the Optometrist in the Management of Learning Related Vision Problems
Optometric Assessment Case History
Optometric Assessment Visual Efficiency Problems
Optometric Assessment Visual Information Processing Problems
Various techniques used in management of anomalies

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	25	15	40	100

Text & References:

- Optometric Management of Learning-related Vision Problems: Mitchell Scheiman, Michael W. Rouse
- Understanding and Managing Vision Deficits: A Guide for Occupational Therapists Mitchell Scheiman

EYE BANKING

Course Code: OPT2608 **Credit Units: 03**

Course Objective:
To familiarise the students with various methods of eye banking and the various procedures involved in tissue preservation, transport and storage.

Course Contents:

Module-I: Quality Assurance and Control
EB Medical Standards
EB Standardized Procedures
Sterilization
Refrigeration and Temperature Recording
Instrument Inspection, Cleaning, and Handling
Quality Assurance Monitoring
Record Keeping and Documentation
Professional Standards
Adverse Reaction Reports
Consent Informed Consent Procedures and Documentation
Donor History, Screening, and Evaluation
Determination of Suitability
Donation
Transplant
Legislation and Regulatory Requirements

Module-II: Tissue Related Procedures
Preservation of Tissue
Procedures and Methods
Preservation Media
Transport and Storage of Tissue
Packaging and Labeling
Documentation Requirements
Distribution of Tissue
Storage
Examination and Evaluation of Tissue
Slit Lamp Biomicroscopy
Specular Microscopy
Other
Surgical Procedures
Penetrating Keratoplasty
Lamellar Keratoplasty
Epikeratoplasty
Patch Graft

Module-III: Technical Procedures
Whole Eye Enucleations
Preparation
Equipment and Instrumentation

Procedure
Corneal Excisions
Preparation
Equipment and Instrumentation
Procedure

Evaluation Scheme:

Attendance	Record file	Multiple Choice Questions/ Quiz	Viva	Practical skills /performance	Total
5	15	25	15	40	100

Text & References:

- Essentials of Eye Banking : by A. Panda
- Eye Banking : T. Bredehorn, Gernot Duncker, W. John Armitage
- Postgraduate Ophthalmology, Volume 1Zia Chaudhuri, MurugesanVanathi
- As per the clinical supervisor

PROJECT

Course code: OPT2632 **Credit Units: 03**

Objectives:
The aim of the project is to provide the students with an opportunity to further their intellectual and personal development in the chosen field by undertaking a significant practical unit of activity. The project can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

Chapter Scheme and distribution of marks:
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework/ National/International Scenario – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Abstract: The body of the report should have summary of the project.
a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.
b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).
c) Presentation of Data, Analysis and Findings
d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I: Selection of the topic for the project by taking following points into consideration:
Suitability of the topic.
Relevance of the topic
Time available at the disposal.
Feasibility of data collection within the given time limit.

Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)
Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Methodology,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:
Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Syllabus - Seventh Semester

(CLINIC-VI A – INTERNSHIP)
RETINA, GLAUCOMA, LOW VISION

Course Code: OPT2701 **Credit Units: 03**

Course Objectives:
At the end of the course, the student will be knowledgeable in the following:
Examination diagnose and manage various conditions of retina
Examine, Diagnose and manage various conditions of glaucoma
Examine manage patients with low vision
Prescribe and train patient for use of low vision devices

Course Contents:

Module-I: Retina and Vitreous: student should be learning following
Assess pupil reactions
Interpret and investigate the presenting symptoms of the patient.
Examine fundus using direct and indirect techniques
Identify external pathology and offer appropriate advice to patients not needing referral,
Understand of risk factors for common ocular conditions.
Recognise common ocular abnormalities and to refer when appropriate.
Develop a management plan for the investigation of the patient
Manage a patient presenting with reduced vision.
Manage a patient presenting with macular degeneration
Recognize, evaluate and manage diabetic eye disease and refer accordingly.
Evaluate and manage a patient presenting with symptoms suggestive of retinal detachment.
An understanding of the treatment of a range of common retinal diseases.
Recognise ocular manifestations of systemic disease.
Assess symptoms and signs of neurological significance.
Manage patients presenting with sight- threatening eye disease.
Recognise adverse ocular reactions to medication.
Help ophthalmologist in performing Retinal LASERS
Perform and analyse Fluorescein angiography
Perform and interpret test results of OCT

Module-II: Glaucoma
The ability to perform an examination of the eye and related structures use instruments in ocular examination and to understand the implications of the findings in terms of subsequent examination techniques. Use a contact tonometer to measure intraocular pressure and analyse and interpret the results of Tonometry-ApplanationSchiotz
Amsler grid
Assess visual fields of patients with reduced visual acuity.
Interpret and investigate the presenting symptoms of the patient.
Understanding of risk factors for Glaucoma
Investigate visual fields and to analyse and interpret the results.
Visual fields- confrontations, automated, tangent screen, bernels perimeter
Manage a patient presenting with a red eye.

Manage a patient presenting with reduced vision.
Evaluate glaucoma risk factors, to detect glaucoma and refer accordingly.
Understanding of the role of optometrists in shared care
Recognise adverse ocular reactions to medication.
Management : common medications, laser intervention and surgical techniques
Glaucoma investigations and procedures
GTX,HRT,
Provocative test
OCT

Module-III: Low Vision
Clinical examination of Low vision subjects
Optical, Non-Optical, Electronic, and Assistive devices.
Training for Low Vision subjects with Low vision devices
Deciding management plan for Referrals and follow-up
Visual rehabilitation

Examination Scheme

Component	Attendance	Performance	Log book	Practical skills	Viva	Total
Max marks	05	25	20	30	20	100

Text books:

- A K Khurana: Comprehensive Ophthalmology, 4th edition, new age international (p) Ltd. Publishers, New Delhi, 2007
- Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998

Reference Books:

- Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
- Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007
- Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999

(CLINIC-VI B) PEDIATRIC & BINOCULAR VISION

Course Code: OPT2702 **Credit Units: 03**

Course Objective:
To inculcate in a student the
Ability to take an appropriate binocular vision history
Ability to assess eye alignment and eye movements.
Ability to assess sensory fusion and stereopsis.
Ability to assess oculomotor function.
Ability to assess accommodation.

Also to make the student able
To develop an appropriate timetable for eye and vision examinations for pediatric patients
To select appropriate examination procedures for all pediatric patients
To examine the eye health and visual status of pediatric patients effectively
To minimize or avoid the adverse effects of eye and vision problems in children through early identification, education, treatment, and prevention
To inform and educate patients, parents/caregivers, and other health care providers about the importance and frequency of pediatric eye and vision examinations

Evaluation:
Evaluation will be based on the following competencies:
Assesses binocular status using objective and subjective means.
Understands the management of patients with an anomaly of binocular vision.
Investigates and manages adult patients presenting with heterophoria
Manages adult patients with heterotropia.
Manages children at risk of developing an anomaly of binocular vision.
Manages children presenting with an anomaly of binocular vision.
Manages patients presenting with an in commitant deviation.

Examination Scheme:

Component	Attendance	Performance	Log book	Practical skills	Viva	Total
Max marks	05	25	20	30	20	100

(CLINIC-VI C) CORNEA & CONTACT LENS

Course Code: OPT2703 **Credit Units: 03**

Course Objectives: At the end of the course the student will be able to:

- Examine the anterior segment of the eye with the help of advanced diagnostic instrument.
- Access the ocular health and clinical decision making of types of contact lens is appropriate
- Instruct a patient in the techniques of soft & RGP lens insertion, removal and other relevant handling instructions and Instruct a patient on the principles of lens wear and care including lens care products.

Course Contents:

Module-I: Examination of anterior segment:
Anatomy & physiology of the anterior segment
Corneal topography: Measurement and significance
Keratometry: interpretation of keratometry result.
Slit lamp bio microscopy procedure
Tear function test
Corneal staining
Corneal sensation test
Specular microscopy: interpretation of test result

Module-II: RGP lens
Pre-fitting evaluation
Nomenclature and lens design
RGP contact lens fitting
Correction of astigmatism with rigid lens
Market availability of different types of RGP contact lens and lens material

Module-III: Soft contact lens
Nomenclature, design, Material properties and manufacturing techniques.
Soft contact lens fitting
Disposable, extended wear and frequent replacement soft contact lens
Correction of astigmatism with soft contact lens
Silicon hydrogel lens
Market availability of different types of soft CL and

Module-IV: Speciality contact lens
Presbyopic lenses
Rose k Lenses
Scleral lenses
Lenses for irregular cornea
Orthokeratology
Myopia control lenses .
Contact lens fitting in high myopia and hyperopia.

Module-V: Care & Maintenance
Preservation and disinfection
Contact lens cleaning and disinfection

Post fitting care of RGP and soft lenses
Write appropriate order form for RGP and soft lenses
CL practice management

Examination Scheme:

Components	Attd.	Case Presentation	Log book	Viva /CT	EE Practical
Weightage (%)	5	10	15	30	40

Text book:

- IACLE modules
- Essential Contact Lens practice : Jane Veys, John Meyler , Ian Davies
- Contact lens Primer : Monica Chaudhry : Jaypee Brothers
- CLAO Volumes 1, 2, 3
- Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
- Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

(CLINIC-VI D) PRIMARY EYE CARE

Course Code: OPT2704 **Credit Units: 03**

Objectives:

- It is expected that upon completion the student will be able to carry out the standard clinical procedures safely and efficient
- Upon completion of the course the student must be able to achieve these skills

Module-I: Take down a comprehensive history –
Must be able to take a structured, accurate history of symptoms from patients with a range of ophthalmic problems and needs
Must be able to produce comprehensive, legible and organized record keeping

Module-II: Do a complete and proper refraction
Visual acuity estimation
Must be able to measure and assess visual function of patients of any age with appropriate tests and techniques like
Lensometry
Retinoscopy
Refraction procedures
Must be able to use subjective and objective techniques to identify and quantify ametropia

Module-III: Do a torch light examination.
Hirschberg test

Module-IV: Do a binocular vision assessment
Ocular motility, cover test
Must be able to assess eye alignment and eye movements
Near point of accommodation, Near point of convergence
Do a detailed binocular vision assessment if required in particular cases

Module-V: Use a slit lamp to do a complete anterior segment examination and posterior segment as required
Must be able to examine for abnormalities in eye and adnexa especially eyelid, conjunctiva, cornea, anterior chamber, lens and fundus using appropriate instruments and techniques
Must be able to interpret signs and symptoms of ocular abnormality
Must be able to perform applanation tonometry and non contact tonometry
Must be able to take the decision to dilate the eye as per need
Must be able take the decision to use appropriate ocular drugs diagnostically and to aid refraction and fundus examination in consultation with the ophthalmologist.

Module-VI: Must be able to give a preliminary diagnosis
During management the student must be able to advice on the most suitable form of optical correction

Examination Scheme:

Components	A	Case Discussion	Log book	Viva /CT	EE Practical
Weightage (%)	5	10	10	25	50

SUMMER INTERNSHIP EVALUATION-II

Course Code: OPT2735 **Credit Units: 06**

Course Objectives:
The basic objective of a Summer Internship is to refine the practical exposure .This summer training will provide an opportunity to the students to apply their theoretical understanding while working on the concerned project in the hospital / corporate. Thus this summer internship programme is an attempt to bridge the gap between theory and practice. This will also enhance the students' intellectual ability and attributes related to data handling, decision making, report writing, oral presentation and imbibing an interdisciplinary approach.

General Guidelines:
Every student of Boptom shall be required to undergo a practical training in a organization approved by the Institute for minimum of four weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific tasks to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in form of a training report.

The last date for the receipt of training report AND CASE SHEETS in the department shall be one month after the date of completion of training, i.e. at the beginning of the next semester.

Evaluation Scheme:

Attendance	Overall Performance: grading by centre	Viva	Attendance	LOG book Report	Total
5	30	30	10	30	100

RESEARCH PROJECT (MID TERM EVALUATION)

Objectives: Midterm review of the final year project will be done this semester .The student is required to submit the following during this semester end
Chapter Scheme and distribution of marks:
Chapter 1: Introduction
Chapter 2: Literature review
Chapter 3 : methodology
Chapter 4 : data and its analysis
Pre conclusion and results

Project Report	Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Abstract: The body of the report should have summary of the project.
a) Introduction: This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, inclusion & exclusion criteria and method of analysis), Limitations of the Study, and Planning.
b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).
c) Presentation of Data, Analysis and Findings
d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I: Selection of the topic for the project by taking following points into consideration:
Suitability of the topic.
Relevance of the topic
Time available at the disposal.
Feasibility of data collection within the given time limit.
Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
Step III: Collection of information and data relating to the topic and analysis of the same.
Step IV: Writing the report dividing it into suitable chapters, viz.,

Chapter 1: Introduction,
Chapter 2: Methodology,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
Step V: The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.

Guidelines for Evaluation:
Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.

Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.

Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

Syllabus - Eighth Semester

INTERNSHIP-II
(CLINIC-VII) COMPREHENSIVE EYE CARE & REFRACTION

Course Code: OPT2801 **Credit Units: 05**

Objectives: It is expected that upon completion the student will be able to carry out the standard clinical procedures especially refraction efficiently and safely.

Course Contents:
Upon completion of the course the student must be able to

Module-I: Take down a comprehensive history –
Must be able to communicate effectively with the patient, taking into account his/her physical, emotional, intellectual and cultural background – building a rapport
Must be able to take a structured, efficient, accurate history and symptoms from patients with a range of ophthalmic problems and needs
Must be able to produce comprehensive, legible and organised record keeping with appropriate detail and grading
Must be able to interpret and respond appropriately to patient records and other relevant information

Module-II: Do a complete and proper refraction
Visual acuity estimation.
Must be able to measure visual function of patients of any age with appropriate tests and techniques
Must be able to assess visual function in patients with visual impairment
Lensometry
Retinoscopy
Refraction procedures
Must be able to use subjective and objective techniques to identify and quantify ametropia

Module-III: Do a torch light examination.
Hirschberg test

Module-IV: Do a binocular vision assessment
Ocular motility, cover test
Must be able to assess eye alignment and eye movements
Near point of accommodation, Near point of convergence

Module-V: Do a detailed binocular vision assessment if required in particular cases as per the format given in binocular vision syllabus

Module-VI: Do a pupil evaluation with torch light

Module-VII: Use a slit lamp to do a complete anterior segment examination and posterior segment as required
Must be able to examine for abnormalities in eye and adnexa especially eyelid, conjunctiva, cornea, anterior chamber, lens and fundus using appropriate instruments and techniques
Must be able to interpret signs and symptoms of ocular abnormality
Must be able to perform applanation tonometry and non contact tonometry

8. Must be able to take the decision to dilate the eye as per need
Must be able take the decision to use appropriate ocular drugs diagnostically and to aid refraction and fundus examination.
Must be able to give a preliminary diagnosis
During management the student must be able to advice on, order and be able to dispense the most suitable form of optical correction taking into account durability, comfort, cosmetic appearance, age and lifestyle.

Evaluation Scheme:

Attendance	Record file Log book	Case discussion-I	Case discussion-II	EE Practical	Total
10	20	20	20	30	100

The final evaluation is based on the Clinical skill evaluation practical exam the candidate will be asked to examine a patient with all details. This examination will primarily measures skills, it contains an assessment, management and communication skills, as well as some interpretation of clinical findings.
The study centre will form an integral part of the evaluation and will be based on the regular performance and participation in grand rounds .discussions and presentations.

Text book/ Reference Book

- Grosvenor, Primary Care Optometry , Butterworth-Heinemann,
- A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international (p) Ltd. Publishers, New Delhi, 2007
- D B. Elliott :Clinical Procedures in Primary Eye Care,3rd edition, Butterworth-Heinemann, 2007
- BHVI modules

(CLINIC-VII) OPTOMETRIC PROCEDURES & INSTRUMENTS

Course Code: OPT2802 **Credit Units: 05**

Course Objective:
This course deals with complete theory and practical experience in all basic tests, instrumentation and procedures necessary to evaluate the ocular health status of a patient. The topics include complete optometric procedures and instruments taught in the previous semesters like case history, gross external examination of the eye and adnexa, pupil and muscle functions, anterior and posterior segment examination, tonometry, visual acuity, and visual fields assessment and so on .

The objective of this course is to apply all theoretical knowledge into examination and optometric management of the patient with ocular problems.
The student should learn to operate all instruments and be able to carry out all ophthalmic procedures.

Evaluation Scheme:
The final evaluation is based on the Clinical skill evaluation practical exam the candidate will be asked to examine a patient with all details. This examination will primarily measures skills, it contains an assessment, management and communication skills, as well as some interpretation of clinical findings.
It will be assessing the competence of individual optometrists in the practice of optometry

Evaluation Scheme:

Attendance	Record file Log book	Practical	Written test	Viva	Total
10	20	30	30	20	100

The study centre will form an integral part of the evaluation and will be based on the regular performance and participation in grand rounds .discussions and presentations.

PROJECT-DISSERTATION

Course Code: OPT2837 **Credit Units: 12**

The project evaluation will include assessment at the end of third year (synopsis submission). Midterm review (at the end of 7th semester)
Weightage will be as follows
Synopsis submission = 20% (end of sixth semester)
Mid-Term review = 30 % (end of seventh semester)
Final submission and presentation = 50%

Chapter Scheme and distribution of marks: (submission at end semester)
Chapter 1: Introduction – 10 marks
Chapter 2: Conceptual Framework and literature review – 25 marks
Chapter 3: Presentation, Analysis & Findings -- 25 marks
Chapter 4: Conclusion & Recommendations -- 10 marks
Chapter 5: Bibliography -- 05 marks

Project Report	Power Point Presentation & Viva
75 marks	25 marks

Components of a Project Report
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
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b) Conceptual Framework / National and International Scenario: (relating to the topic of the Project).
c) Presentation of Data, Analysis and Findings
d) Conclusion and Recommendations: In this section, the concluding observations based on the main findings and suggestions are to be provided.
5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexure: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

The Steps of a Project Report
Step I: Selection of the topic for the project by taking following points into consideration:
Suitability of the topic.
Relevance of the topic
Time available at the disposal.

Feasibility of data collection within the given time limit.
Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

Step II: Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
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Chapter 2: Methodology,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
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2) Student's declaration (Annexure-IB)
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No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.

INTEGRATIVE SEMINAR DURING THE INTERNSHIP

It serves to teach optometry students how the material in the curriculum relates to their role as optometrist. This will be achieved through a synthesis of lecture, clinical observation, case-based learning and small-group discussion. Once a week, the entire class will attend a one-hour lecture with topics reflective of the ongoing course material being presented in other courses. For two additional hours per week, small seminar group observation and discussion will take place. The seminar meetings will reinforce the lecture concepts through clinical observation and case discussions relating to those observations. Lecture and small-group discussions will include the participation of both basic and clinical science faculty in order to promote integration of the curricular material and to show how the care provided is related to what is currently being learned. This will enable the future clinician to make informed clinical decisions, encourage critical thinking and promote lifelong independent learning.

INTEGRATIVE SEMINAR

Is designed to facilitate the student's transition into clinical internship by using an integrative approach. The course builds upon past Integrative Seminars, providing the student with an environment leading to the development of informed clinical decision making, critical thinking and lifelong independent learning. The student gains a foundation for optometric practice by learning to employ scientific knowledge, utilization of informational resources, doctor-patient interactive skills and clinic participation to form the basis of an individualized patient evaluation, assessment and plan. This will be achieved through a synthesis of group teaching, case-based learning, small-group discussion and clinical experience. Group discussions will include the participation of both basic and clinical science faculty to foster integration of curricular material. As a means of entry into clinical practice, the highest standards of professional conduct and responsibility will be emphasized throughout the course.

The interns are required to complete one quarter of senior seminar.
The seminar meets over four hours each week to provide a small group-learning environment focused on clinical case presentations derived from the participants' clinical experience.
This grand-rounds format will provide a basis for integration and critical analysis of current clinical research with the goal of increasing the participants' understanding, use and communication of evidence-based clinical information.

DIETETICS & NUTRITION

Programme Structure

Course Code	Course Title	Lectures (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits (15)
DAN2151	Principles of Nutrition	3	-	-	3
DAN2251	Family Meal Management	3	-	-	3
DAN2351	Basic Dietetics	2	-	2	3
DAN2451	Advanced Dietetics	2	-	2	3
DAN2551	Community Nutrition	3	-	-	3
DAN2651	Food Chemistry	3	-	-	3
	TOTAL				**18**

DIETETICS & NUTRITION

Syllabus - Semester First

PRINCIPLES OF NUTRITION

Course Code: DAN2151 **Credit Units: 03**

Course Objective

This Course is designed to enable students

1. Understand the vital link between nutrition and health
2. Gain knowledge on functions, metabolism and effects of deficiency of nutrients

Course Contents:

Module -I

Nutrition - General introduction, Classification of nutrients, Functions of food, social function of food, psychological functions of food.

Energy - Definition of Kilocalories, Joule, energy value of foods, determination, physiological fuel values, SDA of foods, determination of energy requirements of body, basal metabolic rate determination, factors influencing BMR, Recommended Dietary Allowances for energy.

Carbohydrates - Classification, functions, source, digestion, absorption and utilization, dietary fiber and health.

Module -II

Protein - Classification, functions, sources and requirements, digestion, absorption and Utilization, Protein quality - Definition of biological value, NPU, digestibility coefficient, PER definition and measurement. Deficiency due to shortage of protein and energy – PCM, kwashiorkor. Reference protein, essential amino acids and mutual supplementation of dietary protein.

Fats and Lipids - Classification, functions, sources, requirement, digestion, absorption and utilization, importance of essential fatty acids, their requirements and deficiency.

Module -III

Vitamins – Fat soluble vitamins –A, D, E and K- functions, source, requirements, deficiency disorders. Water soluble vitamins –The B-complex vitamins – Thiamine, Riboflavin, Niacin, Folic acid, Biotin, Pantothenic acid and Vitamin C - functions, source, requirements and deficiency disorders.

Module -IV

Minerals - General functions in the body, classification- macro and micro minerals.

Micro minerals – Iron, Fluorine, Zinc, copper, Iodine -functions, absorption, utilization, requirements, deficiency and toxicity. Macro minerals – Calcium & phosphorus - functions, absorption, utilization, requirements, deficiency and toxicity.

Module -V

Water Balance – Functions of water, water distribution, maintenance of water and electrolyte balance, regulation of acid-base balance in the body.

Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References:

- Essential of food & Nutrition –Vol. 1 M. Swaminathan, Bappco, Bangalore.
- Human Nutrition and Dietetics –Davidson S. Passmore
- Normal and Therapeutic Nutrition- Corinne .H.Robinson & Marilyn Lawler
- Contemporary Nutrition - Gordon M. Wardlaw, Paul Insel et, al., (2000) Mosby, Chicago.
- Nutrition- concepts and controversies- Eleanor Whitney –Eighth Edition (2000)
- Basic principles of Nutrition- Seema Yadav, First edition (1997)
- Essentials of Nutrition and Diet therapy -Sue Rodwell Williams, fifth edition, Times Mirror Mosby College Publishing, 1990.
- Understanding Nutrition -Whitney P.N. and Roes S.R., West Publication Co, 1996

Syllabus - Semester Second

FAMILY MEAL MANAGEMENT

Course Code: DAN2251 **Credit Units: 03**

Course Objectives: To enable the students

1. Understand the nutritional demands in various stages of life cycle.
2. Acquire skills in planning adequate meals in different stages of life cycle.

Course Contents:

Module I

Basic Principles of Meal Planning - Basic meal pattern and its need to suit different income levels age and physiological stages. Recommended allowance-RDA for Indians, basis for requirement, energy allowance for different growth pattern of children, energy allowance for various activities.

Module II

Nutritional Needs during Pregnancy - Normal growth and weight change. Nutritional requirements, complications during various stages of pregnancy – hyper emesis gravid arum, preeclampsia and eclampsia and their management at family level.

Nutrition during Lactation - Function of breast, physiology of lactation, hormonal control and relaxation, Milk output and factors affecting it, frequency of nursing- supply and demand, nutritional components of colostrum and mature milk. Nutritional requirements of lactating women.

Module III

Nutrition during Infancy - Growth and development, factors influencing growth, Advantages of breast feeding, difference between breast feeding and bottle feeding, factors to be considered in bottle feeding. Different types of milk formulae.

Weaning Foods - Weaning foods and commercially prepared baby foods. Uses of growth chart to monitor growth & development. Nutritional requirements of infants' upto one year. Weaning foods developed by different organizations. Problems of feeding in normal and premature infants.

Module IV

Nutritional needs of pre-school children (1-5 year) - Nutritional and food requirements of preschool children. Factors to be considered while planning meals for pre-school children. Eating problems of children and their management, preparation of supplementary foods using available low cost foods.

Nutrition for School children - Nutritional requirement, meal planning for school children, dental caries and packed lunch.

Module-V

Nutrition during Adolescence - Physical Growth- changes and factors affecting height and weight, increments during menarche, Nutritional requirement. Nutritional problems in adolescence- Iron deficiency anemia, obesity , anorexia nervosa and bulimia nervosa.

Nutritional needs of adults (men and women) – Nutrition and work efficiency. Menopausal and post menopausal women, hormonal changes, nutritional requirement of the adult in relation to occupation.

Nutrition During Old Age - Physiological changes in ageing- psycho-social and economic factors affecting eating behavior. Nutritional problems of aged and their management.

Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References :

- Nutrition Trends in India -Vinodhini Reddy, Prahlad Rao, Govmth Sastry and Kashinath, NIN, Hyderabad, 1993.
- Modern Nutrition in Health and Diseases- Shills, E.M. Olson, A.J. and Shike, Lea and Febiger
- Dietetics -B. Srilakshmi, New Age International Pvt. Ltd, 2003.
- NutritionScience-B.Srilakshmi,NewAgeInternationalPvt.Ltd., 2003.
- Food,nutrition and diet therapy -Krause, Eleventh edition
- Human Nutrition and Dietetics- Davidson S Passmore R, Brock JP, ELBS and Churchill, Livingstone.
- Fundamentals of foods and Nutrition - Mudambi SR and Rajagopal M Y, Wiley Eastern Ltd.
- ICMR- Nutritive value of Indian Foods, 1989.
- Nutrition throughout the life cycle, Bonnie S.Worthinton, Roberts, Sue Rod well Williams., TheMcGraw- Hill company,1996.
- Nutrition in the life span- Virginia Beal, John Wiley & sons New York.

Syllabus - Semester Third

BASIC DIETETICS

Course Code: DAN2351 **Credit Units: 03**

Course Objectives:

- To understand the modifications in nutrients and dietary requirements for various diseases.
- To acquire the ability to plan and prepare diets for various diseases.

Course Contents:

Module I

1.Role of Dietician-hospital and community
2. Basic concepts in Diet Therapy
3. Therapeutic Adaptation of the normal diet
4. Routine Hospital Diets- Regular diet, light diet, soft diet, full liquid diet and tube feeding.
5. Modifications of Diet -Febrile conditions, infections & surgical conditions.

Module II

6. Diets of gastro intestinal disorders, renal diseases, liver diseases, obesity, cardio vascular disorders and diabetes mellitus.
7. Geriatrics - Role of diet.
8. Feeding infants & children - problems in feeding children in the hospital.
9. Feeding the patient - psychology of feeding the patient, assessment of patients needs.
10. Nutrition & Diet Clinics - Patients check up and dietary counseling, education of the patient and follow up.

Examination Scheme:

Components	**ATT**	**P**	**HA**	**CT**	**EE**
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Syllabus - Semester Fourth

ADVANCED DIETETICS

Course Code: DAN2451 **Credit Units: 03**

Course Objectives: To enable students

1. Gain knowledge about principles of diet therapy and different therapeutic diets.
2. Develop aptitude for taking up dietetics as a profession.

Course Contents:

Module-I

Objectives of diet therapy - Role of a dietitian. Principles of diet preparation and counselling.
Normal diet in the hospitals –regular diet, liquid ,semi liquid, light , soft diet, and bland diet.
Different types of Feeding - Basic concepts of oral feeding, tube feeding, IV feeding, gastrostomy feeding.

Module-II

Therapeutic diets for the following disorders:
a. Under weight - definition, etiology, treatment
b. Obesity - definition, etiology, treatment.
c. Diseases of the gastro intestinal tract-Peptic ulcer and duodenal ulcer, Dumping syndrome, constipation
d. Acute and chronic diarrhea -rehydration therapy.

Module-III

Diseases of the liver and gall bladder (risk factors and diet therapy)
a) jaundice b) hepatitis c) cirrhosis d) fatty liver and diet therapy
Diseases of the cardio vascular system (risk factors and diet therapy)
a) atherosclerosis b) arteriosclerosis c) hypertension d) congestive heart failure

Module-IV

Diabetes mellitus – causes, symptoms, bio-chemical changes, insulin, hypo- glycemic drugs, changes in the metabolism of carbohydrate, fat and protein, food exchange list, dietary management
Diseases of the kidney and urinary tract
a. Acute and chronic nephritis
b. Nephrotic syndrome
c. Renal failure
d. Urinary calculi
e. Uremia
Causes and dietary treatment of kidney diseases and dialysis.
Nutrition and cancer - Dietary guidelines for management.

Module-V

Diet in Allergy - Definition, classification, common food allergy, test of allergy, diet therapy. Pre operative and post operative diets.
Diet in febrile conditions - Short duration e.g. Typhoid, Long duration e.g. Tuberculosis. Dietetic management of gout and phenyl ketonuria.
Diet in relation to deficiency diseases-Protein calorie deficiency, vitamin A deficiency and anemia.

Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References:

- Krause and Mahan – Food ,Nutrition and Diet therapy, 6th Edition W.B. Saunders company, London
- Normal and therapeutic nutrition –17th Edition, Robinson et. al ., Mac Millan Pub.Co., New York
- ICMR(1989) Nutrient Requirements and recommended dietary allowances for Indians.
- Antia FP (1987) Clinical Dietetics and Nutriton, Oxford University Press, New Delhi
- Srilakshmi (2002) Dietetics, IVth Edition. New Age International (P) Limited, Publishers, New Delhi
- Shubhangini. A. Joshi (2002) Nutrition and dietetics, Tata Mc Graw- Hill publishing company limited, New Delhi.
- B. Srilakshmi (2002) Nutrition science, New age international (P) limited, New Delhi
- Carolynn E.Town send and Ruth A. Roth (2002) Nutrition and Diet Therapy, Delmar
- publisher
- Sue rod Williams, Nutrition and diet Therapy, Times Mirror Mosby College
- publishing, Boston, 1989.
- The Indian journal of nutrition and dietetics, Avinashilingam Deemed University, Coimbatore

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Syllabus - Semester Fifth

COMMUNITY NUTRITION

Course Code: DAN2551 **Credit Units: 03**

Course Objectives: To enable the students

1. Know about the application of basics of nutrition in the community
2. Gain knowledge of community nutrition programmes of national and international organization

Course Contents :

Module-I

Definition - Community, family, village and block

Meaning of Optimum Nutrition, Malnutrition- Under nutrition and over nutrition..

Characteristics of community- Demography, Vital statistics, IMR, MMR, morbidity. Causes of **malnutrition**-Factors contributing to malnutrition in the community - food habits, customs and practices, availability of food, Socio-economic factors, Housing and hygienic conditions, population explosion.

Module-II

Assessment of the nutritional status of the community -direct and indirect methods - Anthropometry, Clinical and Biochemical, Diet Surveys.

Nutritional problems of women and men- Anemia, Vitamin A deficiency, B-complex deficiency.

Nutritional problems of infants and children- PEM-Marasmus and Kwashiorkor, Vitamin A deficiency, B-complex deficiency diseases, anemia-incidence, prevalence, epidemiology and prevention , other problems- Goitre, fluorosis and Lathyrism- prevalence, causes and symptoms and programmes to control.

Module-III

Nutrition intervention programmes - ICDS: Objectives and services, Noon meal programme, TINP, SNP, Vitamin A prophylaxis.

National Organization- Role of ICMR, NIN, NNMB & ICAR

International organization- WHO, FAO , UNICEF, DANIDA & World Bank.

Module-IV

Home Science- Meaning and Objectives. Role of Home-Scientists in rural development-with reference to ongoing programmers like Family Welfare Programme, Adult Education for community-different methods, advantages and disadvantages. Nutrition education- merits and demerits of different methods, Concept of nutrition garden.

Module-V

Communication- Principles, methods and classification. Advantages and limitations of different methods.

Audio-visual aids- Types, advantages and limitations.

Health care- delivery, challenges & strategies. Set up of PHC, school health services and employees state insurance.

Examination Scheme:

Components	ATT	P	HA	CT	EE
Weightage (%)	5	5	5	15	70

(ATT-Attendance; P-Project; HA-Home Assignment; CT-Class Test; EE-End Semester Examination)

Text and References:

- Jellife DN, Assessment of Nutritional Status of the community.
- Ritchie JA, Teaching Nutrition FAO, 1979.
- Rajalakshmi R, Applied Nutrition, Oxford and JBH Publishers, 1981.
- Devadas RF, Nutrition in Tamil Nadu, Sanfam Publishers, Madras, 1972.
- Mc.Laren S, Nutrition and the community, John Wiley & Sons, 1982.
- Reddy AA, Extension Education, Srilakshmi Press, Baptla, 1971.
- Dahama OP and Bhatnagar OP Eucation and Communication for development.Oxford IBH Publishing Co.,1980.
- Savile AH, Extension in rural communities, Oxford University Press,1965.
- Nutrition Science, Srilakshmi (2001).
- Nutritional problem in India-PK Shukla,Prentice Hall, India.
- Foundations of community Health Education, Mc Graw Hill,London.

Syllabus - Semester Sixth

FOOD CHEMISTRY

Course Code: DAN2651 **Credit Units: 03**

Course Contents:

Module-I

Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting , broiling, cooking under pressure. Stages of sugar cookery, crystallization and factors affecting crystallization.

Module-II

Cereals - Structure, composition of rice, wheat, effects of cooking on parboiled and raw rice, principles of starch cookery, gelatinization, flours-types, formation of dough and batter

Pulses and Legumes – Varieties of pulses & legumes, composition, nutritive value, cooking quality of pulses, germination and its effect.

Module III

Vegetables - Classification, composition, nutritive value, selection and preparation for cooking

Fruits - Classification, composition, nutritive value, changes during ripening, methods and effects of cooking, enzymatic browning

Module IV

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and milk powder.

Module V

Egg - Structure, composition, selection, nutritive value, uses of egg in cookery

Fleshy foods - meat structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, methods of cooking meat

a)Poultry – types, composition, nutritive value, selection

b)Fish - Structure, composition, nutritive value selection of fish

Module VI

Fats and Oils - Types of oils, function of fats and oils, shortening effects of oil, smoking point of oil

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Texts & References:

- Food Science, Chemistry and Experimental Foods by M. Swaminathan.
- Food Science by Norman.N.Potter.
- Experimental Study of Foods by Griswold R.M.
- Food Science by Helen Charley.
- Foundation of Food Preparation by A.G. Peckam.
- Modern Cookery for teaching and trade, volume I&II ,Thangam Philip. OrientLongmans Ltd.
- Food Fundamentals by MacWiliams, John Willy and son's, New York.
- Food Facts & Principles by Shakunthala manay & Shadakhraswamy.
- Food Science by Srilakshmi , second edition,2002.

Amity Medical School

Executive-Master of Hospital Administration
(Working Professionals) Three-Year Part-Time

Programme Structure

Curriculum & Scheme of Examinations

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

MANAGEMENT PROCESS & ORGANIZATIONAL BAHAVIOUR

Course Code: HAP4101 **Credit Units: 03**

Course Objective: To provide the student understand Human Behaviour in organizations so as to improve his managerial effectiveness. The subject encompasses management principles, functions and processes, discussing their significance and role in effective and efficient management of health care organizations.

Course Contents:

Module-I: Features of Management
Growing significance of management in organizations; Evolution of Management Thought- Frederic Taylor's scientific Management, Henry Fayol's principles of management, concept of bureaucracy, Behavioral approach, Systems theory of organization, Contingency Theory of organization, Management by Objectives (MBO).

Module-II: Management Functions
Management process and functions - Planning, Organizing, Staffing, Directing, Coordinating and Controlling

Module-III: Organization Concepts and Processes
Nature and structure of organization, Types of organizations, Line and Staff Relationships; Decision-Making Process, Leadership

Module-IV: Behavioral Concepts and Theories
Cognitive process, Perception process and its stages, Creativity and problem solving; Motivation process, Conflict management, Team building, Concepts of organization Behavior, Personality development, transactional analysis, Management ethics, Corporate Social Responsibility

Examination Scheme

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text and References

- Koontz 'O' Donnel and Weirch: *Management* (Tokyo,McGraw Hill).
- Last and Tenscnzing: *Organisation and Mangement*(New York: McGraw Hill 1980).
- Peter F.Drucker: *The Practice of Management* (Bombay:Allied Publishing Co., 1989).
- Fred Luthans. *Organisational behavior*, McGraw Hill Co., Tokyo.
- Keith Davis. *Human Behavior at Work*, Tata McGraw Hill, New Delhi.
- Abraham K.Karmam. *Organizational Behavior*, Prentice Hall, New Delhi.
- StephinP.Robbins. *Organisational Behavior*, Prentice Hall New Delhi

HOSPITAL AS AN ORGANIZATION

Course Code: HAP4102 **Credit Units: 03**

Course Objective:
To help the students gain understanding of the functions and responsibilities of the manager This subject focuses on acquainting the student with the principles and practices essential for managing a hospital.

Course Contents:

Module-I: Hospital as an Organization
History and development of hospitals, Definition, types, control, role and functions, Hospitals in India-today their number, types, size, distribution, ownership, hospitals utilization, issues & trends, characteristics of a modern hospital.

Module-II: Hospital Administration
Roles and functions of Hospital Administration, profile of Hospital Administrator, role of HA in education and research.

Module-III: Unique features of Hospital Management
Hospital as an organization, Characteristics of a Modern Hospital, Growing significance of management in Hospitals, Application of managerial functions to health care organizations, Hospitals and Social responsibility

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text &References:

- McGibbony, *Hospital Organization & Management.*
- *Hospital administration & management Theory* and Practice R Kumar, S.L. Goel

DEMOGRAPHY

Course Code: HAP4103 **Credit Units: 03**

Course Objective:
To present students some basic techniques and concepts in population sciences

Course Contents

Module-I: Population Fundamentals
Science of demography, Demographic cycle, Population trends and demographic indicators, Demography and Family Planning and its role in population policy of India

Module-II: Demographic Studies
- Fundamentals of population studies and its links with health.
- Methods of demographic data collection, sources of data, population census, population composition, world population growth, growth of Indian population, morbidity, mortality, ageing, migration/ urbanization, population projections life tables.

Module-III: Family Planning
Fertility and fertility factors, Family planning, Population policies & programmes and National Population Policy.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts& References:

- AshaBhende and Tara Kanitkar. *Principles of population Studies*, Himalaya Pub Houses,
- John Weeks, *Population*, Wordsworth pub, 1994.
- S.N.Singh, M.K.Premi, P.S.Bhatia. *Population Transition In India*, B. R. Publishing Corporation.
- P.B. Desai. *Population in the context of India's development*, UGC – UNFPA project.
- Peter Cox. *Demography*, Cambridge University Press
- K.B. Pathak, F. Ram. *Techniques of Demographic Analysis*, Himalaya Publishing Houses.
- *Health Monitor*, Foundation for Research in Health S.
- International Institute for Population Sciences. *National Family Health Survey – 1, 2 and 3*, Mumbai.
- K. Srinivasan. *Basic Graphic Techniques and Applications*, Sage Publications, 1998

MARKETING MANAGEMENT

Course Code: HAP4104 **Credit Units: 03**

Course Objective:
The objective of this course is to provide the students exposure to modern marketing concepts, tools, and techniques, and help them develop abilities and skills required for the performance of marketing functions.

Course Contents:

Module-I: Understanding Marketing in New Perspective
Fundamentals of Marketing, Customer Value and Satisfaction, Customer Delight, Conceptualizing Tasks and Philosophies of Marketing Management, Value Chain, Scanning the Marketing Environment, Marketing Mix Elements, Relationship marketing, Social marketing, Strategic Planning in marketing, formulating the marketing plan.

Module-II: Analyzing Consumers & Selecting Markets
The factors influencing consumer behavior, Buying process, Buying decision making process, Market Segmentations, Tool for Competitive Differentiation, Developing a Positioning Strategy.

Module-III: Managing Product & Pricing Strategies
Classification of products, New Product development, Adoption process, Product mix decisions and line management, Brand management, Product life cycle, Setting & adapting the price, initiating and responding the price changes.

Module-IV: Designing: Managing the Integrated Communication
Channel - functions and flows, its design decisions, its management decisions, its dynamics, vertical horizontal & multi-channel marketing systems, Market Logistic decisions; Integrated Marketing Communication, Marketing Communication Process, Promotion mix, Advertising, Personal Selling, Sales Promotion, Publicity & Public Relations, Direct Marketing.

Module-V: Emerging Trends in Marketing
An Introduction to Internet Marketing, Multi-Level Marketing, E-Marketing, Green Marketing, Event Marketing, Types of Events, Sponsorship, Marketing for Non Profit Organizations, Marketing Strategies for Leaders, Challenges, Followers and Nichers

Examination Scheme

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Kotler, Keller, Koshy, Jha, (2008), Marketing Management– A South Asian Perspective, Pearson India Pvt.
- Kurtz, (2008) Principles of Marketing, Cengage Learning, India,
- S. Neelamegham, (2009), Marketing In India,Vikas publishing house,
- Biplo Bose, (2008), Marketing Management, Himalaya Publishing House.
- Paul Baines, Chris Fill, Kelly Page, (2009), Marketing, Oxford University Press

- Winner (2009), Marketing Management, Pearson India Pvt.
- William L. Pride and O.C. Ferrell, (1993) Marketing Concepts and Strategies, Boston, Houghton Mifflin.
- Czinkota and Kotabe, (2007) Marketing Management, Cengage Learning, India
- Evans, (2008), Marketing Management, CengageLearning,India
- RajanSaxena, (2010) , Marketing Management,Tata McGraw Hill

INFORMATION TECHNOLOGY FOR MANAGERS

Course Code: HAP4105 **Credit Units: 03**

Course Objective: This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. It will also expose the students to the latest trends in computer.

Course Contents:

Module-I: Modern Computer Systems
Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation, Computer Controlled Biometric/RFID based Access Control, Contemporary hardware and software platforms

Module-II: Data Resource Management
Introduction & types of DBMS and its application, SQL Query handling, Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers, Storage Technologies and Architecture, Storage strategies of various multinational companies.

Module-III: Telecommunications and Computer Networks
Networked Enterprise- Components, Types, and Advantages; Intranet and Extranet, GSM & CDMA, GPRS ,3G & 4G technologies, E-governance

Module-IV: Electronic Commerce Systems
Introduction to e-Commerce and M-Commerce. Concept of B2B, B2C, C2C, Concept of Internet Banking and Online Shopping, Electronic Payment Systems. Development of e-commerce store.

Module-V: Security Management
The Information Security, System Vulnerability and Abuse, Security Threats and counter measure, Cyber Crime and its types, Antivirus, Firewalls, Anti-Spyware, Security Audit, Overview of IT-ACT 2000.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Text &References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons
- Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Jawadekar, WS (2009); Management Information System; Tata McGraw Hill
- Mclead R & Schell G (2009), Management Information Systems; Pearson Prentice Hall
- O'Brein, JA (2009); Introduction to Information Systems; Tata McGraw Hill

Syllabus - Second Semester

HUMAN RESOURCE MANAGEMENT

Course Code: HAP4201 **Credit Units: 03**

Course Objective:
To help students develop an understanding of the dimensions of management of human resources, with particular reference to HRM policies and practices in India. Attention will also be paid to help them develop their communication and decision making skills through case discussions, role plays etc.

Course Contents:

Module-I: Introduction to Human Resource Management
Nature and scope of HRM, HRM functions, Role and Responsibilities of the HR Manager , HRM models, understanding concepts of personnel management, Strategic HR Management, HR Environment , changing Role of HR

Module-II: Meeting Human Resource Requirements
Job Analysis, Job Description, Job specification, Strategic Human Resource Planning, Recruitment, Selection Process, Methods – Interview, Tests, Induction and Placement, Promotion and Transfer

Module-III: Development of Human Resources and Managing Compensation
Training and Development, Managing Careers, Understanding Performance Appraisal, Compensation, Components of compensation, Job evaluation, methods of job evaluation, Designing and administration of wage and salary structure

Module-IV: Separation Processes
Turnover, Retirement, Layoff, Retrenchment and Discharge, VRS

Module-V: Emerging Trends and Challenges in HRM
Overview of Human Resource Information System (HRIS), Introduction to HR Audit, IHRM Practices, Cross- Cultural and Diversity Management, Work-life integration, Human Resource Outsourcing

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Snell S and Bohlander G (2007). Human Resource Management, Cengage Learning (Thomson Learning).
- Aswathappa. K, (2005),Human Resource Management- Text & Cases, Tata McGraw Hill, New Delhi
- Dessler G (2005).Human Resource Management Pearson Education, India
- Mathis R L and Jackson J H (2006). Human Resource Management, Cengage Learning (Thomson Learning).

HOSPITAL PLANNING

Course Code: HAP4202 **Credit Units: 03**

Course Objective
To expose the students to planning and operation of hospitals in a detailed manner which will include all facets of hospital planning activities covering every department that is involved both in clinical care as well as supportive services.

Course Contents

Module-I: Introduction to Hospital Planning
Conception of idea, formation of hospital planning team, market survey, feasibility study, selection of location, Financial planning of hospitals, Macro level planning, Conception to commissioning- site development, architects brief working drawings and specifications, engineering drawing, equipment planning, bed distribution, space allocation, interior designing and construction of building - commissioning, shake down period

Module-II: Planning for Medical and Ancillary services
Out-patient services, Emergency services, Day care services, Inpatient services and Intensive Care Units (ICU), Surgical suites, Labor and delivery suites-LDRP suites and Physical Therapy department.

Module-III: Planning for Supportive Services
Admitting department, Medical Records department, Laboratory services, blood banking & Radiological services, Pharmacy & Medical store, Medical gas system, HVAC, CSSD, Food & Beverages and Laundry & linen services.

Module-IV: Planning for Advanced facilities
Cardiac catheterization laboratory, various endoscopy units, Radiotherapy unit, IVF unit and Dialysis unit.

Module-V: Recent Advances in Hospital Planning
Green Hospitals, Energy efficiency in hospitals, Robotics in Hospitals and Geriatric Care

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Modern Trends in Planning & Designing of Hospitals: Principles and Practice*: Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar, SidharthSatpathy, by Jaypee – 2007
- *Hospitals: Facilities Planning and Management*, GD Kunders by Tata Mcgraw Hill
- *Hospital Planning*: Charles Butler, Addison Erdman
- Dr Malhotra's series: *Step by Step – Hospital designing & Planning*, by Jaypee 2007

EPIDEMIOLOGY

Course Code: HAP4203 **Credit Units: 03**

Course Objective:
To provide an introduction to the basic concepts and methods of epidemiology and to highlight inter-relationship between epidemiology and medicine to understand evidence based medicine.

Course Contents:

Module-I: Introduction
Concepts and uses of epidemiology, Components of epidemiological studies – frequency distribution and determinants of diseases, Methods to measure and describe health of population, epidemiological triad.

Module-II: Descriptive epidemiology
Natural history of disease, Disease spectrum, Methods of transmission, epidemiological principles in prevention and control of disease, levels of prevention.

Module-III: Measurement Methods
Measurement of morbidity and mortality, incidence, prevalence, age adjustment, standardization and Risk Measurement.

Module-IV: Study designs Basics
- Epidemiological study designs and analysis, its application and use in the community.
- Sampling & Survey methods, Case control and Cohort methods.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts& References:

- Gordis Leon *Epidemiology* (3rd edition) ,W B Saunders and Co.
- Beaglehole. R. Bonita, et. al *Basic Epidemiology* : WHO Publication
- David E., et. al. *Foundations of Epidemiology* : Oxford University Press.
- Katz Mitchell: *Study Design and Statistical Analysis*: A Practical Guide for Clinicians
- Last, J.M., Spasoff, R.A. Harris, S. S. and Thuriaux, M.C. (Eds): *A Dictionary of Epidemiology*, Oxford University Press, 4th Ed., 2001.
- Mayer Dan, *Essential Evidence-Based Medicine Series: Essential Medical Texts for Students and Trainees*
- Silman and McFarland: *Epidemiological Studies- A Practical Guide,* 2nd Edition
- Timmreck Thomas C: *An Introduction to Epidemiology*, Third Edition 2002.

BIOSTATISTICS

Course Code: HAP4204 **Credit Units: 3**

Course Objective: The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the Hospital environment.

Course Contents:

Module-I: Introduction
Classification of data, Source of data, data organization Method of scaling - nominal, ordinal, ratio and interval scale, building composite scales, measuring reliability and validity of scales.

Module-II: Properties of measurement & Probability distributions
Measurement of central tendency, measurement of dispersion – Range, Mean deviation & Standard deviation; Concepts of probability, Probability distributions - Binomial, Poisson &Normal Distribution.

Module-III: Sampling and Testing Hypothesis
Sampling methods, Sampling Errors; Sampling distribution, Hypothesis Testing to compare two populations – Student's T-test, Interpretation of computer output of ANOVA, Chi – Square Test, F-test.

Module-IV: Forecasting and Statistical Techniques
Correlation-Karl Person, Spearman's Rank methods, Regression Analysis, least squares method, coefficient of determination, Time Series Analysis, Statistical procedures-descriptive, univariate, bivariate and multivariate statistics.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- P.S.S. SundarRao. *An Introduction to Biostatistics: A manual for students in Health Sciences*, J.Richard Prentice Hall, 1996.
- B.K. Mahajan. *Methods in Biostatistics*, Jaypee Brothers
- Daniel, Wayne.W. *Bio-Statistics: A foundation for Analysis in the Health Sciences*, John Wiley and Sons Pub, 1991.
- K. VishwasRao. *Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology*, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. *Bio-Statistics perspective in Health care research and practice*, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), *Handbook of Statistics*, Elsevier Science Pub, 1988.

ESSENTIALS OF HEALTHCARE SYSTEM

Course Code: HAP4205 **Credit Units: 03**

Course Objective: To provide the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Course Contents:

Module-I: Health and Development
Concept of Health, illness, sickness and disease; Public health Indicators, Health and its determinants, Disease Burden in terms of DALY, Social context of Health – Culture, health belief model and social issues affecting health like urbanization etc; Gender and health, Nutrition and Health, Nutritional Transition.

Module-II: Healthcare Systems
Evolution of Health Planning in India, Concept and Elements of Primary Health Care, Rural Healthcare system in India – Structure & Current Scenario, Indian Public Health Standards, Organization and Management of Public Healthcare System, Issues in healthcare delivery system,

Module-III: Health Policies and Schemes
Millennium development goals, National Health Policy, Integrated Child Development Scheme, Health Sector Reforms, Five year Plans, Reproductive and Child Health Programme, Universal Immunization Coverage, National Health Mission and National Urban Health Mission.

Module-IV: NRHM
Goals & Strategies of NRHM, expected outcomes and its various components like Accredited Social Health Activists, Mobile Meidcal Units, JananiSurkshaYojna, JSSK, Village Health & Sanitation Committee, RogiKalyanSamiti etc.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- K Park, *Preventive and Social Medicine*, Bansaridas Bhanot Publishing House.
- Brijesh C Purohit. *Health Care System in India*: *Towards Measuring Efficiency in Delivery of Services*.
- Maxcy-Rosenau-Last, *Public Health & Preventive Medicine*, 14th Edition Ed Robert Wallace.

Syllabus - Third Semester

FINANCIAL MANAGEMENT

Course Code: HAP4301 **Credit Units: 03**

Course Objective: To develop an understanding of short-term and long-term financial decisions of a firm and various financial tools used in taking these decisions. It is also aimed to develop the understanding of the financial environment in which a company operates and how it copes with it.

Course Contents:

Module-I: Introduction

A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm.

Module-II: Valuation Concepts

Time Value of Money, Risk and Return, Financial and Operating Leverage.

Module-III: Financing Decisions

Capital Structure and Cost of Capital**,** Marginal Cost of Capital.

Module-IV: Capital Budgeting

Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction.

Module-V: Working Capital Management

Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of Working Capital.

Module-VI: Dividend Policy Decisions

An introduction**:** Different Schools of Thought on Dividend Policy.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Financial Management for Hospital Administration, Kulkarni, GR, Jaypee Brother Medical Publications.
- Chandra, P. (2006), Financial Management: Theory and Practice, Tata McGraw Hill.
- Van Horne, J.C. (2006), Financial Management and Policy, Prentice Hall of India.
- Brearly R A and Myers, S. C. (2006), Principles of Corporate Finance, Tata McGraw Hill
- Rustagi, R.P. (1999), Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.
- Pandey, I.M. (1999), Financial Management, Vikas Publishing House

RESEARCH METHODOLOGY

Course Code: HAP4302 **Credit Units: 03**

Course Objectives:
- To provide basic understanding towards research principles and methods.
- To introduce important analytical tools for research data analysis.
- To assist in the development of research proposals/reports.

Course Contents:

Module-I: Basics of Research
Definitions & uses of research in healthcare, Research Process, Research Variables, Scales of Measurement, Formulation of research problem, Development of conceptual framework.

Module-II: Sampling & Research Designs
Sampling, Sampling Procedure, Types of Sampling Techniques, Sample size determination, reliability & validity in research, Research Designs.

Module-III: Review of Literature & Hypothesis
Review of literature, Hypothesis- Meaning and types of hypothesis, Hypothesis testing, Type I & Type II errors in hypothesis testing.

Module-IV: Data Collection
Types of Data, Different methods of data collection, Data Management: editing, entry and preparing data sets for analysis; Design and development of questionnaire.

Module-V: Research Reports
Structure and Components of Research Report, Types of Reports, Layout of Research Report, Method of writing a research report.

Module-VI: Research Ethics & Reference Writing
History of ethics in health research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent, Styles of reference writing.

Examination Scheme:

Components	**CPA**	**TP**	**Q/S**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	5	10	70

Text & References:

- Gummersson, E. *Qualitative methods in Management Research*, Sage publications
- Verkevieser et al, *Designing and conducting Health Systems Research Projects* WHO and IDRC
- Grundy F and Reinke W A, *Health Practice Research and formalize Managerial Methods*, Geneva, WHO
- *Designing and conducting Health surveys*, Jossey Bass Publishers.

HEALTH ECONOMICS

Course Code: HAP4303 **Credit Units: 03**

Course Objective:
To provide a clear, concise introduction to micro and macro economic concepts and their applications in Healthcare

Course Contents:

Module-I: Nature and scope of Economics
Fundamental Concepts – Scarcity & Choice, Macroeconomics & Microeconomics, Economic Agents – Consumer, Producer & government, Market – Free market mechanism and chained Market Mechanism.

Module-II: Demand and Supply Market
Law of Demand, Shift in Demand Curve, Law of Supply, Shift in Supply curve, Market Equilibrium, Concept of elasticity – Price elasticity of Demand & Supply.

Module-III: Healthcare Market
- Market Failure: Imperfect competition, Risk & uncertainty, Moral Hazard, Adverse selection, Externalities, Public Good, Asymmetric Information and concern of Equity. Market of unqualified medical care providers.
- Demand for Healthcare: Need, Want & demand, Healthcare as an investment, Determinants of demand – Price factors (opportunity cost), Patient factors & Physician factors – Supplier Induced Demand; Insurance and demand for healthcare.

Module-IV: Costs
Classification of costs on the basis of traceability, cost behavior, controllability and selection among alternatives; Total, Average and Marginal costs.

Module-V: Health Expenditure
Public Expenditure on Health, Expenditure and Allocations under Five-Year Plans, its SWOT analysis, National Health Accounts.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Ceri J Phillips. *Health Economics- An introduction for health professionals*, Blackwell publishing.
- Clewer Ann and D Perkins. *Economics for healthcare management*, Prentice Hall.
- Folland S, A.C. Goodman, and M. Stano, *The economics of health & Healthcare*, Prentice Hall
- *Principles of Health Economics for developing countries*, The World bank.

MEDICAL & HEALTH LAWS

Course Code: HAP4304 **Credit Units: 03**

Course Objectives:
- To acquaint the students with various legal aspects concerning type and character of the health care organizations and its duties towards patients and its employees.
- To familiarize the students in matters of liability of hospital medical negligence and medical malpractice in diagnosis, administration of drugs, surgery etc.

Course Contents:

Module-I: Hospitals as an Industry
Law pertaining to establishment of hospitals & legal requirements under Medical Council Acts, Basic concepts of labour laws in India, application of labour enactments, Discipline in hospitals and Trade union act, Hospital's duties towards Patients, Essentials of Contractual obligations in hospital services, Rights of patients and Code of ethics.

Module-II: Acts pertaining to Hospitals
Legal aspects relating to Organ transplantation, MTP Act 1971, Basics of Drugs and Cosmetic Acts, Euthanasia. ESI Act, PNDT Act, Human experimentation, Clinical trials, Industrial dispute Act, Central Births & Death Registration Act.

Module-III: Legal liabilities of Hospitals
Legal liability of hospitals - criminal, civil and tortuous; Absolute liability and vicarious liability, Medical negligence, Legal remedies available to patients under contract law, tort, criminal law, Consumer protection Act and Medical Jurisprudence.

Module-IV: Medical ethics and Auditory procedures
- Autopsy, Use of investigational drugs, Introduction/need & procedures for medical audit, Audit administration &Regulating committees.
- Confidentiality and professional secrecy, informed consent,
- Medical ethics – basic issues, importance, process of developing and implementing ethics and values in an institution – codes of conduct: Hippocrates oath and declaration of Geneva – MCI regulation – professional conduct.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- *Medico-legal Aspects of Patient Care*, 3rdEdition, R. C. Sharma, Peepee Publishers & Distributers-2008

HOSPITAL MATERIALS MANAGEMENT

Course Code: HAP4305 **Credit Units: 03**

Course Objective: To make student conversed with Purchase management and Inventory control as the Hospitals carry a large inventory of drugs, sophisticated and highly costly equipment besides beds, furniture and linen.

Course Contents:

Module-I: Introduction to Hospital Material and Store Management
Definition, scope, importance and principles of materials management; Material Cycle; Material Codification - advantages and types, Functioning and types of Stores, lay-out planning and design of hospital stores, duties of officer in-charge & storekeeper, preservation of stores, documentation & evaluation of stores, role of IT in hospital stores management.

Module-II: Purchase Management
Objectives and elements of good purchasing system, Procurement procedure, Tendering system, modes of tenders, Purchase order and its types, types of purchasing systems.

Module-III: Inventory Management
Inventory control, Basic inventory model, Lead time, Buffer stock, Re-order level, Economic order quantity (EOQ), Inventory control costs – Purchase cost, shortage cost, inventory carrying cost & inventory acquisition cost; Inventory ordering systems; Inventory control Techniques- ABC, VED, SDE, SAP, FSN, HML, XYZ, SOS, GOLF, MUSIC.

Module-IV: Stock Verification, Condemnation and disposal
Process and need for stock verification, Techniques of verification, Pilferage, Stock distribution methods, criteria and procedure of stock condemnation and disposal.

Module-V: Equipment Management
Classification of Hospital equipments, Planning and selection of equipments, factors affecting utilization of equipments, equipment failure, equipment maintenance and Equipment audit.

Module-VI: Legal aspects
Role and functions of DGS&D, Registration and blacklisting of firms, Law of contract, Letter of credit & its types, Import & export policy & pricing of goods.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts & References:

- *Hospital Stores Management- An Integrated Approach,* by Dr. Gupta Shakti, JaypeeBrothers.
- *Material Management* by Dr. PawanArora, Global India Publication Pvt Ltd
- *Handbook of Materials Management*, P. Gopalkrishnan, EasternEconomy Edition
- *Procurement and Materials management for Hospitals,* Rex H Gregor, Harold C. Mickey

Syllabus - Fourth Semester

OPERATIONS RESEARCH

Course Code: HAP4401 **Credit Units: 03**

Course Objectives:
- To provide basic OR approach to problem solving.
- To introduce important analytical tools for managerial decision making.
- To introduce concepts of resource allocation & health service planning.

Course Contents:

Module-I: Introduction
The OR approach to problem-solving and decision-making, Scope and limitations of OR in managerial decision-making.

Module-II: Introduction to OR Techniques
Linear Programming, Decision Tree Analysis, Queuing theory, PERT/CPM

Module-III: OR Models
Replacement models, Sensitivity analysis, Assignment models, Inventory control models, Forecasting.

Module-IV: Applications of OR in Hospitals and Health Agencies
Resource allocation, Health services planning, Deployment of health human power, Materials Management, Equipment replacement, Patient scheduling.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- *Operations Research in Hospitals: Diagnosis and Prognosis*, David H. Stimson, Ruth H. Stimson
- *Operations Research and Healthcare: A handbook of methods and Applications*, Margaret L. Brandeau, Francois Sainfort, William P. Pierskalla
- *Patients hospitals and Operational Research*, Taylor Francis
- *Operations Research* by P. Rama Murthy
- *Operations Research: Methods, Models and Applications*, Jay E, Aronson and Stanley Zionts

QUALITY MANAGEMENT

Course Code: HAP4402 **Credit Units: 03**

Course Objective: To understand the concept of quality and its application in healthcare& hospitals.

Course Contents:

Module-I: Basics of Quality Management
Definitions, principles of quality, benefits of quality management, dimensions of quality in primary healthcare and various quality frameworks

Module-II: Quality Improvement Approaches
- Quality Assurance cycle and developing standards.
- TQM Quality Gurus: Deming, Juranand Crosby principles.
- Benchmarking: Principles, types and process of benchmarking
- Medical Audit: Clinical Audit, its methodology and related statistics.

Module-III: Quality Improvement Tools and techniques:
- Tools: Brainstorming, Cause effect Analysis, Flow chart, Pareto Analysis, etc
- Lean Management: Lean principles and its tools - 5 S technique, 3 M technique, Kaizen's theory, Jidoka & Andon, Throughput & Takt Time.
- Six Sigma Methodology and its applications:

Module-IV: Accreditation
Benefits of Hospital Accreditation, Quality Council of India (QCI), National Accreditation Board for Hospitals & Healthcare Providers (NABH) – accreditation procedure, assessment criteria and its standards; and Joint Commission International (JCI)

Module-V: Cost and Quality
Prevention cost, Appraisal Cost, Internal & External failure costs, Net & Total cost of quality.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- *Quality Management in Hospitals* by S. K. Joshi
- *Total Quality Management* – Aswathappa – Himalaya Books House
- *Quality Management* – P. C. Tripathy
- *Hospital Quality Assurance: Risk Management & Program evaluation*, Jesus J. Pena
- Donald E. Lighter and Douglas C Fair: *Quality Management in Health Care – Principles and Methods*, Jones and Bartlett publishers, second edition.
- Daigh RD. *Financial implications of a quality improvement process.*

MANAGEMENT OF CLINICAL SERVICES

Course Code: HAP4403 **Credit Units: 03**

Course Objectives:

- To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of clinical services in a hospital.
- To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:

Module-I: Hospital as a system

Concept of patient care, Role of Hospital Administration towards the patient and towards the Hospital, Patient safety and patient risk management.

Module-II: Out-Patient & Inpatient Department

- Organization & management of OPD: Overview of the department, its functions, location and physical facilities, Daycare services; Auxiliary, Ancillary & Domiciliary facilities in the OPD.
- Organization & management of IPD: Overview of department, its functions, Ward design (general & specialized), Nursing Administration, Isolation unit, Janitor's closet.
- Assessment of IPD in terms of Patient Days, Bed Utilization Rate, Ward Occupancy, and Average length of stay.

Module-III: Accident and Emergency Services

Organization & management of department, Physical facilities and Manpower planning, Triaging, Centralized Accident & Trauma services (CATS) and Observation unit.

Module-IV: Operation Theatres& Intensive Care Units

- Organization & Management of OT complex, Pre-op & Post-op area, Zoning, ventilation & lighting, Modular systems, Methods of fumigation and OT scheduling.
- Organization & Management of ICUs, Types of ICUs, Staffing in ICUs, Specialized ICUs – ICCU, NICU, PICU etc, and Critical care scoring

Module-V: Specialty Services

Rehabilitation unit, Nuclear Medicine department, Burns Unit, Obstetrics & gynecology unit, Pediatric unit, Transplantation Unit etc.

Module-VI: Other Hospital Functional Activities

Biomedical Waste Management: segregation, collection, transportation & disposal, Nosocomial Infections & its control, Patient safety

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts & References:

- *Principles of Hospital Administration and Planning,* Shakharkar B.M.
- *Modern trends in Planning and designing of Hospitals: Principles and Practice:* Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar.
- *Management of Hospitals & Health services*: Strategic issues and performance, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*
- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century*Vol 1 Kumar R, S.L. Goel
- *Hospital Management, Dr. A.K. Malhotra,* Global India Publications Pvt ltd, New Delhi
- *Hospital Management : A guide to departments,* Howard S. Roland, Beatrice L Rowland

MANAGEMENT OF SUPPORT & UTILITY SERVICES

Course Code: HAP4404 **Credit Units: 03**

Course Objectives:

- To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of non-clinical services in a hospital.
- To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:

Module-I: Support Services-I

- Radiology & Imaging Services: Organization & management of department, Turn-around time assessment, Radiation Hazards and its preventive measures.
- Hospital Laboratory: Its functional components, Lab hazards, quality assessment, NABL
- Blood Bank & Transfusion Services: Blood donation, labelling, transfusion reactions, legal aspects and accreditation.
- Transportation & Ambulance Services: History, Administrative aspects, Basic Life Support (BLS) and Advanced Life support (ALS).

Module-II: Support Services-II

- Central Sterile Supply department: Functional areas, Sterilization process, Theatre Sterile Supply Unit (TSSU) and supply distribution system.
- Dietetics: Functions of Dietary services, Functional areas, equipments, diet distribution systems, centralized &decentralized services and managerial issues.
- Medical Records Department: Types of medical records & their importance, functional organization of MRD, storage & retrieval of records, MRD reports, medico-legal aspects

Module-III: Utility Services-I

- Hospital Linen and Laundry: Types of hospital linen, Basic tasks of laundry, Types of laundering system and laundry process.
- Housekeeping services: Its functions, types, cleaning agents and cleaning operations.
- Mortuary: Physical facilities & staffing, policies & guidelines and managerial concerns.
- Security: Its functions, Security risks and types of security system.
- Pharmacy: Role & types of pharmacies, drug distribution systems, procurement of drugs and managerial issues.

Module-IV: Utility Services-II

- Basic Engineering Services: Civil Assets, Electricity Supply, Water supply, Gas manifold
- Allied Engg services: Air conditioning, Refrigeration, non-conventional energy devices.
- Maintenance & store management, Engg service department
- Engineering Hazards: Hospital Planning & design, Physical environment, Building elements and material, preventive management program.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts & References:

- *Principles of Hospital Administration and Planning,* Shakharkar B.M.
- *Modern trends in Planning and designing of Hospitals: Principles and Practice:* Shakti Kumar Gupta, Sunil Kant, RChandrashekhar.
- *Management of Hospitals & Health services*: Strategic issues and performance, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*
- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century*Vol 1 Kumar R, S.L. Goel
- *Hospital Management, Dr. A.K. Malhotra,* Global India Publications Pvt ltd, New Delhi
- *Hospital Management : A guide to departments,* Howard S. Roland, Beatrice L Rowland

DISASTER MANAGEMENT

Course Code: HAP4405 **Credit Units: 03**

Course Objectives:
- To learn, identify and assess disasters in the community.
- To set-forth policies and procedures for disaster preparedness and to prepare hospital disaster plan.

Course Contents

Module-I: Basics of Disaster Management
Definitions, Determining risk of disaster, Classification of disaster on the basis of origin, source, onset & anticipated response; Disaster process, Effects of Disasters – Health issues, characteristics and geography of disasters, Impact of Disasters on the Hospitals.

Module-II: Disaster Management Process
Phases of disaster management, leadership, organization of medical relief, Triaging, Disaster Response – local, national & International; Disaster Management Act – 2005.

Module-III: Disaster preparedness
Hospital Disaster Plan – its pre-requisites, principles and components; Hospital disaster management committee and its role; Hospital disaster manual.

Module-IV: Fire Safety
Grades of fire and its causes; elements of fire safety, various fire extinguishers; and fire safety training.

Examination Scheme:

Components	**CP**	**V**	**A**	**CT 1**	**CT 2**
Weightage (%)	20	15	5	30	30

Text & References:

- *A guide to emergency health management after natural disasters*, American health organization scientific publication.
- *Emergency vector control after Natural disaster*, American health organization scientific publication.
- *District Health facilities*, WHO regional publication western pacific services.
- *Medical supply management after natural disaster*, American health organization scientific publication.

Syllabus - Fifth Semester

SUMMER PROJECT EVALUATION

Course Code: HAP4535 **Credits Units: 06**

Training Objective:
To provide on the job experience, as an understudy in a hospital, to help the student understand systems and procedures and learn to make decisions considering the Hospital as an integral unit

Duration: 2 months

Format for Report Writing

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Guidelines for presentation-

- PowerPoint presentation
- Time for presentation: 20minutes
- Time for discussion: 10 minutes

Examination Scheme

Components	Presentation	Report submitted	Viva-voce
Weightage (%)	25	50	25

STRATEGIC MANAGEMENT

Course Code: HAP4501 **Credit Units: 03**

Course Objective:
To help students to understand the concept of strategy and strategic management process, Acquaint students with basic concepts and principles of strategic management, develop and prepare organizational strategies that will be effective for the current dynamic environment and likewise to impart the strategic management conceptual framework which will increase students' skills and knowledge in identifying and describing organizations' strategic posture and direction.

Course Contents:

Module-I: Introduction and Purpose of Strategy Formulation
Evolution and Introduction of strategic management. Concept and Classification of Corporate and Business Strategy with Hierarchy definition; Purpose of Strategy Formulation: Concept of Vision, Mission and Business Definition. Importance of Stakeholders in Business.

Module-II: Strategic Analysis
PESTLE Analysis, Environmental Threat and Opportunity Profile (ETOP), Strategic Advantage Profile (SAP), Porter's Value Chain Analysis, Resource Based View of the Firm-VRIO Framework; Market Analysis-David AakerModel, Competitor Analysis, Industry Analysis using Porter's five forces Model; Scenario analysis and SWOT Analysis. Strategic implications of company decisions and Strategic response to changes in business environment.

Module-III: Strategic Choice – Traditional Approach
Portfolio Analysis using BCG, GE Nine Cell Matrix, Hofer's Model, Making Strategic Choices using Strickland's Grand Strategy Selection Matrix; Ansoff's Product Market Grid; Choosing Generic Strategies using Porter's Model of competitive advantage.

Module-IV: Industry Structures and Competitive Strategies
Industry Structures and Lifecycle stages, Marketing Warfare and Dominance Strategies: Advantages and Disadvantages of Defensive and Offensive strategies; Innovation as Blue Ocean Strategy.

Module-V: Strategy Implementation and Evaluation
Issues in implementation: Resource Allocation, Organization Structure, Social responsibilities – Ethics. Measuring performance and establishing strategic controls.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References*:*

- Wheelen and Hunger, (2008),Essentials of Strategic Management, Prentice Hall India.
- Ramaswamy and Namakumari,(1999), Strategic Planning: Formulation of Corporate Strategy Text and Cases, Macmillan India Ltd.,
- Jausch&Glueck, (1988), Business Policy and Strategic Management, McGraw Hill.
- Thomson & Strickland,(2008), Business Policy and Strategic Management, McGraw Hill.
- Pearce John 'A & Robinson R.B,(1997), Strategic Management: Strategy Formulation and Implementation, AI.T.B.S. Publishers & Distributors
- Regular reading of all latest Business journals: HBR, Business World, Business India, Business Today

HOSPITAL MANAGEMENT INFORMATION SYSTEM

Course Code: HAP4502 **Credit Units: 03**

Course Objective: This course will expose students to developments in computer technology and will help to understand the various indicators of health and health information system and health management information system in hospitals.

Course Contents

Module-I: Information System
Concept of information as a resource, understanding the principles of information systems and Classification of information in hospitals.

Module-II: Management Information System
Concept of MIS, functions of MIS, developing MIS, types of MIS, developing indicators, identifying data and developing tools of measurement and applications of MIS; Use of MIS: monitoring progress and evaluation, hospital planning, monitoring employees, monitoring health development, decision making. Computerization of MIS: demonstration and critical analysis of different MIS software packages used in health projects in hospitals.

Module-III: Managing Hospital Information Systems
- Data generated for HIS; Functions, Benefits and applications of HIS, HIS components, various performance Indicators, HIS model and data movement.
- HIS modules: Various HIS Modules for Clinicians, Nurses and Administrators
- Importance of security and confidentiality of data.

Module-IV: Telemedicine
Concept of Telemedicine and its evolution, Telemedicine network in India, and SWOT analysis of Telemedicine

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References

- *Management Information System (MIS) in Hospitals: A computer based approach for quality in hospital services and administration*, by Anil Kumar Saini
- S.C. Joshi & S.N. Mehta. *National Information System: Planning and Management*, Global vision publishing house.
- *Information Technology in health care: Socio technical approaches, 2010.* IOS Press BV
- Norton P (2010), *Introduction to Computers*, Tata McGraw-Hill
- Potter T (2010), *Introduction to Computers*, John Wiley & Sons (Asia) Pvt Ltd
- Jawadekar, WS (2009); *Management Information System*; Tata McGraw Hill
- Mclead R & Schell G (2009), *Management Information Systems*; Pearson Prentice Hall
- O'Brein, JA (2009); *Introduction to Information Systems*; Tata McGraw Hill

HEALTH INSURANCE AND MEDICAL TOURISM

Course Code: HAP4503 **Credit Units: 03**

Course Objective:
To acquaint students to the concept of HI and various HI products, so that the students are ready for challenges of healthcare insurance which is emerging as a sector holding great promise.

Course Contents

Module-I: **Introduction**
History of Health Insurance, Principles of Health Insurance, Public Financing, Private Financing, Current trends in Health Insurance - International and Indian scenario, Economic and financial management of Health Insurance.

Module-II: **Private Health Insurance system**
Individual Health Plans, Mediclaim, Floaters plans, Third Party Administration, Benefits Management, Claims Management, Insurance Regulatory Development Agency (IRDA)

Module-III: Social and Community based Insurance
- Employee State Insurance Scheme (ESIS), Central Government Health Scheme (CGHS), Rashtriya Swasthya BimaYojana (RSBY)
- Micro-insurance

Module-IV: Medical Tourism
Basic Concepts of Medical Tourism, Scope of Medical Tourism in India.

Examination Scheme:

Components	**CP**	**V**	**A**	**CT 1**	**CT 2**
Weightage (%)	20	15	5	30	30

Text & References:

- Usha Mehta, A.D. Narde. *Health Insurance in India and Abroad,* Allied Publishers.
- Thomas K. T., Sakthivel R.*Health Insurance In India*: *Overcoming Challenges and Looking Ahead*, Lambert Academic Publishing, 2012.
- Michelle A. Green, JoAnne C. Rowell. *Understanding Health Insurance- A guide to billing and reimbursement.*
- William S Stevens. *Health Insurance- Current Issues and Background,* Nova Science Publishers.

Syllabus - Sixth Semester

DISSERTATION-PROJECT

Course Code: HAP4637 **Credit Units: 15**

Internship Objective:
To impart the practical knowledge through research methods, help formulate a rigorous research problem related to hospital on the basis of their observation, help do an independent study, and encourage working in a team.

Duration: 6 months

Pedagogy
- Identifying several situations amenable to dissertation work, writing a proposal and making a presentation.
- Reporting to the committee on the progress of research work periodically.
- Making use of a variety of research methods.
- Defending the inference before the Examining Committee.

Report Contents
Every student will do a detailed study on the topic selected for the dissertation, and is expected to prepare a two or three proposals which he intends to take up for the Dissertation. The Assigned guide will examine and decide on the topic of dissertation. The final Report will comprise of following contents:

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Examination Scheme:

Components	Presentation	Report submitted	Viva-voce
Weightage (%)	25	50	25

Amity Medical School

Master of Science - Clinical Research

FLEXILEARN
-Freedom to design your degree

Programme Structure

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

13402 - Master of Science- Clinical Research

PROGRAM OBJECTIVE

This course has the following objectives –

• To provide the students with the requisite knowledge that will enable them to pursue a career in the Clinical Research industry.

• Synthesize the highest academic standards with relevance to the need to present business & commercial policies.

• Encourage clinical research methodologies & start PhD programs in clinical research.

• Collaborate with organizations at national & international level in areas of research, training, seminars & conferences.

•Represent the interest of clinical research professionals in the country & ensure that

India does not lag behind in maintaining the internationally prescribed standards of clinical Ethics.

• To give students in-depth training in both the theoretical and practical aspects of clinical research, regulatory affairs and clinical data management in the clinical research industry.

ELIGIBILITY

• Graduate or post graduate from a recognized university in Life Sciences

(Biochemistry, Pharmacology, Toxicology, Biotechnology, Microbiology,

Botany or Zoology)

• Doctors (MBBS/ BDS/ BAMS/ BHMS/ BUMS/ BVSc/BSSM)

• Bachelors in physiotherapy, pharmacists (B.Pharm, M.Pharm)

• Nursing graduate

Syllabus - First Semester

FUNDAMENTALS OF CLINICAL OPERATIONS

Course Code: CLR4101 **Credit Units: 05**

Course Objective:
To enrich the understanding of clinical operations procedures in clinical research which sponsor, CRO and Hospital use for conducting clinical trials on patient. To know the importance of clinical research in clinical trials.

Course Contents:

Module-I: Introduction to Clinical pharmacology, Overview of Clinical Research Process Drugs:
Definition of drugs, dose, formulation development, various route of drug administration, sources of drug, pharmaceutics, labelling of drug, and packaging of drugs Acting on Nervous System, Drugs Acting on Respiratory System, Drugs Acting on Gastrointestinal System, Drugs Acting on Cardiovascular System, Drugs Acting on Kidney, Autacoids and Related Drugs, Hormones and Related Drugs, Drugs Affecting Blood and Blood Formation, Antimicrobial Drugs, Anticancer Drugs. GMP, Quality management, GLP-Objective, medical devices.

Module-II: Medical terminologies and Clinical Research terminologies:
Medical Terminologies, List of Symbols/Abbreviations, Abbreviations/Terminologies, Clinical research terminologies, Glossary of clinical trials terms. Adverse drug reactions, A/BE studies, study design.

Module-III: Phases and Types of Clinical Trials & Good Clinical Practice, GCP-FDA, GCP-WHO:
Introduction to Clinical trials, Phases of Clinical Trials, Types of Clinical Trials, Randomized Clinical Trial, Non Experimental clinical trials, Superiority trials. Introduction to Clinical trials, Phases of Clinical Trials, Types of Clinical Trials, Randomized Clinical Trial, Non Experimental clinical trials, Superiority trials.

Module-IV: Site selection, Site initiation, Monitoring and Site closeout:
Site Selection Visit: Introduction to Site Selection Visit, Flow of Events Prior to SSV, Feasibility Study, SSV Checklist, On Site visit, Elements of Discussion during the SSV, Documentation and Reporting. Site initiation Visit : Introduction, Trials, Initiating the Study, Site initiation process, Procedure Site Monitoring and Site Close Out: Monitor, Responsibility of the Monitor, Aims of

Monitoring, Monitoring Plan, Preparation for Monitoring Visits, Monitoring activities, Documenting the Monitoring Visit, Follow-up of Persistent Non-Compliance at site, Site Close Out, Flow of Events Prior to Site Close Out Visit, On Site Close Out visit.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Basic and Clinical Pharmacology :Bertrand Katzung
- Essentials of Medical Pharmacology :K. D Tripathi
- Textbook of therapeutics Drug and Disease Management: Eric T Herfindel,Dick R. Gourley, 6th ed.

STATISTICS FOR CLINICAL RESEARCH

Course Code: CLR4103 **Credit Units: 04**

Course Objective:
To enrich the understanding of biostatistician procedure in clinical research which sponsor, CRO and Hospital use in clinical trials. To know the importance of biostatistics in clinical trials.

Course Contents:

Module 1:
Introduction and basic concepts ,Overview of the drug development process, bias, randomization, blinding, choice of control group. Organization and display of data, Types of data, graphical diagrammatic representation of data. Role of biostaticians in clinical research, ANOVA –Survival analysis, measurement scales and variables, sampling, degree and meaning of correlation, and its types , karl Pearson and spearman correlation coefficient ,difference b/w correlation and regression.

Module 2:
Measures of Central tendency ,Mean, median, mode, measure of dispersion ,Standard Deviation, Standard Error, Variance, range, Coefficient of Variation. Skegness & Kurtosis.

Module3: Correlation and Regression
Correlation:, types of data required, assumptions, correlation coefficient, significance of correlation, meaningfulness of correlation coefficient. **Regression:-**, Simple linear regression.

Module 4:
Probability and probability distributions, Definitions, probability distribution curves. Continuous probability distribution-Normal distribution, properties and applications.Discrete probability distribution-Binomial & Poisson distribution, properties and applications. Test of significance-F –test, t-test & chi-square test. Statistical input during protocol design, Demonstration of sample size calculation: comparing two means, Sample size computation

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Biostatistics, P.N Arora and P.K Malhan. Publisher: Himalaya Publishing House.

References:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee .Publisher: Elsevier.
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Statistical Methodology, S.P Gupta. Publisher: S.Chand& Co.
- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. VisweswaraRao. Publisher: Jaypee Brothers.

- Fundamentals of Mathematical Statistics, S.C Gupta and V.K Kapoor. Publisher: S. Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers.
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics by H.C. Saxena and V.K. Kapoor. Publisher: S. Chand & Co

PRACTICAL

- Collection of data & statistical calculations
- Preparation of charts/graphs
- Problems based on measure of central tendency.
- Problems based on measure of dispersion.
- Problems based on test of significance-t-test, F-test, chi-square test.
- Problems based on correlation & regression.
- Problems based on Probability

BASICS OF PHARMACY, DRUG DISCOVERY AND DEVELOPMENT

Course Code: CLR4104 **Credit Units: 05**

Course Objective:
To enrich the understanding of pharmacology, drug discovery procedure in clinical research which sponsor, CRO and Hospital use for patient protection. To know the importance of drug discovery in clinical trials.

Course Contents:

Module-1:
History of Pharmacy, Indian Pharmaceutical industry, Drugs-sources, nomenclature, classification, Pharmacopoeias, Formulary, Codex. Branches of Pharmacy: Pharmacognosy, Pharmaceutical chemistry, Quality Assurance, Pharmaceutics, Pharmacology, Pharmacy Management and Pharmacy Practice. Pharmaceutical Manufacturing-Quality Assurance and Quality Control.

Module-2:
Drug Regulatory Environment-Pharmaceutical Legislation in India, Drug regulatory authorities, International Conference on Harmonization, Good Practices and Quality Management, Drug Master File.

Module-3:
Drug Discovery & Development. History of drug development, Drug Discovery Pipeline, Drug Discovery Process. Approaches to Drug Discovery: Synthetic/medicinal chemistry, combinatorial synthesis, Natural Product, In Silicon approach or CADD, QSAR, Discovery Genomics.

Module-4:
Personalized medicines, High throughput screening. Manufacturing and packaging Manufacturing-Multitasking machines Packaging-cGMP, USP requirements on containers and closures, Quality Control, Inhalation drug products, drug products for injection, drug products for ophthalmic, liquid based oral and topical drug products, post approval packaging changes.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

- Drug Discovery and Development , 2nd Edition by Raymond G Hill
- Drugs: From Discovery to Approval by Rick Ng

FUNDAMENTALS OF ANATOMY AND PHYSIOLOGY

Course Code: CLR4105 **Credit Units: 04**

Course Objectives:

- To develop the knowledge of anatomy and physiology.
- To provide the basic understanding of human organs
- To provide the concepts of interrelationship among different organ systems and their functions

Course Contents:

Module I

Introduction of Anatomy & Physiology: Definition, organization of the human body, Structure and functions of mammalian cell and organelles. Structure, functions and classification of tissues.

Skeletal System: Division, anatomy and function of skeleton; Histology of bone; Types of bones and joints; Bone marrow; Cartilage; Composition and function of synovial fluid.

Muscular system: Histology, classification and functions of muscles; mechanism of muscle contraction.

Module II

Respiratory System: Structure and functions of different organs involved in respiratory system, gas exchange in the lungs, regulation of respiration, mechanism of respiration, respiratory muscles, composition and functions of pleural fluid; Vital capacity, Total volume, Reserve volume, Total lung capacity.

Cardiovascular System: Structure and functions of heart and blood vessels, blood circulation, cardiac cycle, cardiac output, stroke volume and blood pressure; ECG.

Lymphatic System: Structure and functions of lymphoid organs; lymph vessels; compositions, function and circulation of lymph.

Module III

Digestive System: Structure and function of digestive organs, digestion and absorption of food, compositions and functions of various gastrointestinal secretions.

Urinary system: Structure and functions of organs involved in urinary system, structure and functions of nephron, measurement and regulation of GFR, mechanism and composition of urine formation, physiology of excretion of urine.

Endocrine system: Histology and functions of different endocrine glands, hormones and their functions.

Module IV

Nervous system: Central Nervous System – structure and functions of brain and spinal cord; Peripheral Nervous System – structure and functions of cranial nerves and spinal nerves; Autonomic Nervous System – structure and functions of sympathetic system and parasympathetic system; electroencephalogram and nerve impulse; Secretion, composition and functions of CSF.

Special senses organs: Structure and functions of eyeball, ear, nose, tongue and skin, mechanism of vision, hearing, smell, taste, and sensation.

Male and Female reproductive system: Structure and functions of male reproductive organs, spermatogenesis. Structure and functions of female reproductive organs, ovarian cycle, menstruation, fertilization and pregnancy.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text and Reference:

Texts:

- Stand, F.L. Modern Physiology the Macmillan Company Latest Ed.
- Guyton, A.C. Text Book of Medical Physiology W.S. Saunders
- Davidson, B. and Smith E., Text book of Physiology and Biochemistry, 1972 (8th Ed.).
- Human Physiology – A.J. Vander
- Principles of Anatomy and Physiology – Anagnastakes

References:

- Text Book of Physiology – Patton
- Bloom W. & Favcott. D.W.A. – Text Book of Histology, W.B. Saunders and Company
- Martini: Fundamentals of Anatomy and Physiology (6th & 7th Ed.)

Syllabus – Second Semester

PRE-CLINICAL STUDIES AND SAFETY

Course Code: CLR4201 **Credit Units: 05**

Course Objective:
To enrich the understanding of pre-clinical drug discovery procedure in clinical research.
To know the importance of Preclinical studies and various procedure used in clinical trials.

Course Contents:

Module-I:
Experimental animals used, Equipments used in ATC, Sterilization techniques, media for animal cell culture. Cell culture and cell lines, concepts in mammalian and non-mammalian culture, applications of cell culture, Assessment of preclinical data ,assessment of cost benefit and risk ratio.

Module-II:
History of toxicity, relationship between dose and toxicity, types of toxicity, factors influencing toxicity, toxins, toxicity studies, special toxicity studies, in vitro models, in situ methods, in vivo models.

Module III:
Good Laboratory Practices, ICMR-GLP guidelines, FDA-GLP guidelines, Organization and personnel, facilities, equipment, testing facilities operation, test and control studies, protocol for and conduct of a non-clinical laboratory study, records and reports, disqualification of testing facilities, OECD-GLP guidelines, quality assurance program, facilities, test systems, test and reference items, Standard Operating Procedures, Performance of the study, reporting of study results, storage and retention of records and materials.

Module-IV:
Drug action, mechanism of drug action, dose-response relationship, therapeutic index, undesirable effects, disease modeling–hypertension, asthma, acidity, arthritis, cancer, addiction, autoimmune diseases, pain, epilepsy, inflammation.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Basic Principles of Clinical Research and Methodology by S.K.Gupta
- Drug Discovery and Development by Raymond G Hill

IPR & DATA EXCLUSIVITY, BIOETHICS IN CLINICAL RESEARCH

Course Code: CLR4202 **Credit Units: 05**

Course Objective:
To enrich the understanding of IPR and bioethics procedure in clinical research which sponsor, CRO and Hospital use for patient protection .To know the importance of ethics and IPR law used in clinical trials.

Course Contents:

Module-1:
Intellectual property rights, Laws of IPR, patents, The World Trade Organization and the TRIPS agreement, copy rights, the rationale for IP protection, the evidence about the impact of IP, Technology Transfer, Contracts and Agreements ,CIOMS , Insurance for research injuries, contractual agreement.

Module-2:
The Data Protection Act & data mining, data and disclosure, data exclusivity, data exclusivity as a governmental function, commercial and economical rationale for test data, confidentiality, current state of data protection.

Module-3:
Introduction to bioethics, ethical issues in preclinical (animal) studies, & clinical studies-Ethical principles, Institutional Review Board, Special issues in research. Ethical Guidelines-ICMR, Institutional Ethics Committees, Institutional Review Board, Ethics-SOPs Ethical issues based on methodology of clinical Research. The ethics of clinical research in developing countries.

Module-4:
Basic philosophies of animal ethics: (3 'R's), Animal Ethics Committee, executive, meetings, confidentiality and indemnity, period of approval, joint animal ethics committee, process to establish an AEC, guidelines for ethical conduct in the care and use of animals. Social responsibility for clinical researcher.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
- Basic Principles of Clinical Research and Methodology by S.K.Gupta

REGULATORY AFFAIRS

Course Code: CLR4204 **Credit Units: 05**

Course Objective:
To enrich the understanding of Regulatory Affairs procedure in clinical research for global business purposes. To know the procedure of regulatory submission from CRO, Sponsor.

Course Contents:

Module-1: Introduction regulatory affairs:
Overview of judicial system in India, Medical Evidence, Privileged Communication and Professional Secrets, The Rights and Obligations of a Medical Professional to Patient, Medical Malpractice, Code of Medical Ethics.

Module-2: Drugs and Cosmetics Act & Schedule Y:
Introduction to Drugs and Cosmetics Act, Aims and Objectives, Definitions, Administrative bodies, Schedules to Drug Rules, Import of drugs, Manufacture of drugs, Sale of drugs, penalties for offence regarding sale of drugs, labelling and packaging of drugs . Schedule Y, Clinical trials, Studies in special populations, Post Marketing Surveillance, special studies. Bioavailability and Bioequivalence studies, Amendment of Schedule Y.

Module-3: Regulatory authorities & ICH:
Regulatory authorities in India- Indian FDA, DCGI, Schedule Y, ICMR, GEAC, AERB, DGFT, DTAB, DBT Guidelines and other important provisions, Indian regulatory approval process, regulatory timelines, approval timeline, approval letter.ICH and Process of Harmonization: History and structure of ICH, Process of Harmonization ICH Guidelines, Categories of ICH guidelines, Quality, Safety, and Efficacy Guidelines.

Module-4: International Regulatory bodies and Guidelines:
US Food and Drug Administration (USFDA): The FDA and Food Drug and Cosmetics Act, New drug development and approval : the principal steps.
India: Regulatory laws, Schedule Y, registration of new drugs, requirements for registration, regulatory environment and practices.
Medicines and Healthcare Products Regulatory Agency (MHRA): Overview of regulatory environment/ background, regulatory authorities, regulatory requirements and procedures.
European Agency for Evaluation of medicinal Products(EMEA): National registration , the decentralized procedures, mutual recognition procedures.

Module-5: Regulatory Requirements of Clinical Trial Application
Investigational New drug (IND): Classifications, IND application process
New Drug Application (NDA): Pre NDA meeting, NDA submission Check list, FDA NDA review
Abbreviated New drug Application (ANDA): ANDA content, ANDA Submission check list, FDA ANDA review check list, ANDA process for generic drugs, guidance documents for ANDAs

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- A guide book for regulatory submission: Sandy Weinberg.
- A guide to clinical drug research: A.Cohen& J. Posner.
- FDA Regulatory affairs: Dougles J. Posano& David Mantus.
- Introduction to regulatory affairs: Vedjignesh.
- Regulatory affairs: Fegodets.

AUDIT AND INSPECTION

Course Code: CLR4206 **Credit Units: 05**

Course Objective:
To enrich the understanding of Audit and inspection procedure in clinical research for global business purposes. To know the importance of Audit and inspection for CRO, Sponsor and Hospital.

Course Contents:

Module 1: Introduction to Audits and Quality Assurance:
Quality Assurance, Definition, Quality system, The Quality Plan, Quality Assurance (QA), Quality Control (QC), Differentiating quality control and quality assurance, Structuring the quality assurance function, Critical Issues For Organizing The Quality Assurance Function, Overview Of QA Activities Audits: Definition of audit, Quality Assurance Audits In Clinical Research, Motives For Process Audit, Objectives Of Process Audit, Auditors, Conducting A Clinical Research Department Process Audit, Audit findings, Research Fraud and misconduct, site audits, FDA inspections, PL 483 warning letters, Auditing clinical data management function.

Module 2: Site Audits, Fraud and Misconduct:
Definition of audits as per ICH GCP, Goals and objectives of study site audits, Types of clinical trial site audits, Criteria for onsite audits, The audit process, Audit preparation activities, Common audit findings.

Module 3: FDA Inspections, PL 483, and Warning Letters:
Definitions, Differentiating inspection from audits, Types of inspections, Purpose of regulatory inspections, The process of inspection, forms, warning letters, Selection of the study site for inspection, Forms, warning letters.

Module 4: Clinical Data Management and Auditing CDM function:
Introduction to CDM, Computer system validation (CSV), Clinical Data Management flow.
Data Entry/Remote data entry: First data entry, Second data entry, heads up and heads down data entry, audit trail, , computerized system in clinical trials,
Data Capture: Definition, paper based and electronic data capture, dataflow in paper CRFs and e-CRFs, tools for data capture, advantages and disadvantages of paper CRF/ e-CRF
Data cleaning/validation: Definition, Discrepancy management system, Data Management team, Roles and responsibilities of key team members and sponsor, Introduction to data base design and build, data base validation, Clinical data entry process, data entry process, data entering. Electronic clinical trials, Clinical Trial registry of India (CTRI), Types of audits in CDM, Audit process, Activity-specific audits, Protocol audit, CRF audit, Common findings during a data management audit.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & Reference:
- Clinical trials audit-David machin
- Introduction to Audit & inspection-DJ Cockbuern
- Clinical trials audit preparation: a guide for good clinical practice inspection: Vera mihajlovic & madzarevic.

Syllabus – Third Semester

REPORTING AND MEDICAL WRITING

Course Code: CLR4303 **Credit Units: 05**

Course Objective :
To enrich the student role and responsibility of medical writer in clinical trials. To know the importance of medical writer in clinical research.

Course Contents:

Module-1:
Fundamentals of Medical Writing & Data interpretation and presentation:
The Scope of Medical Writing, Qualities of effective medical writer, role and responsibilities of medical writer in clinical research,
Essential Documents prepared by medical writer-Importance of Essential Documents
Pre Study Document: Investigators Brochure, Financial aspects of the trial, Approval letter from the IRB, IRB Composition etc.
During the Study Documents: Updates on medical/laboratory/technical procedure tests, Subject enrolling log, Investigational product accountability at site, , Audit certificate etc
Post Study Documents: Final report by investigator to IRB, Final report by investigator to regulatory authorities, Clinical study report to document results and interpretation etc, Study Completion documents, Study Termination/closure documents

Module-2:
Study Protocol - The contents of a trial protocol should generally include the topics: General Information, Background Information, Trial Objectives and Purpose. Trial Design, Selection and Withdrawal of Subjects, Treatment of Subjects, Assessment of Efficacy, Assessment of Safety, Biostatistics, Direct Access to Source Data/Documents, Quality Control and Quality Assurance, Ethics, Data Handling and Record Keeping, Financing and Insurance, Publication Policy, Supplements, Annexure.

Case Report Forms (CRF) & e-CRF- Study Title, Inclusion Criteria, Exclusion Criteria, Patient Screening, Admission /discharge procedure, Visit wise, Period wise, Laboratory Analysis, Vital signs, Diet restriction, Concomitant medication, withdrawal/drop out details, Adverse Events Form, Serious Adverse Event Form.

Module-3:
Informed Consent Form/Assent Form- Study title, What is the purpose of research, The study design, Study Procedures, Women of childbearing potential, Possible risks , Possible benefits, Compensation, Possible benefits to other people, The alternatives you have, Cost to the participant, Confidentiality of the information of subject/patient, decision to participate/ not participate, Withdrawal of the consent, Right to new information, Contact persons, Patient consent form, Patient Information Sheet, Patient visit diary

Standard Operating Procedures (SOP) in Clinical Trials - Need of SOPs, What is SOPs, Benefits of SOPs, different types of SOPs, SOP Writing SOPs and Guideline, Implementation and monitoring of SOPs, Change control.

Module-4:
The Clinical Study Report

Structure of CSR and possible modifications, study patients, efficacy evaluation, safety evaluation, discussion and overall conclusions, tables, figures and graphs referred to but not included in the text, reference list, appendices. Reference ranges (normal ranges), Interpretation of normal values, Units of measurement, Factors Affecting interpretation of test.

Investigator's Brochure, and Electronic Common Technical Document:

Contents of the Investigator's Brochure, Table of Contents, Summary, Introduction, Physical, Chemical, and Pharmaceutical Properties and Formulation, Non-clinical Studies, Effects in Humans, Summary of Data and Guidance for the Investigator, Components of the CTD, Electronic Common Technical Document

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & Reference:

- Clinician's Guide to Medical Writing :Robert B. Taylor. 1st ed. 2004.Springer Publications.
- Guidebook to Better Medical Writing :Robert L. Iles (Author), Debra Volkland. Iles
- Medical writing & clinical reporting: Beltas.
- Medical writing: Cam Johns tan.
- Medical writing & reporting: Dr.Nancy Snyder man.

PHARMACOGENOMICS

Course Code: CLR4304 **Credit Units: 04**

Course Objective:

To enrich the student important role of pharmacogenomics in drug discovery in clinical trials
To know the importance of pharmacogenomics in clinical research

Course Contents:

Module 1: Introduction to pharmacogenomics:
History, Chronology of Events, Pharmacogenetics and Pharmacogenomics: The Difference, Benefits of Pharmacogenetics, Pharmacogenetics in Practice, Promise of Pharmacogenomics, Limitations, Pharmacogenomics drugs in the market, Future of Pharmacogenomics

Module 2: Determinants of drug response & Bioinformatics tools for pharmacogenomics:
Pharmacokinetics and pharmacodynamics of drug, drug properties that influence its pharmacokinetics and pharmacodynamics .Bioinformatics, Divisions of Bioinformatics, Fields Related to Bioinformatics, Application of Bioinformatics in various disciplines/fields, Major categories of Bioinformatics Tools with examples

Module 3: Pharmacogenetics of enzymes and transporters:
Xenobiotic -Phase I and II reactions Drug transporters-Structure and model of drug transporters, transport mechanisms, polarized expression of drug transporters, drug transporters in barrier epithelium, classification of drug transporters, ABC and SLC transporters, genetic variation and drug response, genetic variation in membrane transporters

Module 4: Clinical pharmacogenomics and clinical trials:
Pharmacogenomics in clinical practice, the role of drug metabolizing enzymes in cardiovascular pharmacology, Pharmacogenetics and clinical trials-Issues in clinical trials ethical implications of pharmacogenomics research, guidance on pharmacogenomics data.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & Reference:

- Basic and Clinical Pharmacology: BertrandKatzung
- Essentials of Medical Pharmacology :K. D Tripathi
- Pharmacology: Rang, Dale and Ritter
- Pharmacology and Pharmacotherapeutics:Satoskar,18th ed, 2003

PRACTICAL DEMONSTRATION (DRY LAB)

1. To navigate different component of NCBI including PUBMEd
2. To search literature in NCBI-PUBMED using Bollean operators
3. To find out the details on a given molecule including gene, gene symbol, OMIM, chromosome location

4. To find out the details on a given molecule including protein, HPRD architecture, localization in human protein atlas, proteins sequence,
5. To study drug-drug interaction to find out if there is synergism, antagonism, or additive outcome using COMPUSYN software
6. To count cells in a given sample for cell viability using trypan blue assay (Virtual)
7. To separate different cell types from blood samples and their segregation using surface markers
8. To perform BLAST to know if your sequence aligned with existing sequence or not using BLAST alignment tool
9. To perform in silico PCR using primer sequence to know the output with coding along or coding and non-coding sequences
10. To predict ORF to know if a sequence has potential to code for a protein
11. To determine which sequence in pool of DNA sequences is more or less stable based on Nitrogenous base content

PROJECT MANAGEMENT AND PHARMACOVIGILANCE

Course Code: CLR4306 **Credit Units: 05**

Course Objective:

- To enrich the student role and responsibility of Project manager in clinical trials.
- To enrich the student role and responsibility of Pharmacovigilance and various safety monitoring's in clinical trials.
- To know the importance of Pharmacovigilance in clinical research.

Course Contents:

Module 1: Project Management Process & Project Development Plan in clinical research:
The triple constraints in Project Management, Project management activities, Project objectives, Project management Documents, Project control variables, Project Management & Clinical Trials, Role of Project Management in Clinical Trials, Major Roles of a Project Manager in a CRO, Ensuring Project Success. Initiating, Planning, Executing, Monitoring & Controlling, Closing .Preparation of Clinical Project Development Plan, Contents of Clinical Project Development, Plan, Review and Approval of CPDP.

Module 2: Clinical Research outsourcing & Services Offered by CROs:
Outsourcing in Clinical Research, Reasons for outsourcing to contract research organizations, Benefits of outsourcing, Out/In-Sourcing of Clinical Services, Scope and Future of CRO, List of Clinical Research Organizations in India, List of IT companies offering services in Clinical Research, Outsourcing in Clinical Trial Management, Clinical Trial Monitoring, Pharmacovigilance - Drug Safety, Data Management, Regulatory Affairs, Protocol Development, Site Management, Clinical Trial Supplies, Centralized Lab Management, Centralized ECG reading services, Centralized Imaging Services.

Module 3: Introduction to Pharmacovigilance and safety signals :
Introduction, Definition, requirement of Pharmacovigilance needed, Objectives of Pharmacovigilance, and Agencies concerned with Pharmacovigilance, Reporting ADRs, Methods involved in Pharmacovigilance, Scope of Pharmacovigilance, Adverse Event (AE), Adverse Drug Reaction(ADR), Serious Adverse Drug Reaction (SAE), Unexpected Adverse Reaction, Suspected-unexpected serious Adverse reaction (SUSAR), Reporting of AE & SAE. Risk management process, Signals,and Detection of Signal, Causality assessment.

Module 4: Pharmacovigilance regulations and Periodic safety update reports
Pharmacovigilance in India: Pharmacovigilance centers in India, CDSCO Indian PV guidelines National Pharmacovigilance Program (NPP)

Global Pharmacovigilance& safety standards- Pharmacovigilance activity in USA, Australia, WHO Monitoring of safety aspects – Uppasla Monitoring Center.

Adverse Event reporting form: MEDWATCH, CDSCO Adverse Event Reporting Form, CIOMS form for Serious Adverse event reporting, Medication errors reporting

Periodic safety update reports (PSUR) for marketed drugs : Brief Introduction and Purpose of Periodic safety Update Report, PSUR Content, PSUR Process, Various Regulatory Requirement for PSUR.

Module 5: Pharmacoepidemiology

Pharmacoepidemiology, Guidelines for Good Pharmacoepidemiology Practices (GPP), Registries, Surveys.

Concepts and uses of epidemiology, Components of epidemiological studies – frequency distribution and determinants of diseases, Methods to measure and describe health of population, epidemiological triad.

Natural history of disease, Disease spectrum, Modes of transmission, Levels of prevention. Epidemiological principles of Intervention in prevention and control of disease, Measurement of morbidity and mortality, incidence, prevalence, age adjustment, standardization and Risk Measurement.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & Reference:

- Project Management - The Managerial Approach: Clifford Gray and Erik W. Larson
- Principles of project management: Richard A. Billows.
- Principles of project management & risk management: R.Max Wideman.
- Business development: the expanding role of the project management: Lew Ireland
- Textbook of therapeutics Drug and Disease Management: Eric T Herfindel, Dick R. Gourley, 6th ed.
- Assuring Data Quality And Validity In Clinical Trials For Regulatory Decision Making : Janet Woodcock, Frederick Ognibene, John Overbeke.2003;Welly Publication.

DIAGNOSTICS IN CLINICAL RESEARCH

Course Code: CLR4307 **Credit Units: 04**

Course Objective: To make the students understand the basics of diagnosis and related tests and clinical significance in the field of clinical research.

Course Contents:

Module-1:
Diagnosis in clinical research: Definition of diagnosis, types, different parameters used in diagnosis and its related basic tests.
Diabetes Profile: Diabetes mellitus**;** Blood glucose; Glucose tolerance test; Glycosylated hemoglobin; urine sugar.
Kidney Profile: Serum total protein; albumin; creatinine; urea; blood urea nitrogen; clearance test; Sodium and Potassium

Module-2:
Pancreatic Function Test: Serum amylase; lipase; secretin stimulation test; serum trypsinogen.
Liver Function Test: SGOT, SGPT, phosphatase, serum bilirubin; albumin; globulins; A/G ratio; gamma-glutamyltranspeptidase .

Module-3:
Cardiac Function Test: SGOT, SGPT, LDH, CK-MB, Troponins and heart-type fatty acid binding protein (H-FABP); Myoglobin; Brain type natriuretic peptide (BNP).
Lipid Profile: Total serum lipids; total serum cholesterol; triglyceride; HDL; LDL; VLDL; Apo 1 and Apo 2

Module-4:
Gastric and Intestinal Function Test: Examination of resting contents; fractional gastric analysis; serum pepsinogen; tubeless gastric analysis; zollinger-elison syndrome; lactose intolerance; xylose absorption test; inulin absorption test.
Enzymes in the diagnosis and clinical interpretation: Diagnosis, prognosis and assessment of myocardial infarction, hepatitis, jaundice, pancreatitis, cancer, neurodegenerative disorders.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & Reference:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and RanaShinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.
- Text Book of Pathophysiology by Dr.RajpalBansal, Dr.Anu Gupta

PATHOPHYSIOLOGY AND THERAPEUTICS

Course Code: CLR4308 **Credit Units: 04**

Course Objective:

- To empower the students' knowledge with the understanding of pathophysiology of diseases.
- To develop professional interests in the field of diseases therapeutics and its significance in clinical research.

Course Contents:

Module-1:
Fundamentals of Pathophysiology: Definition, terminology, pathology of diseases including etiology, risk factors, signs and symptoms, Systemic pathology of blood vessels and lymphatic's, liver, exocrine pancreas, kidney, endocrine system, musculoskeletal system, nervous system, system associated diseases, communicable and non-communicable diseases overview of diagnosis of the disease and treatment.

Module-2:
Diseases and therapeutics: Etiologic and diseases management of Fever (Acute and chronic), Allergy, Stress, Burns, Obesity, HTN, Diabetes, CVD, Gout , Osteopenia , Osteoporosis, Peptic ulcer, diarrhoea, constipation, mal-absorption syndrome – carbohydrates, fat and lactose intolerance, and celiac disease. Inborn errors of metabolism, Phenylketonuria, Galactosemia, Alkaptonuria, Glomerulonephritis, Nephrotic syndrome, Acute and chronic renal failure, TB, AIDS, Hepatitis, cirrhosis, hepatic failure, pancreatitis, rheumatoid arthritis, schizophrenia, depression, migraine, anxiety, insomnia, thyroid and metabolic disorders and infectious diseases.

Module-3:
Cancer: Types of Cancer-Benign and malignant cancer; Cancer markers -CA15-3, CA19-9, CA-125 , PSA, CEA, alpha fetoprotein, beta-HCG and other markers, cancer pathophysiology, therapeutics and research.

Module-4:
Advance laboratory diagnosis, clinical interpretation and research : Assessment of enzymes and hormones-T3, T4, TSH, Testosterone, Estrogens, Progesterone, Prolactin, FSH, ADH, Insulin and Glucagon, Lab testing and clinical interpretation of communicable and non-communicable diseases and latest advancements.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Recommended books:

- Handbook of Pathophysiology by Joan P Frizzell
- Text Book of Pathophysiology by Dr.RajpalBansal, Dr.Anu Gupta
- Diabetes Mellitus: Williames and Wikins Co., USA
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and RanaShinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.

SUMMER INTERNSHIP EVALUATION

Course Code: CLR4335 **Credit Units: 06**

GUIDELINES FOR SUMMER TRAINING

The main objective of summer training is to familiarize students to laboratory environment and make them learn to handle equipments and softwares, design experiments and analyze the results. The student will be supervised by one or more faculty members and he or she will be required to submit a synopsis. While writing a synopsis emphasis should be given to make it publishable. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student. Initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- TITLE PAGE
- CERTIFICATE
- ACKNOWLEDGEMENT
- ABBREVIATIONS
- CONTENTS WITH PAGE NUMBERS
- CHAPTER –
  a. INTRODUCTION
  b. REVIEW OF LITERATURE
  c. MATERIALS & METHODS
  d. RESULTS & DISCUSSION
  e. SUMMARY AND CONCLUSION
  f. REFERENCES
  g. APPENDIX (OPTIONAL)
- 1 inch Margin on left side & 1”each on other sides.
- Single side of the paper to be used.
- Times New Roman.

Font Size

- 12 (Bold for headings)
- 12 (Normal for Matter)
- 14 (for Chapter Names)
- 1.5 line spacing
- Numbering on the right hand Top of the page
- Numbers on pages before chapters to be done in Roman at the bottom of the page

References
This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article
Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli* O157: H7. *ClinMicrobiol Infect*, **8** (suppl 1): 116–117.

For Book
Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

- Scientific names in Italics
- Cover Page containing - Title, Students Name, Supervisors Name, University, Name (along with logo), Course name & year of Submission in the prescribed format
- 2 copies to be submitted

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.. Evaluation will compose of two components - Project report assessment and Viva - voce. Project report assessment will be done by the two internal faculty members in respective fields. A committee of three faculty members will conduct Viva-voce.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project will be assessed as per evaluation format.

Examination Scheme:

Project Report	50
Viva Voce	50
Total	**100**

Syllabus – Fourth Semester

DISSERTATION

Course Code: CLR4437 **Credit Units: 20**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.
The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout
The report should contain the following components:

➢ **Title or Cover Page**
The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)
Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➢ **Abstract**
A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➢ **Table of Contents**
Titles and subtitles are to correspond exactly with those in the text.

➢ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

- **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

- **Future prospects**

- **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

- **References/ Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic*Escherichia coli* O157: H7. *ClinMicrobiol Infect*, 8(suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality
Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	**100**

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AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

CELL BIOLOGY & GENETICS

Course Code: SCT4101 **Credit Units: 03**

Course Objective
The objective of the course is to understand the structure and function of cellular and subcellular components of cells and tissues. It also focuses on the understanding of basic principles of genetics, incorporating the concepts of classical, molecular and population genetics. Compilation is required for recent advances in genetic principles for strong foundation in Biotechnology.

Course Contents

Module I
Introduction to cell and cellular organelles: Cell theory, prokaryotic and eukaryotic cells. Structure and function of cell wall, plasma membrane, nucleus, mitochondria, chloroplast, Nucleus, lysosomes, peroxisomes, golgi bodies, and transport across membranes. Cell locomotion, cytoskeleton, structure and function of cilia and flagella. Cell cycle: molecular events, cell division, mitosis and meiosis.

Module II
Cell signaling mechanisms and their significance: General mechanism of signaling and structures of the various types of receptors. Cell proliferation and cell death mechanisms, e.g. apoptosis, necrosis, autophagy, immunogenic and non-immunogenic cell death.

Module III
Genetics: classical and molecular genetics, Mendelian principles of inheritance, human genetics. Extension of Mendelism: Allelic variations, influence of environment on expression, penetrance and expressivity, epistasis, pleiotropy. Chromosomal basis of inheritance, linkage, crossing over and chromosome mapping.

Module IV
Mutation and mutagenic agents, types of mutations. Numerical and structural changes in chromosomes with emphasis on human syndromes and genetic counseling. Types of cancer, etiology of cancer, metastasis, tumor suppressor genes. Cytological role of p53 and p21 genes in cancer development. Introduction to cancer therapy approaches: chemotherapy, radiation therapy, immunotherapy.

Module V
Classical and modern concept of gene, pseudoallelism, position effect, intragenic crossing over & complementation (cistron, recon & nutron) Benzer's work on rII locus in T_2 bacteriophage. Genetics of Population: Hardy-Weinburg Law and its deviations.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
- Cell and Molecular Biology, DeRobertis, B.I. Publication Pvt. Ltd.
- Genetics, P.K. Gupta, Rastogi Publication
- Concepts of Genetics (Sixth Edition), William S. Klug and Michael R, Cummings, Pearson Education

References:

- Cell in Development and Inheritance, E.B. Wilson, Macmilian
- Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
- Essential Cell Biology : An Introduction to the Molecular Biology of the Cell, B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Roff, K. Robert, P. Walter and K. Roberts, Garland Publishing Company
- Molecular Cell Biology, H.Lodish, A.Berk, S.L. Zipursky, P. Matsudaura, D. Baltimore and J. Danell, W.H. Preeman and Company.
- Genetics, M.W. Strickberger, Prentice Hall College Division
- Genetics, P.J.Russell, Benjamin/Cummings
- Principles of Genetics, E J Gardner, John Wiley & Sons Inc.
- Genetics, R. Goodenough, International Thomson Publishing
- Introduction to Genetic Analysis, A.J. F. Griffiths, W.H. Freeman and Company
- Principles of Genetics, D.P. Snustad& M.J. Simmons, John Wiley and Sons Inc.
- Molecular Biology of the Gene (Fifth Edition), J.D. Watson, A.M. Weiner and N.H. Hopkins, Addison – Wiesley Publishing

MICROBIOLOGY & VIROLOGY

Course Code: SCT4102 **Credit Units: 03**

Course Objective:
The course will offer thorough understanding of the biology of different forms of bacteria, fungi, protozoa and viruses, their role in disease development as well as in useful applications in biotechnology.

Course Contents:

Module I
Introduction and historical perspective: Discovery of the microbial world, role of microorganisms in transformation of organic matter and in the causation of diseases, development of pure culture methods. Methods in Microbiology: Principles of microbial nutrition, culture media, theory and practice of sterilization, pure culture techniques.

Module II
Prokaryotic structure and function: functional anatomy of bacteria, cell envelope, cell wall, cytoplasmic membrane, capsule, surface appendages, cytoplasm and cytoplasmic inclusions. Growth: Definition of growth, mathematical expression of growth, growth curve, measurement of growth, synchronous growth, continuous culture, culture collection and maintenance of cultures. Systematics and taxonomy: new approaches to bacterial taxonomy, classification including ribotyping, ribosomal RNA sequencing, characteristics of primary domains, taxonomy, nomenclature and Bergey's manual.

Module III
Metabolic diversity among microorganisms: photosynthesis in microorganisms, role of bacteriochlorophylls, carotenoids and phycobilins, Chemolithotrophy, hydrogrn-iron-nitrite-oxidizing bacteria, nitrate and sulphate reduction, methanogenesis and acetogenesis, Fermentations, nitrogen fixation, plant microbe interactions (mycorrhizae).

Module IV:
Archae as earliest life forms, thermophiles, psychrophiles, halophiles, alkalophiles, acidophiles, hyperthermophiles Viruses: Bacterial, animal; structure of viruses; Reproduction and life cycle of RNA and DNA viruses; Viroids and prions. Algae and Fungi: Classification and Reproduction. Host-parasite relationship: Normal micro flora of skin, oral cavity, gastrointestinal tract, Respiratory infections; entry of pathogens into the host, types of toxins (Exo, endo, entro) and their mode of actions, Microbial pathogenesis: Disease reservoirs; Epidemiological terminologies; Infectious disease transmission; Sexually transmitted disease including AIDS, Food and water- borne diseases; pathogenic fungi.

Module V
Chemotherapy/antibiotics: Antimicrobial agents, sulfa drugs, antibiotics, penicillin and cephalosporins, broad spectrum antibiotics, antifungal antibiotics; mode of action.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:

- General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L.Wheelis and P.R. Painter, Macmillian
- Microbiology VI Edition, M.J. Pelczar, E.C.S. Chan and N.R. Kreig, Tata McGraw Hill Microbiology by Prescott
- The microbes – An Introduction to their Nature and Importance, P.V. Vandenmark and B.L. Batzing, Benjamin Cummings.

References:

- The Microbial World, Roger Y. Stanier, Prentice Hall
- Microbiology, Tortora, Funke and Chase, Benzamin & Cummings
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Books Pvt. Ltd.
- Industrial Microbiology, Casida, New Age International
- Industrial Microbiology, Prescott and Dunn, C.B.S. Publishers Principles of Microbiology, R.M. Atlas, WMC. Brown Publisher.

MOLECULAR BIOLOGY & rDNA TECHNOLOGY

Course Code: SCT4103 **Credit Units: 02**

Course Objective:
A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR for the cloning and expression of genes can be obtained through the course.

Course Contents:

Module I
Purification of DNA from bacterial, plant and animal cells, manipulation of purified DNA. Introduction of DNA into living cells, transformation, transduction, electroporation, micro-injection.

Module II
Introduction to gene cloning and its uses, tools and techniques: plasmids, cosmids, transposons and other vectors, DNA, RNA, cDNA, viral and non-viral vectors.

Module III
Clinical applications of recombinant technology; Erythropoietin; Insulin analogs and its role in diabetes; Recombinant human growth hormone; Streptokinase and urokinase in thrombosis; Recombinant coagulation factors, Monoclonal antibodies and their role in cancer; Role of recombinant interferons; Immunostimulants; Immune-supressors in organ transplants; Role of cytokine therapy in cancers.

Module IV
Analysis of DNA by Southern blotting, Analysis of RNA by Northern blotting, Analysis of proteins by Western blot techniques, Dot blots and slot blots, RFLP, AFLP.
PCR: Basic principles and its modification application and uses.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Gene cloning and DNA analysis by T.A. Brown

References:

- Recombinant DNA, J.D. Watson et al, W.H. Freeman and Company
- Principles of Gene Manipulation: An Introduction to Genetic Engineering, R.W. Old and S. B Primrose, Blackwell Science Inc
- Molecular Biotechnology: Principles and Applications of Recombinant DNA, B.R. Grick and J.J. Pasternak, ASM Press
- Molecular Biology of gene by Watson, Baker, Bell, Gann, Levine, Losick
- DNA Science by Micklos Freyer
- Principles of Gene manipulation and Genomics by Primrose and Twyman

HUMAN ANATOMY AND PHYSIOLOGY

Course Code: SCT4104 **Credit Units: 02**

Course Objective: The objective of this course is to familiarize students with basic organization of adult somatic cells, human anatomy and normal physiology. Students will learn basic principles and mechanisms that dictate maintenance of pluripotency in pluripotent stem cells and their differentiation into adult stem cells, somatic cells, tissues and organs.

Course Contents:

Module-I:
Cell anatomy, organizational components, cell division mechanisms in somatic cells and pluripotent stem cells.

Module-II:
Introduction to epigenetics and its role in maintenance of pluripotency and differentiation of pluripotent stem cells into different somatic cell lineages.

Module-III:
Basics of human anatomy & physiology and role of pluripotent stem cells and adult stem cells in maintenance of normal

Module-IV:
Effect of breach in normal cellular physiology and homeostasis on human development.

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

BIOANALYTICAL TECHNOLOGIES & INSTRUMENTATION

Course Code: SCT4105 **Credit Units: 02**

Course Objective:
The course aims to educate students about bio-analytical instruments, principles of their proper functioning, and analysis methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice.

Course Contents:

Module I
BSL I, BSLII, BSLIII laboratory facility development: design and regulatory requirements. Sampling and sample preparation: Sample fixing for various analytical applications and sample processing. Principles of microscopy, Light, dark field, fluorescence microscope, confocal microscope, transmission and Scanning electron microscopy, microtomy and analysis and measurement of image. Fluorescence activated cell sorter (FACS) basic principles and applications.

Module II
Electrophoresis of DNA, RNA and proteins. Capillary electrophoresis, Two-dimensional electrophoresis, Southern blotting, Northern blotting, Immunoprecipitation, Western blotting. Sequencing, Next Generation Sequencing, RNA-Seq. etc.

Module III: Centrifugation and Spectroscopy
Centrifugation techniques: Introduction, Basic principle of sedimentation, centrifuges and their uses, Density gradient and analytical centrifugation.
UV and visible spectroscopy, infrared and atomic absorption spectroscopy, fluorescence spectroscopy, mass spectrometry, MALDITOF, nuclear magnetic resonance and electron spin resonance spectroscopy.

Module IV: Chromatography
Introduction to chromatographic techniques: Theoretical basis of chromatographic separations. Column, Thin layer, Paper, Normal phase and reverse phase chromatography, Ion-exchange, Affinity and Gas Chromatography, High performance liquid chromatography (HPLC) and GLC.

Module V
Principles of X-ray diffraction and X-ray Crystallography. Theory and application of UV-VIS, IR, NMR, Fluorescence, Atomic absorption spectroscopy; X-ray diffraction. Introduction to mass spectroscopy Radioisotopic techniques: Introduction to radioisotopes, detection, measurement and uses of radioisotopes, counting efficiency and autoradiography, biotechnological applications

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Principles of Physical Biochemistry, K.E. Van Holde, Prentice Hall.
- Essentials of Biophysics, P. Narayanan, New Age International Publishers

References:

- Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes, J.F. Van Impe, Kluwer Academic
- Crystal Structure Analysis, J.P. Glusker and K.N. Trueblood, Oxford University Press
- Crystallography made Crystal Clear, G. Rhodes, Academic Press
- Modern Spectroscopy, J.M. Hollas, John Wiley and Son Ltd.
- NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry, H. Gunther, John Wi

BIOSTATISTICS

Course Code: SCT4106 **Credit Units: 03**

Course Objective:
The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice.

Course Contents:

Module I
Statistics and Biostatistics: Preliminary concepts; Measures of Central Tendency: Mean, Median, Mode Measures of Dispersion: Range, Standard deviation, Variance

Module II: Probability
Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation.

Module III: Types of Probability Distributions
Introduction to Normal Distribution, Bernoulli Distribution, Uniform Distribution, Binomial Distribution, Poisson distribution, Exponential Distribution

Module IV: Correlation & Regression
Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation, Some examples. Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line

Module V: Hypothesis Testing
Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type1 Error, Type 11 Error, Level of significance, P-value and its applications. One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test. Normal test for sample mean and population mean, Normal test for two sample means. Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chi-square test, Coefficient of contingency, Yates' correction for continuity. Analysis of Variance: One way and Two-way (only Examples)

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:

Text:

- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee, Publisher: Elsevier.
- Statistical Methodology, S.P. Gupta, Publisher: S. Chand & Co.
- Fundamentals of Statistics, S.C. Gupta. Publisher: S.Chand & Co.

References:

- Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers Biostatistics: A foundation for analysis in the Health Sciences, W.W. Daniel, Publisher: John Wiley and Sons
- Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Publisher: S.Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics, H.C. Saxena, and V.K. Kapoor: S. Chand & Company
- Biostatistics, P.N. Arora and P.K. Malhan, Publisher: Himalaya Publishing House.

BIOLOGICAL PROGRAMMING (BIOINFORMATICS)-I

Course Code: SCT4107 **Credit Units: 01**

Course Objective:
The course offers a basic understanding of bioinformatics tools and technologies for understanding different biological pathways at systems level as well as for characterizing cross-talks between different pathways.

Course Contents:

Module I: Introduction and overview
The NCBI data model; sequence databases, sequence retrieval, sequence file formats, submitting DNA and protein sequences; classification of biological databases. Sequence databases (EMBL, GenBank, DDBJ, -UNIPROT, PIR, TrEMBL),

Module II: Sequence alignment
Global and local alignments, statistical significance of alignments, scoring matrices and gap penalties, position specific scoring matrices, programs and methods for Pairwise and multiple alignment, pattern searching programs, family and superfamily representation - Pfam, hidden Markov models.

Module III: Predictive methods using DNA and protein sequences
ESTs: construction, databases, clustering, gene discovery and identification, and functional classification. Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Cluster databases-An Introduction, Specialised databases (KEGG, etc), Database technologies (Flat-file), Protein identification tools, physical properties, motifs and patterns

Module IV: Structure databases
Structural databases - PDB and MMDB, structure file formats, Secondary and tertiary structure prediction methods in proteins, Internal and external coordinate system, software to visualize secondary and tertiary structural information in protein.folding classes, structure classification databases – SCOP and CATH;

Module V: Comparative genome analysis
Phylogenetic analysis, Evolutionary Models, Character and distance based Tree building methods; tree evaluation, phylogenetic analysis, parsimony, maximum likelihood trees; Trees-splits and metrics on trees, tree interpretation, Distance – additive, ultrametric and nonadditive distances.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Computer Science, J.G. Brookshear, Pearson, Addison Wesley
- Introduction to Bioinformation – T.Attawood
- Essentials of Genomics and Bioinformatics, C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F Quellette, Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag

CELL & MOLECULAR BIOLOGY LAB

Course Code: SCT4108 **Credit Units: 01**

Course Contents

Module I
Microscopy: Light microscopy, Bright field, Phase contrast.

Module II
Cell culture: aseptic suspension and adherent cell culture techniques. Cell number enumeration and cell passage methods, and methods for characterization of cells in culture and cell proliferation.

Module III
Induction and characterization of apoptosis and necrosis. Cell mitosis and meiosis and karyotyping techniques. Cell mounting techniques, and study of permanent slides of different types of cancer.

Module IV
Bacterial culture techniques, single cell clone isolation, bacterial transformation and transduction techniques.

Module V
Study of physical and chemical mutagens on growth of *E. coli*; PTC test.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

MOLECULAR BIOLOGY & rDNA TECHNOLOGY LAB

Course Code: SCT4109 **Credit Units: 01**

Course Objective:
The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:

Module I
Study of cloning (GFP cloning)

Module II
Design and execution of PCR, RT-PCR, quantitative RT-PCR

Module III
Study of Southern hybridization

Module IV
Study of RAPD

Module V
Site directed mutagenesis

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

BIOANALYTICAL TECHNOLOGIES & INSTRUMENTATION LAB

Course Code: SCT4110 **Credit Units: 01**

Course Contents:

Module I
Cell disruption techniques

Module II
Centrifugation – low speed and high speed.

Module III
Spectrophotometer techniques

Module IV
Chromatography –Paper Chromatography and Thin Layer Chromatography

Module V
Electrophoresis –SDS Page and Agarose gel electrophoresis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

RESEARCH PRESENTATION / LIT. REVIEW & PRESENTATION

Course Code: SCT4111 **Credit Units: 01**

Course Objective:

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	**100**

TERM PAPER

Course Code: SCT4131 **Credit Units: 01**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

b) Begin by making a list of subject-headings under which you might expect the subject to be listed.

c) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.

b) In research studies, notice the methods and procedures, results & conclusions.

c) Check cross references.

4. Outlining the paper

a) Review notes to find main subdivisions of the subject.

b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion & Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

a) summary of question posed
b) summary of findings
c) summary of main limitations of the study at hand
d) details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: 40%
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)

Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

Syllabus - Second Semester

STEM CELL TECHNOLOGY

Course Code: SCT4201 **Credit Units: 02**

Course Objective: The objective of this paper is to familiarize the students with stem cell technology and its applications for betterment of the society. The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I: Introduction to stem cells

Definition, properties, proliferation and, culture of stem cells, medical applications of stem cells, ethical and legal issues in use of stem cells.

Module II: Types of stem cells.

Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module III: Gene Therapy

Gene Therapy: Introduction, history and evolution of Gene therapy, optimal disease targets. Genetic perspectives for Gene Therapy, Gene Delivery methods: Viral vectors and Non-viral Vectors. Failures and successes of gene therapy. Future prospects of gene therapy.

Module IV: Therapeutic applications of stem cells

Applications of stem cells in cell replacement and gene therapy approaches. Stem cells in drug discovery.

Module V: Ethical Issues associated with stem cell-based regenerative medicine field

Regulatory and ethical considerations of stem cell and gene therapy. Assessing human stem cell safety, use of genetically godified gtem cells in experimental gene therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

FUNDAMENTAL IMMUNOLOGY-I

Course Code: SCT4202 **Credit Units: 02**

Course Objective:
The course provides in-depth understanding of innate and adaptive immune responses, definition and, properties of antigens, Major Histocompatibility complexes and their role in generation of immune response and transplant rejection. Factors determining generation and regulation of immune system, and cell-mediated cytotoxicity.

Course Contents:

Module I: Introduction
Phylogeny of Immune System, Innate and acquired immunity, clonal nature of Immune Response. Organization and structure of lymphoid organs Nature and Biology of antigens and super-antigens Antibody structure and function; Types of immunity:innate, acquired, active and passive.

Module II: Major Histocompatibility
MHC, BCR and TCR, generation of antibody diversity, Complement system.

Module III: Cells of the immune system
Hematopoiesis and differentiation, lymphocyte trafficking, B-Lymphocytes, T -Lymphocytes, macrophages, dendritic cells, natural killer, lymphokines and lymphokine activated killer cells, eosinophils, neutrophils and mast cells

Module IV: Regulation of immune response
Antigen processing and presentation, activation of B and T lymphocytes, cytokines and their role in immune regulation, T cell regulation and MHC restriction, immunological tolerance

Module V: Cell mediated toxicity
Mechanism of T cell and NK cell mediated lysis and macrophage mediated cytotoxicity.
Immunological Techniques: Immunodiffusion, immunoelectrophoresis, ELISA, RIA, fluorescence activated cell sorter. Cross reactivity, Precipitation and Agglutination reaction.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

HUMAN EMBRYOLOGY AND DEVELOPMENTAL BIOLOGY

Course Code: SCT4203 **Credit Units: 02**

Course Objective: The objective of this course is to familiarize students with fundamental process of human embryology and developmental biology and progression of pluripotent stem cells through different phases of development.

Course Contents:
Module-I: Basics principles of human embryogenesis--gametogenesis, fertilization and embryo development.

Module-II:
Ectoderm, mesoderm and endoderm development and process of organogenesis during human development.

Module-III:
Molecular regulation of embryogenesis and organogenesis processes during human development. Epigenetics mechanisms and their role in human development.

Module-IV:
Different types of stem cells, process and mechanism of stem cell subset development and their spatial organization during human development. Role of epigenetic mechanisms in human stem cell homeostasis and differentiation.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**
- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

BIOLOGICAL PROGRAMMING (BIOINFORMATICS)-II

Course Code: SCT4204 **Credit Units: 01**

Course Objective:
It enables the students to access biological information networks and databases in order to understand the different techniques of biotechnology to build detection systems especially in the prevention and treatment of human diseases.

Course Contents:
Module I: Data Models and Database Management Systems
File systems vs. DBMS, advantages of DBMS**,** Levels of abstraction and data independence; Data models and their comparison; Entity relationship model -concepts, design, keys and features; Relational model - introduction, structure of the relational databases, integrity constraints, Relational algebra and calculus - selection and projection, set operations, renaming, Joins, Division etc.

Module II: Introduction to Biological scripting languages: BioJava
BioJava modules for sequence alignment, data mining, structure alignment.

Module III: BioPerl & BioPython
BioPerl & BioPython modules for sequence alignment, data mining, structure alignment,

Module IV: Introduction to R Programming
Introduction to R Programming R basics; Data structures in R; R programming fundamentals; Working with data in R; Strings and Dates in R;

Module V: R/Bioconductor for advanced biological data analysis
Overview of the Bioconductor; Pre-processing microarray data; Differential gene expression; Distances, prediction, and cluster analysis; Annotation and metadata Visualization; GO;

Examination Scheme:

Components	**CT**	**Attendance**	**Assignment/ Project/Seminar/Quiz**	**EE**
Weightage (%)	15	5	10	70

Text & References:
Text:
- Data Mining: Concept and techniques, J. Han and M. Kamber, Morgan Kaufman.
- Database Management, P.C. Desai.
- Bioinformatics and Computational Biology Solutions Using R and Bioconductor (Statistics for Biology and Health)" by Vincent Carey and Sandrine Dudoit
- Statistics and Data Analysis for Microarrays Using R and Bioconductor by Sorin Drăghici

References:
- Introduction to Database Systems, C.J. Date, Addison Wesley Publishing.
- BioJava - www.biojava.org;
- BioPerl - www.bioperl.org;
- BioPython - www.biopython.org;
- R Programming Language: http://cran.r-project.org/;
- Bioconductor: http://www.bioconductor.org ;

MOLECULAR MEDICINE: PRINCIPLES AND APPLICATIONS

Course Code: SCT4205 **Credit Units: 03**

Course Objective
The students will be exposed to basic concepts related with human health development of different types of infectious and non-infectious diseases.

Course Contents

Module I: Medical Biotechnology
History and scope of medical biotechnology, current status and future prospects.

Module II: Classification of genetic diseases
Chromosomal disorders – Numerical disorders e.g. trisomies & monosomies, Structural disorders e.g deletions, duplications, translocations & inversions, Chromosomal instability syndromes. Gene controlled diseases – Autosomal and X-linked disorders, Mitochondrial disorders.

Module III: Molecular basis of human diseases
Mechanism of disease development, Genetic susceptibility, Identification of targets for diagnosis and therapy: Acquired diseases, cardiovascular diseases, Neurological diseases, Hematology, Cancer. Pathogenic mutations: Gain of function mutations: Oncogenes, Huntingtons Disease, Pittsburg variant of alpha 1 antitrypsin. Loss of function: Tumour Suppressor. Dynamic Mutations - Fragile- X syndrome, Myotonic dystrophy. Mitochondrial diseases.

Module IV: Traditional and Modern Tools for Detection of Genomic Abnormalities
Classical gene mapping techniques, next generation sequencing technology.

Module V: Nucleic acid based Therapy
Gene silencing technology, siRNA, Aptamers, antisense oligodeoxynucleotides (AS-ODN), Ribozymes, Peptide Nucleic Acids

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (August 15, 2000) ISBN-10: 0896037983
- Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon Sales Rank: #287831 in Books
- Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank
- Principles of Biostatistics by Marcello Pagano , Kimberlee Gauvreau
- Essentials of Epidemiology in Public Health, Second Edition by Ann Aschengrau, George R., III Seage
- Designing Clinical Research: An Epidemiologic Approach, by Stephen B. Hulley, Steven R. Cummings
- Journal articles and reviews

NANO-MEDICINE AND TECHNOLOGIES

Course Code: SCT4206 **Credit Units: 03**

Course Objective:
Nanotechnology is the branch of biotechnology that utilizes nanomaterials for biological applications to develop novel solutions to different scientific and medical problems. Students will learn basic concepts, techniques and technologies and applications of nanomaterials for biotechnology and medical applications.

Course Contents:
Module I: Introduction to Nanotechnology
Historical perspective of the developments in the field of nanotechnology. Classification of nanostructured materials, physical environment regulations governing nanomaterials, and rules governing health and safety regulations for chemicals and nanomaterials.

Module II: Investigation and manipulation of nanomaterials
Principal and applications of electron microscope, scanning probe microscope, optical microscope, Fourier transform Infrared spectroscopy, X-ray photoelectron spectroscopy, and X-ray diffraction for nanoscience and technology.

Module III: Nanostructures for medicinal applications and toxicity
Introduction to nanomedicine and nanobiotechnology materials, their applications and therapeutic and commercial implications. Micro- and nanoscale control of cellular environment for tissue engineering. Nanoparticle contrast agents for molecular magnetic resonance imaging. Nano-material-based cancer therapeutics.

Module IV: Safety and regulatory issues associated with nanomaterials
Nanomaterials and toxicity evaluation: cytotoxicity, genotoxicity, in-vivo-tests and assays. Biological barriers to nanocarrier-mediated delivery of therapeutic and imaging agents.

Module V: Societal implications of nanoscience
From first industrial revolution to nano-revolution. Implications of nanoscience and nanotechnology for society, nano policies, nano arms race, public perception and public involvement in nano discourse. Harnessing nanotechnology for economical and social development

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Texts:

- Nanobiotechnology: Concepts, Applications and Perspectives by Christof M. Niemeyer and Chad A. Mirkin, First Wiely 2006, ISBN: 978-3-527-60591-0.
- Nanobiotechnology II: More Concepts and Applications by Chad A. Mirkin and Christofer M. ZNiemeyer, Wiely 2007, ISBN: 978-3-527-31673-1.
- Nano-The essentials- Understanding the nanoscience and technology by T. Pradeep, Tata McGraw-Hill Publishing Company Limited 2008, ISBN-10:0-07-154829-7/0071548297.

FERMENTATION TECHNOLOGY AND ITS APPLICATIONS IN MOLECULAR MEDICINE

Course Code: SCT4207 **Credit Units: 03**

The course will educate students about use microorganism to produce various compounds of commercial interest. The student will be exposed to various techniques available for large scale cultivation of microorganisms.

Course Contents:

Module I
Introduction to fermentation process, Batch and Continuous production systems of cultivation, Solid-state fermentation process.

Module II
Selection of industrial microorganisms, media for fermentation, aeration, pH, temperature and other requirements during fermentation, downstream processing and product recovery, food industry waste as fermentation substrate.

Module III
Production of compounds like, antibiotics, enzymes, organic acids, solvents, beverages, SCP.

Module IV
Production of fermented dairy products

Module V
Immobilized enzymes systems, production and applications.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:
- Principles of Fermentation Technology by P.F. Stanbury, A. Whitaker, and S.J. Hall, Aditya Books (P) LTD.
- Industrial Microbiology by L.E.Casida, JR. New Age International (P) LTD.
- Biotechnology, A Text book of Industrial Microbiology, W. Crueger and A. Crueger, Sinauer Association.

References:
- Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker
- Biochemical Engineering Fundamentals, J.E. Bailey and D.F. Ollis, McGraw-Hill
- Protein Purification, M.R. Ladisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society ***Text:***
- Industrial Microbiology – Cassida
- Principles of fermentation Technology, Salisbury, Whitaker and Hall
- Industrial microbiology – Prescot & Duhn.

STEM CELL TECHNOLOGY LAB

Course Code: SCT4208 **Credit Units: 01**

Course Contents:
Module-I:
Stem cell isolation and characterization.

Module-II:
Generation of iPSC lines and characterization of their pluripotency profile and genome stability (Stem Cell Keryotype analysis).

Module-III:
Differentiation of iPSC into somatic cell lineages and characterization of stem cell-derived somatic cell populations.

Module-IV:
Functional characterization of stem cell-derived somatic cell populations.

Module-V:
Recent advances in stem cell therapeutics and stem cell-based drug discovery.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Text & References:
***Text*:**
- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer.

***References*:**
- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

NANO-MEDICINES AND TECHNOLOGIES LAB

Course Code: SCT4209 **Credit Units: 01**

Course Objective:
This course offers understanding of generation of nano particles, their characterization and applications.

Course Contents:

1. Demonstration about occupational health and safety (OHS) and workplace health and safety (WHS) in nanotechnology.
2. Preparation of aqua regia, its handling and role in washing glass-wares for metal nanoparticles sysnthesis.
3. Optimization of temperature for metal nanoparticle preparations using biological materials.
4. Synthesis of silver nanoparticles and analysis of their surface Plasmon resonance (SPR) properties.
5. Neem extract mediated silver nanoparticle synthesis and analysis of their optical properties.
6. Dye degradation using silver nanoparticles synthesized in experiments 4 and 5.
7. Preparation of metal oxide nanoparticles and their characterization.
8. Interactions of silver nanoparticles with red blood cells.
9. Interaction of silver nanoparticles with bacterium and their antimicrobial properties.
10. Preparation of nanoparticles containing polymeric films.

Examination Scheme:

IA			**EE**			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

FUNDAMENTAL IMMUNOLOGY-I LAB

Course Code: SCT4210 **Credit Units: 01**

Course Contents:

1. Blood film preparation and identification of cells.
2. Immuno-diffusion.
3. Hemagglutination, Agglutination inhibition.
4. Rocket immune-electrophoresis.
5. Western blotting, ELISA.
6. Epitope prediction using Immuno-informatics tool.
7. Isolation of Peripheral blood mononuclear cells.
8. Phenotype analysis.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner

BIOLOGICAL PROGRAMMING (BIOINFORMATICS)-II LAB

Course Code: SCT4211 **Credit Units: 01**

Course Contents:

Module I
Database creation using DDL and DML. Defining the primary and secondary keys.Implementation of selection, projection and joins (internal and external) with MySQL

Module II
Introduction to Linux Shell Programming, Running BioJava Scripts

Module III
Running BioPerl and BioPython Scripts

Module IV
Programming in R basic scripts

Module V
R/Bioconductor programming for DEGs, Visualization and annotation.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

Note: Minor variation could be there depending on the examiner

Syllabus - Third Semester

CANCER BIOLOGY & CANCER THERAPEUTICS (T CELL AND ANTIBODY-BASED THERAPEUTICS)

Course Code: SCT4301 **Credit Units: 03**

Course Objective: The objective of this paper is to provide students greater understanding of different approaches for T cell-based and antibody-based cancer immunotherapy approaches.

Course Contents:

Module I

Biology and mechanism of cancer development. Chemotherapy, radiation therapy, immunotherapy of cancer.

Module II

History of Vaccine Development, Definition of Vaccine, Evolution of Vaccines, Process development for vaccines, Manufacturing of vaccines, Various aspects of vaccines, process development and manufacturing.

Module III

Clinical development of vaccines, Clinical end-point: Evolution of vaccines, General specifications and pharmaceuticals release criteria for the existing vaccines, Cold chain management of vaccines, Current vaccine research: Immune checkpoint strategies in cancer immunotherapy.

Module IV

Engineered anti-tumor immunity: T cell receptor (TCR) and chimeric antigen receptor technology development and TCR/CAR-engineered anti-tumor immunity.

Module V

Antibody-based cancer immunotherapy. Antibodies as drug carriers.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (August 15, 2000) ISBN-10: 0896037983
- Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon Sales Rank: #287831 in Books
- Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank
- Principles of Biostatistics by Marcello Pagano , Kimberlee Gauvreau
- Essentials of Epidemiology in Public Health, Second Edition by Ann Aschengrau, George R., III Seage
- Designing Clinical Research: An Epidemiologic Approach, by Stephen B. Hulley, Steven R. Cummings
- Journal articles and reviews

HUMAN STEM CELL CULTURE & DIFFERENTIATION METHODS

Course Code: SCT4302 **Credit Units: 03**

Course Objective: The objective of this paper is to provide students greater understanding of methodologies for generation of different cell lineages from pluripotent stem cells, and their phenotypic and functional characterization.

Course Contents:

Module-I:

History of human pluripotent stem cell development: isolation of human embryonic stem cells, generation of human induced pluripotent stem cells (iPSC).

Module-II:

Methodologies for pluripotent stem cell culture, characterization of pluripotency. Methods for differentiation of PSC into different lineages, e.g. RBCs, platelets, lung cells, heart cells, neuronal cells, and their functional characterization.

Module-III:

Methods to engineer pluripotent stem cells for treatment of genetically impaired conditions/diseases: Viral and non-viral vector-mediated gene delivery, homologous gene recombination-mediated genome engineering, CRISPR/TALEN-mediated gene editing.

Module-IV:

Stem cell-based organogenesis, xeno-free culture systems for stem cell-based therapeutics, Immunogenicity of PSC, 3D-culture systems and bioreactors for stem cell culture and differentiation.

Module-V:

Ethical, regulatory and safety issues affective pluripotent stem cell-based cell replacement therapies. Technological challenges towards development of pluripotent stem cell-based cell replacement therapies. Methodologies and recent advances in development of stem cell-based clinical trials.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer.

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

VACCINES AND PRECLINICAL ANIMAL MODELS

Course Code: SCT4303 **Credit Units: 02**

Course Objective:
The application of Animal Biotechnology covers major areas related to commercial applications. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I
Historical perspectives, sterilization methods, organ culture - culture techniques, plasma clot, raft methods, agar gel, grid method, organ engineering. Cell culture substrates, cultural media, natural and artificial media, initiation and maintenance of cell cultures, cell culture products, cryopreservation techniques, immobilized cultures

Module II
In vitro fertilization and embryo transfer

Module III
Somatic cell hybridization, hybridoma technology. Animal genetic engineering, vectors, gene transfer methods: microinjection, virus mediated and other methods of gene transfer

Module IV
Transgenic animals with new traits, transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutics. Animal models for cancer research.

Module V
Bioethical issues related to utilization of animals in ,

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References

- Cell Culture LabFAx, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication

FUNDAMENTAL IMMUNOLOGY-II

Course Code: SCT4304 **Credit Units: 02**

Course Objective:
Role of antibody engineering in biomedical applications and the importance of immune-genetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I: Antigen, antibody definitions, properties and utility
Antigens and Antibodies: Factors responsible for immunogenicity, Epitopes, Adjuvants, superantigens, Antigen Presentation and processing, Structure and function of antibody, Antibody classes, Passive antibody therapy, Monoclonal antibody, Antibody engineering, Generation of antibody diversity

Module II: Autoimmunity, Hypersensitivity and Immunodeficiency
Tolerance and Autoimmunity, Types and mechanism of autoimmune diseases, Hypersensitive reactions, Transplantation types, Immunological basis of graft rejection. Primary and secondary immunodeficiency, AIDS

Module III: Tumor immunology, Immunity to infectious agents
Immune response to viral infections, Tumor immunity and Tumor antigens, Immunodiagnostics (diagnosis of infectious diseases)

Module IV: vaccines
General consideration, ideotype network hypothesis, Synthetic vaccines: Active and passive immunization, Vaccine types (Live but attenuated, Killed, Subunit, Recombinant, DNA and Peptide).

Module V: Hybridoma technology and its applications
Fusion of myeloma cells with lymphocytes

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text:
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company

References:
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
- Kuby Immunology, R.A. Goldsby, T.J. Kindt, and B.A. Osborne, Free

GENOMICS & PROTEOMICS

Course Code: SCT4305 **Credit Units: 02**

Course Objective:
The course involves a basic understanding of computer and bioinformatics tools and skills in the field of biology.

Course Contents:

Module I: Essential Probability and Statistical Models
Conditional Probability, Bayesian Probability, HMM, Profile HMM, Mapping and Sequencing Algorithms

Module II: Similarity Searching Algorithms
Global and local alignments, statistical significance of alignments, scoring matrices and gap penalties, position specific scoring matrices, programs and methods for Pairwise and multiple alignment, pattern searching programs,

Module III: Gene Predictive Methods
family and superfamily representation - Pfam, hidden Markov models Protein family/domain databases (PROSITE, PRINTS, Pfam, BLOCK, etc), Gene finding,

Module IV: Classification algorithms
Phylogenetic analysis, Evolutionary Models, Character and distance based Tree building methods; tree evaluation, phylogenetic analysis, parsimony, maximum likelihood trees; Trees-splits and metrics on trees, tree interpretation, Distance – additive, ultrametric and nonadditive distances.

Module V: Proteomics Algorithms
Algorithms for Secondary, tertiary structure prediction methods, docking, protein-protein, protein-DNA interaction algorithms, minimization and simulation algorithms, peptide sequencing problem, .

Module VI: Comparative genome analysis
Algorithmic basis of reconstruction of metabolic pathways; genome rearrangements with inversions, signed inversions, functional classification.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
Text:

- Gusfield, Dan. *Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology*. Cambridge, UK: Cambridge University Press, 1997. ISBN: 0521585198.
- Waterman, Michael. *Introduction to Computational Biology: Maps, Sequences, and Genomes*. Boca Raton, FL: CRC Press, 1995. ISBN: 0412993910.

- Durbin, Richard, Graeme Mitchison, S. Eddy, A. Krogh, and G. Mitchison. *Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids*. Cambridge, UK: Cambridge University Press, 1997. ISBN: 0521629713.
- Jones, Neil, and Pavel Pevzner. *An Introduction to Bioinformatics Algorithms*. Cambridge, MA: MIT Press , 2004. ISBN: 0262101068.

References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, D. Gusfield, Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, A.D. Baxevanis and B.F.F Quellette, Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis, D.W. Mount, Cold Spring Harbor Laboratory Press.
- Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit, G. Von Heijne and G. Von Heijne, Academic Press.
- Structural Bioinformatics, Philip E. Bourne, Helge Weissig 2003
- Statistical Methods in Bioinformatics: An Introduction, G.R. Grant, W.J. Ewens, Springer Verlag

ETHICS OF BIOMEDICAL RESEARCH, INTELLECTUAL PROPERTY (IP), IP RIGHTS (IPR)

Course Code: SCT4306 **Credit Units: 02**

Course Objective

The aim of this course is to develop the understanding of relevance, business Impact and protection of Intellectual Property along with the types of Intellectual Property Rights: Patents, Trademarks, Copyrights, Industrial Designs, Geographical Indications and International Conventions, Biosafety and Bioethics

Course Contents

Module I: Basic Principles and Acquisition of Intellectual Property Rights

Basic Principles of Patent Law, Patent Application procedure, Drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark and Design Rights, International Background of Intellectual Property

Module II: Ownership and Enforcement of Intellectual Property Rights

Patents-Objectives, Rights, Assignments, Defences in case of Infringement. Copyright-Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defences for infringement. Trademarks-Objectives, Rights, Protection of goodwill, Infringement, Passing off, Defences. Designs-Objectives, Rights, Assignments, Infringements, Defences of Design Infringement, Enforcement of Intellectual Property Rights - Civil Remedies, Criminal Remedies, Border Security measures, Practical Aspects of Licensing - Benefits, Determinative factors, important clauses, licensing clauses.

Module III: Biotechnology and Intellectual Property Rights

Objective, Evolution, Basic Structure of Gene Techniques, Applications, Commercial Potential of Biotech Inventions, Rationale for Intellectual Property Protection. Patenting Biotechnology Inventions-Objective, Concept of Novelty, Concept of inventive step, Microorganisms, Moral Issues in Patenting Biotechnological inventions. Plant Varieties Protection-Objectives, Justification, International Position, Plant Varieties Protection in India Protection of Geographical Indications Objectives, Justification, International Position, Multilateral Treaties, National Level, Indian Position.

Module IV

Biosafety and Bioethics Management-Key to environmentally responsible use of biotechnology. Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques. Biosafety: History, evolution and concept of biosafety; need and application of biosafety in laboratories and industries; biosafety guidelines and regulations, international and national norms of biosafety; Implementation of biosafety guidelines; Classification and Description of Biosafety levels. Good laboratory practice (GLP) and Good manufacturing practice (GMP), Use of GMO's and their release, GM products, issues in use of GMO's, risk for animal/human/agriculture and environment owing to GMOs. Bioethics: Introduction and need of bioethics, its relation with other branches, types of risk associated with genetically modified microorganisms, Ethical Issues involving GMOs; ethics related to human cloning, human genome project, prenatal diagnosis, agriculture and animal rights, data privacy of citizens health; ethical issues in India and abroad through case studies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

Text

- Intellectual Property Rights by Birgitte Anderson, Edward Elgar Publishing
- Intellectual Property Rights and the Life Science Industries by Graham Dutfield, Ashgate Publishing

References

- WIPO Intellectual Property Handbook
- Intellectual Property by William Rodelph Cornish, David Clewelyn
- Globalising Intellectual Property Rights by Duncan Matthews
- Journals and Current magazines

PLANT BIOTECHNOLOGY AND ITS APPLICATIONS IN MOLECULAR MEDICINE

Course Code: SCT4307 **Credit Units: 02**

Course Objective:
The application of Plant Biotechnology covers major areas related to commercial applications. Regeneration of plants through *in vitro* techniques offers a practical strategy for micro propagation. Importance will also be given to areas like *in vitro* fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

Module I
Historical perspective of plant tissue culture.
Tissue culture lab and organization
Sterilisation techniques
Types of nutrient media and media composition
Plant regeneration pathways
Role of phytohormones
Cell culture techniques- cell, tissue, organ cultures, callus culture, suspension culture
Culture techniques Callus culture, cell culture and protoplast cultures.

Module II
Organogenesis and somatic embryogenesis.
Applications of plant tissue and cell culture.
Micropropagation, pathogen free plants. production haploids,
Somaclonal variation.preservation of germplasm.

Module III
Genetic engineering in plants, - transformation vectors
Gene transfer techniques-vector meditated and vector less gene transfer.
Transgenic plants transgene integration and expression

Module IV
Transgenic crop with new traits-herbicide tolerance, insect and disease resistance,
Therapeutic proteins and compounds
Oral vaccines
Production of secondary metabolites via tissue culture
Bioethics of plant genetic engineering.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Experiments in Plant Tissue Culture, J.H. Dodds and L.K. Roberts, Cambridge University Press
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Biotechnology, J. Hammond, P.McGarvy and V. Yusibov, Springer Verlag.
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Adacemic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences

FUNDAMENTAL IMMUNOLOGY-II LAB

Course Code: SCT4308 **Credit Units: 01**

Course Contents:

Module I
Blood film preparation and identification of cells. Identification of blood groups.

Module II
Isolation of serum. Purification of lgG through affinity chromatography

Module III
Immunohistochemistry. Lymphoid organs and their microscopic organization.

Module IV
WIDAL Test

Module V
Radial Immuno-diffusion Test. Ouchterlony Double diffusion Test. DOT, Sandwich ELISA.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

GENOMICS & PROTEOMICS LAB

Course Code: SCT4309 **Credit Units: 01**

Course Contents:

Module I
Three dimensional Structures – In silico study – large molecular complexes RNA polymerase II, ribosome, unstructured proteins

Module II
Microarray and Microarray data analysis, DNA sequencing methods, next generation sequencing.

Module III
Comparison of two given genomes

Module IV
Inference of protein function from structure

Module V
Gene finding tools and Genome annotation.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

STEM CELL CULTURE LAB

Course Code: SCT4310 **Credit Units: 01**

Course Objective:
Students will learn methods for isolation, culture and maintenance of immune cells, for example T cell lines, human primary T cells and antigen presenting cells. Students will also learn nuances of antigen-specific immune response generation, antigen processing and presentation, cell phenotype analysis, cell proliferation, cell death and cytotoxicity assays.

Course Contents:

1. Culture of immortalized immune cell lines, for example Jurkat, T2-A2 etc.
2. Isolation of CD4 and CD8+ T cells from human peripheral blood.
3. Cell phenotype analysis, calculation of CD4:CD8 ratio in normal healthy individual blood.
4. Isolation and characterization of antigen presenting cells.
5. Activation of T cells by non-specific stimulus as well as by engaging their T cell receptor (TCR).
6. Cell proliferation assay.
8. Generation, and phenotypic and functional characterization of antigen-specific T cell response.
9. B cell culture and hybridoma technology.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	**Mid Term Viva**	**Attendance**	**Major Experiment**	**Minor Experiment/Spotting**	**Practical Record**	**Viva**
15	10	05	35	15	10	10

SCIENTIFIC COMMUNICATION SKILL DEVELOPMENT (SEMINAR/ WORKSHOP)

Course Code: SCT4311 **Credit Units: 01**

Students will learn how to do literature search on a particular topic, how to construct, organize and deliver a scientific presentation.

Examination Scheme:

Literature Search/Project Report	50
Presentation	50
Total	**100**

SUMMER INTERNSHIP EVALUATION

Course Code: SCT4335 **Credit Units: 03**

GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

Methodology

The students will be sent to various industries and institutes where they will undergo short term training. After the completion of the training the students will be required to submit project report which shall then be evaluated by two internal examiners. The students will then have to appear for a Viva Voce examination to be conducted by an external evaluator at the end of the semester.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

➢ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)

Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➢ **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➢ **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

➢ **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➢ **Materials and Methods**

This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➢ **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in textbooks. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations

should also be numbered and unless it is really necessary never write in "point" form.

➢ **Conclusion**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➢ **Future prospects**

➢ **Appendices**

The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➢ **References / Bibliography**

This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infec*, **8** (suppl 1): 116–117.

For book

Kowalski, M. (1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research
Data Analysis
Analyse Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Examination Scheme:

Project Report	50
Viva Voce	50
Total	**100**

SYSTEMS BIOLOGY

Course Code: SCT4312 **Credit Units: 02**

Course Objective:
The course offers different tools and technologies for systems biology analysis, interpretation of data and development of hypothesis based on interpretations. Students will get acquainted with the diversity of different organisms and models and mathematical frameworks used in systems biology, and their application to a range of biological systems and processes.

Course Contents:

Module-I:
Concepts and working principles of System Biology.

Module-II:
The multi-scale and multi-disciplinary nature of Systems Biology. Introduction to System Biology platforms. Proprietary system Biology platform. Practical applications of System Biology in Life Sciences.

Module-III:
Microarray data analysis - Microarray analysis platforms - Introduction to Concepts and principles of Microarray technology - Application of Microarrays in Life Sciences.

Module-IV:
Different Markup languages used in systems biology. Introduction to NGS technology. Current research topics within the field

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Texts & References
Texts:

- System Biology: Computational Systems Biology (Hardcover) by Andres Kriete (Editor), Roland Eils (Editor)
- Stochastic Modelling for Systems Biology. ISBN-10 1-58488-540-8 and ISBN-13 978-158488-540-5
- Microarray Data Analysis: Gene Expression Data Analysis. A Beginner's Guide By: Helen Causton (Imperial College), J Quackenbush and AlvisBrazma (The European Bioinformatics Institute)
- A Practical Approach to Microarray Data Analysis (Hardcover) by Daniel P. Berrar (Editor), Werner Dubitzky (Editor), Martin Granzow (Editor)

TERM PAPER

Course Code: SCT4331 **Credit Units: 02**

METHODOLOGY

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consists of the following steps:

- Choosing a subject
- Finding sources of materials
- Collecting the notes
- Outlining the paper
- Writing the first draft
- Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

e) Begin by making a list of subject-headings under which you might expect the subject to be listed.

f) The sources could be books and magazines articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

d) Get facts, not just opinions. Compare the facts with author's conclusion.

e) In research studies, notice the methods and procedures, results & conclusions.

f) Check cross references.

4. Outlining the paper

c) Review notes to find main sub-divisions of the subject.

d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main ideas.

6. Editing & Preparing the final Paper

g) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

h) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

i) Check for proper spelling, phrasing and sentence construction.

j) Check for proper form on footnotes, quotes, and punctuation.

k) Check to see that quotations serve one of the following purposes:

(iv) Show evidence of what an author has said.

(v) Avoid misrepresentation through restatement.

(vi) Save unnecessary writing when ideas have been well expressed by the original author.

l) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

- Title page
- Table of contents
- Introduction
- Review
- Discussion & Conclusion
- References
- Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

- summary of question posed
- summary of findings
- summary of main limitations of the study at hand
- details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Bibliographical conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited Volumes
Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited Articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal Articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic Book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic Journal Articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other Websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished Papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished Theses/ Dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts,...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation: (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	40%
Final Evaluation: (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	60%

Syllabus - Fourth Semester

PROJECT/ DISSERTATION

Course Code: SCT4437 **Credit Units: 18**

Course Objective:
The students are expected to utilize their scheduled periods by undertaking the project that would be completed during the semester

Every student shall undertake a major Project. The major Project shall be undertaken in some biotechnology industry or laboratory of repute. Each student shall be assigned to a faculty who shall continuously monitor the progress of the Project in the concerned laboratory or industry. The faculty, in consultation with the concerned scientist of the industry/laboratory, shall decide the topic of the project. At the conclusion of the project the student shall submit a seminar and a dissertation. The dissertation shall be evaluated by the internal faculty/examiner. The student then shall have to appear for the viva voce examination.

GUIDELINES FOR PROJECT FILE
Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include
- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout
The report should contain the following components:

➢ **Title or Cover Page**

The title page should contain the following information: Project Title; Student's Name; Course; Year; Supervisor's Name.

➢ **Acknowledgements** (optional)
Acknowledgment to any advisory or financial assistance received in the course of work may be given.

➢ **Abstract**
A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

➢ **Table of Contents**
Titles and subtitles are to correspond exactly with those in the text.

➢ **Introduction**
Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

➢ **Materials and Methods**
This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

➢ **Results and Discussion**
Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

➢ Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.

➢ **Conclusion**
A conclusion should be the final section in which the outcome of the work is mentioned briefly.

➢ **Future prospects**

➢ **Appendices**
The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➢ **References / Bibliography**
This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples

For research article

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect*, 8 (suppl 1): 116–117.

For book

Kowalski, M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.

Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.

Project execution is concerned with assessing how much work has been put in.

The File should fulfill the following ***assessment objectives:***

Range of Research Methods used to obtain information

Execution of Research

Data Analysis

Analyse Quantitative/ Qualitative information

Control Quality

Draw Conclusions

Examination Scheme:

Dissertation:	50
Viva Voce:	50
Total:	**100**

ANALYSIS OF BUSINESS OF SCIENCE AND ALTERNATIVE CAREERS IN MOLECULAR MEDICINE & REGENERATIVE MEDICINE

Course Code: SCT4401 **Credit Units: 01**

Course Objective:
Students will be provided study material on business aspects of science/biotechnology. Material may include papers, articles, webinars etc.

Examination Scheme:
Assignment/Project/Viva: 100

INDUSTRY TRENDS AND CAMPUS RECRUITMENT EVENTS AND CAREER COUNSELING

Course Code: SCT4402 **Credit Units: 01**

Course Objective:
Students will be provided study material on Molecular Medicine and Stem Cell Technology Industry trends. Material may include papers, articles, webinars etc..

Examination Scheme:
Assignment/project: 100

Amity Medical School

Master of Science - Dietetics & Applied Nutrition

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

ADVANCED NUTRITION-I

Course Code: DAN4101 **Credit Units: 04**

Course Objectives

1. The subject helps students to get detailed information about the various nutrients, their metabolism, classification, functions and food sources.
2. The health benefits and the role of nutrients in health and diseases are being included.
3. To make students understand the basics of food requirement, hunger, including information of individual's body composition which will make students understand the physiology of hunger.
4. Students are made to learn about physiology of water and its importance, including maintaining its regulation in the body.
5. Diseases of water and electrolyte imbalances are included to make students learn about their importance which may be useful to them in practical terms as well.

Course Contents:
Module – I: Body Composition:
General body composition, determination of body water acid-base balance, extra cellular water, cell mass and body fat. Change in body composition

Module – II: Physiology of hunger and Water
Regulation of food intake Water intake and loss, exchange of water in body, effect of low and excess water and intake and effect of electrolytes on water balance

Module – III: Energy
Components of energy requirements . Factors affecting energy expenditure and requirements. Factors affecting the thermic effect of food. Energy content of food stuffs –unit and determination of gross and physiological energy value of food Energy expenditure – factors affecting – BMR and its maintenance Determination of energy metabolism of humans by direct and indirect method , Thermogenesis; Specific dynamic action (SDA)

Module – IV: Carbohydrates:
Types, Classification, digestion, absorption and transport- review, dietary fiber, fructo-oligosaccharides. Glycemic index of foods. Sweeteners- nutritive and non nutritive. Role of carbohydrate in health and disease

Module – V: Proteins:
Functions of protein. Evaluation of protein quality. Improvement of quality of protein in diet. Methods of estimating and assessing protein requirements at different stages of life cycle.Deriving Nutritional requirements and recommended dietary allowances for different age groups. Hormonal control of protein Metabolism.

Module – VI: Lipids and Dietary Fiber
Classification, digestion, absorption, transport - review. Functions of EFA. Role of n-3, n-6 fatty acids in health and disease.Requirements of total fat and fatty acids. Tran's fatty acids Prostaglandins Components of dietary fiber - Physiological effects of dietary fibe , Potential health benefits of dietary fiber. Recommended intake of dietary fiber

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Text and References:

Texts:

1 Modern Nutrition in; Health and Disease – Goodhearth, R. S.
2 Recommended dietary allowance for Indian – I.C.M.R., 1980
3 Nutrition and Development- Winick 1973, Univ. of Calombia.
4 Biology of Nutrition – Eclames 1972, Palaniuma Press
5 Foods & Nutrition – Krause 1972, Saunders.
6 Proteins and Human Foods 1970, Lowrie, Avi. Pub. Co.
7 Nut. & Physical ;fitness-BoGert L.J.
8 Principles of Nut. – Wilson, L.D. and Fisher. K.H.
9 Standardised diets for Hospital – National Nut. Advisory Committee
10 Nutrition in Health & Disease – Cooper, L. Barher, L. Mitehell, Hand Rynheraen.

References:

11 Nutrition A comprehensive: Beaton and McHanery, Treatise Vol-1, II, & III. 12 Human Nut. & Dietectics- Davidson S., Passmore, R., Brook, J.E. and Truswell.
13 Foods and Nut.- Rankin, W. Munn. Hildath E.N.
14 Iron deficiency – Holiberth, H.C. Harvorth, vannotti, N.Y.
15 Trace Elements in Human and Animal Nut. – Underwood, N.Y.
16 Essays in Biochemistry – Samul Graff, Tandon Book Dept. Sec. –16
17 Diabetes Mellitus- The Williams and Wilkinas Co., U.S.A.

NUTRITIONAL BIOCHEMISTRY-I

Course Code: DAN4102 **Credit Units: 04**

Course Objectives

1. This subject makes students understand about the basic concepts of biochemistry like cell and the various processes involved in it like the release of energy.
2. Students are made to know about the various enzymes involved in the various biochemical reactions taking place in the human body.
3. The subject involves understanding of various nutrients and their involvement in the processes occurring in our body.
4. Biochemical structures, various acids, their classification are being learnt by the students.

Module – I :

Principles of Bioenergetics- Concept of free energy, Oxidation and reduction, concept of cell, high energy compounds (ATP, PEP, and Phosphogens),role of ATP/ADP cycle in transfer of high energy phosphates, concept of coupled reactions.

Module – II :

Carbohydrates-

Definition, classification.

Monosaccharides Classification, occurrence, structure, stereoisomerism (DL and RS systems) and Properties, derivatives of Monosaccharides- deoxy sugars and amino sugars. **Disaccharides** of nutritional importance (sucrose, maltose, lactose),

Polysaccharides Homopolysaccharides- starch, glycogen, cellulose,

Heteropolysaccharides - glycoprotein, Proteoglycans, mucopolysaccharides, pectins.

Module – III :

Lipids : Definition, classification. Structure and functions of fatty acids (including essential fatty acids) Trans fatty acids, prostaglandins acylglycerols, phospholipids, sphingolipids, glycolipids, steroids (including role of cholesterol). Characterization of fats- saponification, iodine, acid, acetyl and peroxide value.

Module – IV :

Amino acids and Proteins: Common structural features,classification based on the nature of R group, non-protein amino acids, essential amino acids and titration curves of monoamino-monocarboxilic,monoamino-dicarboxilic and diamino-monocarboxilic acids. peptide bond,biological role of proteins, classification of proteins, levels of protein structure- primary, secondary (super secondary elements in brief), tertiary and quaternary structure, forces stablizing protein structure, denaturation of proteins.

Module – V :

Enzymology: General Characteristics, classification and nomenclature, coenzyme, cofactor, prosthetic group, concept of holoenzyme and apoenzyme, units of enzyme activity, Enzyme kinetics- Michaelis-Menten and Lineweaver-Burk equation for monosubstrate reactions (turnover number), bisubstrate reactions.

Module – VI :

Nucleic acids: Nitrogenous bases, experimental proof of DNA and RNA as genetic material, Chargaff's rules, double helical model of DNA (A, B and Z), DNA packaging, types of RNA and their functions.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:

Texts:

1 Harper's Biochemistry- Robert K. Murray
2 Textbook of Biochemistry- West and Todd
3 Bio chemical aspect of Nutrition – S.X.C.- Okoyo
4 Food Chemistry – O.R. Fennema
5 Biochemistry – Voet and Voet
6 Principles of Biochemistry – A.L. Lehniger

References:

7 Outlines of Biochemistry- E. E. Conn
8 Practical Clinical Biochemistry- Harold Varley

HUMAN PHYSIOLOGY

Course Code: DAN4103 **Credit Units: 03**

Course Objectives:

1. Students learn about the various systems included in the human body.
2. The organs involved, their working and their functions in detail are being known by the students.
3. The various diseases of each system and their causative factors are focussed.
4. This subject makes students learn about Hyper and hypo activity of the various organs and imbalances.
5. Importance of various hormones and their role in various diseases in learnt by the students.

Course Contents:

Module – I :

Digestive System : Different parts of digestive system, Secretory and digestive functions of the salivary glands, stomach, pancreas, liver and intestines, mechanism of absorption of carbohydrates, proteins and fats.

Module – II :

Cardiovascular system: Structure and function of the heart, ECG, cardiac cycle, cardiac output, heart sounds, regulation of heart rate, blood pressure, Factors affecting it and hypertension, composition and function of blood: RBCs, WBCs, hemoglobin, plasma proteins, erythropoiesis, coagulation of blood, Rh factor, blood groups.

Module – III:

Respiratory system: Structure of respiratory organs, uptake and delivery of respiratory gases and regulation of breathing, Laryngitis, pharyngitis, bronchitis, asthma in brief.

Module – IV :

Reproductive system : Structure and function of testis and ovaries, Menstrual cycle, puberty, menopause, breast and cervical cancer, menstrual disorders, infertility, ultra sound imaging in brief.

Module – V :

Excretory System: Structure and function of kidneys, mechanism of urine formation and the role of the kidneys in water and electrolyte balance, renal stone, albuminurea, haematourea, oedema, uremia, incontinence, in brief.

Module – VI :Sensory System

General senses (types, structure and functions).Special senses (olfaction, vision, gestation, equilibrium and hearing).

Module – VII : Endocrine System

Structure, functions and the different syndromes resulting from hypo or hyperactivity of the following glands: Thyroid, parathyroid, adrenal cortex, adrenal medulla, endocrine pancreas, pituitary.

Module – VIII :Nervous system

Main divisions, structure and function of various parts of brain: brain stem, cerebral cortex, cerebellum and diencephalon, structure and function of spinal cord, cerebrospinal fluid, cranial and spinal nerves, introduction to autonomic nervous system, neuralgia, sciatica, coma, poliomyelitis, EEC, CT in brief.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE

Weightage (%)	5	10	8	7	70

Text and Reference:

Texts:

1 Stand, F.L. Modern Physiology the Macmillan Company Latest Ed.
2 Guyton, A.C. Text Book of Medical Physiology W.S. Saunders
3 Davidson, B. and Smith E., Text book of Physiology and Biochemistry,1972 (8th Ed.).
4 Human Physiology – A.J. Vander
5.Principles of Anatomy and Physiology – Anagnastakes.

References:

1. Text Book of Physiology – Patton
2. Bloom W. & Favcott. D.W.A. – Text Book of Histology, W.B. Saunders and Company
3. Martini: Fundamentals of Anatomy and Physiology (6th & 7th Ed.)

FOOD SCIENCE – I

Course Code: DAN4104 **Credit Units: 04**

Course Objectives:

1. Students learn about the various food groups and their structure and composition
2. Properties of all food groups are included in the subject to make students aware about the various processes
3. Cooking methods involved for making varieties of foods are being known by the students.
4. Various adulterants and their tests of presence are learnt by the students which they can utilize for doing quality check.
5. Evaluating the various foods on different measures is included to make students know about those measures and their use.

Course Contents:

Module – I

Physical & Physiological changes in food.
a) Colloidal Chemistry as related to food emulsions, foams, sols & gels, osmotic pressure. b)Enzymatic browning immobilized enzymes & enzymes in food Processing..
c) Denaturation of Protein.

Module – II :Cereal and cereal Products:

(A) Cereal grains, structure & composition , Cereal products, Breakfast Cereals. Leavening agents and products.

Module – III :Sugar and Sugar Products

Manufacturing Process of Sugar Stages of sugar Cookery. Starch Structure , gelatinization, Modified Food Starches.

Module – IV :Fruits & Vegetables:

Pigments and colour in Food.

Module – V :Milk & Milk Products:

Composition and properties of milk. Dairy Products: Cultured milk , Yoghurt, butter, Whey, cheese etc.

Module – VI :

Meat , Poultry & Egg: Postmortem changes in meat, tenderizing meat, heat induced changes in meat, meat substitutes.
Egg: Structure & composition , changes during storage, functional properties of egg, egg substitutes.

Module – VII :Food Additives

a) Meaning, need of food additives.
b) Antioxidants, chelating agents, coloring agents, curing agents.
c) Nutrient supplements, Non nutritive sweeteners, pH control agents.
d) Preservatives, stabilizers and thickeners, Other Additives.
e) Additives & Food Safety.

Module – VIII :Food Adulteration and Sensory evaluation

Definition, meaning and various tests used in Sensory evaluation & food product development.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

THERAPEUTIC NUTRITION-I

Course Code: DAN4105 **Credit Units: 03**

Course Objectives:

1. To make students learn about the various types of diets included in hospitals as therapy.
2. Various types of diseases, their aetiology and assessment is included which makes students know about the causative factors.
3. The dietary modification in the diseases included is being taught to the students.
4. Surgical conditions, error in normal metabolism are some other conditions about which the students are acknowledged.

Course Contents:

Module – I :

Therapeutic modification of the normal diet Principles of Diet therapy; Routine Hospital diet; Diet modifications for therapeutic care, enteral and parenteral nutrition

Module – II :

Etiology, clinical aberrations, prevention and nutritional management of Infection
Fever (Acute and chronic)
Allergy
Stress
Burns

Module – III :

Nutrition in surgical conditions -pre and post operative
Obesity – Etiology , Assessment , Complications and Dietary Management
Nutrition in bone and joint diseases – Gout , Osteopenia , Ospeoporosis

Module – IV :

Etiology, manifestations and dietary management of
a Gastro intestinal tract disorders- Peptic ulcer, diarrhea, constipation,
b mal absorption syndrome – carbohydrates, fat and lactose intolerance, sprue and celiac disease,

Module – V :

Inborn errors of metabolism, Introduction, clinical features, dietary management of phenylketonuria, Galactosemia, Alkaptonuria

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:

Texts:

1. Diet Therapy- Williams
2 Human Nutrition Mc Durtt, Maxine
3 Applied Nutrition – Rajalakshmi, R.
4 Hand book of diet therapy: Dorothea, Turner.
5 Human Nutrition and dietetics- Davidson, S. Passmore, R. Brock- J.F. and Turswell A.S.
6 Clinical Dietetics and Nutrition - Antia, F.P.

References:

7 Modern Nutrition in health and disease by Goodhe
8 Nutrition and Physical fitness: Bogert, L.J.

NUTRITIONAL BICHEMISTRY LAB

Course Code: DAN4106 **Credit Units: 01**

Course Objectives:

1. Students learn the process to identify the presence of one or more component present in food.
2. Practical teaches them about the preparation of solutions and buffers.
3. Qualitative and quantitative estimation of nutrients is learnt by the students.
4. The change in activity of certain foods on adding chemicals and observing them.

Course Content:

1. Preparation of standard solutions.
2. Preparation of buffers using buffer tables and verify pH
3. Extraction and quantitative estimation of total sugars and reducing sugar from food stuffs.
4. Isolation and estimation of casein from milk.
5. Quantitative estimation of proteins by kjeldahl's, Biuret and lowary's method (any two methods).
6. Effect of pH, concentration, time and temperature of incubation on enzyme activity.
7. Estimation of activity of alkaline phosphatase in Moong been seeds.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	25	25	20

FOOD SCIENCE – I LAB

Course Code: DAN4107 **Credit Units: 01**

Course Objectives:

1. This practical aims at making students learn about the presence and absence of adulterants in foods.
2. Various experiments to check the purity and quality of foods are included to make students know about them and their use in future.
3. Students learn about the sensory evaluation and the various types and its uses to check the quality of food.
4. Students are made to think about innovative recipes by focussing on new product development and then checking its acceptability.

Assessment of purity and quality of different food

1 Detection of metanil yellow in a given food sample .
2 Check the presence of rhodamine B in the given food sample.
3 Test the presence of sugar in honey.
4 Detection of NaHCo3 in flour.
5 Check for the presence of vanaspati and rancidity in the ghee.
6 Check the milk for presence of protein, urea, sugar and starch.
7.Check the presence of mineral oil in the edible oil sample.

Sensory Evaluation of Foods

1 Design of sensory experiment – selection of panel, types of panel, training of panel, development of score card , data analysis and interpretation of results.
2 Determination of test threshold for the different sensations sweet, salty, sour.
3. Conduct test to know the acceptability of a new product using rating test.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	25	25	20

Text and Reference:

Texts:

1. Sharma, S. Practical biochemistry, classic publishing house, Jaipur, 1993.
2. Mody, N.I.Experimental food chemistry, Avi publishing company, INC, Westport, connetional.
3. A manual of laboratory techinques, National Institute of Nutrition. 1983.
4. Sathe, A.V.(1999) A first course in food analysis, New age International (p) limited Publishers, New Delhi.

Reference:

5. Sethi M. and Rao, E.S. (2001) Food Science Experiments and Applications, CBS Publishers & Distributors, New Delhi.

THERAPEUTICS NUTRITION – I LAB

Course Code: DAN4108 **Credit Units: 01**

Course Objectives:

1. This practical aims to make students learn and make use of the various cooking methods.
2. Students learn to plan about the various diets of various diseases they have learnt in theory.
3. Calculation of nutritive values, the preparation of the planned recipe, its presentation and its evaluation is known by the students.
4. Including the correct choices of foods and the correct method of preparation is being learnt by the students.
5. Students learn the way of presenting a recipe to the person or patient.

Course Content:

Planning, Calculation, Preparation, serving and evaluation of therapeutic diets for diseases covered in theory

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	25	25	20

Syllabus – Second Semester

ADVANCED NUTRITION–II

Course Code: DAN4201 **Credit Units: 03**

Course Objectives:
1.To understand about the digestion, absorption and transport of proteins, vitamins and minerals
2. To understand the role of nutrient interaction and drug-nutrient interaction in our body
3. To learn about the practical knowledge of various nutrients.
4. To learn about the physiological, pharmacological and therapeutic effects, toxicity and deficiency of vitamins.

Course Contents:
Module – I
Proteins: Classification, digestion, absorption and transport - review. Protein quality, methods of evaluating protein quality. Protein and amino acid requirements. Therapeutic applications of specific amino acids: Branched chain, glutamine arginine, homocysteine, cysteine, taurine.

Module – II :
Vitamins : Historical background, food sources, absorption and transport, biochemical function. Interactions with other nutrients. Physiological, pharmacological and therapeutic effects, toxicity and deficiency with respect
to the following
a) Fat soluble: Vitamins A, D, E & K.
b) Water soluble:Thiamine, riboflavin, niacin, biotin, pyridoxine, folic acid, pantothenic acid,ascorbic acid, cyanocobalamin, choline, inositol.

Module – III :
Minerals
(Note: For each nutrient sources, bioavailability, function requirements, RDI/ESADDI, deficiency and toxicity, interactions with other nutrients are to be discussed)
Macro minerals: calcium, phosphorus, magnesium sodium, potassium and chloride.
Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride.
Trace minerals: Selenium, cobalt, chromium, vanadium, silicon, boron, nickel.

Module – IV :Nutrient
Nutrient interaction, drug-nutrient interaction.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:
Texts:
1 Modern Nutrition in Health and Disease – Goodhearth, R. S.
2 Recommended dietary allowance for Indian – I.C.M.R., 1980
3 Nutrition and Development- Winick 1973, Univ. of Calombia.
4 Biology of Nutrition – Eclames 1972, Palaniuma Press
5 Foods & Nutrition – Krause 1972, Saunders.

6 Proteins and Human Foods 1970, Lowrie, Avi. Pub. Co.
7 Nut. & Physical fitness-BoGert L.J.
8 Principles of Nut. – Wilson, L.D. and Fisher. K.H.
9 Standardised diets for Hospital – National Nut. Advisory Committee
10 Nutrition in Health & Disease – Cooper, L. Barher, L. Mitehell, Hand Rynheraen.

References:

1. Nutrition A comprehensive: Beaton and McHanery, Treatise Vol-1, II, & III.
2. Human Nut. & Dietetics- Davidson S., Passmore, R., Brook, J.E. and Truswell.
3. Foods and Nut.- Rankin, W. Munn. Hildath E.N.
4. Iron deficiency – Holiberth, H.C. Harvorth, vannotti, N.Y.
5. Trace Elements in Human and Animal Nut. – Underwood, N.Y.
6. Essays in Biochemistry – Samul Graff, Tandon Book Dept. Sec. –16
7. Diabetes Mellitus- The Williams and Wilkinas Co., U.S.A.

NUTRITIONAL BIOCHEMISTRY-II

Course Code: DAN4202 **Credit Units: 04**

Course Objectives:
1. To understand the metabolism of carbohydrate, amino acid, lipid metabolism and nucleotide.
2. To learn the mechanism of enzyme action and role of enzymes in medicine and food industry.
3. To understand the different bio physical techniques with their applications.
4. To learn about the regulation of metabolic pathways in our body.

Course Contents:
Module – I :
Metabolism of Carbohydrates: Review of glycolysis, fate of pyruvate: alcoholic and homolactic fermentation, Cori cycle, Citric acid cycle. Hexose monophosphate shunt, glycogenesis, glycogenolysis, gluconeogenesis, glyoxalate cycle. Regulation of blood glucose level.

Module – II :
Amino Acid Metabolism: Transamination, deamination, urea cycle, amino acids as biosynthetic precursors- biosynthesis of heme, biologically active amines and glutathione.

Module – III
Lipid Metabolism: Beta-oxidation of saturated and unsaturated fatty acids (including brief account of minor pathways of fatty acid oxidation),biosynthesis of fatty acids, triacylglycerols, Phospholipids, ketone body formation and their utilization, prostaglandins. Major alterations in carbohydrates,protein and fat metabolism in chronic nutrition related degenerative diseases.

Module – III :
Nucleotide Metabolism :Biosynthesis of purines and pyrimidines, DNA replication, transcription, translation, regulation of gene expression (Prokaryotes), mutagenesis and DNA repair, recombinant DNA technology and genetically modified foods.

Module – IV :
Enzymology :Mechanism of enzyme action (acid base catalysis, covalent catalysis, metal ion catalysis, electrostatic catalysis, proximity and orientation effect, preferential binding of the transition stae complex, strain and distortion theory) Enzyme inhibition – irreversible(non-competitive,uncompetitive),reversible(competitive), feed back and product inhibition, regulation of enzyme activity by covalent modification, allosteric modification, isoenzymes, applications of enzymes in medicine and food industry

Module – V :
Biophysical Techniques: Chromatography- Column, Thin layer, Paper, Ionexchange, Affinity, Molecular exclusion, GLC and HPLC.
Electrophoresis- cellulose acetate and gel electrophoresis, isoelectric focusing. Spectrophotometry- Bear Lambert's Law, determination and application of extinction coefficient.
Centrifugation- sedimentation velocity and analytical methods, ultracentrifugation.Immunochemical Methods – RIA, ELISA.Use of Isotopes in biochemistry. *Regulation of metabolic pathways should be discussed along with.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:

Texts:

1 Harper's Biochemistry- Robert K. Murray
2 Textbook of Biochemistry- West and Todd
3 Bio chemical aspect of Nutrition – S.X.C. - Okoyo
4 Food Chemistry – O.R. Fennema
5 Biochemistry – Voet and Voct

References:

6 Principles of Biochemistry – A.L. Lehniger
7 Outlines of Biochemistry- E. E. Conn
8 Practical Clinical Biochemistry- Harold Varley

RESEARCH MEHODOLOGY

Course Code: DAN4203 **Credit Units: 04**

Course Objectives:

1. To understand the scientific approaches to research.
2. To appreciate the importance of scientific writing and develop competence in writing skills.
3. To identify the sources of variability and uncertainty in research.
4. To learn about the different methods of research.

Course Contents:

Module – I :

Nature of research in Home Science, scientific approach. Types of Research: Experimental, Field studies, Case study, and Survey research.

Designing research: Problem, hypothesis, concept and types of variables (dependent, independent, random, discrete, continuous, qualitative and quantitative).

Module – II

Methods of data collection: Interview, observation, questionnaire, rating scales. Research Designs: randomized groups, matched groups, pre and post test and factorial.

Sampling: Meaning, importance and types; random (simple, stratified, cluster), Non random (incidental, purposive, quota)

Module – III :

Statistics: Meaning, primary data, array, frequency, frequency distribution and its types.

Measures of central tendency: Mean, Median, Mode; Measures of dispersion: range, mean deviation, standard deviation, root mean square deviation, variance, moments about origin and moments about mean, Binomial and Normal distribution, Skewness and Kurtosis.Case studies of areas of current research. Formulating a research plan and its presentation

Module – IV :

Type of Articles (review, letters etc). Scientific paper format (Abstract, Introduction, Materials and Methods, Results, Discussion). Writing, evaluating, presenting and publishing the results of scientific research in the academic press (journals, conferences etc). Choosing the appropriate journal (Sources, Information, Instructions to authors, peer review system, journal evaluation)

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:

Texts:

1. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics
2. S.C. Gupta: Fundamentals of statistics
3 G. Udny Yule, N.M.G. Kendall: An Introduction to the theory of Statistics

References:

4 Croxton, F.C. and Cowden, D. J. Applied General Statistics, Prentics hall Inc. 1955
2 Garrett. H. Statistical in Psychology and Education. Oxford book Co. 1960.
3 R.P. Hooda: Introduction to statistics. The MacMillon Co.
5 Scotharman, W. A. Textbook of Statistics, (Revised edition) 1973.
6 Kerlinge, Foundations of Behavioral Research

7 Sneedecer G. W. Statistical Methods. Applied Pacific Private Ltd., 1961.

THERAPEUTICS NUTRITION–II

Course Code: DAN4204 **Credit Units: 03**

Course Objectives:

1.To understand causative factors and metabolic changes in various disease/disorders

2. To gain knowledge of the principles of diet therapy

3. To learn principles of dietary counseling

4. To understand the rationale of prevention of various diseases/disorders

Course Contents:

Module – I :

Etiology, manifestations and dietary management of Renal Disorders-
Glomerulonephritis,
Nephrotic syndrome,
Acute and chronic renal failure

Module – II :

Nutrition in AIDS and Cancer
Nutrition management in special conditions; space travel, high altitude/ low temperature, heavy manual labour in tropical climate

Module – III :

Etiology, metabolic and clinical aberrations, complications, prevention and
nutritional management of:
a) Weight imbalances (over and under nutrition)
b) Diabetes mellitus
c) Cardiovascular disorders - Hypertension, Atheroscelerosis,
Coronary heart disease.

Module – IV : Chronic alcoholism – effect on digestion and absorption, alcohol nutrient interaction and dietary management.
Etiology, manifestation and dietary management in disorders of Liver, and pancreas. - Infective hepatitis, cirrhosis, hepatic failure, s, pancreatitis – acute and chronic

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:

Texts:

1 Mal-Nutrition and the Eye: Donala Sterart Mclaren, Academic Press, New York and London.
2 Diabetes Mellitus: Williames and Wikins Co., USA
3 Nutrition and Physical fitness: Bogert, L.J.
4 Human Nutrition Mc Durtt, Maxine
5 Applied Nutrition – Rajalakshmi, R.
6 Hand boom of diet therapy: Dorothea, Turner.

References:

7 Human Nutrition and dietetics- Davidson, S. Passmore, R. Brock- J.F. and Turswell A.S.
8 Clinical Dietetics and Nutrition - Anita, F.P.

9 Food Science and Technology: Pyke, Maonus.
10 Modern Nutrition in health and disease by Goodhearth R.S. Shills.

DIETETIC TECHNIQUES AND PATIENT COUNSELING

Course Code: DAN4205 **Credit Units: 03**

Course Objectives:
1. To understand the knowledge about the disease like gastrointestinal disorders, renal disease, liver diseases etc.
2. To familiarize the students with the layout and organization of the hospital.
3. To assess the medical profile of the patient like general details, family history, and associated complications, anthropometry, clinical status, biochemical and biophysical status.
4. To suggest the diet for the particular diseased condition.

Module I
Dietitian as part of the Medical Team and Outreach Services.
Clinical Information - Medical History and Patient Profile Techniques of obtaining relevant information, Retrospective information, Dietary Diagnosis, Assessing food and nutrient intakes, Lifestyles, Physical activity, Stress, Nutritional Status. Correlating Relevant Information and identifying areas of need.
The Care Process - Setting goals and objectives short term and long term, Counselling and Patient Education, Dietary Prescription.

Module II
Motivating Patients. Working with -
B. Hospitalized patients (adults, pediatric, elderly, and handicapped), adjusting and adopting to individual needs.
C. Outpatients (adults, pediatric, elderly, handicapped), patients' education, techniques and modes.
Follow up, Monitoring and Evaluation of outcome, Home visits

Module III
Teaching aids used by dietitians- charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.

Module IV

Maintaining records, Reporting findings, Applying findings, Resources and Aids for education and counselling, Terminating counselling, Education for individual patients, Use of regional language, linguistics in communication process, Counselling and education.

Texts and References:

Texts:
1 Modern Nutrition in Health and Disease – Goodhearth, R. S.
2 Recommended dietary allowance for Indian – I.C.M.R., 1980
3Nutrition and Development- Winick 1973, Univ. of Calombia.
4.Biology of Nutrition – Eclames 1972, Palaniuma Press
5Foods & Nutrition – Krause 1972, Saunders.

References:
6 Human Nutrition and dietetics- Davidson, S. Passmore, R. Brock- J.F. and Turswell A.S.
7 Clinical Dietetics and Nutrition - Anita, F.P.
8 Food Science and Technology: Pyke, Maonus.
9 Modern Nutrition in health and disease by Goodhearth R.S. Shills.

NUTRITIONAL BIOCHEMISTRY-II LAB

Course Code: DAN4206 **Credit Units: 01**

Course Objectives:
1. To understand the use of instruments like chromatography, calorimeter, etc. in biochemical estimation .
2. To detect the purity of sample by using biochemical techniques.

Course Content:
1. Extraction and quantitative estimation of ascorbic acid.
2 Isolation and quantitative estimation of B1, B2 vitamins in various food stuffs.
3 Estimation of Moisture, Crude Fat, crude fiber and ash in the food stuffs.
4 Determination of energy value of foods using bomb calorie meter.
5 Determination of iodine value of given fat sample.
6 Determination of Sodium & Potassium of food /drinks through Flame Ph Meter
7 Separation of amino acids by paper chromatography, TLC.
8. Separation of proteins by gel electrophoresis

ADVANCED NUTRITION-II LAB

Course Code: DAN4207 **Credit Units: 01**

Course Objectives:
1. To develop the new food product from different food groups.
2. To understand the knowledge about sensory evaluation of the food product

Course content:
1. Market and consumer survey to identify new products
2. Product development from different food groups and their sensory evaluation by different methods.
3. Two Visit to Food Industry

THERAPEUTICS NUTRITION – II LAB

Course Code: DAN4208 **Credit Units: 02**

Course objectives:
1. Plan and prepare suitable therapeutic diets based on patient needs for various diseased condition.
2. To provide nutritional counseling for the prevention/ treatment of various disease in hospitals.
3. Prepare special therapeutic diets.

Course Contents:

1 Planning, Calculation, Preparation, serving and evaluation of therapeutic diets for diseases covered in theory

2 Study of the management of food services in selected Hospitals.

3 Visits to dietetic clinics in hospitals- case study of patients needing specific therapeutic diets.

Syllabus – Third Semester

COMMUNITY NUTRITION-I

Course Code: DAN4301 **Credit Units: 02**

Course objectives:
1. To understand community and common health problems in the community.
2. To study methods to assess nutritional status in the community.
3. To study the impact of health care policies and different health care delivery systems in improving health of the community.
4. To understand the role of national and international organizations in delivering community nutrition.

Course Contents:
Module I :
Definition and brief study of community, family, village and block. Malnutrition - causes, ecological factors, effects of malnutrition, protein deficiency diseases - PEM, Kwashiorkor - incidence, prevalence, epidemiology. The package programmes of immunization, nutrition education, feeding programmes, and measures to overcome malnutrition.

Module II :
Assessing the food and nutrition problems in the community - socio economic diet survey, anthropometry, clinical examination, laboratory examination for common nutrition problems.

Module III :
Nutrition and National Development, National nutritional policy - Aim, objectives, guidelines and thrust areas. PDS - Public distribution system, Agricultural planning - New strategies.

Module IV :
Nutrition intervention Programmes - Objectives, operation of feeding programmes. ICDS, TINP, NNMS, IRDP, DWACRA.
National organizations - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD.
International organizations - FAO, WHO, UNICEF, UNESCO, World Bank.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Texts and References:
Texts:
1. Health and hygiene - A Lesties Banks and Hislop J.A, Universal Tutorial Press, London.
2. Challenges in Rural Development - Senha H.K, Discovery publishing.
3. Food consumption and planning - Vol 5, International encyclopedia.
4. Theory and Practice of Public Health, Oxford university press, London.
References:
5. Applied Nutrition and Health Education, Sabarwal .B, Common wealth publishers, New Delhi.
6. Foundations of Community Health Education, Mc Graw Hill, London.
7. Nutritional Problems of India, P.K.Shukla, Prentice Hall, India

INSTITUTIONAL FOOD ADMINISTRATION

Course Code: DAN4302 **Credit Units: 04**

Course Objectives:
1. To understand management aspects related to food services and its application
2. Develop general knowledge on the origins and development of food service systems in hotels, restaurants, and institutions.
3. To identify variety of managerial, production, and service areas that is typical of the food service industry.
4. To understand managerial responsibilities as they relate to food service functions including menu planning, purchasing, storing, preparation, and recipe development.
5. To understand role of food safety, food budgeting and food standards.

Course Contents:

Module I :
Food service system and management
(i) Introduction to food service system
(ii) Evaluation of the food service industry
(iii) Characteristics of the various types of food service units –
commercial, institutional, hospital, military, any other
(iv) Scope and development of food service institution in India
(v) Effects of environmental changes on different types of establishments

Module II :
Food service management
(a) Definitions, principles and functions of Management
(b) Approaches to management – traditional, system approach, management by objectives
(c) Financial management – (i) Definition, application of management accounting to catering operations
(ii) Budgeting, determining the financial needs sources
(iii) Book- keeping and accounting

Module III : Food service organization
(a) Definition and types of organization in food
(b) Tools of organization Chart, job description, job specification, work schedule and communication
(c) Recruitment, induction, training, motivation and performance appraisal of personnel
(d) Administrative leadership

Module IV: Planning and service of food
(a) Menu planning
(i) Types of menu structure
(ii) Factors affecting menu planning
(iii) Menu evaluation

Module V :Delivery and service of food
(a) Food service system Conventional, commissary, assembly service
(b) Service of food: Self-service, tray service, waiter service, portable meals, banquets
(c) Food service in selected types of organizations Hospitals, schools, colleges, industrial canteens, airlines and space
(d) Customer relationships

Module VI :
Quality and Quantity control
(a) Construction and selection of recipes by quantity cooking

(b) Standardization of recipe, recipe format and adjustment
(c) Product standard and production control

Module VII:
Food cost accounting / Analysis
(a) Importance of costing and food cost control
(b) Methods of costing
(c) Cost classification into materials, labor and overheads and their percentage analysis
(d) Reports and trend analysis
Food purchasing, selection and storage
(a) Purchasing –
(i) Forecasting, product selection, purchasing , specification
(ii) Methods and procedure of purchasing

(i) Elements of receiving process
(ii) Inventory control
(c) Storage -
(i) Dry
(ii) Refrigerated and cold storage

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Text and References:
Texts:
1. West, B Bessie & Wood, Levelle (1988): Food service in institutions 6th Edition. Revised by F.V., Shuggart S.G. & Palgne-Palacio June Macmillian Publication company New York.
2. Sethi Mohini (1993): Catering Management An integrated approach 2nd Edition, Wiley publication.
3. Kotas Richard & Jayawardardene, C., (1994): Profitable Food and Beverage Management, Hodder Stoughton Publication.

References:
1. Brodner, J., Maschal, H.T., Carlon, H. M.(1982): Profitable Food and Beverage Operation 4th Edition, Hayden Book company New Jersey.
2. Green, E. F., Drake, C.G., Sweeny, J.F. (1972): Profitable Food and Beverage Management, Planning Operatio Hayden Book company New Jersey.
3. Knootz, H.O., Donnel C (1968): Principles of Management , McGraw Hill Book Company.

FOOD SCIENCE - II

Course Code: DAN4303 **Credit Units: 03**

Course Objectives:
1. To inculcate knowledge about various food groups
2. To study nutritional value and cooking properties of vegetable and fruits, eggs, meat, fish and sea foods, milk and milk products, grams and dals.
3. To study cooking techniques with respect to various food groups.
4. To gain knowledge of new food products available in the market.

Course Contents:
Module I :
Vegetables and fruits: Structure, texture, pigments(Structure) and acids in vegetables and fruits, Browning reaction.Pectic substances: Characteristics, uses, theory of pectic gel formation, testing of pectin, factors affecting jelly formation.

Module II :
Eggs: Structure, composition and selection. Coagulation of eggs protein. Eggs cooked in shells, poached eggs, omelets and their types. Role of eggs in baking
Meat: Structure, constituents of meat, post-mortem changes and symptoms, Methods of cooking and changes in meat during cooking. Tenderness and juiciness.

Module III : Fish and sea food
Types and composition, Storage and changes during storages. Changes during processing. By products and newer products. Cooking techniques for fish

Module IV :
Milk and Milk products: Composition, structure and constituents of milk and Milk products – Carbohydrates , Proteins , fats, vitamins and minerals. Coagulation of milk protein. Setting of curds, Creaming butter, different types of cheese.Micro organisms role in curds and cheese. New Dairy food products in market with Nutritional value

Module V: Grams and Dhals:
Composition, methods of processing and cooking, Effect of processing such as roasting, parching, soaking, germination and fermentation.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Text and References:
Texts:

1 Experimental Cookery: Low Bells.
2 Food Selection and Preparation: Sweetman, M.D.
3 Handbook of Food Preparation: A.N. Hime Ec. Asso.
4 Our Food : Swaminathan, M,. and Bhagiam, R.K.
5 Experimental Foods: Swaminathan
6 Food Science and Application: L Paul, C. Pauling.

References:

7 Food Science: Mudami, S.R. & Rao, S.M. 1994, Wiley Eastern Ltd. New Delhi

8 Food Facts & Principles: Maney N. S. & Shudarshan Swamy M. 1966. New Age International Pub. N. Delhi

FOOD MICROBIOLOGY-I

Course Code: DAN4304 **Credit Units: 05**

Course Objectives:
1. To learn importance of microorganisms as food and its nutritional value as well as impact on health.
2. To understand methods of detection of microorganisms its use in food safety.
3. To study spoilage caused by microorganisms in various food groups and food borne diseases.
4. To understand methods of food preservation and indicators of food safety and quality assurance.

Course Contents:

Module I :
Microorganisms of importance in food- role of bacteria and fungi, sources, taxonomy, morphology, cultural and physiological characteristics and biochemical activities.

Module II :
Factors Affecting Growth of Microorganisms- intrinsic and extrinsic factors like pH, water activity, oxidation reduction potential, nutritional requirements, temperature, relative humidity, gaseous environment, biological structure of food and inhibitory substances.
Methods of Isolation and Detection of Microorganisms or their products in food
(a) Conventional methods
(b) Rapid methods (newer techniques)
(c) Immunological methods- fluorescent, antibody, radio Immune assay, ELISA etc
(d) Chemical methods- Thermo stable, nuclear, ATP measurement and PCR(Polymer chain reactions)- only principles in brief.
(e) Microbiological Assays.

Module III :
Sources of contamination of food- Water, air, soil, sewage, animals, during handling and processing.
General principles underlying spoilage.
(a) Chemical changes due to microbial spoilage.
(b) Spoilage of different groups of foods- cereal and cereal products, vegetables and fruits, meat and meat products, egg and poultry, fish and other sea foods, sugar, milk and milk products, canned food.
Role of microbes in fermented foods and genetically modified foods oriented fermented foods, malt, bread, beverages, vinegar fermented vegetables, fermented dairy products, tea and coffee. Single cell protein, fats, amino acids and enzymes from microorganisms.

Module IV:
Food Preservation- physical methods- drying, freeze drying, cold storage, heat treatment, irradiation, high pressure processing. Chemical preservatives and natural antimicrobial compounds. Biologically based preservation systems and probiotic bacteria.
Food Borne Diseases- infections and intoxications. Bacterial and viral food borne disorders. Food borne important animal parasites. Mycotoxins
Food Sanitation- microbiology in food plant sanitation, bacteriology of water, sewage and waste treatment and disposal. Microbiology of the food product 10. Indicators of food safety and quality- microbiological criteria of foods and their significance.

Module V :
HACCP system and food safety- Introduction, need, benefits,& principles of HACCP.
- Guidelines for application of HACCP principles.
- The HACCP system in India

- Regulations related to genetically modified foods.
- International organizations and agreement in the area of food standard and quality comtrol.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

A – Attendance , CT- Class Test , S- Seminar , V- Viva , Q –Quiz , HA – Home Assignment , EE – End Term Exam

Text and References:

Texts:

1. Relezar, M.I and Reid, R.D.(1993): Microbiology, Mc Graw Hill Book Company New York 5th edition.
2. Atlas, M .Ronald (1995): Principles of microbiolody 1st edition, Mosby Year Book, Inc, Missourin, USA.
3. Topley and Wislson's(1983): Principals of Bacteriology, Virology and Immunity Edited by S.G. Wilson, A. Miles and M.T. Parkar vol1; General Microbiology and Immunity II: Systematic Bacteriology 7th edition Edward Armold Publisher.
4. Block, J.G. (1999) Microbiology Principles and Explanations 4th Edition, John Wiley and sons Inc.
5. Frazier, W.C. (1988) Food Microbiology Mc Graw Hill Inc 4th Edition.
6. Jay James, M(2000): Modern Food Microbiology 6th Edition Aspen Publishers Inc, Maryland.
7. Banwart, G(1989) Basic Food Microbiology 2nd Edition CBS Publisher.
8. Garbutt, J(1997): essentials of Food Microbiology, 1st Edition Armold International Students Edition

References:

1. Doyle, P, Bemehat, L.R. and Mantiville, T.J(1997): Food Microbiology- Fundamentals and Frontiers, ASM Press, Washington, D.C.
2. Adams, M.R and M.G. Moss(1995): Food Microbiology 1st Edition New Age International(P) Ltd.
3. Benason, H.J.(1990) Microbiological applications C. Brown Publishers USA
4. Roday, S(1999) Food hygiene and sanitation 1st Edition Tata Mc Graw Hill, New Delhi.
5. Venderzant, C and D,F. Splitls Toesser(1992); Compendium of Methods forMicrobiological Examinations of Foods 3rd Edition American Public Health Association, Washington, D.C.

COMMUNITY NUTRITION LAB

Course Code: DAN4305 **Credit Units: 01**

Course Objectives:
1. To learn method of socio-economic survey.
2. To perform dietary survey.
3. To study clinical examination to asses nutrient deficiencies.
4. To plan and conduct nutrition education program.

Course Content:
Conduct of socio - economic survey
Conduct of Diet survey
Conduct of Clinical Examination
Planning, conducting and Evaluating Nutrition Education Programme.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	25	25	20

FOOD SCIENCE-II LAB

Course Code: DAN4306 **Credit Units: 02**

Course Objectives:
1. To conduct appropriate experiments of food science and interpret the results.
2. To study effect of various treatments on food.
3. To learn basic culinary skills in various food groups.
3. To plan and perform nutrient rich recipes.

Course content:
Practical related to theory papers i.e : Effect of various treatments on the foods mentioned in syllabi

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	25	25	20

FOOD MICROBIOLOGY- II LAB

Course Code: DAN4307 **Credit Units: 02**

1. To learn basic microbiological apparatus and equipments used in the laboratory.
2. To study and perform sterilization techniques used in microbiology.
3. To study and perform staining of bacteria and microscopic examination.
4. To perform isolation and culture techniques used in food microbiology.
5. To demonstrate RIA and ELISA

Course content:

1. Microbiological apparatus and equipments-a basic introduction, instruments needed for isolation, cultivation and maintenance of microbes, tools needed in microbiology laboratory for inoculation and culturing
2. Cleaning and sterilization procedures for glassware.
3. Preparation and sterilization of laboratory media.
4. Staining of bacteria- gram's staining, use of oil immersion lens, micrometry, and microscopic enumeration.
5. Spread plating, pour plating, streaking techniques.
6. Enrichment of isolated cultures, SPC, MPC. Coli count and coli confirmations.
7. Study of biochemical characteristics of isolated cultures-

· Fermentation reaction · Starch cultures
· IMVIC Tests · Catalase test
· Oxidase test · Urease test
· H2S test · Coagulase test

8. Microbiological analysis of milk- raw, boiled and pasteurized - MBRT Test.
9. Demonstration of Techniques of

. Radio immune Assay (RIA)
.Enzyme Linked Immuno Sorbunt Assay (ELISA)

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	25	25	20

SUMMER INTERNSHIP

Course Code: DAN4335 **Credit Units: 06**

Objectives:
Summer internships are usually eight weeks long and it is full time. The students are required to do internships during the summer than during any other time of the year. These short term experiences provide a real insight into what it's actually like working in a particular job or career field. There's ample time to get into a regular work routine and gain valuable knowledge and skills. Internship objectives include:

- Developing personally and professionally while gaining confidence and real-world experience
- Meeting and networking with practitioners in one's area of interest
- Mentoring and performance feedback from the site supervisor
- Earning academic credit while getting paid or non paid.

General Guidelines:
Every student of post graduate courses will be required to undergo a practical training in an organization approved by the Institute for eight weeks, normally in the Summer Vacation, after the end of the fourth semester examinations. The candidates shall be required to undergo training in the various areas of the organization concerned. The organization may assign a specific project to the candidate, which will be completed by him/her during the period of training. The work done by the candidate during the training period shall be submitted in the form of a report as per the guidelines provided by the Department.

Chapter Scheme for the SIP Report:

Chapter I: Introduction	- 10 marks
Chapter II: Conceptual Framework/National/International Scenario	- 05 marks
Chapter III: Presentation, Analysis and Findings / Case Studies	- 20 marks
Chapter IV: Conclusion and Recommendations	- 10 marks
Hospital Chief Dietitian Marking	-30 marks

The Chief Dietitian is asked to evaluate the student based on his/her performance as well as their conduct. The report has to be written in font Times New Roman, 12 points, 1.5 line spacing on both sides of the paper, Spiral Bound. The report should comprise of a maximum of 70 pages and has to be submitted in two copies.

THE COMPONENTS OF A SIP REPORT

The outcome of Summer Internship is the Project Report. A project report should have the following components:

1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.

2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.

3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.

4) Body of the Report: The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data, Analysis and Findings / Case studies* : (using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.

6) Annexure: Questionnaires (if any), relevant reports, etc.

Evaluation Scheme:

SIP Report	Power Point Presentation & Viva
75 marks	25 marks

Syllabus – Fourth Semester

COMMUNITY NUTRITION-II

Course Code: DAN4401 **Credit Units: 02**

Module I:
Factors affecting food production & conservation- Per capita food availability and consumption, poverty, family planning, social & cultural values, education. Food security, food safety, nutrition security, Nutrition surveillance and planning.

Module II:
a) Nutritional epidemiology: Introduction aims and purposes.
Principles of Nutritional epidemiology. Types of epidemiology and sources of information.

b) Descriptive epidemiology, cross sectional analysis, Prevalence and incidence, Risk factors, Socio demographic and psychosocial variables.

Module III:
Vitamin deficiency - A, B1, B2, Niacin, C, D - prevalence, programmes to combat.
Nutritional Anaemia - Prevalence, programmes to control.
IDD and fluorosis - Prevalence, causes, symptoms and programmes to control.

Nutritional Programmes for improvement of Nutritional status
Nutrition Education:

a Methods
b Planning and execution
c Evaluation and follow up

Module IV:
Nutrition education - Merits, planning, evaluation and conduct.
Health care delivery - PHC, School Health services and their role in preventing communicable diseases.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

Books Recommended:

1 Nutritional evaluation of food processing, Roberts Haris John willy & Sons, N.Y. London.
2 Nutrition and Physical Fitness: Bogrert, L.J.
3 Nutrition in India: V.N.
4 Human Nutrition- M.C. Durtt, Maxine
5 Applied Nutrition- Rajalakshmi-R.
6 Biology of nutrition – Elements 1972, Platinum Press
7 Nutritional Evaluation of Food

FOOD PROCESSING & TECHNOLOGY

Course Code: DAN4402 **Credit Units: 03**

Course objectives:
1. To understand principles of food preservation and its application of the different food.
2.To impart systematic knowledge of basic and applied aspects food processing and technology
3. To gain in depth knowledge about processing and preservation techniques of milk and milk product technology and fruits and vegetable technology.
4. To gain knowledge about industrial processing of legumes and oil seeds.

Module I:
Processing technology of foods & nutritional implications for the following:
• Cereals & Pulses- Wheat grain characteristics and products, Rice processing, Pulses Processing & their elimination of toxic factors. Fermentation & Germination Nuts & Oilseeds- Nuts Oilseeds Processing, solvent extraction purification, hydrogenation and tempering products - butter, margarine etc
• Flesh Foods: Processing & Their Products.

Module II:
Milk and Milk Products:- Classification and standardization, Pasteurization, homogenization, packing of milk. Milk Products- Fortified milk, Skim milk, Concentrated milks, Cream, Butter, Cheese, Ice cream and Indigenous milk products: Khoa, Paneer, Curd, Yoghurt, Ghee.

Module III:
• Fruits & Vegetables: Physiological and biochemical changes during ripening, handling & storage & fruit processing. Processing of vegetables, canning, freezing, dehydration, pickles & chutneys. Beverages & Appetizers : Classification, Coffee, Tea, coco chocolates, Fruit beverages, soups, Vegetable Beverages, Carbonated & Noncarbonated beverages, Alcoholic beverages.

Module IV:
a).Physical principles in Food Processing Operations:
b).Food Deterioration, Methods of Preservation and Processing: Thermal Processing, Refrigeration, Freezing, Dehydration, Ionizing radiations, Fermentation, concentration.
c).Chemical Principles of Food Processing:
d).Preservation/processing by sugar, salt, smoke, acid and chemicals.
e).Chemical & biochemical reactions affecting food quality & safety.
Some Recent concepts in Food Technology -
• Biotechnology in food.
• Algae as food - Spirulina
• Low cost nutrient supplement.
• Packaging of foods.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

NUTRITION FOR HEALTH & FITNESS

Course Code: DAN4403 **Credit Units: 03**

Course objectives:

1.Students learn about the meaning and importance of general health and fitness.
2. Detailed study of various sports and the diet involved for best outcome is being included.
3.Subject aims to make students understand how nutrition is important pre and post games and how it makes an influence on the performance of the player.
4. Nutrition and diet of injured athletes, specially abled athletes, along with the influence of environmental conditions are being learnt by the students.

Module I:

Physical Fitness and health status: meaning, concept, assessment criteria and management
Healthy life style: Strategies, factors that promote life style changes, self management skills. Body composition in exercise and sport

Module II:

Physical Activity: need, principles of physical activity Energy input and output: Different energy systems for endurance and power activity, Fuels and nutrients to support physical activity.

Module III:

Nutrition in Sports: Sports specific requirement, Diet manipulation, Pre-game, during and post-game meals. Diets for athletes with high energy requirements, stress, fracture and injury
Water and electrolyte balance: Losses and their replenishment during exercise and sports events, effect of dehydration, sports drinks.

Module IV:

Special Nutrition considerations for female, older and disabled athletes. Nutrition of athletes in hot, cold and high altitude environments
Nutrition education of athletes and coaches.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

Books Recommended

- Ira Walinaky, (1998) Nutrition in Exercise and sport
- Charles B. Corbin, Ruth Lindsey and grey walk (2000) Concepts of fitness and wellness
- Robert A. Robergers and Scott O. Roberts (2000) exercise physiology.

COMMUNITY NUTRITION-II LAB

Course Code: DAN4404 **Credit Units: 02**

Course Objectives:
1. To conduct socio-economic and dietary survey in detail.
2. To conduct of clinical examination with ICMR score card.
3. To design, perform, interpret and evaluate nutrition education program.
4. To critically review various nutritional programs conducted in villages
5. To cook recipes for various socio-economic groups: LIG, MIG, HIG.

Course content:
1. Conduct of socio - economic survey with Nutritional status parameters
2. Conduct of Dietary survey with detail calculations
3. Conduct of Clinical Examination with ICMR score card.
4. Planning, conducting and Evaluating Nutrition Education Programme.
5. Evaluation of various nutritional programmes conducted in villages.
6. Cooking of recipes for Low income group , Middle income group and High Income group.

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	25	25	20

FOOD PROCESSING AND TECHNOLOGY LAB

Course Code: DAN4405 **Credit Units: 01**

Course Objectives:
1. To study physical dimensions of grains and other properties.
2. To determine pectin strength in various fruits and vegetables.
3. To study various food adulterants present in common foods.
4. To study tests used in sensory appraisal.
5. To prepare culture media of various microorganisms.

Course content:
1. Determination of physical dimensions of grains (Length, Breadth, Thickness and Bulk density)
2. Determination of wet and dry gluten content of flours.
3. Testing the pectin strength of different fruits and vegetables.
4. Determination of PH and titrable acidity of a food sample.
5. Determination of Total solids as soluble and insoluble in foods
6. Test for adulterants
7. Food Evaluation using different sensory tests
8. Total microbial count
9. Determination of pasteurization effect in milk by MBRT
10. Preparation of culture media for different organisms

Examination Scheme:

IA				EE		
A	**PR**	**LR**	**V**	**PR**	**WT**	**V**
5	10	10	5	25	25	20

DISSERTATION

Course Code: DAN4437 **Credit Units: 06**

Course Objectives:
1. To understand comprehensive knowledge of the literature in the field of nutrition.
2. To conduct and apply appropriate research methods, collect & interpret data systematically; to conduct research ethically.
3. To learn importance of scientific writing and develop competence in writing skills.
4. To do research work and submit dissertation at the end of semester.

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.
Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricula where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department
The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:
- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the lay out of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

➢ **Title or Cover Page**

The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.

➢ **Acknowledgement(s)**

Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.

- **Abstract**

A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.

- **Table of Contents**

Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**

Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**

This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.

- **Results and Discussion**

Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various secions, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.

While presenting the results, write at length about the the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather, it should lead to generalization of data on the chosen sample.

Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporing or contradicting the present case of research.

- **Conclusion(s) & Recommendations**

A conclusion should be the final section in which the outcome of the work is mentioned briefly.
Check that your work answers the following questions:

- Did the research project meet its aims (check back to introduction for stated aims)?
- What are the main findings of the research?
- Are there any recommendations?
- Do you have any conclusion on the research process itself?

- **Implications for Future Research**

This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.

➢ **Appendices**

The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

➢ **References**

References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic *Escherichia coli* O157: H7. *Clin Microbiol Infect* , **8** (suppl 1): 116–117.

For book:

Kowalski,M.(1976) Transduction of effectiveness in *Rhizobium meliloti*. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), **7**: 63-67

The Layout Guidelines for the Project File & Project Report:

- A4 size Paper
  - Font: Arial (10 points) or Times New Roman (12 points)
  - Line spacing: 1.5
  - Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT

Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfill the following ***assessment objectives:***

- Range of Research Methods used to obtain information
- Execution of Research
- Data Analysis (Analyze Quantitative/ Qualitative information)
- Quality Control
- Conclusions

Assessment Scheme:

Continuous Evaluation:40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

Examination Scheme:

Research Originality	Dissertation (including all Chapters)	Research Paper	Power Point Presentation & Viva
20	40	10 marks	30 marks

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2021

AMITY UNIVERSITY HARYANA
GURUGRAM

Syllabus - First Semester

LABORATORY MANAGEMENT AND QUALITY CONTROL

Course Code: MLT4108 **Credit Units: 3**

Course Objective: To allow students to understand the laboratory management and quality control.

Course Contents:

Module-I: General Concept of Laboratory Management: Strategic planning; quality system management; human resource management; laboratory design and service model; regulation, accreditation and legislation; safety- biomedical hazard, chemical hazard, ergonomic hazard.

Module-II: Clinical Laboratory Informatics: Information flow (patient's registration/ID), test order, sample collection, labeling, performing test, releasing result & report, feedback. LIS selection, Implementations & management; good laboratory practice

Module-III: Quality Control: Introduction, analytical variability and calibration; calibration issue in quality control; proficiency testing; Westgurd rules; quality control of the product, chemicals, reagent; good, reliable, authentic report; total quality management framework of laboratory; essential elements of quality assurance programme; quality laboratory processes, quality assurance, quality assessment, quality control, quality planning and quality improvement

Module-IV: Internal Quality control: Control of pre-analytical variables, control of analytical variables, laboratory precision, accuracy & sensitivity; validation of methods; reference materials and calibrating definitive methods; sources of variation in laboratory test results. Systemic and random errors; quality control charts: Levy-Jenning chart, Cusum chart and Gaussian curve; Internal and external factors for quality control assurance; reference values

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- Praful B. Godkar, Darshan P. Godkar. Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- J Ochei and A Kolhatkar. Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co. Ltd.
- Mc Pherson and Pincus. Henry's Clinical Diagnosis and management by Laboratory Method, 23rd Edition, Elsevier.

ANATOMY

Course Code: MLT4110 **Credit Units: 3**

Course Objectives:
To develop the knowledge of anatomical structures; To provide the basic understanding of human organ systems; To provide the concepts of interrelationship among different organ systems.

Course Contents:

Module-I: Gross Anatomy: Introduction to Anatomy, nomenclature, anatomical position, planes, tissues and movements.
Osteology: Bones of the body and their position; classification of the bones with examples; general features of the bone and normal development; microscopic anatomy of bone; general pattern of blood supply; ossification of the bones of the limbs for age determination. X-rays of bones.

Module-II: Muscular System: Classification and identification of the muscles of the body: main attachments, nerve supply and action(s), microscopic anatomy of muscles and the nerve terminations; Details of attachments of the muscles; ultrastructural features of muscle; mechanism of the movement caused by the muscles and various forces exerted by them and their detailed action.
Arthrology: Definition and classification of joints, general features of different types of joints; detailed study of major joints of the limbs and movements performed at various joints in the body; Microscopic anatomy of articular cartilage; maintenance of articular cartilages; blood supply and nerve supply of the joints.

Module-III: Cardio Vascular System: Normal position, external features and parts of the heart; internal features of the chambers of heart, names of the blood vessels and venous drainage of the organs, structures and body as a whole, conducting system of heart, fibroskeleton of heart.
Respiratory System: Position, parts, relations, blood supply of upper and lower respiratory tract. Pleura, its reflection, nerve supply, pleural recesses and their significance, bronchopulmonary segments, their importance.

Module-IV: Endocrine System and Individual Endocrine Glands: Various endocrine glands, their location, relations, blood supply, nerve supply and lymphatic drainage.
Nervous System and its components: Parts of nervous system, neuron meninges, nerve terminals, neuroglia, myelination, degeneration and regeneration, ventricles, CSF, spinal cord and its blood supply. Motor and sensory pathways, cranial nerves, thalamus, cerebellum, limbic and autonomic pathways.
Special Sensory Organs: Gross Anatomy of eye ball, ear, nose and tongue.

Examination Scheme:

Components	**CA**	**A**	**ME**	**EE**
Weightage (%)	15	5	10	70

Recommended books:

- B. D. Chaurasia, BD Chaurasia's Human Anatomy Regional and Applied Dissection and Clinical: Lower Limb Abdomen and Pelvis, Vol I, II and III, 7th Edition 2016, CBS Publishers & Distributors.
- K Simbulingam & P Simbulingam, Essential Medical Physiology, 6th Edition 2012, Jaypee Brothers Medical publishers (P) LTD.

- N Murgesh, Basic Anatomy and Physiology, 6th Edition 2011, Satya Publishers.
- Anne Waugh, Kathleen and J W Wilson, Ross and Wilson Anatomy and Physiology, 12th Edition 2014, Churchill Living Stone.
- Gerard J. Tortora, Bryan H. Derrickson, Principle of anatomy and physiology, 14th Edition 2014, Wiley Publication.

PHYSIOLOGY

Course Code: MLT4111 **Credit Units: 3**

Course Objectives:
To develop the knowledge of anatomical structures; To provide the basic understanding of human organ systems; To provide the concepts of interrelationship among different organ systems.

Course Contents:

Module-I: Skeletal System: Division, anatomy and function of skeleton; Histology of bone; Types of bones and joints; Bone marrow; Cartilage; Composition and function of synovial fluid.
Muscular system: Histology, classification and functions of muscles; mechanism of muscle contraction; role of joints and muscles in movements.

Module-II: Cardiovascular System: Structure and functions of heart and blood vessels, blood circulation, cardiac cycle, cardiac output, stroke volume and blood pressure; ECG.
Lymphatic System: Structure and functions of lymphoid organs; lymph vessels; compositions, function and circulation of lymph.

Module-III: Digestive System: Structure and function of digestive organs, digestion and absorption of food, compositions and functions of various gastrointestinal secretions.
Urinary system: Structure and functions of organs involved in urinary system, structure and functions of nephron, measurement and regulation of GFR, mechanism and composition of urine formation, physiology of excretion of urine.

Module-IV: Male reproductive system: Structure and functions of male reproductive organs, spermatogenesis.
Female reproductive system: Structure and functions of female reproductive organs, ovarian cycle, menstruation, fertilization and pregnancy.

Examination Scheme:

Components	**CA**	**A**	**ME**	**EE**
Weightage (%)	15	5	10	70

Recommended books:

- B. D. Chaurasia, BD Chaurasia's Human Anatomy Regional and Applied Dissection and Clinical: Lower Limb Abdomen and Pelvis, Vol I, II and III, 7th Edition 2016, CBS Publishers & Distributors.
- K Simbulingam & P Simbulingam, Essential Medical Physiology, 6th Edition 2012, Jaypee Brothers Medical publishers (P) LTD.
- N Murgesh, Basic Anatomy and Physiology, 6th Edition 2011, Satya Publishers.
- Anne Waugh, Kathleen and J W Wilson, Ross and Wilson Anatomy and Physiology, 12th Edition 2014, Churchill Living Stone.
- Gerard J. Tortora, Bryan H. Derrickson, Principle of anatomy and physiology, 14th Edition2014, Wiley Publication.

CLINICAL IMMUNOLOGY

Course Code: MLT4113 **Credit Units: 4**

Course Objective: To familiarize the students about the immune system and its role in infections, allergy and transplantation.

Course Contents:
Module-I: Introduction to Immunology: History of immunology; innate immunity; acquired immunity.
Immunoglobulin: Structure, function and types of immunoglobulin; monoclonal and polyclonal antibody; adjuvant.
Antigen: Types of antigens; antigenicity; haptens

Module-II: Immune Response: Primary and secondary immune response; phagocytosis; antigen processing and presentation; humoral and cell mediated immune response; hemolytic disease of newborn.
Compliment System: Complement portions and functions; classical, alternative pathway and lectin pathway.
Hypersensitivity: Introduction, types and complications of hypersensitive reactions; allergies

Module-III: Clinical Transplantation: Types of transplant; types of donor; HLA typing; transplant rejection; ethical issues; artificial organ; laboratory-grown organ; organ trafficking;
Autoimmunity: Factor affecting autoimmunity; pathogenesis of autoimmunity;autoimmune disease;diagnosis;immunological tolerance.

Module-IV: Vaccines: Effectiveness; adverse effects; types; recombinant vaccines
Antigen and Antibody Reactions: General features; precipitation; agglutination; flocculation; complement fixation test; neutralization; opsonisation.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- Dale Male, Jonathan Brostoff, David B Roth and Ivan RoittKuby Immunology, 7th Edition 2012, Mosby (Elsevier).
- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- D.R.Arora / BrijBala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors Pvt. Ltd..
- B S Nagoba and D V Bedpathsk, Immunology, 1st Edition 2008, BI Publications.
- J Ochei and A Kolhatkar, Medical Laboratory Science- Theory and Practice, 1st Edition 2000, Tata Mcgraw Hill Publishing Co Ltd.
- Praful B. Godkar, Darshan P. Godkar, Text book of Medical Laboratory Technology, 3rd Edition 2014, Bhalani Publishing House.
- Peter Lydyard, Alex Whelan, Michael Fanger, Instant Notes in Immunology 3rd Edition 2011, BIOS Scientific Publisher.
- William E. Paul, Fundamental Immunology 7th Edition 2013, WoultersKluwar / Lippincott Williams & Wilkins.
- T Doan, R Mervold, S Visseli, C Waltenbough, Immunology 2nd Edition 2013, WoultersKluwar / Lippincott Williams & Wilkins.

ADVANCED LABORATORY TECHNIQUE

Course Code: MLT4114 **Credit Units: 4**

Course Objective: To enable the students to understand the working principle of latest laboratory techniques.

Course Contents:

Module-I: Principles & Application of Chromatography: Definition and types of Chromatography; Paper Chromatography; Thin Layer Chromatography; Adsorption Chromatography; Partition Chromatography; Ion-exchange Chromatography; Gel Filtration; Affinity Chromatography; Column Chromatography; High Performance liquid Chromatography (HPLC).

Module-II: Electrophoresis: Definition, General Methodology; Factors affecting migration of charged particles; Theory and applications of paper, SDS-PAGE and agarose gel electrophoresis; Isoelectric Focusing; Two Dimensional Electrophoresis; Protein purification and Evaluation; Densitometry

Module-III: Immunological Technique: Enzyme Linked immunosorbent assay; Radioimmunoassay; Immunodiffusion, Florescent immunoassay; Immunofluorescence, Immunoarray, Chemiluminosence assay.

Module-IV: Molecular Techniques: Recombinant DNA technology; Polymerase chain reaction; RT PCR; RFLP; DNA Probe; DNA finger printing; Sequencing; Eastern blot; Southern blot; Northern blot; Gel documentation, DNA microarray, FISH, RFLP.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Recommended books:

- Keith Wilson & John Walker. Principles and techniques of biochemistry and molecular biology. Cambridge University Press, 7th Edition, (2015)
- S.V.S. Rana. Biotechniques theory and Practice Rastogi Publications, 3rd edition, (2012)
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.
- Mc Pherson and Pincus. Henry's Clinical Diagnosis and management by Laboratory Method, 23rd Edition, Elsevier.

LAB COURSE

Course Code: MLT4105 **Credit Unit: 1**

Course Objective:

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory.

Serology

1. HIV test.
2. HCV test.
3. HBsAg test.
4. widal test.
5. ASO test.
6. CRP test.
7. RA test.
8. VDRL and RPR test.
9. Coomb's test.

Molecular Pathology and Cytogenetics

1. To demonstrate PCR.
2. To demonstrate recombinant DNA technology.
3. To demonstrate DNA finger printing.
4. To demonstrate RT PCR and RFLP.

Examination Scheme:

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, Jaypee & Brothers Medical Publishers Pvt. Ltd.
- P K Godkar, Text Book of Medical Laboratory Technology 13th edition, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations 4th edition, Jaypee & Brothers Medical Publishers Pvt. Ltd.
- Shivaraja Shankara YM, ,araknahS ,yrtsimehcoiB lacitcarP rof launaM yrotarobaL ,KM hsenaG .dtL .tvP srehsilbuP lacideM srehtorB & eepyaJ
- Medical Laboratory Science: Theory and practice by J. Ochei, Arundhati kolhatkar, Mcgraw Hill Education, 1st edition (2008).

CLINICAL TRAINING

Course Code: MLT4112 **Credits Units: 2**

Course objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Second Semester:

1. Serology Lab
2. Molecular Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

Syllabus - Second Semester

MOLECULAR DIAGNOSTICS

Course Code: MLT4208 **Credit Units: 3**

Course Objective: To enable the students to understand genetic diseases and its diagnosis.

Course Contents:

Module-I: Mendelian Disease: Autosomal recessive disordes; autosomal dominant disorders; sex linked inheritance; hemophilia; sickle-cell anaemia; phenylketonuria; cystic fibrosis; tay-sachs disease; xerodermapigmentosa; pedigree analysis;proband
Chromosomal Disorders: Normal chromosomes**;** Numerical disorders; Structural abnormalities; Down syndrome; Turner syndrome; Klinefeltersyndrome.

Module-II: Karyotyping: Human karyogram, banding technique, applications of karyotyping; prenatal diagnosis; DNA profiling.
Nucleic acid extraction: Plasmid DNA; eukaryotic genomic DNA and Mitochondrial DNA extraction.

Module-III: Mutation: Introduction; molecular basis of mutation, mutagens.
Gene Therapy: Introduction; types and current approach and advancement

Module-IV: Molecular Diagnosis: Molecular based diagnosis of bacterial, viral, parasitic and fungal infections; ethical issues related to molecular diagnostics; future of molecular diagnostics.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- U. Satyanarayana. Biotechnology, 1st Edition 2013. BOOKS & ALLIED Ltd.
- U Satyanarayan and U Chakrapani. Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde. Text book of Medical Biochemistry, 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.

RESEARCH METHODOLOGY AND BIOSTATISTICS

Course Code: MLT4211 **Credit Units: 3**

Course Objective: The course aims to promote the students to progress in research aspects in the medical diagnostic, pharmaceutical, biotechnology, and medical treatment field.

Course Contents:

Module-I: Basics of Research: Meaning and purpose; Types, (Educational, Clinical, Experimental, Historical descriptive, Basic applied and Patent oriented Research); Formulation of hypothesis; Characteristic of designing a research work.
Scientific writing: Characteristics - Logical format for writing thesis and papers; essential features of abstract, introduction, review of literature, materials and methods, and discussion; effective illustration - tables and figures; reference styles - harvard and vancouver systems.
Literature Survey- use of library, books, journals-medlines-internet, and reprints of articles as a source for literature survey.

Module-II: Biostatistics: Collection and classification of data - diagrammatic and graphic representation of data, statistical tools, its importance in data analysis; measurement of central tendency; standard deviation; normal distribution; test of significance based on large samples and small samples; student t test; correlation and regression; Chi square test for independence of attributes; ANOVA

Module-III: Patenting and ethical issues in research patenting: definition of patent; the patents system in India and present status; intellectual property rights; what may be patented? ; Who may apply for patents?; preparation of patent- proposal; registration of patents in foreign countries & vice versa; research funding agency.

Module-IV: ETHICS: Ethics in animal experimentation; cpcsea guidelines - animal care, animal husbandry, feed, bedding, water, sanitation and cleanliness, waste disposal, anesthesia and euthanasia; composition of (human) institutional ethical committee (IEC) - general ethical issues; specific principles for chemical evaluation of drugs, herbal remedies and human genetics research, ethics in food and drug safety; environmental release of microorganisms and genetically engineered organisms; ethical issues in human gene therapy and human cloning.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

Recommended books:

- R.A. Day. How to write a scientific paper. Cambridge University Press.
- Cooray P.G. Guide to scientific and technical writing.
- Carter V. Good and Douglas E seats Methods of Research.
- Alley, Michael. The craft of scientific writing. Englewood Cliffs. N.N. Prentice 1987.
- Sundar Rao, Jesudian Richard - An Introduction to Biostatistics. S.P. Gupta - Fundamentals of statistics, Sultan Chand.

SPECIALIZATION – CLINICAL BIOCHEMISTRY
METABOLIC BIOCHEMISTRY

Course Code: MLT4210 **Credit Units: 4**

Course Objectives:

- The course will impart the concept of major metabolic processes.
- The subject emphasizes on importance and clinical aspects of metabolic pathways.

Course Contents:

Module-I: Carbohydrates Metabolism: Glycolysis, Krebs cycle, gluconeogenesis, glycogenesis, glycogenolysis, HMP Shunt, bioenergetics regulations and clinical aspects.

Module-II: Lipids Metabolism: Lipolysis, oxidation of fatty acid, biosynthesis of fatty acids, ketogenesis, ketogenolysis, cholesterol biosynthesis and clinical aspects.

Module-III: Amino Acid Metabolism: Transamination, deamination, metabolism of ammonia, urea cycle, regulation, relation with TCA cycle and clinical aspects.

Module-IV: Nucleic Acids Metabolism: Denovo and salvage pathway, purine and pyrimidine nucleotide breakdown and biosynthesis and clinical aspects.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- U Satyanarayan and U Chakrapani. Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde. Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd
- D M Vasudevan, Sreekumari S, Kannan Vidhyanathan,Textbook of Biochemistry for Medical students, 8thEdition 2016, Jaypee & Brothers Medical Publishers (P) Ltd.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt. Fundamentals of Biochemistry: Life at the Molecular Level: Life at the Molecular Level. Fifth Edition 2016, Wiley

CLINICAL NUTRITION

Course Code: MLT4213 **Credit Units: 4**

Course Objective: To prepare the students to understand the structure, function and properties carbohydrates, proteins and lipids.

Course Contents:
Module-I: Carbohydrate: Introduction**;** biomedical importance; physical and chemical properties; structure- classification- monosaccharide, disaccharide, polysaccharide; triose, tetrose, pentose and hexoses sugars; digestion and absorption of carbohydrate; quantitative & qualitative test of carbohydrate; reducing and non-reducing sugars.

Module-II: Amino acid: Introduction**;** importance; physical & chemical properties; essential and non-essential amino acid; glucogenic and ketogenic amino acid.
Protein: Properties; functions; structure- primary, secondary, tertiary and quaternary; albumin, globulin and fibrinogen; clinical importance; digestion and absorption of protein; qualitative and quantitative test of protein and amino acid.

Module-III: Lipid: Introduction**;** importance; physical & chemical properties; structure of fat and fatty acid; essential and non- essential fatty acid; triglyceride and cholesterol structure and function; glycolipids; phospholipids; lipoproteins; digestion and absorption of fat; qualitative and quantitative test of lipids.

Module-IV: Nucleic Acid: Introduction**;** importance; physical & chemical properties; structure; Nucleoside; nucleotide; DNA and RNA- structure, function and biomedical importance.
Vitamins: Introduction; classification; importance; source; RDA; normal range and clinical significance.
Minerals: Introduction; classification; micro and macro minerals; importance; source; RDA; normal range and clinical significance.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Recommended books:

- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd
- D M Vasudevan, Sreekumari S, Kannan Vidhyanathan. Textbook of Biochemistry for Medical students, 8thEdition 2016, Jaypee & Brothers Medical Publishers (P) Ltd.
- S Ramakrishana, Test Book of Medical Biochemistry, 3rd Illustrated Edition 2004, Orient Longman.
- S Chitiprol, Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee Brothers Medical Publishers (P) Ltd
- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt. Fundamentals of Biochemistry: Life at the Molecular Level: Life at the Molecular Level. Fifth Edition 2016, Wiley

PRINCIPLES OF BIOCHEMISTRY

Course Code: MLT4214 **Credit Units: 3**

Course Objective: To enable the students to understand the working principle of latest laboratory techniques.

Course Contents:

Module-I: Centrifugation: Types of centrifuge; Types of rotors; Theory and applications.

Module-II: Spectrophotometry: Colorimeter, spectrophotometer and atomic absorption spectrophotometry; theory and applications.

Module-III: Photometry: Introduction & Applications; Flame Photometry& its uses.

Module-IV: Automation: Phases of sample analysis- pre-analytical phase, analytical phase and post analytical phase; semi & fully automated analyzers, batch analyzer; dry chemistry analyzer.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- Keith Wilson & John Walker. Principles and techniques of biochemistry and molecular biology. Cambridge University Press, 7th Edition, (2015)
- S.V.S. Rana. Biotechniques theory and Practice Rastogi Publications, 3rd edition, (2012)
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.
- Mc Pherson and Pincus. Henry's Clinical Diagnosis and management by Laboratory Method, 23rd Edition, Elsevier.

CLINICAL BIOCHEMISTRY LAB COURSE-I

Course Code: MLT4215 **Credit Unit: 1**

Course Objective

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory.

Course Contents:

1) Carbohydrates: estimation of glucose (F, PP & R)
2) Protein: estimation of serum albumin, total protein and A/G ration.
3) Triglycerides : estimation of serum triglycerides
4) Cholesterol : estimation of total cholesterol
5) SGPT : estimation of SGPT
6) SGOT : estimation of SGOT
7) Alkaline phosphatase : estimation of alkaline phosphatase
8) Acid phosphatase : estimation of acid phosphatase
9) Bilirubin : estimation of serum bilirubin
10) Blood urea : estimation of blood urea in blood sample
11) Creatinine : estimation of serum creatinine
12) Calcium : estimation of serum calcium

Examination Scheme:

Components	Internal Assessment	Attendance	File	EE
Weightage(%)	20	5	5	70

Recommended books:

- Medical Laboratory Science: Theory and practice by J. Ochei, Arundhati kolhatkar, Mcgraw Hill Education, 1st edition (2008).
- P K Godkar, Text Book of Medical Laboratory Technology 13th edition, Bhalani Publication.

CLINICAL BIOCHEMISTRY CLINICAL TRAINING-I

Course Code: MLT4216 **Credit Units: 2**

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Clinical Pathology Lab
2. Instrumentation Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

SPECIALIZATION-CLINICAL MICROBIOLOGY
GENERAL MICROBIOLOGY

Course Code: MLT4217 **Credit Units: 4**

Course Objective:

- To provide detailed knowledge of anatomy and physiology of microorganisms.
- To become students aware about applications of microorganisms in the industry, health-care, environment and research fields.

Course Contents:

Module-I: General Microbiology: Introduction, history of microbiology; importance and scopes; safety measurements in microbiology laboratory; terminology related to microbiology.
Microorganisms: Introduction and Classification; morphological characteristics of various medically important microorganisms; microbial metabolism and reproduction; importance of normal micro-flora.

Module-II: Microbial Genetics: Introduction, principles of microbial genetics, structure and functions of genetic material, transformation; transduction, conjugation, lysogenic conversion, transposition, gene transfer by artificial methods, mutation, bacteriophages.

Module-III: Microbial Pathogenicity: Mechanism and transmission of microbial Infections, classification of infections, virulence factors affecting microbial pathogenicity, role of microorganisms in hospital acquired infections.

Module-IV: Microscopy: Introduction and types of microscopy**;** working, components, applications and preventive maintenance of different microscopes.
Sterilisation and Disinfection: Introduction, importance and types of sterilization; sterilization indicators; calibration and preventive maintenance of sterilizing equipments and instruments; mode of action, properties and uses of disinfectants and antiseptics, efficiency testing of disinfectants.

Examination Scheme

Components	**CA**	**A**	**ME**	**EE**
Weightage (%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, Arya Publication.
- R. Ananthanarayan and Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology 4th, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology 13th Edition, Churchill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology revised edition, S Chand & Company LTD.
- Suvarna, Layton & Bancroft, Suvarna Bancroft's Theory & Pract. Of Histological Techniques, Churchill Livingstone.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology 9th edition, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology 7th, Woulter Kluwer.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology 2nd Edition, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, Mc Grew Hill Medical.

DIAGNOSTIC MICROBIOLOGY-I

Course Code: MLT4218 **Credit Units: 3**

Course Objective:

- To develop theoretical as well as practical skills for handling the microorganisms in microbiology laboratory.
- To empower students aware of routine laboratory techniques.

Course Contents:

Module-I: Diagnostic Microbiology: Introduction and importance of diagnostic microbiology.
Specimen Collection: Collection, preservation, transportation and processing of various clinical specimens for microbiological investigations.

Module-II: Gross / Physical Examination: Significance and procedure for gross examination of various microbiological clinical specimens
Microscopic Examination: Unstained microscopic techniques; various staining techniques.

Module-III: Culture Media: Cultural characteristics of microbes; Preparation and application of various culture medias and broth
Cultural techniques: Different cultural techniques; antibiotic susceptibility test; interpretation of cultures and antibiotic testing; stock culture preparation and its maintenance.

Module-IV: Specific identification tests: Various biochemical tests; other laboratory techniques for identification of microbial strains or species.

Examination Scheme:

Components	CA	A	ME	EE
Weightage (%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, Arya Publication.
- R. Ananthanarayan and Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology 4th, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology 13th Edition, Churchill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology revised edition, S Chand & Company LTD.
- Suvarna, Layton & Bancroft, Suvarna Bancroft's Theory & Pract. Of Histological Techniques, Churchill Livingstone.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology 9th edition, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology 7th, Woulter Kluwer.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology 2nd Edition, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, Mc Grew Hill Medical.

CLINICAL BACTERIOLOGY

Course Code: MLT4219 **Credit Units: 4**

Course Objective:

- To impart the knowledge of morphology, culture characteristics, pathogenicity, lab diagnosis and prophylaxis of major bacterial pathogens.
- To provide the understanding of special laboratory techniques.

Course Contents:

Module-I: Bacteriology: Introduction, history and importance in health care sector
Staining: Gram stain, AFB stain, Albert's stain and special stains for spore, capsule and flagella.
Biochemical test: Catalase, coagulase, oxidase, indole, MR, VP, citrate, urease and triple sugar iron agar. Identification of bacteria by conventional method, molecular method and automatic methods.
Special laboratory techniques: Bacteriological examination of water, milk and air.

Module-II: Gram positive bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Staphylococci, Streptococci, Pneumococcus, Enterococcus, Bacillus, Corynebacterium, Clostridia, Mycobacterium Tuberculosis, Mycobacterium leprae, Actinomycetes and Listeria.

Module-III: Gram negative bacteria: Morphology, pathogenicity, lab diagnosis and prophylaxis of: Neisseria gonorrhoeae, Neisseria meningitides, Escherichia coli, Shigella, Klebsiella, Proteus, Yersinia, Salmonella, Vibrio, Aeromonas.

Module-IV: Gram negative bacteria
Pseudomonas, Campylobacter, Bacteroides, Fusobacterium, Brucella, Haemophilus, Bordetella and Helicobacter pylori
Miscellaneous bacteria: Morphology, Pathogenicity, lab diagnosis and prophylaxis of: Spirochetes, Rickettsiae, Chlamydia and Mycoplasma and Ureaplasma. Bacterial Vaginosis.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Mark Gladwin, Trattler William, C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.

- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016,Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology,10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1st Edition 2008, Mc Grew Hill Medical.

CLINICAL MICROBIOLOGY LAB COURSE-I

Course Code: MLT4220 **Credit Unit: 1**

Course Objective:

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory.

Course Contents:

1) **Preparation of culture media:** Peptone water, Nutrient broth, Selenite F broth, Thiosulfate citrate bile salt sucrose agar, Nutrient agar, Blood agar, chocolate agar, MacConkey's agar, Mueller-Hinton, Salmonella-Shigella agar, Xylose Lysine Deoxycholate agar, L J Medium, TSI agar, citrate agar, urease agar.
2) **Staining method**: Simple stain, Gram stain, ZN Stain, Albert stain, Negative stain,
3) **Culture Method**: Streak culture, Lawn Culture, Stroke Culture, Pour plate culture, Liquid culture.
4) **Biochemical tests:** Catalase test, Coagulase test, CAMP reaction, Bile solubility test,
5) Widal test
6) Hanging drop preparation and Satellitism.

Examination Scheme:

Components	Internal Assessment	Attendance	File	EE
Weightage(%)	20	5	5	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Mark Gladwin, Trattler William, C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- Dr. C.P. Baveja, Dr. V. Baveja, Textbook of Microbiology for MLT, 2nd Edition, Arya Publication.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016,Wolters Kluwer Health.

CLINICAL MICROBIOLOGY CLINICAL TRAINING-I

Course Code: MLT4221 **Credit Units: 2**

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.

Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Microbiology Lab
2. Bacteriology Lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

Syllabus - Third Semester

SUMMER PROJECT EVALUATION

Course Code: MLT4335 **Credit Units: 6**

Summer Project report:
The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the layout of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page:** The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgement(s):** Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract:** A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents**: Titles and subtitles are to correspond exactly with those in the text.
- **Introduction:** Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.
- **Materials and Methods:** This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion:** Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow. Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form.While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather; it should lead to generalization of data on the chosen sample. Results and its discussion should be supporting / contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.
- **Conclusion(s) & Recommendations:** A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:
• Did the research project meet its aims (check back to introduction for stated aims)?
• What are the main findings of the research?
• Are there any recommendations?
• Do you have any conclusion on the research process itself?

- **Implications for Future Research:** This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices:** The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References:** References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

- For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic Escherichia coli O157: H7. Clin Microbiol Infect , 8 (suppl 1): 116–117.

- For book:

Kowalski,M.(1976) Transduction of effectiveness in Rhizobium meliloti. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

The Layout Guidelines for the Project File & Project Report:
• A4 size Paper
• Font: Arial (10 points) or Times New Roman (12 points)
• Line spacing: 1.5
• Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT
Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfil the following assessment objectives:
• Range of Research Methods used to obtain information
• Execution of Research
• Data Analysis (Analyze Quantitative/ Qualitative information)
• Quality Control
• Conclusions

Assessment Scheme:
Continuous Evaluation:
40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)
Final Evaluation:
60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the final evaluation should be carried out by internal supervisors.

Examination Scheme:

Components	**Continuous assessment (External Supervisor-20 & Internal Supervisor-20)**	**Final Evaluation (Attendance >75%-5, Viva-10, Presentation- 15 & Final report- 30**
Weightage (%)	40	60

SPECIALIZATION - CLINICAL BIOCHEMISTRY
CLINICAL ENDOCRINOLOGY

Course Code: MLT4307 **Credit Units: 4**

Course Objective: To make the students to understand the basics of hormones function; clinically important hormones; diagnostic procedure and clinical interpretations.

Course Contents:

Module-I: Basics of Endocrinology: Exocrine and endocrine; anatomical aspects of human endocrine system; regulation of endocrine system; chemical nature of human hormones; hormone receptors; mechanism of peptide and non- peptide hormones action; secondary messenger.
Hypothalamus: Introduction; production, secretion regulation and functions of hypothalamic hormones.

Module-II: Pituitary gland: Introduction; production, secretion regulation and functions of pituitary hormones; related disorders.
Pineal gland: Introduction; production, secretion regulation and functions of pineal hormones; related disorders.
Thyroid gland: Introduction; production, secretion regulation and functions of thyroid hormones; related disorders; thyroid function test.

Module-III: Parathyroid glands: Introduction; production, secretion regulation and functions of parathyroid hormones;
Adrenal gland: Introduction; production, secretion regulation and functions of adrenal hormones; related disorders.
Pancreas: Introduction; production, secretion regulation and functions of insulin and glucagon; somatostatin; related disorders.

Module-IV: Testes and Ovary: Introduction; production, secretion regulation and functions of testes and ovarian hormones; related disorders.
Other Biologically Important Hormones: Hormones involving incontraception; calcium metabolism; renin angiotensin; urotensin; erythropoietin; anti-mullerian hormone.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended Books:

- U Satyanarayan and U Chakrapani. Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde. Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd
- D M Vasudevan, SreekumariS, Kannan Vidhyanathan. Textbook of Biochemistry for Medical students, 8thEdition 2016, Jaypee& Brothers Medical Publishers (P) Ltd.
- S Ramakrishana, Test Book of Medical Biochemistry. 3rd Illustrated Edition 2004, Orient Longman.
- S Chitiprol. Biochemistry: Instant Notes for Medical students, 1st Edition 2006, Jaypee Brothers Medical Publishers (P) Ltd
- DM Vasudevan, Subir Kumar Das. Practical Textbook of Biochemistry for Medical Students, 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd

- Ranjna Chawla. Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee Brothers Medical Publishers (P) Ltd
- David T Punmmer. An introduction to practical biochemistry, 3rd Edition 2004, Tata McGraw-Hill Education Private Limited
- YM ShivarajaShankara, MK Ganesh, AR Shivashankara. Laboratory Manual for Practical Biochemistry. 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd
- Albert L Lehninger, Michel M Cox, David L Nension.Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly. Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks. Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt. Fundamentals of Biochemistry: Life at the Molecular Level: Life at the Molecular Level. Fifth Edition 2016, Wiley
- Henry M. Kronenberg, ShlomoMelmed, Kenneth S. Polonsky, P. Reed Larsen. William Textbook of Endocrinology, 11th ed. Saunders Elsevier 2008
- Bolander, F. F. Molecular Endocrinology, III ed. Academic Press, 2004.
- Nelson Cox. Lehninger's Principle of Biochemistry. 3rd ed. MacMillianWorth Publ. 2000.
- Mac E. Hadely. Endocrinology: 5thed. Pearson Education, 2000.

CLINICAL ENZYMOLOGY

Course Code: MLT4308 **Credit Units: 4**

Course Objective: To make the students to understand the basics of enzymes function; clinically important enzymes; diagnostic procedure and clinical interpretations.

Course Contents:
Module-I: Basic Enzymology: Historical perspective; general characteristics; factor affecting enzyme activity; nomenclature and IUB classification; holoenzyme; apoenzyme; co-factors; co-enzymes; prosthetic group; metallozyme; enzyme assay; units; Michaelis-Menten equation.

Module-II: Enzyme inhibition: Introduction; types; enzyme inhibitors; applications
Co-enzyme: NAD; NADP; FAD; Co-enzyme A TTP; Lipic acid; Vitamin B12; Tetrahydrofolate

Module-III: Enzymes In Clinical Medicine: Introduction; intra-cellular and extra-cellular enzymes; CPK; CK-MB; LDH; SGOT; SGPT; cholinesterase; amylase; lipase; aldolase; alkaline and acid phosphatase; Glucose-6-phosphatase; 5-nuceotidease; GGT.

Module-IV: Enzymes in the Diagnosis of Diseases: Diagnosis, prognosis and assessment of myocardial infarction, hepatitis, jaundice, pancreatitis, cancer, neurodegenerative disorders.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- U Satyanarayan and U Chakrapani. Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde. Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd
- D M Vasudevan, Sreekumari S, Kannan Vidhyanathan,Textbook of Biochemistry for Medical students, 8thEdition 2016, Jaypee & Brothers Medical Publishers (P) Ltd.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014,Bhalani Publishing House.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee Brothers Medical Publishers (P) Ltd
- David T Punmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGraw-Hill Education Private Limited
- YM Shivaraja Shankara, MK Ganesh, AR Shivashankara. Laboratory Manual for Practical Biochemistry. 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd
- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis,7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.
- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt. Fundamentals of Biochemistry: Life at the Molecular Level: Life at the Molecular Level. Fifth Edition 2016, Wiley

ADVANCES IN INTERMEDIARY METABOLISM

Course Code: MLT4309 **Credit Units: 3**

Course Objective: The objective of the course is to provide students with knowledge of the various diseases arising due to disorders in the biochemical processes.

Course Contents:

Module-I: Electron Transport & Oxidative Phosphorylation: Components of Electron Transport Chain, Respiratory Chain, Energy Coupling hypothesis, Proton- Gradient generation, Mechanism of ATP synthesis, Uncoupling of Oxidative Phosphorylation

Module-II: Metabolic Disorders of Carbohydrates Metabolism
Galactosemia, glycogen storage disease, deficiency of glucose-6-phosphate dehydrogenase, Hypoglycemia, Diabetes mellitus.

Module-III: Metabolic Disorder of Lipid: SIDS, Tay-Sachs disease, Nieman Pick disease, Farber's disease, Gaucher's disease, Krabbe's disease, hyperlipoproteinemia

Module-IV: Metabolic Disorder of Amino Acid: Phenylketonuria, Richner-Hanhart syndrome, Hartnup's disease, glycinuria, alkaptonuria, Maple syrup urine disease, albinism.
Metabolic Disorder of Nucleotides: Gout, SCID, Lesch-Nyhan Syndrome, Orotic aciduria

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- U Satyanarayan and U Chakrapani. Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde. Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd
- D M Vasudevan, Sreekumari S, Kannan Vidhyanathan,Textbook of Biochemistry for Medical students, 8thEdition 2016, Jaypee & Brothers Medical Publishers (P) Ltd.
- P K Godkar, Text Book of Medical Laboratory Technology, 3rd Edition 2014,Bhalani Publishing House.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 4th Edition 2014, Jaypee Brothers Medical Publishers (P) Ltd
- David T Punmmer, An introduction to practical biochemistry, 3rd Edition 2004, Tata McGraw-Hill Education Private Limited
- YM Shivaraja Shankara, MK Ganesh, AR Shivashankara. Laboratory Manual for Practical Biochemistry. 2nd Edition 2013, Jaypee Brothers Medical Publishers (P) Ltd
- Carl A Buttis, David E. Bruns, Teitz fundamental of clinical chemistry and molecular diagnosis,7th Edition 2015, Elsevier.
- Albert L Lehninger, Michel M Cox, David L Nension, Lehninger Principle of Biochemistry, 6th Edition 2013, W H Freeman & Co.
- Robert Kincaid Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Harpers Illustrated Biochemistry, 30th Edition 2015, McGraw Hill Professional.

- Michael Lieberman, Allan D. Marks, Colleen M. Smith, Dawn B. Marks, Marks' Essential Medical Biochemistry, 2nd Edition 2007, Lippincott Williams & Wilkins.
- Donald Voet, Judith G. Voet, Charlotte W. Pratt. Fundamentals of Biochemistry: Life at the Molecular Level: Life at the Molecular Level. Fifth Edition 2016, Wiley

DIAGNOSTIC BIOCHEMISTRY

Course Code: MLT4310 **Credit Units: 4**

Course Objective: To make the students understand the basic principle, procedure, normal range and clinical significance of blood test.

Course Contents:

Module-I: Diabetes Profile: Diabetes mellitus**;** Blood glucose; Glucose tolerance test; Glycosylated hemoglobin; urine sugar.
Kidney Profile: Serum total protein; albumin; creatinine; urea; blood urea nitrogen; clearance test; Sodium and Potassium

Module-II: Pancreatic Function Test: Serum amylase; lipase; secretin stimulation test; serum trypsinogen.
Liver Function Test: SGOT, SGPT, phosphatase, serum bilirubin; albumin; globulins; A/G ratio; gamma-glutamyl transpeptidase .

Module-III: Cardiac Function Test: SGOT, SGPT, LDH, CK-MB, Troponins and heart-type fatty acid binding protein (H-FABP); Myoglobin; Brain type natriuretic peptide (BNP).
Lipid Profile: Total serum lipids; total serum cholesterol; triglyceride; HDL; LDL; VLDL; Apo 1 and Apo 2

Module-IV: Gastric And Intestinal Function Test: Examination of resting contents; fractional gastric analysis; achylia gastrica ; stimulation tests; serum pepsinogen; tubeless gastric analysis; zollinger-elison syndrome; lactose intolerance; xylose absorption test; inulin absorption test.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Recommended books:

- Praful B. Godkar, Darshan P. Godkar. Text Book of Medical Laboratory Technology, 3rd Edition 2014,Bhalani Publishing House.
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.

ADVANCED CHEMICAL PATHOLOGY

Course Code: MLT4313 **Credit Units: 4**

Course Objective:

- To empower the students' knowledge with the procedure to diagnose human disease.
- To develop professional interests in the field of diagnosis.

Course Contents:

Module-I: Urine chemistry: Colour, pH, bile salt and pigment, glucose, protein, ketones, nitrites, urobilinogen, casts and crystals, amylase, sodium, potassium, chloride, occult blood, Diagnostic Strip and its working principle; future aspects of urine chemistry in diagnosis.

Module-II: Cancer: Benign and malignant cancer; Cancer markers and its uses -CA15-3, CA19-9, CA-125 , PSA, CEA, alpha fetoprotein, beta-HCG and other markes; common techniques.

Module-III: Advance diagnostic procedure: Separation of abnormal haemoglobin, isoenzymes, lipoproteins and serum proteins.

Module-IV: Hormone profile: Advance techniques for estimation of T3, T4, TSH, Testosterone, Oestrogen, Progesterone, Prolactin, FSH, ADH, Insulin and Glucagon

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage (%)	15	5	5	5	70

Recommended books:

- Praful B. Godkar, Darshan P. Godkar. Text Book of Medical Laboratory Technology, 3rd Edition 2014,Bhalani Publishing House.
- U Satyanarayan and U Chakrapani, Text book of Biochemistry, 4th Edition 2013, Elsevier.
- M N Chatterjea and Rana Shinde, Text book of Medical Biochemistry , 8th Edition 2012, Jaypee Brothers Medical Publishers (P) Ltd.

CLINICAL BIOCHEMISTRY LAB COURSE-II

Course Code: MLT4314 **Credit Units: 1**

Course Objective

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory.

    a. Lipid profile.
    b. Liver function test
    c. Pancreas function test
    d. Cardiac profile
    e. Cancer markers
    f. Diabetic profile.
    g. Kidney function test.
    h. Gastric function test
    i. To study hormonal assessment to diagnose disorders related to:
        a. Pituitary gland
        b. Hypothalamus
        c. Thyroid gland
        d. Parathyroid gland
        e. Pancreas
        f. Adrenal gland
        g. Testes and ovary.

Examination Scheme:

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	**20**	**5**	**5**	**70**

Recommended books:

- DM Vasudevan, Subir Kumar Das, Practical Textbook of Biochemistry for Medical Students, Jaypee & Brothers Medical Publishers Pvt. Ltd.
- P K Godkar, Text Book of Medical Laboratory Technology 13th edition, Bhalani Publication.
- Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations 4th edition, Jaypee & Brothers Medical Publishers Pvt. Ltd.
- Shivaraja Shankara YM, ,araknahS ,yrtsimehcoiB lacitcarP rof launaM yrotarobaL ,KM hsenaG .dtL .tvP srehsilbuP lacideM srehtorB & eepyaJ
- Teitz, Fundamental of Clinical Chemistry and Molecular Diagnosis, Carl A Buttis, David E. Bruns Elsevier.
- Medical Laboratory Science: Theory and practice by J. Ochei, Arundhati kolhatkar, Mcgraw Hill Education, 1stedition (2008).

CLINICAL BIOCHEMISTRY CLINICAL TRAINING-II

Course Code: MLT4315 **Credit Units: 2**

Course objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.
Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

1. Clinical Biochemistry Lab
2. Collection centre

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

SPECIALIZATION - CLINICAL MICROBIOLOGY
DIAGNOSTIC MICROBIOLOGY-II

Course Code: MLT4316 **Credit Units: 4**

Course Objective:

- To develop theoretical as well as practical skills for handling the microorganisms in microbiology laboratory.
- To make students aware of advanced laboratory techniques.

Course Contents:

Module-I: Molecular Techniques: DNA recombinant techniques, PCR, NAT, nucleic acid amplification, plasmid analysis, fingerprinting, ribo-typing and DNA sequencing, probe amplification, and other advanced techniques.

Module-II: Rapid and advanced diagnostic techniques: Immunoassays – ELISA, Immuno-electrophoresis, immuno- fluorescence, precipitation, flocculation and agglutination tests, rapid card methods; automatic blood culture system; rapid culture technique for MTB detection; micro-assays; laboratory techniques for cancer immunology.

Module-III: Emerging Diseases: Detailed study (etiology, transmission, pathogenesis, clinical manifestations, laboratory Diagnosis, prevention and control) of following infections – Dengue, Listeriosis, VRE (Vancomycin Resistant enterococci), Leptospirosis, Hepatitis non A , Swine flu, infections caused by Campylobacter , and prions.

Module-IV: Epidemiology of infectious diseases: Introduction, historical aspects, objectives and significance, epidemiological principals in prevention and control of various epidemic microbial diseases or infections; Measures of risks: frequency measures, morbidity frequency measures, mortality frequency measures natality (birth) measures, measures of association, measures of public health impact.

Examination Scheme

Components	**CA**	**A**	**ME**	**EE**
Weightage (%)	15	5	10	70

Recommended books:

- C P Baveja, Text book of Microbiology, Arya Publication.
- R. Ananthanarayan and Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, Orient BlackSwan.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology 4th, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology 13th Edition, Churchill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology revised edition, S Chand & Company LTD.
- Suvarna, Layton & Bancroft, Suvarna Bancroft's Theory & Pract. Of Histological Techniques, Churchill Livingstone.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology 9th edition, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology 7th, Woulter Kluwer.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology 2nd Edition, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, Mc Grew Hill Medical.

CLINICAL VIROLOGY

Course Code: MLT4317 **Credit Units: 4**

Course Objectives:

- To impart knowledge about harmful effects of virus in human health.
- To develop understanding of morphology, cultivation, transmission, Pathogenicity, and control strategies of clinically important Virus.
- To familiarize with techniques of sample collection, transport and processing to diagnose viral infection.

Course Contents:

Module-I: Virology: The nature of viruses, Classification of viruses, structure of virus, Cultivation and replication of virus, Bacteriophase, Interferon, Viral vaccines and antiviral drugs, sample collection, transport and storage of sample for viral diagnosis.

Module-II: Clinically important DNA virus: Herpes simplex virus, Varicella Zoster virus, Cytomegalovirus, Epstein-Barr virus, Poxviridae, Adenoviridae, Parvoviridae, Papillomaviridae.

Module-III: Clinically important of RNA virus: Orthomyxoviruses, Paramyxoviruses, Rubella virus, Picornaviruses, Dengue virus, Chikungunya virus, Japanese B encephalitis virus, Kyasanur Forest disease virus, Rhabdoviruses, HIV and other Retroviruses.

Module-IV: Clinically important of miscellaneous virus: Hepatitis viruses, Oncogenic viruses, Hantaviruses, Arenaviruses, Ebola virus, Coronaviruses, Slow viruses, Rotavirus. Emerging viral infections – SARS, Avian influenza, H1N1.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Mark Gladwin, Trattler William, C. Scott, Mahan Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.
- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology,10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1St Edition 2008, Mc Grew Hill Medical.

CLINICAL MYCOLOGY

Course Code: MLT4318 **Credit Units:4**

Course Objectives:

- The subject includes the study of fungi (yeasts and moulds) which can cause infectious disease in humans.
- It discusses the present classification of fungi, modes of transmission, and infection, disease spectrum.
- Laboratory isolation and identification techniques by cultural and non cultural methods and susceptibility testing to antifungal agents will be emphasized.

Course Contents:

Module-I: Mycology: Introduction of Mycology, Characteristic of Fungi, Taxonomy of Fungi, Immunity to Fungal diseases, Fungal culture media, Fungal reagent and staining, Discuss the procedures used in properly collecting specimens for mycology; Diagnosis of fungal disease; Anti Fungal drugs.

Module-II: Superficial Mycoses: Malassezia Versicolor, Atopic Dermatitis, Malassezia Folliculitis and Systemic Malassezia infection. Tinea Nigra, White Piedra, Black Piedra, Dermatophytes, Tinea Capitis, Dermatophytid or id reaction, wood,s lamp examination.

Module-III: Subcutaneous Mycoses: Mycetoma, Sporotrichosis, Chromoblastomycosis, Phaeohyphomycosis, Rhinosporidiosis and Lobomycosis.

Module-IV: Systemic and Opportunistic Mycoses: Histoplasmosis, Blastomycosis, Coccidioidomycosis and Paracoccidioidomycosis. Candidiasis, Cryptococcosis, Pneumocystosis, Penicilliosis Marneffei, Aspergillosis, Zygomycosis and Oppertunistic Mycoses.

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage (%)	15	5	5	5	70

Recommended books:

- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Mark Gladwin, Trattler William, C. Scott, Mahan, Clinical Microbiology Made Ridiculously Simple. 6th Edition 2013, Medmaster.
- D.R.Arora / Brij Bala Arora, Textbook of Microbiology, 5th Edition 2016, CBS Publishers & Distributors.
- Eds J. G. Collee, J. P. Duguid, A. G. Fraser & B. P. Marmio, Mackie and McCartney: Practical medical microbiology, 14th Edition 2007, Church New Delhi (India): Elsevierill Livingston.
- R C Dubay & D.K.Maheshwari, Practical Microbiology, Revised edition 2014, S Chand & Company LTD.
- Joanne Willey, Linda Sherwood, Christopher J. Woolverton, Presscot's Microbiology, 9th Edition 2014, McGraw-Hill Education.
- Gary W Procop & Elmer W. Koneman Koneman's Color Atlas and Textbook of Diagnostic Microbiology, 7th Edition 2016, Wolters Kluwer Health.

- F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology,10th German Edition 2005, Thieme Stuttgart, New York.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1St Edition 2008, Mc Grew Hill Medical.
- Jagdish Chander, Text book of medical Mycology, 3rd Edition2009, Mehta publishers.

CLINICAL PARASITOLOGY

Course Code: MLT4319 **Credit Units:4**

Course Objectives:

- To provide advanced knowledge and understanding of medically important parasites.
- To equip students with the fundamental understanding of parasitological techniques.

Course Contents:

Module-I: Parasitology: Introduction to parasites and host, classification of parasites and hosts, relationship between parasites and host, transmission of parasitic infections, preventive measurements for parasitic infections, terminology related to parasitology.

Module-II: Protozoology: Detailed study and laboratory techniques for diagnosis of medically important protozoa such as intestinal protozoa, blood and tissue protozoa.

Module-III: Helminthology: Detailed study and laboratory techniques for diagnosis of medically important parasitic worms; for example- intestinal, blood and tissue parasitic worms.

Module-IV: Laboratory Techniques: Collection and processing of different clinical samples for parasitological investigations; laboratory techniques for intestinal parasites, blood parasites, tissue parasites; advanced diagnostic techniques and molecular laboratory techniques.

Examination Scheme

Components	**CA**	**A**	**ME**	**EE**
Weightage (%)	15	5	10	70

Recommended books:

- Arora & Arora, Text book of Medical parasitology, CBS Publishers.
- Saugata Ghosh, Paniker's text book of medical parasitology, Jaypee.
- KD Chatterjee, Protozoology and Helminthology 13th edition, CBS Publishers & Distributors pvt.
- Parasitic diseases in man by Richard Knight English Language Book Society (ELBS).
- Subhash Chandra Parija, Textbook of Medical Parasitology : Protozoology & Helminthology, 4th Edition.
- T V Rajan, Textbook of Medical Parasitology, B I Publications.
- World Health Organization, Basic laboratory methods in medical parasitology, World Health Organization.
- Lynne S. Garcia, Diagnostic Medical Parasitology 5th Edition, ASM Press.
- David T. John, William A. Petri Jr., Markell and Voge's Medical Parasitology 9th, Sunders Elseviers.
- World Health Organization, Basic laboratory methods in medical parasitology, World Health Organization.

PHARMACEUTICAL MICROBIOLOGY

Course Code: MLT4320 **Credit Units: 3**

Course Objective:

- A provide detailed knowledge about antimicrobial action and resistance.
- To become students aware about applications of microorganisms in the industry, health-care, environment and research fields.

Course Contents:

Module-I: Antimicrobial Agents: Introduction and types of antimicrobial agents; terminology related to pharmaceutical microbiology; history of development of antimicrobial drugs or agents, concept of R & D. **Action Mechanism:** Mode of action and activity spectrum of major antibiotic classes, antifungal agents, antiviral agents, prophylactic usage and adverse reactions.

Module-II: Antibiotic and antimicrobial Resistance: introduction and importance, Mechanism of resistance- enzymatic destruction and modification, decreased permeability, promotion of antibiotic reflux, alteration and protection of target sites, bind-up antibiotics etc; molecular genetics of antibiotics resistance in bacteria- role off plasmid, transposable genetic elements, DNA integration elements.

Module-III: Multidrug Resistance: Mechanism and significance of multidrug resistance among microbes; detailed study about - multidrug resistant TB, Malaria, MRSA, VRE, MDR GNR, MDR viruses and fungus.

Module-IV: Sterilization and quality control: Microbial contamination and spoilage of microbial agents and their sterilization, FDA and govt. regulatory practices and policies, quality control**.**
Vaccines: Introduction**,** types**,** working mechanism and applications, adverse effects, terminology related to vaccines.

Examination Scheme

Components	**CA**	**A**	**ME**	**EE**
Weightage (%)	15	5	10	70

Recommended books:

- Hugo, WB and Russell, AD. Pharmaceutical Microbiology, (2003). Blackwell Science, Oxford, UK.
- Krogsgaard L, Lilijefors T. and Madsen, U. Textbook of Drug Design and Discovery, (2004). Taylor and Francis, London.
- Geoffrey Hanlon and Norman Hodges. Essential Microbiology for pharmacy and pharmaceutical science. (2013). Wiley Blackwell.
- S. P. Vyas & V. K. Dixit. Pharmaceutical Biotechnology. (2003) CBS Publishers & Distributors, New Delhi.
- Bhatia R and Ichhpujani RL. Quality Assurance in Microbiology. (1995). CBS Publishers, New Delhi.
- Gregory Gregoriadis. Drug Carriers in biology & Medicine. (2001). Academic Press New York.
- Davis, B. D., Dulbecco, R, Eisen, H. N., Ginsberg, R. S. Microbiology. (1990). Harper and Row Publishers, Singapore. F. H. Kayser, K. A. Bienz, J. Eckert, Medical Microbiology, Thieme Stuttgart, New York.
- Quality Assurance in Microbiology by Rajesh Bhatia, Rattan Lal Ihhpunjani. CBS publishers & distributors, New Delhi.
- Quniolinone antimicrobial agents- Edited by David C. Hooper, John S. Wolfson. ASM Washington DC.

CLINICAL MICROBIOLOGY LAB COURSE-II

Course Code: MLT4321 **Credit Units: 1**

Course Objective:

- To impart the basic knowledge of principles, procedure and clinical importance of laboratory various test.
- To familiarize with basic knowledge of instruments commonly utilized in the clinical laboratory

LIST OF PRACTICAL EXERCISES:

Virology, Mycology and Parasitology sections:

- Collection, transportation and preservation of specimens Specimen for viral diagnosis.
- Isolation and identification of viruses from specimens.
- Preparation of glassware and media for tissue culture.
- Preparation and maintenance of tissue culture.
- Virus isolation in tissue culture and identification.
- Use of chick embryo – inoculation by various routes.
- Use of laboratory animals for isolation of viruses, preparation of antisera and complement etc.
- Serological tests in virology.
- Antigen detection by various techniques.
- Collection of specimens for fungal examination.. Direct KOH examination.
- LPCB and India ink staining.
- Concentration techniques for stool and blood samples.
- Wet mount preparation of stool.
- Slide culture techniques.

Examination Scheme:

Components	Internal Assessment	Attendance	Record	EE
Weightage (%)	20	5	5	70

Recommended books:

- Arora & Arora, Text book of Medical parasitology, CBS Publishers.
- Saugata Ghosh, Paniker's text book of medical parasitology, Jaypee.
- KD Chatterjee, Protozoology and Helminthology 13th edition, CBS Publishers & Distributors pvt.
- C P Baveja, Text book of Microbiology, 4th Edition 2010, Arya Publication.
- Arti Kapil, Ananthanarayan and Paniker's Textbook of Microbiology, 9th Edition 2013, Orient BlackSwan.
- Michael Ford, Medical Microbiology, 2nd Edition 2014, Oxford university press.
- Neal Chamberlain, Medical Microbiology: The Big Picture, 1St Edition 2008, Mc Grew Hill Medical.

CLINICAL MICROBIOLOGY CLINICAL TRAINING-II

Course Code: MLT4322 **Credit Units: 2**

Course Objective: The purpose of a Clinical training is to provide hands on practical experience in relevant sections of diagnostic labs as per the need of healthcare system. Students will participate in samples collection, documentation, transportation, receiving, processing and dispatch of reports. Students will help in the performance of clinical protocols, quality maintenance and laboratory research. In some cases, students may be deputed in community services or assist in organizing camps like blood testing or blood donation camp.
Students will be sent to diagnostic laboratory or hospital once a week outside campus or may be within the campus if facility available.

Plan for clinical training:

- Serology Lab
- Microbiology lab

Note: Students must submit training report during examination and the same would be evaluated through Viva voice and presentation.

Examination Scheme:

Components	**Viva**	**A**	**ME**	**EE**
Weightage (%)	10	5	15	70

Syllabus - Fourth Semester

ON JOB TRAINING

Course Code: MLT4401 **Credit Units: 9**

On-the-job training, also known as OJT, is teaching the skills, knowledge, and competencies that are needed to perform a specific job within the workplace and work environment. The main purpose is to correlate laboratory investigations, through case studies and laboratory tests and their correlations. Implementation of Quality controls and guidelines for implementation in accreditation programmes. Students will learn in an environment in which they will need to practice the knowledge and skills which he/she learnt in the class. On-the-job training uses the regular or existing workplace tools, machines, documents, equipment, knowledge, and necessary skills required for an employee to learn to effectively perform his or her job where ever he/she is sent for OJT.

Examination Scheme:

Components	**Continuous assessment (External Supervisor-20 & Internal Supervisor-20)**	**Final Evaluation (Attendance >75%-5, Viva-10, Presentation- 15 & Final report- 30**
Weightage (%)	40	60

CLINICAL RESEARCH-DISSERTATION

Course Code: MLT4437 **Credit Units: 9**

GUIDELINES FOR PROJECT FILE AND PROJECT REPORT

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critically analyzed by the faculty guide and corrected by the student at each stage.

PROJECT FILE

The Project File may be a very useful tool for undertaking an assignment along-with a normal semester, an exploratory study, sponsored projects, a project undertaken during summer period or any other period as per curricular where the researcher is working with a company/organization. The project/ assignment may also be a part of the bigger research agenda being pursued by a faculty/ institution/ department

The Project File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation. This file may be considered in continuous assessment.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated objectives;
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen and may be useful to document for future reference.

PROJECT REPORT

The Project Report is the final research report that the student prepares on the project assigned to him. In case of sponsored project the layout of the project could be as prescribed by the sponsoring organization. However, in other cases the following components should be included in the project report:

- **Title or Cover Page:** The title page should contain Project Title; Student's Name; Programme; Year and Semester and Name of the Faculty Guide.
- **Acknowledgement(s):** Acknowledgment to any advisory or financial assistance received in the course of work may be given. It is incomplete without student's signature.
- **Abstract:** A good"Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project. It should not exceed more than 1000 words.
- **Table of Contents**: Titles and subtitles are to correspond exactly with those in the text.
- **Introduction:** Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods:** This section should aim at experimental designs, materials used (wherever applicable). Methodology should be mentioned in details including modifications undertaken, if any. It includes organization site(s), sample, instruments used with its validation, procedures followed and precautions.
- **Results and Discussion:** Present results, discuss and compare these with those from other workers, etc. In writing this section, emphasis should be laid on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow. Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary, do not write in "point" form. While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be in congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion rather; it should lead to generalization of data on the chosen sample. Results and its discussion should be supporting/contradicting with the previous research work in the given area. Usually one should not use more than two researches in either case of supporting or contradicting the present case of research.
- **Conclusion(s) & Recommendations:** A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Check that your work answers the following questions:
• Did the research project meet its aims (check back to introduction for stated aims)?
• What are the main findings of the research?
• Are there any recommendations?
• Do you have any conclusion on the research process itself?

- **Implications for Future Research:** This should bring out further prospects for the study either thrown open by the present work or with the purpose of making it more comprehensive.
- **Appendices:** The Appendices contain material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.
- **References:** References should include papers, books etc. referred to in the body of the report. These should be written in the alphabetical order of the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples:

- For research article:

Voravuthikunchai SP, Lortheeranuwat A, Ninrprom T, Popaya W, Pongpaichit S, Supawita T. (2002) Antibacterial activity of Thai medicinal plants against enterohaemorrhagic Escherichia coli O157: H7. Clin Microbiol Infect , 8 (suppl 1): 116–117.

- For book:

Kowalski,M.(1976) Transduction of effectiveness in Rhizobium meliloti. SYMBIOTIC NITROGEN FIXATION PLANTS (editor P.S. Nutman IBP), 7: 63-67

The Layout Guidelines for the Project File & Project Report:
• A4 size Paper
• Font: Arial (10 points) or Times New Roman (12 points)
• Line spacing: 1.5
• Top and bottom margins: 1 inch/ 2.5 cm; left and right margins: 1.25 inches/ 3 cm

ASSESSMENT OF THE PROJECT FILE AND THE PROJECT REPORT
Essentially, the assessment will be based on the quality of the report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project. Project execution is concerned with assessing how much work has been put in.

The Project should fulfil the following assessment objectives:
• Range of Research Methods used to obtain information
• Execution of Research
• Data Analysis (Analyze Quantitative/ Qualitative information)
• Quality Control
• Conclusions

Assessment Scheme:
Continuous Evaluation:
40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/mid-course corrections etc. as reflected in the Project File.)

Final Evaluation:
60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)

It is recommended that the Final evaluation should be carried out by a panel of evaluators.

Examination Scheme:

Components	**Continuous assessment** (External Supervisor-20 & Internal Supervisor-20)	**Final Evaluation** (Attendance >75%-5, Viva-10, Presentation- 15 & Final report- 30

Amity Medical School

Master of Hospital Administration

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

HOSPITAL ORGANIZATION & MANAGEMENT PROCESSES

Course Code: MHA4101 **Credit Units: 04**

Course Objective:
To help the students gain understanding of the functions and responsibilities of the manager and to provide the student understand Human Behaviour in organizations so as to improve his managerial effectiveness.

Course Contents:

Module-I: Management Process
Evoluation of Management thought and function of Management, roles and skills of a Manager, Emerging challenges of Management.

Module-II: Fundamentals of Organizational Behaviour
Nature and Structure of Organisation, Types of Organisation Line and Staff relationships, Formal and Informal Organisations.

Module-III: Individual Behaviour
Overview of OrganisationBehaviour and its Importance, Organisation Models.

Module-IV: Foundations of Group Behaviour
Individual Behaviour, Perception and Learning, Personality, Values & Attitudes, Motivation: Concept Theory and application

Module-V: Conflict Management
Group Dynamics, Communication, Leadership, Power and Politics, Conflicts and Negotiation.

Module-VI: Organizational Change and Stress Management
Organisational Culture, Organisational Change and Development, Work Stress and its Management.

Module-VII: Hospital as an Organization
History and development of hospitals, Definition, types, control, role and functions, Hospitals in India-today their number, types, size, distribution, ownership, hospitals utilization, issues & trends, characteristics of a modern hospital.
Roles and functions of Hospital Administration, Profile of Hospital Administrator, Role of HA in education and research.

Module-VIII: Social responsibilities of management
Management and Society, Culture and management, management ethics, social objectives and responsibilities of management, Corporate social responsibility- hospitals and social responsibility.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text &References:

- McGibbony, *Hospital Organization &Managemen.*
- *Hospital administration & management Theory* and Practice R Kumar, S.L. Goel
- Luthans, F. (2005), Organizational Behaviour, McGraw – Hill International Edition.
- Robbins, S.P. (2005), Organizational Behaviour, Eleventh Edition, Prentice Hall of India.
- Greenberg, J. & Baron, R.A. (2005), Behaviour in Organizations, Pearson Education.
- Newstrom John W. and Davis Keith, (1993), Organizational Behaviour: Human Behaviour at Work, Tata McGraw Hill, New Delhi
- P. SubbaRao (2010), Management and Organisation and Behaviour, Himalaya Publishing House, New Delhi
- Pierce Gardner with Dunham (2011)Managing Organizational Behaviour. Cengage Learning India.

DEMOGRAPHY

Course Code: MHA4102 **Credit Units: 03**

Course Objective:
To present students some basic techniques and concepts in population sciences.

Course Contents

Module-I: Population Fundamentals
Science of demography, Demographic cycle, Population trends and demographic indicators, Demography and Family Planning and its role in population policy of India.

Module-II: Demographic Studies
- Fundamentals of population studies and its links with health.
- Methods of demographic data collection, sources of data, population census, population composition, world population growth, growth of Indian population, morbidity, mortality, ageing, migration/ urbanization, population projections life tables.

Module-III: Family Planning
Fertility and fertility factors, Family planning, Population policies & programmes and National Population Policy.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Texts& References:

- AshaBhende and Tara Kanitkar. *Principles of population Studies*, Himalaya Pub Houses,
- John Weeks, *Population*, Wordsworth pub, 1994.
- S.N.Singh, M.K.Premi, P.S.Bhatia. *Population Transition In India*, B. R. Publishing Corporation.
- P.B. Desai. *Population in the context of India's development*, UGC – UNFPA project.
- Peter Cox. *Demography*, Cambridge University Press
- K.B. Pathak, F. Ram. *Techniques of Demographic Analysis*, Himalaya Publishing Houses.
- *Health Monitor*, Foundation for Research in Health S.
- International Institute for Population Sciences. *National Family Health Survey – 1, 2 and 3*, Mumbai.
- K. Srinivasan. *Basic Graphic Techniques and Applications*, Sage Publications, 1998

MARKETING MANAGEMENT

Course Code: MHA4104 **Credit Units: 3**

Course Objective:
The objective of this course is to provide the students exposure to modern marketing concepts, tools, and techniques, and help them develop abilities and skills required for the performance of marketing functions.

Course Contents:

Module-I: Understanding Marketing in New Perspective
Fundamentals of Marketing, Customer Value and Satisfaction, Customer Delight, Conceptualizing Tasks and Philosophies of Marketing Management, Value Chain, Scanning the Marketing Environment, Marketing Mix Elements, Difference between marketing and Selling, Relationship marketing, Social marketing, Strategic Planning in marketing, formulating the marketing plan.

Module-II: Analyzing Consumers & Selecting Markets
The factors influencing consumer behavior. The stages in the buying process, the buying decision making process, factors effecting the buying decision., Market Segmentations, Levels of Market Segmentations, Patterns, Procedures, Requirement for Effective Segmentation, Evaluating the Market Segments, Selecting the Market Segments, Tool for Competitive Differentiation, Developing a Positioning Strategy.

Module-III: Managing Product & Pricing Strategies
Classification of products, New Product development, stages of product development, Adoption process, Product mix decisions and line management, Length, width and depth of a line, line analysis, and brand management, product life cycle, stages in lifecycle and factors affecting each stage, Managing product life cycles. Setting the price, adapting the price, initiating and responding the price changes.

Module-IV: Designing: Managing the Integrated Communication
Channel functions and flows. Channel design decisions. Channel management decisions.Channel dynamics; vertical horizontal and multi channel marketing systems. Market Logistics decisions. Effective Communication, Integrated Marketing Communication, Marketing Communication Process, Promotion mix, Advertising, Personal Selling, Sales Promotion and Publicity and Public Relations, Direct Marketing.

Module-V: Emerging Trends in Marketing
An Introduction to Internet Marketing, Multi Level Marketing, E-Marketing, Green Marketing, Event Marketing, Types of Events, Sponsorship, Cause Related Marketing, Marketing for Non Profit Organizations Marketing Strategies for Leaders, Challenges, Followers and Nichers

Examination Scheme

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Kotler, Keller, Koshy, Jha, (2008), Marketing Management– A South Asian Perspective, Pearson India Pvt.
- Kurtz, (2008) Principles of Marketing, Cengage Learning, India,
- S. Neelamegham, (2009), Marketing In India,Vikas publishing house,
- Biplo Bose, (2008), Marketing Management, Himalaya Publishing House.
- Paul Baines, Chris Fill, Kelly Page, (2009), Marketing, Oxford University Press
- Winner (2009), Marketing Management, Pearson India Pvt.
- William L. Pride and O.C. Ferrell, (1993) Marketing Concepts and Strategies, Boston, Houghton Mifflin.
- Czinkota and Kotabe, (2007) Marketing Management, Cengage Learning, India
- Evans, (2008), Marketing Management, CengageLearning,India
- RajanSaxena, (2010) , Marketing Management,Tata McGraw Hill

BIOSTATISTICS

Course Code: MHA4105 **Credit Units: 3**

Course Objective: The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the Hospital environment.

Course Contents:

Module-I: Introduction
Classification of data, Source of data, data organization Method of scaling - nominal, ordinal, ratio and interval scale, building composite scales, measuring reliability and validity of scales.

Module-II: Properties of measurement & Probability distributions
- Measurement of central tendency, measurement of dispersion – Range, Mean deviation & Standard deviation.
- Concepts of probability, Probability distributions – Binomial, Poisson & Normal Probability Distribution.

Module-III: Sampling
Sampling methods, Sampling Errors; Sampling distribution.

Module-IV: Testing Hypothesis
Hypothesis Testing to compare two populations – Student's T-test, Interpretation of computer output of ANOVA, Chi – Square Test, F-test.

Module-V: Forecasting Techniques
Correlation-Karl Person, Spearman's Rank methods, Regression Analysis, least squares method, coefficient of determination, Time Series Analysis.

Module-VI: Statistical methods and application:
SPSS processing, Transformation and manipulation of SPSS file, Statistical procedures-descriptive, univariate, bivariate and multivariate statistics.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- P.S.S. SundarRao. *An Introduction to Biostatistics: A manual for students in Health Sciences*, J.Richard Prentice Hall, 1996.
- B.K. Mahajan. *Methods in Biostatistics*, Jaypee Brothers
- Daniel, Wayne.W. *Bio-Statistics: A foundation for Analysis in the Health Sciences*, John Wiley and Sons Pub, 1991.
- K. VishwasRao. *Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology*, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. *Bio-Statistics perspective in Health care research and practice*, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), *Handbook of Statistics*, Elsevier Science Pub, 1988.

INFORMATION TECHNOLOGY FOR MANAGERS

Course Code: MHA4106 **Credit Units: 3**

Course Objective: This course will expose students to developments in computer technology and understand the working of a computer system. It will introduce end-user computing and build skills in using IT and understanding various technologies like internet, telecom, DBMS concepts, e-commerce etc. The course will expose the students to the latest trends in computer.

Course Contents:

Module-I: Modern Computer Systems
Evolution of Computer Systems, Input, output and storage technologies, Computer Assisted Control and Automation, (e.g. Delhi Metro , Digitally Controlled Car engines etc.), Computer Controlled Biometric/RFID based Access Control , Contemporary hardware and software platforms(Open Source, Web Software etc.), Storage of Data Resources

Module-II: Data Resource Management
Introduction to DBMS, Benefits of DBMS over traditional file system, Types of DBMS, Application of DBMS using MS-ACCESS / ORACLE as a tool for understanding of DBMS concepts.SQL Query handling, Forms, Concept of Data Warehouses and Data Marts, Introduction to Data Centers.Storage Technologies and Architecture (DAT, NAS, SAN etc.). Live examples of storage strategies of companies like Google, Amazon Wal-Mart dealing with storage crisis

Module-III: Telecommunications and Computer Networks
Networked Enterprise :- Components, Types of networks, Advantages of Network Environment, Business Uses of Internet, Intranet and Extranet, Web 2.0/3.0, Distributed/Cloud/Grid Computing, GSM & CDMA, GPRS ,3G & 4G technologies, VOIP and IPTV.

Module-IV: Electronic Commerce Systems
Introduction to e-Commerce and M-Commerce, Advantages and Disadvantages of each. Concept of B2B, B2C, C2C , with examples. Concept of Internet Banking and Online Shopping, Electronic Payment Systems. Project Discussion:- Development of e-commerce store (Web Site Development, Internet Publicity, Payment Gateway, Packaging & Delivery , After Sales Support) .

Module-V: E-governance
Concept of e-governance, World Perspective, Indian Perspective, Technologies for e-governance, e-governance as an effective tool to manage the country's citizens and resources, Advantages and Disadvantage of E-governance, E-governance perspective in India. Discussion on MCA21 Project, Bhoomi etc.

Module-VI: Security Management
The Information Security, System Vulnerability and Abuse, Security Threats (Malicious Software, Hacking etc.) and counter measure. Definition of Cyber Crime and Types. Antivirus, Firewalls, Anti-Spyware, Security Audit, Discussion on Overview of IT-ACT 2000.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Norton P (2010), Introduction to Computers, Tata McGraw-Hill
- Potter T (2010), Introduction to Computers, John Wiley & Sons (Asia) Pvt Ltd
- Morley D & Parker CS (2009), Understanding Computers – Today and Tomorrow, Thompson Press
- Jawadekar, WS (2009); Management Information System; Tata McGraw Hill
- Mclead R & Schell G (2009), Management Information Systems; Pearson Prentice Hall
- O'Brein, JA (2009); Introduction to Information Systems; Tata McGraw Hill

ESSENTIALS OF HEALTHCARE SYSTEM

Course Code: MHA4107 **Credit Units: 3**

Course Objective: To provide the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Course Contents:

Module-I: Health and Development
Concept of Health, illness, sickness and disease; Public health Indicators, Health and its determinants, Disease Burden in terms of DALY, Social context of Health – Culture, health belief model and social issues affecting health like urbanization etc; Gender and health, Nutrition and Health, Nutritional Transition.

Module-II: Healthcare Systems
Evolution of Health Planning in India, Concept and Elements of Primary Health Care, Rural Healthcare system in India – Structure & Current Scenario, Indian Public Health Standards, Organization and Management of Public Healthcare System, Issues in healthcare delivery system,

Module-III: Health Policies and Schemes
Millennium development goals, National Health Policy, Integrated Child Development Scheme, Health Sector Reforms, Five year Plans, Reproductive and Child Health Programme, Universal Immunization Coverage, National Health Mission and National Urban Health Mission.

Module-IV: NRHM
Goals & Strategies of NRHM, expected outcomes and its various components like Accredited Social Health Activists, Mobile Meidcal Units, JananiSurkshaYojna, JSSK, Village Health & Sanitation Committee, RogiKalyanSamiti etc.

Module-V: National Health Progrmmes
Management and Implementation of National Health Programmes– Revised National Tuberculosis Control Programme, National AIDS control Programme, National programme for Control of Blindness, Vector Borne Diseases Control Programme, National Leprosy Eradication Programme, National Cancer Control Programme, National Diabetes Control Programme and National Mental Health Programme.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- K Park, *Preventive and Social Medicine*, BansaridasBhanot Publishing House.
- Brijesh C Purohit. *Health Care System in India*: *Towards Measuring Efficiency in Delivery of Services*.
- Maxcy-Rosenau-Last, *Public Health & Preventive Medicine*, 14th Edition Ed Robert Wallace.

HUMAN RESOURCE MANAGEMENT

Course Code: MHA4108 **Credit Units: 03**

Course Objective: To help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India.

Course Contents

Module-I: HRM in perspective
Nature & scope of HRM, HRM functions, HRM models, understanding concepts of personnel management, HR development and strategic HR management, HR environment, changing role of HR.

Module-II: Meeting HR requirements
The HRM processes cycle from job (role) analysis, description, strategic HR planning, recruitment, selection process, methods – Interview, tests, placement & induction.

Module-III: Training & development of Employees
Training and development, understanding of performance management systems, potential appraisal, career development.

Module-IV: Managing Compensation
Job evaluation, methods of job evaluation, strategic compensation, equity theory, components of pay structure, designing and administration of Wage and salary structure, Wage regulations in India.

Module-V: Employee Compensation
Overview of Industrial relations, industrial disputes, collective bargaining, workers participations and management, grievance handling.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Aswathappa. K, (2011), *Human Resource Management - Text & Cases*, (6thEdn.), McGraw Hill.
- Dessler G (2005). *Human Resource Management*, Pearson Education, India
- Mathis R L and Jackson J H (2006). *Human Resource Management*, (10thEdn.) Cengage Learning, Indian Print.
- Snell S and Bohlander G (2007). *Human Resource Management*, Cengage Learning (Thomson Learning), Indian Edition

Syllabus - Second Semester

FINANCIAL MANAGEMENT

Course Code: MHA4201 **Credit Units: 03**

Course Objective: The objective of this course is to develop an understanding of short-term and long-term financial decisions of a firm and various financial tools used in taking these decisions. It is also aimed to develop the understanding of the financial environment in which a company operates and how it copes with it.

Course Contents:

Module-I: Introduction
A Framework for Financial Decision-Making- Financial Environment, Changing Role of Finance Managers, Objectives of the firm.
Module-II: Valuation Concepts
Time Value of Money, Risk and Return, Financial and Operating Leverage.

Module-III: Financing Decisions
Capital Structure and Cost of Capital**,** Marginal Cost of Capital.

Module-IV: Capital Budgeting
Estimation of Cash Flows, Criteria for Capital Budgeting Decisions, Issues Involved in Capital Budgeting, Risk analysis in Capital Budgeting – An Introduction.

Module-V: Working Capital Management
Factors Influencing Working Capital Policy, Operating Cycle Analysis, Management of Inventory, Management of Receivables, Management of Cash and Marketable Securities, Financing of Working Capital.

Module-VI: Dividend Policy Decisions
An introduction**:** Different Schools of Thought on Dividend Policy.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Financial Management for Hospital Administration, Kulkarni, GR, Jaypee Brother Medical Publications.
- Chandra, P. (2006), Financial Management: Theory and Practice, Tata McGraw Hill.
- Van Horne, J.C. (2006), Financial Management and Policy, Prentice Hall of India.
- Brearly R A and Myers, S. C. (2006), Principles of Corporate Finance, Tata McGraw Hill
- Rustagi, R.P. (1999), Financial Management: Theory, Concepts and Problems, Galgotia Publishing Company.
- Pandey, I.M. (1999), Financial Management, Vikas Publishing House

HOSPITAL PLANNING

Course Code: MHA4203 **Credit Units: 03**

Course Objective
To expose the students to planning and operation of hospitals in a detailed manner which will include all facets of hospital planning activities covering every department that is involved both in clinical care as well as supportive services.

Course Contents

Module-I: Introduction to Hospital Planning
Conception of idea, formation of hospital planning team, market survey, feasibility study, selection of location, Financial planning of hospitals, Macro level planning, Conception to commissioning- site development, architects brief working drawings and specifications, engineering drawing, equipment planning, bed distribution, space allocation, interior designing and construction of building - commissioning, shake down period

Module-II: Planning for Medical and Ancillary services
Out-patient services, Emergency services, Day care services, Inpatient services and Intensive Care Units (ICU), Surgical suites, Labor and delivery suites-LDRP suites and Physical Therapy department.

Module-III: Planning for Supportive Services
Admitting department, Medical Records department, Laboratory services, blood banking & Radiological services, Pharmacy & Medical store, Medical gas system, HVAC, CSSD, Food & Beverages and Laundry & linen services.

Module-IV: Planning for Advanced facilities
Cardiac catheterization laboratory, various endoscopy units, Radiotherapy unit, IVF unit and Dialysis unit.

Module-V: Recent Advances in Hospital Planning
Green Hospitals, Energy efficiency in hospitals, Robotics in Hospitals and Geriatric Care

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Modern Trends in Planning & Designing of Hospitals: Principles and Practice*: Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar, SidharthSatpathy, by Jaypee – 2007
- *Hospitals: Facilities Planning and Management*, GD Kunders by Tata Mcgraw Hill
- *Hospital Planning*: Charles Butler, Addison Erdman
- Dr Malhotra's series: *Step by Step – Hospital designing & Planning*, by Jaypee 2007

HEALTH ECONOMICS

Course Code: MHA4204 **Credit Units: 3**

Course Objective: To study principles of economics and its application in Hospitals.

Course Contents:

Module-I: Nature and scope of Economics
Fundamental Concepts –Scarcity & Choice, Macroeconomics & Microeconomics, Economic Agents – Consumer, Producer & government, Market – Free market mechanism and chained Market Mechanism.

Module-II: Demand and Supply Market
Law of Demand, Shift in Demand Curve, Law of Supply, Shift in Supply curve, Market Equilibrium, Concept of elasticity – Price elasticity of Demand & Supply.

Module-III: Healthcare Market
- Market Failure: Imperfect competition, Risk & uncertainty, Moral Hazard, Adverse selection, Externalities, Public Good, Asymmetric Information and concern of Equity. Market of unqualified medical care providers.
- Demand for Healthcare: Need, Want & demand, Healthcare as an investment, Determinants of demand – Price factors (opportunity cost), Patient factors & Physician factors – Supplier Induced Demand; Insurance and demand for healthcare.

Module-IV: Costs
Classification of costs on the basis of traceability, cost behavior, controllability and selection among alternatives; Total, Average and Marginal costs.

Module-V: Health Expenditure
Public Expenditure on Health, Expenditure and Allocations under Five-Year Plans, its SWOT analysis, National Health Accounts.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Ceri J Phillips. *Health Economics- An introduction for health professionals*, Blackwell publishing.
- Clewer Ann and D Perkins. *Economics for healthcare management*, Prentice Hall.
- Folland S, A.C. Goodman, and M. Stano, *The economics of health & Healthcare*, Prentice Hall

RESEARCH METHODOLOGY

Course Code: MHA4205 **Credit Units: 03**

Course Objectives:
- To provide basic understanding towards research principles and methods.
- To introduce important analytical tools for research data analysis.
- To assist in the development of research proposals/reports.

Course Contents:

Module-I: Basics of Research
Definitions & uses of research in healthcare, Steps Involved in Research Process, Variables in research, Measurement scales, Formulation of research problems, writing research questions, Development of conceptual framework.

Module-II: Sampling & Research Designs
Sampling, Sampling Procedure, Various types of Sampling Techniques, Sample size determination, reliability & validity in research, Research Designs- Non-experimental & experimental research designs.

Module-III: Review of Literature & Hypothesis
Review of literature, Hypothesis- Meaning and types of hypothesis, Hypothesis testing, Type I & Type II errors in hypothesis testing.

Module-IV: Data Collection
Types of Data: Secondary and Primary, Different methods of data collection- Observation method, interview method, Questionnaire and schedule, Data Management: editing, entry and preparing data sets for analysis; Design and development of questionnaire.

Module-V: Research Reports
Structure and Components of Research Report, Types of Reports, Layout of Research Report, Method of writing a research report.

Module-VI: Research Ethics& Reference Writing
Historyofethicsinhealthresearch, Principlesand Conceptsinresearch ethics – confidentialityand privacy,informedconsent,vulnerablesubjectsand special treatments,standardsofcare–principles, reviewprocessesetc.; Vancouver style of reference writing.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Gummersson, E. *Qualitative methods in Management Research*, Sage publications
- Verkevieser et al, *Designing and conducting Health Systems Research Projects* WHO and IDRC
- Grundy F and Reinke W A, *Health Practice Research and formalize Managerial Methods*, Geneva, WHO
- *Designing and conducting Health surveys*, Jossey Bass Publishers.

HOSPITAL MATERIALS MANAGEMENT

Course Code: MHA4206 **Credit Units: 03**

Course Objective: Hospitals carry a large inventory of drugs, sophisticated and highly costly equipment besides beds, furniture and linen. The student should be conversant with Inventory and various methods of control and Purchase management.

Course Contents:

Module-I: Introduction

Definition, scope and importance of materials management; aims, objectives & principles of materials management; Material Cycle; Material Codification-advantages and types.

Module-II: Stores Management

Responsibilities and functioning of stores, types of Medical Stores, planning of hospital stores, duties of officer in-charge and storekeeper; location, lay-out planning and design of hospital stores, preservation of stores, documentation & evaluation of stores and role of computers in hospital stores management.

Module-III: Purchase Management

Objectives and elements of good purchasing system, Procurement procedure, Tendoring system, modes of tenders, Purchase order and its types, types of purchasing systems.

Module-IV: Inventory Management

Inventory control, Basic inventory model, types of inventory, objectives and scope of inventory control, Lead time, Buffer stock, Re-order level, Economic order quantity (EOQ), Inventory control costs – Purchase cost, shortage cost, inventory carrying cost & inventory acquisition cost; Inventory ordering systems;Inventory control Techniques- ABC, VED, SDE, SAP, FSN, HML, XYZ, SOS, GOLF, MUSIC; and Supply chain management.

Module-V: Stock Verification, Condemnation and disposal

Process and need for stock verification, Techniques of verification, Pilferage, Stock distribution methods, criteria and procedure of stock condemnation and disposal.

Module-VI: Equipment Management

Classification of Hospital equipments, Planning and selection of equipments, factors affecting utilization of equipments, equipment failure, training & development, documentation, equipment maintenance and its types and Equipment audit.

Module-VII: Legal aspects

Role and functions of Director General of supplies and disposal, Registration and blacklisting of firms, Law of contract, Letter of credit& its types, Import & export policy & pricing of goods and Duty of customs.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Hospital Stores Management- An IntegratedApproach,* by Dr. Gupta Shakti, JaypeeBrothers.
- *Material Management* by Dr. PawanArora, Global India Publication Pvt Ltd
- *Handbook of Materials Management*, P. Gopalkrishnan, EasternEconomy Edition
- *Procurement and Materials management for Hospitals,* Rex H Gregor, Harold C. Mickey

EPIDEMIOLOGY

Course Code: MHA4207 **Credit Units: 03**

Course Objective
To provide an introduction to the basic concepts and methods of epidemiology and to highlight inter-relationship between epidemiology and medicine to understand evidence based medicine.

Course Contents

Module-I: Introduction
Concepts and uses of epidemiology, Components of epidemiological studies – frequency distribution and determinants of diseases, Methods to measure and describe health of population, epidemiological triad.

Module-II: Descriptive epidemiology
Natural history of disease, Disease spectrum, Methods of transmission, epidemiological principles in prevention and control of disease, levels of prevention.

Module-III: Measurement Methods
Measurement of morbidity and mortality, incidence, prevalence, age adjustment, standardization and Risk Measurement.

Module-IV: Study designs Basics
- Epidemiological study designs and analysis, its application and use in the community.
- Sampling & Survey methods, Case control and Cohort methods.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts& References:

- Gordis Leon *Epidemiology* (3rd edition) ,W B Saunders and Co.
- Beaglehole. R. Bonita, et. al *Basic Epidemiology* : WHO Publication
- David E., et. al. *Foundations of Epidemiology* : Oxford University Press.
- Katz Mitchell: *Study Design and Statistical Analysis*: A Practical Guide for Clinicians
- Last, J.M., Spasoff, R.A. Harris, S. S. and Thuriaux, M.C. (Eds): *A Dictionary of Epidemiology*, Oxford University Press, 4th Ed., 2001.
- Mayer Dan, *Essential Evidence-Based Medicine Series: Essential Medical Texts for Students and Trainees*
- Silman and McFarland: *Epidemiological Studies- A Practical Guide,* 2nd Edition
- Timmreck Thomas C: *An Introduction to Epidemiology*, Third Edition 2002.

HOSPITAL STUDY-I

Objective:
To have a practical exposure of various departments of a hospital. It is included in the syllabus to make the students aware of the functioning of different departments of hospital.

Training:

1. Central Sterile Supply Dept.
2. Hospital Library
3. Emergency Dept
4. Critical Care Unit
5. Medical Record
6. Operation Theatre
7. Maintenance Department
8. Bio-Medical Department

Central Sterile Supply Department (CSSD)

1) Location
2) Equipments
3) Items processed by Central Sterile Supply Department
4) Sterilization technique
    a) Heat
    b) Gas
    c) Liquid
    d) Ionizing radiation
    e) Others
5) Work flow
6) Clean zone, dirty zone
7) Pooling of materials, equipments
8) Process of receiving and distribution of materials
10) Cleaning, drying and packing of sterilized materials
11) Segregation of Dirty zone and clean zone
12) Process of receiving and distribution of materials
13) Quality control checking of sterilization in collaboration with Micro-biology Lab.
14) Organization & Staffing
15) CSSD Committee

Emergency Dept

1) Location
2) Basic lay out of Emergency Dept
    (a) Receiving patients
    (b) Patient examination zone
    (c) Patient investigation zone
    (d) Procedure room
    (d) Cardio Pulmonary Resuscitation Unit
    (e) Dead bodies identification and segregation

(f) EMO's Office
(g) Nursing Station

3) Infrastructural facilities
4) Equipments
5) Legal procedure system
6) Emergency Operation Theatre
7) Admission procedure
8) Billing for day care procedure in Emergency Dept.
9) Staffing
10) Security

Critical Care Unit

1) Organizational structure
2) Bed orientation pattern
3) Lighting system
4) Monitoring system
5)Maintenance of sterility and general cleanliness
6) Administration of CCU
7)Workflow
8)Equipmentmaintainence
9)Maintainence of uninterrupted gas and power supply system
1) Continuous wall flow oxygen
2) Compressed air
3) Suction Apparatus (Vacuum Pump)
4) Uninterrupted Power Supply (UPS) line

Medical Records

a) Assembly of records
b) Quantitative and qualitative analysis
c) Different classification of records
d) Methods of deficiency check
e) Completion of incomplete records
f) Retrieval of medical records
g) Coding system
h) Indexing system
i) Generation of statistics and analysis
j) Reporting to various statutory authorities
k) Methods of numbering
i) Serial number
ii) Unit number system
iii) Serial unit numbering
l) Filing System
i) Decentralized system
ii) Centralized system
iii) Various other methods
m) Types of forms

Operation Theatre

1) Location
2) Zoning of Operation Theatre
3) Infrastructural facilities
4) Centralized and decentralized Operation Theatres
5) Equipment requirement
6) Procurement and maintenance including annual maintenance contract
7) Functions and policies of Operation Theatres
8) Manpower requirement
9) Duties and responsibilities including standard operation procedures
10) Safety procedures
11) Methods of checking operating rooms for readiness to receive patient
12) Periodical sterilization / fumigation
13) Sterile supply

Maintenance Department

Observation of

a) Location of different maintenance departments
b) Lay out
c) Power Generation and supply
d) Demineralization Plant with R.O. facility for Dialysis unit
e) Oxygen Plant
f) Effluent Treatment Plant
g) Air Condition Plant and distribution system
h) Maintenance of the medical equipments, calibration
i) Maintenance of total hospital building – civil, electrical and mechanical
j) Organization

Bio-Medical Department

1) Bio Medical equipment and their function
2) Importance and fundamental functions of Bio-Medical Equipments
3) Maintenance procedures of Bio-Medical Equipments
4) AMC of Bio Medical Equipments

Syllabus - Third Semester

SUMMER INTERNSHIP EVALUATION

Course Code: MHA4335 **Credits Units: 06**

Training Objective:
To provide on the job experience, as an understudy in a hospital, to help the student understand systems and procedures and learn to make decisions considering the Hospital as an integral unit.

Duration: 2 months

Format for Report Writing

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Guidelines for presentation-

- Powerpoint presentation
- Timeforpresentation: 20minutes
- Time for discussion: 10 minutes

Examination Scheme

Components	Presentation	Report submitted	Viva-Voce
Weightage (%)	25	50	25

STRATEGIC MANAGEMENT

Course Code: MHA4301 **Credit Units: 03**

Course Objective:
The course is designed to help students to understand the concept of strategy and strategic management process. Acquaint students with basic concepts and principles of strategic management, develop and prepare organizational strategies that will be effective for the current dynamic environment and likewise to impart the strategic management conceptual framework which will increase students' skills and knowledge in identifying and describing organizations' strategic posture and direction.

Course Contents:

Module-I: Introduction and Purpose of Strategy Formulation
Evolution and Introduction of strategic management. Concept and Classification of Corporate and Business Strategy with Hierarchy definition; Purpose of Strategy Formulation: Concept of Vision, Mission and Business Definition. Importance of Stakeholders in Business.

Module-II: Strategic Analysis
PESTLE Analysis, Environmental Threat and Opportunity Profile (ETOP), Strategic Advantage Profile (SAP), Porter's Value Chain Analysis, Resource Based View of the Firm-VRIO Framework; Market Analysis-David Aaker Model, Competitor Analysis, Industry Analysis using Porter's five forces Model; Scenario analysis and SWOT Analysis. Strategic implications of company decisions and Strategic response to changes in business environment.

Module-III: Strategic Choice – Traditional Approach
Portfolio Analysis using BCG, GE Nine Cell Matrix, Hofer's Model, Making Strategic Choices using Strickland's Grand Strategy Selection Matrix; Ansoff's Product Market Grid; Choosing Generic Strategies using Porter's Model of competitive advantage.

Module-IV: Industry Structures and Competitive Strategies
Industry Structures and Lifecycle stages, Marketing Warfare and Dominance Strategies: Advantages and Disadvantages of Defensive and Offensive strategies; Innovation as Blue Ocean Strategy.

Module-V: Strategy Implementation and Evaluation
Issues in implementation: Resource Allocation, Organization Structure, Social responsibilities – Ethics. Measuring performance and establishing strategic controls.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- Wheelen and Hunger, (2008),Essentials of Strategic Management, Prentice Hall India.
- Ramaswamy and Namakumari,(1999), Strategic Planning: Formulation of Corporate Strategy Text and Cases, Macmillan India Ltd.,
- Jausch&Glueck, (1988), Business Policy and Strategic Management, McGraw Hill.
- Thomson & Strickland,(2008), Business Policy and Strategic Management, McGraw Hill.
- Pearce John 'A & Robinson R.B,(1997), Strategic Management: Strategy Formulation and Implementation, AI.T.B.S. Publishers & Distributors
- Regular reading of all latest Business journals: HBR, Business World, Business India, Business Today

OPERATIONS RESEARCH

Course Code: MHA4302 **Credit Units: 03**

Course Objectives:
- To provide basic OR approach to problem solving.
- To introduce important analytical tools for managerial decision making.
- To introduce concepts of resource allocation & health service planning.

Course Contents:

Module-I: Introduction
The OR approach to problem-solving and decision-making, Scope and limitations of OR in managerial decision-making.

Module-II: Introduction to OR Techniques
Linear Programming, Decision Tree Analysis, Queuing theory, PERT/CPM.

Module-III: OR Models
Replacement models, Sensitivity analysis, Assignment models, Inventory control models, Forecasting.

Module-IV: Applications of OR in Hospitals and Health Agencies
Resource allocation, Health services planning, Deployment of health human power, Materials Management, Equipment replacement, Patient scheduling.

Examination Scheme:

Components	CPA	TP	Q/S	A	ME	EE
Weightage (%)	5	5	5	5	10	70

Text & References:

- *Operations Research in Hospitals: Diagnosis and Prognosis*, David H. Stimson, Ruth H. Stimson
- *Operations Research and Healthcare: A handbook of methods and Applications*, Margaret L. Brandeau, Francois Sainfort, William P. Pierskalla
- *Patients hospitals and Operational Research*, Taylor Francis
- *Operations Research* by P. Rama Murthy
- *Operations Research: Methods, Models and Applications*, Jay E, Aronson and Stanley Zionts

QUALITY MANAGEMENT

Course Code: MHA4303 **Credit Units: 03**

Course Objective:
To understand the concept of quality and its relation to healthcare scenario

Course Contents:

Module-I: Basics of Quality Management
Definitions, principles of quality, benefits of quality management, dimensions of quality in primary healthcare and various quality frameworks

Module-II: Quality Improvement Approaches
- Quality Assurance cycle and developing standards.
- TQM Quality Gurus: Deming, Juranand Crosby principles.
- Benchmarking: Principles, types and process of benchmarking
- Medical Audit: Clinical Audit, its methodology and related statistics.

Module-III: Quality Improvement Tools and techniques:
- Tools: Brainstorming, Cause effect Analysis, Flow chart, Pareto Analysis, etc
- Lean Management: 4P model, Lean principles and its tools - 5 S technique, 3 M technique, Kaizen's theory, Jidoka & Andon, Throughput & Takt Time.
- Six Sigma: Variations in performance, DMAIC & DFSS methodology, Champions, black belts and green belts, Six sigma applications and its benefits.

Module-IV: Accreditation
Benefits of Hospital Accreditation, ISO certification, Quality Council of India (QCI), National Accreditation Board for Hospitals & Healthcare Providers (NABH) – accreditation procedure, assessment criteria and its standards; and Joint Commission International (JCI)

Module-V: Cost and Quality
Prevention cost, Appraisal Cost, Internal & External failure costs, Net & Total cost of quality.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- *Quality Management in Hospitals* by S. K. Joshi
- *Total Quality Management* – Aswathappa – Himalaya Books House
- *Quality Management* – P. C. Tripathy
- *Hospital Quality Assurance: Risk Management & Program evaluation*, Jesus J. Pena
- Donald E. Lighter and Douglas C Fair: *Quality Management in Health Care – Principles and Methods*, Jones and Bartlett publishers, second edition.
- Daigh RD. *Financial implications of a quality improvement process.*
- McLaughlin CP and Kalauzny AD. *Total quality management in health*, Healthcare management review.

MEDICAL & HEALTH LAWS

Course Code: MHA4304 **Credit Units: 03**

Course Objectives:
To acquaint the students with various legal aspects concerning type and character of the health care organizations and its duties towards patients and its employees.
To familiarize the students in matters of liability of hospital medical negligence and medical malpractice in diagnosis, administration of drugs, surgery etc.

Course Contents:

Module-I: Introduction
Law pertaining to establishment of hospitals andlegal requirements under Medical Council Acts.

Module-II: Hospitals as an Industry
Basic concepts of labour laws in India, Hospitals as an 'industry' - application of labour enactments, Discipline in hospitals and Trade union act

Module-III: Hospital's duties towards Patients
Essentials of Contractual obligations in hospital services, duties towards patients, Rights of patients and Code of ethics.

Module-IV: Acts pertaining to Hospitals
Legal aspects relating to Organ transplantation, MTP Act 1971, Basics of Drugs and Cosmetic Acts, Euthanasia. ESI Act, PNDT Act, Human experimentation, Clinical trials, Industrial dispute Act, Central Births & Death Registration Act.

Module-V: Legal liabilities of Hospitals
Legal liability of hospitals - criminal, civil and tortuous; Absolute liability and vicarious liability, Medical negligence, Legal remedies available to patients under contract law, tort, criminal law, Consumer protection Actand Medical Jurisprudence.

Module-VI: Medical ethics, CPA & Auditory procedures
Consumer protection act, Autopsy, Use of investigational drugs, Introduction/need & procedures for medical audit, Audit administration & Regulating committees.
Confidentiality and professional secrecy, ethics of trust and ethics of rights – autonomy and informed consent,
Medical ethics – basic issues, importance, process of developing and implementing ethics and values in an institution – codes of conduct: Hippocrates oath and declaration of Geneva – MCI regulation – professional conduct, etiquette and ethics.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- *Medico-legal Aspects of Patient Care*, 3rd Edition, R. C. Sharma, Peepee Publishers & Distributers-2008

MANAGEMENT OF CLINICAL SERVICES

Course Code: MHA4305 **Credit Units: 03**

Course Objectives:

- To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of clinical services in a hospital.
- To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:

Module-I: Hospital as a system

Concept of patient care, Role of Hospital Administration towards the patient and towards the Hospital, Patient safety and patient risk management.

Module-II: Out-Patient Department

- Organization & management of OPD: Overview of the department, its functions, location and physical facilities
- Daycare services; Auxiliary, Ancillary& Domiciliary facilities in the OPD.

Module-III: Inpatient Department

- Organization & management of OPD: Overview of department, its functions, Ward design (general & specialized), Nursing Administration, Isolation unit, Janitor's closet.
- Assessment of IPD in terms of Patient Days, Bed Utilization Rate, Ward Occupancy, and Average length of stay.

Module-IV: Accident and Emergency Services

Organization & management of department, Physical facilities and Manpower planning, Triaging, Centralized Accident & Trauma services (CATS) and Observation unit.

Module-V: Operation Theatres

Organization & Management of OT complex, Pre-op & Post-op area, Zoning, ventilation &lighting, Modular systems, Methods of fumigation and OT scheduling.

Module-VI: Intensive Care Units

Organization & Management of ICUs, Types of ICUs, Staffing in ICUs, Specialized ICUs – ICCU, NICU, PICU etc, and Critical care scoring

Module-VII: Specialty Services

Rehabilitation unit, Nuclear Medicine department, Burns Unit, Obstetrics & gynecology unit, Pediatric unit, Transplantation Unit etc.

Module-VIII: Other Hospital Functional Activities

Biomedical Waste Management: segregation, collection, transportation & disposal, Nosocomial Infections& its control, Patient safety

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Principles of Hospital Administration and Planning,* Shakharkar B.M.
- *Modern trends in Planning and designing of Hospitals: Principles and Practice:* Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar.
- *Management of Hospitals & Health services*: Strategic issues and performance, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*
- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century*Vol 1 Kumar R, S.L. Goel
- *Hospital Management, Dr. A.K. Malhotra,* Global India Publications Pvt ltd, New Delhi
- *Hospital Management : A guide to departments,* Howard S. Roland, Beatrice L Rowland

MANAGEMENT OF SUPPORT & UTILITY SERVICES

Course Code: MHA4306 **Credit Units: 03**

Course Objectives:

- To enable the students gain insights into various aspects like importance, functions, policies and procedures, equipping, controlling, co-ordination, communication, staffing, reporting and documentation of non-clinical services in a hospital.
- To understand the processes and details related to effective patient care and to further increase the satisfaction level of patients

Course Contents:

Module-I: Support Services-I

- Radiology & Imaging Services: Types of services, Functional Areas, Organization & management of department, Turn-around time assessment, Radiation Hazards and its preventive measures.
- Hospital Laboratory: Its functional components, Lab hazards, quality assessment, National Accreditation Board for testing & calibration laboratories (NABL)
- Blood Bank & Transfusion Services: blood donation, labelling, transfusion reactions, legal aspects and accreditation.
- Transportation & Ambulance Services: History, transportation bay, Administrative aspects, Basic Life Support (BLS) and Advanced Life support (ALS).

Module-II: Support Services-II

- Central Sterile Supply department: Functional areas, Sterilization process, Theatre Sterile Supply Unit (TSSU) and supply distribution system.
- Dietetics: Functions of Dietary services, Functional areas, equipments, diet distribution systems, centralized & decentralized services and other managerial issues.
- Medical Records Department: Types of medical records & its importance, functional organization of MRD, storage & retrieval of records, Reports generated by MRD and medico-legal aspects.

Module-III: Utility Services-I

- Hospital Linen and Laundry: Types of hospital linen, Basic tasks of laundry, Types of laundering system and laundry process.
- Housekeeping services: Its functions, types, cleaning agents and cleaning operations.
- Mortuary: Mortuary services, physical facilities & staffing, policies & guidelines and managerial concerns.
- Security: Its functions, Security risks and types of security system.
- Pharmacy: Role & types of pharmacies, drug distribution systems, procurement of drugs and managerial issues.

Module-IV: Utility Services-II

- Basic Engineering Services: Civil Assets, Electricity Supply, Water supply, Gas manifold
- Allied Engg services: Air conditioning, Refrigeration, non-conventional energy devices.
- Maintenance & store management, Engg service department
- Engineering Hazards: Hospital Planning & design, Physical environment, Building elements and material, preventive management program.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Texts & References:

- *Principles of Hospital Administration and Planning,* Shakharkar B.M.
- *Modern trends in Planning and designing of Hospitals: Principles and Practice:* Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar.
- *Management of Hospitals & Health services*: Strategic issues and performance, Rockwell Schulz, Alton C. Johnson
- Shakharkar B.M., *Principles of Hospital Administration and Planning*
- *Hospital managerial services* Volume -4, S.L. Goel, R. Kumar
- *Hospital Core Services: Hospital administration in 21st century*Vol 1 Kumar R, S.L. Goel
- *Hospital Management, Dr. A.K. Malhotra,* Global India Publications Pvt ltd, New Delhi
- *Hospital Management : A guide to departments,* Howard S. Roland, Beatrice L Rowland

HOSPITAL STUDY-II

Objective:
To have a practical exposure of various departments of a hospital. It is included in the syllabus to make the students aware of the functioning of different departments of hospital.

Training:

1. Central Sterile Supply Dept.
2. Hospital Library
3. Emergency Dept
4. Critical Care Unit
5. Medical Record
6. Operation Theatre
7. Maintenance Department
8. Bio-Medical Department

Central Sterile Supply Department (CSSD)

1) Location
2) Equipments
3) Items processed by Central Sterile Supply Department
4) Sterilization technique
    a) Heat
    b) Gas
    c) Liquid
    d) Ionizing radiation
    e) Others
5) Work flow
6) Clean zone, dirty zone
7) Pooling of materials, equipments
8) Process of receiving and distribution of materials
10) Cleaning, drying and packing of sterilized materials
11) Segregation of Dirty zone and clean zone
12) Process of receiving and distribution of materials
13) Quality control checking of sterilization in collaboration with Micro-biology Lab.
14) Organization & Staffing
15) CSSD Committee

Emergency Dept

1) Location
2) Basic layout of Emergency Dept
    (a) Receiving patients
    (b) Patient examination zone
    (c) Patient investigation zone
    (d) Procedure room
    (d) Cardio Pulmonary Resuscitation Unit
    (e) Dead bodies identification and segregation
    (f) EMO's Office

(g) Nursing Station
3) Infrastructural facilities
4) Equipments
5) Legal procedure system
6) Emergency Operation Theatre
7) Admission procedure
8) Billing for day care procedure in Emergency Dept.
9) Staffing
10) Security

Critical Care Unit

1) Organizational structure
2) Bed orientation pattern
3) Lighting system
4) Monitoring system
5) Maintenance of sterility and general cleanliness
6) Administration of CCU
7) Workflow
8) Equipment maintenance
9) Maintenance of uninterrupted gas and power supply system
    1) Continuous wall flow oxygen
    2) Compressed air
    3) Suction Apparatus (Vacuum Pump)
    4) Uninterrupted Power Supply (UPS) line

Medical Records

a) Assembly of records
b) Quantitative and qualitative analysis
c) Different classification of records
d) Methods of deficiency check
e) Completion of incomplete records
f) Retrieval of medical records
g) Coding system
h) Indexing system
i) Generation of statistics and analysis
j) Reporting to various statutory authorities
k) Methods of numbering
    i) Serial number
    ii) Unit number system
    iii) Serial unit numbering
l) Filing System
    i) Decentralized system
    ii) Centralized system
    iii) Various other methods
m) Types of forms

Operation Theatre

1) Location
2) Zoning of Operation Theatre
3) Infrastructural facilities
4) Centralized and decentralized Operation Theatres
5) Equipment requirement
6) Procurement and maintenance including annual maintenance contract
7) Functions and policies of Operation Theatres
8) Manpower requirement
9) Duties and responsibilities including standard operation procedures
10) Safety procedures
11) Methods of checking operating rooms for readiness to receive patient
12) Periodical sterilization / fumigation
13) Sterile supply

Maintenance Department

Observation of

a) Location of different maintenance departments
b) Lay out
c) Power Generation and supply
d) Demineralization Plant with R.O. facility for Dialysis unit
e) Oxygen Plant
f) Effluent Treatment Plant
g) Air Condition Plant and distribution system
h) Maintenance of the medical equipments, calibration
i) Maintenance of total hospital building – civil, electrical and mechanical
j) Organization

Bio-Medical Department

1) Bio Medical equipment and their function
2) Importance and fundamental functions of Bio-Medical Equipments
3) Maintenance procedures of Bio-Medical Equipments
4) AMC of Bio Medical Equipments

Syllabus - Fourth Semester

HOSPITAL MANAGEMENT INFORMATION SYSTEM

Course Code: MHA4401 **Credit Units: 02**

Course Objective:
To understand the various indicators of health and health information system and health management information system in hospitals

Course Contents

Module-I: Introduction
Concept of information as a resource, understanding the principles of information systems and Classification of information in hospitals.

Module-II: Managing Hospital Information Systems
- Data generated for HIS; Functions, Benefits and applications of HIS, HIS components, various performance Indicators, HIS model and data movement.
- HIS modules: Various HIS Modules for Clinicians Access, Nursing Access, In-patient Module, Registration Module, Diagnostic services Module, Dietetics Module, OT Module and Accident & Emergency Module etc.

Module-III: Role of Information Technology in Hospitals
Computerization in Hospitals, advantages of computerized system, database interface, IT Components of HIS and various softwares available in the healthcare market.

Module-IV: Management Information System
Concept of MIS, functions of MIS, developing MIS, types of MIS, developing indicators, identifying data and developing tools of measurement and applications of MIS.

Module-V: Telemedicine
Concept of Telemedicine and its evolution, Telemedicine network in India, and Strengths & Opportunities for Telemedicine in India.

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References

- *Management Information System (MIS) in Hospitals: A computer based approach for quality in hospital services and administration*, by Anil Kumar Saini
- S.C. Joshi & S.N. Mehta. *National Information System: Planning and Management*, Global vision publishing house.
- *Information Technology in health care: Socio technical approaches, 2010.* IOS Press BV

HEALTH INSURANCE AND MEDICAL TOURISM

Course Code: MHA4402 **Credit Units: 02**

Course Objective:
To acquaint students to the concept of HI and various HI products, so that the students are ready for challenges of healthcare insurance which is emerging as a sector holding great promise.

Course Contents

Module-I: Introduction
History of Health Insurance, Principles of Health Insurance, Public Financing, Private Financing, Current trends in Health Insurance - International and Indian scenario, Economic and financial management of Health Insurance

Module-II: Health Insurance systems in India
- Private Health Insurance: Individual Health Plans, Mediclaim, Floaters plans, Third Party Administration, Benefits Management, Claims Management, IRDA
- Social Health Insurance: ESI, CGHS, RSBY
- Social and Community based Insurance: Microfinance

Module-III: Medical Tourism
Basic Concepts of Medical Tourism, Scope of Medical Tourism in India.

Examination Scheme:

Components	CP	V	A	CT 1	CT 2
Weightage (%)	20	15	5	30	30

Text & References:

- Usha Mehta, A.D. Narde. *Health Insurance in India and Abroad,* Allied Publishers.
- Thomas K. T., Sakthivel R.*Health Insurance In India*: *Overcoming Challenges and Looking Ahead*, Lambert Academic Publishing, 2012.
- Michelle A. Green, JoAnne C. Rowell. *Understanding Health Insurance- A guide to billing and reimbursement.*
- William S Stevens. *Health Insurance- Current Issues and Background,* Nova Science Publishers.

DISASTER MANAGEMENT

Course Code: MHA4403 **Credit Units: 02**

Course Objectives:
- To learn, identify and assess disasters in the community.
- To set-forth policies and procedures for disaster preparedness and to prepare hospital disaster plan.

Course Contents

Module-I: Basics of Disaster Management
Definitions, Determining risk of disaster, Classification of disaster on the basis of origin, source, onset & anticipated response; Disaster process, Effects of Disasters – Health issues, characteristics and geography of disasters, Impact of Disasters on the Hospitals.

Module-II: Disaster Management Process
Phases of disaster management, leadership, organization of medical relief, Triaging, Disaster Response – local, national & International; Disaster Management Act – 2005.

Module-III: Disaster preparedness
Hospital Disaster Plan – its pre-requisites, principles and components; Hospital disaster management committee and its role; Hospital disaster manual.

Module-IV: Fire Safety
Grades of fire and its causes; elements of fire safety, various fire extinguishers; and fire safety training.

Examination Scheme:

Components	**CP**	**V**	**A**	**CT 1**	**CT 2**
Weightage (%)	20	15	5	30	30

Text & References:

- *A guide to emergency health management after natural disasters*, American health organization scientific publication.
- *Emergency vector control after Natural disaster*, American health organization scientific publication.
- *District Health facilities*, WHO regional publication western pacific services.
- *Medical supply management after natural disaster*, American health organization scientific publication.

HOSPITAL STUDY-III

Objective:
To have a practical exposure of various departments of a hospital. It is included in the syllabus to make the students aware of the functioning of different departments of hospital.

Training:

1. Diagnostic Imaging
2. Dental Service
3. Dialysis Unit
4. Burn Units
5. Blood Bank
6. Mortuary
7. Telemedicine
8. Medical transcription

Diagnostic Imaging

1) Various types of machines like;
   a) CT
   b) MRI
   c) PET
   d) USG with color Doppler
2) Advantages / disadvantages of different types of machine
3) Basic functioning and maintenance
4) Special licensing requirement
5) Special structural requirements
6) Staffing and manpower planning
7) Cost analysis and profitability
8) Operation and maintenance

Dental Services

a) Location
c) Laboratory
d) Recovery Room
e) Waiting Room
f) Storage
i) Lighting
j) Plumbing
k) Ventilation
l) Equipment and maintenance

Dialysis Unit

1. Location
2. Infrastructural facility
   a) for day care dialysis or out patient dialysis
   b) for inpatient dialysis

3. Various types of dialysis units
4. Special arrangement for maintaining sterility
5. Ambulatory dialysis system
6. Procurement, installation and maintenance of various types of dialysis machines
7. Arrangement for stand-by unit

Burn Unit

1. Location
2. Infrastructural facility
3. Special equipment requirement for Burn Unit
4. Laboratory facility
5. Communication facility
6. Maintenance of Asepsis
7. Manpower

Blood Bank

1) Location
2) Reception
3) Special arrangements for voluntary donors
4) Administrative Office
5) Record Keeping
6) Servicing rooms
7) Bleeding Room
8) Storage Room
9) Storage equipment
10) Regulatory requirement
11) Blood safety procedures
12) Receipt, storing and delivery of blood
13) Triple screening and check method
14) Record keeping
15) Medico-legal aspects
16) Physical facilities
17) Waiting facilities
18) Laboratory facilities
19) Issuance of Blood Donor Card
20) Safety devices
21) Liquid waste management
22) Procedure for discarding
23) Staffing

Mortuary

1) Location
2) Physical facilities
3) Body refrigerator
4) Walk in refrigerator
5) Capacity requirement of Mortuary
6) Autopsy facility

7) Preservation / identification/labeling of viscera / body fluids and other materials for medicolegal purposes
8) Embalming procedures
9) Methods of long distance transportation of dead bodies
10) Arrangements for religious rites
11) Mortuary traffic control
    a) Internal
    b) External
12) Identification of bodies using triple check system
13) Maintenance of records
14) Various legal requirements
15) Disposal of unclaimed bodies

Telemedicine

1. Infrastructure – both end – (1) Hospital end (2) Nodal Centre
2. Requirement of:
    a) Computer Monitors
    b) Cameras
    c) Internet connection
3. Observation of telemedicine techniques and practical demonstration
4. Manpower requirement

Medical Transcription

1. Observation of techniques and demonstration
2. Infrastructural requirement
3. Trained manpower
4. Transmission modes

DISSERTATION

Course Code: MHA4437 **Credit Units: 15**

Internship Objective:
To impart the practical knowledge through research methods, help formulate a rigorous research problem related to hospital on the basis of their observation, help do an independent study, and encourage working in a team.

Pedagogy
- Identifying several situations amenable to dissertation work, writing a proposal and making a presentation to the Departmental Research Committee.
- Reporting to the committee on the progress of research work periodically.
- Making use of a variety of research methods.
- Defending the inference before the Examining Committee.

Report Contents
Every student will do a detailed study on the topic selected for the dissertation, and is expected to prepare a two or three proposals which he intends to take up for the Dissertation. The Assigned guide will examine this and decide on the topic of dissertation. Report will comprise of following contents:

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Evaluation
The Departmental Research Committee and an expert from Hospital industry will evaluate the dissertation.

Components	**Presentation**	**Report submitted**	**Viva-voce**
Weightage (%)	25	50	25

Amity Medical School

Master of Optometry

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

EPIDEMIOLOGY, PUBLIC HEALTH & COMMUNITY OPTOMETRY

Course Code: OPT4101 **Credit Units: 03**

Course Objective: To inculcate the knowledge, sensitivity and clinical exposure of community optometry. The outcomes of the course are: thorough understanding of conducting of screening for specific eye conditions, and resultant implications through theoretical and practical exposure. By the end of the course the student will be able to use the knowledge of the skills gained in promotion and preventive measures of community optometry.

Course Contents:
Module-I: Public health concepts
History of public health
History of public health optometry (including epidemology, man power, projections, community reimbursement mechanisms)
Organizations of health services (principles of primary, secondary and tertiary care) Health Care Delivery systems in India and determinants of health.
Detriments of health care delivery system
Planning of health services (including revelent legislation and implication to optometric practice).
Health manpower protection and in the practice of ophthalmology
Multidisciplinary and institutional practice modes
Global medicine and evolution of Public Health in India
Public Health optometry: concepts and implementation

Module-II: Levels of prevention-optometrist's role in community
Optometry's role as a care primary care professional

Module-III: Health systems
Concepts of Health systems
National Health Programs
Effective delivery of eye care services

Module- IV: Global Blindness and visual impairment
Refractive error and low vision as public health issues
Socioeconomic implications of blindness and visual impairment
Vision screening
Organizing eye camps
Eye Donation and Eye Banking
Role of civil societies in blindness prevention
Vision2020 : the Right to Sight
National and International Agencies in eye Care
NPCB
DBCS

Module-V: Epidemiology
Public health and epidemiology
Prevalence ,incidence and distribution of visual impairment
Basics of Epidemiology study methods
Incidence , prevalence , risk factors , odd ratio
Childhood blindness
Refractive errors and presbyopia
Age related cataract
Low Vision
Diabetic retinopathy
Glaucoma
Age related Macular Degeneration
Trachoma
Corneal blindness

Examination Scheme:

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

BINOCULAR VISION & PEDIATRIC OPTOMETRY-I

Course Code: OPT4102 **Credits Units: 04**

Course Objective: This course gives both in-depth theoretical knowledge and clinical exposure in Binocular Vision, Orthoptics & Pediatric vision care. The outcomes of this course are: Thorough understanding of the visual development issues, evaluation of pediatric subjects, non-surgical management of the pediatric binocular and refractive problems, amblyopia and Strabismus

Course Contents:
BINOCULAR VISION

Module-I:
Refractive Development
Retinal and cortical Development:

Module-II:
Revision: Applied anatomy and physiology of exraocular muscle
Oculomotor Function:

Module-III:
Binocular Vision: and related aspects
Development of binocular vision
Physiology of binocular vision
Development of ocular deviation and its adaptation

Module-IV:
Amblyopia and occlusion
Management guidelines of Amblyopia

Module-V:
Abnormal retinal correspondence
Anomalies of accommodation and its management
Anomalies of convergence and its management
Nystagmus

PEDIATRIC OPTOMETRY
Module-I:
Assessment of Child Vision and Refractive Error
Refractive Routines in the Examination of Children
Cycloplegic Refraction

Module-II: Color Vision Assessment in Children

Module-III: Dispensing for the Child patient

Module-IV:
Common genetic problems in Pediatric optometry
Pediatric Ocular Diseases
Ocular Trauma in Children

Module-V: Myopia control

Module-VI: Clinical uses of prism

Examination Scheme:

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text books

- Pediatric optometry ,Jerom rosner ,Butterworth heinmann
- Binocular vision and ocular motility , guntoor von noordan
- Clinical orthoptics ,Fiona rowe
- Strasbimus simplified ,pradeep sharma
- Assessing Children's Vision, Susan J Leat, Rosalyn H Shute, Carol A Westal
- Paediatric Optometry, William Harvey/ Bernard Gilmartin
- Pediatric Optometry, Jerome Rosner

LOW VISION REHABILITATION AND GERIATRIC OPTOMETRY

Course code: OPT4109 **Credit Units: 04**

Course Objectives: This course gives both in-depth theoretical knowledge and clinical exposure in Low Vision care. The outcomes of this course are: Thorough understanding of the causes of the low vision, its functional and psychosocial consequences, and rehabilitational measures through didactic lectures and clinical postings.

Course Contents:

Module-I: Introduction to Low Vision
Definition of low vision
The impact of low vision
Prevalence of low vision
Different levels of low vision services
Psychosocial implication of low vision services

Module-II: Causes and symptoms of low vision
Common causes of low vision
Low vision symptoms and conditions
Functional implication of diseases causing visual impairment

Module-III: Clinical assessment of low vision patient
Purpose of low vision assessment
Steps of low vision assessment

Module-IV: Magnification
Different types of magnification
Different methods and formulae for calculating magnification
How to determine resolution ability
Predict distance required to meet resolution goal
Measure lens power
Measure equivalent viewing distance
Calculate equivalent viewing distance for different devices

Module-V: Optical Low Vision devices
What are optical devices?
Definition of various low vision devices
Different type of optical low vision devices and their uses

Examination Scheme:

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text books:

- Management & Practice of Low Visual Acuity - A T Dowie
- Low Vision Principles & Practice - C Dickinson
- Optometric Management of Visual Handicap - H Farrall
- Eye Essentials - Low Vision Assessment - J Macnaughton
- Low Vision Manual - Jackson and Wolffsohn
- The Art and Practice of Low Vision (2nd Edition) - P. D. Freeman and R. T. Jose
- Essentials of Low Vision Practice, Richard L. Brilliant OD

APPLIED OPTICS

Course Code: OPT4110 **Credit Units: 04**

Course Objective: This course mainly deals with Optical management of refractive errors-new modalities the advanced techniques in subjective and objective refraction and Spectacle Dispensing. This course leads to a rewarding career as an optometrist, a specialist trained to dispense and to recognize basic ocular disorders. This allows students to recommend the right spectacle lens based on the condition of the eye

Course Contents:
Module-I: Ophthalmic Lens types,
Lens materials Properties of lenses (Refractive index, base curve, specific gravity, Abbe Value, UV cut off,etc)
Prism
Tints and coatings

Module-II: Bifocals/Multifocals

Module-III: Progressive addition lenses
Dispensing PAL, PAL trouble shooting, PALs in detail for Essilor, Hoya, Zeiss, Seiko, Rodenstock lenses

Module-IV: Spectacle FRAMES:
Facial fitting principles
Spectacle delivery
Dispensing problem prescriptions
Frame types and parts
Classification of spectacle frames-material, weight, temple position, coloration Frame construction
Frame Measurements and markings
Frame manipulation and repair
Facial measurements and frame choice
Measuring the interpupillary distance and pupillometer
Special purpose frames (sports, kids, reading)

Module-V: Lens Ordering
Lens edge thickness calculation Writing spectacle lens order
Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
Measurement of effective diameter minimum blank size Glazing and edging Hands on

Module-VI: Lens Verification
Lens verification and axis marking and fitting of all lens types
Final checking of finished spectacle with frame adjustments
Delivery and follow-up
Troubleshooting complaints and handling patient‟s questions.
Optical centre marking
Axis marking
Surface power measurement using Geneva leans measure Identify various types of Frames and mountings

Project: Different brands for spectacle frames and sunglasses –Indian & international Demonstration-safety eyewear, different filters, recumbent spectacle, Ptosis spectacle,

Workshop

PRACTICE MANAGMENT

Building a Successful Optometry Practice
Basic Operational Costs/Income Spread sheet
Marketing a optometry Practice

Developing an Internal Marketing Plan for optometric Practice
Developing an External Marketing Plan for optometric Practice

Managing a optometry Practice
Developing a Plan to Manage a Contact Lens Practice Standards of Practice

Eight Categories of Professional Obligation
Ethics in optometry
Laws related to optometry practice

Examination Scheme:

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Text & Reference Books:

- The fine art of prescribing glasses , Benjmin Milder, Butterworth Heinnemann,
- Spectacle frame dispensing: H Obstfeld: Butterworth Heinnemann
- essentials of ophthalmic lens finishing , C.W.Brooks and Irvin Borish, Butterworth Heinnemann
- Bennett's OPhthalmic prescription work Bennet & K.G wakefield, butterworth heinmann
- Systems of ophthalmic dispensing , Brook & Borish, Butterworth heinmann
- Clinical Optics , Troy Fennin ,Theodore Grosvenor, Butterworth Heinmann

CLINIC-I (GENERAL)

Course Code: OPT4105 **Credit Units: 3**

Course Contents:

This course includes minimum of 90 hours of supervised clinical training. The clinics involve primary care clinics and community work.

The objective of clinics in this semester is to be able to examine the eye and understand the basic eye procedures with clinical management.

A logbook is maintained and 15 case sheets with complete management and follow up are mandatory for submission. The log book needs to be signed by the supervisor.

Examination Scheme:

Components	Attd.	Log Book	Case Sheets	Viva-EE	EE-Practical
Weightage (%)	5	10	15	20	50

RESEARCH METHODOLOGY & BIOSTATISTICS-I

Course Code: OPT4106 **Credit Units: 03**

Research Methodology

Course Objective: This course is a brief overview about research design that is intended to cover the basics of designing and implementing a scientific study. It will provide the students the basic knowledge in Bio-statistics. At the completion of the course, the students will have the knowledge of data collection, statistical application and finally ready for research project. This will enable the student to gain understanding of different research methodologies and appropriate research design to be able to conduct research projects.

Course Contents:

Module-I:

Introduction to research methods, Variables in research, Reliability and validity in research, Formulation of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Module-II:

Introduction of epidemiology, Descriptive epidemiology, Experimental and non experimental research designs, Screening, Sampling methods, Biological variability, normal distribution

Module-III:

Bias and Confounding, Association and causation, Odds ratio and relative risk, sensitivity and specificity Data collection methods- Observation method, Interview method, Questionnaires and schedules Construction,

Module-IV:

Critical analysis of research papers, Conducting a literature review, Writing Research proposals, Development of conceptual framework in research

Module-V: Introduction to Biostatistics

Introduction to Statistics, Classification of data, Source of data, Method of scaling - nominal, ordinal, ratio and interval scale, measuring reliability and validity of scales, Measures of Central tendency, Measures of Dispersion, Skewness and kurtosis, Sampling, Sample size determination

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

(CP – Class Performance; V-Viva; A- Attendance; ME- Mid-Term Exam, EE – End semester Exam)

Text & References:

Text books:

- Research Methodology: A Step By Step Guide For Beginners: Ranjit Kumar
- Research Methodology: Methods and Techniques : By C. R. Kothari

Syllabus - Second Semester

OCULAR DISEASE AND OCULAR DIAGNOSTICS-I

Course Code: OPT4211 **Credit Units: 04**

Course Objectives: This course gives both in-depth theoretical knowledge and clinical exposure to the diagnostic procedures. The outcomes of this course are: Thorough understanding of the basic and advanced ophthalmic procedures and instrumentation through didactic lectures and clinical postings.

Revision and tutorial of clinical procedures and recent advanced shall be taught.

Case files / log book needs to be maintained in the case examination procedures done during the semester. These need to be signed by the supervisor.

Examination Scheme:

Components	**A**	**CT**	**HA (log book)**	**EE**
Weightage (%)	5	10	15	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Exam

Recommended Text books:

- BHVI optometry course modules
- Clinical Procedures in Optometry : J. Boyd Eskridge, John F. Amos, Jimmy D. Bartlett
- Primary care in Optometry :Theodore Grosvenor, Theodore P. Grosvenor
- Clinical Procedure Prim Eyecare : By David B. Elliott
- Optometric instrumentation : Dave Henson

RESEARCH METHODOLOGY & BIOSTATISTICS-II

Course Code: OPT4212 **Credit Units: 03**

Course Objective:
Introduction to Biostatistics and Implementing Statistical Tests and Procedures. This course is intended to provide a better understanding of data analysis and statistical issues in design of experiments, as well as the techniques and terminology commonly used to elicit and communicate evidence concerning scientific hypotheses. Students will learn to properly interpret the strength of statistical arguments made by researchers, and how to weigh statistical and clinical evidence in assessing a scientific hypothesis. Emphasis will be placed on conceptual understanding of issue. This is intended for students interested in learning how to conduct data analysis and how to interpret the output of statistical software. The implementation of these techniques through Excel and JMP will be illustrated by real datasets taken from clinical and public health studies. Students will learn where to find the relevant information from the statistical output tables generated by the software. Emphasis will be placed on application of statistical methods to real datasets.

Course Contents:
Module-I:
Introduction to SPSS

Module-II:
Concept of probability and Probability distributions – Binomial Probability distribution, Poisson Probability distribution and Normal Probability distribution

Module-III:
Data entry. Data coding and cleaning, tests for Normality, chi square test two sample tests (t test, man whitney test and wilcoxon signed rank test)

Module-IV:
Three or more sample testing (One way AND Repeated measures ANOVA, Kruskal Wallis test and Friedman test

Module-V:
Correlation-Karl Person, Spearman's Rank correlation methods, Regression Analysis, Scientific writing (Writing research papers and thesis), Ethical Issues in Research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent

Examination Scheme:

Components	**A**	**HA (log book)**	**CT-I**	**CT-II**	**EE-Practical/ Viva**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Exam

Text & References:
Text books:

- B.K. Mahajan. Methods in Biostatistics, Jaypee Brothers
- P.S.S. Sundar Rao. An Introduction to Biostatistics: A manual for students in Health Sciences, J.Richard Prentice Hall, 1996.

Reference Books:

- Daniel, Wayne.W. Bio-Statistics: A foundation for Analysis in the Health Sciences, John Wiley and Sons Pub, 1991.
- K. Vishwas Rao. Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. Bio-Statistics perspective in Health care research and practice, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), Handbook of Statistics, Elsevier Science Pub, 1988.

BINOCULAR VISION-II & VISION THERAPY

Course Code: OPT4203 **Credit Units: 04**

Course Objective:
This course provides the student with the ability to diagnose as well as to initiate treatment for patients who present with non-strabismic binocular dysfunctions, accommodative anomalies, and non-pathologic oculomotor dysfunction. From a diagnostic perspective, it will integrate the clinical information gained in with the theoretical and practical information covered in other courses discussing binocular vision. Treatment options discussed will include the judicious application of lenses and prisms, as well as an introduction to optometric vision therapy. The course then takes a more clinical turn, as it provides the student with an organized approach to the clinical evaluation and management of a patient with strabismus and/or amblyopia. Discussions focus on natural history, etiology, signs and symptoms, related characteristics, significance and practical management of amblyopia, esotropia, exotropia, and noncomitant strabismus. There is special emphasis on the clinical decisions and procedures needed to recognize functional versus pathological etiologies with a laboratory component, setting the stage for discussion and hands-on experience with relevant diagnostic and treatment procedures.

Course Contents:

Module-I: Strabismus
Diagnosis of strabismic anomalies
Clinical model of visual processing
Diagnostic Evaluation of strasbimus
Diagnostic assessment and prognosis

Module-II: Management Strategy and treatment options
Lens Therapy
Prism Therapy
Occlusion Therapy
Active Vision Therapy
Pharmacological Therapy
Surgical Therapy

Module-III: Management of sensory anomalies
Treatment of suppression
Treatment of functional amblyopia
Treatment of anomalous correspondence

Module-IV: Strabismus management strategies
Management of Exotropias
Management of Esotropias
Management of vertical strabismus

Module-V: Nystagmus

Module-VI: Vision Therapy and Vision therapy techniques

Module-VII: Dyslexia and Optometry Management

Examination Scheme:

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books

- Pediatric Optometry ,Jerom Rosner ,Butterworth Heinmann
- Binocular Vision And Ocular Motility , Guntoor Von Noordan
- Clinical Orthoptics, Fiona Rowe
- Strasbimus Simplified, Pradeep Sharma
- Assessing Children's Vision, Susan J Leat, Rosalyn H Shute, Carol A Westal
- Paediatric Optometry, William Harvey/ Bernard Gilmartin
- Clinical management of strasbismus, Elizabeth E Caloroso,btterworth

ADVANCED CONTACT LENS -I

Course Code: OPT4204 **Credit Units: 4**

Course Objective: Contact lenses are an essential part of optometric practice; not only for practice success, but also in the management of certain ocular conditions that require visual or therapeutic rehabilitation. This course introduces all aspects of contacts lens practice to the optometry student. It begins with soft and rigid gas permeable contact lenses, and continues through toric, multifocal and specialty lenses in the next semester. This semester gives overview of contact lens related complications and their management which is discussed in detail in the next semester, A hands-on practical provides experience with the various lens types, and online materials encourage independent learning.

Course Contents:

Module-I: Introduction to Contact Lenses

History of Contact Lenses ,Contact Lens Materials and Manufacturing ,Optics of Contact Lenses, Soft & Rigid Gas Permeable Contact Lens Design ,Contact Lens Fabrication, Contact Lens Verification

Module-II: Contact Lens Fitting

Examining the Prospective Contact Lens Patient, Selecting Lens Type, Wear Mode and Replacement Rate

Fitting Spherical GP Contact Lenses, Fitting Spherical Soft Contact Lenses, Correcting Astigmatism with Contact Lenses

Module-III: Contact Lens Fitting

Fitting SiHyCLs, The Dispensing Visit and After-Care, Contact Lenses for Sports, Presbyopic Contact Lens Options

Module-IV: Care and Maintenance

Contact Lens Contamination ,CL Care and CL Care Products ,Rigid CL Care ,Hydrogel and Silicone Hydrogel CL Care

Module-V: Complications

Defending the Ocular Surface in Contact Lens Wear

Rigid Contact Lens Complications

Soft Contact Lens Complications

Dry Eye and Contact Lenses

Examination Scheme:

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	5	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books:

- IACLE modules A,B,C,D,E
- Text book Of Contact Lenses 5th edition by Sinha Rajesh ,jaypee publication 2017
- Contact lens Primer
- Essentials of Contact lens practice

- Silicone hydrogels: the rebirth of continuous wear contact lense, Deborah F. Sweeney, Butterworth Heinemann
- Clinical manual of Contact Lenses, Edward S. Bennett and Vinita Allee Henry, Lippincott Williams and Wilkins, 2008
- Medical Contact Lens Practice, Elisabeth A. W. Millis
- Contact Lenses, Anthony J. Phillips and Lynne Speedwell
- The CLAO Guide to Basic Science and Clinical Practice: Volumes 1, 2, 3, Contact Lens Association of Ophthalmologists

CLINICS-II (SPECIALITY)

Course Code: OPT4205 **Credit Units: 3**

The objective of clinics in this semester is to be able to examine the eye and understand the classified eye procedures with clinical management with special reference to low vision, binocular vision, pediatric care and contact lens.

An approximate of guided 150 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, associated hospital partners and optical / optometric clinics.

The logbook has to be maintained and 30 case sheets of SELECTED speciality in the semester with complete management and follow up are mandatory for submission at the end of the semester

The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature.

Examination Scheme:

Components	**A**	**Log Book**	**Case Sheets**	**Viva-EE**	**EE-Practical**
Weightage (%)	5	10	15	20	50

A: Attendance, EE: End Semester Exam

PROJECT (Research)

Course Code: OPT4232 **Credit Units: 02**

Research Project Data update

Examination Scheme:

Components	**Results & Analysis**	**Data Collection**	**Conclusion & Discussion**	**Total**
Weightage (%)	40	40	20	100

Syllabus - Third Semester

TEACHING METHODOLOGY

Course Code: OPT4307 **Credit Units: 3**

Course Contents:

Module-I:
Introduction, Understanding how adults learn, How to enhance student learning

Module-II:
Teaching strategies to enhance Learning, How to structure your course, leaning activities

Module-III:
Effective learning and Teaching activities in eye Care,
Methods of teaching, presentation, demonstration, case studies, Role plays, group discussion

Module-IV:
Student Assessment and evaluation techniques, formative and summative assessment, marking and providing feedback

Examination Scheme:

Components	A	Assignment-1	Assignment-2	Assignment-3	Project	Total
Weightage (%)	5	20	20	20	35	100

A: Attendance

Text book/ Reference Book
As recommended by the faculty

ADVANCED CONTACT LENS-II

Course Code: OPT4303 **Credit Units: 4**

Course Objective: This course gives both in-depth theoretical knowledge and clinical exposure in Contact lens at advanced level and in therapeutic conditions. It prepares student to develop competency in handling all types of specialty lenses. This course also deals with all complications related to contact lenses and its management.

Course Contents:
Module-I: Children and Contact Lenses

Module-II: Fitting Scleral and Mini-Scleral Contact Lenses, Fitting an Ocular Prosthesis

Module-III: Myopia Control and Orthokeratology

Module-IV: Special Topics
Contact Lenses for Keratoconus ,Special Applications of Contact Lenses, Advanced Techniques and Instrumentation ,The Working Environment and Contact Lenses

Module-V: Business Aspects of Contact Lens Practice
Contact lenses (CLs) in practice, Financial factors in a CL practice, Managing &marketing techniques for a CL practice, Employee management, Record Keeping
Professionalism & standards of care

Examination Scheme:

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books:

- IACLE modules B,C,D,E
- Text book Of Contact Lenses 5th edition by Sinha Rajesh ,jaypee publication 2017
- Contact lens Primer
- Essentials of Contact lens practice
- Silicone hydrogels: the rebirth of continuous wear contact lense, Deborah F. Sweeney, Butterworth Heinemann
- Clinical manual of Contact Lenses, Edward S. Bennett and Vinita AlleeHenry,Lippincott Williams and Wilkins, 2008
- Medical Contact Lens Practice, Elisabeth A. W. Millis
- Contact Lenses, Anthony J. Phillips and Lynne Speedwell
- The CLAO Guide to Basic Science and Clinical Practice: Volumes 1, 2, 3, Contact Lens Association of Ophthalmologists

OCULAR DISEASE AND DIAGNOSTICS-II

Course Code: OPT4308 **Credit Units: 04**

Course Objective: In this course latest articles published in optometry and vision science journals will be discussed. Periodic Journal club presentation would be conducted. This will enable the student to develop skill on critical appraisal of publications and also help to keep abreast of latest developments in the field of optometry and vision science. The course would also provide insight on understanding and/or incorporation of scientific evidence in clinical practice.

This course examines selected areas of recent research in optometry. Current advances in methodology, specifics of research design, and impact of research findings will be emphasized. Selected topics are based on participating faculty expertise will be assigned to the students.

Students will be assigned topics of presentation during the semester and they will have to present base literature review and latest advancements.

Text & Reference books /journals:
Clinical and experimental optometry, Edited By: H. Barry Collin
Optometry & vision science ,journal of American academy of optometry
Optometry journal of American optometric association
Ophthalmic and Physiological Optics Journal of the College of Optometrists, UK
Contact lens & anterior eye : the journal of the British Contact Lens Association
British Contact Lens Association

CLINICAL DECISION MAKING IN OPTOMETRIC CARE-I

Course Objective: Upon completing this course, the student will achieve a moderately-high level of competence with respect to a modest list of patient presentations commonly encountered by primary care optometrists. By the course's end, the student will be able to conduct a comprehensive, primary-care optometric examination, reach a diagnosis, and outline a management plan for the vast majority of patients seen during the year. The course will cover the general areas of ocular disease, refraction, functional vision analysis, and patient communication.

Course Contents: In this course, the student will begin with refreshing their basic knowledge on common eye disease of the anterior segment. The course would further orient towards clinical decision making skills, interpretation and improving their clinical skill set, clinical management of optometry. They will learn and develop skills on evidence/intuitive based management for the commonly seen eye diseases and learn appropriate referral & co management guidelines for secondary or tertiary ophthalmic care

The mode of delivery would be through cases scenarios discussion, problem based learning and seminar/workshops and Presentations. Records need to be maintained in the following pathologies.

The following common conditions will be covered in this semester:

Module-I: Lid and Adnexa:
Eyelid cysts
GPC
Hodeleum
Chemosis

Xanthelasma
Ectropion VKC Entropion

Module-II: Cornea :corneal dystrophy Corneal edema corneal infiltrates
corneal opacities Fuchs endothelial dystrophy fungal keratitis
Hypopyon
Keratoconus follicular conjunctivitis Irirtis
pterigium PMD Pingecula ptosis
Rhematoid and eye Acne and eye Scleritis Episcleritis
Stevenson johnson syndrome Synechia
Terriens marginal degeneration

Module-III: Dry eye and its interpretation and managementWorkshop

Module-IV: Diseases of sclera and conjunctiva
Abrasion
Allegic eye disease Aniridia
Atopic Keratoconjunctivitis Bacterial Conjunctivitis Blephritis
Chalazion
Epiphora
Scleritis Episcleritis
ophthalmia neonatrum Trachoma
Trichiasis

Module-V: Lens and its abnormalities –
Cataract Ectopia Lentis
IOL, power calculations – post-refractive surgery , analysis of surgically induced astigmatism , complications of cataract surgery

Module-VI: Diseases of Uvea /
Endophthtalmitis
Anterior uveitis

Examination Scheme:

Components	**A**	**Presentation**	**Presentation-EE**	**Case Records**	**EE-Viva**	**EE-Viva**
Weightage (%)	5	20	20	5	30	20

A: Attendance, EE: End Semester Exam

Text books:

- Kanski, Clinical Ophthalmology: A Systematic Approach – May 2011 Edition, Jack J. Kanski MD MS FRCS FRCOphth, Brad Bowling FRCSEd(Ophth),Elsweare heath science division
- Optometric Management Of Visual Handicap, Helen Farral,Blackwell Scientific Publications, 1991
- Ocular Differential Diagnosis, Roy
- Clinical Decision Making In Optometry, Ellen Richter Ettinger OD MS FAAO
- Anterior segment disease and Management by Andrian Bruce

CLINICS-III (SPECIALITY)

Course Code: OPT4305 **Credit Units: 3**

The objective of clinics in this semester is to be able to examine the eye and understand the eye procedures with clinical management with special reference to complete optometric care.

A minimum of guided 240 hours need to be completed in this semester. The students will be by rotation go to community clinic, Campus clinics, associated hospital partners and optical / optometric clinics.

The logbook has to be maintained and 30 case sheets of complete case management and follow up are mandatory for submission.

The log book needs to be signed by the supervisor every time a case is recorded in it. No case will be considered without the supervisor's signature.

Examination Scheme:

Components	**A**	**Assignment (log book)**	**Case Sheets**	**Viva-EE**	**EE-Practical**
Weightage (%)	5	15	10	20	50

A: Attendance, EE: End Semester Exam

ENVIRONMENTAL OPTOMETRY

Course Code: OPT4306 **Credit Units: 3**

Course Objective: Occupational optometry is the portion of optometric practice that is concerned with the efficient and safe visual functioning of an individual within the work environment. It encompasses more than just the prevention of occupational eye injuries, although that certainly is a major component. It also includes vision assessments of workers/patients, taking into account their specific vision requirements and the demands these requirements place upon them. Optometrists provide occupational vision services at three general areas or levels: primary care, eye safety consultation, vision consultation.

After the completion of the course the student should be able to
Complete an occupational history on each adult patient
Diagnose and manage occupationally induced conditions (making referrals when necessary)
Assess his or her patients‟ occupational vision demands and provide appropriate treatments as necessary
Educate patients on the need to incorporate eye safety principles into their daily activities.
Performing an eye-safety workplace assessment
Overseeing the procurement of eye protection devices (both prescription and nonprescription)

Course Contents:
Module-I: Introduction

Module-II: Work place survey
Oculo visual hazard analysis
Ergonomic Factor
Work place lighting assessment

Module-III: Matching the worker to the task
Visual standards
Clinical evaluation
Personal protective strategies

Module-IV: Pitsfall of industrial consulting

Module-V: Visual Health in selected industries

Module-VI: References and standards

Examination Scheme:

Components	Attd.	Case Studies	Field Visit	Assignment	Class Test
Weightage (%)	5	30	10	5	50

Test Books:

- Eye Essentials: Environmental & Occupational Optometry, G Carson, S Doshi, W Harvey, butterworth heinmann
- BHVI module for environmental optometry
- R V North: Work and the eye, Second edition, Butterworth Heinnemann, 2001
- G W Good: Occupational Vision Manual available in the following website: www.aoa.org
- N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999
- J Anshel : Visual Ergonomics Handbook, CRC Press, 2005

INTERNSHIP

Eye care clinic: This sequence of courses gives students direct patient care experience and responsibilities in affiliated health centers, hospitals or in private practices. Clinical preceptors will evaluate and guide the student through the process of providing eye care. Students are graded on key clinical tools: technical skills, knowledge base, analytical skills, diagnostic skills, management and treatment, communication skills, efficiency, attitude, and professionalism. The clinical grade is honors, pass, remedial, or fail based on a midterm and final preceptor evaluation; on meeting documentation requirements, such as maintaining documentation; and on submitting patient logs, and site evaluations.

The AUG department of Optometry monitors the quality and quantity of patient encounters for each student. Through the clinical assignments, students will gain proficiency in full scope primary care optometry and contact lenses. All students must satisfy a minimum number of patient encounters during the course of their assignments. Some students may be assigned to specific sites in order to assure a clinical experience based on their projects. Some students may meet the contact lens requirement through affiliations set up on behalf of the students during the summer vacations with private practitioners who meet the College's program standards.

Four rotations during the final semester complete the clinical requirements, with mandatory assignments in Primary Care, Advanced Care and Specialty Care. Students choose an additional assignment in one of the mandatory categories or from a list of elective sites based on their projects. The College currently has affiliated clinical sites located around the campus and in other states.

Clinical sites that provide comprehensive eye care services for patients of all age brackets are categorized as Primary Care sites. Typically, these sites are eye care hospitals or private optometric practices. Clinical sites that provide professional specialty care are categorized as Specialty Care clinics. These include clinics specializing in visual therapy/binocular vision, contact lenses, pediatrics, geriatrics, patients with disabilities, or low vision. The rotation provides training in all of these specialty areas.

Syllabus - Fourth Semester

CLINICAL OPTOMETRY (GENERAL)

Course Code: OPT4401 **Credit Units: 05**

Objective: It is expected that upon completion the student will be able to carry out the standard clinical procedures safely and efficiently
Upon completion of the course the student must be able to
Take down a comprehensive history
Do a complete and proper refraction
Do a torch light examination
Do a binocular vision assessment
Use a slit lamp to do a complete anterior segment examination and posterior segment as required
Must be able to take the decision to dilate the eye as per need
Must be able to give a preliminary diagnosis

Each student must be able to complete 20 such examinations under supervision and maintain verified case records for the same.

Tutorial (Presentations) – Each student must also make 1 presentation on instruments and present it atthe study center.

Case Presentation:
Each student must do two case discussions during the semester and of the patients. Thus each student presents 2 case discussions at a time and presents it at the study centre.

The hard copy of the presentations will have to be submitted for the term end exam.

Examination Scheme:

Components	Attd.	Case Records	Assignments	Clinical Supervisors Evaluation	Case Discussion	Practical + Viva
Weightage (%)	5	10	10	15	10	50

CLINICS-I -ADVANCE CLINICAL RETINA, GLAUCOMA

Course Code: OPT4407 **Credit Units: 10**

Course Contents:

MODULE-I: Retinal evaluation, diagnostics & optometric management

MODULE-II: Glaucoma investigation diagnostics and optometric management

MODULE-III: Low vision Evaluation, deciding diagnosis & management plan

MODULE-IV: Visual Rehabilitation for visually impaired person

Examination Scheme:

Components	**A**	**Case Records**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	10	15	70

A: Attendance, EE: End Semester Exam

CLINICS-II: ADVANCE PEDIATRIC, BINOCULAR VISION & VISION THERAPY

Course Code: OPT4408 **Credit Units: 10**

Course Contents:

MODULE- I- To assess and manage patients with anomalies of binocular vision

MODULE II- To Assess binocular status using objective and subjective tests.

MODULE III- To Understanding of the management of a patient with an anomaly of binocular vision.

MODULE IV- To Investigate and manage adult patients presenting with heterophoria.

MODULE V- To Manage an adult patient with heterotropia

MODULEVI- To Manage children at risk of developing an anomaly of binocular vision.

MODULEVII- To Manage children presenting with an anomaly of binocular vision.

MODULE VIII- To Manage a patient presenting with an incomitant deviation.

Examination Scheme:

Components	**A**	**Case Records**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	10	15	70

A: Attendance, EE: End Semester Exam

ADVANCE APPLIED OPTICS AND ADVANCE CORNEA & CONTACT LENS

Course Code: OPT4409 & OPT4410 **Credit Units: 10 & 10**

Course Contents:

MODULE I- Insert and remove contact lenses and instruct patients in these procedures.

MODULE II- Fit soft contact lenses.

MODULE III- Manage the aftercare of patients wearing soft contact lenses

MODULE IV- Advise on contact lens materials and care regimes

MODULE V- Manage the aftercare of patients wearing rigid gas permeable contact lens.

MODULE VI- Fit rigid gas permeable contact lenses.

MODULE VII- Fit contact lenses to patients with astigmatism.

MODULE VIII- Techniques used in fitting contact lenses and to advise patients requiring complex visualcorrection.

MODULE IX- Fit multifocal, contact Lenses

MODULE X- Fit special contact lenses e.g Rose K , Orthokeratology, Scleral

MODULE XI- Dispensing, ordering &verification of spectacle

Examination Scheme:

Components	**A**	**Case Records**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	10	15	70

A: Attendance, EE: End Semester Exam

CLINICAL INTERNSHIP-DISSERTATION

Course Code: OPT4437 **Credit Units: 10**

Course Contents:

MODULE-I: Thesis Proposal Development is an independent tutorial conducted by the student's advisor, and involves a comprehensive literature survey of the chosen research area. Through regular meetings, the student and advisor discuss this literature in detail, and the student writes a paper, reviewed by the advisor, summarizing the literature. This paper should help in the development of the thesis proposal and thesis.

MODULE-II: Thesis Proposal At the end of the Semester 2. each student must submit to the university with the signed approval of the advisor, a thesis proposal defining the thesis project, the methods and design of the experiments needed for completion, the progress to date, and plans for completion.

MODULE-III: Thesis Preparation

This is involving preparation of the thesis. The thesis must include a cover and title page, abstract, table of contents, Introduction of the thesis topic with a comprehensive review of the literature, appropriately organized methods, results, and discussion sections for the experiments performed, and a final conclusions section summarizing the outcome of the project. The student should submit a draft of the thesis to the advisor by the end of the third semester. Plans should be in place for the thesis examination to be held in the final exam.

MODULE-IV: Thesis submission

Project Work and Practical Training

A Full time student admitted to M.Optom course will have to be involved in teaching under-graduate students for lectures, demonstrations and hands-on practical sessions.

All students will have to choose ONE speciality subject at start of first year M.Optom and inform the University through School of Optometry in writing within 3 months of being admitted for the first Semester M.Optom

As a part of clinical training during the first year M.Optom every student will document minimum number of cases specified in clinically examined by them. These clinical cases will have to be submitted before end of 4thsemester

Every student will have to do a dissertation thesis during the second year M.Optom for this. Every student should submit a protocol which will have to be approved and accepted by post graduate teaching faculty at School of Optometry within second semester of starting first year.

Two copies of the dissertation thesis will have to be submitted before 15thMay in second year.
Some post graduate students may have to work with ophthalmic and optical industry in their projects of practitioner education, research and other related activities which will be given as assignments by the School of Optometry, Amity medical school.

Examination Scheme:

Components	**A**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	25	70

A: Attendance, EE: End Semester Exam

Examination & Rules of passing for first and Second Year M.Optom

Format for term end examination Theory papers
Each theory examination will be of 100 marks and 3 Hours duration, 70% marks will be taken as external marks.
Each theory examination paper will have total three Sections

Examination Pattern:
Each semester examination will consists of both internal assessment and term end examination in the subjects prescribed in syllabus for each semester. The Faculty will conduct the internal assessments as per schedule prepared by school of optometry.

Amity University, Gurgaon will conduct university every term end examination
Eligibility for a student to appear in term for semester-term end Examination

Minimum 50% marks in internal assessment i.e. minimum 15marks in theory internal and minimum 25 marks in practical/Viva/Oral

Minimum 75% attendance for all course , If of these eligibility conditions have not been satisfied, thestudent will not be allowed to appear for semester term end examinations

Duration of examination at end for each semester term for each written/practical/clinical examination will be such as may be notified from time to time on recommendation of the Amity University, Gurgaon authorities.

Results and passing for each semester Examination:
A student will be declared to have passed in particular theory subjects provided he/she has secured not less than 50% marks out of 100(15 marks out of 30 in internal assessment and 35 marks out of 70 in term end examination) in each theory subject for every semester.

A student will be declared to have passed in a particular subject provided he/she has secured not less than 50 marks out of 100 [25 marks out of 50 in internal Assessment and 25 marks out of 50 in terms end examination] in each practical subject for every semester.

A student will be declared to have “PASSED” the complete semester Examination provided he/she has secured 50% marks individually in all theory and practical subjects of that semester.

If a student fails or does not appear for semester examination for semester I& III he/she will still be allowed to attend the theory classes and practical sessions for the semester II & IV Respectively ,which falls in same academic year.

A student who has not appeared or has failed in the semester examination for semester I& III will have to appear for the internal and external exams for only that subject along with semester exam for the current semester i.e. .II and IV respectively.

Only when the student is declared pass all subject of semester I and semester II examinations will be admitted to the second year of the course.

A student who has not appeared or has failed in the semester examination for semester I & II will not be admitted to the second year of the course. He/ She will have to get readmitted in the first year and pay the fees as prescribed by the university.

Allowed to keep term: If the student secures minimum 50% marks in at least three subjects offirst year M.Optom, he/she will be allowed to keep term for second year. However he/she will have to pass in all the subjects of first year M.Optom in order to become eligible to apply/appear for second year final M.Optom University Examinations.

Repeat term: If the student fails in four or all five subjects of first year, he/she will be asked to pay the tuition fees proportionate to the number of subjects failed and the university examination fees and then appear for the midterm external examinations in those subjects in which he/she failed earlier. But they are not required to appear for internal examinations and neither repeat project.

Second Year M.Optom Passing: The internal examination and external examination marks will be added as the final marks of that subject for each year. Only when the student secures minimum 50% marks [Internal+External=combined] in all subjects of both the years and has completed the M.Optom. Course and will be eligible for post graduate degree of Master of Clinical optometry [M.Optom]

Repeat Dissertation: If the M.Optom student has failed in subject of the second year M.Optom the student will be required to either repeat the same dissertation project OR Choose different dissertation project and appear for the year end examination only.
He/she cannot take midterm examination for this subject in month of February every year.

If any student fails three times successively in the same subject at the university examinations for either first or second year M.Optom, He/She will not be allowed to continue the M.Optom course and his admission stands cancelled.

Award of the Degree:
A student who has secured 50% marks in every subject of final second year M.Optom Examination will be Eligible for conferment of Master of clinical Optometry [M.Optom] Post Graduate Degree by Amity university, Gurgaon

Award of Gold Medal:
Gold Medal will be awarded to the student who secures maximum marks in first and second ,Third& Fourth semester M.Optom added together, The candidate should have cleared each and every subject in every term in the first attempt.

Guidelines for Master research project work:
Basic reading material: Introductory reading material on research methodology, how to do a literature search and statistical methods should be provided at the beginning of the semester.

The students should read the material thoroughly and can mail their queries to their guides. a. Assignment 1: Exercises should be also given based on the reading material

The student should learn to do a through pubmed search in their area of research interest.. Read the recent research articles initially. Find out the research gaps. Based on that set up your research

aim. Your research aim should not be a repetition of an already done research. Substantiate the necessity (Gap in current research) for the proposed study. (Assignment II: mailed to guide)

Discuss with your peers and clinicians regarding the Originality & objective of the study, feasibility of the study and other ethical issues involved: Very important

Institutional Review Board and Ethics committee approval
Consent form certified
As they begin the research, it would be wise to also meet the statistician

Sample size estimation
Microsoft excel or access proforma design

Prepare a rough draft of the protocol (Assignment III)
Emphasize on the methodology
The final protocol should be ready by end of second semester

Update your research activities at least once in a month to your guide (Data collection proforma as excel sheet).

Data entry should be done in Excel appropriately. Consult with your local statistician for any queries and also discuss with your guide. (Assignment IV)

End of your data collections takes to Analysis: Kindly discuss with your guide and a statistician (Assignment V: on the basics of statistics pertaining to your research interest)*

In the thesis introduction, literature and methodology should be ready before the end of fourth semester.

Submission of the final thesis to the guide should be done before one month of the deadline given. So that your guide will have enough time to review and make corrections

Amity Medical School

Master of Optometry-Practitioner

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Syllabus - First Semester

EPIDEMIOLOGY, PUBLIC HEALTH & COMMUNITY OPTOMETRY

Course Code: OPP4101 **Credit Units: 03**

Course Objective: To inculcate the knowledge, sensitivity and clinical exposure of community optometry. The outcomes of the course are: thorough understanding of conducting of screening for specific eye conditions, and resultant implications through theoretical and practical exposure. By the end of the course the student will be able to use the knowledge of the skills gained in promotion and preventive measures of community optometry.

Course Contents:
Module-I: Public health concepts
History of public health, History of public health optometry (including epidemology, man power, projections, and community reimbursement mechanisms), Organizations of health services (principles of primary, secondary and tertiary care) Health Care Delivery systems in India and determinants of health. Detriments of health care delivery system planning of health services (including revelent legislation and implication to optometric practice). Health manpower protection and in the practice of ophthalmology Multidisciplinary and institutional practice modes Global medicine and evolution of Public Health in India, Public Health optometry: concepts and implementation

Module-II: Levels of prevention-optometrist's role in community
Optometry's role as a care primary care professional, preventable blindness

Module-III: Health systems
Concepts of Health systems National Health Programs Effective delivery of eye care services,
Role of civil societies in blindness prevention:
Vision2020: the Right to Sight
National and International Agencies in eye Care, NPCB
DBCS

Module-IV: Global Blindness and visual impairment
Refractive error and low vision as public health issues
Socioeconomic implications of blindness and visual impairment
Vision screening
Organizing eye camps
Eye Donation and Eye Banking

Module-V: Epidemiology
Prevalence, incidence and distribution of visual impairment
Basics of Epidemiology study methods
Incidence, prevalence, risk factors, odd ratio
Childhood blindness
Refractive errors and presbyopia
Age related macular degeneration
Low Vision
Diabetic retinopathy

Glaucoma
Age related Macular Degeneration
Trachoma
Corneal blindness

Examination Scheme:

Components	**A**	**CT**	**P (field report)**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Text book and reference

- Community eye health journal
- Epidemiology of Eye Diseases, by Gordon and Drawin

BINOCULAR VISION & PEDIATRIC OPTOMETRY-I

Course code: OPP4102 **Credits Units: 04**

Course Objective: This course gives both in-depth theoretical knowledge and clinical exposure in Binocular Vision, Orthoptics & Pediatric vision care. The outcomes of this course are: Thorough understanding of the visual development issues, evaluation of pediatric subjects, and non-surgical management of the pediatric binocular and refractive problems, amblyopia and Strabismus.

Course competencies:
1. Ability to diagnose and manage and co-manage binocular vision anomalies
2. Ability to co-manage visual perceptual anomalies
3. Ability to manage diplopia, suppression and ARC
4. Ability to manage amblyopia

BINOCULAR VISION

Course Contents:
Module-I:
Revision: Applied anatomy and physiology of extraocular muscle and Oculomotor Function
Retinal and cortical development, refractive development, Development of vision, ocular changes with age

Module-II:
Binocular Vision: and related aspects, Development of binocular vision, Physiology of binocular vision. Development of ocular deviation and its adaptation

Module-III:
Amblyopia and occlusion, Management guidelines of Amblyopia, Abnormal retinal correspondence, Anomalies of accommodation and its management, Anomalies of convergence and its management, Nystagmus

PEDIATRIC OPTOMETRY

Module-I:
Assessment of Child Vision and Refractive Error, Refractive Routines in the Examination of Children
Cycloplegic Refraction, Color Vision Assessment in Children, Dispensing for the Child patient

Module-II:
Common genetic problems in Pediatric optometry, Pediatric Ocular Diseases
Ocular Trauma in Children, Myopia control

Examination Scheme:

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text books

- Clinical management of binocular vision Mitchell Scheiman and Bruce Wick
- Applied concepts in vision therapy: Leonard Press
- Paediatric optometry: Jerome K Rosner

Reference books

- Binocular Vision And Ocular Motility , Guntoor Von Noordan
- Clinical Orthoptics ,Fiona Rowe
- Strasbimus Simplified ,Pradeep Sharma
- Assessing Children's Vision, Susan J Leat, Rosalyn H Shute, Carol A Westal
- Paediatric Optometry, William Harvey/ Bernard Gilmartin
- Pediatric Optometry, Jerome Rosner

CLINIC-I (GENERAL)

Course Code: OPP4105 **Credit Units: 3**

This course includes minimum of 90 hours of supervised clinical training. The clinics involve primary care clinics and community work.

The objective of clinics in this semester is to be able to examine the eye and understand the basic eye procedures with clinical management.

A logbook is maintained and case sheets with complete management and follow up are mandatory for submission.

The log book needs to be signed by the supervisor.

Examination Scheme:

Components	**Attd.**	**Log Book**	**Case Sheets**	**Viva-EE**	**EE-Practical**
Weightage (%)	5	10	15	20	50

RESEARCH METHODOLOGY & BIOSTATISTICS

Course Code: OPP4106 **Credit Units: 04**

Research Methodology

Course Objective: This course is a brief overview about research design that is intended to cover the basics of designing and implementing a scientific study. It will provide the students the basic knowledge in Bio-statistics. At the completion of the course, the students will have the knowledge of data collection, statistical application and finally ready for research project. This will enable the student to gain understanding of different research methodologies and appropriate research design to be able to conduct research projects.

Course Contents:

Module-I:

Introduction to research methods, Variables in research, Reliability and validity in research, Formulation of research problems and writing research questions, Hypothesis, Null and Research Hypothesis, Type I and Type II errors in hypothesis testing

Module-II:

Introduction of epidemiology, Descriptive epidemiology, Experimental and non experimental research designs, Screening, Sampling methods, Biological variability, normal distribution

Module-III:

Bias and Confounding, Association and causation, Odds ratio and relative risk, sensitivity and specificity Data collection methods- Observation method, Interview method, Questionnaires and schedules Construction,

Module-IV:

Critical analysis of research papers, Conducting a literature review, Writing Research proposals, Development of conceptual framework in research

Module-V: Introduction to Biostatistics

Introduction to Statistics, Classification of data, Source of data, Method of scaling - nominal, ordinal, ratio and interval scale, measuring reliability and validity of scales, Measures of Central tendency, Measures of Dispersion, Skewness and kurtosis, Sampling, Sample size determination

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

(CP – Class Performance; V-Viva; A- Attendance; ME- Mid-Term Exam, EE – End semester Exam)

Text & References:

Text books:

- Research Methodology: A Step By Step Guide For Beginners : Ranjit Kumar
- Research Methodology: Methods and Techniques : By C. R. Kothari

LOW VISION CARE AND GERIATRIC OPTOMETRY

Course Code: OPP4109 **Credit Units: 04**

Course Objectives: This course gives both in-depth theoretical knowledge and clinical exposure in Low Vision care. The outcomes of this course are: Thorough understanding of the causes of the low vision, its functional and psychosocial consequences, and rehabilitational measures through didactic lectures and clinical postings.

Course Contents:

Module-I: Introduction to Low Vision

Definition of low vision. The impact of low vision. Prevalence of low vision

Module-II: Causes and symptoms of low vision

Common causes of low vision. Low vision symptoms and conditions. Functional implication of diseases causing visual impairment. Disorder related to geriatric population and visual disability. Ocular changes with ageing.

Module-III: Clinical assessment of low vision patient

Purpose of low vision assessment, Steps of low vision assessment. Diverse types of magnification, Different methods and formulae for calculating magnification, how to determine resolution ability, predict distance required to meet resolution goal, Measure lens power, Measure equivalent viewing distance, Calculate equivalent viewing distance for different devices

Module-IV: Assistive technology in Low Vision devices

Different type of optical / non-optical low vision devices and their uses, Computer assistive Technology for low vision patient CTV, electronic magnifier, hand held electronic magnification. Mobility devices

Module-V: Non –optical low vision devices

Relative size magnification Large-print clocks, timers, calculators, remote controls, watches, books, Glare & contrast control, Posture and comfort maintenance device, Hand writing and written communication device Orientation and mobility device, Sensory substitution device Medical management device

Examination Scheme:

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text books:

- Management & Practice of Low Visual Acuity - A T Dowis
- Low Vision Principles & Practice - C Dickinson
- Optometric Management of Visual Handicap - H Farrell
- Eye Essentials - Low Vision Assessment - J McNaughton
- Low Vision Manual - Jackson and Wolfson
- The Art and Practice of Low Vision (2nd Edition) - P. D. Freeman and R. T. Jose
- Essentials of Low Vision Practice, Richard L. Brilliant OD

APPLIED OPTICS

Course Code: OPP4110 **Credit Units: 04**

Course Objective: This course mainly deals with Optical management of refractive errors-new modalities the advanced techniques in subjective and objective refraction and Spectacle Dispensing. This course leads to a rewarding career as an optometrist, a specialist trained to dispense and to recognize basic ocular disorders. This allows students to recommend the right spectacle lens based on the condition of the eye

Course Contents:

Module-I: Ophthalmic Lens types,
Lens materials Properties of lenses (Refractive index, base curve, specific gravity, Abbe Value, UV cut off,etc)
Prism
Tints and coatings
Bifocals/Multifocals

Module-II: Progressive addition lenses
PAL design
Indication and advantages
Dispensing PAL,
PAL trouble shooting
Market availability

Module-III: Spectacle FRAMES:
Facial fitting principles
Spectacle delivery
Dispensing problem prescriptions
Frame types and parts
Classification of spectacle frames-material, weight, temple position, coloration Frame construction
Frame Measurements and markings
Frame manipulation and repair
Facial measurements and frame choice
Measuring the interpupillary distance and pupillometer
Special purpose frames (sports, kids, reading)
identify various types of Frames and mountings

Module-IV: Lens Ordering and lens verification
Lens edge thickness calculation Writing spectacle lens order
Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
Measurement of effective diameter minimum blank size Glazing and edging Hands on
Lens verification and axis marking and fitting of all lens types
Final checking of finished spectacle with frame adjustments
Delivery and follow-up
Troubleshooting complaints and handling patient‟s questions.
Optical centre marking
Axis marking

Project: Different brands for spectacle frames and sunglasses –Indian & international Demonstration- safety eyewear, different filters, recumbent spectacle, Ptosis spectacle,

Examination Scheme

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Text & Reference Books:

- The fine art of prescribing glasses, Benjmin Milder,Butterworth Heinnemann,
- Spectacle frame dispensing: H Obstfeld:Butterworth Heinnemann
- essentials of ophthalmic lens finishing , C.W.Brooks and Irvin Borish,Butterworth Heinnemann
- Bennett's OPhthalmic prescription work Bennet & K.G wakefield,butterworth heinmann
- Systems of ophthalmic dispensing , Brook & Borish,Butterworth heinmann
- Clinical Optics , Troy Fennin ,Theodore Grosvenor,Butterworth Heinmann

PROJECT

Course Code: OPP4132 **Credit Units: 04**

RESEARCH PROJECT:
Students will prepare the protocol during this semester after doing extensive literature search. Each student will be reporting to guide/supervisor who helps the student to go about in systematically. Research proposal need to be presented in front of the experts before going ahead with data collection. In institute which has Institute research board and ethics committee student can be encouraged to present the proposal in it.

Syllabus - Second Semester

BINOCULAR VISION –II & VISION THERAPY

Course Code: OPP4203 **Credit Units: 4**

Course Objective:
This course provides the student with the ability to diagnose as well as to initiate treatment for patients who present with non-strabismus binocular dysfunctions, accommodative anomalies, and non-pathologic oculomotor dysfunction. From a diagnostic perspective, it will integrate the clinical information gained in with the theoretical and practical information covered in other courses discussing binocular vision. Treatment options discussed will include the judicious application of lenses and prisms, as well as an introduction to optometric vision therapy. The course then takes a more clinical turn, as it provides the student with an organized approach to the clinical evaluation and management of a patient with strabismus and/or amblyopia. Discussions focus on natural history, etiology, signs and symptoms, related characteristics, significance and practical management of amblyopia, esotropia, exotropia, and noncombatant strabismus. There is special emphasis on the clinical decisions and procedures needed to recognize functional versus pathological etiologies with a laboratory component, setting the stage for discussion and hands-on experience with relevant diagnostic and treatment procedures.

Course Contents:

Module-I: Strabismus
Diagnosis of strabismus anomalies
Clinical model of visual processing
Diagnostic Evaluation of strabismus
Nystagmus

Module-II: Management Strategy and treatment options
Lens Therapy
Prism Therapy
Occlusion Therapy
Active Vision Therapy
Pharmacological Therapy
Surgical Therapy

Module-III: Management of sensory anomalies
Treatment of suppression
Treatment of functional amblyopia
Treatment of anomalous correspondence

Module-IV: Strabismus management strategies
Management of Exotropia's
Management of Esotropias
Management of vertical strabismus
Dyslexia

Examination Scheme

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books

- Pediatric Optometry ,Jerom Rosner ,Butterworth Heinmann
- Binocular Vision And Ocular Motility , Guntoor Von Noordan
- Clinical Orthoptics, Fiona Rowe
- Strasbimus Simplified, Pradeep Sharma
- Assessing Children's Vision, Susan J Leat, Rosalyn H Shute, Carol A Westal
- Paediatric Optometry, William Harvey/ Bernard Gilmartin
- Clinical management of strasbismus, Elizabeth E Caloroso, btterworth

ADVANCED CONTACT LENS -I

Course Code: OPP4204 **Credit Units: 4**

Course Objective: Contact lenses are an essential part of optometric practice; not only for practice success, but also in the management of certain ocular conditions that require visual or therapeutic rehabilitation. This course introduces all aspects of contacts lens practice to the optometry student. It begins with soft and rigid gas permeable contact lenses, and continues through toric, multifocal and specialty lenses in the next semester. This semester gives overview of contact lens related complications and their management which is discussed in detail in the next semester, A hands-on practical provides experience with the various lens types, and online materials encourage independent learning.

Course Contents:

Module-I: Basics of Contact Lenses
History of Contact Lenses, Contact Lens Materials and Manufacturing, Optics of Contact Lenses, Soft & Rigid Gas Permeable Contact Lens Design, Contact Lens Verification

Module-II: Contact Lens Fitting
Examining the Prospective Contact Lens Patient, Selecting Lens Type, Wear Mode and Replacement schedule
Fitting Spherical GP Contact Lenses, Fitting Spherical Soft Contact Lenses, Correcting Astigmatism with Contact Lenses

Module-III: Advanced materials and designs
Fitting Silicone Hydrogels,
The Dispensing Visit and After-Care,Contact Lenses for Sports,Presbyopia Contact Lens Options in contact lens wear

Module-IV: Care and Maintenance
Contact Lens Contamination, CL Care and CL Care Products, Rigid CL Care, Hydrogel and Silicone Hydrogel CL Care, Dry Eye and Contact Lenses

Module-V: Complications with contact lenses
Defending the Ocular Surface in Contact Lens Wear, Rigid Contact Lens Complications, Soft Contact Lens Complications

Examination Scheme

Components	**A**	**CT**	**P**	**HA**	**EE**
Weightage (%)	5	10	5	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books:

- IACLE modules A, B, C, D, E,
- Text book Of Contact Lenses 5th edition by Sinha Rajesh, Jaypee publication 2017
- Contact lens Primer
- Essentials of Contact lens practice

- Silicone hydrogels: the rebirth of continuous wear contact lenses, Deborah F. Sweeney, Butterworth Heinemann
- Clinical manual of Contact Lenses, Edward S. Bennett and Vinita Alee Henry, Lippincott Williams and Wilkins, 2008
- Medical Contact Lens Practice, Elisabeth A. W. Millis
- Contact Lenses, Anthony J. Phillips and Lynne Speedwell
- The CLAO Guide to Basic Science and Clinical Practice: Volumes 1, 2, 3, Contact Lens Association of Ophthalmologists

CLINICS-II (SPECIALITY)

Course Code: OPP4205 **Credit Units: 3**

The objective of clinics in this semester is to be able to examine the eye and understand the classified eye procedures with clinical management with special reference to low vision, binocular vision, pediatric care and contact lens.

An approximate of guided150 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, associated hospital partners and optical / optometric clinics.

The logbook must be maintained and 30 case sheets of SELECTED specialty in the semester with complete management and follow up are mandatory for submission at the end of the semester

The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature.

Examination Scheme

Components	**Attd.**	**Log Book**	**Case Sheets**	**Viva-EE**	**EE-Practical**
Weightage (%)	5	10	15	20	50

A: Attendance, EE: End Semester Exam

OCULAR DISEASE AND DIAGNOSTICS-I

Course code: OPP4211 **Credit Units: 04**

Course Objectives: This course gives both in-depth theoretical knowledge and clinical exposure to the diagnostic procedures. The outcomes of this course are: Thorough understanding of the basic and advanced ophthalmic procedures and instrumentation through didactic lectures and clinical postings. Evidence based approach to Diagnosis, Clinical decision Making, Management and co management of anterior segment ocular diseases. Developing more reading ability of scientific journals for more evidence based management with recent understanding of diseases.

Desired competencies

Ability to perform clinical decision making for Ocular abnormalities
Referral criteria
Ability to perform and interpret corneal diagnostics including Topography/Pentacam/Orbscan
Specular microscopy
Pachymetry
Abberometry
AS OCT UBM
Ability to perform pre and post Lasik evaluation
Ability to interpret glaucoma diagnostic reports
OCT
Gonioscopy /HRT /GDX
ONH evaluation
Ability to perform anterior segment photography
Ability to manage and co-manage therapeutics for anterior segment

Recent advances will be added time to time

Examination Scheme:

Components	A	CT	HA (log book)	EE-Viva	EE-Practical
Weightage (%)	5	10	15	20	50

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Exam

Recommended Text books:

- Clinical Ophthalmology: Jack J Kanski
- Diagnostics and imaging techniques in Ophthalmology: Amar Agarwal

Reference books

- Clinical Procedures in Optometry : J. Boyd Eskridge, John F. Amos, Jimmy D. Bartlett
- Primary care in Optometry :Theodore Grosvenor, Theodore P. Grosvenor
- Clinical Procedure Prim Eyecare : By David B. Elliott

LOW VISION CARE AND REHABILITATION

Course code: OPP4212 **Credit Units: 4**

Course Objectives: This course gives both in-depth theoretical knowledge and clinical exposure in Low Vision care. The outcomes of this course are: Thorough understanding of the causes of the low vision, its functional and psychosocial consequences, and rehabilitational measures through didactic lectures and clinical postings. This course introduces low vision rehabilitation and geriatrics. The course teaches the role optometrists perform in treating the level 1 low vision patient who has moderate visual impairment. The course also addresses how to refer the level 2 patient who has advanced visual impairment to comprehensive low vision care.

Course Contents:

Module-I: Orientation and mobility

Orientation and mobility skill set cane skills, sighted guide technique, using a cane
Using other senses for orientation, Dos and don'ts for orientation and mobility
Driving with Low vision, Visual functioning, how to enhance visual functioning, residual vision, classification of activities of daily living, basic step towards independent living, how to achieve independent living

Module-II: The vision related rehabilitation network

Rehabilitation services network, state rehabilitation Programs & services, Private rehabilitation programs &services, low vision practitioner's role in rehabilitation service network, building a referral network, ensuring accessibility to service, financial resources,

Module-III: Visual Disorders

The Epidemiology of Vision Impairment, Vision Impairment in the paediatric population, Children with Multiple Impairments, Dual Vision and Hearing Impairment, Diabetes Mellitus and Vision Impairment, Vision Problems associated with Multiple Sclerosis, Vision Impairment related to Acquired Brain Injury, Vision and Dementia, Low Vision and HIV infection

Module-IV: The Functional Perspective

Low Vision and Psychophysics, Visual Disorders – The Psychosocial Perspective, Vision Impairment and Cognition, Spatial orientation and Mobility of people with vision impairments, Social skills Issues in vision impairment, Communication and language: Issues and concerns, Developmental perspectives on Aging and vision loss, Vision and cognitive Functioning in old age, Interactions of Vision Impairment with other Disabilities and sensory Impairments.
The Role of psychosocial Factors in adaptation to vision Impairment and Habitation outcomes for Adults and Older adults and children, Social support and adjustment to vision Impairment across the life span, Associated Depression, Disability and rehabilitation

Module-V: The Environment and Vision Impairment:

Indian Disabilities act, Children's Environments, Environments of Older people
Outdoor environments, Lighting to enhance visual capabilities, Signage and way finding. Accessible Environments through Technology

Examination Scheme

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text books:

- Essentials of Low Vision Practice, Richard L. Brilliant OD
- Management & Practice of Low Visual Acuity - A T Dowis
- Low Vision Principles & Practice - C Dickinson
- Optometric Management of Visual Handicap - H Farrall
- Eye Essentials - Low Vision Assessment - J Macnaughton
- Low Vision Manual - Jackson and Wolffsohn
- The Art and Practice of Low Vision (2nd Edition) - P. D. Freeman and R. T. Jose
- Primary Low Vision Care, Nowakovaski.R, Appleton and Lange

PROJECT

Course Code: OPP4232 **Credit Units: 04**

Data Collection, Literature search, Presentation of the progress of the project to the guide

Examination Scheme

Components	**Overall Progress**	**Literature Review**	**Presentation**	**Total**
Weightage (%)	40	40	20	100

Syllabus - Third Semester

ADVANCED CONTACT LENS-II

Course Code: OPP4303 **Credit Units: 4**

Course Objective: This course gives both in-depth theoretical knowledge and clinical exposure in Contact lens at advanced level and in therapeutic conditions. It prepares student to develop competency in handling all types of specialty lenses. This course also deals with all complications related to contact lenses and its management.

COURSE COMPETENCIES:
Ability to understand corneal physiology and oxygen needs
Ability to diagnose and manage complications due to contact lenses
Ability to fit specialized contact lenses
Keratoconus
Rose 'lenses
Mini scleral lenses
Handling complications

Course Contents:

Module-I: & II: Ability to fit specialized contact lenses
Keratoconus
Rose 'lenses
Mini scleral lenses
Hybrid lenses
Orthokeratology
Scleral lenses: Dry eyes, SJS, Post PK, Post C3R, Post LASIK ectasia
Ability to fit custom made ocular prosthesis
Ability to fit paediatric contact lenses

Module-III: Contact lens complications
For all types of lenses

Module-IV: Business Aspects of Contact Lens Practice
Contact lenses (CLs) in practice, Financial factors in a CL practice, Managing &marketing techniques for a CL practice, Employee management, Record Keeping, Professionalism & standards of care
Communication skill
Recent advances

Examination Scheme

Components	A	CT	P	HA	EE
Weightage (%)	5	10	10	5	70

A: Attendance, CT: Class Test, HA: Home Assignment, P: Presentation, EE: End Semester Exam

Recommended Text & Reference books:

- IACLE modules B, C, D, E
- Text book Of Contact Lenses 5th edition by Sinha Rajesh, Jaypee publication 2017
- Contact lens Primer
- Essentials of Contact lens practice
- Silicone hydrogels: the rebirth of continuous wear contact lenses, Deborah F. Sweeney, Butterworth Heinemann
- Clinical manual of Contact Lenses, Edward S. Bennett and Vinita AlleeHenry, Lippincott Williams and Wilkins, 2008
- Medical Contact Lens Practice, Elisabeth A. W. Millis
- Contact Lenses, Anthony J. Phillips and Lynne Speedwell
- The CLAO Guide to Basic Science and Clinical Practice: Volumes 1, 2, 3, Contact Lens Association of Ophthalmologists

CLINICS-III (SPECIALITY)

Course Code: OPP4305 **Credit Units: 4**

The objective of clinics in this semester is to be able to examine the eye and understand the eye procedures with clinical management with special reference to complete optometric care.

A minimum of guided 240 hours need to be completed in this semester. The students will be by rotation go to community clinic, Campus clinics, associated hospital partners and optical / optometric clinics.

The logbook has to be maintained and 30 case sheets of complete case management and follow up are mandatory for submission.

The log book needs to be signed by the supervisor every time a case is recorded in it. No case will be considered without the supervisor's signature.

Examination Scheme

Components	**A**	**Assignment (log book)**	**Case sheets**	**EE-Viva**	**EE-Practical**
Weightage (%)	5	15	10	20	50

A: Attendance, EE: End Semester Exam

ENVIRONMENTAL OPTOMETRY

Course Code: OPP4306 **Credit Units: 3**

Course Objective: Occupational optometry is the portion of optometric practice that is concerned with the efficient and safe visual functioning of an individual within the work environment. It encompasses more than just the prevention of occupational eye injuries, although that certainly is a major component. It also includes vision assessments of workers/patients, considering their specific vision requirements and the demands these requirements place upon them. Optometrists provide occupational vision services at three general areas or levels: primary care, eye safety consultation, vision consultation.

After the completion of the course the student should be able to
Complete an occupational history on each adult patient
Diagnose and manage occupationally induced conditions (making referrals when necessary)
Assess his or her patients‟ occupational vision demands and provide appropriate treatments as necessary
Educate patients on the need to incorporate eye safety principles into their daily activities.
Performing an eye-safety workplace assessment
Overseeing the procurement of eye protection devices (both prescription and nonprescription)

Course Contents:
Module-I: Introduction

Module-II: Work place survey
Oculi visual hazard analysis
Ergonomic Factor
Work place lighting assessment

Module-III: Matching the worker to the task
Visual standards
Clinical evaluation
Personal protective strategies

Module-IV: Pitfall of industrial consulting
Module-V: Visual Health in selected industries
Module-VI: References and standards

Examination Scheme

Components	A	Case Studies	Field Visit	Assignment	Class Test
Weightage (%)	5	30	20	15	30

Test Books:

- Eye Essentials: Environmental & Occupational Optometry, G Carson, S Doshi, W Harvey, ButterworthHeinemann
- BHVI module for environmental optometry
- R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001
- G W Good: Occupational Vision Manual available in the following website: www.aoa.org
- N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Sachem Services, 1999
- J Anshul: Visual Ergonomics Handbook, CRC Press, 2005

TEACHING METHODOLOGY

Course Code: OPP4307 **Credit Units: 3**

Course Contents:
Module-I:
Introduction, understanding how adults learn, how to enhance student learning

Module-II:
Teaching strategies to enhance Learning, how to structure your course, leaning activities

Module-III:
Effective learning and Teaching activities in eye Care,
Methods of teaching, presentation, demonstration, case studies, Role plays, group discussion

Module-IV:
Student Assessment and evaluation techniques, formative and summative assessment, marking and providing feedback

Examination Scheme

Components	Attd.	Assignment-1	Assignment-2	Assignment-3	CP	Total
Weightage (%)	5	20	20	20	35	100

Text book/ Reference Book
As recommended by the faculty

OCULAR DISEASES AND DIAGNOSTICS-II

Course Code: OPP4308 **Credit Units: 4**

Course Objective: In this course, latest articles published in optometry and vision science journals will be discussed. Periodic Journal club presentation would be conducted. This will enable the student to develop skill on critical appraisal of publications and help to keep abreast of latest developments in the field of optometry and vision science. The course would also provide insight on understanding and/or incorporation of scientific evidence in clinical practice.

This course examines selected areas of recent research in optometry. Current advances in methodology, specifics of research design, and impact of research findings will be emphasized. Selected topics are based on participating faculty expertise will be assigned to the students.

Students will be assigned topics of presentation during the semester and they will have to present base literature review and latest advancements.

Text & Reference books /journals:
Clinical and experimental optometry, Edited By: H. Barry Collin
Optometry & vision science, journal of American academy of optometry
Optometry journal of American optometric association
Ophthalmic and Physiological Optics Journal of the College of Optometrists, UK
Contact lens & anterior eye: the journal of the British Contact Lens Association
British Contact Lens Association

CLINICAL DECISION MAKING IN OPTOMETRIC CARE-I

Course Objective: Upon completing this course, the student will achieve a moderately-high level of competence with respect to a modest list of patient presentations commonly encountered by primary care optometrists. By the course's end, the student will be able to conduct a comprehensive, primary-care optometric examination, reach a diagnosis, and outline a management plan for most of, many of patients seen during the year. The course will cover the general areas of ocular disease, refraction, functional vision analysis, and patient communication.

Course Contents: In this course, the student will begin with refreshing their basic knowledge on common eye disease of the anterior segment. The course would further orient towards clinical decision-making skills, interpretation and improving their clinical skill set, clinical management of optometry. They will learn and develop skills on evidence/intuitive based management for the commonly seen eye diseases and learn appropriate referral & co management guidelines for secondary or tertiary ophthalmic care

The mode of delivery would be through cases scenarios discussion, problem based learning and seminar/workshops and Presentations. Records need to be maintained in the following pathologies.
The following common conditions will be covered in this semester:

This semester will focus on Ability to manage and co-manage diseases and disorders of posterior segment

Examination Scheme:

Components	A	Presentation	Presentation-EE	Case Records	EE-Viva	EE-Viva
Weightage (%)	5	20	20	5	30	20

A: Attendance, EE-End Semester Exam

Text books:

- Kanski, Clinical Ophthalmology: A Systematic Approach – May 2011 Edition, Jack J. Kanski MD MS FRCS Froth, Brad Bowling FRCSEd(Ophth),Elsweare heath science division
- Optometric Management Of Visual Handicap, Helen Farral,Blackwell Scientific Publications, 1991
- Ocular Differential Diagnosis, Roy
- Clinical Decision Making In Optometry, Ellen Richter Ettinger OD MS FAAO
- Anterior segment disease and Management by Andrian Bruce

PROJECT

Course Code: OPP4332 **Credit Units: 06**

Research Project Data update

Examination Scheme

Components	**Results & Analysis**	**Data Collection**	**Conclusion & Discussion**	**Total**
Weightage (%)	40	40	20	100

INTERNSHIP

Eye care clinic: This sequence of courses gives students direct patient care experience and responsibilities in affiliated health centers, hospitals or in private practices. Clinical preceptors will evaluate and guide the student through the process of providing eye care. Students are graded on key clinical tools: technical skills, knowledge base, analytical skills, diagnostic skills, management and treatment, communication skills, efficiency, attitude, and professionalism. The clinical grade is honors, pass, remedial, or fail based on a midterm and final preceptor evaluation; on meeting documentation requirements, such as maintaining documentation; and on submitting patient logs, and site evaluations.

The AUG department of Optometry monitors the quality and quantity of patient encounters for each student. Through the clinical assignments, students will gain proficiency in full scope primary care optometry and contact lenses. All students must satisfy a minimum number of patient encounters during their assignments. Some students may be assigned to specific sites to assure a clinical experience based on their projects. Some students may meet the contact lens requirement through affiliations set up on behalf of the students during the summer vacations with private practitioners who meet the College's program standards.

Four rotations during the final semester complete the clinical requirements, with mandatory assignments in Primary Care, Advanced Care and Specialty Care. Students choose an additional assignment in one of the mandatory categories or from a list of elective sites based on their projects. The College currently has affiliated clinical sites located around the campus and in other states.

Clinical sites that provide comprehensive eye care services for patients of all age brackets are categorized as Primary Care sites. Typically, these sites are eye care hospitals or private optometric practices. Clinical sites that provide professional specialty care are categorized as Specialty Care clinics. These include clinics specializing in visual therapy/binocular vision, contact lenses, pediatrics, geriatrics, patients with disabilities, or low vision. The rotation provides training in these specialty areas.

Syllabus - Fourth Semester

CLINICAL OPTOMETRY (GENERAL)

Course Code: OPP4401 **Credit Units: 06**

Objective: It is expected that upon completion the student will be able to carry out the standard clinical procedures safely and efficiently

PATIENT HISTORY
1.1 Communicates with the patient
1.1.1 Modes and methods of communication are employed which consider the physical, emotional, intellectual and cultural background of the patient.
1.1.2 A structured, efficient, rational and comfortable exchange of information between the optometrist and the patient takes place.
1.2 Makes general observations of patient
1.3 Obtains the case history
1.4 Obtains and interprets patient information from other professionals

2. **PATIENT EXAMINATION**
2.1 Formulates
2.1.1 An examination plan based on the patient history is designed to obtain the information necessary for diagnosis and management.
2.1.2 Tests and procedures appropriate to the patient's condition and abilities are selected.
2.2 Implements examination plan
2.2.1 Tests and procedures which will efficiently provide the information required for diagnosis are performed.
2.2.2 The examination plan and procedures are progressively modified based on findings.
2.3 Assesses the ocular adnexa and the eye
2.3.1 The structure and health of the ocular adnexa and their ability to function are assessed.
2.3.2 The structure and health of the anterior segment and its ability to function are assessed.
2.3.3 The structure and health of the ocular media and their ability to function are assessed.
2.3.4 The structure and health of the posterior segment and its ability to function are assessed.
2.3.5 The nature of the disease state is determined.
2.3.6 Microbiological tests are selected and ordered
2.4 Assesses central and peripheral sensory visual function and the integrity of the visual pathways
2.4.1 Vision and visual acuity are measured.
2.4.2 Visual fields are measured.
2.4.3 Colour vision is assessed.
2.4.4 Pupil function is assessed.
2.5 Assesses refractive status
2.6 Assesses oculomotor and binocular function.
2.6.1 Eye alignment and the state of fixation are assessed.
2.6.2 The quality and range of the patient's eye movements are determined.
2.6.3 The status of sensory fusion is determined.
2.6.4 The adaptability of the vergence system is determined.
2.6.5 Placement and adaptability of accommodation are assessed.
2.7 Assesses visual information processing

Examination Scheme

Components	Attd.	Case Records	Assignments	Clinical Supervisors Evaluation	Case Discussion	Practical + Viva
Weightage (%)	5	10	10	15	10	50

ADVANCE CLINICAL RETINA

Course Code: OPP4407 **Credit Units: 10**

Course Contents:
Retinal evaluation, diagnostics & optometric management
Low vision Evaluation, deciding diagnosis & management plan
Visual Rehabilitation for visually impaired person

Examination Scheme

Components	**Attd.**	**Case Records**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	10	15	70

ADVANCE CLINICAL GLAUCOMA

Course Code: OPP4408 **Credit Units: 10**

Course Contents:
Glaucoma investigation diagnostics and optometric management
Low vision Evaluation, deciding diagnosis & management plan
Visual Rehabilitation for visually impaired person

Examination Scheme

Components	**Attd.**	**Case Records**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	10	15	70

ADVANCE CLINICAL PEDIATRIC, BINOCULAR VISION & VISION THERAPY

Course Code: OPP4409 **Credit Units: 10**

To assess and manage patients with anomalies of binocular vision
To Assess binocular status using objective and subjective tests.
To Understanding of the management of a patient with an anomaly of binocular vision.
To Investigate and manage adult patients presenting with heterophoria
To Manage an adult patient with heterotropia
To Manage children at risk of developing an anomaly of binocular vision.
To Manage children presenting with an anomaly of binocular vision.
To Manage a patient presenting with an incomitant deviation.

Examination Scheme

Components	**Attd.**	**Case Records**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	10	15	70

ADVANCE APPLIED OPTICS

Course Code: OPP4410 **Credit Units: 10**

Course Contents:

MODULE I- Spectacle prescription & interpretation, transposition, Add and near power relation, Prescription for various requirements. e.g intermediate uses /computer use

MODULE II- Facial measurements – IPD, Frame size, bridge size, facial wrap, Pantoscopic tilt

MODULE III-Deciding most suitable type of single vision and bifocal Lens

MODULE IV- Lens selection of Progressive addition lenses as per patient needs

MODULE V- Frame selection and recommendation as per patient needs and facial type, communication & counselling of patient regarding frame selection

MODULE VI- Dispensing, ordering &verification of spectacle

MODULE VII- latest Technology in ophthalmic lenses and frames

Examination Scheme

Components	**Attd.**	**Case Records**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	30	30	35

ADVANCE CORNEA & CONTACT LENS

Course Code: OPP4411 **Credit Units: 10**

Course Contents:
Insert and remove contact lenses and instruct patients in these procedures.
Fit soft contact lenses.
Manage the aftercare of patients wearing soft contact lenses
Advise on contact lens materials and care regimes
Manage the aftercare of patients wearing rigid gas permeable contact lens.
Fit rigid gas permeable contact lenses.
Fit contact lenses to patients with astigmatism.
Techniques used in fitting contact lenses and to advise patients requiring complex visual correction.
Fit multifocal, contact Lenses
- Fit special contact lenses e.g Rose K , Orthokeratology, Scleral
Dispensing, ordering &verification of spectacle
Contact lens complications

Examination Scheme

Components	**Attd.**	**Case Records**	**Clinical Supervisors Evaluation**	**EE Practical + Viva**
Weightage (%)	5	10	15	70

CLINICAL DISSERTATION

Course Code: OPP4437 **Credit Units: 11**

Course Contents:

MODULE-I: Thesis Proposal Development is an independent tutorial conducted by the student's advisor, and involves a comprehensive literature survey of the chosen research area. Through regular meetings, the student and advisor discuss this literature in detail, and the student writes a paper, reviewed by the advisor, summarizing the literature. This paper should help in the development of the thesis proposal and thesis.

MODULE-II: Thesis Proposal At the end of the Semester 2. each student must submit to the university with the signed approval of the advisor, a thesis proposal defining the thesis project, the methods and design of the experiments needed for completion, the progress to date, and plans for completion.

MODULE-III: Thesis Preparation
This is involving preparation of the thesis. The thesis must include a cover and title page, abstract, table of contents, Introduction of the thesis topic with a comprehensive review of the literature, appropriately organized methods, results, and discussion sections for the experiments performed, and a final conclusions section summarizing the outcome of the project. The student should submit a draft of the thesis to the advisor by the end of the third semester. Plans should be in place for the thesis examination to be held in the final exam.

MODULE-IV: Thesis submission
Project Work and Practical Training

A Full-time student admitted to M.Optom course will have to be involved in teaching under-graduate students for lectures, demonstrations and hands-on practical sessions.
All students will have to choose ONE specialty subject at start of first year M.Optom and inform the University through School of Optometry in writing within 3 months of being admitted for the first Semester M.Optom
As a part of clinical training during the first year M. Optom every student will document
Minimum number of cases specified in clinically examined by them. These clinical cases will have to be submitted before end of 4thsemester
Every student will have to do a dissertation thesis during the second year M. Optom for this. Every student should submit a protocol which will have to be approved and accepted by post graduate teaching faculty at School of Optometry within second semester of starting first year.

Two copies of the dissertation thesis will have to be submitted before 15thMay in second year.
Some post graduate students may have to work with ophthalmic and optical industry in their projects of practitioner education, research and other related activities which will be given as assignments by the School of Optometry, Amity medical school.

Examination & Rules of passing for first and Second Year M. Optom

Format for term end examination Theory papers
Each theory examination will be of 100 marks and 3 Hours duration, 70% marks will be taken as external marks.
Each theory examination paper will have total three Sections

Examination Pattern:
Each semester examination will consist of both internal assessment and term end examination in the subjects prescribed in syllabus for each semester. The Faculty will conduct the internal assessments as per schedule prepared by school of optometry.

Amity University, Gurgaon will conduct university every term end examination
Eligibility for a student to appear in term for semester-term end Examination

Minimum 50% marks in internal assessment i.e. minimum 15marks in theory internal and minimum 25 marks in practical/Viva/Oral

Minimum 75% attendance for all course, if of these eligibility conditions have not been satisfied, the student will not be allowed to appear for semester term end examinations

Duration of examination at end for each semester term for each written/practical/clinical examination will be such as may be notified from time to time on recommendation of the Amity University, Gurgaon authorities.

Results and passing for each semester Examination:
A student will be declared to have passed theory subjects provided he/she has secured not less than 50% marks out of 100 (15 marks out of 30 in internal assessment and 35 marks out of 70 in term end examination) in each theory subject for every semester.

A student will be declared to have passed in a subject provided he/she has secured not less than 50 marks out of 100 [25 marks out of 50 in internal Assessment and 25 marks out of 50 in terms end examination] in each practical subject for every semester.

A student will be declared to have "PASSED" the complete semester Examination provided he/she has secured 50% marks individually in all theory and practical subjects of that semester.

If a student fails or does not appear for semester examination for semester I& III he/she will still be allowed to attend the theory classes and practical sessions for the semester II & IV Respectively, which falls in same academic year.

A student who has not appeared or has failed in the semester examination for semester I& III will have to appear for the internal and external exams for only that subject along with semester exam for the current semester i.e. II and IV respectively.

Only when the student is declared pass all subject of semester I and semester II examinations will be admitted to the second year of the course.

A student who has not appeared or has failed in the semester examination for semester I & II will not be admitted to the second year of the course. He/ She will have to get readmitted in the first year and pay the fees as prescribed by the university.

Allowed to keep term: If the student secures minimum 50% marks in at least three subjects of first year M. Optom, he/she will be allowed to keep term for second year. However, he/she will have to pass in all the subjects of first year M. Optomto become eligible to apply/appear for second year final M. Optom University Examinations.

Repeat term: If the student fails in four or all five subjects of first year, he/she will be asked to pay the tuition fees proportionate to the number of subjects failed and the university examination fees and then appear for the midterm external examinations in those subjects in which he/she failed earlier. But they are not required to appear for internal examinations and neither repeat project.

Second Year M. Optom Passing: The internal examination and external examination marks will be added as the final marks of that subject for each year. Only when the student secures minimum 50% marks [Internal External=combined] in all subjects of both the years and has completed the M. Optom. Course and will be eligible for post graduate degree of Master of Clinical optometry [M. Optom]

Repeat Dissertation: If the M. Optom student has failed in subject of the second year M. Optom the student will be required to either repeat the same dissertation project OR Choose different dissertation project and appear for the year end examination only.
He/she cannot take midterm examination for this subject in month of February every year.

If any student fails three times successively in the same subject at the university examinations for either first or second year M. Optom, Hershel will not be allowed to continue the M. Optom course and his admission stands cancelled.

Award of the Degree:
A student who has secured 5.5 CGPAM. Optom Examination will be Eligible for conferment of Master of clinical Optometry [M. Optom] Post Graduate Degree by Amity university, Gurgaon

Award of Gold Medal:
Gold Medal will be awarded to the student who secures maximum marks in first and second, Third& Fourth semester M. Optom added together, the candidate should have cleared each subject in every term in the first attempt.

Guidelines for Master research project work:
Basic reading material: Introductory reading material on research methodology, how to do a literature search and statistical methods should be provided at the beginning of the semester.

The students should read the material thoroughly and can mail their queries to their guides. a. Assignment 1: Exercises should be also given based on the reading material

The student should learn to do a thorough Pub Med search in their area of research interest. Read the recent research articles initially. Find out the research gaps. Based on that set up your research aim. Your research aim should not be a repetition of an already done research. Substantiate the necessity (Gap in current research) for the proposed study. (Assignment II: mailed to guide)

Discuss with your peers and clinicians regarding the Originality & objective of the study, feasibility of the study and other ethical issues involved: Very important

Institutional Review Board and Ethics committee approval
Consent form certified
As they begin the research, it would be wise to also meet the statistician

Sample size estimation
Microsoft excel or access proforma design

Prepare a rough draft of the protocol (Assignment III)

Emphasize on the methodology
The final protocol should be ready by end of FIRST semester

Update your research activities at least once in a month to your guide (Data collection proforma as excel sheet).

Data entry should be done in Excel appropriately. Consult with your local statistician for any queries and discuss with your guide. (Assignment IV)

End of your data collections takes to Analysis: Kindly discuss with your guide and a statistician (Assignment V: on the basics of statistics pertaining to your research interest) *

In the thesis introduction, literature and methodology should be ready before the end of fourth semester.

Submission of the final thesis to the guide should be done before one month of the deadline given. So that your guide will have enough time to review and make corrections

Amity Medical School

Master of Public Health

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

DEMOGRAPHY

Course Code: PUH 4101 **Credit Units: 03**

Course Objective:
To present students some basic techniques and concepts in population sciences.

Course Contents

Module I: Population Fundamentals

Science of demography, Demographic cycle, Population trends and demographic indicators, Demography and Family Planning and its role in population policy of India.

Module II: Demographic Studies

- Fundamentals of population studies and its links with health.
- Methods of demographic data collection, sources of data, population census, population composition, world population growth, growth of Indian population, morbidity, mortality, ageing, migration/ urbanization

Module III: Family Planning

Fertility and fertility factors, Family planning, Population policies &programmes and National Population Policy, Family Planning 2020 India Commitment

Examination Scheme:

Components	**P**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Asha Bhende and Tara Kanitkar. *Principles of population Studies*, Himalaya Pub Houses,
- John Weeks, *Population*, Wordsworth pub, 1994.
- S.N.Singh, M.K.Premi, P.S.Bhatia. *Population Transition In India*, B. R. Publishing Corporation.
- P.B. Desai. *Population in the context of India's development*, UGC – UNFPA project.
- Peter Cox. *Demography*, Cambridge University Press
- K.B. Pathak, F. Ram. *Techniques of Demographic Analysis*, Himalaya Publishing Houses.
- *Health Monitor*, Foundation for Research in Health S.
- International Institute for Population Sciences. *National Family Health Survey – 1, 2 and 3*, Mumbai.
- K. Srinivasan. *Basic*
- *graphic Techniques and Applications*, Sage Publications, 1998

BASIC EPIDEMIOLOGY

Course Code: PUH 4102 **Credit Units: 03**

Course Objective

To provide an introduction to the basic concepts and methods of epidemiology and to highlight inter-relationship between epidemiology and medicine to understand evidence based medicine.

Course Contents

Module I: Introduction

Concepts and uses of epidemiology, Components of epidemiological studies – frequency distribution and determinants of diseases, Methods to measure and describe health of population, epidemiological triad.

Module II: Descriptive epidemiology

Natural history of disease, Disease spectrum, Modes of transmission, Levels of prevention. Epidemiological principles of Intervention in prevention and control of disease,

Module III: Measurement Methods

Measurement of morbidity and mortality, incidence, prevalence, age adjustment, standardization and Risk Measurement.

Module IV: Study designs Basics

- Epidemiological study designs and analysis, its application and use in the community.
- Case control and Cohort methods.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Gordis Leon *Epidemiology* (3rd edition) ,W B Saunders and Co.
- Beaglehole. R. Bonita, et. al *Basic Epidemiology* : WHO Publication
- David E., et. al. *Foundations of Epidemiology* : Oxford University Press.
- Katz Mitchell: *Study Design and Statistical Analysis*: A Practical Guide for Clinicians
- Last, J.M., Spasoff, R.A. Harris, S. S. and Thuriaux, M.C. (Eds): *A Dictionary of Epidemiology*, Oxford University Press, 4th Ed., 2001.
- Mayer Dan, *Essential Evidence-Based Medicine Series: Essential Medical Texts for Students and Trainees*
- Silman and McFarland: *Epidemiological Studies- A Practical Guide,* 2nd Edition
- Timmreck Thomas C: *An Introduction to Epidemiology*, Third Edition 2002.

SOCIAL & BEHAVIORAL ASPECTS OF HEALTH

Course Code: PUH 4103 **Credit Units: 02**

Course Objective

To highlight the diseases and conditions that are of concern to a future public health professional. It highlights the social and behavioral issues in public health.

Course Contents

Module I: Introduction

Psychology and Public Health, Sociology & Public Health, Culture and Health, rural/urban migration, Urban Health

Module II: Family & Health

Inter-relationships between culture, society and environment, Ecology of health and disease, Demographic features of health and disease, interrelationship between human ecology, occupation, social changes and specific disease patterns.

Module III:

Cultural constraints to provision and utilization of healthcare, Socio-economics of health care, Socio-economic cost of disease

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Marmot, Michael. 2005. Social determinants of Health Inequalities
- Linda Brannon, Jess Feist. *Health Psychology: An Introduction to Behavior and Health,* seventh edition.
- Jeannine Coreil. *Social and Behavioral foundations of Public Health,* Second edition.
- M Robin Dimatteo and Leslie R. Martin. *Health Psychology,* Pearson Education.
- Kaplan, R.M., Sallis J. F. Jr. & Patterson, T.L., Health & Human Behavior, McGraw-Hill, Inc.

HEALTHCARE DELIVERY SYSTEM & POLICIES

Course Code: PUH 4104 **Credit Units: 03**

Course Objective:
To provide the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Course Contents:

Module I: Health and Development

Concept of Health, illness, sickness and disease; Public health Indicators, Health and its determinants, Disease Burden in terms of DALY, Social context of Health – Culture, health belief model and social issues affecting health like urbanization etc; Gender and health, Nutrition and Health- National Nutrition Mission and Mid-Day Meal Program

Module II: Healthcare Systems & Delivery

Millennium development goals, Sustainable Development goals,Evolution of Health Planning in India, Concept and Elements of Primary Health Care, Rural Healthcare system in India , Indian Public Health Standards, Five Year Plans

Module III: Health Policies and Schemes

National Health Policy, Integrated Child Development Scheme, Reproductive Maternal Newborn Child and adolescent Health Scheme, , Universal Immunization Program, PradhanMantriSurakshitMatritvaAbhiyan, Ayushman Bharat, RashtriyaBalSwasthyaKaryakram, Rashtriya Kishore SwasthyaKaryakram, Mission Indradhanush, RashtriyaArogyaNidhi, PradhanMantriSwasthyaSurakshaYojna and National Oral Health Program.

Module IV: National Health Mission

National Urban Health Mission (NUHM), National Rural Health Mission, National AYUSH Mission, National Nutrition Mission,

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- K Park, *Preventive and Social Medicine*, Bansaridas Bhanot Publishing House.
- Brijesh C Purohit. *Health Care System in India*: *Towards Measuring Efficiency in Delivery of Services*
- Maxcy-Rosenau-Last, *Public Health & Preventive Medicine*, 14th Edition Ed Robert Wallace

HEALTH ECONOMICS

Course Code: PUH 4103 **Credit Units: 02**

Course Objective: To study principles of economics and its application in Public Health

Course Contents:

Module I: Nature and scope of Economics

Fundamental Concepts – Scarcity & Choice, Macroeconomics & Microeconomics, Economic Agents – Consumer, Producer & government, Market – Free market mechanism and chained Market Mechanism.

Module II: Demand and Supply Market

Law of Demand, Shift in Demand Curve, Law of Supply, Shift in Supply curve, Market Equilibrium, Concept of elasticity – Price elasticity of Demand & Supply.

Module III: Healthcare Market

- Market Failure: Imperfect competition, Risk & uncertainty, Moral Hazard, Adverse selection, Externalities, Public Good, Asymmetric Information and concern of Equity. Market of unqualified medical care providers.
- Demand for Healthcare: Need, Want & demand, Healthcare as an investment, Determinants of demand – Price factors (opportunity cost), Patient factors & Physician factors – Supplier Induced Demand; Insurance and demand for healthcare.

Module IV: Costs

Classification of costs on the basis of traceability, cost behavior, controllability and selection among alternatives; Total, Average and Marginal costs.

Module V: Health Expenditure

Public Expenditure on Health, Expenditure and Allocations under Five-Year Plans, its SWOT analysis, National Health Accounts.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Ceri J Phillips. *Health Economics- An introduction for health professionals*, Blackwell publishing.
- Clewer Ann and D Perkins. *Economics for healthcare management*, Prentice Hall.

- Folland S, A.C. Goodman, and M. Stano, *The economics of health & Healthcare*, Prentice Hall
- *Principles of Health Economics for developing countries*, The World bank.

BIOSTATISTICS

Course Code: PUH 4106 **Credit Units: 03**

Course Objective: The aim of this course is to develop the understanding of various statistical tools used for decisions making and how each applies to and can be used in the environment.

Course Contents:

Module I: Introduction

Classification of data, Source of data, data organization Method of scaling - nominal, ordinal, ratio and interval scale, building composite scales, measuring reliability and validity of scales.

Module II: Properties of measurement & Probability distributions

- Measurement of central tendency, measurement of dispersion – Range, Mean deviation & Standard deviation.
- Concepts of probability, Probability distributions – Binomial, Poisson & Normal Probability Distribution.

Module III: Sampling

Sampling methods, Sampling Errors; Sampling distribution.

Module IV: Testing Hypothesis

Hypothesis Testing to compare two populations – Student's T-test, Interpretation of computer output of ANOVA, Chi – Square Test, F-test.

Module V: Forecasting Techniques

Correlation-Karl Person, Spearman's Rank methods, Regression Analysis, least squares method, coefficient of determination, Time Series Analysis

Examination Scheme:

Components	**CP/P**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- B.K. Mahajan. *Methods in Biostatistics*, Jaypee Brothers
- P.S.S. Sundar Rao. *An Introduction to Biostatistics: A manual for students in Health Sciences*, J.Richard Prentice Hall, 1996.
- Daniel, Wayne.W. *Bio-Statistics: A foundation for Analysis in the Health Sciences*, John Wiley and Sons Pub, 1991.

- K. Vishwas Rao. *Bio-Statistics: A Manual of statistical methods for use in the Health, Nutrition and Anthropology*, Jaypee Brothers Medical Pub, 1996.
- Verma B.L., Shukla G.D. *Bio-Statistics perspective in Health care research and practice*, C.B.S. Pub, 1993.
- Krishnaiah, P.K. Rao, C.R. (ed), *Handbook of Statistics*, Elsevier Science Pub, 1988.

BASICS OF COMMUNICATION

Course Code: CSS 4151 **Credit Units: 1**

Course Objective:
One cannot'not communicate'. This course is designed to facilitate our young Amitians to communicate effectively by emphasizing on practical communication through refurbishing their existing language skills and also to bring one and all to a common take-of level.

Course Contents:

Module I: Fundamentals of communication
Relevance of communication
Effective communication
Models of communication
Effective use of language

Module II: Tools of communication
Proficiency in English – The international
Language of business
Building vocabulary
(Denotative & connotative)
Extensive vocabulary drills
(Synonyms / Antonyms / Homonyms)
One Word substitution
Idioms & phrases
Mechanics and Semantics of sentences
Writing sentences that really communicate
(Brevity, Clarity, and Simplicity)
Improving the tone and style of sentences

Module III: Barriers to Effective use of language
Avoiding clichés
Removing redundancies
Getting rid of ambiguity
Euphemism
Jargons
Code switching

Note: 2 tests of 20 marks of one hour duration each will be conducted over and above the teaching hours. They will have to be programmed accordingly.

Examination Scheme:

Components	**CT1**	**CT2**	**CAF**	**V**	**GD**	**GP**	**A**
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion

GP – Group Presentation

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Echoes: Jha Madhulika: Orient Longman
- Practical English Usage, Swan M , Cambridge

SELF-DEVELOPMENT & INTERPERSONAL SKILLS

Course Code: BEH 4151 **Credit Units: 1**

Course Objective: This course aims at imparting an understanding of:

- Self and the process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and their effect on work behaviour
- Effective management of emotions and building interpersonal competence.

Course Contents:

Module I: Understanding Self

- Formation of self concept
- Dimension of Self
- Components of self
- Self Competency

Module II: Self-Esteem: Sense of Worth

Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power

Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace
Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence

Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude

Understanding Attitudes
Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behaviour
Perception

Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	**SAP**	**A**	**Mid Term Test (CT)**	**VIVA**	**Journal for Success (JOS)**
Weightage (%)	20	05	20	30	25

Text & References:

- Towers, Marc: Self Esteem, 1st Edition 1997, American Media
- Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book Company.
- Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
- Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
- Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
- Chatterjee Debashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt Ltd.
- Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
- Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
- Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
- Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

FRENCH - I

Course Code: LAN 4151 **Credit Units: 03**

Course Objective:
To familiarize the students with the French language
- with the phonetic system
- with the accents
- with the manners
- with the cultural aspects

To enable the students
- to establish first contacts
- to identify things and talk about things

Course Contents: Unité 1, 2: pp. 01 to 37

Contenu lexical:
Unité 1: Premiers contacts
1. Nommer des objets, s'adresser poliment à quelqu'un
2. se présenter, présenter quelqu'un
3. entrer en contact : dire tu ou vous, épeler
4. dire où on travaille, ce qu'on fait
5. communiquer ses coordonnées

Unité 2: Objets
1. identifier des objets, expliquer leur usage
2. Dire ce qu'on possède, faire un achat, discuter le prix.
3. Monter et situer des objets
4. Décrire des objets
5. comparer des objets, expliquer ses préférences

Contenu grammatical:
1. articles indéfinis, masculin et féminin des noms, pluriel des noms
2. Je, il, elle sujets, verbes parler, habiter, s'appeler, être, avoir, masculin et féminin des adjectifs de nationalité
3. tu, vous sujets, verbes parler, aller, être, c'est moi/c'est toi
4. verbes faire, connaître, vendre, c'est/il est + profession, qui est-ce ? qu'est-ce que ... ?
5. article défini, complément du nom avec de, quel interrogatif
6. adjectifs possessifs (1), pour + infinitif
7. verbe avoir, ne...pas/pas de, question avec est-ce que ?, question négative, réponse Si
8. Prépositions de lieu, il y a/qu'est-ce qu'il y a
9. accord et place des adjectifs qualificatifs, il manque...
10. comparatifs et superlatifs, pronoms toniques, pronom on

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Français.Com (Débutant)

GERMAN – I

Course Code: LAN 4152 **Credit Units: 03**

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Introduction
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics
Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions
To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – I

Course Code: LAN 4153 **Credit Units: 03**

Course Objective:
To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary.

Course Contents:

Module I
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets.

Module II
Introduction to '*Saludos*' (How to greet each other. How to present/ introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI
Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- Español, En Directo I A
- Español Sin Fronteras

CHINESE – I

Course Code: LAN 4155 **Credit Units: 03**

Course Objective:
There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.

Use of “you” – “mei you”.
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- “Elementary Chinese Reader Part I” Lesson 1-10

APPLIED EPIDEMIOLOGY

Course Code: PUH 4201 **Credit Units: 03**

Course Objective

To furnish the students with knowledge and skills regarding general principles of clinical trials research including regulatory, ethical principles & guidelines and theoretical idea about the design conduct and analysis of clinical trials

Course Contents

Module I: Epidemiological Methods & Screening for disease.

Sources of epidemiological data, concepts of screening, criteria for screening, sensitivity and specificity, disease surveillance, techniques for randomization, adverse events, investigation of an epidemic and role of a healthcare facility in its control.

Module II: Epidemiology and Public Health

Epidemiology and Public Health, different epidemiological perspectives, use of epidemiological tools for health planning and making a community diagnosis,

Module III: Epidemiological Tools

Epidemiological tools for monitoring and evaluation of health programmes, epidemiological considerations in development of management information systems, epidemiological basis for formulation of health interventions, interpretation of published epidemiological studies.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References

- Barkar, D.J.P., *Practical Epidemiology* : Churchill pub, 1982.
- E.A. Knox (ed). *Epidemiology in health care planning*, Oxford University Press, 1979.
- PV Sathe & AP Sathe. *Epidemiology & Management for Healthcare for all*.
- Aschengrau and Seage: *Essentials of Epidemiology in Public Health*
- Friis Robert: *Epidemiology for Public Health Practice*, Third Edition
- Szklo Moyses: *Epidemiology: Beyond the Basics*

HUMAN RESOURCE MANAGEMENT

Course Code: PUH 4202 **Credit Units: 02**

Course Objective: To help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices in India.

Course Contents

Module I: HRM in perspective

Nature & scope of HRM, HRM functions, HRM models, understanding concepts of personnel management, HR development and strategic HR management, HR environment, changing role of HR.

Model II: Meeting HR requirements

Job Analysis, Job Description, Job specification, Strategic Human Resource Planning, Recruitment, Selection Process, Methods – Interview, Tests, Induction and Placement, Promotion and Transfer

Module III: Development of Human Resources

Training and Development, Managing Careers, Understanding Performance Appraisal

Module IV: Managing Compensation

Compensation, Components of compensation, Job evaluation, methods of job evaluation, Designing and administration of wage and salary structure

Module V: Separation Processes

Turnover, Retirement, Layoff, Retrenchment and Discharge, VRS

Module VI: Emerging Trends and Challenges in HRM

Overview of Human Resource Information System (HRIS), Introduction to HR Audit, IHRM Practices, Cross- Cultural and Diversity Management, Work-life integration, Human Resource Outsourcing

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	5	5	5	15	70

Text & References:

- Aswathappa. K, (2011), *Human Resource Management - Text & Cases*, (6th Edn.), McGraw Hill.
- Dessler G (2005). *Human Resource Management*, Pearson Education, India

- Mathis R L and Jackson J H (2006). *Human Resource Management*, (10th Edn.) Cengage Learning, Indian Print.
- Snell S and Bohlander G (2007). *Human Resource Management*, Cengage Learning (Thomson Learning), Indian Edition

COMMUNICABLE & NON-COMMUNICABLE DISEASES

Course Code: PUH 4203 **Credit Units: 04**

Course Objective

To provide students with an understanding of the scope of the public health issues with regard to communicable diseases and non-communicable diseases in India and also provide them the overview with the national health programs that have been designed to address these issues.

Course Contents

Module I: Introduction

Classification of diseases, modes of evolution of disease stages, burden of communicable & and non-communicable diseases, disease cycle/ transmission

Module II: Communicable diseases

Vaccine preventable diseases, respiratory, intestinal, contact and vector borne diseases

Module III: Non-communicable diseases

Asthma, Cancer, Cardiovascular diseases, chronic rheumatic diseases, diabetes, substance abuse related illness & control, obesity, mental health, and Accident & Injuries.

Module IV: Disease Control Programmes

National Malaria Eradication Programme, Revised National Tuberculosis Control Programme, National Leprosy Eradication Programme, Vector Borne Disease Control Programme, Guinea worm Eradication Programme, National Iodine Deficiency Disorder Control Programme, Diarrheal Diseases Control Programme, National Blindness Control Programme, STD Control Programme, National AIDS Control Programme, National Cancer Control Programme, National Diabetes Control Programme, National surveillance Programme for Communicable diseases.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

- Utpal Kant Singh. *Infectious diseases and immunization.*
- WHO report on *infectious diseases and report on multi-drug resistance*.
- Griesecke J. *Modern infectious disease epidemiology*
- Duguid et al. *Textbook of Medical microbiology.*

- Davidson, Edward, Bouchier et. Al. *Principles and practice of Medicine*, Pearson Professional Ltd., 1995.
- Harrison's *Principles of Internal Medicine* 16th Edition 2005
- WHO Technical publications: *Vaccines, Human Genetics Program series*

ENVIRONMENTAL HEALTH & SANITATION

Course Code: PUH 4204 **Credit Units: 02**

Course Objective

To provide the comprehensive knowledge in issues related to environment affecting health, sanitation and means of sustainable development.

Course Contents

Module I: Air, Noise and Water Pollution

- Air pollution: Pollutants and their resources, effects on human health, vegetation and climate of air pollution, ventilation, air pollution control legislation.
- Noise pollution: sources and effects, control measures
- Water pollution: sources, classification of water pollutants- organic waste, oxygen demanding waste, disease causing wastes, synthetic organic compounds. Sewage and agricultural run – off, inorganic pollutants suspended solids and sediments, radioactive materials, purification of water and waste water treatment.

Module II: Waste management

- Biomedical Waste management: classification, methods of treatment and disposal- compositing, sanitary land filling, thermal process, recycling and reuse.
- Hazardous waste management: sources, treatment and disposal.

Module III: Sustainable development and Environment

Climate change- ozone depletion, global warming, green house effect, urban problems related to energy, water conservation, rainwater harvesting, watershed management, resettlement and rehabilitation of people, waste minimization and cleaner production.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	5	5	5	15	70

Text & References:

- Moeller, D.W. *Environmental Health*, Harvard University Press, 2004

RESEARCH METHODOLOGY

Course Code: PUH 4205 **Credit Units: 03**

Course Objectives:
- To provide basic understanding towards research principles and methods.
- To introduce important analytical tools for research data analysis.
- To assist in the development of research proposals/reports.

Course Contents:

Module I: Basics of Research

Definitions & uses of research in healthcare, Steps Involved in Research Process, Variables in research, Measurement scales, Formulation of research problems, writing research questions, Development of conceptual framework.

Module II: Sampling & Research Designs

Sampling, Sampling Procedure, Various types of Sampling Techniques, Sample size determination, reliability & validity in research, Research Designs- Non-experimental & experimental research designs.

Module III: Review of Literature & Hypothesis

Review of literature, Hypothesis- Meaning and types of hypothesis, Hypothesis testing, Type I & Type II errors in hypothesis testing.

Module III: Data Collection

Types of Data: Secondary and Primary, Different methods of data collection- Observation method, interview method, Questionnaire and schedule, Data Management: editing, entry and preparing data sets for analysis; Design and development of questionnaire.

Module IV: Research Reports

Structure and Components of Research Report, Types of Reports, Layout of Research Report, Method of writing a research report.

Module V: Research Ethics & Reference Writing

History of ethics in health research, Principles and Concepts in research ethics – confidentiality and privacy, informed consent, vulnerable subjects and special treatments, standards of care – principles, review processes etc.; Vancouver style of reference writing.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References

- Gummersson, E. *Qualitative methods in Management Research*, Sage publications
- Verkevieser et al, *Designing and conducting Health Systems Research Projects* WHO and IDRC
- Grundy F and Reinke W A, *Health Practice Research and formalize Managerial Methods*, Geneva, WHO
- *Designing and conducting Health surveys*, Jossey Bass Publishers.

NATIONAL HEALTH PROGRAMMES

Course Code: PUH 4206 **Credit Units: 03**

Course Objective
To give an idea about the background objectives, action plan, targets, operations, achievements and constraints of various National Health Programmes

Course Contents

Module I: Introduction

Brief outline of health situation in India, Organization network for health and family welfare services at the centre, state, district and block level.

Module III: Key Health programmes in India – 1

National Health Mission, including Reproductive Child Health, Family Planning Programme, Universal Immunization Programme, Child Survival and Safe Motherhood Programme, Integrated Child Development Scheme, National AYUSH Mission, National Nutrition Mission.

Module III: Key Health programmes in India – 2

Ayushman Bharat, Pradhan Mantri Surakshit Matritva Abhiyan, Family Planning 2020, Reproductive Maternal Newborn Child and Adolescent Health Program, Rashtriya Bal Swasthya Karyakram, Rashtriya Kishore Swasthya Program, Mission Indradhanush, Pradhan Mantri, Rashtriya Arogya Nidhi, National Oral Health Program.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References

- GOI 2005, National Rural Health Mission: Meeting People's Health needs in rural areas, Framework for implementation, 2005-2012, MoHFW.
- GOI 2005, Report of National Commission on Macroeconomics and Health, MoHFW.
- GOI, MoHFW, Annual Report of various years.
- National Health Programmes of India by J Kishore

CORPORATE COMMUNICATION

Course Code: CSS 4251 **Credit Units: 01**

Course Objective:
This course is designed to hone the PR skills of the budding managers and enable them to be an integral part of the corporate communication network. The Verbal Communication (oral and written) will be the lingua franca of this endeavour.

Course Contents:

Module I: Communication in Practice
Verbal Communication
1. Communication Networks
2. Developing writing skills

Inter- office communication
The business letters
E mail – Netiquette (etiquette on the mail)
Intra- office communication
Memos
Notices
Circulars
Agenda and Minutes
Business Report writing
Resume writing

Module II: Cross Functional Communication
Marketing/ integrated marketing communication
Project management communication
Human Resource communication
Financial Communication

Module III: Communication for Public Relations
Functions and activities of PR
Reputation Management
Building Corporate Image and Identity
Negotiation Techniques

Examination Scheme:

Components	**CT1**	**CT2**	**CAF**	**V**	**GD**	**GP**	**A**
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Communication, Raman – Prakash, Oxford
- The Oxford Handbook of Commercial Corrospondence, Ashley A, Oxford Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford

BEHAVIOURAL COMMUNICATION AND RELATIONSHIP MANAGEMENT

Course Code: BEH 4251 **Credit Units: 01**

Course Objective:
This course aims at imparting an understanding of:
Process of Behavioural communication
Aspects of interpersonal communication and relationship
Management of individual differences as important dimension of IPR

Course Contents:

Module I: Behavioural Communication
Scope of Behavioural Communication
Process – Personal, Impersonal and Interpersonal Communication
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication in relationship management

Module II: Managing Individual Differences in Relationships
Principles
Types of issues
Approaches
Understanding and importance of self disclosure
Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships
Elements of satisfying relationships
Conforming and Disconfirming Communication
Culturally Relevant Communication
Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication
Imperatives for Interpersonal Communication
Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel
Types – Self and Other Oriented
Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Harvard Business School, Effective Communication: United States of America
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - II

Course Code: LAN 4251 **Credit Units: 03**

Course Objective: To enable the student
- to talk about his time schedule
- to talk about travel

Course Contents: Unité 3, 4: pp. 42 to 72:

Contenu lexical:

Unité 3: Emploi du temps
1. demander et donner l'heure, des horaires
2. raconter sa journée
3. parler de ses habitudes au travail, de ses loisirs
4. dire la date, parler du temps qu'il fait
5. fixer rendez-vous (au téléphone par e-mail), réserver une table au restaurant

Unité 4: Voyage
1. réserver une chambre d'hôtel, demander la note
2. expliquer un itinéraire
3. parler de ses déplacements, situer sur une carte
4. exprimer un conseil, une interdiction, une obligation
5. acheter un billet de train, consulter un tableau d'horaires

Contenu grammatical:
1. question avec à quelle heure ? adjectifs démonstratifs
2. verbes pronominaux au présent, les prépositions à et de : aller à venir de
3. adverbes de fréquence, pourquoi... ? Parce que ... ?
4. expression indiquant la date, verbes impersonnels
5. verbe pouvoir + infinitif, le lundi, lundi prochain
6. adjectifs possessifs (2), adjectif tout
7. impératif présent (1), nombres ordinaux
8. questions avec est-ce que ? à et en + moyen de transport, en/au+pays
9. verbes devoir+infinitif, il faut+ infinitif, il est interdit de
10. verbes: aller, venir, partir, questions avec d'où, où,par où, à quel, de quel

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References: le livre à suivre : Français.Com (Débutant)

GERMAN – II

Course Code: LAN 4252 **Credit Units: 03**

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Grammar to consolidate the language base learnt in Semester - I

Course Contents:

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: ‘In the market place’
‘At the Hotel’

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – II

Course Code: LAN 4253 **Credit Units: 03**

Course Objective:
To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Possessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – II

Course Code: LAN 4255 **Credit Units: 03**

Course Objective:
Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II
Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV
Counting from 1-1000
Use of "chang-chang".

Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – “zai”, “gen”.
Use of interrogative pronoun – “duoshao” and “ji”.
“Whose”??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V
The verb “qu”
Going to the library issuing a book from the library
Going to the cinema hall, buying tickets
Going to the post office, buying stamps
Going to the market to buy things.. etc
Going to the buy clothes …. Etc.
Hobby. I also like swimming.
Comprehension and answer questions based on it.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- “Elementary Chinese Reader Part I” Lesson 11-20

OPERATIONAL RESEARCH

Course Code : PUH 4301 **Credit Units: 02**

Course objectives:

_ To provide basic OR approach to problem solving.
_ To introduce important analytical tools for managerial decision making.
_ To introduce concepts of resource allocation & health service planning.

Course Contents:

Module I: Introduction

The OR approach to problem-solving and decision-making, Scope and limitations of OR in managerial decision-making.

Module II: Introduction to OR Techniques

Linear Programming, Decision Tree Analysis, Queuing theory, PERT/CPM.

Module III: OR Models

Replacement models, Sensitivity analysis, Assignment models, Inventory control models, Forecasting.

Module III: Applications of OR in Hospitals and Health Agencies

Resource allocation, Health services planning, Deployment of health human power, Materials Management, Equipment replacement, Patient scheduling.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References:

Operations Research in Hospitals: Diagnosis and prognosis, David H. Stimson, Ruth H. Stimson
Operations Research and Healthcare: A handbook of methods and Applications, Margaret L. Brandeau, Francosis Sainfort, William P. Pierskalla
Patients Hospitals and Operational Research, Taylor Francis
Operations Research by P. Rama Murthy
Operations Research: Methods, Models and Applications, Jay E, Aronson and Stanley

QUALITY IN HEALTH CARE

Course Code: PUH 4302 **Credit Units: 01**

Course Objective: To understand the concept of quality and its relation to healthcare scenario benefits of quality managements, dimensions of quality in primary healthcare and various quality frameworks

Module I: Basics of Quality Management

Definitions, principles of quality, benefits of quality management, dimensions of quality in primary healthcare and various quality frameworks

Module II: Quality Improvement Approaches

Quality assurance cycle and developing standards.
TQM Quality Gurus: Deming, Juran and Crosby principles.
Benchmarking principles: Principles, types and process of benchmarking.
Medical Audits: Clinical Audit, its methodology and related statistics.

Module III: Quality Improvement Tools and Techniques:

Tools: Brainstorming, Cause effect analysis, Flow chart, Pareto Analysis, etc.
Lean Management: 4P madel, Lean principles and its tools, 5 S technique, 3M techniques, Kaizens theory, Jidoka & Andon, Throughput & Takt Time.
Six Sigma: Variation in performance, DMAIC & DFFS methodology, Champions, black belts and green belts, Six sigma applications and its benifits

Module IV: Accreditation

Benefits of hospital Accreditation, ISO certification, Quality Council of India (QCI), National Accreditation Board for Hospitals & Healthcare providers (NABH) – Accreditation procedure assessment criteria and its standards

Module V: Cost and Quality

Prevention cost, Appraisal Cost, Internal & external failure costs, Net & Total cost of quality.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Total Quality Management- Aswathappa- Himalaya Book House
- Quality Management- P.C. Tripathy

- Hospital Quality Assurance: Risk Management & Program evaluation, Jesus J. Pena
- Donald E. Lighter and Douglas C Fair: Quality Management in Health care-Principles and Methods, Jones and Bartlett publishers, second edition.
- Mclaughlin cp and Kalauzny AD. Total quality management in health , Healthcare management review

NUTRITION

Course Code: PUH 4303 **Credit Units: 3**

Course Objective: To cover the basics of human, community nutrition and issues related to food safety.

Course Contents

Module I: Basics of Nutrition

Classification of Foods by origin, chemical composition, predominant function & by nutritive value; Nutrients: Macro & Micro nutrients, Nutritional profiles of Principle Foods, Assessment of Nutritional status.

Module II: Disease specific nutrition

Nutritional Requirements, Diet modifications during various diseased condition – diabetes, obesity, heart diseases, civil and kidney, TB, HIV etc, Deficiency disorders & dietary management – PCM, anaemia, goitre and vitamin & mineral deficiency.

Module III: Community nutrition

Nutritional problems in Public Health, Nutritional surveillance, Prevalence of under nutrition and malnutrition in India, Malnutrition infection and infestation, effect of malnutrition in infancies, pregnant and lactating mothers, Nutrition organization programmes – national, international & voluntary organizations undertaken to combat malnutrition, policy & programmes for nutrition related issues and Balanced diet for preschool going children adolescents, pregnant and lactating mothers, old age & athletes.

Module IV: Food Safety

General principles of Hygiene, importance of food borne illness, prevention of contamination, food intoxicants, food additives, food standards, importance of safe drinking water, purification methods, Food borne diseases, Prevention of Food Adulteration Act 1954 and National Nutrition Policy 1993.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Dr. M Swaminathan. *Advanced textbook on food and Nutrition*, Bangalore Publishing Co. Ltd., 1974
- C Gopalan. *Recent Trends in Nutrition*, Oxford University Press, 1993.
- E. Savage King. *Nutrition for Developing Countries*, Oxford University Press, 1992.

- Dr. C. Gopalan. *Nutrition problems and Programmes in South East Asia*, WHO, 1987.
- Sumati R. Mudambi, M.V. Rajagopal, V.R. Damodharan *Fundamentals of food and Nutrition*, Wiley Eastern Ltd. , 1982.
- Nutritional Sciences: Sreelakshmi

WOMEN & CHILD HEALTH

Course Code: PUH 4304 **Credit Units: 03**

Course Objective
To impart an understanding of the scope of women and child health and to enable students to find and interpret relevant information on women and child health.

Course Contents

Module I: Women's Health

Concepts, definition and measures; customs, norms, attitudes and practices pertaining to various aspects of women's health including menstruation, puberty, childbirth and menopause; sexual and reproductive rights, infertility.

Module II: Adolescent Sexual Health & Family Planning

Adolescent sexual health & contraception: role and involvement of men in reproductive health, methods of family planning, contraception behavior, measurement and service delivery, quality of family planning care

Module III: Women's Health status in India

Gender, autonomy, empowerment and status of women, domestic violence in India, maternal mortality and morbidity, abortion, HIV, STIs.

Module IV: Child Health

Growth and development from infancy to childhood; Child health & morbidity; neonatal, infant & child mortality; IMR & U5MR; breastfeeding, weaning & supplementary feeding

Module V: Child Health Initiatives in India

Programmes and policies related to child health and development, health of physically and mentally challenges children, behavioral disorders, child abuse.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Dutta DC 2005. *Textbook of Obstetric and Gynaecology*, Rawat Pub.
- Gupta SD 2005. *Adolescent and Youth reproductive health in India*.
- Jejeebhoy S. 1998. *Adolescent sexual and reproductive health in India: review of the evidence from India*. Social science and medicine; 46-10.

HEATH PROGRAMME MANAGEMENT

Course Code: PUH 4305 **Credit Units: 03**

Course Objective: To train the students in project management with special focus on formulation, implementation, monitoring and evaluation.

Course Contents

Module I: Introduction

Need for programme planning, Concept of programme planning, Process of planning: need assessment, community diagnosis. Micro-planning: need assessment in the community, Community involvement in planning.

Module II: Project Management Cycle

Situation analysis-SWOT, strategy formulation, Planning tools, Quality assurance in project management, activity based implementation plan, gender issues in project management, monitoring, MIS, evaluating, developing action plans, developing action plans for implementation.

Module III: System's Approach on Health Planning

Data needs for health planning, drawing national health plan, problem identification and priority setting, evolving a logical framework - setting goals, objectives and targets. Feasibility analysis and budgeting, Plan implementation, monitoring and evaluation.

Module IV: National Health Program Planning in India

Role of Health Ministry, Planning Commission and Directorate of Health Services. Role of NGOs in Health planning and development. Analyzing the achievements of Five Year Plans in the health sector.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References

- David Shirley. *Project Management for health care*, CRC press.
- Beaufort B. Longest, Jr. *Managing Health programs and projects*, Jossey Bass publications.

HEALTH PROMOTION & BEHAVIOR CHANGE COMMUNICATION

Course Code: PUH 4306 **Credit Units: 02**

Course Objective:
To introduce different models of communication for use in health promotion activities and community based activities.

Course Contents

Module I: Basics of Communication

Communication Process, Function and Types, Barriers to communication, Mass Communication, Communication Skills, Community Participation: Concepts and Types

Module II: Health Communication & its functions

Concepts & approach of Health Education & Promotion, Models & contents of health education, Practice of Health education – Audio-visual aids, Process of curriculum development, Types of evaluation and evaluation methods.

Module III: Information, Education and Communication:

- IEC in Health and Family Welfare
- IEC structure in districts
- Innovative strategies and evaluation

Module IV: Behavioral Change Communication

- Best practices and strategic approaches
- BCC framework, implementation strategy
- Target audience segmentation: Different approaches to target audience
- Physician- Patient Communication: Physician- patient relationship
- Data for IEC Planning
- Relationship Management

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References

- Ahmed Manzoor. *Community Participation: The Heart of Primary Health Care,* International council for education, Essex.
- Bhat Anil. *Community-involvement in Primary Health Care,* Public systems group, IIM.
- *Behaviour Change through Mass communication,* AIDS control and prevention Project, Family Health International, USAID.

SUMMER INTERNSHIP (EVALUTION)

Course Code: PUH 4335 **Credits Units: 06**

Training Objective: To expose the student to various programmes/ activities in health sector and develop a comprehensive understanding of programme design, strategies and planned intervention.

Duration: 2 months

Format for Report Writing

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Guidelines for presentation-

- Power point presentation
- Time for presentation: 20 minutes
- Time for discussion: 10 minutes

Examination Scheme

Components	**Presentation**	**Report submitted**	**Viva-voce**
Weightage (%)	25	50	25

INTERPERSONAL COMMUNICATION

Course Code: CCS 4351 **Credit Units: 01**

Course Objective:
'Actions speak louder than words.' Every business communicator needs to understand the nuances of 'body language and voice.' This course is designed to enable the young Amitian to decipher the relevance of Kinesics, Proxemics and Para Language that cater to the fundamental requirements of effective business presentations and speeches.

Course Contents:

Module I: Non-Verbal Communication
Principles of non- verbal communication
Kinesics
Proxemics
Paralanguage and visible code

Module II: Speaking Skills
Pronunciation drills (Neutralizing regional pulls)
Conversational English
Guidelines to an effective presentation

Module III: Interviews and GDs

Examination Scheme:

Components	**CT1**	**CT2**	**CAF**	**V**	**GD**	**GP**	**A**
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Business Communication, Krizan, Thomson
- Understanding Human Communication, 9/e, Adler R Oxford

LEADING THROUGH TEAMS

Course Code: BEH 4351 **Credit Units: 01**

Course Objectives: This course aims to enable students to:

- Understand the concept and building of teams
- Manage conflict and stress within team
- Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

Module I: Teams: An Overview
Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team & Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III: Team Building
Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams
Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, Viva books
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH – III

Course Code: LAN 4351 **Credit Units: 02**

Course Objectives: To furnish linguistic tools
- to talk about work and problems related to work
- to perform simple communicative tasks (explaining a setback, asking for a postponement of appointment, give instructions, place orders, reserve)
- to master the current social communication skills
- oral (dialogue, telephone conversation)
- Written (e-mails, reply to messages)

Course Contents: Unité 5, 6: pp. 74 to 104

Contenu lexical:

Unité 5: Travail
1. manger au restaurant, comprendre un menu, commander
2. engager une conversation téléphonique
3. parler de sa formation, de son expérience, de ses compétences
4. Raconter des événements passes
5. consulter sa boite e-mails, répondre aux messages

Unité 6: Problèmes
1. identifier un problème, demander des précisions
2. expliquer un contretemps, déplacer un rendez-vous
3. demander de l'aide (par téléphone, par e-mail)
4. donner des instructions
5. expliquer un problème, suggérer une solution

Contenu grammatical:
1. futur proche, articles partitifs, un peu de, beaucoup de, une bouteille de, un morceau de…
2. pronoms COD, venir de + infinitif, verbes appeler (au présent)
3. passé composé avec avoir, affirmatif et interrogatif, savoir et connaître
4. passé composé avec être, accord du participe passé, négation
5. pronoms COI, être en train de
6. ne…rien, ne…personne, ne…plus, ne…pas encore, qu'est-ce que/ qu'est-ce qui/qui est-ce que/qui est-ce qui
7. passé composé des verbes pronominaux
8. si/quand+présent, ne…plus, ne …pas encore
9. impératif présent (2) place du pronom et verbes pronominaux
10. trop/pas assez, verbe devoir au conditionnel présent

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Français.Com (Débutant)

GERMAN – III

Course Code: LAN 4352 **Credit Units: 02**

Course Objectives:

- To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
- To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.

Course Contents:

Module I: Modal verbs
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns
Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions
Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues
In the Restaurant,
At the Tourist Information Office,
A telephone conversation

Module VII: Directions
Names of the directions
Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions
To assimilate the knowledge of the conjunctions learnt indirectly so far

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – III

Course Code: LAN 4353 **Credit Units: 02**

Course Objective:
To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir….*
Weather

Module II
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + Infinitive form of a verb

Module IV
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

Module V
Reflexives

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

CHINESE – III

Course Code: LAN 4355 **Credit Units: 02**

Course Objective:
Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between “hii” and “neng”, “keyi”.

Module III
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g. ; fever, cold, stomach ache, head ache.
Use of the modal particle “le”
Making a telephone call
Use of “jiu” and “cal” (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV
The ordinal number “di”
“Mei” the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit

Structural particle “de” (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of “li” and “cong”.
Comprehension reading followed by questions.

Module V
Persuasion-Please don’t smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of “it doesn’t matter”
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- “Elementary Chinese Reader Part I, Part-2” Lesson 21-30

HEALTH INFORMATION SYSTEM

Course Code: PUH 4401 **Credit Units: 02**

Course Objective

To understand the various indicators of health and health information system and health management information system in India.

Course Contents

Module I: Basics

Concept of information as a resource, understanding the principles of information system and Classification of information in health sector.

Module II: Managing Hospital Information Systems

- Data generated for HIS;Functions, Benefits and applications of HIS, HIS components, various performance Indicators, HIS model and data movement.
- HIS modules: Various HIS Modules for Clinicians Access, Nursing Access, In-patient Module, Registration Module, Diagnostic services Module, Dietetics Module, OT Module and Accident & Emergency Module etc.
    - Setting strategic objectives for information systems, organizing an information systems department, Principles of systems development, Importance of security and confidentiality of data.

Module III: Role of Information Technology in Hospitals

Principles of information processing, Role of information technology in information processing, Role of database management systems, Role of communication in managing hospital information systems.

Module IV: Management Information System

Concept of Management Information System (MIS).Developing indicators, identifying data and developing tools of measurement. Use of MIS: monitoring progress and evaluation, hospital planning, monitoring employees, monitoring health development, decision making. Computerization of MIS: demonstration and critical analysis of different MIS software packages used in health projects in hospitals

Module V: Telemedicine

Concept of Telemedicine and its evolution, Telemedicine network in India, and Strengths & Opportunities for Telemedicine in India.

Examination Scheme:

Components	CP	V	A	ME	EE
Weightage (%)	10	5	5	10	70

Text & References

- S.C. Joshi & S.N. Mehta. *National Information System: Planning and Management*, Global vision publishing house.
- Jorgan Darre. *Implementing a Health Information System in India: Challenges and Opportunities for Scaling and Sustainability*
- *Information Technology in health care: Socio technical approaches, 2010.* IOS Press BV

HEALTH INSURANCE

Course Code: PUH 4402 **Credit Units: 01**

Course Objective

To acquaint students to the concept of HI and various HI products, so that the students are ready for challenges of healthcare insurance which is emerging as a sector holding great promise.

Course Contents

Module I: **Introduction**

History of Health Insurance, Principles of Health Insurance, Public Financing, Private Financing, Current trends in Health Insurance - International and Indian scenario, Economic and financial management of Health Insurance

Module II Health Insurance systems in India

- Private Health Insurance: Individual Health Plans, Mediclaim, Floaters plans, Third Party Administration, Benefits Management, Claims Management, IRDA
- Social Health Insurance: ESI, CGHS, RSBY
- Social and Community based Insurance: Microfinance

Examination Scheme:

Components	**CP**	**V**	**A**	**CT 1**	**CT 2**
Weightage (%)	20	15	5	30	30

Text & References

- Usha Mehta, A.D. Narde. *Health Insurance in India and Abroad*, Allied Publishers.
- Thomas K. T., Sakthivel R. *Health Insurance In India*: *Overcoming Challenges and Looking Ahead*, Lambert Academic Publishing, 2012.
- Michelle A. Green, JoAnne C. Rowell. *Understanding Health Insurance- A guide to billing and reimbursement.*
- William S Stevens. *Health Insurance- Current Issues and Background*, Nova Science Publishers.

DISASTER MANAGEMENT

Course Code: PUH 4403 **Credit Units: 02**

Course Objective

- To learn, identify and assess disasters in the community.
- To set-forth policies and procedures for disaster preparedness and to prepare disaster plan.

Course Contents

Module I: Basics of Disaster Management

Definitions, Determining risk of disaster, Classification of disaster on the basis of origin, source, onset & anticipated response; Disaster process, Effects of Disasters – Health issues, characteristics and geography of disasters, Impact of Disasters on the Hospitals

Module II: Disaster Management Process

Phases of disaster management, leadership, organization of medical relief, Triaging, Disaster Response – local, national & International; Disaster Management Act – 2005.

Module III: Disaster preparedness

Hospital Disaster Plan – its pre-requisites, principles and components; Hospital disaster management committee and its role; Hospital disaster manual.

Module IV: Fire Safety

Grades of fire and its causes; elements of fire safety, various fire extinguishers; and fire safety training.

Examination Scheme:

Components	**CP**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References

- *A guide to emergency health management after natural disasters,* American health organization scientific publication.
- *Emergency vector control after Natural disaster*, American health organization scientific publication.
- *District Health facilities,* WHO regional publication western pacific services.
- *Medical supply management after natural disaster*, American health organization scientific publication.

OCCUPATIONAL HEALTH

Course Code: PUH 4404 **Credit Units: 02**

Course Objective:
To study basic concepts of Occupational Health & learn about various occupational diseases & their prevention and know about the concerning laws applicable to it.

Course Contents

Module I: Introduction:

Definition & history of occupational health, occupational hazards & their classification, Principles of occupational health & Ergonomics

Module II: Occupational Diseases:

Definition, classification, salient features of various common diseases including Pneumoconiosis & Occupational cancers and their preventive measures

Module III: Agricultural & Industrial hazards:

Agricultural accidents, Zoonotic diseases, snake bite, Insecticide & Pesticide Poisoning.
Industrial accidents
.

Module IV: Prevention & Control:

Medical methods, Engineering methods, Psycho-social methods & Legislative methods

Examination Scheme:

Components	**P**	**V**	**A**	**ME**	**EE**
Weightage (%)	10	5	5	10	70

Text & References:

- Hunter's Diseases of Occupations(10th edition)
- Julian *Smedlay* Oxford Text Book Of Occupational Health(2nd edition)
- Barry s levy Occupational & Environmental Health(5th edition)
- K Park Text book of Preventive & Social Medicine(23rd edtion)
- Sunder lal Text Book of Community Medicine(5th edition)

CROSS-CULTURAL COMMUNICATION

Course Code: CSS 4451 **Credit Unit: 01**

Course Objective:
The influx of multinationals, FDIs and Retail Management makes global communication a harsh reality and offers cultural communication challenges. This course is designed to inculcate transcultural communication skills among the young Amitians.

Course Contents:

Module I: Importance of Culture in Communication
- Principles of effective cross cultural communication
- Developing Communication Competence

Module II: Barriers to effective communication
- Sender, Receiver and Situation related barriers
- Measures to overcome the barriers
- Listening skills

Module III: Cross cultural communication
- Characteristics of culture
- Social differences
- Contextual differences
- Nonverbal differences
- Ethnocentrism

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Business Communication for Managers: An Advanced Approach, Penrose, Thomson
- Understanding Human Communication,9/e, Adler R Oxford

PROFESSIONAL EXCELLENCE

Course Code : BEH 4451 **Credit Unit: 01**

Course Objective: This course aims at imparting an understanding of:
- Build and leverage your professional reputation
- Maintain focus in pressure situations
- Make a balanced choice between professional and personal commitments

Course Contents:

Module I: Individual, Society and Nation
- Individual Differences and Dimensions of Personality
- Socialization Process
- Relating to the Nation: Values, Culture, Religion
- Sense of pride and Patriotism
- Managing Diversity

Module II: Components of Excellence
- Personal Excellence:
- Identifying long-term choices and goals
- Uncovering the talent, strength & style
- Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.
- Developing professional power: Goal-setting, time management, handling criticism, interruptions and time wasters

Module III: Career Planning
- Knowing one's Interest and Aptitude
- Identifying available Resources
- Setting goals to maintain focus:
- Developing Positive attributes in personality
- Self-reliance and Employability skills

Module IV: Stress Management for Healthy Living
- Meaning and Nature of Stress
- Stages of stress
- Causes and Consequences of stress: Personal, Organizational and Environmental
- Personal Styles and strategies of coping

Module V: Professional Success
- Building independence & interdependence
- Reducing resistance to change
- Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities etc.)

Module VI: End-of-Semester Appraisal

- Viva based on personal journal
- Assessment of Behavioural change as a result of training
- Exit Level Rating by Self and Observer

Examination Scheme:

Components	**SAP**	**A**	**Mid Term Test (CT)**	**VIVA**	**Journal for Success (JOS)**
Weightage (%)	20	05	20	30	25

Text & References:

- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers
- Raman, A.T. (2003) Knowledge Management: A Resource Book. Excel Books, Delhi.
- Kamalavijayan, D. (2005). Information and Knowledge Management. Macmillan India Ltd. Delhi

DISSERTATION (3 Months)

Course Code: PUH 4437 **Credits Units: 15**

Internship Objective:
To impart the practical knowledge through research methods, help formulate a rigorous research problem related to public health sector on the basis of their observation, help do an independent study and encourage working in a team.

Pedagogy
- Identifying several situations amenable to dissertation work, writing a proposal and making a presentation to the Dissertation faculty advisory committee.
- Reporting to the committee on the progress of research work periodically.
- Making use of a variety of research methods.
- Defending the inference before the Examining Committee.

Report Contents:
Every student will do a detailed study on the topic selected for the dissertation, and is expected to prepare a two or three proposals which he intends to take up for the Dissertation. The Assigned guide will examine this and decide on the topic of dissertation. Report will comprise of following contents:

1. Abstract
2. Introduction
3. Aims & Objectives
4. Operational definitions
5. Significance of Study
6. Review of literature
7. Research methodology
8. Data Analysis
9. Results
10. Discussion
11. Conclusion
12. Recommendations
13. Limitations of study
14. Future prospects of study
15. References

Evaluation Scheme

Components	**Presentation**	**Report submitted**	**Viva-voce**
Weightage (%)	25	50	25

STEM CELL TECHNOLOGY

Programme Structure-2018

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Total Credits
SCT2151	Introduction to Stem Cell Technology	3	-	3
SCT2251	Fundamental Human Embryology & Developmental Biology	3	-	3
SCT2351	Fundamental Cell Biology and Human Anatomy & Physiology	3	-	3
SCT2451	Human Pluripotent Stem Cell Culture & Differentiation Methods	3	-	3
SCT2551	Therapeutic Applications of Human Pluripotent Stem Cells	3	-	3
SCT2651	Project & Paper Presentation	-	-	3
	TOTAL			**18**

STEM CELL TECHNOLOGY

Syllabus - Semester First

INTRODUCTION TO STEM CELL TECHNOLOGY

Course Code: SCT2151 **Credit Units: 03**

Course Objective: The objective of this paper is to familiarize the students with stem cell technology and its applications for betterment of the society. The course is designed to give a broad view of mammalian stem cells, reviewing where they are found in the body, the different types and how they are cultured. The topics will cover the basic biology of these stem cells as well as bioengineering and application of these stem cells to potential treatments of human diseases.

Course Contents:

Module I: Introduction to stem cells
Definition, properties, proliferation, culture of stem cells, medical applications of stem cells, ethical and legal issues in use of stem cells.

Module II: Types of stem cells.
Stem Cell biology and therapy, types embryonic stem cell, Adult stem cell, Stem Cell Biology and Therapy, Embryonic Stem Cells, culture and the potential benefits of stem cell technology

Module III: Therapeutic applications of stem cells
Gene Therapy: Introduction, History and evolution of Gene therapy, optimal disease targets, Failures and successes with gene therapy and future prospects,Genetic Perspectives for Gene Therapy, **Gene Delivery** methods: Viral vectors and Non-viral Vectors

Module IV: Ethical Issues associated with stem cell-based regenerative medicine field
Regulatory and Ethical Considerations of stem cell and Gene Therapy, Assessing Human Stem Cell Safety, Use of Genetically Modified Stem Cells in Experimental Gene Therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer,

***References*:**

- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Progress in gene therapy, Volume 2,Pioneering stem cell/gene therapy trials, Roger Bertolotti, Keiya Ozawa and H. Kirk Hammond, VSP international science publishers
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003,
- Human Embryonic Stem Cells: The Practical Handbook by Stephen Sullivan and Chad A Cowan.

Syllabus - Semester Second

FUNDAMENTAL HUMAN EMBRYOLOGY AND DEVELOPMENTAL BIOLOGY

Course Code: SCT2251 **Credit Units: 03**

Course Objective: The objective of this course is to familiarize students with fundamental process of human embryology and developmental biology and progression of pluripotent stem cells through different phases of development.

Course Contents:
Module-I: Basics principles of human embryogenesis--gametogenesis, fertilization and embryo development.

Module-II:
Ectoderm, mesoderm and endoderm development and process of organogenesis during human development.

Module-III:
Molecular regulation of embryogenesis and organogenesis processes during human development.

Module-IV:
Different types of stem cells, process and mechanism of stem cell subset development and their spatial organization during human development.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Human embryology and developmental biology 5th Edition by Bruce M. Carson.
- Larsen's Human Embryology (Schoenwolf,Larsen's Human Embryology) 4th Edition
- Atlas of Human Anatomy (Netter Basic Science) 7th Edition
- Developmental Biology, S.F. Gilbert, Sinauer Associates Inc.
- Gray's Anatomy for Students 3rd Edition by Richard Drake, Wayne Vogl and Adam W. M. Mitchell.

***References*:**
- The Developing Human: Clinically Oriented Embryology 10th Edition by Keith L. Moore, T. V. N. Persaud MD and Mark G. Torchia.
- Developmental Biology, Tenth Edition 11th Edition by Scott F. Gilbert.
- Molecular Developmental Biology 2nd Edition by T. Subramoniam.

Syllabus - Semester Third

FUNDAMENTAL CELL BIOLOGY, HUMAN ANATOMY AND PHYSIOLOGY

Course Code: SCT2351 **Credit Units: 03**

Course Objective: The objective of this course is to familiarize students with basic organization of adult somatic cells, human anatomoy and normal physiology. Students will learn basic principles and mechanisms that dictate maintenance of pluripotency in pluripotent stem cells and their differentiation into adult stem cells, somatic cells, tissues and organs.

Course Contents:

Module-I:

Cell anatomy, organizational components, cell division mechanisms in normal adult cells and in pluripotent stem cells.

Module-II:

Introduction to epigenetics and its role in maintenance of pluripotency and differentiation of pluripotent stem cells into different somatic cell lineages.

Module-III:

Basics of Human anatomy & physiology and role of pluripotent stem cells and adult stem cells in maintenance of normal

Module-IV:

Effect of breach in normal cellular physiology and hoemostasis on human development.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

***Text*:**

- Molecular Biology of the Cell. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Publishing
- Cell Biology, Thomas D. Pollard MD
- Atlas of Human Anatomy (Netter Basic Science) 7th Edition
- Gray's Anatomy for Students 3rd Edition by Richard Drake, Wayne Vogl and Adam W. M. Mitchell.

***References*:**

- The Developing Human: Clinically Oriented Embryology 10th Edition by Keith L. Moore, T. V. N. Persaud MD and Mark G. Torchia.
- Gene VIII, Benjamin Lewin 2005, Oxford University Press
- Cell and Molecular Biology, Gerald Karp, John Wiley and Sons Inc.
- Cell and Molecular Biology, DeRobertis, B.I. Publication Pvt. Ltd.

Syllabus - Semester Fourth

HUMAN PLURIPOTENT STEM CELL CULTURE & DIFFERENTIATION METHODS

Course Code: SCT2451 **Credit Units: 03**

Course Objective: The objective of this paper is to provide students greater understanding of different types of stem cells.

Course Contents:

Module-I:

Isolation of human Embryonic stem cells, generation of human induced pluripotent stem cells. History of human pluripotent stem cell development.

Module-II:

Methodologies for pluripotent stem cell culture, characterization of pluripotency and differentiation into different lineages.

Module-III:

Methods to engineer pluripotent stem cells for treatment of genetically impaired conditions/diseases.

Module-IV:

Ethical and regulatory issues affective pluripotent stem cell-based cell replacement therapies. Technological challenges towards development of pluripotent stem cell-based cell replacement therapies.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Human Pluripotent Stem Cells: Methods and Protocols (Methods in Molecular Biology) 2011th Edition by Philip H. Schwartz (Editor), Robin L. Wesselschmidt.
- Atlas of Human Pluripotent Stem Cells: Derivation and Culturing (Stem Cell Biology and Regenerative Medicine) 2011 by Michal Amit and Joseph Itskovitz-Eldor.
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo,* Springer,

References:

- Stem Cell Biology, Daniel Marshak, Richard L. Gardener and David Gottlieb, Cold Spring Harbour Laboratory Press
- Stem cell biology and gene therapy, Booth C., Cell Biology International, Academic Press

Syllabus - Semester Fifth

THERAPEUTIC APPLICATIONS OF HUMAN PLURIPOTENT STEM CELLS

Course Code: SCT2551 **Credit Units: 03**

Course Objective: The objective of this paper is to familiarize students with different therapeutic areas that can benefit with pluripotent stem cell-based cell replacement therapies.

Course Contents:
Module-I:
Principles of cell replacement therapy and application of pluripotent stem cells in cell replacement therapy.

Module-II:
Application of pluripotent stem cells in neuronal disease management and treatment.

Module-III:
Application of pluripotent stem cells in ocular and cardiovascular diseases management and treatment.

Module-IV:
Application of pluripotent stem cells in treatment of autoimmune complications and cancer management and treatment.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
***Text*:**
- Frontiers in Pluripotent Stem Cells Research and Therapeutic Potentials Bench-To-Bedside, 2018**,** by Kuldip S. Sidhu.
- Patient-Specific Induced Pluripotent Stem Cell Models: Generation and Characterization (Methods in Molecular Biology) 1st ed. by Andras Nagy (Editor) and Kursad Turksen (Editor)
- Stem Cell and Gene-Based Therapy: Frontiers in Regenerative Medicine, *Alexander Battler, Jonathan Leo*, Springer.

***References*:**
- Stem Cell Biology and Gene Therapy. Quesenberry PJ, Stein GS, eds. (£65.00.) Wiley, 1998.
- Stem Cells Handbook: Stewart Sell, Humana Press; Totowa NJ, USA; Oct. 2003.
- Frontiers in Pluripotent Stem Cells Research and Therapeutic Potentials Bench-To-Bedside, 2018**,** by Kuldip S. Sidhu.

Syllabus - Semester Sixth

PROJECT & PAPER PRESENTATION

Course Code: SCT2651 **Credit Units: 03**

Course Objective: The objective of this course is to help students acquire scientific skills to formulate research hypothesis and design research projects to test those hypotheses. The course will also help students to acquire/improve research presentation skills.

Course Contents:

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	-	-	100	-

B.Sc.(Hons.)Nursing

DURATION- FOUR YEARS FULL TIME

PROGRAM STRUCTURE

CURRICULUM

&

SCHEME OF EXAMINATION
2021

AMITY UNIVERSITY HARYANA

1. PROGRAMSTRUCTURE

B.Sc.NursingProgramStructure			
ISemester 1. CommunicativeEnglish 2. AppliedAnatomy 3. AppliedPhysiology 4. AppliedSociology 5. AppliedPsychology 6. *NursingFoundationI ***MandatoryModule*** *First Aid as part ofNursingFoundation ICourse	**IIISemester** 1. Applied Microbiologyand Infection ControlincludingSafety 2. PharmacologyI 3. PathologyI 4. *Adult Health (MedicalSurgical)NursingIwithintegratedpathophysiology ***MandatoryModule*** *BCLS as part of AdultHealthNursingI	**VSemester** 1. *Child HealthNursingI 2. Mental HealthNursingI 3. Community HealthNursing I (includingEnvironmental Science&Epidemiology) 4. EducationalTechnology/NursingEducation 5. IntroductiontoForensic Nursing and IndianLaws ***MandatoryModules*** *Essential Newborn Care(ENBC), Facility BasedNewborn Care (FBNBC),IMNCI and PLS as part ofChildHealthNursing	**VIISemester** 1. Community HealthNursingII 2. Nursing Research &Statistics 3. Midwifery/Obstetricsand Gynecology (OBG)NursingII ***MandatoryModules*** *SafedeliveryappunderOBG Nursing I/II(VI/VII Semester)
IISemester 1. AppliedBiochemistry 2. AppliedNutritionand Dietetics 3. *NursingFoundationII 4. Health/Nursing Informatics &Technology ***MandatoryModule*** *HealthAssessmentasparto f Nursing Foundation IICourse	**IVSemester** 1. *PharmacologyII 2. PathologyII&Genetics 3. AdultHealthNursingIIwith integratedpathophysiologyincluding GeriatricNursing 4. Professionalism,ProfessionalValues&Ethics includingBioethics ***MandatoryModule*** *Fundamentals ofPrescribing underPharmacologyII *Palliative care moduleunderAdultHealthNursingII	**VISemester** 1. Child HealthNursingII 2. Mental HealthNursingII 3. NursingManagement& Leadership 4. *Midwifery/ObstetricsandGynecology(OBG)NursingI ***MandatoryModule*** *SBAModuleunderOBGNursingI/II (VI/VIISemester)	**VIIISemester** Internship (IntensivePracticum/ ResidencyPosting)

Note: Noinstitute/Universitywillmodifythecurriculum.Howevertheycanaddunits/subjectinthesyllabusasdeemednecessary.

#Modulesbothmandatoryandelectiveshallbecertifiedbytheinstitution/externalagency.

MANDATORYMODULES

The prepared modules/modules outlined by the Council such as Health Assessment & Fundamentals of Prescribing andavailable modules as National Guidelines (First Aid – NDMA, IMNCI, ENBC, FBNBC), Palliative Care, Safe Delivery AppandSBAmodulewill beprovidedinseparate learning resourcepackage.

For BCLS, PLS – Standard national/international modules can be used. The mandatory modules are offered during the time allotted for respective courses in the course content as theory and practicum – Lab/Clinical.

ELECTIVEMODULES

Numberofelectivestobecompleted:3(Everymodule=1credit=20hours)

III&IVSemesters: Tocompleteany**one**electiveby endof4th semesteracross1st to4th semesters

- Humanvalues
- Diabetescare
- Softskills

V&VISemesters: Tocompleteany **one**ofthefollowingbeforeendof6th semester

- CBT
- Personalitydevelopment
- Addictionpsychiatry
- Adolescenthealth
- Sportshealth
- Accreditationandpracticestandards
- Developmentalpsychology
- Menopausalhealth
- HealthEconomics

VII&VIIISemesters: Tocompleteany **one**ofthefollowingbeforeendof8th semester

- Scientificwritingskills
- Lactationmanagement
- Sexuality&Health
- Stressmanagement
- Jobreadinessandemployability inhealthcaresetting

2. CURRICULUM IMPLEMENTATION: OVERALL

PLANDurationof theprogram:8 semesters

1-7Semesters

OneSemesterPlanforthefirst7Semesters

TotalWeeksperSemester:26weekspersemester

Number of Weeks per Semester for instruction: 20 weeks (40 hours per week × 20 weeks = 800

hours)NumberofWorkingDays: Minimumof 100workingdays(5daysperweek×20weeks)

Vacation,Holidays,ExaminationandPreparatoryHolidays:6weeksVacation:3

weeks

Holidays:1week

ExaminationandPreparatoryHolidays:2weeks

8th Semester

Onesemester:22weeksV

acation:1week

Holidays:1week

ExaminationandPreparatoryHolidays:2weeks

3. **COURSESOFINSTRUCTIONWITHCREDITSTRUCTURE**

FIRST SEMESTER

Course Code	Course Title	Total Contact Hours	Lectures (L)Hours Per week (credits)	Lab Hours Per Week (credits)	Clinical/ Practical (P) Hours Per Week (credits)	Total Credits
ENGL101	Communicative English***	40	2	-	-	2 (Not to be included in SGPA)
ANAT105 & PHYS110	Applied Anatomy and Applied Physiology	120	6	-	-	6
SOCI115 & PSYC120	Applied Sociology and Applied Psychology	120	6	-	-	6
N-NF(I) 125	Nursing Foundation-I including First Aid module*	120+ 80+ 160	6	2	2	10
SSCC(I) 130	Self-study/ Co-curricular including First Aid module	40+ 40	-	-	-	-
	Open Electives					**3**(Not to be included in SGPA)
LAN2151 LAN2152 LAN2153 LAN2154 LAN2155 LAN2156 LAN2157 LAN2158 LAN2159	Foreign Language-I French-I German-I Spanish-I Russian-I Chinese-I Portuguese-I Korean-I Japanese-I Hindi-I **	36	3	-	-	3
	TOTAL	756				**27**

*Theory and Practical exam of Semester I (N-NF125) to be with Nursing Foundation-II including Health Assessment module (N-NF125) in Semester II

** Hindi as Foreign Language for Foreign National Students

***Internal exam at college level

SECOND SEMESTER

Course Code	Course Title	Total Hours	Lectures (L)Hours Per week (credits)	Lab Hours Per Week (credits)	Clinical/ Practical (P) Hours Per Week (credits)	Total Credits
BIOC135 & NUTR140	Applied Biochemistry and Applied Nutrition & Dietetics	100	5	-	-	5
N-NF(II) 125	Nursing Foundation-(I&II) including Health Assessment module*	120+ 120	6	3	-	9
N-NF(II)P 125	Nursing Foundation-(I&II) Practical	320	-	-	4	4
HNIT145	Health/ Nursing Informatics	40	2	1	-	3

	& Technology***					
SSCC(II) 130	Self-study/ Co-curricular	40+ 20	-	-	-	-
	Open Electives					**3**(Not to be included in SGPA)
LAN2251 LAN2252 LAN2253 LAN2254 LAN2255 LAN2256 LAN2257 LAN2258 LAN2259	Foreign Language-II French-II German-II Spanish-II Russian-II Chinese-II Portuguese-II Korean-II Japanese-II Hindi-II	36	3	-	-	3
	TOTAL	836				**24**

***Internal exam at college level

THIRD SEMESTER

Course Code	Course Title	Total Hours	Lectures (L)Hours Per week (credits)	Lab Hours Per Week (credits)	Clinical/ Practical (P) Hours Per Week (credits)	Total Credits
MICR201	Applied Microbiology and Infection Control including Safety	40+ 40	2	1	-	3
PHAR(I) 205 & PATH(I) 210	Pharmacology-I and Pathology-I*	40	2	-	-	2
N-AHN(I) 215	Adult Health Nursing-I with integrated pathophysiology including BCLS module	140+ 40	7	1	-	8
N-AHN (I)P 215	Adult Health Nursing-I Practical	480	-	-	6	6
SSCC(I) 220	Self-study/ Co-curricular	20	-	-	-	-
	Electives (Any One)					**1**(Not to be included in SGPA)
ELEC301	Human Values	20	1	-	-	1
ELEC302	Diabetes Care	20	1	-	-	1
ELEC303	Soft Skills	20	1	-	-	1
	Open Electives					**2**(Not to be included in SGPA)

LAN2351 LAN2352 LAN2353 LAN2354 LAN2355 LAN2356 LAN2357 LAN2358 LAN2359	Foreign Language-III French-III German-III Spanish-III Russian-III Chinese-III Portuguese-III Korean-III Japanese-III Hindi-III	24	2	-	-	2
	TOTAL	844				**22**

*Theory exam of Semester III (PHAR 205 & PATH 210) to be with Pharmacology-II including Fundamentals of prescribing Module and Pathology-II and Genetics (PHAR 205, PATH 210) in Semester IV

FOURTH SEMESTER

Course Code	Course Title	Total Hours	Lectures (L)Hours Per week (credits)	Lab Hours Per Week (credits)	Clinical/ Practical (P) Hours Per Week (credits)	Total Credits
PHAR(II) 205 & PATH(II) 210	Pharmacology-(I&II) including Fundamentals of prescribing Module and Pathology- (I&II) & Genetics	80	4	-	-	4
N-AHN (II) 225	Adult Health Nursing-II with integrated pathophysiology including Geriatric Nursing + Palliative care module	140+ 40	7	1	-	8
N-AHN (II)P 225	Adult Health Nursing-II Practical	480	-	-	6	6
PROF230	Professionalism, Professional Values and Ethics including Bioethics***	20	1	-	-	1
SSCC(II) 220	Self-study/ Co-curricular	40	-	-	-	-
	Open Electives					**2**(Not to be included in SGPA)
LAN2451 LAN2452 LAN2453 LAN2454 LAN2455 LAN2456 LAN2457 LAN2458 LAN2459	Foreign Language-IV French-IV German-IV Spanish-IV Russian-IV Chinese-IV Portuguese-IV Korean-IV Japanese-IV Hindi-IV	24	2	-	-	2
	TOTAL	824				**21**

***Internal exam at college level

FIFTH SEMESTER

Course Code	Course Title	Total Hours	Lectures (L)Hours Per week (credits)	Lab Hours Per Week (credits)	Clinical/ Practical (P) Hours Per Week (credits)	Total Credits
N-CHN(I) 301	Child Health Nursing-I including Essential Newborn Care (ENBC), FBNC, IMNCI and PLS, modules*	60+ 40+ 160	3	1	2	6
N-MHN (I)305	Mental Health Nursing-I*	60+ 80	3	-	1	4
N-COMH (I)310	Community Health Nursing-I including Environmental Science & Epidemiology	100	5	-	-	5
N-COMH (I)P 310	Community Health Nursing-I Practical	160	-	-	2	2
EDUC315	Educational Technology/ Nursing Education	40+ 40	2	1	-	3
N-FORN 320	Introduction to Forensic Nursing and Indian Laws***	20	1	-	-	1
SSCC(I) 325	Self-study/ Co-curricular	40	-	-	-	-
	Electives (Any One)					**1**(Not to be included in SGPA)
ELEC501	CBT	20	1	-	-	1
ELEC502	Personality Development	20	1	-	-	1
ELEC503	Addiction Psychiatry	20	1	-	-	1
ELEC504	Adolescent Health	20	1	-	-	1
ELEC505	Sports Health	20	1	-	-	1
ELEC506	Accreditation & Practice Standards	20	1	-	-	1
ELEC507	Developmental Psychology	20	1	-	-	1
ELEC508	Menopausal Health	20	1	-	-	1
ELEC509	Health Economics	20	1	-	-	1
	Open Electives					**2**(Not to be included in SGPA)
LAN2551 LAN2552 LAN2553 LAN2554 LAN2555 LAN2556 LAN2557 LAN2558 LAN2559	Foreign Language-V French-V German-V Spanish-V Russian-V Chinese-V Portuguese-V Korean-V Japanese-V Hindi-V	24	2	-	-	2
	TOTAL	844				**24**

*Theory and Practical exam of Semester V (N-CHN301 & N-MHN305) to be with Child Health Nursing-II (N-CHN301) and Mental Health Nursing-II(N-MHN305) in Semester VI

***Internal exam at college level

SIXTH SEMESTER

Course Code	Course Title	Total Hours	Lectures (L)Hours Per week (credits)	Lab Hours Per Week (credits)	Clinical/ Practical (P) Hours Per Week (credits)	Total Credits
N-CHN (II)301	Child Health Nursing-(I&II)	40	2	-	-	2
N-MHN (II)305	Mental Health Nursing-(I&II)	40	2	-	-	2
NMLE 330	Nursing Management & Leadership	60	3	-	1	4
N-MIDW (I)/ OBGN 335	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing-I including SBA module*	60+ 40+ 240	3	1	3	7
N-CHN (II)P 301	Child Health Nursing-(I&II) Practical	80	-	-	1	1
N-MHN (II)P 305	Mental Health Nursing-(I&II) Practical	160	-	-	2	2
	Open Electives					**2**(Not to be included in SGPA)
LAN2651 LAN2652 LAN2653 LAN2654 LAN2655 LAN2656 LAN2657 LAN2658 LAN2659	Foreign Language-VI French-VI German-VI Spanish-VI Russian-VI Chinese -VI Portuguese-VI Korean-VI Japanese-VI Hindi-VI	24	2	-	-	2
	TOTAL	824				**20**

*Theory and Practical exam of Semester VI (N-MIDW/ OBGN 335) to be with Midwifery/ Obstetrics and Gynaecology (OBG) Nursing-II including safe delivery app module (N-MIDW / OBGN 410) in Semester VII

SEVENTH SEMESTER

Course Code	Course Title	Total Hours	Lectures (L)Hours Per week (credits)	Lab Hours Per Week (credits)	Clinical/ Practical (P) Hours Per Week (credits)	Total Credits
N-COMH (II)401	Community Health Nursing-II	100	5	-	-	5
NRST405	Nursing Research & Statistics	40+ 80	2	2	-	4
N-MIDW (II)/ OBGN 410	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing –II including safe delivery app module	60+ 40	3	1	-	4
N-COMH (II)P 401	Community Health Nursing-II Practical	160	-	-	2	2
N-MIDW (II)P / OBGN 410	Midwifery/ Obstetrics and Gynaecology (OBG) Nursing –(I&II) Practical	320	-	-	4	4

	Electives (Any One)					1(Not to be included in SGPA)
ELEC701	Scientific Writing Skills	20	1	-	-	1
ELEC702	Lactation Management	20	1	-	-	1
ELEC703	Sexuality & Health	20	1	-	-	1
ELEC704	Stress Management	20	1	-	-	1
ELEC705	Job Readiness & Employability in Health Care Setting	20	1	-	-	1
	TOTAL	820				**20**

EIGHTH SEMESTER (INTERNSHIP)

Course Code	Course Title	Total Hours	Lectures (L)Hours Per week (credits)	Lab Hours Per Week (credits)	Clinical/ Practical (P) Hours Per Week (credits)	Total Credits
INTE (P)440	Internship (Intensive Practicum/ Residency Posting) • Community Health Nursing (4 weeks) • Adult Health Nursing (6 weeks) • Child Health Nursing (4 weeks) • Mental Health Nursing (4 weeks) • Midwifery (4 weeks)	1056	-	-	12	12
	TOTAL	1056				**12**

Notes:

1. **Credits:**
   Theory 20 hrs : 1 Credit
   Lab hours 40 hrs : 1 Credit
   Clinical /Practical 80 hrs : 1 Credit
   **FL Credit as per Amity University Norm
   Theory 12 hrs : 1 Credit

1credittheory–1hourperweekpersemester

1 credit practical/lab/skill lab/simulation lab – 2 hours per week per

semester1credit clinical– 4hoursperweekpersemester

1creditelectivecourse–1hourperweekpersemester(Electives can be offered during self-study hours as shown in the following tables).

TotalSemesters=8

(**Sevensemesters:** Onesemester=20weeks×40hoursperweek=800hours)

(**Eighthsemester–Internship:**Onesemester=22weeks×48hoursperweek=1056hours)

Total number of course credits including internship and electives – 156

(141+12+3)

Distributionofcreditsandhours bycourses,internshipandelectives

S.No.	Credits	Theory(Cr/Hrs)	Lab(Cr/Hrs)	Clinical (Cr/Hrs)	Total	Hour
1	Coursecredits	90creditper1800hours	15/600		141	5280
2	Internship				12	1056
3	Electives				3	60
	TOTAL				156	6396
4	Self-studyand Saturdays(onesemester=5hoursperweek×Co-curricular				12 35	240 700
					47	940

Distributionofcredits,hoursandpercentagefortheoryandpracticum(SkillLab&Clinical)acrosseightsemesters

S.No.	Theory&Practicum(SkillLab&Clinical)	Credits	Hours	Percentage
1	Theory	90	1800	28
2	Lab/SkillLab	15	600	10
3	Clinical	36	3936	62
	Total	**141**	**6336hours**	**100**

Practicum(7semesters)excludinginternship

Lab/skilllab/simulationlab–600(17%)

Clinical–2880 (83%)

Total–3480

Lab/skilllab/simulationlab=17%of thetotalpracticumplanned

Note: Besidesthestipulatedlabandclinicalhours,amaximumof13%(400-450hours)fromtheclinicalhourscanbeusedinsimulation lab/skilllabforskilllab/simulation learning and not toexceed 30% oftotal hours.

4. SCHEMEOFEXAMINATION

Thedistributionofmarksininternalassessment,EndSemesterCollegeExam,andEndSemesterUniversityExamforeachcourseisshownbelow.

ISEMESTER

S.No.	Course	Assessment(Marks)				
		Internal	EndSemester CollegeExam	EndSemester UniversityExam	Hours	Total
	Theory					
1	CommunicativeEnglish	25	25		2	50
2	AppliedAnatomy&AppliedPhysiology	25		75	3	100
3	AppliedSociology&AppliedPsychology	25		75	3	100
4	NursingFoundationI	*25				
	Practical					
5	NursingFoundation-I	*25				

***WillbeaddedtotheinternalmarksofNursingFoundationIITheoryandPracticalrespectivelyinthenextsemester(Total weightage remainsthe same)**

Example:

NursingFoundationTheory: NursingFoundationITheoryInternalmarksin1st semesterwillbeaddedtoNursingFoundationII TheoryInternalin the2nd semester andaverageof thetwosemesterswillbetaken.

II SEMESTER

S.No.	Course	Assessment(Marks)				
		Internal	EndSemester TotalCollegeExam	EndSemester	Hours	
	Theory					
1	AppliedBiochemistryandAppliedNutrition&Dietetics	25		75	3	100
2	NursingFoundation(I&II)	25 ISem-25 & IISem-25 (withaverage ofboth)		75	3	100
3	Health/NursingInformatics& Technology	25	25		2	50
	Practical					
4	NursingFoundation(I&II)	50 ISem-25 & IISem-25		50		100

III SEMESTER

S.No.	Course	Assessment(Marks)				
		Internal	**EndSemester**	**EndSemester TotalCollegeexam**	**Hours**	
	Theory					
1	AppliedMicrobiologyandInfectionC ontrolincluding Safety	25		75	3	100
2	PharmacologyIandPathologyIA	*25				
3	dult Health Nursing I**Practical**	25		75	3	100
	AdultHealthNursingI					
4		50		50		100

***WillbeaddedtotheinternalmarksofPharmacologyIIandPathologyII&Geneticsinthenextsemester(Totalweightagere mainsthe same).**

IV SEMESTER

S.No.	Course	Assessment(Marks)				
		Internal	**EndSemester**	**EndSemester TotalCollegeexam**	**Hours**	
	Theory					
1	Pharmacology&Pathology(I&II)an	25 III Sem-25 & IV Sem-25 (withaver ageof		75	3	100

		both)				
2	AdultHealthNursingII	25		75	3	100
3	Professionalism,EthicsandProfessionalValues	25	25		2	50
	Practical					
4	AdultHealthNursingII	50		50		100

V SEMESTER

S.No.	Course	Assessment(Marks)				
		Internal	**EndSemester**	**EndSemester TotalCollegeexam**	**Hours**	
	Theory					
1	Child Health Nursing	*25				
2	IMentalHealthNursingI	*25				
3	Community Health Nursing I includingEnvironmentalScience&Epidemiology	25		75	3	100
4	Educational Technology/NursingEducation	25		75	3	100
5	Introduction to Forensic Nursing andIndianLaws	25	25		2	50
	Practical					
6	Child Health Nursing	*25				
7	IMentalHealthNursingI	*25				
8		50		50		100

***WillbeaddedtotheinternalmarksofChildHealthNursingIIandMentalHealthNursingIIinboththeoryandpracticalrespectively in thenext semester(Totalweightage remainssame).**

VI SEMESTER

S.No.	Course	Assessment(Marks)				
		Internal	**EndSemester Collegeexam**	**EndSemester UniversityExam**	**Hours**	**Total**
	Theory					
1	ChildHealthNursing(I&II)	25 SemV-25 &Sem VI-25 (withaverage ofboth)		75	3	100
2	MentalHealthNursing(I&II)	25 SemV-25 &Sem VI-25 (withaverage ofboth)		75	3	100

3	Nursing Management &	25		75	3	100
4	LeadershipMidwifery/Obstetrics&Gy	*25				
	necologyI**Practical**					
5	ChildHealthNursing(I&II)	50 (SemV-25 &Sem VI-25)		50		100
6	MentalHealthNursing(I&II)	50(Se mV-25 &Sem VI-25)		50		100
7	Midwifery/Obstetrics&GynecologyI	*25				

***WillbeaddedtoInternalmarksofMidwiferyIItheoryandpracticalrespectivelyinthenextsemester(Totalweightageremainsthe same)**

VII SEMESTER

S.No.	Course	Assessment(Marks)				
		Internal	**EndSemester TotalCollegeExam**	**EndSemester**	**Hours**	
	Theory					
1	CommunityHealthNursingII	25		75	3	100
2	NursingResearch&Statistics	25		75	3	100
2	Midwifery/ObstetricsandGynecol	25 SemVI-25 & SemVII-25 (withaver age ofboth)		75	3	100
	Practical					
3	CommunityHealthNursingII	50		50		100
4	Midwifery/ObstetricsandGynecol	50 (SemVI-25 & SemVII-25)		50		100

VIII SEMESTER

S.No.	Course	Assessment(Marks)				
		Internal	**EndSemester TotalCollegeExam**	**EndSemester**	**Hours**	
	Practical					
1	CompetencyAssessment	100		100		200

5. EXAMINATION

REGULATIONSNote:

1. Applied Anatomy and Applied Physiology: Question paper will consist of Section-A Applied Anatomy of 37 marksandSection-BAppliedPhysiologyof 38 marks.
2. Applied Sociology and Applied Psychology: Question paper will consist of Section-A Applied Sociology of 37 marksandSection-BAppliedPsychologyof 38 marks.
3. Applied Microbiology and Infection Control including Safety: Question paper will consist of Section-A AppliedMicrobiology of37 marksandSection-BInfection Controlincluding Safety of38 marks.
4. Applied Biochemistry and Applied Nutritionand Dietetics: Question paper will consist of and Section-B Applied Nutrition and Dietetics with 50 marks.
5. Pharmacology, Genetics and Pathology: Question paper will consist of Section-A of Pharmacology with 38 marks,Section-Bof Pathologywith25marksandGeneticswith12marks.
6. NursingResearchandStatistics:NursingResearchshouldbeof55marksandStatisticsof20mar ks.
7. A candidate must have minimum of 80% attendance (irrespective of the kind of absence) in theoryand practical ineachcourse/subjectforappearing forexamination.
8. Acandidate musthave100%attendanceineachofthepracticalareasbeforeawardofdegree.
9. Following exams shall be conducted as college exams. The minimum pass is 50% except for Communicative English. The marks for all the college exams listed below alongside all other university exams must be sent to university for inclusion in the mark sheet and shall be considered for calculating aggregate and ranking for awards by university.
   i. Communicative English
   ii. Health/Nursing Informatics and Technology
   iii. Professionalism, Professional Values and Ethics including Bioethics
   iv. Introduction to Forensic Nursing & Indian Laws
   Award of rank will not be considered for those who fail in one or more courses and must have completed the program by 4 years.
   The mark sheet with grades and grade point average shall be given by the University for all courses.
   Communicative English and Elective Modules are not included for calculating Semester Grade Point Average (SGPA).
10. Minimum pass mark shall be 40% for Communicative English and in each of the Elective module. All Electives modules must be completed as indicated in specified semester and pass marks sent to university before appearing
11. for final examination.Minimumpassmarksshallbe50% ineachoftheTheoryandpracticalpapersseparatelyexceptinEnglish.
12. The student has to pass in all mandatory modules placed within courses and the passmark for each module is 50%.
13. Acandidatehas topassintheoryandpracticalexamseparately ineachof thepaper.
14. If acandidatefailsineithertheory orpractical,he/shehastore-appearforboththepapers(Theory andPractical).
15. Ifthestudenthasfailedinonlyonesubjectandhaspassedinalltheothersubjectsofaparticularsemesterand Grace marks of up to 5 marks to theory marks can be added for one course/subject only, provided that by such anadditionthestudentpassesthesemester examination.
16. Thecandidateshallappearforexamsineachsemester:
    i. Thecandidateshallhave clearedalltheprevious examinationsbeforeappearingforfifthsemesterexamination.However, thecandidatesshall bepermittedtoattendtheconsecutive semesters.
    ii. Thecandidateshallhaveclearedallthepreviousexaminationsbeforeappearingforseventhsemesterexamination.How ever,thecandidates shallbe permittedtoattendtheconsecutive semesters.
    iii. Thecandidateshallhaveclearedallthepreviousexamination beforeappearingfor finalyearexamination.
    iv. Themaximumperiodtocompletethecourse successfullyshouldnotexceed8years.
17. The candidate has to pass separately in internal and external examination (shall be reflected in the marks sheet). Noinstitution shall submit average internal marks of the students not more than 75% (i.e. if 40 students are admitted in acoursetheaveragescore ofthe40studentsshallnot exceed75% oftotal internal marks).
18. Atleast50%oftheNon-nursingsubjectslikeAppliedAnatomy&Physiology,AppliedBiochemistry,AppliedPsychology & Sociology, Applied Microbiology, Pharmacology, Genetics, Nutrition & Dietetics, CommunicativeEnglish and Health/Nursing Informatics & Technology should be taught by the Nursing teachers. Teachers who areinvolvedin teaching non-nursing subjectscanbethe examiners fortheprogram.

19. Maximum number of candidates for practical examination should not exceed 20 per day. Particular year and of sameinstitutionbatch shall beexamined by thesamesetof examiners.

20. Allpracticalexaminationsmustbeheldintherespectiveclinicalareas.

21. Oneinternalandoneexternalexaminershouldjointlyconductpracticalexaminationforeachstudent.

22. An examiner for theory and practical/OSCE examination should be an Assistant Professor or above in a College of Nursing with M.Sc. (Nursing) in concerned subject and minimum 3 years of teaching experience. To be an examiner for Nursing Foundation course, the faculty. having M.Sc. (Nursing) with any specialty shall be considered.

23. Examiner for Competency Assessment – VIII Semester: There must be a total of five examiners, one from each specialty i.e. External examiners – 2 and Internal examiners – 3. The internal examiners may be from the college faculty or from hospital with the required qualification and experience i.e. M.Sc. (Nursing) in respective specialty with minimum three years of teaching experience.

II. ASSESSMENTGUIDELINES

1. GradingofPerformance

Basedontheperformance,eachstudentshallbeawardedafinalgradeattheendofthesemesterforeachcourse. Absolutegradingisusedby convertingthe markstograde,basedonpredeterminedclassintervals.UGC10

point gradingsystemisusedwith passgrade modified.

LetterGrade	GradePoint	Percentage ofMarks
O (Outstanding)	10	85%&Above
A+ (Excellent)	9	80-84.99%
A (Very Good)	8	75-79.99%
B+(Good)	7	65-74.99%
B(Above Average)	6	60-64.99%
C(Average)	5	50-59.99%
P(Pass)	-	50% and above
F(Fail)	0	<50%
Ab (Absent)	0	0
***Pass for Communicative English andElectives–40%andabove.** **Gradepoint4(40-49.99%)**		

For Nursing Courses and all other courses – Pass is at C Grade (5 grade point) 50% and

aboveForEnglishand electives –PassisatP Grade(4 gradepoint) 40% andabove

ComputationofSemesterGradePointAverage(SGPA)andCumulativeGradePointAverage(CGPA)

SPGAistheweightedaverageofthegradepointsobtainedinallcoursesbythestudentduringthesemester(Allcoursesexcluding English andelectives)

Ex.SGPAComputation

CourseNumber	Credit/s	Lettergrade	Gradepoint	Creditpoint(Credit×grade)
1	3(C1)	A	8(G1)	3×8 =24
2	4(C2)	B+	7(G2)	4×7 =28
3	3(C3)	B	6(G3)	3×6 =18

$$\mathbf{SGPA} = \frac{C1G1 + C2G2 + C3G3}{C1 + C2 + C3}$$

$$= \frac{70}{10} = 7 \text{ (rounded off to two decimal points)}$$

ComputationofCGPA

CGPAiscalculatedwithSGPAofallsemesterstotwodecimalpointsandis indicatedinfinalgradeinmarkcard/transcriptshowing gradesof all8 semestersandtheircourses/subjects.

CGPAreflectsthefailedstatusincaseof failtillthecourse/sarepassed.

SemesterI	**Semester2**	**Semester3**	**Semester4**
Credit–Cr Cr:20 SGPA:6.5 Cr×SGPA=20 ×6.5	Cr:22 SGPA:7.0	Cr:25 SGPA:5.5	Cr:26 SGPA:6.0

$$\mathbf{CGPA} = \frac{20 \times 6.5 + 22 \times 7 + 25 \times 5.5 + 26 \times 6}{93}$$

$$= \frac{577.5}{93} = 6.2$$

TranscriptFormat

Basedontheaboverecommendationonlettergrades,gradepoints,SPGAandCGPA,thetranscriptshallbeissuedforeachsemesterwithaconsolidatedtranscriptindicatingtheperformancein all semesters.

DeclarationofPass

First Class with Distinction – CGPA of 7.5 and

aboveFirstClass – CGPAof 6.00-7.49

SecondClass –CGPAof5.00-5.99

2. InternalAssessmentandGuidelines

Themarksdistributionofinternalassessmentisshownin Appendix1andthespecificguidelinesinAppendix2.

3. UniversityTheoryandPracticalExaminationPattern

Thetheory questionpaperpatternandpracticalexampatternareshowninAppendix3.

SYLLABUSCOMMUNICATIV

EENGLISH

PLACEMENT:ISEMESTER

THEORY: 2Credits(40hours)

DESCRIPTION: The course is designed to enable students to enhance their ability to speak and write the language (and useEnglish) required for effective communication in their professional work. Students will practice their skills in verbal andwrittenEnglishduring clinicaland classroomexperience.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. IdentifythesignificanceofCommunicativeEnglishforhealthcareprofessionals.

2. ApplytheconceptsandprinciplesofEnglishLanguageuseinprofessionaldevelopmentsuchaspronunciation,vocabulary,grammar,paraphrasing,voicemodulation, Spelling,pauseandsilence.
3. Demonstrateattentivelisteningindifferenthypotheticalsituations.
4. Converseeffectively,appropriatelyandtimelywithinthegivencontextandtheindividualorteamtheyarecommunicating with either faceto faceor byothermeans.
5. Read,interpretandcomprehendcontentintext,flowsheet,framework,figures,tables,reports,anecdotesetc.
6. Analysethesituationandapplycriticalthinkingstrategies.
7. Enhanceexpressionsthroughwritingskills.
8. ApplyLSRW(Listening,Speaking,ReadingandWriting)Skillincombinationtolearn,teach,educateandshareinformation,ideasandresults.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	3(T)	Identify thesignificance ofcommunicativeEnglish	**Communication** • Whatiscommunication? • What are communication roles of listeners,speakers, readers and writers as healthcareprofessionals?	• Definitionswith examples,illustrations andexplanations • Identifyingcompetencies/communicativestrategiesinLSRW • Reading excerptson the above andinterpreting themthroughtasks	• Checking forunderstandingthroughtasks
II	5(T)	Describe conceptsand principles ofLanguage(English) use inprofessionaldevelopment suchas pronunciation,vocabulary,grammar, paraphrasing,voice modulation,spelling, pauseandsilence	**IntroductiontoLSRGW** • L–Listening:Differenttypesoflistening • S–Speaking:UnderstandingConsonants,Vowels, Word and Sentence Stress,Intonation • R–Reading:Medicalvocabulary, • Gr – Grammar: Understanding tenses,linkers • W – Writing simple sentences and shortparagraphs–emphasisoncorrectgrammar	• Exercises onlistening to news,announcements,telephoneconversations andinstructions fromothers • Information onfundamentals ofSpeech – Consonant, Vowel,Stress andIntonation withtasks based onthese throughaudio/video andtexts • Reading a medicaldictionary/ glossaryof medical termswith matchingexercises • Information ontenses and basicconcepts of correctgrammar throughfill in the blanks,true/falsequestions	• Through_check yourunderstanding‘exercises

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
III	5(T)	Demonstrateattentive listeningin differenthypotheticalsituations	**AttentiveListening** • Focusingonlisteningindifferentsituations – announcements,descriptions,narratives,instructions,discussions,demonstrations • ReproducingVerbatim • Listeningtoacademictalks/lectures • Listeningtopresentation	•Listening toannouncements,news,documentaries withtasks based onlistening •Withmultiple choice,Yes/Noand fill in the blankactivities	• Checkingindividuallyagainst correctanswers • Listening forspecificinformation •Listeningfor overall meaningandinstructions • Listening toattitudes andopinions • Listening toaudio, video andidentify keypoints
IV	9(T)	Converseeffectively,appropriately andtimely within thegiven context andthe individual orteam they arecommunicatingwitheitherfaceto face or othermeans	**Speaking–EffectiveConversation** • Conversation situations – informal, formalandneutral • Factors influencing way of speaking – setting, topic, social relationship, attitudeandlanguage • Greetings,introductions,requesting,askingfor and giving permission, speakingpersonally andcasualconversations • Askingforinformation,givinginstructionsanddirections • Agreeinganddisagreeing,givingopinions • Describingpeople,places,eventsandthings,narrating,reporting&reaching conclusions • Evaluatingandcomparing • Complaintsandsuggestions • Telephoneconversations • Deliveringpresentations	• Different types ofspeaking activitiesrelated to thecontent • Guided withprompts and freediscussions • Presentation techniques • Talking to peersandotheradults. • Talkingtopatientsand Patientattenders • Talking to otherhealthcare professionals • Classroomconversation • Scenariobased learningtasks	• Individual andgroup/peer assessmentthrough livespeakingtests • Presentation ofsituation inemergency androutine • Handoff • Reporting indoctors/nurses‘rounds • Casepresentation • Facetofaceoralcommunication • Speakingindividually(Nurse tonurse/patient/doctor) and toothers in thegroup
V	5(T)	Read, interpretand comprehendcontent in text,flow sheet,framework, figures, tables,reports,anecdotes	• **Reading** • Readingstrategies,readingnotesandmessages • Readingrelevantarticlesandnewsitems • Vocabulary for everyday activities,abbreviationsandmedicalvocabulary • Understandingvisuals,graphs,figuresandnoteson instructions	• Detailedtasksandexercises onreading forinformation,inference andevaluation • Vocabularygames and puzzles formedicallexis	• Telephonic talking • Reading/summarizing/justifying answersorally • Patientdocument • Doctor‘sprescription ofcare • Journal/news

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• Readingreportsandinterpretingthem • Usingidiomsandphrases,spottingerrors,vocabulary for presentations • RemedialGrammar	• Grammaractivities	reading andinterpretation • Notes/Reports
VI	5(T)	Enhanceexpressionsthrough writingskills Apply	**WritingSkills** • Writingpatienthistory • Notetaking • Summarising • Anecdotalrecords • Letterwriting • Diary/Journalwriting • Reportwriting • Paperwritingskills • Abstractwriting	• Writing tasks withfocus on taskfulfilment,coherence andcohesion,appropriatevocabulary andcorrectgrammar • Guided and freetasks • Different kinds ofletterwritingtasks	• Paper basedassessment by theteacher/ traineragainst set banddescriptors • Presentation ofsituation • Documentation • Reportwriting • Paper writingskills • Verbatimre producing • Letterwriting • Resume/CV
VII	8(T)	LSRWSkill incombination tolearn, teach,educate and shareinformation, ideasandresults	**LSRWSkills** • Criticalthinkingstrategiesforlisteningandreading • Oralreports,presentations • Writinginstructions,lettersand reports • ErroranalysisregardingLSRW	• Valuatingdifferent options/multipleanswers andinterpretingdecisions throughsituational activities • Demonstration – individually and ingroups • GroupDiscussion • Presentation • RolePlay • Writingreports	• Consolidatedassessment orallyand throughwrittentasks/exercises

APPLIEDANATOMY

PLACEMENT:ISEMESTER

THEORY:3Credits(60hours)

DESCRIPTION:Thecourseisdesignedtoassistsstudenttorecallandfurtheracquiretheknowledgeofthenormalstructureofhumanbody,identifyalterationinanatomicalstructurewithemphasisonclinicalapplicationtopracticenursing.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Describeanatomicalterms.
2. Explainthegeneralandmicroscopicstructureofeachsystemofthebody.
3. Identifyrelativepositionsofthe majorbodyorgansaswellastheirgeneralanatomiclocations.
4. Exploretheeffectofalterationsinstructure.
5. Applyknowledgeofanatomicstructurestoanalyzeclinicalsituationsandtherapeuticapplications.

COURSEOUTLINE

T –

Unit	Time (Hrs)	Learning Outcomes	TheoryCo	Teaching/ Learning Activities	Assessment Methods
I	8(T)	Define the termsrelative to theanatomicalposition Describe theanatomicalplanes Define and describethe terms used todescribemovements Organization ofhuman body andstructure of cell,tissues membranesandglands Describethetypesofcartilage	**ntent** **Introductiontoanatomicaltermsandorganizationofthehumanbody** • Introduction to anatomical terms relative toposition– anterior,ventral,posteriordorsal,superior, inferior, median, lateral, proximal,distal, superficial, deep, prone, supine,palmarandplantar • Anatomical planes (axial/ transverse/horizontal, sagittal/vertical plane andcoronal/frontal/obliqueplane) • Movements (flexion, extension, abduction,adduction, medial rotation, lateral rotation,inversion, eversion, supination, pronation,plantar flexion, dorsal flexion andcircumduction • Cellstructure,Celldivision • Tissue– definition,types,characteristics,classification, location • Membrane, glands – classification andstructure • Identifymajorsurfaceandbonylandmarksineach body region, Organization of humanbody • Hyaline,fibrocartilage,elastic cartilage • Featuresofskeletal,smoothandcardiacmuscle • Applicationandimplicationinnursing	• Lecture cumDiscussion • Useofmodels • Videodemonstration • Use ofmicroscopicslides • Lecture cumDiscussion • Video/Slides • Anatomical Torso	• Quiz • MCQ • Shortanswer
II	6(T)	Compareandcontrastthe features ofskeletal, smooth andcardiac muscle Describethestructureofrespiratorysystem Identify the musclesof respiration andexamine theircontribution to themechanism ofbreathing	**TheRespiratorysystem** • Structureoftheorgansofrespiration • Musclesofrespiration • Applicationandimplicationinnursing	• Lecture cumDiscussion • Models • Video/Slides	• Shortanswer • Objectivetype

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
III	6(T)	Describethestructureofdigestivesystem	**TheDigestivesystem** • Structureofalimentarycanalandaccessoryorgansof digestion • Applicationandimplicationsin nursing	• Lecture cumDiscussion • Video/Slides • Anatomical Torso	• Shortanswer • Objectivetype
IV	6(T)	Describethestructure of circulatory andlymphaticsystem.	**TheCirculatoryandLymphaticsystem** • Structureofbloodcomponents,bloodvessels – ArterialandVenoussystem • Positionofheartrelativetotheassociatedstructures • Chambersofheart,layersofheart • Heartvalves,coronaryarteries • Nerveandbloodsupplytoheart • Lymphatictissue • VeinsusedforIVinjections	• Lecture • Models • Video/Slides	• Shortanswer • MCQ
V	4(T)	Identify the majorendocrine glands anddescribethestructureofendocrineGlands	• Applicationandimplicationinnursing **TheEndocrinesystem** • StructureofHypothalamus,PinealGland,Pituitary gland, Thyroid, Parathyroid,Thymus,PancreasandAdrenal glands	• Lecture • Models/charts	• Shortanswer • Objectivetype
VI	4(T)	Describethestructureof various sensoryorgans	**TheSensoryorgans** • Structureofskin,eye,ear,noseandtongue • Applicationandimplicationsinnursing	• Lecture • Explain withVideo/models/charts	• Shortanswer • MCQ
VII	10 (T)	Describe anatomicalpositionandstructureofbonesand joints Identify major bonesthatmakeuptheaxialand appendicularskeleton Classifythejoints Identify theapplication andimplications innursing Describethestructureof muscle	**TheMusculoskeletalsystem:** **TheSkeletalsystem** • Anatomicalpositions • Bones – types, structure, growth andossification • Axialandappendicularskeleton • Joints – classification, major joints andstructure • Applicationandimplicationsinnursing	• Review – discussion • Lecture • Discussions • Explain usingcharts, skeletonandloosebonesandtorso • Identifyingmusclesinvolved innursingprocedures inlab	• Shortanswer • Objectivetype

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ Learning Activities	Assessment Methods
		Apply the knowledgein performing nursingprocedures/skills	**TheMuscularsystem** • Typesandstructureofmuscles • Musclegroups– musclesofthehead,neck,thorax, abdomen, pelvis, upper limb andlowerlimbs • Principalmuscles– deltoid,biceps,triceps,respiratory, abdominal, pelvic floor, pelvicfloor muscles, gluteal muscles and vastuslateralis • Majormusclesinvolvedinnursingprocedures		
VIII	5(T)	Describe the structureofrenalsystem	**TheRenalsystem** • Structureofkidney,ureters,bladder,urethra • Applicationandimplicationinnursing	• Lecture • Models/charts	• MCQ • Shortanswer
IX	5(T)	Describethestructureof reproductivesystem	**TheReproductivesystem** • Structureofmalereproductiveorgans • Structureoffemalereproductiveorgans • Structureofbreast	• Lecture • Models/charts	• MCQ • Shortanswer
X	6(T)	Describe the structureof nervous systemincluding thedistribution of thenerves,nerveplexuses Describe theventricularsystem	**TheNervoussystem** • ReviewStructureofneurons • CNS,ANSandPNS(Central,autonomicandperipheral) • Structureofbrain,spinalcord,cranialnerves,spinal nerves, peripheral nerves, functionalareasof cerebral cortex • Ventricularsystem– formation,circulation,anddrainage • Applicationandimplicationinnursing	• Lecture • Explain withmodels • Videoslides	• MCQ • Shortanswer

Note: Fewlabhourscanbeplannedforvisits,

observationandhandling(lessthan1 creditlabhoursarenot

specifiedseparately)

APPLIEDPHYSIOLOGY

PLACEMENT:ISEMESTER

THEORY: 3Credits(60hours)

DESCRIPTION: The course is designed to assists student to acquire comprehensive knowledge of the normal functions ofthe organ systems of the human body to facilitate understanding of physiological basis of health, identify alteration infunctionsandprovide thestudent withthenecessaryphysiologicalknowledgetopracticenursing.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Developunderstandingofthenormalfunctioningofvariousorgansystemsofthebody.
2. Identifytherelativecontributionofeachorgansystemtowardsmaintenanceofhomeostasis.
3. Describetheeffectofalterationsinfunctions.
4. Applyknowledgeofphysiologicalbasistoanalyzeclinicalsituationsandtherapeuticapplications.

COURSEOUTLINE

T–Theory

Unit	Time(Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	4(T)	Describethe physiologyofcell, tissues,membranes andglands	**GeneralPhysiology–Basicconcepts** •Cellphysiologyincludingtransportation acrosscellmembrane • Bodyfluidcompartments,Distributionof totalbody fluid,intracellularandextracellular compartments,majorelectrolytesandmaintenanceofhomeostasis • Cellcycle • Tissue–formation,repair • Membranesand glands –functions • Applicationandimplicationinnursing	• Review–discussion • Lecture cumDiscussion •Video demonstrations	• Quiz • MCQ • Shortanswer
II	6(T)	Describe thephysiology andmechanism ofrespiration Identify themuscles ofrespiration andexamineth eir contributiontothe mechanismof breathing	**Respiratorysystem** • Functionsofrespiratoryorgans • Physiologyofrespiration • Pulmonarycirculation–functionalfeatures • Pulmonaryventilation,exchangeofgases • Carriage of oxygen and carbon-dioxide,Exchangeof gasesintissue •Regulation ofrespiration • Hypoxia, cyanosis, dyspnea, periodicbreathing • Respiratorychangesduringexercise • Applicationandimplicationinnursing	• Lecture • Videoslides	• Essay • Shortanswer • MCQ
III IV	8(T) 6(T)	Describe thefunctions ofdigestivesystem Explain thefunctionsofthe	**Digestivesystem** • Functionsoftheorgansofdigestivetract • Saliva–composition,regulationofsecretionandfunctionsof saliva • Composition and function of gastric juice,mechanismandregulationofgastricsecretion • Compositionofpancreaticjuice,function,regulationof pancreaticsecretion • Functionsofliver,gallbladderandpancreas • Compositionofbileandfunction • Secretion and function of small and largeintestine • Movementsofalimentarytract • Digestioninmouth,stomach,smallintestine,largeintestine,absorption offood • Applicationandimplicationsinnursing **CirculatoryandLymphaticsystem** • Functionsofheart,conductionsystem,	•Lecture•Essay •Shortanswer •MCQ	•Shortanswer

•LecturecumDiscussion
•Videoslides

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
		heart, andphysiology ofcirculation	cardiac cycle, Stroke volume and cardiacoutput • Bloodpressure andPulse • Circulation– principles,factorsinfluencingbloodpressure, pulse • Coronary circulation, Pulmonary andsystemiccirculation • Heartrate –regulationofheartrate • Normalvalueandvariations • Cardiovascular homeostasis in exercise andposture • Applicationandimplicationinnursing	• Discussion • Video/Slides	• MCQ
V	5(T)	Describe thecomposition andfunctionsofblood	**Blood** • Blood–Functions,Physicalcharacteristics • Formationofbloodcells • Erythropoiesis– FunctionsofRBC,RBClifecycle • WBC–types,functions • Platelets – Function and production ofplatelets • Clottingmechanismofblood,clottingtime,bleedingtime, PTT • Hemostasis– roleofvasoconstriction,plateletplug formation in hemostasis, coagulationfactors, intrinsic and extrinsic pathways ofcoagulation • Bloodgroupsand types • Functionsofreticuloendothelialsystem,immunity • Applicationinnursing	• Lecture • Discussion • Videos	• Essay • Shortanswer • MCQ
VI	5(T)	Identifythemajorendocrine glandsand describe theirfunctions	**TheEndocrinesystem** • FunctionsandhormonesofPinealGland,Pituitary gland, Thyroid, Parathyroid,Thymus,PancreasandAdrenalglands. • Otherhormones • Alterationsindisease	• Lecture • Explain usingcharts	• Shortanswer • MCQ
VII	4(T)	Describe thestructure ofvarious sensoryorgans	• Applicationandimplicationinnursing **TheSensoryOrgans** • Functionsofskin • Vision,hearing,tasteandsmell • Errorsofrefraction, agingchanges	• Lecture • Video	• Shortanswer • MCQ
VIII	6(T)	Describe thefunctions of	• Applicationandimplicationsinnursing **Musculoskeletalsystem**	• Lecture	• Structuredessay

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
		bones,joints, various types ofmuscles, itsspecial propertiesand nervessupplyingthem	• Bones–Functions,movementsofbonesof axialandappendicularskeleton,Bonehealing • Jointsandjointmovements • Alterationofjointdisease • Properties and Functions of skeletal muscles – mechanismof musclecontraction • Structureandpropertiesofcardiacmusclesandsmoothmuscles • Applicationandimplicationinnursing	• Discussion • Videopresentation	• Shortanswer • MCQ
IX	4(T)	Describe thephysiology ofrenalsystem	**Renalsystem** • Functionsofkidneyinmaintainingho meostasis • GFR • Functionsofureters,bladderandurethra • Micturition • Regulationofrenalfunction • Applicationandimplicationinnursing	• Lecture • Chartsandmodels	• Shortanswer • MCQ
X	4(T)	Describe thestructure ofreproductivesystem	**TheReproductivesystem** • Femalereproductivesystem– Menstrualcycle, function and hormones of ovary,oogenesis, fertilization, implantation,Functionsof breast • Malereproductivesystem– Spermatogenesis,hormonesand itsfunctions, semen • Applicationandimplicationinprovidingnursingcare	• Lecture • Explain usingcharts, models,specimens	• Shortanswer • MCQ
XI	8(T)	Describe thefunctions ofbrain,physiology ofnervestimulus, reflexes, cranialandspinal nerves	• **Nervoussystem** • Overviewofnervoussystem • Reviewoftypes,structureandfunctionsof neurons • Nerveimpulse • Review functions of Brain-Medulla, Pons,Cerebrum,Cerebellum • SensoryandMotorNervoussystem • PeripheralNervoussystem • AutonomicNervoussystem • LimbicsystemandhighermentalFunctions-Hippocampus,Thalamus,Hypothalamus • Vestibularapparatus • Functionsofcranialnerves • Autonomicfunctions • Physiology of Pain-somatic, visceral andreferred	• Lecture cumDiscussion • Videoslides	• Brief structuredessays • Shortanswer • MCQ • Criticalreflection

Unit	Time(Hrs)	Learning Outcomes	Content	Teaching/Learning	Assessment
			• Reflexes • CSFformation,composition,circulationofCSF, blood brain barrier and blood CSFbarrier • Applicationandimplicationinnursing		

Note: Fewlabhourscanbeplannedforvisits,

observationandhandling(lessthan1 creditlabhoursarenot

specifiedseparately)

APPLIEDSOCIOLOGY

PLACEMENT:ISEMESTER

THEORY: 3Credits(60hours)

DESCRIPTION: Thiscourseisdesignedtoenablethestudentstodevelopunderstandingaboutbasicconceptsofsociologyanditsapplication in personaland community life, health, illnessandnursing.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Identifythescopeandsignificanceofsociologyinnursing.
2. Applytheknowledgeofsocialstructureanddifferentcultureinasocietyinidentifyingsocialneedsofsickclients.
3. Identifytheimpactofcultureonhealthandillness.
4. Developunderstandingabouttypesoffamily,marriageanditslegislation.
5. Identifydifferenttypesofcaste,class,socialchangeanditsinfluenceonhealthandhealthpractices.
6. Developunderstandingaboutsocialorganizationanddisorganizationandsocialproblemsin India.
7. Integratetheknowledgeofclinicalsociology anditsusesincrisisintervention.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	1	(T)Describe the scopeand significance	**Introduction** • Definition,natureandscopeofsociology • Significanceofsociologyinnursing	• Lecture • Discussion	•Essay •Shortanswer
II	15(T)	Describethe individualization,Groups,processesof Socialization, socialchange and itsimportance	**Socialstructure** • Basic concept of society, community,associationandinstitution • Individualandsociety • Personaldisorganization • Social group – meaning, characteristics, andclassification. • Socialprocesses–definitionandforms,Co-operation, competition,conflict,accommodation,assimilation,isolation • Socialization – characteristics, process,agenciesof socialization • Socialchange–	• Lecture cumDiscuss	• Essay • Shortanswer • Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ Learning Activities	Assessment Methods
			• Structureandcharacteristicsofurban,ruralandtribalcommunity. • Major health problems in urban, rural and tribalcommunities • Importanceofsocialstructureinnursingprofession		
III	8(T)	Describe culture andits impact on healthanddisease	**Culture** • Nature,characteristicandevolutionof culture • Diversityanduniformityofculture • Differencebetweencultureandcivilization • Cultureandsocialization • Transculturalsociety • Culture,Modernizationanditsimpactonhealthanddisease	• Lecture • Paneldiscussion	• Essay • Shortanswer
IV	8(T)	Explain family,marriage andlegislation related tomarriage	**FamilyandMarriage** • Family– characteristics,basicneed,typesandfunctionsof family • Marriage – forms of marriage, social customrelatingtomarriageandimportanceofmarriage • LegislationonIndian marriageandfamily. • Influenceof marriageandfamilyonhealthandhealthpractices	• Lecture	• Essay • Shortanswer • Case studyreport
V	8(T)	Explain differenttypes of caste andclasses in societyand its influence onhealth	**Socialstratification** • Introduction– Characteristics&formsofstratification • Functionofstratification • Indiancastesystem–originandcharacteristics • Positiveandnegativeimpactofcasteinsociety. • Classsystemandstatus • Socialmobility-meaningandtypes • Race–concept,criteriaofracialclassification • Influenceofclass,casteandracesystemonhealth.	• Lecture • Paneldiscussion	• Essay • Shortanswer • Objectivetype
VI	15(T)	Explainsocial organization,disorganization,socialproblemsandrole of nurse inreducing socialproblems	**Socialorganizationanddisorganization** • Socialorganization– meaning,elementsandtypes • Voluntaryassociations • Social system – definition, types, role andstatusasstructuralelementofsocialsystem. • Interrelationshipofinstitutions • Socialcontrol– meaning,aimsandprocessofsocialcontrol	• Lecture • Groupdiscussion • Observational visit	• Essay • Shortanswer • Objectivetype • Visitreport

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ Learning Activities	Assessment Methods
			•Socialnorms,moralandvalues •Socialdisorganization– definition,causes,Controlandplanning •Majorsocialproblems– poverty,housing,foodsupplies, illiteracy, prostitution, dowry, Childlabour, child abuse, delinquency, crime,substanceabuse,HIV/AIDS,COVID-19 •Vulnerablegroup– elderly,handicapped,minority andothermarginalgroup. •Fundamentalrightsofindividual,womenandchildren •Roleofnursein reducingsocial problemandenhancecoping		
VII	5(T)	Explain clinicalsociology and itsapplication in thehospital andcommunity	•SocialwelfareprogramsinIndia **Clinicalsociology** •Introductiontoclinicalsociology •Sociologicalstrategiesfordevelopingservicesfor theabused •Useof clinicalsociology incrisisintervention	•Lecture, •Groupdiscussion •Roleplay	•Essay •Shortanswer

APPLIEDPSYCHOLOGY

PLACEMENT:ISEMESTER

THEORY:3Credits(60Hours)

DESCRIPTION: Thiscourseisdesignedtoenablethestudentstodevelopunderstandingaboutbasicconceptsofpsychology and its application in personal and community life, health, illness and nursing. It further provides studentsopportunitytorecognizethe significanceandapplicationofsoftskillsandself-empowermentinthepracticeofnursing.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Identifytheimportanceofpsychologyinindividualandprofessionallife.
2. Developunderstandingofthebiologicalandpsychologicalbasisofhumanbehaviour.
3. Identifytheroleofnurseinpromoting mentalhealthanddealingwithalteredpersonality.
4. Performtheroleof nursesapplicabletothepsychology ofdifferentagegroups.
5. Identifythecognitiveandaffectiveneedsofclients.
6. Integratetheprinciplesofmotivationandemotioninperformingtheroleofnurseincaringfor emotionallysickclient.
7. Demonstratebasicunderstandingofpsychologicalassessmentandnurse‘srole.
8. Applytheknowledgeofsoftskillsinworkplaceandsociety.
9. Applytheknowledgeofself-empowermentinworkplace,societyandpersonallife.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	2(T)	Describe scope,branches andsignificance ofpsychology innursing	**Introduction** • MeaningofPsychology • Development of psychology – Scope,branchesand methodsofpsychology • Relationshipwithothersubjects • Significanceofpsychologyinnursing • Appliedpsychologytosolveeverydayissues	• Lecture cumDiscussion	• Essay • Shortanswer
II	4(T)	Describebiologyofhumanbehaviour	**Biologicalbasisofbehavior–Introduction** • Bodymindrelationship • Geneticsandbehaviour • Inheritanceofbehaviour • Brainandbehaviour. • Psychologyandsensation–sensoryprocess –normalandabnormal	• Lecture • Discussion	• Essay • Shortanswer
III	5(T)	Describe mentallyhealthypersonanddefensemechanisms	**Mentalhealthandmentalhygiene** • Conceptofmentalhealthandmentalhygiene • Characteristicofmentally healthyperson • Warningsignsofpoormental health • Promotiveandpreventivementalhealthstrategiesandservices • Defensemechanismanditsimplication • Frustration and conflict – types of conflictsand measurementstoovercome • Role of nurse in reducing frustration andconflictandenhancingcoping • Dealingwithego	• Lecture • Casediscussion • Roleplay	• Essay • Shortanswer • Objectivetype
IV	7(T)	Describepsychology ofpeople in differentage groups and roleofnurse	**Developmentalpsychology** • Physical, psychosocial and cognitivedevelopment across life span – Prenatalthrough early childhood, middle to latechildhood through adolescence, early andmid-adulthood, late adulthood, death anddying • Roleofnurseinsupportingnormalgrowthand developmentacrossthelifespan • Psychological needs of various groups inhealth and sickness – Infancy, childhood,adolescence,adulthoodandolderadult • Introductiontochildpsychologyandroleofnurseinmeetingthepsychologicalneedsof	• Lecture • Group • discussion	• Essay • Shortanswer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			children • Psychology of vulnerable individuals – challenged,women,sick etc. • Roleofnursewith vulnerablegroups		
V	4(T)	Explain personalityand role of nurse inidentification andimprovement inalteredpersonality	**Personality** • Meaning,definitionofpersonality • Classificationofpersonality • Measurementandevaluationofpersonality –Introduction • Alterationinpersonality • Roleofnurseinidentificationofindividualpersonality and improvement in alteredpersonality	• Lecture • Discussion • Demonstration	• Essay and shortanswer • Objectivetype
VI	16(T)	Explaincognitive process and theirapplications	**Cognitiveprocess** • **Attention**– definition,types,determinants,duration, degreeandalterationinattention • **Perception –** Meaning of Perception,principles,factoraffectingperception, • **Intelligence** – Meaning of intelligence – Effect of heredity and environment inintelligence, classification, Introduction tomeasurement of intelligence tests – Mentaldeficiencies • **Learning –** Definition of learning, types oflearning, Factors influencing learning – Learningprocess,Habitformation • **Memory**- meaningandnatureofmemory,factors influencing memory, methods toimprove memory, forgetting • **Thinking** – types, level, reasoning andproblemsolving. • **Aptitude** – concept, types, individualdifferencesandvariability • Psychometricassessmentofcognitiveprocesses– Introduction • Alterationincognitiveprocesses	• Lecture • Discussion	• Essay and shortanswer • Objectivetype
VII	6(T)	Describemotivation,emotion, attitudeandroleofnurseinemotionally sickclient	**Motivationandemotionalprocesses** • **Motivation** – meaning, concept, types,theoriesofmotivation,motivationcycle,biologicalandspecial motives • **Emotions –** Meaning of emotions,development of emotions, alteration ofemotion,emotionsinsickness –handlingemotionsin self andother • Stressandadaptation– stress,stressor,cycle,effect,adaptationandcoping	• Lecture • Groupdiscussion	• Essay and shortanswer • Objectivetype

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• **Attitudes** – Meaning of attitudes, nature,factor affecting attitude, attitudinal change,Roleof attitude in healthand sickness • Psychometricassessmentofemotionsandattitude– Introduction • Roleofnurseincaringforemotionallysickclient		
VIII	4(T)	Explainpsychological assessmentandtestsandroleofnurse	**Psychological assessment and tests – introduction** •Types,development,characteristics, principles,uses,interpretation • Roleofnurseinpsychological assessment	• Lecture • Discussion • Demonstration	• Shortanswer • Assessmentof practice
IX	10(T)	Explainconceptof soft skill and itsapplicationinworkplaceandsociety	**Applicationofsoftskill** • Conceptofsoftskill • Types of soft skill – visual, aural andcommunication skill • Thewayofcommunication • Buildingrelationshipwithclientandsociety • **Interpersonal Relationships (IPR):**Definition, Types, and Purposes,Interpersonalskills,Barriers,Strategiestoovercomebarriers • Survivalstrategies– managingtime,copingstress,resilience,work–lifebalance • Applyingsoftskilltoworkplaceandsociety – Presentation skills, social etiquette,telephone etiquette, motivational skills,teamworketc.	• Lecture • Groupdiscussion • Roleplay • Refer/CompleteSoftskillsmodule	•Essayandshortanswer
X	2(T)	Explain self-empowerment	• Useofsoftskillinnursing **Self-empowerment** •Dimensionsofself-empowerment •Self-empowermentdevelopment •Importanceofwomen‘sempowermentinsociety •Professionaletiquetteandpersonalgrooming •Roleofnurseinempoweringothers	• Lecture • Discussion	• Shortanswer • Objectivetype

NURSING FOUNDATION - I (including First Aid module)PLACEMENT: I SEMESTER

THEORY: 6Credits(120hours)

PRACTICUM: SkillLab:2Credits(80hours)andClinical:2Credits(160hours)

DESCRIPTION: Thiscourseisdesignedtohelpnovicenursingstudentsdevelopknowledgeandcompetenciesrequiredtoprovideevidence-based,comprehensivebasicnursing careforadult patients,usingnursingprocessapproach.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Developunderstandingabouttheconceptofhealth,illnessandscopeofnursingwithinhealthcareservices.
2. Applyvalues,codeofethicsandprofessional conductinprofessional life.
3. Applytheprinciplesandmethodsofeffectivecommunicationinestablishingcommunicationlinkswithpatients,familiesandother healthteammembers.
4. Developskillinrecordingandreporting.
5. Demonstratecompetencyinmonitoringanddocumentingvitalsigns.
6. Describethefundamentalprinciplesandtechniquesofinfectioncontrolandbiomedicalwastemanagement.
7. Identifyandmeetthecomfortneedsofthepatients.
8. Performadmission,transfer, anddischargeofa patientundersupervisionapplyingtheknowledge.
9. Demonstrateunderstandingandapplicationofknowledgeincaringforpatientswithrestricted mobility.
10. Performfirstaidmeasuresduringemergencies.
11. Identifytheeducationalneedsofpatientsanddemonstratebasicskillsofpatienteducation.

***MandatoryModuleusedinTeaching/Learning:**

FirstAid:40Hours(includingBasicCPR)

COURSEOUTLINE

T–Theory, SL – SkillLab

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ Learning Activities	Assessment Methods
I	5(T)	Describe theconcept of healthandillness	**Introductiontohealthandillness** • Concept of Health – Definitions (WHO),Dimensions • Maslow'shierarchyofneeds • Health–Illnesscontinuum • Factorsinfluencinghealth • Causes and risk factors for developingillnesses • Illness–Types,illnessbehavior • Impactof illnessonpatientand family	• Lecture • Discussion	• Essay • Shortanswer • Objective type
II	5(T)	Describe the levelsofillnesspreventionandcare,health careservices	**HealthCareDeliverySystems–** ***IntroductionofBasicConcepts&Meanings*** • Levels of Illness Prevention – Primary(Health Promotion), Secondary andTertiary • LevelsofCare– Primary,SecondaryandTertiary • Types of health care agencies/ services – Hospitals, clinics, Hospice, rehabilitationcentres,extended carefacilities	• Lecture • Discussion	• Essay • Shortanswer • Objective type

• Hospitals–Types,Organizationand

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			Functions • Healthcareteamsinhospitals– membersandtheirrole		
III	12(T)	Trace the history ofNursing Explain theconcept, nature andscopeof nursing Describe values,codeof ethics andprofessionalconduct for nursesinIndia	**History of Nursing and Nursing as aprofession** • HistoryofNursing,HistoryofNursinginIndia • ContributionsofFlorenceNightingale • Nursing – Definition – Nurse, Nursing,Concepts, philosophy, objectives,Characteristics, nature and Scope ofNursing/ Nursing practice, Functions ofnurse,Qualitiesofanurse,Categoriesofnursingpersonnel • Nursing as a profession – definition andcharacteristics/criteriaofprofession • Values – Introduction – meaning andimportance • Code of ethics and professional conductfor nurses– Introduction	• Lecture • Discussion • Casediscussion • Roleplays	• Essay • Shortanswers • Objective type
IV	8(T) 3(SL)	Describetheprocess, principles,andtypesofcommunication Explain therapeutic,non-therapeutic andprofessionalcommunication Communicateeffectively withpatients, theirfamilies and teammembers	**CommunicationandNursePatient Relationship** • Communication–Levels,Elementsand Process,Types,Modes,Factors influencingcommunication • Methods of effectivecommunication/therapeuticcommunicationtechniques • Barriers to effective communication/non-therapeuticcommunicationtechniques • Professionalcommunication • HelpingRelationships(NursePatientRelationship)–PurposesandPhases • Communicatingeffectivelywith patient,familiesandteammembers • Maintaining effective human relations andcommunication with vulnerable groups(children,women,physicallyandmentallychallengedand elderly)	• Lecture • Discussion • Roleplayandvideo filmonTherapeutic Communication	• Essay • Shortanswer • Objective type
V	4(T) 2(SL)	Describe thepurposes,typesandtechniques ofrecording andreporting Maintain recordsand reportsaccurately	**DocumentationandReporting** • Documentation – Purposes of Reports andRecords • Confidentiality • Types of Client records/Common Record-keepingforms • Methods/Systems ofdocumentation/Recording	• Lecture • Discussion • Demonstration	• Essay • Shortanswer • Objective type

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• Guidelinesfordocumentation • Do‘sandDon‘tsofdocumentation/LegalguidelinesforDocumentation/Recording • Reporting – Change of shift reports,Transferreports,Incidentreports		
VI	15(T) 20(SL)	Describe principlesand techniques ofmonitoring andmaintaining vitalsigns Assess and recordvitalsignsaccurately	**Vitalsigns** • Guidelinesfortakingvitalsigns • *Bodytemperature*– ○ Definition,Physiology,Regulation, Factorsaffectingbodytemperature ○ Assessmentofbodytemperature– sites,equipmentand technique ○ Temperature alterations – Hyperthermia, Heat Cramps, HeatExhaustion,Heatstroke,Hypothermia ○ Fever/Pyrexia– Definition,Causes,Stages,Types • NursingManagement ○HotandColdapplications • *Pulse*: ○ Definition,PhysiologyandRegulation, Characteristics,Factorsaffectingpulse ○ Assessment of pulse – sites, equipmentandtechnique ○ Alterationsinpulse • *Respiration:* ○ Definition, Physiology and Regulation,Mechanicsofbreathing,Characteristics, Factorsaffectingrespiration ○ Assessmentofrespirations–technique ○ ArterialOxygensaturation ○ Alterationsinrespiration • *Bloodpressure*: ○ Definition,PhysiologyandRegulation, Characteristics,FactorsaffectingBP ○ Assessment of BP – sites, equipmentand technique, Common Errors in BPAssessment ○ AlterationsinBloodPressure	• Lecture • Discussion • Demonstration &Re-demonstration	• Essay • Shortanswer • Objective type • Document thegiven valuesoftemperature,pulse, andrespiration inthe graphicsheet • OSCE
VII	3(T)	MaintainequipmentandlinenEquipmentandLinen	• DocumentingVitalSigns • Types–Disposablesandreusable ○Linen,rubbergoods,glassware, metal,plastics,furniture • Introduction– Indent,maintenance,Inventory		

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
VIII	10(T) 3(SL)	Describe the basicprinciples andtechniques ofinfection controland biomedicalwastemanagement	**IntroductiontoInfectionControlinClinicalsetting Infection** • Natureofinfection • Chainofinfection • Typesofinfection • Stagesofinfection • Factors increasing susceptibility toinfection • Body defenses against infection – Inflammatory response & Immuneresponse • Healthcareassociatedinfection(Nosocomialinfection) **IntroductoryconceptofAsepsis– Medical&Surgicalasepsis** ***Precautions*** • HandHygiene • (HandwashinganduseofhandRub) • Use of Personal Protective Equipment(PPE) • Standardprecautions ***BiomedicalWastemanagement*** • Typesofhospitalwaste,wastesegregationandhazards – Introduction	• Lecture • Discussion • Demonstration • Observation ofautoclaving andother sterilizationtechniques • Video presentationon medical &surgicalasepsis	• Essay • Shortanswer • Objective type
IX	15(T) 15(SL)	Identify and meetthecomfortneedsofthepatients	***Comfort,Rest&SleepandPain*** • Comfort ○ FactorsInfluencingComfort ○ Typesofbedsincludinglatestbeds,purposes& bedmaking ○ Therapeuticpositions ○ Comfortdevices • SleepandRest ○ Physiologyofsleep ○ Factorsaffectingsleep ○ PromotingRestandsleep ○ SleepDisorders • Pain(Discomfort) ○ Physiology ○ Commoncauseofpain ○ Types ○ Assessment– painscalesandnarcoticscales	• Lecture • Discussion • Demonstration &Re-demonstration	• Essay • Shortanswer • Objective type • OSCE

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			○ Pharmacological and Non-pharmacological pain relievingmeasures– Useofnarcotics,TENSdevices,PCA ○ Invasivetechniquesofpain management ○ Anyothernewermeasures ○ CAM(Complementary&AlternativehealingModalities)		
X	5(T) 3(SL)	Describe theconceptofpatientenvironment	**PromotingSafetyinHealthCareEnvironment** • Physicalenvironment–Temperature, Humidity,Noise,Ventilation,Light,Odor, Pest control • Reduction of Physical hazards – fire,accidents • FallRiskAssessment • Roleofnursein providingsafeandcleanenvironment • Safetydevices– ○ Restraints – Types, Purposes,Indications, Legal Implications andConsent,ApplicationofRestraints- SkillandPracticeguidelines ○ OtherSafetyDevices– Siderails,Grabbars, Ambu alarms, non-skid slippersetc.	• Lecture • Discussion • Demonstration	• Essay • Shortanswer • Objective type
XI	6(T) 2(SL)	Explainandperform admission, transfer,and discharge of apatient	**HospitalAdmissionanddischarge** • Admission to the hospital Unit andpreparationof unit ○ Admissionbed ○ Admissionprocedure ○ Medico-legalissues ○ RolesandResponsibilitiesofthenurse • Dischargefromthehospital ○ Types– Planneddischarge,LAMAandAbscond, Referralsandtransfers ○ DischargePlanning ○ Dischargeprocedure ○ Medico-legalissues ○ RolesandResponsibilitiesofthenurse ○ Careoftheunitafterdischarge	• Lecture • Discussion • Demonstration	• Essay • Shortanswer • Objectivetype
XII	8(T) 10(SL)	Demonstrateskillincaring for patientswith restrictedmobility	**MobilityandImmobility** • Elements of Normal Movement,Alignment&Posture,Joint Mobility,Balance,CoordinatedMovement	• Lecture • Discussion • Demonstration&	• Essay • Shortanswer • Objective

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			•Principlesofbodymechanics •FactorsaffectingBodyAlignmentandactivity •Exercise–Typesandbenefits •EffectsofImmobility •MaintenanceofnormalBodyAlignmentand Activity •AlterationinBodyAlignmentandmobility •NursinginterventionsforimpairedBodyAlignment and Mobility – assessment,types,devicesused, method ○ Rangeofmotionexercises ○ Musclestrengtheningexercises ○ Maintainingbodyalignment–positions ○ Moving ○ Lifting ○ Transferring ○ Walking •Assistingclientswithambulation •CareofpatientswithImmobility usingNursingprocessapproach •Careofpatientswithcastsandsplints	Re-demonstration	type •OSCE
XIII	4(T) 2(SL)	Describe theprinciples andpractice of patienteducation	**Patienteducation** •PatientTeaching–Importance,Purposes,Process •Integratingnursingprocessinpatientteaching	•Discussion •Roleplays	•Essay •Shortanswer •Objectivetype
XIV	20(T) 20(SL)	Explain and applyprinciples of FirstAid duringemergencies	**FirstAid*** •Definition,BasicPrinciples,Scope&Rules •FirstAidManagement ○ Wounds,Hemorrhage&Shock ○ MusculoskeletalInjuries–Fractures, Dislocation,Muscleinjuries ○ TransportationofInjuredpersons ○ RespiratoryEmergencies&Basic CPR ○ Unconsciousness ○ ForeignBodies–Skin,Eye,Ear,Nose, Throat&Stomach ○ Burns&Scalds ○ Poisoning,Bites&Stings ○ Frostbite&EffectsofHeat ○ CommunityEmergencies	•Lecture •Discussion •Demonstration &Re-demonstration •Modulecompletion •National DisasterManagementAuthority(NDMA) / Indian Red CrossSociety (IRCS)FirstAidmodule	•Essay •Shortanswer •Objectivetype •OSCE

*Mandatorymodule

CLINICALPRACTICUM

ClinicalPracticum: 2Credits(160hours),10weeks×16hoursperweek

PRACTICECOMPETENCIES: Oncompletionoftheclinicalpracticum,thestudentswillbeableto

1. Maintaineffectivehumanrelations(projectingprofessionalimage)
2. Communicateeffectivelywithpatient,familiesandteammembers
3. Demonstrateskillsintechniquesofrecordingandreporting
4. Demonstrateskillinmonitoringvitalsigns
5. Careforpatientswithalteredvitalsigns
6. Demonstrateskillinimplementingstandardprecautionsanduseof PPE
7. Demonstrateskillinmeetingthecomfortneedsofthepatients
8. Providesafeandcleanenvironment
9. Demonstrateskillinadmission,transfer,anddischargeofapatient
10. Demonstrateskillincaringforpatientswithrestrictedmobility
11. Planandprovideappropriatehealthteachingfollowingtheprinciples
12. AcquireskillsinassessingandperformingFirstAidduringemergencies.

SKILLLAB

UseofMannequinsandSimulators

S.No.	Competencies	ModeofTeaching
1.	TherapeuticCommunicationandDocumentation	RolePlay
2.	Vitalsigns	Simulator/Standardizedpatient
3.	MedicalandSurgicalAsepsis	Videos/Mannequin
4.	PainAssessment	Standardizedpatient
5.	ComfortDevices	Mannequin
6.	TherapeuticPositions	Mannequin
7.	PhysicalRestraintsandSiderails	Mannequin
8.	ROMExercises	Standardizedpatient
9.	Ambulation	Standardizedpatient
10.	MovingandTurningpatientsinbed	Mannequin
11.	Changingpositionofhelplesspatients	Mannequin/Standardizedpatient
12.	Transferringpatientsbedtostretcher/wheelchair	Mannequin/Standardizedpatient
13.	Admission,Transfer,Discharge&HealthTeaching	RolePlay

CLINICAL POSTINGS – General Medical/Surgical Wards10weeks×16hours/week =160Hours

Clinical Unit	Duration(inWeeks)	LearningOutcomes	ProceduralCompetencies/Clinical Skills (SupervisedClinicalPractice)	ClinicalRequirements	AssessmentMethods
General Medical/ Surgical wards	2	Maintain effectivehuman relations(projecting professionalimage) Communicateeffectively withpatient, families andteammembers Demonstrateskillsintechniques ofrecording andreporting	**Communication and Nursepatientrelationship** •MaintainingCommunicationwithpatient and family andinterpersonalrelationship •DocumentationandReporting ○ Documentingpatientcareandprocedures ○ Verbalreport ○ Writtenreport		•OSCE
	2	Demonstrateskillin monitoring vitalsigns Careforpatientswithalteredvitalsigns Demonstrate skill inimplementingstandard precautionsanduseof PPE	*Vitalsigns* •Monitor/measureanddocumentvitalsignsinagraphicsheet ○ Temperature(oral,tympanic,axillary) ○ Pulse(Apicalandperipheralpulses) ○ Respiration ○ Bloodpressure ○ Pulseoximetry •Interpretandreport alteration •Cold Applications – ColdCompress, Ice cap, TepidSponging •Careofequipment–thermometer,BP apparatus, Stethoscope, Pulseoximeter *Infection control in Clinicalsettings* •Handhygiene •UseofPPE	•Careofpatients with alterationsinvitalsigns-1	•Assessmentof clinical skillsusingchecklist •OSCE
	3	Demonstrate skill inmeeting the comfortneedsofthepatients	**Comfort, Rest & Sleep, Pain andPromoting Safety in Health CareEnvironment** *Comfort,Rest&Sleep* •Bedmaking- ○ Open ○ Closed ○ Occupied ○ Post-operative		•Assessment ofclinical skillsusingchecklist •OSCE

Clinical Unit	Duration(inWeeks)	LearningOutcomes	ProceduralCompetencies/Clinical Skills (SupervisedClinicalPractice)	ClinicalRequirements	AssessmentMethods
		Providesafeandcleanenvironment	○ Cardiacbed ○ Fracturebed •Comfortdevices ○ Pillows ○ Overbedtable/cardiactable ○ Backrest ○ BedCradle •TherapeuticPositions ○ Supine ○ Fowlers(low,semi,high) ○ Lateral ○ Prone ○ Sim‘s ○ Trendelenburg ○ Dorsalrecumbent ○ Lithotomy ○ Kneechest *Pain* •Painassessmentandprovisionforcomfort *Promoting Safety in Health CareEnvironment* •CareofPatient‘sUnit •UseofSafetydevices: ○SideRails •Restraints(Physical) •FallriskassessmentandPostFallAssessment	•Fall riskassessment-1	
	2	Demonstrate skill inadmission, transfer,and discharge of apatient	**Hospital Admission anddischarge, Mobility andImmobilityandPatienteducation** *HospitalAdmissionanddischarge* Perform&Document: •Admission •Transfer •PlannedDischarge		•Assessment ofclinical skillsusingchecklist •OSCE
		Demonstrate skill incaring for patientswith restrictedmobility	*MobilityandImmobility* •Rangeof MotionExercises •Assistpatientin: ○Moving	•Individualteaching-1	•Assessment ofclinical skillsusingchecklist •OSCE

Clinical Unit	Duration(inWeeks)	LearningOutcomes	ProceduralCompetencies/Clinical Skills(Supervised ClinicalPractice)	Clinical Requirements	Assessment Methods
		Plan and provideappropriate healthteaching followingtheprinci	○ Turning ○ Logrolling • Changingpositionofhelplesspatient • Transferring (Bed to and fromchair/wheelchair/stretcher)		
	1	Demonstrateskillsin assessingand performingFirstAiddduringemergencies	**FirstaidandEmergencies** • BandagingTechniques ○ BasicBandages: ▪ Circular ▪ Spiral ▪ Reverse-Spiral ▪ Recurrent ▪ FigureofEight ○ SpecialBandages: ▪ Caplin ▪ Eye/EarBandage ▪ JawBandage ▪ ShoulderSpica ▪ Thumbspica ▪ TriangularBandage/Sling(Head& limbs) ▪ Binders	• ModulecompletionNationalDisasterManagementAuthority (NDMA) FirstAid module(Tocompleteitin clinicals ifnot completedduringlab)	• Assessment ofclinical skillsusingchecklist • OSCE (first

APPLIEDBIOCHEMISTRY

PLACEMENT:IISEMESTER

THEORY: 2credits(40hours) (includeslabhoursalso)

DESCRIPTION: The course is designed to assist the students to acquire knowledge of the normal biochemical compositionandfunctioning ofhumanbody,itsalterationsindiseaseconditionsandtoapply thisknowledgeinthepracticeofnursing.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Describethe metabolismofcarbohydratesanditsalterations.
2. Explainthe metabolismoflipidsanditsalterations.
3. Explainthe metabolismofproteinsandaminoacidsanditsalterations.
4. Explainclinicalenzymology invariousdisease conditions.
5. Explainacidbasebalance,imbalanceanditsclinicalsignificance.
6. Describethemetabolismofhemoglobinanditsclinicalsignificance.
7. Explaindifferentfunctiontestsandinterpretthefindings.
8. Illustratetheimmunochemistry.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	8(T)	Describe themetabolism ofcarbohydrates anditsalterations	**Carbohydrates** •Digestion,absorptionandmetabolismofcarbohydratesand related disorders •Regulationofblood glucose •Diabetes Mellitus – type 1 and type 2,symptoms,complications&management inbrief •InvestigationsofDiabetesMellitus ○ OGTT–Indications,Procedure, InterpretationandtypesofGTTcurve ○ MiniGTT,extendedGTT,GCT,IVGTT ○ HbA1c(Onlydefinition) •Hypoglycemia–Definition&causes	•Lecturecum Discussion •Explain usingchartsandslides •Demonstrationoflaboratory tests	•Essay •Shortanswer •Veryshortanswer
II	8(T)	Explain themetabolism oflipids and itsalterations	**Lipids** •Fattyacids–Definition,classification •Definition & Clinical significance ofMUFA&PUFA,Essentialfattyacids, Transfattyacids •Digestion,absorption&metabolismoflipids& relateddisorders •Compoundsformedfromcholesterol •Ketonebodies(name,types&significanceonly) •Lipoproteins–types&functions(metabolismnot required) •Lipid profile	•Lecturecum Discussion •Explain usingchartsandslides •Demonstrationoflaboratory tests	•Essay •Shortanswer •Veryshortanswer
III	9(T)	Explain themetabolism ofamino acids andproteins Identify alterationsin diseaseconditions	•Atherosclerosis(inbrief) **Proteins** •Classification of amino acids based onnutrition,metabolicratewithexamples •Digestion,absorption&metabolismofprotein& related disorders •Biologically important compoundssynthesizedfromvariousaminoacids(only names) •Inbornerrorsofaminoacid metabolism –onlyaromatic aminoacids(inbrief) •Plasmaprotein –types,function&normalvalues •Causesofproteinuria,hypoproteinemia,hyper-gammaglobinemia •Principleof electrophoresis,normal&abnormalelectrophoreticpatterns(in	•Lecturecum Discussion •Explain usingcharts,modelsandslides	•Essay •Shortanswer •Veryshortanswer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			brief)		
IV	4(T)	Explain clinicalenzymology invariousdiseaseconditions	**ClinicalEnzymology** •Isoenzymes–Definition&properties •Enzymesofdiagnosticimportancein ○ LiverDiseases–ALT,AST,ALP,GGT ○ Myocardial infarction – CK, cardiactroponins,AST, LDH ○ Muscledisease s–CK,Aldolase ○ Bonediseases–ALP ○ Prostatecancer–PSA,ACP	•Lecturecum Discussion •Explain usingchartsandslides	•Essay •Shortanswer •Veryshortanswer
V	3(T)	Explain acid basebalance, imbalanceand its clinicalsignificance	**Acidbasemaintenance** •pH– definition,normalvalue •RegulationofbloodpH–bloodbuffer,respiratory & renal •ABG–normal values •Acidbasedisorders –types,definition&causes	•Lecturecum Discussion •Explain usingchartsandslides	•Shortanswer •Veryshortanswer
VI	2(T)	Describe themetabolism ofhemoglobin and itsclinicalsignificance	**Hemecatabolism** •Hemedegradationpathway •Jaundice–type,causes,urine&bloodinvestigations(vandenbergtest)	•Lecturecum Discussion •Explain usingchartsandslides	•Shortanswer •Veryshortanswer
VII	3(T)	Explain differentfunction tests andinterpretthefindings	**Organ function tests (biochemicalparameters&normal valuesonly)** •Renal •Liver	•Lecturecum Discussion •VisittoLab	•Shortanswer •Veryshortanswer
VIII	3(T)	Illustrate theimmunochemistry	•Thyroid **Immunochemistry** •Structure&functionsofimmunoglobulin •Investigations&interpretation–ELISA	•Explain usingchartsandslides •Lecturecum Discussion •Explain usingchartsandslides •Demonstrationoflaboratory tests	•Shortanswer •Veryshortanswer

Note: Fewlabhourscanbeplannedforobservationandvisits(Lessthan1credit, labhoursarenotspecifiedseparately).

APPLIEDNUTRITIONANDDIETETICS

PLACEMENT:IISEMESTER

THEORY: 3 credits (60 hours)Theory:45 hours

Lab :15hours

DESCRIPTION: Thecourseisdesignedtoassistthestudentstoacquirebasicknowledgeandunderstandingoftheprinciplesof Nutrition andDieteticsandapplythisknowledgein thepracticeof Nursing.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Identifytheimportanceofnutritioninhealthandwellness.
2. Applynutrientanddietarymodificationsincaringpatients.
3. ExplaintheprinciplesandpracticesofNutritionandDietetics.
4. Identifynutritional needsofdifferentagegroupsandplanabalanceddietfor them.
5. Identifythedietaryprinciplesfordifferentdiseases.
6. Plantherapeuticdietforpatientssufferingfromvariousdiseaseconditions.
7. Preparemealsusingdifferentmethodsandcookeryrules.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	2(T)	DefinenutritionandIts relationship toHealth	**IntroductiontoNutrition** ***Concepts*** • DefinitionofNutrition&Health • Malnutrition–UnderNutrition&OverNutrition • RoleofNutritioninmaintaininghealth • Factorsaffectingfoodandnutrition ***Nutrients*** • Classification • Macro&Micronutrients • Organic&Inorganic • EnergyYielding&Non-EnergyYielding ***Food*** • Classification–Foodgroups • Origin	• Lecture cumDiscussion	• Essay • Shortanswer • Very shortansw
II	3(T)	Describethe classification,functions, sourcesand recommendeddaily allowances(RDA) of ExplainBMRandfactors affectingBMR	**Carbohydrates** • Composition–Starches,sugarandcellulose • RecommendedDailyAllowance(RDA) • Dietarysources • Functions **Energy** • Unitofenergy–Kcal • BasalMetabolicRate(BMR) • FactorsaffectingBMR	• Lecture cumDiscussion • Charts/Slides • Models • Displayoffoodi	• Essay • Shortanswer • Very shortansw
III	3(T)	Describe theclassification, Functions,sources	**Proteins** • Composition	• Lecture cumDiscussion	• Essay • Shortanswer • Veryshort

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
		and RDA ofproteins.	• Eightessentialaminoacids • Functions • Dietarysources • Proteinrequirements–RDA	•Models •Displayoffoodite ms	answer
IV	2(T)	Describe theclassificati on, Functions, sourcesandRDAof fats	**Fats** • Classification–Saturated&unsaturated • Calorievalue • Functions • Dietarysourcesoffatsandfattyacids • Fatrequirements–RDA	•Lecturecum Discussion •Charts/Slides •Models •Displayoffoodite ms	•Essay •Shortanswer •Veryshorta nswer
V	3(T)	Describe theclassification,f unctions, sourcesand RDA ofvitamins	**Vitamins** • Classification–fatsoluble&watersoluble • Fatsoluble–VitaminsA,D,E,andK • Water soluble – Thiamine(vitamin B1), Riboflavin (vitamin B2),Nicotinic acid, Pyridoxine (vitamin B6),Pantothenicacid,Folicacid,VitaminB12,Ascorbicacid(vitamin C) • Functions, Dietary Sources &Requirements–RDAofeveryvitamin	•Lecturecum Discussion •Charts/Slides •Models •Displayoffoodite ms	•Essay •Shortanswer •Veryshorta nswer
VI	3(T)	Describe theclassification,f unctions, sourcesand RDA ofminerals	**Minerals** • Classification – Majorminerals(Calcium,phosphorus,sodium,potassium andmagnesium)andTraceelements • Functions • DietarySources • Requirements–RDA	•Lecturecum Discussion •Charts/Slides •Models •Displayoffoodite ms	•Shortanswer •Veryshorta nswer
VII	7(T) 8(L)	Describe and planbalanced diet fordifferent agegroups, pregnancy,andlactation	**Balanceddiet** • Definition,principles,steps • Foodguides–BasicFourFoodGroups • RDA–Definition,limitations,uses • FoodExchangeSystem • Calculationofnutritivevalueoffoods • Dietaryfibre **Nutritionacrosslifecycle** • Meal planning/Menu planning – Definition,principles,steps • InfantandYoungChildFeeding(IYCF)guidelines–breastfeeding,infantfoods • Dietplanfordifferentagegroups –	•Lecturecum Discussion •Mealplanning •Labsessionon ○ Preparation ofbalanced diet fordifferentcategories ○ Low costnutritiousdishes	•Shortanswer •Veryshorta nswer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			Children,adolescentsandelderly •Diet in pregnancy – nutritionalrequirementsandbalanced dietplan •Anemiainpregnancy– diagnosis,dietforanemicpregnantwomen,iron&folicacidsupplementationandcounseling •Nutrition in lactation – nutritionalrequirements,dietforlactating mothers,complementaryfeeding/weaning		
VIII	6(T)	Classify anddescribe thecommon nutritionaldeficiency disordersand identify nurses'role in assessment,management andprevention	**Nutritionaldeficiencydisorders** •Proteinenergymalnutrition –magnitudeof the problem, causes, classification,signs & symptoms, Severe acutemalnutrition (SAM), management &preventionandnurses'role •Childhoodobesity– signs&symptoms,assessment, management & preventionandnurses' role •Vitamindeficiencydisorders–vitaminA,B, C & D deficiency disorders –causes,signs & symptoms, management &preventionandnurses'role •Mineral deficiency diseases – iron, iodineandcalciumdeficiencies– causes,signs&symptoms,management&preventionandnurses' role	•Lecturecum Discussion •Charts/Slides •Models	•Essay •Shortanswer •Veryshortanswer
IX	4(T) 7(L)	Principles of dietsinvariousdiseases	**Therapeuticdiets** •Definition,Objectives,Principles •Modifications–Consistency,Nutrients, •Feedingtechniques. •Diet in Diseases – Obesity, DiabetesMellitus, CVD, Underweight, Renaldiseases,HepaticdisordersConstipation,Diarrhea,PreandPost-operativeperiod	•Lecturecum Discussion •Mealplanning •Lab session onpreparation oftherapeuticdiets	•Essay •Shortanswer •Veryshortanswer
X	3(T)	Describe the rulesand preservation ofnutrients	**Cookery rules and preservation ofnutrients** •Cooking– Methods,AdvantagesandDisadvantages •Preservationofnutrients •Measurestopreventlossofnutrientsduringpreparation •SafefoodhandlingandStorage offoods •Foodpreservation •Foodadditivesandfoodadulteration •PreventionofFoodAdulterationAct(PFA) •Foodstandards	•Lecturecum Discussion •Charts/Slides	•Essay •Shortanswer •Veryshortanswer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
XI	4(T)	Explain themethods ofnutritionalassessment andnutritioneducation	**Nutritionassessmentandnutritioneducation** • Objectivesofnutritionalassessment • Methods of assessment – clinicalexamination, anthropometry, laboratory&biochemicalassessment,assessmentofdietary intake including Food frequencyquestionnaire(FFQ)method • Nutritioneducation– purposes,principlesand methods	• Lecture cumDiscussion • Demonstration • Writing nutritionalassessmentreport	• Essay • Shortanswer • Evaluation ofNutritional assessmentreport
XII	3(T)	Describe nutritionalproblems in Indiaand nutritionalprograms	**NationalNutritionalProgramsandroleof nurse** • NutritionalproblemsinIndia • Nationalnutritionalpolicy • *National nutritional programs* – VitaminA Supplementation, Anemia Mukt BharatProgram, Integrated Child Development Services (ICDS), Mid-day Meal Scheme(MDMS), National Iodine DeficiencyDisorders Control Program (NIDDCP),Weekly Iron Folic Acid Supplementation(WIFS)andothersasintroduced • Roleofnurseinevery program	• Lecture cumDiscussion	• Essay • Shortanswer • Very shortanswer
XIII	2(T)	Discuss theimportanceoffoodhygiene and foodsafety Explain the Actsrelated to foodsafety	**Foodsafety** • Definition,Foodsafetyconsiderations&measures • FoodsafetyregulatorymeasuresinIndia –RelevantActs • Fivekeystosaferfood • Foodstorage,foodhandlingandcooking • Generalprinciplesoffoodstorageoffoodite ms(ex.milk,meat) • Roleoffoodhandlersinfoodbornedis eases • Essentialstepsinsafecookingpractices	• Guidedreadingonrelatedacts	• Quiz • Shortanswer

FoodborndiseasesandfoodpoisoningaredealtinCommunityHealthNursingI.

NURSING FOUNDATION - II (including Health Assessment

Module)PLACEMENT: IISEMESTER

THEORY: 6Credits(120hours)

PRACTICUM: SkillLab:3Credits(120hours), Clinical:4Credits(320hours)

DESCRIPTION: Thiscourseisdesignedtohelpnovicenursingstudentsdevelopknowledgeandcompetenciesrequiredtoprovideevidence-based,comprehensivebasicnursing careforadult patients,usingnursingprocessapproach.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Developunderstandingaboutfundamentalsofhealthassessmentandperformhealthassessmentinsupervisedclinicalsettings

2. Demonstratefundamentalskillsofassessment,planning,implementationandevaluationofnursingcareusingNursingprocessapproach in supervised clinicalsettings
3. AssesstheNutritionalneedsofpatientsandproviderelevantcareundersupervision
4. Identify andmeetthehygienicneedsofpatients
5. Identifyandmeettheeliminationneedsofpatient
6. Interpretfindingsofspecimentestingapplying theknowledgeofnormalvalues
7. Promoteoxygenationbasedonidentifiedoxygenationneedsofpatientsunder supervision
8. Reviewtheconceptoffluid,electrolytebalanceintegratingtheknowledgeof appliedphysiology
9. Applytheknowledgeoftheprinciples,routes,effectsofadministrationofmedicationsinadministeringmedication
10. Calculate conversions ofdrugsanddosages within and between systemsofmeasurements
11. Demonstrateknowledgeandunderstandingincaringforpatientswithalteredfunctioningofsenseorgansandunconsciousness
12. Explainloss,deathandgrief
13. Describesexualdevelopmentandsexuality
14. Identifystressorsandstressadaptationmodes
15. Integratetheknowledgeofcultureandculturaldifferencesinmeetingthespiritualneeds
16. Explaintheintroductory conceptsrelevantto modelsofhealthandillnessinpatientcare

***MandatoryModuleusedinTeaching/Learning:**

HealthAssessmentModule:40hours

COURSEOUTLINE

T– Theory,SL –SkillLab

	Unit Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	20(T) 20(SL)	Describethe purposeandprocess ofhealth assessmentand perform assessmentunder supervisedclinicalpractice	**HealthAssessment** • Interviewtechniques • Observationtechniques • Purposesofhealthassessment • ProcessofHealthassessment ○Healthhistory ○ Physicalexamination: ▪ Methods: Inspection, Palpation,Percussion,Auscultation, Olfaction ▪ Preparationforexamination:patientand unit ▪ Generalassessment ▪ Assessmentofeachbodysystem ▪ Documentinghealthassessmentfindings	• ModularLearning ***HealthAssessment Module** • Lecture • Discussion	• Essay • Shortanswer • Objective type • OSCE
II	13(T) 8(SL)	Describeassessment,planning,	**TheNursingProcess** • CriticalThinkingCompetencies, • cumDiscussion • Demonstration		• Essay • Shortanswer

	implementation andevaluationof nursingcareusing Nursingprocess	AttitudesforCriticalThinking,Levelsof criticalthinkinginNursing • NursingProcessOverview • ed ClinicalPractice • of careplan	• Demonstration	• Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		approach	○**Assessment** ces,Methods ▪ OrganizingData ▪ ValidatingData ▪ DocumentingData ○ **NursingDiagnosis** ▪ Identificationofclientproblems, risksandstrengths ▪ Nursingdiagnosisstatement–parts,Types,Formulating, GuidelinesforformulatingNursing Diagnosis ▪ NANDAapproveddiagnoses ▪ Differencebetweenmedicaland nursingdiagnosis ○ **Planning** ▪ Typesofplanning ▪ EstablishingPriorities ▪ EstablishingGoalsandExpectedOutcomes–Purposes,types, guidelines,Componentsofgoals andoutcomestatements ▪ TypesofNursingInterventions, Selectinginterventions:Protocols andStandingOrders ▪ IntroductiontoNursing InterventionClassificationand NursingOutcomeClassification ▪ Guidelinesforwritingcareplan ○ **Implementation** ▪ ProcessofImplementingtheplan ofcare ▪ Typesofcare–Directand Indirect ○ **Evaluation** ▪ EvaluationProcess, DocumentationandReporting **Nutritionalneeds**		
III	5(T) 5(SL)	Identifyandmeetthe Nutritionalneeds ofpatients ▪ ctionofData: Types, Sour	• Importance • Factorsaffectingnutritionalneeds • Assessmentof nutritionalstatus • *Review:*specialdiets–Solid,Liquid,Soft • *Review* ontherapeuticdiets • Care ofpatient withDysphagia,	• Lecture • Discussion • Demonstration • Exercise • SupervisedClinicalpractice	• Essay • Shortanswer • Objectivetype • Evaluationof nutritional assessment& dietplanning

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			Anorexia,Nausea,Vomiting • MeetingNutritionalneeds:Principles,equipment,procedure,indications ○ Oral ○ Enteral:Nasogastric/ Orogastric ○ Introduction to other enteralfeeds– types, indications, Gastrostomy,Jejunostomy ○ Parenteral – TPN (TotalParenteralNutrition)		
IV	5(T) 15(SL)	Identify and meetthe hygienic needsofpatients	**Hygiene** • FactorsInfluencingHygienicPractice • Hygienic care: Indications andpurposes,effectsofneglectedcare ○ Care of the Skin – (Bath, feet and nail,HairCare) ○ Careofpressurepoints ○ AssessmentofPressureUlcersusingBradenScaleandNortonScale ○ Pressure ulcers – causes, stages andmanifestations,careandprevention ○ Perinealcare/Meatalcare ○ Oralcare,CareofEyes,EarsandNose including assistive devices (eyeglasses,contactlens,dentures,hearingaid)	• Lecture • Discussion • Demonstration	• Essay • Shortanswer • Objectivetype • OSCE
V	10(T) 10(SL)	Identifyandmeetthe eliminationneeds of patient	**Eliminationneeds** • UrinaryElimination ○ Review of Physiology of UrineElimination, Composition andcharacteristicsof urine ○ FactorsInfluencingUrination ○ AlterationinUrinaryElimination ○ Facilitating urine elimination:assessment,types, equipment,procedures and specialconsiderations ○ Providingurinal/bedpan ○ Careofpatientswith ▪ Condomdrainage ▪ IntermittentCatheterization ▪ Indwelling Urinary catheter andurinarydrainage ▪ Urinarydiversions ▪ Bladderirrigation	• Lecture • Discussion • Demonstration	• Essay • Shortanswer • Objectivetype • OSCE

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• BowelElimination ○ ReviewofPhysiologyofBowelElimination, Composition andcharacteristicsof feces ○ FactorsaffectingBowelelimination ○ AlterationinBowelElimination ○ Facilitating bowel elimination:Assessment,equipment, procedures ▪ Enemas ▪ Suppository ▪ Bowelwash ▪ DigitalEvacuationofimpactedfeces ▪ Care of patients with Ostomies(BowelDiversionProcedures)		
VI	3(T) 4 (SL)	Explain varioustypes of specimensandidentifynormalvaluesof tests Develop skill inspecimencollection, handlingandtransport	**Diagnostictesting** • Phases of diagnostic testing (pre-test,intra-test & post-test) in Commoninvestigationsandclinicalimplications ○ CompleteBloodCount ○ SerumElectrolytes ○ LFT ○ Lipid/Lipoproteinprofile ○ SerumGlucose–AC,PC, HbA1c ○ Monitoring Capillary BloodGlucose (Glucometer RandomBloodSugar – GRBS) ○ StoolRoutineExamination ○ UrineTesting–Albumin, Acetone,pH,SpecificGravity ○ UrineCulture,Routine,TimedUrineSpecimen ○ Sputumculture ○ OverviewofRadiologic&EndoscopicProcedures	• Lecture • Discussion • Demonstration	• Essay • Shortanswer • Objectivetype
VII	11(T) 10(SL)	Assess patients foroxygenation needs,promoteoxygenation andprovide care duringoxygentherapy	**Oxygenationneeds** • ReviewofCardiovascularandRespiratory Physiology • Factorsaffectingrespiratoryfunctioning • AlterationsinRespiratoryFunctioning • Conditionsaffecting ○ Airway ○ Movementofair	• Lecture • Discussion • Demonstration& Re-demonstration	• Essay • Shortanswer • Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			○ Diffusion ○ Oxygentransport • Alterationsinoxygenation • Nursinginterventionstopromoteoxygenation: assessment, types,equipmentused& procedure ○ Maintenanceofpatentairway ○ Oxygenadministration ○ Suctioning–oral, tracheal ○ Chestphysiotherapy–Percussion,Vibration&Posturaldrainage ○ CareofChestdrainage–principles& purposes ○ PulseOximetry–Factorsaffecting measurement of oxygensaturation using pulse oximeter,Interpretation • Restorative&continuingcare ○ Hydration ○ Humidification ○ Coughingtechniques ○ Breathingexercises ○ Incentivespirometry		
VIII	5(T) 10(SL)	Describe theconcept of fluid,electrolytebalance	**Fluid,Electrolyte,andAcid–BaseBalances** • ReviewofPhysiologicalRegulationofFluid, Electrolyte and Acid-BaseBalances • FactorsAffectingFluid,ElectrolyteandAcid-BaseBalances • Disturbancesinfluidvolume: ○ Deficit ▪ Hypovolemia ▪ Dehydration ○ Excess ▪ Fluidoverload ▪ Edema • Electrolyteimbalances(hypoandhyper) ○ Acid-baseimbalances ▪ Metabolic–acidosis&alkalosis ▪ Respiratory–acidosis&alkalosis ○ Intravenoustherapy	• Lecture • Discussion • Demonstration	• Essay • Shortanswer • Objectivetype • Problems olving – calculations

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			▪ Peripheralvenipuncturesites ▪ TypesofIVfluids ▪ CalculationformakingIVfluidplan ▪ ComplicationsofIVfluidtherapy ▪ Measuringfluidintakeandoutput ▪ AdministeringBloodandBloodcomponents ▪ Restrictingfluidintake ▪ EnhancingFluidintake		
IX	20(T) 22(SL)	Explain theprinciples, routes,effectsof administrationof medications Calculateconversions ofdrugsanddosages withinandbetweensystems ofmeasurements Administeroraland topical medicationand documentaccurately undersupervision	**AdministrationofMedications** • Introduction – Definition ofMedication,Administrationof Medication,DrugNomenclature,Effects of Drugs, Forms of Medications,Purposes,PharmacodynamicsandPharmacokinetics • FactorsinfluencingMedicationAction • MedicationordersandPrescriptions • Systemsofmeasurement • Medicationdosecalculation • Principles,10rightsofMedication Administration • ErrorsinMedicationadministration • Routesofadministration • StorageandmaintenanceofdrugsandNursesresponsibility • Terminologiesandabbreviationsusedinprescriptionsandmedicationsorders • Developmentalconsiderations • Oral,SublingualandBuccalroutes:Equipment,procedure • Introduction to ParenteralAdministration of Drugs – Intramuscular, Intravenous,Subcutaneous, Intradermal: Location ofsite, Advantages and disadvantages ofthe specific sites, Indication andcontraindications for the different routesandsites. • Equipment – Syringes & needles,cannulas, Infusion sets – parts, types,sizes • Types of vials and ampoules,Preparing Injectable medicines fromvialsandampoules ○ Care of equipment: decontaminationanddisposalofsyringes,needles,	• Lecture • Discussion Demonstration& Re-demonstration	• Essay • Shortanswer • Objectivetype • OSCE

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			infusionsets ○PreventionofNeedle-StickInjuries • Topical Administration: Types,purposes,site,equipment,procedure ○ Applicationtoskin&mucousmembrane ○ Directapplicationofliquids,Gargleand swabbing thethroat ○ Insertion of Drug into body cavity:Suppository/ medicated packing inrectum/vagina ○ Instillations:Ear,Eye,Nasal,Bladder,andRectal ○ Irrigations:Eye,Ear,Bladder,VaginalandRectal ○ Spraying:Noseandthroat • Inhalation: Nasal, oral,endotracheal/tracheal (steam, oxygenand medications) – purposes, types,equipment, procedure, recording andreportingofmedicationsadministered • OtherParenteralRoutes:Meaningofepidural, intrathecal,		
X	5(T) 6(SL)	Providecareto patientswithalteredfunctioningofsense organs andunconsciousness insupervised clinicalpractice	intraosseous,intraperitoneal, intra-pleural, intra-arterial **Sensoryneeds** • Introduction • Demonstration	• Lecture • Discussion • Objectivetype	• Essay • Shortanswer

- mponentsofsensoryexperience– Reception,Perception&Reaction
- ArousalMechanism
- Factorsaffectingsensoryfunction
- Assessment of Sensory alterations – sensorydeficit,deprivation,overload&sensorypoverty
- Management
  - Promoting meaningful communication (patients with Aphasia, artificial airway &VisualandHearingimpairment)

CareofUnconsciousPatients

- Unconsciousness: Definition, causes & riskfactors, pathophysiology, stages ofUnconsciousness,ClinicalManifestations
- Assessment and nursing management ofpatientwithunconsciousness,complications

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
XI	4(T) 6(SL)	Explainloss,death andgrief	**CareofTerminallyill,deathanddying•** • Loss– Types • Grief,Bereavement&Mourning • TypesofGriefresponses • ManifestationsofGrief • FactorsinfluencingLoss&GriefResponses • TheoriesofGrief&Loss–KublerRoss • 5StagesofDying • TheRProcessmodel(Rando‘s) • Death–Definition,Meaning,Types(Brain&CirculatoryDeaths) • SignsofImpendingDeath • Dyingpatient‘sBillofRights • CareofDyingPatient • PhysiologicalchangesoccurringafterDeath • DeathDeclaration,Certification • Autopsy • Embalming • Lastoffice/Death Care • Counseling&supportinggrievingrelatives • PlacingbodyintheMortuary • ReleasingbodyfromMortuary • Overview – Medico-legal Cases,Advancedirectives,DNI/DNR, OrganDonation,Euthanasia	Lecture • Discussion • Casediscussions • Death care/lastoffice	• Essay • Shortanswer • Objectivetype
XII	3(T)	Develop basicunderstanding ofself-concept	**PSYCHOSOCIALNEEDS(A-D)** **A. Self-concept** • Introduction • Components (Personal Identity, BodyImage,RolePerformance,SelfEsteem) • FactorsaffectingSelfConcept • NursingManagement **B. Sexuality** • Sexualdevelopmentthroughoutlife • Sexualhealth • Sexualorientation • Factorsaffectingsexuality	• Lecture • Discussion • Demonstration • Case Discussion/Roleplay	• Essay • Shortanswer • Objectivetype
XIII	2(T)	Describe sexualdevelopment andsexuality		• Lecture • Discussion	• Essay • Shortanswer • Objective type

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• Prevention of STIs, unwantedpregnancy,avoidingsexualharassmentandabuse • Dealingwithinappropriatesexualbehavior		
XIV	2(T) 4(SL)	Describe stress andadaptation	**C. Stress and Adaptation – Introductoryconcepts** • Introduction • Sources,Effects,Indicators&TypesofStress • Typesofstressors • Stress Adaptation – GeneralAdaptationSyndrome(GAS) ,LocalAdaptationSyndrome(LAS) • Manifestation of stress – Physical &psychological • Copingstrategies/Mechanisms • StressManagement ○ Assistwithcopingandadaptation ○ Creatingtherapeuticenvironment • Recreationalanddiversiontherapies	• Lecture • Discussion	• Essay • Shortanswer • Objective type
XV	6(T)	Explain culture andculturalnorms Integrate culturaldifferences andspiritual needs inproviding care topatients undersupervision	**D. ConceptsofCulturalDiversityandSpirituality** • Culturaldiversity ○ CulturalConcepts– Culture,Subculture,Multicultural,Diversity, Race,Acculturation,Assimilation ○ TransculturalNursing ○ CulturalCompetence ○ ProvidingCulturallyResponsiveCare • Spirituality ○ Concepts–Faith,Hope,Religion, Spirituality,SpiritualWellbeing ○ FactorsaffectingSpirituality ○ SpiritualProblemsinAcute,Chronic,Terminal illnesses & Near-DeathExperience ○ DealingwithSpiritual Distress/Problems	• Lecture • Discussion	• Essay • Shortanswer • Objective type
XVI	6(T)	Explainthe significance ofnursingtheories	**NursingTheories:Introduction** • Shortanswer • Objectivetype • Discussion of theories with examples,Overviewof	• Lecture	• Essay

- aning&Definition,Purposes,Types
- selected nursing theories– Nightingale,Orem,Roy
- Useof theories innursingpractice

CLINICALPRACTICUM

Clinical:4Credits(320hours)

PRACT|ICECOMPETENCIES: Oncompletionofthecourse,thestudentwillbeableto

1. Performhealthassessmentofeachbodysystem
2. Developskillsinassessment,planning,implementationandevaluationofnursingcareusingNursingprocessapproach
3. IdentifyandmeettheNutritionalneedsofpatients
4. Implementbasicnursingtechniquesinmeetinghygienicneedsofpatients
5. PlanandImplementcaretomeettheeliminationneedsofpatient
6. Developskillsininstructingandcollectingsamplesforinvestigation.
7. Performsimplelabtestsandanalyze&interpretcommondiagnosticvalues
8. Identifypatientswithimpairedoxygenationanddemonstrateskillincaringforpatientswithimpairedoxygenation
9. Identifyanddemonstrateskillincaringforpatientswithfluid,electrolyteandacid–baseimbalances
10. Assess,plan,implement&evaluatethebasiccareneedsofpatientswithalteredfunctioningofsenseorgansandunconsciousness
11. Carefor terminallyillanddyingpatients

SKILLLAB

UseofMannequinsandSimulators

S.No.	Competencies	ModeofTeaching
1.	HealthAssessmentNutritional	Standardized
2.	Assessment	PatientStandardized
3.	Spongebath,oralhygiene,perinealcareNa	PatientMannequin
4.	sogastrictubefeeding	Trainer/
5.	Providing bed pan &	SimulatorMannequinC
6.	urinalCathetercare	atheterization
7.	Bowelwash,enema,insertionofsuppository	TrainerSimulator/Man
8.	Oxygenadministration–facemask,venturemask,nasal prongs	nequin
9.	AdministrationofmedicationthroughParenteralroute–IM,SC,ID,IV	IMinjectiontrainer,IDinjectiontrainer, IVarm(Trainer)
10.	LastOffice	Mannequin

CLINICAL POSTINGS – General Medical/Surgical

Wards(16weeks×20hoursper week =320hours)

Clinical Unit	Duration (Weeks)	LearningOutcomes	Procedural Competencies/Clinical Skills (SupervisedClinicalPractice)	ClinicalRequirements	Assessment Methods
General Medical/ Surgical wards	3	Perform healthassessmento feachbody system	**HealthAssessment** • Nursing/Healthhistorytaking • Performphysicalexamination;	• HistoryTaking–2 • Physical examination–2	• Assessmentof clinical skillsusingchec • OSCE

Clinical Unit	Duration (Weeks)	LearningOutcomes	Procedural Competencies/Clinical Skills (SupervisedClinicalPractice)	Diagnostictesting	ClinicalRequirements
			○Bodysystems • Use various methods ofphysical examination – Inspection, Palpation,Percussion, Auscultation,Olfaction • Identification of system wisedeviations		• Nursingprocess–1
	1	Develop skills inassessment, planning,implementation andevaluation of nursingcare using Nursingprocessapproach	• Documentationoffindings **TheNursingProcess** • PrepareNursingcareplanforthe patient based on the givencase scenario		• NutritionalAssessment andClinicalPresentation–1
	2	Identify and meet theNutritional needs ofpatients Implement basicnursing techniques inmeeting hygienicneedsof patients	**Nutritional needs, Eliminationneeds&Diagnostic testing** *Nutritionalneeds* • NutritionalAssessment • PreparationofNasogastrictubefeed • Nasogastrictubefeeding *Hygiene* • CareofSkin&Hair: – SpongeBath/Bedbath – Careofpressurepoints&backmassage • Pressuresoreriskassessmentusing Braden/Nortonscale – Hairwash – Pediculosistreatment		• Pressure soreassessment–1 • ClinicalPresentation onCare of patientwithConstipation–1
	2	Plan and Implementcare to meet theeliminationneeds ofpatient Develop skills ininstructing andcollectingsamples forinvestigation.	• OralHygiene • PerinealHygiene • Cathetercare **Eliminationneeds** • Providing – Urinal – Bedpan • InsertionofSuppository • Enema • UrinaryCathetercare • Careofurinarydrainage		• Labvalues–inter-pretation

Assessment Methods	• Evaluation ofNursing processwithcriteria • Assessment ofclinical skills using check list • OSCE	• Assessment of clinical skills using checklist • OSCE

Clinical Unit	Duration (Weeks)	LearningOutcomes	Procedural Competencies/Clinical Skills (SupervisedClinicalPractice)	ClinicalRequirements	AssessmentMethods
		Perform simple labtests and analyze &interpret commondiagnostic values	• SpecimenCollection ○Urineroutineandculture ○Stoolroutine ○Sputum Culture • PerformsimpleLabTestsusingreagent strips ○ Urine – Glucose, Albumin,Acetone,pH,Specificgravity		
	3	Identify patients withimpaired oxygenationand demonstrate skillin caring for patientswith impairedoxygenation Identify anddemonstrate skill incaringforpatientswithfluid, electrolyte andacid–baseimbalances	• Blood–GRBSMonitoring **Oxygenation needs, Fluid,Electrolyte, and Acid – BaseBalances** ***Oxygenationneeds*** • Oxygenadministration methods ○ NasalProngs ○ FaceMask/VenturiMask • Steaminhalation • ChestPhysiotherapy • DeepBreathing&CoughingExercises • OralSuctioning ***Fluid, Electrolyte, and Acid – BaseBalances*** • Maintainingintakeoutputchart • Identify&reportcomplicationsofIV therapy • ObserveBlood&BloodComponenttherapy • Identify & ReportComplications of Blood & BloodComponenttherapy		• Assessment ofclinical skillsusingchecklist • OSCE • Assessment ofclinical skillsusingchecklist • OSCE
	3	Explain the principles,routes, effects ofadministration ofmedications Calculate conversionsof drugs and dosageswithin and betweensystems ofMeasurements Administer drugs bythe following routes-Oral,Intradermal,	**AdministrationofMedications** • CalculateDrugDosages • Preparation of lotions &solutions • AdministerMedications ○Oral○Topical○Inhalations○Parenteral ▪ Intradermal ▪ Subcutaneous		• Assessment ofclinical skillsusingchecklist • OSCE

Clinical OutcomesUnit	Duration (Weeks)	Learning	Procedural Competencies/Clinical Skills (SupervisedClinicalPractice)	ClinicalRequirements	Assessment Methods
		Subcutaneous,Intra muscular, IntraVenous Topical,inhalation	▪ Instillations ○ Eye, Ear, Nose –instillation ofmedicateddrops,nasalsprays ,irrigations		
	2	Assess, plan,implement & evaluatethebasiccareneedsofpatients with alteredfunctioning of senseorgans andunconsciousness Care for terminally illanddying patients	**Sensory Needs and Care ofUnconscious patients, Care ofTerminallyill,deathanddying** *SensoryNeedsandCareofUnconsciouspatients* • Assessment of Level ofConsciousnessusingGlasgowComaScale *Terminallyill, deathanddying* • DeathCare	• Nursingroundsoncareof patient withalteredsensorium	• Assessmentof clinical skillsusingchecklist • Assessmentof clinical skillsusingchec

HEALTH/NURSINGINFORMATICSANDTECHNOLOGY

PLACEMENT:IISEMESTER

THEORY:2Credits(40hours)

PRACTICAL/LAB:1Credit(40hours)

DESCRIPTION: Thiscourseisdesignedtoequipnovicenursingstudentswithknowledgeandskillsnecessarytodeliverefficientinformatics-ledhealth careservices.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Developabasicunderstandingofcomputerapplicationinpatientcareandnursingpractice.
2. Applytheknowledgeofcomputerandinformationtechnologyinpatientcareandnursingeducation,practice,administrationandresearch.
3. Describetheprinciplesof healthinformaticsanditsuseindevelopingefficienthealthcare.
4. Demonstratetheuseof informationsysteminhealthcareforpatientcareandutilizationofnursingdata.
5. DemonstratetheknowledgeofusingElectronicHealthRecords(EHR)systeminclinicalpractice.
6. Applytheknowledgeofinteroperabilitystandardsinclinicalsetting.
7. Apply theknowledgeofinformationandcommunicationtechnology inpublichealthpromotion.
8. UtilizethefunctionalitiesofNursingInformationSystem(NIS)systeminnursing.
9. Demonstratetheskillsofusingdatain managementofhealthcare.
10. Applytheknowledge oftheprinciplesofdigitalethicalandlegalissuesinclinicalpractice.
11. Utilizeevidence-basedpracticesininformaticsandtechnologyforprovidingqualitypatientcare.
12. Updateandutilizeevidence-basedpracticesinnursingeducation,administration,andpractice.

COURSEOUTLINE

T–Theory,P/L–Lab

	Unit Time (Hrs)		LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
	T	P/L				
I	10	15	Describetheimportance ofcomputerand technologyinpatientcare and nursingpractice	**Introduction to computerapplicationsforpatientcaredeliverysystemandnursing practice** • Use of computers in teaching,learning,researchand nursingpractice	• Lecture • Discussion • Practicesession • Supervised clinicalpracticeonEHRuse • Participate in dataanalysis using statisticalpackagewithstatistician • Visittohospitalswithdifferenthospital managementsystems	(T) • Shortanswer • Objectivetype • Visitreports • Assessment ofassignments (P) • Assessmentof skills usingcheck list
			Demonstratetheuseofcomputerand technology inpatient care,nursing education,practice, administration andresearch.	• Windows, MS office: Word,Excel, PowerPoint •Internet • Literaturesearch • Statisticalpackages • Hospital managementinformationsystem		
II	4	5	Describetheprinciples of healthinformatics Explain the waysdata,knowledgeandinformation can beused for effectivehealthcare	**PrinciplesofHealthInformatics** • Health informatics – needs,objectivesandlimitations • Use of data, information andknowledgeformoreeffectivehealthcareand betterhealth	• Lecture • Discussion • Practicalsession • Work in groups withhealth informatics teamin a hospital to extractnursingdataandpreparereport	(T) • Essay • Shortanswer • Objective typequestions • Assessment ofreport
III	3	5	Describetheconcepts ofinformation systeminhealth Demonstratetheuse ofhealthinformation systeminhospitalsetting	**InformationSystemsin Healthcare** • Introduction to the role andarchitecture of informationsystemsinmodern healthcareenvironments •ClinicalInformationSystem (CIS)/Hospital informationSystem(HIS)	• Lecture • Discussion • Demonstration • Practicalsession • Workingroupswith nurseleaderstoundrstandthehospitalinformationsystem	(T) • Essay • Shortanswer
IV	4	4	Explain the use ofelectronic healthrecordsinnursing practice	**SharedCare&ElectronicHealthRecords** • Challengesofcapturingrich patienthistoriesinacomputable	• Lecture • Discussion •PracticeonSimulated	(T) • Essay • Shortanswer

describe the latest trend in ele

D

ctronichealth recordsstandards andinteroperability	form • Latestglobaldevelopmentsandstandards to enable lifelongelectronic health records to beintegrated from disparatesystems.	EHRsystem • Practicalsession • Visit to healthinformatics departmentof a hospital tounderstand the use ofEHRinnursingpractice	• Objective type(P) • Assessment ofskills usingchecklist

Unit	Time (Hrs)		LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
	T	P/L				
					• Prepare a report oncurrentEHRstandardsinIndian setting	
V	3		Describethe advantages andlimitations of healthinformatics inmaintaining patientsafety and riskmanagement	**PatientSafety&ClinicalRisk** • Relationshipbetweenpatientsafety andinformatics • Functionandapplicationoftherisk managementprocess	• Lecture • Discussion	(T) •Essay •Shortanswer •Objectivetype
VI	3	6	Explaintheimportance ofknowledge management Describe thestandardizedlanguages used inhealthinformatics	**ClinicalKnowledge&Decision Making** • Roleofknowledgemanagementinimprovingdecision-makingin both the clinical and policycontexts • Systematized Nomenclature ofMedicine, Clinical Terms,SNOMED CT to ICD-10-CMMap, standardized nursingterminologies (NANDA, NOC),Omahasystem.	• Lecture • Discussion • Demonstration • Practicalsession • Work in groups toprepare a report onstandardized languagesused in healthinformatics. • Visithealthinformatics department tounderstand thestandardized languagesusedinhospital setting	(T) •Essay •Shortanswer •Objectivetype
VII	3		Explain the use ofinformation andcommunicationtechnologyinpatientcare Explain theapplication of publichealthinformatics	**eHealth: Patients and theInternet** • Use of information andcommunication technology toimproveorenablepersonalandpublichealthcare • Introduction to public healthinformaticsandroleofnurses	• Lecture • Discussion • Demonstration	•Essay •Shortanswer •Objectivetype •Practicalexam
VIII	3	5	Describethe functionsofnursinginformationsystem Explain the use ofhealthcare data inmanagement ofhealth careorganization	**UsingInformationinHealthcare Management** •Components of NursingInformationsystem(NIS) •Evaluation, analysis andpresentationofhealthcaredatato inform decisions in themanagement of health-careorganizations	•Lecture •Discussion •Demonstration onsimulatedNISsoftware •Visit to healthinformatics departmentof the hospital tounderstand use ofhealthcare data indecision making	(T) •Essay •Shortanswer •Objectivetype
IX	4		Describetheethical and legal issues inhealthcareinformatics	**InformationLaw&Governance**	•Lecture	(T)

Explainsth
eethicaland
legalissues

inClinicalPractice •Ethical-legalissuespertainingtohealthcare information incontemporaryclinicalpractice •Ethical-legalissuesrelatedto	• Discussion • Casediscussion • Roleplay	• Essay • Shortanswer • Objectivetype

Unit	Time Outcomes(Hrs)		Learning	Content	Teaching/ LearningActiv	Assessment Methods
	T	P/L				
			related to nursinginformati	digitalhealthappliedtonursing		
X	3		Explain therelevance ofevidence-basedpractices inproviding qualityhealthcare	**HealthcareQuality&EvidenceBasedPractice** • Useofscientificevidenceinimproving the quality ofhealthcare and technical andprofessional informaticsstandards	• Lecture • Discussion • Casestudy	(T) • Essay • Shortanswer • Objectivetype

SKILLS

- Utilizecomputerinimprovingvariousaspectsofnursingpractice.
- Usetechnologyinpatientcareandprofessionaladvancement.
- Usedatainprofessionaldevelopmentandefficientpatientcare.
- Useinformationsysteminprovidingqualitypatientcare.
- Usetheinformationsystemtoextractnursingdata.
- Developskillinconductingliteraturereview.

APPLIEDMICROBIOLOGYANDINFECTIONCONTROLINCLUDINGSAFETY

PLACEMENT:IIISEMESTER

THEORY: 2Credits(40hours)

PRACTICAL: 1Credit(40hours)(Lab/Experiential Learning –L/E)

SECTIONA:APPLIEDMICROBIOLOGY

THEORY: 20hours

PRACTICAL:20hours(Lab/ExperientialLearning–L/E)

DESCRIPTION: This course is designed to enable students to acquire understanding of fundamentals of Microbiology,compare and contrast different microbes and comprehend the means of transmission and control of spread by variousmicroorganisms.Italsoprovidesopportunitiesfor practicinginfectioncontrolmeasuresinhospitalandcommunitysettings.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto:

1. Identifytheubiquityanddiversityofmicroorganismsinthehumanbodyandtheenvironment.
2. Classifyandexplainthemorphology andgrowthofmicrobes.
3. Identifyvarioustypesofmicroorganisms.
4. Exploremechanismsbywhichmicroorganismscausedisease.
5. Developunderstandingofhowthehumanimmunesystemcounteractsinfectionbyspecificandnon-specificmechanisms.
6. Applytheprinciplesofpreparationanduseofvaccinesinimmunization.
7. Identifythecontributionofthemicrobiologistandthe microbiology laboratory tothediagnosisofinfection.

COURSEOUTLINE

T–Theory,L/E–Lab/ExperientialLearning

Unit	Time (Hrs) T	P	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	3		Explainconcepts and principles ofmicrobiology andits importance innursing	**Introduction:** • Importanceand relevancetonursing • Historicalperspective • Conceptsandterminology • Principlesofmicrobiology	• Lecturecum Discussion	• Shortanswer • Objective type
II	10	10(L/E)	Describestructure,classification morphologyand growthofbacteria Identify Microorganisms	**GeneralcharacteristicsofMicrobes:** • Structureandclassificationof Microbes • Morphological types • Sizeandformofbacteria • Motility • Colonization • Growthandnutritionofmicrobes • Temperature • Moisture • Bloodandbodyfluids • Laboratory methods forIdentificationofMicroorganisms • Types of Staining – simple,differential (Gram's, AFB), special –capsular staining (negative), spore,LPCB,KOHmount. • Cultureandmediapreparation–solid and liquid. Types of media –semi synthetic, synthetic, enriched,enrichment, selective and differentialmedia.Pureculturetechniques–tubedilution, pour, spread, streak plate.Anaerobiccultivationofbacteria	• Lecture cumDiscussion • Demonstration • ExperientialLearning throughvisual	• Shortanswer • Objective type
III	4	6(L/E)	Describe thedifferent diseaseproducingorganisms	**Pathogenicorganisms** • Micro-organisms: Cocci – grampositive and gram negative; Bacilli –grampositiveand gramnegative • Viruses • Fungi:SuperficialandDeepmycoses • Parasites • Rodents&Vectors o Characteristics, Source, portal ofentry, transmission of infection,Identificationofdiseaseproducingmicro-organisms	• Lecture cumDiscussion • Demonstration • Experientiallearning throughvisual	• Shortanswer • Objective type
IV	3	4(L/E)	Explain theconcept sof	**Immunity**	• Lecture	• Shortanswer • Objective

Unit	Time(Hrs)		Learning Outcomes	Content	Teaching/Learning	Assessment
	T	P				
			immunity, hypersensitivity andimmunizatio	• Immunity:Types,classification • Antigenandantibodyreaction • Hypersensitivityreactions • Serologicaltests • Immunoglobulins:Structure,types&properties • Vaccines: Types & classification,storage and handling, cold chain,Immunizationforvariousdiseases	• Discussion • Demonstration • Visit to observevaccine storage	type •Visitreport

SECTIONB:INFECTIONCONTROL&SAFETY

THEORY: 20hours

PRACTICAL/LAB:20hours(Lab/ExperientialLearning–L/E)

DESCRIPTION: This course is designed to help students to acquire knowledge and develop competencies required forfundamental patient safety and infection control in delivering patient care. It also focuses on identifying patient safetyindicators,preventing and managinghospitalacquiredinfections, andinfollowing universalprecautions.

COMPETENCIES: Thestudentswillbeableto:

1. DevelopknowledgeandunderstandingofHospitalacquiredInfections(HAI)andeffectivepracticesforprevention.
2. Integratetheknowledgeofisolation(Barrierandreversebarrier)techniquesinimplementing variousprecautions.
3. DemonstrateandpracticestepsinHandwashingandappropriateuseofdifferenttypesofPPE.
4. Illustratevariousdisinfectionandsterilizationmethodsandtechniques.
5. Demonstrateknowledgeandskillinspecimen collection,handlingandtransporttooptimizethediagnosisfortreatment.
6. IncorporatetheprinciplesandguidelinesofBioMedicalwastemanagement.
7. ApplytheprinciplesofAntibioticstewardshipinperformingthenurses‘role.
8. Identify patientsafety indicatorsandperformtheroleof nurseinthepatientsafety audit process.
9. ApplytheknowledgeofInternationalPatientSafetyGoals(IPSG)inthepatientcaresettings.
10. Identifyemployeesafetyindicatorsandriskofoccupationalhazards.
11. Developunderstandingofthevarioussafetyprotocolsandadheretothoseprotocols.

COURSEOUTLINE

T–Theory,L/E–Lab/ExperientialLearning

Unit	Time(Hrs)		Learning	Content	Teaching/ LearningActiv	Assessment Methods
	T	P				
I	2	2(E)	Summarize theevidence basedand effectivepatient carepractices for theprevention ofcommonhealthcareassociated infectionsintheh ealthcare	**HAI(HospitalacquiredInfection)** • Hospitalacquiredinfection • Bundleapproach - Prevention of Urinary TractInfection(UTI) - Prevention of Surgical SiteInfection(SSI) - PreventionofVentilator	• Lecture &Discussion • Experiential	• Knowledge assessment • MCQ • Shortanswer

Unit	Time (Hrs)		Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
		T P				
			setting	Associatedevents(VAE) -Prevention of Central LineAssociated Blood StreamInfection(CLABSI) • Surveillance of HAI – Infectioncontrol team & Infection controlcommittee		
II	3	4(L)	Demonstrateappropriate useof differenttypes of PPEsand the criticaluse of riskassessment	**Isolation Precautions and use ofPersonal Protective Equipment(PPE)** • Typesofisolationsystem,standardprecaution and transmission-basedprecautions (Direct Contact,Droplet, Indirect) • Epidemiology & Infectionprevention– CDCguidelines • EffectiveuseofPPE	• Lecture • Demonstration &Re-demonstration	• Performance assessment • OSCE
III	1	2(L)	DemonstratetheHand hygienepractice and itseffectivenessoninfectioncontrol	**HandHygiene** gement	• Lecture • TypesofHandhygiene. • Handwashinganduseofalcoholhandrub • MomentsofHandHygiene • WHOhandhygienepromotion **Disinfectionandsterilization** • Definitions • Typesofdisinfectionand sterilization • Environmentcleaning • EquipmentCleaning • Guidesonuseofdisinfectants • Spaulding‘sprinciple **SpecimenCollection(Review)** • Principleofspecimencollection	• Performance sample • Staffprecautionsinhandlingspecimens **BMW(BioMedicalWasteManagement)** *Laundrymanagementprocessandinfectioncontrolandprevention*
IV	1	2(E)	Illustratesdisinfection andsterilization inthe healthcaresetting			
V	1		Illustrate onwhat, when,how, whyspecimens arecollected tooptimize thediagnosis fortreatment andmanagement.			
VI	2	2(E)	Explain on BioMedical wastemanagement &laundrymana		• Typesofspecimens • Collectiontechniquesandspecialconsiderations • Appropriatecontainers • Transportationofthe	

• Demonstration &Re-demonstration	assessment	• Checklist
• Lecture • Discussion • Experientiallearning throughvisit	• Shortanswer • Objectivetype	• Knowledgeassessment
• Discussion		
• Discussion • Demonstration • Experientiallearningthrough	• Knowledgeevaluation • Quiz • Performanceassessme	byshort answers, objectivetype • Performance

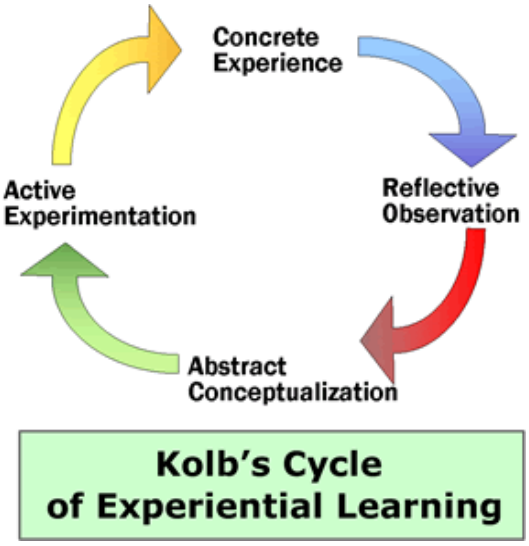
Unit	Time (Hrs)		Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
		T P				
				• Wastemanagementprocessandinfectionprevention • Staffprecautions • Laundrymanagement • Country ordinance and BMWNational guidelines 2017:Segregation of wastes, Colourcoded waste containers, wastecollection&storage,Packaging&labeling,Transportation	visit	assessment
VII	2		Explainindetailabout Antibioticstewardship,AMR DescribeMRSA/MDRO and itspreventi on	**Antibioticstewardship** • ImportanceofAntibiotic Stewardship • Anti-MicrobialResistance • PreventionofMRSA,MDROinhealthcare setting	• Lecture • Discussion • Writtenassignment –Recent AMR(Antimicrobialresistance)guidelines	• Shortanswer • Objectivetype • Assessment ofassignment
VIII	3	5(L/E)	Enlistthepatientsafetyindicators followedina healthcare organizationand theroleofnurse inthepatients afety auditprocess Captures andanalyzesi ncidents andevents forqualityim provement	**PatientSafetyIndicators** •CareofVulnerablepatients • PreventionofIatrogenicinjury •Careof lines,drainsandtubing‘s • Restrain policy and care – PhysicalandChemical • Blood&blood transfusionpolicy • PreventionofIVComplication • PreventionofFall • PreventionofDVT • Shiftingandtransportingofpatients • Surgicalsafety • Care coordination event related tomedication reconciliation andadministration • Preventionofcommunicationerrors • PreventionofHAI • Documentation **IncidentsandadverseEvents** • Capturingofincidents • RCA(RootCauseAnalysis) • CAPA(CorrectiveandPreventiveAction) • Reportwriting	• Lecture • Demonstration • Experiential learning •Lecture	• Knowledge assessment • Performance assessment • Checklist/OSCE •Knowledgeassessment •Shortanswer

Unit	Time (Hrs) T	P	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
					•Roleplay •InquiryBasedLearning	• Objectivetype
IX	1		EnumerateIPSGI and applicationof the goals inthe patient caresettings.	**IPSG(InternationalPatientsafety Goals)** • Identifypatientcorrectly • Improveeffectivecommunication • ImprovesafetyofHighAlertmedication • Ensuresafesurgery • Reducetheriskofhealthcareassociatedinfection • Reduce the risk of patient harmresultingfromfalls • Reducetheharmassociatedwithclinicalalarmsystem	• Lecture • Roleplay	• Objectivetype
X	2	3(L/E)	Enumerate thevarious safetyprotocolsanditsapplications	**Safetyprotocol** • 5S(Sort,Setinorder,Shine,Standardize,Sustain) • Radiationsafety • Lasersafety • Firesafety - Typesandclassificationof fire - Firealarms - Firefightingequipment • HAZMAT(HazardousMaterials)safety - Typesofspill - Spillagemanagement - MSDS (Material Safety DataSheets) • Environmentalsafety - Riskassessment - Aspectimpactanalysis - Maintenance of Temp andHumidity(Departmentwise) - Audits • EmergencyCodes	• Lecture • Demonstration/ Experientiallearning	• Mockdrills • Posttests • Checklist
XI	2		Explainimportance ofemployeesafety	• RoleofNurseintimesofdisaster **EmployeeSafetyIndicators** • Vaccination • Needlestickinjuries(NSI)	• Lecture • Discussion	• Knowledgeassessment byshortanswers,

Unit	Time(Hrs)		Learning	Content	Teaching/ LearningActiv	Assessment Methods
	T	P				
			indicators Identifyriskofo ccupationalhaz ards,preventio n andpost exposureproph ylaxis.	prevention • Fallprevention • Radiationsafety • Annualhealthcheck **HealthcareWorkerImmunization Program and management ofoccupationalexposure** • Occupationalhealthordinance • Vaccinationprogramforhealthcarest aff • Needlestickinjuriesandpreventionan dpostexposure prophylaxis	• Lecturemethod • Journalreview	objectivetype • Shortanswer

***ExperientialLearning:**

Experientiallearningistheprocessbywhichknowledgeiscreated throughtheprocessofexperienceintheclinical field.Knowledgeresultsfromthecombinationofgrasping and transformingexperience.(Kolb,1984).Theexperiential learning cycle begins with an experience that the student hashad, followed by an opportunity to reflect on that experience.Thenstudentsmayconceptualizeanddrawconclusio nsabout what they experienced and observed, leading to futureactionsinwhichthestudentsexperimentwithdifferentbeh aviors. This begins the new cycle as the students havenewexperiencesbasedontheirexperimentation.Thesesteps mayoccurinnearlyandorderasthelearningprogresses.As per theneedofthelearner,theconcretecomponentsand conceptual componentscanbeindifferentorderastheymayrequirea variety ofcognitiveandaffectivebehaviors.



PHARMACOLOGY-I

PLACEMENT:IIISEMESTER

THEORY:1Credit(20hours)

DESCRIPTION: ThiscourseisdesignedtoenablestudentstoacquireunderstandingofPharmacodynamics,Pharmacokinetics,prin ciplesoftherapeuticsand nursing implications.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Describepharmacodynamicsandpharmacokinetics.
2. Reviewtheprinciplesofdrugcalculationandadministration.
3. Explainthecommonlyusedantisepticsanddisinfectants.
4. DescribethepharmacologyofdrugsactingontheGIsystem.
5. Describethepharmacologyofdrugsactingontherespiratorysystem.
6. Describedrugs usedinthetreatmentofcardiovascularandblooddisorders.
7. Explainthedrugsusedinthetreatmentofendocrinesystemdisorders.
8. Describethedrugsactingonskinanddrugsusedtotreatcommunicablediseases.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
I	3(T)	DescribePharmacodynamics,Pharmacokinetics,Classification,principles ofadministrationofdrugs	**IntroductiontoPharmacology** • Definitions&Branches • Nature&Sourcesofdrugs • DosageFormsandRoutesofdrugadministration • Terminologyused • Classification, Abbreviations,Prescription,DrugCalculation,WeightsandMeasures • *Pharmacodynamics:* Actions, DrugAntagonism, Synergism, Tolerance,Receptors,Therapeutic,adverse,toxiceffects,pharmacovigilance • *Pharmacokinetics:* Absorption,Bioavailability, Distribution,Metabolism,Interaction,Excretion • Review: Principles of drugadministrationandtreatmentindividualization ○Factors affectingdose,routeetc. • IndianPharmacopoeia:LegalIssues,DrugLaws,ScheduleDrugs • RationalUseofDrugs	• Lecture cumDiscussion • Guided reading andwritten assignmentonscheduleKdrugs	• Shortanswer • Objectivetype • Assessment ofassignments
II	1(T)	Describe antiseptics,and disinfectant &nurse'sresponsibilities	• PrinciplesofTherapeutics **Pharmacology of commonly usedantisepticsanddisinfectants** • AntisepticsandDisinfectants • Composition,action,dosage,route,indications,contraindications, Druginteractions,sideeffects,adverseeffects,toxicity androleof nurse	• Lecture cumDiscussion • Drug study/presentation	• Shortanswer • Objectivetype
III	2(T)	Describe drugs actingon gastro-intestinalsystem &nurse'sresponsibilities	**DrugsactingonG.I.system** • Pharmacologyofcommonlyuseddrugs ○ EmeticsandAntiemetics ○ LaxativesandPurgatives ○ Antacidsandantipepticulcerdrugs ○ Anti-diarrhoeals – Fluid andelectrolyte therapy, Furazolidone,dicyclomine • Composition,action,dosage,route,indications, contraindications, druginteractions, side effects, adverseeffects,toxicity androleof nurse	• Lecture cumDiscussion • Drug study/presentation	• Shortanswer • Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
IV	2(T)	Describedrugsacting onrespiratorysystem& nurse‘sresponsibilities	**Drugsactingonrespiratorysystem** •Pharmacologyofcommonlyused ○ Antiasthmatics–Bronchodilators(Salbutamolinhalers) ○ Decongestants ○ Expectorants,Antitussivesand Mucolytics ○ Broncho-constrictorsandAntihistamines • Composition, action, dosage, route,indications, contraindications, druginteractions, side effects, adverseeffectstoxicityandroleof nurse	• Lecturecum Discussion • Drug study/presentation	• Shortanswer • Objectivetype
V	4(T)	Describedrugsusedoncardio-vascular system&nurse‘sresponsibilities	**Drugs used in treatment ofCardiovascularsystemandbloodisorders** • Haematinics,&treatmentofanemiaandantiadrenergics • Cholinergicand anticholinergic • AdrenergicDrugsforCHF&vasodilators • Antianginals • Antiarrhythmics • Antihypertensives • Coagulants&Anticoagulants • Antiplatelets&thrombolytics • Hypolipidemics • Plasmaexpanders&treatmentofshock • Drugsusedtotreatblooddisorders • Composition,action,dosage,route,indications, contraindications, druginteractions, side effects, adverseeffects,toxicity androleof nurse	• Lecture cumDiscussion • Drug study/presentation	• Shortanswer • Objectivetype
VI	2(T)	Describethedrugsused in treatment ofendocrine systemdisorders	**Drugsusedintreatmentofendocrine systemdisorders** • Insulin&oralhypoglycemics • Thyroidandanti-thyroiddrugs • Steroids ○Corticosteroids ○Anabolicsteroids • Calcitonin,parathormone,vitaminD3,calciummetabolism ○Calciumsalts	• Lecturecum Discussion • Drug study/presentation	• Shortanswer • Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
VII	1(T)	Describe drugs used inskindiseases&nurse‘ sresponsibilities	**Drugsusedintreatmentofin tegumentary system** • Antihistaminicsandantipruritics • Topical applications for skin-Benzylbenzoate, Gamma BHC,Clotrimazole,Miconazole,S ilverSulphadiazine(burns) • Composition,action,dosage,route,i ndications, contraindications, druginteractions, side effects, adverseeffectstoxicityandroleof nurse	• Lecture cumDiscuss ion • Drug study/prese ntation	• Shortanswer • Objectivetype
VIII	5(T)	Explain drug therapy/chemotherap y ofspecific infections &infestations&nurse‘ sresponsibilities	**Drugs used in treatment ofcommunicablediseases(commo ninfections,infestations)** • GeneralPrinciplesforuseofA ntimicrobials • Pharmacologyofcommonlyusedd rugs: o Penicillin, Cephalosporin‘s, Aminoglycosides,Macrolide&broads pectrum antibiotics, Sulfonamides,quinolones,Misc.antim icrobials • Anaerobicinfections • Antituberculardrugs, • Antileprosydrugs • Antimalarials • Antiretroviraldrugs • Antiviralagents • Antihelminthics,Antiscabiesagents • Antifungalagents • Composition, action, dosage, route,indications,contraindications, Druginteractions, side effects, adverseeffects,toxicity androleof nurse	• Lecture cumDiscuss ion • Drug study/prese ntation	• Shortanswer • Objectivetype

PATHOLOGY -I

PLACEMENT:IIISEMESTER

THEORY: 1Credit(20hours)(includeslabhoursalso)

DESCRIPTION: Thiscourseisdesignedtoenablestudentstoacquireknowledgeofpathologyofvariousdiseaseconditions, understanding of genetics, its role in causation and management of defects and diseases and to apply thisknowledgein practiceofnursing.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Applytheknowledgeofpathology inunderstandingthedeviationsfrom normaltoabnormal pathology.
2. Rationalizethevariouslaboratoryinvestigationsindiagnosingpathologicaldisorders.
3. Demonstratetheunderstandingofthemethodsofcollectionofblood,bodycavityfluids,urineandfecesforvarioustests.

4. Applytheknowledgeofgeneticsinunderstandingthevariouspathologicaldisorders.
5. Appreciatethevariousmanifestationsinpatientswithdiagnosedgeneticabnormalities.
6. Rationalizethespecificdiagnostictestsinthedetectionofgeneticabnormalities.
7. Demonstratetheunderstandingofvariousservicesrelatedtogenetics.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	8(T)	Define thecommon termsused inpathology Identify the deviationsfrom normal toabnormalstructure andfunctions ofbodysystem	**Introduction** • Importanceofthestudyofpathology • Definitionoftermsinpathology • Cellinjury:Etiology,pathogenesisofreversibleandirreversiblecellinjury,Necrosis,Gangrene • Cellularadaptations:Atrophy,Hypertrophy, Hyperplasia,Metaplasia,Dysplasia,Apoptosis • Inflammation: o Acuteinflammation(VascularandCellularevents, systemic effects of acuteinflammation) o Chronic inflammation (Granulomatousinflammation, systemic effects of chronicinflammation) • Woundhealing • Neoplasia**:** Nomenclature, Normal and Cancercell, Benign and malignant tumors, Carcinomain situ, Tumor metastasis: general mechanism,routesof spreadandexamplesofeachroute • Circulatorydisturbances:Thrombosis,embolism, shock • Disturbanceofbodyfluidsandelectrolytes:Edema,TransudatesandExudates	• Lecture • Discussion • Explainusingslides • Explain withclinicalscenarios	• Shortanswer • Objectivetype
II	5(T)	Explainpathologicalchanges indiseaseconditions ofvarioussystems	**SpecialPathology** **Pathological changes in disease conditions ofselected systems:** **1. Respiratorysystem** • Pulmonary infections: Pneumonia, Lungabscess,pulmonarytuberculosis • Chronic Obstructive Pulmonary Disease:Chronic bronchitis, Emphysema, BronchialAsthma,Bronchiectasis • TumorsofLungs **2. Cardio-vascularsystem** • Atherosclerosis • IschemiaandInfarction. • RheumaticHeartDisease	• Lecture • Discussion • Explain usingslides, X-rays andscans • Visit to pathologylab,endoscopyunitandOT	• Shortanswer • Objectivetype

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• Infectiveendocarditis **3. Gastrointestinaltract** • Pepticulcerdisease(GastricandDuodenalulcer) • Gastritis-HPyloriinfection • Oralmucosa:OralLeukoplakia,Squamouscellcarcinoma • Esophagealcancer • Gastriccancer • Intestinal:Typhoidulcer,InflammatoryBowel Disease (Crohn‘s disease andUlcerativecolitis),Colorectalcancer **4. Liver,GallBladderandPancreas** • Liver:Hepatitis,AmoebicLiverabscess,Cirrhosisof Liver • Gallbladder:Cholecystitis. • Pancreas:Pancreatitis • Tumorsofliver, GallbladderandPancreas **5. Skeletalsystem** • Bone:Bonehealing,Osteoporosis,Osteomyelitis,Tumors • Joints: Arthritis - Rheumatoid arthritis andOsteoarthritis **6. Endocrinesystem** • DiabetesMellitus • Goitre • Carcinomathyroid		
III	7(T)	Describe various laboratorytests in assessmentand monitoringof diseaseconditions	**Hematologicaltestsforthediagnosisofblooddisorders** •Bloodtests:Hemoglobin,Whitecellandplatelet counts,PCV,ESR • Coagulation tests: Bleeding time (BT),Prothrombintime(PT),ActivatedPartialProthrombinTime(APTT) • Bloodchemistry • Bloodbank: ○ Bloodgrouping andcrossmatching ○ Bloodcomponents ○ Plasmapheresis ○ Transfusionreactions **Note:**Few lab hours can be planned forobservationandvisits (Lessthan1credit,labhoursarenotspecifiedseparately)	• Lecture • Discussion • Visit to clinical lab,biochemistry labandblood bank	• Shortanswer • Objectivetype

ADULTHEALTHNURSING-IWITHINTEGRATEDPATHOPHYSIOLOGY(includingBCLSmodule)PLACEMENT: III SEMESTER

THEORY:7Credits(140hours)

PRACTICUM: Lab/SkillLab(SL) –1Credit(40hours)Clinical–6 Credits(480hours)

DESCRIPTION: Thiscourseisdesignedtoequipthestudentstoreviewandapplytheirknowledgeof Anatomy,Physiology, Biochemistry and Behavioral sciences in caring for adult patients with Medical/Surgical disorders using nursingprocess approach and critical thinking. It also intends to develop competencies required for assessment, diagnosis, treatment,nursing management,andsupportive/palliative caretopatients withvariousMedicalSurgicaldisorders.

COMPETENCIES: OncompletionofMedicalSurgicalNursingIcourse,studentswillbeableto

1. Explaintheetiology,pathophysiology,manifestations,diagnosticstudies,treatmentsandcomplicationsofcommon medicaland surgicaldisorders.
2. Performcompletehealthassessmenttoestablishadatabaseforprovidingqualitypatientcareandintegratetheknowledgeofa natomy,physiology anddiagnostictestsintheprocessofdatacollection.
3. Identifynursingdiagnoses,listthemaccordingtopriorityandformulatenursingcareplan.
4. Performnursingproceduresskillfullyandapplyscientificprincipleswhilegivingcomprehensivenursingcaretopatients.
5. Integrateknowledgeofpathology,nutritionandpharmacologyincaringforpatientsexperiencingvariousmedicalandsurgi cal disorders.
6. Identifycommondiagnosticmeasuresrelatedtothehealthproblemswithemphasisonnursingassessmentandresponsibiliti es.
7. Demonstrateskillinassisting/performingdiagnosticandtherapeuticprocedures.
8. Demonstratecompetencies/skillstopatientsundergoingtreatmentformedicalsurgicaldisorders.
9. Identifythedrugsusedintreatingpatientswithmedicalsurgicalconditions.
10. Planandgiverelevantindividualandgroupeducationonsignificantmedicalsurgicaltopics.
11. Maintainsafeenvironmentforpatientsandthe healthcarepersonnelinthehospital.
12. Integrateevidence-basedinformationwhilegivingnursingcaretopatients.

COURSECONTENT

T–Theory,L/SL –Lab/SkillLab

Unit	Time Outcomes(Hrs)	Learning	Content	Teaching/Learning Activities	Assessment Methods
I	6(T) 4(L/SL)	NarratetheevolutionofmedicalsurgicalnursingApplynursingprocessin caring for patientswith medical surgicalproblemsExecute the role of anurse in variousmedicalsurgicalDevelop skills inassessmentandcareofwound	**Introduction** • Evolutionandtrendsofmedicalandsurgicalnursing • International classification ofdiseases • Roles and responsibility of a nurseinmedicalandsurgicalsettings ○ Outpatientdepartment ○ In-patientunit ○ Intensivecareunit • Introductiontomedicalandsurgicalasepsis ○ Inflammation,infection ○ Wound healing – stages,influencingfactors	• Lecturecum discussion • Demonstration &Practicesession • Roleplay • Visit to outpatientdepartment, inpatient and	•ShortAnswer •OSCE

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		Developcompetencyinproviding pre andpostoperativecare	○Woundcareanddressingtechnique • Careofsurgicalpatient ○pre-operative ○post-operative • Alternativetherapiesusedincaringfor patients with Medical SurgicalDisorders **Intraoperative Care**		
II	15(T) 4(L/SL)	Explain organizationalset up of the operatingtheatre Differentiate the role ofscrub nurse andcirculatingnurse Describe the differentpositioning for varioussurgeries Apply principles ofasepsis in handling thesterileequipment Demonstrate skill inscrubbingprocedures Demonstrate skill inassessing the patientand documentaccurately the surgicalsafety checklist Develop skill inassisting with selectedsurgeries Explain the types,functions, and nursingconsiderations fordifferent types ofanaesthesia	• Organization and physical set up oftheoperation theatre ○ Classification ○ O.TDesign ○ Staffing ○ MembersoftheOT team ○ Dutiesandresponsibilitiesofthenursein OT • Position and draping for commonsurgicalprocedures • Instruments, sutures and suturematerials, equipment for commonsurgicalprocedures • Disinfection and sterilization ofequipment • Preparationofsetsforcommonsurgicalprocedures • Scrubbing procedures – Gowning,maskingandgloving • Monitoring the patient during theprocedures • MaintenanceofthetherapeuticenvironmentinOT • Assisting in major and minoroperation,handlingspecimen • Preventionofaccidentsandhazardsin OT • Anaesthesia – types, methods ofadministration, effects and stages,equipment& drugs • Legalaspects	• Lecture cumDiscussion • Demonstration,Practicesession,andCase Discussion • Visittoreceivingday	• Caring forpatient intraoperatively • Submit a list ofdisinfectants used forinstruments with the actionandprecaution
III	6(T) 4(L/SL)	Identify the signs andsymptoms of shock andelectrolyteimbalances Develop skills inmanaging fluid andelectrolyteimbalances	**Nursing care of patients withcommon signs and symptoms andmanagement** • Fluidandelectrolyteimbalance • Shock • Pain	• Lecture, discussion,demonstration • Casediscussion	• Shortanswer • MCQ • Casereport

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		Perform painassessmentandplansfor the nursingmanagement	andstomacare		andphysicalassessment • GIinvestigations • CommonGIdisorders:
IV	18(T) 4(L)	Demonstrate skill inrespiratoryassessment Differentiates differentbreath sounds and liststheindications Explain the etiology,pathophysiology,clinical manifestations,diagnostic tests, andmedical, surgical,nutritional, and nursingmanagement ofcommon respiratoryproblems Describe the healthbehaviourtobeadoptedin preventingrespiratory illnesses		**NursingManagementofpatientswithrespiratoryproblems** • Review of anatomy andphysiologyofrespiratorysystem • Nursing Assessment – historytaking,physicalassessment anddiagnostictests • Commonrespiratory problems: ○ Upperrespiratorytractinfections ○ Chronicobstructivepulmonarydiseases ○ Asthma ○ Pleuraleffusion,Empyema ○ Bronchiectasis	○ Oralcavity:lips, gumsandteeth ○ GI: Bleeding, Infections,Inflammation, tumors,Obstruction, Perforation &Peritonitis ○ Peptic&duodenalulcer, ○ Mal-absorption,Appendicitis, Hernias ○ Hemorrhoids,fissures,Fistulas ○ Pancreas:inflammation,cysts,andtumors
V	16(T) 5(L)	Explain the etiology,pathophysiology,clinical manifestations,diagnostic tests, andmedical, surgical,nutritional, and nursingmanagement ofgastrointestinaldisorders Demonstrate skill ingastrointestinalassessment Prepare patient forupper and lowergastrointestinalinvestigations		○ Pneumonia ○ Lungabscess ○ Cystandtumors ○ ChestInjuries ○ Acute respiratory distresssyndrome ○ Pulmonaryembolism • Healthbehaviourstoprevent respiratoryilness **Nursing Management of patientswithdisordersofdigestivesystem** • ReviewofanatomyandphysiologyofGI system	
		Demonstrate skill ingastric decompression,gavage,		• Nursing assessment – History	

• Lecture,discussion, • Demonstration • Practicesession • Casepresentation • VisittoPFTLab	•Essay •Shortanswer •OSCE
• Lecture,Discussion • Demonstration, • Roleplay • Problem BasedLearning • Visittostomaclinic	•Shortanswer •Quiz •OSCE

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		Demonstrate skill indifferent feedingtechniques	○ Liver: inflammation, cysts,abscess, cirrhosis, portalhypertension,hepaticfailure,tumors ○ Gallbladder:inflammation, Cholelithiasis,tumors • Gastricdecompression,gavageandstoma care, different feedingtechniques • Alternativetherapies,drugsusedintreatment of disorders of digestivesystem		
VI	20(T) 5(L)	Explain the etiology,pathophysiology,clinical manifestations,diagnostic tests, andmedical, surgical,nutritional, and nursingmanagement ofcardiovasculardisorders Demonstrate skill incardiovascularassessment Prepare patient forinvasive and non-invasive cardiacprocedures Demonstrate skill inmonitoring andinterpreting clinicalsigns related to cardiacdisorders Complete BLS/BCLSmodule	**NursingManagementofpatientswithcardiovascularproblems** • Review of anatomy andphysiology of cardio-vascularsystem • NursingAssessment:HistoryandPhysicalassessment • Invasive & non-invasive cardiacprocedures • Disorders of vascular system-Hypertension, arteriosclerosis,Raynaud'sdisease,aneurysmandperipheralvascular disorders • Coronary artery diseases:coronaryatherosclerosis,Anginapectoris,myocardialinfarction • Valvulardisorders:congenitalandacquired • Rheumatic heart disease:pericarditis, myocarditis,endocarditis,cardiomyopathies • Cardiacdysrhythmias,heartblock • Congestive heart failure,corpulmonale,pulmonaryedema,cardiogenic shock, cardiactamponade • Cardiopulmonaryarrest	• Lecture,discussion • Demonstration • Practicesession • CaseDiscussion • Healtheducation • Drug Book/presentation • **Completion ofBCLSModule**	• Careplan • Drugrecord • BLS/ BCLSevaluation
VII	7(T) 3(L)	Explain the etiology,pathophysiology,clinical manifestations,diagnostic tests, andmedical, surgical,nutritional, and nursingmanagement ofhematologicaldisorders Interpretbloodreports	**NursingManagementofpatientswithdisordersof blood** • ReviewofAnatomyandPhysiologyofblood • Nursing assessment: history,physicalassessment&Diagnostictests • Anemia,Polycythemia • Bleeding Disorders: clotting factordefects and platelets defects,thalassemia,leukemia,leukopenia,	• Field visit to bloodbank • Counseling	• Interpretation ofbloodreports • Visitreport

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		Prepare and provideshealth education onblooddonation	agranulocytosis • Lymphomas,myelomas		
VIII	8(T) 2(L)	Explain the etiology,pathophysiology,clinical manifestations,diagnostic tests, andmedical, surgical,nutritional,and nursingmanagement ofendocrinedisorders Demonstrateskillin assessment of endocrine organdysfunction Prepare and provideshealth education ondiabeticdiet	**Nursing management of patientswithdisordersofendocrinesystem** • Reviewofanatomyandphysiologyof endocrine system • Nursing Assessment –History andPhysicalassessment • Disorders of thyroid andParathyroid,AdrenalandPituitary(Hyper, Hypo,tumors) • Diabetes mellitus	• Lecture, discussion,demonstration • Practicesession • CaseDiscussion • Healtheducation	• Preparehealthe ducation onself-administration ofinsulin • Submits adiabetic dietplan
IX	8(T) 2(L)	Demonstrate skill ininsulinadministration Explain the etiology,pathophysiology,clinical manifestations,diagnostic tests, andmedical, surgical,nutritional,and nursingmanagement ofdisorders ofintegumentarysystem Demonstrate skill inintegumentaryassessment Demonstrate skill inmedicatedbath Prepare and providehealtheducation onskincare	**Nursing management of patientswith disorders of Integumentarysystem** • Reviewofanatomyandphysiologyof skin • NursingAssessment:HistoryandPhysicalassessment • Infection and infestations;Dermatitis • Dermatoses;infectiousandNoninfectious • Acne,Allergies,Eczema&Pemphigus • Psoriasis,Malignantmelanoma, Alopecia • Specialtherapies,alternativetherapies • Drugs used in treatment ofdisordersofintegumentarysystem	• Lecture,discussion • Demonstration • Practicesession • CaseDiscussion	• Drugreport • Preparation ofHomecareplan
X	16(T) 4(L)	Explain the etiology,pathophysiology,clinical manifestations,diagnostic tests, andmedical, surgical,nutritional,and nursingmanagement ofmusculoskeletaldisorders	**Nursing management of patientswithmusculoskeletalproblems** • ReviewofAnatomyandphysiologyof the musculoskeletalsystem • NursingAssessment:Historyandphysical assessment, diagnostictests • Musculoskeletal trauma:Dislocation,fracture,sprain, strain,	• Lecture/ • Discussion • Demonstration • CaseDiscussion • Healtheducation	• Nursing careplan • Prepare healthteaching on careof patient withcast

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		Demonstrate skill inmusculoskeletalassessment Prepare patient forradiological and non-radiologicalinvestigations ofmusculoskeletalsystem Demonstrate skill incrutch walking andsplinting Demonstrate skill incare of patient withreplacementsurgeries	contusion,amputation • Musculoskeletal infections andtumors: Osteomyelitis, benign andmalignanttumour • Orthopedicmodalities:Cast,splint,traction, crutchwalking • Musculoskeletalinflammation: Bursitis,synovitis,arthritis • Specialtherapies,alternativetherapies • Metabolicbonedisorder:Osteoporosis, osteomalacia andPaget‘sdisease • Spinal column defects anddeformities – tumor, prolapsedintervertebraldisc,Pott‘sspine • Rehabilitation,prosthesis • Replacementsurgeries		
XI	20(T) 3(L)	Prepare and providehealth education onbonehealing Explain the etiology,pathophysiology,clinical manifestations,diagnostic tests, andmedical, surgical,nutritional, and nursingmanagementofpatientswith communicablediseases Demonstrate skill inbarrier and reversebarriertechniques Demonstrate skill inexecution of differentisolationprotocols	**NursingmanagementofpatientswithCommunicablediseases** • Overviewofinfectiousdiseases,theinfectiousprocess • NursingAssessment:HistoryandPhysical assessment, Diagnostictests • Tuberculosis • Diarrhoeal diseases, hepatitis A-E, Typhoid • Herpes,chickenpox,Smallpox, Measles,Mumps,Influenza • Meningitis • Gasgangrene • Leprosy • Dengue, Plague, Malaria,Chikungunya,swineflu,Filariasis • Diphtheria,Pertussis,Tetanus, Poliomyelitis • COVID-19 • Special infection controlmeasures: Notification, Isolation,Quarantine,Immunization	• Lecture, discussion,demonstration • Practicesession • Case Discussion/seminar • Healtheducation • Drug Book/presentation • **ReferTBControl & Managementmodule**	• Prepares andsubmitsprotocol onvarious isolationtechniques

CLINICALPRACTICUM

CLINICALPRACTICUM:6Credits(480hours)-18weeks×27hours

PRACTICE COMPETENCIES: On completion of the clinical practicum, the students will be able to apply nursingprocess and critical thinking in delivering holistic nursing care including rehabilitation to the adult patients undergoingsurgery,withshockandfluidandelectrolyteimbalanceandwithselectedmedical&surgicalconditionsi.e.,Gastrointestinal,Respiratory,Endocrine,Orthopedic, Dermatology andCardiovascular disorders.

Thestudentswillbecompetentto:

1. Utilizethenursingprocessinprovidingcaretothesickadultsinthehospital:
   a. Performcompletehealthassessmenttoestablishadatabasefor providingquality patientcare.
   b. Integratetheknowledgeofdiagnostictestsintheprocessofdatacollection.
   c. Identifynursingdiagnosesandlistthemaccordingtopriority.
   d. Formulatenursingcareplan,usingproblemsolvingapproach.
   e. Applyscientificprincipleswhilegivingnursingcaretopatients.
   f. Performnursingproceduresskillfullyonpatients.
   g. Establish/developinterpersonalrelationshipwithpatientsandfamilymembers.
   h. Evaluatetheexpectedoutcomesand modify theplanaccordingtothepatientneeds.
2. Providecomfortandsafety toadultpatientsinthehospital.
3. Maintainsafeenvironmentforpatientsduring hospitalization.
4. Explainnursingactionsappropriatelytothepatientsandfamily members.
5. Ensurepatientsafety whileprovidingnursingprocedures.
6. Assesstheeducationalneedsofthepatientandtheirfamilyrelatedtomedicalandsurgicaldisordersandprovideappropriatehealth educationtopatients.
7. Providepre,intraandpost-operativecaretopatientsundergoingsurgery.
8. Integrateknowledgeofpathology,nutritionandpharmacologyforpatientsexperiencingvariousmedicalandsurgicaldisorders.
9. Integrateevidence-basedinformationwhilegivingnursingcaretopatients.
10. Demonstratetheawarenessoflegalandethical issuesinnursingpractice.

I. NURSINGMANAGEMENTOFPATIENTSWITHMEDICALCONDITIONS

A. SkillLab

Useofmanikinsandsimulators

- Intravenoustherapy
- Oxygenthroughmask
- Oxygenthroughnasalprongs
- Venturimask
- Nebulization
- Chestphysiotherapy

B. ClinicalPostings

Clinical	Duration (weeks)	Learningarea/unit Outcomes	Procedural Competencies/ ClinicalSkills	Clinical Requirements	Assessment Methods
General	4	Developskillinmedical intravenous injectionadministr	• Intravenoustherapy ○ IVcannulation ○ IVmaintenanceandmonitoring ○ AdministrationofIVmedication	• CareStudy–1 • Healtheducation presentation/Care	•Clinical evaluation •OSCE •CareStudy

		Assist withdiagno sticproced ures Developskillin themanagementof patients withRespirat oryproblems Develop skill inmanaging patientswith metabolicabnorm ality	• CareofpatientwithCentralline • Preparation and assisting andmonitoring of patients undergoingdiagnostic procedures such asthoracentesis,Abdominalparacentesis *Managementpatientswithrespiratory problems* • Administrationofoxygenthrough mask,nasalprongs,venturimask • Pulseoximetry • Nebulization • Chestphysiotherapy • Posturaldrainage • Oropharyngealsuctioning • Careofpatientwithchestdrainage • DietPlanning ○ HighProteindiet ○ Diabeticdiet • Insulinadministration • MonitoringGRBS	note)–1	evaluation • Care Note/Clinic alpresentati on

II. NURSINGMANAGEMENTOFPATIENTSWITHSURGICALCONDITIONS

A. SkillLab

Useofmanikinsandsimulators

- Nasogastricaspiration
- Surgicaldressing
- Sutureremoval
- Colostomycare/ileostomycare
- Enteralfeeding

B. ClinicalPostings

Clinical	Duration (Weeks)	Learningarea/unit Outcomes	Procedural Competencies/ ClinicalSkills	ClinicalRequirements	Assessment Methods
General surgical wards	4	Developskillin caringfor patients during pre-andpost- Assistwith diagnostic procedures Develop skill inmanaging patientwith Gastro-	• Pre-Operativecare • ImmediatePost-operativecare • Post-operativeexercise • Painassessment • PainManagement • Assisting diagnostic procedure andaftercareof patientsundergoing ○ Colonoscopy ○ ERCP ○ Endoscopy ○ LiverBiopsy	• Carestudy–1 • Healthteaching	• Clinicalev aluation,O SCE • Carestudy • Care note/Clinica lpresentatio

		Developskillin woundmanage ment	• Nasogastricaspiration • Gastrostomy/Jejunostomyfeeds • Ileostomy/Colostomycare • Surgicaldressing • Sutureremoval • Surgicalsoak • Sitzbath • Careofdrain		

III. NURSINGMANAGEMENTOFPATIENTSWITHCARDIACCONDITIONS

A. SkillLab

Useofmanikinsandsimulators

- Cardiovascularassessment
- InterpretingECG
- BLS/BCLS
- CPR
- ABGanalysis
- Takingbloodsample
- Arterialbloodgasanalysis–interpretation

B. ClinicalPostings

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/ ClinicalSkills	ClinicalRe quirements	Assessment Methods

Cardiology wards	2	Develop skill inmanagement ofpatients withcardiacprobl ems
		
		Develop skill inmanagement ofpatients withdisordersofBl ood
			• Cardiacmonitoring
			• RecordingandinterpretingECG
			• Arterial blood gas analysis – interpretation
			• Administercardiacdrugs
			• Preparationandaftercareofpatientsfor cardiaccatheterization
			• CPR
			• Collectionofbloodsamplefor:
			  ○ Bloodgrouping/crossmatching
			  ○ Bloodsugar
			  ○ Serumelectrolytes
			• Assistingwithbloodtransfusion
			• Assistingforbonemarrowaspiration
			• Application of anti-embolismstockings(TED hose)
			• Application/maintenance ofsequentialCompressiondevic e
				• Cardiacassess ment–1
				• Drugpresentation –1
					• Clinicalev aluation
					• Drug presentation

IV. NURSINGMANAGEMENTOFPATIENTSWITHDISORDERSOFINTEGUMENTARYSYSTEM

A. SkillLab

Use of manikins and simulatorsApplicationoftopicalmedication

B. ClinicalPostings

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clinical Skills	ClinicalRequirements	Assessment Methods
Dermatology wards	1	Developskillin management ofpatients withdisorders ofintegumentarysystem	• Intradermalinjection-Skinallergytesting • Applicationoftopicalmedication		• Clinicalevaluation

V. NURSINGMANAGEMENTOFPATIENTSWITHCOMMUNICABLEDISEASES

A. SkillLab

- BarrierNursing
- ReverseBarrierNursing
- Standardprecautions

B. ClinicalPostings

ClinicalDurationarea/unit(Weeks)	Learning Outcomes	ProceduralCompetencies/Clinical Skills	Clinical Requirements	Assessment Methods
Isolation ward 1	Develop skill inthe managementof patientsrequiringisolation	• BarrierNursing • Reversebarriernursing • Standard precautions (Universalprecaution), use of PPE, needlestick and sharp injury prevention,Cleaning and disinfection,Respiratory hygiene, wastedisposal and safe injectionpractices)	• CareNote–1	• Clinicalevaluation • Carenote

VI. NURSINGMANAGEMENTOFPATIENTSWITHMUSCULOSKELETALPROBLEMS

A. SkillLab

Useof manikinsandsimulators

- Rangeofmotionexercises
- Musclestrengtheningexercises
- Crutchwalking

B. ClinicalPostings

Clinical area/unit	DurationLearningOutcomes(Weeks)	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
Orthopedic wards	2	Develop skill inmanagement ofpatients withmusculoskeletalproblems	• Preparationofpatientwith Myelogram/CT/MRI • Assistingwithapplication&removalof POP/Cast • Preparation,assistingandafterc	• CareNote–1	• Clinicalevaluation, • Carenote

			traction/skeletaltraction • Careoforthotics • Musclestrengtheningexercises • Crutchwalking • Rehabilitation		

VII. NURSINGMANAGEMENTOFPATIENTSINTHEOPERATINGROOMS

A. SkillLab

Useofmanikinsandsimulators

- Scrubbing,gowningandgloving
- Orienttoinstrumentsforcommonsurgeries
- Orienttosuturematerials
- Positioning

B. ClinicalPostings

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/ ClinicalSkills	Clinical Requirements	Assessment Methods
Operation theatre	4	Developskillinc aring forintraoperativ epatients	• Positionanddraping • Preparationofoperationtable • Setupoftrolleywithinstrument • Assistinginmajorandminorop eration • Disinfectionandsterilizationofe quipment • Scrubbing procedures – Gowning,maskingandgloving • Intraoperativemonitoring	• Assistas •Clinicalcirculatory nurse– 4 • Positioning& draping– 5 • Assist as scrubnurse in majorsurgeries –4	evaluation •OSCE

PHARMACOLOGY-II

includingFundamentalsofPrescribingModule

PLACEMENT:IVSEMESTER

THEORY:3Credits(60hours)

DESCRIPTION: Thiscourseisdesignedtoenablestudentstoacquireunderstandingof Pharmacodynamics,Pharmacokinetics, principles of therapeutics & nursing implications. Further it develops understanding of fundamentalprinciplesof prescribing in students.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Explainthedrugsusedinthetreatmentof ear,nose,throatand eyedisorders.
2. Explainthe drugsusedinthetreatmentof urinarysystemdisorders.
3. Describethedrugsusedinthetreatmentof nervoussystemdisorders.
4. Explain the drugs used for hormonal replacement and for the pregnant women during antenatal, intra natal and postnatalperiod.
5. Explainthedrugsusedtotreatemergency conditionsandimmunedisorders.
6. Discusstheroleandresponsibilitiesofnursestowardssafeadministrationofdrugsusedtotreatdisordersofvarioussystemswith basicunderstanding of pharmacology.
7. Demonstrateunderstandingaboutthedrugsusedinalternativesystemofmedicine.
8. Demonstrateunderstandingaboutthefundamentalprinciplesofprescribing.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	4(T)	Describedrugsusedin disordersofear,nose,throat and eye andnurses'responsibilities	**Drugsusedindisordersofear,nose, throat&Eye** • Antihistamines • Topical applications for eye(Chloramphenicol, Gentamycin eyedrops),ear(Sodaglycerin,boricspirit ear drops), nose and buccal cavity-chlorhexidine mouthwash • Composition,action,dosage,route,indications, contraindications, druginteractions, side effects, adverseeffects,toxicity androleof nurse	• Lecturecum Discussion • Drug study/presentation	• Shortanswer • Objectivetype
II	4(T)	Describe drugs actingon urinary system &nurse'sresponsibilities	**Drugsusedonurinarysystem** • Pharmacologyofcommonlyuseddrugs ○ Reninangiotensinsystem ○ Diureticsandantidiuretics ○ Drugstoxictokidney ○ Urinaryantiseptics ○ Treatment of UTI – acidifiers andalkalinizers • Composition, action, dosage, route,indications, contraindications, Druginteractions, side effects, adverseeffectstoxicityandroleof nurse	• Lecture cumDiscussion • Drug study/presentation	• Shortanswer • Objectivetype
III	10 (T)	Describe drugs usedonnervoussystem&nurse'sresponsibilities	**Drugsactingonnervoussystem** • Basis&appliedpharmacologyofcommonly useddrugs • Analgesicsandanaesthetics ○ Analgesics: Non-steroidal anti-inflammatory(NSAID)drugs ○ Antipyretics ○ Opioids&othercentralanalgesics ✓ General(techniquesofGA,preanesthetic medication) & localanesthetics ✓ Gases:oxygen,nitrous,oxide,carbon-dioxide & others • Hypnoticsandsedatives • Skeletalmusclerelaxants • Antipsychotics ○Moodstabilizers	• Lecture cumDiscussion • Drug study/presentation	• Shortanswer • Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• Antidepressants • AntianxietyDrugs • Anticonvulsants • Drugs for neurodegenerativedisorders&miscellaneousdrugs • Stimulants, ethyl alcohol andtreatmentofmethylalcoholpoisoning • Composition, action, dosage, route,indications, contraindications, druginteractions, side effects, adverseeffectstoxicityandroleofnurse		
IV	5(T)	Describe drugs usedfor hormonal disorder& supplementation,contraception &medicalterminationofpregnancy &nurse'sresponsibilities	**Drugs used for hormonal, disordersand supplementation, contraceptionandmedicaltermination ofpregnancy** • Estrogensandprogesterones ○Oralcontraceptivesandhormonereplacementtherapy • Vaginalcontraceptives • Drugs for infertility and medicalterminationof pregnancy ○Uterinestimulants and relaxants • Composition, actions dosage routeindications contraindications,	• Lecture cumDiscussion • Drug study/presentation	• Shortanswer • Objectivetype
V	3(T)	Develop understanding aboutimportantdrugs usedfor women before,during and afterlabour	drugsinteractions, side effects, adverseeffects, toxicity androleof nurse **Drugsusedforpregnantwomenduring antenatal,labourandpostnatalperiod** •Tetanusprophylaxis •IronandVitK1supplementation •Oxytocin,Misoprostol •Ergometrine •MethylprostaglandinF2-alpha	•Lecturecum Discussion •Drugstudy/presentation	• Shortanswer • Objectivetype
VI	10(T)	Describedrugs usedin deaddiction,emergency, poisoning,vitamins & mineralssupplementation,drugs used forimmunization &immune-suppression&nurse'sresponsibilities	•Magnesiumsulphate •Calciumgluconate **Miscellaneous** • Drugsusedfordeaddiction • Drugs used in CPR and emergency-adrenaline, Chlorpheniramine,hydrocortisone,Dexamethasone • IVfluids&electrolytesreplacement • Commonpoisons,drugsusedfortreatmentofpoisoning ○Activatedcharcoal	• Lecturecum Discussion • Drug study/presentation	• Shortanswer • Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			○ Ipecac ○ Antidotes, ○Anti-snake venom(ASV) • Vitaminsandmineralss upplementation • Vaccines & sera (Universalimmunizationprograms chedules) • Anticancerdrugs:Chemotherapeutic drugscommonlyused • Immuno-suppressants andImmunostimulants		
VII	4(T)	Demonstrate awarenessofcommon drugs used inalternativesystemo fmedicine	**Introductiontodrugsusedin alternativesystemsofmedicine** • Ayurveda,Homeopathy,UnaniandS iddhaetc. • Drugsusedforcommonailments	• Lecturecum Discussion • Observationalvisit	• Shortanswer • Objectivetype
VIII	20(T)	Demonstrate understanding aboutfundamentalpr inciples ofprescribing	**Fundamentalprinciplesofprescribing** • Prescriptiveroleofnursepractitioners:In troduction • Legal and ethical issues related toprescribing • Principlesofprescribing • Stepsofprescribing • Prescribingcompetencies	• Completion ofmodule onFundament alprinciples ofprescribing	• Shortanswer • Assignments evaluation

PATHOLOGY-IIANDGENETICS

PLACEMENT:IVSEMESTER

THEORY: 1Credit(20hours) (Includeslabhoursalso)

DESCRIPTION: Thiscourseisdesignedtoenablestudentstoacquireknowledgeofpathologyofvariousdiseaseconditions, understanding of genetics, its role in causation and management of defects and diseases and to apply thisknowledgein practiceof nursing.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Applytheknowledgeofpathology inunderstandingthedeviationsfromnormaltoabnormal pathology
2. Rationalizethe variouslaboratory investigationsindiagnosingpathologicaldisorders
3. Demonstratetheunderstandingofthemethodsofcollectionofblood,bodycavityfluids,urineandfecesforvarioustests
4. Applytheknowledgeofgeneticsinunderstandingthevariouspathologicaldisorders
5. Appreciatethevariousmanifestationsinpatientswithdiagnosedgeneticabnormalities
6. Rationalizethespecificdiagnostictestsinthedetectionofgeneticabnormalities.
7. Demonstratetheunderstandingofvariousservicesrelatedtogenetics.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	5(T)	Explain pathologicalchanges in diseaseconditionsofvarioussystems	**SpecialPathology:** **Pathological changes in diseaseconditionsofselectedsystems** **1. KidneysandUrinarytract** • Glomerulonephritis • Pyelonephritis • Renalcalculi • Cystitis • RenalCellCarcinoma • RenalFailure(AcuteandChronic) **2. Malegenitalsystems** • Cryptorchidism • Testicularatrophy • Prostatichyperplasia • CarcinomapenisandProstate. **3. Femalegenitalsystem** • Carcinomacervix • Carcinomaofendometrium • Uterinefibroids • Vesicularmoleand Choriocarcinoma • Ovariancystandtumors **4. Breast** • Fibrocysticchanges • Fibroadenoma • Carcinomaof theBreast **5. Centralnervoussystem** • Meningitis. • Encephalitis • Stroke • TumorsofCNS	• Lecture • Discussion • Explain usingslides,X-raysandscans • Visit to pathologylab,endoscopyunitandOT	• Shortanswer • Objectivetype
II	5(T)	Describe thelaboratory tests forexamination of bodycavity fluids, urineandfaeces	**ClinicalPathology** • Examinationofbody cavityfluids: o Methods of collection andexamination of CSF and other bodycavity fluids (sputum, wounddischarge) specimen for variousclinicalpathology,biochemistryandmicrobiology tests	• Lecture • Discussion • Visit to clinical laband biochemistrylab	• Shortanswer • Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning	Assessment
			• Analysisofsemen: ○ Sperm count, motility andmorphology and their importance ininfertility • Urine: ○ Physicalcharacteristics,Analysis, CultureandSensitivity • Faeces: ○ Characteristics ○ Stool examination: Occult blood,Ova, Parasite and Cyst, Reducingsubstanceetc. ○ Methods and collection of urine andfaecesfor various tests		

GENETICSCOURS

EOUTLINE

T–Theory

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	2(T)	Explain nature,principles andperspectives ofheredity	**Introduction:** • Practicalapplicationofgeneticsinnursing • Impactof geneticconditiononfamilies • Reviewofcellulardivision:mitosisandmeiosis • Characteristicsandstructureofgenes • Chromosomes:sexdetermination • Chromosomalaberrations • Patternsofinheritance • Mendeliantheoryofinheritance • Multipleallotsandbloodgroups • Sexlinkedinheritance • Mechanismofinheritance	• Lecture • Discussion • Explainusingslides	• Shortanswer • Objectivetype
II	2(T)	Explain maternal,prenatalandgeneticinfluences ondevelopment ofdefectsanddiseases	• Errorsintransmission(mutation) **Maternal, prenatal and geneticinfluencesondevelopmentofdefectsanddiseases** • Conditions affecting the mother:geneticand infections • Consanguinityatopy • Prenatalnutritionandfoodallergies • Maternalage	• Lecture • Discussion • Explainusingslides	• Shortanswer • Objectivetype

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• Maternaldrugtherapy • Prenataltestinganddiagnosis • EffectofRadiation,drugsandchemicals • Infertility • Spontaneousabortion • NeuralTubeDefectsandtheroleoffolicacid in loweringtherisks • Downsyndrome(Trisomy21)		
III	2(T)	Explain the screeningmethodsfor genetic defectsanddiseasesinneonatesandchildren	**Genetic testing in the neonates andchildren** • Screeningfor ○ Congenitalabnormalities ○ Developmentaldelay ○ Dysmorphism	• Lecture • Discussion • Explainusingslides	• Shortanswer • Objectivetype
IV	2(T)	Identify geneticdisorder sin adolescentsand adults	**Geneticconditionsofadolescentsandadults** •Cancergenetics:Familialcancer • Inbornerrorsof metabolism • Bloodgroupallelesandhematologicaldisorder • Genetichaemochromatosis • Huntington'sdisease	• Lecture • Discussion • Explainusingslides	• Shortanswer • Objectivetype
V	2(T)	Describetheroleofnurse in geneticservices andcounselling	• Mentalillness **Servicesrelatedtogenetics** • Genetictesting • Genetherapy • Geneticcounseling • LegalandEthicalissues • Roleofnurse	• Lecture • Discussion	• Shortanswer • Objectivetype

ADULT HEALTH NURSING - II WITH INTEGRATED PATHOPHYSIOLOGY including Geriatric NursingANDPALLIATIVECARE MODULE

PLACEMENT:IVSEMESTER

THEORY:7Credits(140hours)

PRACTICUM: Lab/SkillLab(SL):1Credit(40hours)Clinical:6Credits(480hours)

DESCRIPTION: Thiscourseisdesignedtoequipthestudentstoreviewandapplytheirknowledgeof Anatomy,Physiology, Biochemistry and Behavioral sciences in caring for adult patients with Medical/Surgical disorders using nursingprocessapproach.Italsointendstodevelopcompetenciesrequiredforassessment,diagnosis,treatment,nursingmanagement, andsupportive/palliativeandrehabilitativecaretoadultpatientswithvariousMedicalSurgicaldisorders.

COMPETENCIES: Oncompletionofthecoursethestudentswillapplynursingprocessandcriticalthinkingindeliveringholisticnursing carewith selectedMedicalandSurgicalconditions.

AtthecompletionofAdultHealthNursingIIcourse,studentswill

1. Explaintheetiology,pathophysiology,manifestations,diagnosticstudies,treatmentsandcomplicationsofselectedcommon medicaland surgicaldisorders.
2. Perform completehealthassessmenttoestablishadatabaseforprovidingqualitypatientcareandintegratetheknowledgeofdiagnostictestsin theprocessof datacollection.
3. Identifydiagnoses,listthemaccordingtopriorityandformulatenursingcareplan.
4. Perform nursingproceduresskillfullyandapplyscientificprincipleswhilegivingcomprehensivenursingcaretopatients.
5. Integrate knowledge ofanatomy,physiology, pathology,nutritionand pharmacologyin caringforpatientsexperiencingvarious medicalandsurgical disorders.
6. Identifycommondiagnosticmeasuresrelatedtothehealthproblemswithemphasisonnursingassessmentandresponsibilities.
7. Demonstrateskillinassisting/performingdiagnosticandtherapeuticprocedures.
8. Demonstratecompetencies/skillstopatientsundergoingtreatmentformedicalsurgicaldisorders.
9. Identifythedrugsusedintreatingpatientswithselectedmedicalsurgicalconditions.
10. Planandproviderelevantindividualandgroupeducationonsignificantmedicalsurgicaltopics.
11. Maintainsafeenvironmentforpatientsandthe healthcarepersonnelinthehospital.

COURSEOUTLINE

T–Theory,L/SL –Lab/SkillLab

	Unit Time	**LearningOutcomes**	**Content**	**Teaching/ LearningActivities**	**Assessment Methods**
I	**(Hrs)** 12(T) 4(SL)	Explaintheetiology, thophysiology, **Throat**clinicalmanifestations, diagnostic measuresand medical, surgical,nutritionaland nursingmanagement ofpatients with ENTdisorders	**Nursingmanagementofpatientwithpa disorders of Ear, Nose and** (Includesetiology,pathophysiolo clinical manifestations, diagnosticmeasures and medical, surgical,nutritionalandnursingmanagement) • Review of anatomy and physiology oftheear, noseand throat • History,physicalassessment,andd iagnostictests • **Ear** ○ External ear: deformities otalgia,foreignbodiesandtumors ○ Middle ear: impacted wax,tympanic,membraneperforation,otitis media, andtumors ○ Inner ear: Meniere's disease,labyrinthitis,ototoxicity tumors • Upper respiratory airway infections:Rhinitis,sinusitis,tonsillitis,laryngitis • Epistaxis,Nasalobstruction,laryngealobstruction • Deafnessanditsmanagement	• Lecture anddiscussion • Demonstrationof hearing aids, nasalpacking, medicationadministration • Visittoaudiologyandspeechclinic	• MCQ • Shortanswer • Essay • OSCE • Assessment ofskill (usingchecklist) • Quiz • Drugbook

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
II	12(T) 4(SL)	Explain the etiology,pathophysiology, clinicalmanifestations, diagnostic measuresand management ofpatientswithdisordersofeye Describeeyedonation, bankingand transplantation	**Nursingmanagementofpatientwithdisorderofeye** •Reviewofanatomy andphysiology of theeye • History,physicalassessment, diagnosticassessment **EyeDisorders** •Refractiveerrors • Eyelids:infection,deformities • Conjunctiva:inflammationandinfectionbleeding • Cornea:inflammationandinfection • Lens:cataract • Glaucoma • Retinaldetachment • Blindness • Eyedonation,bankingandtransplantation	• Lecture anddiscussion • Demonstrationof visual aids, lens,medication administration • Visittoeyebank	• MCQ • ShortEssay • OSCE • Drugbook
III	15(T) 4(L/SL)	Explaintheetiology,pathophysiology, clinicalmanifestations, diagnostictests,and medical,surgical, nutritional,andnursing managementofKidneyand urinary systemdisorders Demonstrateskillingenitourinaryassessment Preparepatientforgenitourinaryinvestigations Prepareandprovidehealth education onprevention of renalcalculi	**NursingmanagementofpatientwithKidneyandUrinaryproblems** •ReviewofAnatomyandphysiologyof thegenitourinarysystem •History,physicalassessment, diagnostictests • Urinarytractinfections:acute,chronic,lower,upper • Nephritis,nephroticsyndrome • Renalcalculi • Acuteandchronicrenalfailure • Disorders of ureter, urinary bladderandUrethra • Disorders of prostate: inflammation,infection, stricture, obstruction, andBenignProstate Hypertrophy	• Lecture cumDiscussion •Demonstration • CaseDiscussion • Healtheducation • Drugbook • Field visit – Visitshemodialysisunit	• MCQ • ShortNote • Longessay • Casereport • Submits healthteaching onprevention ofurinarycalculi
IV	6(T)	Explain the etiology,pathophysiology, clinicalmanifestations, diagnostictests,and medical,surgical, nutritional,andnursing •History,PhysicalAssessment, management of malereproductivedisordersDiagnostictests	**Nursingmanagementofdisordersofmalereproductive system** •ReviewofAnatomyandphysiologyof themalereproductivesystem	• Lecture,Discussion • CaseDiscussion • Healtheducation	• Shortessay

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			Orchitis • Sexual dysfunction, infertility,contraception • MaleBreastDisorders:gynecomastia,tumor, climacteric changes		
V	10(T) 4(SL)	Explaintheetiology,pathophysiology, clinicalmanifestations,types, diagnosticmeasures andmanagement ofpatientswithdisorder sof burns/cosmeticsurgeries and itssignificance	**Nursingmanagementofpatientwithburns,reconstructiveandcosmetic surgery** • Review of anatomy and physiology oftheskin andconnectivetissues • History, physical assessment,assessmentofburnsandfluid&electrolyteloss • Burns • Reconstructive and cosmetic surgeryfor burns, congenital deformities,injuriesandcosmeticpurposes,genderreassignment • Legalandethicalaspects • Specialtherapies:LAD,vacuumeddressing. Laser, liposuction, skinhealth rejuvenation, use of dermafilters	• Lecture anddiscussion • Demonstrationof burn woundassessment, vacuumdressing and fluidcalculations • Visit to burnrehabilitationcenters	• OSCE • Shortnotes
VI	16(T) 4(L/SL)	Explain the etiology,pathophysiology, clinicalmanifestations, diagnosticmeasures andmanagementof patients withneurologicaldisorders	**Nursingmanagementofpatientwithneurologicaldisorders** •Reviewof anatomyandphysiology of theneurologicalsystem • History, physical and neurologicalassessment,diagnostictests • Headache,Headinjuries • Spinal injuries: Paraplegia,Hemiplegia,Quadriplegia • Spinalcordcompression:herniationofinvertebraldisc • Intracranialandcerebralaneurysms • Meningitis,encephalitis,brain,abscess,neuro-cysticercosis • Movementdisorders:Chorea,Seizures &Epilepsies • Cerebrovasculardisorders:CVA • Cranial, spinal neuropathies: Bell‘spalsy,trigeminalneuralgia • PeripheralNeuropathies	• Lecture anddiscussion • Demonstrationof physiotherapy,neuro Myastheniagravis &Multiplesclerosis	• OSCE • Shortnotes •Essay assessment,tracheostomycare • Visittorehabilitation center,long term careclinics, EEG, NCVstudyunit,Drugbook
			• Degenerativediseases:Alzheimer‘sdisease,Parkinson‘sdisease • *Guillain-Barré syndrome,*		

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			•Rehabilitationofpatientwithneurologicaldeficit		
VII	12(T) 4(L/SL)	Explain the etiology,pathophysiology, clinicalmanifestations, diagnostictests,and medical, surgical,nutritional,and nursingmanagement ofimmunologicaldisorders Prepareandprovidesh ealth education onprevention of HIVinfection andrehabilitation Describe the nationalinfection controlprograms	**NursingmanagementofpatientswithImmunological problems** •ReviewofImmunesystem • NursingAssessment:HistoryandPhysicalassessment • HIV & AIDS: Epidemiology,Transmission, Prevention ofTransmissionandmanagementofHIV/AIDS • Role of Nurse; Counseling, Healtheducationandhomecareconsideration andrehabilitation • National AIDS Control Program – NACO, various national andinternational agencies for infectioncontrol	•Lecture,discussion •CaseDiscussion/ seminar • ReferModuleon HIV/AIDS	
VIII	12(T) 4(L/SL)	Explain the etiology,pathophysiology, types,clinical manifestations,staging, diagnosticmeasures andmanagement ofpatientswithdifferentcancer, treatmentmodalities includingnewertreatments	**Nursing management of patient withOncologicalconditions** • Structureandcharacteristicsofnormal andcancercells • History,physicallyassessment,diagnostictests • Prevention screening early detectionswarningsignof cancer • Epidemiology,etiologyclassification, Pathophysiology, staging clinicalmanifestations, diagnosis, treatmentmodalities and medical and surgicalnursing management of Oncologicalcondition • Common malignancies of variousbody system eye, ear, nose, larynx,breast,cervix,ovary,uterus,sarcoma,renal, bladder, kidney, prostate Brain,Spinalcord. • Oncologicalemergencies • Modalities of treatment:Chemotherapy, Radiotherapy:Radiation safety, AERB regulations,Surgical intervention, Stem cell andbone marrow transplant,Immunotherapy,Genetherapy • Psychological aspects of cancer:anxiety,depression,insomnia, anger	• Lecture anddiscussion •Demonstrationof chemotherapypreparation andadministration • Visit to BMT,radiotherapy units(linear accelerator,brachytherapy, etc.),nuclear medicineunit	• OSCE • Essay • Quiz • Drugbook • Counseling, healthteaching
			• Supportivecare • Hospicecare	• Completion ofpalliativecare	

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
				module duringclinical hours(20hours)	
IX	15(T) 4(L/SL)	Explain the types,policies, guidelines,prevention andmanagement ofdisasterandthe etiology,pathophysiology, clinicalmanifestations, diagnostic measuresand management ofpatients with acuteemergencies	**Nursing management of patient inEmergencyandDisastersituations** **DisasterNursing** • Conceptandprinciplesofdisasternursing,RelatedPolicies •Typesofdisaster:Naturaland manmade •Disaster preparedness: Team,guidelines, protocols, equipment,resources •Etiology, classification,Pathophysiology, staging, clinicalmanifestation, diagnosis, treatmentmodalities and medical and surgicalnursingmanagementofpatientwithmedical and surgical emergencies –Poly trauma, Bites, Poisoning andThermalemergencies •Principlesofemergency management •Medicolegalaspects	• Lecture anddiscussion • Demonstration ofdisasterpreparedness (Mockdrill)andtriaging • Filedvisittolocal disaster managementcenters or demo byfireextinguishers •Group presentation(role play, skit,conceptmapping)ondifferent emergencycare •**ReferTraumacaremanagement/ATCN module**	• OSCE • Case presentationsandcasestudy
X	10(T)	Explain the Concept,physiological changes,and psychosocialproblems ofageing Describe the nursingmanagement of theelderly	**Nursingcareoftheelderly** •Historyandphysicalassessment •Agingprocessandage-relatedbodychangesandpsychosocialaspects •Stressandcopinginelderpatient •Psychosocialandsexualabuseofelderly •Roleoffamily andformaland non-formalcaregivers •Useof aidsand prosthesis(hearingaids,dentures) •Legalandethicalissues	•Guided reading onNational DisasterManagementAuthority(NDMA)guidelines •Lectureanddiscussion •Demonstration ofcommunication withvisual and hearingimpaired •Fieldvisittooldagehomes	• OSCE • Case presentations • Assignmento n familysystems ofIndia focusingon geriatricpopulation
XI	15(T) 8(L/SL)	Explain the etiology,pathophysiology, clinicalmanifestations, diagnosticmeasures andmanagementof patientsincriticalcareunits	•National programs for elderly,privileges,communityprogramsandhealthservices •Homeandinstitutionalcare **Nursingmanagementofpatientsincriticalcareunits** •Principlesofcriticalcarenursing • Organization:physicalset-up,policies, staffingnorms	•Lectureanddiscussion • Demonstration ontheuseof • Protocols,equipmentandsupplies	• Objectivetype • Shortnotes • Case mechanicalventilators, cardiacmonitorsetc.

- Clinicalpracticein

presentations

- Assessment ofskill onmonitoringof

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• Use and application of critical carebiomedical equipment: ventilators,cardiac monitors, defibrillators,infusion pump, Resuscitationequipmentand anyother • AdvancedCardiacLifesupport • Nursing management of critically illpatient • Transitionalcare • EthicalandLegalAspects • BreakingBadNewstoPatientsand/orthe ir families: Communication withpatientand family • Endoflifecare	differentICUs	patients inICU. • Writtenassign ment onethical andlegal issues incriticalcare
XII	5(T)	Describe the etiology,pathophysiol ogy, clinical manifestations, diagnostic measuresand management ofpatients withoccupational/in dustrial healthdisorders	**Nursing management of patientsoccupationalandindustrialdis orders** • History,physicalexamination, Diagnostictests • Occupationaldiseasesand management	• Lecture anddiscussi on • Industrialvisit	• Assignment onindustrial healthhazards

CLINICALPRACTICUM

CLINICALPRACTICUM:6Credits(480Hours)–**20weeks×24hours**

PRACTICECOMPETENCIES: Oncompletionoftheclinicalpracticum,thestudentswilldevelopproficiencyinapplying nursing process and critical thinking in rendering holistic nursing care including rehabilitation to the adult/geriatricpatients admitted in Critical Care Units, undergoing cosmetic and reconstructive surgery and with selected medical &surgicaldisordersofear,nose,throat,eye,Genitourinary,reproductive,immunologic,nervoussystemsandinemergency/disasterc onditions.

Thestudentswillbecompetent to

1. Utilizethenursingprocessinprovidingcaretothesickadultsinthehospital
   a. Performcompletehealthassessmenttoestablishadatabaseforprovidingqualitypatientcare.
   b. Integratetheknowledgeofdiagnostictestsinpatientassignment.
   c. Identifynursingdiagnosesandlistthemaccordingtopriority.
   d. Formulatenursingcareplan,usingproblemsolvingapproach.
   e. Applyscientificprincipleswhilegivingnursingcaretopatients.
   f. Developskillinperformingnursingproceduresapplyingscientificprinciple.
   g. Establish/developinterpersonalrelationshipwithpatientsandfamilymembers.
   h. Evaluatetheexpectedoutcomesandmodify theplanaccordingtothepatientneeds.
2. Providecomfortandsafety toadultpatientsinthehospital.
3. Maintainsafeenvironmentforpatientsduringhospitalization.
4. Explainnursingactionsappropriatelytothepatientsandfamily members.
5. Ensurepatientsafetywhileprovidingnursingprocedures.
6. Assesstheeducationalneedsofthepatientandtheirfamilyrelatedtomedicalandsurgicaldisordersandprovideappropriatehealth educationtopatients.

7. Providepre,intraandpost-operativecaretopatientsundergoingsurgery.
8. Integrateknowledgeofpathology,nutritionandpharmacologyforpatientsexperiencingselectedmedicalandsurgicaldisorders.
9. Integrateevidence-basedinformationwhilegivingnursingcaretopatients.
10. Demonstratetheawarenessoflegalandethicalissuesinnursingpractice.

I. NursingManagementofPatientswithENTDisorders

A. SkillLab

Useofmanikinsandsimulators

- Tracheostomycare
- InstillingEarandNasalmedications
- Bandageapplication

B. ClinicalPostings

Clinical	Duration (weeks)	Learningarea/unit Outcomes	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
ENT Ward careandOPD	2	Provide topatients with Educate thepatients andtheirfami	• Examination of ear, nose, throat andHistory taking • ApplyingbandagestoEar,Nose • Tracheostomycare • Preparationofpatient,assistingandmonitoring of patients undergoingdiagnosticprocedures ○ Auditoryscreeningtests ○ **Audiometrictests** • Preparing the patient and assisting inspecialprocedureslikeAnterior/posterior nasalpacking,EarPackingandSyringing • Preparation and after care of patientsundergoingENTsurgicalprocedures	• ENTassessment –1 • Case study/Clinicalpresentation–1	• Clinicalevaluation • OSCE • Case reportstudy/ Clinicalpresentation

II. NursingManagementofPatientswithEyeConditions

A. SkillLab

Useofmanikinsandsimulators

- InstillingEyemedications
- Eyeirrigation
- Eyebandage

B. ClinicalPostings

Clinical	Duration (weeks)	Learningarea/unit Outcomes	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
Ophthalmology skillunit	2	Develop inproviding care topatients Educate thepatientsa	• Historytaking,Examinationofeyesandinterpretation • Assistingprocedures ○ Visualacuity ○ Fundoscopy, retinoscopy,ophthalmoscopy,tonometry,	• Eyeassessment –1 • Healthteaching • Case study/ClinicalPresentation–1	• Clinical evaluation • OSCE • Clinicalpresentation

		theirfamilies	•Preandpost-operative care • Instillationofdrops/ medication • Eyeirrigation • Applicationofeyebandage • Assistingwithforeignbodyremoval		

III. NursingManagementofPatientswithKidneyandUrinarySystemDisorders

A. SkillLab

Useofmanikinsandsimulators

- Assessment:kidney&urinarysystem
- Preparation:dialysis
- Catheterizationandcare

B. ClinicalPostings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
Renal ward/nephrologywardincludingDialysisunit	2	DevelopskillinManagementof patientswith urinary,malereproductiveproblems	• Assessmentofkidneyandurinarysystem ○ Historytaking ○ Physicalexamination ○ Testicularself-examination ○digitalrectalexam • Preparationandassistingwithdiagnosticandtherapeuticprocedures ○ Cystoscopy,Cystometrogram, ○ Contraststudies:IVPetc. ○ Peritonealdialysis ○ Hemodialysis, ○ Lithotripsy ○ Specific tests: Semen analysis,gonorreoeatest,Renal/Prostate Biopsyetc. • Catheterization:care • Bladderirrigation • I/Orecordingandmonitoring • Ambulationandexercise	• Assessment–1 • Drugpresentation –1 • Care study/Clinicalpresentation–1 • Preparing andassisting inhemodialysis	• Clinicalevaluation • Careplan • OSCE • Quiz • Drug presentation

IV. NursingManagementofPatientswithBurnsandReconstructiveSurgery

A. SkillLab

Useofmanikinsandsimulators

- Assessmentofburnswound
- Wounddressing

B. ClinicalPostings

Clinical area/unit	Duration (weeks)	LearningOutcomes	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
Burns unit/reconstructivesurgicalu	2	Developskillinburnsassessment andproviding care topatients with differenttypesof burns Develop skill inproviding care topatients with differenttypes of cosmetic	• Assessmentofburns • Firstaidofburns • Fluid & electrolytereplacementtherapy • Skincare • CareofBurnwounds – Bathing – Dressing • Pre-operative and post-operativecareofpatients • Caringofskingraftandpostcosmeticsurgery	• burn woundassessment–1 • care	• Clinicalevaluation, • Care study/case report

V. NursingManagementofPatientswithneurologicaldisorders

A. SkillLab

Useofmanikinsandsimulators

- Rangeofmotionexercises
- Musclestrengtheningexercises
- Crutchwalking

B. ClinicalPostings

Clinical area/unit	Duration	Learning(	Procedural Competencies/ ClinicalSkills	ClinicalRequirements	Assessment Methods
Neurology-medical/ Surgery wards	3	Developskillin Management of patientswith Neurological problems	• Historytaking;Neurological Examination • Patientmonitoring • Prepare and assist for various invasiveand non-invasive diagnosticprocedures • Rangeofmotionexercises,musclestrengthening • Careofmedical,surgicalandrehabilitativepatients	• euro-assessment –1 • Case study/ casepresentation –1 • Drug	• Clinical evaluation • Neuroassessment • OSCE • Case report/presen

VI. NursingManagementofPatientswithImmunologicalDisorders

A. SkillLab

- BarrierNursing
- ReverseBarrierNursing

B. ClinicalPostings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/ ClinicalSkills	ClinicalRequirements	Assessment Methods
Isolation ward/Medicalward	1	Developskillin Management ofpatients withimmunologicaldisorders	• Historytakingthe • Immunologicalstatusassessment(e.g.HIV) and Interpretation of specifictests • Caringofpatientswithlowimmunity • Practicingofstandardsafetymeasures, precautions/barrier nursing/reversebarrier/isolation	• Assessment ofimmunestatus • Teaching ofisolation to patientand family • Nutritional management • CareNote–1	• Carenote • Quiz • HealthTeaching

VII. NursingManagementofPatientswithdisordersofOncologicalconditions

A. SkillLab

Useofmanikinsandsimulators

- Applicationoftopicalmedication
- Administrationofchemotherapy

B. ClinicalPostings

Clinical area/unit	Duration (weeks)	Learning Outcomes	Procedural Competencies/ ClinicalSkills	ClinicalRequirements	Assessment Methods
Oncologywards(includingday careradiotherapyunit)	3	Developskilli n providingcare topatients withoncologicaldisorders	• Historytaking&physicalexaminationof cancer patients • Screeningforcommoncancers:TNMclassification • Preparation,assistingandaftercarepatients undergoing diagnosticprocedures – Biopsies/FNAC – Papsmear – Bone-marrowaspiration • Variousmodalitiesoftreatment – Chemotherapy – Radiotherapy – Painmanagement – Stomatherapy – Hormonaltherapy – Immunotherapy – Genetherapy – Alternativetherapy • Stomacareandfeeding • Caringofpatientstreatedwithnuclearmedicine • Rehabilitation	• Assessment–1 • Care study/clinicalpresentation–1 • Pre and post-operativecareofpatient withvariousmodesof cancertreatment • Teaching onBSEtofamilymembers • Visit topalliative careunit	• Clinicalevaluation • Carestudy • Quiz • Drugbook

VIII. NursingManagementofPatientsinemergencyconditions

A. SkillLab

Useofmanikinsandsimulators

- Assessment:primaryandsecondarysurvey
- Traumacare:bandaging,woundcare,splinting,positions

B. ClinicalPostings

Clinical area/unit	Duration Skills(weeks)	Learning	Procedural Competencies/ Clinical Outcomes	Clinical Requirements	Assessment Methods
Emergency room/Emergencyunit	2	Developskillroviding care topatients withemergencyhealthproblems	•Practicing_triage‘inp • Primary and secondary survey inemergency • Examination, investigations & theirinterpretations,inemergency&disastersituations • Emergencycareofmedicalandtraumaticinjury patients • Documentations,assistinginlegalproceduresin emergencyunit • Managingcrowd • Counseling the patient and family indealingwithgrieving&bereavement	• Triage • Immediatecare • Useof •Quiz emergency	•Clinical evaluation

IX. NursingManagementofgeriatricpatients

A. SkillLab

Useofmanikinsandsimulators

- **Useofassistivesafetydevices**

B. ClinicalPostings

ClinicalDurationLearningOutcomesarea/unit(weeks)			ProceduralCompetencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
Geriatric ward	1	Developsskillin takinggeriatricassessment dprovidingcare to Geriatricpatientswith	•History andassessmentan of	• Geriatricassessment–1 • Care of normal and geriatric patientwithillness • Fallriskassessment–1 • Functionalstatusassessment–1	• Clinicalevaluation • Careplan

X. NursingManagementofPatientsincriticalcareunits

A. SkillLab

Useofmanikinsandsimulators

- Assessmentcriticallyill
- ETtubesetup–suction
- TTsuction
- Ventilatorsetup
- Chestdrainage
- Bagmaskventilation

- Central&Peripheralline
- Pacemaker

B. ClinicalPostings

Clinical area/unit	Duration (weeks)	Learning Outcomes	ProceduralCompetencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
CriticalCareUnit	2	Develop skillin assessmentofcriticallyilland providingcare topatients withcritical healthconditions	• Assessmentofcriticallyillpatients • Assisting in arterial puncture, ET tubeintubation&extubation • ABG analysis & interpretation - respiratoryacidosis,respiratoryalkalosis, metabolicacidosis,metabolicalkalosis • Setting up of Ventilator modes andsettingsandcareof patientonaventilator • Setupoftrolleywithinstruments • MonitoringandmaintenanceofChestdrainagesystem • Bagandmaskventilation • AssistingandmaintenanceofCentralandperipherallines invasive • Settingupofinfusionpump,defibrillator, • Drug administration-infusion, intracardic,intrathecal,epidural, • Monitoringpacemaker • ICUcarebundle • ManagementofthedyingpatientintheICU	• Hemodynamic monitoring • Different scalesusedin ICU • Communicating withcriticallyill patients	•Clinicalevaluation •OSCE •RASSscaleassessment • Use of VAEbundle VAP,CAUTI,BSI •Case Presentation

PROFESSIONALISM,PROFESSIONALVALUES&ETHICSINCLUDINGBIOETHICSPLACEMENT:

IV SEMESTER

THEORY:1Credit(20hours)

DESCRIPTION: This course is designed to help students to develop an understanding of professionalism and demonstrateprofessional behavior in their workplace with ethics and professional values. Further the students will be able to identifyethicalissuesin nursingpracticeandparticipateeffectively inethicaldecision making alongwithhealthteammembers.

COMPETENCIES: Oncompletionofthiscourse,thestudentswillbeableto

1. Describeprofessionandprofessionalism.
2. Identifythechallengesofprofessionalism.
3. Maintainrespectfulcommunicationand relationshipwithotherhealthteammembers,patientsandsociety.
4. Demonstrateprofessionalconduct.
5. Describevariousregulatory bodiesandprofessionalorganizationsrelatedtonursing.
6. Discusstheimportanceofprofessionalvaluesinpatientcare.
7. Explaintheprofessionalvaluesanddemonstrateappropriateprofessionalvaluesinnursingpractice.
8. Demonstrateandreflectontheroleandresponsibilitiesinprovidingcompassionatecareinthehealthcaresetting.
9. Demonstraterespect,humandignityandprivacyandconfidentialitytoself,patientsandtheircaregiversandotherhealthteam members.
10. Advocateforpatients‘wellbeing,professionalgrowthandadvancingtheprofession.
11. Identifyethicalandbioethicalconcerns,issuesanddilemmasinnursingandhealthcare.
12. Applyknowledgeofethicsandbioethicsinethicaldecisionmakingalongwithhealthteammembers.
13. Protectandrespectpatient‘srights.

COURSEOUTLINE

T–Theory

	Unit Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	5(T)	Discussnursingasaprofession Describetheconceptsand attributes ofprofessionalism Identifythechallengesofprofessionalism Maintain respectfulcommunication andrelationshipwithotherhealth team members,patientsandsociety Demonstrateprofessionalconduct Respectandmaintainprofessionalboundaries betweenpatients, colleaguesandsociety Describetherolesandresponsibilities ofregulatorybodiesand professional organizations	**PROFESSIONALISM** **Profession** • Definitionofprofession • Criteriaofaprofession • Nursingasaprofession **Professionalism** • Definition and characteristics ofprofessionalism • Concepts, attributes and indicators ofprofessionalism • *Challengesofprofessionalism* ○ Personal identity vs professionalidentity ○ Preservationofself-integrity:threatto integrity, Deceiving patient:withholding information andfalsifyingrecords ○ Communication & Relationship withteam members: Respectful and opencommunication and relationshippertaining to relevant interests forethicaldecisionmaking ○ Relationshipwithpatientsandsociety **ProfessionalConduct** • Followingethicalprinciples • Adheringtopolicies,rulesandregulationoftheinstitutions • Professionaletiquettesandbehaviours • Professionalgrooming:Uniform,Dresscode • Professionalboundaries:Professionalrelationship with the patients,caregiversand teammembers **RegulatoryBodies&Professional Organizations:Roles&Responsibilities** • *Regulatory bodies*: Indian NursingCouncil,StateNursingCouncil • *ProfessionalOrganizations:*Trained Nurses Association of India (TNAI),Student Nurses Association (SNA),Nurses League of Christian MedicalAssociation of India, InternationalCouncil of Nurses (ICN) andInternational Confederation ofMidwives	• Lecture cumDiscussion • Debate • Roleplay • Case baseddiscussion •Lecturecum Discussion • VisittoINC,SNC,TNAI	• Shortanswer • Essay • Objectivetype • Visitreports

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
II	5(T)	Discuss theimportance ofprofessionalvalues Distinguish betweenpersonal values andprofessionalvalues Demonstrateappropriateprofessional values innursingpractice	**PROFESSIONALVALUES** •Values:Definitionandcharacteristicsof values •Valueclarification •Personalandprofessionalvalues •Professionalsocialization:Integrationof professional values with personalvalues **Professionalvaluesinnursing** •Importanceofprofessionalvaluesinnursingandhealth care •Caring:definition,andprocess •Compassion:SympathyVsempathy,Altruism •Conscientiousness •Dedication/devotiontowork •Respectfortheperson-Humandignity •Privacyandconfidentiality:Incidentaldisclosure •Honestyandintegrity:Truthtelling •Trustandcredibility:Fidelity,Loyalty •Advocacy:Advocacyforpatients,workenvironment, nursing education andpractice, and for advancing theprofession	•Lecturecum Discussion •Valueclarificationexercise •Interactivelearning •Story telling •Sharingexperiences •Scenariobasedd iscussion	•Shortanswer •Essay •Assessmentofstudent‘sbehavior withpatients andfamilies
III	10(T)	Define ethics &bioethics Explain ethicalprinciples Identify ethicalconcerns Ethical issues anddilemmas in healthcare	**ETHICS&BIOETHICS** **Definitions:Ethics,BioethicsandEthicalPrinciples** •Beneficence •Non-maleficence: Patient safety,protectingpatientfromharm,Reportingerrors •Justice:Treatingeachpersonasequal •Carewithoutdiscrimination,equitableaccesstocareandsafety ofthepublic •Autonomy: Respects patients‘autonomy,Self-determination,Freedomofchoice **Ethical issues and ethical dilemma**:**Commonethicalproblems** •Conflictof interest •Paternalism •Deception •Privacy andconfidentiality	•Lecturecumd iscussion •Groupdiscussionwithexamples •Flipping/ self-directedlearning •Roleplay •Story telling •Sharingexperiences •CasebasedClinicaldiscussion •Role modeling •Groupexerciseonethical decision-making followingsteps on a givenscenario •Assignment	•Shortanswer •Essay •Quiz •Reflectivediary •Casereport •Attitudetest •Assessmentofassignment

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			•Validconsentandrefusal •Allocationofscarcenursingresources •Conflictsconcerningnewtechnologies •Whistle-blowing •*Beginningoflifeissues* ○ Abortion ○ Substanceabuse ○ Fetaltherapy ○ Selectivededuction ○ Intrauterine treatment of fetalconditions ○ Mandatedcontraception ○ Fetalinjury ○ Infertilitytreatment •*Endof lifeissues* ○ Endoflife ○ Euthanasia ○ DoNotResuscitate(DNR) •*Issuesrelatedtopsychiatriccare* ○ Noncompliance ○ Restrainandseclusion ○ Refusetotakefood		
		Explain process ofethical decisionmaking and applyknowledge of ethicsand bioethics inmaking ethicaldecisions			
		Explain code of ethicsstipulated by ICN andINC			

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		Discuss the rights ofthe patients andfamilies to makedecisionsabouth ealthcare Protect and respectpatients'rig hts	**Processofethicaldecisionmaking** •Assessthesituation(collectinf ormation) •Identify theethical problem •Identify thealternativedecisions •Choosethesolutiontotheethicaldeci sion •Implementthedecision •Evaluatethedecision **Ethicscommittee:Rolesandr esponsibilities** •Clinicaldecision making •Research **CodeofEthics** •InternationalCouncilofNurses(ICN) •IndianNursingCouncil **Patients' Bill of Rights-17 patients'rights(MoH&FW,GoI)** 1. Righttoemergency medicalcare 2. Right to safety and quality careaccordingtostandards 3. Righttopreservedignity 4. Righttonondiscrimination 5. Righttoprivacyandconfidentiality 6. Righttoinformation 7. Righttorecords andreports 8. Righttoinformedconsent 9. Righttosecond opinion 10. Righttopatient education 11. Right to choose alternative treatmentoptionsif available 12. Righttochoosesourceforobtainingme dicinesor tests 13. Righttoproperreferralandtransfer,wh ich is free from perversecommercialinfluences 14. Right to take discharge of patient orreceive body of deceased fromhospital 15. Right toinformationontherates tobe charged by the hospital for eachtypeofserviceprovidedandfaciliti esavailable on a prominent displayboardanda brochure 16. Right to protection for patientsinvolved in clinical trials, biomedicalandhealth research 17. Righttobeheardandseekredressal		

CHILDHEALTHNURSING-I

PLACEMENT:VSEMESTER

THEORY:3Credits(60hours)

PRACTICUM: Lab/SkillLab:1Credit(40hours) Clinical:2Credits(160hours)

DESCRIPTION: Thiscourseisdesignedfordevelopinganunderstandingofthemodernapproachtochild-care,identification,prevention andnursingmanagementof commonhealthproblemsof neonatesandchildren.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Developunderstandingofthehistoryandmodernconceptsofchildhealthandchild-care.
2. Explorethenationalchildwelfareservices,nationalprogramsandlegislationinthelightofNationalHealthPolicy2017.
3. Describetheroleofpreventivepediatricsandperformpreventive measurestowardsaccidents.
4. Participateinnationalimmunizationprograms/UniversalImmunizationProgram(UIP).
5. Identifythedevelopmentalneedsofchildrenandprovideparentalguidance.
6. Describetheprinciplesof childhealthnursingandperformchildhealthnursingprocedures.
7. Demonstratecompetenciesinnewbornassessment,planningandimplementationofcare tonormalandhigh-risknewborn including neonatalresuscitation.
8. Applytheprinciplesandstrategiesof Integratedmanagementofneonatalandchildhoodillness(IMNCI).
9. Applytheknowledgeofpathophysiologyandprovidenursingcaretochildrenwithrespiratorysystemdisorders.
10. IdentifyandmeetchildhoodemergenciesandperformchildCPR.

COURSEOUTLINE

T–Theory,L/SL –Lab/SkillLab

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	10(T) 10(L)	Explainthemodern conceptofchild-care Describe Nationalpolicy, programs andlegislationinrelationto child health &welfare Describe role ofpreventivepediatrics	**Introduction**:**Modernconceptsofchild-care** • Historicaldevelopmentofchildhealth • Philosophyandmodernconceptofchild-care • Culturalandreligiousconsiderationsinchild-care • Nationalpolicyandlegislationsinrelationtochildhealthandwelfare • Nationalprogramsandagenciesrelated to welfare services to thechildren • Internationallyacceptedrightsofthechild • Changing trends in hospital care,preventive, promotive and curativeaspectofchild health • *Preventivepediatrics:* ○ Concept ○ Immunization ○ Immunizationprogramsandcold	•LectureDiscussion•Shortanswer •Demonstration ofcommon pediatricprocedures	•Objectivetype •Assessmentofskills withchecklist

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
			chain. ○ Care of under-five and Under-fiveClinics/Well-baby clinics ○ Preventive measures towardsaccidents • Childmorbidityandmortalityrates • Difference between an adult andchildwhichaffectresponsetoillness ○ Physiological ○ Psychological ○ Social ○ Immunological • Hospitalenvironmentforsickchild • Impactofhospitalizationonthechildandfamily • Communicationtechniquesforchildren • Griefandbereavement • Theroleofachildhealthnurseincaringforahospitalizedchild • Principles of pre and postoperativecareofinfantsand children. *ChildHealthNursingprocedures:* •Administrationof medication:oral,I/M,& I/V •Calculationof fluidrequirement •Applicationofrestraints •Assessmentofpaininchildren.		
II	12(T)	Describethenormal growth anddevelopment ofchildren at differentages Identifytheneedsofchildren at differentages & provideparentalguidance Identifythenutritionalneeds of children atdifferentages&ways	○ FACESpainratingscale ○ FLACCscale ○ Numericalscale **TheHealthyChild** • Definitionandprinciplesofgrowthanddevelopment • Factors affecting growth anddevelopment • Growthanddevelopmentfrombirthto adolescence • Growth and developmental theories(Freud, Erickson, Jean Piaget,Kohlberg) • Theneedsofnormalchildrenthroughthe	•LectureDiscussion•Shortanswer stagesofdevelopmentalandparentalguidance	•Demonstration •Developmentalstudy of infant andchildren •Observationstudyof normal & sickchild •Field visit toAnganwadi, childguidanceclinic •Videosonbreastfeeding

- Objectivetype
- Assessment offield visits anddevelopmentalstudyreports

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		ofmeetingneeds Identifytheroleofplayfor normal & sickchildren	• Nutritional needs of children andinfants - breastfeeding - exclusivebreastfeeding - Supplementary/artificial feedingandweaning •Babyfriendlyhospitalconcept •Typesandvalueofplayandselectionofplay material	•Clinicalpractice/field • Refer/consult MAA Mothers absolute affection program for breast feeding module (National Guideline)	
III	15(T) 20(L)	Providecaretonormal andhigh-riskneonates Perform neonatalresuscitation Recognizeandmanagecommon neonatalproblems	**Nursingcareofneonate:** •AppraisalofNewborn • Nursingcareofanormal newborn/essentialnewborncare • Neonatalresuscitation • Nursingmanagementoflowbirthweightbaby • Kangaroomothercare • Nursingmanagementofcommonneonataldisorder - Hyperbilirubinemia - Hypothermia - Hyperthermia - Metabolicdisorder - Neonatalinfections - Neonatalseizures - Respiratory distresssyndrome - RetinopathyofPrematurity	• Modularbased teaching**: ENBCandFBNCmodule(oraldrills,videos, self-evaluationexercises)** •Workshop onneonatalresuscitation: NRPmodule •Demonstration •PracticeSession •Clinicalpractice •LectureDiscussion	• OSCE •Shortanswer •Objectivetype
IV	10(T) 5(L)	ApplyprinciplesandstrategiesofIMNCI	•Organizationofneonatalcareunit •Neonatalequipment **Integratedmanagementofneonataland childhoodIllnesses**	*Modularbased teaching:* **IMNCImodule**	• OSCE
V	8(T)	Describetheetiology, pathophysiology,clinical manifestationand nursingmanagement ofchildrenwithdisordersof respiratory, andendocrinesystem	**Nursingmanagementincommon childhood diseasesRespiratory system**: • IdentificationandNursing management of congenitalmalformations • Congenital disorders:Tracheoesophageal fistula,Diaphragmatichernia	• Clinicalpractice/field • LectureDiscussion	•Shortanswer • Demonstration • Practicesession • Clinicalpractice

- Objectivetype
- Assessment ofskills withchecklist

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning	Assessment
			• Others:Acutenaso-pharyngitis,Tonsillitis, Croup, Bronchitis,Bronchiolitis,Pneumonia,Asthma **Endocrinesystem**: • JuvenileDiabetesmellitus, Hypo-thyroidism		
	5(L)	child-hood emergencies andperformchildC	• Accidents – causes and prevention,Poisoning,Foreignbodies,Hemorrhage,BurnsandDrowning • PLS(AHAGuidelines)	• Lecture • Discussion • Demonstration • PLSModule/ Workshop	• OSCE

CHILD HEALTH NURSING - I & II CLINICAL (3 Credits – 240 hours)PLACEMENT: V& VI SEMESTER

PRACTICUM: SkillLab:1Credit(40hours)

Clinical:V SEMESTER – 2 Credits (160 hours)VISEMESTER – 1Credit(80hours)

PRACTICECOMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Performassessmentofchildren:health,developmental&anthropometric.
2. Providenursingcaretochildrenwithvariousmedicaldisorders.
3. Providepre&postoperativecaretochildrenwithcommonpediatricsurgicalconditions/malformation.
4. PerformimmunizationasperNIS.
5. Providenursingcaretocriticallyillchildren.
6. Givehealtheducation/nutritionaleducationtoparents.
7. Counselparentsaccordingtoidentifiedcounselingneeds.

SkillLab

Use of Manikins and SimulatorsPLS,CPAP,Endotrachealsuction**PediatricNursingProcedures:**

- Administrationofmedication–Oral,IM&IV
- Oxygenadministration
- Applicationofrestraints
- Specimencollection
- Urinarycatheterizationanddrainage
- Ostomycare
- Feeding–NG,gastrostomy,Jejunostomy
- Wounddressing
- Sutureremoval

CLINICALPOSTINGS

8weeks×30hoursperweek(5weeks+3weeks)

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
Pediatric MedicalWard	**VSem– 2weeks** **VI Sem – 1week**	• Providenursing care to childrenwith variousmedicaldisorders	•Takingpediatrichistory •Physicalexamination&assessmentofchildren •Administrationoforal,I/M,&I/V medicine/fluids •Calculationoffluidreplacement •PreparationofdifferentstrengthsofI/Vfluids •Applicationofrestraints •Administration of O_2inhalationbydifferentmethods •Baby bath/spongebath •FeedingchildrenbyKatorispoon, Paladai cup •Collectionofspecimensforcommoninvestigations •Assistingwithcommondiagnostic procedures •Teaching mothers/parents ○ Malnutrition ○ Oralrehydrationtherapy ○ Feeding&Weaning ○ Immunizationschedule •Play therapy	• Nursingcareplan –1 •Case studypresentation–1 •Healthtalk –1	• Assess performance with ratingscale • Assess eachskill withchecklist OSCE/OSPE • Evaluation ofcase study/presentation &healtheducationsession • Completion of activityrecord
PediatricSurgicalWard	**V Sem – 2weeks** **VI Sem – 1week**	• Recognizedifferent pediatricsurgicalconditions/malformations • Provide pre &post-operativecare to childrenwith commonpaediatricsurgicalconditions/malformation • Counsel &educateparents	•Calculation,preparation&administrationofI/Vfluids •Bowelwash,insertionofsuppositories •Carefor ostomies: ○ ColostomyIrrigation ○ Ureterostomy ○ Gastrostomy ○ Enterostomy •Urinarycatheterization&drainage •Feeding ○ Naso-gastric ○ Gastrostomy	• Nursing careplan– 1 • Case study/presentation–1	• Assessperformancewith ratingscale • Assess eachskill withchecklist OSCE/OSPE • Evaluation ofcase study/presentation • Completion of activityrecord

Clinical area/unit	Duration (Weeks)	Learning Outcomes	Procedural Competencies/Clini	ClinicalRequirements	Assessment Methods
			○Jejunostomy • Careofsurgicalwounds ○ Dressing ○ Sutureremoval		
PediatricOPD/ Immunization room	**VSem–1week**	• Performassessment ofchildren: health,developmental &anthropometric • Performimmunization • Give healtheducation/nutritional education	• Assessmentofchildren ○ Healthassessment ○ Developmental assessment ○ Anthropometricassessment ○ Nutritionalassessment • Immunization • Health/Nutritionaleducation	• Growth anddevelopmentalstudy: Infant– 1 Toddler– 1 Preschooler–1 Schooler–1 Adolescent–1	• Assessperformancewith ratingscale • Completion of activityrecord
NICU&PICU	**VISem–1week**	• Providenursing caretocritically illchildren	• Care of a baby inincubator/warme • Careofachildonventilator,CPAP • EndotrachealSuction • ChestPhysiotherapy • Administrationoffluidswithinfusionpumps • TotalParenteralNutrition • PhototherapyMonitori • ng of • babiesRecording&rep • orting	• Newbornassessment–1 • Nursing CarePlan– 1	• Assessperformancewith ratingscale • Evaluation ofobservationreport • Completion of activityrecord

MENTALHEALTHNURSING -I

PLACEMENT:VSEMESTER

THEORY:3Credits(60hours)

PRACTICUM: Clinical:1Credit(80hours)

DESCRIPTION: Thiscourseisdesignedtodevelopbasicunderstandingoftheprinciplesandstandardsofmentalhealthnursingandskill inapplicationof nursingprocessinassessment andcare ofpatientswithmentalhealthdisorders.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbecompetentto

1. Tracethehistoricaldevelopmentofmentalhealthnursinganddiscussitsscope.
2. Identifytheclassificationofthe mentaldisorders.
3. Developbasicunderstandingoftheprinciplesandconceptsofmentalhealthnursing.

4. ApplytheIndianNursingCouncilpracticestandardsforpsychiatricmentalhealthnursinginsupervisedclinicalsettings.
5. Conductmentalhealthassessment.
6. Identifyandmaintaintherapeuticcommunicationandnursepatientrelationship.
7. Demonstrateknowledgeofthevarioustreatmentmodalitiesandtherapiesusedinmentaldisorders.
8. Applynursingprocessindeliveringcaretopatientswithmentaldisorders.
9. Providenursingcaretopatientswithschizophreniaandotherpsychoticdisordersbasedonassessmentfindingsandtreatment/therapiesused.
10. Providenursingcaretopatientswithmooddisordersbasedonassessmentfindingsandtreatment/therapiesused.
11. Providenursingcaretopatientswithneuroticdisordersbasedonassessmentfindingsandtreatment/therapiesused.

COURSEOUTLINE

T–Theory

	Unit Time (Hrs)	**LearningOutcomes**	**Content**	**Teaching/Learning Activities**	**Assessment Methods**
I	6(T)	Describe thehistoricaldevelopment &current trends inmentalhealthnursing Discuss the scope ofmentalhealthnursing Describetheconcepto f normal &abnormalbehaviour	**Introduction** •PerspectivesofMentalHealthandMentalHealth Nursing, evolution of mentalhealth services, treatments and nursingpractices •Mentalhealthteam •Nature&scope ofmentalhealthnursing •Role&functionsof mentalhealthnursein various settings and factors affectingthelevelof nursing practice •Conceptsofnormalandabnormalbehaviour	•Lecturecum Discussion	• Essay • Shortanswer
II	10(T)	Definethevarious termsusedinmentalhealthNursing Explainthe classificationof mentaldisorders Explain thepsychodynamics ofmaladaptivebehaviour Discuss theetiological factors &psychopathology ofmentaldisorders Explaintheprinciplesand standards ofMentalhealthNursing Describe theconceptual models ofmentalhealthnursing	**PrinciplesandConceptsofMentalHealthNursing** •Definition:mentalhealthnursingandterminology used • Classificationofmentaldisorders:ICD11,DSM5,Geropsychiatrymanualclassification •Reviewofpersonalitydevelopment,defensemechanisms •Etiology bio-psycho-socialfactors •Psychopathology of mental disorders:reviewofstructureandfunctionofbrain,limbic system and abnormalneurotransmission •PrinciplesofMentalhealthNursing •Ethicsandresponsibilities •PracticeStandardsforPsychiatricMentalHealthNursing(INCpracticestandards) •Conceptual modelsandthe roleof nurse:○Existentialmodel	•Lecturecum Discussion • Explain usingCharts •Reviewof personalitydevelopment	• Essay • Shortanswer

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
			○ Psychoanalyticalmodels ○ Behaviouralmodel ○ Interpersonalmodel •Preventivepsychiatryandrehabilitation		
III	6(T)	Describe nature,purpose and processof assessment ofmentalhealthstatus	**MentalHealthAssessment** •Historytaking •Mentalstatusexamination •Minimentalstatusexamination •Neurologicalexamination •Investigations:RelatedBloodchemistry,EEG,CT & MRI •Psychologicaltests	•Lecturecum Discussion •Demonstration •Practicesession •Clinicalpractice	•Essay •Shortanswer •Assessmentof mental healthstatus
IV	6(T)	Identify therapeuticcommunication &techniques Describe therapeuticrelationship	**Therapeutic Communication and Nurse-PatientRelationship** •Therapeutic communication: Types,techniques,characteristicsandbarriers •Therapeuticnurse-patientrelationship •Interpersonalrelationship- •Elementsofnursepatientcontract, •ReviewoftechniqueofIPR-Johariwindow •Therapeuticimpasseandits management	•Lecturecum Discussion •Demonstration •RolePlay •Processrecording •Simulation(video)	•Essay •Shortanswer •OSCE
V	10(T)	Describe therapeuticimpasses and itsinterventions Explain treatmentmodalities andtherapies used inmental disorders androleof thenurse	**Treatmentmodalitiesandtherapiesusedin mental disorders** •**Physical therapies**:Psychopharmacology, •ElectroConvulsivetherapy •**PsychologicalTherapies**:Psychotherapy,Behaviourtherapy,CBT •**Psychosocial**: Group therapy, Familytherapy, Therapeutic Community,Recreational therapy, Art therapy (Dance,Musicetc),Occupationaltherapy •**Alternative&Complementary**:Yoga,Meditation,Relaxation •**Considerationforspecialpopulations**	•Lecturecum Discussion •Demonstration •Groupwork •Practicesession • Clinicalpractice	•Essay •Shortanswer •Objectivetype
VI	8(T)	Describetheetiology,psycho-dynamics/pathology, clinicalmanifestations,diagnostic criteriaandmanagementofpatients withSchizophrenia, andother psychoticdisorders	**Nursingmanagementofpatientwith Schizophrenia,andotherpsychoticdisorders** • Prevalenceandincidence • Classification • Etiology,psychodynamics,clinical manifestation, diagnosticcriteria/formulations	• Lectureand Discussion • Casediscussion • Casepresentation • Clinicalpractice	• Essay • Shortanswer • Assessment ofpatientmanagementproblems

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
			Nursingprocess • NursingAssessment:History,Physicala nd mentalassessment • Treatment modalities and nursingmanagement of patients withSchizophrenia and other psychoticdisorders • Geriatric considerations andconsiderationsforspecialpopulatio ns • Followupandhomecareandre habilitation		
VII	6(T)	Describetheetiology,psycho-dynamics,clinical manifestations,di agnosticcriteria andmanagementof patientswithmoodd isorders	**Nursingmanagementofpatientwith mooddisorders** • Prevalenceandincidence • Mooddisorders:Bipolaraffective disorder,maniadepressionanddysthymia etc. • Etiology, psycho dynamics, clinicalmanifestation,diagnosis • NursingAssessmentHistory,Physicalandm entalassessment • Treatment modalities and nursingmanagement of patients with mooddisorders • Geriatric considerations/ considerationsfor specialpopulations • Follow-up and home care andrehabilitation	• Lectureand Discussion • Casediscussion • Casepresentation •Clinicalpractice	• Essay • Shortanswer • Assessment ofpatient management problems
VIII	8(T)	Describetheetiology,psycho-dynamics,clinicalm anifestations,diagn ostic criteriaandmanage mentofpatients withneurotic, stressrelated andsomatizationdis orders	**Nursingmanagementofpatientwith neurotic, stress related and somatisationdisorders** • Prevalenceandincidence • classifications • Anxiety disorders – OCD, PTSD,Somatoform disorders, Phobias,DisassociativeandConversiondi sorders • Etiology,psychodynamics,clinical manifestation, diagnostic criteria/formulations • NursingAssessment:History,Physicala nd mentalassessment • Treatment modalities and nursingmanagementofpatientswithneuroti candstressrelateddisorders • Geriatric considerations/ considerationsfor specialpopulations • Follow-up and home care andrehabilitation	• Lectureand Discussion •Casediscussion •Casepresentation •ClinicalpracticeShortanswer • Assessment of patientm	• Essay anagementproblems

CLINICAL PRACTICUMMENTALHEALTHNURSING -I&II

PLACEMENT:SEMESTERV&VI

MENTALHEALTHNURSING-I–1Credit(80hours)

MENTALHEALTHNURSING -II–2Credits(160hours)

PRACTICECOMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto:

1. Assesspatientswithmentalhealthproblems/disorders
2. Observeandassistinvarioustreatment modalitiesortherapies
3. Counselandeducatepatientsandfamilies
4. Performindividualandgrouppsychoeducation
5. Providenursingcaretopatientswithmentalhealthproblems/disorders
6. Motivatepatientsinthecommunity forearlytreatmentandfollowup
7. Observetheassessmentandcareof patientswithsubstanceabusedisordersindeaddictioncentre.

CLINICALPOSTINGS

(8weeks×30hoursperweek=240hours)

Clinical Area/Unit	Duration (Weeks)	Learning Outcomes	Skills/ Procedural Competencies	
Psychiatric OPD	2	•Assess patientswith mentalhealthproblems •Observe andassistintherapies •Counsel andeducate patients,andfamilies	•Historytaking •Performmentalstatusexamination(MSE) •Observe/practicePsychometricassessment •PerformNeurological examination	•Parentalteachingforchildwithmentaldeficiency •Historytaking •Mentalstatusexamination(MSE) •Neurologicalexamination •Assistinginpsychometric
ChildGuidanceclinic	1	•Assesschildrenwith variousmental healthproblems •Counsel andeducate children,families andsignificantothers	•Observingandassistingintherapies •Individualandgroup psycho-education ▪ Mentalhygienepracticeeducation ▪ Familypsycho-education	
Inpatientward	4	•Assess patientswith mentalhealthproblems • Provide	•History&mentalstatusexamination •Observe/practicepsychometricassessment	

nursingcare for patientswithvarious

•Observeandassistinvariousterapies

ClinicalRequirements	Assessments Methods		
•History takingand Mental statusexamination–2 •Healtheducation –1 •ObservationreportofOPD	• Assessperformance withratingscale • Assessseachskill	•Checklist •Evaluation of heal the education • Assessment of observation report	•Completionofactivityrecord •Assessperformance withratingscale •Assesseachskillwithchecklist •Evaluationoftheobservationreport •Assessperformance withratingscale •Assesseachskillwithchecklist
•Casework–1 •Observationreportofdifferenttherapies– 1 •Givecareto2-3patients withvarious mentaldisorders •Casestudy –1			

Clinical Area/Unit	Duration (Weeks)	LearningOutcomes	Skills/Procedural Competencies	ClinicalRequirements	Assessments Methods
		mental healthproblems •Assistinvariousotherapies • Counsel andeducate patients,families andsignificantothers	assessment •Recordingtherapeuticcommunication • Administrationofmedications •AssistElectro-ConvulsiveTherapy (ECT) •Participatinginalltherapies •Preparing patients forActivitiesofDailyLiving(ADL) •Conductingadmissionanddischargecounselling •Counselingandteachingpatientsandfamilies	• Careplan • Clinicalpresentation–1 •Processrecording –2 •Maintaindrugbook	•Evaluationofthecase study, careplan, clinicalpresentation, processrecording • Completion ofactivityrecord
Community psychiatry & Deaddictioncentre	1	•Identify patientswithvariousmentaldisorders • Motivate patientsfor earlytreatment andfollowup • Assist in followupclinic • Counsel andeducate patient,family andcommunity • Observe theassessment andcareofpatients atdeaddictioncentre	•Conducthomevisitandcasework •Identifyingindividualswithmentalhealthproblems •AssistinginorganizationsofMentalHealthcamp •Conducting awarenessmeetingsformental health&mentalillness •Counseling and Teachingfamilymembers,patientsandcommunity •Observingdeaddictioncare	•Casework–1 •Observationreport on fieldvisits •Visit todeaddictioncentre	• Assessperformance withratingscale • Evaluation ofcase work andobservationreport • Completion ofactivityrecord

COMMUNITYHEALTHNURSING-I
includingEnvironmentalScience&Epidemiology

PLACEMENT:VSEMESTER

THEORY: 5Credits(100hours) includesLabhoursalso

PRACTICUM: Clinical:2Credits(160hours)

DESCRIPTION: This course is designed to help students develop broad perspectives of health, its determinants, aboutcommunity health nursing and understanding about the health care delivery services, health care policies and regulations inIndia. It helps the students to develop knowledge and understanding of environmental science. It further helps them to applythe principles and concepts of BCC and health education for health promotion and maintenance of healthwithin thecommunity in wellness and illness continuum. It helps students to practice Community Health Nursing for the individuals,family and groups at rural, urban and tribal settings by applying principles of community health nursing and epidemiologicalapproach.It also helps thestudents todevelop knowledge and competencies required toscreen, assess, diagnose,manageand refer clients appropriately in various health care settings. It prepares the students to provide primary healthcare to clientsof all ages in the community, DH, PHC, CHC, SC/HWC and develop beginning skills in participating in all the NationalHealthPrograms.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Exploretheevolutionofpublic healthinIndiaandcommunity healthnursing
2. Explaintheconceptsanddeterminantsofhealth
3. IdentifythelevelsofpreventionandhealthproblemsofIndia
4. Develop basic understanding about the health care planning and the present health care delivery system in India atvariouslevels
5. Locate the significance of primary health care and comprehensive primary health care as part of current health caredelivery systemfocus
6. Discusshealth carepoliciesandregulationsin India
7. Demonstrateunderstandingaboutanoverviewofenvironmentalscience,environmentalhealthandsanitation
8. Demonstrateskillinnutritionalassessmentfordifferentagegroupsinthecommunityandprovideappropriatenutritionalcounseling
9. Providehealtheducationtoindividualsandfamiliesapplyingtheprinciplesandtechniquesofbehaviorchangeappropriateto communitysettings
10. Describecommunityhealthnursingapproachesandconcepts
11. Describetheroleandresponsibilitiesofcommunityhealthnursingpersonnel
12. Utilizetheknowledgeandskillsinprovidingcomprehensiveprimaryhealthcareacrossthelifespanatvarioussettings
13. Makeeffectivehomevisitsapplyingprinciplesandmethodsusedfor homevisiting
14. Useepidemiologicalapproachincommunitydiagnosis
15. Utilize the knowledge of epidemiology, epidemiological approaches in caring for people with communicable and non-communicable diseases
16. Investigateanepidemicofcommunicablediseases
17. Assess, diagnose, manage and refer clients for various communicable and non- communicable diseases appropriately attheprimaryhealth carelevel
18. Identify and perform the roles and responsibilities of nurses in implementing various national health programs in thecommunity for the prevention, control and management of communicable and non-communicable diseases particularlyinscreening,identification, primarymanagementandreferraltoahealthfacility/FirstReferralUnit(FRU)

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/LearningActivities	Assessment Methods
I	4(T)	Define public health,communityhealthandcommunity health nursing Explain the evolutionofpublic healthinIndia and scope ofcommunity healthnursing Explain variousconceptsofhealthanddisease, dimensionsand determinants ofhealth Explain the naturalhistoryofdiseaseandlevelsof prevention	**ConceptsofCommunity Health and CommunityHealthNursing** • Definitionofpublichealth,	• Lecture • Discussion • Explainusingchart,graphs Discusstheheal	• Shortanswer • Essay • Objectivetype

community health andcommunityhealthnursing

- Public health in India andits evolution and Scope ofcommunityhealthnursing
- *Review:* Concepts ofHealth & Illness/ disease:Definition,dimensionsanddeterminants of health anddisease
- Naturalhistoryofdisease
- Levels of prevention:Primary,Secondary&

- Communityneeds assessment(Field•Surveyreports urvey on identificationof demographic characteristics, healthdeterminants and resources of aruraland anurbancommunity)
- Explainusingexamples

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		problemsofIndia	tertiary prevention – Review •Healthproblems(Profile)of India		
II	8(T)	Describe healthplanning and its steps,and various healthplans,andcommittees Discuss health caredelivery system inIndiaatvariouslevels Describe SDGs,primaryhealthcareand comprehensiveprimaryhealthcare(CPHC) Explain health carepolicies andregulationsinIndia	**HealthCarePlanningand Organization of HealthCareat variouslevels** •Healthplanningsteps •Health planning in India:various committees andcommissionsonhealthandfamily welfare and FiveYearplans •Participation ofcommunity andstakeholders in healthplanning •Health care deliverysystem in India:Infrastructure and Healthsectors, Delivery of healthservices at sub-centre(SC), PHC, CHC, Districtlevel, state level andnationallevel •Sustainabledevelopmentgoals (SDGs), PrimaryHealth Care andComprehensive PrimaryHealth Care (CPHC):elements,principles •CPHCthroughSC/HealthWellnessCenter(HWC) •RoleofMLHP/CHP •National Health CarePoliciesandRegulations ○ National Health Policy(1983, 2002, 2017) ○ NationalHealthMission(NHM): National RuralHealth Mission(NRHM), NationalUrban Health Mission(NUHM),NHM ○ National HealthProtection Mission(NHPM) ○ AyushmanBharat	•Lecture •Discussion •Field visits to CHC, PHC, SC/HealthWellnessCenters(HWC) •Directedreading	• Shortanswer • Essay • Evaluation ofField visitreports &presentation
			○ Universal HealthCoverage		
III	15(T)	Identifytheroleofanindividualin the	**Environmental Science,EnvironmentalHealth,and**	• Lecture	• Shortanswer

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		conservationofnaturalresources Describe ecosystem,itsstructure,typesandfunctions Explain theclassification, valueand threats tobiodiversity Enumerate the causes,effects and controlmeasures ofenvironmentalpollution Discuss about climatechange, globalwarming, acid rain,and ozone layerdepletion Enumerate the role ofan individual increating awarenessaboutthesocialissues relatedtoenvironment	**Sanitation** •*Natural resources:*Renewable and non-renewable resources,natural resources andassociated problems:Forest resources, waterresources, mineralresources, food resources,energyresource sandlandresources •Role of individuals inconservation of naturalresources,andequitableuse of resources forsustainablelifestyles •*Ecosystem:* Concept,structure and functions ofecosystems, Types &Characteristics – Forestecosystem, Grasslandecosystem, Desertecosystem, Aquaticecosystem,Energy flowinecosystem •*Biodiversity:*Classification, value ofbio-diversity, threats tobiodiversity, conservationofbiodiversity •*Environmental pollution:*Introduction, causes,effects and controlmeasures of Air pollution,Water pollution, Soilpollution, Marinepollution, Noise pollution,Thermalpollution,nuclearhazards & their impact onhealth •*Climate change, globalwarming:* ex. heat wave,acid rain, ozone layerdepletion, waste landreclamation&itsimpactonhealth •*Social issues andenvironment:* sustainabledevelopment, urbanproblems related toenergy, water andenvironmental ethics •Acts related toenvironmental protectionandpreservation	• Discussion •Debates on environmentalprotectionandpreservation • ExplainusingCharts,graphs, Models,films,slides • Directedreading • Visitstowatersupply&purificationsites • dvisitreports	• Essay

EnvironmentalHealth&

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		ListtheActsrelatedto environmental protection andpreservation Describe the conceptof environmentalhealth andsanitation Describe waterconservation, rainwater harvesting andwater shedmanagement Explain wastemanagement	**Sanitation** • Conceptofenvironment healthandsanitation • Concept of safe water,sourcesofwater, waterbornediseases,water be	• Observerainwaterharvesting purification processes,household purification ofwater • Physical and chemicalstandards of drinkingwaterqualityandtestsforassessing bacteriologicalquality of water • Concepts of waterconservation: rain waterharvestingandwatershedmanagement • Solid waste management,human excreta disposal &management and sewagedisposalandmanagement • Commonly usedinsecticidesandpesticides	plants • Visit to sewage disposal andtreatmentsites,andwastedisposalsites
IV	7(T)	Describe the variousnutrition assessmentmethods at thecommunity level Planandprovidedietplans for all agegroups includingtherapeutic diet Provide nutritioncounseling andeducation to all agegroupsanddescri		**NutritionAssessmentandNutritionEducation** • *ReviewofNutrition* ○ Concepts,types ○ Mealplanning:aims,steps & diet plan fordifferentagegroups ○ Nutrition assessment ofindividuals,familiesandcommunity by usingappropriate methods • Planning suitable diet forindividuals and familiesaccording to localavailability of foods,dietary habits andeconomic status • Generalnutritionaladvice • Nutrition education:purpose, principles &methods andRehabilitation	• Lecture • Discussion • Demonstration • Roleplay • Marketvisit • Nutritionalassessmentfordifferentagegroups • Lecture • Discussion

- Performanceassessment ofnutritionassessment fordifferent agegroups
- Evaluationonnutritionalassessment reports

- Shortanswer
- Essay

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		the national nutritionprogramsand Identifyearlythefoodborne diseases, andperform initialmanagement andreferralappropriately	•*Review:* Nutritionaldeficiencydisorders •Nationalnutritionalpolicy& programsinIndia **FoodBorneDiseasesandFoodSafety** **Foodbornediseases** •Definition, & burden,Causesandclassification •Signs&Symptoms •Transmission of foodbornepathogens&toxins •Earlyidentification,initialmanagementandreferral **Food poisoning & foodintoxication** •Epidemiologicalfeatures/ clinicalcharacteristics, Types offoodpoisoning • Foodintoxication-features, preventive & controlmeasures •Publichealthresponsetofoodborne diseases	•Fieldvisitstomilkpurificationplants,slaughterhouse •ReferNutritionmodule-BPCCHN Block2-unitI&UNIT5	• Field visitreports
V	6(T)	Describe behaviourchangecommunicationskills Counsel and providehealth education toindividuals, familiesand community forpromotionofhealthylifestylepractices	**CommunicationmanagementandHealthEducation** •Behaviour changecommunicationskills ○communication ○ Humanbehaviour ○ Health belief model:concepts&definition,ways to influencebehaviour ○ Stepsofbehaviourchange ○ Techniquesofbehaviourchange: Guidingprinciples in planningBCCactivity ○ StepsofBCC ○ Social and BehaviourChange Communicationstrategies (SBCC):techniques to collectsocial history fromclients ○ Barrierstoeffective	•Lecture •Discussion •Roleplay •Demonstration:BCCskills •Supervisedfieldpractice •Refer:BCC/SBCCmodule(MoHFW&USAID)	• Shortanswer • Essay • Performance evaluation ofhealth

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		using appropriatemethod sandmedia	communication, andmethodstoovercomethem •Health promotion andHealth education:methods/techniques, andaudio-visualaids		educationsessions toindividual sandfamilies
VI	7(T)	Describe communityhealth nursingapproaches andconcepts Describeandidentifythe activities ofcommunity health nursetopromoteand maintain familyhealththrough homevisits	**Community healthnursingapproaches,concepts, roles andresponsibilities ofcommunity healthnursingpersonnel** • *Approaches:* ○ Nursingprocess ○ Epidemiological approach ○ Problem solvingapproach ○ Evidence basedapproach ○ Empoweringpeopletocareforthemselves •*Review:* Primary healthcareandComprehensivePrimary Health Care(CPHC) **HomeVisits**: • Concept, Principles,Process, & Techniques:Bagtechnique • QualitiesofCommunity HealthNurse •Rolesandresponsibilitiesofcommunity healthnursing personnel infamily healthservices	• Lecture • Discussion • Demonstration • Roleplays • Supervisedfieldpractice adolescents, elderly etc.	• Shortanswer • Essays • Assessment ofsupervisedfieldpractice
VII	10(T)	Explain the specificactivities ofcommunity healthnurse in assistingindividuals andgroupsto promoteand maintain theirhealth	•*Review:* Principles &techniquesofcounseling **Assistingindividualsandfamilies to promote andmaintaintheirhealth** *A. Assessment of individualsand families* (Reviewfrom Child healthnursing,Medicalsurgicalnursing and OBGNursing) •Assessmentofchildren,women,	•Lecture •Discussion •Demonstration •Roleplays	

- Short answer
- Essay
- Assessment of clinical performance in the field practice area

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
			•Children: Monitoringgrowth and development,milestones • Anthropometricm easurements,BMI • Socialdevelopment • Temperature and Bloodpressure monitoring •Menstrualcycle • Breast self-examination(BSE) and testicles self-examination(TSE) • Warning Signs of variousdiseases •Tests:Urineforsugarandalbumin, blood sugar,Hemoglobin *B. Provision of healthservices/primary healthcare:* •Routine check-up,Immunization, counseling,anddiagnosis •Managementofcommondiseases at home andhealthcentrelevel ○ Care based on standingorders/protocolsapprovedbyMoH&FW ○ Drugs dispensing andinjections at healthcentre *C. Continue medical careand follow up* incommunityforvariousdiseases/disabilities *D. Carry out therapeuticprocedures* asprescribed/required forclientand family *E. Maintenanceofhealthrecordsandreports* •Maintenanceofclientrecords • Maintenance of healthrecordsatthefacilitylevel •Report writing anddocumentationofactivitiescarried out during homevisits, in the clinics/centersandfield visits		• Assessment ofproceduralskills in labprocedures
		Provideprimarycarehome/healthcenters(HWC) using standingorders/protocolsasper public healthstandards/approved byMoH&FW and INCregulation Develop skill inmaintenance ofrecordsandreports		•Documentandmaintain: •Individualrecords	• Evaluation ofrecords andreports

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		Develop beginningskills in handlingsocialissuesaffectingthe health anddevelopment of thefamily Identify and assist thefamilies to utilize thecommunity resourcesappropriately	*F. Sensitize and handlesocial issues affectinghealthanddevelopmentofthefamily* •Womenempowerment •Womenandchild abuse •Abuseofelders •Femalefoeticide •Commercialsexworkers •Substanceabuse *G. Utilize communityresources for client andfamily* •Traumaservices •Oldagehomes •Orphanages •Homes for physicallychallengedindividuals •Homesfor destitute •Palliativecarecentres •Hospicecarecentres •Assistedlivingfacility	• Familyrecords • Healthcenterrecords • Fieldvisits	• Evaluation offield visitreports
VIII	10(T)	Describetheconcepts,approaches andmethods ofepidemiology	**Introduction toEpidemiology–EpidemiologicalApproachesandProcesses** •Epidemiology:ConceptandDefinition •Distributionandfrequencyof disease •Aims&usesofepidemiology •Epidemiologicalmodelsofcausationof disease •Conceptsofdiseasetransmission •Modes of transmission:Direct, Indirect and chainofinfection •Timetrendsorfluctuationsindiseaseoccurrence •Epidemiologicalapproaches: Descriptive,analytical andexperimental •Principlesofcontrolmeasures/levelsof	•Lecture •Discussion •Demonstration •Roleplay •Fieldvisits:communicablediseasehospital& Entomology office •Investigationofanepidemicof	• Shortanswer • Essay • Reportonvisitto communicablediseasehospital • Report on visitto entomologyoffice

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		Investigate anepidemic ofcommunicabledisease	preventionofdisease •Investigation of anepidemicofcommunicabledisease •Use of basicepidemiological tools tomake communitydiagnosis for effectiveplanningandintervention	communicabledisease	• Report andpresentationoninvestigatingan epidemic ofcommunicabledisease
IX	15(T)	Explainthe epidemiologyof specificcommunicable diseases Describe the variousmethodsofprevention,control andmanagement ofcommunicablediseasesandtheroleof nurses in screening,diagnosing, primarymanagement andreferral to a healthfacility	**Communicable DiseasesandNationalHealth Programs** **1.** *CommunicableDiseases–Vectorbornediseases(Every diseasewillbe dealtunder thefollowingheadlines)* •Epidemiology of thefollowing vector borndiseases •Prevention&controlmeasures •Screening,anddiagnosingthe following conditions,primary management,referraland followup ○ Malaria ○ Filaria ○ Kala-azar ○ Japaneseencephalitis ○ Dengue ○ Chickungunya **2.** *Communicablediseases: Infectious diseases (Everydisease will be dealt underthefollowingheadlines)* • Epidemiology of thefollowing infectiousdiseases • Prevention & Controlmeasures •Screening,diagnosingthefollowing conditions,primary management,referraland followup ○ Leprosy ○ Tuberculosis ○ Vaccine preventablediseases – Diphtheria,whooping cough,tetanus,poliomyelitis	• Lecture • Discussion, •Demonstration •Roleplay •Suggestedfieldvisits •Fieldpractice •Assessmentofclientswithcommunicabledseases	• Field visitreports • Assessmentof family casestudy

- OSCEassessment
- Shortanswer
- Essay

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
			andmeasles ○ Entericfever ○ Viralhepatitis ○ HIV/AIDS/RTI infections ○ HIV/AIDS, andSexually TransmittedDiseases/ Reproductivetract infections(STIs/RTIs) ○ Diarrhoea ○ Respiratory tractinfections ○ COVID-19 ○ Helminthic – soil &food transmitted andparasitic infections –Scabiesandpediculosis **3.** *Communicablediseases: Zoonoticdiseases* •EpidemiologyofZoonoticdiseases •Prevention&controlmeasures •Screeninganddiagnosingthe following conditions,primary management,referraland followup ○ Rabies: Identify,suspect, primarymanagementand referraltoahealth facility •Roleofanursesincontrolofcommunicablediseases **NationalHealthPrograms** 1. UIP: UniversalImmunization Program(Diphtheria, Whoopingcough, Tetanus,Poliomyelitis, MeaslesandHepatitisB) 2. National LeprosyEradication Program(NLEP) 3. Revised NationalTuberculosis ControlProgram(RNTCP) 4. Integrated DiseaseSurveillance Program(IDSP): Enteric fever,Diarrhea,Respiratory		
		Identify the nationalhealth programsrelevant tocommunicabledisease sandexplainthe role of nurses inimplementation oftheseprograms			

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
			infectionsandScabies 5. National Aids ControlOrganization(NACO) 6. National Vector BorneDiseaseControlProgram 7. NationalAirQuality MonitoringProgram 8. Any other newly addedprogram		
X	15(T)	Describethenational health program for thecontrol of non-communicabledisease s and the roleofnursesinscreenin g,identification, primarymanagement andreferral to a healthfacility	**Non-CommunicableDiseases and NationalHealthProgram(NCD)** •National response toNCDs(Everydiseasewill be dealt under thefollowingheadlines •Epidemiologyofspecificdiseases •Preventionandcontrolmeasures •Screening, diagnosing/identificationandprimarymanagement, referral andfollowup care **NCD-1** ○ DiabetesMellitus ○ Hypertension ○ Cardiovasculardiseases ○ Stroke&Obesity ○ **Blindness:** Categories ofvisual impairment andnational program forcontrolof blindness ○ **Deafness:** nationalprogramforpreventionandcontrolofdeafness ○ **Thyroiddiseases** ○ **Injury and accidents:**Risk factors for Roadtraffic injuries andoperationalguidelines fortrauma care facility onhighways **NCD-2Cancers** ○ CervicalCancer ○ BreastCancer ○ Oralcancer ○ Epidemiologyofspecificcancers,Riskfactors/	• Lecture • Discussion • Demonstration • Roleplay • Suggestedfieldvisits • Fieldpractice • Assessmentofclientswithnon-communicable diseases	• Field visitreports • Assessment offamily casestudy • OSCEassessment • Shortanswer • Essay

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/LearningActivities	Assessment Methods
			Causes, Prevention,Screening, diagnosis – signs,Signs&symptoms,and early management &referral ○ Palliativecare ○ Role of a nurse in non-communicable diseasecontrolprogram **NationalHealthPrograms** • National program forprevention and control ofcancer, Diabetes,Cardiovascular DiseasesandStroke(NPCDCS) • Nationalprogramforcontrolofblindness • National program forprevention and control ofdeafness • Nationaltobaccocontrolprogram • **Standard treatmentprotocols used inNational HealthPrograms**	• Participation innationalhealthprograms	
XI	3(T)	Enumerate the schoolhealth activities andtherolefunctionsofaschoolhealthnurse	**SchoolHealthServices** • Objectives • Healthproblemsofschoolchildren • Componentsofschoolhealthservices • Maintenanceofschoolhealthrecords • Initiationandplanningofschoolhealthservices • Role of a school healthnurse	• Lecture • Discussion • Demonstration • Roleplay • Suggestedfieldvisits • Fieldpractice	• Shortanswer • Essay • Evaluation ofhealthcounseling toschoolchildren • Screen,diagnose,manage andrefer schoolchildren • OSCEassessment

Note: Labhourslessthan1Creditisnotspecifiedseparately.

CLINICALPRACTICUM

CLINICAL:2Credits(160hours)

CLINICALPOSTINGS:(4weeks×40hoursperweek)

Clinical	Duration	LearningOutcomes	ProceduralCompetencies/ ClinicalSkills	ClinicalRequirements	Assessment Methods
Urban	2weeks	Buildandm	• Interviewingskillsusingcommunication and	• Communityneeds •Evaluationofassessment/Survey	

Clinical Area/Unit	Duration (Weeks)	LearningOutcomes	Procedural Competencies/CliniclalSkills	ClinicalRequirements	Assessment Methods
Rural	2Weeks	Identifythesocio-demographiccharacteristics, healthdeterminants andresourcesofaruralandanurbancommunity	interpersonalrelationship • Conductingcommunityneeds assessment/surveytoidentifyhealth determinants of acommunity	– Rural/urban– 1Fieldvisits: • SC/HWC,PHC, CHC • Water resources &purification site –water qualitystandards • Rain waterharvesting • Sewage disposal	• Evaluationof field visit andobservationreports
		Observethefunctioningand documentsignificantobservations	• Observationskills	Observationof • milkdiary • slaughterhouse – meathygiene • Observation ofnutritionprograms	
		Perform nutritionalassessmentandplandietplanforadult	• Nutritionalassessmentskills	• Visittomarket • Nutritionalassessment of anindividual (adult) –1	• Health talkevaluation
		Educate individuals/family/community on - Nutrition - Hygiene - Foodhygiene - Healthylifestyle - Healthpromotion	• Skill in teachingindividual/familyon: ○ Nutrition,includingfoodhygieneand safety ○ Healthylifestyle ○ Healthpromotion	• Health teaching(Adult) – 1 • Useofaudio-visualaids ○ Flashcards ○ Posters ○ Flannelgraph ○ Flipcharts	
		Perform healthassessmentforclientsofvariousagegroups	• Healthassessmentincludingnutritionalassessmentfor clientsofdifferentagegroups	• Health assessmentof woman – 1,infant/under five –1, adolescent – 1,adult– 1 • Growthmonitoring of under-fivechildren – 1	• Assessment ofclinicalperformance
		Maintainrecordsandreports	• Documentationskills	**Document andmaintain**: • Individualrecord • Familyrecord • Healthcenterrecord • Community healthsurvey toinvestigate anepidemic– 1	• Evaluations ofreports&

Clinical Area/Unit	Duration (Weeks)	LearningOutcomes	Procedural Competencies/CliniclalSkills	ClinicalRequirements	Assessment Methods
		Investigateepidemicofcommunicabledisease Identify prevalentcommunicable andnon-communicablediseases Screen, diagnose,manage and referclients with commonhealthproblemsinthecommunity and referhigh risk clients usingstandingorders/protocols Participatein implementation ofnational healthprograms	• Investigatinganepidemic– Communityhealthsurvey • Screening, diagnosing,primary management ofcommonhealthproblemsin the community and referral of high-riskclients to FRUs • Conducthomevisit • Participation inimplementation of nationalhealthprograms	**Screening,diagnosing andprimarymanagement andreferral**: • Communicable disease– 1 • Non-communicablediseases– 1 •Home visits – 2 • Participationinanytwo national healthprograms • Participationin school healthprogram– 1	records • Clinicalperformanceassessment • OSCE • Final clinicalexamination • Evaluation ofhomevisit
		Participateinschoolhealthprogram	• Participationinschoolhealthprogram		

EDUCATIONAL TECHNOLOGY/NURSING

EDUCATIONPLACEMENT: VSEMESTER

THEORY:2Credits(40hours)

PRACTICUM: Lab/Practical:1Credit(40hours)

DESCRIPTION: This course is designed to help the students to develop knowledge, attitude and beginning competenciesessential for applying basic principles of teaching and learning among individuals and groups both in educational andclinical settings. It also introduces basics of curriculum planning and organization. It further enables students to participateactively in teamandcollaborativelearning.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbecompetentto

1. Developbasicunderstandingoftheoreticalfoundationsandprinciplesofteachingandlearning
2. Identifythelatestapproachesto educationandlearning
3. Initiateself-assessmenttoidentifyone‘sownlearningstyles
4. Demonstrateunderstandingofviousteachingstylesthatcanbeused,basedonthelearners‘readinessandgenerationalneeds
5. Developunderstandingofbasicsofcurriculumplanning,andorganizing
6. Analyzeandusedifferentteachingmethodseffectivelythatarerelevanttostudentpopulationandsettings
7. Makeappropriatedecisionsinselectionofteachinglearningactivitiesintegratingbasicprinciples

8. Utilizeactivelearningstrategiesthatenhancecriticalthinking,teamlearningandcollaboration
9. Engageinteamlearningandcollaborationthroughinterprofessionaleducation
10. Integratetheprinciples ofteachingandlearninginselectionanduseofeducational media/technology
11. Applytheprinciplesofassessmentinselectionanduseofassessmentandevaluationstrategies
12. Constructsimpleassessmenttools/testsintegratingcognitive,psychomotorandaffectivedomainsoflearningthatcanmeasureknowledgeand competenceof students
13. Developbasicunderstandingofstudentguidancethroughmentoringandacademicadvising
14. Identifydifficultsituations,crisisanddisciplinary/grievanceissuesexperiencedbystudentsandprovideappropriatecounseling
15. Engageinethicalpracticeineducationalaswellasclinicalsettingsbasedonvalues,principlesandethical standards
16. Developbasicunderstandingofevidence-basedteachingpractices

COURSEOUTLINE

T–Theory,P –Practical(Laboratory)

Unit	Time (Hrs.)		LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
	T	P				
I	6	3	Explainthedefinition,aims, types,approaches and scopeof educationaltechnology Compare and contraststhe variouseducationalphilosophies Explain the teachinglearning process,nature, characteristicsandprinciples	**IntroductionandTheoretical Foundations:** *Educationandeducationaltechnology* • Definition,aims • Approachesandscopeofeducationaltechnology • Latestapproachestoeducation: ○ Transformationaleducation ○ Relationshipbasededucation ○ Competencybasededucation *Educationalphilosophy:* • Definitionofphilosophy,educationandphilosophy • Comparison of educationalphilosophies • Philosophyofnursingeducation *Teachinglearningprocess:* • Definitions • Teachinglearningasaprocess • Nature and characteristics of teachingandlearning • Principlesofteachingandlearning • Barrierstoteachingandlearning • Learningtheories • Latestapproachestolearning ○Experientiallearning	•Lecturecumdiscussion	• Quiz

Unit	Time (Hrs.)		LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
	T	P				
				○ Reflectivelearning ○ Scenariobasedlearning ○ Simulationbasedlearning ○ Blendedlearning	**Groupexercise**: • Create/discuss scenario-basedexercise	**Assessment ofAssignment:** • Learningtheories –analysis of anyone
II	6	6	Identify essentialqualities/attributes of ateacher Describe the teachingstylesof faculty Explain thedeterminants oflearning and initiatesself-assessment toidentify own learningstyle Identify the factorsthat motivate thelearner Define curriculum andclassify types Identify the factorsinfluencing curriculumdevelopment Develop skill inwriting learningoutcomes, and lessonplan	**AssessmentandPlanning** *Assessmentofteacher* • Essentialqualitiesof ateacher • Teaching styles – Formalauthority,demonstrator,facilitator,delegator *Assessmentoflearner* • Typesof learners • Determinants of learning – learningneeds,readinesstolearn,learningstyles • Today'sgenerationoflearnersandtheirskillsand attributes • Emotional intelligence of thelearner •Motivational factors – personalfactors, environmental factors andsupportsystem **CurriculumPlanning** • Curriculum–definition, types • Curriculum design – components,approaches •Curriculum development – factorsinfluencing curriculum development,facilitatorsandbarriers • Writing learning outcomes/behavioralobjectives •Basic principles of writing	•Lecture cumdiscussion **Self-assessmentexercise:** • Identify yourlearningstyleusingany learning styleinventory (ex.Kolb's learningstyleinventory) • Lecture cumdiscussion **Individual/group exercise**:	• Shortanswer • Objectivetype **Assessment ofAssignment:** •Individual/ Group
III	8	15	Explain the principlesand strategies ofclassroommanagement	courseplan,unit planand lesson plan **Implementation** *TeachinginClassroomandSkilllab – TeachingMethods* • Classroom management-principlesandstrategies •Classroomcommunication ○ Facilitators and Barriers toclassroomcommunication	• Writing learningoutcomes •Preparationofalessonplan • Lecture cumDiscussion	• Shortanswer • Objectivetype

Unit	Time (Hrs.)		LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
	T	P				
			Describe differentmethods/strategies ofteaching and developbeginning skill inusing various teachingmethods Explainactivelearning strategies andparticipate actively inteamandcollaborativelearning	○ Information communicationtechnology (ICT) – ICT used ineducation *Teachingmethods– Features,advantagesanddisadvantages* •Lecture,Groupdiscussion,microteaching •Skill lab – simulations,Demonstration&re-demonstration •Symposium,paneldiscussion,seminar, scientific workshop,exhibitions •Roleplay, project •Fieldtrips •Self-directedlearning(SDL) •Computerassistedlearning •One-to-oneinstruction *Activelearningstrategies* •Teambasedlearning •Problembasedlearning •Peersharing •Casestudyanalysis •Journaling •Debate •Gaming	• Practiceteaching/Microteaching •Exercise(Peerteaching) •Patientteachingsession • Constructionof game– puzzle •Teachingingroups –interdisciplinary	•Assessmentofmicroteaching
IV	3	3	Enumerate the factorsinfluencing selectionof clinical learningexperiences Developskillinusingdifferent clinicalteachingstrategies	•Inter-professionaleducation **Teaching in the Clinical Setting – TeachingMethods** •Clinicallearningenvironment •Factorsinfluencingselectionofclinicallearning experiences •Practicemodel •Characteristicsofeffectiveclinicalteacher •Writing clinical learningoutcomes/practice competencies •Clinicalteachingstrategies– patientassignment – clinical conference,clinical presentation/bedside clinic,Case study/care study, nursingrounds, concept mapping, project,debate, game, role play, PBL,questioning, written assignment,processrecording	• Lecture cumdiscussion • Writing clinicaloutcomes –assignments inpairs	•Shortanswer • Assessment ofwrittenassignment

Unit	Time (Hrs.)		LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
	T	P				
V	5	5	Explain the purpose,principlesand stepsintheuseof media Categorize thedifferent types ofmediaanddescribeit sadvantages anddisadvantages Develop skill inpreparing and usingmedia	**Educational/TeachingMedia** •Mediause– Purpose,components,principlesand steps •Typesofmedia *Stillvisuals* ○ Non projected –drawings &diagrams, charts, graphs, posters,cartoons,boarddevices(chalk /whiteboard, bulletin board, flannel board,flip charts, flash cards, stillpictures/photographs, printedmaterials-handout, leaflet, brochure,flyer ○ Projected– filmstripes,microscope,power point slides, overheadprojector *Movingvisuals* ○ Video learning resources – videotapes & DVD, blu-ray, USBflashdrive ○ Motionpictures/films *Realiaandmodels* ○ Realobjects&Models *Audioaids/audiomedia* ○ Audiotapes/Compactdiscs ○ Radio&Taperecorder ○ Publicaddresssystem ○ Digitalaudio *Electronic media/computer learningresources* ○ Computers ○ Web-basedvideoconferencing ○ E-learning,Smartclassroom *Telecommunication (Distanceeducation)* ○ Cable TV, satellite broadcasting,videoconferencing Telephones – Telehealth/telenursing *Mobiletechnology*	•Lecturecumd iscussion •Preparation ofdifferent teachingaids – (Integratewith practiceteachings essions)	• Shortanswer • Objectivetype • Assessment ofthe teachingmediap repared
VI	5	3	Describe the purpose,scope,princip lesin selectionofevaluation methods and barrierstoevaluation Explaintheguidelinest odevelopassessment	**Assessment/EvaluationMethods/Strategies** •Purposes,scope andprinciplesin selectionofassessmentmethodsandtypes •Barrierstoevaluation •Guidelinestodevelopassessment	• Lecture cumdiscussio n	• Shortanswer • Objectivetype

Unit	Time (Hrs.)		LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
	TP					
			tests Developskillinconstruction ofdifferenttests Identifyvariousclinicalevaluation tools anddemonstrate skill inselectedtests	tests *Assessmentofknowledge*: •Essaytypequestions, •Shortanswerquestions(SAQ) •Multiple choice questions (MCQ – singleresponse&multipleresponse) *Assessmentofskills:* • Clinicalevaluation •Observation(checklist,ratingscales,videotapes) •Writtencommunication– progressnotes, nursing care plans, processrecording,writtenassignments •Verbalcommunication(oralexamination) •Simulation •ObjectiveStructuredClinicalExamination(OSCE) •Self-evaluation •Clinicalportfolio, clinicallogs *AssessmentofAttitude:* •Attitudescales *Assessmenttestsforhigherlearning*: •Interpretive questions, hot spotquestions,draganddropandorderedresponsequestions	•Exercise onconstructingassessmenttool/s	•Assessment oftool/sprepared
VII	3	3	Explain the scope,purposeandprinciplesofguidance Differentiate betweenguidance andcounseling Describethe principles,types,andcounselingprocess Developbasicskillofcounseling andguidance	**Guidance/academic advising,counselinganddiscipline** *Guidance* • Definition,objectives,scope,purposeand principles • Roles of academic advisor/ facultyinguidance *Counseling* • Difference between guidance andcounseling • Definition,objectives,scope, principles,types,processandstepsof counseling • Counselingskills/techniques– basics • Rolesof counselor • Organizationofcounselingservices	• Lecture cumdiscussion • Role play onstudent counselingin differentsituations • Assignmenton identifying situationsrequiring counseling	• Assessment ofperformance inroleplayscenario • Evaluationof assignment

Unit	Time (Hrs.)		LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
	T	P				
			Recognize theimportance ofpreventive counselingand develop skill torespond to disciplinaryproblemsandgrievanceamongstudents	• Issues for counseling innursingstudents *Disciplineandgrievanceinstudents* • Managingdisciplinary/grievanceproblems– preventiveguidance&counseling • Roleofstudents'grievancer edressalcell/committee		
VIII	4	2	Recognize theimportance of value-basededucation Developskillinethicaldecision making andmaintain ethicalstandardsfor students Introduce knowledge ofEBT and its applicationinnursing education	**Ethics and Evidence BasedTeaching (EBT) in NursingEducation** *Ethics– Review* •Definitionofterms •Valuebasededucationinnursing •Valuedevelopmentstrategies •Ethicaldecisionmaking •Ethicalstandardsforstudents •Student-facultyrelationship *Evidencebased teaching– Introduction* •Evidencebasededucationprocessand its application to nursingeducation	• Valueclarificationexercise • Case studyanalysis (studentencounteredscenarios) andsuggest ethicaldecision-makingsteps • Lecture cumdiscussion	• Shortanswer •Evaluationofcase studyanalysis •Quiz –MCQ

INTRODUCTION TO FORENSIC NURSING AND INDIAN

LAWSPLACEMENT: VSEMESTER

THEORY: 1Credit(20hours)

DESCRIPTION:Thiscourseisdesignedtohelpstudentstoknowtheimportanceofforensicscienceintotalpatientcareandto recognizeforensicnursing asaspecialtydiscipline inprofessionalnursing practice.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Identifyforensicnursingasan emergingspecialtyinhealthcareandnursingpractice
2. Explorethehistoryandscopeofforensicnursingpractice
3. Identifyforensicteam,roleandresponsibilitiesofforensicnurseintotalcareofvictimofviolenceandinpreservationofevidence
4. DevelopbasicunderstandingoftheIndianjudicialsystemandlegalprocedures

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	3(T)	Describe thenature offorensicscience anddiscusissuesncerning violence	**ForensicScience** •Definition •Historyco • Importanceinmedicalscience • ForensicScienceLaboratory **Violence** • Definition • Epidemiology • Sourceofdata	• Lecture cumdiscussion • Visit to RegionalForensic ScienceLaboratory	• Quiz–MCQ • Write visitreport
II	2(T)	Explainconceptsof forensicnursingand scopeofpractice forensic nurse	**Sexualabuse–childandwomen** **ForensicNursing** • Definition •Historyanddevelopmentfor •Scope–settingofpractice,areasofpractice andsubspecialties •Ethicalissues	• Lecturecum discussion	• Shortanswer • Objectivetype
III	7(T)	Identifymembers offorensic teamanddescribe role offorensicnurse	•Rolesandresponsibilitiesofnurse •INC&SNCActs **ForensicTeam** •Membersandtheirroles **Comprehensiveforensicnursingcareof victimandfamily** • Physicalaspects • Psychosocialaspects • Culturalandspiritualaspects • Legalaspects • Assistforensicteamincarebeyondscopeofher practice • Admissionanddischarge/referral/deathofvictimof violence • Responsibilitiesofnurseasawitness **Evidencepreservation–roleofnurses** • ObservationRecognition	• Lecture cumDiscussion • Hypothetical/real casepresentation • Observation of post-mortem • Visit to departmentforensic medicine	• Objectivetype • Shortanswer •Writereport

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			• Collection • Preservation • Documentation of Biological and otherevidencerelatedtocriminal/traumaticevent • Forwarding biological samples for forensicexamination		
IV	3(T)	Describe fundamental rights andhuman rightscommi	**FundamentalRights** • Rightsofvictim • Rightsofaccused **HumanRightsCommission**	• Lecture cumdiscussi • WrittenAssignment • Visittoprison	• Shortanswer • Assessmentof writtenassignment • Write visitreport
V	5(T)	ExplainIndian judicial systemandlaws Discuss theimportance	**Sourcesoflawsandlaw-makingpowers** **OverviewofIndianJudicialSystem** • JMFC(JudicialMagistrateFirstClass) • District • State • Apex **CivilandCriminalCaseProcedures** • IPC(IndianPenalCode) • ICPC • IEAct(IndianEvidenceAct) **OverviewofPOSCOAct**	• Lecture cumdiscussi • Guidedreading • Lecture cumdiscussi	• Quiz • Shortanswer

CHILDHEALTHNURSING -II

PLACEMENT:VISEMESTER

THEORY: 2Credits(40hours)

PRACTICUM: Clinical:1Credit(80hours)

DESCRIPTION: Thiscourseisdesignedfordevelopinganunderstandingofthemodernapproachtochild-care,identification,prevention andnursingmanagementof commonhealthproblemsofneonatesandchildren.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Applytheknowledgeofpathophysiologyandprovidenursingcare tochildrenwithCardiovascular,GI,genitourinary,nervoussystemdisorders,orthopedicdisorders, eye,earandskindisordersand communicablediseases
2. Providecaretochildrenwithcommonbehavioural,socialandpsychiatricproblems
3. Managechallengedchildren
4. Identifythesocialandwelfareservicesforchallengedchildren

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
1	20(T)	Describetheetiology, pathophysiology,clinical manifestationand nursingmanagement ofchildrenwithdisordersof cardiovascular,gastrointestinal,genitourinary, andnervoussystem	**Cardiovascularsystem:** •IdentificationandNursingmanagementof congenitalmalformations •**Congenital heart diseases:** CyanoticandAcyanotic(ASD,VSD,PDA,TOF) •Others:RheumaticfeverandRheumaticheartdisease,Congestivecardiacfailure •**Hematological conditions:** a) Congenital:Hemophilia, Thalassemia b) Others: Anemia, Leukemia,Idiopathic thrombocytopenicpurpura, Hodgkins and non-hodgkinslymphoma **Gastro-intestinalsystem:** •IdentificationandNursingmanagementof congenitalmalformations. •Congenital: Cleft lip, Cleft palate,Congenital hypertrophic pyloricstenosis, Hirschsprungs disease(Megacolon),Anorectalmalformation,Malabsorption syndrome, Abdominalwalldefects, Hernia •Others: Gastroenteritis, Diarrhea,Vomiting, Protein energy malnutrition,Intestinalobstruction,Hepaticdiseases,intestinalparasites **Genitourinaryurinarysystem:** •IdentificationandNursingmanagementof congenitalmalformations. •Congenital:Wilmstumor,Extropyofbladder, Hypospadias, Epispadias,Obstructiveuropathy •Others:Nephroticsyndrome,Acutegl omerulonephritis,renalfailure **Nervoussystem:** •IdentificationandNursingmanagementof congenitalmalformations a) Congenital:Spinabifida, Hydrocephalous. b) Others: Meningitis, Encephalitis,Convulsivedisorders(convulsionsand seizures), Cerebral palsy headinjury	•Lecturecumdiscussion •Demonstrationandpracticesession Refer/consult **SAM operational guidelines on facility-based management of children with severe acute malnutrition**	•Lecturecumdiscussion •Demonstration
II	10(T)	Describetheetiology, pathophysiology,clinical manifestationandnursing	**Orthopedicdisorders**: •Clubfoot		

- Shortanswer
- Objectivetype
- Assessment ofskills withchecklist

- Shortanswer
- Objectivetype
- Assessmentof

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/ LearningActivities	Assessment Methods
		management ofchildren withOrthopedicdisorders,eye, ear and skindisorders Explainthepreventive measuresandstrategies forchildrenwith communicablediseases	• Hipdislocationand • Fracture **Disorderofeye,earandskin**: • Refractoryerrors • Otitismediaand • Atopicdermatitis **Communicablediseasesinchildren**, theiridentification/diagnosis,nursing managementinhospital,inhome,control&prevention: • Tuberculosis • Diphtheria • Tetanus • Pertussis • Poliomyelitis • Measles • Mumps,and • Chickenpox • HIV/AIDS • Denguefever • COVID-19	• Practicesession • Clinicalpractice	skillswith checklist
III	10(T)	Describethe management ofchildren withbehavioral & socialproblems Identifythesocial&welfare services forchallengedchildren	**Managementofbehaviorandsocialproblemsin children** • ChildGuidanceclinic • Commonbehaviordisordersinchildrenand management ○ EnuresisandEncopresis ○ Nervousness ○ Nailbiting ○ Thumbsucking ○ Tempertantrum ○ Stealing ○ Aggressiveness ○ Juveniledelinquency ○ Schoolphobia ○ Learningdisability • Psychiatricdisordersinchildrenandmanagement ○ Childhoodschizophrenia ○ Childhooddepression ○ Conversionreaction ○ Posttraumaticstressdisorder ○ Autisticspectrumdisorders	•Lecturecumd iscussion •Field visits to childguidance clinics,schoolformentally& physically,socially challenged	•Shortanswer •Objectivetype •Assessmentofficeldreports

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning	Assessment
			• Eatingdisorderinchildrenandm anagement ○ Obesity ○ Anorexianervosa ○ Bulimia • Managementofchallengedchildren. ○ Mentally ○ Physically ○ Socially ○ Childabuse, ○ Substanceabuse • Welfare services for challengedchildrenin India		

CHILDHEALTHNURSING -II–CLINICALPRACTICUM(1Credit–80hours)

GivenunderChildHealthNursing-IasI&II

MENTALHEALTHNURSING-II

PLACEMENT:VISEMESTER

THEORY:1Credit(40Hours)

PRACTICUM:Clinical:2Credits(160Hours)

DESCRIPTION: Thiscourseisdesignedtoprovidethestudentswithbasicunderstandingandskillsessentialtomeetpsychiatricemergenciesand performtheroleofcommunitymentalhealth nurse.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Applynursingprocessinprovidingcaretopatients withsubstanceusedisorders,andpersonalityandsexualdisorders.
2. Applynursingprocessinprovidingcaretopatientswithbehaviouralandemotionaldisordersoccurringduringchildhoodandadolescence.
3. Applynursingprocessinprovidingcaretopatients withorganicbraindisorders.
4. Identifyandrespondtopsychiatricemergencies.
5. Carryoutcrisisinterventionsduringemergenciesundersupervision.
6. PerformadmissionanddischargeproceduresasperMHCA2017.
7. Exploretherolesandresponsibilitiesofcommunitymentalhealthnurseindeliveringcommunitymentalhealthservices.

COURSEOUTLINE

T–Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessment Methods
I	6(T)	Describe theetiology, psycho-dynamics, clinicalmanifestations,diagnostic criteriaandmanagementofpatients withsubstance usedisorders	**Nursing Management of Patients withSubstanceUseDisorders** •Prevalenceandincidence •Commonlyusedpsychotropicsubstance:classifications, forms, routes, action,intoxicationandwithdrawal •Psychodynamics/etiologyofsubstanceusedisorder (Terminologies: Substance Use,Abuse, Tolerance, Dependence,Withdrawal) •Diagnosticcriteria/formulations •Nursing Assessment: History (substancehistory),Physical,mentalassessmentanddruganddrug assay •Treatment(detoxification,antabuseandnarcotic antagonist therapy and harmreduction, Brief interventions, MET,refusal skills, maintenance therapy) andnursing management of patients withsubstanceusedisorders •Specialconsiderationsforvulnerablepopulation	•Lecturecumdiscussion •Casediscussion •Casepresentation •Clinicalpractice	• Essay • Shortanswer • Assessment ofpatientmanagementproblems
II	6(T)	Describe theetiology, psycho-dynamics, clinicalmanifestations,diagnosticcriteria andmanagementofpatients withpersonality, andsexualdisorders	•Follow-upandhomecareandrehabilitation **Nursing Management of Patient withPersonalityandSexualDisorders** •Prevalenceandincidence •Classificationofdisorders •Etiology,psychopathology,characteristics,diagnosis •NursingAssessment:History,Physicalandmentalhealthassessment •Treatment modalities and nursingmanagementofpatientswithpersonality,andsexualdisorders	•Lecturecumdiscussion •Casediscussion •Casepresentation •Clinicalpracticediagnosis	• Essay • Shortanswer • Assessment ofpatient management problems
III	8(T)	Describe theetiology, psycho-pathology, clinicalmanifestations,diagnostic criteriaand management ofchildhood andadolescent disordersincluding mentaldeficiency	•Geriatricconsiderations •Follow-upandhomecareandrehabilitation **NursingManagementofBehavioural&Emotional Disorders occurring duringChildhood and Adolescence (**Intellectualdisability, autism, attention deficit,hyperactive disorder, eating disorders,learningdisorder) •Prevalenceandincidence •Classifications •Etiology,psychodynamics,Characteristics,diagnosticcriteria/formulations	•Lecturecumdiscussion •Casediscussion •Casepresentation •Clinicalpractice	• Essay • Shortanswer • Assessment ofpatientmanagementproblems

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			•NursingAssessment:History,Physical,mental status examination and IQassessment •Treatment modalities and nursingmanagementofchildhooddisordersincludingintellectualdisability •Follow-upandhomecareandrehabilitation		
IV	5(T)	Describe theetiology, psycho-pathology, clinicalmanifestations,diagnostic criteriaandmanagementoforganic braindisorders.	**Nursing Management of Organic BrainDisorders** (Delirium, Dementia, amnesticdisorders) •Prevalenceandincidence •Classification • Etiology, psychopathology, clinicalfeatures, diagnosis and Differentialdiagnosis •NursingAssessment:History,Physical,mentalandneurologicalassessment •Treatment modalities and nursingmanagementoforganicbraindisorders •Follow-upandhomecareandrehabilitation	•Lecturecumdiscussion •Casediscussion •Casepresentation •Clinicalpractice	•Essay •Shortanswer •Assessmentofpatientmanagementproblems •Shortanswer
V	6(T)	Identify psychiatricemergencies andcarry out crisisintervention	**PsychiatricEmergenciesandCrisisIntervention** •Types of psychiatric emergencies(attemptedsuicide,violence/aggression,stupor, delirium tremens and otherpsychiatric emergencies) and theirmanagements •Maladaptivebehaviourofindividualandgroups,stress,crisisanddisaster(s) •Typesof crisis •Crisisintervention:Principles,TechniquesandProcess - Stressreductioninterventionsasperstressadaptation model	•Lecturecumdiscussion •Casediscussion •Casepresentation •Clinicalpractice	•Objectivetype •Shortanswer
VI	4(T)	Explain legalaspects applied inmental healthsettingsandroleofthenurse	- Copingenhancement - Techniquesof counseling **LegalIssuesinMentalHealthNursing** •OverviewofIndianLunacyActandTheMentalHealthAct1987 •(ProtectionofChildrenfromSexualOffence) POSCOAct •MentalHealthCareAct(MHCA)2017 •Rightsof mentally illclients •Forensicpsychiatryandnursing •Actsrelatedtonarcoticandpsychotropicsubstancesand illegaldrugtrafficking	•Lecturecumdiscussion •Casediscussion	•Objectivetype

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			•AdmissionanddischargeproceduresasperMHCA2017 •Roleandresponsibilitiesofnursesinimplementing MHCA2017		
VII	5(T)	Describethemodelof preventivepsychiatry DescribeCommunity Mentalhealth services androleofthenurse	**CommunityMentalHealthNursing** •DevelopmentofCommunityMentalHealthServices: •Nationalmentalhealthpolicyviz.NationalHealthPolicy •NationalMentalHealthProgram •Institutionalizationversus Deinstitutionalization •ModelofPreventivepsychiatry •MentalHealthServicesavailableatthepri mary, secondary, tertiary levelsincluding rehabilitation and nurses'responsibilities •MentalHealthAgencies:Governmentandvoluntary,NationalandInternational •Mental health nursing issues for specialpopulations: Children, Adolescence,WomenElderly,Victimsofviolenceandabuse,Handicapped,HIV/AIDSetc.	•Lecturecumd iscussion •Clinical/fieldp ractice •Field visits tomental healthserviceag encies	• Shortanswer • Objectivetype • Assessment ofthe field visitreports

CLINICALPRACTICUM–2Credits(80hours)

Clinical Practicum for Mental Health Nursing - I & II are given under Mental Health Nursing - I Clinical PracticumNURSINGMANAGEMENTANDLEADERSHIP

PLACEMENT:VISemester

THEORY:3Credits(60hours)includesLab/SkillLabhoursalso

PRACTICUM: Clinical:1Credits(80hours)

DESCRIPTION: Thiscourseisdesignedtoenablestudentstoacquireknowledgeandcompetenciesinareasofadministration, and management of nursing services and education. Further prepares the students to develop leadershipcompetenciesandperformtheir role aseffectiveleadersin an organization.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Analyzethehealthcaretrendsinfluencingdevelopmentof nursingservicesand educationinIndia.
2. Describetheprinciples,functionsandprocessof managementappliedtonursing.
3. Developbasicunderstandingandbeginningcompetenciesinplanningandorganizingnursingservicesinahospital.
4. Applytheconceptofhumanresourcemanagementandidentifythejobdescriptionforallcategoriesofnursingpersonnelincluding in serviceeducation.
5. Discusstheprinciplesandmethodsofstaffingandschedulinginanindividualhospital/nursingunit.
6. Developskillinmanagementofmaterialsandsuppliesincludinginventorycontrol.
7. Developteamworkingandinterprofessionalcollaborationcompetencies.
8. Identifyeffectiveleadershipstylesanddevelopleadershipcompetencies.
9. Utilizetheknowledgeofprinciplesandlineofcontrolandparticipateinqualitymanagementandevaluationactivities.
10. Utilizetheknowledgerelatedtofinancialplanninginnursingservicesandeducationduringbudgetaryprocess.

11. Applytheknowledgeofnursinginformaticsinmaintenanceofrecordsandreportsrelevanttopatientinformation,nursingcareand progress.
12. DemonstrateunderstandingoftheINCguidelinesforestablishmentandaccreditationofeducationalinstitutionsintermsof faculty norms, physical infrastructureand clinicalfacilities.
13. Demonstratebeginningcompetenciesinplanning,organizingandstaffingatcollegeincludingimplementationandevaluationof curriculum.
14. Identifythelegalissuesandlawsrelevanttonursingpracticeandeducation.

15Applytheknowledgeandutilizethevariousopportunitiesforprofessionaladvancement.

COURSEOUTLINE

T–Theory

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessmentmethods
I	1(T)	Explore the healthcare, developmentof nursing services andeducation inIndia andtrends	**HealthCareandDevelopmentof NursingServicesinIndia** • Currenthealthcaredelivery systemof India–review • Planninganddevelopmentofnursingservices and education at global andnationalscenario • Recenttrendsandissuesofnursingserviceand management	• Lecturecumdiscussion • Directedreadingandwrittenassignment	• Shortanswer • Assessmentof assignment
II	2(T)	Explainthe principles andfunctions ofmanagementapplied tonursing Describe theintroductoryconcepts of managementasprocess	**Management Basics Applied toNursing** • Definitions,conceptsandtheoriesofmanagement • Importance, features and levels ofmanagement • Managementandadministration • Functionsofmanagement • Principlesofmanagement • Roleofanurseasa manager **IntroductiontoManagementProcess** • Planning • Organizing • Staffingap • Directing/Leading	• Lectureanddiscussion	• MCQ • Shortanswer
			• Controlling		
III	4 (T)	Describetheessentialelements ofplanning	**MANAGEMENT OF NURSINGSERVICES** **PlanningNursingServices** • Vision,Mission,philosophy,objectives • Nursingservicepolicies,proceduresand manuals • Functionalandoperationalplanning	• LectureandDiscussion • Visittospecifichospital/patientcareunits • Demonstrationofdisasterdrillintherespectivesetting	• FormulateMission &VisionStatement forthe nursingdepartment/unit • Assessment

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessment Methods
			• Strategicplanning • Program planning – Gantt chart &milestonechart • Budgeting– concepts,principles,types, • Budgetproposal,costbenefitanalysis • Planninghospitalandpatientcareunit(Ward) • Planningforemergencyanddisaster		of problem-solvingexercises • VisitReport
IV	4(T)	Discussthe concepts oforganizingincludinghospitalorganization	**Organizing** • Organizingasaprocess– assignment,delegationand coordination • Hospital– types,functions&organization • Organizationaldevelopment • Organizationalstructure • Organizationalcharts • Organizationaleffectiveness • Hospitaladministration,Control&lineof authority • Hospitalstatisticsincludinghospitalutilizationindices • Nursingcaredeliverysystemsandtrends • Roleofnurseinmaintenanceofeffectiveorganizationalclimate	• Lecturecumdiscussion • Comparisonoforganizationalstructure of variousorganizations • Nursingcaredeliverysystems– assignment • PreparationofOrganizationalchart of hospital/ Nursingservices	•Shortanswer •Assessmentofassignment
V	6(T)	Identify the significanceof humanresource management(HRM) andmaterialmanagementand discussitselements	**Staffing (Human resourcemanagement)** • Definition,objectives,components andfunctions **Staffing&Scheduling** •Staffing–Philosophy,staffingactivities •Recruiting,selecting,deployment •Training,development,credentialing,retaining, promoting, transfer,terminating,superannuation •Staffing units – Projecting staffingrequirements/calculation ofrequirements of staff resources Nursepatient ratio, Nurse Population ratio asperSIUnorms/IPHNorms,andPatient classification system • Categories of nursing personnelincludingjobdescriptionofallllevels •Assignmentandnursingcareresponsibilities	• Lectureanddiscussion • Roleplay •Games self-assessment, casediscussionandpracticesession •Calculation of staffingrequirementsforaspecifiedward	•FormulateJob descriptionatdifferentlevels of care& comparewithexistingsystem • Preparation ofduty roster

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessment Methods
		Explain theprocedural steps ofmaterialmanagement Developmanagerialskill ininventorycontrol andactivelyparticipate inprocurementprocess	• Turnoverandabsenteeism • Staffwelfare • Disciplineandgrievances **In-ServiceEducation** • Nature and scope of in-serviceeducationprogram • Principlesofadultlearning –review • Planning and organizing in-serviceeducationalprogram • Methods,techniquesandevaluation • Preparationofreport **MaterialResourceManagement** • Procurement,purchasingprocess,inventory control&roleofnurse • Auditingandmaintenanceinhospitalandpatient careunit	• Visit to inventory store of theinstitution	•Preparationof MMF/records •Preparationoflog book &condemnationdocuments •VisitReport
VI	5 (T)	Describethe	**DirectingandLeading**	•Lectureanddiscussion	•Assignmenton
		importantmethods ofsupervision andguidance	• Definition,principles,elementsofdirecting • Supervisionandguidance •Participatorymanagement •Inter-professionalcollaboration •Managementbyobjectives •Teammanagement •Assignments,rotations •Maintenanceof discipline •Leadershipin management	•Demonstration of record &reportmaintenanceinspecific wards/departments	Reports &Recordsmaintained innursingdepartment/ • Preparation ofprotocols andmanuals
VII	4(T)	Discussthe		•Lecturecumdiscussion	•Shortanswer
		significanceand changingtrends ofnursingleadership Analyze thedifferentleadershipstyles anddeveloleadershipcompetencies	**Leadership** •Definition,concepts,andtheories •Leadershipprinciplesandcompetencies •Leadershipstyles:Situationalleadership, Transformationalleadership • Methodsofleadershipdevelopment • Mentorship/preceptorshipinnursing • Delegation, power & politics,empowerment, mentoring andcoaching •Decisionmakingandproblemsolving	•Self-assessment •Report on types of leadershipadopted at different levels ofhealthcareinthegivensetting •Problemsolving/Conflictmanagementexercise •Observationofmanagerialrolesat different levels (middle levelmangers-wardincharge,ANS)	•Essay •Assessmentofexercise/report

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessment Methods
			• Conflictmanagementandnegotiation • Implementingplannedchange		
VIII	4(T)	Explainthe process ofcontrolling anditsactivities	**Controlling** •Implementing standards, policies,procedures,protocolsandpractices •Nursingperformanceaudit,patientsatisfaction •Nursingrounds,Documentation – recordsandreports •Totalqualitymanagement– Qualityassurance,Quality andsafety •Performanceappraisal •Programevaluationreviewtechnique(PERT) •Benchmarking,Activityplan(Ganttchart) •Criticalpathanalysis	•Lecturecumdiscussion •Preparation of policies/protocolsfornursingunits/department	• Assessment of preparedprotocols
IX	4(T)	Explainthe concepts oforganizationalbehavior andgroupdynamics	**OrganizationalBehaviorandHumanRelations** •Conceptsandtheoriesofor ganizationalbehavior •Groupdynamics •Review–Interpersonalrelationship •Humanrelations •Publicrelations inthecontextofnursing •Relations with professionalassociationsandemployeeunions •Collectivebargaining •Review– Motivationandmoralebuilding •Communicationintheworkplace– assertivecommunication •Committees– importanceintheorganization,functioning	•Lectureanddiscussion •Role play/ exercise – Groupdynamics&humanrelations	•Shortanswer •OSCE
X	2 (T)	Describe thefinancial management related tonursingservices	**FinancialManagement** • Definition,objectives,elements,functions, principles & scope offinancial management • Financialplanning(budgetingfornursingdepartment) • Proposal,projectingrequirementforstaff, equipment and supplies for – Hospital & patient care units &emergency anddisaster units	•Lecturecumdiscussion •Budgetproposalreview •Preparationofbudgetproposalforaspecificdepartment	•Shortanswer •Essay •Assessmentofassignment

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessment Methods
			• BudgetandBudgetaryprocess • Financialaudit		
XI	1(T)	Reviewthe concepts,principles andmethods anduse of nursinginformatics	**Nursing Informatics/ InformationManagement – Review** •Patientrecords •Nursingrecords •Useofcomputersinhospital,collegeand community •Telemedicine& Telenursing •ElectronicMedicalRecords(EMR),EHR	• Review • Practicesession • Visittodepartments	• Shortanswer
XII	1(T)	Review personalmanagement interms ofmanagement of emotions,stress andresilience	**PersonalManagement–Review** •Emotionalintelligence •Resiliencebuilding •Stressandtimemanagement –de-stressing •Career planning	• Review • Discussion ,labs,	
			MANAGEMENT OF NURSINGEDUCATIONALINSTITUTIONS		
XIII	4(T)	Describethe process ofestablishingeducationalinstitutions andits accreditationguidelines	**EstablishmentofNursingEducationalInstitutions** •Indian Nursing Council norms andguidelines – Faculty norms, physicalfacilities, clinical facilities, curriculumimplementation, andevaluation/examinationguidelines •Coordinationwithregulatorybodies– INCandState NursingCouncil •Accreditation–Inspections • Affiliation with university/Statecouncil/boardofexaminations		•Lectureanddiscussion •Visittooneof theregulatorybodies
XIV	4(T)	Explainthe planning andorganizingfunctions of anursingcollege	**PlanningandOrganizing** •Philosophy,objectivesandmissionofthe college •Organizationstructureofschool/college •Review– Curriculumplanning • Planning teaching and learningexperiences,clinicalfacilities–masterplan,timetableandclinicalrotation •Budget planning – faculty, staff,equipment&supplies,AVaids,Labequipment, library books, journals,computersandmaintenance •Infrastructurefacilities– college,classrooms,hostel,library		• Directed reading – INCCurriculum • Preparationoforganizationalstructureofthecollege • Writtenassignment– writingphilosophy of a teachingdepartment • Preparation of master plan,timetableandclinicalrotation

- Visitreport
- Shortanswer
- Essay
- Assessmentofassignment

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessment Methods
			computerlab,transportfacilities •Records&reportsforstudents,staff,faculty andadministrative •Committeesandfunctioning •Clinicalexperiences		
XV	4(T)	Develop understanding of staffing thecollege andselecting thestudents	**StaffingandStudentSelection** • Faculty/staffselection,recruitmentandplacement,jobdescription • Performanceappraisal • Facultydevelopment • Faculty/staffwelfare • Studentrecruitment,admission,clinicalplacement	• Guidedreadingonfacultynorms • Facultywelfareactivitiesreport • Writing job description oftutors	•Shortanswer •Activityreport •Assessmentof jobdescription
XVI	4(T)	Analyzethe leadership andmanagementactivitiesinaneducationalorganization	**DirectingandControlling** • Review–Curriculumimplementationandevaluation • Leadershipandmotivation,supervision–review • Guidanceandcounseling • Quality management – educationalaudit • Programevaluation,evaluationofperformance • Maintainingdiscipline • Institutional records and reports – administrative, faculty, staff andstudents	•Reviewprinciplesofevaluation •**Assignment –** Identifydisciplinary problems amongstudents •Writingstudentrecord	• Short answer •Assessmentof assignmentandrecord
XVII	4(T)	Identify various legalissuesand lawsrelevantto nursing practice	**PROFESSIONAL CONSIDERATIONS** **Review–LegalandEthicalIssues** • Nursing as a profession – Characteristicsofaprofessionalnurse • Nursing practice – philosophy, aimandobjectives • Regulatory bodies – INC and SNCconstitutionandfunctions **Review–Professionalethics** • Code of ethics and professionalconduct– INC& ICN • Practicestandardsfor nursing–INC • InternationalCouncilforNurses(ICN) **Legalaspectsinnursing:** • Consumerprotectionact,patientrights • Legaltermsrelatedtopractice,legal		

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessment Methods
			system – types of law, tort law &liabilities • Laws related to nursing practice – negligence, malpractice, breach,penalties • Invasionofprivacy,defamationofcharacter • Nursing regulatory mechanisms – registration, licensure,renewal,accreditation, nurse practice act,regulation for nursepractitioner/specialistnursingpractice		
XVIII	2(T)	Explainvarious for professionaladv	**ProfessionalAdvancement** • ContinuingNursingEducation • Careeropportunities • Membership with professionalorganizations – national andinternational • Participationinresearchactivities • Publications–journals,newspaper	• Preparejournallistavailable •AssessmentinIndia • Writeanarticle–research/ assignments clinical	of

Note: Lessthan1creditlabhoursarenotspecified

CLINICALPRACTICUM

Clinical:2Credits(80hours)2weeks×40hoursperweek=80hours

PracticeCompetencies:

Hospital

1. Prepareorganizationalchartofhospital/Nursingservices/nursingdepartment
2. Calculatestaffingrequirementsforaparticularnursingunit/ward
3. FormulateJobdescriptionatdifferentlevelsofcare
4. Preparedutyrosterforstaff/studentsatdifferentlevels
5. Participateinprocuring/purchaseofequipment&supplies
6. Preparelogbook/MMFforspecificequipment/materials
7. Maintainandstoreinventory andkeepdaily records
8. Prepareandmaintainvariousrecords&reportsofthesettings–incidentreports/adversereports/auditreports
9. Prepareandimplementprotocols&manuals
10. Participateinsupervision,evaluationandconductinginservice educationforthestaff

College&Hostel

1. Prepareorganizationalchartofcollege
2. Formulatejobdescriptionfortutors
3. PrepareMasterplan,timetableandclinicalrotation
4. Preparestudentanecdotes
5. Participateinplanning,conductingandevaluationofclinicalteaching

6. Participateinevaluationofstudents‘clinicalexperience
7. ParticipateinplanningandconductingpracticalexaminationOSCE–endofposting

CLINICALPOSTING: Managementexperienceinhospital&college.

MIDWIFERY/OBSTETRICSANDGYNECOLOGY(OBG)NURSING-I includingSBAmodule

PLACEMENT:VISEMESTER

THEORY: 3Credits(60hours)

PRACTICUM: SkillLab**:**1Credit(40hours);Clinical:3Credits(240hours)

DESCRIPTION: This course is designed for students to develop knowledge and competencies on the concepts andprinciples of midwifery. It helps them to acquire knowledge and skills in rendering respectful maternity care to womanduring antenatal, intranatal and postnatal periods in hospitals and community settings. It further helps to develop skills inmanagingnormalneonatesandparticipatein familywelfare programs.

COMPETENCIES: Oncompletionoftheprogram,thestudentswillbeableto

1. Demonstrateprofessionalaccountabilityforthedeliveryofnursingcareasper INCstandards/ICMcompetenciesthatareconsistentwith moral, altruistic,legal,ethical,regulatory andhumanisticprinciplesin midwifery practice.
2. Communicateeffectivelywithindividuals,familiesandprofessionalcolleaguesfosteringmutualrespectandshareddecision making to enhancehealth outcomes.
3. Recognizethetrendsandissuesinmidwiferyandobstetricalnursing.
4. Reviewanddescribetheanatomyandphysiologyofhumanreproductivesystemandconception.
5. Describeandapplyphysiologyinthemanagementofnormalpregnancy,birthandpuerperium.
6. Demonstratecompetencyinprovidingrespectfulandevidencebasedmaternitycareforwomenduringtheantenatal,intranatalan d postnatal period.
7. Upholdthefundamentalhumanrightsofindividualswhenprovidingmidwiferycare.
8. Promotephysiologiclabourandbirth,andconductnormalchildbirth.
9. Provideevidencebasedessentialnewborncare.
10. Applynursingprocessapproachincaringforwomenandtheirfamilies.
11. Describethemethodsofcontraceptionandroleofnurse/midwifeinfamilywelfareservices.
12. Recognizetheimportanceofandactivelyparticipateinfamilywelfareprograms.
13. Provideyouthfriendlyhealthservicesandcarefor womenaffectedbygenderbasedviolence.

COURSEOUTLINE

T–Theory,SL/L–SkillLab/Lab,C–Clinical

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning	Assessment
I	8(T)	Explainthehistory and current scenarioofmidwifery Reviewvitalhealth	**Introductiontomidwifery** • HistoryofmidwiferyinIndia • *Currentscenario:* ○ Trendsof maternity careinIndia ○ MidwiferyinIndia– Transformativeeducationforrelations transformativemidwiferypracticein India • Vital health indicators – Maternalmortalityratio,InfantMortali	• Discussion • Demonstration • Roleplay • Directedreading Quizandassignment: ICMcompetencies • Scenariobased learning	• Shortanswer • Objectivetype • Essay •

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		indicators Describe the variousnational healthprograms related toRMNCH+A Identify the trendsand issues inmidwifery Discuss the legal andethicalissuesrelevanttomidwiferypractice	NeonatalMortalityRate,perinatalmortality rate,fertility rates ○Maternaldeath audit • NationalhealthprogramsrelatedtoRMNCH+A (Reproductive MaternalNewborn and Child Health +AdolescentHealth) *CurrenttrendsinmidwiferyandOBGnursing:* ○ Respectfulmaternityandnewborncare(RMNC) ○ Midwifery-ledcareunits(MLCU) ○ Women centered care, physiologicbirthinganddemedicalizationofbirth ○ Birthingcenters,waterbirth,lotusbirth ○ Essentialcompetenciesfor midwifery practice(ICM) ○ Universal rights of child-bearingwomen ○ Sexualandreproductivehealthandrights ○ Women'sexpectations&choicesaboutcare *LegalprovisionsinmidwiferypracticeinIndia:* • INC/MOH&FWregulations • ICMcodeofethics • Ethicalissuesinmaternalandneonatalcare •Adoption laws, MTP act, Pre-NatalDiagnosticTest(PNDT)Act,Surrogate mothers • Roles and responsibilities of amidwife/Nurse practitioner midwife indifferentsettings(hospital/community)		
II	6(T) 3(L)	Review theanatomyand physiology of humanreproductivesystem	•Scopeof practicefor midwives **Anatomy and physiology of humanreproductivesystemandconception(Maternal, Fetal & Newbornphysiology)** *Review:* •Femaleorgansofreproduction •Femalepelvis–bones,joints,ligaments, planes, diameters,landmarks, inclination, pelvicvariations •Foetalskull–bones,sutures,	•Lecture •Discussion •Self-directedlearning •Models •Videos&films	•Quiz •Shortanswer •Essay

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
			fontanelles,diameters,moulding •Fetopelvicrelationship •Physiologyofmenstrualcycle,menstrualhygiene •Fertilization,conceptionandimplantation •Embryologicaldevelopment •Placentaldevelopmentandfunction,placentalbarrier •Fetalgrowthanddevelopment •Fetalcirculation&nutrition		
III	12(T) 10(L) 40(C)	Providepreconception caretoeligiblecouples Describethe physiology,assessment and management ofnormalpregnancy Demonstrateknowledge, attitudeandskillsofmidwiferypractice throughout1st,2nd and3rd	**Assessmentandmanagementofnormalpregnancy(ante-natal):** **Pre-pregnancyCare** •Reviewof sexualdevelopment*(SelfLearning)* • Socio-cultural aspects of humansexuality*(Self Learning)* • Preconceptioncare • Pre-conceptioncounseling(includingawareness regarding normal birth)Geneticcounseling*(SelfLearning)* • Plannedparenthood **Pregnancyassessmentandantenatalcare(I,II&IIITrimesters)** **Normalpregnancy** •Physiologicalchangesduringpregnancy •Assess and confirm pregnancy:Diagnosis of pregnancy – Signs,differentialdiagnosisandconfirmatorytests •Reviewofmaternalnutrition&malnutrition •BuildingpartnershipwithwomenfollowingRMC protocol •Fathers'engagementinmaternitycare **Ante-natalcare:** **1st Trimesters** •Antenatalassessment:Historytaking,physical examination, breastexamination,laboratoryinvestigation •Identificationandmanagementofminordiscomfortsofpregnancy	• Lecture • Discussion • Demonstration • Self-Learning • Healthtalk • Roleplay • Counselingsession • Casediscussion/ presentation • Simulation • Supervisedclinicalpractice •Refer SBA module&Safemotherhood	• Shortanswer • Objectivetype • Assessmentof skillswith checklist •Casestudyevaluation •OSCE

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		trimesters	•Antenatalcare:asperGoIguidelines •Antenatalcounseling(lifestylechanges, nutrition,shareddecision making,risky behavior,sexuallifeduringpregnancy,immunizationetc.) • Dangersignsduringpregnancy • Respectfulcareandcompassionatecommunication • Recordingandreporting:aspertheGoIguidelines • RoleofDoula/ASHAs **II Trimester** • Antenatal assessment: abdominalpalpation, fetal assessment,auscultate fetal heart rate – Dopplerandpinnard'sstethoscope • Assessment of fetal well-being:DFMC, biophysical profile, Nonstress test, cardio-tocography, USG,Vibro acoustic stimulation,biochemicaltests. • Antenatalcare • Womencentered care • Respectful care and compassionatecommunication • Health education on IFA, calciumand vitamin D supplementation,glucosetolerance test, etc. • Educationandmanagementofphysiological changes anddiscomfortsof2nd trimester • Rh negative and prophylacticantiD • Referral and collaboration,empowerment • Ongoingriskassessment • MaternalMentalHealth **III Trimester** • Antenatal assessment: abdominalpalpation, fetal assessment, auscultatefetalheartrate– Dopplerandpinnard'sstethoscope • Education and management ofphysiological changes anddiscomfortsof3rd trimester • Thirdtrimestertestsandscreening • Fetalengagementinlatepregnancy • Childbirthpreparationclasses	booklet •Labtests– performance andinterpretation •Demonstration •Roleplay •Demonstrationofantenatalassessment	

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
			• Birthpreparednessandcomplicationreadiness including micro birthplanning •Danger signs of pregnancy – recognitionofrupturedmembranes •Education on alternative birthingpositions – women's preferredchoices,birthcompanion • Ongoingriskassessment • Culturalneeds • Womencenteredcare •Respectfulandcompassionatecommunication •Health education on exclusivebreastfeeding • RoleofDoula/ASHA's	•Scenariobasedlearning •Lecture •Simulation •Roleplay •Refer GoIGuidelines •Healthtalk •Counselingsession •Demonstrationofbirthingpositions •Workshop onalternative birthingpositions	
IV	12(T) 12(L) 80(C)	Applythephysiologyof labour inpromoting normalchildbirth Describethe managementandcare duringlabour Discusshowto maintainasafe environmentforlabour Workeffectivelyforpain managementduringlabour	**Physiology,managementandcareduringlabour** •Normallabourandbirth •Onsetof birth/labour •Pervaginalexamination(ifnecessary) •Stagesoflabour • Organizationoflabourroom–Triage,preparationforbirth • Positivebirthenvironment • Respectfulcare andcommunication • DrugsusedinlabourasperGoIguidelines **FistStage** • Physiologyofnormallabour •Monitoringprogressoflabourusing Partograph/laboureareguide • Assessingandmonitoringfetalwellbeing • Evidencebased careduring1ststageoflabour gementinlabour(non-pharmacological) • Psychologicalsupport–Managing fear • Activityandambulationduringfirst stageoflabour	•Lecture •Discussion •Demonstration •Bedsideclinics •Casediscussion/ presentation •Simulatedpractice •SupervisedClinicalpractice – Pervaginalexamination,Conduction ofnormalchildbirth •ReferSBA module • LaQshya guidelines • guidelines	• Essay type • Shortanswer • Objective type • Casestudy evaluation • Assessment ofskillswithchecklist • OSCE

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Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		Discuss how themidwife provides careand support for thewomenduringbirtht oenhance physiologicalbirthing and promotenormalbirth Assess and providecare of the newbornimmediatel yfollowingbirth Discusstheimpactofla bour and birth as atransitional event inthewoman'slife	• Nutritionduringlabour • Promotepositivechildbirthexperiencef or women • Birthcompanion • RoleofDoula/ASHA‘s **Secondstage** • Physiology(Mechanismoflabour) • Signsofimminentlabour • Intrapartummonitoring • Birthpositionofchoice • Vaginalexamination • Psychologicalsupport • Non-directivecoaching • Evidence based management ofphysiological birth/Conduction ofnormalchildbirth • Essentialnewborncare(ENBC) • Immediateassessmentandcareofth enewborn • RoleofDoula/ASHA‘s **ThirdStage** • Physiology– placentalseparationandexpulsion, hemostasis • Physiologicalmanagementoft hirdstageoflabour • Activemanagementofthirdstageof labour (recommended) • Examinationofplacenta, membranesandvessels • Assessperineal,vaginaltear/i njuriesandsutureifrequired • InsertionofpostpartumIUCD • Immediateperinealcare • Initiationofbreastfeeding • Skintoskincontact • Newbornresuscitation **FourthStage** *Observation, Critical Analysis andManagementofmotherandnewbor n* • Maternal assessment, observationfundal height, uterine consistency,urineoutput, blood loss • DocumentationandRecordofbirth	•Refer ENBC,NSSKmod ule • Demonstration • Groupwork • Scenario basedlearning •Simulation •Roleplay •Demonstration •Videos	

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
		Ensure initiation ofbreast feeding andadequatelatching	•Breastfeedingandlatching •Managinguterinecramp •Alternative/complementarytherapies •RoleofDoula/ASHA‘s •Variouschildbirthpractices •Safeenvironmentformotherandnewbornto promotebonding • Maintainingrecordsandreports		
V	7(T) 6(L) 40(C)	Describe thephysiology managementandcare ofnormalpuerperium	**Postpartumcare/Ongoingcareofwomen** •Normalpuerperium–Physiology, duration •Post-natal assessment and care –facility andhome-basedcare •Perinealhygieneandcare •Bladderandbowelfunction •Minordisordersofpuerperiumanditsmanagement •Physiology of lactation and lactationmanagement •Postnatal counseling andpsychological support •Normal postnatal baby blues andrecognitionofpost-nataldepression •Transitiontoparenthood •Care for the woman up to 6 weeksafterchildbirth •Cultural competence (Taboos relatedtopostnatal diet andpractices) •Dietduringlactation-review •Post-partumfamilyplanning •Follow-upofpostnatal mothers	• Lecture • Discussion • Demonstration • Healthtalk • Simulated practice • Supervisedclinicalpractice •ReferSBAmodule	• Essay type • Shortanswer • Objective type • Assessment ofskills withchecklist • OSCE
VI	7(T) 7(L) 40(C)	Discuss the need forand provision ofcompassionate,family centered midwifery careofthenewborn Describe theassessmentandcareofnormalneonate	•Drugsusedinthepostnatalperiod •Recordsandreports **Assessmentandongoingcareofnormalneonates** •Family centeredcare •Respectfulnewborncareandcommunication •NormalNeonate–Physiologicaladaptation •Newbornassessment–Screeningforcongenitalanomalies •Careof newbornupto6weeksafter	• Lecture •Discussion • Demonstration • Simulatedpracticesession • Supervisedclinicalpractice • Refersafedelivera	• Essay type • Shortanswer pp module –newborn

- Objectivetype
- Assessment ofskills withchecklist
- OSCE

Unit	Time (Hrs)	LearningOutcomes	Content	Teaching/Learning Activities	Assessment Methods
			thechildbirth(Routinecareofnewborn) •Skintoskincontactandthermoregulation •Infectionprevention •Immunization •Minordisordersofnewbornanditsmanagement	management • Partial completionofSBA module	
VII	8(T) 2(L) 40 (C)	Explain variousmethods of familyplanningandroleof nurse/midwife inproviding familyplanningservices Describe youthfriendlyservicesandrole of nurses/midwives Recognize the role ofnurses/midwives ingenderbasedviolence	**Familywelfareservices** • Impactofearly/frequentchildbearing ○ Permanent methods – Male sterilization andfemalesterilization • Action, effectiveness, advantages,disadvantages, myths, misconception andmedical eligibility criteria (MEC) for use ofvariousfamilyplanningmethods • Emergencycontraceptives • Recent trends and research incontraception • Family planning counseling using BalancedCounselingStrategy(BCS) • LegalandrightsaspectsofFP • Human rights aspects of FPadolescents • Youth friendly services – SRHR services,policies affecting SRHR and attitude of nursesandmidwivesinprovisionofservices(Review) • Importance of follow up andrecommendedtiming **GenderrelatedissuesinSRH** • Gender based violence – Physical, sexual andabuse, Laws affecting GBV and role ofnurse/midwife • Specialcourtsforabusedpeople • Gender sensitive health services includingfamily planning	• Lecture • Supervised practice • Fieldvisits • Scenariobased learning • Discussion • GoI guidelines – injectablecontraceptives, oral contraceptives,IUCD,maleandfemalesterilization • jectivetype • Fieldvisitreports • Vignettes	• Essay type • Shortanswers

• mprehensive range of family planningmethods

○ Temporarymethods – Hormonal,non-hormonalandbarrier methods

PRACTICUM

PLACEMENT:VI&VIISEMESTER

VI SEMESTER:MIDWIFERY/OBSTETRICSANDGYNECOLOGY(OBG)NURSING-I

SKILLLAB& CLINICAL: SkillLab–1Credit(40hours);Clinical–3Credits(240hours)

PRACTICECOMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto:

1. Counselwomenandtheirfamiliesonpre-conceptioncare
2. Demonstratelabtestsex.urinepregnancytest
3. Performantenatalassessmentofpregnantwomen
4. Assessandcarefornormalantenatalmothers
5. Assistandperformspecificinvestigationsfor antenatalmothers
6. Counselmothersandtheirfamiliesonantenatalcareandpreparationfor parenthood
7. Conductchildbirtheducationclasses
8. Organizelabourroom
9. Prepareandproviderespectfulmaternity carefor mothersinlabour
10. Performper-vaginalexaminationforawoman inlabourifindicated
11. Conductnormalchildbirthwithessentialnewborncare
12. Demonstrateskillsinresuscitatingthenewborn
13. Assistwomeninthetransitiontomotherhood
14. Performpostnatalandnewbornassessment
15. Providecareforpostnatalmothersandtheirnewborn
16. Counselmotherson postnatalandnewborncare
17. PerformPPIUCDinsertionandremoval
18. Counselwomenonfamilyplanningandparticipateinfamilywelfareservices
19. Provideyouthfriendlyhealthservices
20. Identify,assess,careandreferwomenaffectedwithgenderbasedviolence

SKILLLAB: Procedures/Skillsfordemonstrationandreturndemonstration:

1. Urinepregnancytest
2. CalculationofEDD,Obstetricalscore,gestationalweeks
3. Antenatalassessment
4. Counselingantenatalmothers
5. Microbirthplanning
6. PVexamination
7. Monitoringduring firststageoflabour–Plottingandinterpretationofpartograph
8. Preparationfordelivery–settinguplabourroom,articles,equipment
9. Mechanismoflabour –normal
10. Conductionofnormalchildbirthwithessentialnewborncare
11. Activemanagementofthirdstageoflabour
12. Placentalexamination
13. Newbornresuscitation
14. Monitoringduringfourthstageoflabour
15. Postnatalassessment

16. Newbornassessment
17. Kangaroomothercare
18. Familyplanningcounseling
19. PPIUCDinsertionandremoval

CLINICALPOSTINGS(6weeks×40hoursperweek=240hours)

Clinical Area	Duration (weeks)	ClinicalLearning Outcomes	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
Antenatal OPD andAntenatalward	1week	Perform antenatalassessment Performlaboratorytestsforantenatal women and assistin selected antenataldiagnosticprocedures Counselantenatalwomen	• Historycollection • Physicalexamination • Obstetricexamination • Pregnancyconfirmationtest • Urinetesting • BloodtestingforHemoglobin,grouping& typing • Bloodtestformalaria • KICKchart • USG/NST • Antenatalcounseling • Preparationfor childbirth • Birth preparedness andcomplicationreadiness	•Antenatal palpation •Healthtalk •Casestudy	•OSCE •Case presentation
Labour room	3weeks	Monitor labour usingpartograph Providecaretowomenduringlabour Conduct normal childbirth,provide care to mother andimmediatecareofnewborn	• Assessmentofwomaninlabour • Partograph • Pervaginalexaminationwhenindicated • Careduringfirststageoflabour • Painmanagementtechniques • Uprightandalternativepositionsinlabour • Preparation for labour – articles,physical,psychological • Conductionofnormalchildbirth • Essentialnewborncare • Newbornresuscitation • Active management of thirdstageoflabour • Monitoring and care duringfourthstageof labour	•Partographrecording •PVexamination •Assisting/Conduction ofnormalchildbirth •Casestudy •Case presentation •Episiotomyand suturingifindicated •Newbornresuscitation	•Assignment •casestudy •Case presentation •OSCE
Post-partumclinic andPostnatalWardincludingFPunit	2weeks	Perform postnatalassessment Providecaretonormalpostnatal mothers andnewborn	• Postnatalassessment • Care of postnatal mothers – normal • Careofnormal newborn • Lactationmanagement	•Postnatalassessment •Newbornassessment •Casestudy	•Assignment •Casestudy •Case presentation

Clinical Area	Duration (weeks)	ClinicalLearning Outcomes	Procedural Competencies/ClinicalSkills	Clinical Requirements	Assessment Methods
		Providepostnatalcounseling Providefamilywelfareservices	• Healthteaching onpostnataland newborncare • Familywelfarecounseling	• Case presentation • PPIUCDinsertion &removal	

Note: PartialCompletionofSBAmoduleduringVIsemester

VII SEMESTER

MIDWIFERY/OBSTETRICS AND GYNECOLOGY (OBG) NURSING - IIPRACTICUM

SKILLLAB&CLINICAL: SkillLab –1Credit(40hours);Clinical–4Credits(320hours)

PRACTICECOMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto:

1. Identify,stabilizeandreferantenatalwomenwithcomplications
2. Providecaretoantenatalwomenwithcomplications
3. Providepostabortioncare&counselling
4. Assistintheconductionofabnormalvaginaldeliveriesandcaesareansection.
5. Demonstrateskillsinresuscitatingthenewborn
6. Assistandmanagecomplicationsduringlabour
7. Identifypostnatalandneonatalcomplications,stabilizeandreferthem
8. Providecareforhighriskantenatal,intranatalandpostnatalwomenandtheir familiesusingnursingprocessapproach
9. Providecareforhighrisknewborn
10. Assistinadvancedclinicalproceduresinmidwiferyandobstetricnursing
11. Providecareforwomenduringtheirnonchildbearingperiod.
12. Assessandcareforwomenwithgynecologicaldisorders
13. Demonstrateskillsinperformingandassistinginspecificgynecologicalprocedures
14. Counselandcareforcoupleswithinfertility

SKILLLAB: Procedures/Skillsfordemonstrationandreturndemonstration:

1. Antenatalassessmentandidentificationofcomplications
2. Postabortioncare&counseling
3. Counselingantenatalwomenforcomplicationreadiness
4. Mechanismoflabour–abnormal
5. Assistingintheconductionofabnormalvaginaldeliveriesandcaesareansection.
6. Managementofcomplicationsduringpregnancy/labour/postpartum(casestudies/simulatedscenarios)
7. AdministrationofInj.Magnesiumsulphate
8. StartingandmaintaininganoxytocindripforPPH
9. ManagementofPPH –Bimanualcompressionofuterus
10. ManagementofPPH–Balloontamponade
11. Instrumentsusedinobstetricsandgynecology
12. Visualinspectionofcervixwithaceticacid
13. Cervicalbiopsy
14. Breastexamination
15. Counselingofinfertilecouples

CLINICALPOSTINGS(8weeks×40hoursperweek=320hours)

Clinical Areas	Duration (Weeks)	LearningOutcomes	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
Antenatal OPD/ infertilityclinics/Reproductivemedicine andantenatal ward	2weeks	Perform/assist inselected advancedantenatal diagnosticprocedures Provideantenatalcarefor women withcomplications ofpregnancy Counsel antenatalmothers Provide post abortioncare and counselling Providecounsellingandsupport to infertilecouples	•Kickchart,DFMC •AssistinNST/CTG/USG •Assistinginadvanceddiagnosticprocedures •Careofantenatalwomenwithcomplicationsinpregnancy •Antenatalcounselling •Preparationforchildbirth,Birthpreparedness and complicationreadiness •Postabortioncare •Postabortioncounselling •Counselling infertilecouples	•Antenatal palpation •Healthtalk •Casestudy	• Simulation • Case presentation • OSCE
Labourroom	2weeks	Conductionofnormalchidlbirth Conduct/assist inabnormaldeliveries Monitor labour usingpartograph Identify and managecomplications duringlabour	•Assessmentofwomaninlabour •Partograph •Pervaginalexaminationifindicated •Obstetricexamination •Careduringfirststageoflabour •Painmanagementtechniques •Uprightandalternativepositionsin labour •Preparation for labour – articles,physical,psychological •Conductionofnormalchildbirth •Essentialnewborncare •Newbornresuscitation •Activemanagementofthirdstageoflabour •Monitoringandcareduringfourthstageof labour •Identification, stabilization,referal and assisting inmanagement of prolongedlabour,cervicaldystocia,CPD,contractedpelvis •Assistinthemanagementof	•Partographrecording •Pain management duringlabour •Conductionofnormalchildbirth •Assistingina bnormaldeliveries •Managingcomplicationduringlabour •Casestudy •Case presentation	• Assignment • Casestudy • Case presentation • Simulation • OSCE

Clinical Areas	Duration (Weeks)	LearningOutcomes	Procedural Competencies/ClinicalSkills	ClinicalRequirements	Assessment Methods
			abnormaldeliveries– posteriorposition,breechdeliveries,twin deliveries, vacuumextraction, forceps delivery,shoulderdystocia • Assistincervicalencerclageprocedures,D&C,D&E • Identify, assist and managetrauma to the birth canal,retained placenta, post partumhemorrhage,uterineatony		
Postnatal Ward	1week	Performpostnatal assessment and identifypostnatalcomplications Providepostnatalcare Providefamilywelfareservices	• Managementofobstetricshock • Postnatalhistorycollectionand physicalexamination •Identifypostnatalcomplications •Care of postnatal mothers – abnormal deliveries, caesareansection •Careofnormal newborn •Lactationmanagement •Postnatalcounselling •Healthteachingonpostnatalandnewborn care	•Healthtalk •Postnatalassessment •Newbornassessment •Casestudies •Case presentation •PPIUCDinsertion andremoval	• Roleplay •Assignment •Casestudy •Case presentation •Simulation •Vignettes •OSCE
NeonatalIntensive CareUnit	1week	Perform assessment ofnewborn and identifycomplications/congenitalanomalies Perform neonatalresuscitation Care of high risknewborn Provide care fornewbornsinventilator,incubatoretc	•Familywelfarecounselling •Neonatal assessment – identification of complication,congenitalanomalies. •Observationofnewborn •Neonatalresuscitation •Phototherapyandmanagementof jaundicein newborn •AssistinExchangetransfusion •Neonatalfeeding– spoonandkatori, paladai, NGtube •Careofbabyinincubator,ventilator, warmer •Infectioncontrolinthenursery	•Casestudy •Case presentation •Assignments •Simulatedpractice	•Case presentation •Carestudy •Careplan •Simulation, Vignettes •OSCE
Obstetric/ Gynaeoperationtheatre& Gynecology	2weeks	Assist/perform specialneonatalprocedures Assistingynecologicalandobstetric surgeries	•Neonatalmedications •StartingIVlinefornewborn,drug calculation •Observe/Assistincaesarean section •Managementofretainedplacenta	•Assisting inobstetric andgynecological surgery •Trayset-upfor	•Assignment •Trayset-upforobstetric andgynecologicalsurgeries

Clinical Areas	DurationLearningOutcomes(Weeks)		Procedural Competencies/CliniclalSkills	ClinicalRequirements	Assessment Methods
ward		Care for women withgynecologicaldisor	• Gynecologicalsurgeries • Hysterectomy • Uterinerupture • Care of women withgynecologicalconditions	caesarean section • Careplan	• Case presentation • Simulation • Vignettes

Note: CompletionofsafedeliveryAppmoduleduringVIISemester

COMMUNITYHEALTHNURSING–II

PLACEMENT:VIISEMESTER

THEORY: 5Credits(100hours)–includeslabhoursalso

PRACTICUM: Clinical:2Credit(160hours)

DESCRIPTION: This course is designed to help students gain broad perspective of specialized roles and responsibilities ofcommunity health nurses and to practice in various specialized health care settings. It helps students to develop knowledgeand competencies required for assessment, diagnosis, treatment, and nursing management of individuals and families withinthecommunityinwellnessandillnesscontinuum.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto

1. Demonstrate beginning practice competencies/skills relevant to provide comprehensive primary health care/community-based care to clients with common diseases and disorders including emergency and first aid care at home/clinics/centresasper predeterminedprotocols/drugstandingordersapprovedbyMOH&FW
2. Provide maternal, newborn and child care, and reproductive health including adolescent care in the urban and ruralhealthcare settings
3. Describethemethodsofcollectionandinterpretationofdemographicdata
4. Explainpopulationcontrolanditsimpactonthesocietyanddescribetheapproachestowardslimitingfamilysize
5. Describeoccupationalhealthhazards,occupationaldiseasesandtheroleofnursesinoccupationalhealthprograms
6. Identifyhealthproblemsofolderadultsandprovideprimarycare,counselingandsupportivehealthservices
7. Participateinscreeningformentalhealthproblemsinthecommunityandprovidingappropriatereferralservices
8. Discussthe methodsofdatacollectionforHMIS,analysisandinterpretationofdata
9. Discussabouteffectivemanagementofhealthinformationincommunitydiagnosisandintervention
10. Describethemanagementsystemofdeliveryofcommunityhealthservicesinruralandurbanareas
11. Describe the leadership role in guiding, supervising, and monitoring the health services and the personnel at the PHCs,SCsandcommunity levelincludingfinancialmanagement and maintenanceof records &reports
12. Describe the roles and responsibilities of Mid-Level Health Care Providers (MHCPs) in Health Wellness Centers(HWCs
13. Identifytherolesandresponsibilitiesofhealthteammembersandexplaintheir jobdescription
14. Demonstrateinitiativeinpreparingthemselvesandthecommunityfordisasterpreparednessandmanagement
15. Demonstrateskillsinproperbio-medicalwastemanagementasperprotocols
16. Explaintherolesandfunctionsofvariousnationaland internationalhealthagencies

COURSEOUTLINE

T–Theory

	Unit Time (Hrs)	Learning Outcomes	Content	Teaching/LearningActivities	Assessment Methods
I	10(T)	Explainnurses'roleMin identification,primarymanagement andreferral of clientswith commondisorders/conditions andemergenciesincludingfirstaid	**Managementofcommonconditionsand emergenciesincludingfirstaid** • Standingorders:Definition,uses **Screening,diagnosing/identification, primary care and referral ofGastrointestinalSystem** ○ Abdominalpain ○ Nauseaandvomiting ○ Diarrhea ○ Constipation ○ Jaundice ○ GIbleeding ○ Abdominaldistension ○ Dysphagiaanddyspepsia ○ Aphthousulcers **RespiratorySystem** ○ Acute upper respiratory infections – Rhinitis,Sinusitis,Pharyngitis,Laryngitis, Tonsillitis ○ Acute lower respiratory infections – Bronchitis,pneumoniaandbronchialasthma ○ Hemoptysis,Acutechestpain **Heart&Blood** ○ Common heart diseases – Heartattack/coronary artery disease, heart failure,arrhythmia ○ Bloodanemia,bloodcancers,bleedingdisorders **Eye&ENTconditions** • Eye – local infections, redness of eye,conjunctivitis,stye,trachomaandrefractiveerrors • ENT– Epistaxis,ASOM,sorethroat,deafness **UrinarySystem** • Urinary tract infections – cystitis,pyelonephritis,prostatitis,UTIsinchildren **Firstaidincommonemergencyconditions –Review** • Highfever,lowbloodsugar, minorinjuries,fractures, fainting, bleeding, shock, stroke,bites, burns, choking, seizures, RTAs,poisoning,drowningandforeignbodies	• Lecture •Discussion •Demonstration •Roleplay •Suggestedfieldvisits •Fieldpractice •Assessment ofclientswithcommonconditions andprovidereferral	• Shortanswer •Essay •Fieldvisitreports •OSCEassessment

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
II	20(T)	Providereproductive,maternal, newbornand childcare,includingadolescent care inthe urban and ruralhealthcaresettings	**Reproductive, maternal, newborn, childandadolescentHealth(ReviewfromOBGNursing and application in communitysetting)** •Presentsituationofreproductive,maternaland child healthin India **Antenatalcare** •Objectives, antenatal visits andexamination,nutritionduringpregnancy,counseling •Calciumandironsupplementationinpregnancy •Antenatalcareathealthcentrelevel •Birth preparedness •High risk approach – Screening/earlyidentificationandprimary managementofcomplications – Antepartum hemorrhage,pre-eclampsia, eclampsia, Anemia,Gestational diabetes mellitus,Hypothyroidism,Syphilis •Referral,followupand maintenanceofrecordsandreports **Intranatalcare** •Normallabour– process,onset,stagesoflabour •Monitoringandactivemanagementofdifferentstagesof labour •Careofwomenafterlabour •Earlyidentification,primarymanagement,referral and follow up – preterm labour,fetal distress, prolonged and obstructedlabour, vaginal & perennial tears, rupturedutерus •Careofnewbornimmediatelyafterbirth •Maintenanceof recordsandreports •Useof Safechildbirthchecklist •SBAmodule–Review •Organizationoflabourroom **Postpartumcare** •Objectives,Postnatalvisits,careofmotherand baby, breast feeding, diet duringlactation,andhealthcounseling •Earlyidentification,primarymanagement,referral and follow up of complications,Danger signs-postpartum hemorrhage,shock, puerperal sepsis, breast conditions,post-partumdepression •Postpartumvisitbyhealthcare provider	•Lecture •Discussion •Demonstration •Roleplay •Suggestedfieldvisits and fieldpractice •Assessment ofantenatal, postnatal,newborn, infant,preschool child,school child, andadolescenthealth	•Shortanswer •Essay •OSCEassessment

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching / LearningActivities	Assessment Methods
		Promote adolescenthealth and youthfriendly services	**Newbornandchildcare** •*Review:*Essentialnewborncare •Managementofcommonneonatalproblems •Management of common child healthproblems:Pneumonia,Diarrhoea,Sepsis,screening for congenital anomalies andreferral •*Review:*IMNCIModule •Underfive clinics **AdolescentHealth** •Commonhealthproblemsandriskfactorsinadolescentgirls andboys •Common Gynecological conditions – dysmenoorhea, Premenstrual Syndrome(PMS),Vaginaldischarge,Mastitis,Breastlump,pelvicpain,pelvicorganprolapse •Teenagepregnancy,awarenessaboutlegalage of marriage, nutritional status ofadolescents National Menstrual Hygienescheme •Youthfriendlyservices: ○ SRHServiceneeds ○ Role and attitude of nurses:Privacy,confidentiality,nonjudgementalattitude,client autonomy, respectful care andcommunication •Counselingfor parentsandteenagers(BCS –balancedcounselingstrategy) **NationalPrograms** •RMNCH+A Approach – Aims, Healthsystems strengthening, RMNCH+Astrategies,Interventionsacrosslifestages,program management, monitoring andevaluation systems •UniversalImmunizationProgram(UIP)asper Government of India guidelines –Review •RashtriyaBalSwasthyaKaryakaram(RSBK)-children •RashtriyaKishorSwasthyaKaryakram(RKSK)– adolscents Anyothernewprograms	•Screen,manageandreferadolescents •Counseladolescents	

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
III	4(T)	Discuss theconcepts and scopeofdemography	**Demography,SurveillanceandInterpretationofData** •*Demography and vital statistics* – demographic cycle, world populationtrends,vital statistics •Sexratioandchildsexratio, trendsof sexratio in India, the causes and socialimplications •*Sourcesofvitalstatistics*– Census,registration of vital events, sampleregistrationsystem •*Morbidityand mortalityindicators*– Definition,calculationandinterpretation •Surveillance,Integrateddiseasesurveillanceproject(IDSP),OrganizationofIDSP, flow of information and mother andchildtrackingsystem(MCTS)inIndia •Collection,analysis,interpretation,useofdata •*Review:*Commonsamplingtechniques– randomand nonrandomtechniques •Disaggregation ofdata	•Lecture •Discussion •Demonstration •Roleplay •Suggestedfieldvisits •Fieldpractice	•Shortanswer •Essay
IV	6(T)	Discuss populationexplosion and itsimpact on socialand economicdevelopment ofIndia Describe thevarious methods ofpopulationcontrol	**PopulationanditsControl** •PopulationExplosionanditsimpactonSocial, Economic development ofindividual,society andcountry. •Population Control – WomenEmpowerment; Social, Economic andEducationalDevelopment •LimitingFamilySize – Promotionofsmallfamily norm, Temporary Spacing Methods(natural, biological, chemical, mechanicalmethods etc.), Terminal Methods(Tubectomy,Vasectomy) •EmergencyContraception •Counselinginreproductive,sexualhealthincludingproblemsof adolescents •MedicalTerminationofpregnancyandMTPAct •NationalPopulationStabilizationFund/JSK(JansankhyaSthirataKosh) •Family planning2020 •NationalFamilyWelfareProgram	•Lecture •Discussion •Demonstration •Roleplay •Suggestedfieldvisits •Fieldpractice	•Shortanswer •Essay •OSCEassessment •Counselingonfamilyplanning •Essay
V	5(T)	Describeoccupational healthhazards,occupationaldiseases and theroleof nursesin	•RoleofanurseinFamilyWelfareProgram **OccupationalHealth** •Occupationalhealthhazards •Occupationaldiseases •ESIAct	•Lecture •Discussion •Demonstration •Roleplay	•Shortanswer •Clinicalperformance

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		occupational healthprograms	•National/StateOccupationalHealthProgra ms •Role of a nurse in occupational healthservices – Screening, diagnosing,managementandreferralofcli entswithoccupationalhealth problems	•Suggestedfieldv isits •Fieldpractice	evaluation
VI	6(T)	Identify healthproblems of olderadults and provideprimary care,counseling andsupportive healthservices	**GeriatricHealthCare** •Healthproblemsofolderadults •Managementofcommongeriatricailments:cou nseling, supportive treatment of olderadults •Organizationofgeriatrichealthservices •National programfor healthcareofelderly(NPHCE) •Statelevelprograms/Schemesforolderadu lts •Role of a community health nurse ingeriatric health services – Screening,diagnosing,managementandr eferralofolderadultswith healthproblems	•Lecture •Discussion •Demonstration	•Visitreportonel derlyhome •Essay •Shortanswer
VII	6(T)	Describe screeningfor mental healthproblems in thecommunity, takepreventivemea sures andprovide appropriatereferrals ervices	**MentalHealthDisorders** •Screening,management,preventionandref erralformental healthdisorders •*Review:* ○ Depression,anxiety,acutepsychosis, Schizophrenia ○ Dementia ○ Suicide ○ Alcoholandsubstanceabuse ○ Drugdeaddictionprogram ○ NationalMentalHealthProgram ○ NationalMentalHealthPolicy ○ NationalMentalHealthAct •Role of a community health nurse inscreening,initiationoftreatmentandfollow upofmentallyill clients	•Lecture •Discussion •Demonstration •Roleplay •Healthcounselingo n promotion ofmentalhealth •Suggestedfieldv isits •Fieldpractice	•Essay •Shortanswer •Counselingr eport
VIII	4(T)	Discuss abouteffectiveman agement ofhealth informationin communitydiagno sis andintervention	**HealthManagementInformationSystem(HMIS)** •Introductiontohealthmanagementsystem:dat a elements, recording and reportingformats,dataqualityissues •*Review:* ○ BasicDemographyandvitalstatistics ○ Sourcesofvitalstatistics ○Commonsamplingtechniques,frequency distribution	•Lecture •Discussion •Demonstration •Roleplay •Suggestedfieldv isits •Fieldpractice •Group project on communitydiag nosis–data	•Groupprojectr eport •Essay •Shortanswer

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			○Collection,analysis,interpretationofdata • Analysis of data for community needsassessmentandpreparationofhealthactionplan	management	
IX	12(T)	DescribethesystemmanagementofdeliveryofcommunityhealthservicesinruralandurbanareasManagementofdeliveryofcommunity healthservices:	**ManagementofdeliveryofcommunityhealthservicesPlanning, budgeting and materialmanagementofCHC,PHC,SC/HWC** •**ManpowerplanningasperIPHSstandards** •**Rural:**Organization,staffingandmaterialmanagement of rural health servicesprovided by Government at village,SC/HWC, PHC, CHC, hospitals – district,stateand central •**Urban:** Organization, staffing, andfunctionsofurbanhealthservicesprovidedby Government at slums, dispensaries,special clinics, municipal and corporatehospitals •Defenseservices •Institutionalservices •Other systems of medicine and health:Indiansystemofmedicine,AYUSHclinics,Alternative health care system referralsystems,Indigenoushealthservices	• Lecture •Discussion •Visits to varioushealthcaredeliverysystems •Supervisedfieldpractice	• Essay •Shortanswer •Filedvisitreports
X	15(T)	Describe theleadership role inguiding,supervising, andmonitoring thehealth services andthe personnel at thePHCs, SCs andcommunity levelincluding financialmanagement Describe the rolesand responsibilitiesof Mid-LevelHealth CareProviders(MHCPs)in Health WellnessCenters(HWCs)	**Leadership,SupervisionandMonitoring** •Understanding work responsibilities/jobdescriptionofDPHN,HealthVisitor,PHN,MPHW (Female), Multipurpose healthWorker(Male),AWWsandASHA •RolesandresponsibilitiesofMid-LevelHealthCareProviders(MLHPs) •Village Health Sanitation and NutritionCommittees (VHSNC): objectives,compositionandroles&responsibilities •Healthteammanagement •*Review*:Leadership&supervision – concepts,principles&methods •Leadershipinhealth:leadershipapproachesin healthcare setting, taking control ofhealth of community and organizing healthcamps,villageclinics •Training, Supportive supervision andmonitoring – concepts, principles andprocesse.g.performanceoffrontlinehealthworkers **FinancialManagementandAccounting&ComputingatHealthCenters(SC)**	•Lecture •Discussion •Demonstration •Roleplay •Suggestedfieldvisits •Fieldpractice	•Report oninteraction with MPHWs,HVs, ASHA,AWWs •Participationin trainingprograms •Essay •Shortanswer

○ Activitiesforwhichfundsarereceived

Unit	Time (Hrs)	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
			○ Accountingandbookkeepingrequirements – accounting principles & policies, book ofaccounts to be maintained, basic accountingentries, accounting process, payments &expenditure, fixed asset, SOE reportingformat,utilizationcertificate(UC)reporting ○ Preparingabudget ○ Audit **Records&Reports:** •*Concepts of records and reports* – importance, legal implications, purposes,useofrecords,principlesofrecordwriting,filingof records •*Typesofrecords*–community relatedrecords, registers, guidelines formaintaining •*Reportwriting*– purposes,documentationofactivities, typesof reports •*MedicalRecordsDepartment* – functions,filingandretentionofmedicalrecords •*Electronic Medical Records (EMR)* – capabilities and components of EMR,electronic health record (EHR), levels ofautomation, attributes, benefits anddisadvantagesof HER		
XI	6(T)	Demonstrateinitiative inpreparingthemselvesandthecommunity fordisasterpreparedness andmanagement	•**Nurses'responsibilityinrecordkeepingandreporting** **DisasterManagement** •Disastertypesandmagnitude •Disasterpreparedness •Emergency preparedness •Commonproblemsduringdisastersandmethodsto overcome •Basicdisastersupplieskit •Disaster response including emergencyreliefmeasuresandLifesavingtechniques Usedisastermanagementmodule	•Lecture •Discussion •Demonstration •Roleplay • Suggested fieldvisits, and fieldpractice •Mockdrills •Refer Disastermodule (NDMA)NationalDisaster/INC – Reaching out inemergencies	
XII	3(T)	Describe theimportance of bio-medical wastemanagement, itsprocess andmanagement	**Bio-MedicalWasteManagement** •Waste collection, segregation,transportation and management in thecommunity •Wastemanagementinhealthcenter/clinics •Bio-medicalwastemanagementguidelines –2016,2018(Review)	•Lecturecum Discussion •Fieldvisittowastemanagementsite	•Fieldvisitreport
XIII	3(T)	Explain the rolesandfunction sof	**HealthAgencies**	•Lecture	•Essay

Unit	Time	Learning Outcomes	Content	Teaching/Learning Activities	Assessment Methods
		various nationaland internationalheal	• **International:** WHO, UNFPA, UNDP,World Bank, FAO, UNICEF, EuropeanCommission, Red Cross, USAID,UNESCO,ILO,CAR,CIDA,JHPIEGO,any other • **National:**IndianRedCross,IndianCouncilfor Child Welfare, Family PlanningAssociation of India, TuberculosisAssociationofIndia,CentralSocialWelfare Board, All India Women'sConference, Blind Association of India, anyother • **Voluntary Health Association of India(VHA)**	• Discussion	•Shortanswer

COMMUNITYHEALTHNURSINGII

Clinical practicum – 2 credits (160 hours)CLINICALPOSTINGS(4weeks×40hoursperweek)

Clinical Area	Duration (Weeks)	LearningOutcomes	ProceduralCompetencies/ ClinicalSkills	ClinicalRequirements	Assessment Methods
Urban Rural	2weeks 2Weeks	Screen,diagnose, manageandreferclientswith commonconditions/emergencies Assess and provideantenatal, intrapartum,postnatal and new- borncare Promote adolescenthealth	• Screening, diagnosing,management andreferral of clientswith commonconditions/emergencies •Assessment(physical &nutritional) ofantenatal,intrapartum,postnatal andnewborn •Conduction ofnormal delivery athealthcenter •Newborncare •Counseladolescents •Familyplanningcounselling •Distribution oftemporarycontraceptives – condoms, OCP's,emergencycontraceptives	• Screening,diagnosing,Primary managementandcarebasedonstanding orders/protocolsapprovedby MOH&FW •Minorailments–2 •Emergencies–1 •Dentalproblems–1 •Eyeproblems – 1 •Ear,nose,andthroatproblems –1 •Highriskpregnantwoman–1 •High riskneonate –1 •Assessment of antenatal – 1,intrapartum – 1, postnatal – 1andnewborn – 1 •Conductionofnormaldeliveryat health center anddocumentation– 2 •Immediatenewborncareanddocumentation– 1 •Adolescentcounseling –1 •Family planningcounselling–	•Clinical performance assessment •OSCEduringposting •Finalclinicaleexamination(University) •Clinicalperformanceassessment •OSCE

Clinical Area	Duration (Weeks)	LearningOutcomes	ProceduralCompetencies/ ClinicalSkills	ClinicalRequirements	Assessment Methods
		Providefamilywelfareservices Screen, diagnose,manage and refer clientswithoccupational healthproblem Screen, assess andmanageelderlywithhealth problems andreferappropriately Screen, diagnose,manage and refer clientswho are mentallyunhealthy Participate incommunity diagnosis –data management Participateinhealthcentreactivities Organize and conductclinics/health camps inthecommunity Preparefordisasterpreparedness andmanagement Recognize theimportanceandobservethe biomedical wastemanagementprocess	• Screening, diagnosing,management andreferral of clientswith occupationalhealthproblems •Healthassessmentofelderly •Mentalhealthscreening •Participation inCommunitydiagnosis–datamanagement • Writing healthcenter activityreport •Organizingandconductingclinics/camp •Participation indisastermockdrills	1 •Family casestudy–1(Rural/Urban) •Screening, diagnosing,management and referral ofclients with occupationalhealthproblems– 1 •Healthassessment(Physical&nutritional)of elderly–1 •Mentalhealthscreeningsurvey–1 •**Group project:** Communitydiagnosis–datamanagement •Writereportonhealthcenteractivities– 1 •OrganizingandconductingAntenatal/under-fiveclinic/Healthcamp– 1 •Participationindisastermockdrills •Fieldvisittobio-medicalwastemanagementsite •VisittoAYUSHclinic	•FamilyCasestudyevaluation •Clinicalperformanceevaluation •OSCE •Projectevaluation

NURSINGRESEARCHANDSTATISTICS

PLACEMENT:VIISEMESTER

THEORY:2Credits(40hours)

PRACTICUM: Lab/SkillLab:1Credit(40hours)ClinicalProject:40hours

DESCRIPTION: The Course is designed to enable students to develop an understanding of basic concepts of research,research process and statistics. It is further, structured to conduct/ participate in need-based research studies in varioussettings and utilize the research findings to provide quality nursing care. The hours for practical will be utilized forconductingindividual/group research project.

COMPETENCIES: Oncompletionofthecourse,studentswillbecompetentto

1. Identifyresearchpriorityareas
2. Formulateresearchquestions/problemstatement/hypotheses
3. Reviewrelatedliteratureonselectedresearchproblemandprepareannotated bibliography
4. Preparesampledatacollectiontool
5. Analyzeandinterpretthegivendata
6. Practicecomputing,descriptivestatisticsandcorrelation
7. Drawfiguresandtypesofgraphson givenselectdata
8. Developaresearchproposal
9. Planandconductagroup/individualresearchproject

COURSEOUTLINE

T–Theory,P – Practicum

Unit	Time(Hrs.)		Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
	T	P				
I	6		Describe theconcept ofresearch, terms,needandareasofresearch innursing Explain the stepsof researchprocess State the purposesand steps ofEvidence BasedPractice	**ResearchandResearchProcess** •Introduction and need for nursingresearch •Definition of Research & nursingresearch •Stepsofscientificmethod •Characteristicsofgoodresearch •StepsofResearchprocess– overview •Evidence Based Practice – Concept,Meaning, Purposes, Steps of EBPProcessand Barriers	•Lecture cumDiscussion •Narratestepsofresearch processfollowed fromexamples ofpublishedstudies •Identifyresearchpriorities onagivenarea/specialty •List examples ofEvidence BasedPractice	•Shortanswer •Objectivetype
II	2	8	Identify and statethe researchproblem andobjectives	**ResearchProblem/Question** •Identificationofproblemarea •Problemstatement •Criteriaofagoodresearchproblem •Writingobjectivesandhypotheses	•Lecturecum Discussion •Exercise on writingstatement ofproblem andobjectives	•Shortanswer •Objectivetype •Formulation ofresearchquestions/objectives/hypothesis

Unit	Time (Hrs.) T	P	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
III	2	6	Review therelatedliterature	**ReviewofLiterature** •Location •Sources •Onlinesearch;CINHAL,COCHRANEetc. •Purposes •Methodofreview	• Lecture cumDiscussion • Exercise onreviewing oneresearch report/articleforaselectedresearchproblem	•Shortanswer •Objectivetype •Assessmentofreview ofliterature ongiven topicpresented
IV	4	1	Describethe Researchapproaches anddesigns	**ResearchApproachesandDesigns** • Historical,surveyandexperimental • QualitativeandQuantitativedesigns	• Prepare annotatedBibliography •Lecturecum Discussion •Identifytypesofresearch approachesused from examplesof published andunpublishedresearch	• Shortanswer •Objectivetype
V	6	6	Explain theSamplingprocess Describethe methodsofdatacollection	**SamplinganddataCollection** • DefinitionofPopulation,Sample • Samplingcriteria,factors influencing sampling process, typesofsampling techniques • Data– why,what,fromwhom,whenand wheretocollect • Data collection methodsandinstruments ○ Methodsofdatacollection ○ Questioning,interviewing ○ Observations,recordanalysisand measurement ○ Typesofinstruments,Validity&Reliability oftheInstrument • Researchethics • Pilotstudy • Datacollectionprocedure	•Studieswithrationale •Lecture cumDiscussion • Readingassignment onexamplesofdatacollectiontools •Preparationofsample datacollection tool •Conductgroupresearchproject	•Shortanswer •Objectivetype •Developing •Practiceon
VI	4	6	Analyze,Interpret andsummarize theresearchdata	**Analysisofdata** • Compilation, Tabulation,classification, summarization,presentation,interpretationofdata	•Lecturecum Discussion •Preparation ofsampletables	
VII	12	8	Explain the useof statistics,scales ofmeasurement	**IntroductiontoStatistics** • Definition, use of statistics, scalesof measurement.	•Lecturecum Discussion	

questionnaire/Interview Schedule/Checklist

- Shortanswer
- Objectivetype
- Analyzeandinterpret givendata
- Shortanswer
- Objectivetype
- Computationof

Unit	Time (Hrs.)T	P	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			and graphicalpresentation ofdata Describe themeasures ofcentraltendency andvariabilityand efficientofcorrelation Correlation	• Frequency distribution andgraphicalpresentationofdata • Mean,Median,Mode,Standarddeviation • Normal Probability and tests ofsignificance •Co-methodsof •Statisticalpackagesanditsapplication	graphicalpresentations • Practice oncomputation ofmeasures of centraltendency, variability&correlation	descriptive statistics
VIII	4	5 40 Hrs(ClinicalProject)	Communicate andutilize the researchfindings	**CommunicationandutilizationofResearch** •Communication of researchfindings •Verbalreport •Writingresearchreport •Writingscientificarticle/paper •Critical review ofpublishedresearchincluding publicationethics •Utilizationofresearchfindings •Conductinggroupresearchproject	• Lecture cumDiscussion • Read/ Presentationsof a samplepublished/unpublishedresearch report • Plan, conduct andWriteindividual/groupresearch project	• Shortanswer • Objectivetype • Oral Presentation • Development ofresearchproposal • Assessment ofresearchProject

MIDWIFERY/OBSTETRICANDGYNECOLOGYNURSING-II includingSafeDeliveryAppModule

PLACEMENT:VIISEMESTER

THEORY:3Credits(60hours)

PRACTICUM: SkillLab:1Credit(40Hours)Clinical:4Credits(320Hours)

DESCRIPTION: This course is designed for students to develop knowledge and competencies on the concepts andprinciples of obstetric and gynecology nursing. It helps them to acquire knowledge and skills in rendering respectfulmaternity care to high risk woman during antenatal, natal and postnatal periods in hospitals and community settings and helpto develop skills in initial management and referral of high risk neonates. It would also help students to gain knowledge,attitudeandskillsin caringforwomen with gynecologicaldisorders.

COMPETENCIES: Oncompletionofthecourse,thestudentswillbeableto:

1. Describetheassessment,initialmanagement,referralandrespectfulmaternitycareofwomenwithhighriskpregnancy.
2. Demonstratecompetencyinidentifyingdeviationfromnormalpregnancy.
3. Describetheassessment,initialmanagement,referralandnursingcareofwomenwithhighrisklabour.
4. Assistintheconductionofabnormalvaginaldeliveriesandcaesareansection.
5. Describetheassessment,initialmanagement,referralandnursingcareofwomenwithabnormalpostnatalconditions.
6. Demonstratecompetencyintheinitialmanagementofcomplicationsduringthepostnatalperiod.
7. Demonstratecompetencyinprovidingcareforhighrisknewborn.
8. Applynursingprocessincaringforhighriskwomenandtheirfamilies.
9. Describetheassessmentandmanagementofwomenwithgynecologicaldisorders.

10. Demonstrateskillsinperformingandassistinginspecificgynecologicalprocedures.
11. Describethedrugsusedinobstetricsandgynecology.
12. Counselandcareforcoupleswithinfertility.
13. Describeartificialreproductivetechnology.

COURSEOUTLINE

T–Theory,SL/L–SkillLab,C–Clinical

	Unit Time	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
I	**(Hrs.)** 12(T) 10(L) 80(C)	Describe theassessment, initialmanagement, andreferral of womenwith problemsduringpregnancy Support womenwith complicatedpregnancy andfacilitatesafeandpositive birthingoutcome	**Recognition and Management ofproblemsduringPregnancy** • Assessmentofhigh-riskpregnancy **Problems/ComplicationsofPregnancy** •Hyper-emesisgravidarum, •Bleedinginearlypregnancy – abortion,ectopicpregnancy,vesicular mole •Unintendedormistimedpregnancy •Postabortioncare&counseling •Bleedinginlatepregnancyplacentapre via,abruptionplacenta,trauma •Medical conditions complicatingpregnancy – Anemia, PIH/Pre-eclampsia,Eclampsia,GDM,cardiacdisease, pulmonary disease,thyrotoxicosis, STDs, HIV, Rhincompatibility •Infectionsinpregnancy – urinarytractinfection, bacterial, viral, protozoal,fungal,malariainpregnancy •Surgicalconditionscomplicatingpregnancy – appendicitis, acuteabdomen •COVID-19&pregnancy andchildren •Hydramnios •Multiplepregnancy •Abnormalitiesofplacentaandcord •Intrauterinegrowthrestriction •Intrauterinefetaldeath •Gynaecologicalconditionscomplicatingpregnancy •Mentalhealthissuesduringpregnancy •Adolescentpregnancy •Elderlyprimi,grandmultiparity •Managementandcareof conditionsaspertheGoIprotocol •Policyforthereferralservices	• Lecture • Discussion • Demonstration • Video&films • Scanreports • Casediscussion • Casepresentation • Drugpresentation • Healthtalk • Simulation • Roleplay • SupervisedClinical practice • WHO midwiferytoolkit • GoI guideline – screening forhypothyroidism,screeningforsyphilis,deworming duringpregnancy, diagnosisand management ofGDM	• Essay • Shortanswer • Objectivetype • Assessment ofskills withchecklist • OSCE

Unit	Time (Hrs.)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			• Drugsusedinmanagementofhigh-riskpregnancies • Maintenanceof recordsandreports		
II	20(T) 15(L) 80(C)	Identify,provide initialmanagement and refer womenwith problemsduring labourwithinthescopeofmidwiferypractice.	**Recognitionandmanagementof abnormallabour** •Preterm labour – Prevention andmanagement of preterm labour; (Use ofantenatal corticosteroids in pretermlabour) •Prematureruptureofmembranes •Malposition‘s and abnormalpresentations(posteriorposition ,breech,brow, face, shoulder) •ContractedPelvis,CephaloPelvicDisproportion(CPD) •Disorders of uterine action – Prolongedlabour,Precipitatelabour,Dysfunctionallabour •Complications of third stage – Retainedplacenta, Injuries to birth canal,Postpartum hemorrhage (bimanualcompression of the uterus, aorticcompression,uterineballoontamponade) •Obstetric emergencies – Foetal distress,Rupturedutterus,Cordprolapse,Shoulderdystocia, Uterine inversion, Vasa previa,Obstetrical shock, Amniotic fluidembolism •Episiotomyandsuturing •Obstetricprocedures – Forcepsdelivery,Vacuumdelivery,Version •Inductionoflabour–Medical&surgical •Caesareansection– indicationsandpreparation •Nursingmanagementofwomenundergoing •Obstetricoperationsandprocedures •Drugsusedinmanagementofabnormallabour	• Lecture • Discussion •Demonstration •Case discussion/presentation •Simulation •Roleplay •Drugpresentation •Supervisedclinicalpractice •WHOmidwiferytoolkit •GoI guidelines – useof uterotonics duringlabour, antenatalcorticosteroids •GoIguidancenoteonprevention andmanagementofPPH	• Essay • Shortanswer •Objectivetype •Assessmentofskills withchecklist •OSCE
III	9(T) 5(L) 40(C)	Describe theassessment, initialmanagement ,referralandnursing care ofwomen withabnormal postnatalconditions.	•Anesthesiaandanalgesiainobstetrics **RecognitionandManagementofpostnatalproblems** •Physicalexamination,identificationofdeviationfromnormal •Puerperalcomplicationsanditsmanagement ○ Puerperalpyrexia ○ Puerperalsepsis	•Lecture •Demonstration •Casediscussion/presentation •Drugpresentation •Supervisedclinicalpractice	•Quiz •Simulation •Shortanswer •OSCE

Unit	Time (Hrs.)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			○ Urinarycomplications ○ SecondaryPostpartumhemorrhage ○ Vulvalhematoma ○ Breast engorgement includingmastitis/breastabscess,feedingproblem ○ Thrombophlebitis ○ DVT ○ Uterinesubinvolution ○ Vesicovaginalfistula(VVF),Rectovaginalfistula(RVF) ○ Postpartumdepression/psychosis •Drugsusedinabnormalpuerperium •Policyaboutreferral		
IV	7(T) 5(L) 40(C)	Describehighriskneonates and theirnursingmanagement	**~~Assessment and management of High-~~ risk newborn(Review)** •ModelsofnewborncareinIndia–NBCC;SNCUs •Screeningofhigh-risknewborn •Protocols,levelsofneonatalcare,infectioncontrol •Prematurity,Post-maturity •Lowbirthweight •KangarooMotherCare •Birthasphyxia/Hypoxicencephalopathy •Neonatalsepsis •Hypothermia •Respiratorydistress •Jaundice •Neonatalinfections •Highfever •Convulsions •Neonataltetanus •Congenitalanomalies •Baby ofHIVpositivemothers •Baby ofRhnegative mothers •Birth injuries •SIDS(SuddenInfantDeathSyndrome)prevention, Compassionatecare •Calculationoffluidrequirements,EBM/formulafeeds/tubefeeding •Homebasednewborncareprogram-	•Lecture •Discussion •Demonstration •Simulation •Case discussion/presentation •Drugpresentation •SupervisedClinicalpractice •IntegratedManagement ofNeonatalChildhoodIllnesses(IMNCI)	•Shortanswer •Objectivetype •Assessmentofskills withchecklist •OSCE

Unit	Time (Hrs.)	Learning Outcomes	Content	Teaching/ LearningActivities	Assessment Methods
			community facility integration innewborncare • Decisionmakingaboutmanagementandreferral • Bereavementcounseling • Drugsusedforhighrisknewborns • Maintenanceof recordsandreports		
V	12(T) 5(L) 80(C)	Describethe assessment andmanagement ofwomen withgynecological disorders.	**Assessmentandmanagementofwomen withgynecologicaldisorders** • Gynecologicalassessment– HistoryandPhysicalassessment • BreastSelf-Examination • Congenitalabnormalitiesoffemalereproductivesystem • Etiology, pathophysiology, clinicalmanifestations, diagnosis, treatmentmodalitiesandmanagementof womenwith ○ Menstrualabnormalities ○ Abnormaluterinebleed ○ Pelvicinflammatorydisease ○ Infectionsofthereproductivetract ○ Uterinedisplacement ○ Endometriosis ○ Uterine and cervical fibroids andpolyps ○ Tumors – uterine, cervical, ovarian,vaginal,vulval ○ Cysts–ovarian,vulval ○ Cystocele,urethrocele,rectocele ○ Genitor-urinaryfistulas ○ Breast disorders – infections,deformities,cysts,tumors ○ HPVvaccination ○ DisordersofPubertyandmenopause ○ Hormonalreplacementtherapy • Assessmentandmanagementofcoupleswithinfertility ○ Infertility–definition,causes ○ Counselingtheinfertilecouple ○ Investigations– maleandfemale ○ Artificialreproductivetechnology ○ Surrogacy,spermandovumdonation,cryopreservation	• Lecture • Discussion • Demonstration • Casediscussion/presentation • Drugpresentation • Videos,films • Simulatedpractice • SupervisedClinicalpractice • Visittoinfertilityclinic and ARTcenters	• Essay • Shortanswer • Objectivetype • Assessment ofskills withchecklist • OSCE

Unit	Time (Hrs.)	Learning Outcomes	Content	Teaching/ LearningActiv	Assessment Methods
			• Adoption–counseling,procedures • InjuriesandTrauma;Sexualviolence • Drugsusedintreatmentofgy naecologicaldisorders		

Note: CompletesafedeliveryappduringVIISemester.

PRACTICUM

SKILLLAB&CLINICALAREGIVENUNDEROBGNURSING–I

LISTOFAPPENDICES

1. InternalAssessment:Distributionofmarks
2. InternalAssessmentguidelines
3. UniversityTheorypaperQuestionpatternandPracticalexamination

APPENDIX 1

INTERNALASSESSMENT:Distributionofmarks

ISEMESTER

S.No.	NameoftheCourse	Continuous Assessment	Sessional Exams – Theory/Practical	TotalInternalMarks
	Theory			
1	CommunicativeEnglish	10	15	25
2	AppliedAnatomy&AppliedPhysiology	10	15	25
3	AppliedSociology&AppliedPsychology	10	15	25
4	NursingFoundationI	10	15	25
	Practical			
5	NursingFoundationI	10	15	25

II SEMESTER

S.No.	Course	Continuous Assessment	Sessional Exams – Theory/Practical	TotalMarks
	Theory			
1	AppliedBiochemistryandAppliedNutrition&Dietetics	10	15	25
2	NursingFoundationIIincludingFirstAid I&II	10	15	25 I&II=25+25=50/2
3	Health/NursingInformatics&Technology	10	15	25
	Practical			
4	NursingFoundationII I&II	10	15	25 I&II=25+25=50

III SEMESTER

S.No.	Course	Continuous Assessment	Sessional Exams – Theory/Practical	TotalMarks
	Theory			
1	AppliedMicrobiologyandInfectionControlincludingSafety	10	15	25
2	PharmacologyIandPathologyI	10	15	25
3	Adult Health Nursing I with integratedpathophysiologyincludingBCL	10	15	25
	Practical			
4	AdultHealthNursingI	20	30	50

IV SEMESTER

S.No.	Course	Continuous Assessment	SessionalExams/ Practical	TotalMarks
	Theory			
1	PharmacologyII&PathologyII I&II	10	15	25 I&II=25+25=50/2
2	Adult Health Nursing II with integratedpathophysiologyincludingGeriatric	10	15	25
3	Professionalism,Professionalvalues&Ethicsincludingbioethics	10	15	25
	Practical			
4	AdultHealthNursingII	20	30	50

V SEMESTER

S.No.	Course	Continuous Assessment	Sessional Theory/Practical	TotalMarks
	Theory			
1	ChildHealthNursingI	10	15	25
2	MentalHealthNursingI	10	15	25
3	CommunityHealthNursingI	10	15	25
4	EducationalTechnology/Nursingeducation	10	15	25
5	IntroductiontoForensicNursingandIndianLaws	10	15	25
	Practical			
6	ChildHealthNursingI	10	15	25
7	MentalHealthNursingI	10	15	25
8	CommunityHealthNursingI	20	30	50

VI SEMESTER

S.No.	Course	Continuous Assessment	SessionalExams/ Practical	TotalMarks
	Theory			
1	ChildHealthNursingII I&II	10	15	25 I&II=25+25=50/2
2	MentalHealthNursingII I&II	10	15	25 I&II=25+25=50/2
3	NursingManagementandLeadership	10	15	25
4	Midwifery/ObstetricsandGynecologyI	10	15	25
	Practical			
5	ChildHealthNursingII I&II	10	15	25 I&II=25+25=50
6	MentalHealthNursingII I&II	10	15	25 I&II=25+25=50
7	Midwifery/Obstetrics and Gynecology (OBG)NursingI	10	15	25

VII SEMESTER

S.No.	Course	Continuous assessment	SessionalExams/ Practical	TotalMarks
	Theory			
1	CommunityHealthNursingII	10	15	25
2	NursingResearch&Statistics	10	15	25
3	Midwifery/Obstetrics and Gynecology (OBG)NursingII I&II	10	15	25 I&II =25+25=50/2
	Practical			
4	CommunityHealthNursingII	20	30	50
5	Midwifery/ObstetricsandGynecology(OBG)NursingII I&II	10	15	25 I&II =25+25=50

VIII SEMESTER(Internship)

S.No.	Course	Continuousperformance evaluation	OSCE	TotalMarks
1	Competencyassessment– 5specialties× 20marks	Eachspecialty–10 5×10=50 marks	Eachspecialty–10 5×10=50 marks	100

APPENDIX 2

INTERNALASSESSMENTGUIDELINEST

HEORY

I. CONTINUOUSASSESSMENT:10marks

1. Attendance–**2marks**(95-100%:2marks,90-94:1.5marks,85-89:1mark, 80-84:0.5mark,<80:0)
2. Writtenassignments(Two)–**10marks**
3. Seminar/microteaching/individualpresentation(Two)–**12marks**
4. Group project/work/report – **6**

marksTotal=30/3=10

Ifthereismandatorymodule inthatsemester,marksobtainedbystudentoutof10canbeaddedto30totaling40 marks

Total=40/4=10marks

II. SESSIONALEXAMINATIONS:15marks

Twosessionalexamspercourse

Exampattern:

MCQ–4×1=4

Essay–1×10=10

Short–2×5=10

VeryShort–3×2=6

30marks× 2=60/4 =15

PRACTICAL

I. CONTINUOUSASSESSMENT:10marks

1. Attendance–**2marks**(95-100%:2marks,90-94:1.5marks,85-89:1mark, 80-84:0.5mark,<80:0)
2. Clinicalassignments –**10marks**

   (Clinicalpresentation–3,drugpresentation&report–2,casestudy report–5)
3. Continuousevaluationofclinicalperformance–**10marks**
4. EndofpostingOSCE –**5marks**
5. Completion of procedures and clinical requirements – **3**

marksTotal=30/3 =10

II. SESSIONAL EXAMINATIONS: 15

marksExampattern:

OSCE–10marks(2-3hours)

DOP–20 marks(4-5hours)

{DOP–Directlyobservedpracticalintheclinicalsetting}

Total=30/2=15

Note: For Adult Health Nursing I, Adult Health Nursing II, Community Health Nursing I & Community Health Nursing II,the marks can be calculated as per weightage. Double the weightage as 20 marks for continuous assessment and 30 forsessionalexams.

COMPETENCYASSESSMENT:(VIIISEMESTER)

Internalassessment

Clinical performance evaluation – 10 × 5 specialty = 50

marksOSCE= 10 ×5specialty=50marks

Total=5specialty×20marks=100

APPENDIX 3

I. UNIVERSITYTHEORYQUESTIONPAPERPATTERN(For75marks)

1. **SectionA–37marksandSectionB–38marks**

   a. **AppliedAnatomy&AppliedPhysiology:**AppliedAnatomy–SectionAandAppliedPhysiology–SectionB,

   b. **AppliedSociology&AppliedPsychology:**AppliedSociology–SectionAandAppliedPsychology–SectionB

   c. **AppliedMicrobiology&InfectionControlincludingSafety:**AppliedMicrobiology–SectionAandInfectionControl including Safety– Section B

   SectionA(37marks)

   MCQ–6 ×1 =6

   Essay – 1×10=10

   Short–3×5=15

   Very Short – 3 × 2 = 6**Section B (38 marks)**MCQ– 7 ×1 =7

   Essay – 1×10=10

   Short–3×5=15

   VeryShort –3×2=6

2. **SectionA–25marksandSectionB–50marks**

   AppliedBiochemistry&Nutrition&Dietetics: AppliedBiochemistry–SectionAandAppliedNutrition&Dietetics–Section B

   SectionA(25marks)

   MCQ–4 ×1 =4

   Short–3×5=15

   Very Short – 3 × 2 = 6**Section B (50 marks)**MCQ– 8 ×1 =8

   Essay/situationtype– 1×10=10

   Short–4×5=20

   VeryShort –6×2=12

3. **SectionA–38marks,SectionB–25marksandSectionC–12marks**

   Pharmacology,PathologyandGenetics: Pharmacology–SectionA,Pathology–SectionBandGenetics–SectionC

   SectionA(38marks)

   MCQ–7 ×1 =7

   Essay – 1×10=10

   Short–3×5=15

Very Short – 3 × 2 = 6**Section B (25 marks)**MCQ– 4 ×1 =4

Short–3×5=15

Very Short – 3 × 2 = 6**Section C (12 marks)**MCQ– 3 ×1 =3

Short–1×5=5

VeryShort –2×2=4

4. **SectionA–55marksandSectionB–20marks**

   ResearchandStatistics: Research–SectionAandStatistics–SectionB

   SectionA(55marks)

   MCQ–9 ×1 =9

   Essay/situationtype– 2×15=30

   Short–2×5=10

   Very Short – 3 × 2 = 6**Section B (20 marks)**MCQ– 4 ×1 =4

   Short–2×5=10

   VeryShort –3×2=6

5. **Marks75(Forallotheruniversityexamswith75marks)**

   MCQ–12 ×1=12

   Essay/situationtype– 2×15=30

   Short–5×5=25

   VeryShort –4×2=8

6. **CollegeExam(EndofSemester)–50marks(50/2=25marks)**

   MCQ–8 ×1 =8

   Essay/situationtype– 1×10=10

   Short–4×5=20

   VeryShort –6×2=12

II. UNIVERSITY PRACTICAL EXAMINATION – 50 marksOSCE– 15 marks

DOP –35marks

III. COMPETENCYASSESSMENT–UniversityExam(VIIISEMESTER)

IntegratedOSCEincludingall5specialties(Stationsbasedonevery specialty)=5specialty 5×20=100marks

Totalof5Examiners: external–2andinternal–3(Onefromeachspecialty)

Internalexaminersmaybechosenfromcollegefacultywithrequiredqualificationorfromhospitalwithrequiredqualification.

Clinical Logbook for B.Sc. Nursing

Program(ProceduralCompetencies/Skills)

I&IISEMESTER

S.No.	ProceduralCompetencies/Skills	Performsin dependently	Assists/ Observes procedures A/O	DATE		Signature of theTutor/Faculty
				Skill Lab/SimulationLab	Clinical Area	
	ISEMESTER					
I	**CommunicationandDocumentation**					
1	MaintainingCommunicationandinterpersonal relationship withpatientand families					
2	VerbalReport					
3	Recording/Documentationofpatientcare(WrittenReport)					
II	**MonitoringVitalSigns**					
	Temperature					
4	OralAxillary					
5	RectalTymp					
6	anic*Pulse*					
7	RadialApic					
	al*Respirati*					
8	*on*					
9	*BloodPressure*					
10	**Hot&ColdApplication**					
11	Cold					
III	CompressHot					
12	CompressIceC					
13	ap					
14	Tepidsponge					
15						
IV	**HealthAssessment(Basic–Firstyearlevel)**					
16	HealthHistory					
17	Physical Assessment – General &systemwise					
18	Documentationoffindings					
V	**InfectionControlinClinicalSettings**					

S.No.	ProceduralCompetencies/Skills	Performsindependently	Assists/ Observes	DATE		Signature of theTutor/Faculty
		Transferringpatientfrom&to			SkillLab/ SimulationLab	
19	Handhygiene(Handwashing&Handrub)					
20	Use of personal and protectiveequipment					
VI	**Comfort**Ope					
21	n					
22	BedOccupied					
23	Bed					
24	Post-operative					
25	BedSupine					
26	PositionFowler‘s					
27	PositionLateral					
28	PositionPronePosit					
29	ion					
30	Semi Prone					
31	PositionTrendelenburg					
32	PositionLithotomyPosition					
33	ChangingPositionofhelplesspatient					
34	(Moving/Turning/Logrolling)					
35	Cardiac table/Over-bed					
VII	tableBackRest					
36	BedCradle					
37	Pain Assessment (Initial &Reassessment)					
38	**Safety**					
VIII	Siderail					
39	Restraint(Physical)					
40	Fallriskassessment&postfallassessment					
41	**Admission&Discharge**					
IX	Admission					
42	Discharge					
43	Transfer(withinhospital)					
	Mobility					
	Ambulation					

procedure

s A/O

Clinical Area

S.No.	ProceduralCompetencies/Skills	Performsindependently	Assists/ Observes	DATE		Signature of theTutor/Faculty
		chartIntra Venous Infusion			SkillLab/ SimulationLab	
		PlanElimination				
	bed&wheelchair					
44	Transferringpatientfrom&tobed& stretcher					
45	RangeofMotionExercises(ROM)					
X	**PatientEducation**					
46	IndividualPatientTeaching					
XI	**Hygiene**					
47	Sponge bath/Bed					
48	bathPressureInjuryAssessmen					
49	t					
50	Skincareandcareofpressurepoints					
51	Oral					
52	hygieneHair					
53	wash					
54	Pediculosis					
XII	treatmentPerineal					
55	Care/Meatal careUrinary					
56	Catheter					
57	care**NursingProcess-**					
58	**Basiclevel** Assessmentandformulatingn					
XIII	ursingdiagnosis					
59	Planning the nursing					
60	CareImplementation ofCare					
61	EvaluationofCare(Reassessment &Modification)					
62	**Nutrition & Fluid**					
63	**Balance**24 Hours Dietary					
64	RecallPlanningWellbalance					
65	ddietMakingfluid plan					
XIV	Preparationofnasogastrictubefeed					
	Nasogastric tube feedingMaintainingintake&output					

IISEMESTER

Proceduresa/o

Clinical Area

S.No.	ProceduralCompetencies/Skills	Performsin dependently	Assists/ Observes procedures A/O	DATE		Signature of theTutor/Faculty
				SkillLab/ Simulation Lab	Clinical Area	
66	Providing					
67	BedpanProviding					
68	UrinalEnema					
69	BowelWash					
XV	**DiagnosticTests-Specimencollection**					
70	UrineSpecimenforRoutineAnalysis					
71	Urine Specimen for					
72	CultureTimed urine specimen					
73	collectionFeces specimen for					
74	routineSputumCulture					
	Urine					
75	***Testing***Ketone					
76	AlbuminReacti					
77	onSpecificGravi					
78	ty					
XVI	**OxygenationNeeds/PromotingRespiration**					
79	DeepBreathing&CoughingExercises					
80	Steaminhalation					
81	Oxygenadministrationusingfacemask					
82	Oxygenadministrationusingnasalprongs					
XVII	**Medication**					
83	**Administration**Oral					
84	MedicationsIntramuscular					
85	SubcutaneousRectal					
86	Suppositories**Death**					
XVIII	**andDying**					
87**XI**	Deathcare/LastOffice					
X	**FirstAidandEmergenciesB**					
88	**andages & Binders**Circular					

S.No.	ProceduralCompetencies/Skills	Performs independently	Assists/Observesprocedures A/O	DATE		Signature of theTutor/Facul
				Skill Lab/SimulationLab	Clinical Area	
89	Spiral					
90	ReverseSpiral					
91	Recurrent					
92	Spica					
93	Figureofeight					
94	Eye					
95	Ear					
96	Caplin					
97	Jaw					
98	ArmSling					
99	AbdominalBinder					
100	BasicCPR(firstaidmodule)					

III&IVSEMESTER

S.No.	Specific ProceduralCompete	Performs independently	Assists/ Observes Procedures A/O	DATE		Signatureofthe Tutor/ Faculty
				SkillLab/SimulationLab	Clinical Area	
IIISEMESTER						
I	**MEDICAL**					
	Intravenoustherapy					
1	IVcannulation					
2	IVmaintenance&monitoring					
3	AdministrationofIVmedication					
4	CareofpatientwithCentralLine					
	Preparation,assisting,andaftercareofpatientsundergoingdiagnosticprocedures					
5	Thoracentesis					
6	Abdominalparacentesis					
	Respiratorytherapiesandmonitoring					
7	Administrationofoxygenusingventuri mask					
8	Nebulization					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
9	Chestphysiotherapy					
10	Posturaldrainage					
11	Oropharyngealsuctioning					
12	Careofpatientwithchestdrainage					
	Planningtherapeuticdiet					
13	Highproteindiet					
14	Diabeticdiet					
15	Performingandmonitoring GRBS					
16	Insulinadministration					
II	**SURGICAL**					
17	Pre-Operativecare					
18	ImmediatePost-operativecare					
19	Post-operativeexercise					
20	Painassessmentandmanagement					
	Assistingdiagnosticproceduresandaftercareofpatientsundergoing					
21	Colonoscopy					
22	ERCP					
23	EndoscopyL					
24	iverBiopsy					
25	Nasogastric					
26	aspirationGastrostomy/Jejunost					
27	omy feedsIleostomy/Colostomy					
28	careSurgicaldressing					
29	Sutureremoval					
30	Surgical					
31	soakSitzbath					
32	Careofdrain					
III	**CARDIOLOGY**					
33	Cardiacmonitoring					
34	Recording and interpreting					
35	ECGArterialbloodgasanalysis–					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
	interpretation					
36	Administrationofcardiacdrugs					
37	Preparation and after care ofpatientsundergoingcardiac Catheterization					
38	PerformingBCLS					
	Collectionofbloodsamplefor					
39	Bloodgrouping/crossmatching					
40	Bloodsugar					
41	Serumelectrolytes					
42	Assistingwithbloodtransfusion					
43	Assistingforbonemarrowaspiration					
44	Application of antiembolismstockings(TED hose)					
45	Application/maintenanceof sequentialCompression Device					
IV	**DERMATOLOGY**					
46	Applicationoftopicalmedication					
47	Intradermalinjection-Skinallergytesting					
48	Medicatedbath					
V	**COMMUNICABLE**					
49	Intradermal injection-BCG andTuberculin skin Test or Mantouxtest					
50	Barriernursing&Reversebarriernursing					
51	Standard precautions-Handhygiene,useofPPE,needlestickand sharp injury prevention,Cleaning and disinfection,Respiratory hygiene, wastedisposal and safe injectionpractices					
VI	**MUSCULOSKELETAL**					
52	Preparationofpatientwith Myelogram/CT/MRI					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
53	Assistingwithapplication&removalof POP/Cast					
54	Preparation,assistingandaftercare of patient with Skintraction/skeletal traction					
55	Careoforthotics					
56	Muscle strengthening					
57	exercisesCrutchwalking					
58	Rehabilitation					
VII	**OR**					
59	PositionanddrapingPreparation					
60	of operation					
61	tableSetupoftrolleywithinstrume					
62	nt Assistinginmajorandminorop					
63	eration Disinfection and sterilization					
64	ofequipment Scrubbing procedures –					
65	Gowning,maskingandgloving					
	Intraoperativemonitoring	**IVSEMESTER**				
I						
1	**ENT** History taking and					
2	examinationofear, nose& throat ApplicationofbandagestoEar					
3	& Nose					
	Tracheostomycare					
	Preparationofpatient,assistingandmonitoringofpatientsundergoingdiagnosticprocedures					
4	Auditoryscreeningtests					
5 6	**Audiometrictests** Preparing and assisting in specialprocedures like Anterior/posteriornasal packing,					
7	Ear Packing andSyringing Preparation and after care ofpatientsundergoingENTsurgicalprocedures					
8	Instillationofear/nasal					

S.No.	Specific ProceduralCompetencies/ Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				SkillLab/SimulationLab	Clinical Area	
	medication					
II	**EYE**					
9	Historytakingand examination of eyes andinterpretation					
	Assisting					
10	*procedures*Visual					
11	acuityFundoscopy/retinos					
12	copy/ Ophthalmoscopy/tonometry					
13	Refractiontests					
14	Pre and postoperative care ofpatientundergoingeyesurgery					
15	Instillation of					
16	eyedrops/medication					
17	Eyeirrigation					
III	Applicationofeyebandage					
18	Assisting with foreign bodyremoval **NEPHROLOGY&UROLOGY** Assessment of kidney and urinarysystem •Historytakingandphysicalexamination					
	•Assisting with Testicularself-examination					
	•Digitalrectalexam					
	Preparationandassistingwithdiagnosticandtherapeuticprocedures					
19	Cystoscopy,Cystometrogram					
20	Contraststudies–IVP					
21	Peritonealdialysis					
22	Hemodialysis					
23	Lithotripsy					
24	Renal/ProstateBiopsy					
25	Specific tests –					
26	Semen analysis,gonorrheatest					
27	Urinary Catheterization&care					
28	Bladderirrigation					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
28	Intake and output recording andmonitoring					
29	Ambulationandexercise					
IV	**BURNS&RECONSTRUCTIVESURGERY**					
30	Assessment of burns wound					
31	Firstaidofburns					
32	Fluid&electrolytereplacementtherapy					
33	Skincare					
34	CareofBurnwounds					
35	○ Bathing ○ Dressing Pre-operative and post-operativecareofpatientwith burns					
36	Caringofskingraftandpostcosmeticsurgery					
37	Rehabilitation					
V	**NEUROLOGY**					
38	NeurologicalExamination–ex. UseofGlasgowcomascale					
39	Continuous monitoring					
40	Preparation and assisting forvarious invasive and non-invasivediagnosticprocedures					
41	Careofpatientundergoingneurosurgery includingrehabilitation					
VI	**IMMUNOLOGY**					
42	HistorytakingandPhysicalexamination					
43	Immunological status assessmentand interpretation of specific test(e.g.HIV)					
44	Careofpatientwithlowimmunity					
VII	**ONCOLOGY**					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
45	History taking & physicalexaminationofcancerpatients					
46	Screening for common cancers – TNMclassification					
	Preparation,assistingandaftercarepatientsundergoingdiagnosticprocedures					
47	Biopsies/FNAC					
48	Bone-marrowaspiration					
	Preparationofpatientsandassistingwithvariousmodalitiesoftreatment					
49	Chemotherapy					
50	Radiotherapy					
51	Hormonal					
52	therapy/Immunotherapy					
53	Genetherapy/anyother					
54	Care of patients treated withnuclear medicine					
VIII	Rehabilitation					
55	**EMERGENCY**					
56	Practicing_triage‘					
57	Primary and secondary survey inemergency					
58	Examination, investigations &their interpretations, inemergency&disastersituations					
59	Emergency care of medical andtraumaticinjury patients					
60	Documentation,andassistinginlegal procedures in emergencyunit					
61	Managingcrowd					
IX	Counseling the patient and familyin dealing with grieving &bereavement					
62	**CRITICALCARE**					
63	Assessment of critically illpatients					
64	Assistingwitharterialpuncture					
	Assisting with ET tube intubation&extubation					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
65	ABGanalysisandinterpretation – respiratoryacidosis,respiratoryalkalosis, metabolic acidosis,metabolicalkalosis					
66	Setting up of ventilator modesandsettingsandcareofpatientonventilator					
67	Settingupoftrolleywithin struments					
68	MonitoringandmaintenanceofChestdrainage system					
69	Bagandmaskventilation					
70	Assisting with starting andmaintenanceofCentralandperipherallinesinvasive					
71	Settingupofinfusionpump,anddefibrillator					
72	Administration of drugs viainfusion,intracardiac,intrathecal,epidural					
73	Monitoringandmaintenanceofpacemaker					
74	ICUcarebundle					
75	ManagementofthedyingpatientintheICU					
X	**Geriatric**					
76	HistorytakingandAssessmentofGeriatricpatient					
77	Geriatriccounseling					
78	Comprehensive Healthassessment(adult)aftermodulecompletion					
	V & VI SEMESTER – CHILD HEALTH NURSING I & III PEDIATRICMEDICAL & SURGICAL					
	Healthassessment–Takinghistory &Physicalexaminationandnutritionalassessmentof					
1	Neonate					
2	Infant					
3	Toddler					
4	Preschooler					
5	Schooler					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
6	Adolescent					
	Administrationofmedication/fluids–Calculation,preparationandadministrationofmedication					
7	Oral					
8	I/M					
9	I/V					
10	Intradermal					
11	Subcutaneous					
12	Calculationoffluidrequirements					
13	Preparation of different strengthsofI/V fluids					
14	AdministrationofIVfluids					
15	Applicationofrestraints					
	Administration of O_2 inhalationbydifferentmethods					
16	NasalCatheter/NasalProng					
17	Mask					
18	Oxygenhood					
19	Babybath/spongebath					
20	Feeding children by Katori&spoon/paladai, cup					
	Collectionofspecimensforcommoninvestigations					
21	Urine					
22	Stool					
23	Blood					
24	Assistingwithcommond iagnosticprocedures					
	(Lumbarpuncture,bonemarrowa spiration) *Healtheducationtomothers/parents–Topics*					
25	Prevention and management ofMalnutrition					
26	Prevention and management ofdiarrhea (Oral rehydrationtherapy)					
27	Feeding&Complementaryf eeding					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
28	Immunization					
29	schedulePlay therapy					
30	Conductindividualandgroupplay therapysessions					
31	Preventionofaccidents					
32	Bowelwash					
33	Administrationofsuppositories					
	Careforostomies:					
34	Colostomy					
35	IrrigationUreterosto					
36	myGastrostomyEnte					
37	rostomy					
38	Urinarycatheterization&drainage					
	*Feeding*Nas					
39	o-					
40	gastricGastr					
41	ostomyJejun					
	ostomy					
42	*Careofsurgicalwounds*					
43	DressingSuture					
II	removal					
	PEDIATRICOPD/IMMUNIZATIONROOM					
44	*GrowthandDevelopmentalassessmentofchildren*					
45	InfantToddl					
46	erPreschool					
47	erSchooler					
48	Adolescent					
49	Administrationofvaccination					
50	Health/Nutritional					
III	education**NICCU/PICU**					
51	Assessmentofnewborn					
52	Careofpreterm/LBWnewborn					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
53	Kangaroocare					
54	Neonatalresuscitation					
55	Assistinginneonataldiagnosticprocedures					
56	Feeding of high risk newborn – EBM(spoon/paladai)					
57	Insertion/removal/feeding– Naso/oro-gastrictube					
58	Administrationofmedication– oral/parenteral					
59	Neonataldrugcalculation					
60	Assistinginexchangetransfusion					
61	Organizingdifferentlevelsofneonatalcare					
62	Careofachildonventilator/CPAP					
63	EndotrachealSuction					
64	ChestPhysiotherapy					
65	Administrationoffluidswithinfusionpumps					
66	TotalParenteralNutrition					
67	Recording&reporting					
68	CardiopulmonaryResuscitation–PLS					
	V & VI SEMESTER – MENTAL HEALTH NURSING I & IIPSCHIATRY OPD					
1	Historytaking					
2	Mentalstatusexamination(MSE)					
3	Psychometric assessment(Observe/practice)					
4	Neurologicalexamination					
5	Observing & assisting intherapies					
	Individualandgrouppsychoeducation					
6	Mentalhygienepracticeeducation					
7	Familypsycho-education					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Are	
	CHILDGUIDANCECLINIC					
8	History Taking & mental statusexamination					
9	Psychometricassessment (Observe/practice)					
10	Observingandassistinginvariousthe rapies					
11	Parentalteachingforchildwithmentaldeficiency					
	IN-PATIENTWARD					
12	Historytaking					
13	Mentalstatusexamination(MSE)					
14	Neurologicalexamination					
15	Assistinginpsychometricassessment					
16	Recording therapeuticcommunication					
17	Administrationofmedications					
18	AssistinginElectro-convulsiveTherapy (ECT)					
19	Participationinalltherapies					
20	Preparation of patients forActivitiesofDailyliving(ADL)					
21	Conductingadmissionandd ischargecounseling					
22	Counselingandteachingpatientsandfamilies					
	COMMUNITYPSYCHIATRY&DEADDICTIONCENTRE					
23	Conducting home visit and casework					
24	Identification of individuals withmentalhealthproblems					
25	Assistinginorganizationsof MentalHealthcamp					
26	Conducting awareness meetingsfor mental health & mentalillness					
27	CounselingandTeachingfamily members, patients andcommunity					
28	Observationofdeaddictioncare					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				SkillLab/SimulationLab	Clinical Area	
	V SEMESTER – COMMUNITY HEALTH NURSING IINCLUDINGENVIRONMENTALSCIENCE&EPIDEMIOLOGY					
1	Interviewing skills (usingcommunication and					
2	interpersonalskills) Conducting community needsassessment/survey					
3	Observationskills					
4	Nutritionalassessmentskills					
5	Teaching individuals and familieson nutrition-food hygiene					
6	andsafety,healthylifestyleandhealthpromotion BCC (Behaviour changecommunication)s					
7	kills Health assessment					
8	includingnutritional assessment-differentagegroups • Childrenunder five • Adolescent • Woman Investigating an epidemic –					
9	Communityhealthsurvey Performing lab tests –					
10	Hemoglobin, blood sugar, bloodsmearformalaria,etc. Screening, diagnosis and					
	primarymanagement of common healthproblems in the community andreferral of high-risk clients(Communicable &NCD)					
11	Documentationskills					
12	Homevisit					
13	Participationinnationalhealthprograms					
14	Participationinschoolhealthprograms					
	VSEMESTER–EDUCATIONALTECHNOLOGY/NURSINGEDUCATION					
1	Writinglearningoutcomes					
2	Preparationoflessonplan					
3	PracticeTeaching/Microteaching					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
4	Preparation of teaching aids/media					
	Preparationofassessmenttools					
5	ConstructionofMCQtests					
6	Preparationofobservationchecklist					
VISEMESTER–NURSINGMANAGEMENT&LEADERSHIP						
	HospitalandNursingServiceDepartment					
1	Preparation of organogram(hospital/nursing department)					
2	Calculation of staffingrequirements for a nursingunit/ward					
3	Formulation of Job description ofnursingofficer (staff nurse)					
4	PreparationofPatientassignmentplan					
5	Preparation of duty roster forstaff/studentsatdifferentlevels					
6	Preparation of logbook/MMF forspecificequipment/ materials					
7	ParticipationinInventorycontrolanddailyrecord keeping					
8	Preparation and maintenance ofrecords & reports such asincident reports/adversereports/auditreports					
9	Participation in performanceappraisal/evaluationofnursingstaff					
10	Participate in conducting in-serviceeducationforthestaff					
	College&Hostel					
11	Preparation of organogram ofcollege					
12	Formulationofjobdescriptionfor tutor					
13	Participationinperformanceappraisalof tutor					
14	PreparationofMasterplan,time-tableand clinicalrotation					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
15	Preparationofstudentanecdotes					
16	Participation in clinicalevaluationofstudents					
17	Participation in planning andconducting practical examinationOSCE– endof posting					
	VI&VIISEMESTER–MIDWIFERY/OBSTETRICSANDGYNECOLOGY(OBG)NURSINGI&III ANTENATALCARE					
	Healthassessmentof antenatalwoman					
1	History Taking includingobstetrical score, Calculation ofEDD, gestationalage					
2	Physicalexamination:headtofoot					
3	Obstetrical examination includingLeopards maneuvers &auscultation of Fetal heart sound(fetoscope/stethoscope/Doppler)					
	Diagnostictests					
4	Urinepregnancytest/cardtest					
5	EstimationofhemoglobinusingSahle‘shemoglobinometer					
6	Advice/assistinHIV/HBsAg/ VDRLtesting					
7	Preparationofperipheralsmearfor malaria					
8	Urinetestingforalbuminandsugar					
9	PreparationofmotherforUSG					
10	Kickchart/DFMC(DailyFetalandMaternalChart)					
11	Preparation and recording ofCTG/NST					
12	Antenatal counseling for eachtrimester including birthpreparednessandcomplicationreadiness					
13	Childbirth preparation classes forcouples/family					
14	AdministrationofTd/TT					
15	Prescription of iron & folic acidandcalciumtablets					

S.No.	Specific ProceduralCompetencies/ Skills	ng	Performs independently	Assists/Observes Procedures		D A E
				A/O	Skill Lab/ Simulation Lab	ClinicalArea
II	INTRANATALCARE					
16	Identification and assessment ofwomanin labour					
17	AdmissionofwomaninlabourPe					
18	rforming/assistingCTG					
19	Vaginalexaminationduringl abour including Clinicalpelvimetry					
20	Plotting and interpretation ofpartograph					
21	Preparationforbirthing/delivery – physicalandpsychological					
22	Setting up of the birthingroom/delivery unit					
23	andnewborncorner/carea rea					
24	Pain management during labour-non-pharmacological					
25	Supportingnormalbirths/conductn ormal childbirth in					
26	uprightpositions/evidencebased					
27	Essential newborn careBasicnewbornresuscitat ion					
28	Management of third stage					
29	oflabour – Physiologicmanagement/active management(AMTSL)					
30	Examinationofplacenta					
31	Careduringfourthstageofla bour					
III	Initiationofbreastfeedingandla ctation management					
32	Infectionpreventionduringl					
33	abourandnewborncare					
34	POSTNATALCARE					
35	PostnatalassessmentandcareP erineal/episiotomy careBreastcare Postnatal counseling-diet,exercise&breastfeedi					

Signature of the Tutor / Faculty

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
36	Preparationfor discharge					
IV	**NEWBORNCARE**					
37	Assessmentofnewborn					
38	Weighingofnewborn					
39	AdministrationofVitaminK					
40	Neonatal immunization – AdministrationofBCG,HepatitisB vaccine					
41	Identification of minor disordersofnewborn andtheirmanagement					
CAREOFWOMENWITHANTENATAL,INTRANATAL&POSTNATALCOMPLICATIONS						
42	High risk assessment – identification of antenatalcomplications such as pre-eclampsia, anemia, GDM,Antepartumhemorrhageetc.					
43	Postabortioncare&counseling					
44	Glucose challenge test/GlucoseTolerancetest					
45	Identification of fetal distress andits management					
46	AdministrationofMgSo4					
47	Administration of antenatalcorticosteroidsforpretermlabour					
48	AssistingwithMedicalinductionoflabour					
49	Assist in Surgical induction – stripping and artificial rupture ofmembranes					
50	Episiotomy(onlyifrequired)andrepair					
51	Preparation for emergency/electivecaesareansection					
52	Assistingincaesareansection					
53	Preparation of mother and assistinvacuumdelivery					
54	Identification and assisting inmanagementofmalpresentationandmalpositionduringlabour					
55	Preparationandassistinginlow					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
	forcepsoperation					
56	Preparation and assisting inemergencyobstetricsurgeries					
57	Prescription/administration offluids and electrolytes throughintravenousroute					
	Assistinginprocedures					
58	Assisting in Manual removal oftheplacenta					
59	Assisting in Bimanualcompressionofuterus /Balloontamponadeforatonicuterus					
60	AssistinginAorticcompressionfor PPH					
61	Identification and first aidmanagementofPPH&obstetricshock					
62	Assistinginmanagementofobstetricshock					
63	Identification and assisting inmanagement of puerperal sepsisandadministrationofantibiotics					
64	Management of breastengorgementandinfections					
65	Managementofthrombophlebitis					
	HIGHRISKNEWBORN(Someaspectsofhighrisknewborncareareincludedin ChildHealthNursing)					
66	Identification of high-risknewborn					
67	Care of neonate under radiantwarmer					
68	Careofneonateonphototherapy					
69	Referralandtransportationofhighrisknewborn					
70	Parental counselling – sickneonateandneonatallos s					
	FAMILYWELFARE					
71	PostpartumFamilyplanningcounseling					
72	Postpartum family planning – Insertion and removal ofPPIUCD/PAIUCD					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
73	CounsellingofthewomanforP					
	ostpartumsterilization					
74	Preparationandassistingint					
	ubectomy					
	OTHERPROCEDURES					
75	PreparationandassistingforD					
	&C/D&Eoperations					
76	Observation/AssistinginManual					
	VacuumAspiration					
77	Assessmentofwomenwithg					
	ynaecological disorders					
78	Assisting/performingPapsmear					
79	PerformingVisualinspectionofc					
	ervixwith aceticacid					
80	Assisting/observationofcervicalp					
	unch biopsy/Cystoscopy/Cryosurgery					
81	Assistingingynecologicals					
	urgeries					
82	Postoperativecareofwomanw					
	ithgynecologicalsurgeries					
83	CounselonBreastself-					
	examination					
84	Counselingcoupleswithi					
	nfertility					
85	Completionofsafedeliveryappwi					
	thcertification					
VIISEMESTER–COMMUNITYHEALTHNURSINGII						
1	Screening, diagnosing,management					
	and referral ofclients with commonconditions/emergencies					
2	Antenatalandpostnatalcareatho					
	meand healthcentre					
3	Conductionofnormalchildbirth					
	&newborncare athealth centre					
4	Tracking every pregnancy					
	andfillingup MCPcard					
5	Maintenanceofrecords/r					
	egisters/reports					
6	Adolescent counseling					
	&participationinyouthfriendl					
	y					

S.No.	Specific ProceduralCompetencies/Skills	Performsindependently	Assists/ObservesProcedures A/O	DATE		Signature of theTutor/ Faculty
				Skill Lab/Simulation Lab	Clinical Area	
	services					
7	Counselingforsafeabortionsservices					
8	Familyplanningcounseling					
9	Distribution of temporarycontraceptives – condoms,OCP‘s, emergencycontraceptives,InjectableMPA					
10	InsertionofintervalIUCD					
11	Removalof IUCD					
12	Participation in conductingvasectomy/tubectomycamp					
13	Screening, diagnosis, primarymanagement and referral ofclientswithoccupationalhealthproblems					
14	Healthassessmentofelderly					
15	MentalHealthscreening					
16	Participation in communitydiagnosis–datamanagement					
17	Writinghealthcentreactivityreport					
18	Participationinorganizingandconductingclinic/healthcamp					
19	Participationindisastermockdrills					
20	Co-ordinating with ASHAs andothercommunityhealthworkers					
	VIISEMESTER–NURSINGRESEARCH&STATISTICS					
	ResearchProcessExercise					
1	Statementof theproblem					
2	FormulationofObjectives&Hypotheses					
3	Literaturereviewofresearchreport/article					
4	Annotatedbibliography					
5	Preparationofsampleresearchtool					
	Analysis&Interpretationofdata –Descriptivestatistics					

S.No.	Specific ProceduralCompete	Performs independently	Assists/ Observes Procedures A/O	DATE		Signatureofthe Tutor/ Faculty
				SkillLab/SimulationLab	Clinical Area	
6	Organizationofdata					
7	Tabulationofdata					
8	Graphicrepresentationofdata					
9	Tabularpresentationofdata					
10	Research Project(Group/Individual)					
VIIISEMESTER(INTERNSHIP)						

Note: Maximum of 30% of all skills/procedures can be performed by students in skill lab/simulation lab for allclinical nursing Courses except Community Health Nursing and Mental Health Nursing in which the percentageallowedisonly 10%

*–Whenthestudentisfoundcompetenttoperformtheskill,itwillbesignedby thefaculty/tutor.

Students: Students are expected to perform the listed skills/competencies many times until they reach level 3 competency,afterwhichthe preceptor signsagainst eachcompetency.

Preceptors/faculty: Mustensurethatthesignatureisgivenforeachcompetency onlyaftertheyreachlevel3.

- Level3competencydenotesthatthestudentisabletoperformthatcompetencywithoutsupervision
- Level2Competencydenotesthatthestudentisabletoperformeachcompetencywithsupervision
- Level1competencydenotesthatthestudentisnotabletoperformthatcompetency/skillevenwithsupervision

SignatureoftheFacultyCoordinator **SignatureoftheHOD/Principal**

CLINICALREQUIREMENTS

S.No.	ClinicalRequirement	Date	Signature of theFaculty
I&IISEMESTER			
	NURSINGFOUNDATIONI&II		
1	History Taking – 21. 2.		
2	Physical Examination – 21. 2.		
3	Fallriskassessment –2		

S.No.	ClinicalRequirement	Date	Signature of theFaculty
	1. 2.		
4	Pressure Sore Assessment – 21. 2.		
5	Nursing Process – 21. 2.		
6	Completionoffirstaidmodule		
7	CompletionofHealthassessmentmodule		
III	**SEMESTER–ADULTHEALTHNURSINGI**		
	Medical		
1	CareStudy –1		
2	Healtheducation–1		
3	Clinicalpresentation/carenote–1		
	Surgical		
4	Carestudy–1		
5	Healtheducation–1		
6	ClinicalPresentation/Carenote –1		
	Cardiac		
7	Cardiacassessment –1		
8	Drugpresentation –1		
	Communicable		
9	Clinicalpresentation/Carenote –1		
	Musculoskeletal		
10	Clinicalpresentation/Carenote –1		
	OR		
11	Assist as circulatory nurse – 5i. ii.i ii.i v. v.		
12	Assist as scrub nurse in minor surgeries – 5i. ii.		

S.No.	ClinicalRequirement	Date	Signature of theFaculty
	iii. iv. v.		
13	Positioning & draping – 5i. ii.i ii.i v. v.		
14	Assist as scrub nurse in major surgeries – 5i. ii.i ii.i v. v.		
15	CompletionofBCLS module		
IV	**SEMESTER–ADULTHEALTHNURSINGII**		
	ENT		
1	ENT assessment of an adult – 2i. ii.		
2	ObservationandactivityreportofOPD		
3	Clinicalpresentation –1		
4	DrugBook		
	EYE		
5	Eyeassessment i. Adult–1 ii. Geriatric–1		
6	Patient-teaching–1		
7	ClinicalPresentation–1		
	NEPHROLOGY&UROLOGY		
8	Assessment of adult – 1AssessmentofGeriatric–1		
9	Drugpresentation –1		
10	Carestudy/Clinicalpresentation–1		
	BURNSANDRECONSTRUCTIVESURGERY		

S.No.	ClinicalRequirement	Date	Signature of theFaculty
11	Burn wound assessment –		
12	1Clinical presentation –		
13	1ObservationreportofBurnsunit		
14	Observecosmetic/reconstructiveprocedures		
	NEUROLOGY		
15	Neuro-assessment – 2i ii.		
16	Unconsciouspatient–1		
17	Care study/case presentation –		
18	1Drugpresentation–		
	1**IMMUNOLOGY**		
19	Assessmentofimmunestatus		
20	Teachingofisolationtopatient		
21	andfamilycaregiversNutritional management		
22	CareNote –1		
	ONCOLOGY		
23	Observationreportofcancerunit		
24	Assessment of each system cancer patients –		
25	2Carestudy/clinicalpresentation– 1		
26	Pre and post-operative care of patient with various modes of cancertreatmentsuchaschemotherapy,radiationtherapy,surgery,BMT,etc. –3(at least)i. ii. ii.		
27	TeachingonBSEtofamily members		
	EMERGENCY		
28	Primaryassessmentofadult–1		
29	Immediate care (IV access establishment, assisting in intubation,suction,etc.)		
30	Useofemergencytrolley		
	CRITICALCARE		
31	Assessmentofcriticallyill i. Adult ii. Geriatric		

S.No.	ClinicalRequirement	Date	Signature of theFaculty
32	Carenote/Clinicalpresentation–1		
	GERIATRIC		
33	Geriatricassessment–1		
34	Care note/clinical presentation –		
35	1Fallrisk assessment1		
36	Functionalstatusassessment–1		
37	CompletionofFundamentalsofPrescribingmoduleCo		
38	mpletionofPalliative care module		
V &VISEMESTER –CHILDHEALTHNURSINGI&II			
	Pediatricmedical		
1	Nursingcareplan–1		
2	Casepresentation –1		
3	Healthtalk–1		
	Surgical		
4	Nursingcareplan–1		
5	Casestudy/presentation–1		
	OPD/ImmunizationRoom		
6	GrowthandDevelopmentalstudy: i. Infant– 1 ii. Toddler– 1 iii. Preschooler–1		
	NICCU/PICU		
7	Newbornassessment–1		
8	NursingCarePlan–1		
9	Kangaroomothercare–2		
10	Nursingcareplanof highrisknewborn –1		
11	CompletionofENBCmodule		
12	CompletionofFNBCmodule		
13	CompletionofIMNCImodule		
14	CompletionofPLSmodule		
V&VISEMESTER –MENTALHEALTHNURSINGI&II			
	PsychiatryOPD		
1	History taking and Mental status examination – 2i.		

S.No.	ClinicalRequirement	Date	Signature of theFaculty
	ii.		
2	Healtheducation–1		
3	ObservationreportofOPD		
	Childguidanceclinic		
4	Casework –1		
	InpatientWard		
5	Casestudy –1		
6	Careplan– 2		
7	Clinicalpresentation1		
8	Processrecording2		
9	Maintaindrugbook		
	Communitypsychiatry&Deaddictioncentre		
10	Casework –1		
11	Observationreportonfieldvisits		
12	Visittodeaddictioncentre		
	V SEMESTER – COMMUNITY HEALTH NURSING – IINCLUDINGENVIRONMENTALSCIENCE&EPIDEMIOLOGY		
1	Communityneedsassessment/survey(Rural/Urban) –1		
2	Visitsto – SC/HWC – PHC – CHC		
3	Observation of nutritional programsAnganwadi		
4	**Observationvisits**		
	i. WaterpurificationsiteandWaterqualitytests		
	ii. Milkdiary		
	iii. Slaughter-house		
	iv. Market		
	v. Sewagedisposalsite		
	vi. Rainwaterharvesting		
	vii. Slaughter-house		
5	Nutritionalassessment–Adult1		
6	Individualhealthteaching –Adult1		

S.No.	ClinicalRequirement	Date	Signature of theFaculty
7	UseofAVaids–flashcards/posters/flannelgraphs/flipcharts(AnyTwo) i. ii. Healthassessmentof		
8	i. Woman–1 ii. Infant/underfivechild– 1 iii. Adolescent–1 iv. Adult–1 Growth monitoring of children under five –		
9	1Documentation		
10	i. Individualrecords–1 ii. Family records– 1Investigationofanepidemic–1		
11	Screeningandprimarymanagementof		
12	i. Communicablediseases–1 ii. NCD – 1Homevisits–2		
13	Participation in national health programs –		
14	2Participationinschoolhealthprogram–1		
15	**VSEMESTER–EDUCATIONALTECHNOLOGY/NURSINGEDUCATION**		
1	Microteaching –2		
	i. Theory – 1 ii. Practical/lab– 1		
2	Field Visit to nursing educational institution – regional/nationalorganization		
	VISEMESTER–NURSINGMANAGEMENT&LEADERSHIP		
1	FieldvisittoHospital–regional/nationalorganization		
	&VIISEMESTER–MIDWIFERY/OBSTETRICSANDGYNECOLOGY (OBG)NURSINGI&II		
1	Antenatalassessmentandcare–20		
2	Postnatalassessmentandcare–15		
3	Assessmentoflabourusingpartograph–10		
4	Pervaginalexamination –10		
5	Observingnormalchildbirths/deliveries–10		
6	Assistinginconductionofnormalchildbirth –10		
7	Conductionofnormaldeliveries –10		

VI

S.No.	ClinicalRequirement	Date	Signature of theFaculty
8	Assisting in abnormal/instrumental deliveries –		
9	5Performing placental examination –		
10	5Episiotomy and suturing (only if indicated)–		
11	3Assist/observe Insertionof PPIUCD–2		
12	Newborn assessment –		
13	10Newborn resuscitation		
14	– 5Kangaroomothercare–		
	2		
15	**NursingCarePlan/ClinicalpresentationwithDrugStudy** *Antenatalcare* Normal(careplan) –1		
16	Highrisk(casestudy/Clinicalpresentation)–1 *Intrapartumcare*		
17	Highrisk(Clinicalpresentation) –1 *Postnatalcare* Normal(careplan) –1		
18	Highrisk(Clinicalpresentation) –1 *Newborncare*		
19	Normal(careplan) –1 Gynecological		
20	conditionCareplan – 1		
21	Health talk – individual/group –		
22	2Counselingmothersandfamilymembers Visitto •Peripheralhealthfacility/Laqshyacertifiedlabourroom		
23	•Infertilitycentre(Virtual/videos)C		
24	ompletion of SBA		
	moduleCompletionofsafedelivery app		
	VII SEMESTER–COMMUNITYHEALTHNURSINGII		
1	Screeningandprimarymanagementofof i. Minorailments–2 ii. Emergencies–1 iii. Dentalproblems–1		
	iv. Eye–1 v. ENT –1		
2	PrimarymanagementandcarebasedonprotocolsapprovedbyMO H&FW (Home/healthcentre)		

S.No.	ClinicalRequirement	Date	Signature of theFaculty
3	Screeningandprimarymanagementof i. Highriskpregnancy ii. Highriskneonate		
4	Assessmentof i. Antenatal–1 ii. Intrapartum– 1 iii. Postnatal–1 iv. Newborn–1		
5	Conductionofnormalchildbirthanddocumentation–2		
6	Immediatenewborncareanddocumentation –1		
7	Familyplanningcounseling–1		
8	Grouphealtheducation(Rural/urban)–1		
9	Adolescentcounseling–1		
10	Familycasestudy(Rural/urban)–1		
11	Screening,diagnosis,primarymanagementandreferralofclientswithoccupationalhealth problems–2 i. ii.		
12	Healthassessment(physical&nutritional)ofelderly–1		
13	Mentalhealthscreeningsurvey–1		
14	**Groupproject–**Communitydiagnosis(datamanagement)		
15	Writingreportonhealthcentre activity–1		
16	Participation in organizing and conducting under five/antenatalclinic/healthcamp– 2 i. ii.		
17	Participationindisastermockdrills		
18	Fieldvisits - Biomedicalwastemanagementsite - AYUSHcentre - Industry - Geriatrichome		
19	Report on interaction with MPHW/HV/ASHA/AWWs (Any 2)1. 2.		
VIISEMESTER–NURSINGRESEARCH			
1	Research Project – Group/IndividualTitle:		

SignatureoftheFacultycoordinator **SignatureoftheHOD/Principal**

CLINICALEXPERIENCEDETAILS

NameofICU	ClinicalCondition	Numberofdayscare given	Signatureof Faculty/Preceptor

SignatureoftheFacultyCoordinator **SignatureoftheHOD/Principal**

SHEET/MARK CARD(Marksareshownasexample)INCTemplateasExample only

NameoftheUniversity: ……

NameoftheCollege/Institution: ……

NameoftheNursingProgram/Course:……

NameoftheStudent:……

SEMESTERNo:ISEMESTER

COURSES			Credits	InternalAssessment		EndSemester College/UniversityExam		Final Grade	Letter Marks	GradePoi
S.No.	CourseCode	TitleoftheCourse		MarksMarksobtained	PassMarks out of	Marks out of	Pass obtained			
1	ENGL101	*Communicative English							A+	9
2	ANAT 105 &PHYS110	AppliedAnatomy &Physiology	6 (3+3)	18	12.5/25	57	37.5/75	75	A	8
3	SOCI 115 &PSYC120	Applied Sociology & Applied Psychology	6(3+3)	16	12.5/25	54	37.5/75	70	B+	7

*ENGL 101-CollegeExam,Marksarenotaddedfor calculating SGPA,Passmarks-40%

SEMESTERNo:IISEMESTER

COURSES			Credits	InternalAssessment		EndSemester College/UniversityExam		Final Grade	Letter Marks	GradePoi
S.No.	Course Code	Title of the Course		Marks obtained	PassMarks out of	Marksobtained	Pass Marksout of			
1	BIOC135&Applied NUTR140	Biochemistryand Applied Nutrition &Dietetics	5(2+3)		12.5/2	44		60	B	6
2	N-NF(I&II) 125	Nursing Foundation I & II Incl HealthAssessment	T-12(6	20	12.5/2	55	37.5/7	75	A	8
			+6) P-	30	25/5	30	25/5	60	B	6
3*	HNIT145	Health/NursingI nformatics &Technology	11(4	20	12.5/2	19	12.5/2	78	A	8

T-Theory,P-Practicum (Skilllab&Clinical)

*HNIT145-CollegeExam

SEMESTERNo:IIISEMESTER

COURSES			Credits	InternalAssessment		EndSemester College/UniversityExam		Final Grade	Letter Marks	GradePoi
S.No.	Course Code	Title of the Course		Marks Marksobtained	PassMarks out of	Marks out of	Pass obtained			
1	MICR201	AppliedMicrobiol ogy andInfection Controlincluding Safety							A	8
2	N-AHN(I)215	Adult HealthNursing I withIntegratedP athophysiologyi ncluding	T-7	20	12.5/2	58	37.5/7	78	A	8
			P-7	35	25/5	35	25/5	70	B+	7

T-Theory, P-

PracticalSEMESTERNo:IVSEMESTER

COURSES			Credits	InternalAssessment		EndSemester College/UniversityExam		Final Marks (%)	Letter Grade	GradePoint
S.No.	CourseCode	TitleoftheCourse		Marks obtained	PassMarks out of	Marks obtained	PassMarks out of			
1	PHAR(I&II)205 PATH(I&II)(I&II) 210	Pharmacology (I&II)&Pathology (including Genetics)	6 (4+2)		12.5/25	57	37.5/7	75	A	8
2	N-AHN(II)225	Adult HealthNursing II withIntegratedPat hophysiologyinclu ding GeriatricNursing &PalliativeCare	T-7	20	12.5/2	58	37.5/7	78	A	8
			P-7	35	25/5	35	25/5	70	B+	7
3*	PROF230	Professionalism,Pr ofessionalValues	1	18	12.5/2	20	12.5/2	76	A	8

		and EthicsincludingBio								
		ethics				70	40/10	70		

T-Theory,P-Practical

*PROF230-CollegeExam;*Elective1-CollegeExam**,**Marksarenotaddedforcalculating SGPA,Passmarks-40%

SEMESTERNo:VSEMESTER

COURSES			Credits	InternalAssessment		EndSemester College/UniversityExam		Final Marks (%)	LetterGrade GradePoint	
S.No.	CourseCode	TitleoftheCourse		Marks obtained	Pass Marksout of	Marks obtained	Pass Marksout			
1	N-COMH(I)Com 310	CommunityHealth Nursing I includingEnvironmentalScience &Epidemiology	T-5	18	12.5/2	57	37.5/7	75	A	8
			P-2	35	25/5	35	25/5	70	B+	7
2	EDUC315	EducationalTechnology/NursingEducation	3	20	12.5/2	58	37.5/7	78	A	8
3*	N-FORN320	Introduction toForensicNursin	1	18	12.5/2	20	12.5/2	76	A	8

T-Theory,P-Practical

*N-FORN320-CollegeExam

SEMESTERNo:VISEMESTER

COURSES			Credits	InternalAssessment		EndSemester College/UniversityExam		Final Marks (%)	LetterGrade GradePoint	
S.No.	CourseCode	TitleoftheCourse		Marks obtained	Pass Marksout of	Marks obtained	Pass Marksout			
1	N-CHN(I&II) 301	Child HealthNursing(I &II)	T-5(3+2)	20	12.5/25	60	37.5/75	80	A+	9
			P-4(3+1)	38		38		76	A	8
2	N-MHN(I&II)	Mental HealthNursing(I &II)	T-5(3+2)	20	25/50	58	25/50	78	A	8
			P-3(1+2)	35	12.5/25	35	37.5/75	70	B+	7
			4 (T-3,P-1)	19		54		73	B+	7
4*	Elective-2	NursingManagement &Leadership	1			76	40/10	76		

T-Theory,P-Practical;

*Elective-2-CollegeExam,Marksarenotaddedforcalculating SGPA, Passmarks-40%

SEMESTERNo:VIISEMESTER

COURSES			Credits	InternalAssessment		EndSemester College/UniversityExam		Final Marks (%)	LetterGrade GradePoint	
S.No.	CourseCode	TitleoftheCourse		Marks obtained	Pass Marksout	Marks obtained	Pass Marksout of			
1	N-COMH(II) 401	Community HealthNursing II	T-5	19	12.5/25	60	37.5/75	79	A	8
			P-2	40		42		82	A+	9
2	NRST	NursingResearch&	4	20	12.5/2	58	37.5/7	78	A	8

	405	Statistics	(T-2, P-2)							
3	N-MIDW/ OBGNI&andGynaecology II 335&410	Midwifery/Obstetrics (OBG)NursingI&II	T-6 (3+3)	19	12.5/25	58	37.5/7	77	A	8
			P-9(4+5)	32	25/5	42	25/5	74	B+	7

T-Theory,P-Practical

SEMESTERNo:VIIISEMESTER

COURSES			Credits	InternalAssessment		End SemesterCollege/UniversityExam		Final Marks (%)	LetterGrade	
S.No.	**CourseCode**	**TitleoftheCourse**		**Marks obtained**	**Pass Marks out of**	**Marks GradePoint**	**Pass Marks obtained**		**out of**	
1	INTE 415, 420, 425,430&435	**Competency Assessment** • Community HealthNursing • Adult HealthNursing • Child HealthNursing • Mental HealthNursing • Midwifery/OBG Nursing	P-12	70	50/10	76	50/100	146/200=73	B+	7
2*	Elective-3	Ex. Scientific WritingSkills	1			79	40/10	79		

P-Practical

*Elective3-CollegeExam,MarksarenotaddedforcalculatingSGPA

SAMPLE TRANSCRIPT (INC Template as Example only)NameoftheUniversity:……

NameoftheCollege/Institution: ……

NameoftheNursingProgram/Course: ……

NameoftheStudent:……

Date/MonthandYearofcompletionoftheB.Sc.(Nursing)Program: ……

SEMESTERNo:ISEMESTER

COURSES			Credits	Marks		Grade Point	CreditPoint
S.No.	**Course Code**	**TitleoftheCourse**		**obtained(%)**	**Letter Grade**		
1	ENGL 101	*CommunicativeEnglish	2			9	----
2	ANAT 105 & PHYS110	AppliedAnatomy&AppliedPhysiology	6(3+3) C_1	80	A+	8 G_1	6×8=48
3	SOCI115 & PSYC120	AppliedSociology&AppliedPsychology	6(3+3) C_2	70	B+	7 G_2	6×7=42

*ENGL 101-Marksarenotadded forcalculating SGPA,Passmarks-40%

ComputationofSGPA(SemesterGradePointAverage)

$$SGPA=\frac{C_1G_1+C_2G_2}{C_1+C_2}$$

$$=\frac{48+42}{6+6}$$

$$=\frac{90}{12}$$

$$=7.50$$

ISEMESTERSGPA=7.50

SEMESTERNo:IISEMESTER

COURSES			Credits	Marks	Letter	Grade	CreditPoint
S.No.	**Course Code**	**TitleoftheCourse**		**obtained(%)**	**Grade**	**Point**	
1	BIOC13	Applied Biochemistry andApplied Nutrition&Dietetics	5 (2+3			6 G_1	5×6=30
2	N-NF (I&II)125	Nursing FoundationI&II	T-12 (6+6)C_2	75	A	8 G_2	12×8=96
			P-11 (4+7)C_3	.60	B	6 G_3	11×6=66
3	HNIT145	Health/Nursing Informatics& Technology	3 C_4	78	A	8 G_4	3×8=24

ComputationofSGPA

$$SGPA=\frac{C_1G_1+C_2G_2+C_3G_3+C_4G_4}{C_1+C2+C_3+C_4}$$

$$=\frac{30+96+66+24}{5+12+11+2}$$

$$=\frac{216}{31}$$

$$=6.97$$

II SEMESTERSGPA=6.97

SEMESTERNo:IIISEMESTER

COURSES			Credits	Marks	Letter	Grade	CreditPoint
S.No.	**Course Code**	**TitleoftheCourse**		**obtained(%)**	**Grade**	**Point**	
1	MICR201	Applied Microbiology andInfection Control includingSafety	3 C_1			8 G_1	3×8=24
2	N-AHN (I)215	Adult Health Nursing Iwith IntegratedPathophysiology includingBCLSmodule	T-7C	78	A	8 G_2	7×8=56
			2 P-	70	B+	7 G_3	7×7=49

ComputationofSGPA

$$SGPA=\frac{C_1G_1+C_2G_2+C_3G_3}{C_1+C_2+C_3}$$

$$=\frac{24+56+49}{3+7+7}$$

$$=\frac{129}{17}$$

=7.59

III SEMESTERSGPA=7.59

SEMESTERNo:IVSEMESTER

COURSES			Credits	Marks obtained(%)	Letter Grade	Grade Point	CreditPoint
S.No.	CourseCode	TitleoftheCourse					
1	PHAR (I&II)205 PATH (I&II)210	Pharmacology (I&II) &Pathology (I&II) (includingGenetics)	6(4+2) C_1	75	A	8 G_1	6×8=48
2	N-AHN (II)225	Adult Health Nursing IIwith IntegratedPathophysiology includingGeriatricNursing	T-7 C_2	78	A	8 G_2	7×8=56
			P- 7C	70	B+	7 G_3	7×7=49
3	*PROF230	Professionalism,Professional Values andEthicsincludingBioethi	3 1	76	A	8 G_4	1×8=8
4	*Elective1	Ex. HumanValues	1	70	----	-----	-----

*Elective1-MarksarenotaddedforcalculatingSGPA,Passmarks-40%

ComputationofSGPA

$$SGPA=\frac{C_1G_1+C_2G_2+C_3G_3+C_4G_4}{C_1+C_2+C_3+C_4}$$

$$=\frac{48+56+49+8}{6+7+7+1}$$

$$=\frac{161}{21}$$

=7.67

IV SEMESTER SGPA=7.67

SEMESTERNo:VSEMESTER

COURSES			Credits	Marks obtained(%)	Letter Grade	Grade Point	CreditPoint
S.No.	Course Code	TitleoftheCourse					
1	N-COMH (I)310	Community HealthNursing I includingEnvironmentalScience&Epidemiology	T- 5C			8 G_1	5×8=40
			1 P- 2C	70	B+	7 G_2	2×7=14
2	EDUC315	Educational Technology/Nursing	2 3 C_3	78	A	8 G_3	3×8=24
3	*N-	FORN320Introductiont		76	A	8 G_4	1×8=8

ComputationofSGPA

$$SGPA=\frac{C_1G_1+C_2G_2+C_3G_3+C_4G_4}{C_1+C_2+C_3+C_4}$$

$$=\frac{40+14+24+8}{5+2+3+1}$$

$= \frac{86}{11}$

$=7.82$

V SEMESTERSGPA=7.82

SEMESTERNO: VISEMESTER

COURSES			Credits	Marks obtained(%)	Letter Grade	Grade Point	CreditPoint
S.No.	CourseCode	Titleof theCourse					
1	N-CHN(I&II)Child 301	HealthNursing (I&II)	T-5 (3+2)C_1	90	A+	9 G_1	5×9=45
			P-4 (3+1)C_2	76	A	8 G_2	4×8=32
2	N-MHN(I&II)Mental 305	HealthNursing (I&II)	T-5 (3+2)C_3	78	A	8 G_3	5×8=40
			P-3 (1+2)C_4	70	B+	7 G_4	3×7=21
3	NMLE330	NursingManagement&Leadership	4 C_5	73	B+	7 G_5	4×7=28
4	*Elective-2	Ex.MenopausalHealth		76	----	---	----

*Elective-2Marksnotadded forcalculating SGPA,Passmarks-40%

ComputationofSGPA

$$SGPA=\frac{C_1G_1+C_2G_2+C_3G_3+C_4G_4+C_5G_5}{C_1+C_2+C_3+C_4+C_5}$$

$$=\frac{45+32+40+21+28}{5+4+5+3+4}$$

$$=\frac{166}{21}$$

VI SEMESTERSGPA=7.90

SEMESTERNo:VIISEMESTER

COURSES			Credits	Marksobtained(%)	Letter Grade	Grade Point	CreditPoint
S.No.	Course Code	TitleoftheCourse					
1	N-COMH (II)401	Community HealthNursing II	T-5C_1	79	A	8 G_1	5×8=40
			P-2C_2	82	A+	9 G_2	2×9=18
2	NRST4 05	NursingResearch&Statistics	4 C_3	78	A	8 G_3	4×8=32
3	N-MIDW/OBG NI&II335&41	Midwifery/Obstetrics andGynaecology (OBG)Nursing I&II	T-6 (3+3)C_4	77	A	8 G_4	6×8=48
			P-9 (4+5)	74	B+	7 G_5	9×7=63

ComputationofSGPA

$$SGPA=\frac{C_1G_1+C_2G_2+C_3G_3+C_4G_4+C_5G_5}{C_1+C_2+C_3+C_4+C_5}$$

$$=\frac{40+18+32+48+63}{5+2+4+6+9}$$

$$=\frac{201}{26}$$

VII SEMESTERSGPA=7.73

SEMESTERNo:VIIISEMESTER

COURSES			Credits	Marks obtained(%)	Letter Grade	GradePoint	CreditPoint
S.No.	**CourseCode**	**TitleoftheCourse**					
1	INTE 415,420,425, 430&435	**CompetencyAssessment** • Community HealthNursing • AdultHealthNursing • ChildHealthNursing • Mental HealthNursing • Midwifery/OBG Nursing	P-12 C_1	73	B+	7 G_1	12×7=84
2	*Elective-3	Ex.ScientificWriting Skills	1	79	----	----	---

*Elective3-Marksarenotadded forcalculating SGPA,Pass marks-40%

ComputationofSGPA

$$SGPA=\frac{C_1G_1}{C_1}$$

$$=\frac{12\times7}{12}$$

$$=\frac{84}{12}$$

VIII SEMESTERSGPA=7.00

ComputationofCGPA

CGPA-CumulativeGradePointAverage

CGPAiscalculatedwithSGPAofallsemesterstotwodecimalpointsandisindicatedinfinalgradeinmarkcard/transcript showinggradesofall 8semestersandtheir courses/subjects.

CGPAreflectsthefailed statusin case offailtillthecourse/sare passed.

SEMESTERISEM2		SEM3	SEM4	SEM5	SEM6	SEM7	SEM8
Credit-CrCr:12 SGPA:7.50 Cr×SGPA= 12×7.50=90.002	Cr:31 SGPA:6.97 31×6.97= 16.07	Cr: 17 SGPA:7.59 17×7.59= 129.03	Cr:21 SGPA:7.67 21×7.67= 161.07	Cr:11 SGPA:7.82 11×7.82= 86.02	Cr:21 SGPA:7.90 21×7.90= 165.90	Cr:26 SGPA:7.73 26×7.73= 200.98	Cr:12 SGPA:7.00 12×7.00=84.00

$$CGPA=\frac{12\times7.5+31\times6.97+17\times7.59+21\times7.67+11\times7.82+21\times7.90+26\times7.73+12\times7.00}{151}$$

$$=\frac{90.00+216.07+129.03+161.07+86.02+165.90+200.98+84.00}{151}$$

$$=\frac{1133.07}{151}=7.50$$

CumulativeGradePointAverage(CGPA)=7.50

Dr. T. DILEEP KUMAR, President

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ModuleonYogaforNursingStudents

Nursing is a demanding profession and nursing students may experience considerableamount of stress to meet the demands in academic and clinical fields. Yoga is an effectivepractice to reduce stress and improve physical and mental wellbeing. Indian Nursing Councilhas prepared a ten hour Yoga module for nursing students under the directions of MOHFWand Ministry of AYUSH. This yoga training module can be implemented in the nursingprogrammes like ANM, GNM, B.Sc(N) during the Co-Curricular activities provided in variousacademicyears/semesters.Thecontent/yogapracticestobeperformedareasunder:

Content		Hours
1.Yoga&General Guidelines for Yoga practices:	Its definition,origin,history,benefits, yoga, indications,Therapeutic effect of contraindications, Do'sandDon'ts.	1hr
2 YogaPractices:	Prayer / MeditationYogicsukshmavyamaYogasthulavyama	lhr
3.Asanas:	TadasanaPadhastasanaArdhchakarasanaSuryanamaskar TrikonasanaKaticha karanaShavasanaPawanmuktasanaSetubandasanaBhujangasanaBhadrasana VakrasanaVajrasanaPadmasanaSukhasana	5hr

4. Pranayama:	DeepBreathing-10breathsNadiShodhanPranayama -20Breaths BhramariPranayama-10rounds	lhr
5 **Meditation**:	Omchanting,SohamchantingChakra Meditation	lhr
6 YogaNidra		lhr

Note: - Institution to hire part time / full time yoga teacher to teach the faculty & students.The qualification requirement (QR) of the teacher is Graduation/ General Post Graduation withDiplomainYoga/GraduationinYogafromreputedUniversityorInstituteofrepute.

Amity College of Nursing

Master of Science (Nursing)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination
2021

AMITY UNIVERSITY HARYANA
GURUGRAM

Programme Overview

M.Sc. Nursing programme has duration of 4 semesters and the aim of the post-graduate Nursing program is to:

- Upgrade & to prepare graduate nurses to assume responsibilities as nurse specialists, consultants, educators, administrators in a wide variety of professional settings
- Prepare graduates to assume responsibilities as professional, competent nurses in providing promotive, preventive, curative and rehabilitative services.
- Prepare nurses who can make independent decisions in nursing situations, protect the rights of and facilitate individuals and groups in pursuit of health, function in the hospital, community nursing services, and conduct research studies in the areas of nursing practice . They are also expected to assume the role of teacher, supervisor, and manager in a clinical. Public health setting.

PROGRAMME OUTCOMES (PO's)

- **PO1**: **Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

- **PO2**: **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

- **PO3**: **Social Interaction**: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

- **PO4**: **Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

- **PO5**: **Ethics**: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

- **PO6**: **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

- **PO7**: **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PROGRAMME SPECIFIC OUTCOMES (PSO's)

On the completion of the two-year M.Sc. Nursing Programme the graduate will be able to:

- **PSO1 :** Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.
- **PSO2:** Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.
- **PSO3:** Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.
- **PSO4:** Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Supporting document for PSOs of M.Sc. Nursing

PSO1	PSO2					PSO3	PSO4	
PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.	**PSO2:** Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.					**PSO3:** Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.	**PSO4:** Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.	
1	2	3	4	5	6	7	8	9
Basic Nursing Courses	**Medical Surgical Nursing**	**Psychiatric Nursing**	**Pediatric Nursing**	**Community Health Nursing**	**Obstetrical and Gynaecological Nursing**	**Administration &management of nursing services & education**	**Value added courses**	**Nursing Research**
Nursing Education Nursing Education-Practical	Medical and Surgical Nursing	Psychiatric Nursing	Pediatric Nursing	Community Health Nursing	Obstetrical and Gynaecological Nursing	Nursing Management & Administration	Foreign Language French German Spanish Russian Chinese Portuguese	Introduction to Nursing Research and Statistics
Advance Nursing Practice	Medical and Surgical Nursing practical	Psychiatric Nursing Practical	Pediatric Nursing Practical	Community Health Nursing Practical	Obstetrical and Gynaecological Nursing Practical			Dissertation (Nursing Research)

NUR4101	Nursing Education - I	L	T	P	C
Version 1.1	Date of Approval:	**15**	**15**	**-**	**15**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: This course is aimed at developing competent teacher for delivering extempore by using competence based learning on objective based outcome by using modern trends & methods in teaching, learning & in evaluation as well.

Course Objectives:

This course is designed to assist students to develop a broad understanding of Fundamental Principles, concepts, trends and issues related to education and nursing education. Further, it would provide opportunity to students to understand, appreciate and acquire skills in teaching and evaluation, curriculum development, implementation, maintenance of standards and accreditation of various nursing educational programs.

Course Outcomes:

On completion of this course students will be able to:

CO1: Describe the current trends and issues in education

CO2: Explain the Concepts of teaching and learning process

CO3: Discuss Key concepts in the selection and use of media in education

CO4: Explain the concept and nature of measurement and evaluation

CO5: Describe Standardized and non-standardized tests

CO6: Discuss the Administration, Scoring and Reporting

CO7: Explain the Standardized Tools

CO8: Discuss Perspectives of nursing education: Global and national

CO9: Explain Program planning, implementation and evaluation of continuing education programs.

CO10: Describe Program planning, implementation and evaluation of continuing education programs.

CO11: Discuss the Curriculum Development process

CO12: Explain the Preparation of professional teacher in organising professional teacher program

CO13: Describe the concept of Guidance and counselling

CO14: Discuss the concept of Administration of Nursing Curriculum

CO15: Explain Management of nursing educational institutions

CO16: Describe Development and maintenance of standards and accreditation in nursing education programs

Modules	**Blooms level***	**Number of hours**
MODULE 1: **Introduction** Education :Definition, aims, concepts, philosophies & their education implications • Impact of Social, economical, political & technological changes on education: • Professional education • Current trends and issues in education • Educational reforms and National Educational policy, various educational commissions-reports • Trends in development of nursing education in India	L1, and L2	10
MODULE 2: **Teaching – Learning Process** • Concepts of teaching and learning: Definition, theories of teaching and learning, relationship between teaching and learning. • Educational aims and objectives; types, domains, levels, elements and writing of educational objectives • Competency based education(CBE) and outcome based education(OBE)	L1,L2, and L3	10

• Instructional design: Planning and designing the lesson, writing lesson plan : meaning, its need and importance, formats. • Instruction strategies – Lecture, discussion, demonstration, simulation, laboratory, seminar, panel, symposium, problem solving, problem based learning (PBL), workshop, project, role-play(socio drama), clinical teaching methods, programmed instruction, self directed learning(SDL), micro teaching, computer assisted instruction(CAI), computer assisted learning (CAL)		
MODULE 3: **Instructional media and methods** • Key concepts in the selection and use of media in education • Developing learning resource material using different media • Instructional aids – types, uses, selection, preparation, utilization. • Teacher's role in procuring and managing instructional Aids – Project and non-projected aids, multi media, video-tele conferencing etc	L1,L2, L3 and L4	15
MODULE 4: **Measurement and evaluation:** • Concept and nature of measurement and evaluation, meaning, process, purposes, problems in evaluation and measurement. • Principles of assessment, formative and summative assessment-internal assessment external examination, advantages and disadvantages. • Criterion and norm referenced evaluation	L1,L2, and L3	10
MODULE 5: **Standardized and non-standardized tests** • Meaning, characteristics, objectivity, validity, reliability, usability, norms, construction of tests	L1,L2 and L3	15

– Essay, short answer questions and multiple choice questions. – Rating scales, checklist, OSCE/OSPE(Objective structured clinical/practical examination) – Differential scales, and summated scales, sociometry, anecdotal record, attitude scale, critical incident technique • Question bank-preparation, validation, moderation by panel, utilization • Developing a system for maintaining confidentiality		
MODULE 6: **Administration, Scoring and Reporting** • Administering a test; scoring, grading versus marks • Objective tests, scoring essay test, methods of scoring, Item analysis.	L1, L2,L3 and L5	5
MODULE 7: **Standardized Tools** • Tests of intelligence aptitude, interest, personality, achievement, socio-economic status scale, tests for special mental and physical abilities and disabilities**.**	L1,L2, and L3	10
MODULE 8: **Nursing Educational programs** • Perspectives of nursing education: Global and national. • Patterns of nursing education and training programmes in India. Non-university and University programs: ANM, GNM, Basic B.Sc. Nursing, Post Certificate B.Sc. Nursing, M.Sc(N) programs, M.Phil and Ph.D) in Nursing, post basic diploma programs, nurse practitioner programs.	L1,L2, and L5	10

MODULE 9: **Continuing Education in Nursing** • Concepts – Definition, importance, need scope, principles of adult learning, assessments of learning needs, priorities, re-sources. • Program planning, implementation and evaluation of continuing education programs. • Research in continuing education. • Distance education in nursing.	L1,L2, and L3	10
MODULE 10: **Curriculum Development** • Definition, curriculum determinants, process and steps of cur-riculum development, Curriculum • models, Types and framework. • Formulation of philosophy, objectives, selection and organiza-tion of learning experiences; master plan, course plan, unit plan. • Evaluation strategies, process of curriculum change, role of udents, faculty, administrators, statutory bodies and other stakeholders. • Equivalency of courses: Transcripts, credit system.	L1,L2, L3 and L4	10
MODULE 11: **Teacher preparation** • Teacher – roles & responsibilities, functions, characteristics, competencies, qualities • Preparation of professional teacher • Organizing professional aspects of teacher preparation pro-grams • Evaluation: self and peer	L1,L2, and L3	10

• Critical analysis of various programs of teacher education in India.		
MODULE 12: **Guidance and counselling** • Concept, principles, need, difference between guidance and counselling , trends and issues. • Guidance and counselling services : diagnostic and remedial. • Coordination and organization of services • Techniques of counselling: Interview, case work, characteristics of counsellor, problems in counselling. • Professional preparation and training for counselling	L1,L2, and L5	5
MODULE 13: **Administration of Nursing Curriculum** • Role of curriculum coordinator – planning, implementation and euation. • Evaluation of educational programs in nursing course and program. • Factors influencing faculty staff relationship and techniques of working together. • Concept of faculty supervisor (dual) position. • Curriculum research in nursing. • Different models of collaboration between education and service	L1,L2, and L5	10
MODULE 14: **Management of nursing educational institutions** • Planning, organizing, staffing, budgeting, recruitment, discipline, public relation, performance appraisal, welfare services, library services, hostel	L1,L2, and L5	10

MODULE 15: **Standards and accreditation** • Development and maintenance of standards and accreditation in nursing education programs. • Role of Indian Nursing Council, State Registration Nursing Councils, Boards and University. • Role of Professional associations and unions.	L1,L2, and L5	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Main text

1. Conley, Virginia C. Curriculum and Instruction in Nursing; Little Brown and Co, London.
2. Heidgerkein LE. Teaching and Learning in Schools of Nursing Delhi; Konark Publishers 1992.
3. Aggarwal J.C, *Principles, Methods & Techniques of Teaching,* Vikas Publishing House
4. Neeraja K.P, Text *Book of Nursing Education*, Jaypee Brothers, New Delhi.
5. Bevis, Em Olivia, *Curriculum Building in Nursing a Process*, C.V Mosby Co., St. Louis. George Kurian Aleyamma,
6. *Principles of Curriculum Development and Evaluation*, Vivekananda Press, 2002.
7. Basavanthappa B.T, *Nursing Education,* Jaypee Brothers, 2005, New Delhi.
8. Bhatia B.D, *Principles and Methods of Teaching*, Doabra House, New Delhi.
9. Billing, Diane M & Halstead, Judith A, *Teaching in Nursing: A Guide for Faculty*, W.B. Saunders.
10. Bloom, Benjamin S Ed, *Taxonomy of Educational Objectives: Cognitive Domain,* David Mckay CO., Inc, 1956, New York.
11. Modley Doris M, *Advancing Nursing Education World Wid*e, Springer Publishing Co., 1995, New York.

* Latest editions of all the suggested books are recommended.

Additional Texts:

1. Fuszard, Barbara, *Innovating Teaching Strategies in Nursing*, Aspen Publishers Inc, 1989, Maryland.
2. Gay L.R., *Educational Evaluation and Measurement Competencies for Analysis and Application*, Ion, Charles E. Merill Publishers Co., 1985, Columbus.
3. Guilbert. J J., *Educational Handbook for Health Personnel*, World Health Organization, 1982, Geneva.

4. Guinee. Kathleen k, *Teaching and Learning in Nursing*, Macmillan, 1978, New York.
5. Joyce.B, *Models of Teaching*, Prentice Hall Inc, Englewood Cliffs, 1986, New Jersey.
6. Keay F.E., *A History of Education in India and Pakistan*, Oxford University Press, 1964, London.

Other readings:

- ✓ Journal of Nursing Education
- ✓ Journal of Continuing Education in Nursing
- ✓ Journal of Nursing Education and Practice

Web Resources:

- Pub med
- CINAHL(cumulative index to Nursing and allied health literature)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA-Extracurricular activity; EE- End Semester Examination

Concept Mapping between COs, PLOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-
CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1
CO11	-	1	1	2	2	1	1	2	-	1	1
CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1
CO15	1	1	1	1	1	1	1	-	1	1	1
CO16	1	-	1	1	1	1	1	-	1	-	1
CO17	-	1	1	2	2	1	1	2	-	1	1

1-strongly related; 2-moderately related; 3-weakly related

NUR4102	Nursing Education (Practical)	L	T	P	C
Pre-requisites/Exposure				**15**	**8**
Co-requisite					

Course Description:

This course is designed to assist students in developing expertise and in - depth knowledge in the field of neurology and neurosurgical Nursing. It will help students to develop advanced skills for nursing intervention in caring for patients with neurological and neurosurgical disorders. It will enable the student to function as neuroscience nurse practitioner/ specialist. It will further enable the student to function as educator, manager and researcher in the field of neurology and neuro-surgical Nursing.

Course Outcomes:

At the end of the course the students will be able to perform the following activities (Practical):

CO1- Framing philosophy, aims and objectives.

CO2-Lesson Planning.

CO3-Micro teaching-2.

CO4-Conduct practice teachings using different teaching strategies -10 (like lecture cum discussion, demonstration- lab method, field trips, seminars, project, role play, panel discussion, clinical methods etc)

CO5-Preparation and utilization of instructional Aids using different media.

CO6-Develop course plans, unit plans, rotation plans.

CO7-Conduct a continuing education workshop.

CO8-Annotated bibliography.

CO9-Critical evaluation of any nursing education program offered by a selected institution.

CO10-Planning and Organizing field visits.

CO11-Educational visits.

CO12-Field visits (INC/SNRC) to get familiar with recognition/registration process.

CO13-Construct, administer and evaluate tools (objective & essay type test, observation checklist, rating scale etc)

CO14-Observe and practice application of various non-standardized tests (intelligence, Aptitude, personality, Sociometry, physical & mental disabilities tests.)

Course Content

Modules	Blooms level*	Number of hours
Module I: • Framing philosophy, aims and objectives. • Annotated bibliography.	L1, L2 and L3	5
Module II Lesson Planning.	L1,L2, L3	5
Module III Micro teaching-2.	L1, L2 and L3	10
Module IV Conduct practice teachings using different teaching strategies -10 (like lecture cum discussion, demonstration- lab method, field trips, seminars, project, role play, panel discussion, clinical methods etc)	L1,L2, L3, L4 and L5	15
Module V Preparation and utilization of instructional Aids using different media.	L1,L2, L3 and L4	5
Module VI Develop course plans, unit plans, rotation plans.	L1,L2, L3, and L5	5

Module VII Conduct a continuing education workshop.	L1,L2, L3, L4 and L5	10
Module VIII Critical evaluation of any nursing education program offered by a selected institution.	L3, L4 and L5	10
Module IX Field visits (INC/SNRC) to get familiar with recognition/registration process. Educational visits. Planning and Organizing field visits.	L1,L2, and L3	10
Module X Construct, administer and evaluate tools (objective & essay type test, observation checklist, rating scale etc)	L1,L2, L3,	10
Module XI Observe and practice application of various non-standardized tests (intelligence, Aptitude, personality, Sociometry, physical & mental disabilities tests.)	L1,L2, L3,	10

Text & References:

12. Conley, Virginia C. Curriculum and Instruction in Nursing; Little Brown and Co, London.
13. Heidgerkein LE. Teaching and Learning in Schools of Nursing Delhi; Konark Publishers 1992.
14. Aggarwal J.C, *Principles, Methods & Techniques of Teaching,* Vikas Publishing House
15. Neeraja K.P, Text *Book of Nursing Education*, Jaypee Brothers, New Delhi.
16. Bevis, Em Olivia, *Curriculum Building in Nursing a Process*, C.V Mosby Co., St. Louis. George Kurian Aleyamma,
17. *Principles of Curriculum Development and Evaluation*, Vivekananda Press, 2002.
18. Basavanthappa B.T, *Nursing Education*, Jaypee Brothers, 2005, New Delhi.
19. Bhatia B.D, *Principles and Methods of Teaching*, Doabra House, New Delhi.
20. Billing, Diane M & Halstead, Judith A, *Teaching in Nursing: A Guide for Faculty*, W.B. Saunders.
21. Bloom, Benjamin S Ed, *Taxonomy of Educational Objectives: Cognitive Domain,* David Mckay CO., Inc, 1956, New York.

22. Modley Doris M, *Advancing Nursing Education World Wid*e, Springer Publishing Co., 1995, New York.

* Latest editions of all the suggested books are recommended.

Additional Texts:

7. Fuszard, Barbara, *Innovating Teaching Strategies in Nursing*, Aspen Publishers Inc, 1989, Maryland.
8. Gay L.R., *Educational Evaluation and Measurement Competencies for Analysis and Application*, Ion, Charles E. Merill Publishers Co., 1985, Columbus.
9. Guilbert. J J., *Educational Handbook for Health Personnel*, World Health Organization, 1982, Geneva.
10. Guinee. Kathleen k, *Teaching and Learning in Nursing*, Macmillan, 1978, New York.
11. Joyce.B, *Models of Teaching*, Prentice Hall Inc, Englewood Cliffs, 1986, New Jersey.
12. Keay F.E., *A History of Education in India and Pakistan*, Oxford University Press, 1964, London.

Other readings:

- ✓ Journal of Nursing Education
- ✓ Journal of Continuing Education in Nursing
- ✓ Journal of Nursing Education and Practice

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Scheme of Examination

Practical:

	Internal- 100				**EE = 100**		
Components	**ATT**	**RM**	**W/ISE**	**PT**	**RM**	**PT**	**RP**
Weightage (%)	**5**	**25**	**50**	**20**	**25**	**50**	**25**

ATT-Attendance; RM-Resource material; ; PT- Practice teaching; RP- Rotation Plan/construction of test; W/ISE-Workshop/In-service education programme; EE- End Semester Examination

Mapping between COs, PLOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-
CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1
CO11	-	1	1	2	2	1	1	2	-	1	1
CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1

1-strongly related; 2-moderately related; 3-weakly related

MSN4103	MEDICAL SURGICAL NURSING I	L	T	P	C
Pre-requisites/Exposure		**15**	**15**		**15**
Co-requisite					

Course Catalogue: This course is aimed at developing competent teacher for delivering extempore by using competence based learning on objective based outcome by using modern trends & methods in teaching, learning & in evaluation as well.

Course Objectives:

The objective of this course is to assist students:

In developing expertise and in-depth understanding in the field of Medical Surgical nursing

1. To develop advanced skills for nursing intervention in various medical surgical Nursing conditions.
2. To function as Medical Surgical Nurse practitioner/specialist.
3. To enable the student to function as educator, manager and researcher in the field of Medical Surgical Nursing.

Course Outcomes:

On completion of this course students will be able to:

CO1: Describe the current trends and issues in Medical Surgical Nursing

CO2: Perform health Assessment

CO3: Discuss care in hospital setting

CO4: Explain management of patients with disorders of Gastrointestinal tract.

CO5: Explain management of patients with disorders of Nervous system

CO6: Explain management of patients with disorders of respiratory system

CO7: Explain management of patients with disorders of cardiovascular system

CO8: Explain management of patients with disorders of blood

CO9: Explain management of patients with disorders of genito-urinary system

CO10: Explain management of patients with disorders of endocrine system

CO11: Explain management of patients with disorders of musculoskeletal system

CO12: Explain management of patients with disorders of integumentary

CO13: Explain management of patients with disorders of Eye and ENT

CO14: Explain management of patients with disorders of Reproductive system

CO15: Discuss aging and Disorders of geriatric population

CO16: Discuss disorders of communicable and sexually transmitted diseases.

CO17: Discuss emergency, trauma and multi-system organ failure care of patient.

Course Content

Modules	Blooms level*	Number of hours
Module I **Introduction** • Historical development of medical surgical nursing in India • Current status of health and disease burden in India • Current concept of health • Trends & issues in medical surgical nursing • Ethical & cultural issues in medical surgical nursing • Rights of patients • National health policies and national programs related to adult health • National health policy, special laws & ordinances related to older people • Five year plans	L1,L2	5
Module II **Health assessment of patients** • History taking • Physical examination of various systems • Nutrition assessment	L1,L2,L3	20

• Related investigations and diagnostic assessment		
Module III **Care in hospital settings** • Ambulatory settings • Acute and critical care • Long term care • Home health care • Characteristics, care models, practice settings, interdisciplinary team • Hospitalization- effects of hospitalization on patient & family • Stressors & reaction related to disease process • Nursing care using nursing process	L1,L2	5
Module IV **Management of patients with disorders of Gastro intestinal tract** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice Rehabilitation and follow up.	L1,L2,L3	10

Module V **Management of patients with disorders of nervous system** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.		
Module VI **Management of patients with disorders of respiratory system** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.	L1,L2,L3	10

Module VII **Management of patients with disorders of cardiovascular system** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.	L1,L2,L3	10
Module VIII **Management of patients with disorders of blood** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.	L1,L2,L3	5
Module IX	L1,L2,L3	10

Management of patients with disorders of genito-urinary system • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.		
Module X **Management of patients with disorders of endocrine system** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.	L1,L2,L3	10
Module XI **Management of patients with disorders of musculo-skeletal system**	L1,L2,L3	10

• Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.		
Module X **Management of patients with disorders of integumentary system** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.	L1,L2,L3	8
Module XIII **Management of patients with disorders of eye and ENT** • Review of related anatomy and physiology	L1,L2,L3	5

• Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.		
Module XIV **Management of patients with disorders of reproductive system** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.	L1,L2,L3	8
Module XV **Geriatric nursing** • Nursing assessment • Aging	L1,L2,L3	8

• Demography- myths &realities • Concepts and theories of aging • Normal biological aging • Age related body systems changes • Psychosocial aspects of aging • Medications and elderly • Stress and coping in older adults • Common health problems and nursing management • Psychosocial and sexual patterns • Abuse of elderly • Role of nurse for care of elderly: ambulation,nutritional, communication, psychosocial and spiritual • Use of aids and prosthesis • Legal and ethical issues • Provisions and programmes for elderly: privileges, community programs and health services Issues problems and trends		
Module XVI **Management of patients with disorders of communicable and sexually transmitted diseases** • Review of related anatomy and physiology • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.	L1,L2,L3	8

Module XVII **Emergency, trauma and multi-system organ failure** • DIC • Trauma, burns, poisoning • Disorders – etiology, pathophysiology, clinical manifestations, complications, prognosis. • Health assessment- history taking, physical examination, investigation & diagnostic assessment • Treatment modalities and trends • Nursing management • Related research studies • Evidence based nursing practice • Rehabilitation and follow up.	L1,L2,L3	8

REFERENCES:

1. Black M.J., Hawks H.J, *Medical Surgical Nursing, Clinical Management for Positive Outcome*, 7th edition, Sauders, Elsevier Publication.
2. Morton, Patricia, et. al. *Critical Care Nursing: A Holistic Approach*, Lippincott Williams and Wilkkins; Eighth edition.
3. Urban, A.N., Greenlac K.K,"*Guidelines for Critical Care Nursing*, Mosby.
4. Wood L.S., Freelicher S.E, *Fetal Cardiac Nursing*, Lippincott Williams & Wilkings.
5. Gulanic, Klopp, Galnes, *Fetal Nursing Care Plans Nursing Diagnosis and intervention*.
6. Lewis, Collier & Heitkemper, *Medical Surgical Nursing Assessment and Management of Clinical Problems.*
7. Baughman Diane C, *Hand Book for Surgical Nursing*, 2nd edition, published by Lipincott, NewYork.

8. Philip &Wilma J, *Medical- Surgical Nursing*, 3rd edition, published by B.T Pubn Bangalore.

* Latest editions of all the suggested books are recommended.

Web Resources:

- Pub med
- CINAHL(cumulative index to Nursing and allied health literature)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Concept Mapping between COs, PLOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	2	-	1	-	-	-	1	-	-
CO2	2	1	2	-	3	-	1	-	1	-	-
CO3	1	1	1	-	3	-	3	-	1	-	-
CO4	1	1	2	-	-	-	-	-	1	-	-
CO5	1	1	2	-	-	-	-	-	1	-	-
CO6	1	1	2	-	-	-	-	-	1	-	-
CO7	1	1	2	-	-	-	-	-	1	-	-
CO8	1	1	2	-	-	-	-	-	1	-	-
CO9	1	1	2	-	-	-	-	-	1	-	-

CO10	1	1	2	-	-	-	-	-	1	-	-
CO11	1	1	2	-	-	-	-	-	1	-	-
CO12	1	1	2	-	-	-	-	-	1	-	-
CO13	1	1	2	-	-	-	-	-	1	-	-
CO14	1	1	2	-	-	-	-	-	1	-	-
CO15	1	1	2	-	-	3	-	-	1	-	-
CO16	1	1	2	-	-	3	2	-	1	-	-
CO17	1	1	2	-	-	3	2	-	1	-	-

1-strongly related; 2-moderately related; 3-weakly related

PDN4103	**Child Health (Pediatric) Nursing**	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:	**15**	**20**		**15**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: This course is aimed at developing an understanding of the modern approach to child care, the common health problems of children and neonates in health and sickness.

Course Description: This course is designed to assist students in developing expertise and in depth understanding in the field of Pediatric Nursing. It will help students to appreciate the child as a holistic individual and develop skill to function as neonatal and Paediatric Nurse Specialist. It will further enable the student to function as educator, manager, and researcher in the field of Paediatric Nursing.

Course Objectives: At the end of the course the students will be able to:

- Appreciate the history and developments in the field of pediatrics and
- pediatric nursing as a specialty, apply the concepts of growth and development in providing care to the pediatric clients and their families.
- Appreciate the child as a holistic individual
- Perform physical, developmental, and nutritional assessment of
- pediatric clients. Apply nursing process in providing nursing care to neonates & children
- Integrate the concept of family centered pediatric nursing care with related areas such as genetic disorders, congenital malformations and long term illness.
- Recognize and manage emergencies in neonates, describe various recent technologies and treatment modalities in the management of high risk neonates
- Prepare a design for layout and management of neonatal units

Course Outcomes:

On completion of this course students will be able to:

CO1. Appreciate the history and developments in the field of pediatrics and pediatric nursing as a specialty
CO2. Apply the concepts of growth and development in providing care to the pediatric clients and their families.
CO3. Appreciate the child as a holistic individual
CO4. Perform physical, developmental, and nutritional assessment of pediatric clients
CO5. Apply nursing process in providing nursing care to neonates & children
CO6. Integrate the concept of family centered pediatric nursing care with related areas such as genetic disorders, congenital malformations and long term illness.
CO7. Recognize and manage emergencies in neonates
CO8. Describe various recent technologies and treatment modalities in the management of high risk neonates
CO9. Appreciate the legal and ethical issues pertaining to pediatric and neonatal nursing
CO10. Prepare a design for layout and management of neonatal units
CO11. Incorporate evidence based nursing practice and identify the areas of research in the field of pediatric/neonatal nursing
CO12. Recognize the role of pediatric nurse practitioner and as a member of the pediatric and neonatal health team

PROGRAMME SPECIFIC OUTCOMES:-

On completion of M.Sc. Nursing programme the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.

PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care

Course Content

Modules	**Blooms level**	**Number of hours (as per INC)**
Module I **Introduction** □ Historical development of Pediatrics and Pediatric Nursing in India; □ Current status of child health in India; □ Trends in Pediatrics and Pediatric Nursing, □ Ethical and cultural issues in pediatric care □ Rights of children □ National health policy for children, special laws and ordinances relating to children. □ National goals, □ Five year plans, □ National health programs related to child health.	**L1,2**	**10**
Module II **Assessment of pediatric clients** □ History taking □ Developmental assessment	**L4,5,6**	**10**

□ Physical assessment □ Nutritional assessment □ Family assessment		
Module III **Hospitalized child** □ Meaning of hospitalization of the child, preparation for hospitalization, effects of hospitalization on the child and family □ Stressors and reactions related to developmental stages, play activities for ill hospitalized child. □ Nursing care of hospitalized child and family -principles and practices	**L1,2,3**	**10**
Module IV **Pre-natal Pediatrics** □ Embryological and fetal development, Prenatal factors influencing growth and development of fetus, □ Genetic patterns of common pediatric disorders, chromosomal aberrations, genetic assessment and counseling legal and ethical aspects of genetic, screening and counseling role of nurse in genetic counseling, □ Importance of prenatal care and role of pediatric nurse.	**L1,2**	**15**
Module V **Growth and Development of children** □ Principles of growth and development, □ Concepts and theories of growth and development, □ Developmental tasks and special needs from infancy to adolescence, developmental milestones,	**L4,5,6**	**15**

□ Assessment of growth and development of pediatric clients, □ Factors affecting growth and development.		
Module VI **Behavioral Pediatrics and Pediatric Nursing** □ Parent child relationship, □ Basic behavioral pediatric principles and specific behavioral pediatric concepts/disorders- maternal deprivation, failure to thrive, child abuse, the battered child, □ Common behavioral problems and their management, □ Child guidance clinic.	**L1, 2,3**	**15**
Module VII **Preventive Pediatrics and Pediatric Nursing** □ Concept, aims and scope of preventive pediatrics, □ Maternal health and its influence on child health antenatal aspects of preventive pediatrics, □ Immunization, expanded program on immunization/ universal immunization program and cold chain, □ Nutrition and nutritional requirements of children, changing patterns of feeding, baby- friendly hospital initiative and exclusive breast feeding, □ Health education, nutritional education for children □ Nutritional programs □ National and international organizations related to child health, Role of pediatric nurse in the hospital and community**.**	**L1,2,3**	**15**
Module VIII **Neonatal Nursing** □ New born baby- profile and characteristics of the new born,	**L1,2,3**	**30**

□ Assessment of the new born, □ Nursing care of the new born at birth, care of the new born and family, □ High risk newborn- pre term and term neonate and growth retarded babies, □ Identification and classification of neonates with infections, HIV & AIDS, Ophthalmia neonatorum, congenital syphilis. □ High risk new born- Identification, classification and nursing management □ Organization of neonatal care, services(Levels), transport, neonatal intensive care unit, organization and management of nursing services in NICU.		
Module IX **IMNCI** (Integrated management of neonatal and childhood illnesses)	**L4, 5, 6**	**30**

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme (Theory): Internals-25, External- 75

Components	ATT	SE	Seminar1	Seminar 2	Class test	EE
Weightage	**5**	**5**	**5**	**5**	**5**	**75**

ATT-Attendance; SE-Sessional Examination; EE- End Semester Examination

Reference Books:

1. Whaley and Wong, Essentials of Pediatrics Nursing

2. Learners Guide, WHO, AIIMS
3. IMNCI Students' Handbook, WHO
4. Ball and Bindler, *Paediatric Nursing Caring for Children*, Prenticehall.
5. Behrman, Richard K & Vaughan, Nelson,s, *TextBook of Paediatrics*, WB Saunders Co.,
6. Ghai O P, *Essential Paediatrics*
7. Asuma Beevi, Textbook of Pediatric Nursing
8. Parul Datta, Textbook of Pediatric Nursing
9. Panchali Pal, Textbook of Pediatric Nursing

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1
CO7	2	1	3	2	2	2	2	1	2	2	1

CO8	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO9	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO10	**1**	**2**	**2**	**1**	**1**	**1**	**3**	**1**	**2**	**3**	**1**
CO11	**3**	**3**	**3**	**1**	**3**	**3**	**1**	**1**	**2**	**2**	**1**
CO12	**1**	**2**	**2**	**1**	**1**	**1**	**3**	**1**	**2**	**3**	**1**

1: strongly related, 2: moderately related and 3: weakly related

CHN4103	Community Health Nursing-1	L	T	P	C
Version 1.1	Date of Approval:	**15**	**20**		**15**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to assist students in developing expertise and in-depth understanding in the field of Community Health Nursing. It would help students to appreciate holistic life style of individuals, families & Group and develop skills to function as Community Health Nurse specialist/practitioner.

Course Objectives:

The course is designed to develop an understanding of concepts and constructs of theoretical basis of community health nursing and further enable student to function as an educator, manager and researcher in the field of Community Health nursing.

Course Outcomes:

On completion of this course students will be able to:

CO1: Describe the History and development of community health nursing, National Policies and Programmes

CO2: Explain the concepts and issues of health and eco system

CO3: Discuss the Approaches of Population dynamics and control

CO4: Explain the Quality Assurance in Community health Nursing and Family health nursing process

CO5: Explain the Maternal and neonatal care, Integrated Management of Neonatal And Childhood Illnesses

CO6: Describe the Disaster Management and Nursing Care in emergencies

CO7: Discuss the Information, education and communication and Management information and evaluation system

CO8: Explain the Health care delivery system in India

PROGRAMME SPECIFIC OUTCOMES:-

On completion of M.Sc. Nursing programme in Community Health Nursing, the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.

PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction • Historical development of Community Health and Community health Nursing- World and India, various health and family welfare committees • Current status, trends and challenges of Community Health Nursing • Health status of the Community-community diagnosis	L1, and L2	15

• Scope of Community health Nursing practice • Ethical and legal issues • Socio-cultural issues in Community health Nursing • National Policies, plans and programmes • National health policy • National Population policy • National Health and welfare Programmes • National Health goals/ indicators/ Millennium developmental goals(MDG)/ Strategies • Planning process: Five year plans • National Rural Health Mission • Panchayati Raj institutions		
MODULE 2: Health • Concepts, issues • Determinants • Measurements • Alternate systems for health promotion • and management of health problems • Health economics • Health technology • Genetics and health • Waste disposal • Eco system	L1,L2	15
MODULE 3:Population dynamics and Control	L1,L2,	15

• Demography • Transition and theories of population • National population policy • National population programmes • Population control and related programmes • Methods of family limiting and spacing • Research, Census, National Family Health Survey	and L3	
MODULE 4: Community Health Nursing • Philosophy, Aims, Objectives, Concepts, Scope, Principles, Functions • Community health Nursing theories and models • Quality assurance: Community health Nursing standards, competencies, Monitoring community health nursing, nursing audits • Family nursing and Family centered nursing approach • Family health nursing process – Family health assessment – Diagnosis – Planning – Intervention – Evaluation • Nursing care for special groups: children, adolescents, adults, women, elderly, physically and mentally challenged- Urban and rural population at large • Community nutrition • Concept, role and responsibilities of community health Nurse practitioners/nurse midwifery practitioners-decision making skills, professionalism, legal issues •	L1,L2, and L3	20
MODULE 5: Maternal and neonatal care • IMNCI(Integrated Management of Neonatal And Childhood Illnesses) • Skilled Birth Attendant (SBA)	L1,L2 and L3	15
MODULE 6: Disaster Management • Disaster nursing (INC module on Reaching out: Nursing Care in emergencies)	L1, L2,L3	20
MODULE 7: Information, education and communication • IEC/BCC: Principles and strategies • Communication Skills • Management information and evaluation system: Records and reports	L1,L2, and L3	20

• Information technology • Tele-medicine and tele-nursing • Journalism • Mass media • Folk media		
MODULE 8:Health care delivery system: Urban, rural, tribal and difficult areas • Health agencies: NGO's, Roles and functions • Inter-sectoral coordination • Public private partnership • Challenges of health care delivery system	L1 and L2	20

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Main text

1. Clark, June & Jill Handerson, Community Health, Churchill Livingstone, 2012, New York.
2. Freeman B. Ruth, Public Health Practices, W. W. Saunders CO., 2014, Philadelphia.
3. Fromer Joan Margot, Community Health Care and the Nursing Process, C.VMosby CO., 2011,Toronto.
4. Park J. E, Text Book of Preventive and Social Medicine, Ms Banarsidas Bhanot CO., 2016, Jabalpur.
5. Rao S. Kasthi, An Introduction to Community Health Nursing, B. I. Publishers, 2018 Madras.
6. Gulani,K,K. Community Health Nursing(2017). Kumar Publishing House.pp 339-420.
7. Basavanthappa,B,T. Community Health Nursing(2nd edition), Jaypee Brothers Medical Publishers, 2013.
8. Kamalam, S. Essentials in Community Health Nursing Practice.(2nd edition), Jaypee Brothers, 2015.
9. Alternative approaches to health care. ICMR. Paper presented at the National Symposium on Alternative Approaches to health care, 2014.
10. Archer,S,E. Community Health Nursing:Patterns and Practice.(2nd edition).Duxbusy Press, 2016
11. Prabhakara,G,N. Textbook of Community Health for Nurses.(2nd edition). Peepee Publishers and distributers, 2012.
12. Stanhope,M &Lanchaster,J.Community Health Nursing:Practice and Process for Promoting Health.(3rd edition).mosby, 2015.
13. Pinger,R,P.An Introduction to Community health.(4th edition).Jones and Bartlett Publishers, 2015

14. Patney Sunita , (2005), Text Book Of Community Health Nursing, First Edition, Cbs, 2012.
15. Mckenzie James F. Pinger Robert R, Kotecki Jerome E, (2014), An Introduction To Community Health Nursing, Fourth Edition, Jones And Bartlett.
16. Lundy Saucier Karen, Janes Sharyn, (2012) Community Health Nursing, First Edition, Jones And Bartlettt.

* Latest editions of all the suggested books are recommended.

Web Resources:

- Pub med
- CINAHL(cumulative index to Nursing and allied health literature)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA-Extracurricular activity; EE- End Semester Examination

Concept Mapping between COs, PSOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	2	1	3	1	2	1	2	1	2
CO2	2	1	2	2	1	1	2	1	2	3	2
CO3	1	1	1	2	3	2	1	3	1	3	1
CO4	2	2	1	2	1	2	2	2	2	1	2
CO5	2	1	2	2	2	1	2	2	1	1	1
CO6	1	1	3	1	1	1	1	1	1	2	1
CO7	1	1	1	1	3	1	1	1	1	3	1
CO8	2	1	2	3	1	1	2	2	1	2	1

1: strongly related, 2: moderately related and 3: weakly related

PSN4103	Mental Health (Psychiatric) Nursing	L	T	P	C
Version 1.1	Date of Approval:	**15**	**20**		**15**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalog: This course is designed to assist students in developing expertise and in depth understanding in the field of Psychiatric Nursing. It will help students to develop advanced skills for nursing intervention in various Psychiatric conditions. It will enable the student to function as Psychiatric Nurse practitioner/specialist. It will further enable the student to function as educator, manager, and researcher in the field of Psychiatric Nursing

Course Objectives:

1. This course is designed to assist students in developing expertise and in depth understanding in the field of Psychiatric Nursing.
2. It will help students to appreciate the client as a holistic individual and develop skill to function psychiatric nurse specialist.
3. It will further enable the student to function as educator, manager, and researcher in the field of Psychiatric nursing.

Course Outcomes:

On completion of this course, the students will be able to:

CO1: Utilize/apply the concepts, theories and principles of psychiatric nursing science
CO2: Demonstrate advance competence in practice of psychiatric nursing
CO3: Practice as a psychiatric nurse specialist.
CO4: Demonstrate leadership qualities and function effectively as psychiatric nurse educator and manager.
CO5: Demonstrate skill in conducting nursing research, interpreting and utilizing the findings from health related research.

CO6: Demonstrate the ability to plan and effect change in psychiatric nursing practice and in the health care delivery system.

CO7: Establish collaborative relationship with members of other disciplines

C08: Demonstrate interest in history taking of the psychiatric patients..

CO9 : Explain the Psycho social and physical therapies

CO10 : Describe the various Psychopharmacology

CO11 : Enumerate the Electroconvulsive Therapy

CO12: Explain the Alternative systems of medicine in mental health

Modules	Blooms level*	Number of hours

MODULE: 1: Introduction.
• Mental Health and Mental Illness
• Historical perspectives
• Trends, issues and magnitude
• Contemporary practices
• Mental health laws/Acts
• National mental health program -National mental health authority, state mental health authority
• Human rights of mentally ill
• Mental Health/ Mental Illness Continuum
• Classification of mental illnesses-ICD, DSM
• Standards of Psychiatric nursing
• Challenges and Scope of psychiatric nursing
• Multi-disciplinary team and role of nurse
  • Role of psychiatric nurse- extended and expanded
  • Principles and practice of Psychiatric Nursing Review
	L1, L2 and L3	10

MODULE 2: Concepts of Psychobiology	L2, L3	15

• The Nervous System: – An Anatomical Review – The Brain and limbic system – Nerve Tissue – Autonomic Nervous system – Neurotransmitters • Neuroendocrinology – Pituitary, Thyroid Gland – Circadian Rhythms • Genetics • Neuro psychiatric disorders • Psychoimmunology – Normal Immune response – Implications for psychiatric Illness – Implications for Nursing	and L4	
MODULE 3: Theories of Personality Development and relevance to nursing practice • Psychoanalytic Theory- Freud's • Interpersonal Theory-Sullivan's • Theory of Psychosocial Development-Erikson's	L2, L3 and L4	10

• Theory of object relations • Cognitive Development Theory • Theory of Moral Development • A Nursing Model-Hildegard E.Peplau		
MODULE 4: Stress and its management • An introduction to the concepts of stress • Psychological Adaptation to stress • Stress as a Biological Response. • Stress as an Environmental Event. • Stress as Transaction between the Individual and the Environment. • Stress management.	L1, L2, and L4	5
MODULE 5: Therapeutic communication and interpersonal relation-ship • Review communication process, factors affecting communication • Communication with individuals and in groups • Techniques of therapeutic communication-touch therapy • Barrier of communication with specific reference to psychopathology • Therapeutic attitudes • Dynamics of a therapeutic Nurse-client relationship; • Therapeutic use of self Gaining self-awareness • Therapeutic nurse-patient relationship its phases ; Conditions essential	L1,L2, and L4	10

to development of a therapeutic relationship • Therapeutic impasse and its management		
MODULE 6: Assertive Training • Assertive Communication • Basic Human Rights • Response Patterns – (Non assertive Behavior – Assertive Behavior – Aggressive Behavior – Passive-Aggressive Behavior) • Behavioral Components of Assertive Behavior • Techniques that Promote Assertive Behavior • Thought-Stopping Techniques Method • Role of The Nurse	L2, L3 and L4	10
Module 7: Promoting Self-Esteem • Components of Self-Concept • The Development of Self-Esteem • The Manifestations of Low-Self-Esteem • Boundaries • Role of The Nurse	L1, L2, and L4	10

• Women and Mental Health – Normal reaction to conception, pregnancy and puerperium – Problems related to conception, pregnancy and puerperiumand its management. – Counselling – Premarital, marital and genetic		
Module 8: The nursing process in psychiatric/mental health nursing • Mental health assessment- History taking, mental status examination • Physical and neurological examination • Psychometric assessment • Investigations, Diagnosis and Differential diagnosis • Interpretation of investigations • Nurse's role • Nursing case management – Critical pathways of care – Documentation – Problem-oriented recording – Focus charting	L1,L2, L3 and L4	10
Module 9: Psycho social and physical therapies • Individual therapy • Behavioural Therapy- Relaxation therapy, cognitive therapy, positive-negative reinforcement, bio-feedback, guided imagery, ab-reactive therapy	L2, L3 and L4	35

• Group Therapy • Family Therapy • Milieu Therapy • The Therapeutic Community • Occupational therapy • Recreational therapy • Play therapy • Music therapy • Light therapy • Color therapy • Aroma therapy		
Module 10: Psychopharmacology • Historical Perspectives • Role of a Nurse in Psychopharmacological Therapy – Antianxiety Agents – Antidepressants Agents – Mood stabilizers – Antipsychotics – Sedative-Hypnotics – Central Nervous System Stimulants	L1,L2, and L4	10

– Future developments		
Module 11: Electroconvulsive Therapy • Historical Perspectives • Indications • Contraindications • Mechanisms of Action • Side Effects • Risks Associated with Electroconvulsive Therapy • The Role of The Nurse in Electroconvulsive Therapy	L1,L2, L3 and L4	5
Module 12: Alternative systems of medicine in mental health • Types of Therapies – Herbal Medicine – Unani – Siddha – Homeopathic – Acupressure and Acupuncture – Diet and Nutrition – Chiropractic Medicine – Therapeutic Touch and Massage – Yoga	L2, L3 and L4	15

– Pet Therapy		

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

a) Main text: Kaplan H. Saddock B, Synopsis of Psychiatry, William sand Wilkins, 1991, Bathmov.

b)Bimla kapoor CV, A Text book of Psychiatric Nursing, Mosby Co., 1982, Delhi.

c)Shivas, "Basic Concept of Psychiatric Mental Health Nursing, B.I Publications, 1994.

d)Brown R. T. Feldman G. R., Epilepsy -Diagnosis and Management, Little Brown And Co., 1983, Toronto.

e)Beck M. C. Rawtins P. R. and et al, Mental Health – Psychiatric Nursing. The C.V. Mosby Co., Ltd. 1984, Toronto.

f)Kaplan H. Saddock B, Synopsis of Psychiatry, William sand Wilkins, 1991, Bathmov.

g)Stuart W. G. Sundeen J. S, Principles and Practice of Psychiatric Nursing, Mosby Year book, 1991, London.

h)Taylor C.M., Essentials of Psychiatric Nursing, CV Mosby Co., 1982, London.

i)Bimla kapoor CV, A Text book of Psychiatric Nursing, Mosby Co., 1982, Delhi.

j)Shivas, "Basic Concept of Psychiatric Mental Health Nursing, B.I Publications, 1994.

k)Brown R. T. Feldman G. R., Epilepsy -Diagnosis and Management, Little Brown And Co., 1983, Toronto.

l)Beck M. C. Rawtins P. R. and et al, Mental Health – Psychiatric Nursing. The C.V. Mosby Co., Ltd. 1984, Toronto.

m)Coleman C. J, Abnormal Psychology and Modern Life. P. B. Tara and Sons Co. Pvt Ltd. 1982.

n)Coleman C. J, Abnormal Psychology and Modern Life. P. B. Tara and Sons Co. Pvt Ltd. 1982.

i) Additional Texts: Gelder M.G., Andreasen N.C. New Oxford Textbook of Psychiatry, Oxford University Press, 2012.

ii) Other readings: Journals of Psychiatry
Journals of Psychiatric Nursing
Journals of Psychiatric Social Work
Journals of Clinical Psychology

Reference Books :

1.Stuart W. G. Sundeen J. S, Principles and Practice of Psychiatric Nursing, Mosby Year book, 1991, London.

2. Taylor C.M., Essentials of Psychiatric Nursing, CV Mosby Co., 1982, London

1. **Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination**

Examination Scheme:

1. **Assessment Scheme(more columns may be added for assessment):**

Components	**ATT**	**HA**	**CT**	**SE**	**EA**	**EE**
Weightage (%)	**5**	**5**	**5**	**5**	**5**	**75**

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA- Extracurricular activity; EE- End Semester Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	**1**	**2**	**1**	**-**	**3**	**1**	1	--	--	1
CO2	**1**	**3**	**1**	**1**	**1**	**-**	**3**	**1**	1	--	--	1
CO3	**1**	**3**	**1**	**3**	**1**	**-**	**3**	**1**	1	--	--	1
CO4	**1**	**1**	**1**	**2**	**2**	**2**	**3**	**1**	1	-	1	-
CO5	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO6	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO7	**1**	**3**	**1**	**2**	**1**	**-**	**3**	**1**	1	--	--	1
CO8	**1**	**3**	**1**	**1**	**1**	**-**	**3**	**1**	1	--	--	1
CO9	**1**	**3**	**1**	**3**	**1**	**-**	**3**	**1**	1	--	--	1
CO10	**1**	**1**	**1**	**2**	**2**	**2**	**3**	**1**	1	-	1	-
CO11	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO12	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1

OGN4103	Obstetrics & Gynaecological Nursing	L	T	P	C
Version 1.1	Date of Approval:	**15**	**20**		**15**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue:

This course is designed to assist students in developing expertise and in depth understanding in the field of Obstetrics & Gynecological Nursing. It will help students o appreciate the client as a holistic individual and develop skill to function as an independent midwifery practitioner. It will further enable the student to function as an educator, manager and researcher in the field of Obstetrics & Gynecological Nursing.

Course Objectives:

The objective of this course is to:

1. Be in a position to describe the physiology and management of the various stages of labour and puerperium.
2. Be is a position to manage the mothers during the normal vaginal delivery
3. Be in a position to conduct normal vaginal delivery and also be able to resuscitate the newborn babies immediately after birth.
4. Be in a position to identify the at risk mothers and manage them accordingly.
5. Be in a position to identify the various alternative and complimentary therapies in obstetrics & gynaecological nursing
6. Be in a position to incorporate evidence based nursing practice and identify the areas of nursing research.

Course Outcomes:

At the end of the course students will be able to:

CO1: Appreciate the trends in the field of midwifery, obstetrics and gynecological as a speciality.

CO2: Describe the population dynamics and indicators of maternal and child health.

CO3: Describe the concepts of biophysical, psychological and spiritual aspects of normal pregnancy, labour and pueperium.

CO4: Provide comprehensive nursing care to women during reproductive period and newborns.

CO5: Integrate the concepts of family centered nursing care and nursing process approach in obstetric and gynecological nursing.

CO6: Identify and analyze the deviations from normal birth process and refer appropriately.

CO7: Describe the pharmacological agents, their effects during pregnancy, child birth, pueperium, lactation and the role of nurse.

CO8: Counsel adolescents, women and families on issues pertaining to pregnancy, child birth and lactation.

CO9: Describe the role of various type of complementary and alternative therapies in obstetric and gynecological nursing.

CO10: Incorporate evidence based nursing practice and identify the areas of research on obstetric and gynecological nursing.

CO11: Describe the recent advancement in contraceptive technology and birth control measures.

CO12: Appreciate the legal and ethical issues pertaining to obstetric and gynecological nursing.

Course coverage:

Modules	Bloom's level	Number of hours
Module I **Introduction** • Historical and contemporary perspectives • Epidemiological aspects of maternal and child health • Magnitude of maternal and child health problems • Issues of maternal and child health : Age, Gender, Sexuality, psycho Socio cultural factors • Preventive obstetrics • National health and family welfare programmes related to maternal and child health: health care delivery system- National Rural health mission, Role of NGO's • Theories, models and approaches applied to midwifery practice • Role and scope of midwifery practice: Independent Nurse midwifery practitioner • Legal and Ethical issues: Code of ethics and standards of midwifery practice, standing orders • Evidence based midwifery practice • Research priorities in obstetric and gynaecological nursing.	L1, L2	10
Module II • Review of anatomy and physiology of human reproductive system: male and female • Hormonal cycles • Embryology • Genetics, teratology and counselling	L1, L2	15

• Clinical implications		
Module III **Pregnancy** • Maternal adaptation : Physiological, psychosocial • Assessment – Maternal and foetal measures Maternal measures: History taking , examination-General, physical and obstetrical measure, identification of high risk • Foetal measure- clinical parameters, biochemical- human estriol, Maternal Serum Alfa Feto Protein, Acetyl Choline esterase (AchE), Triple Test Aminocentesis, Cordocentesis, chorionic villus sampling (CVS) • Biophysical- (US IMAGING, Foetal movement count, Ultra Sonography, Cardiotocography, cardiotomography, Non Stress Test(NST), Contraction stress test(CST), amnioscopy, foetoscopy. • Radiological examination, • Interpretation of diagnostic tests and nursing implications • Nursing management of the pregnant women, minor disorders of pregnancy and management, preparation for child birth and parenthood, importance of institutional delivery , choice of birth setting, importance and mobilizing of transportation, prenatal counselling, role of nurse and crisis intervention, identification of high risk pregnancy and refer • Alternative/complementary therapies	L1, L2,	10
Module IV • **Normal Labour and nursing management** –Essential factors of labour –Stages and onset • **First stage: Physiology of normal labour** –Use of partograph: Principles, use and critical analysis,	L1, L2, L3, L4	5

evidence based studies –Analgesia and anaesthesia in labour –Nursing management • **Second stage** – Physiology , intrapartum monitoring – Nursing management. – Resuscitation , immediate newborn care and initiate breastfeeding (Guidelines of National neonatology forum of India) • **Third stage** Physiology and nursing management • **Fourth stage – Observation, critical analysis and Nursing management.** –Various child birth practice: water birth, position change etc –Evidence based practice in relation to labour intervention • **Role of nurse midwifery practitioner** • Alternative/complementary therapies		
Module V **Normal puerperium and nursing management** • Physiology of puerperium • Physiology of lactation, lactation management, exclusive breastfeeding, Baby friendly hospital initiative (BFHI) • Assessment of postnatal women • Minor discomforts and complications of puerperium • Management of mothers during puerperium: Postnatal exercises Rooming in, bonding, warm chain • Evidence based studies • Role of nurse midwifery practitioner • Alternative/complementary therapies	L3, L4	10

Module VI **Normal Newborn** • Physiology and characteristics of normal newborn • Physical and Behavioural assessment of newborn • Needs of newborn • Essential newborn care: Exclusive breast feeding, Immunization, Hygiene measures, Newborn nutrition • Organization of neonatal care, services(Levels), transport, neonatal intensive care unit, organization and management of nursing services in NICU • Observation and care of newborn • Parenting process	L1,L2, L3	10
Module VII **Pharmacodynamics in obstetrics** • Drugs used in pregnancy, labour, post partum and newborn • Calculation of drug dose and administration • Effects of drugs used • Anaesthesia and analgesia in obstetrics • Roles and responsibilities of midwifery nurse practitioner • Standing orders and protocols and use of selected life saving drugs and interventions of obstetric emergencies approved by the MOHFW	L2,L3,L4	10
Module VIII **Family welfare services** • Population dynamics • Demography trends: vital statistics, calculation of indicators especially maternal and neonatal mortality rates and problems and other health problems • Recent advancement in contraceptive technology	L1,L2	10

• Role of nurses in family welfare programmes in all settings • Role of independent nurse midwifery practitioner • Family life education • Evidence based studies • Information, Education and Communication(IEC) • Management information and evaluation system(MIES) • Teaching and supervision of health team members		
Module IX **Infertility** • Primary and secondary causes • Diagnostic procedures • Counselling: ethical and legal aspects of assisted reproductive technology (ART) • Recent advancement in infertility management. • Adoption procedures • Role of nurses in infertility management.	L1, L2 L3	35
Module X **Menopause** • Physiological, psychological and social aspects • Hormone Replacement Therapy • Surgical menopause • Counselling and guidance • Role of midwifery nurse practitioner	L1, L2 L3	10

Module XI **Abortion** • Types, causes • Legislations, Clinical rights and professional responsibility • Abortion procedures • Complications • Nursing management • Role of midwifery nurse practitioner	L1, L2 L3	5

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

1. **Main text:**

- DUTTA, D.C., 2011 Textbook of Obstetrics. 7th edition. New Central Agency, Delhi
- MYLES, 2009 Textbook of Midwives, 15th edition, Elsevier, China
- JACOB, A and et. Al. Clinical Nursing Procedures: The art of nursing practice. Jaypee Brothers, New Delhi.

2. **Additional texts:**

- Jane Marshall "Myles Textbook for Midwives" 16th edition Elsevier
- Salhan Sudha, 2007 Textbook of Obstetrics, 1st ed. Jaypee Brothers, Delhi
- Lowdermilk, et. Al. Maternity & Women's Health Care, 10th ed. Elsevier
- Dawn C.S., Textbook of Obstetrics, New Central book agency Ltd., Calcutta
- Hawkins & Borune, Shaw's, Textbook of Gynaecology, B. I. Churchill Livingstone Pvt. Ltd.

3. **Other readings:**

- Singh Meharban 2010 Care of the Newborn, 7th ed. Sagar, New Delhi
- Gupta Piyush 2010 Essential Paediatric Nursing, 2nd ed CBS, Noida
- Weber, J and Kelly, J. Health Assessment in Nursing. Lippincott Williams and Wilkins, Philadelphia

4. **Web resources:**

- www.elseiverhealth.com

- http://mohfw.nic.in/

Examination scheme (Theory):

Components	ATT	HA	CT	SE	EE
Weightage (%)	5	5	5	10	75

ATT – Attendance, HA – Home assignment, CT – class test, SE – Sessional examination, EA – extracurricular activity, EE – End term examination

Relationship between the course outcomes (COs), programme Outcomes (PO) and learning outcomes (Los)

Mapping between COs, PLOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	2	2	1	2	1	1	2	2
CO2	1	2	1	2	1	2	2	1	1	1	-
CO3	2	2	1	1	2	1	2	2	2		-
CO4	2	-	-	1	2	2	1	2	2	2	2
CO5	1	1	2	1	1	2	1	1	1	2	1
CO6	2	2	1	2	1	1	-	1	1	1	1
CO7	1	2	1	2	1	1	1	2	-		2
CO8	1	2	1	1	-	1	2	2	2	2	-
CO9	1	1	2	1	2	1	2	1	1	2	2
CO10	2	1	2	1	2	2	1	1	1	1	2
CO11	2	2	2	2	1	2	1	2	2		1
CO12	1	2	1	2	1	2	1	2	2	2	-

1: strongly related, 2: moderately related and 3: weakly related

NUR4201	Advance Nursing Practice	L	T	P	C
Version 1.1	Date of Approval: November 2011	**15**	**12****		**21**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: This course is aimed at developing a holistic approach in rendering nursing care to the patients/clients in the hospital as well as in the community respectively by implementing modern trends & methods in nursing profession for the specific protection, promotion, prevention and rehabilitation of the patients/clients.

Course Objectives:

The course is designed to develop an understanding of concepts and constructs of theoretical basis of advance nursing practice and critically analyze different theories of nursing and other disciplines.

Course Outcomes:

On completion of this course students will be able to:

CO1: Describe the History of development of nursing profession, characteristics, criteria of the profession, perspective of nursing profession-national, global

CO2: Explain the Health care delivery system- national, state, district as well as at local level.

CO3: Discuss the Approaches to common genetic disorders

CO4: Describe the Application of epidemiology in health care delivery, Health surveillance and health informatics

CO5: Explain the Bio-Psycho social pathology

CO6: Describe the Philosophy as well as Theories of Nursing along with its implication in health care delivery system.

CO7: Explain Nursing process approach for the individual, family as well as community

CO8: Discuss Psychological aspects and Human relations

CO9: Describe the Extended and expanded role of the Nurse in promotive, preventive, curative as well as restorative health care delivery system in community and institutions

CO10: Explain the Computer applications for patient care delivery system as well as in Nursing Practice

Modules	Blooms level*	Number of hours
MODULE 1: **Nursing as a Profession** • History of development of nursing profession, characteristics, criteria of the profession, perspective of nursing profession-national, global • Code of ethics(INC), code of professional conduct(INC), autonomy and accountability, assertiveness, visibility of nurses, legal considerations • Role of regulatory bodies • Professional organizations and unions-self defense, individual and collective bargaining • Educational preparations, continuing education, career opportunities, professional advancement & role and scope of nursing education. • Role of research, leadership and management. • Quality assurance in nursing (INC). • Futuristic nursing.	L1, and L2	10
MODULE 2: **Health care delivery** • Health care environment, economics, constraints, planning process, policies, political process vis a vis nursing profession. • Health care delivery system- national, state, district and local level.	L1,L2, and L3	10

• Major stakeholders in the health care system-Government, non-govt, Industry and other professionals. • Patterns of nursing care delivery in India. • Health care delivery concerns, national health and family welfare programs, inter-sectoral coordination, role of nongovernmental agencies. • Information, education and communication (IEC). • Tele-medicine.		
MODULE 3: **Genetics** • Review of cellular division, mutation and law of inheritance, human genome project ,The Genomic era. • Basic concepts of Genes, Chromosomes & DNA. • Approaches to common genetic disorders. • Genetic testing – basis of genetic diagnosis, Pre symptomatic and predisposition testing, Prenatal diagnosis & screening, Ethical, legal & psychosocial issues in genetic testing. • Genetic counselling. • Practical application of genetics in nursing.	L1,L2, L3 and L4	15
MODULE 4: **Epidemiology** • Scope, epidemiological approach and methods, • Morbidity, mortality, • Concepts of causation of diseases and their screening, • Application of epidemiology in health care delivery, Health surveillance and health informatics • Role of nurse	L1,L2, and L3	15
MODULE 5:	L1,L2	15

Bio-Psycho social pathology • Pathophysiology and Psychodynamics of disease causation. • Life processes, homeostatic mechanism, biological and psycho-social dynamics in causation of disease, life style. • Common problems: Oxygen insufficiency, fluid and electrolyte imbalance, nutritional problems, hemorrhage and shock, altered body temperature, unconsciousness, sleep pattern and its disturbances, pain, sensory deprivation. • Treatment aspects: pharmacological and pre- post operative care aspects, • Cardio pulmonary resuscitation. • End of life Care • Infection prevention (including HIV) and standard safety measures, bio-medical waste management. • Role of Nurse- Evidence based Nursing practice; Best practices • Innovations in Nursing.	and L3	
MODULE 6: **Philosophy and Theories of Nursing** • Values, Conceptual Models, Approaches. • Nursing theories: Nightingale's, Hendersons's, Roger's, Peplau's, Abdella's, Lewine's, Orem's, Johnson's, King's, Neuman's, Roy's, Watson Parsce, etc and their applications, • Health belief models, communication and management, etc • Concept of Self health. • Evidence based practice model.	L1, L2,L3 and L5	15
MODULE 7: **Nursing process approach** • Health Assessment- illness status of patients/clients (Individuals, family, community), Identification of health illness problems,	L1,L2, and L3	10

health behaviors, signs and symptoms of clients. • Methods of collection, analysis and utilization of data relevant to Nursing Process. Formulation of nursing care plans, health goals, implementation, modification and evaluation of care.		
MODULE 8: **Psychological aspects and Human relations** • Human behavior, Life processes & growth and development, personality development, defense mechanisms, • Communication, interpersonal relationships, individual and group, group dynamics, and organizational behavior, • Basic human needs, Growth and development, (Conception through preschool, School age through adolescence, Young & middle adult, and Older adult) • Sexuality and sexual health. • Stress and adaptation, crisis and its intervention, Coping with loss, death and grieving, • Principles and techniques of Counseling.	L1,L2, and L5	15
MODULE 9: **Nursing practice** • Framework, scope and trends. • Alternative modalities of care, alternative systems of health and complimentary therapies. • Extended and expanded role of the Nurse, in promotive, preventive, curative and restorative health care delivery system in community and institutions. • Health promotion and primary health care. • Independent practice issues: - Independent Nurse-midwifery practitioner. • Collaboration issues and models-within and outside Nursing.	L1,L2, and L3	15

• Models of Prevention, • Family Nursing, Home Nursing, • Gender sensitive issues and women empowerment. • Disaster Nursing. • Geriatric considerations in Nursing. • Evidence based Nursing practice- best practices • Trans-cultural Nursing.		
MODULE 10: **Computer applications for patient care delivery system and Nursing Practice** • Use of computers in teaching, learning, research and Nursing practice. • Windows, MS office: Word, Excel, Power Point, • Internet, literature search, • Statistical packages, • Hospital management information system: software.	L1,L2, L3 and L4	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Main text

1. Potter A. P. & Perry A. G, *Fundamental of Nursing*, C. V. Mosby Co., 2005, St. Louis.
2. Kozier B. et al, *Fundamentals of Nursing Concepts, Process and Practice, Pearson Education*, Inc, 2004.
3. Brunner and Suddarth, *Text Book of Medical Surgical Nursing*, 2002.
4. Zwemer A, *Professional Adjustments and Ethics for Nurse in India*, BI publications, 1995, Bangalore.
5. Rosdhal, *Fundamentals of Nursing*, Lippincott Co., 2003.
6. Taylor Carol, et al, *Fundamentals of Nursing*, Lippincott Co., 2005.
7. Park J.E., *Text Book of Preventive and Social Medicine*, Banarsidas Bhanot, Jabalpur

* Latest editions of all the suggested books are recommended.

Additional Texts:

1. Basavanthappa B. T, *Nursing Theories*, Jaypee Brothers, 2007, New Delhi.
2. Alligood M. R. & Tomey A. M, *Nursing Theory Utilization and Application*, Mosby, St. Louis.

Other readings:

- ✓ International Journal of Nursing Practice
- ✓ Journal of Advance Nursing
- ✓ International Journal of Research and Analytical Reviews

Web Resources:

- Pub med
- CINAHL(cumulative index to Nursing and allied health literature)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA-Extracurricular activity; EE- End Semester Examination

Concept Mapping between COs, PLOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-
CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1

CO11	-	1	1	2	2	1	1	2	-	1	1
CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1
CO15	1	1	1	1	1	1	1	-	1	1	1
CO16	1	-	1	1	1	1	1	-	1	-	1
CO17	-	1	1	2	2	1	1	2	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

NUR4202	Nursing Research and Statistics	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval: November 2011	**15**	**6**		**18**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Description

The course is designed to assist the students to acquire an understanding of the research methodology and statistical methods as a basis for identifying research problem, planning and implementing a research plan. It also enables the students to evaluate research studies and utilize research findings to improve quality of Nursing practice, education and management. It will further enable the students to develop an understanding of the statistical methods and apply them in conducting research studies in Nursing.

Course Objectives

The objective of this course is to

1. to acquire an understanding of the research methodology and statistical methods as a basis for identifying research problem, planning and implementing a research plan.
2. enable the students to evaluate research studies and utilize research findings to improve quality of Nursing practice, education and management.
3. enable the students to develop an understanding of the statistical methods and apply them in conducting research studies in Nursing.

Course Outcomes:

At the end of the course the students will be able to:

CO1. Define the terms used in research

CO 2. Describe concepts of scientific inquiry

CO 3. Describe research methodology

CO 4. Critically analyze research studies

CO 5. Develop acceptable research proposal

CO 6. Demonstrate initial competency to conduct health related research

CO 7. Write, present, interpret and utilize health related research

CO 8. Write scientific paper for publication

CO 9. Explain basic concepts related to statistics

CO 10. Identify scope of statistics

CO 11. Organize and tabulate the data and present it

CO 12. Use descriptive and inferential statistics to predict the results

CO 13. Apply & interpret measures of central tendency & measures of variance

CO 14. Identify concepts related to probability

CO 15. Use parametric and non- parametric statistical methods.

CO 16. Draw conclusions of the study and to predict statistical significance of the results

CO 17. Describe vital and health statistics and their use

Course Content

Modules	**Blooms level***	**Number of hours**
Unit I: Introduction Methods of acquiring knowledge – problem solving and scientific method. Research – Definition, characteristics, purposes, kinds of	L1, L2,L3 and L4	10

research, Historical Evolution of research in Nursing, Basic research terms, Scope of Nursing research: areas, problems in Nursing, health and social research, Concept of evidence based practice, Ethics in research, Overview of Research process.		
Unit II **Review of Literature** Importance, purposes, sources, criteria for selection of resources and steps in reviewing literature.	L1,L2, L3 and L5	5
Unit III **Research Approaches and designs** Type: Quantitative and Qualitative, Historical, survey and experimental –Characteristics, types advantages and disadvantages, Qualitative: Phenomenology, grounded theory, ethnography	L2, L3 and L4	12
Unit IV: **Research problem:** Identification of research problem, Formulation of problem statement and research Objectives:, Definition of terms, Assumptions and delimitations, Identification of variables, Hypothesis – definition, formulation and types.	L1,L2, L3, L4 and L5	10
Unit V: **Developing theoretical/conceptual framework** • Theories: Nature, characteristics, Purpose and uses • Using, testing and developing conceptual framework, models and	L1,L2 and L4	5

theories.		
Unit VI –Sampling • Population and sample • Factors influencing sampling • Sampling techniques • Sample size • Probability and sampling error • Problems of sampling	L1,L2, L3, L4 and L5	6
Unit VII **Tools and methods of Data collection:** • Concepts of data collection • Data sources, methods/techniques quantitative and qualitative. • Tools for data collection – types, characteristics and their development • Validity and reliability of tools Procedure for data collection	L1,L2, L3, L4 and L5	20
Unit VIII **Implementing research plan** • Pilot Study, review research plan (design), planning for data collection, Administration of tool /interventions, collection of data	L1,L2, L3, L4 and L5	5
Unit IX **Analysis and interpretation of data** • Plan for data analysis: quantitative and qualitative	L1,L2, L3, L4 and L5	10

• Preparing data for computer analysis and presentation. • Statistical analysis • Interpretation of data • Conclusion and generalizations • Summary and discussion		
Unit X **Reporting and utilizing research findings:** • Communication of research results; oral and written • Writing research report purposes, methods and style Vancouver, American Psychological Association (APA), Campbell etc. • Writing scientific articles for publication: purposes & style	L1,L2, L3, L4 and L5	10
Unit XI Critical analysis of research reports and articles	L1,L2, L3, L4 and L5	3
Unit XII • Developing and presenting a research proposal	L1,L2, L3, L4 and L5	4
STATISTICS		
Unit I – **Introduction:** Concepts, types, significance and scope of statistics, meaning of data, • Sample, parameter • Type and levels of data and their measurement	L1,L2, L3, L4 and L5	7

• Organization and presentation of data – Tabulation of data; • Frequency distribution • Graphical and tabular presentations.		
Unit II - **Measures of central tendency:** • Mean, Median, Mode	L1,L2, L3, L4 and L5	4
Unit III **Measures of variability;** • Range, Percentiles, average deviation, quartile deviation, standard deviation	L1,L2, L3, L4 and L5	4
Unit V **Measures of relationship:** • Correlation – need and meaning • Rank order correlation • Scatter diagram method • Product moment correlation • Simple linear regression analysis and prediction.	L1,L2, L3, L4 and L5	6
Unit VI **Designs and meaning:** • Experimental designs • Comparison in pairs, randomized block design, Latin squares.	L1,L2, L3, L4 and L5	5

Unit VII **Significance of Statistic and Significance of difference between two Statistics (Testing hypothesis)** • Non parametric test – Chi-square test, Sign, median test, Mann Whitney test. • Parametric test –'t' test, ANOVA, MANOVA, ANCOVA	L1,L2, L3, L4 and L5	8
Unit VIII **Use of statistical methods in psychology and education:** • Scaling – Z score, Z Scaling • Standard Score and T Score • Reliability of test Scores: test-retest method, parallel forms, split half method.	L1,L2, L3, L4 and L5	5
Unit IX **Application of statistics in health:** • Ratios, Rates, Trends • Vital health statistics – Birth and death rates. • Measures related to fertility, morbidity and mortality	L1,L2, L3, L4 and L5	4
Unit X **Use of Computers for data analysis** • Use of statistical package.	L1,L2, L3, L4 and L5	4

Text books:

1. Polit, D.F. & Bleck C.T, *Nursing Research Principles & Methods*, Lippincott Williams Wilkins, 2004, New York.

2. Polit, Bleck & P. Hungler, Nursing *Research Methods, Appraisal & Utilization*, 2001, Lippincott.
3. Mahajan, B.K, *Methods in Biostatistics*, Jaypee Brothers, 1999, New Delhi.
4. Rose Hott & Budin. Notter's, *Essentials of Nursing Research*, spinger publisher, 1999, New York.

Reference Books:

5. Patricial Nunhall. *Nursing Research*, James & Bar, 2001, Canada.
6. Caroly M.H, *Research Methods for Clinical Therapists Applied Project Design and Analysis*, 1999, Churchill Livingstone.
7. P.K. Indrani, T.K, *Research Methods for Nurses*. Jaypee brothers, 2005.
8. Clifford et al, *Getting Research into Practice*, Churchill Livingstone, 2004, New York.
9. Freshwater D. & Bishop V, *Nursing Research in Context*, Palgrave Macmillan, 2004, New York.
10. Macnee C. L, *Understanding Nursing Research: Reading & Using Research in Practice*, Lippincott Williams, Wilinks, 2004, London.
11. Specials & Carpenter, *Qualitative Research in Nursing Advancing the Humanistic Imperative*, Lippincott Williams. 2007
12. Basavanthappa, B.T, *Nursing Research*, Jaypee Brothers, 2003, New Delhi.

* Latest editions of all the suggested books are recommended

Journals:

1. *Journal of nursing practice and research.*
2. *Indian journal of medical ethics*
3. *International Journal of Nursing Education*
4. *Nursing Journal of India*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	5	8	7	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course Outcomes Assessment

This course contributes towards the learning outcomes**, 'nursing research and statistics**. The outcome will be measured by the performance of students in various class tests/assignments in addition to the End Semester Examination (ESE) that contains significant number of questions on problems related to the **nursing research and statistics**.

Relationship between the course outcomes (COs), programme Outcomes (PO) and learning outcomes (Los)

Mapping between COs, PLOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-
CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1
CO11	-	1	1	2	2	1	1	2	-	1	1

CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1
CO15	1	1	1	1	1	1	1	-	1	1	1
CO16	1	-	1	1	1	1	1	-	1	-	1
CO17	-	1	1	2	2	1	1	2	-	1	1

1-strongly related; 2-moderately related; 3-weakly related

MSN4203	Medical Surgical Nursing CS I & II Practical	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:				**22**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of medical surgical nursing procedures.

Course Description: It will help students to appreciate the adults as a holistic individual and develop skill to function as a Medical Surgical Nurse specialist.

Course Outcomes:

On completion of this course students will be able to:

CO1: Apply concepts & theories related to health promotion.

CO2: Appreciate the client as a holistic individual.

CO3: Perform physical, psychosocial assessment of Medical – Surgical patients.

CO4: Apply Nursing process in providing care to patients.

CO5: Integrate the concept of family centered nursing care with associated disorder such as genetic, congenital and long-term illness.

CO6: Recognize and manage emergencies with Medical- Surgical patients.

CO7: Describe various recent technologies & treatment modalities in the management of critically ill patients.

CO8: : Recognize the role of Nurse practitioner as a member of the Medical – Surgical health team

CO9: Prepare a design for layout and management of Medical – Surgical Units.

PROGRAMME SPECIFIC OUTCOMES:-

On completion of M.Sc. Nursing programme the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.

PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Course Content

Modules	**Blooms level**
Module I Students will be posted in General Medical Ward 120 Hours General Surgical Ward 120 Hours ICUs 120 Hours Oncology 60 Hours Ortho 60 Hours Cardio 60 Hours Emergency Department 60 Hours Neuro 60 Hours	**L1,2, 3**

Total 660 Hours (22 Weeks)	
Module II **Student Activities:** • Clinical presentations • History taking • Health Assessment • Nutritional Assessment • Health Education related to disease conditions • Case studies • Project work • Field visits	**L2,3, 4**

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	**NCP**	**CS/CP**	**Project**	**OR**	**HE**	**CE**	**EPE**
Weightage (%)	**10**	**30**	**10**	**05**	**05**	**40**	**100**

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Reference Books:

1. Black M.J., Hawks H.J, *Medical Surgical Nursing, Clinical Management for Positive Outcome*, 7th edition, Sauders, Elsevier Publication.
2. Morton, Patricia, et. al. *Critical Care Nursing: A Holistic Approach*, Lippincott Williams and Wilkkins; Eighth edition.
3. Urban, A.N., Greenlac K.K,"*Guidelines for Critical Care Nursing*, Mosby.
4. Wood L.S., Freelicher S.E, *Fetal Cardiac Nursing*, Lippincott Williams & Wilkings.
5. Gulanic, Klopp, Galnes, *Fetal Nursing Care Plans Nursing Diagnosis and intervention*.
6. Lewis, Collier & Heitkemper, *Medical Surgical Nursing Assessment and Management of Clinical Problems.*
7. Baughman Diane C, *Hand Book for Surgical Nursing*, 2nd edition, published by Lipincott, NewYork.
8. Philip &Wilma J, *Medical- Surgical Nursing*, 3rd edition, published by B.T Pubn Bangalore.

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO2	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO3	**2**	**1**	**2**	**3**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO4	**3**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO5	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO6	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO7	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO8	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO9	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

PDN4203	Pediatric Nursing CS I & II Practical	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:				**22**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of child health nursing procedures.

Course Description: It will help students to appreciate the child as a holistic individual and develop skill to function as a Pediatric Nurse specialist.

Course Outcomes:

On completion of this course students will be able to:

CO1. Elicit the history and perform physical examination of children

CO2. Apply the concepts of growth and development in providing care to the pediatric clients and their families.

CO3. Perform developmental, family and nutritional assessment of pediatric clients

CO4. Apply nursing process in providing nursing care to neonates & children

CO5. Integrate the concept of family centered pediatric nursing care with related areas such as genetic disorders, congenital malformations and long term illness.

CO6. Recognize and manage emergencies in neonates

CO7. Implement care using recent technologies and treatment modalities in the management of high risk neonates

CO8. Prepare a design for layout and management of neonatal units

CO9. Incorporate evidence based nursing practice and identify the areas of research in the field of pediatric/neonatal nursing

PROGRAMME SPECIFIC OUTCOMES:-

On completion of M.Sc. Nursing programme the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.

PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Course Content

Modules	**Blooms level**
Module I Growth & developmental assessment	**L1,2, 3**
Module II History taking, Physical examination Family assessment	**L2,3, 4**
Module III Developmental assessment	**L1,2,3**
Module IV Nutritional assessment	**L1,2, 3**
Module V	**L3,4, 5**

Assess and manage neonatal conditions	

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	**NCP**	**CS/CP**	**Project**	**OR**	**HE**	**CE**	**EPE**
Weightage (%)	**10**	**30**	**10**	**05**	**05**	**40**	**100**

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Reference Books:

1. Whaley and Wong, Essentials of Pediatrics Nursing
2. Learners Guide, WHO, AIIMS
3. IMNCI Students' Handbook, WHO
4. Ball and Bindler, *Paediatric Nursing Caring for Children*, Prenticehall.
5. Behrman, Richard K & Vaughan, Nelson,s, *TextBook of Paediatrics*, WB Saunders Co.,
6. Ghai O P, *Essential Paediatrics*
7. Asuma Beevi, Textbook of Pediatric Nursing
8. Parul Datta, Textbook of Pediatric Nursing
9. Panchali Pal, Textbook of Pediatric Nursing

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1
CO7	2	1	3	2	2	2	2	1	2	2	1
CO8	3	2	3	2	2	2	2	1	2	3	1
CO9	2	2	2	2	2	2	2	1	2	2	1

1: strongly related, 2: moderately related and 3: weakly related

CHN4203	Community Health Nursing CS I & II Practical	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:				**22**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of Community health nursing health nursing procedures.

Course Description: The course is designed to enable students to develop expertise in the field of clinical specialization. It will help students to appreciate the patient, individual as a holistic individual and develop skill to function as a Nurse specialist in their field of clinical specialization

Course Outcomes:

On completion of this course students will be able to:

CO1. Elicit the importance of health services in subcentre, primary health centres and community health centres
CO2. Apply the Government health scheme in providing community health services
CO3. Perform developmental, family and nutritional assessment of Geriatrics
CO4. Apply nursing process in providing nursing care to Antenatal and Post natal Mothers
CO5. Apply the Family planning services among eligible couples
CO6. Recognize the importance of Health Programmes in community
CO7. Apply the nursing Procedures in post natal mothers
CO8. Prepare the vital statistics of community people

CO9. Incorporate evidence based nursing practice and identify the areas of research in the field of nursing.

PROGRAMME SPECIFIC OUTCOMES:-

On completion of M.Sc. Nursing programme the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.

PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Course Content

Modules	**Blooms level**
Module I • Identification of community leaders and resource persons (community mapping) • Community health survey	**L1,2, 3**

• Community health nursing process- individual, family and special groups and community Counseling • Identification of community leaders and resource persons (community mapping.	
Module II • Health education – campaign, exhibition, folk media, preparation of IECmaterials • Organising and participating in special clinics/camps and national health and welfare programmes-Organise atleast one health and family welfare mela/fair (all stalls of national health and family welfare activities should be included)	**L2,3, 4**
Module III • Estimation of Vital health statistics –Exercise Drill for disaster preparedness • Organise atleast one in-service education to ANM's/LHV/PHN/HW • Nutrition – Exercise on nutritional assessment on dietary planning, demonstration and education for various age groups	**L1,2,3**
Module IV • Filling up of Records, reports and registers maintained at SC/PHC/CHC • Assist women in self breast examination • Conduct antenatal examination • Conduct vaginal examination • Conduct deliveries	**L1,2, 3**
Module V	**L3,4, 5**

• Post natal visits • Perform Episiotomy and suturing • Prepare Pap smear • Conduct Insertion/Removal of IUD • Blood Slide preparation	

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	**NCP**	**CS/CP**	**Project**	**OR**	**HE**	**CE**	**EPE**
Weightage (%)	**10**	**30**	**10**	**05**	**05**	**40**	**100**

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Text & References:

Reference Books:

1. Clark, June & Jill Handerson, *Community Health*, Churchill Livingstone, 1993, New York.
2. Freeman B. Ruth, *Public Health Practices*, W. W. Saunders CO., 1990, Philadelphia.
3. Fromer Joan Margot, *Community Health Care and the Nursing Process*, C.VMosby CO., Toronto.
4. Park J. E, *Text Book of Preventive and Social Medicine*, Ms Banarsidas Bhanot CO., 1996, Jabalpur.
5. Rao S. Kasthi, *An Introduction to Community Health Nursing*, B. I. Publishers, Madras.
6. Gulani,K,K. Community Health Nursing(2007). Kumar Publishing House.pp 339-420.

7. Basavanthappa,B,T. Community Health Nursing(2nd edition), Jaypee Brothers Medical Publishers.
8. Park ,K .Preventive and Social Medicine.(19th edition), Kumar Book Depot.
9. Kamalam, S. Essentials in Community Health Nursing Practice.(2nd edition), Jaypee Brothers.
10. Alternative approaches to health care. ICMR. Paper presented at the National Symposium on Alternative Approaches to health care.
11. Archer,S,E. Community Health Nursing:Patterns and Practice.(2nd edition).Duxbusy Press.
12. Prabhakara,G,N. Textbook of Community Health for Nurses.(2nd edition). Peepee Publishers and distributers.
13. Stanhope,M &Lanchaster,J.Community Health Nursing:Practice and Process for Promoting Health.(3rd edition).mosby.
14. Pinger,R,P.An Introduction to Community health.(4th edition).Jones and Bartlett Publishers.
15. Patney Sunita , (2005), Text Book Of Community Health Nursing, First Edition, Cbs.
16. Mckenzie James F. Pinger Robert R, Kotecki Jerome E, (2002), An Introduction To Community Health Nursing, Fourth Edition, Jones And Bartlett.
17. Lundy Saucier Karen, Janes Sharyn, (2002) Community Health Nursing, First Edition, Jones And Bartlettt.

*Latest editions of all the suggested books are recommended

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO2	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO3	**2**	**1**	**2**	**3**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO4	**3**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO5	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO6	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO7	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**
CO8	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**1**
CO9	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

PSN4203	Psychiatric Nursing CS-I & II Practical	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval: November 2011		**24**		**22**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalog: This course is designed to assist students in developing expertise and in depth understanding in the field of Psychiatric Nursing. It will help students to develop advanced skills for nursing intervention in various Psychiatric conditions. It will enable the student to function as Psychiatric Nurse practitioner/specialist. It will further enable the student to function as educator, manager, and researcher in the field of Psychiatric Nursing.

Course Objectives:

The objective of this course is to Provide an overview of psychiatric disorders and management of psychiatric patients.

- Demonstrate the role of nurse in psychiatric settings/hospitals.

Course Outcomes:

On completion of this course, the students will be able to:

1. Appreciate the trends and issues in the field of psychiatry and psychiatric nursing.
2. Explain the dynamics of personality development and human behaviour.
3. Describe the concepts of psychobiology in mental disorders and its implications for psychiatric nursing
4. Demonstrate therapeutic communications skills in all interactions
5. Demonstrate the role of psychiatric nurse practitioner in various therapeutic modalities
6. Establish and maintain therapeutic relationship with individual and groups
7. Uses assertive techniques in personal and professional actions
8. Promotes self-esteem of clients, others and self
9. Apply the nursing process approach in caring for patients with mental disorders 10. Describe the psychopharmacological agents, their effects and nurse's role

11. Recognize the role of psychiatric nurse practitioner and as a member of the psychiatric and mental health team

12. Describe various types of alternative system of medicines used in psychiatric settings

13. Incorporate evidence-based nursing practice and identify the areas of research in the field of psychiatric nursing.

Course Content

Modules	**Blooms level**
Module 1: History collection and Assessment of mental status examination	L1,2, 3
Module 2 : Management of Psychiatric Patient	L2,3, 4
Module 3: Psychometric and Personality Assessment	L1,2,3
Module 4: Observing various therapies	L1,2, 3
Module 5: Process Recording	L3,4
Module 6: Socio and Psycho drama	L2, 3

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Kaplan H. Sadock B, Synopsis of Psychiatry, William and Wilkins, 1991, Bathmov.
- Stuart W.G. Sundeen J.S, Principles and Practice of Psychiatry Nursing, Mosby Year book, 1991, London.
- Taylor C.M., Essentials of Psychiatric Nursing, CV Mosby Co., 1982, London.
- Bimla Kapoor CV, A Text book of Psychiatric Nursing, Mosby Co.,1982, Delhi
- Shivas, "Basic Concept of Psychiatric Mental Health Nursing, B.I Publications, 1994

- Brown R.T. Feldman G.R., Epilepsy- Diagnosis and Management, Little Brown and Co.,1983, Toronto.
- Beck M.C. Rawtins P.R. and et al, Mental Health-Psychiatric Nursing. The C.V. Mosby Co., Ltd.1984, Toronto.
- Coleman C.J, Abnormal Psychology and Modern Life. P.B. Tara and Sons Co. Pvt Ltd. 1982.

Reference Books

- Gelder M.G., Andreasen N.C., New Oxford Text book of Psychiatry, Oxford University Press, 2012.
- Elizabeth M. Varcarolis: Foundations of Psychiatric Mental Health Nursing; 4th Edition, W.B. Saunders, Company, 2002.
- Kaplan & Sadock's: Concise Text book of Clinical psychiatry; 2nd Edition, J.P. Brothers (Indian) Lippincott, Williams & Wilkins, 2002.
- Stuart M. psychiatric mental health nursing
- Sheila. L. Videbeck: Psychiatric mental health nursing; Lippincott, 2001.
- Many Ann Boyd & Mary Ann Nihart: Psychiatric Nursing Contemporary Practice; Lippincott, 1998

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

CO, PO and PSO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**3**	**3**	**3**	**2**	**3**	**2**	**-**	**1**	**-**	**-**
CO2	**1**	**1**	**2**	**3**	**2**	**3**	**1**	**-**	**1**	**-**	**-**
CO3	**1**	**1**	**2**	**3**	**2**	**3**	**1**	**-**	**1**	**-**	**-**
CO4	**1**	**1**	**2**	**3**	**1**	**2**	**1**	**-**	**1**	**-**	**-**
CO5	**1**	**2**	**3**	**3**	**1**	**2**	**1**	**-**	**1**	**-**	**-**
CO6	**2**	**2**	**2**	**3**	**1**	**2**	**2**	**-**	**1**	**-**	**-**
CO7	**2**	**1**	**1**	**1**	**2**	**1**	**3**	**-**	**1**	**-**	**-**
CO8	**1**	**1**	**1**	**3**	**2**	**3**	**2**	**-**	**1**	**-**	**-**
CO9	**2**	**1**	**2**	**3**	**2**	**3**	**1**	**-**	**1**	**-**	**-**
CO10	**2**	**3**	**3**	**3**	**1**	**3**	**1**	**-**	**1**	**-**	**-**
CO11	**1**	**2**	**3**	**3**	**1**	**3**	**1**	**-**	**1**	**-**	**-**
CO12	**2**	**1**	**1**	**2**	**1**	**2**	**1**	**-**	**1**	**-**	**-**
CO13	**1**	**1**	**2**	**3**	**1**	**3**	**1**		**1**		

1: strongly related, 2: moderately related and 3: weakly related

OGN4203	Obstetrical and Gynaecological CS I & II Practical	L	T	P	C
Pre-requisites/Exposure					**32**
Co-requisite					

Course Description:

This course is designed to assist students in developing expertise and in depth understanding in the field of Obstetrics & Gynecological Nursing. It will help students o appreciate the client as a holistic individual and develop skill to function as an independent midwifery practitioner. It will further enable the student to function as an educator, manager and researcher in the field of Obstetrics & Gynecological Nursing.

Course Outcomes:

CO1- Be in a position to describe the physiology and management of the various stages of labour and puerperium.

CO2-Be is a position to manage the mothers during the normal vaginal delivery

CO3-Be in a position to conduct normal vaginal delivery and also be able to resuscitate the newborn babies immediately after birth.

CO4-Be in a position to identify the at risk mothers and manage them accordingly.

CO5-Be in a position to identify the various alternative and complimentary therapies in obstetrics & gynaecological nursing

CO6-Be in a position to incorporate evidence based nursing practice and identify the areas of nursing research.

Course Content

Modules	Blooms level*	Number of hours
Module I : Students will be posted in following areas: Anetenatal Wards & OPDs 120 Hours Labour Room 150 Hours Postnatal Ward 60 Hours	L1, L2 and L3	5

Family Planning Clinics 60 Hours PHC/Rural maternity settings 120 Hours Gynae 60 Hours Maternity OT 60 Hours NICU 30 Hours **Total 660Hours - 22 Weeks**		
Module II : Procedures Observed • Diagnostic investigations : amniotcentecis, chordocentecis, chorionic villi sampling • Infertility management: artificial reproduction : artificial in-semination, invitro fertilization, and related procedures		
Module II : Procedures Assisted • Medical termination of pregnancy		8
Module III : Procedures Performed Antenatal assessment-20 • Postnatal assessment-20 • Assessment during labour : use of partograph - 20 • Per vaginal examination-20 • Conduct of normal delivery-20 • Episiotomy and suturing-10 • Setting up of delivery areas • Insertion of intra uterine devices(copper T) **Others** • Identification of high risk women and referral • Health education: to women and their families • Motivation of couples for planned parenthood		10

Text & References:

Reference Books:

1. Buckley Kathleen and Kulb Nancy W, *High Risk Maternity Nursing Manual*, Williams & Wilkin, 1993, Philadelphia.
2. Bennet V Ruth & Brown K Linda, *Myles Text Book for Midwives*, ELBS, Churchill Livingstone.
3. Calander, R & Miller A, *Obstetrics Illustrated*, 4th edition, Churchill & Livingstone, 1993, New York.
4. Dawn C.S, *Text Book of Obstetrics and Neonatology*, Dawn Books, Calcutta.
5. Dawn C.S, *Text Book of Gynecology and Contraception*, Dawn Books, Calcutta.
6. Dutta D.C, *Text Book of Obstetrics*, 4th edition, New Central Agency (p), 2001, Calcutta.
7. Dutta D.C, *Text Book of Gynaecology*, 4th edition, New Central Agency (p), 2001, Calcutta.
8. Daftary Shrish, *Holland and Brews Manual of Obstetrics*,16th edition, B Churchill Livingstone (P) Ltd, New Delhi.
9. Dickason Elizabeth jean et al, *Maternal Infant Nursing Care*, 2nd edition, Mosby, 1998, St. Louis.
10. GoodnerBrenda, *Concepts of Obsterics Nursing*, 1st edition, Skidmore, Roth Publishing, INC, 1994, Texas.
11. Gorie Trula Myers et al, *Foundations of Maternal Newborn Nursing*, 2nd edition, WB Saunders Co., 1998, Philadelphia.
12. Ladewing Patricia Wieland et al, *Essentials of Maternal Newborn Nursing*, 2nd edition, Addisol Wesley Nursing, 1990, New York.
13. Rashmi Patil, *Instruments, Operatuions, Drugs in Obstetrics and Gynaecology*, Vors Medical Publications, Mumbai.
14. Philips Celeste R, *Family Centered Maternity Newborn Care*, 3rd edition, Mosby New year Book, 1996, St Louis.

Examination Scheme Practical:

Components	**NCP**	**CS/CP**	**Pr**	**OR**	**HE**	**CE**	**EPE**
Weightage (%)	**10**	**30**	**10**	**05**	**05**	**40**	**100**

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, Pr- Project, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Relationship between the course outcomes (COs), programme Outcomes (PO) and learning outcomes (Los)

Mapping between COs, POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	1	1	-	1	-	1	1	1	1	-	1
CO5	2	1	2	-	1	1	2	2	1	2	-
CO6	1	1	1	2	-	-		1	1	1	2

1-strongly related; 2-moderately related; 3-weakly related

PSN4203	Psychiatric Nursing	L	T	P	C
Version 1.1	Date of Approval: November 2011	**16**	**36**		**16**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Catalogue:

This course is designed to assist students in developing expertise and in depth understanding in the field of Psychiatric Nursing. It will help students to develop advanced skills for nursing intervention in various Psychiatric conditions. It will enable the student to function as Psychiatric Nurse practitioner/specialist. It will further enable the student to function as educator, manager, and researcher in the field of Psychiatric Nursing

Course Objectives: On completion of the two year M.Sc. Nursing (Psychiatry) programme, the Post Graduate Nurse will be able to provide comprehensive nursing care to patients with psychiatric problems in preventive, curative and rehabilitation aspects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Utilize/apply the concepts, theories and principles of psychiatric nursing science

CO2.Demonstrate advance competence in practice of psychiatric nursing &Practice as a psychiatric nurse specialist.

CO3.Demonstrate leadership qualities and function effectively as psychiatric nurse educator and manager.

CO4.Demonstrate skill in conducting nursing research, interpreting and utilizing the findings from health related research.

CO5.Demonstrate the ability to plan and effect change in psychiatric nursing practice and in the health care delivery system.

CO6.Establish collaborative relationship with members of other disciplines and Demonstrate interest in continued learning for personal and professional advancement

CO7 Elaborate the Substance-Related Disorders

CO8 Explain the Schizophrenia and Other Psychotic Disorders (Check ICD10)

CO9 Describe the mood disorder

CO10 Describe the Anxiety disorder

CO11 Discuss Somatoform and Sleep Disorders

CO12 Discuss the Dissociative Disorders and Management

CO13 Elaborate the Sexual and Gender Identity Disorders

CO14 Enumerate the Eating Disorders

CO15 Describe the Adjustment and Impulse Control Disorders

CO16 Explain the Medical Conditions due to Psychological Factors

CO17 Explain the Personality Disorders

CO18 Discuss the The Aging Individual

CO19 Describe the person living with HIV Disease

CO20 Explain the Problems Related to Abuse or Neglect

CO21 Elaborate the Community Mental Health Nursing

CO22 Discuss the Ethical and Legal Issues in Psychiatric/Mental Health Nursing

CO23 Describe the Psychosocial rehabilitation

CO24 Discuss the Counseling

CO25 Explain the Administration and management of Psychiatric units including emergency unit

Modules	**Blooms level***	**Number of hours**
MODULE 1: **Principles and practice of Psychiatric Nursing** Review	L1, L2 and L3	6
MODULE 2: **Crisis Intervention** • Crisis, Definition	L2, L3 and L4	16

• Phases in the Development of a Crisis • Types of Crisis Dispositional, Anticipated Life Transitions Traumatic Stress, • Maturational / Development , Reflecting • Psychopathology • Psychiatric Emergencies and their management • Grief and grief reaction • Crisis Intervention; Phases • Post traumatic stress disorder (PTSD) • Role of the Nurse		
MODULE 3: **Anger / Aggression Management** • Anger and Aggression, Types, Predisposing Factors • Management • Role of the Nurse	L2, L3 and L4	20
MODULE 4: **The Suicidal Client** • Epidemiological Factors • Risk Factors **Predisposing Factors** • Theories of Suicide-Psychological, Sociological, Biological Nursing Management	L1, L2, and L4	10
MODULE 5: **Disorders of Infancy, Childhood, and Adolescence** • Mentally Challenged • Autistic Disorders • Attention-Deficit/Hyperactivity Disorder • Conduct Disorders, behavioural disorders • Oppositional Defiant Disorder • Tourette's Disorders	L1,L2, and L4	10

• Separation Anxiety Disorder Psychopharmacological Intervention and Nursing Management		

MODULE 6: **Delirium, Dementia, and Amnestic Disorders** • Delirium • Dementia • Amnesia Psychopharmacological Intervention and Nursing Management	L1,L2, L4	12
MODULE 7: **Substance-Related Disorders** • Substance-Use Disorders • Substance-Induced Disorders • Classes Of Psychoactive Substances • Predisposing Factors • The Dynamics of Substance-Related Disorders • The Impaired Nurse • Codependency Treatment Modalities For Substance-Related Disorders and Nursing Management	L1,L2, L3 and L4	10

MODULE 8: **Schizophrenia and Other Psychotic Disorders (Check ICD10)**
• Nature of the Disorder
• Predisposing Factors
• Schizophrenia -Types
  • Disorganized Schizophrenia
  • Catatonic Schizophrenia
  • Paranoid Schizophrenia
  • Undifferentiated Schizophrenia
	L1,L2, L3 and L4	06

• Residual Schizophrenia • Other Psychotic disorders • Schizoaffective Disorder • Brief Psychotic Disorder • Schizophrenic form Disorder • Psychotic Disorder Due to a General Medical Condition • Substance-Induced Psychotic Disorder Treatment and Nursing Management		
MODULE 9: **Mood Disorders** • Historical Perspective • Epidemiology • The Grief Response • Maladaptive Responses to Loss • Types Of Mood Disorders • Depressive disorders • Bipolar disorders Treatment and Nursing Management	L1,L2, L3 and L4	06
MODULE 10: **Anxiety Disorders** • Historical Aspects • Epidemiological Statistics • How much is too much? • Types • Panic Disorder • Generalized Anxiety Disorder • Phobias • Obsessive-Compulsive Disorder • Posttraumatic Stress Disorder • Anxiety Disorder Due to a General Medical Condition • Substance-Induced Anxiety Disorder • Treatment Modalities	L1,L2, L3 and L4	08

Psychopharmacology & Nursing Management		
MODULE 11: **Somatoform and Sleep Disorders** • Somatoform Disorders • Historical Aspects •Epidemiological Statistics •Pain Disorder •Hypochondriasis •Conversion Disorder •Body Dysmorphic Disorder • Sleep Disorder Treatment Modalities and Nursing Management	L1,L2, L3 and L4	06
MODULE 12: **Dissociative Disorders and Management** • Historical Aspects • Epidemiological Statistics • Application of the Nursing Management Treatment Modalities and Nursing Management	L1,L2, L3 and L4	06
MODULE 13: **Sexual and Gender Identity Disorders** • Development of Human Sexuality • Sexual Disorders • Variation in Sexual Orientation Nursing Management	L1,L2, L3 and L4	06
MODULE 14: **Eating Disorders** • Epidemiological Factors • Predisposing Factors: Anorexia Nervosa and Bulimia Nervosa obesity • Psychopharmacology Treatment & Nursing Management	L1,L2, L3 and L4	06
MODULE 15: **Adjustment and Impulse Control Disorders** • Historical and Epidemiological Factors	L1,L2,	06

• Adjustment Disorders • Impulse Control Disorders Treatment & Nursing Management	L3 and L4	
MODULE 16: **Medical Conditions due to Psychological Factors** • Asthma • Cancer • Coronary Heart Disease • Peptic Ulcer • Essential Hypertension • Migraine Headache • Rheumatoid Arthritis • Ulcerative Colitis Treatment & Nursing Management	L1,L2, L3 and L4	06

MODULE 17: **Personality Disorders**
• Historical perspectives
• Types Of Personality Disorders
  • Paranoid Personality Disorder
  • Schizoid Personality Disorder
  • Antisocial Personality Disorder
  • Borderline Personality Disorder
  • Histrionic Personality Disorder
  • Narcissitic Personality Disorder
  • Avoidance Personality Disorder
  • Dependent Personality Disorder
  • Obsessive-Compulsive Personality Disorder
  • Passive-Aggressive Personality Disorders
• Identification, diagnostic, symptoms
• Psychopharmacology
Treatment & Nursing Management
	L1,L2, L3 and L4	06

MODULE 18: **The Aging Individual** • Epidemiological Statistics • Biological Theories • Biological Aspects of Aging • Psychological Aspects of Aging • Memory Functioning • Socio-cultural aspects of aging • Sexual aspects of aging • Special Concerns of the Elderly Population • Psychiatric problems among elderly population Treatment & Nursing Management	L1,L2, L3 and L4	06
MODULE 19: **The person living with HIV Disease** • Psychological problems of individual HIV/AIDS • Counseling Treatment & Nursing Management	L1,L2, L3 and L4	06
MODULE 20: **Problems Related to Abuse or Neglect** • Vulnerable groups, Women, Children, elderly, Psychiatric patients, under privileged, challenged • Predisposing Factors Treatment & Nursing management- Counseling	L1,L2, L3 and L4	06
MODULE 21: **Community Mental Health Nursing** • National Mental Health Program- Community mental health program • The Changing Focus of care • The Public Health Model • The Role of the Nurse • Case Management	L1,L2, L3 and L4	06

• The community as Client
  • Primary Prevention
  • Populations at Risk
  • Secondary prevention
  • Tertiary Prevention
Community based rehabilitation		

MODULE 22: **Ethical and Legal Issues in Psychiatric/Mental Health Nursing** • Ethical Considerations • Legal Consideration • Nurse Practice Acts • Types of Law • Classification within Statutory and Common Law • Legal Issues in Psychiatric/Mental Health Nursing Nursing Liability	L1,L2, L3 and L4	06
Module 23 : Psychosocial rehabilitation • Principles of rehabilitation • Disability assessment • Day care centers • Half way homes • Reintegration into the community • Training and support to care givers • Sheltered workshops Correctional homes	L1,L2, L3 and L4	05
MODULE 24: **Counselling** • Liaison Psychiatric Nursing • Terminal illnesses-Counseling • Post partum psychosis-treatment, care and counseling	L1,L2, L3 and	05

• Death dying- Counseling • Treatment, care and counseling – • Unwed mothers HIV and AIDS	L4	
MODULE 25: **Administration and management of Psychiatric units including emergency unit** • Design & layout • Staffing, • Equipment, supplies, • Norms, policies and protocols • Quality assurance • Practice standards for Psychiatric Nursing Documentation	L1,L2, L3 and L4	05

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

1. **Text Books a) Main text:** Kaplan H. Saddock B, Synopsis of Psychiatry, William sand Wilkins, 1991, Bathmov.
2. Bimlakapoor CV, A Text book of Psychiatric Nursing, Mosby Co., 1982, Delhi.
3. Shivas, "Basic Concept of Psychiatric Mental Health Nursing, B.I Publications, 1994.
4. Brown R. T. Feldman G. R., Epilepsy -Diagnosis and Management, Little Brown And Co., 1983, Toronto.
5. Beck M. C. Rawtins P. R. and et al, Mental Health – Psychiatric Nursing. The C.V. Mosby Co., Ltd. 1984, Toronto.
6. Coleman C. J, Abnormal Psychology and Modern Life. P. B. Tara and Sons Co. Pvt Ltd. 1982.

– **b) Additional Texts:** Gelder M.G., Andreasen N.C. New Oxford Textbook of Psychiatry, Oxford University Press, 2012.

c) Other readings: Journals of Psychiatry
Journals of Psychiatric Nursing
Journals of Psychiatric Social Work
Journals of Clinical Psychology

7. **Reference Books** :

1.Stuart W. G. Sundeen J. S, Principles and Practice of Psychiatric Nursing, Mosby Year book, 1991, London.

2. Taylor C.M., Essentials of Psychiatric Nursing, CV Mosby Co., 1982, London

2. Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

2. Assessment Scheme(more columns may be added for assessment):

Components	**ATT**	**HA**	**CT**	**SE**	**EA**	**EE**
Weightage (%)	**5**	**5**	**5**	**5**	**5**	**75**

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA- Extracurricular activity; EE- End Semester Examination

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**	**3**	**1**	**2**	**1**	**-**	**3**	**1**	1	--	--	1
CO2	**1**	**3**	**1**	**1**	**1**	**-**	**3**	**1**	1	--	--	1
CO3	**1**	**3**	**1**	**3**	**1**	**-**	**3**	**1**	1	--	--	1
CO4	**1**	**1**	**1**	**2**	**2**	**2**	**3**	**1**	1	-	1	-
CO5	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1

CO6	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO7	**1**	**3**	**1**	**2**	**1**	**-**	**3**	**1**	1	--	--	1
CO8	**1**	**3**	**1**	**1**	**1**	**-**	**3**	**1**	1	--	--	1
CO9	**1**	**3**	**1**	**3**	**1**	**-**	**3**	**1**	1	--	--	1
CO10	**1**	**1**	**1**	**2**	**2**	**2**	**3**	**1**	1	-	1	-
CO11	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO12	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO13	**1**	**3**	**1**	**2**	**1**	**-**	**3**	**1**	1	--	--	1
CO14	**1**	**3**	**1**	**1**	**1**	**-**	**3**	**1**	1	--	--	1
CO15	**1**	**3**	**1**	**3**	**1**	**-**	**3**	**1**	1	--	--	1
CO16	**1**	**1**	**1**	**2**	**2**	**2**	**3**	**1**	1	-	1	-
CO17	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO18	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO19	**1**	**3**	**1**	**2**	**1**	**-**	**3**	**1**	1	--	--	1
CO20	**1**	**3**	**1**	**1**	**1**	**-**	**3**	**1**	1	--	--	1
CO21	**1**	**3**	**1**	**3**	**1**	**-**	**3**	**1**	1	--	--	1
CO22	**1**	**1**	**1**	**2**	**2**	**2**	**3**	**1**	1	-	1	-
CO23	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO24	**1**	**2**	**3**	**3**	**1**	**2**	**3**	**1**	1	-	2	1
CO25	**1**	**3**	**1**	**2**	**1**	**-**	**3**	**1**	1	--	--	1

1: strongly related, 2: moderately related and 3: weakly related

PDN4301	Child Health (Pediatric) Nursing	L	T	P	C
Version 1.1	Date of Approval:	**16**	**36****		**16**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: This course is designed to assist students in developing expertise and in-depth understanding in the field of Pediatric Nursing.

Course Description:

This course will help students to develop advanced skills for nursing intervention in various pediatric medical and surgical conditions. It will enable the student to function as pediatric nurse practitioner/specialist. It will further enable the student to function as educator, manager, and researcher in the field of Paediatric nursing

Course Objectives: At the end of the course the students will be able to:

At the end of the course the students will be able to:

1. Apply the nursing process in the care of ill infants to pre adolescents in hospital and community
2. Demonstrate advanced skills/competence in nursing management of children with medical and surgical problems
3. Recognize and manage emergencies in children
4. Provide nursing care to critically ill children
5. Utilize the recent technology and various treatment modalities in the management of high risk children
6. Prepare a design for layout and describe standards for management of pediatric units/hospitals
7. Identify areas of research in the field of pediatric nursing

Course Outcomes:

On completion of this course students will be able to:

CO1. Apply the nursing process in the care of ill infants to pre adolescents in hospital and community

CO2. Demonstrate advanced skills/competence in nursing management of children with medical and surgical problems

CO3. Recognize and manage emergencies in children and Provide nursing care to critically ill children

CO4. Utilize the recent technology and various treatment modalities in the management of high risk children

CO5. Prepare a design for layout and describe standards for management of pediatric units/hospitals

CO6. Identify areas of research in the field of pediatric nursing

Course Content

Modules	**Blooms level**	**Number of hours (as per INC)**
Module I **Introduction** Current principles, practices and trends in Pediatric Nursing Role of pediatric nurse in various settings -Expanded and extended	**L1,2**	**5**
Module II Pathophysiology, assessment(including interpretation of various invasive and non-invasive diagnostic procedures), treatment modalities and nursing intervention in selected pediatric medical disorders	**L4,5,6**	**35**

• Child with respiratory disorders: - Upper respiratory tract: choanal atresia, tonsillitis, epistaxis, aspiration. - Lower respiratory tract: Broncheolitis, Bronchopneumonia, Asthma, cystic fibrosis • Child with gastro-intestinal disorders: - Diarrheal diseases, gastro-esophageal reflux. - Hepatic disorders: Hepatitis, Indian childhood cirrhosis, liver transplantation. - Malabsorption syndrome, Malnutrition • Child with renal/ urinary tract disorders: Nephrotic syndrome, Nephritis, Hydronephrosis, hemolytic-uremic syndrome, kidney transplantation • Child with cardio-vascular disorders: - Acquired: Rheumatic fever, Rheumatic heart disease, - Congenital: Cynotic and acynotic • Child with endocrine/metabolic disorders: Diabetes insipidus, Diabetes Mellitus – IDDM, NIDDM, hyper and hypo thyroidism, phenylketonuria, galactosemia • Child with Neurological disorders: Convulsions, Meningitis, encephalitis, guillian- Barre syndrome • Child with oncological disorders: Leukemias, Lymphomas, Wilms' tumor, nephroblastomas, neuroblastomas, Rhabdomyosarcoma, retinoblastoma, hepatoblastoma, bone tumors • Child with blood disorders: Anemias, thalassemias, hemophilia, polycythemia, thrombocytopenia, and disseminated intravascular coagulation • Child with skin disorders • Common Eye and ENT disorders • Common Communicable diseases		
Module III Assessment (including interpretation of various invasive and non-invasive diagnostic procedures), treatment modalities including cosmetic surgery and nursing interventions in selected pediatric surgical problems/ Disorders • Gastrointestinal system: Cleft lip, cleft palate and conditions requir-	**L1,2,3**	**35**

ing plastic surgery, Tracheo esophageal fistula/atresia, Hirsch-sprungs' disease/megacolon, malrotation, intestinal obstruction, duodenal atresia, gastrochisis, exomphalus, anorectal malformation, omphalocele, diaphragmatic hernia • Anomalies of the nervous system: Spina bifida, Meningocele, Myelomeningocele, hydrocephalus • Anomalies of the genito-urinary system: Hypospadias, Epispadias, Undescended testes, Exstrophy bladder • Anomalies of the skeletal system • Eye and ENT disorders • Nursing management of the child with traumatic injuries: General principles of managing Pediatric trauma - Head injury, abdominal injury, poisoning, foreign body obstruction, burns - & Bites • Child with oncological disorders: Solid tumors of childhood, Nephroblastoma, Neuro blastoma, Hodgkin's/Non Hodgkin's Lymphoma, Hepatoblastoma, Rhabdomyosarcoma • Management of stomas, catheters and tubes • Management of wounds and drainages		
Module IV Intensive care for pediatric clients Resuscitation, stabilization & monitoring of pediatric patients Anatomical & physiological basis of critical illness in infancy and childhood Care of child requiring long-term ventilation Nutritional needs of critically ill child Legal and ethical issues in pediatric intensive care Intensive care procedures, equipment and techniques Documentation	**L1,2**	**10**
Module V High Risk Newborn	**L4,5,6**	**20**

Concept, goals, assessment, principles. Nursing management of • Post-mature infant, and baby of diabetic and substance use mothers. • Respiratory conditions, Asphyxia neonatorum, neonatal apnoea meconium aspiration syndrome, pneumo thorax, pneumo mediastinum • Icterus neonatorum. • Birth injuries. • Hypoxic ischaemic encephelopathy • Congenital anomalies. • Neonatal seizures. • Neonatal hypocalcaemia, hypoglycemia, hypomagnesaemia. • Neonatal heart diseases. • Neonatal hemolytic diseases • Neonatal infections, neonatal sepsis, opthalmia neonatorum, cogenital syphilis, HIV/AIDS • Advanced neonatal procedures. • Calculation of fluid requirements. • Hematological conditions – erythroblastosis fetalis, hemorrhagic disorder in the newborn • Organization of neonatal care, services(Levels), transport, neonatal intensive care unit, organization and management of nursing services in NICU		
Module VI Developmental disturbances and implications for nursing Adjustment reaction to school, Learning disabilities Habit disorders, speech disorders, Conduct disorders, Early infantile autism, Attention deficit hyperactive disorders (ADHD), depression and childhood schizophrenia.	**L1, 2,3**	**10**
Module VII Challenged child and implications for nursing Physically challenged, causes, features, early detection & management Cerebral palsied child, Mentally challenged child. Training & rehabilitation of challenged children	**L1,2,3**	**10**
Module VIII Crisis and nursing intervention The hospitalized child, Terminal	**L3,4**	**5**

illness & death during childhood Nursing intervention-counseling		
Module IX Drugs used in Pediatrics Criteria for dose calculation Administration of drugs, oxygen and blood Drug interactions Adverse effects and their management	**L4,5**	**5**
Module X Administration and management of pediatric care unit Design & layout Staffing, Equipment, supplies, Norms, policies and protocols Practice standards for pediatric care unit Documentation	**L5**	**10**
Module XI Education and training in Pediatric care Staff orientation, training and development, In-service education program, Clinical teaching programs.	**L6**	**5**

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme (Theory): Internals-25, External- 75

Components	ATT	SE	Seminar1	Seminar 2	ECC	EE
Weightage	**5**	**5**	**5**	**5**	**5**	**75**

ATT-Attendance; SE-Sessional Examination; EE- End Semester Examination, ECC- Extra Curricular activity

Reference Books:

1. Whaley and Wong, Essentials of Pediatrics Nursing
2. Learners Guide, WHO, AIIMS

3. IMNCI Students' Handbook, WHO
4. Ball and Bindler, *Paediatric Nursing Caring for Children*, Prenticehall.
5. Behrman, Richard K & Vaughan, Nelson,s, *TextBook of Paediatrics*, WB Saunders Co.,
6. Ghai O P, *Essential Paediatrics*
7. Asuma Beevi, Textbook of Pediatric Nursing
8. Parul Datta, Textbook of Pediatric Nursing
9. Panchali Pal, Textbook of Pediatric Nursing

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**1**	**2**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**1**	**2**
CO2	**1**	**2**	**2**	**2**	**1**	**2**	**2**	**3**	**2**	**1**	**2**
CO3	**1**	**2**	**2**	**3**	**1**	**2**	**2**	**3**	**2**	**1**	**2**
CO4	**1**	**2**	**2**	**2**	**1**	**2**	**2**	**3**	**2**	**1**	**2**
CO5	**1**	**2**	**3**	**2**	**1**	**2**	**2**	**3**	**2**	**2**	**1**
CO6	**1**	**2**	**3**	**2**	**1**	**2**	**2**	**3**	**2**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

CHN4301	**Community Health Nursing -III**	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:	**16**	**36****		**16**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue : The course is designed to assist students in developing expertise and in-depth understanding in the field of Community Health Nursing. It would help students to appreciate the Quality assurance and holistic geriatric care and understand the Community health services.

Course Objectives:

This course is designed to assist students in developing expertise and in depth understanding in the field of community health Nursing. It will help students to develop advanced skills for nursing intervention in various aspects of community health care settings. It will enable the student to function as community health Nurse practitioner/specialist. It will further enable the student to function as educator, manager and researcher in the field of community health Nursing

Course Outcomes:

On completion of this course students will be able to:

CO1: Describe the Epidemiological Methods in Community Health NUrsing

CO2: Explain the National Health and Family welfare programmes

CO3: Understand the approaches in School Health Services

CO4: understand the International Health

CO5: Understand the Quality Assurance

CO6: describe the Geriatric care

CO7: Explain the Rehabilitation Council of India

CO8: Understand the Community Health Services

CO9 : Explain the Occupational Health

Course Coverage:

Modules	Blooms level*	Number of hours

MODULE 1: Introduction
 	
Epidemiology
• Introduction
• Concept, scope, definition, trends, History and development of modern Epidemiology
• Contribution of epidemiology
• Implications
• Epidemiological methods
• Measurement of health and disease:
• Health policies
• Epidemiological approaches
  • Study of disease causatives
  • Health promotion
  • Levels of prevention
• Epidemiology of
  • Communicable diseases
  • Non-communicable diseases
• Emerging and re-emerging diseases Epidemics
• National Integrated disease Surveillance Programme
• Health information system
• National Integrated disease Surveillance Programme
• Health information system
• Epidemiology study and reports
• Role of Community health Nurse
	L1, and L2	20

MODULE 2: National Health and Family Welfare
 	
• Objectives: Organisation/manpower/resources, Activities, Goals, inter-sectoral approach, implementation, item/purpose, role and responsibilities of community health Nurse:
  • National Vector Borne Disease Control Program (NVBDCP)
  • NationalFilaria Control Programme
  • National Leprosy Eradication Programme
  • Revised national TB Control Programme
  • National Programme for Control of Blindness
  • National Iodine Deficiency disorders Control Programme
  • National Mental Health Programme
  • National AIDS Control Programme
  • National Cancer Control Programme
  • RCH I and II
  • Non- communicable disease programmes
  • NRHM
  • Health Schemes
• ESI
• CGHS
• Health Insurance
	L1,L2	15

MODULE 3: School Health Services • Introduction: definition, concepts, Objectives: • Health assessment, Screening, identification, referral and follow up, • Safe environment • Services, programmes and plans- first aid, treatment of minor ailments • Inter-sectoral coordination	L1,L2, and L3	15

• Adolescent health • Disaster, disaster preparedness, and management • Guidance and counseling • School health records - maintenance and its importance • Roles and responsibilities of community health Nurse		
MODULE 4: International Health • Global burden of disease • Global health rules to halt disease spread • Global health priorities and programmes • International quarantine • Health tourism • International cooperation and assistance • International travel and trade • Health and food legislation, laws, adulteration of food • Disaster management • Migration • International health agencies –World Health organizations, World health assembly, • UNICEF, UNFPA, SIDA, USAID, DANIDA, DFID. etc • International health issues and problems • International Nursing practice standards • International health vis-a vis national health • International health days and their significance •	L1,L2, and L3	20
MODULE 5: Education and Administration • Quality assurance • Standards, Protocols, Policies, Procedures • Infection control; Standard safety measures	L1,L2 and L3	20

• Nursing audit • Design of Sub-Centre/Primary Health Centre/ Community health center • Staffing; Supervision and monitoring-Performance appraisal • Budgeting • Material management • Role and responsibilities of different categories of personnel in community health • Referral chain- community outreach services • Transportation • Public relations • Planning in-service educational programme and teaching • Training of various categories of health workers preparation of manuals		
MODULE 6: Geriatrics • Concept, trends, problems and issues • Aging process and changes • Theories of ageing • Health problems and needs • Psycho-physiological stressors and disorders • Myths and facts of aging • Health assessment • Home for aged-various agencies • Rehabilitation of elderly • Care of elderly • Elderly abuse • Training and supervision of care givers • Government welfare measures Programmes for elderly- Role of NGOs	L1, L2,L3	20

• Roles and responsibilities of Geriatric Nurse in the community		
MODULE 7: Rehabilitation Process • Introduction: Concepts, principles, trends, issues, • Rehabilitation team • Models, Methods • Community based rehabilitation • Ethical issues • Rehabilitation Council of India • Disability and rehabilitation- Use of various prosthetic devices • Psychosocial rehabilitation • Rehabilitation of chronic diseases • Restorative rehabilitation • Vocational rehabilitation • Role of voluntary organizations • Guidance and counseling • Welfare measures • Role and responsibilities of community health Nurse	L1,L2, and L3	15

MODULE 8: Community Mental Health
 	
• Magnitude, trends and issues
• National Mental Health Program- Community mental health program
• The Changing Focus of care
• The Public Health Model
• Case Management- Collaborative care
• Crisis intervention
• Welfare agencies
Population at Risk
 	
• The community as Client
  • Primary Prevention
  • Secondary prevention
  • Tertiary Prevention
• Community based rehabilitation
• Human rights of mentally ill
• Substance use
• Mentally challenged groups
• Role of community health Nurse
	L1 and L2	20

MODULE :9 Occupational Health • Introduction: Trends, issues, Definition, Aims, Objectives:, Workplace safety • Ergonomics and Ergonomic solutions • Occupational environment- Physical, social, Decision making, Critical thinking • Occupational hazards for different categories of people physical, chemical, biological, mechanical, Accidents, • Occupational diseases and disorders	L1, L2, L3	15

• Measures for Health promotion of workers; Prevention and control of occupational diseases, disability limitations and rehabilitation • Women and occupational health • Occupational education and counseling • Violence at workplace • Child labour • Disaster preparedness and management • Legal issues: Legislation, Labour unions, ILO and WHO recommendations, Factories act, ESI act • Role of Community health Nurse, Occupational health team		

Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Main text

- Park J. E, Text Book of Preventive and Social Medicine, MsBanarsidas & Bhanhot Co., 2019, Jabalpur.
- Dr.Mrs.kasturi SundaRao,"An Introduction to Community Health Nursing"BI Publications , 2008, Chennai
- S.Kamalam "Essentials in Community Health Nursing Practice'Jaypee Publications, 2019, New Delhi
- SunitaPatney "Text Book of Community Health Nursing" CBS publishers,2019, New Delhi

Additional Texts:

- Clark, June & Jill Handerson, Community Health, Churchill Livingstone, 2000, New York.
- Freeman B. Ruth, Public Health Practices, W. W. Saunders Co, 1990, Philadelphia.

- Fromer Joan Margot, Community Health Care and the Nursing process, C. V. Mosby Co, Toronto.
- Park J. E, Text Book of Preventive and Social Medicine, MsBanarsidasBhanhot Co., 2019,Jabalpur.
- Park K, Text Book of Preventive and Social Medicine, MsBanarsidasBhanhot Co, 2019, Jabalpur.
- Rao S. Kasthi, An Introduction to Community Health Nursing, B. I. Publishers, 2002, Madras.
- Stan hope & Lancaster Janette, Community Health Process and Practice for Promoting Health,2019, The C.V Mosby & CO. London.
- Latest editions of all the suggested books are recommended.

Other readings:

- ✓ Journal of Public Health
- ✓ Journal of Preventive and Social medicine
- ✓ Indian Journal of Community Medicine

Web Resources:

- Pub med
- CINAHL(cumulative index to Nursing and allied health literature)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA-Extracurricular activity; EE- End Semester Examination

Concept Mapping between COs, PSOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO3**
CO1	1	1	2	1	3	1	2	1	2	1	-

CO2	2	1	2	2	1	1	2	1	2	3	-
CO3	1	1	1	2	3	2	1	3	1	3	-
CO4	2	2	1	2	1	2	2	2	2	1	-
CO5	2	1	2	2	2	1	2	2	1	1	-
CO6	1	1	3	1	1	1	1	1	1	2	-
CO7	1	1	1	1	3	1	1	1	1	3	-
CO8	2	1	2	3	1	1	2	2	1	2	-
CO9	2	1	2	3	1	1	2	2	1	3	-

1: strongly related, 2: moderately related and 3: weakly related

OGN4301	Obstetrics & Gynaecological Nursing	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:	**16**	**36****		**16**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue:

This course is designed to assist the student in developing expertise and in depth understanding in the field of Obstetric and gynecological Nursing .It will help the student to develop advanced Nursing skills for nursing interventions in various obstetrical and gynecological conditions. It will further enable the students to function as midwifery Nurse practitioner/ specialist, educator, manager and researcher in the field of obstetric and gynecological Nursing

Course Objectives:

The objective of this course is to:

1. Be in a position to manage the problems of women during pregnancy
2. Be is a position to assess pregnancies at risk due to pre existing health problems
3. Be in a position to identify abnormal labour, pre term labour and obstetrical emergencies
4. Be in a position to identify and manage post partum complications
5. Be in a position to identify and manage high risk newborn
6. Be in a position to identify and manage patients with HIV/ AIDS
7. Be in a position to identify gynecological problems and nursing management
8. Be in a position to manage obstetrical and gynecological unit
9. Be in a position to educate and train staff in obstetrical and gynecological care

Course Outcomes:

At the end of the course students will be able to:

CO1: Describe the epidemiology, etiology, pathophysiology and diagnostic assessment of women with obstetric and gynecological conditions

CO2: Perform physical, psychological, cultural and spiritual assessment

CO3: Demonstrate competence in caring for women with obstetrical and gynaecological conditions

CO4: Demonstrate competence in caring for high risk newborn

CO5: Identify and manage obstetrical neonatal emergencies as per protocol

CO6: Practice infection control measures

CO7: Utilize technology and various diagnostic, therapeutic modalities in the management of obstetrical, gynaecological and neonatal care

CO8: Demonstrate skill in handling various equipments/ gadgets used for obstetrical, gynaecological and neonatal care

CO9: Teach and supervise nurses and allied health workers

CO10: Design a layout of speciality units of obstetrics and gynaecology

CO11: Develop standards for obstetrical and gynaecological nursing practice

CO12: Counsel women and families

CO13: Incorporate evidence based nursing practice and identify the areas of research in the field of obstetrical and gynaecological nursing

CO14: Function as independent midwifery nurse practitioner

Course coverage:

Modules	Bloom's level	No. of hours

Module I
Management of problems of women during pregnancy
• Risk approach of obstetrical Nursing care, concept &goals.
• Screening of high-risk pregnancy, newer modalities of diagnosis.
• Nursing Management of Pregnancies at risk-due to obstetrical complication
  • Pernicious Vomiting.
  • Bleeding in early pregnancy, abortion, ectopic pregnancy, and gestational trophoblostic diseases.
	L1, L2	**25 hrs**

• Hemorrhage during late pregnancy, ante partum hemorrhage, Placenta praevia, abruptio placenta. • Hypertensive disorders in pregnancy, pre-eclampsia, eclampsia, Heomolysis Elevated liver enzyme Low Platelet count (HELLP) • Iso–immune diseases. Rh and ABO incompatibility • Hematological problems in pregnancy. • Hydramnios-oligohydramnios • Prolonged pregnancy- post term, post maturity. • Multiple pregnancies. • Intra uterine infection & pain during pregnancy. • Intra Uterine Growth Retardation (IUGR), Premature • Rupture of Membrane (PROM), intra uterine death		
Module II **Pregnancies at risk-due to pre-existing health problems** • Metabolic conditions. • Anemia and nutritional deficiencies • Hepatitis • Cardio-vascular disease. • Thyroid diseases. • Epilepsy. • Essential hypertension • Chronic renal failure. • Tropical diseases. • Psychiatric disorders • Infections Toxoplasmosis Rubella Cytomegalo virus Herpes (TORCH); Reproductive Tract Infection(RTI);STD; HIV/AIDS, Vaginal infections; Leprosy, Tuberculosis • Other risk factors: Age- Adolescents, elderly; unwed	L1, L2	**15 hrs**

mothers, sexual abuse, substance use • Pregnancies complicating with tumors, uterine anomalies, prolapse, ovarian cyst.		

Module III
Abnormal labour, pre-term labour & obstetrical emergencies
• Etiology, pathopyhsiology and Nursing management of
  • Uncoordinated uterine actions, Atony of uterus, precipitate labour, prolonged labour.
  • Abnormal lie, presentation**,** position compound presentation.
  • Contracted pelvis-CPD; dystocia.
  • Obstetrical emergencies Obstetrical shock, vasa praevia, inversion of uterus, amniotic fluid embolism, rupture uterus, presentation and prolapse cord.
  • Augmentation of labour. Medical and surgical induction.
  • Version
  • Manual removal of placenta.
  • Obstetrical operation: Forceps delivery, Ventouse,
  • Caesarian section, Destructive operations
  • Genital tract injuries-Third degree perineal tear, VVF, RVF
• Complications of third stage of labour:
  • Post partum Hemorrhage.
  • Retained placenta.
	L1, L2, L3, L4	**15 hrs**

Module IV **Post partum complications** • Nursing management of • Puerperal infections, puerperal sepsis, urinary complications, puerperal venous thrombosis and pulmonary	L1, L2, L3, L4	**10 hrs**

embolism • Sub involution of uterus, Breast conditions, Thrombophlebitis • Psychological complications, post partum blues, depression, psychosis		
Module V **High Risk Newborn** • Concept, goals, assessment, principles. • Nursing management of • Pre-term, small for gestational age, post-mature infant, and baby of diabetic and substance use mothers. • Respiratory conditions, Asphyxia neonatorum, neonatal apnoea meconium spiration syndrome, pneumo thorax, pneumo mediastinum • Icterus neonatorum. • Birth injuries. • Hypoxic ischaemic encephelopathy • Congenital anomalies. • Neonatal seizures. • Neonatal hypocalcaemia, hypoglycemia, hypomagnesaemia. • Neonatal heart diseases. • Neonatal hemolytic diseases • Neonatal infections, neonatal sepsis, opthalmia neonatorum, cogenital syphilis, HIV/AIDS • Advanced neonatal procedures. • Calculation of fluid requirements. • Hematological conditions – erythroblastosis fetalis, hemorrhagic disorder in the newborn • Organization of neonatal care, services (Levels), transport, neonatal intensive care Unit, organization	L3, L4	**25 hrs**

and management of Nursing services in NICU		
Module VI **HIV/AIDS** • HIV positive mother and her baby • Epidemiology • Screening • Parent to child transmission (PTCT) • Prophylaxis for mother and baby • Standard safety measures • Counseling • Breast feeding issues • National policies and guidelines • Issues: Legal, ethical, Psychosocial and rehabilitation • Role of Nurse	L1,L2, L3	**15 hrs**

Module VII
Gynecological problems and Nursing management
• Gynecological assessment
• Gynecological procedures
• Etiology, pathophysiology, diagnosis and Nursing management of
  • Menstrual irregularities
  • Diseases of genital tract
  • Genital tract infections
  • Uterine displacement
  • Genital prolapse
  • Genital injuries
  • Uterine malformation
  • Uterine fibroid, ovarian tumors, Breast carcinoma, Pelvic inflammatory diseases, reproductive tract malignancies, hysterectomy – vaginal and abdominal.
	L2,L3,L4	**25 hrs**

• Sexual abuse, rape, trauma , assault		
Module VIII **Administration and management of obstetrical and Gynaecological unit** • Design & layout • Staffing, • Equipment, supplies, • Infection control; Standard safety measures • Quality Assurance:-Obstetric auditing –records /reports, Norms, policies and protocols • Practice standards for obstetrical and gynaecological unit	L1,L2	**5 hrs**
Module IX **Education and training in obstetrical and gynecological care** • Staff orientation, training and development, • In-service education program, • Clinical teaching programs.	L1, L2 L3	**5 hrs**

*Bloom's Level:

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

1. **Main text:**

- DUTTA, D.C., 2011 Textbook of Obstetrics. 7th edition. New Central Agency, Delhi
- MYLES, 2009 Textbook of Midwives, 15th edition, Elsevier, China
- JACOB, A and et. Al. Clinical Nursing Procedures: The art of nursing practice. Jaypee Brothers, New Delhi.

2. **Additional texts:**

- Jane Marshall "Myles Textbook for Midwives" 16th edition Elsevier
- Salhan Sudha, 2007 Textbook of Obstetrics, 1st ed. Jaypee Brothers, Delhi
- Lowdermilk, et. Al. Maternity & Women's Health Care, 10th ed. Elsevier
- Dawn C.S., Textbook of Obstetrics, New Central book agency Ltd., Calcutta

- Hawkins & Borune, Shaw's, Textbook of Gynaecology, B. I. Churchill Livingstone Pvt. Ltd.

3. Other readings:

- Singh Meharban 2010 Care of the Newborn, 7th ed. Sagar, New Delhi
- Gupta Piyush 2010 Essential Paediatric Nursing, 2nd ed CBS, Noida
- Weber, J and Kelly, J. Health Assessment in Nursing. Lippincott Williams and Wilkins, Philadelphia

4. Web resources:

- www.elseiverhealth.com
- http://mohfw.nic.in/

Examination scheme (Theory):

Components	ATT	HA	CT	SE	EE
Weightage (%)	5	5	5	10	75

ATT – Attendance, HA – Home assignment, CT – class test, SE – Sessional examination, EA – extracurricular activity, EE – End term examination

Relationship between the course outcomes (COs), programme Outcomes (PO) and learning outcomes (Los)

Mapping between COs, PLOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	2	2	1	2	1	1	2	2
CO2	1	2	1	2	1	2	2	1	1	1	-
CO3	2	2	1	1	2	1	2	2	2		-
CO4	2	-	-	1	2	2	1	2	2	2	2
CO5	1	1	2	1	1	2	1	1	1	2	1
CO6	2	2	1	2	1	1	-	1	1	1	1

CO7	1	2	1	2	1	1	1	2	-		2
CO8	1	2	1	1	-	1	2	2	2	2	-
CO9	1	1	2	1	2	1	2	1	1	2	2
CO10	2	1	2	1	2	2	1	1	1	1	2
CO11	2	2	2	2	1	2	1	2	2		1
CO12	1	2	1	2	1	2	1	2	2	2	-

1: strongly related, 2: moderately related and 3: weakly related

MSN4301	Cardiothoracic and Vascular Nursing	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:	**16**	**36****		**16**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Objectives

The objective of this course is to assist students:

4. In developing expertise and in-depth understanding in the field of cardiovascular and thoracic nursing.

5. To develop advanced skills for nursing intervention in various cardio medical and surgical conditions.
6. To function as Cardio vascular and Thoracic Nurse practitioner/specialist.
7. To enable the student to function as educator, manager and researcher in the field of cardio vascular and thoracic nursing.

Course Outcomes:

At the end of the course the students will be able to:

CO1: Appreciate trends and issues related to cardio vascular and thoracic Nursing.

CO2: Describe the epidemiology, etiology, pathophysiology and diagnostic assessment of cardio vascular and thoracic CO3: conditions

CO4: Participate in national health programs for health promotion, prevention and rehabilitation of patients with cardio CO5: vascular and thoracic conditions

CO6: Perform physical, psychosocial & spiritual assessment

CO7: Assist in various diagnostic, therapeutic and surgical procedures

CO8: Apply nursing process in providing comprehensive care to patients with cardio vascular and thoracic conditions

CO9: Demonstrate advance skills/competence in managing patients with cardio vascular and thoracic conditions including Advance Cardiac Life Support.

CO10:Describe the various drugs used in cardio vascular and thoracic conditions and nurses responsibility

Demonstrate skill in handling various equipments/gadgets used for critical care of cardio vascular and thoracic patients

CO11: Appreciate team work & coordinate activities related to patient care.

CO12: Practice infection control measures.

CO13:Identify emergencies and complications & take appropriate measures

CO14: Discuss the legal and ethical issues in cardio vascular and thoracic nursing

CO15: Assist patients and their family to cope with emotional distress, grief, anxiety and spiritual needs.

CO16: Appreciate the role of alternative system of medicine in care of patient

CO17: Incorporate evidence based nursing practice and identify the areas of research in the field of cardio vascular and thoracic nursing

CO18: Identify the sources of stress and manage burnout syndrome among health care providers.

CO19: Teach and supervise nurses and allied health workers.

CO20: Design a layout of ICCU and ICTU and develop standards for cardiovascular and thoracic nursing practice.

Course Content

Modules	Blooms level*	Number of hours
Unit I: Introduction • Historical development, trends and issues in the field of cardiology. • Cardio vascular and thoracic conditions – major health problem. • Concepts, principles and nursing perspectives • Ethical and legal issues • Evidence based Nursing and its application in cardio vascular and thoracic nursing	L1, L2 and L3	5
Unit II **Epidemiology** • Risk factors: hereditary, psycho social factors, hypertension, smoking, obesity, diabetes mellitus etc • Health promotion, disease prevention, Life style modification • National health programs related to cardio vascular and thoracic conditions • Alternate system of medicine • Complementary therapies	L1,L2, L3	5

Unit III **Review of anatomy and physiology of heart, lung, thoracic cavity and blood vessels. Embryology of heart and lung.** • Coronary circulation • Hemodynamics and electro physiology of heart. • Bio-chemistry of blood in relation to cardio pulmonary function	L1, L2 and L3	05
Unit IV: **Assessment and Diagnostic Measures:** • History taking • Physical assessment • Heart rate variability: Mechanisms, measurements, pattern, factors, impact of interventions on HRV • Diagnostic tests • Hemodynamic monitoring: Technical aspects, monitoring, functional hemodynamic indices, ventricular function indices, output measurements (Arterial and swan Ganz monitoring). Blood gases and its significance, oxygen supply and demand • Radiologic examination of the chest: interpretation, chest film findings • Electro cardiography(ECG) : electrical conduction through the heart, basic electrocardiography 12 lead electrocardiogram, axis determination - ECG changes in: intraventricular conduction abnormalities- Arrhythmias, ischemia, injury and infarction, atrial and ventricular enlargement, electrolyte imbalance, • Echocardiography: technical aspects, special techniques, echocardiography of cardiac structures in health and disease, newer techniques • Nuclear and other imaging studies of the heart: Magnetic Resonance Imaging. • Cardio electrophysiology procedures: diagnostic studies, interven-	L1,L2, L3, L4 and L5	20

tional and catheter ablation, Nursing care • Exercise testing: indications and Objectives:, safety and personnel, pretest considerations, selection, interpretation, test termination, recovery period • Cardiac catheterization: indications, contraindications, patient preparation, procedure, interpretation of data • Pulmonary function test: Bronchoscope and graphics • Interpretation of diagnostic measures • Nurse's role in diagnostic tests • Laboratory tests using blood: Blood specimen collection, Cardiac markers, Blood lipids, Hematologic studies, Blood cultures, Coagulation studies, Arterial blood gases, Blood Chemistries, cardiac enzyme studies, Serum Concentration of Selected drugs. • Interpretation and role of Nurse		

Unit V:
Cardiac disorders and Nursing management:
• Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and Nursing management of:
  • Hypertension
  • Coronary Artery Disease.
  • Angina of various types.
  • Cardiomegaly
  • Myocardial Infarction, Congestive cardiac failure
  • Heart Failure, Pulmonary Edema, Shock.
  • Rheumatic heart disease and other Valvular Diseases
  • Inflammatory Heart Diseases, Infective Endocarditis, Myocarditis, Pericarditis.
  • Cardiomyopathy, dilated, restrictive, hypertrophic.
  • Arrhythmias, heart block associated illnesses
	L1,L2, L3 and L4	25

Unit VI	L1,L2,	10

Altered pulmonary conditions • Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and Nursing management of: • Bronchitis • Bronchial asthma • Bronchiectasis • Pneumonias • Lung abscess, lung tumor • Pulmonary tuberculosis, fibrosis, pneumoconiosis etc • Pleuritis, effusion • Pneumo, haemo and pyothorax • Interstitial Lung Disease • Cystic fibrosis • Acute and Chronic obstructive pulmonary disease (conditions leading to) • Cor pulmonale • Acute respiratory failure • Adult respiratory distress syndrome • Pulmonary embolism • Pulmonary Hypertension	L3, and L5	
Unit VII **Vascular disorders and Nursing management** • Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and Nursing management of: • Disorders of arteries • Disorders of the aorta • Aortic Aneurysms, • Aortic dissection • Raynaud's phenomenon • Peripheral arterial disease of the lower extremities	L1,L2, L3, L4 and L5	10

• Venous thrombosis • Varicose veins • Chronic venous insufficiency and venous leg ulcers • Pulmonary embolism		
Unit VIII **Cardio thoracic emergency interventions** • CPR- BLS and ALS • Use of ventilator, defibrillator, pacemaker • Post resuscitation care. • Care of the critically ill patients • Psychosocial and spiritual aspects of care • Stress management; ICU psychosis • Role of Nurse	L3, L4 and L5	10
Unit IX **Nursing care of a patient with obstructive airway** • Assessment • Use of artificial airway • Endotracheal intubation, tracheostomy and its care • Complication, minimum cuff leak, securing tubes **Oxygen delivery systems** • Nasal Cannula • Oxygen mask, Venturi mask • Partial rebreathing bag • Bi-PAP and C-PAP masks • Uses, advantages, disadvantages, nursing implications of each. **Mechanical Ventilation** • Principles of mechanical ventilation • Types of mechanical ventilation and ventilators. • Modes of ventilation, advantage, disadvantage, complications.	L1,L2, and L3	10

• PEEP therapy, indications, physiology, and complications. Weaning off the ventilator. • Nursing assessment and interventions of ventilated patient.		
Unit X **Congenital Heart Diseases,** • Etiology, clinical manifestations, diagnois, prognosis, related pathophysiology, treatment modalities and Nursing management of: •Embryological development of heart. •Classification – cyanotic and acyanotic heart disease. •Tetralogy of Fallots. •Atrial Septal Defect, Ventricular Septal Defect., Eisenmenger's complex. •Patent ductus arteriosus, AP window •Truncus Arteriosus. •Transposition of great arteries. •Total Anomaly of Pulmonary Venous Connection. •Pulmonary stenosis, atresia. •Coarctation of aorta. •Ebstein's anomaly •Double outlet right ventricle, Single ventricle, Hypoplastic left heart syndrome.	L1,L2, L3,	10
Unit XI **Pharmacology** **Review** • Pharmacokinetics • Analgesics/Anti inflammatory agents • Antibiotics, antiseptics • Drug reaction & toxicity • Drugs used in cardiac emergencies	L1,L2, L3,	10

• Blood and blood components • Antithrombolytic agents • Inotropic agents • Beta-blocking agents • Calcium channel blockers. • Vaso constrictors • Vaso dilators • ACE inhibitors. • Anticoagulents • Antiarrhythmic drugs. • Anti hypertensives • Diuretics • Sedatives and tranquilizers. • Digitalis. • Antilipemics • Principles of drug Administration, role and responsibilities of Nurses and care of • Drugs		
Unit XII **Nursing Care of patient undergoing cardio thoracic surgery** • Indications, selection of patient • Preoperative assessment and preparation; counseling. • Intraoperative care: Principles of open heart surgery, equipment, anesthesia, cardiopulmonary by pass. • Surgical procedures for Coronary Artery Bypass Grafting, recent advances and types of grafts, Valve replacement or reconstruction, cardiac transplant, Palliative surgery and different Stents, vascular surgery, other recent advances. • Thoracic surgery: lobotomy, pneumonectomy, tumor excision etc	L1, L2 and L3	20

• Immediate postoperative care: assessment, post-operative problems and interventions: Bleeding, Cardiac tamponade, Low cardiac output, Infarction, Pericardial effusion, Pleural effusion, Pneumothorax, Haemothorax, Coagulopathy, • Thermal imbalance, inadequate, ventilation/perfusion, Neurological problems, renal problems, Psychological problems. • Chest physiotherapy • Nursing interventions- life style modification, complementary therapy / alternative systems of medicine. • Intermediate and late post operative care after CABG, valve surgery, others. • Follow up care		
Unit XIII **Cardiac rehabilitation** • Process • Physical evaluation • Life style modification • Physical conditioning for cardiovascular efficiency through exercise • Counseling • Follow up care	L1, L2 and L3	5

Unit XIV
 	
Intensive Coronary Care units/intensive cardio thoracic units:
• Quality assurance
  • Standards, Protocols, Policies, Procedures
  • Infection control; Standard safety measures
  • Nursing audit
  • Design of ICCU/ICTU
  • Staffing; cardiac team
  • Burn out syndrome
	L1, L2 and L3	

• Nurse's role in the management of I.C.C.U and ICTU. • Mobile coronary care unit. • Planning in-service educational programme and teaching		

Text & References:

1. Finkelmeir, Betsy A., *Cardiothoracic Surgical Nursing,* Philadelphia: Lipincott, 2000
2. Woods, Susan L. Cardiac Nursing, 3rd Edition Philadelphia;: JB Lipincott Co
3. Meltzer, Concept and Practices of Intensive care for Nurse Specialists 2nd edition Philadelphia: Charles Press Publications
4. Black M.J., Hawks H.J, *Medical Surgical Nursing, Clinical Management for Positive Outcome,* Sauders, Elsevier.
5. Urban, A.N., Greenlac K.K, *Guidelines for Critical Care Nursing,* Mosby.
6. Wood L.S., Freelicher S.E, *Fetal Cardiac Nursing,* Lippincott Williams & Wilkings.
7. Gulanic, Klopp, Galnes, *Fetal Nursing Care Plans Nursing Diagnosis and intervention*.
8. Philip &Wilma J, *Medical- Surgical Nursing,* B.T Publication Bangalore.
9. Ignatavicius, D.D. & Workman, M.L. (2016). *Medical-Surgical Nursing: Patient-Centered Collaborative Care* (8th ed.). St. Louis: Elsevier.
10. LeMone, P., Burke, K.M., Bauldoff, G., & Gubrud, P. (2015). *Medical-Surgical Nursing: Critical Reasoning in Patient Care* (6th ed.). Upper Saddle River, NJ: Pearson/Prentice Hall.
11. Lewis, S.L., Dirksen, S.R., Heitkemper, M.M., & Bucher, L. (2014). *Medical-Surgical Nursing: Assessment and Management of Clinical Problems* (9th ed.). St. Louis: Elsevier.
12. Hinkle, J.L. & Cheever, K.H. (2014). *Brunner & Suddarth's Textbook of Medical-Surgical Nursing* (13th ed.). Philadelphia: Lippincott Williams & Wilkins.
13. Ignatavicius, D. D., Workman, M. L. (Eds.). (2015). *Medical-surgical nursing: Critical thinking for collaborative care* (7th ed.). Toronto: Elsevier Saunders.
14. Jarvis, C. (2014). *Physical examination and health assessment* (2nd Cdn. ed.). St. Louis: Saunders.
15. Kozier, B. J., Erb, G., Berman, A. T., Snyder, S., Buck, M., Yiu, L., & Stamler, L. L.. (2014). *Fundamentals of Canadian nursing: Concepts, process, and practice* (3rd Cdn. ed.). Toronto: Pearson.

16. Potter, P.A., Perry, A.G., Stockert, P.A., & Hall, A.M. (2017). *Fundamentals of Nursing* (9th ed.). St. Louis: Elsevier/Mosby.
17. Academy of Medical-Surgical Nurses. (2012). *Scope and Standards of Medical-Surgical Nursing Practice* (5th ed.). Pitman, NJ. Craven, H. (Ed.). (2015). *Core Curriculum for Medical-Surgical Nursing*. (5th ed.). Pitman, NJ: Academy of Medical-Surgical Nurses.
18. Pasero, C. & McCaffery, M. (2011). *Pain Assessment and Pharmacologic Management*. St. Louis: Elsevier/Mosby.
19. Roberts, D. (Ed.). (2014). *Medical–Surgical Nursing Review Questions* (3rd ed.). Pitman, NJ: Academy of Medical-Surgical Nurses.
20. Kee, J.L., Hayes, E.R., & McCuistion, L.E. (2014). *Pharmacology: A Patient-Centered Nursing Process Approach*. (8th ed.). St. Louis: Elsevier/W.B. Saunders

* Latest editions of all the suggested books are recommended.

Web Resources:

- Pub med
- CINAHL(cumulative index to Nursing and allied health literature)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course Outcomes Assessment

This course contributes towards the learning outcomes**, ‘**cardiovascular and thoracic nursing. The outcome will be measured by the performance of students in various class tests/assignments in addition to the End Semester Examination (ESE) that contains significant number of questions on problems related to the cardiovascular and thoracic nursing.

Relationship between the course outcomes (COs), programme Outcomes (PO) and learning outcomes (Los)

Mapping between COs, PLOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-
CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1
CO11	-	1	1	2	2	1	1	2	-	1	1
CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1
CO15	1	1	1	1	1	1	1	-	1	1	1
CO16	1	-	1	1	1	1	1	-	1	-	1
CO17	-	1	1	2	2	1	1	2	-	1	1

CO18	2	-	-		1	1	1	1	2	-	-
CO19	-	1	2	2	2	2	2	1	-	1	2
CO20	2	2	1	2	2	-	-	-	2	2	1

1-strongly related; 2-moderately related; 3-weakly related

MSN4302	Critical care nursing	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:	**16**	**36****		**16**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Objectives

The objective of this course is to assist students:

In developing expertise and in-depth understanding in the field of Critical care nursing

8. To develop advanced skills for nursing intervention in various critical care conditions.
9. To function as critical care Nurse practitioner/specialist.
10. To enable the student to function as educator, manager and researcher in the field of critical care.

Course Outcomes:

At the end of the course the students will be able to:

CO1: Appreciate trends and issues related to Critical Care Nursing.

CO2: Describe the epidemiology, etiology, pathophysiology and diagnostic assessment of critically ill patients

CO3: Describe the various drugs used in critical care and nurses responsibility

CO4: Perform physical, psychosocial & spiritual assessment

CO5: Demonstrate advance skills/competence in managing critically ill patients including Advance Cardiac Life Support.

CO6: Demonstrate skill in handling various equipments/gadgets used for critical care

CO7: Provide comprehensive care to critically ill patients.

CO8: Appreciate team work & coordinate activities related to patient care.

CO9: Practice infection control measures.

CO10: Assess and manage pain.

CO11: Identify complications & take appropriate measures.

CO12: Discuss the legal and ethical issues in critical care nursing

CO13: Assist patients and their family to cope with emotional distress, spiritual, grief and anxiety

Assist in various diagnostic, therapeutic and surgical procedures

CO14: Incorporate evidence based nursing practice and identify the areas of research in the field of critical care nursing

CO15: Identify the sources of stress and manage burnout syndrome among health care providers.

CO16: Teach and supervise nurses and allied health workers.

CO1: Design a layout of ICU and develop standards for critical care nursing practice.

Course Content

Modules	**Blooms level***	**Number of hours**

Unit I Introduction to Critical Care Nursing • Historical review- Progressive patient care (PPC) • Review of anatomy and physiology of vital organs, fluid and electrolyte balance • Concepts of critical care nursing • Principles of critical care nursing • Scope of critical care nursing • Critical care unit set up including equipments supplies, use and care of various type of monitors & ventilators • Flow sheets	L1, L2 and L3	5
Concept of Holistic care applied to critical care nursing practice • Impact of critical care environment on patients:- • Risk factors, Assessment of patients, Critical care psychosis, prevention & Nursing care for patients affected with psycho-physiological & psychosocial problems of critical care unit, caring for the patient's family, family teaching • The dynamics of healing in critical care Units:-therapeutic touch, Relaxation, Music therapy, Guided Imagery, acupressure • Stress and burnout syndrome among health team members	L1,L2, L3	5
Unit III **Review** • Pharmacokinetics • Analgesics/Anti inflammatory agents • Antibiotics, antiseptics • Drug reaction & toxicity • Drugs used in critical care Unit (inclusive of ionotropic, life saving drugs) • Drugs used in various body systems • IV fluids and electrolytes • Blood and blood components	L1, L2 and L3	05

• Principles of drug Administration, role of Nurses and care of drugs		
Unit4: **Pain Management** • Pain & Sedation in Critically ill patients • Theories of pain, Types of pain, Pain assessment, Systemic responses to pain • Pain management-pharmacological and non-pharmacological measures • Placebo effect	L1,L2, L3, L4 and L5	20
Unit V: **Infection control in intensive care Unit** • Nosocomial infection in intensive care unit; methyl resistant staphylococcus aurous (MRSA), Disinfection, Sterilization, Standard safety measures, Prophylaxis for staff	L1,L2, L3 and L4	25
Unit VI **Gastrointestinal System** • Causes, Pathophysiology, Clinical types, Clinical features, diagnosis, Prognosis, Management: Medical, Surgical and Nursing management of:-Acute Gastrointestinal Bleeding, Abdominal injury, Hepatic Disorders:-Fulminent hepatic failure, Hepatic encephalopathy, Acute Pancreatitis, Acute intestinal obstruction, perforative peritonitis	L1,L2, L3, and L5	10
Unit VII **Renal System** • Causes, pathophysiology, Clinical types,Clinical features, diagnosis, Prognosis, Management: Medical, Surgical and Nursing management of:-Acute Renal Failure, Chronic Renal Failure, Acute tubular necrosis, Bladder	L1,L2, L3, L4 and L5	10

trauma • Management Modalities: Hemodialysis, Peritoneal Dialysis, Continuous Ambulatory Peritoneal Dialysis, Continuous arterio venus hemodialysis, Renal Transplant,		
Unit VIII **Nervous System** • Causes, pathophysiology, Clinical types,Clinical features, diagnosis, Prognosis, Management: Medical, Surgical and Nursing management of:-Common Neurological Disorders:-Cerebrovascular disease, Cerebrovascular accident, Seizure disorders, Guille in Barre-Syndrome, Masthenia Gravis, Coma, Persistent vegetative state, Encephalopathy, Head injury, Spinal Cord injury • Management Modalities: Assessment of Intracranial pressure, Management of intracranial hypertension, Craniotomy • Problems associated with neurological disorders: Thermo regulation, Unconsciousness, Herniation syndrome	L3, L4 and L5	10
Unit IX **Endocrine System** • Causes, Pathophysiology, Clinical types, Clinical features, diagnosis, Prognosis, Management: Medical, Surgical and Nursing Management of :-Hypoglycemia, Diabetic Ketoacidosis, Thyroid crisis, Myxoedema, Adrenal crisis, Syndrome of Inappropriate / hypersecretion of Antidiuretic Hormone (SIADH)	L1,L2, and L3	10
Unit X **Management of other Emergency Conditions** • Mechanism of injury, Thoracic injuries, Abdominal injuries, pelvic fractures, complications of trauma, Head inju-	L1,L2, L3,	10

ries • Shock: Shock syndrome, Hypovolemic, Cardiogenic, Anaphylactic, Neurogenic and Septic shock • Systemic inflammatory Response:The inflammatory response, Multiple organ dysfunction syndrome • Disseminated Intravascular Coagulation • Drug Overdose and Poisoning, • Acquired Immunodeficiency Syndrome (AIDS) • Ophthalmic: Eye injuries, Glaucoma, retinal detachment • Ear Nose Throat: Foreign bodies, stridor, bleeding, quincy, acute allergic conditions • Psychiatric emergencies;, suicide, • Crisis intervention		
Unit XI **Cardiovascular emergencies** • Principles of Nursing in caring for patient's with cardiovascular disorders • Assessment: Cardiovascular system: Heart sounds, Diagnostic studies:- Cardiac enzymes studies, Electrocardiography monitoring, Holter monitoring, Stress test. Echo cardiography, Coronary angiography, Nuclear medicine studies • Causes, Pathophysiology, Clinical types, Clinical features, Diagnostic Prognosis, Management : Medical, Surgical & Nursing management of:-Hypertensive crisis, Coronary artery disease, Acute Myocardial infarction, Cardiomyopathy, Deep vein thrombosis, Valvular diseases, Heart block, Cardiac arrhythmias & conduction disturbances, Aneurysms, Endocarditis, Heart failure Cardio pulmonary resuscitation BCLS / ACLS • Management Modalities: Thrombolytic therapy, Pacemaker – temporary & permanent, Percutaneous transluminal coronary angioplasty, Cardioversion, Intra Aortic Balloon pump monitoring,	L1,L2, L3,	10

Defibrillations, Cardiac surgeries, Coronary Artery Bypass Grafts (CABG/MICAS), Valvular surgeries, Heart Transplantation, Autologous blood transfusion, Radiofrequency Catheter Ablation		
Unit XII **Respiratory System** • Acid-base balance & imbalance • Assesment: History & Physical Examination • Diagnostic Tests:Pulse Oximetry, End –Tidal Carbon Dioxide Monitoring, Arterial blood gas studies, chest radiography, pulmonary Angiography, Bronchoscopy, Pulmonary function Test, Ventilation perfusion scan, Lung ventilation scan • Causes Pathophysiology, Clinical types, Clinical features, Prognosis, Management: Medical, Surgical and Nursing management of Common pulmonary disorders:-Pneumonia, Status asthmatics, interstitial drug disease, Pleural effusion, Chronic obstructive pulmonary disease, Pulmonary tuberculosis, Pulmonary edema, Atelectasis, Pulmonary embolism, Acute respiratory failure, Acute respiratory distress syndrome (ARDS), Chest Trauma Haemothorax, Pneumothorax • Management Modalities:-Airway Management • Ventilatory Management:-Invasive, non- invasive, long term mechanical ventilations • Bronchial Hygiene:-Nebulization, deep breathing exercise, chest physiotherapy, postural drainage, Inter Costal Drainage, Thoracic surgeries	L1, L2 and L3	20
Unit XIII **Cardiac rehabilitation** • Process • Physical evaluation	L1, L2 and L3	5

• Life style modification • Physical conditioning for cardiovascular efficiency through exercise • Counseling • Follow up care		
Unit XIV **Obstetrical Emergencies** • Causes, Pathophysiology, Clinical types, clinical features, diagnostic Prognosis, Management: Medical, Surgical and Nursing management of:Antepartum haemorrhage, Preeclampsia, eclampsia, Obstructed labour and ruptured uterus, Post partum haemorrhage, Peurperal sepsis, Obstetrical shock.	L1, L2 and L3	5
Unit XV **Neonatal Paediatric emergencies** • Causes, pathophysiology, Clinical types, Clinical features, diagnostic, Prognosis, Management: medical, surgical and Nursing management of • Neonatal emergencies • Asphyxia Neonatorum, Pathological Jaundice in Neonates, Neonatal seizures, Metabolic disorders, Intra cranial Hemorrhage, Neonatal Sepsis, RDS/HMD (Respiratory Distress Syndrome/Hyaline Membrane Disease), Congenital disorders:- • Cyanotic heart disease, tracheo oesophageal fistula, congenital hypertropic pyloric stenosis, imperforate anus • Paediatric emergencies • Dehydration, Acute broncho pneumonia, Acute respiratory distress syndrome, Poisoning, Foreign bodies, seizures, traumas, Status asthmaticus	L1, L2 and L3	5

Unit XVI **Legal and ethical issues in critical care-Nurse's role** • Brain death • Organ donation & Counseling • Do Not Resuscitate (DNR) • Euthanasia • Living will	L1, L2 and L3	51
Unit XVII **Quality assurance** • Standards, Protocols, Policies, Procedures • Infection control; Standard safety measures • Nursing audit • Staffing • Design of ICU / CCU	L1, L2 and L3	5

Text & References:

21. Finkelmeir, Betsy A., *Cardiothoracic Surgical Nursing*, Philadelphia: Lipincott, 2000
22. Woods, Susan L. Cardiac Nursing, 3rd Edition Philadelphia;: JB Lipincott Co
23. Meltzer, Concept and Practices of Intensive care for Nurse Specialists 2nd edition Philadelphia: Charles Press Publications
24. Black M.J., Hawks H.J, *Medical Surgical Nursing, Clinical Management for Positive Outcome*, Sauders, Elsevier.
25. Urban, A.N., Greenlac K.K, *Guidelines for Critical Care Nursing*, Mosby.
26. Wood L.S., Freelicher S.E, *Fetal Cardiac Nursing*, Lippincott Williams & Wilkings.
27. Gulanic, Klopp, Galnes, *Fetal Nursing Care Plans Nursing Diagnosis and intervention*.
28. Philip &Wilma J, *Medical- Surgical Nursing*, B.T Publication Bangalore.
29. Ignatavicius, D.D. & Workman, M.L. (2016). *Medical-Surgical Nursing: Patient-Centered Collaborative Care* (8th ed.). St. Louis: Elsevier.

30. LeMone, P., Burke, K.M., Bauldoff, G., & Gubrud, P. (2015). *Medical-Surgical Nursing: Critical Reasoning in Patient Care* (6th ed.). Upper Saddle River, NJ: Pearson/Prentice Hall.
31. Lewis, S.L., Dirksen, S.R., Heitkemper, M.M., & Bucher, L. (2014). *Medical-Surgical Nursing: Assessment and Management of Clinical Problems* (9th ed.). St. Louis: Elsevier.
32. Hinkle, J.L. & Cheever, K.H. (2014). *Brunner & Suddarth's Textbook of Medical-Surgical Nursing* (13th ed.). Philadelphia: Lippincott Williams & Wilkins.
33. Ignatavicius, D. D., Workman, M. L. (Eds.). (2015). *Medical-surgical nursing: Critical thinking for collaborative care* (7th ed.). Toronto: Elsevier Saunders.
34. Jarvis, C. (2014). *Physical examination and health assessment* (2nd Cdn. ed.). St. Louis: Saunders.
35. Kozier, B. J., Erb, G., Berman, A. T., Snyder, S., Buck, M., Yiu, L., & Stamler, L. L.. (2014). *Fundamentals of Canadian nursing: Concepts, process, and practice* (3rd Cdn. ed.). Toronto: Pearson.
36. Potter, P.A., Perry, A.G., Stockert, P.A., & Hall, A.M. (2017). *Fundamentals of Nursing* (9th ed.). St. Louis: Elsevier/Mosby.
37. Academy of Medical-Surgical Nurses. (2012). *Scope and Standards of Medical-Surgical Nursing Practice* (5th ed.). Pitman, NJ. Craven, H. (Ed.). (2015). *Core Curriculum for Medical-Surgical Nursing*. (5th ed.). Pitman, NJ: Academy of Medical-Surgical Nurses.
38. Pasero, C. & McCaffery, M. (2011). *Pain Assessment and Pharmacologic Management*. St. Louis: Elsevier/Mosby.
39. Roberts, D. (Ed.). (2014). *Medical–Surgical Nursing Review Questions* (3rd ed.). Pitman, NJ: Academy of Medical-Surgical Nurses.
40. Kee, J.L., Hayes, E.R., & McCuistion, L.E. (2014). *Pharmacology: A Patient-Centered Nursing Process Approach*. (8th ed.). St. Louis: Elsevier/W.B. Saunders

* Latest editions of all the suggested books are recommended.

Web Resources:

- Pub med
- CINAHL(cumulative index to Nursing and allied health literature)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Course Outcomes Assessment

This course contributes towards the learning outcomes**, ‘**cardiovascular and thoracic nursing. The outcome will be measured by the performance of students in various class tests/assignments in addition to the End Semester Examination (ESE) that contains significant number of questions on problems related to the cardiovascular and thoracic nursing.

Relationship between the course outcomes (COs), programme Outcomes (PO) and learning outcomes (Los)

Mapping between COs, PLOs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	1	-	1	1	1	1	-	1
CO2	2	1	2	-	1	1	2	2	1	2	-
CO3	1	1	1	2	-	-		1	1	1	2
CO4	2	2	1	-	1	2	2	2	2	1	-

CO5	2	-	-	2	2	1	2	2	-	-	2
CO6	1	1	-	1	1	1	1	1	1	-	1
CO7	1	1	-	1	-	1	1	1	1	-	1
CO8	2	1	2	-	1	1	2	2	1	2	-
CO9	1	1	1	2	-	-		1	1	1	2
CO10	1	-	1	1	1	1	1	-	1	-	1
CO11	-	1	1	2	2	1	1	2	-	1	1
CO12	2	-	-		1	1	1	1	2	-	-
CO13	-	1	2	2	2	2	2	1	-	1	2
CO14	2	2	1	2	2	-	-	-	2	2	1
CO15	1	1	1	1	1	1	1	-	1	1	1
CO16	1	-	1	1	1	1	1	-	1	-	1
CO17	-	1	1	2	2	1	1	2	-	1	1

1-strongly related; 2-moderately related; 3-weakly related

NUR4401	Nursing Management	L	T	P	C
Version 1.1	Date of Approval:	**15**	**10**	**-**	**20**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: This course is aimed at developing an understanding of the modern approach to child care, the common health problems of children and neonates in health and sickness.

Course Objectives:

· To develop a broad understanding of Principles, concepts, trends and issues related to nursing management.

· To provide opportunity to students to understand, appreciate and acquire skills in planning, supervision and management of nursing services at different levels to provide quality nursing services.

Course Outcomes:

On completion of this course students will be able to:

CO1: Describe the philosophy and objectives of the health care institutions at various levels.

CO2: Identify trends and issues in nursing and analyse legal and ethical issues in nursing administration

CO3: Discuss the public administration, health care administration in nursing

CO4: Describe the principles of administration applied to nursing

CO5: Explain the organization of health and nursing services at the various levels/institutions.

CO6: Collaborate and co-ordinate with various agencies by using multisectoral Approach

CO7: Discuss the planning, supervision and management of nursing workforce for various health care settings.

CO8: Discuss various collaborative models between nursing education and nursing service to improve the quality of nursing care

CO9: Describe the process of quality assurance in nursing services.

CO10: Demonstrate leadership in nursing at various levels

CO11 Explain the leadership style as well as strategies in administration

CO12 Describe the legal & ethical issues in administration

PROGRAMME SPECIFIC OUTCOMES

On completion of M.Sc. Nursing programme the post graduates will be able to:

PSO1 : Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.

PSO2: Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioral sciences. And Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.

PSO3: Demonstrate leadership, managerial skills, qualities and decision-making abilities, teaching and communication skills in clinical/ community health settings.

PSO4: Participation in research activities towards continued learning for personal and professional development, practice ethical values and utilize the research findings to improve the quality of care.

Course Content

Modules	**Blooms level**	**Number of hours (as per INC)**
Module I **Introduction** □ Philosophy, purpose, elements, principles and scope of Administration □ Indian Constitution, Indian Administrative system vis a vis health care delivery system: National, State and Local □ Organization and functions of Nursing services and education at National, State , □ District and institutions: Hospital and Community □ Planning process: Five year plans, Various Committee Reports on health, State and □ National Health policies, national population policy, national policy on AYUSH and plans.	**L1,2**	**10**
Module II Management □ Functions of Administration □ Planning and control □ Co-ordination and delegation □ Decision making – decentralization basic goals of decentralization.	**L3,4**	**10**

□ Concept of management Nursing management □ Concept, types, principles and techniques □ Vision and Mission Statements □ Philosophy, aims and objective □ Current trends and issues in Nursing Administration □ Theories and models □ Application to Nursing service and education		
Module III Planning □ Planning process: Concept, Principles, Institutional policies □ Mission, philosophy, Objectives:, □ Strategic planning, □ Operational plans, □ Management plans □ Programme evaluation and review technique(PERT), Gantt chart, Management by Objectives □ Planning new venture, □ Planning for change □ Innovations in Nursing, □ Application to Nursing service and education	**L4,5**	**15**
Module IV Organization □ Concept, Principles, Objectives: Types and theories, Minimum requirements for organization, Developing an organizational Structure, levels, organizational Effectiveness and organizational Climate, Organizing Nursing services and patient care: Methods of patient assignment- Advantages and disadvantages, primary Nursing care, □ Planning and Organizing: hospital, unit and ancillary services (specifically central sterile supply department, laundry, kitchen, laboratory services, emergency etc) □ Disaster management: plan, resources, drill, etc Application to Nursing service and Education	**L5,6**	**15**

Module V Human Resource for health: □ Staffing, □ Philosophy □ Norms: Staff inspection unit (SIU), Bajaj Committee, High power committee, □ Estimation of Nursing staff requirement- activity analysis □ Various research studies, □ Recruitment: credentialing, selection, placement, promotion □ Retention, □ Personnel policies, □ Termination □ Staff development programme □ Duties and responsibilities of various category of Nursing personnel □ Applications to Nursing service and education	**L4,5**	**15**
Module VI Directing □ Roles and functions □ Motivation: Intrinsic, extrinsic, Creating motivating climate, Motivational theories □ Communication : process, types, strategies, Interpersonal communication, channels, barriers, problems, Confidentiality, Public relations □ Delegation; common delegation errors □ Managing conflict: process, management, negotiation, consensus □ Collective bargaining: health care labour laws, unions, professional associations, role of Nurse manager □ Occupational health and safety, Application to Nursing service and education	**L2,3**	**15**
Module VII- Material management □ Concepts, principles and procedures □ Planning and procurement procedures: Specifications	**L3**	**10**

□ ABC analysis, VED (very important and essential daily use) analysis □ Planning equipments and supplies for Nursing care: unit and hospital □ Inventory control, □ Condemnation □ Application to Nursing service and education		
Module VIII- Controlling □ Quality assurance – Continuous Quality Improvement • Standards, • Models, • Nursing audit □ Performance appraisal: Tools, confidential reports, formats, Management, interviews □ Supervision and management: concepts and principles □ Discipline: service rules, self discipline, constructive versus destructive discipline, problem employees, disciplinary proceeding enquiry etc. Self evaluation or peer evaluation, patient satisfaction, utilization review □ Application to Nursing service and education	**L1,2,3**	**15**
Module IX- Fiscal planning □ Steps, □ Plan and non-plan, zero budgeting, mid-term appraisal, capital and revenue □ Budget estimate, revised estimate, performance budget □ Audit, □ Cost effectiveness, □ Cost accounting, □ Critical pathways □ Health care reforms, Health economics, Health insurance □ Budgeting for various units and levels □ Application to Nursing service and education	**L3, 4**	**15**
Module X	**L1, 2, 3**	**10**

Nursing informatics □ Trends, General purpose, Use of computers in hospital and community □ Patient record system, Nursing records and reports □ Management information and evaluation system (MIES) □ E- Nursing, Telemedicine, tele - Nursing □ Electronic medical records		
Module XI- Leadership □ Concepts, Types, Theories □ Styles, □ Manager behaviour □ Leader behaviour, □ Effective leader: Characteristics, skills □ Group dynamics, □ Power and politics □ Lobbying, □ Critical thinking and decision making □ Stress management □ Applications to Nursing service and education	**L2, L3**	**10**
Module XII- Legal and ethical issues Laws and ethics □ Ethical committee, Code of ethics and professional conduct □ Legal system: Types of law, tort law, and liabilities □ Legal issues in Nursing: negligence, malpractice, invasion of privacy, defamation of character □ Patient care issues, management issues, employment issues □ Medico legal issues □ Nursing regulatory mechanisms: licensure, renewal, accreditation □ Patients rights, Consumer protection act (CPA) □ Rights of special groups: children, women, HIV, handicap, ageing □ Professional responsibility and accountability □ Infection control, Standard safety measures	**L2, L3**	**10**

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

PRACTICALS

- Prepare prototype personal files for staff Nurses, faculty and cumulative records
- Preparation of budget estimate, revised estimate and performance budget
- Plan and conduct staff development programme
- Preparation of Organization Chart
- Developing Nursing standards/protocols for various units
- Design a layout plan for specialty units /hospital, community and educational institutions.
- Preparation of job description of various categories of nursing personnel
- Prepare a list of equipment and supplies for specialty units.
- Assess and prepare staffing requirement for hospitals, community and educational institutions.
- Plan of action for recruitment process
- Prepare a vision and mission statement for hospital, community and educational institutions
- Prepare a plan of action for performance appraisal
- Identify the problems of the specialty units and develop plan of action by using problem solving approach
- Plan a duty roster for specialty Units/hospital, community and educational institutions
- Prepare: anecdotes, incident reports, day and night reports, handing and taking over reports, enquiry reports, Nurses notes, Official letters, curriculum vitae, presentations etc.
- Prepare a plan for disaster management
- Group work
- Field appraisal report

Examination Scheme

Components	ATT	SE	Seminar1	Seminar2	ECC	EE
Weightage	5	5	5	5	5	75

(%)						

Reference Books

- Eleanor J. Sullivan. 2017. Effective Leadership and Management in Nursing Paperback –
- Bessie L. Marquis, Carol J. Huston, 2017. Leadership Roles and Management Functions in Nursing: Theory and Application
- Essentials of Nursing Leadership & Management 7th Edition by Sally A. Weiss EdD APRN FNP-C CNE ANEF (Author), Ruth M. Tappen EdD RN FAAN (Author), Karen Grimley PhD MBA RN NEA-BC FACHE (Author)
- Health Informatics: An Interprofessional Approach 2nd Edition by Ramona Nelson PhD RN-BC ANEF FAAN (Author), Nancy Staggers PhD RN FAAN (Author)

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**
CO2	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**
CO3	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**1**	**1**	**3**	**1**
CO4	**3**	**3**	**1**	**1**	**1**	**1**	**2**	**1**	**2**	**3**	**1**

CO5	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
CO6	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
CO7	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**2**
CO8	**3**	**2**	**3**	**1**	**1**	**1**	**2**	**1**	**2**	**3**	**2**
CO9	**3**	**3**	**3**	**1**	**3**	**3**	**-2**	**2**	**2**	**2**	**2**
CO10	**1**	**2**	**2**	**2**	**2**	**2**	**3**	**1**	**2**	**3**	**1**
CO11	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**1**	**2**	**2**	**1**
CO12	**1**	**2**	**2**	**1**	**1**	**1**	**3**	**1**	**2**	**3**	**1**

1: strongly related, 2: moderately related and 3: weakly related

CHN4402	**Community Health Nursing Practical**	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:		**28****		**32**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of Community health nursing procedures.

Course Outcomes: The course is designed to assist students in developing expertise and in depth understanding in the field of Community Health Nursing. It would help students to appreciate holistic life style of individuals, families & groups and develop skills to function as Community Health Nurse specialist/practitioner. It would further enable student to function as an educator, manager, care giver and researcher in the field of Community Health Nursing. Each student is required to participate in following activities during the community posting in urban as well as rural area

On completion of this course students will be able to:

CO1. Apply the nursing process in the care of geriatric patients in old age home and community
CO2. Demonstrate advanced skills/competence in nursing management of children with Communicable problems
CO3. Recognize and manage emergencies in deaddiction centres and mental health centres
CO4. Utilize the recent technology and various treatment modalities in the management of high risk children
CO5. Prepare a design for layout and describe standards for National health services
CO6. Identify areas of research in the field of community health nursing

Course Content

Modules	**Blooms level**
Module 1 • MCH office and DPHNO • CHC/ First Referral unit (FRU) • Child guidance clinic • Institute/ unit for mentally challenged • District TB centre • AIDS control society	**L1,2,**
Module 2 • Filariasis clinic • RCH clinic	**L1. 2**

• STD clinic • Leprosy clinic • Community based rehabilitation unit • Cancer centers • Palliative care	
Module 3: • Home of old age • Mental health units • De-addication centres • School health services • Industry • Selected industrial health centers • ESI unit • Municipality/ corporation office	**L1,2,**
Module 4 • Laparoscopic sterilization • Vasectomy • All clinics related to RCH • Monitoring of national health and family welfare programmes	**L1,2, 3**
Module 5 • Conduct various clinics • School health assessment. • Health survey. • Health assessment	**L3,4**

• Drug Administration as per the protocols • Treatment of minor ailments Investigating outbreak of epidemic	
Module 6 • Screening for leprosy, TB and non-communicable disease • Presumptive and radical treatment for Malaria. • Counseling • Report writing • Referrals • Writing a project proposal • Material management- requisition for indent, condemnation, inventory maintenance, • Training and Supervision of various categories of personnel • Liaison with NGO's	**L3,4**

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	**NCP**	**CS/CP**	**Project**	**OR**	**HE**	**CE**	**EPE**
Weightage (%)	**10**	**30**	**10**	**05**	**05**	**40**	**100**

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Text & References:

Reference Books:

1. Clark, June & Jill Handerson, *Community Health*, Churchill Livingstone, 1993, New York.
2. Freeman B. Ruth, *Public Health Practices*, W. W. Saunders CO., 1990, Philadelphia.
3. Fromer Joan Margot, *Community Health Care and the Nursing Process*, C.VMosby CO., Toronto.
4. Park J. E, *Text Book of Preventive and Social Medicine*, Ms Banarsidas Bhanot CO., 1996, Jabalpur.
5. Rao S. Kasthi, *An Introduction to Community Health Nursing*, B. I. Publishers, Madras.
6. Gulani,K,K. Community Health Nursing(2007). Kumar Publishing House.pp 339-420.
7. Basavanthappa,B,T. Community Health Nursing(2nd edition), Jaypee Brothers Medical Publishers.
8. Park ,K .Preventive and Social Medicine.(19th edition), Kumar Book Depot.
9. Kamalam, S. Essentials in Community Health Nursing Practice.(2nd edition), Jaypee Brothers.
10. Alternative approaches to health care. ICMR. Paper presented at the National Symposium on Alternative Approaches to health care.
11. Archer,S,E. Community Health Nursing:Patterns and Practice.(2nd edition).Duxbusy Press.
12. Prabhakara,G,N. Textbook of Community Health for Nurses.(2nd edition). Peepee Publishers and distributers.
13. Stanhope,M &Lanchaster,J.Community Health Nursing:Practice and Process for Promoting Health.(3rd edition).mosby.
14. Pinger,R,P.An Introduction to Community health.(4th edition).Jones and Bartlett Publishers.
15. Patney Sunita , (2005), Text Book Of Community Health Nursing, First Edition, Cbs.
16. Mckenzie James F. Pinger Robert R, Kotecki Jerome E, (2002), An Introduction To Community Health Nursing, Fourth Edition, Jones And Bartlett.
17. Lundy Saucier Karen, Janes Sharyn, (2002) Community Health Nursing, First Edition, Jones And Bartlettt.

*Latest editions of all the suggested books are recommended

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1
CO7	2	1	3	2	2	2	2	1	2	2	1
CO8	3	2	3	2	2	2	2	1	2	3	1
CO9	2	2	2	2	2	2	2	1	2	2	1

1: strongly related, 2: moderately related and 3: weakly related

PSN4402	Psychiatric Nursing CS-III & IV Practical	L	T	P	C
Version 1.1	Date of Approval:		**28****		**32**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Catalog Catalogue:

This course is designed to assist students in developing expertise and in depth understanding in the field of Psychiatric Nursing. It will help students to develop advanced skills for nursing intervention in various Psychiatric conditions. It will enable the student to function as Psychiatric Nurse practitioner/specialist. It will further enable the student to function as educator, manager, and researcher in the field of Psychiatric Nursing

Course Objectives: On completion of the two year M.Sc. Nursing (Psychiatry) programme, the Post Graduate Nurse will be able to provide comprehensive nursing care to patients with psychiatric problems in preventive, curative and rehabilitation aspects.

Course Outcomes

At the end of the course the students will be able to:

1. Apply the nursing process in the care of patients with mental disorders in hospital and community

2. Demonstrate advanced skills/competence in nursing management of patients with mental disorders

3. Identify and care for special groups like children, adolescents, women, elderly, abused and neglected, people living with HIV/AIDS.

4. Identify and manage psychiatric emergencies.

5. Provide nursing care to critically ill patients with mental disorders

6. Utilize the recent technology and various treatment modalities in the management of patients with mental disorders

7. Demonstrate skills in carrying out crisis intervention.

8. Appreciate the legal and ethical issues pertaining to psychiatric nursing.

9. Identify areas of research in the field of psychiatric nursing.

10. Prepare a design for layout and describe standards for management of Psychiatric units/emergency units/hospitals

11. Teach psychiatric nursing to undergraduate students & in-service nurses.

Course Content

Modules	**Blooms level**
Module 1: History collection and Assessment of mental status examination	**L1,2, 3**
Module 2 : Management of Psychiatric Patient	**L2,3, 4**
Module 3: Psychometric and Personality Assessment	**L1,2,3**
Module 4: Observing various therapies	**L1,2, 3**
Module 5: Process Recording	**L3,4**
Module 6: Socio and Psycho drama	**L2, 3**

*Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Kaplan H. Sadock B, Synopsis of Psychiatry, William and Wilkins, 1991, Bathmov.
- Stuart W.G. Sundeen J.S, Principles and Practice of Psychiatry Nursing, Mosby Year book, 1991, London.
- Taylor C.M., Essentials of Psychiatric Nursing, CV Mosby Co., 1982, London.
- Bimla Kapoor CV, A Text book of Psychiatric Nursing, Mosby Co.,1982, Delhi
- Shivas, "Basic Concept of Psychiatric Mental Health Nursing, B.I Publications, 1994
- Brown R.T. Feldman G.R., Epilepsy- Diagnosis and Management, Little Brown and Co.,1983, Toronto.
- Beck M.C. Rawtins P.R. and et al, Mental Health-Psychiatric Nursing. The C.V. Mosby Co., Ltd.1984, Toronto.
- Coleman C.J, Abnormal Psychology and Modern Life. P.B. Tara and Sons Co. Pvt Ltd. 1982.

Reference Books

- Gelder M.G., Andreasen N.C., New Oxford Text book of Psychiatry, Oxford University Press, 2012.
- Elizabeth M. Varcarolis: Foundations of Psychiatric Mental Health Nursing; 4th Edition, W.B. Saunders, Company, 2002.
- Kaplan & Sadock's: Concise Text book of Clinical psychiatry; 2nd Edition, J.P. Brothers (Indian) Lippincott, Williams & Wilkins, 2002.
- Stuart M. psychiatric mental health nursing
- Sheila. L. Videbeck: Psychiatric mental health nursing; Lippincott, 2001.
- Many Ann Boyd & Mary Ann Nihart: Psychiatric Nursing Contemporary Practice; Lippincott, 1998

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme Practical: Internal 100, External 100

Components	NCP	CS/CP	Project	OR	HE	CE	EPE
Weightage (%)	10	30	10	05	05	40	100

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

CO PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	3	3	3	2	3	2	-	1	-	-
CO2	1	1	2	3	2	3	1	-	1	-	-
CO3	1	1	2	3	1	2	1	-	1	-	-
CO4	1	2	3	3	1	2	1	-	1	-	-
CO5	2	2	2	3	1	2	2	-	1	-	-
CO6	2	1	1	1	2	1	3	-	1	-	-
CO7	1	1	2	3	1	2	1	-	1	-	-
CO8	1	1	2	3	1	2	1	-	1	-	-

CO9	**1**	**1**	**2**	**3**	**1**	**2**	**1**	**-**	**1**	**-**	**-**
CO10	**1**	**1**	**2**	**3**	**1**	**2**	**1**		**1**		
CO11	**1**	**1**	**2**	**3**	**1**	**2**	**1**		**1**		

1: strongly related, 2: moderately related and 3: weakly related

PDN 4402	**Child Health (Pediatric) Nursing Practical**	**L**	**T**	**P**	**C**
Version 1.1	Date of Approval:		**28****		**32**
Pre-requisites/Exposure	NIL				
Co-requisites	NIL				

Course Catalogue: The course is designed to enable students to develop expertise in the field of child health nursing procedures.

Course Description: It will help students to appreciate the child as a holistic individual and develop skill to function as a Pediatric Nurse specialist.

Course Outcomes:

On completion of this course students will be able to:

CO1. Apply the nursing process in the care of ill infants to pre adolescents in hospital and community

CO2. Demonstrate advanced skills/competence in nursing management of children with medical and surgical problems

CO3. Recognize and manage emergencies in children and Provide nursing care to critically ill children

CO4. Utilize the recent technology and various treatment modalities in the management of high risk children

CO5. Prepare a design for layout and describe standards for management of pediatric units/hospitals

CO6. Identify areas of research in the field of pediatric nursing

Course Content

Modules	**Blooms level**
Module I **Procedures Observed:** • Echo cardiogram • Ultrasound head • ROP screening (Retinopathy of prematurity)	**L1,2, 3**
Module II **Procedures Assisted** • Advanced neonatal life support • Lumbar Puncture • Arterial Blood Gas • ECG Recording • Umbilical catheterization – arterial and venous • Arterial B P monitoring • Blood transfusion- exchange transfusion full and partial • IV cannulation & therapy • Arterial catheterization • Chest tube insertion • Endotracheal intubation • Ventilation • Insertion of long line • Assist in surgery	**L2,3, 4**

Module III
Procedures Performed:
• Airway Management
  • Application of Oro Pharyngeal Airway
  • Oxygen therapy
  • CPAP (Continuous Positive Airway Pressure)
  • Care of Tracheostomy
  • Endotracheal Intubation
• Neonatal Resuscitation
• Monitoring of Neonates – clinically & with monitors, CRT (Capillary Refill Time), assessment of jaundice, ECGGastric Lavage
• Setting of Ventilators
• Phototherapy
• Assessment of Neonates: Identification & assessment of risk factors, APGAR Score, gestation age, Anthropometric assessment, Weighing the baby, Newborn examination, detection of life threatening congenital abnormalities,
• Admission & discharge of neonates
• Feeding - management of breast feeding, artificial feeding, expression of breast milk, OG (Orogastric) tube insertion, gavage feeding, TPN, Breast feeding counseling
• Thermoregulation- Axillary temperature, Kangaroo Mother Care (KMC), Use of Radiant warmer, incubators, management of thermoregulation & control
• Administration of Drugs: I/M, IV injection, IV Cannulation & fixation infusion pump, Calculation of dosages, Neonatal formulation of drugs, use of tuberculin/ insulin syringes, Monitoring fluid therapy, Blood Administration.
	L1,2,3

• Procedures for prevention of infections: Hand washing, disinfections & sterilization, surveillance, fumigation • Collection of specimens • Setting, Use & maintenance of basic equipment: Ventilator, O2 analyzer, monitoring equipment, Photo therapy unit, Flux meter, Infusion pump, Radiant warmer, incubator, Centrifuge machine, Bilimeter, Refractometer, laminar flow	

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

7. Examination Scheme Practical: Internal 100, External 100

Components	**NCP**	**CS/CP**	**Project**	**OR**	**HE**	**CE**	**EPE**
Weightage (%)	**10**	**30**	**10**	**05**	**05**	**40**	**100**

NCP- Nursing Care Plan, CS- Case Study, CP - Case Presentation, OR- Observation Report, HE- Health Education, CE-Clinical Evaluation, EPE- External Practical Examination

Reference Books:

10. Whaley and Wong, Essentials of Pediatrics Nursing
11. Learners Guide, WHO, AIIMS
12. IMNCI Students' Handbook, WHO
13. Ball and Bindler, *Paediatric Nursing Caring for Children*, Prenticehall.
14. Behrman, Richard K & Vaughan, Nelson,s, *TextBook of Paediatrics*, WB Saunders Co.,
15. Ghai O P, *Essential Paediatrics*
16. Asuma Beevi, Textbook of Pediatric Nursing

17. Parul Datta, Textbook of Pediatric Nursing
18. Panchali Pal, Textbook of Pediatric Nursing

Course Outcome Measurement:

The outcome will be measured by the performance of the students in various class tests, assignments in addition to the End Semester Exam (ESE) that contains significant number of questions on problems related to meeting needs of the patients.

Relationship between the course outcomes (COs), Programme Outcomes (PO) and Programme Specific Outcomes (PSOs)

Mapping between COs, POs and PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	2	2	2	2	2	1	2	3	1
CO2	2	1	2	2	2	2	2	1	2	3	1
CO3	2	1	2	3	2	2	2	1	2	3	1
CO4	3	1	2	2	2	2	2	1	2	3	1
CO5	2	1	3	2	2	2	2	1	2	2	1
CO6	2	1	3	2	2	2	2	1	2	2	1

1: strongly related, 2: moderately related and 3: weakly related

Amity College of Nursing

Post Basic Bachelor of Science Nursing

FLEXILEARN

-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Post Basic B.Sc. Nursing

Aim

The programme at post basic level is designed to upgrade and enhance the knowledge of the diploma nurses (General Nursing and Midwifery) to assume the roles and responsibilities as professional, competent nurses and midwives at basic level in providing promotive, preventive, curative and rehabilitative services. It enables them to make independent decisions in clinical situations, protect the patients' rights and facilitate individuals and groups in pursuit of health and function in the hospital, community nursing services and Nursing educational institutes. They are also prepared to conduct research in the areas of nursing practice.

OBJECTIVES

On completion of Post Basic B.Sc. Nursing degree programme the graduates will be able to:

1. Assess the health status, identify nursing needs, plan, implement and evaluate nursing care for patients/client that contribute to health of individuals, families and communities.
2. Demonstrate competency in techniques of nursing skills based on concepts and principles from specialized areas of nursing, physical, biological and behavioural sciences.
3. Participate as member of health care team in the promotive, preventive, curative and restorative health care delivery system of the country.
4. Demonstrate skills in effective communication and interpersonal relationship.
5. Demonstrate leadership qualities and decision-making abilities in various situations.
6. Demonstrate skills in teaching to individuals and groups in community health settings.
7. Emphasize on practicing ethical values in their personal and professional life.
8. Participate in research activities and utilize research findings in improving nursing practice.
9. Recognize the need for continued learning for their personal and professional development.

Post Basic B.Sc. Nursing –First Semester
NURSING FOUNDATION

Course Code: NUR2105 **Credit Unit-04**

Course Description: This course will help students develop an understanding of the philosophy, objectives and responsibilities of Nursing as a Profession. The purpose of the course is to orient to the current concepts involved in the practices of Nursing and developments in the Nursing Profession.

OBJECTIVES
At the end of the course, the student will:

1. Identify Professional aspects of Nursing.
2. Explain theories of Nursing.
3. Identify ethical aspects of Nursing Profession.
4. Utilize steps of Nursing Process.
5. Identify the role of the Nurse in various levels of health services.
6. Appreciate the significance of quality assurance in Nursing.
7. Explain current trends in health and Nursing.

Course Contents
Module I

- Development of Nursing as a Profession:
  - Its philosophy
  - Objectives and responsibilities of a professional Nurse.
- Trends influencing Nursing Practices.
- Expanded role of the Nurse.
- Development of Nursing Education in India and trends in Nursing Education.
- Professional organizations, career planning.
- Code of ethics & Professional conduct for Nurses.

Module II

- Ethical, legal and other issues in Nursing.
- Concept of health and illness, effects on the person.
- Stress and adaptation.
- Health care concept and Nursing care concept.
- Developmental concept, needs, roles and problems of the development stages of individual – newborn, infant, toddler, pre-adolescent, adolescent, adulthood, middle- age old age.

Module III

- Theory of Nursing practices.
- Meta-paradigm of Nursing – characterized by four central concepts i.e. Nurse, person (client/ patient), health and environment.

Module IV

- Nursing process.
- Assessment: Tools for assessment, methods, recording.
- Planning: Teaching for planning care, types of care plans.

- Implementation: Different approaches to care, organizations and implementation of care, recording.
- Evaluation: tools for evaluation, process of evaluation, types of evaluation.

Module V

- Quality assurance: Nursing Standards, Nursing audit, total quality management.
- Role of council and Professional bodies in maintenance of standards.

Module VI

- Primary health care concept:
  - Community oriented Nursing
  - Holistic Nursing
  - Primary Nursing.
- Family oriented Nursing concept:
  - Problem oriented Nursing
  - Progressive patient care
  - Team Nursing.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage(%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S Presentation /Seminar; EE- End Semester Examination

Text & References:

Text

1. Barbara Kosier et al, *Fundamentals of Nursing Concepts and Procedure*, Addison Welsloy Publishing Co., 2007, Philadelphia
2. Potter and Perry, *Fundamentals of Nursing Concepts-Process and Practice*, C.V Mosby and Co., 1985, London.
3. Nancy Sr., *Principles and Practices of Nursing*, vol. I, II, NR Publishing Home, 1984, Indore

References

1. Brown Ammy Francis, *Medical Nursing*, W.B Saunders and Co., 2006, USA.
2. Esther Mc Clain RN, *Scientific Principle of Nursing*, Current technical literature Publications, 1969, Bombay.
3. Virginia Henderson et al, *Principles and Practice of Nursing*, Mc Milan Publishing Co., London.
4. Elbert et al, *Scientific Principles in Nursing*, C. V Mosby and Co., 1974, USA.
5. Ann Marriner, *The Nursing Process- A Scientific Approach to Nursing Care*, C.V Mosby and Co., 1979.
6. Hoodmark Rohweden, *Scientific Foundation of Nursing*, 3rd edition, J.B Lippincott Co., 1975,
7. Norman G. Kirby and Sliphen J Mather, Bailliers, *Hand Book of First Aid*, India Traveller Book Seller,
8. Lois Dakes, *Illustrations of Bandaging and First Aid*, E and S Livingstone Ltd, Teviot plane.

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –First Semester
NUTRITON AND DIETETICS

Course Code: NUR2106 **Credit Unit-04**

Course Description: This course is designed to provide the students with a wide knowledge of dietetics in Indian setting, that the practices of teaching optimum and realistic dietary planning can become an integral part of Nursing Practices.

OBJECTIVES
At the end of the course, the student will:

1. Explain the principles and practices of nutrition and dietetics.
2. Plan therapeutic diets in different settings.
3. Identify nutritional needs of different age groups and plan diet accordingly.
4. Prepare meals using different methods utilizing cookery rules.
5. Prepare recommended meals according to the disease conditions of the patients.

Course Contents
Module I

- Introduction to nutrition and dietetics.
- Balanced diet, factors on which it depends.
- Factors to be considered in planning.
- Guides available for planning.
- Food hygiene, preparation and preservation.
- Review of nutrients – micro & macro.

Module II

- Introduction to diet therapy.
- Routine hospital diets.
- Therapeutic diet under each Module i.e. Cardiovascular diseases, gastrointestinal diseases, renal disorders, endocrine and metabolic disorders, allergy, infections and fevers, pre and post operative stages, deficiency diseases and malnutrition, overweight and underweight.

Module III

- Infant and child nutrition.
- Feeding of normal infants: factors to be considered in planning nutritional requirements.
- Feeding of premature infants: factors to be considered in panning nutritional requirements.
- Supplementary feeding of infants: Advantage and method of introduction.
- Weaning, effects on mother and child.
- Psychology of infant and child feeding.
- Feeding the sick child. Diet in diseases of infancy and childhood.
- Deficiency status – Malnutrition and under nutrition.
- Feeding pre-school child: Nutritional needs, factors to be considered in planning diets. Problems in feeding.
- School lunch programme: Advantage, need in India.

Module IV

- Community nutrition: need for Community nutrition programme.
- Nutritional needs for special groups: Infant, child, adolescent, pregnant woman, lactating mother and old people.
- Substitutes for non-vegetarian foods.
- Selection of cheap and nutritious foods. Nutrition education needs and methods.
- Methods of assessing nutritional status of individual / group / Community.
- Current nutritional problems and national programmes.

PRACTICUM

I. ***Methods of cooking and cookery rules***.

1. Simple preparation of beverages, soups, cereals and pulses, eggs, vegetables, meat.
2. Menu plans.

II. *Preparation of supplementary food for infants.*

1. Foods for toddlers.
2. Low cost nutritious dishes for vulnerable groups.
3. Dietary case study of patient on special diet planning of low cost dietary instructions for home adaptations.
4. Planning of therapeutic diets.

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage(%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA- Extracurricular activity; EE- End Semester Examination

Text & References:

Text

1. Swaminathan M., *Hand Book of Food and Nutrition*, Bangalore printing and publishing Co., 1970, Bangalore.
2. Anderson, *Nutrition in Nursing*, Lippincott Co., 1972, Philadelphia.
3. Joshi V.D., *Hand Book of Nutrition and Dietetics*, Vora Medical Publications, Bombay

References

1. Antia, E. P., *Clinical Dietetics and Nutrition*, Oxford University Press, 1995, New Delhi.
2. Corrine H Robinson, *Normal and Therapeutic Nutrition*, Oxford and IBH Publications.
3. Sue Rodwell Williams, *Nutrition and Diet Therapy*, C.V Mosby and Co., 1977.
4. Patwardhan V. N., *Nutrition in India*, 1961.
5. Hervietta Flick, *Introduction to Nutrition*, Mac Millon Publishing Co., 1970.
6. Lenna F. Copper, *Nutrition in Heath and Disease*, J.B Lippincott Co., Philadelphia.

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –First Semester
BIOCHEMISTRY AND BIOPHYSICS

Course Code: NUR2107 **Credit Unit-05**
(Biochemistry-3)
(Biophysics -2)

Course Description: This course introduces the basic principles of Biochemistry and Biophysics related to Nursing.

OBJECTIVES
At the end of the course, the student will:

1. Identify the basic principles of Biochemistry and Biophysics.
2. Synthesize the knowledge of these principles in various Nursing situations.

Section A: Biochemistry

Course Contents

Module I

- Introduction: Importance of Biochemistry in Nursing.
- Study of cell and its various components.

Module II

- Water and Electrolytes: Water – Sources, property & functions in human body.
- Water and fluid balance.
- Electrolytes of human body, functions, sources.

Module III

- Enzymes
  - Mechanism of action
  - Factors affecting enzyme activity
  - Diagnostic applications
  - Precautions for handling specimens for enzyme estimation.
- Digestion and absorption of carbohydrates, proteins and fats
- Various factors influencing the digestion and absorption, mal-absorption syndrome.

Module IV

- Carbohydrates: Catabolism of carbohydrates for energy purposes.
- Mitrochondrial oxidation and oxidation phosphorylation.
- Fats of glucose in the body. Storage of glucose in the body, glycogenesis, glycogenolysis and neoglucogenesis, blood glucose and its regulation.
- Glucose tolerance test, hyperglycemia, hypoglycemia, glycemia.

Module V

- Protein: Amino acids, hormones.
- Essential amino acids. Biosynthesis of protein in the cells.
- Role of nucleic acid in protein synthesis.
- Nitrogenous constituents of urine, blood, their origin – urea cycle, uric acid formation, gout.
- Plasma proteins and their functions.

Module VI

- Fat: Biosynthesis of fats and storage of fats in the body.
- Role of liver in fat metabolism.
- Biological importance of important lipids and their functions
- Cholesterol and lipoprotein
  - Sources, occurrence and distribution
  - Blood level and metabolism
  - Ketone bodies and utilization.
- Inter relationship in metabolism and cellular control of metabolic processes.

Section B: Biophysics

Course Contents

Module I

- Introduction: Concepts of Module and measurements.
- Fundamental and derived Modules.
- Modules of length, weight, mass, time.

Module II

- Vector and scalar motion, speed, velocity and acceleration.

Module III

- Gravity: Specific gravity, centre of gravity, principles of gravity.
- Effect of gravitational forces on human body.
- Application of principles of gravity in Nursing.

Module IV

- Force, work, energy: their Modules of measurement.
- Type and transformation of energy, forces of the body, static forces.
- Principles of machines, friction and body mechanics.
- Simple mechanics – lever and body mechanics, pulley and traction, incline plane, screw.
- Application of these principles in Nursing.

Module V

- Heat: Nature, measurement, transfer of heat.
- Effects of heat on matter.
- Relative humidity, specific heat.
- Temperature scales.
- Regulation of body temperature.
- Use of heat for sterilization.
- Application of these principles in Nursing.

Module VI

- Light: Laws of reflection.
- Focusing elements of the eye, defective vision and correction, use of lenses.
- Relationship between energy, frequency and wavelength of light.
- Biological effects of light.

- Use of light in therapy.
- Application of these principles in Nursing.

Module VII

- Pressures: Atmospheric pressure, hydrostatic pressure, osmotic pressure.
- Measurements of pressures in the body
  - Arterial and venous blood pressures
  - Ocular pressure
  - Intracranial pressure
  - Application of these principles in Nursing.

Module VIII

- Sound: Frequency, velocity and intensity.
- Vocalization and hearing.
- Use of ultrasound. Noise pollution and its prevention.
- Application of these principles in Nursing.

Module IX

- Electricity and electromagnetism: Nature of electricity, voltage, current, resistance and their Modules.
- Flow of electricity in solids, electrolytes, gases and vacuum.
- Electricity and human body.
- ECG, EEG, EMG, ECT.
- Pace makers and defibrillation.
- Magnetism and electricity.
- M.R.I. Scanning, C.T scan.

Module X

- Atomic energy: Structure of atom, isotopes and isobars.
- Radioactivity: Use of radioactive isotopes.
- Radiation protection Modules and limits, instruments used for detection of ionizing radiation. X- Rays.

Module XI

- Principles of electronics: Common electronic equipments used in patient care.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S- Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Suresh K Sharma,Biophysics in Nursing, Jaypee Brothers, Delhi, 1st edition
2. Manoj K Sharma, Biophysics for Nurses, Kumar Publishing House, Delhi, 1st edition, 2012
3. Antikad J., *Nutrition & Biochemistry for Nurses*, jaypee brothers medical publishers (p) LTD. 1st edition 2009.
4. V.K. Malhotra, *Biochemistry for Students*, jaypee brothers medical publishers (p) LTD

References

1. Eastham Duncan Robert, *Biochemical Values in Clinical Medicine*, John Cought and Sons Ltd, 1977.
2. Chandlish J K, *Lecture Notes on Biochemistry*, Blackwell Scientific Publications, 1984.
3. Klein S. Israel and Ordan James, *Human Biochemistry*, Mosby Co., 1958.
4. Varley Harold, *Practical Clinical Biochemistry*, CBS Publishers and Distributers, 1988, New Delhi.

*Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –First Semester
MEDICAL SURGICAL NURSING

Course Code: NUR2108 **Credit Unit-08**

Course Description: The purpose of this course is to widen the students' knowledge and develop proficiency in caring for patients with medical surgical problems. This course includes review of relevant Anatomy and Physiology, Pathophysiology in Medical-Surgical disorders and Nursing management of these conditions.

OBJECTIVES

At the end of the course, the student will:

1. Explain relevant Anatomy and Physiology of various systems of the body.
2. Explain Pathophysiology of various disorders.
3. Explain the actions, side effects and Nursing implications in administering drugs for various disorders.
4. Discuss the recent advancement in the treatment and care of patients with medical surgical conditions.
5. Develop skill in giving comprehensive Nursing care to patients following the steps of Nursing process.
6. Assist the patients and their families in identifying and meeting their own health needs.
7. Appreciate the role of the nurse in the medical surgical health term.

Course Contents

Module I

- Introduction to Medical Surgical Nursing.
- Review of concepts of comprehensive Nursing care in medical surgical conditions.
- Nurse, patient and his/ her family.
- Functions of Nurse in the Outpatient Department.
- Intensive care Module.

Module II

- Nursing management of patient with specific problems:
  - Fluid and electrolyte imbalance.
  - Dyspnea and cough, Respiratory obstruction
  - Fever
  - Shock
  - Unconsciousness
  - Pain
  - Acute illness
  - Chronic illness
  - Terminal illness
  - Age related illness
  - Patient undergoing surgery
  - Incontinence.

Module III

- Nursing management of patient with Neurological and Neurosurgical conditions.
- Review of Anatomy and Physiology of the Nervous System.
- Pathophysiology, diagnostic procedures and management of-
  - Cerebra-vascular accident.
  - Cranial spinal and peripheral Neuropathies.
  - Headache and intractable pain.
  - Epilepsy.
  - Infectious and inflammatory diseases and trauma of the Nervous System.
  - Common disorders of the system.
  - Recent advances in diagnostic and treatment modalities.
  - Drugs used in these disorders.
  - Tumors of brain & Spinal card, congenital malformations, degenerative diseases.

Module IV

- Nursing management of patient with Cardiovascular problems.
- Review of relevant Anatomy and Physiology of Cardiovascular system.
- Pathophysiology, diagnostic procedures and management of:
  - Ischemic Heart diseases
  - Cardiac arrhythmias
  - Congestive heart failure
  - Rheumatic and other valvular heart diseases
  - Endocarditis, cardiomyopathies, congenital heart diseases, hypertension, heart block
  - Cardiac emergencies: Cardiac Arrest, acute pulmonary oedema, cardiac tamponade, cardiogenic shock, aneurysms and peripherovascular disorders, recent advancement in cardiology.

Module V

- Nursing management of patient with respiratory problems.
- Review of Anatomy and Physiology of respiratory system Pathophysiology, diagnostic procedures and management of upper respiratory tract infections:
  - Bronchitis
  - Asthma
  - Emphysema, Empyema, Atelectasis, COPD
  - Bronchiectasis
  - Pneumonia
  - Pulmonary tuberculosis
  - Lung abscess
  - Pleural effusion
  - Tumours and cysts
  - Chest injuries
  - Respiratory arrest and insufficiency
  - Pulmonary embolism
  - Drugs used in the management of these patients
  - Special respiratory therapies.

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Module VI

- Nursing management of patient with Genito-urinary problems.
- Review of Anatomy and Physiology of the Genito-urinary System
  - Nephritis
  - Renal calculus
  - Acute renal failure
  - Chronic renal failure
  - End stage renal disease.
- Special procedures, dialysis, renal transplant.
- Drugs used in management of these patients.
- Congenital disorders, urinary infections.
- Benign prostate hypertrophy.

Module VII

- Nursing management of patients with problems of the digestive systems.
- Review of Anatomy and Physiology of gastrointestinal system and accessory organs.
- Pathophysiology, diagnostic procedures and management of :
  - G.I. Bleeding
  - Peptic ulcer
  - Infections
  - Acute abdomen
  - Colitis, diarrhea, dysentery & mal-absorption syndrome.
  - Cholecystitis
  - Hepatitis, hepatic coma and cirrhosis of liver
  - Portal hypertension
  - Pancreatitits
  - Tumors, Hernias, Fistulas, Fissures, Hemorrhoids.

- Drug used in the management of these patients.

Module VIII

- Nursing management of patients with endocrine problems.
- Review of Anatomy, Physiology and Pathophysiology of patient with:
  - Thyroid disorders
  - Diabetes mellitus
  - Diabetes insipidus
  - Adrenal tumour
  - Pituitary disorders
  - Diagnostic procedures.

- Nursing management of patient with above problems.
- Drug used in Endocrine problems.

Module IX

- Nursing management of patient with musculoskeletal problems.
- Review of anatomy, Physiology and Pathophysiology:
  - Arthritis Osteomyelitis, Bursitis

    - Fractures, dislocation and trauma
    - Prolapsed disc
    - Osteomalacia and osteoporosis
    - Tumor
    - Amputation.

- Diagnostic procedures
- Nursing management of patient with above problems.
- Prosthesis and Rehabilitation.
- Transplant & replacement surgeries.

Module X

- Nursing management of patient with disorders of female reproductive tract.
- Disorder of menstruation.
- Infections of the genital tract.
- Benign and malignant tumors of the genital tract.
- R.V.F., V.V.F.
- Climacteric changes and associated problems.

Module XI

- Nursing management of patient with Oncological disorders.
- Types of Neoplasms and related Pathophysiology.
- Diagnostic procedures.
- Modalities of treatment and nurse's role.
- Special therapies – Chemotherapy and Radiotherapy
- Preventive measures, other therapies.

Module XII

- Nursing management of patient with burns.
- Nursing management of patient with reconstructive surgeries.

Module XIII

- Nursing management of patient with common communicable diseases & STD'S.
- Nursing management of patient with immunological disorders including HIV/AIDS.

Module XIV

- Nursing management of patient with diseases of eye, ear, nose, throat & skin.

Module XV

- Nursing management of patient with blood disorders
- Review of Anatomy & Physiology of Blood & Blood products.
- Pathophysiology, diagnostic procedures and management of blood disorders:
    - Anemia
    - Leukemia
    - Bleeding disorders
    - Hemophilia
    - Purpura etc.

- Blood transfusion, safety checks, procedure and requirements. Management of adverse transfusion reaction, records for blood transfusion.
- Management and counseling of blood donors, phlebotomy procedure, and post donation management.
- Blood bank functioning and hospital transfusion committee
- Bio-safety and waste management in relation to blood transfusion.

Module XVI

- Nursing in emergencies.
- Cardiac emergencies.
- Trauma.
- Poisoning.
- Crisis management: Thyroid crisis, Hypertensive crisis and Adrenal crisis.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Chintamani, Lewis's Medical Surgical Nursing, Assessment and Management of Clinical Problems, Adapted for South Asian Curriculum; 2011, New Delhi, Elsevier,
2. Joyce M. Black & Jane Hokanson Hawks, Medical Surgical Nursing, 7th Edition, Year 2004, Saunders (imprint of device)

References

1. Phippe, Manohar, Saids et al. Medical Surgical Nursing – Health and Illness perspectives, 7th Edition, Year 2003 Mosby (Elsevier).
2. Beare-Myers-Adults Health Nursing 3rd Edition, Year 1998 Mosby.
3. Saundra M Nettina- The Lippincott Manuel of Nursing Practice, 6th Edition, Year- 1991, Lippincott.
4. Brunner & Doris Smith Suddarth, Text Book of Medical Surgical Nursing, J.B. Lippincott Company.
5. Ansari, Javed. A textbook of Medical Surgical Nursing II, Year 2013, S.Vikas and Company India (Pee Vee)
6. Jean Luckman-Saunders, Manual of Nursing Care Year 1997, W.B. Saunders Company.
7. Donna D. Jgmataromis & M Linda workman Medical Surgical Nursing, Year- 2002. L.B. Saunders Company.

Post Basic B.Sc. Nursing –First Semester
ENGLISH

Course Code: NUR2109 **Credit Unit-05**

Course Description: This course is designed to help the students understand and use skills of English language required for their professional work.

OBJECTIVES

After the course the student will develop:

1. Ability to speak and write grammatically corrects English.
2. Effective skill in reading and understanding the English language.
3. Skill in reporting.

Course Contents

Module I

- Remedial study of Grammar.
- Review of grammar, vocabulary and effective use of dictionary.
- Prepare task oriented seminars.
- Symposia and panel discussion.

Module II

- The ability to understand selected passage and express meaning in one's own words.
- Reading and comprehension of the prescribed books.

Module III

- The study of various forms of composition:
  - Note taking
  - Diary
  - Nurse notes, Anecdotal records
  - Writing of summary
  - Nurses' reports on health problems.

The student will submit one sample of each item from her own practical experience.

Module IV

- Verbal communication.
- Oral reports.
- Summarization of discussion.
- Debate.
- Listening comprehension- film, cassette and radio.

PRACTICUM

1. The clinical experience in the wards and bed side nursing will provide opportunity for students to fulfill the objectives of learning language.
2. Assignment on writing and conversation through participation in Discussion, Debates, Seminars and Symposia. The students will gain further skill in task oriented communication.

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA- Extracurricular activity; EE- End Semester Examination

Text & References:
Text

Reference Books

1. Tikkoo M. L., et al, *Intermediate Grammar usage and Composition*, Orient Longman Publication.
2. Sidhu, *An Intensive Course in English – A Remedial Work Book*, Orient Longman Publication.
3. Jain R.C., *English Grammar and Composition*, Mac-Milan Publication.

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –First Semester
MEDICAL SURGICAL NURSING (PRACTICAL)

Course Code: NUR2110 **Credit Unit-11**

This Course is based on Course Code NUR2108
Guidelines

1. Students should be rotated in the selected medical & surgical areas, like Cardio Thoracic, Neurology, Urology, Orthopedics, Gynecology, Oncology, and Burns and Reconstructive surgical Modules.
2. The students should be given patient assignment. They have practices patient centered comprehensive Nursing.
3. Each student is requested to give planned health teachings, conduct clinical teaching, case presentation and drug study.

Examination Scheme:

Components	P/S	NCS	NCP	HE	CE	SPE	EPE
Weightage (%)	20	15	30	5	20	10	100

P/S-Presentation/Seminar; NCS-Nursing Case Study; NCP- Nursing Care plan; HE- Health Education; CE-Clinical Evaluation; SPE-Sessional Practical Examination; EE- External Practical Examination

Post Basic B.Sc. Nursing – Second Semester

PSYCHOLOGY

Course Code: NUR2207 **Credit Unit-06**

Course Description: This course is designed to reorient and widen the student's knowledge of fundamentals of psychology. The student is offered an opportunity to apply the theoretical concepts in the clinical setting and thereby understand the psychodynamics of patient behaviors. This course would also help the student to develop an insight into her own behavior.

OBJECTIVES

At the end of course, the student will:

1. Apply psychological principles while performing Nursing duties.
2. Distinguish the psychological processes during health and sickness.
3. Analyze own behavior patterns.
4. Tabulate the psychological needs of the patients for planning Nursing care.
5. Participate in psychometric assessment of the client.

Course Contents

Module I

- Introduction: Definition of psychology, scope and methods of psychology.
- Relationship with other subject.

Module II

- Sensation, Attention and Perception: Definitions.
- Sensory processes: Normal and abnormal.
- Attention and distraction: Contributory factors.
- Characteristics of perception, Perception: normal and abnormal.

Module III

- Motivation: Definition and nature of motivation.
- Biological and social motives.
- Frustration and conflicts.
- Self- actualization.

Module IV

- Emotions: Definition of emotions, Expression and perception.
- Emotions in sickness.

Module V

- Personality: Definition, constituents of personality.
- Personality in sickness and Nursing.

Module VI

- Psychological aspects of Nursing.
- Behaviour and sickness. Psychological needs of:
    - Child and adolescents
    - Adult
    - Aged
    - Attendants
    - Chronically ill individual.

Module VII

- Individual differences.
- Significance of individual differences.
- Heredity and environment.
- Role of individual differences both in health and sickness.
- Implications of individual differences in Nursing.

Module VIII

- Intelligence and abilities: Definition.
- Intelligence and abilities during sickness.
- Measurement of intelligence and abilities.

Module IX

- Learning: Definition, Conditions of learning.
- Laws of learning.
- Learning during health and sickness.

Module X

- Memory and forgetting: Definition and nature of memory.
- Memory during health and sickness.
- Forgetting during health and sickness.

Module XI

- Attitudes: Definition, development and modification.
- Role of attitudes in health and sickness.

Module XII

- Concept of mental hygiene & mental health.
- Characteristics of a mentally healthy person.
- Defense mechanisms.

PRACTICUM

1. Simple experiments on (i) perception (ii) measuring thresholds (iii) reaction time.
2. Administration of psychological tests.
3. Observation and recording data: (i) field observation (ii) interview (iii) Case study (iv) Self-rating.

Examination Scheme:

Components	ATT	HA	CT	SE	EA	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EA- Extracurricular activity; EE- End Semester Examination

Text & References:

Text

1. Morgan T.C, 'Introduction to psychology', 7th edition, Tata Mc Graw Hill Publications.1993
2. Mehta .M, 'Behavioral sciences in medical practice', Jaypee publications
3. Fernald I.D & Fernad Peter S Munn's Introduction to Psychology, Fifth Edition. AITBS Publisher: Delhi, India 2003
4. Bhatia and Craig. Elements of Psychology and Mental Hygiene for Nurses in India. 26th editon. Publisher Orient Longman Pvt Ltd, Hyderabad: India 2003

Reference Books

1. Andrew Mc Ghee, *Psychology on Applied to Nursing*, Livingstone Nursing Texts, Churchill Livingstone.
2. Philip E Vernon, *The Measurement of Abilities*, University of London Press Ltd., 1972.
3. Kuppuswamy, Prabhu P.H, *General Psychology*, Asia Publishing Home, 1975, Bombay.
4. Madeleine A. Leininger, *Wontemporary Issues in Mental Health Nursing*, Little Brown & Company, Boston.
5. Donald Snygy, *Individual Behaviour, A new frame of Reference for Psychology*, Harper and Brother Publishers, 1982.
6. Phillip L Harriman, *Handbook of Psychological Terms*, Littlefield Adam and co., 1969.

*Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Second Semester
MATERNAL NURSING

Course Code: NUR2208 **Credit Unit-05**

Course Description: This course is designed to widen the student's knowledge of obstetrics during pregnancy, labour and puerperium. It also helps to acquire knowledge and develop skill in rendering optimum Nursing care to a child bearing mother in a hospital or Community and help in the management of common gynecological problems.

OBJECTIVES

At end of the course, the student will:

1. Describe the Physiology of pregnancy, labour and puerperium.
2. Manage normal pregnancy, labour and puerperium.
3. Explain the Physiology of lactation and advice on management of breast feeding.
4. Be skilled in providing pre and post operative Nursing care in obstetric conditions.
5. Identify and manage high risk pregnancy including appropriate referrals.
6. Propagate the concept and motivate acceptance of family planning methods.
7. Teach, guide and supervise auxiliary midwifery personnel.

Course Contents

Module I

- Introduction and historical review.
- Planned Parenthood.
- Maternal morbidity and mortality rates.
- Legislations related to maternity benefits, MTP acts, incentives for family planning etc.

Module II

- Review of the Anatomy and Physiology of female reproductive system.
- Female pelvis (normal and contracted).
- Review of Foetal development.

Module III

- Physiology and management of pregnancy, labour and puerperium.
- Signs and symptoms and diagnosis of pregnancy.
- Antenatal care.
- Pregnant woman with HIV/ AIDS.
- Management of common Gynecological problems.

Module IV

- The new born baby.
- Care of the baby at birth including resuscitation.
- Essential newborn care:
  - Feeding
  - Jaundice and infection
  - Small & large for date babies.
  - Intensive care of the new born
  - Trauma and hemorrhage.

Module V

- Management of abnormal pregnancy, labour and puerperium.
- Abortion, ectopic pregnancy and vesicular mole.

- Pregnancy induced hypertension, gestational diabetes, anaemia, heart disease.
- Urinary infection, Antepartum haemorrhage.
- Abnormal labour (malposition & malpresentation):
  - Uterine inertia
  - Disorders of puerperium
  - Management of engorged breast, cracked nipples, breast abscess and mastitis
  - Pueperal sepsis
  - Post partum haemorrhage
  - Inversion and prolapsed of uterus, obstetrical emergencies
  - Obstetrical operation i.e. forceps, vacuum, episiotomy, caesarean section.

Module VI

- Drugs in obstetrics.
- Effects of drugs during pregnancy, labour and puerperium on mother & body.

Module VII

- National Welfare Programmes for Women.
- National Family Welfare Programme.
- Infertile Family.
- Problems associated with unwanted pregnancy.
- Unwed mothers.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Dawn C.S, *Text Book of Gynaecology & Contraception*, Dawn books, 1994, CIT Road, Calcutta.
2. Dutta D. C., *Text Book of Gynaecology*, New central book agency Ltd., Calcutta.
3. Myles Margaret, *Text Book of Midwifes*, Educational low priced books scheme, British Government

Reference Books

1. Dawn C.S, *Text Book of Obstetrics*, New central book agency Ltd., Calcutta.
2. Hawkins & Borune, Shaw's, *Text Book of Gynaecology*, B.I. Chrchill Livingstone Pvt. Ltd.

*Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Second Semester
PAEDIATRIC NURSING

Course Code: NUR2209 **Credit Unit-05**

Course Description: This course is aimed at developing an understanding of the modern approach to child care, the common health problems of children and neonates in health and sickness.

OBJECTIVES

At the end of the course, the student will:

1. Explain the modern concept of child care and the principles of Paediatric Nursing.
2. Describe the normal growth and development of children at different ages.
3. Manage sick as well as healthy neonates and children.
4. Identity various aspects of preventive Paediatric Nursing and apply them in providing Nursing care to children in hospital and Community.

Course Contents

Module I

- Introduction.
- Modern concept of child care.
- Internationally accepted rights of the child.
- National policy and legislations in relation to child health and welfare.
- National programmes related to child health and welfare.
- Changing trends in hospital care, preventive, promotive and curative aspects of child health.
- Child morbidity and mortality rates.
- Differences between an adult and child.
- Hospital environment for a sick child.
- The role of a Paediatric Nurse in caring for a hospitalized child.
- Principles of Pre and Post operative care of infants and children.
- Paediatric Nursing procedures.

Module II

- The healthy child.
- Growth and development from birth to adolescence.
- The needs of normal children through the stages of development and parental guidance.
- Nutritional needs of children & infants breast- feeding, supplementary/ artificial feeding and weaning.
- Accidents, causes and prevention.
- Value of play selection of play material.
- Preventive immunization.

Module III

- Nursing care of a neonate.
- Nursing care of a normal newborn.
- Neonatal resuscitation.
- Nursing management of a low birth weight body.
- Nursing management of common neonatal disorders.
- Organization of neonatal Module. Preventive of infections in the nursery.

Module IV

- Nursing management in common childhood diseases.
- Nutritional deficiency disorders.

- Reparatory disorders and infections.
- Gastrointestinal infections, infections and congenital disorders.
- Cardio vascular problem-congenital defects and rheumatic fever.
- Genito-urinary disorder – Nephritic syndrome, Wilms' tumor, infection and congenital disorders.
- Neurological infections and disorders- convulsions, epilepsy, meningitis, hydrocephalus, spinabifida.
- Hematological disorders – Anemias, Thalassemia, ITP, Leukemia, hemophilia.
- Endocrine disorders – Juvenile Diabetes Mellitus.
- Orthopedic disorders – club feet, hip dislocation and fracture.
- Disorders of skin eye and ears.
- Common Communicable Diseases in children, their identification, Nursing management in hospital and home and prevention.
- Paediatric emergencies – poisoning, foreign bodies, haemorrage, burns and drowning.

Module V

- Management of behavioral disorders in children.
- Management of challenged children:
  - Mentally challenged
  - Physically challenged
  - Socially challenged.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Marlow R., *Child Health for Nurses*, 6th edition, W.B. Saunders Company, New Delhi, 2002
2. Parthasarathy A., *Text Book of Paediatrics*, 3rd edition, Jaypee Brothers, New Delhi, 2006.
3. Lippincott, *Lippincott manual of nursing practice*, 6th edition, , Lippincott publishers, Philadelphia. 1996

References

1. Behrman, Richard K & Vaughan, Nelson,s, *TextBook of Paediatrics*, WB Saunders Co.,
2. Barbara EW, *Guidelines in the Care of the Low Birth Weight*, Orient Longman
3. Aravind. R., *Applied Neonatology*, 1st edition, Jaypee brothers medical publication, New Delhi, 2006.
4. Guha.K, *Neonatology-Principles and practice*, 3rd edition, Jaypee publication, New Delhi, 2005.
5. Singh Meharban, *Care of the Newborn*, 6th edition, Sagar publications, New Delhi, 2004.
6. Ghai .O.P, *Essential Pediatric*, 6th edition, CBS Publishers, Bangalore, 2006
7. Gupta .S, *Essential Text Book of Paediatrics*, Jaypee Brothers Publishers Pvt. Ltd., 7th edition, 1995.
8. J.M. Chellapa, *Paediatric Nursing*, Gajanana Book Publishers and Distributors, Delhi, 1995.

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Second Semester
MICROBIOLOGY

Course Code: NUR2210 **Credit Unit-07**

Course Description: This course reorients the students to the fundamentals of Microbiology and its various sub-divisions. It provides opportunities to gain skill in handing and use of microscope for identifying various micro- organisms. It also provides opportunities for safe handling of materials containing harmful bacteria and methods of destroying microorganisms.

OBJECTIVES

At the end of course the student will:

1. Identify common disease producing micro- organisms.
2. Explain the basic principles of microbiology and their significance in health and disease.
3. Demonstrate skill in handing specimens.
4. Explain various methods of disinfection and sterilization.
5. Identify the role of the Nurse in hospital infection control system.

Course Contents

Module I

- Structure and classification of microbes.
- Morphological types.
- Size and form of bacteria.
- Motility.
- Classification of micro-organisms.

Practical:

- Use and care of microscope.
- Common examination: Smear Blood, Moulds, and Yeasts.

Module II

- Identification of micro-organisms.
- Discussion of laboratory methods.
- Diagnosis of bacterial diseases.

Practical:

- Staining techniques- gram staining, acid fast staining.
- Hanging drop preparation.

Module III

- Growth and nutrition of microbes.
- Temperature.
- Moisture.
- Blood.

Practical

- Preparation of media and culture techniques.
- Collection, handling and transportation of various specimens.

Module IV

- Destruction of micro- organisms.
- Sterilization and disinfection.
- Chemotherapy and antibiotics.
- Effects of heat and cold.
- Hospital infection control procedure & role of Nurses.

Practical: Sterilization methods – Physical, Chemical and Mechanical

Module V

- Disease producing micro- organisms.
- Gram positive bacilli.
- Tuberculosis and leprosy.
- Anaerobes.
- Cocci.
- Spirochaete.
- Rickettsiae.

Practical: Identification and study of the following bacteria: streptococci, Pneumococci, and Staphylococci Corynebacteria, Spirochetes and gonococci. Enteric bacteria, Posting in infection control department.

Module VI

- Pathogenic Fungi.
- Dermatophytes.
- Systemic Mycotic infection.
- Laboratory diagnosis of Mycotic infection.

Module VII

- Immunity.
- Immunity and hypersensitivity - Skin test.
- Antigen and antibody reaction.
- Immunization in disease.

Practical: Demonstration of serological methods.

Module VIII

- Parasites and vectors.
- Characteristics and classification of parasites.
- Protozoal infection including amoebiasis.
- Helminthes infection.
- Diagnosis of parasitic infection.
- Vectors and diseases transmitted by them.

Practical: Identification of Parasites and Vectors.

Module IX

- Viruses.
- Classification and general character of viruses.
- Diseases caused by viruses in man and animal and their control.

Module X

- Micro- organisms transmitted through food.
- Food poisoning. Food borne infections.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Anathanarayan and Panikar. Textbook of Microbiology. Sixth edition. Publishers Orient Longman Ltd Hyderabad-2004
2. Sood .S, Text book of Microbiology for Nurses, J.P Brothers' Publishers, New Delhi, 3rd Edition, 2004.

References

1. Blackwell C. Caroline, *Principles of Infection and Immunities in Patient Care*, Edenburg Churchill Livingston, 1981.
2. Hug L. L, Muffet, *Clinical Microbiology*, J. B. Lippincott Co., 1981.
3. Loyd Roberts et al, *Medical Microbiology*, Boston Little Co., 1989.

*Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Second Semester
MATERNAL NURSING (PRACTICAL)

Course Code: NUR2211 **Credit Unit-10**

This Course is based on Course Code NUR2208
Guidelines

1. The student will:
   a. Be posted in antenatal Clinic, MCH clinic, antenatal ward, labour room, postnatal ward, maternity OT, MTP room.
   b. Visit welfare agencies for woman and write observation report.
   c. Follow Nursing process in providing care to 3-6 patients.
   d. Write at least two Nursing care studies and do a presentation.
   e. Give at least one planned health teaching to a group of mothers.
2. Practices following Nursing procedures -
   a. Antenatal & Post natal examination, per vaginal exam.
   b. Conduct normal delivery, stitching of episiotomy, (for male candidate minimum conduct of 5 deliveries)
   c. Motivation of family for adopting family planning methods.
   d. Motivate family for Planned Parenthood.
   e. Assist in various diagnostic and therapeutic procedures including IUD insertion and removal.

Examination Scheme:

Components	ANC	NCP (PNC)	P/S	HE	NCS	CE	SPE	EPE
Weightage (%)	10	10	10	10	10	40	10	100

ANC-Antenatal case; NCP- Nursing Care plan; PNC-Post natal case; P/S-Presentation//Seminar; HE-Health Education; NCS- Nursing Case Study; CE- Clinical Evaluation; SPE- Sessional Practical Examination; EPE-External Practical Exam

Post Basic B.Sc. Nursing –Second Semester
PAEDIATRIC NURSING (PRACTICAL)

Course Code: NUR2212 **Credit Unit-10**

This Course is based on Course CodeNUR2209

Guidelines
The student will:

1. Be posted in Pediatric Medical and Surgical wards, OPD in hospital, health centre and neonatal unit.
2. Visit a centre for handicapped children and child welfare centre and write observation report.
3. Write an observational study of normal children of various age groups in home/ nursery school/ crèche.
4. Follow Nursing process in providing care to 3-6 children.
5. Write at least two Nursing care studies and do a presentation.
6. Give two planned health teachings, one in hospital and one in OPD / health centre.
7. Practice the following Nursing procedures:
   - Taking pediatric history
   - Physical assessment of children
   - Baby bath
   - Feeding
   - Restraining.
8. Calculation of dosage of drugs and administration of medications and injections.
9. Collection of specimens.
10. Enema, bowel wash, colostomy irrigation.
11. Steam and oxygen inhalation.
12. Preparation to assist with diagnostic tests and operations.
13. Examination / Assessment of a newborn.
14. Neonatal resuscitation.
15. Care of a baby in incubator and on ventilator.
16. Photo Therapy.
17. Assist in exchange transfusion and other therapeutic procedures.

Examination Scheme:

Components	NCP	HE	NCS/P	GDA	CE	SPE	EPE
Weightage (%)	10	10	20	10	30	20	100

NCP-Nursing Care Plan; HE- Health Education; NCS/P-Nursing Case Study/Presentation; GDA-Growth & Development Assessment; SPE-Sessional Practical Examination; CE- Clinical Evaluation; EPE- End Semester Practical Examination

Post Basic B.Sc. Nursing –Third Semester
SOCIOLOGY

Course Code: NUR2305 **Credit Unit-05**

Course Description: This course is to reorient students to Sociology, relation to Community and social institution in India and its relationship with health, illness and Nursing.

OBJECTIVES
At the end of the course, the student will:

1. Describe Sociological concepts that are applicable to Nursing.
2. Determine role of Sociology in Nursing as related to social institutions in India.
3. Develop positive attitudes towards individual, family and Community.

Course Contents
Module I

- Introduction.
- Importance of study of Sociology in Nursing, relationship of Anthropology, Sociology, etc.

Module II

- Individual and the society.
- Socialization.
- Interdependence of the individual and society.
- Personal disorganization.

Module III

- Culture.
- Nature of culture.
- Evolution of culture.
- Diversity and uniformity of culture.

Module IV

- Social organization.
- Social groups, Crowds and Public groups, Nations, Race.
- Social Institutions: Family, Marriage, Education, Religion, Arts, Economic organization, Political organization.
- The Urban & Rural Community in India: Ecology, characteristics of the village, characteristics of the town and city.
- Social stratification: Class and Caste.

Module V

- Social Process.
- Process of Social Interaction: Competition, Conflict- war, Cooperation, Accommodation and Assimilation.

Module VI

- Social Change.
- Nature and process of Social Change: Factors influencing cultural change.
- Cultural Lag.

Module VII

- Social Problems.
- Social disorganization control & planning: Poverty, Population Housing, Illiteracy, Food supplies, growth of urbanization, Prostitution, Minority groups, rights of woman & children, child labour, child abuse delinquency and crime, substance abuse.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Indrani T.K. Textbook of Sociology for Nurses, First Edition; (Reprint) New Delhi, Jaypee Brothers, 2005.
2. Williams, Anne, Cooke, Hannah & May Caul, Sociology, Nursing & Health, First Edition; Great Britain, Butler Worth Heinemenn, 1998.
3. Sachdeva V., D. R. and Bhushan, An *Introduction to Sociology*, Kitab Mahal Ltd., 2002, Allahabad.
4. S.R Myneni,Sociology, 2010

References Books

1. Gupta Dipankar, *Social Stratification*, Pub. Oxford University Press, 1991, New Delhi.
2. Shankar Rao C.N, *Introducing Sociology*, Pub. Jai Bharat Prakashana Manglore-575004.
3. Bhimappa K, *Sociology*, Cambridge Publishing Co. West of Chord Road.Banglore-560044

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Third Semester
COMMUNITY HEALTH NURSING

Course Code: NUR2306 **Credit Unit-05**

Course Description: The course enables the students to understand the national health care delivery system and to participate in the delivery of Community Health Nursing.

OBJECTIVES

At the end of the course, the student will:

1. Explain the concepts of various factors contributing to health of individual, family and Community.
2. Identify the role of a Community Health Nurse.
3. Describe National Health Care delivery system.
4. Describe Epidemiological methods and principles of prevention and control of illness in the Community.
5. Identity the role of personnel working in the Community Health setting.
6. Plan the work of Community Health Nursing, and supervise and train health workers.

Course Contents

Module I

- Introduction.
- Introduction to Community Health – Concepts, Principles and Elements of Primary Health Care.
- Introduction to Community Health Nursing.
- Concept of Community Health Nursing – Community Nursing process.
- Objective, Scope and Principles of Community Health Nursing.

Module II

- Family Health Services.
- Concept, Objective, Scope and Principles.
- Individual, Family and Community as a unit of service.
- Principles and techniques of home visiting.
- Establishing working relationship with the family.
- Working with families in relation to prevention of diseases, promotion of health.
- Care of the sick in the home, physically handicapped and mentally challenged.
- Surveillance and Monitoring.
- Social Mobilization Skills
- Programme management including supervision and monitoring

Module III

- Organization and Administration of health services in India.
- National Health Policy.
- Health Care Delivery system in India.
- Health team concepts:
    - Centre, State, District, Urban Health Services, Rural Health Services
    - System of medicines
    - Centrally sponsored health schemes
    - Role of voluntary health organizations and International Health Agencies
    - Role of health personnel in the Community
    - Public Health Legislation.
    - Roles and Responsibilities of Mid- level Health care Providers

- Diagnosing and treatment skills essential at sub-centre level using standard treatment protocols as per national health programmes
- Drug Dispensing

Module IV

- Health Education:
  - Aims, Concepts and Scope of Health Education.
  - National Plan for Health Education
  - Communication Techniques
  - Methods and media for health education programmes
  - Planning for health education and role of nurse.
  - Behaviour Change Communication and soft skills

Module V

- Role of the Community Health Nurse.
- National Health Programmes:
  - Maternal and child health programmmes
  - Family welfare and school health services
  - Occupational health services.
- As a member of the health team.
- Training and supervision of health care workers.
- New National Health Programmes
- Ayushman Bharat
- Introduction to Rashtriya Bal Sureksha Karyakaram (RBSK)
- Integrated disease Surveillance Project (IDSP)
- Mother and Child Tracking System (MCTS)
- Organization of labour room
- Safe Child Birth Checklist
- Post Partum visit by health workers
- Family Planning 2020
- National Family Programmes
- Climate Change and its Impact on Health
- Heat Wave and its impact on Health
- Air Pollution and its impact on Health
- Air Pollution and its impact on Health
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Module VI

- Epidemiology
- Definition – concepts, aims, objectives, methods & principles,
- Epidemiology – theories and models.
- Application of Epidemiology, principles and concepts in Community health.
- Food Born Diseases
- Chikungunya
- Investigation of an Outbreak

Module VII

- Bio-Statistics and Vital Statistics.
- Introduction, definition and scope, legislation.

- Report, recording and compiling of vital statistics at the local, state, national and international level.
- Definition and methods of computing vital statistics.
- Methods of presenting data.
- Management information system.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Park J. E, Text Book of Preventive and Social Medicine, Ms Banarsidas Bhanhot Co., Jabalpur.
2. Dr.Mrs.kasturi Sunda Rao,"An Introduction to Community Health Nursing" BI Publications , Chennai
3. S.Kamalam "Essentials in Community Health Nursing Practice' Jaypee Publications, New Delhi
4. Sunita Patney"Text Book of Community Health Nursing" CBS publishers, New Delhi

References

1. Clark, June & Jill Handerson, *Community Health*, Churchill Livingstone, New York.
2. Freeman B. Ruth, *Public Health Practices*, W. W. Saunders Co, Philadelphia.
3. Fromer Joan Margot, *Community Health Care and the Nursing process*, C. V. Mosby Co, Toronto.
4. Park J. E, *Text Book of Preventive and Social Medicine*, Ms Banarsidas Bhanhot Co., Jabalpur.
5. Park K, *Text Book of Preventive and Social Medicine*, Ms Banarsidas Bhanhot Co, Jabalpur.
6. Rao S. Kasthi, *An Introduction to Community Health Nursing*, B. I. Publishers, Madras.
7. Stan hope & Lancaster Janette, *Community Health Process and Practice for Promoting Health*, The C.V Mosby & CO. London.

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Third Semester
NURSING ADMINISTRATION

Course Code: NUR2307 **Credit Unit-13**

Course Description: This course is designed to give an opportunity to the student to gain an understanding of the principle of administration and its application to nursing service. It is also intended to assist the students to develop an understanding of professional leadership need.

OBJECTIVES
At the end of the course, the student will:

1. Identify the principles of administration.
2. Describe the principles and techniques of supervision.
3. Explain the principles and methods of personnel management.
4. Explain the principles of budgeting.
5. Organize and manage a Nursing Module effectively.
6. Identify dynamics of organizational behavior, styles and functions of effective leadership.

Course Contents
Module I

- Principles and Practices of administration.
- Significance, elements and principles of administration,
- Organization of Hospital – Definition, aims, functions, and classifications, health term.
- Policies of hospital, different departments with special emphasis to department of Nursing & office management.
- Responsibilities of the Nursing personnel especially of ward Sister, medico legal aspects, concept of cost effectiveness.

Module II

- Nursing Module Management.
- Physical layout of a Nursing Module of necessary facilities.
- Factors affecting the quality of Nursing care.
- Maintenance of a therapeutic environment
- Administration of the Module – management of patient care.
- Maintenance of physical environment.
- Assignment of duties and time plan.
- Patient assignment, safety measures, prevention of accidents and infections.
- Maintenance of patients' records and reports, legal responsibilities.
- Maintenance of quality Nursing care, Nursing audit.

Module III

- Personnel management.
- Staff recruitment and selection, appointment, promotions, personnel policies and jobs descriptions.
- Job analysis.
- Staffing the Module, staffing norms, rotation plan, leave planning, performance appraisal, staff welfare and management of disciplinary problems.

Module IV

- Supervision.
- Principles of supervision, nature and objectives.
- Tools and techniques of supervision.
- Evaluation.
- Nursing audit.
- Staff development – orientation program.
- Skill training.
- Leadership development.
- Problem solving process.

Module V

- Material management.
- Principles of material management.
- Quality control.
- Inventory, care of equipment, safekeeping.
- Role of nursing personnel in material management.

Module VI

- Financial Management.
- Budgeting – principles of budgeting, audit.

Module VII

- Organizational Behavior.
- Group dynamic and human relation, organizational communication (hospital information system).
- Public relation, leadership styles and functions.
- Methods of reporting.
- Maintaining records and reports.

PRACTICUM

1. Observe the functioning of Nursing administration at various level i.e. institution, department, Module etc.
2. Each student will practice Ward Management under supervision.
3. Student will prepare rotation plan of the staff, write reports, give verbal reports of the ward and assist in maintaining the inventory of the Nursing Module.
4. Visit to private and government hospital and write observation reports.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Jogindra Vati ,Principles & Practice of Nursing Management & Administration, Jaypee Brothers,New Delhi, 1st edition, 2013
2. Jean Barrett, Ward Management and Teaching, , Himalayan Books, New Delhi

References

1. Goel S.L, *Health Care Administration*, Seterling Publication New Delhi.
2. Jean Barrett, *Ward Management and Teaching*, Himalayan Books, New Delhi.
3. Goyal R.C, *Hospital Personal Management*, Prentice Hall India, New Delhi.
4. Awasthi, *Public Administration*, Makeshwar, Publication Laxmi Narayan Agarwal, 1987.
5. TNAI,Nursing Administration and Management, 1st edition, 2000
6. Rebecca Samson, Leadership and Management in Nursing Practice and Education, Jaypee Brothers, New Delhi, 1st edition, 2009

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Third Semester
COMMUNITY HEALTH NURSING (PRACTICAL)

Course Code: NUR2308 **Credit Unit-10**

This Course is based on Course Code NUR2306
Guidelines

1. Each student will prepare a Community profile.
2. The student will be allotted families for gaining experience in identifying family health needs, health counseling and guidance and family budgeting for optimum health.
3. The student will participate in the activities of primary health centre.
4. Sub-centre, MCH centre.
5. Visits will be made to selected health and welfare agencies, water purification plant and sewage disposal plant, infectious disease hospital, child welfare centre, old aged homes, orphanages and handicapped hospitals.
6. Conduct health educational programmes for individual/ groups/ Community.

Examination Scheme:

Components	CHP	CP	FCS	OR	HE	EPE
Weightage (%)	20	10	30	10	30	100

CHP- Community Health project; CP-Community Profile; FCS-Family Case Study; OR-Observation Report; HE-Health Education; EPE-External Practical Exam

Post Basic B.Sc. Nursing –Fourth Semester
PSYCHIATRIC NURSING

Course Code: NUR2405 **Credit Unit-05**

Course Description: This course enables the students to recognize and appreciate the causes, symptoms and process of abnormal human behavior. It also introduces the student to the present day treatment modalities in the light of psychological, social and cultural factors affecting human behavior. This course helps the student to learn principles of Mental Health and Psychiatric Nursing and to develop beginning skills in the management of the mentally ill in hospital and Community.

OBJECTIVES
At the end of course, the student will:

1. Identity and describe the Philosophy and Principles of Mental Health Nursing.
2. Describe the Historical Development of Mental Health and Psychiatric Nursing.
3. Classify Mental Disorders.
4. Develop skill in history taking and performing Mental status examination.
5. Describe etiological factors, Psychopathology, clinical features, diagnostic criteria and treatment methods used for mental disorders.
6. Manage the patients with various Mental disorders.
7. Communicate therapeutically with patients and their families.
8. Identity role of the Nurse in preventive psychiatry.
9. Identity the legal aspects in practice of Mental Health and Psychiatric Nursing.

Course Contents
Module I

- Introduction and historical development.
- History of Psychiatry.
- Historical development of Mental Health Nursing.
- Philosophy, Principles of Mental Health Nursing and Psychiatric Nursing.
- Concept of normal and abnormal behavior.
- Role and qualities of Mental Health and Psychiatric Nurse.
- Mental Health team and functions of team members.
- Legal aspects in Psychiatry and Mental Health services.

Module II

- Classification and assessment of mental disorders.
- Terminologies used in Psychiatry.
- Classification of mental disorders.
- Etiological factors and psychopathology of mental disorders.
- History taking an assessment methods for mental disorders.

Module III

- Therapeutic communication.
- Communication process.
- Interview skills, therapeutic communication techniques. Nurse patient relationship, therapeutic impasse and its management process recording.

Module IV

- Management of mental disorders
- Etiological factors, psychopathology, types, clinical features, diagnostic criteria, treatment and Nursing management of patient with following disorders:
    - Neurotic disorders: Anxiety Neurosis, Depressive Neurosis, Obsessive Compulsive Neurosis, Phobic Neurosis and Hypochondriacal Neurosis, stress related and somatoform disorders.
    - Psychotic disorders: Schizophrenic form, Affective and Organic psychosis.
    - Organic Brain syndromes
    - Psychosomatic disorders
    - Personality disorders
    - Disorders of Childhood and Adolescence.

Module V

- Management of patients with Substance abuse disorders.
- Substance abuse and misuse.
- Dependence, Intoxication and Withdrawal
    - Classification of Psychoactive Substances
    - Etiological & Contributory factors
    - Psychopathology
    - Clinical features
    - Diagnostic criteria.
- Treatment and Nursing management of patient with Substance use disorders.
- Preventive and rehabilitative aspects in substance abuse.

Module VI

- Management of mental sub-normality.
- Classification of mental sub-normality.
- Etiological factors, psychopathology, psychometric assessment. diagnostic criteria and management of sub-normality.

Module VII

- Psychiatric emergencies.
- Types of emergencies, psychopathology, clinical features, assessment and diagnosis, treatment and Nursing management of patient with Psychiatric emergencies.
- Crisis intervention therapy.

Module VIII

- Therapeutic modalities.
- Principles, indication, contraindications and role of Nursing in various treatment methods: Therapeutic Community and Milieu therapy
    - Occupational therapy
    - Psychotherapy
    - Behavior therapy
    - Group therapy
    - Family therapy
    - Pharmacotherapy
    - Electro convulsive therapy
    - Other miscellaneous therapies.

Module IX

- Preventive Psychiatry.
- Model of prevention.

- Role of Nursing in preventive Psychiatry.
- Psychiatric social work.
- Community Mental Health Nursing.
- Community Mental Health agencies.
- National Mental Health programmes.

Examination Scheme:

Components	ATT	HA	CT	SE	P/S	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/S-Presentation/Seminar; EE- End Semester Examination

Text & References:

Text

1. Taylor C.M., *Essentials of Psychiatric Nursing,* CV Mosby Co., London.
2. Bimlakapoor CV, *A Text Book of Psychiatric Nursing,* Mosby Co., Delhi.
3. Shivas, *Basic Concept of Psychiatric Mental Health Nursing*, B.I Publications.

Reference Books

1. Brown R. T. Feldman G. R., *Epilepsy -Diagnosis and Management*, Little Brown And Co., Toronto.
2. Beck M. C. Rawtins P. R. & et al, *Mental Health – Psychiatric Nursing*. The C.V. Mosby Co., Ltd. Toronto.
3. Coleman C. J, *Abnormal Psychology and Modern Life*. P. B. Tara and Sons Co. Pvt Ltd
4. Kaplan H. Saddock B, *Synopsis of Psychiatry*, William sand Wilkins, Bathmov.
5. Stuart W. G. Sundeen J. S, *Principles and Practice of Psychiatric Nursing*, Mosby Year Book, London.

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Fourth Semester
INTRODUCTION TO NURSING EDUCATION

Course Code: NUR2406 **Credit Unit-10**

Course Description: This course introduces the students to the principles and concepts of education, curriculum development, and methods and media of teaching. It also describes the steps in curriculum development and implemental of education programmes in Nursing.

OBJECTIVES

At the end of the course, the students will:

1. Describe the philosophy and principles of education.
2. Explain the teaching – learning process.
3. Develop the ability to teach using various methods and media.
4. Describe the process of assessment.
5. Describe the administrative aspects of school of Nursing.
6. Participate in planning and organizing an in-service education programme.
7. Develop basic skill of counseling and guidance.

COURSE CONTENTS

Module I

- Introduction to education:
  - Meaning of education, aims, function and principles.
- Philosophy of education:
  - Factors influencing development of philosophy of Nursing Education.

Module II

- Teaching learning process.
- Nature and characteristics of learning.
- Principles and maxims of teaching
- Formulating objectives.
- Lesson planning.

Module III

- Methods of teaching:
  - Teaching methods
  - Lecturer
  - Discussion
  - Demonstration
  - Group discussion
  - Project
  - Role play
  - Panel discussion
  - Symposium
  - Seminar
  - Field trip
  - Workshop
  - Exhibition
  - Programmed instruction
  - Computer assisted learning.

- Clinical teaching methods:
  - Case methods

- Case presentation
- Nursing rounds and reports
- Bedside clinic
- Conference (individual and group)
- Recording of interaction process.

Module IV

- Educational media.
- Communication Process: Factors Affecting Communication.
- Purpose and Types of Audio-Visual Aids.
- Graphics aids: Chalk-board, Charts, Graphs, Poster, Flash Cards, Flannel graph / Khadigraph, Bulletin, Cartoon,
- Three Dimensional Aids: Objects, Specimen, Models, Puppets.
- Printed Aids: Pamphlets and Leaflets.
- Projected Aids: Slides, Films and Television, VCR, VCP, Overhead Projector, Camera, Microscope.
- Audio Aids: Tape Recorder, Public address system, Computer.

Module V

- Methods of assessment.
- Purpose and Scope of evaluation and assessment.
- Criteria for selection of assessment techniques and methods.
- Assessment of knowledge: essay type question, SAQ (short answer questions).
- MCQ (multiple choice questions).
- Assessment of skills: observation, check list. Practical examination Viva, objective structured clinical examination.
- Assessment of attitude: Attitude scale.

Module VI

- Management of School of Nursing.
- Planning of school of Nursing, organization.
- Recruitment of teaching staff, budget, facilities for the school, student selection and admission procedure, administrative planning of students, welfare services for students, maintenance of schools records, preparation of annual reports, INC guidelines for schools of Nursing.

Module VII

- Guidance and counseling: Definition.
- Basic principles of guidance and counseling.
- Organization of guidance and counseling services.
- Counseling process.
- Managing disciplinary problems.
- Management of crisis.

Module VIII

- In-service education.
- Introduction to nature and scope of in-service education programme.
- Principles of adult learning.
- Planning for in-service programme.
- Techniques, and methods of staff education programme
- Evaluation of in- service programme.

PRACTICUM

Each student should:

1. Conduct five planned teaching using different methods and media.
2. Prepare different types of teaching aids.
3. Plan, organize and conduct in-service education programme
4. Conduct at least one counseling session.
5. Prepare rotation plans.

Examination Scheme:

Components	ATT	HA	CT	SE	P/PT	EE
Weightage (%)	5	5	5	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; P/PT-Presentation/Practice Teaching; EE- End Semester Examination

Reference Books

1. Hedgerken Loretta E, *Teaching and Learning in School of Nursing*, J.B. Lippincott Co.,

2. Tomyay de Rheba, Thompson, *Strategies for Teaching Nursing*, Willey Medical Publisher, 1982, New York.

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Fourth Semester
INTRODUCTION TO NURSING RESEARCH AND STATISTICS

Course Code: NUR2407 **Credit Unit-04**

Course Description: The course is designed to assist the students to develop an understanding of basic concepts of Research and Statistics, use the findings of Nursing Research in nursing practices, apply the knowledge in conducting project(S) and solve problems related to nursing using scientific method.

OBJECTIVES

At the end of the course, the students will:

1. Define the terms and concepts of Nursing Research.
2. Identify needs and scope of Nursing Research
3. Identify and define a Research problem
4. Locate and list sources of literature for a specific study
5. Describe different Research approaches, methods of data collection and sampling techniques with a special reference to survey method.
6. Develop tool for data collection.
7. Enumerate steps of data analysis and present data summary in tabular form.
8. Use descriptive and co-relational statistics in data analysis.
9. Conduct a group Research project.

Course Contents

A. INTRODUCTION TO RESEARCH METHODOLOGY

Module I

- Steps of scientific methods.
- Definition of Research.
- Need for Nursing Research.
- Characteristics of good research. Research process.

Module II

- Statement of Research problem.
- Statement of purpose and objectives.
- Definition of Research terms.
- Review of literature.

Module III

- Research approaches: historical, survey and experimental.

Module IV

- Sampling techniques and methods of data collection.
- Sampling.
- Instrument-questionnaire, Interview.
- Observation schedule, records, measurements.
- Reliability and validity of instruments.

Module V

- Analysis of Data, Tabulation:
    - Classification and summarization

- Presentation
- Interpretation of data.

Module VI

- Communication of research findings.
- Writing report:
  - Organizing materials for writing
  - Format of the report
  - Use of computers.

B. INTRODUCTION TO STATISTICS

Module VII

- Descriptive Statistics.
- Frequency Distribution – Types of measure - frequencies, class interval, graphic methods of describing frequency.
- Measures of Central Tendency – Mode, Median, Mean.
- Measures of variability: Range, Standard deviation
- Introduction to normal probability.

Module VIII

- Correlation.
- Computation by rank difference methods.
- Uses of correlation co-efficient.

Module IX

- Biostatistics: Crude rates and standardized rates, ratio and estimation of the trends.

Module X

- Introduction to computers in Nursing.
- Introduction to Computer and disk – operating system
- Introduction to word processing
- Introduction to data base
- Window application: Word, Excel, Power point, Multimedia.
- Use of statistical packages.
- Introduction to internet & use of electronic mail.
- Computer aided teaching & testing.

Examination Scheme:

Components	ATT	HA	CT	SE	EE
Weightage (%)	5	10	5	5	75

ATT-Attendance; HA-Home Assignment; CT-Class Test; SE-Sessional Examination; EE- End Semester Examination

Text & References:

Text

1. Polit. D. F. and Hungler, B. P, *Essentials of Nursing Research*, J. B. Lippincott Co., Philadelphia.
2. Basavanthappa B.T, *Nursing Research*, Jaypee Brothers, 2003, New Delhi

References

1. Treece, E. W. and Treece J. W, *Elements of Research in Nursing*, C.V. Mosby Co., St. Louis.
2. Garrrett H.E, *Statistic in Psychology & Education*, Vakils, Feffer and Samons, Bombay.
3. Mahajan B.K, *Methods in Biostatistics*, Jaypee medical publication, 1999, New Delhi.

* Latest editions of all the suggested books are recommended.

Post Basic B.Sc. Nursing –Fourth Semester
PSYCHIATRIC NURSING (PRACTICAL)

Course Code: NUR2408 **Credit Unit-10**

This Course is based on Course Code NUR2405

Guidelines

The student will be provided opportunity to:

1. Observe, Record and Report the behavior of their selected patients.
2. Record the process of interaction.
3. Assess the Nursing needs of their selected patients, plan and implement the Nursing intervention.
4. Counsel the attendant and family members of patient.
5. Participate in the activities of Psychiatric team.
6. Write observation report after a field visit to the following places:
   - Child guidance clinic.
   - School / Special Schools (For mentally subnormal)
   - Mental Hospital,
   - Community Mental Health Centers.
   - De-addiction and Rehabilitation Centers.

Examination Scheme:

Components	PR	NCP	NCS	MSE	HE	CE	EPE
Weightage (%)	**20**	**20**	**20**	**10**	**10**	**20**	**100**

PR-Process Recording; NCP-Nursing Care Plan; NCS-Nursing Case Study; MSE- Mental status Examination; HE- Health Education; CE-Clinical Evaluation; EPE-End Term Practical Examination.

Post Basic B.Sc. Nursing –Fourth Semester
DISSERTATION (NURSING RESEARCH)

Course Code: NUR2437 **Credit Unit-10**

Objectives: During the training the students are expected to learn about research problem, research methodology, research plan, implementation and statistical methods. The knowledge will be utilized for improving the quality of nursing practice and education.

Research Project

Students will conduct research project in selected areas of nursing and submit a report. The studies may include exploring existing health practices, improved practices of nursing procedures, health records, patient records and survey of nursing literature.

Guidelines:

- During the clinical training a student will write a research project work related to the profession of nursing, based on his/her interest.
- Project work would be under the supervision of internal faculty (assigned for guiding the project) appointed by the Principal/Director of college of nursing.
- The research project would be completed and submitted before the completion of fourth semester of the course.
- Before the submission of project the student will be required to make a presentation before the research committee through power point presentation.
- The assessment of performance of student will be totally internal and the research committee will assess the student on the basis of his/her performance.
- There would be mid-term review of the progress of the project before three members of the research committee appointed by the Principal/Director of college of nursing.
- The research project work should cover the following area.
    - Review of literature on the selected topic and reporting
    - Formulation of problem statement, objectives.
    - Research methodology
    - Analysis and interpretation
    - Summary & Conclusion.

Examination Scheme

Components	PP	TP	DAP	GE	Pr R/V (EE)
Weightage (%)	10	10	15	15	50

PP -Proposal Presentation; TP- Tool Presentation; DAP- Data Analysis Presentation; GE- Guides' Evaluation; Pr R/V (EE)-Project Report/Viva (External Examination)

Amity Institute of Pharmacy

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITY HARYANA

GURUGRAM

Bachelor of Pharmacy

Syllabus - First Semester

HUMAN ANATOMY AND PHYSIOLOGY-I

Course Code : BP101T **Credit Units: 04**

Course Objective :
This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Course Contents:

Module-I
Introduction to human body: Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.
Cellular level of organization: Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine
Tissue level of organization: Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

Module-II
Integumentary System: Structure and functions of skin
Skeletal System: Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system. Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction
Joints: Structural and functional classification, types of joints movements and its articulation

Module-III
Body fluids and blood: Body fluids, composition and functions of blood, hemopoeisis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.
Lymphatic system: Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

Module-IV
Peripheral nervous system: Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves.
Special senses: Structure and functions of eye, ear, nose and tongue and their disorders.

Module-V
Cardiovascular system: Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Text & References :

Recommended Books (Latest Editions)

- Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
- Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
- Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
- Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
- Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
- Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
- Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
- Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

- Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
- Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
- Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

PHARMACEUTICAL ANALYSIS

Course Code : BP102T **Credit Units: 04**

Course Objective : This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs. Upon completion of the course student shall be able to understand the principles of volumetric and electro chemical analysis, carryout various volumetric and electrochemical titrations & develop analytical skills.

Course Contents :

Module-I
(a) Pharmaceutical analysis- Definition and scope
i) Different techniques of analysis
ii) Methods of expressing concentration
iii) Primary and secondary standards.
iv) Preparation and standardization of various molar and normal solutions-
Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate,
sulphuric acid, potassium permanganate and ceric ammonium sulphate
(b) Errors: Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures
(c) Pharmacopoeia, Sources of impurities in medicinal agents,limit tests.

Module-II
Acid base titration: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves
Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl

Module-III
Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.
Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.
Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.
Basic Principles,methods and application of diazotisation titration.

Module-IV
Redox titrations
(a) Concepts of oxidation and reduction
(b) Types of redox titrations (Principles and applications)
Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate

Module-V
Electrochemical methods of analysis
Conductometry: Introduction, Conductivity cell, Conductometric titrations, applications.
Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.

Polarography: Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
- A.I. Vogel, Text Book of Quantitative Inorganic analysis
- P. Gundu Rao, Inorganic Pharmaceutical Chemistry
- Bentley and Driver's Textbook of Pharmaceutical Chemistry
- John H. Kennedy, Analytical chemistry principles
- Indian Pharmacopoeia.

PHARMACEUTICS-I

Course Code : BP103T **Credit Units: 04**

Course Objectives:
This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

Course Contents:

Module-I
Historical background and development of profession of pharmacy: History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.
Dosage forms: Introduction to dosage forms, classification and definitions
Prescription: Definition, Parts of prescription, handling of Prescription and Errors in prescription.
Posology: Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

Module-II
Pharmaceutical calculations: Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.
Powders: Definition, classification, advantages and disadvantages,Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.
Liquid dosage forms: Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

Module-III
Monophasic liquids: Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
Biphasic liquids:
Suspensions: Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.
Emulsions: Definition, classification, emulsifying agent, test for the identification of type ofEmulsion, Methods of preparation & stability problems and methods to overcome.

Module-IV
Suppositories: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
Pharmaceutical incompatibilities: Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

Module-V
Semisolid dosage forms: Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams andWalkins, New Delhi.
- Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
- M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh.
- Indian pharmacopoeia.
- British pharmacopoeia.
- Lachmann. Theory and Practice of Industrial Pharmacy,Lea& Febiger Publisher, The University of Michigan.
- Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi.
- Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
- E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
- Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
- Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
- Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

PHARMACEUTICAL INORGANIC CHEMISTRY

Course Code : BP104T **Credit Units: 04**

Course Objectives:
This subject deals with the monographs of inorganic drugs and pharmaceuticals.
Upon completion of course student shall be able to know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals & understand the medicinal and pharmaceutical importance of inorganic compounds

Course Content:

Module-I
Impurities in pharmaceutical substances: History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate
General methods of preparation, assay for the compounds superscripted with **asterisk (*),** properties and medicinal uses of inorganic compounds belonging to the following classes

Module-II
Acids, Bases and Buffers: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
Major extra and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.
Dental products: Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

Module-III
Gastrointestinal agents
Acidifiers: Ammonium chloride* and Dil. HCl
Antacid: Ideal properties of antacids, combinations of antacids, Sodium 40 Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture
Cathartics: Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite
Antimicrobials: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations

Module-IV
Miscellaneous compounds
Expectorants: Potassium iodide, Ammonium chloride*.
Emetics: Copper sulphate*, Sodium potassium tartarate
Haematinics: Ferrous sulphate*, Ferrous gluconate
Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite333
Astringents: Zinc Sulphate, Potash Alum

Module-V
Radiopharmaceuticals: Radio activity, Measurement of radioactivity, Properties of α, β, γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide I131, Storage conditions, precautions & pharmaceutical application of radioactive substances.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II,
- Stahlone Press of University of London, 4th edition.
- A.I. Vogel, Text Book of Quantitative Inorganic analysis
- P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
- M.L Schroff, Inorganic Pharmaceutical Chemistry
- Bentley and Driver's Textbook of Pharmaceutical Chemistry
- Anand & Chatwal, Inorganic Pharmaceutical Chemistry
- Indian Pharmacopoeia

COMMUNICATION SKILLS

Course Code : BP105T **Credit Units: 02**

Course Objectives:
This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

Course Contents:

Module-I
Communication Skills: Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context
Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers
Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

Module-II
Elements of Communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication
Communication Styles: Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

Module-III
Basic Listening Skills: Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations
Effective Written Communication: Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication
Writing Effectively: Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

Module-IV
Interview Skills: Purpose of an interview, Do's and Dont's of an interview
Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

Module-V
Group Discussion: Introduction, Communication skills in group discussion, Do's and Dont's of group discussion

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	2	1	2	35

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance
EE: End Semester Examination

Recommended Books: (Latest Edition)

- Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
- Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
- Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
- Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011
- The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
- Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
- Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011
- Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
- Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
- Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
- Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009
- Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999

REMEDIAL BIOLOGY

Course Code : BP106RBT **Credit Units: 02**

Course Objectives:
To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

Course Contents:

Module-I
Living world: Definition and characters of living organisms. Diversity in the living world. Binomial nomenclature. Five kingdoms of life and basis of classification. Salient features of Monera, Potista, Fungi, Animalia and Plantae, Virus,
Morphology of Flowering plants: Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed. General Anatomy of Root, stem, leaf of monocotyledons & Dicotylidones.

Module-II
Body fluids and circulation
Composition of blood, blood groups, coagulation of blood
Composition and functions of lymph
Human circulatory system
Structure of human heart and blood vessels
Cardiac cycle, cardiac output and ECG
Digestion and Absorption
Human alimentary canal and digestive glands
Role of digestive enzymes
Digestion, absorption and assimilation of digested food
Breathing and respiration
Human respiratory system
Mechanism of breathing and its regulation
Exchange of gases, transport of gases and regulation of respiration
Respiratory volumes

Module-III
Excretory products and their elimination
Modes of excretion
Human excretory system- structure and function
Urine formation
Rennin angiotensin system
Neural control and coordination
Definition and classification of nervous system
Structure of a neuron
Generation and conduction of nerve impulse
Structure of brain and spinal cord
Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata
Chemical coordination and regulation
Endocrine glands and their secretions
Functions of hormones secreted by endocrine glands

Human reproduction
Parts of female reproductive system
Parts of male reproductive system
Spermatogenesis and Oogenesis
Menstrual cycle

Module-IV
Plants and mineral nutrition: Essential mineral, macro and micronutrients Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation
Photosynthesis: Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

Module-V
Plant respiration: Respiration, glycolysis, fermentation (anaerobic).
Plant growth and development: Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators
Cell - The Module of life: Structure and functions of cell and cell organelles.Cell division
Tissues: Definition, types of tissues, location and functions.

Examination Scheme:

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**10**	**2**	**1**	**2**	**35**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance
EE: End Semester Examination

Text Books
- Text book of Biology by S. B. Gokhale
- A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

Reference Books
- A Text book of Biology by B.V. Sreenivasa Naidu
- A Text book of Biology by Naidu and Murthy
- Botany for Degree students By A.C.Dutta.
- Outlines of Zoology byM. Ekambaranatha ayyer and T. N. Ananthakrishnan.
- A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

REMEDIAL MATHEMATICS

Course Code: BP106RMT **Credit Units: 03**

Course Objectives:
This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

Course Contents:

Module-I:
Partial fraction: Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction, Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics
Logarithms: Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.
Function: Real Valued function, Classification of real valued functions,
Limits and continuity: Introduction , Limit of a function, Definition of limit of a function (n n definition) , lim x a nan1, lim 1, sin x a x a 0

Module-II: Matrices and Determinant: Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants, Product of determinants, Minors and co-Factors, Adjoint or adjugate of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem,Applicationof Matrices in solving Pharmacokinetic equations

Module-III: Calculus
Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function, Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – **Without Proof**, Derivative of xn $w.r.t$x,where n is any rational number, Derivative of ex,, Derivative of loge x , Derivative of ax , Derivative of trigonometric functions from first principles **(without Proof)**, Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application

Module-IV: Analytical Geometry
Introduction: Signs of the Coordinates, Distance formula,
Straight Line: Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line
Integration: Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

Module-V: Differential Equations : Some basic definitions, Order and degree, Equations in separable form , Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations**
Laplace Transform : Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve

Linear differential equations, **Application in solving Chemical kinetics and Pharmacokinetics equations**

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	10	2	1	2	35

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance
EE: End Semester Examination

Recommended Books (Latest Edition)

- Differential Calculus by Shanthinarayan
- Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
- Integral Calculus by Shanthinarayan
- Higher Engineering Mathematics by Dr.B.S.Grewal

HUMAN ANATOMY AND PHYSIOLOGY PRACTICAL-I

Course Code : BP107P **Credit Units: 02**

Course Objective:
Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject**.**

Course Contents:
List of experiments :
1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure.

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACEUTICAL ANALYSIS PRACTICAL

Course Code : BP108P **Credit Units: 02**

List of experiments:

Limit Test of the following
(1) Chloride
(2) Sulphate
(3) Iron
(4) Arsenic
II **Preparation and standardization of**
(1) Sodium hydroxide
(2) Sulphuric acid
(3) Sodium thiosulfate
(4) Potassium permanganate
(5) Ceric ammonium sulphate
III **Assay of the following compounds along with Standardization of Titrant**
(1) Ammonium chloride by acid base titration
(2) Ferrous sulphate by Cerimetry
(3) Copper sulphate by Iodometry
(4) Calcium gluconate by complexometry
(5) Hydrogen peroxide by Permanganometry
(6) Sodium benzoate by non-aqueous titration
(7) Sodium Chloride by precipitation titration
IV **Determination of Normality by electro-analytical methods**
(1) Conductometric titration of strong acid against strong base
(2) Conductometric titration of strong acid and weak acid against strong base
(3) Potentiometric titration of strong acid against strong base

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACEUTICS PRACTICAL

Course Code : BP109P **Credit Units: 02**

List of experiments :
1 . Syrups
a) Syrup IP'66
b) Compound syrup of Ferrous Phosphate BPC'68
3 Hours / week
2. Elixirs a) Piperazine citrate elixir
b) Paracetamol pediatric elixir
3.Linctus a) Terpin Hydrate Linctus IP'66
4. Solutions
b) Iodine Throat Paint (Mandles Paint)
a) Strong solution of ammonium acetate
b) Cresol with soap solution
c) Lugol's solution
5. Suspensions
a) Calamine lotion
b) Magnesium Hydroxide mixture
c) Aluminimum Hydroxide gel
6. Emulsions a) Turpentine Liniment
b) Liquid paraffin emulsion
7. Powders and Granules
a) ORS powder (WHO)
b) Effervescent granules
c)Dusting powder
d)Divded powders
8. Suppositories
a) Glycero gelatin suppository
b) Coca butter suppository
c) Zinc Oxide suppository
8. Semisolids
a) Sulphur ointment
b) Non staining-iodine ointment with methyl salicylate
c) Carbopal gel
9. Gargles and Mouthwashes
a) Iodine gargle
b) Chlorhexidine mouthwash

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACEUTICAL INORGANIC CHEMISTRY PRACTICAL

Course Code : BP110P **Credit Units: 02**

List of experiments:

I **Limit tests for following ions**
Limit test for Chlorides and Sulphates
Modified limit test for Chlorides and Sulphates
Limit test for Iron
Limit test for Heavymetals
Limit test for Lead
Limit test for Arsenic

II **Identification test**
Magnesium hydroxide
Ferrous sulphate
Sodium bicarbonate
Calcium gluconate
Copper sulphate

III **Test for purity**
Swelling power of Bentonite
Neutralizing capacity of aluminum hydroxide gel
Determination of potassium iodate and iodine in potassium Iodide

IV **Preparation of inorganic pharmaceuticals**
Boric acid
Potash alum
Ferrous sulphate

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMMUNICATION SKILLS PRACTICAL

Course Code : BP111P **Credit Units: 01**

The following learning modules are to be conducted using words worth® English language lab software

Basic communication covering the following topics
Meeting People
Asking Questions
Making Friends
What did you do?
Do's and Dont's

Pronunciations covering the following topics
Pronunciation (Consonant Sounds)
Pronunciation and Nouns
Pronunciation (Vowel Sounds)

Advanced Learning
Listening Comprehension / Direct and Indirect Speech
Figures of Speech
Effective Communication
Writing Skills
Effective Writing
Interview Handling Skills
E-Mail etiquette
Presentation Skills

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**03**	**02**	**03**	**5**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

REMEDIAL BIOLOGY PRACTICAL

Course Code: BP112RBP **Credit Units: 01**

List of Experiments :

1. Introduction to experiments in biology
a) Study of Microscope
b) Section cutting techniques
c) Mounting and staining
d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**03**	**02**	**03**	**5**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Second Semester

HUMAN ANATOMY AND PHYSIOLOGY-II

Course Code : BP201T **Credit Units: 04**

Course Objectives: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms.

Course Contents:

Module-I: Nervous System: Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters. Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid.structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts,reflex activity)

Module-II: Digestive System: Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.
Energetics: Formation and role of ATP, Creatinine Phosphate and BMR.

Module-III: Respiratory System: Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.
Urinary System: Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

Module-IV: Endocrine System: Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

Module-V: Reproductive System: Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition
Introduction to genetics: Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books :

- Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
- Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
- Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
- Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
- Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
- Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
- Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.
- Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books:

- Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
- Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
- Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata

PHARMACEUTICAL ORGANIC CHEMISTRY-I

Course Code : BP202T **Credit Units: 04**

Course Objectives: This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds.

Course Contents:

Module-I: Classification, nomenclature and isomerism: Classification of Organic Compounds Common and IUPAC systems of nomenclature of organic compounds (up to 10 Carbons open chain and carbocyclic compounds) Structural isomerisms in organic compounds

Module-II
Alkanes*, Alkenes* and Conjugated dienes*
SP3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP2 hybridization in alkenes E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 verses E2 reactions, Factors affecting E1and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement

Module-III
Alkyl halides*
SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations. SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.
Alcohols*- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

Module -IV
Carbonyl compounds* (Aldehydes and ketones)
Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

Module-V
Carboxylic acids*
Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid
Aliphatic amines* - Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Organic Chemistry byMorrison and Boyd
- Organic Chemistry by I.L. Finar , Volume-I
- Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
- Organic Chemistry by P.L.Soni
- Practical Organic Chemistry byMann and Saunders.
- Vogel's text book of Practical Organic Chemistry
- Advanced Practical organic chemistry by N.K.Vishnoi.
- Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
- Reaction and reaction mechanism by Ahluwaliah/Chatwal.

BIOCHEMISTRY

Course Code : BP203T **Credit Units: 04**

Course Objectives: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

Course Contents:

Module-I
Biomolecules: Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.
Bioenergetics: Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP

Module-II
Carbohydrate metabolism: Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus
Biological oxidation: Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers level

Module-III
Lipid metabolism: β-Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.
Amino acid metabolism: General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice

Module-IV: Nucleic acid metabolism and genetic information transfer: Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors

Module-V: Enzymes: Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes –Structure and biochemical functions

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Principles of Biochemistry by Lehninger.
- Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
- Biochemistry by Stryer.
- Biochemistry by D. Satyanarayan and U.Chakrapani
- Textbook of Biochemistry by Rama Rao.
- Textbook of Biochemistry by Deb.
- Outlines of Biochemistry by Conn and Stumpf
- Practical Biochemistry by R.C. Gupta and S. Bhargavan.
- Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
- Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
- Practical Biochemistry by Harold Varley.

PATHOPHYSIOLOGY

Course Code: BP204T **Credit Units: 04**

Course Objectives: Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Course Contents :

Module-I: Basic principles of Cell injury and Adaptation: Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury**,**Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage)**,** Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia)**,**Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis,Electrolyte imbalance

Basic mechanism involved in the process of inflammation and repair: Introduction, Clinical signs of inflammation, Different types of Inflammation,Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's,Mediators of inflammation,Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis

Module-II
Cardiovascular System: Hypertension, congestive heart failure, ischemic heart disease (angina,myocardial infarction, atherosclerosis and arteriosclerosis)
Respiratory System: Asthma, Chronic obstructive airways diseases.
Renal System: Acute and chronic renal failure .

Module-III
Haematological Diseases: Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia
Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones
Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.
Gastrointestinal system: Peptic Ulcer

Module-IV
Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.
Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout
Principles of cancer: classification, etiology and pathogenesis of cancer
Diseases of bones and joints: Rheumatoid Arthritis, Osteoporosis,Gout
Principles of Cancer: Classification, etiology and pathogenesis of Cancer

Module-V
Infectious diseases: Meningitis,Typhoid, Leprosy, Tuberculosis Urinary tract infections
Sexually transmitted diseases: AIDS, Syphilis, Gonorrhea

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins &Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
- HarshMohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
- Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
- Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B
- (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; Moduleed states; William and Wilkins, Baltimore;1991 [1990 printing].
- Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston;Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
- Guyton A, John .E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010.
- Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey;
- Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
- V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997.
- Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

COMPUTER APPLICATIONS IN PHARMACY

Course Code : BP205T **Credit Units: 03**

Course Objectives: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Course Contents:

Module-I

Number System: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement ,Two's complement method, binary multiplication, binary division

Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

Module-II

Web technologies: Introduction to HTML, XML,CSS and Programming languages, introduction to web servers and Server Products Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

Module-III: Application of computers in Pharmacy - Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System

Module-IV

Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

Module-V

Computers as data analysis in Preclinical development: Chromatographic dada analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance
EE: End Semester Examination

Recommended books (Latest edition):

- Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
- Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
- Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
- Microsoft office Access - 2003, Application Development Using VBA, SQL Server,
- DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002

ENVIRONMENTAL SCIENCES

Course Code : BP206T **Credit Units: 03**

Course Objectives: Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural
factors and the impact of man on environment.

Course Contents:
Module-I: The Multidisciplinary nature of environmental studies Natural Resources Renewable and non-renewable resources:
Natural resources and associated problems a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

Module-II
Ecosystems Concept of an ecosystem.Structure and function of an ecosystem. Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Module-III
Environmental Pollution: Air pollution; Water pollution; Soil pollution

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance
EE: End Semester Examination

Recommended Books (Latest edition):

- Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
- Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down of Earth, Centre for Science and Environment

HUMAN ANATOMY AND PHYSIOLOGY PRACTICAL-II

Course Code: BP207P **Credit Units: 02**

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject**.**

List of Experiments

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index .
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACEUTICAL ORGANIC CHEMISTRY PRACTICAL-I

Course Code : BP208P **Credit Units: 02**

List of experiments

A. Systematic qualitative analysis of unknown organic compounds like

1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
3. Solubility test
4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
5. Melting point/Boiling point of organic compounds
6. Identification of the unknown compound from the literature using melting point/ boiling point.
7. Preparation of the derivatives and confirmation of the unknown compound bymelting point/ boiling point.
8. Minimum 5 unknown organic compounds to be analysed systematically.

B. Preparation of suitable solid derivatives from organic compounds

C. Construction of molecular models

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

BIOCHEMISTRY PRACTICAL

Course Code : BP209P **Credit Units: 02**

List of experiments

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

COMPUTER APPLICATIONS IN PHARMACY PRACTICAL

Course Code : BP210P **Credit Units: 01**

List of experiments

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
3 Retrieve the information of a drug and its adverse effects using online tools
4 Creating mailing labels Using Label Wizard , generating label in MS WORD
5 Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**03**	**02**	**03**	**5**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance,
LR – Lab Record, V – Viva.

Syllabus - Third Semester

PHARMACEUTICAL ORGANIC CHEMISTRY-II

Course Code : BP301T **Credit Units: 04**

Course Objectives: This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.

Course Content:
General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained. To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences

Module-I
Benzene and its derivatives
A. Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule
B. Reactions of benzene - nitration, sulphonation, halogenationreactivity, Friedelcrafts alkylation-reactivity, limitations, Friedelcrafts acylation.
C. Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction
D. Structure and uses of DDT, Saccharin, BHC and Chloramine

Module-II
Phenols* - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols
Aromatic Amines* - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts
Aromatic Acids* –Acidity, effect of substituents on acidity and important reactions of benzoic acid.

Module-III
Fats and Oils
a. Fatty acids – reactions.
b. Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils.
c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination.

Module-IV
Polynuclear hydrocarbons:
a. Synthesis, reactions
b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives

Module-V
Cyclo alkanes*
Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Organic Chemistry byMorrison and Boyd
- Organic Chemistry by I.L. Finar , Volume-I
- Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
- Organic Chemistry by P.L.Soni
- Practical Organic Chemistry byMann and Saunders.
- Vogel's text book of Practical Organic Chemistry
- Advanced Practical organic chemistry by N.K.Vishnoi.
- Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz

PHYSICAL PHARMACEUTICS-I

Course Code : BP302T **Credit Units: 04**

Course Objectives: The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Content:

Module-I
Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partiallymiscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications

Module-II
States of Matter and properties of matter: State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solidcrystalline, amorphous & polymorphism.
Physicochemical properties of drug molecules: Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications

Module-III
Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface.

Module-IV
Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.

Module-V
pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Physical Pharmacy by Alfred Martin
- Experimental Pharmaceutics by Eugene, Parott.
- Tutorial Pharmacy by Cooper and Gunn.

- Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
- Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
- Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
- Physical Pharmaceutics by Ramasamy C and ManavalanR.
- LaboratoryManual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
- Physical Pharmaceutics by C.V.S. Subramanyam
- Test book of Physical Phramacy, by Gaurav Jain & Roop K. Khar

PHARMACEUTICAL MICROBIOLOGY

Course Code : BP303T **Credit Units: 04**

Course Objectives: Study of all categories of microorganisims especially for the production of alcohol antibiotics, vaccines, vitamins enzymes etc..

Course Content:

Module-I
Introduction, history of microbiology, its branches, scope and its importance. Introduction to Prokaryotes and Eukaryotes. Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count). Study of different types of phase constrast microscopy, dark field microscopy and electron microscopy.

Module-II
Identification of bacteria using staining techniques (simple, Gram's & Acid fast staining) and biochemical tests (IMViC). Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous,radiation and mechanical method of sterilization. Evaluation of the efficiency of sterilization methods. Equipments employed in large scale sterilization. Sterility indicators.

Module-III
Study of morphology, classification, reproduction/replication and cultivation of Fungi and Viruses.
Classification and mode of action of disinfectants Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions Evaluation of bactericidal & Bacteriostatic. Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

Module-IV
Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification. Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids. Assessment of a new antibiotic.

Module-V
Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations.
Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. Application of cell cultures in pharmaceutical industry and research.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest edition)

- W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
- Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
- Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
- Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
- Rose: Industrial Microbiology.
- Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
- Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution. Peppler: Microbial Technology. I.P., B.P., U.S.P.- latest editions.
- Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai Edward: Fundamentals of Microbiology.
- N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
- Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company

PHARMACEUTICAL ENGINEERING

Course Code : BP304T **Credit Units: 04**

Course Objectives: This course is designed to impart a fundamental knowledge on the art and science of various Module operations used in pharmaceutical industry.

Course Content:

Module-I

Flow of fluids: Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer.

Size Reduction: Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill.

Size Separation: Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.

Module-II

Heat Transfer: Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.

Evaporation: Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator.

Distillation: Basic Principles and methodology of simple distillation,flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation

Module-III

Drying: Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.

Mixing: Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetarymixers, Propellers, Turbines, Paddles & Silverson Emulsifier,

Module-IV

Filtration: Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter.

Centrifugation: Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.

Module-V

Materials of pharmaceutical plant construction, Corrosion and its prevention: Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion

and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals, basic of material handling systems.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
- Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson Latest edition.
- Module operation of chemical engineering – Mcabe Smith, Latest edition.
- Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
- Remington practice of pharmacy- Martin, Latest edition.
- Theory and practice of industrial pharmacy by Lachmann., Latest edition.
- Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
- Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.

PHARMACEUTICAL ORGANIC CHEMISTRY PRACTICAL-II

Course Code : BP305P **Credit Units: 02**

List of experiments
I Experiments involving laboratory techniques
Recrystallization
Steam distillation

II Determination of following oil values (including standardization of reagents)
Acid value
Saponification value
Iodine value

III **Preparation of compounds**
Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol /Aniline by acylation reaction.
2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/ Acetanilide by halogenation (Bromination) reaction.
5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.
Benzoic acid from Benzyl chloride by oxidation reaction.
Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.
1-Phenyl azo-2-napthol from Aniline by diazotization and coupling reactions.
Benzil from Benzoin by oxidation reaction.
Dibenzal acetone from Benzaldehyde by Claison Schmidt reaction
Cinnammic acid from Benzaldehyde by Perkin reaction
P-Iodo benzoic acid from *P*-amino benzoic acid

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICAL PHARMACEUTICS PRACTICAL-I

Course Code : BP306P **Credit Units: 02**

List of Experiments

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl4 and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of surface tension of given liquids by drop count and drop weight method
7. Determination of HLB number of a surfactant by saponification method
8. Determination of Freundlich and Langmuir constants using activated char coal
9. Determination of critical micellar concentration of surfactants
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubilitymethod
11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACEUTICAL MICROBIOLOGY PRACTICAL

Course Code : BP307P **Credit Units: 02**

List of experiments

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods
7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.
9. Bacteriological analysis of water
10. Biochemical test.

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACEUTICAL ENGINEERING PRACTICAL

Course Code : BP308P **Credit Units: 02**

List of Experiments

I. Determination of radiation constant of brass, iron, unpainted and painted glass.
II. Steam distillation – To calculate the efficiency of steam distillation.
III. To determine the overall heat transfer coefficient by heat exchanger.
IV. Construction of drying curves (for calcium carbonate and starch).
V. Determination of moisture content and loss on drying.
VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
VII. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic andlogarithmic probability plots.
IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such othermajor equipment.
XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity
XII. To study the effect of time on the Rate of Crystallization.
XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Fourth Semester

PHARMACEUTICAL ORGANIC CHEMISTRY-III

Course Code : BP401T **Credit Units: 04**

Course Objectives: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Course Content:
Note: To emphasize on definition, types, mechanisms, examples, uses/applications

Module-I
Stereo isomerism: Optical isomerism – Optical activity, enantiomerism, diastereoisomerism, meso compounds. Elements of symmetry, chiral and achiral molecules. DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers. Reactions of chiral molecules
Racemic modification and resolution of racemic mixture. Asymmetric synthesis: partial and absolute

Module-II
Geometrical isomerism. Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems)
Methods of determination of configuration of geometrical isomers. Conformational isomerism in Ethane, n-Butane and Cyclohexane. Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereoselective reactions

Module-III
Heterocyclic compounds: Nomenclature and classification. Synthesis, reactions and medicinal uses of following compounds/derivatives. Pyrrole, Furan, and Thiophene. Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene

Module-IV
Synthesis, reactions and medicinal uses of following compounds/derivatives
Pyrazole, Imidazole, Oxazole and Thiazole.
Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine
Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives

Module-V
Reactions of synthetic importance
Metal hydride reduction ($NaBH_4$ and $LiAlH_4$), Clemmensen reduction, Birch reduction, Wolff Kishner reduction.
Oppenauer-oxidation and Dakin reaction.
Beckmanns rearrangement and Schmidt rearrangement.
Claisen-Schmidt condensation

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Organic chemistry by I.L. Finar, Volume-I & II.
- A text book of organic chemistry – Arun Bahl, B.S. Bahl.
- Heterocyclic Chemistry by Raj K. Bansal
- Organic Chemistry byMorrison and Boyd
- Heterocyclic Chemistry by T.L. Gilchrist

MEDICINAL CHEMISTRY-I

Course Code : BP402T **Credit Units: 04**

Course Objectives: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Content:
Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

Module-I
Introduction to Medicinal Chemistry
History and development of medicinal chemistry
Physicochemical properties in relation to biological action
Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism.
Drug metabolism
Drug metabolism principles- Phase I and Phase II.
Factors affecting drug metabolism including stereo chemical aspects.

Module-II
Drugs acting on Autonomic Nervous System
Adrenergic Neurotransmitters:
Biosynthesis and catabolism of catecholamine.
Adrenergic receptors (Alpha & Beta) and their distribution.
Sympathomimetic agents: SAR of Sympathomimetic agents
Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine, Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline. Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine.
Agents with mixed mechanism: Ephedrine, Metaraminol.
Adrenergic Antagonists:
Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide.
Beta adrenergic blockers: SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.

Module-III
Cholinergic neurotransmitters:
Biosynthesis and catabolism of acetylcholine.
Cholinergic receptors (Muscarinic & Nicotinic) and their distribution.
Parasympathomimetic agents: SAR of Parasympathomimetic agents
Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine.
Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible):
Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isofluorphate, Echothiophate iodide, Parathione, Malathion.

Cholinesterase reactivator: Pralidoxime chloride.
Cholinergic Blocking agents: SAR of cholinolytic agents
Solanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*.
Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide,
Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.

Module-IV
Drugs acting on Central Nervous System
A. Sedatives and Hypnotics:
Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem
Barbiturtes: SAR of barbiturates, Barbital*, Phenobarbital, Mephobarbital, Amobarbital, Butabarbital, Pentobarbital, Secobarbital
Miscelleneous:
Amides & imides: Glutethmide.
Alcohol & their carbamate derivatives: Meprobomate, Ethchlorvynol.
Aldehyde & their derivatives: Triclofos sodium, Paraldehyde.
B. Antipsychotics
Phenothiazeines: SAR of Phenothiazeines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.
Ring Analogues of Phenothiazeines: Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine.
Fluro buterophenones: Haloperidol, Droperidol, Risperidone.
Beta amino ketones: Molindone hydrochloride.
Benzamides: Sulpieride.
C. Anticonvulsants: SAR of Anticonvulsants**,** mechanism of anticonvulsant action
Barbiturates: Phenobarbitone, Methabarbital. **Hydantoins:** Phenytoin*, Mephenytoin, Ethotoin **Oxazolidine diones:** Trimethadione, Paramethadione **Succinimides:** Phensuximide, Methsuximide, Ethosuximide* **Urea and monoacylureas**: Phenacemide, Carbamazepine*
Benzodiazepines: Clonazepam
Miscellaneous: Primidone, Valproic acid , Gabapentin, Felbamate

Module-V
Drugs acting on Central Nervous System
General anesthetics:
Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.
Ultra short acting barbitutrates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium.
Dissociative anesthetics: Ketamine hydrochloride.*
Narcotic and non-narcotic analgesics
Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anilerdine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.
Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.
Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepriac, Diclofenac, Ketorolac, Ibuprofen*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
- Foye's Principles of Medicinal Chemistry.
- Burger's Medicinal Chemistry, Vol I to IV.
- Introduction to principles of drug design- Smith and Williams.
- Remington's Pharmaceutical Sciences.
- Martindale's extra pharmacopoeia.
- Organic Chemistry by I.L. Finar, Vol. II.
- The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
- Indian Pharmacopoeia.
- Text book of practical organic chemistry- A.I.Vogel.

PHYSICAL PHARMACEUTICS-II

Course Code : BP403T **Credit Units: 04**

Course Objectives: The course deals with the various physica and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Content:

Module-I
Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization& protective action.

Module-II
Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers
Deformation of solids: Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

Module-III
Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.

Module-IV
Micromeretics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

Module-V
Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, Modules of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Physical Pharmacy by Alfred Martin, Sixth edition
- Experimental pharmaceutics by Eugene, Parott.
- Tutorial pharmacy by Cooper and Gunn.
- Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
- Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
- Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
- Physical Pharmaceutics by Ramasamy C, and Manavalan R.

PHARMACOLOGY-I

Course Code : BP404T **Credit Units: 04**

Course Objectives: The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

Course Content:

Module-I

1. General Pharmacology

a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy.

b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination

Module-II

General Pharmacology

a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action.

b. Adverse drug reactions.

c. Drug interactions (pharmacokinetic and pharmacodynamic)

d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.

Module-III

2. **Pharmacology of drugs acting on peripheral nervous system**

a. Organization and function of ANS.

b.Neurohumoral transmission,co-transmission and classification of neurotransmitters.

c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics.

d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).

e. Local anesthetic agents.

f. Drugs used in myasthenia gravis and glaucoma

Module-IV

3. Pharmacology of drugs acting on central nervous system

a. Neurohumoral transmission in the C.N.S.special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine.

b. General anesthetics and pre-anesthetics**.**

c. Sedatives, hypnotics and centrally acting muscle relaxants.

d. Anti-epileptics

e. Alcohols and disulfiram

Module-V

3. Pharmacology of drugs acting on central nervous system

a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens.
b. Drugs used in Parkinsons disease and Alzheimer's disease.
c. CNS stimulants and nootropics.
d. Opioid analgesics and antagonists
e. Drug addiction, drug abuse, tolerance and dependence.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology,.Churchil Livingstone Elsevier
- Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
- Goodman and Gilman's, The Pharmacological Basis of Therapeutics
- Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A.
- K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams &Wilkins
- Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology
- K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
- Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
- Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert,
- Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
- Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan

PHARMACOGNOSY AND PHYTOCHEMISTRY-I

Course Code : BP405T **Credit Units: 04**

Course Objectives: The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

Course Content:

Module-I
Introduction to Pharmacognosy:
(a) Definition, history, scope and development of Pharmacognosy
(b) Sources of Drugs – Plants, Animals, Marine & Tissue culture
(c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins).
Classification of drugs:
Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs
Quality control of Drugs of Natural Origin:
Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.
Quantitative microscopy of crude drugs including lycopodium spore method, leafconstants, camera lucida and diagrams of microscopic objects to scale with camera lucida.

Module-II
Cultivation, Collection, Processing and storage of drugs of natural origin:
Cultivation and Collection of drugs of natural origin
Factors influencing cultivation of medicinal plants.
Plant hormones and their applications.
Polyploidy, mutation and hybridization with reference to medicinal plants
Conservation of medicinal plants

Module-III
Plant tissue culture:
Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance.
Applications of plant tissue culture in pharmacognosy.
Edible vaccines

Module-IV
Pharmacognosy in various systems of medicine:
Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.
Introduction to secondary metabolites:
Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins

Module-V

Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs

Plant Products:

Fibers - Cotton, Jute, Hemp

Hallucinogens, Teratogens, Natural allergens

Primary metabolites:

General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical

Aids and/or Medicines for the following Primarymetabolites:

Carbohydrates: Acacia, Agar, Tragacanth, Honey

Proteins and Enzymes : Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).

Lipids(Waxes, fats, fixed oils) : Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax

Marine Drugs:

Novel medicinal agents from marine sources

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
- Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
- Text Book of Pharmacognosy by T.E. Wallis
- Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
- Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
- Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
- Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
- Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
- Anatomy of Crude Drugs byM.A. Iyengar

MEDICINAL CHEMISTRY PRACTICAL-I

Course Code : BP406P **Credit Units: 02**

List of experiments

I Preparation of drugs/ intermediates
1 1,3-pyrazole
2 1,3-oxazole
3 Benzimidazole
4 Benztriazole
5 2,3- diphenyl quinoxaline
6 Benzocaine
7 Phenytoin
8 Phenothiazine
9 Barbiturate
II Assay of drugs
1 Chlorpromazine
2 Phenobarbitone
3 Atropine
4 Ibuprofen
5 Aspirin
6 Furosemide

III Determination of Partition coefficient for any two drugs

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHYSICAL PHARMACEUTICS PRACTICAL-II

Course Code : BP407P **Credit Units: 02**

List of experiments

1. Determination of particle size, particle size distribution using sieving method
2. Determination of particle size, particle size distribution using Microscopic method
3. Determination of bulk density, true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order
11. Accelerated stability studies

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACOLOGY PRACTICAL-I

Course Code : BP408P **Credit Units: 02**

List of experiments

1. Introduction to experimental pharmacology.
2. Commonly used instruments in experimental pharmacology.
3. Study of common laboratory animals.
4. Maintenance of laboratory animals as per CPCSEA guidelines.
5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.
6. Study of different routes of drugs administration in mice/rats.
7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8. Effect of drugs on ciliary motility of frog oesophagus
9. Effect of drugs on rabbit eye.
10. Effects of skeletal muscle relaxants using rota-rod apparatus.
11. Effect of drugs on locomotor activity using actophotometer.
12. Anticonvulsant effect of drugs byMES and PTZ method.
13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14. Study of anxiolytic activity of drugs using rats/mice.
15. Study of local anesthetics by different methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACOGNOSY AND PHYTOCHEMISTRY PRACTICAL-I

Course Code : BP409P **Credit Units: 02**

List of experiments

1. Analysis of crude drugs by chemical tests: **(**i)Tragaccanth (ii) Acacia (iii)Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2. Determination of stomatal number and index
3. Determination of vein islet number, vein islet termination and paliside ratio.
4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
5. Determination of Fiber length and width
6. Determination of number of starch grains by Lycopodium spore method
7. Determination of Ash value
8. Determination of Extractive values of crude drugs
9. Determination of moisture content of crude drugs
10. Determination of swelling index and foaming

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Fifth Semester

MEDICINAL CHEMISTRY-II

Course Code : BP501T **Credit Units: 04**

Course Objectives: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Content:
Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

Module-I
Antihistaminic agents: Histamine, receptors and their distribution in the humanbody
H1–antagonists: Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines cuccinate, Clemastine fumarate, Diphenylphyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride*, Phenidamine tartarate, Promethazine hydrochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium
H2-antagonists: Cimetidine*, Famotidine, Ranitidin.
Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole
Anti-neoplastic agents:
Alkylating agents: Meclorethamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa
Antimetabolites: Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine
Antibiotics: Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin
Plant products: Etoposide, Vinblastin sulphate, Vincristin sulphate
Miscellaneous: Cisplatin, Mitotane.

Module-II
Anti-anginal:
Vasodilators: Amyl nitrite, Nitroglycerin*, Pentaerythritol tetranitrate, Isosorbide dinitrite*, Dipyridamole.
Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine.
Diuretics:
Carbonic anhydrase inhibitors: Acetazolamide*, Methazolamide, Dichlorphenamide. Thiazides: Chlorthiazide*, Hydrochlorothiazide, Hydroflumethiazide, Cyclothiazide, Loop diuretics: Furosemide*, Bumetanide, Ethacrynic acid. Potassium sparing Diuretics: Spironolactone, Triamterene, Amiloride.
Osmotic Diuretics: Mannitol
Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide,Minoxidil, Reserpine, Hydralazine hydrochloride.

Module-III

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcainide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol

Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.

Module-IV

Drugs acting on Endocrine system

Nomenclature, Stereochemistry and metabolism of steroids

Sex hormones: Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol.

Drugs for erectile dysfunction: Sildenafil, Tadalafil.

Oral contraceptives: Mifepristone, Norgestril, Levonorgestrol

Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone

Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.

Module-V

Antidiabetic agents:

Insulin and its preparations

Sulfonyl ureas: Tolbutamide*, Chlorpropamide, Glipizide, Glimepiride.

Biguanides: Metformin.

Thiazolidinediones: Pioglitazone, Rosiglitazone.

Meglitinides: Repaglinide, Nateglinide.

Glucosidase inhibitors: Acrabose, Voglibose.

Local Anesthetics: SAR of Local anesthetics

Benzoic Acid derivatives; Cocaine, Hexylcaine, Meprylcaine, Cyclomethycaine, Piperocaine.

Amino Benzoic acid derivatives: Benzocaine*, Butamben, Procaine*, Butacaine, Propoxycaine, Tetracaine, Benoxinate.

Lidocaine/Anilide derivatives: Lignocaine, Mepivacaine, Prilocaine, Etidocaine.

Miscellaneous: Phenacaine, Diperodon, Dibucaine.*

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
- Foye's Principles of Medicinal Chemistry.
- Burger's Medicinal Chemistry, Vol I to IV.
- Introduction to principles of drug design- Smith and Williams.
- Remington's Pharmaceutical Sciences.
- Martindale's extra pharmacopoeia.
- Organic Chemistry by I.L. Finar, Vol. II.
- The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1to 5.
- Indian Pharmacopoeia.
- Text book of practical organic chemistry- A.I.Vogel.

INDUSTRIAL PHARMACY-I

Course Code : BP502T **Credit Units: 04**

Course Objectives: Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.

Course content:

Module-I
Preformulation Studies: Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.
a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism
b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization BCS classification of drugs & its significant. Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

Module-II
Tablets:
a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling.
b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating.
c. Quality control tests: In process and finished product tests
Liquid orals: Formulation and manufacturing consideration of syrups and elixirs suspensions and emulsions; Filling and packaging; evaluation of liquid orals official in pharmacopoeia

Module-III
Capsules:
a. ***Hard gelatin capsules:*** Introduction, Production of hard gelatin capsule shells. Size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules.
b. ***Soft gelatin capsules:*** Nature of shell and capsule content, size of capsules,importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications.
Pellets: Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets

Module-IV
Parenteral Products:
a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity
b. Production procedure, production facilities and controls, aseptic processing
c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products.
d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products.

Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations

Module-V

Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.

Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies.

Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman & J.B.Schwartz
- Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
- Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
- Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
- Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
- Theory and Practice of Industrial Pharmacy by Liberman & Lachman
- Pharmaceutics- The science of dosage form design by M.E.Aulton, Churchill livingstone, Latest edition
- Introduction to Pharmaceutical Dosage Forms by H. C.Ansel, Lea &Febiger, Philadelphia, 5thedition, 2005
- Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.

PHARMACOLOGY-II

Course Code : BP503T **Credit Units: 04**

Course Objectives: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition, emphasis on the basic concepts of bioassay.

Course Content:

Module-I

1. Pharmacology of drugs acting on cardio vascular system

a. Introduction to hemodynamic and electrophysiology of heart.
b. Drugs used in congestive heart failure
c. Anti-hypertensive drugs.
d. Anti-anginal drugs.
e. Anti-arrhythmic drugs.
f. Anti-hyperlipidemic drugs.

Module-II

1. Pharmacology of drugs acting on cardio vascular system

a. Drug used in the therapy of shock.
b. Hematinics, coagulants and anticoagulants.
c. Fibrinolytics and anti-platelet drugs
d. Plasma volume expanders

2. Pharmacology of drugs acting on urinary system

a. Diuretics
b. Anti-diuretics.

Module-III

3. Autocoids and related drugs

a. Introduction to autacoids and classification
b. Histamine, 5-HT and their antagonists.
c. Prostaglandins, Thromboxanes and Leukotrienes.
d. Angiotensin, Bradykinin and Substance P.
e. Non-steroidal anti-inflammatory agents
f. Anti-gout drugs
g. Antirheumatic drugs

Module-IV

5. Pharmacology of drugs acting on endocrine system

a. Basic concepts in endocrine pharmacology.
b. Anterior Pituitary hormones- analogues and their inhibitors.
c. Thyroid hormones- analogues and their inhibitors.
d. Hormones regulating plasma calcium level- Parathormone, Calcitonin and Vitamin-D.
d. Insulin, Oral Hypoglycemic agents and glucagon.
e. ACTH and corticosteroids.

Module -V

5. Pharmacology of drugs acting on endocrine system

a. Androgens and Anabolic steroids.

b. Estrogens, progesterone and oral contraceptives.

c. Drugs acting on the uterus.

6. Bioassay

a. Principles and applications of bioassay.

b.Types of bioassay

c. Bioassay of insulin, oxytocin, vasopressin, ACTH, d-tubocurarine,digitalis, histamine and 5-HT

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
- Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
- Goodman and Gilman's, The Pharmacological Basis of Therapeutics
- Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A.
- K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
- Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.
- K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
- Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
- Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert.
- Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
- Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

PHARMACOGNOSY AND PHYTOCHEMISTRY-II

Course Code : BP504T **Credit Units: 04**

Course Objectives: The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine

Module-I
Metabolic pathways in higher plants and their determination
a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway.
b) Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

Module-II
General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites:
Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,
Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta
Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis
Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander,
Tannins: Catechu, Pterocarpus
Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony
Glycosides: Senna, Aloes, Bitter Almond
Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids

Module-III
Isolation, Identification and Analysis of Phytoconstituents
a) Terpenoids: Menthol, Citral, Artemisin
b) Glycosides: Glycyrhetinic acid & Rutin
c) Alkaloids: Atropine,Quinine,Reserpine,Caffeine
d) Resins: Podophyllotoxin, Curcumin

Module-IV
Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

Module-V
Basics of Phytochemistry
Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
- Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
- Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
- Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
- Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
- Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
- A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
- R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
- Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
- The formulation and preparation of cosmetic, fragrances and flavours.
- Remington's Pharmaceutical sciences.
- Text Book of Biotechnology by Vyas and Dixit.
- Text Book of Biotechnology by R.C. Dubey.

PHARMACEUTICAL JURISPRUDENCE

Course Code : BP505T **Credit Units: 04**

Course Objectives: This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

Course Content:

Module-I
Drugs and Cosmetics Act, 1940 and its rules 1945:
Objectives, Definitions, Legal definitions of schedules to the Act and Rules
Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties**.**
Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,
Conditions for grant of license and conditions of license for manufacture of drugs,
Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

Module-II
Drugs and Cosmetics Act, 1940 and its rules 1945.
Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)
Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties
Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.
Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs
Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

Module-III
Pharmacy Act –1948: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and Penalties
Medicinal and Toilet Preparation Act –1955: Objectives, Definitions, Licensing,
Manufacture In bond and Outside bond, Export of alcoholic preparations,
Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations.
Offences and Penalties.
Narcotic Drugs and Psychotropic substances Act-1985 and Rules: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

Module -IV
Study of Salient Features of Drugs and Magic Remedies Act and its rules: Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties
Prevention of Cruelty to animals Act-1960: Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties

National Pharmaceutical Pricing Authority: Drugs Price Control Order (DPCO)- 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

Module-V

Pharmaceutical Legislations – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee

Code of Pharmaceutical ethics D efinition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath

Medical Termination of Pregnancy Act

Right to Information Act

Introduction to Intellectual Property Rights (IPR)

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended books: (Latest Edition)

- Forensic Pharmacy by B. Suresh
- Text book of Forensic Pharmacy by B.M. Mithal
- Hand book of drug law-byM.L. Mehra
- A text book of Forensic Pharmacy by N.K. Jain
- Drugs and Cosmetics Act/Rules by Govt. of India publications.
- Medicinal and Toilet preparations act 1955 by Govt. of India publications.
- Narcotic drugs and psychotropic substances act by Govt. of India publications
- Drugs and Magic Remedies act by Govt. of India publication
- Bare Acts of the said laws published by Government. Reference books (Theory)

INDUSTRIAL PHARMACY PRACTICAL-I

Course Code : BP506P **Credit Units: 02**

List of experiments

1. Preformulation studies on paracetamol/asparin/or any other drug
2. Preparation and evaluation of Paracetamol tablets
3. Preparation and evaluation of Aspirin tablets
4. Coating of tablets- film coating of tables/granules
5. Preparation and evaluation of Tetracycline capsules
6. Preparation of Calcium Gluconate injection
7. Preparation of Ascorbic Acid injection
8. Qulaity control test of (as per IP) marketed tablets and capsules
9. Preparation of Eye drops/ and Eye ointments
10. Preparation of Creams (cold / vanishing cream)
11. Evaluation of Glass containers (as per IP)

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACOLOGY PRACTICAL-II

Course Code : BP507P **Credit Units: 02**

List of experiments

1. Introduction to *in-vitro* pharmacology and physiological salt solutions.
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.
7. Bioassay of histamine using guinea pig ileum by matching method.
8. Bioassay of oxytocin using rat uterine horn by interpolation method.
9. Bioassay of serotonin using rat fundus strip by three point bioassay.
10. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
11. Determination of PA2 value of prazosin using rat anococcygeus muscle (by Schilds plot method).
12. Determination of PD2 value using guinea pig ileum.
13. Effect of spasmogens and spasmolytics using rabbit jejunum.
14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
15. Analgesic activity of drug using central and peripheral methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACOGNOSY AND PHYTOCHEMISTRY PRACTICAL-II

Course Code : BP508P **Credit Units: 02**

List of Experiments

1. Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
2. Exercise involving isolation & detection of active principles
a. Caffeine - from tea dust.
b. Diosgenin from Dioscorea
c. Atropine from Belladonna
d. Sennosides from Senna
3. Separation of sugars by Paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstitutents by TLC
6. Analysis of crude drugs by chemical tests: **(**i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Sixth Semester

MEDICINAL CHEMISTRY-III

Course Code : BP601T **Credit Units: 04**

Course Objectives: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important
drugs.

Course Content:
Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted by (*)

Module-I
Antibiotics: Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.
β-Lactam antibiotics: Penicillin, Cepholosporins, β- Lactamase inhibitors, Monobactams
Aminoglycosides: Streptomycin, Neomycin, Kanamycin
Tetracyclines: Tetracycline,Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

Module-II
Antibiotics: Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.
Macrolide: Erythromycin Clarithromycin, Azithromycin.
Miscellaneous: Chloramphenicol*, Clindamycin.
Prodrugs: Basic concepts and application of prodrugs design.
Antimalarials: Etiology of malaria.
Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine,
Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine.
Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.
Miscellaneous: Pyrimethamine, Artesunete, Artemether, Atovoquone.

Module-III
Anti-tubercular Agents
Synthetic anti tubercular agents: Isoniozid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.*
Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycine, Capreomycin sulphate.
Urinary tract anti-infective agents
Quinolones: SAR of quinolones, Nalidixic Acid,Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin
Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine.

Antiviral agents: Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.

Module-IV
Antifungal agents:
Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin.
Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconozole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*.
Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.
Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*,
Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.
Sulphonamides and Sulfones
Historical development, chemistry, classification and SAR of Sulfonamides:
Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide*,
Sulphapyridine, Sulfamethoxaole*, Sulphadiazine, Mefenide acetate,
Sulfasalazine.
Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole.
Sulfones: Dapsone*.

Module-V
Introduction to Drug Design: Various approaches used in drug design. Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammet's electronic parameter, Tafts steric parameter and Hansch analysis. Pharmacophore modeling and docking techniques.
Combinatorial Chemistry: Concept and applications chemistry: solid phase and solution phase synthesis of combinatorial

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
- Foye's Principles of Medicinal Chemistry.
- Burger's Medicinal Chemistry, Vol I to IV.
- Introduction to principles of drug design- Smith and Williams.
- Remington's Pharmaceutical Sciences.
- Martindale's extra pharmacopoeia.
- Organic Chemistry by I.L. Finar, Vol. II.
- The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
- Indian Pharmacopoeia.
- Text book of practical organic chemistry- A.I.Vogel

PHARMACOLOGY-III

Course Code : BP602T **Credit Units: 04**

Course Objectives: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition, emphasis on the principles of toxicology and chronopharmacology.

Course Content:

Module-I
1. Pharmacology of drugs acting on Respiratory system
a. Anti -asthmatic drugs
b. Drugs used in the management of COPD
c. Expectorants and antitussives
d. Nasal decongestants
e. Respiratory stimulants
2. Pharmacology of drugs acting on the Gastrointestinal Tract
a. Antiulcer agents.
b. Drugs for constipation and diarrhoea.
c. Appetite stimulants and suppressants.
d. Digestants and carminatives.
e. Emetics and anti-emetics.

Module-II
3. Chemotherapy
a. General principles of chemotherapy.
b. Sulfonamides and cotrimoxazole.
c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolins, tetracycline and aminoglycosides

Module-III
3. Chemotherapy
a. Antitubercular agents
b. Antileprotic agents
c. Antifungal agents
d. Antiviral drugs
e.Anthelmintics
f. Antimalarial drugs
g. Antiamoebic agents

Module-IV
3. Chemotherapy
l. Urinary tract infections and sexually transmitted diseases.
m. Chemotherapy of malignancy.
4. Immunopharmacology
a. Immunostimulants
b. Immunosuppressant
Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

Module-V

5. Principles of toxicology

a. Definition and basic knowledge of acute, subacute and chronic toxicity.

b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity

c. General principles of treatment of poisoning

d. Clinical symptoms and management of barbiturates, morphine, organophosphosphorus compound and lead, mercury and arsenic poisoning.

6. Chronopharmacology

a. Definition of rhythm and cycles.

b. Biological clock and their significance leading to chronotherapy.

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchil Livingstone Elsevier
- Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
- Goodman and Gilman's, The Pharmacological Basis of Therapeutics
- Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A.
- K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams &Wilkins
- Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology
- K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
- Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
- Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert,
- Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata,
- Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,
- N.Udupa and P.D. Gupta, Concepts in Chronopharmacology.

HERBAL DRUG TECHNOLOGY

Course Code : BP603T **Credit Units: 04**

Course Objectives: This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs

Course Content:

Module-I

Herbs as raw materials: Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation. Source of Herbs. Selection, identification and authentication of herbal materials. Processing of herbal raw material

Biodynamic Agriculture: Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Indian Systems of Medicine

a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy

b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika,Churna, Lehya and Bhasma.

Module-II

Nutraceuticals: General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases. Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

Module-III

Herbal Cosmetics

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products.

Herbal excipients:

Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

Herbal formulations :

Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

Module-IV

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products:

a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy

b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

Module-V

General Introduction to Herbal Industry: Herbal drugs industry: Present scope and future prospects.
A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.

S**chedule T – GoodManufacturing Practice of Indian systems of medicine**

Components of GMP (Schedule – T) and its objectives
Infrastructural requirements, working space, storage area, machinery and equipments,
standard operating procedures, health and hygiene, documentation and records.

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Textbook of Pharmacognosy by Trease & Evans.
- Textbook of Pharmacognosy by Tyler, Brady & Robber.
- Pharmacognosy by Kokate, Purohit and Gokhale
- Essential of Pharmacognosy by Dr.S.H.Ansari
- Pharmacognosy & Phytochemistry by V.D.Rangari
- Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in
- Indian Medicine & Homeopathy)
- Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of
- Botanicals. Business Horizons Publishers, New Delhi, India, 2002

BIOPHARMACEUTICS AND PHARMACOKINETICS

Course Code : BP604T **Credit Units: 04**

Course Objectives: This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arised therein.

Course Content:

Module-I
Introduction to Biopharmaceutics
Absorption; Mechanisms of drug absorption through GIT, factors influencing drug absorption though GIT, absorption of drug from Non per oral extra-vascular routes, **Distribution** Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs

Module-II
Elimination: Drug metabolism and basic understanding metabolic pathways renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs
Bioavailability and Bioequivalence: Definition and Objectives of bioavailability, absolute and relative bioavailability, measurement of bioavailability, *in-vitro* drug dissolution models, *in-vitro-in-vivo* correlations, bioequivalence studies, methods to enhance the dissolution rates and bioavailability of poorly soluble drugs.

Module-III
Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartment models, Non compartment models, physiological models, One compartment open model. (a). Intravenous Injection (Bolus) (b). Intravenous infusion and (c) Extra vascular administrations. Pharmacokinetics parameters - KE ,t1/2,Vd,AUC,Ka, Clt and CLR- definitions methods of eliminations, understanding of their significance and application

Module-IV
Multicompartment models: Two compartment open model. IV bolus Kinetics of multiple dosing, steady state drug levels, calculation of loading and mainetnance doses and their significance in clinical settins.

Module-V
Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity. c. Michaelis-menton method of estimating parameters, Explanation with example of drugs.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.
- Biopharmaceutics and Pharmacokinetics; By Robert F Notari
- Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition,Prentice-Hall Inernational edition.USA
- Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B.Jaiswal,Vallabh Prakashan Pitampura, Delhi
- Pharmacokinetics: ByMilo Glbaldi Donald, R. Mercel Dekker Inc.
- Hand Book of Clinical Pharmacokinetics, ByMilo Gibaldi and Laurie Prescott by ADIS Health Science Press.
- Biopharmaceutics; By Swarbrick
- Clinical Pharmacokinetics, Concepts and Applications: ByMalcolm Rowland and Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
- Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company,Pennsylvania 1989.
- Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition
- Revised and expanded by Rebort F Notari Marcel Dekker Inn, New York and Basel, 1987.
- Remington's Pharmaceutical Sciences, ByMack Publishing Company, Pennsylvnia

PHARMACEUTICAL BIOTECHNOLOGY

Course Code : BP605T **Credit Units: 04**

Course Objectives: Biotechnology has a long promise to revolutionize the biological sciences and technology. Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting. Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs. Biotechnology has already produced transgenic crops and animals and the future promises lot more.

Course Contents :

Module-I
a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.
b) Enzyme Biotechnology- Methods of enzyme immobilization and applications.
c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries.
d) Brief introduction to Protein Engineering.
e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase.
f) Basic principles of genetic engineering.

Module-II
a) Study of cloning vectors, restriction endonucleases and DNA ligase.
b) Recombinant DNA technology. Application of genetic engineering in medicine.
c) Application of r DNA technology and genetic engineering in the production of: i) Interferon ii) Vaccines- hepatitis- B iii) Hormones-Insulin.
d) Brief introduction to PCR

Module-III
Types of immModuley- humoral immModuley, cellular immModuley
a) Structure of Immunoglobulins
b) Structure and Function of MHC
c) Hypersensitivity reactions, Immune stimulation and Immune suppressions.
d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immModuley.
e) Storage conditions and stability of official vaccines
f) Hybridoma technology- Production, Purification and Applications
g) Blood products and Plasma Substituties.

Module-IV
a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting.
b) Genetic organization of Eukaryotes and Prokaryotes
c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons.
d) Introduction to Microbial biotransformation and applications.
e) Mutation: Types of mutation/mutants.

Module-V
a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring.
b) Large scale production fermenter design and its various controls.

c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin,
d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substituties.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest edition):

- B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C.
- RA Goldshy et. al., : Kuby Immunology.
- J.W. Goding: Monoclonal Antibodies.
- J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal Society of Chemistry.
- Zaborsky: Immobilized Enzymes, CRC Press, Degraland, Ohio.
- S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.
- Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi

PHARMACEUTICAL QUALITY ASSURANCE

Course Code : BP606T **Credit Units: 04**

Course Objectives: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

Course Content:

Module-I
Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP
Total Quality Management (TQM): Definition, elements, philosophies
ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines
Quality by design (QbD): Definition, overview, elements of QbD program, tools
ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration
NABL accreditation : Principles and procedures

Module-II
Organization and personnel: Personnel responsibilities, training, hygiene and personal records.
Premises: Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.
Equipments and raw materials: Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

Module-III
Quality Control: Quality control test for containers, rubber closures and secondary packing materials.
Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

Module-IV
Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.
Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

Module-V
Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation.
Warehousing: Good warehousing practice, materials management

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Edition)

- Quality Assurance Guide by organization of Pharmaceutical Products of India.
- Good Laboratory Practice Regulations, 2nd Edition, SandyWeinberg Vol. 69.
- Quality Assurance of Pharmaceuticals- A compendium of Guide lines and Related materials Vol IWHO Publications.
- A guide to Total QualityManagement- Kushik Maitra and Sedhan K Ghosh
- How to Practice GMP's – P P Sharma.
- ISO 9000 and Total QualityManagement – Sadhank G Ghosh
- The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
- Good laboratory Practices – Marcel Deckker Series
- ICH guidelines, ISO 9000 and 14000 guidelines

MEDICINAL CHEMISTRY PRACTICAL-III

Course Code : BP607P **Credit Units: 02**

List of experiments

I Preparation of drugs and intermediates
1 Sulphanilamide
2 7-Hydroxy, 4-methyl coumarin
3 Chlorobutanol
4 Triphenyl imidazole
5 Tolbutamide
6 Hexamine

II Assay of drugs
1 Isonicotinic acid hydrazide
2 Chloroquine
3 Metronidazole
4 Dapsone
5 Chlorpheniramine maleate
6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates byMicrowave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PHARMACOLOGY PRACTICAL-III

Course Code : BP608P **Credit Units: 02**

List of experiments

1. Dose calculation in pharmacological experiments
2. Antiallergic activity by mast cell stabilization assay
3. Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.
4. Study of effect of drugs on gastrointestinal motility
5. Effect of agonist and antagonists on guinea pig ileum
6. Estimation of serum biochemical parameters by using semi- autoanalyser
7. Effect of saline purgative on frog intestine
8. Insulin hypoglycemic effect in rabbit
9. Test for pyrogens (rabbit method)
10. Determination of acute oral toxicity (LD50) of a drug from a given data
11. Determination of acute skin irritation / corrosion of a test substance
12. Determination of acute eye irritation / corrosion of a test substance
13. Calculation of pharmacokinetic parameters from a given data
14. Biostatistics methods in experimental pharmacology(student's t test, ANOVA)
15. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

**Experiments are demonstrated by simulated experiments/videos*

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

HERBAL DRUG TECHNOLOGY PRACTICAL

Course Code : BP609P **Credit Units: 02**

List of experiments

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of the alcohol content of Asava and Arista
3. Evaluation of excipients of natural origin
4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.
5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements.
6. Monograph analysis of herbal drugs from recent Pharmacopoeias
7. Determination of Aldehyde content
8. Determination of Phenol content
9. Determination of total alkaloids

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

Syllabus - Seventh Semester

INSTRUMENTAL METHODS OF ANALYSIS

Course Code : BP701T **Credit Units: 04**

Course Objectives: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Course Content:

Module-I
UV Visible spectroscopy: Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations. Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode. Applications - Spectrophotometric titrations, Single component and multi component analysis
Fluorimetry: Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications

Module-II
IR spectroscopy: Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications
Flame Photometry-Principle, interferences, instrumentation and applications
Atomic absorption spectroscopy- Principle, interferences, instrumentation and applications
Nepheloturbidometry- Principle, instrumentation and applications

Module-III
Introduction to chromatography
Adsorption and partition column chromatography-Methodology, advantages, disadvantages and applications.
Thin layer chromatography- Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications.
Paper chromatography-Introduction, methodology, development techniques, advantages, disadvantages and applications
Electrophoresis– Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications

Module-IV
Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications
High performance liquid chromatography (HPLC)-Introduction, theory, instrumentation, advantages and applications.

Module-V

Ion exchange chromatography- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications

Gel chromatography- Introduction, theory, instrumentation and applications

Affinity chromatography- Introduction, theory, instrumentation and applications

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Instrumental Methods of Chemical Analysis by B.K Sharma
- Organic spectroscopy by Y.R Sharma
- Text book of Pharmaceutical Analysis by Kenneth A. Connors
- Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
- Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
- Organic Chemistry by I. L. Finar
- Organic spectroscopy byWilliam Kemp
- Quantitative Analysis of Drugs by D. C. Garrett
- Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
- Spectrophotometric identification of Organic Compounds by Silverstein

INDUSTRIAL PHARMACY-II

Course Code : BP702T **Credit Units: 04**

Course Objectives: This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market

Course Content:

Module-I
Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology

Module-II
Technology development and transfer: WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues

Module-III
Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals
Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

Module-IV
Quality Management Systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

Module-V
Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http,//en.wikipedia.org/wiki/Regulatory_ Affairs.
- International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php
- Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
- Regulatory Affairs brought by learning plus, inc. available at http.//www.cgmp.com/ra.htm.

PHARMACY PRACTICE

Course Code : BP703T **Credit Units: 04**

Course Objectives: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In commModuley pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the commModuley set up.

Course Contents:

Module-I

a) Hospital and it's organization: Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.

b) Hospital pharmacy and its organization: Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.

c) Adverse drug reaction: Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.

d) **CommModuley Pharmacy:** Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

Module-II

a) Drug distribution system in a hospital: Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.

b) Hospital formulary: Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary.

c) Therapeutic drug monitoring: Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic DrugMonitoring, and Indian scenario for Therapeutic Drug Monitoring.

d) Medication adherence: Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence.

e) Patient medication history interview: Need for the patient medication history interview, medication interview forms.

f) CommModuley pharmacy management: Financial, materials, staff, and infrastructure requirements.

Module-III

a) Pharmacy and therapeutic committee: Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.

b) Drug information services: Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information.

c) Patient counseling: Definition of patient counseling; steps involved in patient counseling, and Special

cases that require the pharmacist

d) Education and training program in the hospital: Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for commModuley pharmacy, and Role of pharmacist in the interdepartmental communication and commModuley health education.

e) Prescribed medication order and communication skills: Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.

Module-IV

a) Budget preparation and implementation: Budget preparation and implementation

b) Clinical Pharmacy: Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care. Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern.

c) Over the counter (OTC) sales: Introduction and sale of over the counter, and Rational use of common over the counter medications.

Module-V

a) Drug store management and inventory control: Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

b) Investigational use of drugs: Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee.

c) Interpretation of Clinical Laboratory Tests: Blood chemistry, hematology, and urinalysis

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Edition):

- Merchant S.H. and Dr. J.S.Quadry. *A textbook of hospital pharmacy*, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.
- Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. *A textbook of Clinical Pharmacy Practice-essential concepts and skills,* 1st ed. Chennai: Orient Longman Private Limited; 2004.
- William E. Hassan. *Hospital pharmacy*, 5th ed. Philadelphia: Lea & Febiger; 1986.
- Tipnis Bajaj. *Hospital Pharmacy*, 1st ed. Maharashtra: Career Publications; 2008.
- Scott LT. *Basic skills in interpreting laboratory data*, 4thed. American Society of Health System Pharmacists Inc; 2009.
- Parmar N.S. *Health Education and CommModuley Pharmacy*, 18th ed. India: CBS Publishers & Distributers; 2008.

NOVEL DRUG DELIVERY SYSTEMS

Course Code : BP704T **Credit Units: 04**

Course Objectives: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Course Content:

Module-I

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates.Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations

Polymers: Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

Module-II

Microencapsulation: Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications

Mucosal Drug Delivery system: Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, concept of implantsand osmotic pump

Module-III

Transdermal Drug Delivery Systems: Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches

Gastroretentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications

Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

Module-IV

Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

Module-V

Ocular Drug Delivery Systems: Introduction, intra ocular barriers and methods to overcome – Preliminary study, ocular formulations and ocuserts

Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
- Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
- Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley
- Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
- N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
- S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.

INSTRUMENTAL METHODS OF ANALYSIS PRACTICAL

Course Code : BP705P **Credit Units: 02**

List of experiments

1 Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
2 Estimation of dextrose by colorimetry
3 Estimation of sulfanilamide by colorimetry
4 Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
5 Assay of paracetamol by UV- Spectrophotometry
6 Estimation of quinine sulfate by fluorimetry
7 Study of quenching of fluorescence
8 Determination of sodium by flame photometry
9 Determination of potassium by flame photometry
10 Determination of chlorides and sulphates by nephelo turbidometry
11 Separation of amino acids by paper chromatography
12 Separation of sugars by thin layer chromatography
13 Separation of plant pigments by column chromatography
14 Demonstration experiment on HPLC
15 Demonstration experiment on Gas Chromatography

Examination Scheme :

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
02	**05**	**03**	**05**	**25**	**10**

Note: A-Attendance, IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

PRACTICE SCHOOL

Course Code: BP706PS **Credit Units: 06**

Objectives: Every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time. At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of Semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college level and grade point shall be awarded.

Examination Scheme:
Total: 150 marks

Internal Marks : 25
Continuous Mode :

Assignment	Periodic report
10	15

External Marks : 125

Objective(s) of the work done	15 Marks
Learning Outcomes	30 Marks
Presentation of Work	30 Marks
Communication skills	20 Marks
Question and answer skills	30 Marks
	Total = 125 Marks

Syllabus - Eighth Semester

BIOSTATISITCS AND RESEARCH METHODOLOGY

Course Code : BP801T **Credit Units: 04**

Course Objectives: To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel**.**

Course Content:

Module-I
Introduction: Statistics, Biostatistics, Frequency distribution
Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples
Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems
Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

Module-II
Regression: Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a + by, Multiple regression, standard error of regression– Pharmaceutical Examples
Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems
Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples
Parametric test: t-test (Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

Module-III
Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test
Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism
Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph
Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Module-IV
Blocking and confounding system for Two-level factorials
Regression modeling: Hypothesis testing in Simple and Multiple regressionmodels
Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Module-V
Design and Analysis of experiments:
Factorial Design: Definition, 22, 23design. Advantage of factorial design
Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest edition):

- Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.
- Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
- Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
- Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery

SOCIAL AND PREVENTIVE PHARMACY

Course Code : BP802T **Credit Units: 04**

Course Objectives: The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Course Content:

Module-I:
Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.
Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.
Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health
Hygiene and health: personal hygiene and health care; avoidable habits

Module-II:
Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

Module-III:
National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

Module-IV:
National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

Module-V:
CommModuley services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest edition)*:*

- Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
- Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy
- Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
- Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications
- Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D,
- Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
- Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011,
- ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.
- Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

PHARMA MARKETING MANAGEMENT

Course Code : BP803ET **Credit Units: 04**

Course Objective: The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.

Course Contents:

Module-I
Marketing: Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.
Pharmaceutical market: Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation& targeting.Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist.Analyzing the Market; Role of market research.

Module-II
Product decision: Classification, product line and product mix decisions, product life cycle,product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

Module-III
Promotion: Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

Module-IV
Pharmaceutical marketing channels: Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.
Professional sales representative (PSR): Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

Module-V
Pricing: Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order)and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing: Vertical & Horizontal Marketing; RuralMarketing; Consumerism; Industrial Marketing; Global Marketing.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions)

- Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
- Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MC GrawHill, New Delhi.
- Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill
- Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India
- Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
- Ramaswamy, U.S & Nanakamari, S: Marketing Managemnt:Global Perspective, IndianContext,Macmilan India, New Delhi.
- Shanker, Ravi: Service Marketing, Excell Books, New Delhi
- Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) Excel Publications.

PHARMACEUTICAL REGULATORY SCIENCE

Course Code : BP804ET **Credit Units: 04**

Course Objectives: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia,UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.

Course Content:

Module-I
New Drug Discovery and development: Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

Module-II
Regulatory Approval Process: Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Changes to an approved NDA / ANDA.
Regulatory authorities and agencies: Overview of regulatory authorities of India, United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

Module-III
Registration of Indian drug product in overseas market: Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical Document (eCTD), ASEAN Common Technical Document (ACTD)research.

Module-IV
Clinical trials: Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safetymonitoring in clinical trials

Module-V
Regulatory Concepts: Basic terminology, guidance, guidelines, regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended books (Latest edition):

- Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan.
- The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and
- Robert P. Martin, Drugs and the Pharmaceutical Sciences,Vol.185. Informa Health care Publishers.
- New Drug Approval Process: Accelerating Global Registrations By Richard A
- Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences,Vol.190.
- Guidebook for drug regulatory submissions / SandyWeinberg. By John Wiley & Sons. Inc.
- FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
- Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
- Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
- Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene
- Drugs: From Discovery to Approval, Second Edition By Rick Ng

PHARMACOVIGILANCE

Course Code : BP805ET **Credit Units: 04**

Course Objectives: This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.

Course Content:

Module-I
Introduction to Pharmacovigilance
History and development of Pharmacovigilance
Importance of safety monitoring of Medicine
WHO international drug monitoring programme
Pharmacovigilance Program of India(PvPI)
Introduction to adverse drug reactions
Definitions and classification of ADRs
Detection and reporting
Methods in Causality assessment
Severity and seriousness assessment
Predictability and preventability assessment
Management of adverse drug reactions
Basic terminologies used in pharmacovigilance
Terminologies of adverse medication related events
Regulatory terminologies

Module-II
Drug and disease classification
Anatomical, therapeutic and chemical classification of drugs
International classification of diseases
Daily defined doses
International Non proprietary Names for drugs
Drug dictionaries and coding in pharmacovigilance
WHO adverse reaction terminologies
MedDRA and Standardised MedDRA queries
WHO drug dictionary
Eudravigilance medicinal product dictionary
Information resources in pharmacovigilance
Basic drug information resources
Specialised resources for ADRs
Establishing pharmacovigilance programme
Establishing in a hospital
Establishment & operation of drug safety department in industry
Contract Research Organisations (CROs)
Establishing a national programme

Module-III
Vaccine safety surveillance
Vaccine Pharmacovigilance
Vaccination failure
Adverse events following immunization
Pharmacovigilance methods
Passive surveillance – Spontaneous reports and case series
Stimulated reporting
Active surveillance – Sentinel sites, drug event monitoring and registries
Comparative observational studies – Cross sectional study, case control study and cohort study
Targeted clinical investigations
Communication in pharmacovigilance
Effective communication in Pharmacovigilance
Communication in Drug Safety Crisis management
Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

Module-IV
Safety data generation
Pre clinical phase
Clinical phase
Post approval phase (PMS)
ICH Guidelines for Pharmacovigilance
Organization and objectives of ICH
Expedited reporting
Individual case safety reports
Periodic safety update reports
Post approval expedited reporting
Pharmacovigilance planning
Good clinical practice in pharmacovigilance studies

Module-V
Pharmacogenomics of adverse drug reactions
Genetics related ADR with example focusing PK parameters.
Drug safety evaluation in special population
Paediatrics
Pregnancy and lactation
Geriatrics
CIOMS
CIOMS Working Groups
CIOMS Form
CDSCO (India) and Pharmacovigilance
D&C Act and Schedule Y
Differences in Indian and global pharmacovigilance requirements

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest edition):

- Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
- Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
- Mann's Pharmacovigilance:Elizabeth B. Andrews, Nicholas, Wiley Publishers.
- Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
- An Introduction to Pharmacovigilance: Patrick Waller,Wiley Publishers.
- Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert,Jones& Bartlett Publishers.
- Textbook of Pharmacoepidemiolog edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy,Wiley Publishers.
- A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills:G.
- Parthasarathi, Karin NyfortHansen,Milap C. Nahata National Formulary of India
- Text Book of Medicine by Yashpal Munjal
- Text book of Pharmacovigilance: concept and practice

QUALITY CONTROL AND STANDARDIZATION OF HERBALS

Course Code : BP806ET **Credit Units: 04**

Course Objectives: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Course Contents:

Module-I
Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage Forms WHO guidelines for quality control of herbal drugs.
Evaluation of commercial crude drugs intended for use

Module-II
Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.
WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines
WHO Guidelines on GACP for Medicinal Plants.

Module-III
EU and ICH guidelines for quality control of herbal drugs.
Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

Module-IV
Stability testing of herbal medicines.Application of various chromatographic techniques in standardization of herbal products.
Preparation of documents for new drug application and export registration
GMP requirements and Drugs & Cosmetics Act provisions.

Module-V
Regulatory requirements for herbal medicines.
WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems
Comparison of various Herbal Pharmacopoeias.
Role of chemical and biological markers in standardization of herbal products

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books: (Latest Editions

- Pharmacognosy by Trease and Evans
- Pharmacognosy by Kokate, Purohit and Gokhale
- Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006.
- Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.
- EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
- Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
- Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control
- principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8.
- WHO. Quality Control Methods for Medicinal Plant Materials,World Health
- Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal
- Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO
- Regional office for the Western Pacific, Manila, 1998.
- WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.
- WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
- WHO. WHO Global Atlas of Traditional, Complementary and Alternative
- Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.
- WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

COMPUTER AIDED DRUG DESIGN

Course Code : BP807ET **Credit Units: 04**

Course Objectives: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Course Content:

Module-I
Introduction to Drug Discovery and Development
Stages of drug discovery and development
Lead discovery and Analog Based Drug Design
Rational approaches to lead discovery based on traditional medicine,
Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.
Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

Module-II
Quantitative Structure Activity Relationship (QSAR): SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammet's substituent constant and Tafts steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like
COMFA and COMSIA.

Module-III
Molecular Modeling and virtual screening techniques
Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,
Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. *De novo* drug design.

Module-IV
Informatics & Methods in drug design: Introduction to Bioinformatics, chemoinformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

Module-V
Molecular Modeling: Introduction to molecular mechanics and quantum mechanics.Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Robert GCK, ed., "Drug Action at the Molecular Level" University Prak Press Baltimore.
- Martin YC. "Quantitative Drug Design" Dekker, New York.
- Delgado JN, Remers WA eds "Wilson & Gisvolds's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York.
- Foye WO "Principles of Medicinal chemistry 'Lea & Febiger.
- Koro lkovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
- Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" JohnWiley& Sons, New York.
- Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.
- Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston.
- Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York.

CELL AND MOLECULAR BIOLOGY

Course Code : BP808ET **Credit Units: 04**

Course Objectives:
Cell biology is a branch of biology that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division, death and cell function. This is done both on a microscopic and molecular level. Cell biology research encompasses both the great diversity of single-celled organisms like bacteria and protozoa, as well as the many specialized cells in multi-cellular organismssuch as humans, plants, and sponges.

Course Content:
Module-I
a) Cell and Molecular Biology: Definitions theory and basics and Applications.
b) Cell and Molecular Biology: History and Summation.
c) Properties of cells and cell membrane.
d) Prokaryotic versus Eukaryotic
e) Cellular Reproduction
f) Chemical Foundations – an Introduction and Reactions (Types)

Module-II
a) DNA and the Flow of Molecular Information
b) DNA Functioning
c) DNA and RNA
d) Types of RNA
e) Transcription and Translation

Module-III
a) Proteins: Defined **and** Amino Acids
b) Protein Structure
c) Regularities in Protein Pathways
d) Cellular Processes
e) Positive Control and significance of Protein Synthesis

Module-IV
a) Science of Genetics
b) Transgenics and Genomic Analysis
c) Cell Cycle analysis
d) Mitosis and Meiosis
e) Cellular Activities and Checkpoints

Module-V
a) Cell Signals: Introduction
b) Receptors for Cell Signals
c) Signaling Pathways: Overview
d) Misregulation of Signaling Pathways
e) Protein-Kinases: Functioning

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (latest edition):

- W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
- Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
- Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
- Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology. Rose: Industrial Microbiology.
- Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
- Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
- Peppler: Microbial Technology.
- Edward: Fundamentals of Microbiology.
- N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
- Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company
- B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and
- Applications of RecombinantDNA: ASM Press Washington D.C.
- RA Goldshy et. al., : Kuby Immunology.

COSMETIC SCIENCE

Course Code : BP809ET **Credit Units: 04**

Course Contents :

Module-I
Classification of cosmetic and cosmeceutical products
Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs
Cosmetic excipients: Surfactants, rheologymodifiers, humectants, emollients, preservatives. Classification and application
Skin: Basic structure and function of skin.
Hair: Basic structure of hair. Hair growth cycle.
Oral Cavity: Common problem associated with teeth and gums**.**

Module-II
Principles of formulation and building blocks of skin care products: Face wash, Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages.Application of these products in formulation of cosmecuticals.
Antiperspants & deodorants- Actives & mechanism of action.
Principles of formulation and building blocks of Hair care products: Conditioning shampoo, Hair conditioner,anti-dandruff shampoo. Hair oils. Chemistry and formulation of Para-phylene diamine based hair dye. Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

Module-III
Sun protection, Classification of Sunscreens and SPF.
Role of herbs in cosmetics:
Skin Care: Aloe and turmeric
Hair care: Henna and amla.
Oral care: Neem and clove
Analytical cosmetics: BIS specification and analytical methods for shampoo, skincream and toothpaste**.**

Module-IV
Principles of Cosmetic Evaluation:Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties. Soaps,and syndet bars. Evolution and skin benfits.

Module-V
Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes
Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor. Antiperspirants and Deodorants- Actives and mechanism of action

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

References

- Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
- Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4th Edition, Vandana Publications Pvt. Ltd., Delhi.
- Text book of cosmelicology by Sanju Nanda & Roop K. Khar, Tata Publishers.

EXPERIMENTAL PHARMACOLOGY

Course Code : BP810ET **Credit Units: 04**

Course Objectives:
This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.

Course Contents:

Module-I
Laboratory Animals:
Study of CPCSEA and OECD guidelines for maintenance, breeding and conduct of experiments on laboratory animals, Common lab animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals. Techniques for collection of blood and common routes of drug administration in laboratory animals, Techniques of blood collection and euthanasia.

Module-II
Preclinical screening models
a. Introduction: Dose selection, calculation and conversions, preparation of drug solution/suspensions, grouping of animals and importance of sham negative and positive control groups. Rationale for selection of animal species and sex for the study.
b. **Study of screening animal models for:** Diuretics, nootropics, anti-Parkinson's,antiasthmatics,
Preclinical screening models: for CNS activity- analgesic, antipyretic,anti-inflammatory, general anaesthetics, sedative and hypnotics, antipsychotic, antidepressant, antiepileptic, antiparkinsonism, alzheimer's disease

Module-III
Preclinical Screening Models: for ANS activity, sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics, skeletal muscle relaxants, drugs acting on eye, local anaethetics

Module-IV
Preclinical screening models: for CVS activity- antihypertensives, diuretics, antiarrhythmic, antidyslepidemic, anti aggregatory, coagulants, and anticoagulants. Preclinical screening models for other important drugs like antiulcer, antidiabetic, anticancer and antiasthmatics.
Research methodology and Bio-statistics: Selection of research topic, review of literature, research hypothesis and study design Pre-clinical data analysis and interpretation using Students 't' test and One-way ANOVA. Graphical representation of data

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (latest edition):

- Fundamentals of experimental Pharmacology-byM.N.Ghosh
- Hand book of Experimental Pharmacology-S.K.Kulakarni
- CPCSEA guidelines for laboratory animal facility.
- Drug discovery and Evaluation by Vogel H.G.
- Drug Screening Methods by Suresh Kumar Gupta and S. K. Gupta
- Introduction to biostatistics and research methods by PSS Sundar Rao and J Richard

ADVANCED INSTRUMENTATION TECHNIQUES

Course Code : BP811ET **Credit Units : 04**

Course Objectives: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Course Content:

Module-I
Nuclear Magnetic Resonance spectroscopy: Principles of H-NMR and C-NMR, chemical shift, factors affecting chemical shift, coupling constant, Spin - spin coupling, relaxation, instrumentation and applications
Mass Spectrometry- Principles, Fragmentation, Ionization techniques – Electron impact, chemical ionization, MALDI, FAB, Analyzers-Time of flight and Quadrupole, instrumentation, applications

Module-II
Thermal Methods of Analysis: Principles, instrumentation and applications of ThermogravimetricAnalysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC)
X-Ray Diffraction Methods: Origin of X-rays, basic aspects of crystals, Xray Crystallography, rotating crystal technique, single crystal diffraction, powder diffraction, structural elucidation and applications.

Module-III
Calibration and validation-as per ICH and USFDA guidelines
Calibration of following Instruments: Electronic balance, UV-Visible spectrophotometer, IR spectrophotometer, Fluorimeter, Flame Photometer, HPLC and GC

Module-IV
Radio immune assay: Importance, various components, Principle, different methods, Limitation and Applications of Radio immuno assay
Extraction techniques:General principle and procedure involved in the solid phase extraction and liquid-liquid extraction

Module-V
Hyphenated techniques-LC-MS/MS, GC-MS/MS, HPTLC-MS.

Examination Scheme :

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	3	3	4	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended Books (Latest Editions)

- Instrumental Methods of Chemical Analysis by B.K Sharma
- Organic spectroscopy by Y.R Sharma
- Text book of Pharmaceutical Analysis by Kenneth A. Connors
- Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
- Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
- Organic Chemistry by I. L. Finar
- Organic spectroscopy byWilliam Kemp
- Quantitative Analysis of Drugs by D. C. Garrett
- Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
- Spectrophotometric identification of Organic Compounds by Silverstein

DIETARY SUPPLEMENTS AND NUTRACEUTICALS

Course Code: BP812ET **Credit Units: 04**

Course Objective: This subject covers foundational topic that are important for understanding the need and requirements of dietary supplements among different groups in the population.

Course Contents:

Module-I

a. Definitions of Functional foods, Nutraceuticals and Dietary supplements. Classification of Nutraceuticals, Health problems and diseases that can be prevented or cured by Nutraceuticals i.e. weight control, diabetes, cancer, heart disease, stress, osteoarthritis, hypertension etc.

b. Public health nutrition, maternal and child nutrition, nutrition and ageing, nutrition education in community.

c. Source, Name of marker compounds and their chemical nature, Medicinal uses and health benefits of following used as nutraceuticals/functional foods: Spirulina, Soyabean, Ginseng, Garlic, Broccoli, Gingko, Flaxseeds

Module-II

Phytochemicals as nutraceuticals: Occurrence and characteristic features (chemical nature medicinal benefits) of following

a) Carotenoids- α and β-Carotene, Lycopene, Xanthophylls, leutin

b) Sulfides: Diallyl sulfides, Allyl trisulfide.

c) Polyphenolics: Reservetrol

d) Flavonoids- Rutin , Naringin, Quercitin, Anthocyanidins, catechins, Flavones

e) Prebiotics / Probiotics.: Fructo oligosaccharides, Lacto bacillum

f) Phyto estrogens : Isoflavones, daidzein, Geebustin, lignans

g) Tocopherols

h) Proteins, vitamins, minerals, cereal, vegetables and beverages as functional foods: oats, wheat bran, rice bran, sea foods, coffee, tea and the like.

Module-III

a) Introduction to free radicals: Free radicals, reactive oxygen species, production of free radicals in cells, damaging reactions of free radicals on lipids, proteins, Carbohydrates, nucleic acids.

b) Dietary fibres and complex carbohydrates as functional food ingredients..

Module-IV

a) Free radicals in Diabetes mellitus, Inflammation, Ischemic reperfusion injury, Cancer, Atherosclerosis, Free radicals in brain metabolism and pathology, kidney damage, muscle damage. Free radicals involvement in other disorders. Free radicals theory of ageing.

b) Antioxidants: Endogenous antioxidants – enzymatic and nonenzymatic antioxidant defence, Superoxide dismutase, catalase, Glutathione peroxidase, Glutathione Vitamin C, Vitamin E, α- Lipoic acid, melatonin Synthetic antioxidants: Butylated hydroxy Toluene, Butylated hydroxy Anisole.

c) Functional foods for chronic disease prevention

Module-V

a) Effect of processing, storage and interactions of various environmental factors on the potential of nutraceuticals.

b) Regulatory Aspects; FSSAI, FDA, FPO, MPO, AGMARK. HACCP and GMPs on Food Safety. Adulteration of foods.
c) Pharmacopoeial Specifications for dietary supplements and nutraceuticals.

Examination Scheme :

Components	**CT**	**HA**	**S/V/Q**	**ATTD**	**EE**
Weightage(%)	**15**	**3**	**3**	**4**	**75**

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ATTD: Attendance EE: End Semester Examination

Recommended books :

- Dietetics by Sri Lakshmi
- Role of dietary fibres and neutraceuticals in preventing diseases by K.T Agusti and P.Faizal: BSPunblication.
- Advanced Nutritional Therapies by Cooper. K.A., (1996).
- The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988).
- Prescription for Nutritional Healing by James F.Balch and Phyllis A.Balch 2nd Edn., Avery Publishing Group, NY (1997).
- G. Gibson and C.williams Editors *2000 Functional foods* Woodhead Publ.Co.London.
- Goldberg, I. *Functional Foods*. 1994. Chapman and Hall, New York.
- Labuza, T.P. 2000 Functional Foods and Dietary Supplements: Safety, Good
- Manufacturing Practice (GMPs) and Shelf Life Testing in *Essentials of Functional Foods* M.K. Sachmidl and T.P. Labuza eds. Aspen Press.
- Handbook of Nutraceuticals and Functional Foods, Third Edition (Modern Nutrition)
- Shils, ME, Olson, JA, Shike, M. 1994 *Modern Nutrition in Health and Disease*. Eighth edition. Lea and Febiger

PROJECT WORK

Course Code: BP813PW **Credit Units: 06**

Objectives:
The aim of the project work is to provide student with an opportunity to further intellectual and personal development in chosen field by undertaking a significant practical unit of activity, having an educational value at a level commensurate with the award of the degree. The project work can be defined as a scholarly inquiry into a problem or issues, involving a systematic approach to gathering and analysis of information / data, leading to production of a structured report.

The area of the project shall directly relate any one of the elective subject opted by the student in semester VIII. The project shall be carried out in group not exceeding 5 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages).

THE COMPONENTS OF A PROJECT REPORT
The outcome of Project Work is the Project Report. A project report should have the following components:
1) Cover Page: This should contain the title of the project proposal, to whom it is submitted, for which degree, the name of the author, name of the supervisor, year of submission of the project work, name of the University.
2) Acknowledgement: Various organizations and individuals who might have provided assistance /co-operation during the process of carrying out the study.
3) Table of Content: Page-wise listing of the main contents in the report, i.e., different Chapters and its main Sections along with their page numbers.
4) Body of the Report: The body of the report should have these four logical divisions

a. *Introduction:* This will cover the background, rationale/ need / justification, brief review of literature, objectives, methodology (the area of the study, sample, type of study, tools for data collection, and method of analysis), Limitations of the Study, and Chapter Planning.
b. *Conceptual Framework / National and International Scenario*: (relating to the topic of the Project).
c. *Presentation of Data, Analysis and Findings*: (using the tools and techniques mentioned in the methodology).
d. *Conclusion and Recommendations:* In this section, the concluding observations based on the main findings and suggestions are to be provided.

5) Bibliography or References: This section will include the list of books and articles which have been used in the project work, and in writing a project report.
6) Annexures: Questionnaires (if any), relevant reports, etc.
(The main text of the Project should normally be in the range of 5000 words. However, there may be annexure in addition to the main text)

THE STEPS OF PROJECT WORK
STEP I : Selection of the topic for the project by taking following points into consideration:

- Suitability of the topic.
- Relevance of the topic
- Time available at the disposal.
- Feasibility of data collection within the given time limit.
- Challenges involved in the data collection (time & cost involved in the data collection, possibility of getting responses, etc.)

STEP II : Finalisation of the Topic and preparation of Project Proposal in consultation with the Supervisor.
STEP III : Collection of information and data relating to the topic and analysis of the same.
STEP IV : Writing the report dividing it into suitable chapters, viz.,
Chapter 1: Introduction,
Chapter 2: Conceptual Framework / National & International Scenario,
Chapter 3: Analysis & Findings
Chapter 4: Conclusion and Recommendations.
STEP V : The following documents are to be attached with the Final Project Report.
1) Approval letter from the supervisor (Annexure-IA)
2) Student's declaration (Annexure-IB)
3) Certificate from the Competent Authority of the Organisation / Institution, if the student undertakes the Project Work in any Organisation / Institution.
Annexures, References / Bibliography

Guidelines for Evaluation:

- Each of the students has to undertake a Project individually under the supervision of a teacher and to submit the same following the guidelines stated below.
- Language of Project Report and Viva-Voce Examination may be English. The Project Report must be typed and hard bound.
- Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years (within the time period as per University Rules).
- No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.
- Evaluation of the Project Work to be done jointly by one internal expert and one external expert with equal weightage, i.e., average marks of the internal and external experts will be allotted to the candidate.
- A candidate has to qualify in the Project Work separately, obtaining minimum marks of 80 (Dissertation Book and Presentation taken together).

Examination Scheme: Total-150 marks

Evaluation of Dissertation Book:

Objective(s) of the work done	15 Marks
Methodology adopted	20 Marks
Results and Discussions	20 Marks
Conclusions and Outcomes	20 Marks
	Total-75 Marks

Evaluation of Presentation:

Presentation of work	25 Marks
Communication skills	20 Marks
Question and answer skills	30 Marks
	Total-75 Marks

Amity School of Architecture & Planning

Bachelor of Architecture

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Curriculum & Scheme of Examination

2021

AMITY UNIVERSITYHARYANA

GURUGRAM

Overview

B.Arch. (Bachelor of Architecture) is a 5 years long undergraduate level Degree course. This professional course is related to the field of Architecture. Architecture deals with design, planning and construction of buildings and other physical structures. Usually buildings and physical structures are said to be the product of architectural work. Sometimes, other than buildings, even construction of non-building structures becomes a part of architecture. We have comfortable homes where we live. We go to schools and colleges to study. We go for shopping to the nearest shopping mall. We go to hospital to avail treatment. These different types of buildings are creations of architects. Each type of building has its own design and distinctive style. It is the task of an architect to create such designs and bring those plans to reality. In short, architecture plays a huge role in the design and construction of humble homes and buildings to imposing dams, bridges and tunnels! An architect is a professional, who through his/her skills, is able to perform the tasks of planning, designing and constructing buildings, physical structures and non-building structures.

Programme Objectives (PO's)

The graduates will

PO 1 **Architecture knowledge:** Apply the knowledge of humanities, science, architecture fundamentals to the solution of complex architectural problems.

PO 2 **Problem analysis:** Identify, formulate, research literature and analyze complex architectural problems reaching substantiated conclusions using principles and elements of design.

PO 3 **Design/ Development of Solutions:** Ability to identify social, economic, environmental and cultural issues related to architectural design process.

PO 4 **Conducting Investigations of complex problems:** use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO 5 **Modern tool usage:** Create, select and apply appropriate techniques, resources and modern software with an understanding of the limitations.

PO 6 **The architect and society:** Apply reasoninginformed by the contextual knowledge to assess social, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional architectural practice.

PO 7 **Environment and sustainability:** Understand the impact of the professional architectural solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

PO 8 **Ethics:** Apply ethical and professional responsibilities of the architectural practice.

PO 9 **Individual and team work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.

PO 10 **Communication:** Ability to communicate effectively on complex architectural activities with the architectural community and with society at large, such as, being able to comprehend and write reports and design documentation, make effective presentations and give and receive clear instructions.

PO 11 **Project management and finance:** Demonstrate knowledge and understanding of the architecture and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

On completion of the Bachelor of Architecture, the student will be able to:

PSO1 Create and evaluate architectural designs and represent designs through different manual and digital mediums.

PSO2 Apply technical knowledge to demonstrate a comprehensive application of life safety, accessibility and sustainability issues in making sound design decisions across varying scales and levels of complexity.

PSO3 Relate the architectural knowledge to historical and contemporary context of theories, practices, movements, styles and environmental practices existing globally through different eras.

PSO4 Work professionally by using leadership and communication skills or to identify specialized fields of architecture and pursue higher studies.

Supporting document for PSOs (Programme Specific Outcomes)

PSO 1			PSO 2			PSO 3			PSO 4		
Create **and evaluate architectural designs and represent designs through different manual and digital mediums.**			**Apply techincal knowledge to demonstrate a comprehensive application of life safety, accessibility and sustainability issues in making sound design decisions across varying scales and levels of complexity**			**Relate the architectural knowledge to historical and contemporary context of theories, practices, movements, styles and sustainable environmental practices existing globally through different eras.**			**Work professionally by using leadership and communication skills or to identify specialised fields of architecture and pursue higher studies**		
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Architectural Design	**Software Knowledge**	**Design Representation**	**Building Construction**	**Structural Design**	**Architectural Services**	**Theory of Architecture**	**Professional Practice**	**Environmental Issues**	**Courses for Higher Studies**	**NTCC**	**Value added Course**
Architectural Design - I	**Computer Applications - I**	**Architectural Graphic Skills - I**	**Building Materials & Construction Technology - I**	**Structure - I**	**Building Services - I**	**History of Architecture - I**	**Professional Practice**	**Environmental Studies - I**	**Town Planning**	**Seminar**	**Foreign Languages**
Architectural Design - II	**Computer Applications - II**	**Architectural Graphic Skills - II**	**Building Materials & Construction Technology - II**	**Structure - II**	**Building Services - II**	**History of Architecture - II**	**Specification, Estimation & Valuation**	**Environmental Studies - II**	**Understanding Cultural Landscapes for Urban Renewal & Conservation**	**Research Methodology**	**Understanding for Self Effectiveness**
Architectural Design - III	**Computer Application & Advance Technologies -I**	**Architectural Graphic Skills - III**	**Building Materials & Construction Technology - III**	**Structure - III**	**Building Services - III**	**History of Architecture - III**	**Site Planning & Landscape**	**LEED Lab - I**		**Dissertation**	**Problem Solving & Creative Thinking**
Architectural Design - IV	**Computer Application & Advance Technologies -II**	**Visual Arts - I**	**Building Materials & Construction Technology - IV**	**Structure - IV**	**Building Services - IV**	**History of Architecture - IV**	**Career Development**	**LEED Lab - II**		**Thesis**	**Group Dynamics & Team Building**
Architectural Design -	**Computer Application**	**Visual Arts - II**	**Building Materials & Construction Technology -**	**Structure - V**		**Theory of Architecture - I**		**People Culture & Built Environ**		**Practical Traini**	**Presentation Skills**

V	**&Advance Technologies - III**		**V**					**ment - I**		**ng**	
Architectural Design - VI		**Visual Arts - III**	**Building Materials & Construction Technology - VI**	**Structure - VI**		**Theory of Architecture - II**		**People Culture & Built Environment - II**			**Effective Listening**
Architectural Design - VII		**Visual Arts - IV**	**Building Materials & Construction Technology - VII**	**Structure - VII**		**Theory of Architecture - III**		**People Culture & Built Environment - III**			**Stress & Coping Strategies**
Architectural Design - VIII		**Model Making**	**Building Materials & Construction Technology - VIII**	**Structure - VIII**		**Architectural Climatology**		**Ecology, Environment & Sustainable Development - I**			**English - I**
				Surveying & Leveling				**Ecology, Environment & Sustainable Development - II**			**English - II**
								Ecology, Environment & Sustainable Development - III			**Reading & Comprehension**
											Personality, Nationalism & Human Values

Syllabus - First Semester

	ARCHITECTURAL DESIGN – I (ARC2101)	L	T	S	P	C
Version 1.1	Date of Approval:	1	1	3	1	6
Pre-requisites/Exposure	NA					
Co-requisites	Visual Arts – I					

Catalog Description

The aim of this subject is to familiarize students with visual grammar, elements of design and methods of visual composition with various mediums and color. In addition to the earlier, the intention of space design activity will be limited to the level of visual composition of architectural spaces considering human activity and anthropometry. There would be several studio/ design thinking exercises based on the module contents as is described below. The module may be taken up by the faculty in order of preference. The order should be common in both the sections of the same year. The faculty may achieve stated minimum outcome using various strategies and approaches.

Design Exercise: Small living space, Home stay, Small showroom, Shop, Small Activity space

Course Objectives

The objective of this course is

- To understand the application of visual grammar in the domain of Visual design
- To create composition with various 2D and 3D media with various mediums.
- To develop the ability to translate abstract principles of design into architectural solutions for simple problems.

Course Outcomes

On completion of this course, students will be able to

CO1: Define principles of design and architectural aesthetics

CO2: Evaluate the human activities in built environment
CO3: Measure drawings of simple objects
CO4: Evaluate and analyze 3D form with visual grammar.

Modules	Blooms level*	Number of hours
MODULE 1: Study and Application of Elements and Principles of Design in Basic Composition Elements of design in basic composition, Application of principles of design, Positive and Negative spaces, Additive and Subtractive spaces, Exercises primarily through 2-D & 3-D models of simple geometric.	L1, L2	10
MODULE 2: Anthropometry Anthropometrical study of various spaces, Application of Anthropometrics, Design of Anthropometrics Cell with minimum space requirements of single unit for a single person, Study the interior spaces by making 3-D views (axonometric and isometric)	L1, L2, L3	20
MODULE 3:Measured Drawing Introduction to fundamentals of measured drawing, line value, lettering, drawing representation, format for presentation methods and technique of measuring buildings and their details. Measured drawing of simple objects like furniture, detailing in terms of construction, ornamentation, measured drawing of building components like column, door, window, cornice, etc.	L3, L4	24
MODULE 4: Scale and Order in Architecture Analyzing single activity, anthropometrical data, designing the elements of building e.g. entrance gate design, floor design, door design, Table-Chair, Drafting table etc. Living space, Home stay, Shop, Small Activity space, etc	L4, L5, L6	18

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books/ References

- Chiara, J. D., & Callender, J. (1983). Time-Saver Standards for Building Types. *McGRaw-Hill International Edition*.
- Do, E. Y. L., & Gross, M. D. (2001). *Thinking with diagrams in architectural design. Artificial Intelligence Review*, *15*(1–2), 135–149. https://doi.org/10.1023/A:1006661524497
- Hakim, B. S., & von Meiss, P. (1994). *Elements of Architecture: From Form to Place. Journal of Architectural Education (1984-)*, *47*(3), 182. https://doi.org/10.2307/1425121Architecture: Form, Space and Order, Francis D.K. Ching
- Hencke, D. G. (1978). *Architectural graphics*. *Building Operating Management*, *25*(6), 24–26.
- Janson, H. W., Hitchcock, H.-R., & Giedion, S. (1941). *Space, Time and Architecture; The Growth of a New Tradition. Parnassus*, *13*(5), 179. https://doi.org/10.2307/772093

- Ormiston, R. (2009). *Understanding Architecture through Drawing by Brian Edwards. The Art Book*, *16*(4), 68–68. https://doi.org/10.1111/j.1467-8357.2009.01064_2.x
- Quinan, J., & Alexander, C. (1981). *A Pattern Language: Towns, Buildings, Construction. Leonardo*, *14*(1), 80. https://doi.org/10.2307/1574526
- Roaf, S., & McGill, G. (2018, September 3). *Place, time and architecture: the growth of new traditions. Architectural Science Review*, *61*(5), 267–271. https://doi.org/10.1080/00038628.2018.1502156
- Yin, X., Wonka, P., & Razdan, A. (2009). *Generating 3D Building Models from Architectural Drawings: A Survey. IEEE Computer Graphics and Applications*, *29*(1), 20–30. https://doi.org/10.1109/mcg.2009.9

Modes of Evaluation: Assignment/ Presentation/ Literature Study/ Sheet Work

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	6	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	--	--	1	--	--	--	--	--	_	1	-	--	--
CO2	1	2	--	--	2	--	--	--	--	--	--	_	1	-	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	_	1	-	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	_	1	-	--	--

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING MATERIALS & CONSTRUCTION TECHNOLOGY – I (ARC2102)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	2	5
Pre-requisites/Exposure	NA					
Co-requisites	Architectural Design – I					

Catalog Description

The aim of this subject is to familiarize the students with basic concepts of building materials and construction techniques in the field. This subject will enable students to familiarize with building elements of superstructure and Sub-Structure, to apply the construction techniques involved in masonry work with different materials like brick, stone and composite materials in different locations like T- junctions, independent piers and corner junctions.

Course Objectives

The objective of this course is

- To make students familiar with basic building elements.
- Students will understand the importance of various bonds through brick models and the assembling of these brick models in the form of courses and bonds.
- To introduce brick as building material for super and sub structure construction.
- To know and understand the basic characteristics and classification of timber as a construction material.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define basic building elements

CO2: Recognize the various types of masonry made up of suitable materials

CO3: Explain the types and necessity of timber as building material

CO4: Explain the principles of construction.

Modules	Blooms	Number

	level*	of hours
MODULE 1: Introduction to Super- Structure, Sub- Structure and Building materials Introduction to basic elements of buildings and their importance; Brief introduction to Bricks, different types of bricks, stone, glass, R.C.C., asbestos, paints and varnishes, Fiber Reinforced Plastic (FRP), **Lime:** Sources of lime, Classification and manufacturing process of lime, Fat and hydraulic lime – properties and use, tests on lime, etc. **Cement:** Composition of ordinary cement, function of cement ingredients, properties of cement – soundness, setting time, strength, etc. Grade of cement and different types of cement used in construction. **Mortar:** Sand, sources of sand and its classification, tests on sand, classification of mortar – lime mortar, mud mortar, surkhi mortar, cement mortar, preparation of mortar and its properties, use and selection of mortar for different construction work, etc.	L1, L2	15
MODULE 2: Introduction to different types of Masonry, Brick Masonry and Stone Masonry Introduction to bonds, principle and applications, Brick walls in different bonds, ends, corners and junctions. Composition of brick earth and their properties, manufacturing process of bricks, classification of bricks, test for bricks, special type of bricks, substitutes for bricks, etc Rubble work: Random Rubble, built-to-course and coursed masonry, miscellaneous, Classification, characteristics and properties of stones, quarrying of stone, artificial stones	L1, L2, L3	20
MODULE 3: Timber Types of timber, defects, seasoning and preservation of timber. Ecological impact due to use of wood, deforestation etc. Study of engineered wood used in buildings, i.e., Plywood, block boards, particleboards, and other types. Application of timber in building components.	L1, L3,L4	10
MODULE 4: Principles of Construction and Building Elements Foundations, Footings, D.P.C., flooring, sills, lintel, roofing, parapets, coping, cladding expansion joints, waterproofing of roofs, external wall sections with details, beams, columns, slabs, retaining walls, etc. External Wall Section.	L1, L3,L4	15

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Barry, R. (1999). *The Construction of Buildings Vol. 2.* 5th Ed. New Delhi: East-West Press.
- McKay, W. B. (2005). *Building Construction Metric Vol. I–IV*. 4th Ed. Mumbai: Orient Longman.
- Rangwala, S. C. (1963). *Building Construction: Materials and types of Construction*. 3rd Ed. New York: John Wiley and Sons

References:

- Clayton, C. R. (1987). Materials science and engineering: An introduction. *Materials Science and Engineering*, *94*, 266–267. https://doi.org/10.1016/0025-5416(87)90343-0.
- Fernandes, F. M., Lourenço, P. B., & Castro, F. (2010). Ancient Clay Bricks: Manufacture and Properties. In *Materials, Technologies and Practice in Historic Heritage Structures* (pp. 29–48). Springer Netherlands. https://doi.org/10.1007/978-90-481-2684-2_3

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	5	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	-	1	-	-	-	-	-	-	2	2	1	-	-
CO2	1	1	2	-	1	-	-	-	-	-	-	2	2	1	-	-
CO3	1	1	2	-	1	-	-	-	-	-	-	2	2	1	-	-
CO4	1	1	2	-	1	-	-	-	-	-	-	2	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

	ARCHITECTURAL GRAPHICS SKILLS-I (ARC2104)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Architectural Design- I					
Co-requisites	Basic Design & Visual Arts					

Catalog Description

The aim of this course is to provide the students with the basic tools and techniques for free hand drawing and technical drawings. The subject covers concept of scales and lettering and familiarize them with planar and solid geometry to conceptualize the 3D forms in to 2D with the help of Orthographic Projections of Planes and Solids including sections of solids as well.

Course Objectives

The objective of this course is

- To familiarize the students with various drawing tools and accessories used in drafting and lettering techniques to produce and visualize geometrical composition and form.
- To provide a clear understanding about the scale measurement; plane geometry, solid geometry and projections used as drawing technique.

Course Outcomes

On completion of this course, the students will be able to

CO1: Draw free hand drawing and lettering.
CO2: Project points, lines and planes in different positions in 1st angle projection system.
CO3: Project regular rectilinear and circular solids in different positions.
CO4: Apply their knowledge in making sections, intersections and interpretations of solids.

Modules	Blooms level*	Number of hours
MODULE 1: Free Hand Drawing and Lettering Free hand and mechanical lettering cycle.	L1	6

MODULE 2: Basic Technical Drawing Concept and types of line, Division of lines and angles, Drawing polygons, Inscribing and circumscribing circles in polygons, Drawing geometrical curves helix, Conoid etc.	L1, L2	6
MODULE 3:Orthographic Projections- Planes and Solids Definition, Meaning and concept, Planes of Projections, First angle projections, Projection of points, Lines and planes in different positions. Projection of regular rectilinear and circular solids (prisms, pyramids, cones, cylinders, spheres etc.) in different positions. Sections of regular rectilinear and circular solids (prisms, pyramids, cones, cylinders, spheres etc) in varying conditions of sectional plane.	L1, L2, L3	18
MODULE 4: Solid Geometry Construction of section, Intersection and interpenetration of solid.	L1, L2, L3	6

***Bloom's Level:** *L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Bhatt, N.D. (53rd Edition 2014). *Engineering Drawing*: Charotar Publishing House Pvt. Ltd.
- Dhawan, R.K.(3rd Revised Edition 2006). *A textbook of Engineering Drawing (In First Angle Projection)*: S Chand & Company.
- Ramsey & Sleeper. (Sixth Edition 1970). *Architectural Graphic Standards:* John Wiley & Sons.
- Shah, P.J. (Revised Edition 2013). *Textbook of Engineering Drawing*: S Chand (G/L) & Company Ltd.

References:

- Ching, Francis D.K. (6th Edition 2015). *Architectural Graphics*: John Wiley & Sons.
- Ganesan, R., & Devarajan, V. (1998). Intersecting features extraction from 2D orthographic projections. *CAD Computer Aided Design*, *30*(11), 863–873. https://doi.org/10.1016/S0010-4485(98)00043-8
- Williams, E. (2001). Lettering. *Eurostitch Magazine*, *9*(51), 28–29. https://doi.org/10.1007/978-94-010-2948-3_17

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	--	--	--	1	--	--	2	--	--	--	-	1	2	-	--
CO2	3	--	--	--	1	--	--	2	--	--	--	-	1	2	-	--
CO3	2	--	--	--	2	--	--	1	--	--	--	-	1	2	-	--
CO4	2	--	--	--	2	--	--	1	--	--	--	-	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related

	VISUAL ARTS-I (ARC2105)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Architectural Design- I					
Co-requisites	Carpentry & Model Making					

Catalog Description

The aim of this course is to provide practical learning in creative thinking. The course intends to build student interest in think creative and express freedom of expression in Art, Paintings, and model making. The design and creative thinking course helps analyse complex shapes, design and application of colour.

Course Objectives

The objective of this course is

- To understand the elements and principles of Basic Design as the building blocks of creative design through exercises that will develop the originality, expression, skill and creative thinking.
- To familiarize with principles and theories of arts and architectural composition
- To develop presentation skills, visual expression and representation, imaginative thinking and creativity through free hand sketching and painting on various mediums and materials.
- To familiarize students with the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to understand form, proportion, scale, etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create 2d, 3D Graphic forms, size, and their proportions
CO2: Create object based painting and develop creative art forms
CO3: Apply architectural graphics skills and improve presentation skills
CO4: Create life-long connection in one's pursuit for painting and other art forms

Modules	Blooms level*	Number of hours
MODULE 1: Free Hand Sketching Warm-up module for students to gain exposure to the importance of sketching and drawings in architecture. Free hand still life sketching of composition of solids, cubes, cylinders etc. Study of light, shade and shadow. Free hand sketching in pencil of elements of scale like trees, shrubs, human, figures, vehicles etc. Indoor and Outdoor Sketching.	L1, L2, L3	9
MODULE 2: Live Sketching Live sketching in pencil of elements of scale like trees, shrubs, human, figures, vehicles etc. Indoor and Outdoor Sketching.	L1, L2, L3	9
MODULE 3: Colour Theory and Colour Wheel Properties of colour – Colour schemes – Types of colours -primary, secondary and tertiary colours. Application and visual effects of colour.	L1, L2, L3, L4	9
MODULE 4: Color Course Introduction to Hue, Tint, Tone and Shades. Exercises for the same to study their impacts on still objects, buildings, etc	L1, L2, L3, L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Pen & Ink Drawing: A Simple Guide by Book by Alphonso Dunn

Reference Books

- Ching, F. (1975). *Architectural Drafting*. In *Architectural Graphics* (pp. 15–19). Elsevier. https://doi.org/10.1016/b978-0-85139-066-6.50005-5
- Guptill, a L., & Meyer, S. E. (1997). *Rendering in Pen and Ink*. *Proceedings of the 23rd annual conference on Computer graphics and interactive techniques SIGGRAPH 96* (Vol. 30, pp. 469–476). Retrieved from http://portal.acm.org/citation.cfm?doid=237170.237287
- Pencil Points reader: a journal for the drafting room, 1920-1943. (2004). *Choice Reviews Online*, *42*(02), 42-0757-42–0757. https://doi.org/10.5860/choice.42-0757
- The American Institute of Architects. (2010). Architectural Graphic Standards for Residential Construction, 2nd Edition. *American Institute of Architects*, 1–720.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

1: strongly related, 2: moderately related and 3: weakly related

	HISTORY OF ARCHITECTURE - I (ARC2106)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	NA					
Co-requisites	Visual Arts – I					

Catalog Description

The aim of this course is to make students aware of different style of architecture of various regions. The architecture of the world can be categorized as per the timeline of the respective regions of the world with the rock shelters and ancient civilizations of the world with a theoretical framework and the prominent people of architecture who have significantly contributed in the establishment of major distinct architectural styles and features thereby, resulting in a holistic approach and comprehensive and exhaustive analysis of the Indian architecture. The course covers Pre-historic period, Dravidian Style, Indo-Aryan Style, etc.

Course Objectives:

The objective of this course is:

- To introduce Architectural elements, forms, development trends, characteristics of construction techniques and technologies, buildings, civilization transformation over the time period.
- To familiarize socio–economic, historical, political influences of time period in Architectural development.
- To identify the buildings and the major works of the period.
- To understand architecture as evolving within specific cultural contexts including aspects of politics, society, religion and climate
- To gain knowledge of the development of architectural form with reference to technology, style and character in the prehistoric world and in ancient Egypt, West Asia, Greece and Islamic Period

Course Outcomes:

On completion of this course, the students will be able to

CO1: Identify and define the world's earliest civilizations, including the Neolithic, Paleolithic, Mesolithic and Iron Age.

CO2: Identify prominent historic buildings by their components of design.

CO3: Describe prominent historic buildings of Indo-Aryan Style

CO4: Analyze prominent historic buildings of Dravidian Style.

.Modules	Blooms level*	Number of hours
MODULE 1: History of Civilizations The type of Architectural development during the period taking few building examples of the different periods –Paleolithic, Neolithic, Mesolithic and Iron age. **Indus Valley Civilization:** Town planning principles, cultural ethos, and economy exemplified with examples from Mohenjodaro and Harappa.	L1, L2	5
MODULE 2: Buddhist and Jain Architecture The techniques used for rock-cut spaces and free-standing built masses. The spatial and functional connotations. The Buddhist philosophy and its imprint in built space. The temple cities of Palitana, Mount Abu and Girnar. The Jain philosophy and its imprint in built form. The Jain mandalas.	L1, L2	5
MODULE 3: Hindu Architecture- Indo-Aryan The evolution of the temple form, evolution of the shikhara in north India. The three schools of architecture - the Gujarat, the Khajuraho, and the Orrisan styles. Comparison in spatial attributes, scale and detail.	L1, L2	6
MODULE 4: Hindu Architecture-Dravidian The evolution of the vimana and the contributions of the Chalukyas, the Pallavas, the Pandyas and the Cholas. The contributions of the Nayaks to the temple cities. The city morphology, spatial diversity and planning criteria. Hindu philosophy and its imprint in temples/traditional houses and other built structures. Mandala and the geometric grid in temple plans. The proportional theory in temple elevation.	L1, L2	8

***Bloom's Level**: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Fergusson, J. (2013). *History of Indian and Eastern Architecture*. *History of Indian and Eastern Architecture*. Cambridge University Press. https://doi.org/10.1017/cbo9781139814638

References:

- Architect, J., Prize, P., Yamasaki, M., Khan, L., & Tange, K. (1987). History of architecture 1., 4–6.

- Eaton, L. K. (1988). A History of Architecture: Settings and Rituals Spiro Kostof. *Journal of the Society of Architectural Historians*, *47*(1), 75–76. https://doi.org/10.2307/990258
- Hancock, J. E., & Kostof, S. (1986). A History of Architecture: Settings and Rituals. *Journal of Architectural Education (1984-)*, *39*(3), 31. https://doi.org/10.2307/1424785
- Hartoonian, G., & Hartoonian, G. (2018). On history. In *Time, History and Architecture* (pp. 14–29). Routledge. https://doi.org/10.4324/9781315270210-2
- McMahon, A. P., & Fletcher, B. (1938). A History of Architecture on the Comparative Method. *Parnassus*, *10*(5), 31. https://doi.org/10.2307/771691
- Roth, L. M., & Roth Clark, A. C. (2018). *Understanding architecture: Its elements, history, and meaning*. *Understanding Architecture: Its Elements, History, and Meaning* (pp. 1–745). Taylor and Francis. https://doi.org/10.4324/9780429495588

Modes of Evaluation: Quiz/ Assignment/ Seminar/ Presentation/ Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	2	--	--	--	--	--	--	--	--	-	--	--	1	--
CO2	1	-	3	--	--	--	--	--	--	--	--	-	--	--	1	--
CO3	1	-	2	--	--	--	--	--	--	--	--	-	--	--	1	--
CO4	1	-	2	--	--	--	--	--	--	--	--	-	---	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

	STRUCTURE - I (ARC2109)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure						
Co-requisites	Building Materials & Construction Technology – I					

Catalog Description

The aim of this course is to enable students to understand various principles of strength of materials. The course covers Engineering mechanics, stress and strain of beams, shear force and bending moment theory. The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To introduce the structural system in a building with all the basic components.
- To understand the functions of various elements and building technologies used in various types of buildings.
- To study of stresses and strains and their effect in various elements.
- To give an introduction to the basic principles governing structural systems.
- To introduce basic prefab and high-rise structure.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basics of engineering mechanics

CO2: Define stresses and strains with their effects in various elements

CO3: Explain force and bending moment diagrams.

CO4: Understand prefab and high-rise building structure.

Modules	Blooms level*	Number of hours
MODULE 1: Engineering mechanics Introduction , force, resultant force, parallelogram ,triangle, and polygon law of forces, system of forces, Lami‟s theorem, moment of forces, parallel forces , couple , center of gravity , moment of inertia, friction , angle of friction, angle of repose, basics of pulley centripetal and centrifugal force, super elevation ,work,	L1, L2	06

power, energy. Frame- perfect and imperfect frame, motion of a lift, lifting machine		
MODULE 2: Stress and strain Introduction, direct stress and strain , shear stress and strain, stress strain diagram for mild steel, young's modulus , poisson's ratio, shear modulus, bending equation for beam in simple bending volumetric strain, bulk modulus, stress in bass of varying section, shear stress diagram, stresses in composite bass, flinched beams, stresses due to change in temperature, principal of superposition, principal stress and strain , Mohr's circle of stresses , resilience.	L1, L2	06
MODULE 3:Shear Force and bending moment diagram, theory of yielding and failure Types Of Beams, Supports, Loadings, Assumption Of Theory Of Bending ,SFD And BMD, Material Failure, Structural Failure, Max Principal Stress (Rankine's theory), Max Principle Stress (Saint-Venant's principle), Maximum Shear Stress , Total Strain Energy Theory , Shear And Distortion Strain (von Mises and Hencky)	L1, L2	06
MODULE 4: Design principles and elementary concept for building construction systems Design principles of RCC beams and slabs. Construction system: reinforced concrete, pre-stressed concrete and prefab system and modular co-ordination. Load action and high-rise buildings, various structural systems for high rise buildings.	L1, L2	06

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. https://doi.org/10.1201/b18121-13
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

References

- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. https://doi.org/10.1016/s00160032(41)90378-
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. https://doi.org/10.1063/1.58258

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	1	-	-	-	1	-	-	-	2	2	1	-	-
CO2	2	-	-	1	-	-	-	1	-	-	-	2	2	1	-	-
CO3	2	-	-	1	-	-	-	1	-	-	-	2	2	1	-	-
CO4	2	-	-	1	-	-	-	1	-	-	-	2	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

	MODEL MAKING (ARC2111)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Basic Drawing and Sketching					
Co-requisites	Basic Design & Visual Arts					

Catalog Description

The aim of this course is to provide the foundation, knowledge and skills needed to work in Carpentry & Model Making. The course covers modelling aspects with the focus on understanding the scale and proportions. The modelling making can be taught using various materials in a workshop-based activity. The students would produce/create several 3D, Architectural Designs and experimental innovative aspects to create unique visual presentation of specializing in the subject.

Course Objectives

The objective of this course is

- To teach the modeling aspects with the focus on understanding the scale and proportions.
- To guide students in modeling making can be taught using various materials in a workshop-based activity.

Course Outcomes

On completion of this course, the students will be able to
CO1: Sketching and developing 2D, 3D Graphical forms in scales, size, and their proportions
CO2: Create object based models and develop creative art forms
CO3: Applying architectural graphics skills in model making presentations
CO4: Create life-long connection in one's pursuit for model making and other art forms

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Introduction to the art of model making and its allied tools, techniques and	L1, L2, L3	9

materials.		
MODULE 2: Design Evolution Conceptual sketching/ planning, design and developing various three-dimensional geometries in the model making; in context of understanding the scale and proportion.	L1, L2, L3	9
MODULE 3: Workshop The workshop based activity will help in understanding the qualities of different materials, different types of joints and model making to relevant scales and proportions. Students may use different materials such as – Paper, Thermocol, Clay, Wood, Plaster of Paris, metals, and use of different colors in model making.	L1, L2, L3, L4	9
MODULE 4: Presentation Teaching and developing the presentation skills of the models, using various techniques and materials. The students may also incorporate the same for their Architectural Design studio problem	L1, L2, L3, L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Congdon, R.T. (First Edition 2010). *Architectural Model Building: Tools, Techniques and Materials*: Fairchild Books

Reference Books

- Janke, Rolf. (First Edition 1968). *Architectural Models*: Frederick A. Praeger.
- Taylor, J.R. (1971). *Model Building for Architects and Engineers*: McGraw-Hill Inc.
- Werner, Megan. (First Edition 2011). *Model Making*: Princeton Architectural Press.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	--	--	--	1	--	--	--	2	--	--	--	1	3	2	--
CO2	1	--	--	--	2	--	--	--	1	--	--	--	1	3	2	--
CO3	1	--	--	--	2	--	--	--	1	--	--	--	1	3	2	--
CO4	3	--	--	--	1	--	--	--	1	--	--	--	1	3	2	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus – Second Semester

	ARCHITECTURAL DESIGN – II (ARC2201)	L	T	S	P	C
Version 1.1	Date of Approval:	1	1	3	1	6
Pre-requisites/Exposure	Architectural Design – I					
Co-requisites	Building Materials & Construction Technology - I					

Catalog Description

The aim of this subject is to familiarize the students with architectural design process through small scale projects of human habitat. The design activity will be limited to the level of visual composition of architectural spaces considering human activity and anthropometry, building material exploration, colour etc. The projects would connect horizontal circulation reflecting their creative approach drawn from data analysis and climatic consideration to the physical setting.

Examples of project: Clinic, Residence, Bank, Canteen, Studio Apartment, etc.

Course Objectives

The objective of this course is

- To involve students in a design project(s) that will involve simple space planning and the understanding of the functional aspects of good design.
- To involve students in a small scale building project(s) which will sensitize them to intelligent planning that is responsive to the environmental context.
- To involve students in building case study by choosing appropriate examples to enable them to formulate and concretize their concepts
- To enable the presentation of concepts through various modes and techniques that will move constantly between 2D representation and 3D modeling

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the application of the architectural design process for small scale projects of human habitat.

CO2: Transform the human behavioral needs into architectural program requirements.

CO3: Analyze the information on context and the human space relationship.

CO4: Compose the architectural spaces in a design project.

Modules	Blooms level*	Number of hours
MODULE 1: Design Process and Human as user of space Study and differentiate human needs, wants and desire, study of cases for different user's requirements, Transform the behavioural requirements into space form, Study of relationship among spaces with proximity chart, Storytelling etc.	L1, L2,	10
MODULE2: Human Activity and Context Study if a context and its surroundings and collect information, Analyse the above information in favour of the usage perspective, Understanding of human scale to the context.	L!, L2	10
MODULE 3:Planning of Spaces Distribution of the human activity spaces along the context considering the context as visual background, Analyse the relationship among the spaces. Verbal presentation on planning of built environment with different mediums.	L4, L5, L6	20
MODULE 4: Detail Design of Interior Spaces with a theme Detail planning and design of interior spaces considering human needs and human anthropometric data with a theme. Application of building materials with colour and texture in detail design. Verbal presentation of Interior Spaces.	L4, L5, L6	20

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References:

- Béjar, R., Latre, M. Á., Nogueras-Iso, J., Muro-Medrano, P. R., & Zarazaga-Soria, F. J. (2009). *An architectural style for spatial data infrastructures*. International Journal of Geographical Information Science, 23(3), 271–294. https://doi.org/10.1080/13658810801905282
- Chiara, J. D., & Callender, J. (1983). *Time-Saver Standards for Building Types* Fourth Edition. McGRaw-Hill International Edition.
- Givoni, B. (2004). *Time Saver Standards for Urban Design: Urban Design and Climate.* Digital Engineering Library @ McGraw-Hill.
- Head, A. J. (2017). *Planning and Designing Academic Library Learning Spaces: Expert Perspectives of Architects, Librarians, and Library Consultants.* SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2885471

- USACE. (1997*). Human Behavior and the Interior Environment*. In Design Guide for Interiors.
- Wolfenden, A., & Chusid, M. (1991). *Time-Saver Standards for Building Types*: (3rd Edition). Journal of Testing and Evaluation, 19(4), 347. https://doi.org/10.1520/jte12583j

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	5	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	2	--	--	--	--	--	--	-	1	2	--	--
CO2	1	1	1	1	2	--	--	--	--	--	--	-	1	2	--	--
CO3	1	1	2	2	1	-	-	-	-	-	-	-	-	1	-	3
CO4	3	-	2	1	1	-	-	-	-	-	--	-	-	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING MATERIALS & CONSTRUCTION TECHNOLOGY – II (ARC2202)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	2	5
Pre-requisites/Exposure	Building Materials & Construction Technology – I					
Co-requisites	Architectural Design – II					

Catalog Description

The aim of this course is to make students familiar with basic concepts of building materials and construction techniques in the field. The study in the semester increases in complexity from shallow and spread foundations to deep foundations. Study of openings will proceed to the study of Arches and its classification, to familiarize the students with the temporary supporting structures required for construction.

Course Objectives

The objective of this course is

- To introduce students to details of shallow and deep foundations.
- To understand openings and the use and construction details of doors and windows with timber shutters and frames.
- To understand the use of construction building materials like clay and timber.
- Students will also learn about arches.

Course Outcomes

On completion of this course, the students will be able to

CO1: To develop understanding about foundations and the constructions techniques involved.

CO2: To recognize the various types of temporary supporting structures used in different locations in the building industry

CO3: To understand the importance of wooden carpentry joinery details used in openings

CO4: To evaluate the best suitable Joinery in openings and become aware of conventional and new clay products used.

Modules	Blooms level*	Number of hours
MODULE 1: Foundations: Shallow, spread & Deep Shallow foundation: Types, Isolated, combined and raft foundations and their construction techniques. Deep Foundation: Grillage foundations, Piles foundations, Caisson foundations, etc.	L1, L2, L3	15
MODULE 2: Temporary Supporting Structures Form work and shuttering for different types of RCC elements, trench timbering, scaffolding, shoring and underpinning.	L1, L2	10
MODULE 3: Timber Doors and Windows Timber: Structure and timber trees, varieties of timber, defects in timber, decay of timber, Qualities of timber for construction, seasoning, storage and preservation of timber, properties and strength of manufactured products, veneers, plywood, block boards, fiberboard, etc. • Doors: classification of doors; (a) paneled doors. (b) ledged and battened doors, (c) ledged, braced and battened doors, (d) framed, ledged, braced, and battened doors (e) flush doors • Windows: Timber windows; Casement window and its details	L1, L3,L4	20
MODULE 4: Arches and Clay Product Classification of Arches on the basis of geometrical shape, materials, construction techniques, viz. flat, segmental, semi-circular, Tudor, circular, elliptical, semi-elliptical, venetian, Florentine arches, etc. Illustration of terminology for arches, construction detailing and methods of centring. Clay Products: Flooring and roofing tiles, their properties, manufacturing process, laying of tles, etc.. Clay products like terra-cotta, earthenware, stoneware, porcelain, mud – its stabilization and uses, etc.	L1, L3,L4	15

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Barry, R. (1999). *The Construction of Buildings Vol. 2.* 5th Ed. New Delhi: East-West Press.
- Chudley, R. (2008). *Building Construction Handbook*. 7th Ed. London: Butterworth-Heinemann.
- McKay, W. B. (2005). *Building Construction Metric Vol. I–IV*. 4th Ed. Mumbai: Orient Longman.

- Rangwala, S. C. (1963). *Building Construction: Materials and types of Construction*. 3rd Ed. New York: John Wiley and Sons

References:

- Clayton, C. R. (1987). Materials science and engineering: An introduction. *Materials Science and Engineering*, *94*, 266–267. https://doi.org/10.1016/0025-5416(87)90343-0.
- Fernandes, F. M., Lourenço, P. B., & Castro, F. (2010). Ancient Clay Bricks: Manufacture and Properties. In *Materials, Technologies and Practice in Historic Heritage Structures* (pp. 29–48). Springer Netherlands. https://doi.org/10.1007/978-90-481-2684-2_3
- Freidin, K., & Erell, E. (1995). Bricks made of coal fly-ash and slag, cured in the open air. *Cement and Concrete Composites*, *17*(4), 289–300. https://doi.org/10.1016/0958-9465(95)00017-7
- Saikia, N., & De Brito, J. (2012, September). Use of plastic waste as aggregate in cement mortar and concrete preparation: A review. *Construction and Building Materials*. https://doi.org/10.1016/j.conbuildmat.2012.02.066

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	5	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO2	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO3	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO4																

1: strongly related, 2: moderately related and 3: weakly related

	ARCHITECTURAL GRAPHICS SKILLS-II (ARC2204)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Architectural Graphics Skills-I					
Co-requisites	Architectural Design-II, Basic Design and Visual Arts-II					

Catalog Description

The aim of this course is to provide the theoretical, practical and pictorial aspect of the architectural drawings to the students. The subject covers concepts of metric drawings and development surfaces familiarize them with isometric and axonometric views and development of the surfaces of basic forms. The subject will be taught in congruence with the design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is:

- To familiarize the students with theoretical, practical and pictorial aspects of architectural drawings.
- To develop the perception and presentation of simple architectural forms and buildings.
- To introduce the development of the basic forms in architecture.
- To equip the students with visualization and surface development of complex forms.

Course Outcomes

On completion of this course, the students will be able to

CO1: Recognize the need to combine the use of manual drawing tools and techniques for drafting and freehand drawing for architectural design communication.

CO2: Produce 3- Dimensional Architectural drawings and forms by using drawings/sketching and manual techniques.

CO3: Produce surface development of the simple geometric forms.

CO4: Produce and visualize the surface development of the complex architectural forms.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Metric Drawing Types, uses and advantages, Isometric, Axonometric and Pictorial views, Metric Drawing and projection and their Dimensioning, Metric of plane figures composed of straight lines, Metric of circles, Metric of simple and complex block.	L1, L2, L3	06
MODULE 2: Isometric and Axonometric Drawings Preparation of Isometric and Axonometric views of the 3d composition of simple geometric forms, architectural manifestation and exploded Isometric of furniture and architectural plans.	L2, L3, L4	12
MODULE 3: Development of Surfaces of simple form Development of surfaces of cubes, prisms, cylinders, pyramids, cones and spheres.	L1, L2, L3	12
MODULE 4: Development of Surfaces of complex composition of form Development of surfaces of composition of cubes, prisms, cylinders, pyramids, cones and spheres.	L3, L4, L5	6

**Bloom's Level:* *L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Bhatt, N.D. (53rd Edition 2014). *Engineering Drawing*: Charotar Publishing House Pvt. Ltd.
- Dhawan, R.K.(3rd Revised Edition 2006). *A textbook of Engineering Drawing (In First Angle Projection)*: S Chand & Company.
- Ramsey & Sleeper. (Sixth Edition 1970). *Architectural Graphic Standards:* John Wiley & Sons.
- Shah, P.J. (Revised Edition 2013). *Textbook of Engineering Drawing*: S Chand (G/L) & Company Ltd.

References

- Ching, Francis D.K. (6th Edition 2015). *Architectural Graphics*: John Wiley & Sons.
- Ganesan, R., & Devarajan, V. (1998). Intersecting features extraction from 2D orthographic projections. *CAD Computer Aided Design*, *30*(11), 863–873. https://doi.org/10.1016/S0010-4485(98)00043-8
- Williams, E. (2001). Lettering. *Eurostitch Magazine*, *9*(51), 28–29. https://doi.org/10.1007/978-94-010-2948-3_17

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	--	2	--	1	--	--	3	3	--	--	-	1	2	--	--
CO2	3	--	2	--	1	--	--	3	3	--	--	-	1	2	--	--
CO3	2	--	2	--	1	--	--	3	3	--	--	--	1	2	--	--
CO4	2	--	2	--	1	--	--	3	3	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	VISUAL ARTS – II (ARC2205)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Visual Arts – I					
Co-requisites	Architectural Design - II					

Catalog Description

The aim of this course is to provide practical learning in creative thinking. The course intends to build student interest in think creative and express freedom of expression in Art, Paintings, and model making. The design and creative thinking course helps analyze complex shapes, design and application of colour.

Course Objectives

The objective of this course is to

- To introduce Art and appreciation its philosophies.
- To develop sensitivity towards sculpture and mural as an integral part of architecture.
- To familiarize with principles and theories of arts and architectural composition.
- To utilize the skills for rendering and paintings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create 2d, 3D Graphic forms, size, and their proportions

CO2: Create art forms with different mediums

CO3: Apply rendering techniques for indoor and outdoor painting.

CO4: Create life-long connection in one’s pursuit for painting and other art forms

Modules	Blooms level*	Number of hours
MODULE 1: Art and Philosophy An introduction to the basic formal concepts in the two-dimensional arts and the principles of aesthetic organization. Using Shapes to construct aesthetically pleasing compositions	L1, L2, L3	9
MODULE 2: 2D Compositions An introduction to the basic formal concepts in the two-dimensional arts and the principles of aesthetic organization. Using Shapes to construct aesthetically pleasing composition	L1, L2, L3	9
MODULE 3: Rendering Rendering techniques, dot rendering, point rendering of still and live objects	L1, L2, L3, L4	9
MODULE 4: Painting Different types of painting styles and their masters and philosophy, Indoor and outdoor painting – Exercise involving Water colour – Water soluble colour pencil – Tempra – Acarali – Water soluble oil colour – Oil colour – Pen and ink – Brush – Air brush – Mixed mediums – Study of multi-colour and 3D effects from nature and built environment	L1, L2, L3, L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Pen & Ink Drawing: A Simple Guide by Book by Alphonso Dunn

Reference Books

- Ching, F. (1975). *Architectural Drafting*. In *Architectural Graphics* (pp. 15–19). Elsevier. https://doi.org/10.1016/b978-0-85139-066-6.50005-5
- Guptill, a L., & Meyer, S. E. (1997). *Rendering in Pen and Ink*. *Proceedings of the 23rd annual conference on Computer graphics and interactive techniques SIGGRAPH 96* (Vol. 30, pp. 469–476). Retrieved from http://portal.acm.org/citation.cfm?doid=237170.237287
- Pencil Points reader: a journal for the drafting room, 1920-1943. (2004). *Choice Reviews Online*, *42*(02), 42-0757-42–0757. https://doi.org/10.5860/choice.42-0757
- The American Institute of Architects. (2010). Architectural Graphic Standards for Residential Construction, 2nd Edition. *American Institute of Architects*, 1–720.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme		Total Marks	Credits	Duration of Exam (hr)
Internal Assessment	External Assessment			

CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	HISTORY OF ARCHITECTURE - II (ARC2206)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	History Of Architecture – I					
Co-requisites	Visual Arts – II					

Catalog Description

The aim of this course is to make students familiar with the characteristics of the history of World and Indian Architecture, Urbanism, and the built environment from pre-history to the present; this course explores buildings and cities in their cultural, social, political, and religious contexts. This course will introduce the development of Indian architecture styles, provinces of India to cities and citadels to Mughal architecture and Islamic cities and monuments. The understanding of space development and structural quality based design approach would enable students to design smaller basic structures / houses with applicable structural principles and construction techniques in mind. Innovation in the use of conventional material in non-conventional way, as portrayed in the landmark historic buildings, would also help students to think out of the box.

Course Objectives

The objective of this course is:

- To introduce architectural elements, forms, development trends, characteristics of construction techniques and technologies, buildings, civilization transformation over the time period.
- To familiarize the students with the socio–economic, historical, political influences of time period in Architectural development and identify the buildings and the major works of the period.
- To understand architecture as evolving within specific cultural contexts including aspects of politics, society, religion and climate
- To familiarize the students with the development of architectural form with reference to technology, style and character in Islamic Architecture, Provincial Architecture, Mughal Architecture, Islamic cities & Monuments.

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyzethe contributing factors for the design development of the Islamic Architecture.

CO2: Identify and analyze the development of Sultanate Period.

CO3: Critically analyze the development of colonial styles in various provinces of India.

CO4: Identify and analyze the features of Mughal Period.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Islamic Period Introduction and understanding of 'Islam's' philosophy and its consequent rituals and their interpretation in building type e.g. mosque, tomb, fort and their elements like domes, minarets, arch, squinch, landscape, motif, calligraphy, directionality, symmetry, geometry, material, court, water, patterns etc. **Islamic cities & Monuments:** Concepts of city Planning of various Islamic towns example- Shahajahanabad, Fhatehpur Sikri etc. Monumemts – Qutab Complex, Tuglakabad, Taj Mahal, Gol Gumbaj, Golconda Fort, Jami Masjid etc.	L1,L2	3
MODULE 2:The Sultanate Style With reference to the Slave, Khalji, Tughlaq, Lodi and ShershahSuri (who ruled from Delhi), architecture at Punjab, Gujrat, Bijapur and deccan.	L1,L2	3
MODULE 3: Provincial Architecture Development of colonial styles in various provinces of India like Punjab, Jaunpur, Gujrat, Bengal, Bijapur, Bidar and Deccan.	L1,L2	3
MODULE 4: Mughal Architecture The architecture of the Timuris in India-Babur, Hamayun, Akbar, Jahangir and Shahjahan, which was the culmination of the Indo-Islamic paradigm. The proportions, structure systems, landscape, materials, scale and distinct features.	L1,L2	3

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Gosta,E.Samdstrp.(1962) *Man the Builder*, Mc.Graw Hill Book Company, New York.
- Hoag, J. D. (2002). *Islamic architecture*. *History of world architecture* (pp. 203 p., 24 p. of plates).
- Pier Luigi Nervi.(1972). *History of World Architecture* - Series, Harry N.Abrams, Inc.Pub., New York, 1972.
- Sir Banister Fletcher.(1996).*A History of Architecture*, University of London, The Antholone Press.
- S.Lloyd and H.W.Muller.(1986).*History of World Architecture - Series, Faber and Faber Ltd.*, London,.

- Webb and Schaeffer; *Western Civilisation Volume* I; VNR: NY:

References

- Hancock, J. E., & Kostof, S. (1986). *A History of Architecture: Settings and Rituals.* Journal of Architectural Education (1984-), 39(3), 31. https://doi.org/10.2307/1424785
- Roth, L. M., & Roth Clark, A. C. (2018). *Understanding architecture: Its elements, history, and meaning*. *Understanding Architecture: Its Elements, History, and Meaning* (pp. 1–745). Taylor and Francis. https://doi.org/10.4324/9780429495588
- Spiro Kostof.(1985). *A History of Architecture: Setting and Rituals*, Oxford University Press, London.
- Vincent Scully: *Architecture; Architecture – The Natural and the Man Made*: Harper Collins Pub: 1991

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	2
CO2	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	2
CO3	1	2	--	--	--	--	--	--	--	--	--	--	--	--	1	2
CO4	1	2	--	--	--	--	--	--	--	--	--	---	--	--	1	2

1: strongly related, 2: moderately related and 3: weakly related

	STRUCTURE – II (ARC2209)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Structure – I					
Co-requisites	Building Materials & Construction Technology – II					

Catalog Description

The aim of this course is to enable students to understand various principles of strength of materials especially in case of beams, columns and trusses. The course covers deflection of beams, forces in members of truss, condition of equilibrium and displacement methods. The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To understand the basic principles of structural system so that it forms the basis for study of structural design.
- To help students to understand the basic principles of structural behavior and requirements of buildings with emphasis laid on the principles of various load distribution in beams and columns.
- To understand the basic principles of structural mechanics that would be pertinent to simple design elements ad understanding the structural behavior of buildings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Calculate deflection of beams through analytical method.

CO2: Analyze the resolution of forces as well as various study of various theorem related to equilibrium.

CO3: Explain force and bending moment diagrams.

CO4: Calculate deflection in beams and trusses through graphic and conjugate method.

Modules	Blooms level*	Number of hours
MODULE 1: Deflection of Beams Equation for deflection of beams, formula for maximum deflection under various loading conditions, shear stress in shaft, stiffness of a spring- leaf and helical spring. Column and struts – effective length, buckling load, short or long column, slenderness ratio, Rankine's formula, Euler's formula, dams and retailing walls, Rankine's theory for active earth pressure	L1, L2	09
MODULE 2: Forces in Members Of Trusses Types of Trusses, Method of Section, Method of Joint, Analytical Method, Graphical Method, Analysis of Plane Trusses and Space Trusses	L1, L2	09
MODULE 3:Statically Determinate and In-determinate Structures Condition of equilibrium, compatibility conditions, simple and compound systems, linear and nonlinear systems, sway and sinking, analysis of statically determinate formulas.	L1, L2	09
MODULE 4: Displacements – Geometric Methods Deflected shapes, moment area method, conjugate beam method, deflection of trusses – graphical method.	L1, L2	09

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. https://doi.org/10.1201/b18121-13
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

References

- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. https://doi.org/10.1016/s00160032(41)90378-
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. https://doi.org/10.1063/1.58258

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO2	--	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO3	--	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO4	--	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	SURVEYING AND LEVELLING (ARC2212)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Structure – II					
Co-requisites	Structure – III					

Catalog Description

The aim of this subject is to make students understand the ground situation before preparing an architectural design of any type of structure. The survey maps will be foundation documents for selection of technique of design based on ground elevation and contour pattern of proposed site. This subject covers the conceptual theory and practical application of surveying and leveling on ground with help of various survey concepts, techniques, methods and instruments. The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To understand the role of surveying and leveling in architecture
- To introduce the techniques and equipment for land surveying.
- To understand the practical surveying in the field.

Course Outcomes

On completion of this course, the students will be able to

CO1: Enable the students to understand land topography and its connection with surveying & leveling exercises.

CO2: Enable the students to understand the primary basic surveying techniques adopted in past years.

CO3: Enable the students to understand essentials parameters (basic and advanced) of leveling with various instruments & methods and concept of contouring.

CO4: Enable to do contour and slope analysis for a building.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to surveying Introduction to surveying, its practicality in the profession. Classification of various survey instruments, techniques & equipment. Reading of survey maps, understanding of features and undulations of ground. Scaling of survey measurements and errors in surveying. Concept of trigonometry, traversing & tachometry in surveying.	L1, L2	04
MODULE 1: Measurements Measurements in horizontal plane, linear measurements with chain & tape, setting-out & survey stations, survey accessories, survey lines, open & closed traverse, chaining & offsetting, direct & indirect ranging, log-books, field boundaries, field area estimation. Chain Surveying: Principles of survey, equipment required selection of station, methods of taking offsets. Compass Surveying: The prismatic compass, its construction and uses and other types of compasses.	L1, L2	09
MODULE 3: Basic and advanced surveying techniques Plane table surveying (equipment, methods, advantage & disadvantage, errors etc.), Theodolite Surveying (temporary & permanent adjustment, measuring of magnetic bearings, horizontal & vertical angles and Theodolite traverse & balancing closing error). Tachometric surveying (general instruments, different systems of tachometric measurements, stadia method). The concept of total station survey and its multi-functioning in surveying. Introduction to Use of DGPS, automated & digital surveying, G.P.S, Aerial Photography, etc.	L1, L2	14
MODULE 4: Contours and Slope Analysis Contouring methods & equipment, contour intervals, direct & indirect methods of contouring, block contour surveys, profile levelling, longitudinal & traverse cross sections, and gradients. Measurements along sloping landforms, principles, definitions, methods, instruments required for simple & differential levelling.	L1, L2	09

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books & References

- Clancy, J. (2013). Site Surveying and Leveling. Site Surveying and Leveling. Routledge. https://doi.org/10.4324/9780080928487.
- Ježko, J. (2014). Calibration of Surveying Instruments and Tools – Means to the Quality Increase of Deformation Measurements. Journal of Sustainable Mining, 13(4), 17–22. https://doi.org/10.7424/jsm140404
- Zhang, L., Mao, Q., Li, Q., & Zhang, P. (2014). An accuracy-improvement method for GPS/INS kinematic leveling for use in linear engineering surveying projects. Measurement: Journal of the

International Measurement Confederation, 54, 22– 30. https://doi.org/10.1016/j.measurement.2014.03.026

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	50	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	2	--	3	--	--	--	2	1	--	2	--	2	1	3	--
CO2	--	2	--	3	--	--	--	2	1	--	2	--	2	1	3	--
CO3	--	2	--	3	--	--	--	2	1	--	2	--	2	1	3	--
CO4	--	2	--	3	--	--	--	2	1	--	2	--	2	1	3	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus – Third Semester

	ARCHITECTURAL DESIGN – III (ARC2301)	L	T	S	P	C
Version 1.1	Date of Approval:	1	1	3	1	6
Pre-requisites/Exposure	Architectural Design –II					
Co-requisites	Architectural Climatology					

Catalog Description

The aim of this course is to involve formulation of design concepts and developing simple single storied load bearing structure. The semester focuses on the understanding of context and elements of built form in an existing setting. The projects would connect horizontal circulation reflecting their creative approach drawn from data analysis and climatic consideration to the physical setting. The subject will be integrated with Visual Arts, History of Architecture, Structure, Climatology, Water Supply and Sanitation.

Design Exercise: Primary School, Restaurant, Nursing Home, Primary Health Centre, etc.

Course Objectives

The objective of this course is

- To developsensitivity towards existing informal settings and elements of built space.
- To critique the materials, construction techniques and structural system used in the elements of built forms**.**
- To create an understanding of the inter relationships amongst various elements of architecture – form, function, space planning, user perception and behavior and culture.
- To understand the relationship between form and spaces and the importance of aesthetics.
- To enable the presentation of concepts through sketches and models and drawings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Collect data from standards, case studies for the current project.

CO2: Analyze data collected with relevance to the current project.

CO3: Integrate learning from other allied subjects to the design proposal.

CO4: Complete the architectural project with all given requirements for the given project.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to the Design Problem Introduction to the design problem. Case studies. Collecting relevant data for the given design problem. Synthesising and analysing the collected data.	L4.L5,L6	16
MODULE 2:Site study and Area Programming Site visit and Site analysis. Driving area requirements for the design exercise.	L4.L5,L6	16
MODULE 3: Design Development Relation to various functional aspects of the design problem. Use of bubble diagram, flow diagrams, zoning of site, etc. conceptual design. Finalization of design proposals – schematic 2D/3D single line/conceptual level site plan, floor plan, elevations, sections.	L4.L5,L6	20
MODULE 4: Final design Proposals Final developed to the scale drawings of Site Plan, Floor Plans, Elevations, Sections, Views. Detailed site plan with built and un-built spaces and landscaping features. Model of the proposed design	L4.L5,L6	20

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References:

- Béjar, R., Latre, M. Á., Nogueras-Iso, J., Muro-Medrano, P. R., & Zarazaga-Soria, F. J. (2009). An architectural style for spatial data infrastructures. *International Journal of Geographical Information Science*, *23*(3), 271–294. https://doi.org/10.1080/13658810801905282
- Chiara, J. D., & Callender, J. (1983). Time-Saver Standards for Building Types. *McGRaw-Hill International Edition*.
- Givoni, B. (2004). Time Saver Standards for Urban Design: Urban Design and Climate. *Digital Engineering Library @ McGraw-Hill*, 1–14.
- Head, A. J. (2017). Planning and Designing Academic Library Learning Spaces: Expert Perspectives of Architects, Librarians, and Library Consultants. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2885471

- Julius, P., & Zelnik, M. (1979). Human Dimension & Interior Space. *Vasa*. Retrieved from http://medcontent.metapress.com/index/A65RM03P4874243N.pdf
- Wolfenden, A., & Chusid, M. (1991). Time-Saver Standards for Building Types: 3rd Edition. *Journal of Testing and Evaluation*, *19*(4), 347. https://doi.org/10.1520/jte12583j
- Head, A. J. (2017). Planning and Designing Academic Library Learning Spaces: Expert Perspectives of Architects, Librarians, and Library Consultants. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2885471

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	00	50	50	100	6	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	2	--	--	--	--	--	--	-	1	2	--	--
CO2	1	1	1	1	2	--	--	--	--	--	--	-	1	2	--	--
CO3	2	1	2	2	1	-	-	-	-	-	-	-	1	2	-	-
CO4	2	1	1	1	2	-	-	-	-	-	-	-	1	2	-	-

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY - III (ARC2302)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	2	5
Pre-requisites/Exposure	Building Materials & Construction Technology – II					
Co-requisites	Architectural Design– III					

Catalog Description

The aim of this subject is to introduce students with the classification, types and details of construction of roofs. And to give complete knowledge about the various types of flooring and its construction details. To familiarize students with different types of vertical circulation possibilities. Types and construction details of all vertical circulation elements will be dealt with in detail.Students will also learn about water proofing methods and techniques at all building levels.

Course Objectives

The objective of this course is

- To understand timber single and double roofs and timber floors.
- To comprehend the various modes of vertical circulation through live examples.
- To learn properties of various construction materials like waterproofing materials, clay used as flooring materials and timber used in the building industry.

Course Outcomes

On completion of this course, the students will be able to

CO1: To understand timber single and double roofs.

CO2: To understand timber floor and partition

CO3: Make students aware of various types of staircases with reference to its placement, geometry and material used.

CO4: To understand importance, stages, methods and techniques of waterproofing,

Modules	Blooms level*	Number of hours
MODULE 1: Timber: Roofs Classification of roofs: (a) Single roofs; flat roofs, lean-to roofs, double lean-to, couple, close couple and collar roofs (b) Double or Purlin Roofs. (c) Trussed rafter roofs (d) Triple or framed roofs (e) Common roof coverings with its laying Waterproofing, rainwater gutter details. King post and Queen post roof trusses	L1, L2	15
MODULE 2: Timber- Floor & Partitions Timber floors: construction techniques, types of timber floors: single, double and triple joist timber floors, Furnishing of floors with different floor finishes like cement, coloured cement, mosaic, terrazzo, tiles etc. special consideration for rubber and PVC flooring, methods of laying Types of timber partitions: Single, double and flushed timber partitions	L1, L2, L3	20
MODULE 3: Introduction to Vertical transportation and Staircases Description of staircases, technical terminology involved, classification of staircases based on shape, material and its construction details. • Vertical section through staircases with detailing at various levels of staircases-Dog legged, Circular, Open Well, Spiral, Elliptical, etc. Classification also based on materials like wooden, steel and RCC • Staircase layout and its construction details, different elements of staircases, etc. • Design and details of construction of staircases in timber, stone, RCC and steel. • Cladding materials using traditional and contemporary materials	L1, L3,L4	10
MODULE 4: Water Proofing Materials • Waterproofing details in different levels: details in simple foundations, walls, roofs, sills, lintels and roofs in RCC, RB and steel, damp proof details of plinth, sill, lintel, and roof level. • Water proofing materials and systems for basement	L1, L3,L4	15

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Barry, R. (1999). *The Construction of Buildings Vol. 2.* 5th Ed. New Delhi: East-West Press.
- McKay, W. B. (2005). *Building Construction Metric Vol. I–IV*. 4th Ed. Mumbai: Orient Longman.
- Rangwala, S. C. (1963). *Building Construction: Materials and types of Construction*. 3rd Ed. New York: John Wiley and Sons

References

- Clayton, C. R. (1987). Materials science and engineering: An introduction. *Materials Science and Engineering*, *94*, 266–267. https://doi.org/10.1016/0025-5416(87)90343-0.
- Fernandes, F. M., Lourenço, P. B., & Castro, F. (2010). Ancient Clay Bricks: Manufacture and Properties. In *Materials, Technologies and Practice in Historic Heritage Structures* (pp. 29–48). Springer Netherlands. https://doi.org/10.1007/978-90-481-2684-2_3

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	5	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO2	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO3	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO4	1	1	1	-	2	-	-	-	-	-	-	2	2	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

	ARCHITECTURAL GRAPHICS SKILLS-III (ARC2304)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Architectural Graphic Skills – II					
Co-requisites	Architectural Design – III					

Catalog Description

The aim of this course is to develop essential manual skills such as proficiency in drawing, largely used as primary mode of communication of ideas in architectural design. Students will be introduced to a variety of tools and techniques for visual expression with emphasis on manual drawing. Architectural Graphics-II introduces advanced techniques for architectural drawing such as perspective projection, mix-media renderings etc. The course would help students identify suitable methods of representation and methods in different built environment scenarios.

Course Objectives

The objective of this course is

- To familiarize the students with One Point Perspective visualization of architectural drawing.
- To familiarize the students with Two Point Perspective visualization of architectural drawing.
- To introduce a variety of tools and techniques for visual expression with emphasis on manual drawing.
- To introduce the geometrical method of producing shadows in Architectural Drawings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Recognize the need to combine the use of manual drawing tools and techniques for drafting architectural design communication.

CO2: Apply the projected drawing method of exterior and interior perspective

CO3: Render the drawings in different mediums.

CO4: Draw views demonstrating the play of light and shadows.

Modules	Blooms level*	Number of hours
MODULE 1: One Point Perspective Drawing One perspectives of combination of geometrical forms, Building exterior and interior perspectives.	L3, L4	12
MODULE 2: Two Point Perspective Drawing Two perspectives of combination of geometrical forms, Building exterior and interior perspectives. Introduction to three-point perspective and basic exercises based on the same	L3, L4	12
MODULE 3: Rendering Rendering perspectives in different media (Dry and water based color and ink etc.). Presentation techniques in different types of rendering and materials. Variation in color/ ink, as per light position. Use of basic plantation, vehicles etc to introduce scale to building perspectives.	L4,L5	6
MODULE 4: Sciography Values in shades and shadows, constructing plan shadows (point, line and plane), Constructing shadows in elevations (Point, line and Plane). Short- cut methods for constructing shadows. Introduction of sciography in perspective drawings.	L4,L5	6

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- N D Bhatt,(2014).*Engineering Drawing,(Plane and solid geometry),*Delhi, Charotar Publishing house.

References

- Francis D.K. Ching (1979),*Architecture: Form, Space and Order,* John Wiley& Sons Publication
- Heller Robert and Salvadori Mario (1975),*Structure in Architecture,* Englewood Cliffs, N.J.Prentice-Hall
- Parmar V.S.(1973), *Design Fundamental in Architecture,* Somaiya Pubications

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	3	--	--	--	2	--	--	--	--	--	1	2	--	--
CO2	1	--	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO3	1	--	2	--	--	--	--	--	--	--	--	--	1	2	3	--
CO4	1	--	3	--	--	--	--	--	--	--	--	--	1	2	3	--

1: strongly related, 2: moderately related and 3: weakly related

	VISUAL ARTS – III (ARC2305)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Visual Arts – II					
`	Architectural Design - III					

Catalog Description

The aim of this course is to provide practical learning in creative thinking. The course intends to build student interest in think creative and express freedom of expression in Art, Paintings, and model making. The design and creative thinking course helps analyse complex shapes, design and application of colour.

Course Objectives

The objective of this course is

- To introduce the concept of perspectives and perspective drawings.
- To develop architectural skills of perspectives
- To familiarize with principles and theories of arts and its appreciation techniques.
- To introduce the concept of shades and shadows in architecture drawing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Appreciate art and art works and re-create them in form of logos, symbols, etc.
CO2: Create perspectives for surroundings and buildings
CO3: Understand the importance of shading devices in architecture
CO4: Understand the role of shades and shadows in building construction

Modules	Blooms level*	Number of hours
MODULE 1: Art Appreciation Graphic representations – Visual composition and Abstraction- Exercises involving Logo design, collage, calligraphy and printing.	L1, L2, L3	9
MODULE 2: Perspective (Free-Hand) Free-hand perspective drawing and rendering of imagined objects, in pencil and pen/ink. One and two point perspective drawings of solids and of different room	L1, L2, L3	9

interiors.		
MODULE 3:Perspective (Free-Hand) Free-hand perspective drawing of complex composition of solids. One and two point perspective view of the exterior of the building with understanding of the basic human proportion and scale. Introduction to three point perspective.	L1, L2, L3, L4	9
MODULE 4: Sciography Values in shades and shadows, Constructing plan shadows (point, line and plane), Constructing shadows in elevations (Point, line and Plane). Short- cut methods for constructing shadows Presentation techniques in different types of rendering techniques and materials.	L1, L2, L3, L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Pen & Ink Drawing: A Simple Guide by Book by Alphonso Dunn

Reference Books

- Ching, F. (1975). *Architectural Drafting*. In *Architectural Graphics* (pp. 15–19). Elsevier. https://doi.org/10.1016/b978-0-85139-066-6.50005-5
- Guptill, a L., & Meyer, S. E. (1997). *Rendering in Pen and Ink*. *Proceedings of the 23rd annual conference on Computer graphics and interactive techniques SIGGRAPH 96* (Vol. 30, pp. 469–476). Retrieved from http://portal.acm.org/citation.cfm?doid=237170.237287
- Pencil Points reader: a journal for the drafting room, 1920-1943. (2004). *Choice Reviews Online*, *42*(02), 42-0757-42–0757. https://doi.org/10.5860/choice.42-0757
- The American Institute of Architects. (2010). Architectural Graphic Standards for Residential Construction, 2nd Edition. *American Institute of Architects*, 1–720.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	HISTORY OF ARCHITECTURE – III (ARC2307)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	History of Architecture – II					
Co-requisites	Architectural Design – III					

Catalog Description

The aim of this course is to make students aware of different style of architecture of various regions. The architecture of the world can be categorized as per the timeline of the respective regions of the world with the ancient civilizations of the world with a theoretical framework and the prominent people of architecture who have significantly contributed in the establishment of major distinct architectural styles and features thereby, resulting in a holistic approach and comprehensive and exhaustive analysis of the world architecture.

Course Objectives

The objective of this course is

- To identify different styles of historic architecture.
- To familiarize with the socio–economic, historical, political influences of time period in Architectural development.
- To identify prominent / important historic buildings by their components / style of design

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe prominent / important historic buildings

CO2: Analyze the contributing factors for the design development of different styles

CO3: Identify and describe the characteristics of the Roman Kingdom, Roman Empire, and Imperial Rome.

CO4: Design buildings in the historic architectural styles.

Modules	Blooms level*	Number of hours

MODULE 1: Introduction to Mesopotamian and Egyptian Architecture Introduction to Mesopotamian civilizations, their social systems and cultures • Salient building types – Mesopotamian: • Ziggurats and their development – White Temple, Ziggurat of Ur, Urnammu and Khorsabad • Generic Temple Layout - Temple Oval and Khafaje • Palace Complex/Citadel of Khorsabad, Nebuchadnezzar's Babylon, Persepolis • Introduction to Egyptian civilization, their social systems and cultures • Salient building types – Egyptian: • Temples & temple complexes - Cult Temple and Mortuary Temple • Mastaba – development and typical components • Pyramids – Complex of Zoser, Pyramid of Cheops and Cephren, Standard mortuary complex layout of pyramids	L1, L2	6
MODULE 2: Greek Architecture • Introduction to Greek civilization, their social systems and cultures • Classical Order – Doric, Ionic, Corinthian • Salient building types: • Temple types on basis of column layout – case example of Acropolis, Athens • Discussion of Hellenic Temple (Parthenon, Athens) versus Hellenistic Temple (Athena Polias, Priene) • Public Buildings and Square – Agora, Stoa, Prytaneum, Bouleuterion, Tholos, Gymnasium, Theatre	L1, L2	6
MODULE 3:Roman Architecture • Introduction to Roman civilization, their social systems and cultures • Contribution in new materials and new construction/structural systems, eg, Pozzolana, Cementae, Stone Blocks, Stone Masonry, Arch, Vault, Dome • Salient buildings: • Forums of Rome, • Pantheon • Aqueduct • Colosseum • Bath of Caracalla • Basilica of Trajan	L1, L2	6
MODULE 4: Early Christian & Romanesque Architecture •Introduction to society and culture of 400 -1150 AD in Europe •Early Christian Architecture • Development of Early Christian Church from Roman Basilica • Salient building – St. Peter's Basilica	L1, L2	6

•Romanesque Architecture • Development of Romanesque architecture from Early Christian architecture		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Sir Banister Fletcher, A History of Architecture, University of London, The AntholonePress, 1996.
- Spiro Kostof - A History of Architecture - Setting and Rituals, Oxford UniversityPress, London, 1985.
- Leland M Roth; Understanding Architecture: Its elements, history and meaning; Craftsman House; 1994
- Pier Luigi Nervi, General Editor - History of World Architecture - Series, Harry N.Abrams,Inc.Pub., New York, 1972

Reference Books

- S.Lloyd and H.W.Muller, History of World Architecture - Series, Faber and Faber Ltd.,London, 1986.
- Gosta,E.Samdstrp, Man the Builder, Mc.Graw Hill Book Company, New York, 1970.
- Webb and Schaeffer; Western Civilisation Volume I; VNR: NY: 1962
- Vincent Scully: Architecture; Architecture – The Natural and the Man Made: Harper Collins Pub: 1991.
- Christian Norberg-Schulz, Meaning in Western Architecture, Praegur, 1975
- Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, Ltd. 2007

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	STRUCTURE - III (ARC2308)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – II					
Co-requisites	Building Materials & Construction Technology – III					

Catalog Description

The aim of this course is to understand the ground situation before preparing an architectural design of any type of structure. In this course basic principles of structural mechanics that would be pertinent to simple design elements and understanding the structural behavior of buildings. The survey maps will be foundation documents for selection of technique of design based on ground elevation and contour pattern of proposed site. This subject covers the conceptual theory and practical application of surveying and leveling on ground with help of various survey concepts, techniques, methods and instruments.

Course Objectives

The objective of this course is

- To understand an informal choice regarding the most appropriate structural system for the building design due to different types of loading.
- To provide a basic understanding about the structural modeling and research techniques in the field of Architecture.
- To understand the role of surveying and leveling in architecture and will be introduced to the techniques and equipment's for land surveying.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the calculation of concentrated loads

CO2: Define the basis of arches and cables

CO3: Analyze Frame – With Lateral Translation and With No Lateral Translation of Joints by Slope deflection method and Moment deflection method

CO4: Explain frames with and without lateral translation of joints

Modules	Blooms level*	Number of hours
MODULE 1: Loads and spans Introduction, single concentrated load, udl longer than the span, UDL shorter than the span, two concentrated spans, series of concentrated loads, equivalent UDL	L1, L2	06
MODULE 2: Arches and Cables Basis of arches, cables and suspension in bridges, basic concept, frames with and without lateral translations of joints, general case – 1 story column slender in height and bases fixed or hinged.	L1, L2	08
MODULE 3: Slope deflection method and Moment distribution Method Slope Deflection Method and Moment Distribution Method, Development of Slope Deflection, Equation, Analysis Of Frame – With Lateral Translation And With No Lateral Translation Of Joints. MDM- Development of Method, Analysis Of Frames With Lateral Translation And With No Lateral Translation Of Joints, Symmetrical Frames, Multi Storey Frames, No Shear Moment Distribution	L1, L2	14
MODULE 4: Kani's Method Basic concept, frames with and without lateral translation of joints, general cases, story column unequal in height and bases fixed or hinged	L1, L2	08

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. https://doi.org/10.1201/b18121-13
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.
- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. https://doi.org/10.1016/s00160032(41)90378-
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. https://doi.org/10.1063/1.58258

References

- Guo, Y., Du, Q., Luo, Y., Zhang, W., & Xu, L. (2008). Application of augmented reality GIS in architecture. In The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences (Vol. XXXVII, pp. 331–336). ISPRS.

- Kilford, W. K. (1979). SURVEYING FOR ENGINEERS. Survey Review, 25(192), 94–96. https://doi.org/10.1179/sre.1979.25.192.94

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	00	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	1	2	--	--	1	--	--	--	3	2	1	--	--
CO2	--	--	--	1	2	--	--	1	--	--	--	3	2	1	--	--
CO3	--	--	--	1	2	--	--	1	--	--	--	3	2	1	--	--
CO4	--	--	--	1	2	--	--	1	--	--	--	3	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	ARCHITECTURAL CLIMATOLOGY (ARC2311)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Architectural Design -II					
Co-requisites	Architectural Design – III					

Catalog Description

The aim of this course is to obtain knowledge required for understanding the influence of climate on architecture. This course helps to acquaint students to various concepts of climate and its use in architecture and makes them understand the concept of human thermal comfort as an essential function of the buildings in accordance with climate responsive architecture, ventilation and air movement. The students are exposed to the various design strategies for building in different types of climatic zones. The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To acquaint the students to various concepts of climate analysis and its use in Architecture.
- To familiarize students with human thermal comfort as an essential function of building.
- To familiarize students with the design and settings for buildings for daylight and factors that influence temperature.

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyze factors affecting climate and its elements.

CO2: Analyze different climatic zones and their characteristics and design shelters in response to various climate zones. And analyze relation between transfer of heat between buildings and environment and design buildings for thermal comfort.

CO3: Analyze movement of sun in relation to earth and design shading devices. And analyze how to avoid sun's heat but utilize maximum daylight.

CO4: Analyze the effect of water bodies, vegetation and topography on micro urban climate. And Determine orientation of the building with respect to sun and wind for passive cooling and heating techniques for energy efficient, green and sustainable architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to climate Importance of climate in architecture, factors affecting climate, elements of climate- Solar radiation, temperature, wind, humidity and precipitation and their measurement.	L1, L2	3
MODULE 2: Climatic zones and human thermal comfort Climatic zones, macro and micro climate, elements of climate and climatology data required for design of buildings in different climatic zones, Characteristics of tropical climate, macroclimate and microclimate. Study of various shelters in response to various climate zones in the tropical belt of India. Study of body's heat production and heat loss, comfort zone, bio-climatic chart and effective temperature, Isopleths.	L1, L2, L3, L4	6
MODULE 3: Solar chart, shading devices and Daylight Method of recording the position of sun in relation to earth, solar chart, azimuth, altitude, incidence, using shadow angle protractor for designing shading devices. Apparent movement of sun, solar radiation and intensity on surfaces and buildings in different latitude, sun path diagram, shading device and its design, heliodon and its use; Opaque building and heattransfer through its multi-layered envelope; Transparent surface and solar radiation on it, absorbance, reflectance, transmittance and remittance.Fenestration, lighting level and glare, amount of light, sky as a source of light and daylight factor, effect of different types of fenestrations, their size, shape in different planes with and without obstructions, Principles of day lighting in Tropics.	L1, L2, L3, L4	8
MODULE 4: Site climate and passive design strategies Microclimate, site climate data, local factors, presence of water body and vegetation, topography, special characteristics, urban climate cooling degree days and heating degree days.Orientation-sitting of building with respect to sun, wind and view, use of evaporative cooling, ground cooling-earth air tunnel, thermal mass-cavity wall, natural ventilation of attic space, night time cooling, reflective surfaces and radiant barrier, cool roof and green roof, solar radiation and sun space. Introduction to ECOTECT and Design Builder software.	L1, L2, L3, L4	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Koenigsberger, O. H. (1975). Manual of Tropical Housing and Building Climatic Design: University Press.
- Krishan, Arvind. (1st Edition 2017). Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings: Tata McGraw-Hill Education.

Reference Books

- Altan, H., Hajibandeh, M., Tabet Aoul, K. A., & Deep, A. (2016). Passive design. In Springer Tracts in Civil Engineering (pp. 209–236). Springer. https://doi.org/10.1007/978-3-319-31967-4_8
- 2. Mohamed, S. (2002, September). Safety climate in construction site environments. Journal of Construction Engineering and Management. https://doi.org/10.1061/(ASCE)07339364(2002)128:5(375)
- 3. Rind, D. (2002, April 26). Climatology: The Sun's role in climate variations. Science. https://doi.org/10.1126/science.1069562
- 4. Rupp, R. F., Vásquez, N. G., & Lamberts, R. (2015, August 17). A review of human thermal comfort in the built environment. Energy and Buildings. Elsevier Ltd. https://doi.org/10.1016/j.enbuild.2015.07.047
- 5. Taleghani, M., Tenpierik, M., Kurvers, S., & Van Den Dobbelsteen, A. (2013). A review into thermal comfort in buildings. Renewable and Sustainable Energy Reviews. https://doi.org/10.1016/j.rser.2013.05.050

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	3	--	--	--	--	1	--	--	--	--	--	2	3	1	--
CO2	--	3	--	--	--	--	2	--	--	--	--	--	2	--	1	--
CO3	--	--	2	--	--	--	1	--	--	--	--	--	2	3	1	--
CO4	--	--	2	--	--	--	1	--	--	--	--	--	2	3	1	--

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING SERVICES – I (ARC2312)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Building Materials And Construction Technology –II					
Co-requisites	Architectural Design – III					

Catalog Description

The aim of this subject is to give architects an overview and introduction to Plumbing systems and architectural considerations and their co-ordination with other services and architectural designs. Architectural services are the systems installed in buildings to make them comfortable, functional, efficient and safe. The course covers Water Supply and Sanitation system design in the buildings

Course Objectives

The objective of this course is

- To understand the need and importance of building services.
- To understand the water supply system at urban level.
- To understand the importance of sanitation and sewerage system.
- To understand the treatment process of waste water.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply knowledge gained on water supply system in small buildings.
CO2: Design sewage system for a residential building.
CO3: Design drainage system at urban level.
CO4: Prepare and understand principles of waste water management.

Modules	Blooms level*	Number of hours
MODULE 1: Water Supply Need to protect water supply, Requirements of water supply to different types of buildings. Sources of water supply, Quantity and quality of water as per NBC. Conveyance and distribution of water, Overhead tank, Underground tanks, Pipe appurtenances. Hot and cold water supply system in a low rise and high rise buildings. Distribution system in campus, Pipes their size, Jointing and different fittings.	L1, L2	6
MODULE 2: Sanitary Engineering Purpose and principles of sanitation, Collection and conveyance of waste matter. Quantity and Quality of refuse, Design and construction of sewer's and sewer appurtenances. Garbage and sewage disposal. Sanitary appliances, Traps their variety, Pipes and joints, Sanitary pipes works below and above ground level.	L1, L2	6
MODULE 3: Road and Drainage systems Introduce to the basic concepts of municipal drainage system, road pattern at city level. Roof and surface water drainage. Rain water storage and water harvesting principles and methods.	L4, L5, L6	6
MODULE 4: Waste Management System Introduction of different type of wastes produced at Urban level. Its management skills and criteria's for collections, Disposal and treatment of wastes. Reduce–Reuse–Recycle, Waste collection, Treatment & disposal. Thermal treatment Dumps and Landfills. Biological waste treatment. Waste water treatment	L4, L5, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Walter T. Gondzik (2000) Mechanical And Electrical Equipment For Building
- Punmia, B.C. (2005). Building Construction, New Delhi: Laxmi Publishers
- Rangawala, (2017). Water supply and sanitary engineering, Gujrat: Charotar publisher
- National Building codes of India.

Reference Books

- Anon. (1984). Water Supply. Civil Engineering New York, N.Y., 54(7), 40–41. https://doi.org/10.31729/jnma.916
- Hoekstra, A. (2010). The water footprint : water in the supply chain. Water, (93), 12–13.
- WHO, &Unicef. (2000). Global Water Supply and Sanitation Assessment 2000 Report. Water_Supply,87.
- https://doi.org/http://www.who.int/water_sanitation_health/monitoring/globalassess/en/

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	--	1	--	--	--	--	--	--	--	--	2	2	1	--	--
CO2	2	--	1	--	--	--	--	--	--	--	--	2	2	1	--	--
CO3	2	--	1	--	--	--	--	--	--	--	--	2	2	1	--	--
CO4	2	--	1	--	--	--	--	--	--	--	--	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Fourth Semester

	ARCHITECTURAL DESIGN – IV (ARC2401)	L	T	S	P	C
Version 1.1	Date of Approval:	1	1	4	2	8
Pre-requisites/Exposure	Architectural Design – III					
Co-requisites	Building Materials & Construction Technology, Architectural Graphic Skills-IV					

Catalog Description

The aim of this course is to make students familiar with the characteristics of site and the importance of site planning which includes built form and open space and context. This course will introduce methods of site analysis and research, new generative drawing techniques as well as architectural and disciplinary conventions associated with site work. The course is important as it will familiarize the students with architecture, landscape architecture, planning, structural and electrical engineering and the related issues that contribute to the built environment for our society. The projects would connect horizontal circulation reflecting their creative approach drawn from data analysis and climatic consideration to the physical setting.

Design Exercise: Informal Market area, Haat, Showrooms, Museums, Library, etc.

Course Objectives

The objectives of this course are:

- To developsensitivity towards existing informal settings and elements of built space.
- To critique the materials, construction techniques and structural system used in the elements of built forms**.**
- To create an understanding of the inter relationships amongst various elements of architecture – form, function, aesthetics, space planning, user perception and behavior and culture.
- To enable the presentation of concepts through sketches and models and drawings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Collect data from standards, case studies for the current project.

CO2: Analyze data collected with relevance to the current project.

CO3: Integrate learning from other allied subjects to the design proposal.

CO4: Complete the architectural project with all given requirements for the given project.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to the Design Problem Introduction to the design problem. Case studies. Collecting relevant data for the given design problem. Synthesising and analysing the collected data.	L4.L5,L6	20

MODULE 2:Site study and Area Programming Site visit and Site analysis. Driving area requirements for the design exercise.	L4.L5,L6	20
MODULE 3: Design Development Relation to various functional aspects of the design problem. Use of bubble diagram, flow diagrams, zoning of site, etc. conceptual design. Finalization of design proposals – schematic 2D/3D single line/conceptual level site plan, floor plan, elevations, sections.	L4.L5,L6	28
MODULE 4: Final design Proposals Final developed to the scale drawings of Site Plan, Floor Plans, Elevations, Sections, Views. Detailed site plan with built and un-built spaces and landscaping features. Model of the proposed design	L4.L5,L6	28

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References:

- Béjar, R., Latre, M. Á., Nogueras-Iso, J., Muro-Medrano, P. R., & Zarazaga-Soria, F. J. (2009). An architectural style for spatial data infrastructures. *International Journal of Geographical Information Science*, *23*(3), 271–294. https://doi.org/10.1080/13658810801905282
- Chiara, J. D., & Callender, J. (1983). Time-Saver Standards for Building Types. *McGRaw-Hill International Edition*.
- Givoni, B. (2004). Time Saver Standards for Urban Design: Urban Design and Climate. *Digital Engineering Library @ McGraw-Hill*, 1–14.
- Head, A. J. (2017). Planning and Designing Academic Library Learning Spaces: Expert Perspectives of Architects, Librarians, and Library Consultants. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2885471
- Julius, P., & Zelnik, M. (1979). Human Dimension & Interior Space. *Vasa*. Retrieved from http://medcontent.metapress.com/index/A65RM03P4874243N.pdf
- Wolfenden, A., & Chusid, M. (1991). Time-Saver Standards for Building Types: 3rd Edition. *Journal of Testing and Evaluation*, *19*(4), 347. https://doi.org/10.1520/jte12583j

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	8	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	2	3	--	--	3	--	--	-	1	2	--	--
CO2	1	1	1	1	2	3	--	--	3	--	--	-	1	2	--	--
CO3	1	1	1	1	1	2	-	-	2	-	-	-	1	2	-	-
CO4	1	1	1	1	2	3	-	-	2	-	-	-	1	2	-	-

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING MATERIALS & CONSTRUCTION TECHNOLOGY – IV (ARC2402)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	2	5
Pre-requisites/Exposure	Building Materials & Construction Technology – III					
Co-requisites	ArchitecturalServices					

Catalog Description

The aim of this course is to develop understanding with RCC elements like column, beam etc. The knowledge about RCC is also enhanced through comprehension of RCC framed structures and reinforcement details in building elements like columns, beams, slab and lintels. The course gives complete knowledge about the various types of Cladding, false ceiling and surface finishes. Market survey and site visit studies shall be an essential part of the teaching – learning strategy.

Course Objectives

The objective of this course is

- To make students aware of joining details of columns, beams and slabs.
- To develop the ability to analyze the building construction methods and their applications.
- To equip students about the methods of designing various structural members using reinforced cement concrete.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply basic information about construction procedures and reinforcement detailing about RCC elements like Columns, Beams and Slabs.

CO2: Apply various materials and fixing details of surface cladding

CO3: Explain joinery and fixing details of false ceiling.

CO4: Describe uses of different surface finished in interior and exterior surfaces.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to RCC elements like Columns, Beams and Slabs Reinforcement detailing of RCC building elements like columns, beams and slabs through sketches and site visits.	L1, L2	15
MODULE 2: Cladding and Panelling • Details of cladding of wall with stone, tiles, timber and steel framing • Construction of cavity wall with different thermal and acoustical system • Various types of panelling (glazed, wooden etc.), details for panelling	L1, L2, L3	20
MODULE 3: False Ceiling Advantages and disadvantages of False Ceiling, Detail understanding of Reflected Ceiling Plan, joinery and fixing details.	L1, L3,L4	10
MODULE 4: Finishing Materials SURFACE FINISHES: Paints and surface finishes; Composition, properties and methods of application of different types of paints: Oil, synthetic enamels, acrylic and other plastic emulsions and formulations, interior and exterior grade paints. Natural and synthetic clear varnishes, French polish. Cement based paints • FLOOR FINISHES: PCC, terrazzo, stone slabs, brick and terracotta tiles, Synthetic materials (PVC, Timber). Floors of industrial buildings & warehouses. Ceramic wall & floor tiles. • PLASTIC: Classification of plastic, moulding and fabrication, properties of plastic, use of plastic, PVC. Fiber glass. • MISCELLANEOUS MATERIALS: Cork, rubber, Gypsum, sealants, heat and sound insulation materials. • GLASS AND GLASS PRODUCTS: Plain, sheet, plate, textured, laminated, wired and shock resistant glass. Glass blocks, glass tiles, mirrors, heat reflecting glasses and Glass wool.	L1, L3,L4	15

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Barry, R. (1999). *The Construction of Buildings Vol. 2.* 5th Ed. New Delhi: East-West Press.
- Chudley, R. (2008). *Building Construction Handbook*. 7th Ed. London: Butterworth-Heinemann.
- McKay, W. B. (2005). *Building Construction Metric Vol. I–IV*. 4th Ed. Mumbai: Orient Longman.
- Rangwala, S. C. (1963). *Building Construction: Materials and types of Construction*. 3rd Ed. New York: John Wiley and Sons

References

- Clayton, C. R. (1987). Materials science and engineering: An introduction. *Materials Science and Engineering*, *94*, 266–267. https://doi.org/10.1016/0025-5416(87)90343-0.
- Fernandes, F. M., Lourenço, P. B., & Castro, F. (2010). Ancient Clay Bricks: Manufacture and Properties. In *Materials, Technologies and Practice in Historic Heritage Structures* (pp. 29–48). Springer Netherlands. https://doi.org/10.1007/978-90-481-2684-2_3
- Freidin, K., & Erell, E. (1995). Bricks made of coal fly-ash and slag, cured in the open air. *Cement and Concrete Composites*, *17*(4), 289–300. https://doi.org/10.1016/0958-9465(95)00017-7
- Saikia, N., & De Brito, J. (2012, September). Use of plastic waste as aggregate in cement mortar and concrete preparation: A review. *Construction and Building Materials*. https://doi.org/10.1016/j.conbuildmat.2012.02.066

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	5	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO2	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO3	1	1	2	--	1	--	--	-	-	-	--	2	2	1	-	--
CO4																

1: strongly related, 2: moderately related and 3: weakly related

	STRUCTURE - IV (ARC2409)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure –III					
Co-requisites	Structure – V					

Catalog Description

The aim of this course is to enable students to understand various principles of strength of materials especially in case of beams, columns and trusses. The course covers deflection of beams, forces in members of truss, condition of equilibrium and displacement methods.

Course Objectives

The objective of this course is

- To understand rational basis of the design of reinforced concrete members and structures through advanced materials and structural behavior.
- To enable students to undertake problems, identify, formulate and solve the critical thought, rational inquiry and self-directed learning.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the building materials used in construction such as cement, fine and coarse aggregate, reinforcement, etc.

CO2: Design a slab for given building floor for different end support conditions.

CO3: Design a column for given axial load and moments.

CO4: Develop understanding about complex foundations and the construction techniques involved.

Modules	Blooms level*	Number of hours
MODULE 1: Material and Design Method Cement, Fine and Coarse Aggregate, Water, Admixtures, Reinforcements, Properties and Tests For Concrete, WSM Vs LSM, Soil Mechanics, Basis Of Soil Properties, Soil Type, Bearing Capacity, Terzaghi's And Skempton's Formula.	L1, L2	09
MODULE 2: Beams and Slabs Using LSM and WSM Singly Beam, Doubly Beams, T, L Beams, Slabs – Rectangle, Circular, One Way, Two Way, Flat. Using IS 456:2000 And SP -16, Continuous Beams and Slabs.	L1, L2	09
MODULE 3: Column and Footing Short column and long column, minimum eccentricity, column subjected to combined axial load, uniaxial bending and biaxial bending, design of footing.	L1, L2	09
MODULE 4: Pile and Raft Foundation Design Of RCC Piles, Pile Caps, Raft Foundation (Theory)	L1, L2	09

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. https://doi.org/10.1201/b18121-13
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

References

- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. https://doi.org/10.1016/s00160032(41)90378-
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. https://doi.org/10.1063/1.58258

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO2	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO3	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO4	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	COMPUTER APPLICATION-I (ARC2413)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design –IV					

Catalog Description

The aim of this course is to understand the available software technologies and their applications in Architectural Designs. In order to enable students to use computer systems, software's and hardware, teaching necessary digital skills are important aspect of the course. This course will help learners to prepare presentation drawings, generating 2D and rendered views in a short time. This would finally help them in Design studio to develop conceptual as well as final Plan.

Course Objectives

The objective of this course is

- To introduce the students with the Photo editing software.
- To develop theoretical understanding of AutoCAD and its relevance in Architecture.
- To practice various commands of the Autocad.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop understanding of minimum system requirements and computer aided drafting

CO2: Comprehend Photoshop and its parameter as tools and its application in architecture

CO3: Comprehend computer aided drafting and its parameter as tools and its application in architecture

CO4: Evaluate CAD techniques for quicker methods and presentation skills

Modules	Blooms level*	Number of hours
MODULE 1:Introduction to Use of Photo Editing Software Introduction to Photo editing, montaging as well as preparation of 2-D presentations.	L1, L2	2
MODULE 2:Workshop on Photo Editing Software Practice on Photo editing as well as preparation of 2-D presentations onPhotoshop**.**	L1, L2	6
MODULE 3: Introduction to Auto Cad (2-D) Software Introduce to the drafting software for the graphic design, building planning. Explain the various ways to deal with the graphic drawings. Introduce to 2D-3D drawing concepts. Students learn the ability to Drafting, Editing and modification work to be done in the graphic presentation. Practice on the various AutoCAD commands through software User Interface. Conduct 2D Skills Workshop to train the students. Introduce to the draft skills and minimize errors in the presentation skills.	L1, L2,L3	8
MODULE 4:Workshop on 2D drafting Practice on the various Auto Cad commands through software User Interface. Conduct 2D Skills Workshop to train the students. Introduce to the Modelling skills and minimize errors in the presentation skills.	L4, L5, L6	20

**Bloom's Level:* *L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Texts

- George Omura, Brian C. Benton. (2018). Mastering AutoCAD 2019 and AutoCAD LT 2019. Syvex.

References

- Byrnes, D. (2010). *AutoCAD 2011 for Dummies. Wiley Publishing, Inc* (pp. 1–512).
- Finkel, R. (2005). Operating systems. In *Computers, Software Engineering, and Digital Devices* (pp. 18-1-18–18). CRC Press. https://doi.org/10.5117/mab.47.21471
- Lampson, B. W. (1983). Hints for computer system design. In *Proceedings of the 9th ACM Symposium on Operating Systems Principles, SOSP 1983* (pp. 33–48). Association for Computing Machinery, Inc. https://doi.org/10.1145/800217.806614
- Subscribe to various Microsoft online free services, https://www.microsoft.com/en-in

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	3	--	1	--	--	--	--	--	--	-	1	2	-	--
CO2	1	--	1	--	1	--	--	--	--	--	--	-	1	2	-	--
CO3	2	--	1	--	1	--	--	--	3	2	--	-	1	2	-	--
CO4	2	--	1	2	1	--	--	--	3	2	--	-	1	2	-	--

1: strongly related, 2: moderately related and 3: weakly related

	VISUAL ARTS – IV (ARC2414)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Visual Arts – III					
Co-requisites	Architectural Design - IV					

Catalog Description

The aim of this course is to provide practical learning in creative thinking. The course intends to build student interest in think creative and express freedom of expression in Art, Paintings, and model making. The design and creative thinking course helps analyse complex shapes, design and application of colour.

Course Objectives

The objective of this course is

- To Create 2d, 3D Graphical forms in form of sculptures, murals, etc.
- To study the principles and understand the importance of audio visuals and photography in presenting architectural drawings.

Course Outcomes

On completion of this course, the students will be able to

CO1: Create 2d, 3D Graphic forms, size, and their proportions

CO2: Create sculptural art forms with different mediums

CO3: Apply photography techniques for better presentations

CO4: Understand the importance of ergonomics in designing

Modules	Blooms level*	Number of hours
MODULE 1: 3D Compositions Basic components of 3-dimensional art, including subject, form, and content. Discussions centered on 3-dimensional design and concepts	L1, L2, L3	9
MODULE 2: Sculpture Different types of Sculpture, their masters and philosophy. Live scale murals and their uses in building with examples.	L1, L2, L3	9
MODULE 3: Photography and Audio-Visual Presentation Importance of photography, angles, views in field of art and architecture. Techniques to combine photography and audio into audio-visual presentations using softwares or in form of animated magazine.	L1, L2, L3, L4	9
MODULE 4: Ergonomics and Furniture Design Golden mean ratio, Principles of ergonomics and its importance in history of architecture. Studying furniture design through examples from Schools of Architecture. Exercises incorporating both terminologies.	L1, L2, L3, L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Photography and audio-visual book; available on http://www.easdvalencia.com/download/international/incoming/educational_offer/Photography_and_audiovisual.pdf

Reference Books

- Of visual and audiovisual aids in the foreign language; by Englewood. Cliffs, N. J.: Prentice Hall, 1966. Fenton, D. X.. Better Photography for Amateurs. 3rd ed. New York;
- Ching, F. (1975). *Architectural Drafting*. In *Architectural Graphics* (pp. 15–19). Elsevier. https://doi.org/10.1016/b978-0-85139-066-6.50005-5
- Guptill, a L., & Meyer, S. E. (1997). *Rendering in Pen and Ink*. *Proceedings of the 23rd annual conference on Computer graphics and interactive techniques SIGGRAPH 96* (Vol. 30, pp. 469–476). Retrieved from http://portal.acm.org/citation.cfm?doid=237170.237287
- Pencil Points reader: a journal for the drafting room, 1920-1943. (2004). *Choice Reviews Online*, *42*(02), 42-0757-42–0757. https://doi.org/10.5860/choice.42-0757
- The American Institute of Architects. (2010). Architectural Graphic Standards for Residential Construction, 2nd Edition. *American Institute of Architects*, 1–720.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	75	5	100	0	0	0	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO2	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO3	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--
CO4	2	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	HISTORY OF ARCHITECTURE - IV (ARC2415)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	History of Architecture - III					
Co-requisites	Visual Arts – IV					

Catalog Description

The aim of this course is to make students familiar with the characteristics of the history of World and the built environment from pre-history to the present; this course explores buildings and cities in their cultural, social, political, and religious contexts. This course will introduce the development of World architecture styles from the early Christian era to the Gothic era. The understanding of space development and structural quality based design approach would enable students to design smaller basic structures / houses with applicable structural principles and construction techniques in mind.

Course Objectives

- To introduce architectural elements, forms, development trends, characteristics of construction techniques and technologies, buildings, civilization transformation over the time period.
- To familiarize the students with the socio–economic, historical, political influences of time period in Architectural development and identify the buildings and the major works of the period.
- To understand architecture as evolving within specific cultural contexts including aspects of politics, society, religion and climate
- To familiarize the students with the development of architectural form with reference to technology, style and character in Byzantine Architecture, Romanesque Architecture, Gothic Architecture, Renaissance and Baroque Architecture.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify and analyze the construction of domes and pendentives in Byzantine Architecture.

CO2: Identify and analyze the various Gothic churches and their important architectural features.

CO3: Identify prominent historic building of Renaissance period.

CO4: Identify and analyze Baroque architecture and their important architectural features**.**

Modules	Blooms level*	Number of hours
MODULE 1: Byzantine Architecture Contribution of Byzantine architecture in the development of structural system – dome construction over square plan, Adoption of Greek cross in church layout, Use of mosaic and mural in interior. Salient buildings – Santa Sophia, Istanbul; St. Mark's Cathedral, Venice.	L1, L2	6
MODULE 2: Gothic Architecture Introduction to society and culture of 1150 – 1350 AD in Europe. Development of Gothic church and its new elements: Pointed Arch window, Different arch types – lancet, equilateral, depressed, Trefoil arch, Cluster column and intersecting vault roof, Clerestory window and triforium, Flying buttress, Glazed window, stone and metal trellis, flamboyant window, rose window, Entrance of church. Salient buildings: Cathedrals of St. Dennis, Cathedrals of Chartres, ,Cathedrals of Notre Dame (Paris), Cathedrals of Reims.	L1, L2	6
MODULE 3:Basic Introduction to Renaissance Architecture and its Classical Revivalism, Neo-Classicism Introduction to society and culture of 1400 -1800 AD, Division of Renaissance architecture into Early, Mature and Late periods. Contribution in structural system, e.g., ribbed dome, lantern dome. Revival of classical orders an principles – Neo-Classicism	L1, L2	6
MODULE 4: Baroque Architecture Dynamism and systemization of Baroque architecture vitality and spatial richness with underlying systematic organization. Space as constituent element of architecture, as a complex totality and indivisible figure, comprising of interacting spatial elements based on inner and outer forces. Sensitivity to effects of texture, color, light and water. Study of important urban spaces and churches in Italy and Germany	L1, L2	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Sir Banister Fletcher, A History of Architecture, University of London, The AntholonePress, 1996.

- Spiro Kostof - A History of Architecture - Setting and Rituals, Oxford UniversityPress, London, 1985.
- Leland M Roth; Understanding Architecture: Its elements, history and meaning; Craftsman House; 1994
- Pier Luigi Nervi, General Editor - History of World Architecture - Series, Harry N.Abrams,Inc.Pub., New York, 1972

Reference Books

- S.Lloyd and H.W.Muller, History of World Architecture - Series, Faber and Faber Ltd.,London, 1986.
- Gosta,E.Samdstrp, Man the Builder, Mc.Graw Hill Book Company, New York, 1970.
- Webb and Schaeffer; Western Civilisation Volume I; VNR: NY: 1962
- Vincent Scully: Architecture; Architecture – The Natural and the Man Made: Harper Collins Pub: 1991.
- Christian Norberg-Schulz, Meaning in Western Architecture, Praegur, 1975
- Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, Ltd. 2007

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING SERVICES – II (ARC2416)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Building Materials And Construction Technology –III, Architectural Services- I					
Co-requisites	Architectural Design – IV					

Catalog Description

The aim of this course is to give an overview and introduction of Noise Control, Acoustics, Gas installation and fire-fighting systems. In today's architectural environment, good acoustical design isn't a luxury – it's a necessity. This course deals with the science behind sound and its application to achieve desired acoustical performance in a specific building by using different building materials, systems and technologies.

Course Objectives

The objective of this course is

- To introduce to the theory and practices of Acoustics and Noise reduction.
- To introduce various building elements and their application in the built environment.
- To get familiarized with Gas installation techniques and requirements
- To understand the importance of Fire safety in a building.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the theory of acoustics and its implementations in buildings like Auditorium, Lecture halls, etc.

CO2: Describe the different types of noise, their transmission and the measure to isolate and control them.

CO3: Design Gas installation system at residential and non-residential buildings.

CO4: Describe the installation of Fire safety measures in a building.

Modules	Blooms level*	Number of hours
MODULE 1: Building Acoustics Terminology and unit. Characteristics of audible sound – Propagation, Velocity, Frequency, Pitch, Quality/timbre, Loudness and Intensity. Behavior of audible sound in enclosures – Reflection, Absorption, Diffraction and Transmission of sound. Common acoustical defects and recommended remedies– Echo, Sound foci, Dead spots, Sound shadows, Resonance, Insufficient loudness, External noise and Reverberation. Sabine's expression for calculation of Reverberation time. Absorbents and absorption coefficient. Acoustical requirements as per NBC	L1, L2	6
MODULE 2: Noise Control Noise and its types, Noise pollution. Sources of indoor noise, Indoor noise levels, Planning and design against indoor noise. Sources of outdoor noise, Traffic noise levels, Planning and design against outdoor (traffic & buildings in built-up area) noise. Identification of various sources of noise and recommendations to control them in various types of buildings e.g. – Residential, Educational, Hospital, Office, Hotels & Hostels, Industrial, Laboratories & Test houses, Miscellaneous buildings etc.	L1, L2	6
MODULE 3: Gas Installation L.P.G / Bio-gas installations, their location and layouts in residential and non-residential buildings	L4, L5, L6	6
MODULE 4: Fire Safety System Causes and spread of fire. Fire triangle/ tetrahedron. Classes of fire. Combustibility of materials and fire resistance. Building Plans, Drawings, and Schematics. Fire Detection Equipment- Heat &Smoke sensors. Fire Alarm Systems. Firefighting pump and water storage, Hose and hose fittings, Dry and wet risers, Automatic sprinklers. Fire Extinguishers - Portable fire extinguisher and other firefighting equipments. Means of escape, Fire escape, Fire doors and Water curtain. Passive means of fire fighting and building design criteria as per NBC.	L4, L5, L6	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- John E. Traister (1995), Security/Fire Alarm Systems: Design, Installation, and Maintenance.
- An Introduction to Acoustics. (1952). Physics Today, 5(11), 24. https://doi.org/10.1063/1.3067395
- Bruneau, M. (2010). Fundamentals of Acoustics. Fundamentals of Acoustics. Wiley-ISTE. https://doi.org/10.1002/9780470612439

- Springer handbook of acoustics. (2008). Choice Reviews Online, 45(05), 45-2674-45–2674. https://doi.org/10.5860/choice.45-2674
- S. Kandaswamy (2005), Architectural Acoustics and Noise Control, Allied publishers Pvt. Ltd.,
- National Building Code of India

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	1	--	--	--	--	--	--	--	--	--	2	1	--	--
CO2	--	--	1	--	--	--	--	--	--	--	--	--	2	1	--	--
CO3	2	--	1	--	--	--	--	--	--	--	--	--	2	1	--	--
CO4	--	--	1	--	--	--	--	--	--	--	--	-	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Fifth Semester

	ARCHITECTURAL DESIGN – V (ARC2501)	L	T	S	P	C
Version 1.1	Date of Approval:	1	1	4	2	8
Pre-requisites/Exposure	Architectural Design – IV					
Co-requisites	Architectural Graphic Skills - V					

Catalog Description

The aim of this subject is to emphasize be on creative and rational skills for problem solving in architectural buildings on real site. Design-problem may focus on form follows function and horizontal and vertical zoning. The first step of the design phase is the schematic design. The schematic design is where the student will gathers information on the needs, style, and wants for the project and from there they will create design options. Then second phase will be Design Development In the design development, the students will take the schematic designs and develop them to an approved design concept. Design focuses to create a space that flows with its surroundings. Also it merges with the aesthetic and function of the structure.

Design Exercises: Sports Complex, Exhibition hall, Interpretation Centre, Showrooms, Cultural Centre, etc.

Course Objectives

The objective of this course is to

- To explore the design of buildings addressing the socio – cultural & economic needs of contemporary society.
- To enable the students to understand the importance of spatial planning within the constraints of Development Regulations in force for urban areas.
- To enable the students to design for large groups of people in a socially and culturally sensitive manner, taking into account aspects such as user perception, crowd behavior, large scale movement of people and identity of buildings.
- To emphasis on the importance of understanding the relationship between open space and built form, built form to build form and site planning principles involving landscaping circulation network and parking.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design a Project involving multiple space utilization like Sports Complex, Exhibition hall, Interpretation Centre, Showrooms, Cultural Centre, etc.

CO2: Build with precision block models, study models, site models

CO3: Demonstrates architectural and composite structural system and services.

CO4: Communicate through drawings or models.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Design problem may be introduced, Site visit, Site analysis, Designing the design programme.	L4, L5, L6	15
MODULE 2: Development of Concept Collecting and analysing data of various spaces, Area programming, Flow diagram, Single line graphics and study models.	L4, L5, L6	15
MODULE 3: Design Development Integrate the knowledge gained from previous theory based subjects like Building services, Building materials and Construction Technology, Structure, etc., and apply to detail out their design proposal.	L4, L5, L6	30
MODULE 4: Final Design Proposal	L4, L5,	36

The final design proposal is prepared after conducting various informal and formal reviews at individual and at group level. The drawing and detail physical model explaining the approach and consideration of urban setting to achieve the requirements with various other restrictions may be submittals.	L6	

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/ References:

- Frampton, Kenneth. (1980). *Modern Architecture: A Critical History*. London: Thames and Hudson.
- Francis D.K. Ching (1979),*Architecture: Form, Space and Order*,John Wiley& Sons Publication
- Hays, K. Michael, ed. (1998). *Architecture Theory Since 1968*. Cambridge: MIT.
- N D Bhatt,(2014).*Engineering Drawing,(Plane and solid geometry)*,Delhi, Charotar Publishing house.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	8	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	2	--	--	--	--	--	--	-	1	2	--	--
CO2	1	1	1	1	2	--	--	--	--	--	--	-	1	2	--	--
CO3	1	2	1	2	2	-	-	-	-	-	-	-	1	2	-	3
CO4	2	1	2	2	2	-	-	-	-	-	-	-	2	1	-	2

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY – V (ARC2502)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	2	5
Pre-requisites/Exposure	Building Materials And Construction Technology – IV					
Co-requisites	Architectural Services – III					

Catalog Description

The aim of this course is to continue with metal as the main building material. The study is concerned with special doors and windows to steel doors, windows and partitions. The knowledge about RCC is also enhanced through comprehension of RCC framed structures and reinforcement details in building elements like columns, beams, slab and lintels. Students are familiarized with the types of metal shutters and partitions, doors and windows, their application and construction details in steel and aluminium sections. The subject should be integrated with ongoing subjects like Architectural Design and Building services.

Course Objectives

The objective of this course is to

- To familiarize the students with various types of metal doors.
- To develop understanding about framed structure in terms of reinforcement and construction details.
- To familiarize students with doors and windows in steel and aluminum sections. Also integration of openings with partitions in steel and aluminum used in interior of buildings

Course Outcomes

On completion of this course, the students will be able to

CO1: Define various types of door and windows used in different situations from day to day life.

CO2: Comprehend the details of metal doors.

CO3: Comprehend the details/ arrangements of reinforcement.

CO4: **E**valuate the best suitable material and type of Door, Window and Partitions.

Modules	Blooms level*	Number of hours
MODULE 1: Special Doors and Shutters Different types of doors; sliding, sliding and folding, revolving doors, collapsible shutters, rolling shutters, types of rolling shutters in conventional and contemporary materials. The installation, working and mechanism of such doors and shutter	L1, L2, L3	10
MODULE 2: Metal Doors Doors in steel, aluminum along with technical terminology involved. Types and varieties of available sections in steel and aluminum in market and their application in providing doors. Design considerations and construction details in congruence to IS codes and manuals provided by CPWD and other organizations.	L1, L2, L3	10
MODULE 3: RCC Details of Framed Structures Reinforcement and design details of Footings, Columns, beams, slab and lintels. Buttresses and Retaining Walls: Details of construction of Buttresses and retaining walls.	L1, L2, L3, L4	20
MODULE 4: Metal Windows and Partitions Windows and Partitions in steel, aluminum along with technical terminology involved. Types and varieties of available sections in steel and aluminum in market and their application in providing windows and partitions. Design considerations and construction details in congruence to IS codes and manuals provided by CPWD and other organizations.	L1, L2,L3	20

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- da Silva, L. S., Simões, R., & Gervásio, H. (2014). Design of Steel Structures. Design of Steel Structures (pp. 1–438). wiley. https://doi.org/10.1002/9783433604229
- Khurmi, R. S. (1991), Strength of Materials. New Delhi: S.Chand Publishers
- MacGinley, T. J. (2018). Structural steel design. In Steel Structures (pp. 32–54). CRC Press. https://doi.org/10.1201/9781315274966-3
- Punmia, B.C. (2005). Building Construction, New Delhi: Laxmi Publishers
- Rangawala, (2017). Building Construction, Gujrat:Charotar publishe

Reference Books

- Lane, J., & Lane, J. (2018). Windows and doors. In Aluminium in Building (pp. 89–102). Routledge. https://doi.org/10.4324/9780429463372-10

- Pappu, A., Saxena, M., & Asolekar, S. R. (2007). Solid wastes generation in India and their recycling potential in building materials. Building and Environment, 42(6), 2311– 2320. https://doi.org/10.1016/j.buildenv.2006.04.015
- Venkatarama Reddy, B. V. (2004, October 10). Sustainable building technologies. Current Science.
- Yang, L., & Shi, J. J. (2010). Experimental study on the impact of rainfall on RCC construction. Journal of Construction Engineering and Management, 136(5), 477–483. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000156

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	5	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	--	--	2	--	--	--	--	--	--	--	3	1	--	--
CO2	3	-	--	--	1	--	--	--	--	--	--	--	2	1	--	--
CO3	3	-	--	--	2	--	--	--	--	--	--	--	2	1	--	--
CO4	2	-	--	--	1	--	--	--	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	STRUCTURE - V (ARC2509)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – IV					
Co-requisites	Building Materials & Construction Technology – V					

Catalog Description

The aim of this course is to enable students to design steel structures and also an overview of alternative building materials. The course covers knowledge of materials such as cement, aggregate, grades of concrete, steel structures. The course would enable students to design simple RCC structures and their basic components, viz, columns, beams, slabs and staircases. This course covers staircase design, retaining wall, portal frames, masonry structures, pre-stressed and post stressed concrete.

Course Objectives

The objective of this course is

- To understand the analysis of in-determinant structures and their use in field in greater depth.
- To design different types of staircase with various materials.
- To make students aware of column footing.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design a dogleg staircase for given stair well space in residential or public building.

CO2: Explain the alternatives of long span structures.

CO3: Apply composite materials for masonry works.

CO4: Summarize the conceptual idea behind the development of pre-stressed structural component for general use.

Modules	Blooms level*	Number of hours
MODULE 1: Design of Staircase and Retaining Wall General Features, Types of Staircase, Distribution of Loading on Stairs, Wall Proportions, Design Principles, Counterfort Retaining Walls.	L1, L2	09
MODULE 2: Portal Frames Design of Portal Frames with Hinged Base, Design of Portal Frames with Fixed Base, Structural Analysis and Design of Grid Floor, Slab Culvert Rectangular – Beam Deck.	L1, L2	09
MODULE 3:Masonry Structures Introduction, Masonry Walls, Design of Wall and Column Footing	L1, L2	09
MODULE 4: Design principles and high-rise structures Elements of Pre-Stressed and post tensioning Concrete, Principles and System, Loss, Analysis and Design of Pre-Stress and post tensioned Beam.	L1, L2	09

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. https://doi.org/10.1201/b18121-13
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.
- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. https://doi.org/10.1016/s00160032(41)90378-
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. https://doi.org/10.1063/1.58258

References

- Roeder, C. W., & MacRae, F. A. (1997). Steel structures. Advances in Earthquake Engineering (Vol. 3, pp. 533–561). Computational Mechanics Publ. https://doi.org/10.1201/9781420037135.ch1
- Solanki, H., & Gogate, A. (1998). Flanged deep beams. In Reinforced Concrete Deep Beams. Spon Press. https://doi.org/10.4324/9780203034880.ch5
- Venkatarama Reddy, B. V. (2004, October 10). Sustainable building technologies. Current Science

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	--	--	1	--	--	--	--	--	--	--	--	2	1	--	--
CO2	2	--	--	2	--	--	--	--	--	--	--	--	--	1	--	--
CO3	--	3	--	1	--	--	--	--	--	--	--	--	--	1	--	--
CO4	2	--	--	2	--	--	--	--	--	--	--	--	3	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	COMPUTER APPLICATIONS- II (ARC2513)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Computer Applications - I					
Co-requisites	Landscape Design					

Catalog Description

The aim of this subject is to introduce techniques for further refinement of computer generated graphics covered in the previous semester. In addition to that, this course also trains students for developing photorealistic modeling using popular software in the field of architecture. Advanced technologies and concepts using computers as an essential tool are also introduced such as Building Information Modeling. This course equips students with soft skills which increase their productivity and expression in design related subjects.

Course Objectives

The objective of this course is

1. To introduce and make students learn about graphic presentation tools
2. To introduce Sketch up as 3D drafting software.
3. To introduce Revit as 3D drafting software and its allied rendering plugins.

Course Outcomes

On completion of this course, the students will be able to

CO1: Prepare building design through sketch up software..
CO2: Prepare building design through revit software.
CO3: Render the drawings in various rendering plugins.
CO4: Train others in various types of softwares such as revit, sketch up.

Modules	Blooms level*	Number of hours
MODULE 1:Introduction to SketchUp (3-D) Software Introduce to the Sketch up 3D software for the graphic design, building planning. Explain the various ways to deal with the graphic drawings. Introduce to 3D drawing concepts. Students learn the ability to Model, Editing and modification work to be done in the graphic presentation.	L1, L2	12
MODULE 2:Introduction to Revit (3-D) Software Introduce to the Revit 3D software for the graphic design, building planning. Explain the various ways to deal with the graphic drawings. Students learn the ability to Building Information Modeling.	L4, L5, L6	8
MODULE 3:Introduction to Rendering Plugins Introduce to the Lumion and Twilight Render software for the Rendering.	L1, L2	4
MODULE 4:Workshop Practice on the various Revit and Sketch Up commands through software User Interface. Conduct 3D Skills Workshop to train the students. Introduce to the Modelling skills and minimize errors in the presentation skills.	L4, L5, L6	12

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text &Reference Books

- Brewster, R. (2014). Paint.NET - Free Software for Digital Photo Editing. *Http://Www.Getpaint.Net/Index.Html (Accessed June 2015)*.
- Khan, E., Reinhard, E., Fleming, R., & Bülthoff, H. (2005). Image-based material editing. In *ACM SIGGRAPH 2005 Sketches, SIGGRAPH 2005* (p. 148). Association for Computing Machinery, Inc. https://doi.org/10.1145/1187112.1187291
- Kholgade, N., Simon, T., Efros, A., & Sheikh, Y. (2014). 3D object manipulation in a single photograph using stock 3D models. In *ACM Transactions on Graphics* (Vol. 33). Association for Computing Machinery. https://doi.org/10.1145/2601097.2601209.
- Kirk, D. S., Sellen, A. J., Rother, C., & Wood, K. R. (2006). Understanding photowork. In *Conference on Human Factors in Computing Systems - Proceedings* (Vol. 2, pp. 761–770). https://doi.org/10.1145/1124772.1124885

Modes of Evaluation: Assignment/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									

10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	3	--	--	2	--	--	--	-	-	--	-	3	1	-	--
CO2	--	2	--	--	1	--	--	-	-	-	--	-	2	1	-	--
CO3	--	2	--	--	1	--	--	-	-	-	--	-	2	1	-	--
CO4	--	3	--	--	1	--	--	--	-	-	--	-	2	1	-	--

1: strongly related, 2: moderately related and 3: weakly related

	THEORY OF ARCHITECTURE – I (ARC2517)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	History of Architecture					
Co-requisites	Architectural Design – V					

Catalog Description

The aim of the course is to provide the fundamental concepts of design, elements of design & theory of design with their application in design projects. Also this course will introduce the works of great master's like- Frank Lloyd Wright, Le-Corbusier, Louis Sullivan etc. with the reference of National and International case studies.

Course Objectives

The objective of this course is

1. To have knowledge of Roman, Romanesque, Baroque, Colonial style of architecture.
2. To understand, different architectural theories given by practicing architects.
3. To understand the elements of architecture
4. To introduce the work of Indian Architects like- Charles Chorrea, B.V. Doshi, Raj Rewal

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic architectural features of public buildings in Britain and France.

CO2: Knowledge about different theories like- Five points of Architecture by Le-Corbusier

CO3: Differentiate building materials and construction technology adopted in high rise structures.

CO4: Students will be able to discuss the work of B.V. Doshi & Raj Rewal

Modules	Blooms level*	Number of hours
MODULE 1: Historical study Purity of form with structural honesty obtained in different periods – Roman, Romanesque, baroque, Colonial Architecture etc. leading to modern Architecture. Study of important palaces and public buildings in Britain and France.	L1, L2	6

MODULE 2: Architectural Theory Discuss the evolution and development in design process from past to present. Discuss the principles and Elements of design followed in buildings in past and how the trend changed over the period as per demand. Compare the buildings of past with the present and study the technological, form, shape, design, planning and construction material etc. from earlier days to present day	L1, L2,	6
MODULE 3: Modern Architecture Belief in creation of "new" and "ideal" world through the fundamentals of true and original. Origin of geometry, nature, simplicity, abstraction, non-objective, construction and technology available at that times. Equating technology and progress with present functionalism and appropriateness. Works of great masters – Frank Lloyd Wright, Le-Cobusier, Alvar Alto, Mies Vender, Louis Kahn, Louis Sullivan, Edwin Lutyen etc.	L1, L2,L4	6
MODULE 4: Great Masters of the period Works of the great masters of the period in India i.e.- Charles Chorrea, B.V. Doshi, Raj Rewal, Achyut Knvinde, Hafeez Contractor etc.	L1, L3, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text/Reference Books

- A.B. Gallion (1986), *Ubrban Pattern: City Planning and Design*, Van Nostrand Reinhold; Subsequent
- Sir Bannister Fletcher. (1896), *The History of Architecture*, Oxford, Boston, Architectural Press
- Van De Ven, F. H. M., Nelen, A. J. M., & Geldof, G. D. (1992). *Urban drainage. In Drainage Design* (pp. 118–150). Springer US.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1	-	1	--	--	1	2	1	--	--	-	3	-	-	1	2
CO2	1	-	1	--	--	1	2	1	-	--	-	3	-	-	1	2

CO3	1	-	1	--	--	1	2	1	-	--	-	3	-	-	1	2
CO4	1	-	1	-	-	-	-	-	-	-	-	3	-	-	-	2

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING SERVICES – III (ARC2518)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Building Materials And Construction Technology –IV, Architectural Services- II					
Co-requisites	Architectural Design – V					

Catalog Description

The aim of this course is to introduce the basic concepts of Electrical system design at the building planning level. Building services engineers are responsible for the design, installation, and operation and monitoring of the mechanical, electrical and public health systems required for the safe, comfortable and environmentally operation of modern buildings. The course module can help students to understand the basic concepts of electrical and mechanical circulation systems to make the building comfortable, functional, efficient and safe for use.

Course Objectives

The objective of this course is

- To familiarize the student with theoretical and practical aspects of Electrical Systems and Components of Home Electrical Design.
- To develop perception regarding the various norms and standards for Electrical Systems and Lighting.
- To increase knowledge capacity of the students in the, HVAC system and Ventilation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss the active and passive components of Electrical system and various principles.

CO2: Develop understanding for Electrical and illumination system for Small building.

CO3: Discuss the active and passive components of HVAC and their underlying principles.

CO4: Discuss the importance of ventilation systems in buildings.

Modules	Blooms level*	Number of hours
MODULE 1: Electrical System Terminology and architectural symbols (as per NBC/NEC) for electric installations in buildings. Need to generate and save electricity, transmission and distribution of electricity (single and three phases), procuring service connection. Familiarization to various lighting accessories, wires and cables, metering, distribution panels / boards etc. for single and three phase supply. Basic considerations. Various types of internal wiring systems e.g. cleat, casing and capping, batten and conduit (surface & concealed). Introduction to various types of protection devices e.g. switches, fuses and circuit breakers.	L1, L2, L3	6
MODULE 2: Lighting and Illumination Terminology and unit. Light and its characteristics – scattering, propagation, transmission, reflection, absorption, refraction and dispersion of light. Different types of source of lights: Thermal radiators - Incandescent, Halogen. Discharge lamps– Low pressure (fluorescent, compact fluorescent, sodium, cold cathode neon), High pressure (mercury, metal halide, sodium). New technologies - LED, Fiberoptics. Luminaries – Types of Luminaries – Indirect, Semi-indirect, General diffusing, Semi-direct and Direct. Types of illumination schemes e.g. Ambient, Task, Focal and Decorative etc. Design considerations for illumination Schemes. Methods for lighting calculation – Watts per square meter, Light flux and Point to point method.	L1, L2, L3	6
MODULE 3: HVAC Introduce to the basic concepts of Air Conditioning, function, scope and purpose. Share relevant Indian BIS and ASHRAE standards. Study relationship of Human Comfort, Dry/Wet/Dew Bulb Temperature, Climatology principles, Psychrometric Chart Analysis, and study HVAC design considerations in typical building case	L1, L2, L3	6
MODULE 4: Ventilation Introduction of the importance on ventilation in a building. Types and means of ventilation systems. Natural ventilation, Stack effect, Direct and Indirect ventilation, Placement of windows and openings.	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- National Electrical Code.
- Raina K.B. & Bhattacharya S.K., Electrical Design estimating and costing, New Age International (P) Limited, New Delhi,2004.
- Rudiger Ganslandt & Harald Hofmann, Handbook of Lighting Design, Druckhaus Maack, Lüdenscheid, 1992.

- Kevin Kelly& Kevin O'Connell, Interior Lighting Design - A Student's Guide
- IS SP 7-NBC : National Building Code of India 2016, Bureau of Indian Standards (2016)
- NBC-2005, National Building Code of India - 2005,Bureau of Indian Standards, New Delhi 2005

References

- Electrical power systems quality. (1996). Choice Reviews Online, 34(01), 34-0322-34– 0322. https://doi.org/10.5860/choice.34-0322
- Murty, P. S. R. (2017). Electrical power systems. Electrical Power Systems (pp. 1–814). Elsevier Inc. https://doi.org/10.1016/b978-0-08-100975-8.00006-0
- ASHRAE. (2011). ASHRAE Handbook - HVAC Applications. www.ansi.org American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (pp. 1–1104).
- Pérez-Lombard, L., Ortiz, J., Coronel, J. F., & Maestre, I. R. (2011, February). A review of HVAC systems requirements in building energy regulations. Energy and Buildings. https://doi.org/10.1016/j.enbuild.2010.10.025
- Vakiloroaya, V., Samali, B., Fakhar, A., & Pishghadam, K. (2014). A review of different strategies for HVAC energy saving. Energy Conversion and Management, 77, 738–754. https://doi.org/10.1016/j.enconman.2013.10.023
- Wang, S., & Ma, Z. (2008). Supervisory and optimal control of building HVAC systems: A review. HVAC and R Research, 14(1), 3–32. https://doi.org/10.1080/10789669.2008.10390991

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	2	--	--	--	3	--	--	--	--	--	--	1	--	2
CO2	2	--	1	--	--	--	3	--	--	--	--	--	--	1	--	2
CO3	2	--	1	--	--	--	2	--	--	--	--	--	--	1	--	2
CO4	2	--	1	--	--	--	2	--	--	--	--	-	--	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE - PEOPLE CULTURE AND BUILT ENVIRONMENT- I **(ARC2519)**	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	History of Architecture, Architectural Design – III					
Co-requisites	Theory of Architecture					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in psychological and sociological aspects which are of concern to Architecture. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding society and various built forms produced by society. The course will also provide the students hands-on cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross fertilization with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of psychology, sociology and culture of settlement.
- The course intends to study and understand the typical components of city in order to appreciate how these elements contribute to the quality of life of urban communities.
- To familiarize students with decisive strategies that brings inclusivity and equality in the designs of built forms.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and his larger social environment, with special emphasis on aspects that are likely to affect intervention in or creation of, the built environment (predominantly urban)

CO2: Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Psychology, Sociology and Built Environment Basic introduction to various critical social aspects; Role of psychology in architecture; Role of sociology in built environment; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Inclusive Built Environment; Barrier free designs and built environments; Various case studies related to gender and architecture, community development- community response towards development strategy etc.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Cragun R.T.(2006). Introduction to Sociology, Wikibooks.
- Giddens, A (2006) Sociology, Polity Press, Cambridge (UK)
- Lynch, K. (1960) The Image of the City, Joint Centre Publication, USA
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development, Herpercollins
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books

- Tejchman A. (2016) “The Politics of Inclusive Development”, Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE- ECOLOGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT – I (ARC2520)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Environmental Sciences, Building Services-1, Building Services-2					
Co-requisites	Architectural Design, Building Services-3					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in ecology, environment and sustainable aspects which are of concern to Architecture. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding ecology and various environmental problems faced by settlements. The course will also provide the students hands-on ecological and environmental studies of built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of ecology, environment and sustainable development.
- The course intends to study and understand the different components of city in order to understand how these elements contribute to environment quality.
- To establish the significance of the ecological issues, their impact and initiatives to address the same in the built environs to achieve sustainable development.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and ecology, will understand critical environmental issues and need to address the m by using advanced technology.

CO2: Produce reports and presentation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Ecology, Environment and Sustainable Development Basic introduction to ecology; Interrelation between natural and built environment; Importance of environment sustainability in built environment; Energy conservation, renewable sources: wind, solar, geo-thermal, bio-fuels; Materials minimizing, recycling, reducing energy content, etc; Other environmental issues related to solid waste management, water resources, air quality, storm water drainage etc; Various case studies related to traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Bakari, Mohamed El-Kamel (2017). The Dilemma of Sustainability in the Age of Globalization: A Quest for a Paradigm of Development. New York: Lexington Books. ISBN 978-1498551397
- Blewitt, J. (2008). Understanding Sustainable Development. London: Earthscan. pp. 21–24. ISBN 978-1-84407-454-9.
- Fulekar, M. H., Pathak, B., Kale, R. K. (2014) Environment and Sustainable Development' Springer Nature; ISBN-10: 8132211650; ISBN-13: 978-8132211655
- Goudie, Andrew (2000). The Human Impact on the Natural Environment. Cambridge, Massachusetts: This MIT Press. pp. 203–239. ISBN 0-262-57138-2.
- James, Paul (2014). Urban Sustainability in Theory and Practice. doi:10.4324/9781315765747. ISBN 978-1-315-76574-7.
- James, Paul*; Magee, Liam (2016).* "Domains of Sustainability". *In A. Farazmand (ed.). Global Encyclopedia of Public Administration, Public Policy, and Governance. Springer.*
- Modak, P. (2017)Environmental Management Towards Sustainability, CRC Press, ISBN-10: 9781498796248

- *Odum, E. P. (1971).* Fundamentals of Ecology *(Third ed.). New York: Saunders*. ISBN 0-7216-6941-7.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Thangavel, P., Sridevi, G. (2015) Environmental Sustainability, Springer Nature, ISBN-10: 9788132220558
- Walker, Brian and Salt, David (2006) Resilience Thinking: Sustaining ecosystems and people in a changing world. Island Press. p. xiii. ISBN 978-1597260930.
- Wandemberg, JC (August 2015). Sustainable by Design. Amazon. p. 122. ISBN 978-1516901784

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE - COMPUTER APPLICATIONS AND ADVANCE TECHNOLOGIES - I (ARC2521)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design, Building Materials and Construction Technology					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in computer applications and advance technologies which are of concern to Architecture. The course will generally be conducted in the tutorial mode to encourage exploration and skill developments. The aim of this course is to provide students the exposure to understanding new technological innovations and their applications in field of architecture. The course will also provide the students hands-on experience of new software and applications. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through data base creation, analysis, presentation. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To familiarize students with use of computers in architecture and with impact of Information Technology on architectural knowledge system and practice.
- To critically explore current advancements in smart technologies available for sustainable built environments.
- To sensitize students about strategies for innovations by using latest technologies.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend the latest software and computer applications available in the field of architecture.
CO2: Explain new advanced technologies available for architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to computer applications and advance technologies Basic introduction to information technology in architecture; Introduction to smart technologies in field of architecture; Applications of information technology in architecture; applications of smart technologies in architecture; Case studies related to use of information technology and advance technology in architecture and built environment. .	L1, L2	9
MODULE 2: Project Work Selection and understanding of project; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L3, L4, L5, L6	18

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Ching, F. D. (2009) Architectural Graphics, John Wiley and Sons
- D'Ulizia, A., Ferri, F., Grifoni, P., & Guzzo, T. (2010). Smart homes to support elderly people: innovative technologies and social impacts. In Pervasive and Smart Technologies for Healthcare: Ubiquitous Methodologies and Tools (pp. 25-38). IGI Global.
- Deakin, Mark; Al Waer, Husam (2011). "From Intelligent to Smart Cities". *Journal of Intelligent Buildings International: From Intelligent Cities to Smart Cities*. **3** (3): 140–152.
- Graham, S.; Marvin, S. (1996). *Telecommunications and the city: electronic spaces, urban place*. London: Routledge. ISBN 9780203430453.
- Kedar, Seema (2009). *Database Management System* Technical Publications. ISBN 9788184316049.
- Komninos, Nicos (22 August 2013). "What makes cities intelligent?". In Deakin, Mark (ed.). *Smart Cities: Governing, Modelling and Analysing the Transition*. Taylor and Francis. p. 77. ISBN 978-1135124144
- McLaren, Duncan; Agyeman, Julian (2015). *Sharing Cities: A Case for Truly Smart and Sustainable Cities* MIT Press. ISBN 9780262029728.
- Peris-Ortiz, Marta; Bennett, Dag R.; Yábar, Diana Pérez-Bustamante (2016). *Sustainable Smart Cities: Creating Spaces for Technological, Social and Business Development*. Springer. ISBN 9783319408958.

- Reynolds, George (2009), *Ethics in Information Technology*, Cengage Learning, ISBN 978-0-538-74622-9
- Silberschatz, Abraham (2010). *Database System Concepts* McGraw-Hill Higher Education. ISBN 978-0-07-741800-7
- Wagginton, M., Harris, J (2002) Intelligent Skins, Reed Elsevier, Oxford
- Wang, S. (2010) Intelligent Buildings and Building Automation, Spon Press, USA, ISBN10:0-415-47570-8

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Sixth Semester

	ARCHITECTURAL DESIGN – VI (ARC2601)	L	T	S	P	C
Version 1.1	Date of Approval:	1	1	4	2	8
Pre-requisites/Exposure	Architectural Design – V					
Co-requisites	Structure – VI					

Catalog Description

The aim of this course is to make students familiar with the characteristics of site and the importance of site planning which includes built form and open space and context.This course will introduce methods of site analysis and research, new generative drawing techniques as well as architectural and disciplinary conventions associated with site work.
Design-problem may focus but not limited to a multi-functional, service (advanced services) oriented building like convention hall, shopping complex, resort, habitat centre, office building, mixed use occupancy buildings etc. in an urban setting including application of urban development, controls, codes and bye-laws.

Design Exercise: Mixed-use Building
Course Objectives

The objective of this course is

- To create an awareness with regard to the design of green buildings and sustainable architecture.
- To inculcate the importance of services integration and construction in spatial planning in the context of design of High-rise buildings and service intensive buildings.
- To highlight on the importance of High rise buildings as elements of identity in urban areas and urban design principles that govern their design.
- To explore computer aided presentation techniques involving 2D and 3D drawings, walk through and models as required.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design a Project involving multiple space utilization like a multi-functional, service (advanced services) oriented building like convention hall, shopping complex, resort, habitat centre, office building, mixed use occupancy buildings etc**.**

CO2: Build with precision block models, study models, site models

CO3: Demonstrates architectural and composite structural system and services.

CO4: Communicate through drawings or models.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Design problem may be introduced, students may visit site for collecting context specific data for getting better understanding of real-life project details. The collected data may be analysed and presented for evaluation.	L4, L5, L6	30
MODULE 2: Development of Concept Flow diagram to explore relation of various spaces, bubble diagram for locating various zones on site, re-create for analysing spaces in all dimensions through block models and single line graphics and study models for choosing the right option.	L4, L5, L6	42
MODULE 3: Design Development Integrate the knowledge gained from previous theory based subjects like Building services, Building materials and Construction Technology, Structure, etc., and apply to detail out their design proposal.	L4, L5, L6	30
MODULE 4: Final Design Proposal The final design proposal is prepared after conducting various informal and formal reviews at individual and at group level. The drawing and detail physical model explaining the approach and consideration of urban setting to achieve the requirements with various other restrictions may be submittals.	L4, L5, L6	42

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Chiara, J. D., &Callender, J. (1983). *Time-Saver Standards for Building Types* Fourth Edition. McGRaw-Hill International Edition.
- Francis D.K. Ching (1979),*Architecture: Form, Space and Order,* John Wiley& Sons Publication.

- Givoni, B. (2004). T*ime Saver Standards for Urban Design: Urban Design and Climate*. Digital Engineering Library @ McGraw-Hill.
- USACE. (1997). *Human Behavior and the Interior Environment*. In Design Guide for Interiors.

References:

- Béjar, R., Latre, M. Á., Nogueras-Iso, J., Muro-Medrano, P. R., & Zarazaga-Soria, F. J. (2009). *An architectural style for spatial data infrastructures*. International Journal of Geographical Information Science, 23(3), 271–294. https://doi.org/10.1080/13658810801905282
- Head, A. J. (2017). *Planning and Designing Academic Library Learning Spaces: Expert Perspectives of Architects, Librarians, and Library Consultants*. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2885471.
- Wolfenden, A., & Chusid, M. (1991). *Time-Saver Standards for Building Types:* 3rd Edition. Journal of Testing and Evaluation, 19(4), 347. https://doi.org/10.1520/jte12583j

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	00	50	50	100	8	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	3	--	--	1	--	--	--	--	--	1	2	3	--
CO2	2	2	1	3	--	--	1	--	--	--	--	--	1	2	3	--
CO3	2	2	2	-	-	-	2	-	-	--	-	-	1	2	-	2
CO4	2	2	1	-	-	-	3	-	-	-	-	-	1	1	-	-

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY – VI (ARC2602)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	2	5
Pre-requisites/Exposure	Building Materials And Construction Technology –V					
Co-requisites	Architectural Services – III					

Catalog Description

The aim of this course is to familiarize students with steel structures for the construction of steel columns, beams, trusses etc. It also aims to make students aware of the construction fundamentals to construct steel framed structures and its applications. The studies proceed with sensitizing students about the construction details of the contemporary / modern methods of constructing factory sheds/ large span structures, etc with modern materials and technologies. This course also talks about alternative building materials used in construction of building. The course covers introduction of steel structures such as design of columns, beams and foundations.

Course Objectives

The objective of this course is

- To introduce different alternative building materials.
- To introduce the concepts of designing with steel structures and its components.
- To elucidate the role of steel ropes/strands in pre-stressing in concrete members.
- To enable students to understand and design components such as staircases with steel structural members.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain different building material others than the regular one.

CO2: Analyze the components of roof structure.

CO3: Explain the alternatives of long span structures in steel.

CO4: Compare the various types of steel roofing systems.

Modules	Blooms level*	Number of hours
MODULE 1: Alternative Building materials Different types alternative Building materials like Fly ash bricks, Concrete blocks, Mud construction, energy efficient materials, etc.	L1, L2, L3	15
MODULE 2: Steel Structures Construction of steel structures, Details of Roof and roof trusses , Water proofing and rain water disposal from roofs, Steel columns, portal frames, etc., North light truss, tubular monitor roof truss	L1, L2, L3	20
MODULE 3: Modern Factory Shed/ Large Span Construction Introduction to a wide range of modern building construction systems incorporating the use of metals like steel, aluminum and composite materials. Introduction to modern materials for roof covering, supporting structures.	L1, L2, L3, L4	10
MODULE 4: Multi Storied Steel Framed Structures Introduction to Multi- storied steel frame structures connections and their components, Steel Monitor Trusses, Space Frames	L1, L2,L3, L4	15

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Barry. R. (1996). Construction of Buildings, John Wiley and Sons Ltd
- Khanna P.N. (2001). Civil Engineering Handbook, Delhi: Engineers' Publishers
- Khurmi R. S. (2015). Strength of Materials (Mechanics of Solids),S.Chand Publications.
- Mackay J.K. Vol. 1-4 (2014). Building Construction, Delhi, Persons Publications
- Mitchell G.A.(1959)Elementary Building Construction, HarperCollins Distribution Services

Reference Books

- Venkatarama Reddy, B. V. (2004, October 10). Sustainable building technologies. Current Science.
- Yang, L., & Shi, J. J. (2010). Experimental study on the impact of rainfall on RCC construction. Journal of Construction Engineering and Management, 136(5), 477–483. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000156

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme							Total marks	Credits	Duration of Exam (hr)
Internal Assessment				External Assessment					
CT	TA	A	Total	ESE	ESJ	Total			

I	**II**									
10	10	25	5	50	0	50	50	100	5	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	-	--	2	1	--	--	1	--	--	--	--	2	1	--	3
CO2	--	-	--	2	1	--	--	2	--	--	--	--	2	1	--	3
CO3	--	-	--	1	2	--	--	2	--	--	--	--	2	1	--	--
CO4	--	-	--	2	1	--	--	3	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	STRUCTURE - VI (ARC2609)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – V					
Co-requisites	Building Materials & Construction Technology – VI					

Catalog Description

The aim of this course is to enable students to design simple RCC structures and their basic components viz, columns, beams, slabs and staircases. This course will help student to understand RCC structures and its application in consecutive design project. The course covers limit state state method and working stress method, partial safety factor, stress and strain relationship for concrete and steel, design of simply reinforced L&T beams, RCC columns and beams, foundation and footings.

Course Objectives

The objective of this course is

- To understand the analysis of intermediate structures and their use in field in greater depth.
- To design simple elevated water tanks
- To understand the application of RCC structure in consecutive design project.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe Three Moment theorem and their application in fixed and continuous beams.
CO2: Analyze the structural geometry based on strength and stability criteria.
CO3: Design the effective use of structural systems for complex architectural need.
CO4: Design the effective use of Truss structure for residential and commercial purpose.

Modules	Blooms level*	Number of hours
MODULE 1: Theory of Beams and Frames Continuous beams, curved beams, portal frames, multistory building frames.	L1, L2	09
MODULE 2: Elevated Water Tanks Introduction of Tanks, Conical or Funnel Shaped Tanks.	L1, L2	09
MODULE 3:Shells and Floors Shells, Hyperbolic, Parabolic, Folded Plates, Grid or Coffered Floors, Girders.	L1, L2	09
MODULE 4: Truss Design principles of Truss Roof, Truss for Residential use, Truss for commercial use, Truss for long span structure like Railway shed, hanger etc.	L1, L2	09

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. https://doi.org/10.1201/b18121-13
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

References

- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. https://doi.org/10.1016/s00160032(41)90378-
- Von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. https://doi.org/10.1063/1.58258

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									

10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO2	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO3	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--
CO4	2	--	--	1	--	--	--	1	--	--	--	2	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	SITE PLANNING AND LANDSCAPE (ARC2617)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Architectural Design - IV					
Co-requisites	Architectural Services - III					

Catalog Description

The aim of this course is to make the students understand the role of landscape architecture in the creation of better environments. This course shall have a direct application in the design studio of the same semester as well as in the Thesis. The course covers basic introduction to landscape architecture, landscape graphics, planting design. This course will help students to understand the concepts of landscape architecture and to study and analyze site in relation to landscape design and be able to design and detail various architectural and planning landscape projects.

Course Objectives

The objective of this course is

- To understand various types of Landscape and the role of natural and manmade landscape for Land Development;
- To provide different methods for site planning at regional and micro level;
- To understand landscape design as an allied field of architecture and planning;
- To understand process of landscape design for small and large areas.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role and scope of Landscape architect.
CO2: Identify the development processes and cycles in the urban landscapes.
CO3: Conduct a landscape analysis and evaluate it with required functions.
CO4: Develop a site plan with landscape design and relate with environment and ecology.

Modules	Blooms level*	Number of hours
MODULE 1: Elements and History of Landscape Study of Landscape elements such as land, vegetation, water, earth & climate, Natural & manmade elements, etc. Principles of landscape design such as unity, simplicity, variety, balance, proportion, sequence, etc. Social and economic	L1, L2, L3	9

factors. Psychological considerations of spaces and enclosures. History of Landscape Architecture including natural & cultural factors of the place, development of landscape architecture through history in different parts of the world such as China, Japan, Europe, Italy, France, England, Persia, Egypt, Greece, Rome. Study of landscape architecture in Medieval period in India such as Mughal. Modern & Contemporary Landscape architecture. Cultural aspects of the landscape architecture with contextual understanding.		
MODULE 2: Hardscapes, Softscapes and Urban Landscape Hardscapes - pergolas, garden furniture, fences, rocks, masonry, paving & surfacing, roads & parking lots, walks & plazas; Softscapes such as plantation, turfing, water features. Design criteria for landscape design such as visual, functional, micro-climatic, ecological and aesthetic. Basic horticultural idea about plants, plant selection, planting design and care of plants; Urban Landscape - Characteristics and components of open space patterns in towns and cities (traditional and contemporary) basic types: streets, squares, plazas, gardens, ghats and maidans, public parks at district, local and neighbourhood levels; park systems; landscape design related to land-use, circulation networks and activity; street furniture as a component of urban landscape.	L1, L2, L3	9
MODULE 3: Landscape Design and Services Macro and micro-climatic considerations in landscape architecture. Effect of climate on landscape and various components of landscape on the microclimate. Landscape Services & Sustainability: Introduction; Outdoors lighting, surface water drainage, irrigation, soil management techniques.	L1, L2, L3	9
MODULE 4: Landscape Aspects of Site Planning Principles of understanding and evaluating and existing landscape; development as a response to constraints and opportunities offered by the site; the landscape concept and open space structure as a basic component of the site plan; The role of vegetation: environmental benefits, functional requirements, aesthetic considerations; typical situations and criteria for design with plants and selection of species; grading; in relation to existing contours, plinth levels, road alignment and storm water drainage; principles of cut and fill.	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Marsh, M. William, (2010). *Landscape Planning Environmental Applications*;
- Booth, Norman K., *Basic Elements of Landscape Architectural Design*;
- J.O. Symonds, *Landscape Architecture*;
- J.O. Symonds, *Architecture-A manual of site planning and design*;
- John l. Motloch, *Introduction to Landscape Design*;
- J. E. Ingels, *Landscaping – Principles and Practice*;
- Walker and Theodre, *Planting Design*

Reference Books

- J.O. Symonds, Earthscape; *Theory in Landscape Architecture: A Reader* (Penn Studies in Landscape Architecture);
- Landscape as Urbanism: A General Theory by Charles Waldheim;
- Cliff Tandy, Handbook of Urban Landscape; M. Bring, Japanese Gardens: Design & Meaning
- Conan, M., & Conan, M. (2000). *Environmentalism in landscape architecture*. *Library* (Vol. 22). Retrieved from http://books.google.com/books?hl=en&lr=&id=wr385lQxrbsC&oi=fnd&pg=PA1&dq=Environmentalism+in+landscape+architecture&ots=hMCOKluPkW&sig=iFCLKXFB_aH6CX6q1w26O1Aj4PU
- Laurie, M. (1986). An introduction to landscape architecture. Second edition. *An Introduction to Landscape Architecture. Second Edition.*
- Vernon, S. (2013). *Landscape Architect's Pocket Book*. *Landscape Architect's Pocket Book*. Routledge. https://doi.org/10.4324/9780203568705
- Starke, B. (2016). *Landscape Architecture: A Manual of Environmental Planning and Design*. *McGraw Hill* (Vol. 86, pp. v–vi). McGraw-Hill Education. https://doi.org/10.1080/02681307.2016.1252112
- Clayden, A., & Osmundson, T. (2001). Roof Gardens: History Design and Construction. *Garden History*, *29*(2), 226. https://doi.org/10.2307/1587387
- Thacker, C., & Keswick, M. (1979). The Chinese Garden: History, Art and Architecture. *Garden History*, *7*(1), 20. https://doi.org/10.2307/1586713
- Smith, L. S., & Fellowes, M. D. E. (2013, July 1). Towards a lawn without grass: The journey of the imperfect lawn and its analogues. *Studies in the History of Gardens and Designed Landscapes*. https://doi.org/10.1080/14601176.2013.799314
- Mannion, A. M. (1999). Modern trends in ecology and environment, R.S. Ambasht (1998) - Book review. *Journal of Ecology*, *87*(1), 176.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	--	--	1	--	--	--	--	--	2	--	1	2	--	--
CO2	2	2	--	--	1	--	--	--	--	--	2	--	1	2	--	--
CO3	2	2	--	--	1	--	--	--	--	--	2	--	1	3	--	--
CO4	2	2	--	--	1	--	--	--	--	--	2	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	THEORY OF ARCHITECTURE – II (ARC2618)	L	T	S	P	C
Version 1.1	Date of approval:	2	0	0	0	2
Pre-requisites/Exposure	Theory of Architecture - II					
Co-requisites	Architectural Design - VI					

Catalog Description

The aim of the course will be on understanding the main theoretical concepts in vernacular architecture. Key theoretical paradigms, methodologies and modes of enquiries will be introduced.Ability to comprehend some of the main theoretical moorings of 20th and 21st century in architecture, analyze built works and critically examine the ideas and view of practice they represent as a precursor to shaping one's own design approach.

Course Objectives

The objective of this course is

- To acquaint students with knowledge of Vernacular Architecture.
- To understand the development of Architecture with time.
- To introduce the different theories prevalent related to Architectural Design.
- To equip the students with their own Design Philosophy.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain basic architectural features of Vernacular Architecture.

CO2: Apply the knowledge of demand and supply in profession as per need.

CO3: Apply the architecture theories in Architecture Design.

CO4: Develop their own Design Philosophy

Modules	Blooms level*	Number of hours
MODULE 1: Vernacular Architecture Vernacular architecture including primitive or aboriginal architecture; indigenous architecture; ancestral or traditional architecture; folk, popular, or rural architecture;	L1, L2	6

MODULE 2: Architecture Growth Understanding the Need, demand and supply in different periods by various great designers.	L1, L2	6
MODULE 3: Architecture Theories Theory and criticism, theories in relation to practice, writing and theory as design tools in professional practice.	L1, L2,L4	6
MODULE 4: Architecture Philosophy Theory as a basis of the student's personal philosophy as an architect	L1, L3, L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text/Reference Books

- A.B. Gallion (1986), *Ubrban Pattern: City Planning and Design*, Van Nostrand Reinhold; Subsequent
- Sir Bannister Fletcher. (1896), *The History of Architecture*, Oxford, Boston, Architectural Press
- Van De Ven, F. H. M., Nelen, A. J. M., & Geldof, G. D. (1992). *Urban drainage. In Drainage Design* (pp. 118–150). Springer US.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	--	--	1	2	1	--	--	-	3	-	-	1	2
CO2	1	-	1	--	--	1	2	1	-	--	-	3	-	-	1	2
CO3	1	-	1	--	--	1	2	1	-	--	-	3	-	-	1	2
CO4	1		1									3				2

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING SERVICES – IV (ARC2619)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Building Materials And Construction Technology –IV, Architectural Services- II					
Co-requisites	Architectural Design – V					

Catalog Description

The aim of this course is to give architect an overview and introduction to escalators, lifts, mechanized parking. This course also covers about security surveillance systems of building using cameras. The course covers Elevators, lift, escalators, mechanized parking system, Mechanical ventilation system and security surveillance model.

Course Objectives

The objective of this course is

- To discuss the working of escalators and lifts including location and criteria for their design.
- To develop an understanding of the advanced building services and their application in the design proposals of buildings of slight complex nature such as multistoried.
- To understand the principles and techniques related to mechanized parking and mechanized ventilation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend the various modes of vertical circulation through live examples

CO2: Develop understanding for techniques and systems for Security and surveillance.

CO3: Apply principles of mechanized parking

CO4: Discuss the importance of ventilation systems in buildings.

Modules	Blooms level*	Number of hours
MODULE 1: Lifts and Escalators Basic Principles of Elevators working, definitions, NBC's recommendations, location and service, Method of working, various shapes and sizes available,	L1, L2, L3, L4	8

sketches – plans, sections, elevations of different types of lifts including construction and installation details. Basic Principles of Escalator working, definitions, NBC's recommendations, location and service, Method of working, various shapes and sizes available, sketches – plans, sections, elevations of different types of escalators including construction and installation details.		
MODULE 2: Security and Surveillance Perimeter Protection - Barriers, Doors, Gates, Turnstiles and Fences. Intrusion Detection Sensors and Systems - Outdoor & Indoor. Introduction to Access Control Systems, Locks & Emergency Exits. Visitor Management Systems. Identification Systems – PIN, Card, Wireless systems and Biometric system. Security Lighting, Illumination including Infra-red. Understanding CCTV cameras - Pan, Tilt &Zoom mechanisms. Recording Systems – Digital and Analog Recording. Components of Basic systems.	L1, L2, L3, L4	8
MODULE 3: Mechanical Parking Basic Principles of Mechanized Parking system working, definitions, NBC's recommendations, location and service, Method of working, various shapes and sizes available, sketches of different types of parking	L1, L2, L3, L4	4
MODULE 4: Mechanical Ventilation Standard requirements of ventilation for different conditions of living and works. Conditions for comfort. Control of quality, quantity, temperature and humidity of air.	L1, L2, L3, L4	4

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- The CIBSE (2000) Building Control Systems, Applications Guide (CIBSE Guide)
- Hession, A. (2001, September). Escalators. Elevator World.
- Humberg, H., Friedrich Mader, H., & Will, F. (1992). Remote diagnosis as used for mechanized parking systems. Technische Mitteilungen Krupp English Ed., (2), 85–96.
- Kinsey, M. J., Galea, E. R., & Lawrence, P. J. (2012). Human Factors Associated with the Selection of Lifts/Elevators or Stairs in Emergency and Normal Usage Conditions. Fire Technology, 48(1), 3–26. https://doi.org/10.1007/s10694-010-0176-7
- Understanding Building Automation Systems (Direct Digital Control, Energy Management, Life Safety, Security, Access Control, Lighting, Building Management Programs) by Reinhold A. Carlson, Robert A. Di Giandomenico.
- Building Automation: Control Devices and Applications by In Partnership with NJATC (2008).
- Building Control Systems, Applications Guide (CIBSE Guide) by The CIBSE (2000).

References

- Anon. (1981). Safety Code for Elevators and Escalators. American National Standards Institute, Standards.

- Bangash, M. Y. H. (2007). Lifts, Elevators, Escalators and Moving Walkways/Travelators. Lifts, Elevators, Escalators and Moving Walkways/Travelators. CRC Press. https://doi.org/10.1201/9780203020760

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	2	--	--	--	--	--	--	--	--	--	2-	1	--	--
CO2	2	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	2	--	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	2	--	1	--	--	--	-	--	--	--	--	-	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	SEMINAR (ARC2638)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Architectural Design - V					
Co-requisites	Building Material and Construction Technology-VI					

Catalog Description

The aim of this course is to prepare students for writing a paper based on secondary research and literature review and its oral and visual presentation. Students would be able to identify and go in depth into specific and appropriate aspects relating to the discipline of architecture and discuss how it is reflected in the realm of design. Students learn how to research a subject area through readings; learn description, analysis and synthesis of readings; citation of authors in their writing. The importance of the course is also in understanding what constitutes plagiarism research writing and in imbibing the ethics of publication. Literature review is seen as the first step in preparation of understanding research methods.

Course Objectives

The objective of this course is

- To introduce research work to the students
- To identify a specific aspect relating to the discipline of architecture.
- To make them aware of the constitutes of plagiarism.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify research papers published in Journals for a study.
CO2: Apply the projected drawing method of exterior and interior perspective.
CO3: Organize a study based on literature survey
CO4: Apply research methods in case study and Develop ethics of publication

Modules	Blooms level*	Number of hours
MODULE 1: Foundations of Research Meaning, Objectives, Motivation, Utility of research. – Understanding the language of research – Concept, Construct, Definition, Variable. Research	L1, L2, L3	6

Process		
MODULE 2: Problem Identification and Formulation Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance.	L1, L2, L3	6
MODULE 3: Surveys and Sampling Types of surveys in details for various types of research; Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non-Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample – Practical considerations in sampling and sample size.	L1, L3, L4	6
MODULE 4: Analysis, Interpretation of Data and Paper Writing Univariate analysis (frequency tables, bar charts, pie charts, percentages); Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish. Ethical issues related to publishing, Plagiarism and Self-Plagiarism.	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Kothari, C.R. (1985). *Research Methodology*, Delhi: New Delhi International Publishers

Reference Books

- Sagar ,Linkan (2019). 3D Max 2019 *Training Guide*, New Delhi: BPB Publication
- Sagar ,Linkan, (2019). Revit 2019 *Architecture Training Guide*. New Delhi: BPB Publication.
- Lorraine Farrelly Nicola Crowson. (2014). *Representational Techniques for Architecture (Basics Architecture).* (2nd Revised edition). Bloombury.
- M.C. Trivedi. (2009). *Computer Graphics & Animation*. (First edition). Jaico Publishing House.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								**Total Marks**	**Credits**	**Duration of Exam (hr)**
Internal Assessment					**External Assessment**					
CT		**TA**	**A**	**Total**	**ESE**	**ESJ**	**Total**			
I	**II**									

10	10	75	5	100	0	0	0	100	2	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	1	3	2	--	--	--	--	--	--	--	--	1	3	--	3
CO2	--	2	2	3	--	--	--	--	--	--	--	--	1	2	--	2
CO3	--	2	1	3	--	--	--	--	--	--	--	--	1	2	--	2
CO4	--	3	2	2	--	--	--	--	--	--	--	--	2	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE- PEOPLE CULTURE AND BUILT ENVIRONMENT- II (ARC2620)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	History of Architecture, Architectural Design – III					
Co-requisites	Theory of Architecture					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in psychological and sociological aspects which are of concern to Architecture. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding society and various built forms produced by society. The course will also provide the students hands-on cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross fertilization with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of psychology, sociology and culture of settlement.
- The course intends to study and understand the typical components of city in order to appreciate how these elements contribute to the quality of life of urban communities.
- To familiarize students with decisive strategies that brings inclusivity and equality in the designs of built forms.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and his larger social environment, with special emphasis on aspects that are likely to affect intervention in or creation of, the built environment (predominantly urban)

CO2: Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Psychology, Sociology and Built Environment Basic introduction to various critical social aspects; Role of psychology in architecture; Role of sociology in built environment; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Inclusive Built Environment; Barrier free designs and built environments; Various case studies related to gender and architecture, community development- community response towards development strategy etc.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Cragun R.T.(2006). Introduction to Sociology, Wikibooks.
- Giddens, A (2006) Sociology, Polity Press, Cambridge (UK)
- Lynch, K. (1960) The Image of the City, Joint Centre Publication, USA
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development, Herpercollins
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books
- Tejchman A. (2016) "The Politics of Inclusive Development", Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE- ECOLOGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT – II (ARC2621)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Environmental Sciences, Building Services-1, Building Services-2					
Co-requisites	Architectural Design, Building Services-3					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in ecology, environment and sustainable aspects which are of concern to Architecture. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding ecology and various environmental problems faced by settlements. The course will also provide the students hands-on ecological and environmental studies of built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of ecology, environment and sustainable development.
- The course intends to study and understand the different components of city in order to understand how these elements contribute to environment quality.
- To establish the significance of the ecological issues, their impact and initiatives to address the same in the built environs to achieve sustainable development.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and ecology, will

understand critical environmental issues and need to address the m by using advanced technology.

CO2: Produce reports and presentation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Ecology, Environment and Sustainable Development Basic introduction to ecology; Interrelation between natural and built environment; Importance of environment sustainability in built environment; Energy conservation, renewable sources: wind, solar, geo-thermal, bio-fuels; Materials minimizing, recycling, reducing energy content, etc; Other environmental issues related to solid waste management, water resources, air quality, storm water drainage etc; Various case studies related to traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Bakari, Mohamed El-Kamel (2017). The Dilemma of Sustainability in the Age of Globalization: A Quest for a Paradigm of Development. New York: Lexington Books. ISBN 978-1498551397
- Blewitt, J. (2008). Understanding Sustainable Development. London: Earthscan. pp. 21–24. ISBN 978-1-84407-454-9.
- Fulekar, M. H., Pathak, B., Kale, R. K. (2014) Environment and Sustainable Development' Springer Nature; ISBN-10: 8132211650; ISBN-13: 978-8132211655
- Goudie, Andrew (2000). The Human Impact on the Natural Environment. Cambridge, Massachusetts: This MIT Press. pp. 203–239. ISBN 0-262-57138-2.

- James, Paul (2014). Urban Sustainability in Theory and Practice. doi:10.4324/9781315765747. ISBN 978-1-315-76574-7.
- James, Paul*; Magee, Liam (2016).* "Domains of Sustainability". *In A. Farazmand (ed.). Global Encyclopedia of Public Administration, Public Policy, and Governance. Springer.*
- Modak, P. (2017)Environmental Management Towards Sustainability, CRC Press, ISBN-10: 9781498796248
- *Odum, E. P. (1971).* Fundamentals of Ecology *(Third ed.). New York: Saunders.* ISBN 0-7216-6941-7.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Thangavel, P., Sridevi, G. (2015) Environmental Sustainability, Springer Nature, ISBN-10: 9788132220558
- Walker, Brian and Salt, David (2006) Resilience Thinking: Sustaining ecosystems and people in a changing world. Island Press. p. xiii. ISBN 978-1597260930.
- Wandemberg, JC (August 2015). Sustainable by Design. Amazon. p. 122. ISBN 978-1516901784

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE - COMPUTER APPLICATIONS AND ADVANCE TECHNOLOGIES – II (ARC2622)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design, Building Materials and Construction Technology					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in computer applications and advance technologies which are of concern to Architecture. The course will generally be conducted in the tutorial mode to encourage exploration and skill developments. The aim of this course is to provide students the exposure to understanding new technological innovations and their applications in field of architecture. The course will also provide the students hands-on experience of new software and applications. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through data base creation, analysis, presentation. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To familiarize students with use of computers in architecture and with impact of Information Technology on architectural knowledge system and practice.
- To critically explore current advancements in smart technologies available for sustainable built environments.
- To sensitize students about strategies for innovations by using latest technologies.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Students will be exposed to the latest software and computer applications available in the field of architecture.

CO2: Students will be aware of new advanced technologies available for architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to computer applications and advance technologies Basic introduction to information technology in architecture; Introduction to smart technologies in field of architecture; Applications of information technology in architecture; applications of smart technologies in architecture; Case studies related to use of information technology and advance technology in architecture and built environment. .	L1, L2	9
MODULE 2: Project Work Selection and understanding of project; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L3, L4, L5, L6	18

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Ching, F. D. (2009) Architectural Graphics, John Wiley and Sons
- D'Ulizia, A., Ferri, F., Grifoni, P., & Guzzo, T. (2010). Smart homes to support elderly people: innovative technologies and social impacts. In Pervasive and Smart Technologies for Healthcare: Ubiquitous Methodologies and Tools (pp. 25-38). IGI Global.
- Deakin, Mark; Al Waer, Husam (2011). "From Intelligent to Smart Cities". *Journal of Intelligent Buildings International: From Intelligent Cities to Smart Cities*. **3** (3): 140–152.
- Graham, S.; Marvin, S. (1996). *Telecommunications and the city: electronic spaces, urban place*. London: Routledge. ISBN 9780203430453.
- Kedar, Seema (2009). *Database Management System* Technical Publications. ISBN 9788184316049.
- Komninos, Nicos (22 August 2013). "What makes cities intelligent?". In Deakin, Mark (ed.). *Smart Cities: Governing, Modelling and Analysing the Transition*. Taylor and Francis. p. 77. ISBN 978-1135124144
- McLaren, Duncan; Agyeman, Julian (2015). *Sharing Cities: A Case for Truly Smart and Sustainable Cities* MIT Press. ISBN 9780262029728.
- Peris-Ortiz, Marta; Bennett, Dag R.; Yábar, Diana Pérez-Bustamante (2016). *Sustainable Smart Cities: Creating Spaces for Technological, Social and Business Development*. Springer. ISBN 9783319408958.

- Reynolds, George (2009), *Ethics in Information Technology*, Cengage Learning, ISBN 978-0-538-74622-9
- Silberschatz, Abraham (2010). *Database System Concepts* McGraw-Hill Higher Education. ISBN 978-0-07-741800-7
- Wagginton, M., Harris, J (2002) Intelligent Skins, Reed Elsevier, Oxford
- Wang, S. (2010) Intelligent Buildings and Building Automation, Spon Press, USA, ISBN10:0-415-47570-8

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Seventh Semester

	ARCHITECTURAL DESIGN - VII (ARC2701)	L	T	S	P	C
Version 1.1	Date of Approval:	1	1	4	2	8
Pre-requisites/Exposure	Building Materials & Construction Technology – VII					
Co-requisites	Advanced Building Services					

Catalog Description

The aim of the course it to emphasize on creative and rational skills for problem solving in architectural buildings on real site. Design-problem may focus on multifunctional, multi storied structure and services with application at site and building level like multi star hotels, multi specialist hospitals, high rise mall etc. in an urban setting including application of urban development controls, codes and bye-laws. The design proposal will be taken up with byelaws, master plan or any other restriction on large site.

Design Exercise: Housing

Course Objectives:

The objective of this course is

- To create an awareness with regard to the design of green buildings and sustainable architecture.
- Integration of structures into design development.
- To inculcate the Complex services integration and construction.
- To integration of technology to make the building intelligent and secured.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Design a Project involving multiple space utilization like 5 Star Hotel, Multi-specialty hospital.

CO2: Build with precision block models, study models, site models

CO3: Demonstrates architectural and composite structural system and services.

CO4: Communicate through drawings or models.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Design problem may be introduced, students may visit site for collecting context specific data for getting better understanding of real-life project details. The collected data may be analysed and presented for evaluation.	L4, L5, L6	30
MODULE 2: Development of Concept Flow diagram to explore relation of various spaces, bubble diagram for locating various zones on site, re-create for analysing spaces in all dimensions through block models and single line graphics and study models for choosing the right option.	L4, L5, L6	42
MODULE 3: Design Development Integrate the knowledge gained from previous theory based subjects like Building services, Building materials and Construction Technology, Structure, etc., and apply to detail out their design proposal.	L4, L5, L6	30
MODULE 4: Final Design Proposal The final design proposal is prepared after conducting various informal and formal reviews at individual and at group level. The drawing and detail physical model explaining the approach and consideration of urban setting to achieve the requirements with various other restrictions may be submittals.	L4, L5, L6	42

***Bloom's Level:** *L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation*

References:

- Filippín, C., & Larsen, S. F. (2009). Energy efficiency in buildings. In *Energy Efficiency Research* (pp. 153–166). Nova Science Publishers, Inc.
- Fischer, J. R., & Finnell, J. A. (2007). Energy and buildings. *Resource: Engineering and Technology for Sustainable World*, *14*(3), 8–9

- Grenier, D., Kaae, B. C., Miller, M. L., & Mobley, R. W. (1993). Ecotourism, landscape architecture and urban planning. *Landscape and Urban Planning*, *25*(1–2), 1–16. https://doi.org/10.1016/0169-2046(93)90119-X
- Hamula, W., Hamula, D. W., & Dwyer, F. (1997). Site planning. *Journal of Clinical Orthodontics : JCO*, *31*(1), 47–53.
- Huseynov, E. F. O. (2011). Planning of sustainable cities in view of green architecture. In *Procedia Engineering* (Vol. 21, pp. 534–542). Elsevier Ltd. https://doi.org/10.1016/j.proeng.2011.11.2048
- Leyzerova, A., Sharovarova, E., & Alekhin, V. (2016). Sustainable Strategies of Urban Planning. In *Procedia Engineering* (Vol. 150, pp. 2055–2061). Elsevier Ltd. https://doi.org/10.1016/j.proeng.2016.07.299
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- Manzano-Agugliaro, F., Montoya, F. G., Sabio-Ortega, A., & García-Cruz, A. (2015, May 22). Review of bioclimatic architecture strategies for achieving thermal comfort. *Renewable and Sustainable Energy Reviews*. Elsevier Ltd. https://doi.org/10.1016/j.rser.2015.04.095
- Pacheco, R., Ordóñez, J., & Martínez, G. (2012, August). Energy efficient design of building: A review. *Renewable and Sustainable Energy Reviews*. https://doi.org/10.1016/j.rser.2012.03.045
- Williams, D. E. (2007). Sustainable design: Ecology, architecture, and planning. *A Wiley Book on Sustainable Design.* Retrieved from http://www.loc.gov/catdir/toc/ecip077/2006102173.html

Modes of Evaluation: Case Study/ Site Visit/ Portfolio Submission:

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	8	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	2	3	-	-	-	-	-	-	-	-	1	2	-	-

CO2																
CO3																
CO4																

1: strongly related, 2: moderately related and 3: weakly related

	BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY – VII (ARC2702)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	2	5
Pre-requisites/Exposure	Building Materials And Construction Technology –VI					
Co-requisites	Architectural Services – III, Architectural Design – VII					

Catalog Description

The aim of this course is to make students aware of the requirement of drawings at the site for the execution of the construction work. The Design of a building prepared needs to be executed and constructed on the site. The building drawings so prepared become part of the contract documents with proper labeling and dimensioning, specifications, detailing. The drawings shall be based on building design prepared as design studio assignment in the previous semester. The learning of building material and construction will be implemented for preparing various drawings through the semester.

Course Objectives

The objective of this course is

- To train the students to prepare detailed Working drawings for effective execution at construction site
- To integrate all services and structure system in the working drawing project.
- To understand the value of detailing for various types of drawings and methods of transmittals and record keeping.

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate the preparation of execution drawings in the process of realization of a designed building.

CO2: Select the appropriate construction details as per the various services.

CO3: Interpret and translate drawings based on the structural and other practical considerations.

CO4: Integrate all the drawings prepare for the execution purpose.

Modules	Blooms level*	Number of hours
MODULE 1: Architectural working drawing Making complete set of submission drawing for the residence or any other project complying all the local building byw-laws and NBC. Making complete set of working drawings for the residence or any other project designed by the student. The drawings to incorporate all necessary information complete with schedule and all specifications. The Working Drawings to include: 1. Site plan. 2. Foundation layout with details of foundations and DPC. 3. Ground floor Plan. 4. First Floor Plan. 5. Terrace Plan 6. Sections 7. Elevations	L3, L4, L5, L6	15
MODULE 2: Services drawing Making complete set of services drawings for the above said project. The drawings to incorporate services details complete with schedule and all specifications. The Services Drawings to include: 1. Electrical Layout. 2. Plumbing Layout. 3. Sanitary Layout. 4. Drainage Layout. 5. Rain Water Disposal / Harvesting Layout and Details. 6. Toilet details. 7. Kitchen / Pantry Details.	L3, L4, L5, L6	15
MODULE 3: Working details Making complete set of working details for the above said project. The drawings to incorporate details complete with schedule and all specifications. The Working Details to include: 1. Doors and Windows Drawings and Details. 2. Staircase Details including railings. 3. Details of Grills, Parapet or railings. 4. Typical wall section showing foundation, DPC, skirting, sill, lintel, slab and terracing details.	L3, L4, L5, L6	15
MODULE 4: Finishing Drawings Making complete set of finishing drawings for the above said project. The drawings to incorporate finishing details complete with schedule and all specifications. The Finishing Details to include: 1. Doors and Windows Frame and Shutter details. 2. Flooring & Skirting pattern and fixing details. 3. Dado / Wall tile pattern and fixing details.	L3, L4, L5, L6	15

4. Wall Cladding pattern and fixing details. 5. Plaster Pattern with Colour schemes.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Barry. R. (1996). Construction of Buildings, John Wiley and Sons Ltd
- Khanna P.N. (2001). Civil Engineering Handbook, Delhi: Engineers' Publishers
- Khurmi R. S. (2015). Strength of Materials (Mechanics of Solids),S.Chand Publications.
- Mackay J.K. Vol. 1-4 (2014). Building Construction, Delhi, Persons Publications
- Mitchell G.A.(1959)Elementary Building Construction, HarperCollins Distribution Services

Reference Books

- Citherlet, S., Di Guglielmo, F., & Gay, J. B. (2000). Window and advanced glazing systems life cycle assessment. Energy and Buildings, 32(3), 225–234. https://doi.org/10.1016/S0378-7788(98)00073-5
- Mikosch, T., & Kallenberg, O. (1998). Foundations of Modern Probability. Journal of the American Statistical Association, 93(443), 1243. https://doi.org/10.2307/2669881
- Tasou, P. (2008). Trusses. In Steel Designers' Manual: The Steel Construction Institute, Sixth Edition (pp. 541–576). Blackwell Science Ltd. https://doi.org/10.1002/9780470775097.ch19

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	5	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	-	2	1	--	--	--	--	--	--	--	--	--	3	1	3
CO2	--	-	2	1	--	--	--	--	--	--	--	--	--	3	1	3
CO3	--	-	2	1	--	--	--	--	--	--	--	--	--	3	1	3
CO4	--	-	2	1	--	--	--	--	--	--	--	--	--	3	1	3

1: strongly related, 2: moderately related and 3: weakly related

	STRUCTURE - VII (ARC2703)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – VI					
Co-requisites	Building Materials & Construction Technology – VII					

Catalog Description

The aim of this course is to enable students to design simple steel structures and their basic components. The fundamental aspects of analysis and design and also discusses the practical requirements such as safety, feasibility and economy of steel structures. The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To understand the design of steel structures.
- To learn the behavior and design of structural steel components (members and connections in two - dimensional (2D) truss and frame structures)
- To gain an educational and comprehensive experience in the design of simple steel structures.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design building structure.

CO2: Design simple connections, rivets, welds, bolts and pins.

CO3: Design column base and footing.

CO4: Design beams and gantry girders.

Modules	Blooms level*	Number of hours
MODULE 1: Design Principles Introduction to Design Specification for Steel Members, Bolted Connections, Welded Connections.	L1, L2, L3	09
MODULE 2: Structural Connections Beam to beam connections, beam to column connection, bolted bracket connection, welded crane bracket connection.	L1, L2, L3	09
MODULE 3:Shear Force and bending moment diagram, theory of yielding and failure Design Of Laced Column, Battened Column, Design Of Slab Base And Gusseted Base.	L1, L2, L3	09
MODULE 4: Design principles and high-rise structures Laterally restrained beam, gantry girder, plate girder with -thick web plate and thin web plate. Design of steel roof truss and tubular truss.	L1, L2, L3	09

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. https://doi.org/10.1201/b18121-13
- Coutie, M. G. (1997). Structural and stress analysis. Engineering Structures, 19(1), 92. https://doi.org/10.1016/s0141-0296(97)81457-5
- Cowin, S. C. (2001). Mechanics of materials. In Bone Mechanics Handbook, Second Edition (pp. 6-1-6–24). CRC Press.
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third Edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).
- Guadagnini, M. (2008, May). Mechanics of Composite Materials: Preface. Mechanics of Composite Materials, 44(3), 197–198. https://doi.org/10.1007/s11029-008-9011-3
- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. https://doi.org/10.1016/s00160032(41)90378-2

References

- Baig, M. N., Fan, J., & Nie, J. (2006). Strength of concrete filled steel tubular columns. Tsinghua Science and Technology, 11(6), 657–666. https://doi.org/10.1016/S1007-0214(06)70248-6
- Megson, T. H. G. (2005). Analysis of Statically Indeterminate Structures. In Structural and Stress Analysis (pp. 467–547). Elsevier. https://doi.org/10.1016/b978-0750662215/50017-5 3.

Salvadori, M., & Heller, R. (1986). Structure In Architecture: The Building Of Buildings, Third Edition. Struct in Archit, The Build of Build, Third Ed. Prentice-Hall Inc.

- Structural modeling and analysis. (1998). Choice Reviews Online, 35(07), 35-3890-35– 3890. https://doi.org/10.5860/choice.35-3890
- von Glasersfeld, E. (2009). A model for the construction of elementary concepts (pp. 45– 50). AIP Publishing. https://doi.org/10.1063/1.58258

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	1	3	--	--	1	--	--	--	--	3	1	--	--
CO2	--	--	--	1	3	--	--	1	--	--	--	--	3	1	--	--
CO3	--	--	--	2	3	--	--	1	--	--	--	--	2	1	--	--
CO4	--	--	--	2	3	--	--	1	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	RESEARCH METHODOLOGY (ARC2705)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Research - I					
Co-requisites	Building Material and Construction Technology-VI					

Catalog Description

The aim of this course is to prepare students for writing a paper based on secondary research and literature review and its oral and visual presentation. Students would be able to identify and go in depth into specific and appropriate aspects relating to the discipline of architecture and discuss how it is reflected in the realm of design.
Students learn how to research a subject area through readings; learn description, analysis and synthesis of readings; citation of authors in their writing. The importance of the course is also in understanding what constitutes plagiarism research writing and in imbibing the ethics of publication. Literature review is seen as the first step in preparation of understanding research methods.

Course Objectives

The objective of this course is

- To introduce research work to the students
- To identify a specific aspect relating to the discipline of architecture.
- To conduct a research

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify area of research for thesis

CO2: Identify a research problem, formulation of hypothesis and organize a study based on literature survey

CO3: Apply research methods in case study and analyze the data collected from different sources

CO4: Develop ethics of publication

Modules	Blooms level*	Number of hours
MODULE 1: Identifying research topic, Research Gap and Project Formulation Choose any topic of the interest in consultation to the faculty concern; Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance.	L1, L2, L3	6
MODULE 2: Literature Review Review of research paper, books, journals etc related to the topic	L1, L2, L3	6
MODULE 3: Surveys, Data Collection and Data Analysis Questionnaire to be prepared and Surveys to be conducted related to research. Other related data to be collected from appropriate resources. Collected data to be analysed using proper software. frequency tables, bar charts, pie charts, percentages etc	L1, L2, L3, L4	6
MODULE 4: Paper Writing Research paper writing in appropriate format. Ethical issues related to publishing, Plagiarism and Self-Plagiarism to be checked	L1, L2, L3	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Kothari, C.R. (1985). *Research Methodology*, Delhi: New Delhi International Publishers

Reference Books

- Sagar ,Linkan (2019). 3D Max 2019 *Training Guide*, New Delhi: BPB Publication
- Sagar ,Linkan, (2019). Revit 2019 *Architecture Training Guide*. New Delhi: BPB Publication.
- Lorraine Farrelly Nicola Crowson. (2014). *Representational Techniques for Architecture (Basics Architecture).* (2nd Revised edition). Bloombury.
- M.C. Trivedi. (2009). *Computer Graphics & Animation*. (First edition). Jaico Publishing House.

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									

10	10	75	5	100	0	0	0	100	2	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	1	3	2	--	--	--	--	--	--	--	--	1	3	--	3
CO2	--	2	2	3	--	--	--	--	--	--	--	--	1	2	--	2
CO3	--	2	1	3	--	--	--	--	--	--	--	--	1	2	--	2
CO4	--	3	2	2	--	--	--	--	--	--	--	--	2	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

	LEED LAB – I (ARC2717)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Architectural Design- VI					
Co-requisites	Architectural Design – VII					

Catalog Description

The aim of this course is to provide fundamental knowledge about natural and built environment. And also introduces fundamental concepts to understand environmental processes. The curriculum further incorporates understanding in relation to Indian context. Course will be interdisciplinary and flexible.

Course Objectives

The objective of this course is

- To acquaint the student with the factors to be taken into consideration
- To understand the applications of an intelligent building.
- To familiarize the students to the Green Building rating systems, design processes, regulations and prevailing best practices

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the fundamental of green building design.
CO2: Identify the role of USGBC, GBCI and their structure.
CO3: Identify the criteria for the selection of site
CO4: Review the fundamental concepts of waste management system.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Green Building & Green Building Rating Systems Introduction to Course, Syllabus and assessment, Fundamental concepts of Green Building Design and Sustainability. Green Rating regime and their scope (regional and global), Policies and legislations	L1, L2	6

MODULE 2: LEED Lab & Processes LEED Systems: Organization, fundamentals & Role USGBC/GBCI, Structure of LEED rating (credit, prerequisites and requirements) and Impact categories, LEED Certification & registration process, What, How and where to collect data for LEED certification	L1, L2, L3	6
MODULE 3: Site, Location and Transportation Scope and criterion of sustainable site, Transport and resource footprint	L1, L3,L4	6
MODULE 4: Buildings Material and Resources Fundamental concepts (LCA), Waste management, 3Rs and Health), Procurement, declarations and documentations of Materials according to requirement of LEED certification	L1, L3,L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Altomonte, S., & Schiavon, S. (2013). Occupant satisfaction in LEED and non-LEED certified buildings. Building and Environment, 68, 66–76. https://doi.org/10.1016/j.buildenv.2013.06.008
- Azhar, S., Carlton, W. A., Olsen, D., & Ahmad, I. (2011). Building information modeling for sustainable design and LEED ® rating analysis. Automation in Construction, 20(2), 217–224. https://doi.org/10.1016/j.autcon.2010.09.019
- Leed. (2014). Reading for the R and D Community, 56(3), 25–27. https://doi.org/10.1007/978-90-313-9258-2_26

References:

- Newsham, G. R., Mancini, S., & Birt, B. J. (2009). Do LEED-certified buildings save energy? Yes, but... Energy and Buildings, 41(8), 897–905. https://doi.org/10.1016/j.enbuild.2009.03.014
- Suzer, O. (2015). A comparative review of environmental concern prioritization: LEED vs other major certification systems. Journal of Environmental Management, 154, 266–283. https://doi.org/10.1016/j.jenvman.2015.02.029

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									

10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO2	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO3	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO4	-	-	2	-	3	1	2	-	-	-	-	-	2	-	-	2

1: strongly related, 2: moderately related and 3: weakly related

	INTERIOR DESIGN (ARC2718)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	1	1	3
Pre-requisites/Exposure	Architectural Design - IV					
Co-requisites	Architectural Design - V					

Catalog Description

The aim of this course is to make students understand the application of design principles in interiors. The subject Interior Design is a specialized course offered in architecture which deals with functionality, safety and provides an aesthetically pleasing space for users. This semester will deal with minute details and construction techniques involved in interior design. The subject will also be integrated with a small component of design exercise with the current or previous semester design works. The course will include several exercises in relation to sit visits, market surveys, presentation, reports, etc.

Course Objectives:

The objective of this course is

1. To equip the students with varied aspects of theory and practice of Interior Design, and develop skills to deal with diverse interior spaces.
2. To understand qualities of spaces and develop their skills in designing for functional and meaningful interior space.
3. To initiate students into theory and practice of Interior design.
4. To merge theoretical and practical knowledge of interior design of a building.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Apply elements of interior design in their design process.

CO2: Explain the application of design principles in interiors.

CO3: Create interior design model with the help of furniture, lighting fixtures, furnishings, paintings, sculptures, etc.

CO4: Design modern interiors using modern materials and techniques.

Modules	Blooms level*	Number of hours
MODULE 1:Introduction and basic principles of design Purpose, scope, objectives, history and importance of Interior Design. Elements and principles of interior design and their application inthe contextof buildings.Aesthetic order, functional Value and Psychological impact of various elements ofInterior Design. Application of Colour, Texture, Landscaping, Artificial and Natural Lighting in theBuilding interiors.	L1, L2	9
MODULE 2: Principles and Elements of Interior Design Elements of Interior Design, Role in interiors.Space making elements like wall, column, partition screen, floor, furniture, interior landscaping etc., their design value, colour theories and schemes, light	L2, L3, L4	9
MODULE 3: Understanding Furniture work and furnishings in Interior Understanding furniture layout, furniture design with the construction technique, types of furniture and their usage, construction materials and fabrics used in furniture designing, cost estimation, understanding works of great masters.Furniture, Furnishings, Fabrics, Murals, Paintings, Sculpture, Lighting Fixtures, Floor coverings, Wall coverings and related materials. Study of furniture designs, Built-in furniture, Movable furniture, Modular furniture.	L2, L3, L4	9

MODULE 4: Modern trends in Interior design Understanding and designing modern interiors using modern materials and techniques. Study Report of an existing DESIGN PROJECT. Space organization in interiors--presentation of the complete interior scheme of a given projects such as Library, Public Halls, Conference Room, Commercial buildings etc.	L4, L5, L6	9

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References:

- Beecher, M. A., & Pile, J. (2002). *A History of Interior Design*. *APT Bulletin*, *33*(1), 57. https://doi.org/10.2307/1504797
- Demirbaş, Ö. O. (2017). *The Fundamentals of Interior Design*. *The Design Journal*, *20*(4), 537–542. https://doi.org/10.1080/14606925.2017.1325635
- Di Cintio, L. (2019*). Design activism*. In *The Interior Architecture Theory Reader* (pp. 376–384). Routledge. https://doi.org/10.4324/9781315693002-44
- Hayles, C. S. (2015). *Environmentally sustainable interior design: A snapshot of current supply of and demand for green, sustainable or Fair Trade products for interior design* practice. International Journal of Sustainable Built Environment, *4*(1), 100–108. https://doi.org/10.1016/j.ijsbe.2015.03.006
- Margolin, V., & Margolin, S. (2002). A *"Social Model" of Design: Issues of Practice and Research. Design Issues*, *18*(4), 24–30. https://doi.org/10.1162/074793602320827406
- Merrell, P., Schkufza, E., Li, Z., Koltun, V., & Agrawala, M. (2011). *Interactive Furniture Layout Using Interior Design Guidelines*. *ACM Transactions on Graphics*, *30*(4), 1–10. https://doi.org/10.1145/2010324.1964982
- Stoddart, A. (2012). *Interior design*. *Nature Materials*, *11*(10), 829–829. https://doi.org/10.1038/nmat3445
- Ulrich, R. S. (1991*). Effects of Interior Design on Wellness*. *Journal of Health Care Interior Design*.
- Ulrich, R. S. (1991). *Effects of interior design on wellness: theory and recent scientific research*. Journal of Health Care Interior Design : Proceedings from the ... Symposium on Health Care Interior Design. Symposium on Health Care Interior Design.

Modes of Evaluation: Assignment/ Case Study/ Market Survey/ Presentation/ Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	--	1	--	--	--	--	-	2	-	2	3	--	1
CO2	2	-	-	--	1	--	--	--	-	-	2	-	2	3	--	1
CO3	2	-	-	--	2	--	--	--	-	-	1	-	2	3	--	1
CO4	2	-	-	-	1	-	-	-	-	-	2	-	2	2	-	1

1: strongly related, 2: moderately related and 3: weakly related

	SPECIFICATION, ESTIMATION AND VALUATION (ARC2720)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Building Materials & Construction Technology - V, Workshop Practice & Site Exposure					
Co-requisites	Building Material and Construction Technology-VI					

Catalog Description

The aim of this course is to make students familiar with the theory and practice of specifications and estimation, and quantity surveying; along with its importance in the field of building construction. The process of writing specification document for materials, labour, budgets and; estimating the cost and time of construction works shall be covered. The preparation of bill of quantities, optimum resource consumptions and introduction to BIS and other standardized institutions is also a part of the course.

Course Objectives

The objective of this course is

- To develop a real-time judgment of quantity surveying, details specifications, estimations and valuation
- To develop skill for precise and approximate estimations and be able to estimate and specify quantities of various items of material and work involved in architectural and planning projects

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss the importance and usage of specification, estimation, valuation and depreciation
CO2: Describe the detailed specification of various common building materials
CO3: Execute and implement the appropriate methods for preparing the estimates.
CO4: Compare, evaluate and interpret the building typologies for doing the valuation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction	L1, L2,	9

Why the knowledge of quantity surveying and specifications is necessary for architects and planners? Significance and methods of writing specifications, classifications of specifications, sources of specifications; Types and methods of cost estimation for different types of projects, rates and sources of rates for different components of projects; Cost Index.	L3	
MODULE 2: Specification Specifications for common building materials and building trades, earthwork, structure (framing), flooring, stonework, plasters, waterproofing of basements and terraces, roofing, doors and windows, elevators. Site development and earth works; Water supply network and distribution systems; Sewer systems; Electrical and telephone networks; Landscaping, roads, pathways, boundary wall, pools, lighting.	L1, L2, L3	9
MODULE 3: Estimating Calculation of plinth area, floor area, carpet area and circulation area, Preliminary estimates- plinth area rates and cost indices, Detailed estimate-modes of measurement, taking off quantities from drawings, Bill of Quantities (BOQ) and Bill of Materials (BOM), Deriving rates for items from labour and material costs based on CPWD Schedule of Rates, scheduled and non-scheduled items, Establishing market rates. Cost estimation and determination of rates for different types of housing; Cost estimation and determination of rates of works involved in the infrastructure services (roads, water supply, sewer systems, etc.); Costing procedure for different land use categories, development works, interest on investment, and phasing.	L1, L2, L3	9
MODULE 4: Valuation Value and purpose of valuation; Definition and importance of valuation of land and buildings; Factors affecting property and land value at a city and clarity level; Legal, fiscal and administrative measures of land value; Sinking fund; Betterment; Scrap value, salvage value, outgoings; Capitalized value of buildings; appreciation, depreciation and their types, methods of calculating depreciation.	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Deshpande, G. B. &Nayak, J. P. (2018). *Quantity Suveying, Contracts and Tenders.* NiraliPrakashan.
- Gangrade, Mukesh N. (2018). *Estimating and Costing.* Nirali Prakashan.
- Kohli, R. C. (2013). *A Textbook of Estimating, Costing & Accounts*. S. Chand.
- Rosen, Harold J. &Kalin, Mark. (2010),*Construction Specifications Writing: Principles and Procedures,* John Wiley& Sons Publication.

Reference Books

- Aigner, Dennis, Lovell, C. A. Knox & Schmidt, Peter. (1977). *Formulation and estimation of stochastic frontier production function models.* Journal of Econometrics, 6(1), 21-37.https://doi.org/10.1016/0304-4076(77)90052-5
- Arthanareswaran, R. (2015). *A course material on Estimation and Quantity Surveying*.
- Can, Ayse. (1992). *Specification and estimation of hedonic housing price models. Regional Science and Urban Economics, 22(3),* 453-474.https://doi.org/10.1016/0166-0462(92)90039-4

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	--	--	--	--	--	--	2	--	1	2	--	3
CO2	1	2	1	2	--	--	--	--	--	--	2	--	1	2	--	2
CO3	1	2	1	2	--	--	--	--	--	--	2	--	1	2	--	2
CO4	1	2	1	1	2	--	--	--	--	--	2	--	2	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE- PEOPLE CULTURE AND BUILT ENVIRONMENT- III (ARC2721)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	History of Architecture, Architectural Design – III					
Co-requisites	Theory of Architecture					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in psychological and sociological aspects which are of concern to Architecture. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding society and various built forms produced by society. The course will also provide the students hands-on cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross fertilization with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of psychology, sociology and culture of settlement.
- The course intends to study and understand the typical components of city in order to appreciate how these elements contribute to the quality of life of urban communities.
- To familiarize students with decisive strategies that brings inclusivity and equality in the designs of built forms.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and his larger social environment, with special emphasis on aspects that are likely to affect intervention in or creation of, the built environment (predominantly urban)

CO2: Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Psychology, Sociology and Built Environment Basic introduction to various critical social aspects; Role of psychology in architecture; Role of sociology in built environment; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Inclusive Built Environment; Barrier free designs and built environments; Various case studies related to gender and architecture, community development- community response towards development strategy etc.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Cragun R.T.(2006). Introduction to Sociology, Wikibooks.
- Giddens, A (2006) Sociology, Polity Press, Cambridge (UK)
- Lynch, K. (1960) The Image of the City, Joint Centre Publication, USA
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development, Herpercollins
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books
- Tejchman A. (2016) "The Politics of Inclusive Development", Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE- ECOLOGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT – III (ARC2722)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Environmental Sciences, Building Services-1, Building Services-2					
Co-requisites	Architectural Design, Building Services-3					

Catalog Description

The aim of this course is to offer opportunities in specialized or advance learning in ecology, environment and sustainable aspects which are of concern to Architecture. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding ecology and various environmental problems faced by settlements. The course will also provide the students hands-on ecological and environmental studies of built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of ecology, environment and sustainable development.
- The course intends to study and understand the different components of city in order to understand how these elements contribute to environment quality.
- To establish the significance of the ecological issues, their impact and initiatives to address the same in the built environs to achieve sustainable development.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and ecology, will understand critical environmental issues and need to address the m by using advanced technology.

CO2: Produce reports and presentation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Ecology, Environment and Sustainable Development Basic introduction to ecology; Interrelation between natural and built environment; Importance of environment sustainability in built environment; Energy conservation, renewable sources: wind, solar, geo-thermal, bio-fuels; Materials minimizing, recycling, reducing energy content, etc; Other environmental issues related to solid waste management, water resources, air quality, storm water drainage etc; Various case studies related to traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Bakari, Mohamed El-Kamel (2017). The Dilemma of Sustainability in the Age of Globalization: A Quest for a Paradigm of Development. New York: Lexington Books. ISBN 978-1498551397
- Blewitt, J. (2008). Understanding Sustainable Development. London: Earthscan. pp. 21–24. ISBN 978-1-84407-454-9.
- Fulekar, M. H., Pathak, B., Kale, R. K. (2014) Environment and Sustainable Development' Springer Nature; ISBN-10: 8132211650; ISBN-13: 978-8132211655
- Goudie, Andrew (2000). The Human Impact on the Natural Environment. Cambridge, Massachusetts: This MIT Press. pp. 203–239. ISBN 0-262-57138-2.
- James, Paul (2014). Urban Sustainability in Theory and Practice. doi:10.4324/9781315765747. ISBN 978-1-315-76574-7.
- James, Paul*; Magee, Liam (2016).* "Domains of Sustainability". *In A. Farazmand (ed.). Global Encyclopedia of Public Administration, Public Policy, and Governance. Springer.*

- Modak, P. (2017)Environmental Management Towards Sustainability, CRC Press, ISBN-10: 9781498796248
- *Odum, E. P. (1971).* Fundamentals of Ecology *(Third ed.). New York: Saunders.* ISBN 0-7216-6941-7.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Thangavel, P., Sridevi, G. (2015) Environmental Sustainability, Springer Nature, ISBN-10: 9788132220558
- Walker, Brian and Salt, David (2006) Resilience Thinking: Sustaining ecosystems and people in a changing world. Island Press. p. xiii. ISBN 978-1597260930.
- Wandemberg, JC (August 2015). Sustainable by Design. Amazon. p. 122. ISBN 978-1516901784

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE - COMPUTER APPLICATIONS AND ADVANCE TECHNOLOGIES – III (ARC2723)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design, Building Materials and Construction Technology					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in computer applications and advance technologies which are of concern to Architecture. The course will generally be conducted in the tutorial mode to encourage exploration and skill developments. The aim of this course is to provide students the exposure to understanding new technological innovations and their applications in field of architecture. The course will also provide the students hands-on experience of new software and applications. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through data base creation, analysis, presentation. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To familiarize students with use of computers in architecture and with impact of Information Technology on architectural knowledge system and practice.
- To critically explore current advancements in smart technologies available for sustainable built environments.
- To sensitize students about strategies for innovations by using latest technologies.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Students will be exposed to the latest software and computer applications available in the field of architecture.

CO2: Students will be aware of new advanced technologies available for architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to computer applications and advance technologies Basic introduction to information technology in architecture; Introduction to smart technologies in field of architecture; Applications of information technology in architecture; applications of smart technologies in architecture; Case studies related to use of information technology and advance technology in architecture and built environment. .	L1, L2	9
MODULE 2: Project Work Selection and understanding of project; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L3, L4, L5, L6	18

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Ching, F. D. (2009) Architectural Graphics, John Wiley and Sons
- D'Ulizia, A., Ferri, F., Grifoni, P., & Guzzo, T. (2010). Smart homes to support elderly people: innovative technologies and social impacts. In Pervasive and Smart Technologies for Healthcare: Ubiquitous Methodologies and Tools (pp. 25-38). IGI Global.
- Deakin, Mark; Al Waer, Husam (2011). "From Intelligent to Smart Cities". *Journal of Intelligent Buildings International: From Intelligent Cities to Smart Cities*. **3** (3): 140–152.
- Graham, S.; Marvin, S. (1996). *Telecommunications and the city: electronic spaces, urban place*. London: Routledge. ISBN 9780203430453.
- Kedar, Seema (2009). *Database Management System* Technical Publications. ISBN 9788184316049.
- Komninos, Nicos (22 August 2013). "What makes cities intelligent?". In Deakin, Mark (ed.). *Smart Cities: Governing, Modelling and Analysing the Transition*. Taylor and Francis. p. 77. ISBN 978-1135124144
- McLaren, Duncan; Agyeman, Julian (2015). *Sharing Cities: A Case for Truly Smart and Sustainable Cities* MIT Press. ISBN 9780262029728.
- Peris-Ortiz, Marta; Bennett, Dag R.; Yábar, Diana Pérez-Bustamante (2016). *Sustainable Smart Cities: Creating Spaces for Technological, Social and Business Development*. Springer. ISBN 9783319408958.

- Reynolds, George (2009), *Ethics in Information Technology*, Cengage Learning, ISBN 978-0-538-74622-9
- Silberschatz, Abraham (2010). *Database System Concepts* McGraw-Hill Higher Education. ISBN 978-0-07-741800-7
- Wagginton, M., Harris, J (2002) Intelligent Skins, Reed Elsevier, Oxford
- Wang, S. (2010) Intelligent Buildings and Building Automation, Spon Press, USA, ISBN10:0-415-47570-8

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Eighth Semester

	BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY – VIII (ARC2801)	L	T	S	P	C
Version 1.1	Date of Approval:	1	0	2	2	5
Pre-requisites/Exposure	Building Materials And Construction Technology –VII					
Co-requisites	Architectural Design – VII					

Catalog Description

The aim of this course is to make students familiar with modern techniques of building construction and modern materials usage. This course will introduce aspects related to construction terminology types, application of technique, detailing, site visit and material collection. The course is important as it will familiarize the students with the new and latest terminologies of Architectural construction like Pre-fabrication and pre-stressed construction.

Course Objectives

The objective of this course is

- To understand different technology used in latest construction methods
- To study modern construction techniques used.

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss about Modular construction techniques.

CO2: Discuss the process of pre-fabrication in advanced building construction process

CO3: Summarize the conceptual idea behind the development of pre-stressed structural component for general use.

CO4: Prepare and understand drawings of dia-grid, domes and arches.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Modular construction Introducing current construction technique like Modular construction and fast pace construction. Discussion about terminologies used and their meanings	L1, L2, L3	15
MODULE 2: Introduction to Pre-fabrication Technology Introduction to the topic and its relevance in the construction field. Aspects such as – construction terminology, types, Applications, Detailing. Site visits and material collection from Pre-Fabrication manufacturing units and live examples	L1, L2, L3	15
MODULE 3: Introduction to Pre-stressed Technology Introduction to the topic and its relevance in the construction field. Aspects such as – construction terminology, types, Applications, Detailing. Site visits and material collection from Pre-Stressed manufacturing units and live examples.	L1, L2, L3	15
MODULE 4: Introduction to Advanced Structural Designs Introduction to the Diagrid Structures, domes structures, arches. Introduction to the Design of culverts, overhead water tanks	L1, L2, L3	15

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Barry. R. (1996). Construction of Buildings, John Wiley and Sons Ltd
- Khanna P.N. (2001). Civil Engineering Handbook, Delhi: Engineers' Publishers
- Khurmi R. S. (2015). Strength of Materials (Mechanics of Solids),S.Chand Publications.
- Mackay J.K. Vol. 1-4 (2014). Building Construction, Delhi, Persons Publications
- Mitchell G.A.(1959)Elementary Building Construction, HarperCollins Distribution Services
- Punmia, B.C. (2005). Building Construction, New Delhi: Laxmi Publishers
- Rangawala, (2017). Building Construction, Gujrat: Charotar publisher

Reference Books

- Citherlet, S., Di Guglielmo, F., & Gay, J. B. (2000). Window and advanced glazing systems life cycle assessment. Energy and Buildings, 32(3), 225–234. https://doi.org/10.1016/S0378-7788(98)00073-5
- Mikosch, T., & Kallenberg, O. (1998). Foundations of Modern Probability. Journal of the American Statistical Association, 93(443), 1243. https://doi.org/10.2307/2669881
- Tasou, P. (2008). Trusses. In Steel Designers' Manual: The Steel Construction Institute, Sixth Edition (pp. 541–576). Blackwell Science Ltd. https://doi.org/10.1002/9780470775097.ch19

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	5	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	3	--	2	1	--	2	--	--	1	--	2	2	1	--	3
CO2	--	3	--	2	1	--	2	--	--	1	--	2	2	1	--	3
CO3	--	3	--	2	1	--	2	--	--	1	--	2	2	1	--	3
CO4	--	3	--	2	1	--	--	--	--	1	--	2	2	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

	ARCHITECTURAL DESIGN - VIII (ARC2809)	L	T	S	P	C
Version 1.1	Date of Approval:	1	1	4	2	8
Pre-requisites/Exposure	Building Materials & Construction Technology – VII					
Co-requisites	Construction Management					

Catalog Description

The aim of the design studio is to expose the students to Urban scale problems and to enable them to visualize the contextual part of a built form. They need to understand, as to what goes beyond the premise of a single building or an area and where its boundaries merge into surrounding built form with different land uses and activities. The studio problem therefore will focus on study and intervention within areas that have the context of design issues like, pedestrian and traffic movement, mixed activities etc. and have the scope of redevelopment.
The design problem of Urban design scale is to be introduced, example; Redesigning of existing Urban area by studying and identifying the problems associated with it. The project would be a medium sized urban design intervention. The design solution would address issues like demography, market value, land use patterns etc. Other design issues are the detailing of open and built areas after studying human and movement patterns. The project should be substantiated by detailed site surveys and reading about urban design principles.

Design Exercise: Urban Design Studio

Course Objectives:

The objective of this course is

- To understand the city under study, read the issues in a given area after a methodical analysis and propose housing /urban design/ campus design solutions.

- To compare the built and un-built environment around.
- To formulate and highlight the issues of Urban areas.
- To justify the environment for sensitivity.

Course Outcomes:

On completion of this course, the students will be able to

CO1: Compare the built and un-built environment.

CO2: Demonstrate their understanding of urban issues relating to the built environment.

CO3: Prepare quantitative data for existing and future proposals.

CO4: Prepare a vision statement

Modules	Blooms level*	Number of hours
MODULE 1: Identify the study area Pilot survey of an area to identify the project, Survey the existing urban environment. Delineate the study area, collect initial data, prepare brief questions for responses, Reading the area for commonalities, Take response from the users.	L4, L5, L6	30
MODULE 2: Presenting and Analysing the collected data Mapping of collected data using techniques and methods, Use of both qualitative and qualitative data. Co-relating the various data for inter-relationship, Using different methods for analysis, Prepare activity wise layers	L4, L5, L6	36
MODULE 3: Drawing inferences for interventions Picking up issues for addressing, Thinking about developing sensitive responses to the identified issues, Take case of examples for better understanding, Prepare models for spatial analysis, Prepare quantitative data for existing and future proposals.	L4, L5, L6	42
MODULE 4:Formulation of the Design Programme and Strategies for intervention Prepare the vision statement, phasing of the project, before and after images, Public Private Participation, Implementation of the design solution.	L4, L5, L6	36

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation*

Text Books & References:

- Béjar, R., Latre, M. Á., Nogueras-Iso, J., Muro-Medrano, P. R., & Zarazaga-Soria, F. J. (2009). An architectural style for spatial data infrastructures. *International Journal of Geographical Information Science*, *23*(3), 271–294. https://doi.org/10.1080/13658810801905282

- Chiara, J. D., & Callender, J. (1983). Time-Saver Standards for Building Types. *McGRaw-Hill International Edition*.
- Givoni, B. (2004). Time Saver Standards for Urban Design: Urban Design and Climate. *Digital Engineering Library @ McGraw-Hill*, 1–14.
- Head, A. J. (2017). Planning and Designing Academic Library Learning Spaces: Expert Perspectives of Architects, Librarians, and Library Consultants. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2885471
- Julius, P., & Zelnik, M. (1979). Human Dimension & Interior Space. *Vasa*. Retrieved from http://medcontent.metapress.com/index/A65RM03P4874243N.pdf
- Wolfenden, A., & Chusid, M. (1991). Time-Saver Standards for Building Types: 3rd Edition. *Journal of Testing and Evaluation*, *19*(4), 347. https://doi.org/10.1520/jte12583j

- Head, A. J. (2017). Planning and Designing Academic Library Learning Spaces: Expert Perspectives of Architects, Librarians, and Library Consultants. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2885471

Modes of Evaluation: Case Study/ Site Visit/ Portfolio Submission:

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	8	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	2	3	-	-	-	-	-	-	-	-	1	2	-	-
CO2																
CO3																
CO4																

1: strongly related, 2: moderately related and 3: weakly related

	STRUCTURE - VIII (ARC2815)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Structure – VII					
Co-requisites						

Catalog Description

The aim of this course is to enable students to design advanced structures system and their basic components. This subject covering three major different types of structures i.e. Pneumatic structure, Geodesic Dome and Bridges. The fundamental aspects of analysis and design and also discusses the practical requirements such as safety, feasibility and economy these structures. Along this some iconic examples as a case study will also cover in this course. The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Objectives

The objective of this course is

- To understand the design of Pneumatic structures.
- To learn the behavior and design of Geodesic Dome.
- To understand the design of Bridges.
- To gain an educational and comprehensive experience with the various types of Iconic Structure.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design Pneumatic structures.
CO2: Design Geodesic Dome structures.
CO3: Design various types of Bridges.
CO4: Understanding of different types of modern and contemporary iconic buildings.

Modules	Blooms level*	Number of hours
MODULE 1: Pneumatic Structure Introduction to Design Specification for Pneumatic Structure, Design principles, Components, Limitations in Design, Economic parameters, Case Studies.	L1, L2, L3	09
MODULE 2: Geodesic Dome Introduction to Design Specification for Geodesic Dome, Design principles, Components, Limitations in Design, Economic parameters, Case Studies.	L1, L2, L3	09
MODULE 3:Space Frames Introduction to Design Specification for Space Frames, Design principles, Components, Limitations in Design, Economic parameters, Case Studies.	L1, L2, L3	09
MODULE 4: Modern & Contemporary Structures Case studies of different Indian buildings structure like Hall of nation, STC building, Lotus temple, Cricket Stadium Ahmedabad etc, Case Studies of various International buildings structure like Eiffel tower, Louvere, Guggenheim Museum, Burj Khalifa, Habitat 67, Dupli Casa etc. (at least 10 different typology building structures Indian and Internationally focused on mainly roof system.	L1, L2, L3	09

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Herzog, Thomas (1976). Pneumatic Structures: A Handbook of Inflatable Architecture, Oxford University Press
- Otto, Frei (1967). Tensile Structures Volume One: Pneumatic Structures (v. 1), The MIT Press Ltd; 1st Printing edition
- Chen, Wai -Fah, Duan, Lian (2014). Bridge Engineering: Substructure Design, CRC Press.
- Loon, Vam Borin, (1999). Geodesic Domes: Demonstrated, Tarquin Publications

References

- Arya, C. (2009). Eurocode 3: Design of steel structures. In Design of Structural Elements (pp. 375–433). CRC Press. https://doi.org/10.1201/b18121-13
- Coutie, M. G. (1997). Structural and stress analysis. Engineering Structures, 19(1), 92. https://doi.org/10.1016/s0141-0296(97)81457-5
- Cowin, S. C. (2001). Mechanics of materials. In Bone Mechanics Handbook, Second Edition (pp. 6-1-6–24). CRC Press.
- Emmitt, S., & Gorse, C. (2014). Barry's Advanced Construction Of Buildings Third Edition. John Wiley & Sons, Ltd (Vol. 28, p. 581).

- Guadagnini, M. (2008, May). Mechanics of Composite Materials: Preface. Mechanics of Composite Materials, 44(3), 197–198. https://doi.org/10.1007/s11029-008-9011-3
- Oppermann, R. H. (1941). Strength of materials, part I, elementary theory and problems. Journal of the Franklin Institute, 231(1), 96. https://doi.org/10.1016/s00160032(41)90378-2

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	3	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	1	3	--	--	1	--	--	--	--	3	1	--	--
CO2	--	--	--	1	3	--	--	1	--	--	--	--	3	1	--	--
CO3	--	--	--	2	3	--	--	1	--	--	--	--	2	1	--	--
CO4	--	--	--	2	3	--	--	1	--	--	--	--	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	TOWN PLANNING (ARC2816)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	History of Architecture – III					
Co-requisites	Building Bye-laws					

Catalog Description

The aim of this course is to familiarize the students with Planning concepts and process in urban and regional planning. The course provides insights into ancient Town Planning to the contemporary best practices. The aim is to familiarize the students with the process of evolution of cities, concepts related to humanitarian planning processes and skill development to identify planning issues in existing areas and develop solutions at basic levels. The subject will be taught in congruence with the Design studio and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same

Course Objectives

The objective of this course is to

- To familiarize the students with Planning concepts and process in Urban and Regional Planning.
- To understand the various elements, classifications and typology of humans settlements.
- To develop research interest in the theory of urban planning and development studies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the various elements, classification and typology of planning

CO2: Define types of settlements based on different criteria and different parameters.

CO3: Review the condition of development/status of urbanization.

CO4: Classify constituents of town or city and develop different type of Plans.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Planning and its concepts Definitions, planning as hierarchical process, essential features of planning, town planning as a practice, Regional Planning, Rural Planning, Transport Planning, Housing. Various Roles that Planners Play- in Development Authority. Planning concepts and their relevance to Indian Planning practice in respect of Ebenezer Howard – Garden city concepts and contents – Patrick Geddes – Conservative surgery – case study – C.A. Perry – Neighborhood concept Le Corbusier – concept and case studies	L1, L2	5
MODULE 2: Classification and history of Cities Definitions of urbanization such as world cities, city-regions, global cities; Census definitions such as Class-I, Class-III cities. Example of good planned cities and their planner. Analysis of old– Egyptian, Mesopotamian, Greek, Roman, Renaissance, and Modern cities - Garden cities, Chandigarh etc.	L1, L2	5
MODULE 3: Planning process and standards Identification of values, norms, goals and objectives, methodology of plan formulation, site selection, land use mapping, population projection, calculation of housing and community services, calculation and laying of physical infrastructure, public participation, plan visioning exercise, community dispute resolution as per URDPFI guidelines	L1, L2	6
MODULE 4: Types of Plans and modern approach Comprehensive plans, development plans, local plans, district plans, public participation, people and plans, regional planning, Five Year Plans, District Development Plans, Regional Plans, Master Plans, Strategic Plans, Zonal Plans, Urban Renewal Plan – Meaning, Redevelopment, Rehabilitation and Conservation – JNNURM, SEZ – case studies. Introduction, Benefits and Planning components of Green City (e.g. Vancouver), Compact City (e.g. Sky city, China) and Smart City (e.g. Malta)	L1, L2	8

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Arthur B. Gallion et.al, (1957), Urban Pattern, The Urban Pattern- City Planning and Design: Publication Van Nostrand
- Binode Dutt (1925), Town Planning in Ancient India
- C. A. Doxiadis (1971), Ekistics: An Introduction to the Science of Human Settlements, Discussions On Ekistics: Nature, Man, Shells, Society, Networks. Summary Of The Athens Ekistics: Jstor
- G.K. Hiraskar (20th Edition, 2017), Fundamentals of Town Planning: Dhanpat Rai Publications
- URDPFI Guidelines (2014): Government of India

Reference Books

- Bradshaw, M. (1988). Cities for people. Town & Country Planning, 57(4), 114–116. https://doi.org/10.5860/choice.48-4292
- G. Cherry (1999), Social Town Planning, ISBN 0-415-17241-1, Taylor & Francis e Library, 2001
- Howard, E. (2013). Garden cities of To-morrow. Garden Cities of To-Morrow (pp. 1–168). Taylor and Francis. https://doi.org/10.4324/9780203716779
- J. B. Mcloughin (1969), Urban and Regional Planning – A System Approach: New York, Praeger
- Lewis Kebble (1969), Principles and practice of Town and Country Planning: Estate Gazette, UK

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	--	2	3	2	--	--	--	--	--	--	3	--	--	1
CO2	-	-	--	3	2	1	--	--	--	--	--	--	2	--	--	1
CO3	-	-	--	2	1	1	--	--	--	--	--	--	2	--	--	1
CO4	-	-	--	3	3	2	--	--	--	--	--	--	2	--	--	1

1: strongly related, 2: moderately related and 3: weakly related

	LEED LAB-II (ARC2817)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	LEED Lab – I					
Co-requisites	Architectural Design – VIII					

Catalog Description

The aim of this course is to provide fundamental knowledge about natural and built environment. And also introduces fundamental concepts to understand environmental processes. The curriculum further incorporates understanding in relation to Indian context. Course will be interdisciplinary and flexible.

Course Objectives

The objective of this course is

- To understand the concept of an Energy and climate
- To understand the importance of Water Efficiency
- To familiarize the students with LEED Arc

Course Outcomes

On completion of this course, the students will be able to

CO1: Define basic concepts of building loads, energy efficiency, environmental concern
CO2: Prepare a documentation plan of water efficiency.
CO3: Calculate the indoor environmental quality for comfort and health.
CO4: Define basic concepts for building data analysis and prepare a report on environment impact on built up area.

Modules	Blooms level*	Number of hours
MODULE 1: Energy and Climate Basic concepts I (Building loads, Energy efficiency, Environmental concerns), Basic concept II (Electrical systems, Visual & thermal comfort and other concepts), Energy commissioning & performance management Energy audit process, equipment and tools	L1, L2	6
MODULE 6: Water Efficiency	L1, L2,	6

Water use pattern, source and conservation scope (including water harvesting and treatment), Water flow, fixtures and plumbing networks and water efficient appliances, Water Audit: Performance management and monitoring, LEED requirement and documentation plan	L3	
MODULE 7: Indoor Environment & Human Comfort Fundamentals of Indoors environmental quality (ventilation, air quality, indoor emission, green cleaning) Health and occupational comfort (Natural lighting, Thermal, Quality view & assessment-survey)	L1, L3,L4	6
MODULE 4: LEED Arc and Project Communication Basic concepts and pre-requisites, Buildings Data Analysis, Demonstration of input Data in Arc Platform and create output result for the 5 sustainability indicators. Environmental/Building codes, Impact of built environment, sustainable & regional design Project Documentation follow-up	L1, L3,L4	6

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Altomonte, S., & Schiavon, S. (2013). Occupant satisfaction in LEED and non-LEED certified buildings. Building and Environment, 68, 66–76. https://doi.org/10.1016/j.buildenv.2013.06.008
- Azhar, S., Carlton, W. A., Olsen, D., & Ahmad, I. (2011). Building information modeling for sustainable design and LEED ® rating analysis. Automation in Construction, 20(2), 217–224. https://doi.org/10.1016/j.autcon.2010.09.019
- Leed. (2014). Reading for the R and D Community, 56(3), 25–27. https://doi.org/10.1007/978-90-313-9258-2_26

References:

- Newsham, G. R., Mancini, S., & Birt, B. J. (2009). Do LEED-certified buildings save energy? Yes, but... Energy and Buildings, 41(8), 897–905. https://doi.org/10.1016/j.enbuild.2009.03.014
- Suzer, O. (2015). A comparative review of environmental concern prioritization: LEED vs other major certification systems. Journal of Environmental Management, 154, 266–283. https://doi.org/10.1016/j.jenvman.2015.02.029

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									

10	10	25	5	50	50	0	50	100	2	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO2	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO3	-	-	2	--	3	1	2	-	-	-	--	-	2	-	1	--
CO4	-	-	2	-	3	1	2	-	-	-	-	-	2	-	1	-

1: strongly related, 2: moderately related and 3: weakly related

	DISSERTATION (ARC2837)	L	T	S	P	C
Version 1.1	Date of Approval:	2	1	3	0	6
Pre-requisites/Exposure	Research - I					
Co-requisites	Research - II					

Catalog Description

The aim of this course is to enable students to establish a strong theoretical foundation, clarity of thought and also to orient the students to structured research in a focused manner. The process of study shall enable students to conduct in depth analysis and objective research on a topic of their interest. Students may be encouraged to select the topic which may eventually culminate in the Architectural Design Thesis in the subsequent semester.

Course Objectives

The objective of this course is

- To enable students to establish a strong theoretical foundation, clarity of thought.
- To orient the students to structured research in a focused manner.
- To enable students to conduct in depth analysis and objective research on a topic of their interest.
- To select the topic this may eventually culminate in the Architectural Design Thesis in the subsequent semester.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify area of research for thesis

CO2: Identify a research problem, formulation of hypothesis and organize a study based on literature survey

CO3: Apply research methodology, tools and techniques to conduct a research

CO4: Present the research work carried out in a report format.

Modules	Blooms level*	Number of hours
MODULE 1: Selection of Topic Students may choose a topic of their interest, related to Architecture and allied subjects; stating proper justification	L1, L2, L3	6
MODULE 2: Background study/ Literature Review and Case Studies Review of research paper, books, journals etc related to the topic. Studying, analysing and interpreting various similar case studies, nationally and internationally	L1, L2, L3	6
MODULE 3: Research Design Data Collection, Data Analysis and Data Interpretation; the extensive methodology to be adopted for conducting the research along with various tools and techniques	L1, L2, L3, L4	12
MODULE 4: Presentation Presenting the research work done on identified topic which may eventually culminate in the Architectural Design Thesis of the subsequent semester. Students can thus utilise this as an opportunity for pre-Thesis study, amounting to literature review and relevant case studies which are otherwise required for Thesis.	L1, L2, L3	48

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Kothari, C.R. (1985). *Research Methodology*, Delhi: New Delhi International Publishers

Reference Books

- Dwyer, M. (1995). A guide to the Harvard referencing system. *British Journal of Nursing (Mark Allen Publishing)*, *4*(10), 599–602. https://doi.org/10.12968/bjon.1995.4.10.599
- Hofstee, E. (2006). The Harvard Referencing System. In *Constructing a Good Dissertation A Practical Guide to Finishing a Master's, MBA or PhD on Schedule* (p. 300). Retrieved from http://www.exactica.co.za/dn/exactica-book-harvard-referencing.pdf
- Mühl, J. K. (2014). Research methodology. In *Contributions to Management Science* (pp. 75–100). Springer. https://doi.org/10.1007/978-3-319-04069-1_4
- Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, *24*(3), 45–77. https://doi.org/10.2753/MIS0742-1222240302
- Soediono, B. (1989). Dessertation: Assessment of bookkeeping practices and its relevance. *Journal of Chemical Information and Modeling*, *53*(June), 160. https://doi.org/10.1017/CBO9781107415324.004

Modes of Evaluation: Quiz/Assignment/ Seminar/Practical

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	6	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	3	2	1	--	2	--	2	1	--	2	1	3	--	3
CO2	2	2	2	3	2	--	2	--	2	2	--	2	1	2	--	2
CO3	2	2	1	3	1	--	2	--	2	1	--	2	1	2	--	2
CO4	2	3	2	2	1	--	2	--	2	1	--	2	2	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE- PEOPLE CULTURE AND BUILT ENVIRONMENT- IV (ARC2818)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	History of Architecture, Architectural Design – III					
Co-requisites	Theory of Architecture					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in psychological and sociological aspects which are of concern to Architecture. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding society and various built forms produced by society. The course will also provide the students hands-on cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross fertilization with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of psychology, sociology and culture of settlement.
- The course intends to study and understand the typical components of city in order to appreciate how these elements contribute to the quality of life of urban communities.
- To familiarize students with decisive strategies that brings inclusivity and equality in the designs of built forms.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and his larger social environment, with special emphasis on aspects that are likely to affect intervention in or creation of, the built environment (predominantly urban)

CO2: Develop a language and vocabulary for discussions/ analysis on the sociological/ psychological dimensions of architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Psychology, Sociology and Built Environment Basic introduction to various critical social aspects; Role of psychology in architecture; Role of sociology in built environment; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Inclusive Built Environment; Barrier free designs and built environments; Various case studies related to gender and architecture, community development- community response towards development strategy etc.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Cragun R.T.(2006). Introduction to Sociology, Wikibooks.
- Giddens, A (2006) Sociology, Polity Press, Cambridge (UK)
- Lynch, K. (1960) The Image of the City, Joint Centre Publication, USA
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development, Herpercollins

- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books
- Tejchman A. (2016) “The Politics of Inclusive Development”, Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE- ECOLOGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT - IV **(ARC2819)**	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Environmental Sciences, Building Services-1, Building Services-2					
Co-requisites	Architectural Design, Building Services-3					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in ecology, environment and sustainable aspects which are of concern to Architecture. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide students the exposure to understanding ecology and various environmental problems faced by settlements. The course will also provide the students hands-on ecological and environmental studies of built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on projects. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To understand the basic principles of ecology, environment and sustainable development.
- The course intends to study and understand the different components of city in order to understand how these elements contribute to environment quality.
- To establish the significance of the ecological issues, their impact and initiatives to address the same in the built environs to achieve sustainable development.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop a relationship between man and ecology, will understand critical environmental issues and need to address the m by using advanced technology.

CO2: Produce reports and presentation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Ecology, Environment and Sustainable Development Basic introduction to ecology; Interrelation between natural and built environment; Importance of environment sustainability in built environment; Energy conservation, renewable sources: wind, solar, geo-thermal, bio-fuels; Materials minimizing, recycling, reducing energy content, etc; Other environmental issues related to solid waste management, water resources, air quality, storm water drainage etc; Various case studies related to traditional / vernacular buildings and settlements demonstrating relationship between climate, local material resources and settlement/ building forms.	L1, L2	8
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Bakari, Mohamed El-Kamel (2017). The Dilemma of Sustainability in the Age of Globalization: A Quest for a Paradigm of Development. New York: Lexington Books. ISBN 978-1498551397
- Blewitt, J. (2008). Understanding Sustainable Development. London: Earthscan. pp. 21–24. ISBN 978-1-84407-454-9.
- Fulekar, M. H., Pathak, B., Kale, R. K. (2014) Environment and Sustainable Development' Springer Nature; ISBN-10: 8132211650; ISBN-13: 978-8132211655
- Goudie, Andrew (2000). The Human Impact on the Natural Environment. Cambridge, Massachusetts: This MIT Press. pp. 203–239. ISBN 0-262-57138-2.
- James, Paul (2014). Urban Sustainability in Theory and Practice. doi:10.4324/9781315765747. ISBN 978-1-315-76574-7.
- James, Paul*; Magee, Liam (2016).* "Domains of Sustainability". *In A. Farazmand (ed.). Global Encyclopedia of Public Administration, Public Policy, and Governance. Springer.*
- Modak, P. (2017)Environmental Management Towards Sustainability, CRC Press, ISBN-10: 9781498796248
- *Odum, E. P. (1971).* Fundamentals of Ecology *(Third ed.). New York: Saunders.* ISBN 0-7216-6941-7.

- Porteous, Douglas, J. (1977), Environment Behaviour: Planning and Everyday Urban Life, Addison Wesley
- Thangavel, P., Sridevi, G. (2015) Environmental Sustainability, Springer Nature, ISBN-10: 9788132220558
- Walker, Brian and Salt, David (2006) Resilience Thinking: Sustaining ecosystems and people in a changing world. Island Press. p. xiii. ISBN 978-1597260930.
- Wandemberg, JC (August 2015). Sustainable by Design. Amazon. p. 122. ISBN 978-1516901784

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE - COMPUTER APPLICATIONS AND ADVANCE TECHNOLOGIES – IV (ARC2820)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure	Architectural Graphic Skills					
Co-requisites	Architectural Design, Building Materials and Construction Technology					

Catalog Description

The objective of this course is to offer opportunities in specialized or advance learning in computer applications and advance technologies which are of concern to Architecture. The course will generally be conducted in the tutorial mode to encourage exploration and skill developments. The aim of this course is to provide students the exposure to understanding new technological innovations and their applications in field of architecture. The course will also provide the students hands-on experience of new software and applications. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for cross learning with other courses. The course would be conducted through data base creation, analysis, presentation. During the course the students will be working on a live project in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To familiarize students with use of computers in architecture and with impact of Information Technology on architectural knowledge system and practice.
- To critically explore current advancements in smart technologies available for sustainable built environments.
- To sensitize students about strategies for innovations by using latest technologies.
- To develop interdisciplinary understanding and sensitivities of future architects.

Course Outcomes

On completion of this course, the students will be able to

CO1: Students will be exposed to the latest software and computer applications available in the field of architecture.

CO2: Students will be aware of new advanced technologies available for architecture.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to computer applications and advance technologies Basic introduction to information technology in architecture; Introduction to smart technologies in field of architecture; Applications of information technology in architecture; applications of smart technologies in architecture; Case studies related to use of information technology and advance technology in architecture and built environment. .	L1, L2	9
MODULE 2: Project Work Selection and understanding of project; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L3, L4, L5, L6	18

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books/References

- Ching, F. D. (2009) Architectural Graphics, John Wiley and Sons
- D'Ulizia, A., Ferri, F., Grifoni, P., & Guzzo, T. (2010). Smart homes to support elderly people: innovative technologies and social impacts. In Pervasive and Smart Technologies for Healthcare: Ubiquitous Methodologies and Tools (pp. 25-38). IGI Global.
- Deakin, Mark; Al Waer, Husam (2011). "From Intelligent to Smart Cities". *Journal of Intelligent Buildings International: From Intelligent Cities to Smart Cities*. **3** (3): 140–152.
- Graham, S.; Marvin, S. (1996). *Telecommunications and the city: electronic spaces, urban place*. London: Routledge. ISBN 9780203430453.
- Kedar, Seema (2009). *Database Management System* Technical Publications. ISBN 9788184316049.
- Komninos, Nicos (22 August 2013). "What makes cities intelligent?". In Deakin, Mark (ed.). *Smart Cities: Governing, Modelling and Analysing the Transition*. Taylor and Francis. p. 77. ISBN 978-1135124144
- McLaren, Duncan; Agyeman, Julian (2015). *Sharing Cities: A Case for Truly Smart and Sustainable Cities* MIT Press. ISBN 9780262029728.
- Peris-Ortiz, Marta; Bennett, Dag R.; Yábar, Diana Pérez-Bustamante (2016). *Sustainable Smart Cities: Creating Spaces for Technological, Social and Business Development*. Springer. ISBN 9783319408958.

- Reynolds, George (2009), *Ethics in Information Technology*, Cengage Learning, ISBN 978-0-538-74622-9
- Silberschatz, Abraham (2010). *Database System Concepts* McGraw-Hill Higher Education. ISBN 978-0-07-741800-7
- Wagginton, M., Harris, J (2002) Intelligent Skins, Reed Elsevier, Oxford
- Wang, S. (2010) Intelligent Buildings and Building Automation, Spon Press, USA, ISBN10:0-415-47570-8

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	1	1	2	1	1	2	-	2	-	-	1	1
CO2	2	3	1	2	1	1	2	3	3	1	-	1	-	-	1	1

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Ninth Semester

	PRACTICAL TRAINING (ARC2937)	L	T	S	P	C
Version 1.1	Date of Approval:	0	0	0	0	14
Pre-requisites/Exposure	Architectural Design – VIII					
Co-requisites	NA					

Catalog Description

The aim of the 'Practical Training' is to enable the students to gain the kind and range of practical experience which will prepare them for their likely responsibilities, immediately after qualifying B. Arch. Course. The trainee student has the responsibility to use his/her own initiative in making the best use of the opportunities which he gets during training period and prepare himself/herself for profession. The core of the professional training is architectural one. Student is expected to get well worse with the realm of architectural discipline ranging from generation of idea, preparation of drawings to the final execution of design on site. A Training Manual shall provide the details of the expected outline of work and other procedures.
• **Mandatory Requirements:** Student shall have to undergo Professional Training for a period of at least 06 months

Course objectives

The objective of this course is

- To expose the students to the practical environment and works by working under an Architect.
- To gain a practical knowledge and involved in all aspects of office works.
- To design for situation specific problems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Formulate and theorize the principles into practices.

CO2: Apply the professional aspects of an architecture office/company and the multiple issues in conception, preparation and execution of project on a site.

CO3: Develop a skill that helps to adapt to fit special requirements.

Examination Scheme:

Evaluation Scheme								**Total Marks**	**Credits**	**Duration of Exam (hr)**
Internal Assessment					**External Assessment**					
CT		**TA**	**A**	**Total**	**ESE**	**ESJ**	**Total**			
I	**II**									
0	0	0	0	0	0	1400	1400	1400	14	-

CT: Class Test; TA: Total Assessment; A: Attendance

Syllabus - Tenth Semester

	ARCHITECTURAL THESIS (ARC2037)	L	T	S	P	C
Version 1.1	Date of Approval:	2	6	10	0	18
Pre-requisites/Exposure	Professional Practice- II					
Co-requisites	Architectural Design – VIII					

Catalog Description

The aim of this course is to provide an opportunity to the students to handle a complete design project. Project Thesis is the final stage of learning Architectural Design. With the help of a thesis project, students are expected to demonstrate the understanding of a systematic design process which includes identification of project requirements, site study and analysis, case studies, programming, schematic design and Design Development. It provides the students with an opportunity to culminate the nine semesters of architectural education by demonstrating the body of knowledge and skills gained during their education and the professional training.

Course objectives

The objective of this course is

- To prepare a student to independently handle and present all aspects of an architectural design, from its evolution to final solution in totality.
- To understand the importance of the evolutionary stages of a design process and various techniques required for a successful presentation of an architectural design.
- To develop in students the ability to handle specific aspects / thrust area of design relevant to the topic.

Course Outcomes

On completion of this course, the students will be able to

CO1: Design a Thesis project responsive to the contextual and program requirements.

CO2: Evaluate data and information gathered from primary and secondary data collection

CO3: Combine the systematic methodology from various stages of study and analysis in design process towards culmination of an informed design.

CO4: Produce detail estimation and specification data of a building unit.

CO5: Demonstrate the ideas clearly using detailed physical model.

Text Books/References:

1. Ablamowicz, R. (2007). *An abstract of the thesis of. Young* (Vol. c, pp. 105–106).
2. Agarwal, S. S., Yadav, P. P., Chavali, K. H., & Kumar, L. (2011). How to write a thesis? *National Journal of Physiology, Pharmacy and Pharmacology*, *1*(2), 86–90. https://doi.org/10.5005/jp/books/12140_6
3. Evans, D., Gruba, P., & Zobel, J. (2014). *How to Write a Better Thesis*. *How to Write a Better Thesis*. Springer International Publishing. https://doi.org/10.1007/978-3-319-04286-2
4. Vasaiely, P. (2010). Bachelor Thesis. *Applied Sciences*, *16*(February), 1–106. https://doi.org/10.1053/j.sodo.2009.12.005

Modes of Evaluation: Quiz/ Case Study/ Literature Study/ Presentation/ Report Submission

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
P			R	Total	ESE	ESJ	Total			
I	II	III								
200	200	200	200	800	0	1000	1000	1800	18	NA

P: Presentation; R: Report; ESE: End Semester Examination; ESJ: End Semester Jury

	PROFESSIONAL PRACTICE (ARC2001)	L	T	S	P	C
Version 1.1	Date of Approval:	4	0	0	0	4
Pre-requisites/Exposure	Town Planning					
Co-requisites	Architectural Thesis					

Catalog Description

This course aim is to provide the foundation, knowledge and skills needed to professional practice. It is designed to build understanding of the complex interactions and uncertainties of the professional practice. It provides students with the essential knowledge components of role of COA, IIA, Uttar Pradesh architect association, Architects Act 1972, Tendering & Contract and Valuation. It also develops an appreciation of the skills and tasks inherent in development Conditions of engagement of Architect – Duties, Responsibilities, Liabilities of the profession, scale of charges, mode of payment etc. Clauses governing conduct of professional practice

Course Objectives

The objective of this course is

- To understand the role of Professional bodies.
- To acquaint the students with the responsibility, scale of charges and Architect's conduct in Architectural practice.
- To understand the office and administration of an Architect's office, Tenders and contracts.
- To analyze judicial process involved in arbitration.

Course Outcomes

On completion of this course, the students will be able to

CO1: Gain a comprehensive understanding of the Professional Practice in India.

CO2: Explain different role of Architect's Act 1972 in professional conduct and all the work related to scales of charges.

CO3: Compare and float tenders and contract for the Architectural project.

CO4: Compare difference between Arbitration, Conciliation and Mediation.

Modules	Blooms level*	Number of hours
MODULE 1: Role of professional bodies Role of different bodies i.e. COA, IIA, Uttar Pradesh Architect Association, their working constitution and bye-laws, categories of membership and election procedures.	L1, L2	06
MODULE 2: Architect's Act 1972 & Office and administration Detail study of the Act and procedures of membership. Office set up and administration, Filling and recording, nature of partnership, registration of firm and dissolution, copy rights of drawings, practice procedures and conduct etc. Conditions of engagement of Architect, discuss the Duties, Responsibilities, Liabilities of the Architect profession, Fee (scale of charges), mode of payment etc. Clauses governing conduct of professional practice.	L1, L2,	12
MODULE 3:Tendering and Contract Tendering - Types of tenders and tender documents, tender drafts notices, Inviting Tenders, Procedure of opening and selection process and report of owner. Contract – Types, conditions of contract – Earnest money, Security deposit, Retention money, Mobilization fund, Bank Guarantee, Architect's Instructions, Defects, Certificates and payments, Penalties, Insurance, Liquidated damages, Termination of contract, breach of contract.	L1, L2, L3	15
MODULE 4:Arbitration Introduction, Techniques, elements and factors affecting valuation, Methods, Types – renewal or lease/ extension of lease, standard rent, easement right, dilapidation, Property valuation techniques, circle rate analysis, comparable cost of scale. Share knowledge on the concept of property purchase and mortgage, Goods and Service Tax, Capital gain tax, wealth tax, property tax and other taxes etc. Arbitration, Arbitrator, nature of arbitration, appointment, conduct, powers and duties of arbitrator and umpire amended from time to time. Procedure of arbitration. Mediation & Reconciliation	L1, L2, L3	15

***Bloom's Level:** L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

- Chitkara K.K. (1998). *Construction Project Management*, New Delhi: Tata McGraw- Hill Compony Limited
- Deobhakta Madhav, Deobhakta Meera (2007), *Architecture Practice in India*, Delhi: Council of Architecture
- Gazette of India (1972). *The Architects Act, 1972*, Delhi

Reference Books

- Patil,B.S.(2015), *Civil Engineering Contracts and Estimates*,Delhi:Orient Blackswan Private Ltd
- Ramaswamy, (2016), *Contract and their managment*, New York: LexisNexis

Modes of Evaluation: Assignment/ Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	50	0	50	100	4	3

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1
CO2	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1
CO3	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1
CO4	--	--	--	--	--	--	--	--	--	1	1	--	--	--	1

1: strongly related, 2: moderately related and 3: weakly related

	CAREER DEVELOPMENT (ARC2002)	L	T	S	P	C
Version 1.1	Date of Approval:	2	0	0	0	2
Pre-requisites/Exposure	Professional practice					
Co-requisites						

Catalog Description

The aim of this course is to enable students to understand future after completing architecture study. It also includes knowledge the legal and regulatory body. The subject will be taught in a way so that they are able to build a concrete portfolio, and assignments for the subject will be linked to the design presentation exercises to achieve higher level of representation in real world.

Course Objectives

The objective of this course is

- To introduce the scope after completing architecture.
- To understand the functions of various national and international regulatory bodies.
- To study the cyber security.
- To provide portfolio development.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain career after completing architecture.
CO2: Define national and international regulatory bodies.
CO3: Explain cyber security and its role in architectural field.
CO4: Understanding of portfolio development.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to area of specialized course Architecture, Scope for architecture stream, careers in govt. sector and private sector for architects, higher education in different fields (i.e. planning, construction, management, conservation, software development and analysis etc.) Research in different specialized area.	L1, L2, L3	06

MODULE 2: International Architecture Practice and role of regulatory Role of different bodies i.e. COA, IIA, their working constitution and bye-laws, categories of membership and election procedures. Introduce to the relevant Act and procedures of membership. Conditions of engagement of Architect, discuss the Duties, Responsibilities, Liabilities of the Architect profession, Fee (scale of charges), mode of payment etc.	L1, L2, L3	06
MODULE 3:Cyber security Introduction to information systems, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis. Security Policies, WWW policies, Email Security policies, Policy Review Process-Corporate Policies, Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License.	L1, L2, L3	06
MODULE 4: Portfolio development Analyse, critically evaluate and articulate assessments of their own design works. Composition, Colour schemes, Sizes, Sequences, Software, Logo and style development	L1, L2, L3	06

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation*

Text Books

- Charles P. Pfleeger, Shari LawerancePfleeger, "Analysing Computer Security ", Pearson Education India.
- Dr. Surya PrakashTripathi, RitendraGoyal, Praveen kumarShukla ,"Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
- Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hill. CHANDER, HARISH,"
- V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
- Chitkara K.K. (1998). Construction Project Management, New Delhi: Tata McGraw- Hill Compony Limited
- Deobhakta Madhav, Deobhakta Meera (2007), Architecture Practice in India, Delhi: Council of Architecture
- Gazette of India (1972). The Architects Act, 1972, Delhi
- Gutman, R., & Haviland, D. (1992). The Architect's Handbook of Professional Practice. Journal of Architectural Education (1984-), 45(2), 122. https://doi.org/10.2307/1425280

References

- Baka, J. (2013). The Political Construction of Wasteland: Governmentality, Land Acquisition and Social Inequality in South India. Development and Change, 44(2), 409–428. https://doi.org/10.1111/dech.12018

- LARR. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, The Gazette of India Extraordinary § (2013). Ministry of Law and Justice, Government of India. Retrieved from https://dolr.gov.in/sites/default/files/Right to Fair Compensation and Transparency in Land Acquisition%2C Rehabilitation and Resettlement Act%2C 2013.pdf
- Narain, V. (2009). Growing city, shrinking hinterland: Land acquisition, transition and conflict in peri-urban Gurgaon, India. Environment and Urbanization, 21(2), 501–512. https://doi.org/10.1177/0956247809339660
- Raghuram, G., & Sunny, S. (2015). The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Ordinance, 2015. Research and Publications Of Indian Institute of Management, 2013(July), 51.
- Requirements, D., & Amendment, T. (2010). the Gazette of India. DisClosure, 2011(2), 1–216.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Evaluation Scheme								Total marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	2	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	--	--	--	--	1	--	--	--	2	3	1	3	--	1	2
CO2	--	--	--	--	--	2	--	--	--	1	1	1	3	--	1	2
CO3	--	--	--	--	--	1	--	--	--	2	1	1	3	--	1	2
CO4	--	--	--	--	--	2	--	--	--	1	2	1	3	--	1	2

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE - UNDERSTANDING CULTURAL LANDSCAPES FOR URBAN RENEWAL AND CONSERVATION (ARC2003)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure						
Co-requisites						

Catalog Description

The aim of this course is to understand the definition and concept of Culture Landscapes for urban renewal and conservation. It explain the culture of landscape to renewal/redevelopment of the existing environment and its surrounding to sustain the better quality of life though proper plan or documentation. This course has explained about the cultural heritage conservation particularly heritage site. It also deals about the urban area development through the literature study of Renewal, Redevelopment Revitalization and Rejuvenation. In this course, development approaches are comprises of social, environment and economy dimensions. The learning and outcome of this course is exploring in the field of Culture Landscapes, Heritage site and Urban Environment aspects in order to plan for development. The students must learn through literature review of research articles, professional documents, books related to urban renewal. It needs to carry out the field work and preparing the development report in this particular subject.

Course Objectives

The objectives of this course are

- To assess the urban renewal/redevelopment approaches at old city and historical sites in the context of having better access to services and sustainable urban development.
- To critically analyze the best practices of urban re-development for furthering utilization and formulation of a redevelopment plan.

Course Outcomes

At the end of this course, students will be able to

CO1: Digest and apply the knowledge of development approaches such as urban renewal/redevelopment/revitalization/rejuvenation.

CO2: To prepare the detail report and presentation on a given project related to urban renewal and urban re-development.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction of Cultural Landscape for Urban Renewal and Conservation. Introduction to definition and concept of Cultural Landscape, Urban Renewal, and Conservation, Development Approaches of Old City, A brief history of the landscape concept, Principle for Conservation and Renewal of decay areas within City Area, Principles and methods for the assessment of the cultural landscape, Landscape resources, management and planning structure, Mechanism for Development of Historical Area includes the Environment, Social, Culture and Economic aspect; Infrastructure and Services Facilities System of Old Area within City. Governance System and Planning aspect to build new Plan. Case Studies of various Plan and Documents for Renewal and Redevelopment in Developed Countries and Development Nations particularly Indian cities context.	L1, L2	12
MODULE 2: Project Work Selection of Study Areas, Literature Review, Formulation of Aim and Objectives through Proper Scientific Approaches, Collection of data through various techniques such as primary and secondary sources; Conducting survey (Focus Group Discussion, Households Survey etc), Documentation; Develop the data Base to Analyze the relevant by using the advance software; Analyze the Qualitative and quantitative approaches and formulating the new plan through scientific manner and; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

- Ken Taylor., The Historic Urban Landscape Paradigm and Cities as Cultural Landscape, Landscape Research, 41 (4): 1-10, 2016
- R. Pickard., Management of European Historic Centres, E&FN SPON, Londra 2000

- N. Mitchell, Rössler M., Tricaud P.M., World Heritage Cultural landscapes, A handbook

References

- C. Sauer, The Morphology of Landscape, University of California Publications in Geography, 1925
- Lawrence W.C. Lai., Frank T. Lorne., Sustainable Urban Renewal and Built Heritage
- Conservation in a Global Real Estate Revolution, Sustainability., 11 (580), 2019

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination
Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									
10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE: SMART CITIES AND SMART TECHNOLOGIES (ARC2004)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure						
Co-requisites						

Catalog Description

The aim of this course is to introduce the students to smart cities concepts and solutions with their specific planning needs and priorities and the implication on development in these areas. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be on **exploring the role of technology and data in cities, and learn how you can participate in the creation of smart cities.** This course will provide the student's hands-on experience on smart city planning that required a different planning process in a built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To investigate, analyze and explore Smart City concepts and solutions important for urban development sectors
- To learn about state-of-the-art strategies for effectively managing the transition from legacy infrastructures to smart urban systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend the concept, challenges and solutions for smart cities planning

CO2: Prepare the detail report and presentation on a given project related to Special area planning.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Smart Cities Concept and analysis of smart technologies Introduction to smart cities, the city as a system of systems, smart citizens, Infrastructure, technology and data, Innovation and enterprise, smart leadership and strategy, standards and capacity building, smart measurement, and learning. Case Studies of various smart cities in Indian and international context.	L1, L2	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

- Smart Cities & Urban Development in India, N. Mani, New Century Publications
- Smart Cities Unbundled, Sameer Sharma, Bloomsbury India
- The Smart City Transformations: The Revolution of The 21st Century, Amitabh Satyam, Bloomsbury India
- Introduction to Smart Cities, Anil Kumar, Pearson India

References

- Smart Technologies, K. Worden, World Scientific Publishing Co Pte Ltd
- Smart Technologies for Smart Governments, Manuel Pedro Rodríguez Bolívar, Springer Publications
- Advanced Technology for Smart Buildings, James M. Sinopoli, Artech House Publishers

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESSE	ESJ	Total			
I	II									

10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	ELECTIVE: TRANSIT ORIENTED DEVELOPMENT (ARC2005)	L	T	S	P	C
Version 1.1	Date of Approval:	3	0	0	0	3
Pre-requisites/Exposure						
Co-requisites						

Catalog Description

The aim of this course is to introduce the students to transit oriented development concepts and solutions with their specific planning needs and priorities and the implication on development in urban transportation sectors. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be on **exploring the role of TOD and learn how this can be implemented.** This course will provide the students hands-on experience on planning for TOD that required a different planning process in a built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To investigate, analyze and explore TOD concepts and solutions important for urban transportation sectors
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend the concept, challenges and solutions for TOD planning

CO2: Prepare the detail report and presentation on a given project related to TOD planning.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Planning of TOD Introduction to TOD, need of transit-oriented development, Factors driving the trend, components of TOD, Principles, Benefits, government policies, Case Studies of various TOD's in Indian and international context.	L1, L2	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation*

Text Books

- Transit Oriented Development: Making it Happen (Transport and Mobility), John L. Renne, Carey Curtis, Routledge; 1 edition (25 June 2009)
- Transit Oriented Development and Sustainable Cities: Economics, Community and Methods (Transport, Mobilities and Spatial Change), Richard D. Knowles , Fiona Ferbrache, Edward Elgar Pub (June 28, 2019)
- Financing Transit-Oriented Development with Land Values: Adapting Land Value Capture in Developing Countries (Urban Development), Hiroaki Suzuki , Jin Murakami , Yu-Hung Hong , Beth Tamayose , World Bank Publications (15 January 2015)

References

- Transit Oriented Development: Guide for Practitioners, Queensland. Department of Infrastructure and Planning, Queensland Department of Infrastructure and Planning, 2010
- Urban Transformation: Transit Oriented Development and the Sustainable City, by Ronald A. Altoon , James C. Auld, Images Publishing Dist Ac (November 16, 2011)

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Evaluation Scheme								Total Marks	Credits	Duration of Exam (hr)
Internal Assessment					External Assessment					
CT		TA	A	Total	ESE	ESJ	Total			
I	II									

10	10	25	5	50	0	50	50	100	3	0

CT: Class Test; TA: Total Assessment; A:Attendance; ESE: End Semester Examination; ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

Ordinance- Examination Rules

Bachelor of Architecture

Amity School of Architecture and Planning

Following rules are in addition to regulations for conduct of examinations & Scheme of Evaluation of Amity University Haryana which shall be applicable only for B.Arch Course (Batch 2018-2023onwards).

1. QUALIFYING STANDARDS

1.1. Progressive marks refer to the marks given to a student on a continuous basis during a semester by the concerned subject teacher/teachers.

1.1.1. In the case of subjects which are mainly **studio based** as per the scheme of teaching and examinations, the progressive marks shall be the total of marks given to the various drawings (plates) submitted from time to time by a student on tracing sheets/ butter sheets/drawing sheets or computer printouts. However, if the subject teachers so desire, they shall give some weight age for time problems/tests in these subjects.

1.1.2. In the case of subjects which are mainly **lecture based** as per the scheme of teaching and examinations, the progressive marks shall be based on the average of two tests conducted normally at the end of 8th and 12th weeks of each semester. Provided that, the teacher may give assignments instead of tests which may include sketching, book reviews, write-ups etc.

1.1.3. In the case of subjects which are mainly **practical based** as per the scheme of teaching and examinations, the progressive marks shall be based on the assignments submitted by the students. A minimum of two assignments per semester shall be given.

1.1.4. In all the above mentioned three cases, viz studio based, lecture based and practical based subjects:

- The concerned teacher shall give a reasonable opportunity to the student to improve his/ her progressive marks, for example by re-doing the assignments or taking an additional test etc, within the time frame of the given semester with approval of HOD/HOI.
- The relevant records and submissions of students which have been assessed for progressive marks shall be produced as and when they are sought by the university within 12 months, after 12 months that no records shall be retained/ produced.

1.2. If a candidate fails to secure **a minimum of 50% of marks** in progressive marks in any subject, he /she shall not be eligible to take up theory/viva voce/end term examination in that particular subject.

1.3. It shall be the responsibility of concerned Head of the Architecture Department/Principal to implement clause "1.2" in the event of an ineligible candidate inadvertently being allowed to appear for the theory/ viva voce /end term examination, the result of the concerned examination shall be considered as null and void.

1.4. Such candidates shall correct, improve, redo the concerned works on the advice of subject teacher and re- submit them during subsequent semester of the next year in order to secure the minimum required progressive marks in that subject.

1.5. Once a candidate secures 'minimum' or 'more than the minimum' progressive marks in any subject, the marks shall be made permanent and shall not be changed under any circumstances.

1.6. To pass a subject, a candidate shall secure a minimum of 50% marks in Progressive marks and 50% marks in the end term examination (Theory examination/ Practical examination/ viva voce examination/ Total marks) ie Internal Marks: External Marks: Total marks :: 50:50:50.

1.7. Candidates who do not fulfil above cited **clause no. 1.6** shall be deemed to have failed in that subject and have to re-appear for the Theory examination / practical examination or viva voce examination in which he/she has secured less than the minimum prescribed marks.

1.8. In B. Arch course a minimum of 5.00 SGPA shall be secured by the student to be eligible for the award of degree.

2. THESIS EXAMINATION

2.1. The 'Thesis' of every student in the final semester shall be evaluated on thesis presentation by the student through viva-voce examination by the panel of the jury in accordance with the Regulations issued separately.

2.2. The jury shall include two (1:20) external jury members and one internal member (Thesis Coordinator) from the faculty, in addition to the Chairman/HOD/HOI. Out of the four jury members, at least three must be present to complete the proceedings of the jury.

2.3. A student who fails in the thesis evaluation shall be allowed to resubmit the modified thesis after a minimum period of two months with due approval by the management, Amity University Haryana.

3. PRACTICAL TRAINING

3.1. Each student shall be required to proceed on 'Practical training' for the IX semester after appearing at the VIII semester examination. The HOI/ Chairman ASAP, Amity University Haryana approve the office of the 'Practical training' for the student.

3.2. The marks for Practical training shall be awarded to each student in accordance with the Regulations and guidelines issued by the Training Coordinator in consultation with HOI ASAP, Amity University Haryana.

4. PROMOTION RULES

4.1. A Student not satisfying the requirement of qualifying standards, at any semester, as per the Clause 1.6, shall be detained from appearing at the semester examination for that particular subject.

4.2. Such a student shall have to repeat the particular subject, as a ex-student student with the next batch of students.

4.3. A student satisfying all the standards as provided in Clause 1 shall be declared to have 'Passed' the semester examination.

4.4. A student not satisfying all the criteria of qualifying standards of Clause 1 in conjunction with the provisions of Clause 4.2, but failing in any number of subjects of both the semesters of a class taken together shall be declared to have been 'Promoted With Back-Papers' (PBP) and, shall be governed by Clause 5. A student so declared as PBP shall have to clear the back papers, as and when the examination of the concerned semester is held next.

4.5. A student not satisfying all the criteria of qualifying standards of Clause 1.1 in conjunction with the provisions of Clause 4.2, and has invoked the provisions of Clause no. 6, shall be declared as 'Promoted with Grace marks' (PWG), and shall be promoted to the next higher class.

4.6. The students who are not covered by provisions of Clause 4.1 to 4.5 shall be declared to have 'Failed'. Such students shall be required to repeat both the semesters of the said class, either as a 'regular student' or as an 'ex-student', in accordance with the Clause 5 and 6.

5. PROMOTION UNDER CARRY- OVER SYSTEM

5.1. A candidate covered under Clause 4.4 shall become eligible for provisional promotion to the next higher class of the course and shall get another chance to clear the said 'Back-Papers' in the next examination of the concerned semester under the carry-over system.

5.2. On failing again in any of the 'Back-papers' examination of a semester, the provisional admission granted to the concerned student in the higher class shall automatically stand cancelled and he/she shall have to clear the 'Back-papers' as an 'ex-student' or as a 'regular student', in accordance with the Clause 6.

5.3. Marks obtained by a student to clear his/her back paper shall replace the original marks, secured earlier by the student only to the extent of the minimum qualifying marks for computation of his/her result.

6. EX-STUDENTSHIP

6.1. A student opting to clear his/her examinations as an ex-student shall be required to inform the college, in writing, within 15 days of start of the next academic session.

6.2. An ex-student shall be required to appear at the 'Theory' and 'Practical /viva-voce' examination of all the subjects of both the semesters of the concerned class. However, the marks, for the 'Mid Term Examination' of all the subjects in the earlier regular attempt shall be retained as obtained by him/her.

6.3. If a student opts to repeat the semester as a regular student, the new marks awarded to him for 'Mid Term Examination' shall replace the old marks obtained by him in the earlier attempt.

7. GRACE MARKS

7.1. Grace Marks shall be allotted to the students within the policy directives of the Amity University Haryana.

8. MIGRATION

8.1. Migration of students from one Institute to other shall not be allowed unless it falls within the policy directives of the Amity University Haryana.

9. COURSE DURATION

9.1 Minimum duration of the course will be 5 years.

9.2 If any students fail to clear all the subjects as per clause 9.1, students have to clear remaining subjects in N+2 years where N will be the minimum course duration as per Amity University Gurgaon guidelines.

Amity School of Architecture & Planning

Bachelor of Planning

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITYHARYANA

GURUGRAM

Syllabus - First Semester

	FUNDAMENTALS OF URBAN AND REGIONAL PLANNING (PLN2101)	L	T	S	P	C
Version 1.1		4	0	0	0	4
Pre-requisites/Exposure	Planning and Design Lab- I					
Co-requisites	Statistical and Quantitative Methods for Planning					

Catalog Description

The aim of the course is to study the concepts and principles of urban and regional planning. The course deals about the aim, objectives and scope of town planning. The Course comprises of different types of plan and discusses different categories of land use. In other words, course provides comprehensive knowledge to the students about various fields of urban and regional planning and related norms, regulation and standards for spatial development.

Course Objectives

The objectives of this course are

- To understand the Rationales and Foundations of Planning.
- To introduce the Hierarchy of Development Plans and Planning Process; and Theories of Urbanization.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of town planning, spatial planning, need, scope and various field of planning.

CO2: Explain the various forms of planning in context of space, time and location.

CO3: Discuss various type of development plan and implication of development control regulations in planning.

CO4: Explain the role of local governance at all levels of planning in India.

Modules	Blooms level*	Number of hours
MODULE 1: Definitions and Rationales of Planning Various definitions of town and country planning; Goals and objectives of planning; Components of planning; Benefits of planning; Arguments for and against planning.	L1, L2	12

MODULE 2: Foundations of Planning Orthodoxies of planning including the Lamps of Planning; Sustainability and rationality in planning; Components of sustainable urban and regional development; Defining what counts as planning knowledge: various sources of planning knowledge, various forms of planning knowledge; Reasoning and its various forms in planning; Space, place and location.	L1, L2	12
MODULE 3: Development Plans and Development Regulations Definition of development plan; Types of development plans: master plan, city development plan, structure plan, district plan, action area plan, subject plan, town planning scheme, regional plan, sub-regional plan; Planning Advisory Group report and the UDPFI Guidelines; Sector plans and spatial plans; Defining development and development control regulations, types of development control; Implications of violations of development control regulations; Conforming and Nonconforming land uses; Compatible and non-compatible land uses, LULU and NIMBY.	L1, L2, L4	12
MODULE 4: Governance of Planning and Theories of Urbanization Local government in India; District Planning Committees and Metropolitan Planning Committees; Introduction to Internationalization and globalization of planning: meanings and forms of globalization; Characteristics of a global city; Principles for planning for a global city. Theories of urbanization including Concentric Zone Theory; Sector Theory; Multiple Nuclei Theory and other latest theories; Land Use and Land Value Theory of William Alonso; City as an organism: a physical entity, social entity and political entity.	L1, L2	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Faludi, A. (1973). A reader in planning theory, Oxford: Pergamon Press.
- Keeble, L.B. (1969), Principles and Practice of Town and Country Planning, London: Estates Gazette.
- McLoughlin, J.B. (1969). Urban and Regional Planning, London: Faber and Faber.

Reference Books

- Freidmann, J. (1987). Planning in the Public Domain, Princeton: Princeton University Press.
- Fainstein, S. and Campbell, S. (1996). Readings in Planning Theory, London: Mackwell.
- Hall, P. (1974). Urban and Regional Planning, London: Routledge.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--
CO3	1	1	2	--	--	1	--	--	--	--	--	--	1	2	--	2
CO4	1	1	2	--	--	1	1	--	--	2	1	2	1	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

	FUNDAMENTAL OF BUILDING STRUCTURES, MATERIALS AND CONSTRUCTION (PLN2102)	L	T	S	P	C
Version 1.1		2	0	0	0	2
Pre-requisites/Exposure						
Co-requisites						

Catalog Description
The aim of this course is to provide students a fundamental knowledge of building structures. In this course, concepts of beam, slabs, tension and compression are discussed in detail. This course deals suitable condition of soil required for the foundation of buildings. It is more focuses on various structures system involved in especially high-rise structures.

Course Objectives
The objectives of this course are
- To introduce the definitions of basic terms of building structure.
- To understand the materials and construction techniques

Course Outcomes
On completion of this course, the students will be able to
CO1: Explain and analyze the building structure in terms of forces and foundations
CO2: Identify the types of beam and its characteristics
CO3: Explain the various materials used to construct different types of structure
CO4: Explain the principles of design of RCC beams and slabs.

Modules	Blooms level*	Number of hours
MODULE 1: Fundamental of Building Structure Forces of compression and tension, concept of equilibrium forces and conditions of equilibrium,concept of elasticity and plasticity, Hooke's law, stress – strain relationship of tension andcompression; Different types of foundation; Columns and struts,short and long columns	L1, L2, L6	6
MODULE 2: Design Principles Beams and bending, various types of beams and their behavior; Design principles of RCC beams and slabs. Construction system: reinforced concrete, pre-stressedconcrete and prefab system	L1, L2	6
MODULE 3: Introduction to Building Materials Brick, timber, stone, cement, lime, glass, R.C.C., asbestos, paints and varnishes, Fiber ReinforcedPlastic (FRP)	L1, L2	6

MODULE 4: Principles of Construction Foundations, Footings, D.P.C., flooring, sills, lintel, roofing, parapets, coping, cladding expansionjoints, waterproofing of roofs, external wall sections with details, beams, columns, slabs, retainingwalls, etc.	L1,L2, L3,	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Ambrose J. (1993). Building Structures, 2nd edition, United Kingdom: Wiley.
- Allen E., Ians J. (2008). Fundamentals of Building Construction, New Jersey: John Wiley and Sons.
- Khanna R. N. (1976) Handbook of Civil Engineering, 3rd edition, Engineer Publisher, New Delhi.
- Kumar S. (2014) Building Construction, 20th edition, Standard Publisher Distributer, NaiSarak, New Delhi.
- Shah M.G. and Kale C.M. (2000) Principles of Building Drawing, MacMillan, India Ltd.

Reference Books

- Montoya M. (2008). Green Building Fundamentals, New Jersey: Prentice Hall.
- McKay W.B. (1992) Building Construction, Orient Longman Pvt. Ltd., Mumbai.
- Mitchell, G.A. (2006) Building Construction: Structure and Fabric, The Perfect Used Book Store, and A.M. London, UK

Modes of Evaluation: Presentation/ Assignment/Class Test/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	1	1	1	--	2	--	--	--	--	2	1	2	1	2
CO2	1	2	1	1	1	--	2	--	--	--	--	--	1	1	1	2
CO3	1	1	1	1	1	--	2	--	--	--	1	2	1	1	2	2
CO4	1	2	1	1	1	--	2	--	--	--	1	2	1	1	1	2

1: strongly related, 2: moderately related and 3: weakly related

	STATISTICAL AND QUANTITATIVE METHODS IN PLANNING-I (PLN2104)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning and Design Lab-I					
Co-requisites	Fundamentals of Urban and Regional Planning					

Catalog Description

The aim of this course is to study basic statistical and quantitative methods and applications in planning. In this course concepts of quantitative data and methods of data collection are discussed in detail. This course deals with basic statistical applications and methods which is required for the analysis of collected data in order to draw out results. It is more focuses on methodological part of the planning which is one of the important steps in the planning process.

Course Objectives

The objectives of this course are

- To study the data collection process and methods for data presentation.
- To study time series analysis and probability distributions

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the procedure of data collection.

CO2: Explain the various methods of data presentation.

CO3: Describe the important quantitative measures used in planning?

CO4: Discuss time series data analysis and its application in planning.

Modules	Blooms level*	Number of hours
MODULE 1: Data Collection Statistical Data and methods; collection of data, record, file, sources of data; questionnaire design, design of sample surveys; simple random sampling, stratified sampling, systematic samples, etc.; data coding, data verification.	L1, L2	8
MODULE 2: Basic Data Presentation Statistical tables; types of tables, comparisons, methods of presentation, graphic presentation; types of charts; plotting a curve, rules for drawing curves; bar charts, pictography, pie charts, histograms.	L1, L2	8

MODULE 3: Statistical Methods and Time Series Analysis Raw data, frequency distribution, selecting number of classes, class limits, curves, cumulative frequency distribution and ogives, measures of central tendency; arithmetic mean, median, mode, geometric mean and harmonic mean; measures of absolute dispersion, range, quartile deviation, average deviation, standard deviation, skewness and kurtosis. Statistical Programme for Social Sciences (SPSS) genstat and statistician and its application for statistical methods. Variation in time series, trend analysis, cyclical variation, seasonal variation, irregular variation, time series analysis forecasting; Applications in planning.	L1, L3, L4, L5	10
MODULE 4: Probability Theory and Probability Distribution Introduction, addition rule, conditional probability, multiplication rule, random variables and probability distribution, mathematical expectation; Binomial distribution, poission distribution; and normal distribution.	L4, L5, L6	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kapoor, V.K. (2003). Problem and solution in Statistics, Delhi: Sultan Chand Publications.
- Kapoor, V.K. (1994). Applied Statistics, Delhi: Sultan Chand Publications.
- Spiegel, M.R. (1960). Schaums Theory and Problems of Statistics, New York: McGraw-Hill Education.

Reference Books

- Gupta, S.K (1982). Fundamentals of Statistics, Mumbai: Himalaya Publications.
- Levin, D., Rubin, D.S. (1978). Statistics for management, New Jersey: Pertinence Hall.

Modes of Evaluation: Presentation/ Assignment/Class Test/ Written Examination
Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	--	2	--	--	--	--	--	1	2	1	--
CO2	1	1	1	2	--	--	--	--	--	--	--	--	1	2	1	--
CO3	1	1	1	1	--	--	2	--	--	--	--	--	1	2	1	--
CO4	1	1	1	2	--	--	--	--	--	--	--	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND DESIGN LAB-I (GRAPHIC AND PRESENTATION TECHNIQUES) (PLN2107)	L	T	S	P	C
Version 1.1		0	0	8	0	8
Pre-requisites/Exposure						
Co-requisites	Fundamentals of Building Structures					

Catalog Description
The aim of the course is to study spatial aspect at building level. This Course will provide the architecture knowledge to the planning students with basic understanding of different concepts of architecture, design simple layouts and make various basic architectural drawings. This course also introduces the concepts and fundamentals of architectural drawing and develops representation skills and to nurture the understanding of the nature of geometrical forms and simple building forms.

Course Objectives
The objectives of this course are
- To study Anthropometrics and its Relationship with Building.
- To study various Space Standards, Expression of Built Mass through Plan.

Course Outcomes
On completion of this course, the students will be able to
CO1: Explain the difference between ergonomics and anthropometry.
CO2: Explain the basic concept of form and functions in building design.
CO3: Discuss the importance of architectural space standards for designing of simple buildings.
CO4: Discuss various measurements of drawings, plans, sections and elevations

Modules	Blooms level*	Number of hours
MODULE 1: Study and Application of Elements and Principles of Design in Basic Composition Elements of design in basic composition, Application of principles of design, Positive and Negative spaces, Additive and Subtractive spaces and Exercises primarily through 2-D & 3-D models of simple geometric.	L1, L2	24
MODULE 2: Anthropometry Anthropometrical study of various spaces, Application of Anthropometrics, Design of Anthropometrics Cell with minimum space requirements of single unit for a single person and Study the interior spaces by making 3-D views (axonometric and isometric)	L1, L2	24
MODULE 3:Measured Drawing Introduction to fundamentals of measured drawing, line value, lettering, drawing representation, format for presentation methods and technique of	L1, L2, L4	24

measuring buildings and their details. Measured drawing of simple objects like furniture, detailing in terms of construction, ornamentation, measured drawing of building components like column, door, window, cornice, etc.		
MODULE 4: Scale and Order Analyzing single activity, anthropometrical data, designing the elements of building e.g. entrance gate design, floor design, door design, Table-Chair, Drafting table etc. Living space, Home stay, Shop, Small Activity space, etc.	L1, L4, L5	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Chiara J., A. (1980). Time Save Standards for Building Types, McGraw Hill.
- Ching, D.K (2007)Architecture: Form, Space and Order, Oxford: 3rd John Wiley and Sons Inc,Hoboken, New Jersey.

Reference Books

- Crosbie M. and Watson D., Time Saver Standards for Architectural Design, 8th Mc-Graw Hill
- Lin M. (1985), Architectural Rendering Techniques: A Colour Reference, John Wiley and Sons Inc, Hoboken, New Jersey. Reference

Modes of Evaluation: Presentation/Assignment/ /Drawings/Plans

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	R-I	**R-II**	**R-III**	**Report**	**CE**	**A**	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	2	--	--	2	--	--	--	--	--	1	2	1	--
CO2	1	1	1	2	--	--	2	--	--	--	--	--	1	2	1	--
CO3	1	2	1	1	--	--	2	--	--	--	--	--	1	2	1	--
CO4	1	1	1	2	--	--	2	--	--	--	--	--	1	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

	BASIC GRAPHICAL SKILLS (PLN2108)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Fundamentals of Building Structure					
Co-requisites	Planning and Design Lab I					

Catalog Description

The aim of this course is to provide the students with the basic tools and techniques for free hand drawing and technical drawings. The subject covers concept of scales and lettering and familiarize them with planar and solid geometry to conceptualize the 3D forms in to 2D with the help of Orthographic Projections of Planes and Solids including sections of solids as well.

Course Objectives

The objective of this course is

- To familiarize the students with various drawing tools and accessories used in drafting and lettering techniques to produce and visualize geometrical composition and form.
- To provide a clear understanding about the scale measurement; plane geometry, solid geometry and projections used as drawing technique.

Course Outcomes

On completion of this course, the students will be able to

CO1: Draw free hand drawing and lettering.
CO2: Project points, lines and planes in different positions in 1st angle projection system.
CO3: Project regular rectilinear and circular solids in different positions.
CO4: Apply their knowledge in making sections, intersections and interpretations of solids.

Modules	Blooms level*	Number of hours
MODULE 1: Free Hand Drawing and Lettering Free hand and mechanical lettering cycle.	L1	6
MODULE 2: Basic Technical Drawing Concept and types of line, Division of lines and angles, Drawing polygons, Inscribing and circumscribing circles in polygons, Drawing geometrical curves helix, Conoid etc.	L1, L2	6
MODULE 3:Orthographic Projections- Planes and Solids Definition, Meaning and concept, Planes of Projections, First angle projections, Projection of points, Lines and planes in different positions. Projection of regular rectilinear and circular solids (prisms, pyramids, cones, cylinders, spheres etc.) in different positions. Sections of regular rectilinear and circular solids (prisms, pyramids, cones, cylinders, spheres etc) in varying conditions of sectional plane.	L1, L2, L3	18

MODULE 4: Solid Geometry Construction of section, Intersection and interpenetration of solid.	L1, L2, L3	6

***Bloom's Level:** *L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books:

- Bhatt, N.D. (53rd Edition 2014). *Engineering Drawing*: Charotar Publishing House Pvt. Ltd.
- Dhawan, R.K.(3rd Revised Edition 2006). *A textbook of Engineering Drawing (In First Angle Projection)*: S Chand & Company.
- Ramsey & Sleeper. (Sixth Edition 1970). *Architectural Graphic Standards:* John Wiley & Sons.
- Shah, P.J. (Revised Edition 2013). *Textbook of Engineering Drawing*: S Chand (G/L) & Company Ltd.

References:

- Ching, Francis D.K. (6th Edition 2015). *Architectural Graphics*: John Wiley & Sons.
- Ganesan, R., &Devarajan, V. (1998). Intersecting features extraction from 2D orthographic projections. *CAD Computer Aided Design*, *30*(11), 863–873. https://doi.org/10.1016/S0010-4485(98)00043-8
- Williams, E. (2001). Lettering. *Eurostitch Magazine*, *9*(51), 28–29. https://doi.org/10.1007/978-94-010-2948-3_17

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	--	2	--	--	--	--	2	1	2	1	1
CO2	1	1	1	2	--	--	--	--	--	--	--	2	1	2	1	--
CO3	1	1	1	2	1	--	--	--	--	--	--	2	1	1	1	--
CO4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Second Semester

	SURVEYING AND PHOTOGRAMMETRY (PLN2202)	L	T	S	P	C
Version 1.1		2	0	0	0	2
Pre-requisites/Exposure	Fundamentals of Building Structures, Materials and Principles of Construction					
Co-requisites	Planning and Design Lab – II (Graphics and Presentation Techniques)					

Catalog Description

The aim of this course is to study the Preparation of Base Map from data obtained through Field Survey. The course will convey the theory of map projections and coordinated systems as well as the theoretical basis for data capture within surveying and photogrammetry.

Course Objectives

The objectives of this course are

- To learn the Methods of Techniques of Physical Survey and Preparation of Base Maps and Planning
- To study the Techniques and use of Aerial Photography and GIS for Preparation of Maps and Plans

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the need and concept of scaling, measurement and units

CO2: Carry out basic surveying tasks using Chain Surveying and Compass Surveying equipment's

CO3: Evaluate areas based on Plain Table Surveying using Digital Planimeter.

CO4: Explain the concept of levelling and need of contouring

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to surveying Introduction to surveying, its practicality in the profession. Classification of various survey instruments, techniques & equipment. Reading of survey maps, understanding of features and undulations of ground. Scaling of survey measurements and errors in surveying. Concept of trigonometry, traversing & tachometry in surveying.	L1, L2	6
MODULE 2: Measurements Measurements in horizontal plane, linear measurements with chain & tape,	L1, L2	6

setting-out & survey stations, survey accessories, survey lines, open & closed traverse, chaining & offsetting, direct & indirect ranging, logbooks, field boundaries, field area estimation. Chain Surveying: Principles of survey, equipment required selection of station, methods of taking offsets. Compass Surveying: The prismatic compass, its construction and uses and other types of compasses.		
MODULE 3: Basic and advanced surveying techniques Plane table surveying (equipment, methods, advantage & disadvantage, errors etc.), Theodolite Surveying (temporary & permanent adjustment, measuring of magnetic bearings, horizontal & vertical angles and Theodolite traverse & balancing closing error). Tachometric surveying (general instruments, different systems of tachometric measurements, stadia method). The concept of total station survey and its multi-functioning in surveying. Introduction to Use of DGPS, automated & digital surveying, G.P.S, Aerial Photography, etc.	L1, L2	6
MODULE 4: Contours and Slope Analysis Contouring methods & equipment, contour intervals, direct & indirect methods of contouring, block contour surveys, profile levelling, longitudinal & traverse cross sections, and gradients. Measurements along sloping landforms, principles, definitions, methods, instruments required for simple & differential levelling.	L1, L2	6

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Textbooks

- Arora, D. K. (2018). *Surveying Vol. I.* Standard Book House; 16 edition.
- Bhavikatti, S. S. (2016). *Surveying and Levelling Volume-II, 2nd edition.* I K International Publishing House.
- Edward M. Mikhail, J. S. (2012). *Introduction to Modern Photogrammetry.* Wiley India Pvt Ltd.
- Edward M. Mikhail, J. S. (2012). *Introduction to Modern Photogrammetry.* Wiley India Pvt Ltd.

Reference Books

- Edward M Mikhail and James S Bethel, (2012): *Introduction to Modern Photogrammetry*
- James Warren Bagley, (2018): *The Use of the Panoramic Camera in Topographic Survey: With Notes on the Application of Photogrammetry to Aerial Survey*
- Charles D Ghilani and Paul R Wolf (2018): *Elementary Survey: An Introduction to Geomatics*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	1	--	1	1	--	--	--	--	--	1	1	--	--	--
CO2	1	--	1	--	1	1	--	1	--	--	--	1	1	--	--	--
CO3	1	--	1	--	1	--	--	--	--	--	--	1	1	--	--	--
CO4	1	--	1	--	1	1	--	--	--	--	--	1	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	STATISTICAL AND QUANTITATIVE METHODS IN PLANNING – II (PLN2204)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Statistical and Quantitative Methods in Planning – I					
Co-requisites	Planning and Design Lab – II (Graphics and Presentation Techniques)					

Catalog Description

The aim of this course is to provide exposure to the students to basic understanding of correlation and regression models. Along these, Different types of statistical inference and ANOVA for statistical and quantitative method in planning. This course will enable the students all the techniques used for data analysis through different types of statistical and quantitative method in urban and regional planning. Students will be able to apply these techniques in their planning studios in each of the semesters for major and minor planning exercise.

Course Objectives

The objectives of this course are to

- Learn the Correlation and Regression Analysis.
- Get familiar with different Statistical Inference for Planning.
- Equip students with ANOVA distribution in Planning.
- Learn the Decision Theory and its application in Planning.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define essential analysis for different types of planning.

CO2: Provide an overview about the Hypothesis, large and small tests for means and proportion.

CO3: Utilize their knowledge in conduction of Chi-square and ANOVA distribution method.

Modules	Blooms level*	Number of hours
MODULE 1: Correlation and Regression Analysis Degree of correlation, Scoffer Diagram, correlation analysis, correlation co-efficient, co–efficient of rank correlation, partial correlation analysis and multiple correlation, simple Linear and nonlinear regression, lines of regression, coefficient of regression; Multiple Regression Analysis; Applications in planning.	L1, L3, L4	9

CO4: Incorporate Mathematical Programming models in planning.

MODULE 2: Statistical Inference Types of estimation; point, interval, testing of hypothesis, statistical hypothesis, simple and composite tests of significance, null hypothesis, alternative hypothesis, types of errors, level of significance, critical region; two tailed and one tailed test, large and small sample tests for mean and proportion; Applications in planning.	L1, L3, L4	9
MODULE 3: Chi-Square Test and Analysis of Variance (ANOVA) Chi-square distribution: applications of chi-square distribution; test of goodness of fit; ANOVA distribution; Applications in planning.	L1, L3, L4	9
MODULE 4: Mathematical Programming TechniquesandDecision Theory Mathematical Programming models, linear programming problems, transportation problems, assignment problems, applications in planning. Decision making under conditions of certainty, uncertainty, and conditions of risk, decision trees, pay off matrix, applications in planning.	L3, L4	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Gupta, S.C., (2013). Fundamentals of Statics, Himalaya publishing house, Mumbai, India
- Friedman, J.H., Tibshirnini Robert, Hastie Trevor, (2001). The Elements of Statistical Learning, Springer Stanford, USA
- Marcus, Kartin, (2002). Quantitative Methods in Proteomics, Springer Stanford, USA
- Panter, A. T., Sonya K Sterba (2010).Handbook of Ethics in Quantitative Methodology, Taylor & Francis Group, New York & London

Reference Book

- Sage Journals (1986). Quantitative Reasoning in the Planning Curriculum. https://journals.sagepub.com/doi/abs/10.1177/0739456X8600600106?journalCode=jpea
- http://www.personal.kent.edu/~dfresco/CRM_Readings/Cohen_1992.pdf
- https://journals.sagepub.com/doi/abs/10.1191/030913297676693207
- Fotheringham, A. Stewart (1997). Trends in quantitative methods I: stressing the local,https://journals.sagepub.com/doi/abs/10.1191/030913297676693207

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	--	1	--	--	--	--	--	--	--	--	2	2	2	--	1	--
CO2	--	1	--	--	--	--	--	--	--	--	2	2	2	--	1	--
CO3	--	1	--	--	--	--	--	--	--	--	2	2	2	--	1	--
CO4	--	1	--	--	--	--	--	--	--	--	2	2	2	--	1	--
CO5	--	1	--	--	--	--	--	--	--	--	2	2	2	--	1	--

1: strongly related, 2: moderately related and 3: weakly relate

	EVOLUTION OF AESTHETICS, CULTURE AND TECHNOLOGY (PLN2205)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning					
Co-requisites	Techniques of Planning – I					

Catalog Description

The aim of this course is to provide exposure to the students to fundamental understanding of Arts and Aesthetics. This course will also focus on the role of culture and their technology in Planning for India. This course will enable the students with development of aesthetics outside of India region and their character in respective country and India as well. Students will be able to apply or reference these techniques in their planning studios in each of the semesters for major and minor planning exercise.

Course Objectives

The objectives of this course are

- Learn the fundamentals of Arts and Aesthetics.
- Get familiar with different concepts of Aesthetics.
- Equip students with role of culture and technology in Planning.
- Learn the Aesthetics and Culture in Ancient India Planning.
- Acquire know-how to use Asian, European and American Aesthetics, Culture and Technology for Indian Context.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define creative and visual arts with their social and artistic expression.

CO2: Provide an overview about the different types of concepts and theory for scale, form and structure.

CO3: Utilize their knowledge in conduction different culture, their symbols, expression in built form for contemporary development.

CO4: Incorporate role of climate and Indian Aesthetics Culture in Planning for India.

Modules	Blooms level*	Number of hours
MODULE 1: Fundamentals of Arts and Aesthetics Importance of creative and visual arts; Art as a medium of communication; Art as a means of social expression; Human habitat as an artistic expression. Concepts of beauty and ugliness; Classical theories of aesthetics; Relationship of aesthetics with other cultural values; Concepts of scale, space, form and	L1, L2, L3	9

structure; Concepts of time as a dimension of built form; Role of climate in evolution of settlement form.		
MODULE 2: Role of Culture and Technology in Planning Definition and symbols of culture; Transmission of culture; Cultural traits of ethnic groups and their expression in built form; Aesthetics of mixed culture and global culture; Cultural pollution; Role of technology in changing arts, culture, aesthetics, built form and structure of human habitat.	L1, L2, L3	9
MODULE 3: Aesthetics, Culture and Technology in India Aesthetics, culture and advancement of technology in ancient India and their impact on planning of settlements; Planning principles of the Manasara Treatise and Indus Valley Civilization. Aesthetics, culture and advancement of technology during the Mughal and British periods and their impact on planning of human settlements; Aesthetics, culture and advancement of technology in independent India and their impact on planning of human settlements.	L3, L4, L5, L6	9
MODULE 4: Asian, European and American Aesthetics, Culture and Technology Evolution of aesthetics, culture and technology in Europe and North America and their impact on city planning principles; Greek cities, Roman cities, European medieval cities; Planning during Renaissance and Baroque period. Evolution of aesthetics, culture and technology and their impact on city planning principles in America, Africa, Asia, the Middle East.	L1, L2, L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Manjul Sharma & R B Sharma (2019): Kirti Aesthetics
- DevenderKumari (2019): History of Indian Art
- Agrawal (2017): Textbook of Plastic, Reconstructive and Aesthetics in Plastic Survey

Reference Book

- Tulekova, Gulmira (2018). Problems of development of aesthetic culture at teenagers by means of the Kazakh decorative and applied arts, https://www.redalyc.org/jatsRepo/310/31055914008/html/index.html
- https://lecturenotes.in/materials/30642-evolution-of-aesthetics-culture-and-technology
- https://www.researchgate.net/publication/311583763_Aesthetic_values_of_the_future_cities
- https://journals.sagepub.com/doi/abs/10.1191/030913297676693207

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO2	1	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO3	1	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO4	1	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	TECHNIQUES OF PLANNING - I (PLN2206)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning					
Co-requisites	Planning and Design Lab – II (Graphics and Presentation Techniques)					

Catalog Description

The aim of this course is to provide exposure to the students to Basic Techniques of Planning such as preparation of base maps, preparation of checklist and questionnaire, conduction of various kinds of surveys, techniques for data analysis and presentation. This course will enable the students a thorough understanding of all the techniques used for data collection, analysis and presentation in urban and regional planning. Students will be able to apply these techniques in their planning studios in each of the semesters.

Course Objectives

The objectives of this course are

- Learn the Methods and Contents of Preparation of Base Maps.
- Get familiar with different Database required for Planning.
- Equip students with various survey techniques pertaining to Socio-economic and physical surveys.
- Acquire know-how of analyzing and presenting statistical and spatial data.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define essential elements and preparation of Base Maps.

CO2: Provide an overview about the data requirements, availability and methods for collection.

CO3: Utilize their knowledge in conduction of socio-economic and physical surveys.

CO4: Incorporate learnt techniques of statistical and spatial data presentation in planning studios.

Modules	Blooms level*	Number of hours
MODULE 1: Techniques of Preparing Base Maps Choice of appropriate scale for region and settlement level plans; town development plans, zonal development plans, layout plans; graphical, linear and areal scales; contents of base maps at various scales, notations - basic disciplines of maps; Measurement of Areas.	L1, L2, L3	9
MODULE 2: Data Base for Planning and Socio - Economic Surveys Data requirements for urban and regional planning; sources of primary and secondary data; questionnaire design, measurement scale and their	L1, L2, L3	9

application, sampling techniques, types of socio-economic surveys; self-surveys, interviews, mailed questionnaires and observer participation.		
MODULE 3: Physical Surveys Techniques of conducting surveys for land use, building use, density, structural condition of buildings, heights of building, land utilization and physical features of land; Data requirement for various types of regional plans; Techniques for conducting regional surveys.	L1, L2, L3	8
MODULE 4: Techniques of Graphic Presentation of Statistical Data and Spatial Data Tabulation of data, graphical presentation of data; pie diagrams, histograms, bar charts, normal, semi-log and double log graphs and their uses; colour, black and white presentation techniques; basis disciplines of illustration and tables. Land use classification, coding and analysis; residential and non-residential density patterns and analysis; colour, black and white presentation techniques; basis disciplines of illustration; Presentation of spatial data, analysis and proposals.	L3, L4, L5	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rezaeian, M., Dunn, G., St. Leger, S., & Appleby, L. (2007). Geographical epidemiology, spatial analysis and geographical information systems: A multidisciplinary glossary. Journal of Epidemiology and Community Health, 61(2),
- Schwandt, T. A. (1996). Qualitative data analysis: An expanded sourcebook. Evaluation and Program Planning,
- Sonnad, S. S. (2002). Describing data: Statistical and graphical methods. Radiology. Radiological Society of North America Inc.
- Visualising Spatial Data. (2008). In Applied Spatial Data Analysis with R (pp. 57–80). Springer New York.

Reference Book

- Community Places. (2014). Community Planning Toolkit: Community Engagement. Community Planning Toolkit, 24. Retrieved from
    - http://www.communityplanningtoolkit.org/sites/default/files/Engagement.pdf
- Harrison, J. P. (2010). Strategic Planning and Swot Analysis. Essentials of Strategic Planning in Healthcare, 91–97.
- Chambers, R. (1994). Participatory rural appraisal (PRA): Analysis ofexperience. World Development, 22(9), 1253–1268.
- Shelton, T., Poorthuis, A., &Zook, M. (2015). Social media and the city: Rethinking urban socio-spatial inequality using user-generated geographicinformation. Landscape and Urban Planning, 142, 198–211.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	2	--	--	--	--	--	--	--	--	--	1	2	--
CO2	1	--	--	2	--	--	--	--	--	--	--	--	--	1	2	--
CO3	1	--	--	2	--	--	--	--	--	--	--	--	--	1	2	--
CO4	1	--	--	2	--	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

	APPLIED GEOLOGY AND HYDROLOGY (PLN2207)	L	T	S	P	C
Version 1.1		2	0	0	0	2
Pre-requisites/Exposure	Materials and Principles of Construction					
Co-requisites	Surveying and Photogrammetry					

Catalog Description

The aim of the course is to study basics of Geology and Hydrology related to Planning. The course deals about topography, terrain and climatic conditions of a region which are essential to understand while preparing a plan. The Course deals about the physical processes on the surface and below the surface of the earth. It is a multidisciplinary course aims to some part of Geology (Rock formation, soil formation, aquifer, layer of Earth etc.), Geography (Interaction between Man and Environment and other natural features) and Hydrology (Surface and Ground water). The Course comprises of various types landforms and geological structure exists on the earth surface as well as features located below the surface. The course provides a comprehensive knowledge to the students about relevance of geological structure and hydrology in spatial planning.

Course Objectives

The objectives of this course are

- To learn Earth Science and Meteorology and their Components.
- To provide knowledge on Geological Structures, Landform, Land Slide, Ground Water Characteristics, etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain earth as a planet, its rotation, revolution, solar system, atmosphere and its composition and geological structure etc.

CO2: Explain the various types of landform affects the implementation of a plan.

CO3: Describe spatial distribution of earthquakes zones in India?

CO4: Explain the role of spatial planning in the ground water distribution?

Modules	Blooms level*	Number of hours
MODULE 1: Introductory Earth Science and Meteorology Earth as a planet, the solar system, movement of the earth, atmosphere and its composition, composition of the earth; the earth processes, geological cycles, igneous activities, volcanoes, minerals and their properties; rock types and their character; bedding, outcrop and strikes; rock cycle; geological and time scale; Indian stratigraphy.	L1, L2	6
MODULE 2: Geological Structure, Landforms, Weathering, Landslides and Mass Wasting Description and classification of folds, faults, joints, unconformities, fault planes, geometrical destruction, etc; land form types; erosional, depositional fluvial, glacial, aeolian and marine; rock weathering and climate; mechanical and chemical processes, soil formation, landslides, sources and causes of crystal displacements, soil formation, landslides, sources and causes of crystal displacements, types, characters and effects, instability of hill slopes, prevention.	L1, L2	6
MODULE 3: Earthquakes Historical account, tectonic behavior and seismic belts; causes, intensity and magnitude of earthquakes, seismic zoning in India, earthquake waves and their character, particle motion and behavior in various geological formations; seismography, accelerograms and their interpretation, prediction and prevention; earthquake resistant structures. General considerations, sources of preliminary geological data particularly related to Indian stratigraphic sequences and the types of foundations, nature and preparation of foundation for road, bridge, building and other geo-technical structures; geophysical explorations.	L1, L2, L4	6
MODULE4: Ground Water Concept and role in town planning of different types of terrain, hydrologic cycle, vertical distribution of groundwater, interstices; Groundwater bearing properties of different lithological formations, porosity, permeability, specific yield, specific retention, transmissivity and storage coefficient; ground water in igneous, sedimentary and metamorphic rocks; aquifers; types and classification (geological), aquiclude, aquitard; aquifuge, water table and piezometric surface; surface water reservoirs and springs; artificial recharge and ground water mound hydrological features in relation of seepage, fluctuation of water table and hydrographs, geological structure and underground passages for water supply.	L1, L3, L4	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Reddy D.V. (2010). Applied Geology, Vikas Publication house.
- Reddy M.T.M. (2007), Applied Engineering Geology, New Age International.

Reference Books

- Freeze R.A. (1979), Ground water,Prentice Hall.
- Linsley R.K. (2017), Applied Geology, MC Grawhill Exclusive.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	1	1	2	--	1	--	--	--	--	--	1	2	--	--
CO2	1	2	1	--	--	--	1	--	--	--	--	--	1	2	--	--
CO3	1	2	1	--	--	1	--	--	--	--	--	--	1	--	2	2
CO4	1	--	1	--	1	1	1	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	COMPUTER AIDED DESIGN (CAD) IN PLANNING (PLN2209)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Planning and Design Lab II					
Co-requisites	Techniques of Planning I					

Catalog Description

The course aims to study fundamentals of utilizing CAD tools in layout plans and regional plans. The main objective of the course is to develop understanding and details of master plan and Regional plan and all other maps by the use of drafting software's like AutoCAD. The course deals with technical aspect and gives a brief on the preparation of base map with the help of command and tools used in the software.

Course Objectives

The objectives of this course are

- To study the basic tools of automated design and drafting in CAD.
- To study the application of CAD in layout plans and regional plans and its limitations.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain different basic commands which can be used in Automated drafting.

CO2: Explain different tools and commands used in editing and controlling of drafting

CO3: Discuss how to digitize layout plans made on paper by hand drafting

CO4: Describe use of base map for region, scanning of maps, symbolization and layering in the software.

Modules	Blooms level*	Number of hours
MODULE 1: Drafting in CAD Need for Computer Applications in Planning; Need for automated design and drafting; Tools for automated designs and drafting; Elements of spatial data in CAD - Arcs, lines, rectangles, polylines, points, circles, donuts, layers, grids, snaps and object snaps, etc.	L1, L2	9
MODULE 2: Editing and Controlling Display in CAD Move, scale, copy, offset, change, trim, extend, mirror, divide, measure, array, break, hatch, block, zoom, regen, view, pan, fonts, etc.	L1, L2, L3	9
MODULE 3: Case Studies of Lay-out Plans Paper maps, digital layout maps, on screen digitization; 2D and 3D conversion, perspective view, walk through of layout.	L1, L2, L3	9

MODULE 4: Limitations Limitations of Computer Aided Design and Drafting in Planning; Non-linking of spatial and attribute data; Need for GIS packages for handling spatial and attribute data.	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks

- Rao, P.N. (2002). CAD/CAM: Principles and Applications, New York: McGraw Hill Education.
- Rod, S. (1987). Computer Graphics: Systems and Concepts, Boston: Addison-Wesley.

Reference Books

- Ding, S. (2008). Modelling and Visualization with AutoCAD, New York: Fairchild Books Inc.
- Luepton R.M, (2nd edition, 2007). Graphics Concepts of CAD, New Jersey: Prentice Hall.

Modes of Evaluation: Sheet work/Presentation/Report/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	1	1	--	--	1	--	1	--	--	--	1	2	2	--
CO2	1	1	1	1	--	--	1	--	1	--	--	--	1	2	--	--
CO3	1	1	1	1	--	--	1	--	2	--	--	--	1	1	--	--
CO4	1	1	1	2	1	1	--	--	2	1	1	1	2	1	1	2

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND DESIGN LAB-II (PLN2208)	L	T	S	P	C
Version 1.1		0	0	8	0	8
Pre-requisites/Exposure	Planning and Design Lab I					
Co-requisites	Materials and Principles of Construction					

Catalog Description

This course aims to study graphics presentation techniques and learn communication skills through planning exercises. The Course deals about the appreciation of an area in terms of compatibility of land use, availability of infrastructural facilities and amenities according to the planning standard and benchmarks. The course will enhance the knowledge of applying statistical techniques on database and the representation of the work. This course helps student in the preparation base map and key map at different level. The area appreciation exercise in the course will give a comprehensive knowledge about land use and infrastructure services in the area

Course Objectives

The objectives of this course are

- To do area Appreciation of a Neighbourhood and make Graphical Presentation of the Data.
- To learn about the Communication Skills Verbal as well as Non-verbal.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explainwhich particular statistical diagram applicable on what type of dataset.

CO2: Describe various component of base map and why key map is important in a map.

CO3: Explain major principles of a good presentation.

CO4: Appreciate different uses of land, their description and analysis for the given area.

Modules	Blooms level*	Number of hours
MODULE 1: Graphic Presentation, Base Maps and Key Maps Graphic presentation of statistical data, Preparation of Base Maps at the levels of Site, Area, Zone, City, Region, etc; Preparation of Key Maps;	L1, L2	20
MODULE 2: Composition of Drawings and Photographs Composition of Drawings, Proportions of Lettering and Line thickness, Standard symbols, Line styles, Colour-coding; Legend, Drawing Formats; Appreciation of Thematic Maps of various levels of Planning; Introduction to Photography, Basic Principles, Composition for Architectural Building Photographs and Planning / Site Photographs	L1, L2	25

MODULE 3: Communication Skills Graphic presentation and communication skills; Use of Power Point and Multi-Media Projections;	L1, L3, L4	25
MODULE 4: Appreciation Studies Appreciation studies of Residential, Commercial, Institutional areas in small urban and / or rural Settlements	L1, L3, L6	26

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- David and Johnson PE (2006), Fundamentals of Land Development, John Wiley & Sons.
- Gaber J. &Gaber S. (2007), and Qualitative Analysis for Planning and Policy, Planners Press, American Planning Association.
- Richard E Closterman (1990), Community Analysis and Planning Techniques, Rowman and Littlefield, UK.

Reference Books

- Aldrich J. & Rodríguez H. (2013), Introduction: Graphical Presentation of Data, SPP Publishing house.
- MacFarland T. (2014), Introduction to Data Analysis and Graphical Presentation in Biostatistics, Springer International Publishing.

Modes of Evaluation: Assignment/Case Study/ Presentation/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	R-I	**R-II**	**R-III**	**Report**	**CE**	**A**	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	1	2	--	--	--	2	1	--	--	1	2	1	1
CO2	1	2	1	1	2	--	1	--	1	1	--	--	2	1	2	1
CO3	1	2	1	2	2	--	1	--	1	1	--	--	2	1	2	1
CO4	1	1	1	2	--	1	1	--	--	2	--	--	1	1	2	2

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Third Semester

	PLANNING THEORY-I (PLN2301)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Techniques of Planning I					
Co-requisites	Fundamentals of Urban and Regional Planning					

Catalog Description

The main aim of the course is to study theoretical foundations of planning theory.This course is to study and analyse the concept of planning theory. The course aims to give comprehend knowledge about planning theories in Indian context. The role of public participation in planning process is to be study in this course and its effectiveness in the plan for social welfare in sustainable manner. Learning from advance nation in the planning, implementation and evaluation is also included in this course.

Course Objectives

The objectives of this course are

- To comprehend theorization process in planning and centrality of participation in planning theory.
- To understand sustainability, rationality and globalization.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role of planning theory in guiding development process in developing countries like India.

CO2: Explain the importance of participation in any development plan.

CO3: Describe sustainable urban development.

CO4: Discuss the advantage and disadvantage of compact city.

Modules	Blooms level*	Number of hours
Module 1: Defining Planning Theory and Theories of City Development Definitions of theory in general; Definitions of planning theory including theory of planning, theory in planning and theory about planning; Definition of paradigm and its various stages of development by Kuhn; Significance of planning theory; Espoused theories and theories in use. Compact city approach: concept, advantages and limitations; Forms of cities in developing world, Forms of cities in the developed world; Forms of cities in the former and present socialist countries.	L1, L2	10

Module 2: Participation and Planning Public interest and its forms; History and significance of public participation; Methods of public participation; Impediments to public participation and conditions for effective public participation; Public participation and empowerment; Participation, policy formulation and implementation	L1, L2	8
Module 3: Sustainability, Rationality and Globalization Sustainability and rationality in planning; Components of sustainable urban and regional development; Globalization, internationalization, modernism and postmodernism debate; Pragmatism in planning; Regime theory and urban politics	L1, L2	8
Module 4: Planning, Implementation and Evaluation Need for evaluation; Inseparability of planning and evaluation; Planning theories and evaluation; Methods of evaluating development plans; Theories of implementation of planning policies and development plans.	L1, L2	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rajput, R.K. (2013). *Elements of Mechanical Engineering*, Delhi: Lakmi Publication.
- Jain, V. (2011). *Basics of Mechanical Engineering*, Delhi :DhanpatRai Publication.
- Kumar, D.S. (2013). *Elements of Mechanical Engineering*, , Delhi : S.K. Kataria and Sons Publications.

Reference Books

- Ganesan, V. (2017). *Internal Combustion Engine*, New-Delhi: Tata McGraw Hill.
- Nag, P.K. (2013). *Engineering thermodynamics*, New-Delhi: Tata McGraw Hill.
- Kumar, D.S. (2013).*Thermal Engineering*, New-Delhi: S.K. Kataria and Sons Publications.
- Hazra, S.K. and Chaudhary, A.K. (2012). *Workshop Technology Vol. II* . New Delhi: Asian Book Comp.

Modes of Evaluation: PPT presentation on projector of Theory/Group Discussion/ Individual Presentation/ Case Study

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	2	2	--	--	--	2	--	--	1	1	--	--
CO2	1	1	--	2	2	2	--	--	--	2	--	--	1	1	--	--
CO3	1	1	--	2	1	1	--	--	--	2	--	--	1	1	--	--
CO4	1	1	--	--	--	2	--	--	--	2	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	SETTLEMENT GEOGRAPHY (PLN2302)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning					
Co-requisites	Evolution of Aesthetic, Culture and Technology					

Catalog Description

This course aims at studying Extent, Location, Spatial Distribution and Internal Structure of Human Settlements and their regions. This course comprehends analytically the settlement hierarchy and settlement patterns in a region and evaluates the internal structures of cities, land Value and Land Use Theory.

Course Objectives

The objectives of this course are

- To comprehend analytically the Settlement Hierarchy and Settlement Patterns.
- To understand the Internal Structures of Cities, Land Value and Land Use Theory.
- To develop the ability to Critically Analyze Settlement Systems embedded in the Urban and Regional Planning.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain Site and Situation in the context of settlement pattern.

CO2: Explain spatial distribution and arrangement of settlements.

CO3:Examine the urban land use studies and their applicability in the context of Indian cities.

CO4:Assess the image of a city with respect to its socio-economic and physical characteristics.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Need for study of settlement geography; definition of settlement; ranking of towns; site and situation patterns; settlement morphology.	L1, L2	8
MODULE 2: Spatial Distribution of Settlements Settlement in regional; context; spatial models of location, size and spacing of settlements; Central Place Theory; Characteristic of rural – urban fringe; rural– urban continuum; inter – urban inequalities; Interaction among settlements; Gravity model, classification of settlements.	L1, L3, L4	12
MODULE 3: Urban Land Use Studies Classification of land use in urban area; analysis of location and structure and models of growth patterns of CBD, industrial areas and residential areas; intra – urban inequalities.	L1, L2	5

MODULE 4: Image of the City Typology of urban perception, impact of socio – economic status of people on the image of a city; components forming the image of a city; land marks, edges, etc.	L1, L2	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks

- Glasson, J. (1974). An Introduction to Regional Planning: Concepts, Theory and Practice, Milton Park: Taylor and Francis.
- Hall, P.G. (1970). The theory and practice of regional planning, London: Pemberton Publishers.

Reference Books

- Lynch, K.A. (1960). The Image of the City, Massachusetts: MIT PRESS.
- Pacione, M. (2001). Urban Geography: A Global Perspective, Milton Park: Taylor and Francis Publications.

Modes of Evaluation: Assignment/Case Study/ Presentation/Class Test/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	1	1	2	--	--	--	1	1	--	--
CO2	1	1	2	--	--	--	1	1	1	--	--	--	1	1	--	--
CO3	1	1	--	--	1	2	2	1	1	--	--	--	1	1	--	--
CO4	1	1	--	--	1	2	1	1	1	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	TECHNIQUES OF PLANNING-II (PLN2303)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Understanding of Techniques of Planning-I					
Co-requisites	Demography and Urbanization					

Catalog Description

The Course aims to study advanced planning techniques. This course give exposure to the students about the techniques for understanding various phenomenon in planning. The course aims to make students aware about the plan preparation techniques in urban as well as regional planning. Formulation of spatial standards in planning has also been focused upon. The course also briefs about applications of advanced techniques used in planning.

Course Objectives

The objectives of this course are

- To understand Advanced Planning Techniques.
- To develop the ability to professionally examine the Urban and Regional Planning Issues.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the Locational attributes of activity/population and urban structure.

CO2: Explain spatial standards for residential, industrial, commercial and recreational areas and their importance in planning.

CO3: Discuss the methodology of Master and Regional Plan.

CO4: Describe retail location analysis, industrial location analysis, gravity analysis etc.

Modules	Blooms level*	Number of hours
MODULE 1: Methods of Analysis Methods of analysis of Socio-Economic and Physical data; Use of techniques of Location Quotient, Coefficient of Localization; Locational attributes of activity and population; Techniques for understanding structure of urban areas, land values and density patterns	L1, L2, L4	10
MODULE 2: Spatial Standards Formulation of spatial standards for residential, industrial, commercial and recreational areas, space standards for facility areas, utilities and networks; Population, Distance criteria; Performance standards; Case studies.	L1, L4	8

MODULE 3: Plan Preparation Techniques Setting of Goals and Objectives; Methodologies for preparation of urban/ regional development plans, master plans, structure plan and strategy plan techniques; plan implementation techniques; public participation and plan implementation; techniques of urban renewal and central area redevelopment; Contents of a Master Plan, Regional Plan, etc.	L1, L2	10
MODULE 4: Introduction to Advanced Techniques Thresholds analysis, retail location and industrial location analysis; intervening opportunity models; Linear programming; Simulation, Gravity Models; Applications in planning.	L1, L3, L4	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Textbooks

- Glasson, J. (2007). An Introduction to Regional Planning: Concepts, Theory and Practice, Milton Park: Taylor and Francis.
- Hughes, J.T. and Kozlowski, J. (1968). Threshold Analysis – An Economic Tool for Town and Regional Planning, Urban Studies, Vol No.5, No.2, pp. 132-143.
- Rondinelli, D.A. (1973). Urban Planning as Policy Analysis Management of Urban Change, Journal of the American Institute of Planners, Vol. 39, No. 1, pp. 13 – 22.

Reference Books

- Bracken, I. (1999). Urban Planning Methods: Research and Policy Analysis, London: Methuen Publications.
- Field, B. and MacGregor, B.D. (1992). Forecasting Techniques for Urban and Regional Planning, Abingdon: Routledge Publication.
- Hazra, S.K. and Chaudhary, A.K. (2012). *Workshop Technology Vol. II* . New Delhi: Asian Book Comp.

Modes of Evaluation: Presentation/Assignment// Written Examination
Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	--	1	--	2	--	--	--	1	1	1	--
CO2	1	1	1	2	--	--	1	2	2	--	--	--	1	1	1	--
CO3	1	1	1	1	--	--	1	2	1	--	--	--	1	1	1	--
CO4	1	1	2	2	--	--	2	1	1	--	--	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	DEMOGRAPHY AND URBANISATION (PLN2305)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning					
Co-requisites	Techniques of Planning					

Catalog Description

The course aims to make students aware about population structure, its composition, urbanization, and urban systems in Indian context. This course gives exposure to usage of socio-economic data in planning and enhances their knowledge regarding population, evolution of urbanization trends in a settlement and its related planning theories. The course consists of five modules which assists student in understanding various dimension of population in a city or region, related issues and analyses settlement system rooted in urban and regional planning.

Course Objectives

The objectives of this course are

- To study varied relationships between demography and urbanization in India.
- To develop the ability to critically analyze settlement systems embedded in the urban and regional planning.

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss population structure, its composition and usage of socio-economic data in urban and regional planning.

CO2: Describe the various demographic variables, their implication in planning and role of Census in defining the urban places in region.

CO3: Explain the history of urbanization, its process and functional classification of urban places

CO4: Discuss legal sphere of urban planning such as state level policy, national Urbanization Policy, five years plans etc.

Modules	Blooms level*	Number of hours
MODULE 1: Study of Population Demographic variables: fertility, mortality, migration; evolution of population study, contribution of Malthus; mortality-trends, biological and social factors and mortality-gender, race, social structure, life style, social status, occupation etc; measures of mortality-crude and age-specific death rates;	L1, L2	12

infant mortality, adjusted or standardized death rates; neonatal mortality rate; fertility: fertility trends, fertility and social and biological behavior; differential fertility, ethnic groups, socio-economical group mobility, location etc.; measures of fertility, crude birth rate; Age-specific fertility rate; total fertility rate, net reproduction rate; migration-causes and consequences of population movement; reasons and types of migration trends; methods of measuring volumes of migration; direct and indirect measures; effect of migration of composition of population.		
MODULE 2: Study of Demography Source of demographic data; Census of India and its role as a data warehouse; population structure and composition - age sex composition, sex ratio, dependency ratio, child-woman ratio; measures of age-sex structure, age-sex pyramid, population composition; marital status, caste, region, literacy level, etc; life table techniques; techniques in preparing life table, abridged life table; population estimation, projection and population forecasting; basic cohorts survival model, inter regional cohorts survival model.	L1, L2	8
MODULE 3: Urbanization in India A brief history of urbanization in India; Mughal and British influences of India cities; post-independence urbanization; urbanization process as influenced by socio-cultural, political, economic and administrative factors; definition of urban centers, concepts of rural-urban continuum and dichotomy; census definition of urban places town, cities, town groups, urban agglomeration, standard urban area metropolis, megalopolis, etc; functional classification of urban places.	L1, L2	8
MODULE 4: Policies and Strategies for Directing Urbanization Trends in India Over view of world urbanization, National Urbanization policy, basic issues in urbanization policy; role of national and state level policies; five year plans, latest attempts at urbanization policy formulation in the country; salient features of the report of the National Commission of Urbanization.	L1, L2	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Shivaramakrishnan, K.C and Kundu, A. and Singh, B.N. (2005), Handbook of Urbanisation in India, New Delhi, Oxford University Press.
- Kundu,A. (2011), Trends and Process of Urbanization in India, IIED and UNFPA, London
- Misra, R.P. (1998), Urbanization in India: Challenges and Opportunities, ICSSR Shillong

Reference Books

- Ramachandran, R (1997). Urbanisation and Urban Systems in India, New Delhi : Oxford University Press.

Modes of Evaluation: Presentation/Assignment/Class Test/Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	--	--	--	--	--	--	--	--	1	2	1	--
CO2	1	1	1	1	1	1	--	1	1	1	1	2	1	1	2	2
CO3	1	1	1	2	--	--	--	--	--	--	--	--	1	2	1	--
CO4	1	2	1	1	1	1	--	--	--	--	--	--	1	1	--	2

1: strongly related, 2: moderately related and 3: weakly related

	TRAFFIC AND TRANSPORTATION PLANNING-I (PLN2306)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Techniques of Planning I					
Co-requisites	Fundamentals of Urban and Regional Planning					

Catalog Description

This course aims at to study essential components of traffic and transportation planning including field surveys, facility design and traffic management. The course gives a brief on prediction of usage demand in future travel and to ensure all the necessary facilities and services to cater to that demand. Transport planning is highly essential in shaping cities, enabling economic activities, promoting community interaction, and enhancing quality of life. It is also essential for sustainable development and ensuring safe accessibility at various levels for all individuals.

Course Objectives

The objectives of this course are

- To familiarize students about different Transport Systems and Road Capacity.
- To provide basic Concepts for Designing Transport Facilities and Traffic Management Systems.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain urban structure and mobility levels, concept of accessibility, land use – Transport Cycle.

CO2: Explain Comprehensive Mobility Plan (CMP) contents and characteristics.

CO3: Examine techniques for estimating direct and indirect road user costs and benefits, value of travel time?

CO4: Describe the major source of air and noise pollution?

Modules	Blooms level*	Number of hours
MODULE 1: Transport System and its Development Role and importance of transport, characteristics and role of various forms of	L1, L2	5

transport systems - road, rail, air, water; evolution of mass transport development in India, urbanization and transport demand, motorization trends.		
MODULE 2: Road Capacity and Traffic Survey and Studies Power absorbing devices: Concept of PCU & level of services, capacity of uninterrupted flow conditions, factors affecting capacity and level of service; capacity of rural and urban roads, capacity at intersections.Traffic Volume Count, origin destination survey, speed and delay study, parking surveys, road network inventory, accident study - need, design of survey proforma, methods of conducting surveys, analysis and interpretation.	L1, L2, L4	7
MODULE 3: Transport Facility Design Roads: Road hierarchy, design control and criteria, geometric design elements, sight distance and control of access; at grade and grade separated intersections Parking: Parking space norms and standards, design standards for on-street and off-street parking facilities. Pedestrian Facilities: Capacity guidelines for at-grade and grade separated facilities, design Considerations Cycling Facilities: Capacity guidelines and design considerations for cycle tracks Public Transport / Para Transit Facilities: Design standards for bus stops, auto rickshaw, taxi, cycle-rickshaw stands.	L1, L2, L4	12
MODULE 4: Traffic Management and Control Traffic Management measures; Arterial Management; Traffic Signs - principles, types and design considerations, road markings; Traffic Signals - types, optimal cycle length and signal settings, warrants; Regulation of Traffic - speed regulation, regulation of vehicle, parking regulations, Case Studies.	L1, L2	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Kadiyali, L.R.(1999). Traffic Engineering and Transport Planning, Delhi : Khanna Publishers.
- Saxena, S.C. (2014). Textbook Of Highway And Traffic Engineering, Delhi : CBS Publishers and Distributors.
- Taylor, M.A.P and Bonsall, P.W. (1996). Understanding Traffic Systems: Data Analysis and Presentation, Abingdon, Routledge Publishers.
- URDPFI, (2014), Standards and Guidelines and Guidelines on Transportation, Delhi : ITPI.

Reference Books

- Buchanan, C. (1963), Traffic in Towns, HMSO.
- OECD, (1975). Better Towns with Less Traffic
- IRC, Publication on Standards and guidelines.

Modes of Evaluation: Assignment/Case Study/ Presentation/Class Test/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	--	2	--	1	--	--	--	1	1	2	--
CO2	1	1	1	1	1	--	2	--	1	--	--	--	1	1	1	--
CO3	1	1	1	1	2	--	2	--	1	--	--	--	1	1	1	--
CO4	1	1	2	2	1	--	1	--	1	--	--	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND DESIGN LAB-III (PLN2307)	L	T	S	P	C
Version 1.1		0	0	8	0	8
Pre-requisites/Exposure	Specification, Estimation and Valuation, Planning and Design Lab I and II					
Co-requisites	Understanding of concept of design					

Catalog Description

This course aims to learn basic designing concepts and principles of neighbourhood planning and provide a practical experience of Neighbourhood Planning and preparation of Site Plans. This course also gives a brief to understand different methods to conduct survey for a site and its neighbourhood characteristics. The course also includes report and sheets having all the basic requirements of Site planning and Neighbourhood planning.

Course Objectives

The objectives of this course are

- To introduce the Fundamentals of preparation of Site Plans and Neighborhood Plans.
- To familiarize the students about Standards and Space requirement of different Land Uses and Facilities for a Target Population for preparation of a Site Plans.

Course Outcomes

On completion of this course, the students will be able to

CO1: Prepare methodology, checklist, questionnaire and base map for the study area.

CO2: Examine the existing site analysis on the basis of collected data.

CO3: Identify issues and potential which are essential for preparation of neighbourhood plan.

CO4: Prepare neighbourhood plan and submission of final report for the same.

Modules	Blooms level*	Number of hours
MODULE 1: Designing, Preparation and Presentation of Drawings Design and preparation of plan, sections and elevation of low rise and high-rise apartments taking into account the building bye-laws and zoning regulations; Preparation of presentation drawings. Introduction to the working drawings; Preparation of plans, sections, elevations, and important details of an apartment unit.	L1, L2	20

MODULE 2: Site Analysis and Conceptual Approach to Site Planning Site analysis, development standards and preparation of the design brief; various considerations for site layout, conceptual approach to site planning.	L1, L4	20
MODULE 3: Layouts and Area Analysis Preparation of preliminary layout and area analysis; Final layout showing the circulation and basic infrastructure.	L1, L6	40
MODULE 4: Costing and Preparation of Model Rough costing of the scheme, and preparation of the model to an appropriate scale.	L1, L4	16

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kardiyali, L.R. (2011). Traffic and Transport Planning, New Delhi: Khanna Publishers.
- Khanna, S.K (2011). Highway Engineering, Roorkee: Nem Chand & Brothers.

Reference Books

- Flaherty, O. (2006). Transport Planning and Traffic Engineering.
- Klosterman, R.E. (1990). Community Analysis and Planning Techniques, Lanham: Rowman& Littlefield Publishers.

Modes of Evaluation: Assignment/Case Study/ Presentation/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	R-I	**R-II**	**R-III**	**Report**	**CE**	**A**	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	--	--	--	1	--	1	--	--	--	1	1	1	--
CO2	1	1	1	2	--	--	1	--	1	--	--	--	1	1	1	--
CO3	1	1	1	2	--	--	1	--	1	--	--	--	1	1	1	--
CO4	1	1	1	2	--	--	2	--	1	--	--	--	1	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

	GEO-INFORMATICS FOR PLANNING-I (PLN2308)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Computer Aided Design (CAD) in Planning					
Co-requisites	Planning and Design Lab – V (Area Planning)					

Catalog Description

This course gives exposure to the students about Remote Sensing and Geographic Information System (GIS) along with its application in spatial planning. The knowledge acquired in this subject can also be used by the students in their thesis exercises as well as it can also help them in getting jobs after the completion of the course.

Course Objectives

The objectives of this course are

- To study the concepts of Remote Sensing and photo interpretation as well as their uses in Spatial Planning
- To study planning information systems in India and its applications in planning.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic principles of Remote Sensing.

CO2: Describe the photo-interpretation and use the knowledge in their studio exercises.

CO3: Demonstrate planning information system.

CO4: Explain the relationship between Human settlements and Planning Information System.

Modules	Blooms level*	Number of hours
MODULE 1: Remote Sensing Limitations of Traditional Surveys for Planning; Remote Sensing - Definition, Aerial and Satellite Remote Sensing, Aerial Remote Sensing	L1, L2	6
MODULE 2: Photo Interpretation Aerial Photo-Interpretation, Qualitative and Quantitative Elements of Photo-Interpretation; Satellite Remote sensing, Geo-Stationary and Sun-Synchronous Satellites, Principles of Electro Magnetic Radiations, Resolutions; Introduction to Digital Image Processing; Salient Features of Popular Remote Sensing Satellites; Applications in Planning; Laboratory	L1, L2, L3	10

Exercises		
MODULE 3: Human Settlements and Planning Information Systems Human Settlements' Information Needs, Scales and Levels, Pre-Conditions for Using Planning Information Systems; Introduction to various Planning Information Systems.	L3, L4	10
MODULE 4: Planning Information Systems in India Systems Approach to Planning as basis for Planning Information Systems; Systems, Hierarchy, Types; Data and Information, Value of Information, Information Flows, Loops; Information Security and Sharing; Information Systems, Types, Limitations;, Planning Information Systems -NNRMS, NUIS, National Urban Observatory, Municipal Information Systems, Land Information Systems, Cadastre Systems; Applications and Limitations; Tools for Spatial Data Handling, Introduction to GISs.	L1, L2	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/ References

- Victor Mesev (2007). *Integration of GIS and Remote Sensing*. John Wiley Publishing
- HarsanKarimi (2009). *Handbook of Research on Geo- informatic*s, IGI Global Publishing
- Yeung, C.P.L.A. (2007). *Concept and Techniques of GIS*. Prentice Hall Publishing
- Nath& Pandey, *Geo-informatics for decentralized planning and governance*, Rawat Publishing
- Wilson, J.P. (2008). *Handbook of GIS*. Blackwell Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	2	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	2	--	--	--	--	--	--	--	1	1	1	--
CO4	1	1	1	2	--	--	--	--	--	--	--	1	1	1	--
CO5	1	1	1	2	--	--	--	--	--	--	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	ELEMENTS OF ECONOMICS (PLN2309)	L	T	S	P	C
Version 1.1		2	0	0	0	2
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning					
Co-requisites	Techniques of Planning - I, Statistical and Quantitative Methods in Planning - II					

Catalogue Description

The aim of this course is to provide exposure to the students to basic concepts of economics such as micro and macro-economics. This course will enable the students a thorough understanding of all the theories and definitions of terms relating to economics in planning and their usage in urban and regional planning. The students will know about the market factors of supply and demand and how it effects planning.

Course Objectives

The objective of this course is to

- To study the economics; micro and macroeconomic decisions; use of economics in planning.
- To study the Law of demand and supply, elasticity of demand and supply, its use in planning.
- To study the theory of production and concept of the income and employment.
- To study the urban and regional economics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the theory of supply and demand and its use in planning.

CO2: Know the theory of firm production and factors of production and economics of scale.

CO3: Understand the concept of Income and employment and its role in planning and development.

CO4: Learn basic concepts of urban and regional economics and its significance in planning.

Modules	Blooms level*	Number of hours
Module 1: Definition and Scope of Economics Central problems of economics; micro and macroeconomic decisions; use of economics in planning.	L1, L2, L3	6
Module 2: Theory of Demand and Supply and Firm Production Law of demand and supply, elasticity of demand and supply, its use in planning. Perfect and imperfect market types, market demand and supply; pricing under different market conditions, theory of production; factors of	L1, L2, L3	6

production, costs, scale of production, and economies of scale.		
Module 3: Concept of Income, Employment and Money Classical and modern approaches, growth and development indicators; measures of national income, defining development and under development.	L1, L2, L3	6
Module 4: Introduction to Urban and Regional Economics Use of economic concepts in urban planning, housing, transport, taxes, land use, location, etc.; use of economic concepts in regional planning; location disparities in development, input-output techniques, sectoral development, etc.	L1, L2, L3	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rostovzeff, Michael & Shine, M. L. (2007). Urban Land Economics. *BiblioLife.*
- Fisher, Byron. (2007). The Supply and Demand Paradox. *BookSurge.*
- Dutta, Subhendu . (2006). Introductory Economics (Micro and Macro). *New Age International Publishers.*

Reference Book

- McCann, Philip. (2001). Urban and Regional Economics. *Oxford University Press.*
- Montresor, Sandro&Vezzani, Antonio. (2015). The production function of top R&D investors. *EResearch Policy, 44(2), 381-393.*
- Forrester, Jay W. (1996). Economic Supply and Demand. *MIT Press.*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	--	--	--	--	--	--	1	1	1	--	--	--
CO2	1	--	--	--	--	--	--	--	--	--	1	1	2	--	--	--
CO3	1	--	--	--	--	--	--	--	--	--	1	1	1	--	--	--
CO4	1	--	--	--	--	--	--	--	--	--	1	1	1	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Fourth Semester

	PLANNING THEORY-II (PLN2401)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning Theory I					
Co-requisites	Fundamentals of Urban and Regional Planning					

Catalog Description

The main aim of the course is to study advanced planning theory.This course is to study and analyze the development control regulation at all levels. The course aims to give comprehend knowledge about functions and spatial jurisdictions of development authorities. The role of coordination in planning practice is to be study in this course and its effectiveness in the plan. Learning from advance nation in the planning, implementation and evaluation is also included in this course. The course assists students in understanding the role of private sector in infrastructure development.

Course Objectives

The objectives of this course are

- To understand Rational Planning Model.
- To understand Advocacy Planning and Equity Planning and Collaborative Planning Theory.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the relevance of public policy and policy formulation at center and state level.

CO2: Explain functions and spatial jurisdictions of development authorities

CO3: Describe development control regulation.

CO4: Discuss the role of coordination in planning practice.

Modules	Blooms level*	Number of hours
Modules I Scientific Rationalism and Planning Defining instrumental rationality; Systems view of planning with a focus on contributions of J.B. McLoughlin and others; Chief characteristics of Comprehensive Rational Planning Model and implications for planning practice; Systemic change	L1, L2	9
Modules II Advocacy Planning, Pluralism and Equity Planning, Collaborative and Communicative Planning Meaning, historical background and purposes of Advocacy Planning Model;	L1, L4	9

Main features of Advocacy Planning Model; Relevance for planning practice; Equity and its various definitions; Major components of the Equity Planning Model; Implications onthe role of planners in planning practice Various components of Collaborative Planning Model; Contributions of Patsy Healey and Judith Innes and others; Deliberative policy analysis; Role of trust in planning; Planning as persuasive storytelling		
Modules III Political Economy Theories and the City Defining the term political economy; Role of the state in planning; Contributions of David Harvey, Manuel Castells and others; Richard Foglesong and the property contradiction	L1, L6	9
Modules IV Capabilities, Race, Gender, Religion and Caste Defining functioning's and capabilities; Exploring relevance of Sen and Nussbaum's capabilities to planning; Role of planning and planners in enhancing capabilities of the poor; Capabilities perspective on slums and squatters; Feminist planning theory; Planning, caste and religion; Planning rights and responsibilities	L1, L4	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Allmendinger, P. Planning Theory Second Palgrave Macmillan, London.
- Finche and Iveson, K R. and Planning for Diversity First Palgrave Macmillan, London.

Reference Books

- Brooks, M.P. Planning Theory for -- American Planning Practitioners Association, Washington.
- Fainstein, S.S. and Readings in Planning Theory Second Blackwell, London.

Modes of Evaluation: PPT presentation on projector of Theory/Group Discussion/ Individual Presentation/ Case Study

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	1	1	2	2	--	--	--	2	--	--	1	1	--	--
CO2	1	1	--	2	2	1	1	1	--	2	--	--	1	1	--	--
CO3	1	1	--	2	1	1	--	--	--	2	--	--	1	1	--	--
CO4	1	1	--	--	--	2	--	--	1	1	1	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly relate

	PLANNING PRACTICE-I (PLN2402)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning Theory – I, Techniques of Planning – I					
Co-requisites	Planning Theory - II					

Catalog Description

The aim of this course is to Study Development Regulations and the role of various Agencies in the practice of Urban and Regional Planning. This course objective to provide the foundation, knowledge and skills needed to work in planning Organisation. It is designed to build understanding of the complex interactions and uncertainties of the development process.

Course Objectives

The objectives of this course are

- To understand the roles of Central Town and Country Planning Organization; State Town and Country Planning Departments / Directorates; Development Authorities and Local Bodies in Urban and Regional Plan formulation and implementation.
- Identify the agencies that involves in planning process and development plan, execution and operation and maintenance
- To understand Type and Role of Private Sector Participation in Spatial Planning Practice.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role of planning organization and their policies

CO2: Identify the functions and jurisdictions of development authorities

CO3: Explain different development regulations with the help of NBC & URDPFI

CO4: Explain the role and need of coordination in planning

Modules	Blooms level*	Number of hours
MODULE 1: Framing Planning Policies Role of Town and country planning organization at central level and town and country planning department at state level. Actors framing public planning policies; Influences of various stakeholders on policy formulation; Implementation of public policies.	L1, L2	10
MODULE 2: Development Authorities Types, functions and spatial jurisdictions of development authorities; Reasons for the establishment of development authorities; Place of development	L1, L2	8

authorities in local government.		
MODULE 3: Development and Development Regulations Working of building bye-laws in planning practice; Requirements for grant of building permissions; Streamlining the development control regulations; Making development control regulations work for the poor; UDPFI Guidelines; National Building Code and its implementation.	L1, L2,	10
MODULE 4: Coordination and Privatization in Planning Practice Meaning and types of co-ordination; Mechanisms of coordination; Case examples of coordination from planning practice. History of privatization of planning; Special Economic Zones; Retail sector developments; Infrastructure development by the private sector such as Metro, etc.	L1, L2, L5	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Town and Country Planning Organization (2018): *Policy for Capacity Building of Officers of Town & Country Planning Department*, Haryana, Government of Haryana
- Government of India, (2004): *Proposed Amendment in Town and Country Planning Legislations, Regulations for Land Use Zoning, Additional Provisions in Development Control Regulations for Safety & Additional Provisions in Building Regulations / Byelaws for Structural Safety - in Natural Hazard Zones of India*, Government of India, Delhi
- TCPO, (2016): *Model Building Bye-Law*, Town and Country Planning Organization, Ministry of Urban Development, Delhi
- AITP Reading Material on *Environmental Planning and Design*, Prof A. K. Maitra , SPA Delhi

Reference Books

- CPCB Guidelines for Bio-Technologies for Treatment of Wastes and Cleaner Technologies - Issue and Options
- Exploring Possibilities of Achieving Sustainability in Solid Waste Management, Ramachandra T.V. and Saira Varghese K., Indian Journal of Environmental Health, 45 (4):255-264, 2003

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	1	--	--	--	--	--	1	1	--	--	--
CO2	1	1	--	--	--	1	--	1	--	--	--	1	1	--	1	1
CO3	1	1	1	--	--	--	--	--	--	--	--	--	1	--	1	1
CO4	1	1	--	--	--	1	--	--	--	--	--	1	1	--	--	--
CO5	1	1	1	--	--	--	--	--	1	--	1	1	1	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

	TRAFFIC AND TRANSPORTATION PLANNING-II (PLN2403)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Traffic and Transportation Planning I					
Co-requisites	Planning and Design Lab – IV (Transportation Planning)					

Catalog Description

The aim of this course is to provide exposure to the students to essential understanding Transportation System for the development of particular specific location and society. This course will enable the students with development of transportation management system. Economic relevance and different types of policies related to City Planning. Students will be able to apply or reference these techniques in their planning studios in each of the semesters for major and minor planning exercise.

Course Objectives

The objectives of this course are to

- Learn the fundamentals of urban form and structure.
- Get familiar with different types of surveys used in transportation planning.
- Equip students with role of economic evaluation in any transport development.
- Learn the impacts of the transport development on environment.
- Acquire know-how to develop new policies and transportation management plan effectively.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define different types of Urban Structure and Transportation System.

CO2: Provide an overview about the Comprehensive Transport Planning.

CO3: Utilize their knowledge in conduction role of Economic Evaluation

CO4: Incorporate the impact of Transport on Environment.

Modules	Blooms level*	Number of hours
MODULE 1: Urban Structure and Transport System Types of Urban Form and Structure, Impact of urban form and structure on transport system development, urban structure and mobility levels, concept of accessibility, land use – Transport Cycle, Transit Oriented Development (TOD), Case Studies.	L1, L2, L3	8

MODULE 2: Comprehensive Transport Planning Study area definitions, surveys and studies, survey techniques; and transport planning process – trip generation, trip distribution, modal split, trip assignment; land use transport models, Scenario development, Comprehensive Mobility Plan (CMP) Components, Case studies.	L1, L2, L3	7
MODULE 3: Transport and Environment Traffic noise - factors affecting noise, noise abatement measures, standards; air pollution – factors affecting air pollution levels, abatement measures, standards; Traffic Safety- accident reporting and recording systems, factors affecting road safety; Transport Planning for Target groups - Children, adults, handicapped and women; Norms and Guidelines for highway landscape; Street lighting type - standards and design considerations.	L3, L4, L5, L6	8
MODULE 4: Transport Policy, Managementand Economic Evaluation Review of national, state and local level transport policies and their relevance in spatial and economic planning; pricing and funding of transport systems; energy and environment implications in transport; existing organizational and legal framework, transport co-ordination; Transport System Management (TSM) Plans. Economic appraisal of transport projects, techniques for estimating direct and indirect road user costs and benefits, value of travel time.	L3, L4, L5, L6	7

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- Sarkar, P.K., Maitri, Vinay, Joshi, G.J., (2014). Transportation Planning: Principles, practices and Polices, PHI publishers New Delhi, India
- Victor, Dr. D Johnsan, (2012). Urban Transportation: Planning, Operation and Management, PHI Publishers New Delhi, India
- Kadiyali L. R.,(2018), Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	1	--	--	--	--	--	--	--	--	2	--	1	--
CO2	1	1	--	1	--	--	--	--	--	--	--	--	2	--	1	--
CO3	1	1	--	1	--	--	--	--	--	--	--	--	2	--	1	--
CO4	1	1	--	1	--	--	--	--	--	--	--	--	2	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

	SETTLEMENT SOCIOLOGY (PLN2406)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Settlement Geography					
Co-requisites	Planning Theory I					

Catalog Description

The aim of the course is to study social aspects of human settlements. The course assists students in preparing the settlement centric plans. This course deals with social aspects of people who lives in a settlement and controlled by several determinants of sociology such as social status, social institutions, gender inequality etc. This course gives a comprehensive knowledge on sociology as a discipline in the context of settlement which is a spatial entity.

Course Objectives

The objectives of this course are

- To understand the principles of sociology.
- To sensitize on community development.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the need of sociology in the settlement centric plans.

CO2: Explain the sociological perspective and social life in urban and rural settlement.

CO3: Assess the role of community participation in decision-making process.

CO4: Analyse how gender inequality affects the development of a settlement.

Modules	Blooms level*	Number of hours
MODULE 1: Understanding Sociology Sociology as a science; Sociological imagination and rethinking; Applied sociology.	L1, L2	5
MODULE 2: Sociological Perspective and Organizing Social Life Functionalist perspective, Conflict perspective, Internationalist perspective; Culture of space and cultural ecology; Social structure and social control; Stratification and social inequality; Social mobility and Social defiance.	L1, L2, L3	8
MODULE 3: Social Institutions Family, kinship pattern and authority; Religion as social work and significance in planning; Voluntary associations (identifying NGOs and involving them as partners of development, operational issues); Groups (primary, secondary and reference groups).	L1, L2	7
MODULE 4: Community and Gender Development Development induced displacement (anthrop-social considerations);	L1, L2,	10

Resettlement and rehabilitation; Neighbourhood pattern and development strategy; Rural and urban issues; Community based and workshop based methods; Qualitative data Analysis; Report writing. Gender and sex; Gender Sensitivity; Gender and development planning; Gender implications on spatial planning.	L4, L5	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Cragun R.T.(2006). Introduction to Sociology, Wikibooks.
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Knowledge.

Reference Books

- Khosla R. (2010), Addressing Gender Concern in India's Urban Renewal Mission, UNDP.
- Mukerji D.P. (2004), Basic Concepts in Sociology,Rupa Publication India Private Ltd.

Modes of Evaluation: Assignment/Case Study/ Presentation/Class Test/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	1	--	--	1	2	--	--	1	--	--	1	--	1	2
CO2	1	1	2	--	--	--	1	--	--	1	--	--	1	--	1	--
CO3	1	1	--	--	1	2	1	1	--	--	--	--	1	--	1	2
CO4	1	1	--	--	1	--	1	1	--	2	--	--	1	--	1	2

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND DESIGN LAB - IV (TRANSPORTATION PLANNING) (PLN2407)	L	T	S	P	C
Version 1.1		0	0	8	0	8
Pre-requisites/Exposure	Traffic and Transportation Planning – I					
Co-requisites	Traffic and Transportation Planning – II					

Catalog Description

The aim of this course is to provide practical experience on various aspects of transport planning including road geometrics layouts and area circulation plan on real life projects. This course will not focus on a specific transportation mode but will use the various modes to apply the theoretical and analytical concepts presented in the lectures and readings.

Course Objectives

The objectives of this course are

- To provide Students with Basic understanding about Roads, Road Geometrics and Layout Preparation.
- To train students in Preparation of Area Circulation Plan including Geometric Design and Low Cost Traffic Management Measure.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the different classifications of roads in urban and rural areas.
CO2: Conduct the surveys required for planning of a transportation system.
CO3: Layout the road network for designing the cities
CO4: Evaluate an area with respect to circulation plan with the help of surveys and geometric design

Modules	Blooms level*	Number of hours
Module 1: Classification of Roads and Road Layouts Understanding of functional and geometric classifications of urban and rural roads and their cross sectional elements, Design and preparation of layout for road intersections, rotaries and signalized intersections.	L1, L2	15
Module 2: Types of Transport Surveys Methods, surveys, analysis, presentation of data and also to prepare reports relating to different types of transport surveys.	L1, L2,	15
Module 3: Road Geometrics and Surveys Road geometrics and road components, traffic volume, origin destination, spot speed, speed and delay, parking and pedestrian;	L2, L3, L4	15

Module 4: Area Circulation Plan Preparation of an area circulation plan by studying the existing land use, existing circulation pattern, geometric design, level of services for a small area through networks improvement and low cost traffic management measures.	L5, L6	51

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Prabir Kumar Sarkar, VinayMaitri, G. J. Joshi (2014). *PHI Learning Pvt. Ltd.*
- Dr. L.R. Kadiyali (2016). Transportation Engineering, *Khanna Publishing*

References

- Dr. D Johnson Victor (Author). (2012). *Urban Transportation: Planning, Operation and Management.* McGraw Hill Education (India) Private Limited.
- Sarkar Prabir Kumar, M. V. (2014). *Transportation Planning: Principles, Practices and Policies.* Prentice Hall India Learning Private Limited.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	R-I	**R-II**	**R-III**	**Report**	**CE**	**A**	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	1	--	--	--	--	--	1	1	1	--	--
CO2	1	1	--	--	1	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	1	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	1	1	1	--	--	--	--	--	--	1	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

	GEO-INFORMATICS FOR PLANNING-II (PLN2408)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Computer Aided Design (CAD) in Planning					
Co-requisites	Planning and Design Lab – V (Area Planning)					

Catalog Description

The aim of this subject is to equip the students with the know-how of Geographic Information System and its application in spatial planning. This course will enable students to understand the need and potential uses of GIS in Urban and Regional Planning. They will learn to generate digital spatial data base for their planning studio exercises and methods for spatial data analysis. Students will be able to apply GIS techniques and methods in their planning studios and thesis in each of the semesters.

Course Objectives

The objectives of this course are

- Learn the need and applications of GIS in spatial planning.
- Get familiar with ArcGIS software and technical knowledge of basic tools.
- Learn GIS modelling for various kinds of spatial analysis.
- Acquire knowledge of integrating GIS with Digital Image Processing and GPS.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply GIS in spatial planning.

CO2: Use GIS for digital spatial data base creation.

CO3: Execute GIS modelling for various kinds of spatial analysis.

CO4: UtiliseDigital Image Processing and use of GPS in spatial analysis.

Modules	Blooms level*	Number of hours
Module 1: Need for GISs Maps and Spatial Information, Limitations of Typical DBMS Packages and CAD Packages; Need for GISs.	L1,L2	9
Module 2: Introductions to GISs Geographic Information Systems, Introduction, Components, Benefits;	L3,L4	9

Computerized GISs, Input and Output Devices; Spatial Data Entry into GIS, Spatial Information Security and Sharing; Data Structure for GIS, Vector and Raster Data Structures, Comparative Advantages and Disadvantages; Maps, Base Maps and Thematic Maps, Mapping and Spatial Analysis Software, Linking of Attribute Data, Spatial Data Aggregation; Spatial Data Generalization; Limitations of GISs.		
Module 3: GIS Modelling Overlay functions in GIS; using attribute over spatial data in Modelling; case study-based land suitability analysis; Modelling service area for social infrastructures; impact analysis.	L3,L4	9
Module 4: Advanced Concepts in GISs Introduction to Dynamic GISs; Integration of GIS and Digital Image Processing; Integration of GIS and GPS.	L3,L4	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Victor Mesev (2007). *Integration of GIS and Remote Sensing*. John Wiley Publishing
- HarsanKarimi (2009). *Handbook of Research on Geo- informatic*s, IGI Global Publishing
- Yeung, C.P.L.A. (2007). *Concept and Techniques of GIS*. Prentice Hall Publishing

References

- Nath& Pandey, *Geo-informatics for decentralized planning and governance*, Rawat Publishing
- Wilson, J.P. (2008). *Handbook of GIS*. Blackwell Publishing

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--1	--2	--	--	--	--	--	--	--	1	1	1--	--
CO2	1	1	--	2	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	2	--	--	--	--	--	--	--	1	1	1	--
CO4	1	1	1	2	--	--	--	--	--	--	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	SUSTAINABLE URBAN DEVELOPMENT (PLN2409)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Ecology, Environment and Resource Development and Management					
Co-requisites	Planning and Management of Utilities and Services					

Catalog Description

The course intends to create awareness amongst the students to the various issues and adversities faced by the environment due to extensive and irresponsible use of natural resources such as water, land, energy, etc. The course focuses on the implications on surrounding done by the urban industrial processes, changes in land use and transportation, such as air and water pollution and solid waste management. The course also includes in training the students to suggest and work upon the Environmental Impact Assessment and Strategic Environmental Assessment for urban areas through sustainable strategies such as SDG, Eco- city Approaches, etc.

Course Objectives

The objectives of this course are

- To study Concept and Issues of Sustainable Urban Development.
- To understand the concern for ensuring Sustainability of Land, Water and Energy Sources

Course Outcomes

On completion of this course, the students will be able to

CO1: Plan and develop cities using the sustainable and eco-city approaches of development.

CO2: Suggest and work upon the Environmental Impact Assessment and Strategic Environmental Assessment for urban areas.

CO3: Explain the importance of Land and Energy Resources in day to day life and its diverse implications on the urban development.

CO4: Describe the concepts of Solid waste management, water pollution, Air Pollution, rain water harvesting, water treatment and recycling, etc.

Modules	Blooms level*	Number of hours
MODULE 1: Concept and Issues Changing perspectives in man-environment relationship with focus on issues of population, urbanization, resource depletion and pollution; limits to growth vis-a-vis sustainable economy; growth and environmental imperatives of	L1, L2	6

developing vs. developed countries; definitions, concepts and parameters in sustainable development with particular reference to Brundtland Commission, Agenda 21, Eco-City approach, etc.		
MODULE 2: Methods and Techniques Application of ecological principles in sustainability: energy and resource cycles, food webs, ecological pyramids and evolution and succession of natural ecosystems; Carrying Capacity based planning: concept, parameters and indicator measures, models and case studies in urban and regional development; Environmental Impact and Strategic Environmental Assessment for urban areas; Ecological Footprint Analysis of cities; Sustainable Lifestyle Assessment and behavioural modifications at household levels.	L1, L2, L3	10
MODULE 3: Land, Energy and Water as a Resources Land capability and suitability analysis in location and planning of urban land uses; implications of urban form, density, land use pattern and transportation system in land and energy conservation, Urban interference in hydrological cycle, with particular reference to water pollution, water resources, drainage and natural ecosystems; urban water treatment, recycling and harvesting; use of non-conventional energy sources in urban development	L1, L2	10
MODULE 4: Air Quality & Solid Waste Management Sources, types and effects of air pollution and solid waste disposal in cavities, urban industrial processes and land use and transportation implications in air and solid waste pollution; norms, standards, laws, organizations and policies in urban air quality control and solid waste management; examples of best practices	L1, L2	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Munier, Nolberto (2007). *Handbook on Urban Sustainability*: Springer
- The Energy and the Resource Institute,(2011). *Climate Resilient and Sustainable Urban Development*: TERI
- United Nations, (2010). *Shanghai Manual, A Guide for Sustainable Urban Development of the 21st Cities*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	TECHNICAL REPORT WRITING (PLN2410)	L	T	S	P	C
Version 1.1		2	0	0	0	2
Pre-requisites/Exposure	Planning and Design Lab-I					
Co-requisites	Statistical and Quantitative Methods in Planning					

Catalog Description

The aim of the course is to study the technical aspect of report writing and role of methodology in research. This course gives an idea of writing skills. The course will introduce the students to all types of technical, scientific and legal writings. The course will enable the students to conduct systematic research and write technical reports.

Course Objectives

The objectives of this course are

- To understand the types of reports and style of writing technical reports
- To understand the methods used for conducting research.
- To know about presentation of research.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain differences between different writing formats for reports.

CO2: Explain important elements to give a comprehensive understanding of purpose of report.

CO3: Describe the differences between different writing styles for articles, papers and other texts.

CO4: Explain the basis for selecting appropriate research method and criteria for a good research design.

Modules	Blooms level*	Number of hours
MODULE 1: Types and Classification of Reports Types of reports, difference between technical, scientific, legal and other types of communications; specific characteristics of writing technical reports. English comprehension and oral communication. Presentation techniques in digital and oral format for group discussion in seminars and meetings.	L1, L2	6

MODULE 2: Format and Elements of Reports Preface, acknowledgements, contents, indexing, key word indexing, introduction, body terminal section, appendices, references; Use of Word Processing software; Literature surveys: Use of libraries, knowledge of indexing and available reference materials.	L1, L2	6
MODULE 3: Special Type of Writing Special type of writing: articles and manuals; Planning and preparation of technical articles for publications; Popular articles; Formal letters and specifications: Business and official letters, styles and formats; Requests for specifications and other types of business enquiries; Replies to bidding for tenders and conduct of meetings; Agendas and minutes of official records and meetings.	L1, L2, L6	6
MODULE 4: Research Methodology Intuition and research; Scientific research, need for scientific approach to research; Research methods; Hypotheses, testing of hypotheses; Reporting of research; Research in planning.	L1, L4, L5	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Kothari. C.R. (2009), Research Methodology, New Age International Publisher.
- Kumar R. (2005). Research Methodology, Sage Publication Ltd., New Delhi.

Reference Books

- Allwood, J., Anderson, L.G. and Dahl, O. (1992). Logic of Linguistics, Cambridge University, Press, Cambridge.
- Riordan, D. and Pauley, S.E. (2013). Technical Report Writing Today, 10th edition, Cengage Learning, Boston.

Modes of Evaluation: Group Discussions, Report Submission and Presentation, Literature Review, Referencing, Understanding of Components, Writing Style

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO2	1	2	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO3	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO4	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Fifth Semester

	REAL ESTATE PLANNING AND MANAGEMENT (PLN2501)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Housing and Community Planning					
Co-requisites	Planning and Design Lab – V (Area Planning)					

Catalog Description

This course objective to provide the foundation, knowledge and skills needed to work in real estate sector. It is designed to build understanding of the complex interactions and uncertainties of the development process. It provides students with the essential knowledge components of economics, valuation, planning, law, and regeneration and sustainability principles. It also develops an appreciation of the skills and tasks inherent in development projects, including community participation, satisfying the statutory planning considerations, undertaking the necessary financial appraisals, and achieving funding to make it happen.

Course Objectives

The objectives of this course are

- Introduce the basic Definitions and Concepts of Real Estate Planning and Management.
- Provide a basic understanding of Real Estate Markets.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the term land economics and evaluate the process and cost of development.

CO2: Describe the Heterogeneity and imperfections of land and valuation of real property

CO3: Identify the location of specific uses and urban development programme

CO4: Analyze the real estate development through case studies

Modules	Blooms level*	Number of hours
MODULE 1: Developments of Land and Real Property Economic concepts of land, objectives and scope of land economics;	L1, L2	10

relevance for spatialplanning; economic principles of land uses; economic rent, land use and land values, marketmechanism and land use pattern. Process, cost of development, source of finance, and financial calculation for real estatedeveloper.		
MODULE 2: Real Property Markets Heterogeneity and imperfections, valuation of real property -principles and practices; privateownership and social control of land; disposal of land; land development charges andbetterment levy; land use restrictions, compensation and requisition taxation of capital gain onland versus public ownerships, economic aspects of land policies at various levels of decisionmaking.	L1, L2	10
MODULE 3: Factors Influencing Locational Decisions Analysis of location of specific uses like residential, industrial, commercial and institutional inthe light of location theories in intra-regional and inter-regional context; Techniques of costbenefit analysis of urban development programme.	L4	8
MODULE 4: Case Studies Case studies of real estate development in public, private, partnership sectors; Real estate asfacilitator of development; Development of real estate as a tool for controlling land andproperty prices; Transaction and renting of real estate, Lease deeds/ sale deeds, saledocuments, registration; Mortgage and pledging.	L1, L2	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Sharma, Y. (2019). *Real Estate and Estate Planning*, Delhi : Prabhat Publication
- Mittal, S. (2018). *The ABC of Real Estate in India*, Chandigarh :White Falcon Publishing
- Jain, G.(2017). *Real Estate Investment & Financial Analysis*, Delhi:Anupam Printers and Publishers
- Baum, A. (2015). *Real Estate Investment: A Strategic Approach*, London: *Routledge* publisher

Reference Books

- Prabhu, R. (2017). The *Real Estate (Regulation and Development) Rules 2017*, Maharsatra, MahaSeva
- Daithankar, J. (2016). *SAP Flexible Real Estate Management*, Berlin: Springer Publication

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage	10	10	10	10	05	05	50

(%)							

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND MANAGEMENT OF UTILITIES AND SERVICES (PLN2502)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Housing and Community Planning					
Co-requisites	Planning and Design Lab – V (Area Planning)					

Catalog Description

This course gives a detailed information regarding planning and management of water supply, storm water, sewer, sanitation and solid waste management.

Course Objectives

The objectives of this course are

- To introduce basics of Utilities and Services Planning
- To give exposure to Innovative Techniques for provision of Water Supply, Waste Water Treatment, Storm Water Management, Sanitation and Solid Waste Management, etc.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role of planner in the management of services and utilities while assessing the storm water through proper layout design.

CO2: Demonstrate the importance of water and planning and management of water supply system.

CO3: Describe the need of planning as per demand and low-cost measure to tackle the sanitation issues

CO4: Review CPHEEO guidelines and explain the process of solid waste management including calculation of waste generation and area required for solid waste disposal.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to basic concepts and Storm Water System	L1, L2,	10

Role of physical planner in planning of utilities and services, objectives of utilities and services planning and its implications for public health and environmental protection. Urban water cycle; Typesprecipitation, measurement of precipitation, intensity-duration-frequency relationships, rainfallformula, rainfall maps, significance of interpretation and presentation of rain fall data; Surfacewater runoff, hydrograph, measurement of discharge for small and big rivers, rational methodfor estimating run off, unit hydrograph and its application, definition of watershed; Floodfrequencies, flood protection measures in urban areas. Estimating storm run-off, run-off coefficient, rainfall intensity, time of concentration; Gravity flow, hydraulic gradient line,Manning's formula and nomographs, full flow and partial flow; layout and design of stormwater system; General considerations, inlets, self cleansing velocity, non-scouring velocity,physical layout-design principles, data requirement; hydraulic design of storm water systemand computation procedure.	L3	
MODULE 2: Water Supply Systems Surface and ground water sources, quality and quantity, location of sources and water intakes,area requirements of the components of water intakes; Water requirement for different landuses, factors affecting water demand, per capita requirement and its relationship withpopulation sizes, variation of water consumption; seasonal & hourly, peak factor; demand ofwater for fire fighting; Water treatment system, location and space requirements; Componentsof water distribution systems, water storage location, capacity, fire fighting components, firehydrants location, spacing, pressure requirement in pipe; Pumps types, efficiency, head loss,pump selection criteria, site selection and space requirements for pump house; Planning ofwater supply system, organizations and their jurisdictions, basic design guide line and layout ofwater supply distribution system; Financing water supply system, public and private partnership of providing water; Legal aspects and government policy for urban and rural water supply. Casestudy discussion on innovative methods and successful urban water supply system; Significance and methods and advantages of water harvesting system Design of water harvesting systems;Government initiatives for water harvesting system and case study discussion.	L1, L2, L3	9
MODULE 3: Sanitation and Sewer Systems Methods of sanitations, advantages and limitations; On-site detention, design procedure foron-site detention, Off-site and on-site technology up gradation; Low cost appropriatetechnologies for sanitation; Quantity of sewage, standards for Indian cities; Sanitary sewersystem network and layout, data needs and procedure of planning; Sewer appurtenances;sewer lift station, sewer pumping and forced main manholes; Sewage disposal methods andtheir advantages and disadvantages, location criteria and capacity; Case study of innovativeapproaches of sewage disposal in urban area; Approaches for financing and cost recovery forsewer system.	L1, L2, L3	8
MODULE 4: Solid Waste Management Solid waste management for Indian cities, issues and database, quantity of solid waste and itscharacter; Methods of solid waste management's, collection and transportation, disposal ofsolid waste; Land filling and composting, pre and post treatment; Indore and Bangaloremethods, incineration, pyrolysis and recycling park; Area requirements, location and costaspects of different methods of solid waste disposal systems; Community participation andinvolvement of Non- Governmental Organizations or NGOs in efficient	L1, L2, L3	9

solid wastemanagement. Familiarizing toCPHEEO manual and guidance.		

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books / References:

- Andy D. Ward, Stanley W. Trimble (2011). *Environmental Hydrology*, Second Edition: Lewis Publisher
- Garg, S.K. (2008). *Water Supply Engineering*, Delhi: Khanna Publisher
- Rangwala S.C. (2016). Water suplly and sanitary engineering, Gujarat: Charotar Publishing House
- George Tchobanoglous, Hilary Theisen, and S. A. Vigil (1993). *Integrated Solid Waste Management: Engineering Principles and Management Issues*: McGraw-Hill Education

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	2	--	--	--	2	--	--	--	1	1	--	--
CO3	1	1	--	2	--	--	--	2	--	--	--	1	1	--	--
CO4	1	1	--	2	--	--	--	2	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING LEGISLATION (PLN2503)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning Practice - I					
Co-requisites	Real Estate Planning and Management					

Catalog Description

This course gives a detail idea of evolution, preparation and implementation of different legal aspects in Planning. This course helps gaining the understanding on issues and problems occurring in various transactions and make ways to resolve the issues and encouraging entire urban and regional development. Also, the course focuses on professional ethics and practices to be followed in planning profession.

Course Objectives

The objectives of this course are

- To understand the basic Concept of Law and Indian Constitution.
- To understand the Roles, Responsibilities of various Plan Preparation and Implementation Authorities / Agencies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the basic concept and need of law related to planning

CO2: Describe the different acts and laws enlisted in Indian constitution with respect to Planning.

CO3: Describe the need of acts relevant to planning and development and assess the legal aspect of land acquisition and related case studies.

CO4: Assess the role of different local and regional bodies responsible for plan implementation.

Modules	Blooms level*	Number of hours
MODULE 1: Concept of Law Sources of law (custom, legislation and precedent); meaning of the term of	L1, L2	8

law, legislation, ordinance, bill, act, regulations and bye-laws; significance of law and its relationship to planning; benefits of statutory backing for planning schemes; eminent domain and policepowers.		
MODULE 2: Indian Constitution Concepts and contents of Indian Constitution; provisions regarding property rights; evolution of planning legislation and overview of legal tools connected with urban planning and development; model town planning laws.	L1, L2,	7
MODULE 3: Laws and Acts for Planning and Development Introduction, scope and relevance of various laws and acts relevant to planning; Model Town and Country Planning Acts, Development Authorities Act, Municipal Acts, Environmental and Pollution Control Acts, etc.; Land Acquisition Act, 1984, Historical background, need, advantages, limitations; Relevance in today's context; Case studies highlighting nature of contention, parties in dispute and the decisions in specific planning dispute.	L1, L2, L3, L4	12
MODULE 4: Organizations for Plan Implementation Special purpose bodies for plan implementation such urban / metropolitan development authorities, improvement trusts, water and sewerage boards, housing boards, slum improvement / clearance boards, transport undertakings; regional development boards.	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4: Analysis; L5: Synthesis, L6: Evaluation

Text Books

- ITPI, *Planning Legislation and Professional Practice*, New Delhi
- GOI, (1996). *URDPFI Guidelines Volume 2A*, ITPI New Delhi
- Bijlani, H.U. *Law and Urban Land*, New Delhi

References

- Bhargava G. (2002). *Development of India's Urban and Regional Planning in 21st Century: Policy Perspective*, Gyan Publishing House
- J Cameron Blackhall (2005). *Planning Law and Practice*, Taylor & Francis Ltd
- K. R. Gupta ,PrasenjitMaiti (2004). *Urban Development Debates in the New Millennium*, Atlantic Publishers; ISBN: 9788126903900

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1
CO3	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1
CO4	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND DESIGN LAB - V (AREA PLANNING) (PLN2507)	L	T	S	P	C
Version 1.1		0	0	8	0	8
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning, Planning and Management of Utilities and Services					
Co-requisites	Geo-Informatics for Planning					

Catalog Description

The overall main objective of this course is area development plan with case study of particular area. In this course, students will learns the different types of plan and its approaches particularly in Indian context. Students will develop the survey techniques for data collection and do the analysis of data collected from the various sources and plan to develop the area.

Course Objectives

The objectives of this course are

- To study plan preparation and its relationship of higher order plan with lower order plans such as Master Plan with Zonal Plan and Area Plan.
- To develop the lower order plan within the framework of Master Plan.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the different approaches in plan making; the concepts of master plan, comprehensive development plan - the structure plan, the sector plan, the area/ zonal plan, and other types of plan making processes and relationship among plans.

CO2: Evaluate a master plan, zonal plan or any area plan.

CO3: Use the relevant planning standards for different land uses for area planning.

CO4: Prepare methodology and collect data for site planning such as land use survey, household's survey etc., and analyze the data for area plan.

Modules	Blooms level*	Number of hours
MODULE 1: Approaches to Plan Making and Relationship among Plans	L1, L2	16

The different approaches to plan making; the concepts of master plan, comprehensivedevelopment plan - the structure plan, the sector plan, the area/ zonal plan, and other types ofplan making processes, Relationship of higher order plans with lower order plans		
MODULE 2: Framework for Zonal Plans The approach to developing the area/ zonal plan within the framework of Master Plan.	L2, L3, L4	15
MODULE 3: Planning Standards The study and development of the relevant planning standards for different land uses	L4, L5	15
MODULE 4: Zonal Plans / Area Plans Detailing of specific sites in the proposed Zonal Plans / Area Plans, covering different land uses.	L5, L6	50

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books / References

- MoUD, (2015): *Urban and Regional Development Plans Formulation and Implementation* (URDPFI) Vol. 1, Ministry of Urban Development, Government of India, Delhi
- MoUD, (2015): *Urban and Regional Development Plans Formulation and Implementation* (URDPFI) Vol. II A and Vol. IIB, Appendices to URDPFI Guidelines, 2014, Ministry of Urban Development, Government of India, Delhi

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	R-I	**R-II**	**R-III**	**Report**	**CE**	**A**	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	1	1	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	1	1	1	1	1	1	1	1	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	TRAINING SEMINAR – I (PLN2508)	L	T	S	P	C
Version 1.1		0	0	0	0	2
Pre-requisites/Exposure	Planning and Design Lab – IV (Transportation Planning), Computer Aided Design (CAD) in Planning					
Co-requisites	Planning and Design Lab – V (Area Planning), Geo-Informatics for Planning					

Catalog Description

Each student shall undertake Mandatory Training in a planning (or related) office during summer vacation between the Sixth and Seventh semester. The period of Training will be eight weeks. The exact period and place of training will be decided in consultation with the Co-ordinator-in-charge of training. The objective of Training is to expose the students to live planning projects and working environment at planning offices. The students are required to submit a 'Satisfactory' certificate from the relevant Planning Office after completion of training. The student will also submit a Report highlighting the Profile of the Planning Office, its organization, key work areas, etc; Introduction to the project(s) worked upon during training; planning brief; methods employed; and planning -design solutions / proposals. The students will also be required to present their work through drawings / visuals, power point presentations in the form of a Seminar to the faculty and students of the Department over the seventh semester, as per directions of the Co-ordinator-in-charge of training.

Course Objectives

The objectives of this course are

- To understand the profile of the Planning Office / Planning Authority / Local Body / Planning Professional.
- To participate in a Live Project of Planning Office / Planning Authority / Local Body / Planning Professional

	DISASTER RISK MANAGEMENT AND CLIMATE CHANGE ADAPTATIONS (PLN2509)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Ecology, Environment and Resource Development and Management					
Co-requisites	Planning and Design Lab – VII (Regional Planning)					

Catalog Description

This course aims at developing a systematic understanding for identifying, assessing and reducing the risks of disaster. It helps in assessing physical, socio-economic and environmental vulnerabilities and mitigation mechanisms for various types of disasters. The course also aims at giving a general understanding of climate change and strategies for mitigating the effects of climate change.

Course Objectives

The objectives of this course are

- To understand the basic concepts of disaster management.
- To understand disaster management mechanisms; disaster risk mitigation; and post disaster measures
- Explain the fundamentals of climate change science.
- Present the international climate change legal and policy framework and explain key issues under negotiation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concepts, prevention strategies andpost disaster management for various types of disasters.

CO2: Describe the role of government authorities and others organizations in disaster management

CO3: Explain the basic concepts of climate change science and analyse different climate change scenarios and their implications

CO4: Explain the importance and mechanisms of adaptation in preparing for and coping with climate change

Modules	Blooms level*	Number of hours
MODULE 1: Basic Concepts of Disaster Management Disaster –related terms, definitions, concepts; Types and classifications of disasters- causes and consequences; Overview of disasters across the world; Disaster management cycle, Phases of disasters; Disaster Vulnerability: physical vulnerability, socio-economic vulnerability, environmental vulnerability; Disaster Risk Mapping; Emergency phase of disasters; Disaster Rescue and Relief; Post disaster recovery and rebuilding process	L1, L2	9
MODULE 2: Disaster Management Mechanisms Recent initiatives at national and state level; Kyoto Framework of disaster mitigation and management; Disaster Management Act – national and states; Roles and Responsibilities of National Disaster Management Authority, State Disaster Management Authorities, District Disaster Management Authorities; Various role players in disaster management – NGOs / CBOs and Armed Forces; Community Based Disaster Preparedness (CBDP); Physical planning and disaster management plans; Applications of Remote sensing and GIS in disaster management.	L1, L2,	9
MODULE 3: Introduction to Climate Change Basics of climate change science; Concepts of climate and weather, greenhouse gas; Impact of climate change on surface temperature, precipitation, ocean pH, sea-level; Energy and climate change; Water and climate change; Soil and climate change; Landscape and climate change	L1, L2	9
MODULE 4: Climate Change Adaptations Introduction to the concept of climate change adaptation; Assessing climate vulnerability; Introduction to linkages between climate change adaptation and development; Important international adaptation initiatives and programmes; International climate change negotiations;The 4 United Nations Framework Convention on Climate Change (UNFCCC); The Kyoto Protocol and its associated bodies	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Christian N. Madu, (2017). *Handbook of Disaster Risk Reduction & Management: Climate Change And Natural Disasters*
- Damon P Capolla, (2007). *Introduction to international Disaster Management*: Butterworth Heinemann
- Klijn, F.(2012).*Comprehensive Flood Risk Management: Research for Policy and Practice*
- Wisner, B., Blaikie, P. M., Cannon, T., Davis, I. (2004) 'At Risk: Natural Hazards, People's Vulnerability and Disasters' Psychology Press, ISBN 0415252164, 9780415252164

References

- Blakie, P., Cannon, T., Davis, I. and Wisner, B. (1994), 'At Risk: Natural Hazards, People's Vulnerability and Disasters', Routledge, London
- Cannon, T. (2000). Vulnerability Analysis in Disasters. In: D. Parker, ed., Floods, pp. 43-55. London
- Coburn, A. and Spence, R., (2002) 'Earthquake Protection', John Wiley & Sons, Ltd, England
- Dowrick, D. (2003) 'Earthquake Risk Reduction', John Wiley & Sons, Ltd, England.
- George D Haddow and Jane A Bullock, (2006). *Introduction to Emergency Management*: Elsevier Butterworth Heinemann
- IISD, UNITAR & UNEP (2009). IEA Training Material: Vulnerability and Climate Change Impact Assessment for Adaptation.
- NDMA, (2007-11). *Disaster Management Guidelines:* New Delhi
- UNDP (2004) 'Reducing Disaster Risk: A Challlenge for Development' United Nations Development Programme, ISBN 92-1-126160-0 Available: http://www.undp.org/cpr/whats_new/rdr_english.pdf
- UNEP & UNDP (2011). Mainstreaming Climate Change Adaptation into Development Planning: A Guide for Practitioners

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	HOUSING AND COMMUNITY PLANNING (PLN2510)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning and Design Lab III					
Co-requisites	Settlement Sociology					

Catalogue Description

The aim of this course is to introduce to the students to the theory and practice of specifications, estimation, and quantity surveying; along with its importance in the field of building construction. The procedure of writing specification document for materials, labour, budgets and; estimating the cost and time of construction works shall be covered. The preparation of bill of quantities, optimum resource consumptions and introduction to BIS and other standardized institutions is also a part of the course. Calculating the land value and building values; finding their depreciation values using various methods would also be elaborated in the curriculum of the subject.

Course Objectives

The objectives of this course are

- To study the housing in National Development Goals; Equity and efficiency parameters of housing; Current issues in housing
- To study the housing development process in India – plan and policies / schemes etc
- To study the housing standard and design in India context

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss the importance and usage of housing.

CO2: Describe the terms related to housing.

CO3: Describe housing processes in detail.

CO4: Describe the housing standards and policies in India.

Modules	Blooms level*	Number of hours
Module I: Introduction and Assessing Housing Significance of housing in National Development Goals; Equity and efficiency parameters of housing; Current issues in housing. Existing Housing Statistics; definitions; urban and rural housing statistics; Introduction to concepts of Housing Shortage, Housing Need, quantitative and qualitative aspects of housing; Housing Demand - Understanding current methods of demand assessment; Knowledge of data sources and their use and interpretation; census, NSSO and other data; Limitations of existing methods of assessments.	L1, L2	8
Module II: Housing Development Process Understanding of factors affecting residential location, theoretical knowledge of ecological, neoclassical, institutional approach to housing; Housing subsystems and their characteristics: formal and non-formal housing; Process of Public and private sector housing development process; policy context, actors and their interrelationships; Inner city housing, Slums, Squatter housing, Unauthorized Housing; Role of different institutions in housing; International agencies, NGOs, State, Financing Organizations, Private developers, co-operatives.	L3	10
Module III: Housing Standards and Design Factors determining residential densities; Densities, costs and development control regulations; Housing designs parameters and their relationship to costs; Housing design and climate; Housing for disaster prone areas. Communities; its characteristics and housing; socio-economic implication of slums, clearance/ improvement of slum; sites and services schemes, squatter upgrading, incremental approach.	L1, L2	8
Module IV: Housing Policy Analyses Understanding and evaluation of Housing Policy and programmes in India; five year plans, Central government policy; Policy framework for urban and rural housing; Comparative policy analysis; Housing for the low income groups; Co-operative housing, objectives and principles; management and financing of housing projects; investment in housing in public and private sectors.	L1, L2	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- Rhonda Phillips and PastsyKraeger (2017): Community Planning and Development
- Sam Davis (1997): The Architecture of Affordable Housing

References:

- https://www.researchgate.net/publication/311626984_Housing_Concept_and_Analysis_of_Housing_Classification
- IGBC Green Affordable Housing

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	--	--	--	--	--	--	2	--	--	2	1	--
CO2	1	2	1	2	--	--	--	--	--	--	2	--	--	2	1	--
CO3	1	2	1	2	--	--	--	--	--	--	2	--	--	2	1	--
CO4	1	2	1	1	--	--	--	--	--	--	2	--	--	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

	ECOLOGY, ENVIRONMENT AND RESOURCE DEVELOPMENT AND MANAGEMENT (PLN2511)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Environmental Studies-I, Applied Geology and Hydrology					
Co-requisites	Settlement Sociology					

Catalogue Description

The aim of this course is to provide exposure to the students to basic concepts of ecology, ecosystems, environment and Resource Development. This course will enable the students a thorough understanding of all the theories and definitions of terms relating to ecology and environment in planning and their usage in urban and regional planning. The students will know about the impact of development on environment and its significance in planning.

Course Objectives

The objectives of this course are

- To understand various types of components in Ecology, Environment.
- To the role of Ecology and Environment for the resource development and management.
- To enhance the knowledge for EIA. (Environment Impact Assessment)

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the meaning and scope of ecology and identification of ecological parameters for planning at different levels.

CO2: Understand the ecosystem and its relevance to environment in planning.

CO3: Understand the concept of environmental impact assessment and its role in planning and development.

CO4: Learn the various environmental policies in planning.

Modules	Blooms level*	Number of hours
Module 1: Introduction Meaning and scope of ecology; evolution of ecology; man, environment and ecosystem; components of nature and basic concepts and processes of ecology; identification of ecological parameters for planning at different levels; site planning, settlement planning and regional planning; data needs and format for data collection; types of analysis required to evolve ecological parameters.; Environmental zones.	L1, L2, L3	8
Module 2: Ecosystem and its Relevance to Environment Resources and human settlements impact of advanced agricultural methods, urbanization and industrialization on nature; urban ecosystem approach evolution and significance; soil, water, land, vegetation and solar, biomass, wind, hydro energy resources; settlement planning and energy conservation; development and management. Introduction to quantitative ecology	L1, L2, L3	9
Module 3: Environmental Impact Studies Planning for environmentally sensitive areas, EIA - meaning, significance and framework; Methodologies - checklist, matrices, network and social cost-benefit analysis; sources and acquisition of environmental information; Environmental land use classification; Environment impact studies of development projects.	L1, L2, L3	9
Module 4: Environmental Policies Global and national policies on environment; Five year plans in relation to environmental aspects; Legal measure for protection of environment; Environmental awareness and education in India; Agencies involved in environment protection; Public participation; Role of planners in shaping the future environment.	L1, L2, L3	10

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kumar, Pranav. (2017). Fundamentals of Ecology and Environment. *Pathfinder Publication.*
- Sharma, P. D. (2017). Ecology and Environment. *Rastogi Publications.*
- Raman, N. S., Gajbhiye, A. R. &Khandeshwar, S. R. (2019). Environmental Impact Assessment. *Dreamtech Press.*

Reference Book

- Schneider, David C. (1994). Quantitative Ecology Spatial and Temporal Scaling. *Academic Press Inc.*
- Royle, J. Andrew &Dorazio, Robert M. (2009). Conceptual and philosophical considerations in ecology and statistics. *Hierarchical Modelling and Inference in Ecology, 1-26. https://doi.org/10.1016/B978-0-12-374097-7.00003-X*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	2	--	--	--	1	--
CO2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	COMMUNITY PARTICIPATION IN PLANNING PROCESS (PLN2512) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Settlement Sociology					
Co-requisites	Planning and Design Lab -V					

Catalog Description

The aim of this course is to offer assessment of communities, their crucial role in planning process and successful implementation. This particular subject will be very useful for learning techniques of primary data collection for planning studio exercises. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be inculcating students with the capabilities of effective community interaction and getting their support in data collection. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course, students will be working with small communities either urban or rural, conducting participatory meetings with them and formulating a small project with the help of community participation. Finally, students will demonstrate project to the concerned faculties, participatory community and other key stakeholders. They will be able to choose and apply the most effective PRA techniques for data collection. They will incorporate and utilise important insights provided by the local communities in plan formulation. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objectives of this course are

1. To grasp effective role of community participation in planning process.
2. To analyze contribution of community in successful plan implementation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply community participation techniques during field visits for primary data collection.

CO2: Collect sufficient and significant data for panning studio research.

Modules	Blooms level*	Number of hours
MODULE 1: Concept and Techniques of Community Participation Definitions and diverse dimensions of communities; Understanding concept of social inclusion and participatory planning process, Techniques of effective communication and engaging communities in planning process; Role of community based organisations in participatory planning such as NGOs, Residents welfare associations (RWA), Self-help groups (SHG), Gram-panchayat; Techniques of conducting Participatory Rural Appraisal (PRA).	L3, L4 L5	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L3, L4, L5	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Docherty, I., Goodlad, R., &Paddison, R. (2001). Civic culture, community and citizen participation in contrasting neighbourhoods. *Urban Studies*, *38*(12), 2225–2250. https://doi.org/10.1080/00420980120087144
- Gaventa, J. (2004). Towards participatory governance: assessing the transformative possibilities. *Participation: From Tyranny to Transformation?: Exploring New Approaches to Participation in Development*, 25–41.
- Heritage, Z., &Dooris, M. (2009). Community participation and empowerment in Healthy Cities. *Health Promotion International*, *24 Suppl 1*. https://doi.org/10.1093/heapro/dap054
- Narayanasamy, N. (2008). *Participatory rural appraisal: Principles, methods and application*. *Participatory Rural Appraisal: Principles, Methods and Application* (pp. 1–364). SAGE Publications Inc. https://doi.org/10.4135/9788132108382

References

- Chambers, R. (1994). The origins and practice of participatory rural appraisal. *World Development*, *22*(7), 953–969. https://doi.org/10.1016/0305-750X(94)90141-4
- Head, B. W. (2007). Community engagement: Participation on whose terms? *Australian Journal of Political Science*, *42*(3), 441–454. https://doi.org/10.1080/10361140701513570
- Irvin, R. A., &Stansbury, J. (2004, January). Citizen Participation in Decision Making: Is It Worth the effort? *Public Administration Review*. https://doi.org/10.1111/j.1540-6210.2004.00346.x

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	INFOGRAPHIC TECHNIQUES FOR REPRESENTATION OF DATA (PLN2513) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Planning and Design Lab I, Planning and Design Lab II					
Co-requisites	Planning and Design Lab V					

Catalog Description

The aim of this course is to offer opportunities and skillset in effective infographics and storytelling techniques. This particular subject will be greatly useful in planning and producing effective studio sheets. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will evolving rationale thinking capabilities of the students with respect to delivering students' findings/insights and the best presentation method. The course would be conducted through literature survey, case studies, and hands on exercises with available infographic software in the university. During the course, students will be working in interdisciplinary groups. In this course, students will discuss how to incorporate a story in their presentation to help them capture the attention of the audience. They will be able to choose and apply the most effective analytical method for delivering their insights/ideas. They will incorporate data visualization best practices and use tips and tricks when presenting at various platforms to decision makers and stakeholders.

Course Objectives

The objectives of this course are

- To equip students with effective utilization of infographic techniques.
- To demonstrate effective presentation skills and deliver insights

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply story telling techniques in planning studio presentations.

CO2: Synthesize research findings and develop effective insights

Modules	Blooms level*	Number of hours
MODULE 1: Synthesizing the Findings and Deriving the Insights Synthesizing findings of student research and derive valid/actionable insights, Finding story in the data, Shaping it to contribute to a compelling research presentation, Providing actionable comparisons, Weighing the pros and cons, Deriving insights to address a problem/problems, Methods for developing research-based recommendations, testing and refining ideas. Techniques of reviewing the essential sections of various reports, designing visualizations of data, Understanding the requisite for targeting specific audience, Applying storytelling strategies, Recognize the drawbacks of poor data visualization.	L3, L4 L5	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Cairo, A. (2012). Chapter 1 Introduction Infographics and Visualization. *Functional Art - Infographics and Visualization and Exploration*.
- Walter, E., &Gioglio, J. (2014). *The Power of Visual Storytelling: How to Use Visuals, Videos, and Social Media to Market Your Brand*. *Inside Market Data* (p. 256).
- Tong, C., Roberts, R., Borgo, R., Walton, S., Laramee, R. S., Wegba, K., … Ma, X. (2018). Storytelling and visualization: An extended survey. *Information (Switzerland)*, *9*(3). https://doi.org/10.3390/info9030065

References

- Cairo, A. (2012). Infographics and Visualization and exploration. *The Functional Art*, 15–25. Retrieved from http://www.thefunctionalart.com/
- Smiciklas, M. (2012). *The Power of Infographics: Using Pictures to Communicate and Connect with Your Audience*. *The power of infographics* (pp. 1–17). https://doi.org/10.4324/9780203075609

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	ECO-TOURISM (PLN2514) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Disaster Risk Management and Climate Change Adaptation					
Co-requisites	Planning and Design Lab V					

Catalog Description

The aim of this course is to offer the principles of planning for eco-tourism in the context of sustainable tourism development. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course is getting the insights of relationships between tourism and environment, tourism and urban development, tourism and economic development. In this course, students will be able to grasp planning requirements for developing sustainable eco-tourism hubs and circuits. They will be able to incorporate community needs and sustainable eco-tourism requirements in planning process. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objectives of this course are

1. To apply planning strategies and tools with reference to sustainable tourism development.
2. To grasp the role of public and private sector as well as community participation in eco-tourism planning and development

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply concept of eco-tourism for sustainable tourism development.

CO2: Identify and plan eco-tourism hubs and circuits.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Planning for Eco-Tourism Definitions, scope, nature, key determinants, characteristics; problems and prospects of eco-tourism; eco-tourism hubs in India; impacts of eco-tourism in developed and developing regions; relationship between tourism and urban development, relationship between tourism and economic development, relationship between tourism and environment; concept of carrying capacity and its significance in eco-tourism. Circuit identification and destination planning; assessment of infrastructure requirement for eco-tourism planning; analysing tourism impacts in transforming local livelihood and lifestyle; role of Government institutions and agencies in eco-tourism development.	L3, L4 L5	12

MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Cohen, E. (1978). The impact of tourism on the physical environment. *Annals of Tourism Research*, *5*(2), 215–237. https://doi.org/10.1016/0160-7383(78)90221-9
- Dávid, L. (2011). Tourism ecology: Towards the responsible, sustainable tourism future. *Worldwide Hospitality and Tourism Themes*, *3*(3), 210–216. https://doi.org/10.1108/1755421111114217
- Ghasemi, M., &Hamzah, A. (2014). An Investigation of the Appropriateness of Tourism Development Paradigms in Rural Areas from Main Tourism Stakeholders' Point of View. *Procedia - Social and Behavioral Sciences*, *144*, 15–24. https://doi.org/10.1016/j.sbspro.2014.07.269

References

- Jaini, N., Anuar, A. N. A., &Daim, M. S. (2012). The practice of sustainable tourism in ecotourism sites among ecotourism providers. *Asian Social Science*, *8*(4), 175–179. https://doi.org/10.5539/ass.v8n4p175
- Stakeholders, E. (1994). The Component of Successful Ecotourism. In *UNEP Division of Technology, Industry and Economics* (pp. 33–59).

- Wiltshier, P., Clarke, A., Adebayo, A., Robinson, P., &Oriade, A. (2019). Community-based tourism. In *Community-Based Tourism in the Developing World* (pp. 98–112). Routledge. https://doi.org/10.4324/9781351026383-8

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Sixth Semester

	URBAN MANAGEMENT I (PLN2601)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning Legislation, Planning Practice - I					
Co-requisites	Planning and Management of Informal Sector					

Catalog Description

The aim of this course is to study Management and Financing of Urban Development. This course explores important substantive areas and concepts in the field of urban management and current urban planning and policy issues and debate. This course will provide the knowledge needed for value based management of spatial transformation process, it comprises, every aspects of a city in terms of economic, Environmental, social and infrastructure of an urban area.

Course Objectives

The objectives of this course are

1. To understand the importance of Management of Urban Development
2. To study the role of Private Sector in Urban Development and explore the various sources of Financing Urban Development

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the role of management in Urban Development.

CO2: Identify the different urban local bodies at different levels in India and describe their functions, powers and organizational structure etc.

CO3: Identify the role of NGO's and private organizations in urban development.

CO4: Identify the sources for financing urban development project.

Modules	Blooms level*	Number of hours
Module 1: Role of Management in Urban Development Definition, objectives and scope of management; Role of management in developing economy; Meaning and theory of organization; Urban development as a decision making process and a corporate activity; Application of management techniques in urban planning and development.	L1, L2	6
Module 2: Urban Developments in India and organizations for Urban Development Urban development in India: problems and issues, policies, programmes and provisions in the national five year plans; processes of decision making for urban development at national, regional, state, district and local levels. Various national, state, regional, district and local level organizations involved in urban development and management in India, their background, functions, powers, organization structure and resources; Case studies.	L1, L2	11
Module 3: Urban Developments and Public/ Private Sector Urban development bodies; urban development authorities: background, functions, powers, organization structure and resources, Case studies; Role of NGOs and private organizations in urban development, relationships with local and state governments.	L4	9
Module 4: Financing Urban Development Financing urban development projects; Sources of funding: cost recovery, cost subsidization, medium and long term financing; Private investments in urban development projects: prospects and limitations; Municipal financing: sources of revenue and items of expenditure; Financial resource mobilization for urban development particularly for municipal/ local bodies.	L1, L2	10

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Goel, S. S. (2003). *Urban Development and Management.* Deep & Deep Publications.
- Cheema, S. (1993). *Urban Management: Policies and Innovations in Developing Countries.* Praeger; Revised ed. edition.
- Steven Sinofsky, M. I. (2010). *One Strategy: Organization, Planning, and Decision Making.* John Wiley & Sons.

Reference Books

- Emmanuel Mutale (2017): *The management of urban development in Zambia*

- S K Kulshrestha (2018): *Urban Renewal in India : Theory Initiative and Spatial Planning Strategies*
- Sameer Sharma (2008). *Smart Cities Unbundled*
- James C Y Guo (2017). *Urban Flood Mitigation and Storm*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	--	1	--	1	1	--	--	--	--	--	--	--
CO2	1	--	2	--	--	3	--	1	1	--	--	--	--	--	--	1
CO3	1	--	1	--	--	3	--	--	--	--	--	--	1	--	--	1
CO4	1	--	2	1	--	1	--	--	--	--	--	--	1	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

	URBAN RENEWAL AND CONSERVATION (PLN2602)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Landscape Planning and Design					
Co-requisites	Introduction to Urban Design					

Catalogue Description

The aim of this course is to make students familiar with, how an urban area degrades over a period of time as well as available infrastructure facilities. Also, they will learn about various schemes initiated by Centre and State government for renewal and conservation in urban areas. Economic and social aspects of conservation, traffic and management issues etc are one of the major learning of this course.

Course Objectives

The objectives of this course are

- To introduce the basic concepts of conservation.
- To make them understand about the process of urban renewal and conservation of historically important monuments.
- To get knowledge about slum clearance and improvement schemes.

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss scope and basic technique of urban conservation.

CO2: Describe Economic implications of urban renewal programs and social aspects of conservation?

CO3: Discuss several government schemes on Slums and their critical evaluation.

CO4: How National and international experiences are important for implementing urban renewal programs.

Modules	Blooms level*	Number of hours
Module 1: Introduction Overview and introduction of the basic concepts of conservation; values, attitudes and principles for judging the conservation importance of sites, areas and related typology; scope and basic technique of urban conservation; Urban renewal as apart of metropolitan plan; identification of urban renewal areas; conservation, rehabilitation and redevelopment urban renewal policies and strategies, JNNURM.	L1, L2	10
Module 2: Economic, Financial and Management Aspects and Conservation Economic and social aspects of conservation, Economic and spatial implications of urban renewal programs, mobilization of resources; incentive zoning - management of urban renewal areas, traffic and management issues; ; Conservation policies - case studies.	L1, L2, L3	10
Module 3: Slums Clearance and improvement schemes, planning aspects, land management, social economic issues, public participation, government schemes and their critical evaluation.	L3, L4	8
Module 4: Legal and Administrative Aspects National and international experience in implementing urban renewal programs; Legal and administrative aspects, archaeological acts/ charters pertaining to conservation, development and conservation; Case studies of proposals for urban conservation of sites/ areas in India and abroad.	L3, L4	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- Cohen, Nahoum. (2001)*Urban Design Conservation and Preservation*, United States : MCGRAW-HILL COMPANIES

References

- Coase, R.H.(1988) *The Firm, the Law and the Market*; University of Chicago Press: Chicago, IL, USA.
- Milwaukee. (2004) *Urban Renewal and Techniques: Conservation, Redevelopment, Organization and Strategy*
- Clark Julie, Wise, Nicholas (2018) *Urban Renewal, Community and Participation (Theory, Policy and Practice)*

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme:

Components	Internal Assessment	ESE

	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	1	-	--	--	--	--	--	--	-	1	-	1	--
CO2	1	1	-	2	-	--	--	--2	--	--	--1	-	3	-	1	--
CO3	1	1	-	-	-	--	--	1	--	--	1	1	3	-	1	--
CO4	1	1	-	-	-	--	--	1	--	--	1	1	3	-	1	--

1: strongly related, 2: moderately related and 3: weakly related

	INTRODUCTION TO URBAN DESIGN (PLN2604)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Sustainable Urban Development					
Co-requisites	Urban Renewal and Conservation					

Catalogue Description

The aim of this course is to make students understand urban design theories and its elements. This course will also help them to learn how to organize any spaces and their articulation in the form of squares, streets, vistas and focal points.

Course Objectives

The objectives of this course are

- To understand the basic difference between urban planning and urban design.
- To learn to organize any spaces and their articulation in the form of squares, streets, vistas and focal points.
- To have an introduction of urban design theories, Concepts and Contemporary practices

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss the Study of volumes and open spaces at all spatial levels

CO2: Explain the basic concepts of “Image of the City”

CO3: Discuss any Case study of urban design characteristics of cities in India or abroad.

CO4: Identify agencies which are responsible for ensuring better urban design, their roles, powers and describe bylaws, policies and special rules required for heritage and hill areas development.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Urban Design Theory Urban design as interface between architecture and planning. City as a three dimensional entity; Study of volumes and open spaces at all spatial levels; A brief historic review of the development of the urban design discipline and principles.	L1,L2	8
MODULE 2: Elements of Urban Design Urban form as determined by inter – play of masses, voids, building typology; scale, harmony, symmetry, color, texture, light and shade,; dominance, height, urban signage and graphics; organization of spaces and their articulation in the form of squares, streets, vistas and focal points; image of the city and its components such as edges, paths, landmarks, street features, sky – line, etc,; urban transportation.	L1, L2	8
Module 3: Physical and Non – Physical Determinants of Urban Forms Activity and the morphology of places; form, size and structure of cities and the related geometry co – related with their determinants; case studies of urban design characteristics of cities in India and abroad; related issues for public intervention.	L1,L2	9
Module 4: Control of Urban Design and Contemporary Practices Urban design and its control; Control of visual pollution; Agencies responsible for ensuring better urban design, their roles, powers and limitations.Townscape policies, building byelaws and regulations for existing and emerging areas of development; Special rules for heritage and hill areas.	L3,L4	11

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Kevin Lynch. (1960), *Image of the city***,** The M.I.T. Press

- Christopher W. Alexander. (1988),*A New Theory of Urban Design,* Oxford University Press, USA

References:

- Peter Hall. (2014), *Cities of Tomorrow: An Intellectual History of Urban Planning and Design Since 1880,* Blackwell
- Matthew Carmona (2010), *Public Places Urban Spaces: The Dimensions of Urban Design,* Elsevier Ltd.

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme:

Components	Internal Assessment	ESE

	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	2	--	--	--	--	--	--	-	2	1	--	--
CO2	1	2	2	3	-	--	--	--	--	--	--	-	2	1	--	--
CO3	1	1	-	-	3	--	--	--	--	--	--	-	2	1	--	--
CO4	1	1	-	-	3	--	--	--	--	--	--	-	2	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND MANAGEMENT OF INFORMAL SECTORS (PLN2605)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning and Design Lab – V (Area Planning)					
Co-requisites	GIS for Planning, Planning and Design Lab – VI (Urban Development Plan)					

Catalog Description

The aim of this course is to study the problems and issues of urban informal sector along with its planning and management. The course provides an overview of different dimensions of urban poverty, concept of basic needs, various approaches for delivery of basic services to the urban poor. Student will be able to learn design layout for infrastructure services and amenities for urban poor and their implication in physical planning. The course also deals with the migratory impulses and factors behind spontaneous living and working in urban context.

Course Objectives

The objectives of this course are

- To study the concept and dimensions of urban poverty.
- To study migratory impulses and impact on informal sector.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain various dimensions of poverty and urban poverty alleviation programmes.

CO2: Identify basic needs of poor and their provision for target groups and discuss community planning and institutional approach for delivery of basic services to urban poor.
CO3: Explain the characteristics of migrants and assess their association with growth of informal sector.
CO4: Describe planning and development of urban settlements in respect of the spontaneous growth.

Modules	Blooms level*	Number of hours
MODULE 1: Urban Poverty Dimensions of urban poverty, magnitude of problem, urban poverty alleviation programmes, impact of macro-economic structural adjustment policies on poor urban households.	L1, L2	5
MODULE 2: Basic Needs and alternative approaches for Delivery of Basic Services to Urban Poor Development of the concept of basic needs; identification of basic needs and their provision for various target groups and informal sectors; standards for basic needs, NGO's and voluntary organizations associated with provision of basic needs. Community planning approach, low cost alternatives and institutional reforms approach.	L1, L2, L3	8
MODULE 3: Migratory Impulses and Impact on Informal Sector Characteristics of migrants and their association with growth of informal sector; socio-economic deprivation and informal sector; development of informal sector concept; Role of informal sector in housing stock, economy, commercial activities, etc.; Implications in physical planning.	L1, L2	6
MODULE 4: Consequences of Spontaneous Growth Study of major aspects; spontaneous living and working, their characteristics and functions in urban context, actions for improvement; appraisal of the role of government, private and voluntary organizations; existing management; their organizational set-up and limitations; planning and development of urban settlements in respect of the spontaneous growth; case studies from India and other developing countries.	L1, L2, L4	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Chauhan S., Mukhopadhya U. (2010), Revisiting the Informal Sector, Springer.
- Samal K. (2008), A General Equilibrium Approach, Informal Sector Concept, Dynamics Linkages and Migration, Concept Publishing Company, New Delhi.

Reference Books

- E.J. Blakely, R.J. Milano (2001), Community Economic Development, International Encyclopedia of the Social & Behavioral Sciences.
- Lawson, D. (2010), What Works For The Poorest?, Practical Action Publishing.

Modes of Evaluation: Presentation/ Assignment/Class Test/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	2	--	1	1	--	--	--	1	--	1	--	1	2
CO2	1	1	2	2	--	1	1	--	--	--	1	--	1	--	1	2
CO3	1	1	2	2	--	1	1	--	--	--	1	--	1	--	1	2
CO4	1	1	2	2	--	1	1	--	--	--	1	--	1	--	1	2

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND DESIGN LAB – VI (URBAN DEVELOPMENT PLAN) (PLN2607)	L	T	S	P	C
Version 1.1		0	0	8	0	8
Pre-requisites/Exposure	Planning and Design Lab – V (Area Planning), Sustainable Urban Development					
Co-requisites	GIS for Planning, Urban Management - I					

Catalog Description

The aim of this course is to impart knowledge and Hands-on Skills for Conducting various Field Surveys; Analysis Data and preparation of Urban Development Plans.This course will also focus on various types and hierarchy of Urban Plans, their Characteristics and Contents. It will also help students to evolve Development Policies; Land Use Plan, priorities and Implementation Mechanism for a selected Urban Area.

Course Objectives

The objectives of this course are

- To introduce different parameters of UDP.
- To collect necessary data from their field visit and surveys.
- To use different methods to conduct survey and also to learn different ways to do data analysis.
- To have a different perception and understanding to how local people are approaching development plan.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the contents of various types of development plans and prepare questionnaire required for Urban Development plan preparation.
CO2: Conduct the survey and collect data from their respective sectors.
CO3: Evaluate the area based on the data collected
CO4: Propose the policy based guidelines and recommendation for further development.

Modules	Blooms level*	Number of hours
Module 1: Studying Development Plans and Gathering Secondary Source Information for a Selected City The study shall involve understanding of contents of various types of development plans and explore their foci; Identification and preparation of secondary source information of the towns or cities selected for the study.	L1, L2	21
Module 2: Organization of Field Surveys Visit to the case study area, collection of primary and secondary data and information on various aspects such as demography, social, economic, housing, transportation, etc.; conduct of primary and secondary surveys.	L2, L3, L4	15
Module3: Analysis and Synthesis Analysis and synthesis of data and information collected on various aspects; projections of population and workforce; trends and issues identification.	L4, L5	40
Module 4: Plan, Policies and Proposals Preparation of policies and proposals with different scenarios and identification of priorities and action areas; phasing and monitoring; governance structures for implementation; land use plan and the plan document.	L5, L6	20

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/ References

- Government of India. (1996). UDPFI Guidelines, ITPI, New Delhi
- Dr. L.R. Kadiyali (2016). *Transportation Engineering*, Khanna Publishing
- Delhi Development Authority. (2010). *Master Plan for Delhi 2021*
- CIDCO. (2008). *Navi Mumbai Development Plan*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Internal Assessment						ESJ
	R-I	R-II	R-III	Report	CE	A	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	--	1	--	--	--	--	--	1	1	1	--	--
CO2	1	1	--	--	1	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	1	1	1	--	--	--	--	--	--	1	1	1	1	1
CO4	1	1	1	1	1	--	--	--	1	--	--	1	1	1	1	1

1: strongly related, 2: moderately related and 3: weakly related

	METROPOLITAN PLANNING, DEVELOPMENT AND MANAGEMENT (PLN2608)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Introduction to Regional Planning					
Co-requisites	Planning and Design Lab – VII (Regional Planning)					

Catalog Description

The Course deals about the development of a region because a city can't flourish its own. The course gives the understanding to study the characteristics of a region, nature, components and spatial patterns. It also discusses about the tools and constraints in the implementation of metropolitan development plan in terms of administration, legal and financial aspects.

Course Objectives

The objectives of this course are

- To understand the Process of Metropolitanisation and Evolution of Metropolitan Cities and their respective Regions using Case Studies.
- To introduce the Techniques of Delineation of Metropolitan Regions and study their Structure, Form and Characteristics with the help of Case Studies

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept of Metropolitanisation and its regional structures

CO2: Explain the Forms and concepts for metropolitan planning and development.

CO3: Identify the different hierarchy of growth poles and growth centres in regional planning.

CO4: Explain the need of special planning for special regions through different case studies

Modules	Blooms level*	Number of hours
MODULE 1: Metropolis and its Region Introduction to metropolis and related concepts, growth and scale; Complexities: social,economic, physical and administrative; Metropolitanisation in India: general trends anddistribution; Issues and problems in metropolitan planning and development. Service area of a metropolis; Metropolis as a primate city; Metropolitan region and delineation techniques; Metropolitan regional structures:characteristics, components and spatial patterns	L1, L2	11
MODULE 2: Forms Metropolitan centralization and decentralization processes; Concepts of ring and satellitetowns, counter-magnets; Forms and concepts for metropolitan planning and development:Sheet, Galaxy, Core, Star, Ring and Multi-nucleated; Merits and demerits; Efficient functioning of metropolis	L1, L2	8
MODULE 3: Metropolitan Planning, Development and Management Strategy Metropolitan planning: spatial planning studies and surveys; Concepts and techniques ofpreparation of metropolitan city plans; Metropolitan planning, development and managementstrategies at regional and settlement levels; Tools and constraints in the implementation of metropolitan development plan in terms of administration, legal and financial aspects; Role andfunction of public participation.	L1, L2	9
MODULE 4: Case Studies in Metropolitan Planning and Development Metropolitan planning, development and management in India; Appraisal of planning anddevelopment efforts in case of some of the metropolises, viz. Kolkata, Mumbai, Delhi andChennai, etc	L1, L2	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books /

- ITPI , *City and Metropolitan Planning and Design*, ITPI, New Delhi
- Ramachandran, R. (1998). *Urbanisation and Urban Systems in India*: Oxford University Press, New Delhi
- Bawa V.K. (1987). *Indian Metropolis: Urbanisation, Planning and Management*: Inter-India Publications, New Delhi

References

- MMRDA, (1991). *Madras 2011: A New Perspective for Metropolitan Management*: MMRDA, Chennai
- NCRPB, (2005). *Regional Plan 2021*: New Delhi

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	REGIONAL PLANNING AND MANAGEMENT (PLN2609)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning					
Co-requisites	Planning and Design Lab – VII (Regional Planning), Metropolitan Planning, Development and Management					

Catalog Description

The aim of this course is to study the concepts, characteristics and process of regional planning. This course gives a detail idea of evolution, preparation and implementation of regional planning in India. A regional plan takes into account the economic, spatial and environmental goals and tries to address national level issues. It mainly focuses on resources management and economic development of a region for its balanced growth. This course also has some case study of how regional plans were prepared and what was the need behind the preparation of regional planning.

Course Objectives

The objectives of this course are

- Understand Regionalization and Growth of Regions and study their Nature, Types andStructure using Case Studies
- Identify Regional Planning Process through different case studies.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the contribution of regional development in regional economy

CO2: Describe the different scopes of regional plans at district level, state level, sub-national level and national level.
CO3: Identify the different hierarchy of growth poles and growth centres in regional planning.
CO4: Explain the need of special planning for special regions through different case studies

Modules	Blooms level*	Number of hours
MODULE 1: Regional Planning and Developments Concept of regional planning: nature, objectives, levels and aims; Concept of a region, types,and regionalization, Regional Networks; Regional development; Balanced and unbalanced development; Under-development; Regionalmultiplier, input-output model;Core-periphery model; Growth poles and centers	L1, L2	6
MODULE 2:Planning Processes Regional planning processes: Identification of plan objectives; collection, classification andanalysis of data; Norms and standards for regional planning; Formulation of alternative planproposals with respect to population distribution, location of new regional economic activities,infrastructure, plan implementation, etc. Case studies.	L1, L2	6
MODULE 3: Introduction to Rural Development Meaning, nature and scope of development; Nature of rural society in India; Hierarchy of Rural settlements; Social, economic and ecological constraints for rural development, Three tier system of rural local Government; Need and scope for people's participation and *Panchayati Raj*, 73rd Constitution Amendment Act, including - XI schedule, devolution of powers, functions and finance; *Panchayati Raj* institutions - organizational linkages; Institutionalization; resource mapping, resource mobilization including social mobilization; Information Technology and rural planning	L1, L2, L3	6
MODULE 4:Rural Development Initiatives in Five Year Plans Five Year Plans and Rural Development; Planning process at National, State, Regional and District levels; Planning, development, implementing and monitoring organizations and agencies; Urban and rural interface- integrated approach and local plans; Development initiatives and their convergence; Special component plan and sub-plan for the weaker section; Data base for local planning; Need for decentralized planning; Sustainable rural development.	L1, L2	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Glasson, John ,(1974). *An Introduction to Regional Planning*
- Misra R.P. (2002). Regional Planning – *Concepts, Techniques, Policies and Case Studies*, New Delhi
- Rengasamy, S, *Regional Planning and Development*, Madurai

References

- Mahesh Chand and Vijay Kumar Puri, (2010). *Regional Planning in India*

- Qaiyum, Abdul, (2010). *Regional Planning and Development*, ITPI, New Delhi
- Rural Development: Principles and Practice a book by Malcolm J. Moseley, 2003.
- Rural Development Issues a book by Arnold V. Burlingham, 2008.
- Rural development in India a book by ShriramMaheshwari, 1985.
- Handbook of Rural Development by Gary Paul Green, 2013.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	1	--	--	--	--	--	--	--	1	1	1	--
CO2	1	1	--	--	1	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	1	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	1	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	SPECIAL AREA PLANNING (PLN2610) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Introduction to Regional Planning					
Co-requisites	Metropolitan Planning, Development and Management					

Catalog Description

The aim of this course is to introduce the students to various Special Areas with their specific planning needs and priorities and the implication on development in these areas. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skilldevelopments. The focus of the course will be on studyingthe need and process required for special area planning. This course will provide the students hands-on experience Special area that required a different planning process in a built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objectives of this course are

- To understand the need of special area planning in Indian context.
- To familiarize students with planning process required for special area.
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the need and legislation required for special area planning

CO2: Prepare the detail report and presentation on a given project related to Special area planning.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to SAP and its Management Special Areas under consideration would include Formal and Functional Regions (Hill Areas, Coastal Areas,Desert Areas, Special Economic Zones, Port City, Aerotropolis, Medi-City, Knowledge City etc.)., Types of special areas and their defining characteristics, Legislations and norms for Special Area Development in the Indian context, Capital investment and funding methods, public private partnerships in development process, Governance and Management aspects, Case Studies of various typologies of Special Area Development Plans in Indian and international context.	L1, L2	24
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

- Development of Hill Areas, Dobha G.L, Concept Publishing
- Environmental Problems of Coastal Areas in India, Sharma Vinod, Bookwell
- Integrated Development of Hill Districts in India: Issues and Approaches, Gupta, R.C., SPACE
- Special Economic Zones In India, P. K. Manoj, Serials Publications

Reference Books

- Aerotropolis:The Way Well Live Next, John Kasarda, Allen Lane
- Environmental act in India, Ruma Chatterjee, Oxford University Press
- CRZ Regulations, 2011, MoEF

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	

Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	APPLICATION OF SPSS IN PLANNING (PLN2611) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	-					
Co-requisites	Planning and Design Lab - VI					

Catalog Description

The aim of this course is to introduce the students to learn the SPSS (Statistical package for the social sciences). It is a set of software programs that are combined together in a single package. The basic application of this program is to analyze scientific data related with the social science. This data can be used for market research, surveys, data mining, etc. The importance of SPSS is that students can import data from other sources, when data is organized as a database, including Excel. Importing an Excel spreadsheet to SPSS for the data analysis is a fairly simple process, requiring some preparation and a few basic steps. This course of learning is mainly Statistical software allows researchers to avoid routine mathematical mistakes and produce accurate figures in their research if they input all data correctly. This course is to learn the practical knowledge base on the theory and also students must able to operate this software.

Course Objectives

The objectives of this course are

- To understand the SPSS features for Data Analysis base on the theory knowledge
- To familiarize the SPSS in order to perform this SPSS software for data analyze to produce the summary statistics and chart.

- To learn the statistical tests (means, T Test, One way ANOVA, non parametric tests and normality test), correlation and regression, multiple analysis such as factor and cluster analysis

Course Outcomes

On completion of this course, the students will be able to

CO1: understand the SPSS software and able to operate for data analyze

CO2: exercise in testing such as the statistical tests (means, T Test, One way ANOVA, non parametric tests and normality test), correlation and regression, multiple analysis such as factor and cluster analysis through the SPSS knowledge

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to SPSS software and its application for planning Introduction of SPSS, Data Analysis with SPSS. General Description and Function of SPSS, SPSS file Management; Input and data cleaning, definition variable, manual input of data, Automated input of data and file import; Data Manipulation such as Data Transformation, Syntax files and scripts and Output management; Statistical Tests- Means, T Test, One-way ANOVA, Non parametric Tests and Normality Test, Correlation and regression-Linear correlation and regression and multiple regression (linear).	L1, L2	24
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books / References

- Field A., Discovering Statistics Using SPSS, Fourth Edition, SAGE, 2013
- Sabine LandauandBrian S. Everitt., A Hand Book of Statistical Analysis Using SPSS, 2004

Mode of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage	-	-	-	40	05	05	50

(%)							

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	URBAN DESIGN AND LANDSCAPE (PLN2612) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Introduction to Urban Design					
Co-requisites	Planning and Design Lab -VI					

Catalog Description

The aim of this course is to introduce the students to learn the urban design. It is the design of towns and cities, streets and spaces, collaborative and multi-disciplinary process of shaping the physical setting for life in cities, towns and villages, the art of making places, design in an urban context. This course is to learn the quality of urban design - creates safe, attractive and secure pathways and links between centres, landmarks and neighbourhoods, facilitates green networks that link public and private open space, places a high priority on walking, cycling and public transport. During the course the students will be able work on live projects in groups which are preferably interdisciplinary of architect, planner engineer etc.

Course Objectives

The objectives of this course are

- To learn the shape and form public and communal spaces. Its realm is anything and everything outside of your private living spaces.
- To create an attractive harbour front with high quality development in a luxuriant landscape setting and To create a vibrant harbour front with a mix of uses and diverse activities
- To ensure a sustainable design and greening and to create a harmonious visual and physical relationship with the ridgeline, harbour setting and the CBD

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand the concept, challenges and solutions for Urban Design and Landscape

CO2: Students should able to works on Urban design and landscape inshape and form public and communal spaces and create an attractive harbour front with high quality development in a luxuriant landscape setting and To create a vibrant harbour front with a mix of uses and diverse activities

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Urban Design and Landscape Urban History and Development Theories, Urban Design Methodologies, Digital Skills for Urban Design and Landscape, Research Methodology, Site Planning, Case Studies of Urban Design and Landscape in Indian and international context.	L1, L2	24
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	16

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books/References

- Spiro Kostof , The City Assembled , Thames and Hudson.
- Spiro Kostof , The City Shaped, Thames and Hudson.
- Jon Lang , Urban Design Typology and procedures, Architectural Press
- A.E.J. Morris , History of Urban Form, Longman Scientific and Technical.
- Kevin Lynch , Good City Form, MIT Press. Edmund Bacon, Design of Cities.
- Geoffrey Broadbent, Emerging Concepts of urban Design

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	Internal Assessment						ESJ
	CT-1	CT-2	HA	S/P	CE	A	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Seventh Semester

	URBAN GOVERNANCE (PLN2702)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Planning Legislation,Urban Management – I					
Co-requisites	Urban Finance					

Catalog Description

The course intends to create awareness amongst the students to the concept and meaning of governance and government, stating its evolution in history since the British rule in India. The course deals with the changes brought about due to urbanization and role of governance in urban management. The course aims in enlightening the students regarding a transparent governing system and the need for collaborative public participation.

Course Objectives

The objectives of this course are

- To understand the Significance of Governance in Urban Development
- To ascertain the Role of Governance in view of 74th Constitutions Amendment Act, 1992

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concept and meaning of governance and government, stating its evolution, transparent governing system and need for collaborative public participation.
CO2: Describe the evolution of development and management systems at the National, state and local levels
CO3: Explain the concepts of urbanization and the system deficiencies resulting in urban poverty and exclusion from planning processes
CO4: Describe the 74th Constitution Amendment Act, including - XII schedule, decentralization of powers and functions

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Urban Governance Meaning of governance and government; Scope of governance, evolution of concept of governance; Theories of local government; History of urban local bodies in India, Evolution ofmodern urban local governments during British rule; Decentralization of local government; Recommendations of various committees; Politics and progress of decentralization.	L1, L2	9
MODULE 2: Governance for Urban Management Evolution of development and management systems; Scope of development management at the National, state and local levels; Hierarchy of urban settlements; Institutions and organizations; Stakeholders, their perceptions and role in urban management.	L1, L2	8
MODULE 3: Governance and Urbanization Government, governing and governance; Determinants and indicators of good governance; Citizens charter and other instruments; Decision making processes; Need for openness and transparency; People's participation, collaborative management; Local governance. Processes of urbanization, developmental conflicts, resource constraints, systems deficiencies; Urban poverty and exclusion from development process;; Defects in planning approaches, multiplicity of organizations and authorities	L1, L2	10
MODULE 4: Governance in Post 74th Amendment Scenario 74th Constitution Amendment Act, including - XII schedule, decentralization of powers and functions; Local and participatory planning, bottom up, decentralized and integrated planning processes; Planning, governance and spatial strategy; Best practices of planning and quality of governance.	L1, L2	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rai, N. (2010). *Urban Governance in India: RCEUS*
- Mahala, O.M. (2011).*Urban Governance in India:Emerging challenges in Liberalized Era;* Neha Publishers

References

- Rao P.S., (2010). *Urban Governance and Management: India Initiatives*: Kanishka Publishers
- Sharma, R. (2011). *Urban Governance in India;* Research India Press

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	1	1	--	--	--	--	--	--	--	--	--		1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--		1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--		1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--		1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	URBAN FINANCE (PLN2703)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Urban Governance					
Co-requisites	Metropolitan Planning, Development and Management					

Catalog Description

This course is to study and analysis the urban governance and it importance to deliver the services in India. To study the decentralization of local government is also includes in this course. The governance and government relationship is to study and analysis. In the course, governance and urban management challenges in a urbanization process is to study along with governance in post 74th Amendment Act scenario in India.

Course Objectives

The objectives of this course are

- Analyze Multiple Sources of Urban Finance for Urban Development
- Introduce Urban Reforms and their Implications on Liquidity and Application of Urban Finance

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the urban governance and it's important for development and services delivery.

CO2: Describe the additional funding resources and challenges in urban reforms.

CO3: Explain the importance for urban management through good governance

CO4: Discuss the 74th CAA and it's important to governance in India

Modules	Blooms level*	Number of hours
MODULE 1: Multiple Finance Nature and composition of income and expenditure, limitations and need forrevenue enhancements; Expenditure control methods and mechanisms; Budgetaryallocation from Central and State Governments for urban development; Assistancefrom foreign donors and Multi National agencies; Non-traditional sources of funding;Market access; Pool finance and prerequisite conditions for accessing non-traditionalfunds.	L1, L2	10
MODULE 2: Additional Funding sources and Urban Reforms Types of partnership approaches; Privatization of civic services; public privatepartnership mechanisms; Types of contracts and ownerships; Emerging cost effecttechnology interventions; User charged projects; Pricing of services. Role of state government and urban local bodies; City's challenge fund; Urbanreforms; Implications on resources, incentive fund and state level pooled financedevelopment fund.	L1, L2,	10
MODULE 3: Institutional Capacity Enhancement Better finance management, management process; Accounting and budgeting, assetmanagement, receivables management, cost centre approach; Computerization astool for resource enhancement; Role of Management Information Systems.	L1, L2	8
MODULE 4: Plan forms and Indices Financial operating plan, city corporate plan; Development of urban indicators;Infrastructure pricing and financing – financing mechanisms in addition to tax andgrants; private public partnerships like BOT, BOOT, BOLT etc.; Impact fee, subsidies.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books / References

- Bahl, Ray, W. and J. Link, (1992). *Urban Public Finance in Developing Countries*: Oxford University Press, New York
- Kulwant Singh and Behnam Tai, (2000). *Financing and Pricing of Urban Infrastructure: New Age International*, New Delhi
- KK Pandey, (2010). *Stimulating Revenue Base of Urban Local*, IIPA, New Delhi
- George E. Peterson and Patricia C. Annez, (2007). *Financing Cities*: Sage Publishers, World Bank
- Peterson, G., (2007). *Unlocking Land Values*: Cambridge University Press

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	Internal Assessment						ESE
	CT-1	CT-2	HA	S/P	CE	A	
Weightage	10	10	10	10	05	05	50

(%)							

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING AND DESIGN LAB - VII (REGIONAL PLANNING) (PLN2706)	L	T	S	P	C
Version 1.1		0	0	8	0	8
Pre-requisites/Exposure	Fundamentals of Urban and Regional Planning, Introduction to Regional Planning					
Co-requisites	Planning Thesis					

Catalog Description

This course gives exposure to the students about the preparation of regional plans. They will be aware of the process for preparing checklist for data collection as well as conducting field visits and various methods to collect primary as well as secondary data collection. Students need to do data synthesis, analysis, finding of potentials & issues and drawing conclusions. They need to suggest strategies and proposals as per the findings. At the end they also need to submit a detailed report on District Development plan.

Course Objectives

The objectives of this course are

- To understand Role and Relevance of Regional Planning in general and the Context of 73rd and 74th CAA in particular.
- To study District / Metropolitan Area / Regional Development Policies and Land Utilization Plan along with Phasing, Monitoring Mechanism, and Governance Structure for Implementation

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe the various types of regional plans and their linkages with higher and lower order plans and constitutional provisions.

CO2: Utilise the primary and secondary data obtained through field visit, for the sectoral and spatial planning; detailed data analysis.

CO3: Evaluate the present their data analysis and drawn inferences

CO4: Prepare proposals as per the identified thrust areas and potential of the study area along with a detailed report of District development plan.

Modules	Blooms level*	Number of hours
MODULE 1: Context of Regional Plans and Constitutional Provisions Role and relevance of regional planning at district or block level for regional planning, critical appraisal of district or block level plans; Understanding the contents of various types of regionalplans and their linkages with higher and lower order plans; District planning in the context of 73rd and 74th Constitution Amendment Acts; District Planning Committees (DPCs); Metropolitan Planning Committees (MPCs) and Ward Committees	L1, L2	15
MODULE 2: Organization of Field Surveys Formulation of goals, objectives, methodologies; identification of data and sources of information; Collection of secondary and primary data for sectoral and spatial planning; detailed data analysis.	L2, L3, L4	15
MODULE 3: Analysis and Synthesis Identification of development issues, potential thrust areas and constraints: sectoral and spatial; designing of alternative planning strategies, settlement patterns and development strategies; Sectoral and spatial prioritization, phasing, financial plans, institutional mechanisms, legislative framework, management plans.	L4, L5	40
MODULE 4: Plan, Policies and Proposals Preparation of Regional Plan Document along with drawings, etc; Preparation of policies and proposals with different scenarios and identification of priority areas; phasing and monitoring; governance structures for implementation; regional land utilization plan and the plan document	L5, L6	26

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Planning Commission. (2006) Manual of Integrated District Planning. Planning Commission, New Delhi
- SPA, B. (2018) Coimbatore Regional Development Plan-2038. School of Architecture and Planning, Bhopal,

References

- Gupta, K.K. and Tyagi, V.C. (1992) Working with Maps. 105, printing group, Survey of India, DST, Govt. of India
- Cooper, H. (1998) Synthesizing Research: A Guide for Literature Review.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	R-I	**R-II**	**R-III**	**Report**	**CE**	**A**	
Weightage (%)	50	50	50	40	05	05	200

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	1	1	1	1	1	1	1	--	--	1	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	TRAINING SEMINAR – II (PLN2707)	L	T	P	C
Version 1.1		0	0	0	2
Pre-requisites/Exposure	Urban Governance, Urban Finance, Urban Management - I				
Co-requisites	Planning and Design Lab – VII (Regional Planning)				

Catalog Description

Each student shall undertake Mandatory Training in a planning (or related) office during summer vacation between the Sixth and Seventh semester. The period of Training will be eight weeks. The exact period and place of training will be decided in consultation with the Co-ordinator-in-charge of training. The objective of Training is to expose the students to live planning projects and working environment at planning offices. The students are required to submit a 'Satisfactory' certificate from the relevant Planning Office after completion of training. The student will also submit a Report highlighting the Profile of the Planning Office, its organization, key work areas, etc; Introduction to the project(s) worked upon during training; planning brief; methods employed; and planning -design solutions / proposals. The students will also be required to present their work through drawings / visuals, power point presentations in the form of a Seminar to the faculty and students of the Department over the seventh semester, as per directions of the Co-ordinator-in-charge of training.

Course Objectives

The objectives of this course are

- To understand the profile of the Planning Office / Planning Authority / Local Body / Planning Professional.
- To participate in a Live Project of Planning Office / Planning Authority / Local Body / Planning Professional

	LANDSCAPE PLANNING AND DESIGN (PLN2710)	L	T	S	P	C
Version 1.1		2	0	0	0	2
Pre-requisites/Exposure	Housing and Community Planning					
Co-requisites	Planning and Design Lab – V (Area Planning)					

Catalog Description

This course introduces the theoretical and practical aspects of Landscape Planning, Design and their importance in the urban planning process.

Course Objectives

The objectives of this course are

- Overview of Principles and Techniques of Landscape Design, Open Spaces, etc.
- Significance of Landscape Planning as component of Urban and Regional Development, Ecology and elements of Landscape.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explore various aspects of landscape elements in genera with relation to Social, Environmental and urban quality of life aspects.

CO2: Analyze Bio-mimicry design concepts; learn specific aspects of sustainable design approaches.

CO3: Describe the landscape planning and its importance in terms of quality of life and explain the various best practices in traditional landscape planning.

CO4: Assess impacts as per sustainable development principles and urban planning in India.

Modules	Blooms level*	Number of hours
MODULE 1: Elements and History of Landscape Study of Landscape elements such as land, vegetation, water, earth & climate, Natural & manmade elements, etc. Principles of landscape design such as unity, simplicity, variety, balance, proportion, sequence, etc. Social and economic factors. Psychological considerations of spaces and enclosures. History of Landscape Architecture including natural & cultural factors of the place, development of landscape architecture through history in different parts of the world such as China, Japan, Europe, Italy, France, England, Persia, Egypt, Greece, Rome. Study of landscape architecture in Medieval period in India such as Mughal. Modern & Contemporary Landscape architecture. Cultural aspects of the landscape architecture with contextual understanding.	L1, L2	8
MODULE 2: Hardscapes, Softscapes and Urban Landscape Hardscapes - pergolas, garden furniture, fences, rocks, masonry, paving & surfacing, roads & parking lots, walks & plazas; Softscapes such as plantation, turfing, water features. Design criteria for landscape design such as visual, functional, micro-climatic, ecological and aesthetic. Basic horticultural idea about plants, plant selection, planting design and care of plants; Urban Landscape - Characteristics and components of open space patterns in towns and cities (traditional and contemporary) basic types: streets, squares, plazas, gardens, ghats and maidans, public parks at district, local and neighborhood levels; park systems; landscape design related to land-use, circulation networks and activity; street furniture as a component of urban landscape.	L1, L2	8
MODULE 3: Landscape Design and Services Macro and micro-climatic considerations in landscape architecture. Effect of climate on landscape and various components of landscape on the microclimate. Landscape Services & Sustainability: Introduction; Outdoors lighting, surface water drainage, irrigation, soil management techniques.	L2, L3, L4	3
MODULE 4: Landscape Aspects of Site Planning Principles of understanding and evaluating and existing landscape; development as a response to constraints and opportunities offered by the site; the landscape concept and open space structure as a basic component of the site plan; The role of vegetation: environmental benefits, functional requirements, aesthetic considerations; typical situations and criteria for design with plants and selection of species; grading; in relation to existing contours, plinth levels, road alignment and storm water drainage; principles of cut and fill.	L1, L2	5

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Geoffrey Alan Jellicoe, Susan Jellicoe (1995). *The landscape of man: shaping the environment from prehistory to the present day*, Thames and Hudson Publisher
- William M. Marsh, (1983). *Landscape Planning: Environmental Applications*, John Wiley & Sons Publishers

- John O. Simonds, (1997). *Landscape Architecture: A Manual of Site Planning and Design*: McGraw-Hill Education Publisher

Reference Books

- WencheDramstad , James D. Olson, Richard T.T. Forman, (1996). *Landscape Ecology Principles in Landscape Architecture and Land-Use Planning,* Island Press Publisher
- Norman K. Booth, (1989).*Basic Elements of Landscape Architectural Design,* Waveland PrInc; First Edition edition

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	2	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	2	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	2	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	PROJECT FORMULATION, APPRAISAL AND MANAGEMENT (PLN2711)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Real Estate Planning and Management, Planning and Management of Utilities and Services					
Co-requisites	Planning and Management of Informal Sector					

Catalogue Description

The aim of this course is to provide exposure to the students to basic concepts of project planning, appraisal and management. This course will enable the students a thorough understanding of all the theories and definitions of terms relating to project planning and management and their usage in urban and regional planning. The students will know about the impact of project appraisal, formulation and management and its significance in planning.

Course Objectives

The objectives of this course are

- To study the project formulation and appraisal and management
- To study the project planning and implementation
- To study the project evaluation

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the meaning and scope of project formulation, appraisal and management in planning.
CO2: Understand the process of project formulation and appraisal in planning.
CO3: Understand the process of project implementation and monitoring in planning.
CO4: Learn the process of project evaluation.

Modules	Blooms level*	Number of hours
Module 1: Introduction to Project Formulation, Appraisal and Management The concept of projects, Importance of project formulation, Project formulation: definition, objectives; Stages of project formulation and their significance; Methodology for project identification and formulation; Feasibility studies, input analysis, financial cost-benefit analysis, social-cost benefit analysis; Project appraisal and report.	L1, L2, L3	7
Module 2: Project Appraisals Need for project appraisal; Project formulation: definition, objectives; Stages of project form Network analysis; CPM, PERT, resource leveling and allocation, time-cost trade off aspects; Bar charts, Milestones, Standard oriented cost control techniques; Techno-economic analysis of projects; appraisal and management; reasons for shortfall in its performance; scientific management, life cycle of project; detailed project report, and feasibility studies; techniques of financial appraisal, payback period, IRR, DCF, NPV, CBR.	L1, L2, L3	12
Module 3: Project Implementation and Monitoring Project implementation, stages of implementation, Teamwork, actors in project implementation; Project monitoring: meaning objectives and significance; Monitoring techniques: integrated reporting, Milestones, time and cost overrun and under runs, unit index techniques.	L1, L2, L3	9
Module 4: Project Evaluations Project evaluation: meaning, objectives, scope, stages, approach and steps, Life of a project; Techniques of project evaluation: input analysis, financial cost-benefit analysis, social-cost benefit analysis; case studies in urban and regional development projects.	L1, L2, L3	8

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Chandra, Prasanna. (2017). Projects: Planning, Analysis, Selection, Financing, Implementation, and Review. *McGraw Hill Education.*

- Kerzner, Harold. (2012). Project Management: A Systems Approach to Planning, Scheduling and Contolling. *Wiley.*

Reference Book

- IES Master Team. (2019). ESE 2020 – Basics of Project Management. *IES Master Publication.*
- Padalkar, Milind&Gopinath, Saji. (2016). Six Decades of project management research: Thematic trends and future opportunities. *International Journal of Project Management, 34(7), 1305-1321. https://doi.org/10.1016/j.ijproman.2016.06.006*
- Shenhar, Aaron J. &Dvir, Dov. (2007). Project Management Research – The Challenge and Opportunity. *Project Management Journal, https://doi.org/10.1177%2F875697280703800210*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	-	1	-	--	--	--	--	--	--	-	1	-	1	--
CO2	1	1	-	2	-	--	--	--	--	--	--	-	1	-	1	--
CO3	1	1	-	1	-	--	--	2	--	--	1	-	1	-	1	--
CO4	1	1	-	-	-	--	--	1	--	--	1	1	1	-	1	--

1: strongly related, 2: moderately related and 3: weakly related

	SPECIFICATION, ESTIMATION AND VALUATION (PLN2712)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Fundamentals of Building Structures, Materials and Principles of Construction					
Co-requisites	Project Formulation, Appraisal and Management					

Catalogue Description

The aim of this course is to introduce to the students to the theory and practice of specifications, estimation, and quantity surveying; along with its importance in the field of building construction. The procedure of writing specification document for materials, labour, budgets and; estimating the cost and time of construction works shall be covered. The preparation of bill of quantities, optimum resource consumptions and introduction to BIS and other standardized institutions is also a part of the course. Calculating the land value and building values; finding their depreciation values using various methods would also be elaborated in the curriculum of the subject.

Course Objectives

The objectives of this course are

- To study the quantity surveying and specifications for planners and general specifications.

- To study the details specifications, estimations and valuation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Discuss the importance, usage of specification and detailed specification of various building materials.

CO2: Describe the detailed specification of various construction works.

CO3: Describe terms, types of estimating and methods of estimating.

CO4: Discuss the terms related to valuation and its types

Modules	Blooms level*	Number of hours
Module I: Introduction Why the knowledge of quantity surveying and specifications is necessary for architects and planners? Significance and methods of writing specifications, classifications of specifications, sources of specifications; Types and methods of cost estimation for different types of projects, rates and sources of rates for different components of projects; Cost Index.	L1, L2	8
Module 2: Specifications Specifications for common building materials and building trades, earthwork, structure (framing), flooring, stonework, plasters, waterproofing of basements and terraces, roofing, doors and windows, elevators. Site development and earth works; Water supply network and distribution systems; Sewer systems; Electrical and telephone networks; Landscaping, roads, pathways, boundary wall, pools, lighting.	L3	10
Module 3: Estimation Calculation of plinth area, floor area, carpet area and circulation area, Preliminary estimates- plinth area rates and cost indices, Detailed estimate-modes of measurement, taking off quantities from drawings, Bill of Quantities (BOQ) and Bill of Materials (BOM), Deriving rates for items from labour and material costs based on CPWD Schedule of Rates, scheduled and non-scheduled items, Establishing market rates. Cost estimation and determination of rates for different types of housing; Cost estimation and determination of rates of works involved in the infrastructure services (roads, water supply, sewer systems, etc.); Costing procedure for different land use categories, development works, interest on investment, and phasing.	L1, L2	10
Module 4: Valuation Value and purpose of valuation; Definition and importance of valuation of land and buildings; Factors affecting property and land value at a city and clarity level; Legal, fiscal and administrative measures of land value; Sinking fund; Betterment; Scrap value, salvage value, outgoings; Capitalized value of buildings; appreciation, depreciation and their types, methods of calculating depreciation.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books:

- V N Vazirani and S P Chandola (1968): Civil Engineering Estimation Costing and Valuation
- S P Mahajan and Sanjay Mahajan (2017): Quantity Survey and Valuation (Estimating, Costing and Contracting)
- Rangawala (2017): Estimating, Costing and Valuation Book

References:

- Arthanareswaran, R. (2015). A course material on Estimation and Quantity Surveying.
- Can, Ayse. (1992). Specification and estimation of hedonic housing price models. *Regional Science and Urban Economics, 22(3),* 453-474.https://doi.org/10.1016/0166-0462(92)90039-4
- Aigner, Dennis, Lovell, C. A. Knox & Schmidt, Peter. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics, 6(1),* 21-37. https://doi.org/10.1016/0304-4076(77)90052-5

Modes of Evaluation: Literature Study/ Case Study/ Presentation/ Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO Mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	1	2	--	--	--	--	--	--	2	--	--	2	1	--
CO2	1	2	1	2	--	--	--	--	--	--	2	--	--	2	1	--
CO3	1	2	1	2	--	--	--	--	--	--	2	--	--	2	1	--
CO4	1	2	1	2	--	--	--	--	--	--	2	--	--	2	1	--

1: strongly related, 2: moderately related and 3: weakly related

	DISSERTATION (PLN2737)	L	T	S	P	C
Version 1.1		2	0	0	0	2
Pre-requisites/Exposure	Technical Report Writing, Training Seminar I, Training Seminar II					
Co-requisites	Thesis					

Catalog Description

The aim of the course is to study the technical aspect of report writing and role of methodology in research. This course gives an idea of writing skills. The course will introduce the students to all types of technical, scientific and legal writings. The course will enable the students to conduct systematic research and write technical reports.

Course Objectives

The objectives of this course are

- To introduce students to basic literature, research process, techniques and colloquial arguments, so as to help them finalise a topic for their thesis in the subsequent semester.
- To understand the types of reports and style of writing technical reports
- To understand the methods used for conducting research.
- To know about presentation of research.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain differences between different writing formats for reports.

CO2: Explain important elements to give a comprehensive understanding of purpose of report.

CO3: Describe the differences between different writing styles for articles, papers and other texts.

CO4: Explain the basis for selecting appropriate research method and criteria for a good research design.

Modules	Blooms level*	Number of hours
MODULE 1: Thesis Programming Identification of topic of interest having relevance to planning profession, integration and application of the learnt researchprocess to the pre- thesis work. Planning colloquium: Exposure to the colloquial arguments by the stakeholders, decision makers, urban managers, advocates, technocrats, user groups, etc. Based on the inputs from the colloquial arguments, the topics shall be finalized for thesis in the subsequent semester.	L1, L2	6
MODULE 2: Research Techniques Data collection and analysis: Sample determination, data tabulation (coding, de- coding, etc.), quantitative and qualitative data analysis. Introduction to advanced statistical techniques such as, decision trees, factor analysis, fuzzy logic, multiple regression, multi variance, cobweb, logit and probit models, etc. Testing of hypothesis: Statistical hypothesis, simple and composite tests of significance, null hypothesis, types of errors, level of significance, critical region, chi- square distribution, goodness of fit, applications in planning.	L1, L2	6
MODULE 3: Research Process Problem identification, formulation of problem statement, literature review, working hypothesis, research brief, researchmethodology, sample determination, data collection and analysis, report structuring.	L1, L2, L6	6
MODULE 4: Research Methodology Intuition and research; Scientific research, need for scientific approach to research; Research methods; Hypotheses, testing of hypotheses; Reporting of research; Research in planning.	L1, L4, L5	6

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/

- Kothari. C.R. (2009), Research Methodology, New Age International Publisher.

- Kumar R. (2005). Research Methodology, Sage Publication Ltd., New Delhi.

Reference Books

- Allwood, J., Anderson, L.G. and Dahl, O. (1992). Logic of Linguistics, Cambridge University, Press, Cambridge.
- Riordan, D. and Pauley, S.E. (2013). Technical Report Writing Today, 10th edition, Cengage Learning, Boston.

Modes of Evaluation: Group Discussions, Report Submission and Presentation, Literature Review, Referencing, Understanding of Components, Writing Style

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO2	1	2	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO3	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO4	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	SETTLEMENT SOCIOLOGY AND INCLUSIVE DEVELOPMENT (PLN2713) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Development, Management and Finance, Infrastructure Planning					
Co-requisites	Public Policy in Planning, Urban Finance					

Catalog Description

The aim of this course is to offer opportunities in specialized or advance learning in sociological aspects which are of concern to physical planning. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skilldevelopments. The focus of the course will be on studying social aspects of human settlements and empowering marginalised sections of the population by improving the institutions of social structure. The course will provide the students hands-on experience of cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During

the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objectives of this course are

- To understand the principles of sociology of settlement with a focus on social development as the key concern for inclusive growth.
- To familiarize students with decisive strategies that brings inclusivity and equality in the Plan.
- To expose the students to various tools and techniques which are used in the field of sociology.
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understandthe various determinants of sociology and various elements of inclusivedevelopment by reviewing and conducting various case studies.

CO2: To prepare the detail report and presentation on a given project related to settlement sociology and inclusive development.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Settlement Sociology and Inclusive Development Basic introduction to various critical social aspects; Role of sociology in settlement planning; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Vulnerable and Marginalized groups in society; Elements of inclusive growth; Challenges in achieving inclusive growth; Methods to measure inclusive growth; Indicators of inclusive development; Various case studies related to gender inequality and development planning, community development- community response towards development strategy etc.	L1, L2	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books/References

- Cragun R.T.(2006). Introduction to Sociology, Wikibooks.
- Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
- Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books
- Sinha A. (2013) "An India for Everyone: A Path of Inclusive Development,Herpercollins
- Tejchman A. (2016) "The Politics of Inclusive Development", Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	SMART CITIES AND ADVANCED TECHNOLOGIES FOR EMERGING PLANNING ISSUES (PLN2714) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Development, Management and Finance, Infrastructure Planning					
Co-requisites	Public Policy in Planning, Urban Governance					

Catalog Description

The aim of this course is to introduce the students to smart cities concepts and solutions with their specific planning needs and priorities and the implication on development in these areas. Besides, this course also offers opportunities in specialized or advance learning in emerging spatial planning issues and planners need to give special attention to them while preparing the plans. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skilldevelopments. The course will provide the students hands-on experience of infrastructural, environmental problems emerging in a city. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

- To grasp Smart city concept as well as understanding emerging challenges in a city/region and finding out ways to resolve them.
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply smart city planning as well as critically analyze immerging multifaceted planning issues and technology-based solution to address them.

CO2: Prepare the detail report and presentation on a given project with an emphasis on smart solutions in order to achieve the goal of sustainable development.

Modules	Blooms level*	Number of hours
MODULE 1: Smart Cities, Advance Technologies and Emerging Planning Issues Introduction to smart cities, the city as a system of systems, smart citizens, Infrastructure, technology and data, Innovation and enterprise, smart leadership and strategy, standards and capacity building, smart measurement, and learning. Case Studies of various smart cities in Indian and international context. Challenges and problems faced by Mega city and its region, Issues-rapid unplanned growth, urban sprawl, infrastructure related issues such as shortage of Water Supply, Public transport, Parking Issue, Shortage of housing, Solid waste management, environmental issues such as deforestation, land conversion, depletion of ground water etc. Advanced Solution- Advanced Transport Planning system, Smart Mobility, Application technology for improving agriculture productivity, Rain water harvesting, green roofs Sustainable housing affordability, Zero-carbon city, Use of Information and Communication Technology in Planning and Governance- E- Governance, E-Planning, Case studies covering various planning issues at different level of Planning	L1, L2	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Dash, R. Environmental Sustainability Index for Indian States 2009 Informing Environmental Action. Chenna: Centre for Development Finance, Institute for Financial Management and Research.
- GRIHA. (2010). National Rating System, 'GRIHA' Green Rating for Integrated Habitat Assessment, An evaluation tool to help design, build, operate and maintain a resource-efficient built environment, GRIHA manual Volume 1. TERI Press, New Delhi: Ministry of New and Renewable, Energy, Government of India and The Energy and Resources Institute.
- Girardet, H. _1990.. The metabolism of cities. In: Cadman, D.and Payne, G. _eds. _1990.. The Living City: Towards a Sustainable Future London: Routledge.
- Smart Cities Unbundled, Sameer Sharma, Bloomsbury India
- The Smart City Transformations: The Revolution of The 21st Century, Amitabh Satyam, Bloomsbury India

References

- Basiago, A. D. _1996.. The search for the sustainable city in20th century urban planning. The Environmentalist, 16
- Douglas, I. Urban ecology and urban ecosystems: understanding the links to human health and well-being.Curr. Opine. Environ. Sustain. 2012, 4, 385–392.
- Smart Technologies, K. Worden, World Scientific Publishing Co Pte Ltd
- Smart Technologies for Smart Governments, Manuel Pedro Rodríguez Bolívar, Springer Publications

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**

CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	ENVIRONMENTAL IMPACT ASSESSMENT AND TOD (PLN2715) (ELECTIVE)	L	T	S	P	C
Version 1.1		0	0	3	0	3
Pre-requisites/Exposure	Land Economics and Real Estate Planning, Disaster Risk Mitigation and Management					
Co-requisites	Project Formulation, Appraisal and Management, Planning Design Lab VII					

Catalog Description

The aim of the course is to provide advance learning on the field of Environment Planning especially EIA which is one of the key concern of policy makers and land use planner. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skilldevelopments.The aim of this course is to provide exposure to the students to essential understanding of Environmental Impact Assessment (EIA). UNEP defines Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. This course will enable the students using EIA as tool for both environmental and economic benefits, such as reduced cost and time of project implementation and design, avoided treatment/clean-up costs and impacts of laws and regulations. Students will also be able to apply or reference these techniques in their planning studios. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits,

community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objectives of this course are

- To learn with different methods and process of Environment Impact Assessment.
- To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply EIA techniques while assessing the impacts on land use, resources, health and social conditions.

CO2: Prepare the detail report and presentation on a given project related to Environment Impact Assessment.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Role of Environmental Impact Assessment in the planning and decision-making process; Definition and need, evolution and objectives and scope.Different methods of Environmental Impact Assessment; Advantages and limitations;Public - private - people's participation in EIA, Impact assessment on land use, resources, social and health impacts.	L1, L2	12
MODULE 2: Project Work Selection and understanding of case study by reviewing case studies from India and abroad on projects of various types covering different levels of planning and practical exercises on Environmental Impact Assessments.Formulation of aim and objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Raman N.S., Gajbhiye, A.R., (2014). Environmental Impact Assessment, I. K. International Publishing House New Delhi, India
- Marriott, Betty Bowers, (1997). Environmental Impact Assessment – A Practical Guide, Mcgraw Hill, New Delhi, India

- Watheren, Peter, (2004). Environmental Impact Assessment: Theory and Practice, Tayler & Francis, New York & London

References

- Jay, S., Jones, C., Slinn, P., & Wood, C. (2007). Environmental impact assessment: Retrospect and prospect. *Environmental Impact Assessment Review*, *27*(4), 287–300. https://doi.org/10.1016/j.eiar.2006.12.001
- Ott, K., Mohaupt, F., & Ziegler, R. (2012). Environmental Impact Assessment. In *Encyclopedia of Applied Ethics* (pp. 114–123). Elsevier Inc. https://doi.org/10.1016/B978-0-12-373932-2.00345-8

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESJ**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	-	-	-	40	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	2	2	--	--	--	--	--	--	--	--	--	1	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

Syllabus - Eighth Semester

	URBAN MANAGEMENT-II (PLN2801)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Urban Management - I					
Co-requisites	Human Values in Planning, Planning Thesis					

Catalog Description

The aim of this course is to provide an in-depth understanding of the Basic Themes and Issues in Urban Management. This course explores important substantive areas and concepts in the field of urban management and current urban planning and policy issues and debate. This course will provide the knowledge needed for value-based management of spatial transformation process, it comprises, every aspects of a city in terms of economic, Environmental, social and infrastructure of an urban area.

Course Objectives

The objectives of this course are

- To understand the Importance of Decision Making in Urban Management
- To appreciate role of Leadership and Communications in Urban Management

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role of planner in decision making and approaches to leadership.

CO2: Evaluate the features and essential of effective communication.

CO3: Discuss the difference between socialism and planning.

CO4: Explain the nature and mode of resolution of conflicts in planning.

Modules	Blooms level*	Number of hours
Module 1: Decision Making and Leadership Decision-making; definition, features, factors, essentials and hindrances in sound decision-making; structure of decisions and types of decisions; theories of decision making - rational theory, incremental theory, systems theory, game theory, conflict theory, Herbert Simon's contribution in decision making; role of planner in the decision-making process and decision making bodies related to urban and regional planning at national, state and local level; Planner's functions as a leader, urban development manager, public bureaucrat, policy analyst and social reformer; approaches to study leadership — trait-approach, behavioral approach and situational approach;	L1, L2	10
Module 2: Communication Importance of communications; elements, types, features and essentials of effective communications; hindrances to effective communication; theories of motivation; carrot and stick approach, need based theory, motivational system; integration versus disintegration; co-ordination and co-operation; centralization and decentralization; single versus plural supervision; elements and types of organization; theories of organization — scientific management theory, bureaucratic theory, classis theory, human relations theory; behavioral approach and systems approach.	L1, L2	10
Module 3: Political Systems, Social Systems and Planning Democracy and planning, socialism and planning, fascism and planning; Tribal society, peasant society, industrial society; Spatial segregation in India	L4	8
Module 4: Conflicts and Resolutions Nature and mode of resolution of conflicts; public participation in planning as an aid to better understanding planning and implementation; political nature of planning and implementation problems in India; Case studies; examples from the other parts of the world highlighting situations where such problems have been minimized.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Goel, S. S. (2003). *Urban Development and Management.* Deep & Deep Publications.

- Cheema, S. (1993). *Urban Management: Policies and Innovations in Developing Countries.* Praeger; Revised ed. edition.
- Steven Sinofsky, M. I. (2010). *One Strategy: Organization, Planning, and Decision Making.* John Wiley & Sons.

Reference Books

- Emmanuel Mutale (2017): *The management of urban development in Zambia*
- S K Kulshrestha (2018): *Urban Renewal in India : Theory Initiative and Spatial Planning Strategies*

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	--	1	--	1	1	--	--	--	--	--	--	--
CO2	1	--	1	--	--	3	--	--	--	--	--	--	--	--	--	1
CO3	1	--	1	--	--	3	--	--	--	--	--	--	1	--	--	1
CO4	1	--	2	1	--	1	--	--	--	--	--	--	1	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING PRACTICE II (PLN2802)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Real Estate Planning and Management, Project Formulation, Appraisal and Management					
Co-requisites	Human Values in Planning, Planning Thesis					

Catalog Description

The aim of this course is to study role and responsibilities of Professional Planner and to attain the knowledge of project formulation, valuation and conditions of engagement and scale of professional charges. This course objective to provide the foundation, knowledge and skills needed to work in planning organisation. It is designed to build understanding of the complex interactions and uncertainties of the development process.

Course Objectives

The objectives of this course are

- Understand the roles of planner for plan and development in India cities and towns
- Identify the agencies that involves in planning process and development plan, execution and operation and maintenance
- Understand the need of Valuation, Methods of Real Property Valuation, Contract Documents and Project Formulation

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the role and responsibility of planners as decision maker.

CO2: Evaluate the scale of charges for different plans prepared at different levels

CO3: Describe the heterogeneity and imperfections of land and methods of valuation in real property

CO4: Describe the process involved in project formulation

Modules	Blooms level*	Number of hours
Module 1: Role of Planner Planner's input as professional at various levels and organizations, his role in decision making processes, relevant issues: generalists vs. specialists, professionals vs. technocrats, planner as decision maker vs. advisor to decision maker, relationship with client, developers, institutions and contractors; relationship with other experts such as engineers, architects, sociologists, economist, lawyers, etc; for specialized studies related to planning.	L1, L2	8
Module 2: Organization, Scope and Scale of Charges Aims and objectives of professional institutes, sister bodies; professional roles and responsibilities of planning consultants; professional ethics; responsibilities towards clients, fellow professionals and general public; Scope of services for different projects like master plan for urban area, zonal / district plan, sector / neighbourhood; layout, group housing schemes, commercial centers, industrial estates, etc; Consultancy agreements and safeguards; Fees and scales of professional charges, competitions and copyrights.	L1, L2	8
Module 3: Valuation and Methods of Real Property Valuation Fundamentals of valuation, Purpose of valuation; Valuation for wealth & income tax, capital gains tax, property & gift tax etc, ownership of land, compound interest theory, calculating of present value, concepts of economic rents and social rents, property taxes, sinking fund, annuity, depreciation, valuation tables; Legislative framework-rent control, easements and their effects on properties; Income capitalization methods, land and building method and other methods of valuation;	L1, L2, L3	12
Module 4: Contract Documents and Project Formulation Tenders, contracts, arbitration, schedule of rates for construction; Materials, labor and equipment for land development, unit and mode of measurements, rate analysis; Formulations of project proposals and outline; Preparation of and response to Notice Inviting Tenders, Expression of Interest, Terms of Reference, Penalty clauses, etc.	L1, L2	8

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Gary Hack, E. L. (2009). *Local Planning: Contemporary Principles and Practice.* Intl City County Management Assn.
- ITPI. (1995). *Conditions of Engagement of Professional Services and Scale of Professional Fees and Charges.* ITPI.
- PMBOK Guide" by the Project Management Institute (PMI)
- K. Nagarajan (2004). *Project Management.* New Age International
- Joshua Kahr, M. C. (2005). *Real Estate Market Valuation and Analysi.* John Wiley & Sons; Har/Cdr edition.

- Wyatt, P. (2013). *Property Valuation.* Wiley-Blackwell; 2nd edition.

Reference Books

- AITP Reader on Ecology & Resource Development, AITP
- AITP Reading Material on Environmental Planning and Design, Prof A. K. Maitra , SPA Delhi
- Evaluating Sustainable Development in the Built Environment, Brandon P.S., WILEYBLACKWELL Pub., UK
- MahyarArdeshiri and Ali Arddesiri, (2011): Sprawl or Compact City: The Role of Planners in Urbanization Processes in Developing Countries, Research Gate,
- TCPO, (2014): Urban Greening Guidelines, 2014, Town and Country Planning Organization, Ministry of Urban Development, Government of India, Delhi
- The Economics of Low Carbon Cities: A Mini-Stern Review for the Leeds City Region, Andy Gouldson et al., The Centre for Low Carbon Futures Partnership, University of Hull, University Of Leeds

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	1	--	--	--	--	--	1	1	--	--	--
CO2	1	1	--	--	--	1	--	1	--	--	--	1	1	--	1	1
CO3	1	1	1	--	--	--1	--	--	--	--	--	--1	1	--	1	1
CO4	1	1	1	--	--	--	--	--	1	--	1	1	1	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

	HUMAN VALUES IN PLANNING (PLN2803)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Housing and Community Planning, Planning Practice – I					
Co-requisites	Planning Practice – II					

Catalogue Description

The aim of this course is to provide exposure to the students to basic concepts of human values in planning. This course will enable the students a thorough understanding of all the theories and practices in planning their importance in urban and regional planning. The students will know about the values that make a good human being and a good society.

Course Objectives

The objectives of this course are

- To study the explorations of human values.
- To study the characteristics of good professional and social values.
- To study the context of life with personal and professional work.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the meaning of human values in planning and understand the values in science and technology.

CO2: Know the various types of values.

CO3: Understand the concept of ethics and its role in planning and development.

CO4: Learn the various values and management.

Modules	Blooms level*	Number of hours
Module 1: Values and Science and Technology The value-crisis in the contemporary Indian Society; The nature of values: the value spectrum for a good life; The Indian system of values. Material development and its values; the challenge of science and technology; Values in planning profession, research and education	L1, L2, L3	8
Module 2: Types of Values Psychological values — integrated personality; mental health; Societal values — the modern research for a good society; justice, democracy, rule of law, values in the Indian constitution; Aesthetic values — perception and enjoyment of beauty; Moral and ethical values; nature of moral judgment; Spiritual values; different concepts; secular spirituality; Relative and absolute values; Human values — humanism and human values; human rights; human values as freedom, creativity, love and wisdom.	L1, L2, L3	10
Module 3: Ethics Canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility; Work ethics; Professional ethics; Ethics in planning profession, research and education.	L1, L2, L3	9
Module 4: Values and Managements Management by values — professional excellence; inter-personal relationships at work place; leadership and team building; conflict resolution and stress management, management of power	L1, L2, L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Wachs, Martin. (2017). Ethics in Planning. *Routledge.*
- Schwartz, Barry & Sharpe, Kenneth. (2011). Practical Wisdom: The right way to do the right thing. *Penguin USA.*

Reference Book

- Beatley, Timothy. (1989). Environmental Ethics and Planning Theory. *Journal of Planning Literature.* https://doi.org/10.1177%2F088541228900400101
- Howe, Elizabeth. (1990). Normative Ethics and Planning Theory. *Journal of Planning Literature.* https://doi.org/10.1177%2F088541229000500201
- Thrupp, Lori Ann, Cabarle, Bruce &Zazueta, Aaron. (1994). Participatory methods in planning and political processes: Linking the grassroots & policies for sustainable

development. *Agriculture and Human Values, 11(2-3), 77-84.* https://doi.org/10.1007/BF01530448

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	1	--	1	--	--	--	1	1	--	1	1
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	--	1	1
CO3	1	1	--	--	--	1	--	--	--	--	--	1	1	--	--	--
CO4	1	1	1	--	--	--	--	--	1	--	1	1	1	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

	RURAL DEVELOPMENT AND MANAGEMENT (PLN2804)	L	T	S	P	C
Version 1.1		3	0	0	0	3
Pre-requisites/Exposure	Regional Planning					
Co-requisites	Planning Practice – II					

Catalogue Description

The course attempts to understand the theoretical basis for various concepts Rural Development and learn the practice of rural planning in the Indian context. The course provides an in-depth understanding of the issues of rural development, regional disparity and the need for balanced regional development in the context of globalization and rapid economic transformations in the country. Rural policies and sectoral policies are also discussed. Metropolitan regions, districts as planning regions and rural planning issues are discussed in the wider spectrum of holistic rural development and management.

Course Objectives

The objectives of this course are

- To understand the importance of rural area
- To analyze the post-independence scenario of rural areas
- To examine the initiatives of five-year plans for rural development
- To understand the post 73rd CAA scenario

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the importance of rural development

CO2: Describe the post-independence scenario of rural areas
CO3: Describe initiatives of five-year plans for rural development
CO4: Describethe post 73rd CAA scenario

Modules	Blooms level*	Number of hours
Module 1: Introduction to Rural Development and its roots in India Meaning, nature and scope of development; Nature of rural society in India; Hierarchy of Rural settlements; Social, economic and ecological constraints for rural development. Rural reconstruction and *Sarvodaya*programme before independence; Impact of voluntary effort and *Sarvodaya*Movement on rural development; Constitutional direction, directive principles; *Panchayati Raj* - beginning of planning and community development; National extension services.	L1, L2, L3	8
Module 2: Post Independence rural Development BalwantRai Mehta Committee - Three tier system of rural local Government; Need and scope for people's participation and *Panchayati Raj*; Ashok Mehta Committee - linkage between *Panchayati Raj*, participation and rural development.	L1, L2, L3	10
Module 3: Rural Development Initiatives in Five Year Plans Five Year Plans and Rural Development; Planning process at National, State, Regional and District levels; Planning, development, implementing and monitoring organizations and agencies; Urban and rural interface-integrated approach and local plans; Development initiatives and their convergence; Special component plan and sub-plan for the weaker section; Data base for local planning; Need for decentralized planning; Sustainable rural development.	L1, L2, L3	9
Module 4: Post 73rd Amendment Scenario 73rd Constitution Amendment Act, including - XI schedule, devolution of powers, functions and finance; *Panchayati Raj* institutions - organizational linkages; Institutionalization; resource mapping, resource mobilization including social mobilization; Information Technology and rural planning.	L1, L2, L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

- Rural Development: Principles and Practice a book by Malcolm J. Moseley, 2003.
- Rural Development Issues a book by Arnold V. Burlingham, 2008.
- Rural development in India a book by ShriramMaheshwari, 1985.
- Handbook of Rural Development by Gary Paul Green, 2013.

Reference Book

- Lector Notes on comparision between 73rd and 74th Amendment Act.

- http://planningcommission.nic.in/reports/genrep/mlp_idpe.pdf
- Effectiveness of Mahatma Gandhi National Rural Employment Guarantee Scheme (Mgnregs) with Special Reference to Panchayath, pdf.
- http://www.iosrjournals.org/iosr-jhss/papers/Vol.%2021%20Issue9/Version-8/I2109085671.pdf.

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**Internal Assessment**						**ESE**
	CT-1	**CT-2**	**HA**	**S/P**	**CE**	**A**	
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	1	--	1	--	--	--	1	1	--	1	1
CO2	1	1	1	--	--	--	--	--	--	--	--	--	1	--	1	1
CO3	1	1	--	--	--	1	--	--	--	--	--	1	1	--	--	--
CO4	1	1	1	--	--	--	--	--	1	--	1	1	1	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING THESIS (PLN2837)	L	T	S	P	C
Version 1.1		0	0	18	0	18
Pre-requisites/Exposure	PDL VII, PDLVI, PDL V					
Co-requisites	Human Values in Planning, Planning Practice - II					

Catalog Description

The aim of this course is to Equip Students to Conduct Independent Research. This course will help students of identifying his or her own area of interest; able to explore a subject in depth; manage a research project; define a suitable question and use the appropriate research tools. This course will also contribute tothe standards for academic writing. Each student of Bachelor of Planning is required to prepare a thesis on the subject of his / her choice, concerningurban, regional or rural planning. The topic shall be approved by the concerned department. Thesis will provide anopportunity to the student to conduct independent research by using the skills of analysis and synthesis learntthrough various theory and practical courses. Thesis will be completed under the guidance of an approved researchsupervisor allotted by the Department. Thesis will be prepared by the student as per Thesis Manual prepared by theDepartment. The students will be required to present thesis orally, graphically and through written report. Thestudent will also be required to present her thesis before the external jury appointed by the concerned University /Institute / School.

Course Objectives

The objectives of this course are

- To study and understand the scientific research method to carry out proper research to solving issues andproblems in the context of urban and regional area.
- To study and learns the details research methodology such literature, cases study area, data collection, dataanalysis and result/finding particularly in urban / regional areas for addressing issues and problems and itschallenges.
- To study and learns the formulation of policies, plan, suggestion / recommendation based on the researchwork.

Course Outcomes

On completion of this course, the students will be able to

CO1: Identify the need of their dissertation and formulate the aim and objectives respectively.

CO2: Organize field surveys and collect data from their related fields.

CO3: Analyze the data collected and find the gap .

CO4: Propose and recommend for the gap identified.

Module	Blooms level*	Number of hours
Module 1: Need for the Study and Methodology and Literature Research Clear goals and objectives along with scope of each objective should be outlined before establishing the need for conducting a research study; Substantive limitations of the research work should also be stated. Previous published work on the subject area has to be critically examined for finding out existing thought processes of other authors and trends (proper acknowledgements by authors).	L2,L3	-
Module 2: Field Surveys Depending on the research topic, field surveys have to be designed and field work has to done after conducting appropriate sample surveys.	L4, L5, L6	-
Module 3: Synthesis of Data and Information and Findings Field data and information and literature research findings should be synthesized to make final arguments and identification of planning issues.	L4, L5, L6	-
Module 4: Proposals and Recommendations Final, specific planning proposals and recommendations should be made at various geographical levels. Proposals should directly emanate from analysis and should not be generalized. Thesis should contain a list of references as per international practice.	L4, L5, L6	-

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books / References

- C.R. Kothari, (2004): Research Methodology, New Age International (P) Limited Publications, Delhi
- Shanti Bhushan Mishra and ShashiAlok., (2017): Hand Book of Research Methodology, GateResearch

- ChineloLgwenagu, (2016): Fundamental of Research Method and data collection, British Council,Research Gate
- Jennifer Mason, (2002): Qualitative Researching, 2nd edition, SAGE Publications, London

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination
Examination Scheme:

Components	**Internal Assessment**									**ESJ**
	R-I	**R-II**	**R-III**	**R-IV**	**R-V**	**R-VI**	**Report**	**CE**	**A**	
Weightage (%)	50	50	75	75	75	75	90	05	05	300

R: Review, CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination, ESJ: End Semester Jury

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	--	1	--	--	--	--	1	1	--	1	--
CO2	1	1	1	1	--	--	1	--	--	--	--	1	1	--	1	--
CO3	1	1	1	1	--	--	1	--	--	--	--	1	1	--	1	--
CO4	1	1	1	1	--	--	1	--	--	--	--	1	1	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

Examination Rules and Regulations

1. QUALIFYING STANDARDS

1.1 Progressive marks refer to the marks given to a student on a continuous basis during a semester by the concerned subject teacher/teachers.

1.1.1 In the case of subjects which are mainly studio based as per the scheme of teaching and examinations, the progressive marks shall be the total of marks given to the various jury/reviews from time to time in sheets and report format.

1.1.2 In the case of subjects which are mainly lecture based as per the scheme of teaching and examinations, the progressive marks shall be based on the average of two tests conducted normally at the end of 8th and 12th weeks of each semester. Provided that, the teacher may give assignments instead of tests which may include topic/case presentation, book reviews, write-ups etc.

1.1.3 In the case of subjects which are mainly practical based as per the scheme of teaching and examinations, the progressive marks shall be based on the assignments submitted by the students. A minimum of two assignments per semester shall be given.

1.1.4 In all the above mentioned three cases, viz studio based, lecture based and practical based subjects:

- The concerned teacher shall give a reasonable opportunity to the student to improve his/ her progressive marks, for example by re-doing the assignments or taking an additional test etc, within the time frame of the given semester with approval of HOD/HOI.
- The relevant records and submissions of students which have been assessed for progressive marks shall be produced as and when they are sought by the university within 12 months, after 12 months that no records shall be retained/ produced.

1.2 If a candidate fails to secure a **minimum of 50% of marks** in progressive marks in any subject, he /she shall not be eligible to take up theory/viva voce/end term examination in that subject.

1.3 It shall be the responsibility of concerned Head of the Department to implement clause "1.2" in the event of an ineligible candidate inadvertently being allowed to appear for the theory/ viva voce /end term examination, the result of the concerned examination shall be considered as null and void.

1.4 Such candidates shall correct, improve, redo the concerned works on the advice of subject teacher and re- submit them during subsequent semester of the next year in order to secure the minimum required progressive marks in that subject.

1.5 Once a candidate secures 'minimum' or 'more than the minimum' progressive marks in any subject, the marks shall be made permanent and shall not be changed under any circumstances.

1.6 To pass a subject, a candidate shall secure a minimum of 50% marks in Progressive marks and 50% marks in the end term examination (Theory examination/ Practical examination/ viva voce examination/ Total marks) ie Internal Marks: External Marks: Total marks :: 50:50:50.

1.7 Candidates who do not fulfil above cited clause no. 1.6 shall be deemed to have failed in that subject and have to re-appear for the Theory examination / practical examination or viva voce examination in which he/she has secured less than the minimum prescribed marks.

1.8 A minimum of 4.00 SGPA shall be secured by the student to be eligible for the award of degree.

2. THESIS EXAMINATION

2.1 The 'Thesis' of every student in the final semester shall be evaluated on thesis presentation by the student through viva-voce examination by the panel of the jury in accordance with the Regulations issued separately.

2.2 The jury shall include two external jury members and one internal member (Thesis Coordinator) from the faculty, in addition to the Chairman/HOD/HOI. Out of the four jury members, at least two must be present to complete the proceedings of the jury.

2.3 A student who fails in the thesis evaluation shall be allowed to resubmit the modified thesis after a minimum period of two months with due approval by the management, Amity University Haryana.

3. SUMMER TRAINING

3.1 Each student shall undertake mandatory training in a planning (or related) office during summer vacation afterfourth andsixthsemester. The period of training will be **minimum six weeks and maximum eight weeks**. The exact period and place of training will be decided in consultation with the Co-ordinator-in-charge of training. The students are required to submit a 'Satisfactory' certificate from the relevant Planning Office after completion of training. The student will also submit a report highlighting the profile of the Planning Office, its organization, key work areas, etc;be required to proceed on 'Summer training'. A Final Viva shall be conducted after each successful summer training.

3.2 The marks for Summer training shall be awarded to each student in accordance with the Regulations and guidelines issued by the Training Coordinator in consultation with HOI ASAP, Amity University Haryana.

4. PROMOTION RULES

4.1 A Student not satisfying the requirement of qualifying standards, at any semester, as per the Clause 1.6, shall be detained from appearing at the semester examination for that particular subject.

4.2 Such a student shall have to repeat the particular subject, as a ex-student student with the next batch of students.

4.3 A student satisfying all the standards as provided in Clause 1 shall be declared to have 'Passed' the semester examination.

4.4 A student not satisfying all the criteria of qualifying standards of Clause 1 in conjunction with the provisions of Clause 4.2, but failing in any number of subjects of both the semesters of a class taken together shall be declared to have been 'Promoted With Back-Papers' (PBP) and, shall be governed by Clause 5. A student so declared as PBP shall have to clear the back papers, as and when the examination of the concerned semester is held next.

4.5 A student not satisfying all the criteria of qualifying standards of Clause 1.1 in conjunction with the provisions of Clause 4.2, and has invoked the provisions of Clause no. 6, shall be declared as 'Promoted with Grace marks' (PWG), and shall be promoted to the next higher class.

4.6 The students who are not covered by provisions of Clause 4.1 to 4.5 shall be declared to have 'Failed'. Such students shall be required to repeat both the semesters of the said class, either as a 'regular student' or as an 'ex-student', in accordance with the Clause 5 and 6.

5. PROMOTION UNDER CARRY- OVER SYSTEM

5.1 A candidate covered under Clause 4.4 shall become eligible for provisional promotion to the next higher class of the course and shall get another chance to clear the said 'Back-Papers' in the next examination of the concerned semester under the carry-over system.

5.2 On failing again in any of the 'Back-papers' examination of a semester, the provisional admission granted to the concerned student in the higher class shall automatically stand cancelled and he/she shall have to clear the 'Back-papers' as an 'ex-student' or as a 'regular student', in accordance with the Clause 6.

5.3 Marks obtained by a student to clear his/her back paper shall replace the original marks, secured earlier by the student only to the extent of the minimum qualifying marks for computation of his/her result.

6. EX-STUDENTSHIP

6.1 A student opting to clear his/her examinations as an ex-student shall be required to inform the college, in writing, within 15 days of start of the next academic session.

6.2 An ex-student shall be required to appear at the 'Theory' and 'Practical /viva-voce' examination of all the subjects of both the semesters of the concerned class. However, the marks, for the 'Mid Term Examination' of all the subjects in the earlier regular attempt shall be retained as obtained by him/her.

6.3 If a student opts to repeat the semester as a regular student, the new marks awarded to him for 'Mid Term Examination' shall replace the old marks obtained by him in the earlier attempt.

7. GRACE MARKS

7.1 Grace Marks shall be allotted to the students within the policy directives of the Amity University Haryana.

8. MIGRATION

8.1 Migration of students from one Institute to other shall not be allowed unless it falls within the policy directives of the Amity University Haryana.

9. COURSE DURATION

9.1 Minimum duration of the course will be 4 years.

9.2 If any students fail to clear all the subjects as per clause 9.1, student have to clear remaining subjects in N+2 years where N will be the minimum course duration as per Amity University Gurgaon guidelines.

DISASTER MANAGEMENT AND SUSTAINABLE BUILT ENVIRONMENT

Programme Structure-2021

Course Code	Course Title	Lecture (L) Hours /Week	Tutorial (T) Hours /Week	Practical (P) Hours/Week	Total Credits
DSM2151	Introduction to Disaster Management	2	1	-	3
DSM2251	Resilience Building for Built Environment	2	1	-	3
DSM2351	Emergency Management	2	1	-	3
DSM2451	Rehabilitation Reconstruction and Recovery	2	1	-	3
DSM2551	Climate Change Adaptations and Sustainable Development	2	1	-	3
DSM2651	Geoinformatics in Disaster Management	2	1	-	3
	TOTAL				**18**

DISASTER MANAGEMENT AND SUSTAINABLE BUILT ENVIRONMENT

Syllabus - Semester First

INTRODUCTION TO DISASTER MANAGEMENT

Course Code: DSM2151 **Credit Units: 03**

Course Overview
The aim of the course is to provide broad understanding about the disasters and its management systems. The course will familiarize the students with concepts and approaches pertaining to disaster management and its relationship with development. The course will provide the understanding on how to assess disaster risk. Student will also learn about the government interventions in the field of Disaster Management.

Course Contents:

Module-I: Introduction to Disasters
Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks) Disasters: Classification, Causes, Impacts- Differential impacts-in terms of caste, class, gender, age, location, disability. Global trends in disasters urban disasters, pandemics, complex emergencies, Climate change.

Module-II: Approaches to Disaster Management
Disaster cycle- its analysis, Phases, Culture of safety, prevention, mitigation and preparedness, community based disaster risk reduction, Structural- nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions/ Urban Local Bodies, States, Centre, and other stake-holders.

Module-III: Inter-relationship between Disasters & Development
Factors affecting vulnerabilities, differential impacts, impact of development projects such as dams, embankments, changes in Land-use etc., climate change adaptation, relevance of indigenous knowledge, appropriate technology and local resources.

Module-IV: Disaster Risk Management in India
Hazard and Vulnerability profile of India; Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to

- Understand the concept of disaster management and measures to be taken at different stages of disaster management.
- Train on various aspects of disaster management.
- Appreciate the impact of development in the context of disaster management.
- Recognize the scenario of disaster management at various levels such as global, national and regional level.
- Learn vulnerability reduction strategies

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.

Syllabus - Semester Second

RESILIENCE BUILDING FOR BUILT ENVIRONMENT

Course Code: DSM2251 **Credit Units: 03**

Course Overview
The course is intended to provide various dimensions of disasters caused by nature and induced by human activities and their effects on built environment. The course will introduce different forms of disasters. The course will also help in providing the comprehensive knowledge on nature of disaster, characteristics, and how to mitigate the risk involved with such disasters through several case studies across India.

Course Contents

Module-I: Geological Disasters (earthquakes, landslides, avalanches)
Mechanism, patterns, destruction style, effect on built environment, strategies for mitigation, retrofitting, damage prevention, case studies.

Module-II: Hydrological Disasters (Floods, Cyclones and Tsunamis)
Mechanism, patterns, destruction style, effect on built environment, strategies for mitigation, retrofitting, damage prevention, case studies.

Module-III: Manmade Disasters (CBRN-Chemical, Biological, Radiological and Nuclear)
Mechanism, patterns, destruction style, effect on built environment, strategies for mitigation, retrofitting, damage prevention, case studies.

Module-IV: Other disasters (Fires, accidents, pandemics)
Mechanism, patterns, destruction style, effect on built environment, strategies for mitigation, retrofitting, damage prevention, case studies.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V -** Viva; **CT-** Class Test; **A -** Attendance; **EE -** End Semester Examination)

Learning Outcomes
At the end of the course, the students will be able to:

- Develop an in-depth understanding on nature and characteristics of nature and manmade disaster.
- Learn about the challenges and risks occurred during disasters with the help of case studies.
- Formulate mitigation strategies for risk reduction and damage prevention.

Learning Methods
Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.

Syllabus - Semester Third

EMERGENCY MANAGEMENT

Course Code: DSM2351 **Credit Units: 03**

Course Overview
The course will train the students about how to respond to a disaster in a city or a village so as to restore normalcy at the earliest. The course will provide necessary skills for search, rescue and evacuation operations. This course will also focus on significance of relief distribution and emergency medical facilities during disaster emergencies.

Course Contents

Module-I: Understanding Emergency Management
Types of activities and assistance during disaster emergencies; stakeholders; coordination with multiple agencies; time management and planning; maintenance of law and order; maintenance of records; Emergency communication.

Module-II: Search and Rescue (SAR)Operations
Significance of SAR; Need for SAR; Techniques for SAR; Organizations trained for SAR; Community Training.

Module-III: Relief Distribution
Significance of Relief Distribution; Need for Relief Distribution; Setting up temporary relief distribution camps, Techniques for Relief Distribution; Organizations trained for Relief Distribution; Community Training

Module-IV: Emergency Medical Care
Need for emergency medical care; Planning for medical care; Requirements of temporary medical camps; training of manpower; maintenance of records.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V** - Viva; **CT**- Class Test; **A** - Attendance; **EE** - End Semester Examination)

Learning Outcomes
At the end of this course, the students will be able to:

- Understand the role of multiple agencies, time management, communication during disaster emergencies.
- Practice to respond to a disaster so as to reestablish normalcy at the earliest.
- Acquire the skills and knowledge related to search, rescue and evacuation operations through project work.

- Learn the importance of relief distribution and medical care as a part of emergency management.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.

Syllabus - Semester Fourth

REHABILITATION RECONSTRUCTION AND RECOVERY

Course Code: DSM2451 **Credit Units: 03**

Course Overview
The course will provide an outline on the need and importance of disaster recovery and its planning. The course will familiarize the students about numerous techniques and guidelines for reconstructions after disasters. This course will provide the learning on aspects pertaining to livelihood restoration during rehabilitation process. Student will get to know about BBB (Build Back Better) strategy which is crucial for future disasters and concept of resilient recovery through this course.

Course Contents

Module-I: Damage Assessment for Recovery
Damage Assessment- Post Disaster Damage assessment; estimated damage assessment; Nature and damage to houses and infrastructure due to different disasters; Need and importance of disaster recovery; Planning for disaster recovery.

Module-II: Reconstructions after Disasters
Significance of reconstruction; Guidelines for Disaster resistant constructions; traditional techniques;
Speedy Reconstructions- Essential services, social infrastructures, Immediate shelters/camps, Contingency plans for reconstructions.

Module-III: Socio-economic Rehabilitation
Livelihood restoration; Development towards creation of long-term job opportunities and livelihood options; Various initiatives and policies for socio-economic rehabilitation; Case studies.

Module-IV: Building Back Better (BBB)
Origin of BBB strategy; BBB and preparedness for future disasters; Concepts for resilient recovery; roles and relationships of multilateral agencies like UN, World Bank etc in recovery process; Government's role in BBB; Stimulation of local economies.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V -** Viva; **CT-** Class Test; **A -** Attendance; **EE -** End Semester Examination)

Learning Outcomes
At the end of the course, the students will be able to:

- Prepare a damage assessment framework for managing disaster recovery.
- Review guidelines for disaster resistant constructions and contingency plans for reconstructions.
- Formulate their own strategies related to creation of long-term employment opportunities for displaced people.

- Learn about the BBB strategy and its implementation in order to stimulate local economics.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.

Syllabus - Semester Fifth

CLIMATE CHANGE ADAPTATIONS AND SUSTAINABLE DEVELOPMENT

Course Code: DSM2551 **Credit Units: 03**

Course Overview
This course focuses on creating safe and sustainable built environment for disaster prone settlements. The course will provide an overview of climate change issue and its interrelationship between climate change adaptation and development. Student will be able to learn about the principles of sustainability while providing solutions to the environmental problems of cities such as pollution, degradation of natural resources and various critical issues.

Course Contents:

Module-I: Climate Change
Origin and evolution of the earth's atmosphere; Overview of key concepts – weather and climate; Climatic classification; Climatic variability - temperature, rainfall, wind speed & direction; Effect of various anthropogenic activities on earth's atmosphere.

Module-II: Climate Change Adaptation and Mitigation
Linkage between climate change adaptation and development; International adaptation initiatives and programs; Definitions of mitigation and overview of emissions levels and mitigation targets per country; Climate vulnerability; Exposure sensitivity and adaptive capacity of society; Role of forests and trees outside forests in climate change resilience and adaptation.

Module-III: Introduction to sustainable development of regions
Scope & definitions; Goals; Principles of sustainable development; Environment ethics; Quality of life, Sustainable building designs and practices; Sustainable infrastructure- water supply, solid waste management, transportation; Green buildings and rating systems; Vernacular architecture and sustainability

Module-IV: Sustainable Development and International Contribution
Environmental movements; Global policies for sustainable development – world summits; Conventions and agreements.

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V -** Viva; **CT-** Class Test; **A -** Attendance; **EE -** End Semester Examination)

Learning Outcomes
At the end of the course, the students will be able to:

- Identify key drivers that contribute for enhancing the problem of climate change.
- Understanding for providing sustainable solutions for the emerging challenges related to environment and economic growth.

- Understand the contribution of international agencies for the protection of environment and natural resources

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.

Syllabus - Semester Sixth

GEOINFORMATICS IN DISASTER MANAGEMENT

Course Code: DSM2651 **Credit Units: 03**

Course Overview

The aim of the course is to study the concept of Remote Sensing, Geographical Information System and its applications in the field of Disaster Management. These tools and techniques will assist the students in preparing the spatial database and mapping of the affected area. This course will provide an opportunity to the students for handling various components of spatial modeling digital elevation models, overlay functions etc in the Geographical Information System.

Course Contents:

Module-I:Fundamentals of Remote Sensing

Concept, types and applications of remote sensing (RS); Types of required spatial data; raster and vector data structures; Types of Resolutions; Elements of Image Interpretation, practical exercise on Image Interpretation.

Module-II: Fundamentals of Geographic Information Systems

Definition, concept, significance, components of spatial data base: Types and representations; Applications of GIS in disaster management; Spatial data creation and checking - base maps and thematic maps; Geo-referencing

Module-III: Practical Exercises

Spatial interpretation in GIS; Software Demonstration; Geo-referencing, digitization and geo-database generation; Creating and editing vector data; Attribute data management; Linking of non-spatial data with spatial data, Use of Web GIS; Base map preparation.

Module-IV: Spatial Modelling and Thematic Mapping in GIS

Analysis in GIS: Query and retrieval, buffer and proximity analysis, spatio-temporal analysis, contour generation and Digital Elevation Modelling (DEM)

Examination Scheme:

Components	**CT**	**HA**	**C**	**V**	**A**	**EE**
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; **HA -** Home Assignment; **V -** Viva; **CT-** Class Test; **A -** Attendance; **EE -** End Semester Examination)

Learning Outcomes

At the end of the course, the students will be able to:

- Familiarize with the concept of Remote sensing and its applications required for image interpretation.
- Learn Geographical Information System software for creating spatial database on disasters affected area.
- Linking the non-spatial data with spatial data through practical exercises.

- Conduct spatio-temporal analysis in GIS and develop a GIS based decision support for disaster risk reduction.

Learning Methods

Videos and quizzes through the on-line Learning Management System (LMS); Classroom learning through an experienced Facilitator/Faculty on campus (Videos, In-class Activities, Outbound Activities); Assignments and Presentations.

Text & References:

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- Disaster management – S.K.Singh, S.C. Kundu, Shobha Singh A – 119, WilliamPublications, New Delhi.
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Master of Planning (Urban & Regional)

FLEXILEARN
-Freedom to design your degree

Curriculum & Scheme of Examination

2021

AMITY UNIVERSITYHARYANA

GURUGRAM

Master of Planning (Urban and Regional)

Programme Mission:
The mission of the Planning programme is to foster an environment of academic excellence in Urban and Regional Planningat bachelors and masters level through research and innovation, industry integration, internationalization and extension activities and develop highly trained and employable professionals with specialization in the area of Urban and Regional Planning, who are socially responsible and nationally/globally competent professional to meet the contemporary and emerging needs of society and the nation.

Programme Description:
The two-year full-time Masters programme in planning with specialization in Urban and Regional Planning, is toeducate and prepare students with the knowledge, analytical ability, and management perspectives and skills needed to address and solve urban and regional issues, to motivate and to manage diversified workforce, multiple stakeholders, emerging trends, rapid technological change and competitive marketplace while considering the principles of ethical, legal and governance fundamentals.

Programme Outcome (PO):

PO1 **Planning knowledge**: Apply the fundamentals knowledge of physical, socio-economic, environmental, legal and institutional framework and anurban-regional planning specialization to the solution of complex problems at city and regional level.

PO2 **Problem analysis**: Identify, formulate, research literature, as well as analyze complex urban and regional planning problems and reaching substantiated/concrete conclusions.

PO3 **Design/development of solutions**: Planning/Design solutions for various urban and regional planning problems that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods including data analysis and interpretation as well as synthesis of the information to provide valid conclusions.

PO5 **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern planning, statistical, thematic mapping and design tools (SPSS, GIS, Infographics software), including prediction and modeling to complex planning activities.

PO6 **The Planner and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional planning practice.

PO7 **Environment and sustainability**: Understand the impact of the professional planning solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics**:Apply ethical principles and commit to professional ethics and

responsibilities and norms of the planning practice.

PO9 **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 **Communication**: Communicate effectively on complex planning activities with the planning professionals and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 **Project management and finance**: Demonstrate knowledge and understanding of the planning and development principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of contemporary changes.

Programme Specific Outcomes (PSOs)

PSO1. Explain the physical, socio-economic, environmental, legal and institutional dimensions of an urban area and a region as well as their complexities of governance.

PSO2. Demonstrate the use of contemporary software like Geo-Informatic System (GIS) in spatial planning, infrastructure management and transport planning as well as utilizing Storytelling techniques for effective case presentation in planning studios.

PSO3. Formulate an urban and regional plan through live case studies by analysing and evaluating comprehensive as well as micro level development issues.

PSO4. Apply the principles of soft skills like creative thinking, team building, leadership and decision making in career development.

Supporting document for PSOs(Programme Specific Outcomes)
Masters of Planning (Urban and Regional)

PSO 1			PSO 2		PSO 3		PSO4	
Explain the physical, socio-economic, environmental, legal and institutional dimensions of an urban area and a region as well as their complexities of governance.			Demonstrate the use of contemporary software like Geo-Informatic System (GIS) in spatial planning, infrastructure management and transport planning as well as utilizing Storytelling techniques for effective case presentation in planning studios.		Formulate an urban and regional plan through live case studies by analysing and evaluating comprehensive as well as micro level development issues.		Apply the principles of soft skills like creative thinking, team building, leadership and decision making in career development.	
Basic Planning Courses	**Planning Fundamental Courses**	**Inter-disciplinary domain**	**Technical Planning**	**Spatial Planning/ Design**	**Development Plan Preparation**	**Management /Governance Courses**	**NTCC Courses**	**Value added courses**
Planning History and Theory	Socio-Economic Dimensions in Planning	Demography and Quantitative Analysis	Planning Techniques and Computer Applications	Transportation Planning and Management	Planning Studio-I	Land Management and Real Estate	Professional Training	Basics of Communication
Community Participation in Planning	Housing and Environmental Planning	Statistical Data Analysis in Planning(Elective)	Infrastructure Planning and Management	Urban Design, Renewal and Conservation (Elective)	Planning Studio-II	Project Planning and Finance Management	Infographic and Storytelling Techniques (Elective)	Corporate Communication
-	Regional Planning and Development	Settlement Anthropology and Inclusive Development (Elective)	Application of Geoinformatics	Special Area Planning (Elective)	Planning Studio-III	Resilience and Planning	-	Interpersonal Communication
-		Planning Legislation and Professional Practice	-	Smart Cities and Advanced Technologies for emerging	Planning Thesis	Public Policy in Planning	-	Leading Through Teams

				planning issues(Elective)				
-	-	-	-	-	Eco-Tourism (Elective)	Environmental Impact Assessment (Elective)	-	Behavioural Communication & Relationship Management
-	-	-	-	-	-	Urban and Regional Governance	-	Self-Development & Interpersonal Skills
-	-	-	-	-	-	-	-	Foreign Business Language I, II, III

PROFESSIONAL TRAINING / SUMMER INTERNSHIP

Students must undergo a Professional training during their summer break after second semester. They will need to submit their professional training / summer internship report immediately at the onset of third semester in first week of August. Student will have to present a seminar on the same which would be evaluated by the Jury.

Syllabus – First Semester

	PLANNING HISTORY AND THEORY (PLN4101)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Planning Theory -II (B.Plan.)					
Co-requisites	-					

Catalog Description

The aim of this course is to initiate the student to the historic growth and development of urban and regional settlements, the evolution of civic planning through theories and concepts of contemporary planning thoughts. At the end of the course students will be able to integrate planning theories to current and future planning practises. The course will be delivered through theoretical inputs, class discussions and seminar presentations by students on selected topics.

Course Objectives

The objective of this course is

1. To assess human settlements and its evolution.
2. To critically evaluate urban and regional planning theory models.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend evolution of settlements and need for town and country planning.

CO2: Appraise theories and models of urban settlements planning.

CO3: Apply theories and models of regional settlement planning.

CO4: Utilize concept of city region while working on particularly bigger cities.

Modules	Blooms level*	Number of hours
MODULE 1: Evolution of Human Settlements Definitions of Settlements and their types; Origin and growth of cities; factors affecting the growth of cities; Settlements in Different Civilizations, Overview of City Planning in Mesopotamian, Egyptian, Greek and Roman Civilizations. Renaissance and Its Impact on City Form and Structure, Town Planning Thought and Principles in Ancient and Medieval India, Post Industrial Revolution Settlement Planning: Impact of Industrial Revolution on City Form, Population Density and Infrastructure Breakdown, Birth of Town and Country Planning.	L1, L2 L3	9
MODULE 2: Theories of Settlements in Urban Context Concepts of City Form- Concepts of Garden City, City Beautiful, Linear City and others. Contribution to Modern City Planning by Lewis Mumford, Patrick Geddes, Peter Hall, Jane Jacobs, Chadwick and others, Theories of Urban Structure and Land Use- Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory, Land Use and Land Value Theory etc.	L1, L2 L3	9
MODULE 3: Theories of Settlements in Regional context Spatial Models of Location, Size and Spacing of Settlements; Rank Size Rule; Central Place Theory; Loschian Theory; Cumulative Causation Theory; Core Periphery Model; Growth Poles and Centres; Gravity Model; Classification of Settlements at regional level.	L1, L2 L3	9

MODULE 4: Concept of City Region Definitions, City-Region Relationships, Structure of City Regions, Area of Influence, Dominance; Rural-Urban Fringes; Metropolitan Region; Socio-Economic Impacts of Growth of Urban Areas; Push and Pull Factors; Rural-Urban Migration; Location of New Regional Economic Activities; Impact of Technology on Urban Forms; Transportation and Urban Form; Other Emerging Issues with respect to city-region planning.	L1, L2 L3	9

**Bloom's Level:L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Healey, P. (2012). Readings in Planning Theory. *Planning Theory & Practice*, *13*(2), 342–343. https://doi.org/10.1080/14649357.2012.669994
2. Levy, J. M. (2015). *Contemporary Urban Planning*. *Contemporary Urban Planning*. Routledge. https://doi.org/10.4324/9781315664453
3. *Urban Planning Theory Since 1945*. (2012). *Urban Planning Theory Since 1945*. SAGE Publications Ltd. https://doi.org/10.4135/9781446218648

References

1. Fainstein, S. S. (2000). New directions in planning theory. *Urban Affairs Review*, *35*(4), 451–478. https://doi.org/10.1177/107808740003500401
2. Fainstein, S. (2005). Planning theory and the city. *Journal of Planning Education and Research*, *25*(2), 121–130. https://doi.org/10.1177/0739456X05279275
3. Fischler, R. (2000). Linking planning theory and history: The case of development control. *Journal of Planning Education and Research*, *19*(3), 233–241. https://doi.org/10.1177/0739456x0001900302
4. Goonewardena, K. (2003). The future of planning at the "end of history." *Planning Theory*, *2*(3), 183–224. https://doi.org/10.1177/147309520323004
5. Hall, P., &Tewdwr-Jones, M. (2019). *Urban and regional planning*. *Urban and Regional Planning* (pp. 1–348). Taylor and Francis. https://doi.org/10.4324/9781351261883

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	--	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	2	2	--	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	2	2	--	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	2	2	--	--	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

	SOCIO-ECONOMIC DIMENTIONS IN PLANNING (PLN4102)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Settlement Sociology (B.Plan.)					
Co-requisites	Elements of Economics (B.Plan.)					

Catalog Description

The aim of this course is to offer exposure to concepts, theories and issues relating to socio-economic aspects towards planning of settlements. It also provide insight to society and regional economy and its significance in spatial planning. At the end of the course the students will be able to effectively utilise socio-economic component for sustainable and inclusive planning.

Course Objectives

The objective of this course is

1. To comprehend sociological concepts in the context of planning.
2. To apply development economics in spatial planning.

Course Outcomes

On completion of this course, the students will be able to

CO1: Grasp important sociological concepts relating to planning.

CO2: Relate sociological concepts and theories with reference to urban& regional planning.

CO3: Apply basic principles of economics in planning.

CO4: Analyse economics of location in planning.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Introduction to Sociology and Anthropology Definitions and scope of sociology; Concept of Sociology, Social system, social institutions and organisations, contemporary sociological theories, social change, social relations, social stratification and social inequality, Marginalised, weak and vulnerable social groups; Concept of space and people, Principles of anthropology with the discipline of Planning, involving people in development process and implementations, identification of community needs.	L1, L2 L3	9
MODULE 2: Urban Sociology and Urban Anthropology Industrial Revolution and the Birth of Urban Sociology; Urbanism and Urban Sociology; Urban Anthropology and its various dimensions; Disparities and Equal Opportunities: *Disparities* – Gender, Race, Religion, Social Disparities; *Gender* – Gender Discrimination; Feminist Planning Theory; *Caste and Religion* – Characteristics, Disadvantaged Castes and Ethnic Minorities; *Special Needs* – Lack of Supportive Assistance, Issues; Assessing Specific and Special Needs; Planning and Designing for the Differently Abled, Elderly, Children, and Pregnant Women; Planning Rights and Responsibilities; Provision of Equal Opportunities; Social Sustenance; Social Impact Assessment.	L1, L2 L3	9

MODULE 3: Economics Economics related to Urban and Regional Planning. Basics of Micro v/s Macro Economics; Twin Themes of Economics – Scarcity and Efficiency; Market Demand and Supply; Equilibrium in the Market; Elasticity of Demand and Supply; Price, Income and Cross Elasticity; Average, Marginal and Total Costs and Revenue; Use of economics in spatial planning; Basic Economic Growth Models (concept only), cost-benefit analysis , Quality of life, Human Development Index;.	L1, L2 L3	9
MODULE 4: Economics of Location and Planning Concept of land economics, Concept of Spatial and Regional Economics; economic principles of land uses, relevance of spatial planning; Market mechanism and land use pattern; locational theories of economics in inter-regional and intra-regional context.	L1, L2 L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Benjamin, S. (2008). Occupancy urbanism: Radicalizing politics and economy beyond policy and programs. In *International Journal of Urban and Regional Research* (Vol. 32, pp. 719–729). https://doi.org/10.1111/j.1468-2427.2008.00809.x
2. Harris, R. (2003). Urban and Regional Economics. *Local Economy: The Journal of the Local Economy Policy Unit*, *18*(3), 274–275. https://doi.org/10.1080/0269094032000069460
3. Lopes De Souza, M. (2010). Which right to which city? In defence of political-strategic clarity. *Interface*, *2*(1), 315–333. Retrieved from http://www.google.fr/url?sa=t&rct=j&q=which right to which city ? in defence of political-strategic clarity&source=web&cd=1&ved=0CCQQFjAA&url=http://interfacejournal.nuim.ie/wordpress/wp-content/uploads/2010/11/Interface-2-1-pp315-333-Souza.pdf&ei=z2yWUKy
4. *The Urban Sociology Reader*. (2012). *The Urban Sociology Reader*. Routledge. https://doi.org/10.4324/9780203103333

References

1. Dempsey, N., Bramley, G., Power, S., & Brown, C. (2011). The social dimension of sustainable development: Defining urban social sustainability. *Sustainable Development*, *19*(5), 289–300. https://doi.org/10.1002/sd.417
2. Ioannides, Y. M. (2003). Handbook of Regional and Urban Economics. *Regional Science and Urban Economics*, *33*(1), 121–125. https://doi.org/10.1016/s0166-0462(02)00056-x
3. Harvey, D. (2003). The right to the city. *International Journal of Urban and Regional Research*, *27*(4), 939–941. https://doi.org/10.1111/j.0309-1317.2003.00492.x

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO2	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO3	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO4	1	2	2	1	--	2	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING TECHNIQUES AND COMPUTER APPLICATIONS (PLN4103)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Techniques of Planning I & II (B.Plan.)					
Co-requisites	Computer Aided Design (CAD) in Planning(B.Plan.)					

Catalog Description

The aim of this course is to introduce and be familiar with techniques used for planning at various stages from preliminary to advanced. Students will learn appropriate data mining for their studio exercises, pre-preparation for planning field visits and selecting analysis techniques. Appropriate Software applications in CAD and GIS are also part of the course. They will be able to apply excel, CAD and GIS in their planning studio. At the end of the course student should be able to use all the learnt techniques in respective planning studio works.

Course Objectives

The objective of this course is

1. To prepare students for planning studio exercise by providing them significant base of planning techniques.
2. To equip students with key skill set for conducting filed visits, data collection and analysis.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explore and use various planning information systems available.

CO2: Prepare base maps for their studio exercise and to do effective pre-field visit planning.

CO3: Apply excel and Cad techniques in planning studios.

CO4: Perform basic analysis and map preparations in GIS.

Modules	Blooms level*	Number of hours
MODULE 1: Information Systems for Planning and Literature Review Introduction to Basic Terminologies used in Planning; Definition and components of Information System in Planning; Data warehousing and Data mining for Planning; various data sources like, National Urban Information System – Bhuvan, Natural Resource Data Management System, National Sample Survey (NSSO), Directorate of Economics and Statistics, Census of India, National Family Health Survey (NRHS), Central Pollution Control Boards reports, Indian Metrology Department, World Bank Open Data; Introduction and utilisation of spatial standards-URDPFI; Components and Techniques of literature review; Finding useful insights from the literature review; Exercises on inscribing and presenting reviewed literature	L1, L2 L3	9
MODULE 2: Basemap Preparation and Survey Techniques Base map Preparation: Representation of Spatial Data; Choice of Appropriate Scales: Graphical, Linear and Areal Scales; Contents of Base Maps at Various Scales; Notations - Basic Disciplines of Maps; Setting of Goals and Objectives; Methodologies for Preparation of Urban Regional Development Plans, Plan Implementation Techniques; Selecting appropriate Indicators; Preparation of Checklist for data collection; Preparation of good Questionnaire; Data coding and methods for data analysis.	L1, L2 L3	9
MODULE 3: Computer Applications in Planning Computer Applications for Data Collection and Analysis: Tools of Analyzing Different Types of Data; Use of Excel Software for Analyzing Data; Applications of Features of Excel- Basic and Selected Advanced Features; CAD Applications for Base Map preparation: Applications of CAD tools- drawing, editing, modifying, layer management etc.; Scaling Drawings and Images; Plotting and	L1, L2 L3	9

Printing technicalities.		
MODULE 4: Introduction to Geoinformatics Image Interpretation – Qualitative and Quantitative Elements; Resolutions – Spatial, Temporal, Spectral, Radiometric; Geo-Rectification – Coordinate System, Selection of Ground Control Points (GCPs), Geo-Referencing and Map Projections; Geometric Distortions, Spatial Data Presentation Techniques: Layout Preparation – Grids, Legend, Symbology; Printing – Sheet, Size, Scale.	L1, L2 L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Government of India (2008), NSDI Metadata standard-NNRMS Secretariat, Department of Space, India

References

1. Abbas, S., &Ojo, A. (2013). Towards a linked geospatial data infrastructure. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (Vol. 8061 LNCS, pp. 196–210). https://doi.org/10.1007/978-3-642-40160-2-16
2. Dommaraju, P. (2015). One-person households in India. *Demographic Research*, *32*(1), 1239–1266. https://doi.org/10.4054/DemRes.2015.32.45
3. Guhathakurta, S. (2019). Spatial analysis. In *The Routledge Handbook of International Planning Education* (pp. 162–173). Taylor and Francis. https://doi.org/10.4324/9781315661063-14
4. Miller, H. J., & Han, J. (2009). Geographic data mining and knowledge discovery: An overview. In *Geographic Data Mining and Knowledge Discovery, Second Edition* (pp. 1–26). CRC Press. https://doi.org/10.1201/9781420073980
5. Miller, D., &Salkind, N. (2012). Qualitative Data Analysis Software. In *Handbook of Research Design & Social Measurement* (pp. 165–179). SAGE Publications, Inc. https://doi.org/10.4135/9781412984386.n38
6. Shade, J. (2010). Software for data analysis. *Journal of Applied Statistics*, *37*(8), 1421–1422. https://doi.org/10.1080/02664760902899790

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	1	2	--	--	1	--	--	--	--	--	1	--	2	--
CO2	1	2	1	2	--	--	1	--	--	--	--	--	1	--	2	--
CO3	1	2	1	2	--	--	1	--	--	--	--	--	1	--	2	--
CO4	1	2	1	2	--	--	1	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

	INFRASTRUCTURE PLANNING AND MANAGEMENT (PLN4104)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Infrastructure Planning, Development and Management (B.Plan)					
Co-requisites	-					

Catalog Description

The course would include three sub-components of infrastructure and utility Planning i.e. Physical Infrastructure, Social Infrastructure and Transportation. The aim of this course is on principles of design of utilities and services in urban and regional context and familiarising with Indian standards. The course will focus on acquainting students to assess infrastructure planning techniques and their utilisation in planning studios. The objective of Transportation Planning module is to provide basic information on transportation issues. Students will be familiarized with (i) geometric design of road networks and (ii) traffic characteristics. Techniques of data collection and analysis would be taught as part of this course.

Course Objectives

The objective of this course is

1. To familiar with infrastructure and its sub-sector Planning.
2. To utilize the knowledge in physical planning studios.

Course Outcomes

On completion of this course, the students will be able to

CO1: Comprehend concept of infrastructure planning and its relevance in physical planning.

CO2: Identify and project the demand and spatial need of physical infrastructure

CO3: Assess the need for social infrastructure for sustainable and inclusive planning.

CO4: Utilise transport planning techniques.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Infrastructure Planning Importance of Infrastructure, objectives of the utilities, services planning and implications on public health and environment; Economic-introduction to policies and programmes in infrastructure planning; issues and concerns of maintaining the utilities and services, need and importance of service level benchmarks of water supply, sanitation, sewage, solid waste and transportation; Impact of technology on infrastructure, Green infrastructure and its significance.	L1, L2 L3	9
MODULE 2: Physical Infrastructure Role of physical planner in planning of utilities and services; water supply distribution system, storm water drainage system, sewerage system, solid waste management, electricity distribution system.	L1, L2 L3	9
MODULE 3: Social Infrastructure Types of social infrastructure; Health care-essential service, availability, access and utilisation, standards, public and private institutions, policies, national Rural Healthcare Mission, Hierarchy of health care establishments, Education-primary, secondary educational institutions, standards, policies, rights to education (RTE); Public and community spaces-recreational, safety and security – fire management.	L1, L2 L3	9
MODULE 4: Transportation Introduction to transport and travel; Understanding travel from the mobility, economic, social-psychologist, time/space perspective; Transportation planning process; Introduction to four stage modelling; land use and transportation integration; Demand and Supply of Transport; Congestion pricing, transit-oriented development, transport Pricing, Basic transport economic Model. Role of NHAI in regional transport.	L1, L2 L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Broaddus, A., &Cervero, R. (2019). Transportation planning. In *The Routledge Handbook of International Planning Education* (pp. 253–264). Taylor and Francis. https://doi.org/10.4324/9781315661063-22
2. Criqui, L. (2015). Infrastructure urbanism: Roadmaps for servicing unplanned urbanisation in emerging cities. *Habitat International*, *47*, 93–102. https://doi.org/10.1016/j.habitatint.2015.01.015
3. Loucks, D. P., & van Beek, E. (2017). *Water Resource Systems Planning and Management*. *Water Resource Systems Planning and Management*. Springer International Publishing. https://doi.org/10.1007/978-3-319-44234-1
4. Parkin, J., &Koorey, G. (2012). Network planning and infrastructure design. In *Transport and Sustainability* (Vol. 1, pp. 131–160). Emerald Group Publishing Ltd. https://doi.org/10.1108/S2044-9941(2012)0000001008

References

1. Allen, P. M. (2012). *Cities and regions as self-organizing systems: Models of complexity*. *Cities and Regions as Self-Organizing Systems: Models of Complexity* (pp. 1–309). Taylor and Francis. https://doi.org/10.4324/9780203990018
2. Rinne, M. (2004). Technology roadmaps: Infrastructure for innovation. *Technological Forecasting and Social Change*, *71*(1–2), 67–80. https://doi.org/10.1016/j.techfore.2003.10.002
3. Thomé, A. M. T., Ceryno, P. S., Scavarda, A., &Remmen, A. (2016, December 15). Sustainable infrastructure: A review and a research agenda. *Journal of Environmental Management*. Academic Press. https://doi.org/10.1016/j.jenvman.2016.09.080

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

	HOUSING AND ENVIRONMENTAL PLANNING (PLN4105)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Housing and Community Planning (B.Plan.)					
Co-requisites	Ecology, Environment and Resource Development and Management (B.Plan.)					

Catalog Description

The aim of this course to two-fold, i) Housing ii) Environment.

Housing: First segment is to impart knowledge and skills to create an efficient housing/neighborhood planning which gives equal access to housing for everyone. At the end of the course students will be able to identifies the gaps, problems in providing housing for all. They will be able to focus on various dimensions of housing sector and create efficient and sustainable residential structures and neighborhood designs.

Environment: Second Segment deals with environment and its planning which aims to initiate the students to a discreet understanding of the environment and its interactions with human settlements. All social, cultural and technological activities being carried by human beings have profound influence on the environment. This course will enable a thorough understanding and utilization of all these aspects.

Course Objectives

The objective of this course is

1. To provide a basic understanding of Housing at the Neighborhood and City level and to create an ability to work on the Housing Sector in Town Planning System.
2. To grasp the role of public and private sector as well as community participation in eco-tourism planning and development

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply varied housing concepts in neighbourhood and urban planning.

CO2: Analyse policy and governance framework with reference to housing sector.

CO3: Justify the relevance of ecology, ecosystem and environment in planning.

CO4:Utilise acquired knowledge to conceptualise and to create sustainable planning designs.

Modules	Blooms level*	Number of hours
MODULE 1: Concept of Housing with reference to Planning Current Issues in Housing: Health and Safety Related Issues in Housing, Shift of Housing from Social Sector to Private Sector Participation Housing Design - Housing Typology, Housing Layouts, Housing Density, Community Facilities, Public and Private Sector Housing Development, Social Aspects of Housing, Built Environment and Human Behaviour, Housing Norms and Standards Housing for the Poor-Issues in Slums and Squatter Settlements; Government Initiatives for Providing Housing, Housing Demand- Housing Need Assessment, Estimating and Forecasting Housing Requirements (Qualitatively and Quantitatively); Understanding Current Methods of Housing Demand Assessment, Household Affordability and Concept and performance of Affordable Housing in India, Affordable Housing Policy 2009, Affordable Housing in Public Private Participation, Emerging thoughts. Case Studies of Neighbourhood Planning in Indian and Global Context.	L1, L2 L3	9
MODULE 2: Housing Policies and Institutional Framework Understanding Five Year Plans with respect to Housing Policy, National Housing Policy- Review, Policy Framework for Urban and Rural Housing, Comparative Policy Analysis; Rental Housing in India: An Overview, Current Practices and Upcoming Initiatives; Role of Informal Sector in Housing Stock, Economy, Commercial Activities, Etc.; Implications in Physical Planning, Informal Sector Housing and Basic Needs - Lack of Essential Infrastructure; Poor Condition of Existing Services; Identification of Basic Needs; Provision for Various Target Groups; Standards for Basic Needs; Investment for Housing; Essential Components; Ownership and Tenure Security; Service Delivery - Gaps in Existing Institutional Systems of Delivery; Sustainable Development Goals with reference to Housing for All.	L1, L2 L3	9

MODULE 3: Environmental Components and Resources Environmental resources and ecosystem services; Fundamentals of Ecosystem-Its Structure and Function; Consumption, conservation and recycling of resources; Man, and Environment interrelations; Changing Perspectives in Man-Environment Relationship with Focus on Issues of Population, Urbanization, Resource Depletion and Pollution; Concept of Ecology; Environmental Degradation (Environmental Concerns and Challenges) and Its Impact on Various Ecosystems.	L1, L2 L3	9
MODULE 4: Environmental Planning Planning for Global and Local environmental concerns; Planning for Environmentally Sensitive Zones (Resources Availability, Settlements Pattern, Problems and Potentials, Regulating Mechanisms for Development); Carrying Capacities in environmental context; Tools and Techniques for Environmental Planning and Management- Brief Introduction to Environmental Impact Assessment, Strategic Environment Assessment and Environmental Management Plans; Providing brief about environmental policies; Green Agenda and Global environmental movements.	L1, L2 L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Choguill, C. L. (2008). Developing sustainable neighbourhoods. *Habitat International*, *32*(1), 41–48. https://doi.org/10.1016/j.habitatint.2007.06.007
2. Department of Planning and Infrastructure: WA Planning Commission. (2009). Liveableneighbourhoods. *World Transport Policy and Practice*, *7*(January), 38–43.
3. Glaeser, E. L., Gyourko, J., & Saks, R. E. (2006). Urban growth and housing supply. *Journal of Economic Geography*, *6*(1), 71–89. https://doi.org/10.1093/jeg/lbi003
4. Haffner, M., &Heylen, K. (2011). User costs and housing expenses. towards a more comprehensive approach to affordability. *Housing Studies*, *26*(4), 593–614. https://doi.org/10.1080/02673037.2011.559754
5. Steele, M. (2012). Housing statistics. In *International Encyclopedia of Housing and Home* (pp. 620–626). Elsevier. https://doi.org/10.1016/B978-0-08-047163-1.00639-1
6. Turner, A. (1980). Community development. *The Cities of the Poor; Settlement Planning in Developing Countries*, 35–64. https://doi.org/10.5005/jp/books/12932_9

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1. Albert, S. (2010). The geographic determinants of housing supply. *Quarterly Journal of Economics*, *125*(3), 1253–1296. https://doi.org/10.1162/qjec.2010.125.3.1253
2. Dempsey, N. (2008). Quality of the built environment in urban neighbourhoods. *Planning Practice and Research*, *23*(2), 249–264. https://doi.org/10.1080/02697450802327198
3. Johnson, H. (2001). Voices of the poor. Can anyone hear us? *Journal of International Development*, *13*(3), 377–379. https://doi.org/10.1002/jid.793
4. Saxena, A. (2013). Understanding Inequalities: Stratification and Differences. *INTERNATIONAL SOCIOLOGY*.
5. Winston, N., &ParejaEastaway, M. (2008). Sustainable housing in the urban context: International sustainable development indicator sets and housing. *Social Indicators Research*, *87*(2), 211–221. https://doi.org/10.1007/s11205-007-9165-8

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2	1	2	2	1	1	--	--	--	--	--	1	2	2	--
CO2	2	2	1	2	2	1	1	--	--	--	--	--	1	2	2	--
CO3	2	2	1	2	2	1	1	--	--	--	--	--	1	2	2	--
CO4	2	2	1	2	2	1	1	--	--	--	--	--	1	2	2	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING STUDIO-I (AREA PLANNING, VILLAGE DEVELOPMENT PLAN) (PLN4108)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	8	10
Pre-requisites/Exposure	Planning and Design Lab – V (Area Planning)					
Co-requisites	-					

Catalog Description

The planning studio is an introductory studio for giving basic idea related to urban and regional planning studios. It aims to bring students of diverse backgrounds to a common platform and develop the essential skills of planning amongst the students opting for different specializations of planning. The objective of the studio is to introduce the general concepts associated with physical planning and develop the skills of data collection, data analysis, spatial representation, documentation as well as written and verbal communication. Students will be able to apply the knowledge gained through theoretical subjects in their studio planning.

Course Objectives

The objective of this course is

1. To relate theoretical knowledge of planning with planning practices.
2. To conceptualize and prepare development plan for the given levels.

Course Outcomes

On completion of this course, the students will be able to

CO1: Preparation of Area Plan/Zonal Plan in urban context.

CO2: Preparation of Village Development Plan.

Modules	Blooms level*	Number of hours
MODULE 1: Area Planning (Urban Context) The assignment would identify different urban zones based on land use characteristics and could also include predefined 'zones' for zonal plans. The objective of this exercise would be to learn various methods of surveying to collect different types of data and represent and interpret them to give meaningful observations on the planning and development of the area. Thrust of the exercise would be on: • Understanding the zone in the context of the city. • Mapping of Regional Networks and Linkages • Preparation of Base Map of the area through primary surveys and updating secondary data • Socio-economic profiling of the area through surveys • Physical and Social infrastructure mapping • Gap Analysis and issue identification • Formulation of broad outlines of Intervention Strategies and Development Blueprint.	L4, L5 L6	60
MODULE 2: Rural Planning The main goal of the assignment is to expose students to the life and living in rural area as it is different from urban areas. This would help in conceptualising the integration of urban and rural areas for regional planning. Students will undertake study of a particular village in groups and conduct a primary survey on demographic profile, household income level, socio-cultural practices, etc. Information about development programmes shall be collected and resource mapping will be done. This exercise will aim at improving the understanding about the requirements of different categories of rural population. Conducting the primary survey will provide exposure to research methodology, techniques of data collection, data processing and analysis.	L4, L5 L6	60

Thrust of the exercise would be on: • Understanding the socio-economic aspects of the rural settlement • Importance of location, spatial and economic linkages of the village. • Explaining the social and physical infrastructure of the village. • Understanding the availability and usage of local resources. • Exposure to government programmes and institutional mechanism working for rural • planning and development • Identifying the present problems and future possibilities in the village. • Proposing a strategy of improvement in the condition and development of the villages.		

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Broaddus, A., &Cervero, R. (2019). Transportation planning. In *The Routledge Handbook of International Planning Education* (pp. 253–264). Taylor and Francis. https://doi.org/10.4324/9781315661063-22
2. Criqui, L. (2015). Infrastructure urbanism: Roadmaps for servicing unplanned urbanisation in emerging cities. *Habitat International*, *47*, 93–102. https://doi.org/10.1016/j.habitatint.2015.01.015
3. Loucks, D. P., & van Beek, E. (2017). *Water Resource Systems Planning and Management*. *Water Resource Systems Planning and Management*. Springer International Publishing. https://doi.org/10.1007/978-3-319-44234-1
4. Parkin, J., &Koorey, G. (2012). Network planning and infrastructure design. In *Transport and Sustainability* (Vol. 1, pp. 131–160). Emerald Group Publishing Ltd. https://doi.org/10.1108/S2044-9941(2012)0000001008

References

1. Allen, P. M. (2012). *Cities and regions as self-organizing systems: Models of complexity*. *Cities and Regions as Self-Organizing Systems: Models of Complexity* (pp. 1–309). Taylor and Francis. https://doi.org/10.4324/9780203990018
2. Andersson, E., Barthel, S., Borgström, S., Colding, J., Elmqvist, T., Folke, C., &Gren, Å. (2014). Reconnecting cities to the biosphere: Stewardship of green infrastructure

and urban ecosystem services. *Ambio*, *43*(4), 445–453. https://doi.org/10.1007/s13280-014-0506-y

3. Rinne, M. (2004). Technology roadmaps: Infrastructure for innovation. *Technological Forecasting and Social Change*, *71*(1–2), 67–80. https://doi.org/10.1016/j.techfore.2003.10.002
4. Thomé, A. M. T., Ceryno, P. S., Scavarda, A., &Remmen, A. (2016, December 15). Sustainable infrastructure: A review and a research agenda. *Journal of Environmental Management*. Academic Press. https://doi.org/10.1016/j.jenvman.2016.09.080

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**P -1**	**P -2**	**S**	**R**	**CE**	**A**	**ESE**
Weightage (%)	50	50	60	20	15	05	200

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO2	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO3	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO4	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	COMMUNITY PARTICIPATION IN PLANNING (PLN4109) (ELECTIVE)	L	T	P	S	C
Version 1.1		1	0	2	0	2
Pre-requisites/Exposure	Settlement Sociology					
Co-requisites	Planning and Design Lab -V, B. Plan					

Catalog Description

The aim of this course is to offer assessment of communities, their crucial role in planning process and successful implementation. This particular subject will be very useful for learning techniques of primary data collection for planning studio exercises. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be inculcating students with the capabilities of effective community interaction and getting their support in data collection. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course, students will be working with small communities either urban or rural, conducting participatory meetings with them and formulating a small project with the help of community participation. Finally, students will demonstrate project to the concerned faculties, participatory community and other key stakeholders. They will be able to choose and apply the most effective PRA techniques for data collection. They will incorporate and utilise important insights provided by the local communities in plan formulation. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

1. To grasp effective role of community participation in planning process and plan implementation.
2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply community participation techniques during field visits for primary data collection.

CO2:Prepare the detail report and presentation on a given project related to Community participation.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Concept and Techniques of Community Participation Definitions and diverse dimensions of communities; Understanding concept of social inclusion and participatory planning process, Techniques of effective communication and engaging communities in planning process; Role of community based organisations in participatory planning such as NGOs, Residents welfare associations (RWA), Self-help groups (SHG), Gram-panchayat; Techniques of conducting Participatory Rural Appraisal (PRA).	L3, L4 L5	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Conducting community participation exercises in small groups with varied stakeholders, Organising consultative meetings, Focus group discussion, Preparing small scale project with the help of local community and demonstration of the same. Collection of data through primary sources; Conducting survey; Database development; Qualitative and quantitative data analysis; Report writing and presentations.	L3, L4, L5	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Docherty, I., Goodlad, R., &Paddison, R. (2001). Civic culture, community and citizen participation in contrasting neighbourhoods. *Urban Studies*, *38*(12), 2225–2250. https://doi.org/10.1080/00420980120087144

2. Gaventa, J. (2004). Towards participatory governance: assessing the transformative possibilities. *Participation: From Tyranny to Transformation?: Exploring New Approaches to Participation in Development*, 25–41.
3. Heritage, Z., &Dooris, M. (2009). Community participation and empowerment in Healthy Cities. *Health Promotion International*, *24 Suppl 1*. https://doi.org/10.1093/heapro/dap054
4. Narayanasamy, N. (2008). *Participatory rural appraisal: Principles, methods and application*. *Participatory Rural Appraisal: Principles, Methods and Application* (pp. 1–364). SAGE Publications Inc. https://doi.org/10.4135/9788132108382

References

1. Chambers, R. (1994). The origins and practice of participatory rural appraisal. *World Development*, *22*(7), 953–969. https://doi.org/10.1016/0305-750X(94)90141-4
2. Head, B. W. (2007). Community engagement: Participation on whose terms? *Australian Journal of Political Science*, *42*(3), 441–454. https://doi.org/10.1080/10361140701513570
3. Irvin, R. A., &Stansbury, J. (2004, January). Citizen Participation in Decision Making: Is It Worth the effort? *Public Administration Review*. https://doi.org/10.1111/j.1540-6210.2004.00346.x

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	INFOGRAPHIC AND STORYTELLING TECHNIQUES (PLN4110) (Elective)	L	T	P	S	C
Version 1.1		1	0	2	0	2
Pre-requisites/Exposure	Planning and Design Lab I, B. Plan					
Co-requisites	Planning and Design Lab -V, B. Plan					

Catalog Description

The aim of this course is to offer opportunities and skillset in effective infographics and storytelling techniques. This particular subject will be greatly useful in planning and producing effective studio sheets. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will evolving rationale thinking capabilities of the students with respect to delivering students' findings/insights and the best presentation method. The course would be conducted through literature survey, case studies, and hands on exercises with available infographic software in the university. During the course, students will be working in interdisciplinary groups. In this course, students will discuss how to incorporate a story in their presentation to help them capture the attention of the audience. They will be able to choose and apply the most effective analytical method for delivering their insights/ideas. They will incorporate data visualization best practices and use tips and tricks when presenting at various platforms to decision makers and stakeholders.

Course Objectives

The objective of this course is

1. To equip students with infographic techniques for effective presentation skills and delivering communicable insights.
2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply story telling techniques in planning studio presentations for synthesizing research findings and develop effective insights

CO2: Utilise infographics techniques in the preparation of the detail report and presentation on a given project.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Synthesizing the Findings and Deriving the Insights Synthesizing findings of student research and derive valid/actionable insights, Finding story in the data, Shaping it to contribute to a compelling research presentation, Providing actionable comparisons, Weighing the pros and cons, Deriving insights to address a problem/problems, Methods for developing research-based recommendations, testing and refining ideas. Techniques of reviewing the essential sections of various reports, designing visualizations of data, Understanding the requisite for targeting specific audience, Applying storytelling strategies, Recognize the drawbacks of poor data visualization; Effective ways of communicating research/findings.	L3, L4 L5	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Cairo, A. (2012). Chapter 1 Introduction Infographics and Visualization. *Functional Art - Infographics and Visualization and Exploration*.
2. Walter, E., &Gioglio, J. (2014). *The Power of Visual Storytelling: How to Use Visuals, Videos, and Social Media to Market Your Brand*. *Inside Market Data* (p. 256).

3. Tong, C., Roberts, R., Borgo, R., Walton, S., Laramee, R. S., Wegba, K., … Ma, X. (2018). Storytelling and visualization: An extended survey. *Information (Switzerland)*, *9*(3). https://doi.org/10.3390/info9030065

References

1. Cairo, A. (2012). Infographics and Visualization and exploration. *The Functional Art*, 15–25. Retrieved from http://www.thefunctionalart.com/
2. Smiciklas, M. (2012). *The Power of Infographics: Using Pictures to Communicate and Connect with Your Audience. The power of infographics* (pp. 1–17). https://doi.org/10.4324/9780203075609

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	ECO-TOURISM (PLN4111) (Elective)	L	T	P	S	C
Version 1.1		1	0	2	0	2
Pre-requisites/Exposure	Disaster Risk Management and Climate Change Adaptation					
Co-requisites	Planning and Design Lab -V, B. Plan					

Catalog Description

The aim of this course is to offer the principles of planning for eco-tourism in the context of sustainable tourism development. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course is getting the insights of relationships between tourism and environment, tourism and urban development, tourism and economic development. In this course, students will be able to grasp planning requirements for developing sustainable eco-tourism hubs and circuits. They will be able to incorporate community needs and sustainable eco-tourism requirements in planning process. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

1. To demonstrate planning strategies in the context of sustainable tourism development for eco-tourism planning and development
2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Applicate concept of eco-tourism for sustainable tourism development.

CO2:Prepare the detail report and presentation on a given project related to eco-tourism.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction and Planning for Eco-Tourism Definitions, scope, nature, key determinants, characteristics; problems and prospects of eco-tourism; eco-tourism hubs in India; impacts of eco-tourism in developed and developing regions; relationship between tourism and urban development, relationship between tourism and economic development, relationship between tourism and environment; concept of carrying capacity and its significance in eco-tourism. Circuit identification and destination planning; assessment of infrastructure requirement for eco-tourism planning; analysing tourism impacts in transforming local livelihood and lifestyle; role of Government institutions and agencies in eco-tourism development.	L3, L4 L5	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Cohen, E. (1978). The impact of tourism on the physical environment. *Annals of Tourism Research*, *5*(2), 215–237. https://doi.org/10.1016/0160-7383(78)90221-9
2. Dávid, L. (2011). Tourism ecology: Towards the responsible, sustainable tourism future. *Worldwide Hospitality and Tourism Themes*, *3*(3), 210–216. https://doi.org/10.1108/1755421111114217
3. Ghasemi, M., &Hamzah, A. (2014). An Investigation of the Appropriateness of Tourism Development Paradigms in Rural Areas from Main Tourism Stakeholders' Point of View. *Procedia - Social and Behavioral Sciences*, *144*, 15–24. https://doi.org/10.1016/j.sbspro.2014.07.269

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1. Jaini, N., Anuar, A. N. A., &Daim, M. S. (2012). The practice of sustainable tourism in ecotourism sites among ecotourism providers. *Asian Social Science*, *8*(4), 175–179. https://doi.org/10.5539/ass.v8n4p175
2. Stakeholders, E. (1994). The Component of Successful Ecotourism. In *UNEP Division of Technology, Industry and Economics* (pp. 33–59).
3. Wiltshier, P., Clarke, A., Adebayo, A., Robinson, P., &Oriade, A. (2019). Community-based tourism. In *Community-Based Tourism in the Developing World* (pp. 98–112). Routledge. https://doi.org/10.4324/9781351026383-8

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus – Second Semester

	APPLICATIONS OF GEOINFORMATICS (PLN4208)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Planning Techniques and Computer Applications					
Co-requisites	Planning Studio I, II, III and Planning Thesis					

Catalog Description

The aim of this course is to equip students with advanced concepts of Geoinformatics with special emphasis on applications in Urban and Regional Planning. Students will have hands on experience in ArcGIS and QGIS.

Course Objectives

The objective of this course is

1. To grab basic knowledge of Remote Sensing and GIS and relate its utilization in Urban and Regional Planning.
2. To get hands-on experience of the functions of Geoinformatics software.

Course Outcomes

On completion of this course, the students will be able to

CO1: Describe basic knowledge and terminology of Remote Sensing and GIS

CO2: Comprehend planning Information system and its utilities.

CO3: Work on the linking of spatial and nonspecial attribute data.

CO4: Create spatial database in geoinformatics software and perform geo-spatial analysis.

Modules	**Blooms level***	**Number of hours**
MODULE 1: Introduction to Geo-informatics Overview: Principles and Applications of Remote Sensing (RS); Geographic Information Systems (GIS); Organisational Aspects for Planning; Systems, Nature, Hierarchy, Value and Type of Required	L1, L2 L3	9

Spatial Data; Raster and Vector Data Structures; Spatial Data Models; Geo-Database; Global Navigation Satellite Systems; Electromagnetic Spectrum, Band Combination, Reflectance; Image Interpretation and Analysis; Integration of GIS and Digital Image Processing; Integration of GIS and GPS; Analysing Tools and Software; Ground Control Points and their selection Criteria.		
MODULE 2: Planning Information System Information Systems - Information Needs, Scales and Levels; Pre-Conditions for Using Planning Information Systems; Representing, Modelling and Impact Analysis of the Data; Structure Models; Query Measurement and Transformations; Summary Statistics and Inference; Terrain Modelling, Spatial Data Infrastructure Systems.	L1, L2 L3	9
MODULE 3: Use of GIS Data Focusing on Urban and Regional Planning Data Creation and Checking - Base Maps and Thematic Maps; Mapping and Spatial Analysis; Linking of Attribute Data, Spatial Data Aggregation; Spatial Information, Database Creation; Geo-Coding and Data Accuracy, Topology Creation; Topography and Landforms; Spatio-temporal Change Detection; Suitability Analysis; Landuse / Landcover Analysis.	L1, L2 L3	9
MODULE 4: Laboratory Exercises Practical Exercises – in Selected Packages of Image Processing and GIS; Georeferencing, Data Base creation, Data Linking, Performing Analysis, Working in Symbology and Thematic Map Creation, Functions and working in Layout View; Dynamic GIS; Web Enabled GIS Applications	L3, L4 L5, L6	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Drummond, W. J. (1995). Extending the Revolution: Teaching Land Use Planning in a GIS Environment. *Journal of Planning Education and Research*, *14*(4), 280–291. https://doi.org/10.1177/0739456X9501400405
2. Harris, B., & Batty, M. (1993). Locational Models, Geographic Information and Planning Support Systems. *Journal of Planning Education and Research*, *12*(3), 184–198. https://doi.org/10.1177/0739456X9301200302
3. Holmberg, S. C. (1994). Geoinformatics for urban and regional planning. *Environment & Planning B: Planning & Design*, *21*(1), 5–19. https://doi.org/10.1068/b210005
4. Montagu, A. S. (2001). Repackaging the revolution: Making GIS instruction relevant to planners. *Journal of Planning Education and Research*, *21*(2), 184–195. https://doi.org/10.1177/0739456X0102100206

References

1. Anselin, L., Syabri, I., & Kho, Y. (2006, January). GeoDa: An introduction to spatial data analysis. *Geographical Analysis*. https://doi.org/10.1111/j.0016-7363.2005.00671.x
2. Chapin, T. S. (2003). Revolutionizing the core: GIS in the planning curriculum. *Environment and Planning B: Planning and Design*, *30*(4), 565–573. https://doi.org/10.1068/b12993
3. Unwin, D. J. (1996). GIS, spatial analysis and spatial statistics. *Progress in Human Geography*, *20*(4), 540–551. https://doi.org/10.1177/030913259602000408

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	--	--	1	--	1	--	--	--	--	--	--	--	--	1	2	--
CO2	--	--	1	--	1	--	--	--	--	--	--	--	--	1	2	--
CO3	--	--	1	--	1	--	--	--	--	--	--	--	--	1	2	--
CO4	--	--	1	--	1	--	--	--	--	--	--	--	--	1	2	--

1: strongly related, 2: moderately related and 3: weakly related

	REGIONAL PLANNING AND DEVELOPMENT (PLN4209)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Introduction to Regional Planning (B.Plan.)					
Co-requisites	Planning and Design Lab – III (Regional Planning)					

Catalog Description

The course aims to expose the theoretical basis for various concepts and analytical tools of Regional Planning and learn the practice of regional planning in the Indian context. Elements of settlement system in the regional context are also incorporated in this course. The course provides an in-depth understanding of the issues of regional development, regional disparity and the need for balanced regional development in the context of globalization and rapid economic transformations in the country. Regional policies and sectoral policies are also discussed. Metropolitan regions, districts as planning regions and rural planning issues are discussed in the wider spectrum of holistic regional planning and development.

Course Objectives

The objective of this course is

1. To comprehend concepts and significance of Regional planning.
2. To provide in-depth understanding of the issues of regional development, regional disparity and the need for balanced regional development.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concepts of Region and elements of settlement system in regional context.

CO2: Describe regional equalities, their characteristics and relevance of regional planning policies.

CO3: Appreciate Regional growth process and their applications in India

CO4: Comprehend requirements and significance of rural planning as well as critically define regional plan implementation mechanism

Modules	Blooms	Number

	level*	of hours
MODULE 1: Concepts of Region Definition, Region Types and Regionalization; Concept of Regional Planning: Nature, Objectives, Levels and Aims; Elements of Settlement System: Function, Spacing, Linkage, Settlement Pattern and Factors Responsible Thereof; Potentials and Centrality of Settlements; Regional Inequalities – Growth, Density and Spatial Inequalities of Population Distribution, Spatial Patterns and Characteristics of Occupational Types; Regional Planning Policies and Its Relevance.	L1, L2 L3	9
MODULE 2: Economic and Regional Growth Introduction to Economic and Regional Growth Processes: Some Approaches of Rostow, Hirschman, Myrdal, Friedman, Haggerstand; Concept of Growth Centres, Growth Pole, Service Centre and Agro-Politan District and their Application in India Regional Development Strategies: Centralized and Decentralized; Regional Planning Process: Location of New Regional Economic Activities; Tools and Techniques of Regional Analysis; Metropolitan Regions- : Concept of Degree of Primacy, Area of Influence, Service Area; City Regions and Delineation Techniques; Centralization and Decentralization Processes; Concepts of Ring and Satellite Towns, Counter-Magnets; Forms and Concepts for Metropolitan Planning and Development	L1, L2 L3	9
MODULE 3: District Planning District Planning Process: Identification of Plan Objectives; Collection, Classification and Analysis of Data; Norms and Standards for District Planning; Components of District Planning in the Context of 73rd CAA, 1992, Planning Process Under District Planning Committee, Metropolitan Planning Committee; Plan Implementation: Five Year Plans and Rural Development; Planning Process, Policies and Programmes at National, State, Regional and District Levels; Planning, Development, Implementing and Monitoring Organizations and Agencies: National and State	L1, L2 L3	9
MODULE 4: Concept of Rural Development and Implementation of Regional Plans	L1, L2	9

Concepts of Rural Area and Rural Development; Scope of Rural Development; Causes of Rural Backwardness; Historical Evolution of Rural Development and Rural Settlement Pattern in Indian Context; Economic Issues of Rural Development - Differentiating Economic Growth and Economic Development; Rural Jobs and Income Sources; Rural Economic Policy Infrastructure and Plan Implementation; Tools and Constraints in the Implementation of Plans in Terms of Administration; Schemes, Programmes, Policies for development of regions, districts, villages and cities; Selected Case Studies in Indian Context	L3	

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Hall, P., &Tewdwr-Jones, M. (2019). *Urban and regional planning*. *Urban and Regional Planning* (pp. 1–348). Taylor and Francis. https://doi.org/10.4324/9781351261883
2. Scott, A. J., &Storper, M. (2003). Regions, globalization, development. *Regional Studies*, *37*(6–7), 549–578. https://doi.org/10.1080/0034340032000108697a
3. Lord, A., &Tewdwr-Jones, M. (2015). Regional Planning. In *International Encyclopedia of the Social & Behavioral Sciences: Second Edition* (pp. 129–133). Elsevier Inc. https://doi.org/10.1016/B978-0-08-097086-8.74036-0

References

1. Albrechts, L., Healey, P., &Kunzmann, K. R. (2003). Strategic spatial planning and regional governance in europe. *Journal of the American Planning Association*, *69*(2), 113–129. https://doi.org/10.1080/01944360308976301
2. GoI: Ministry of Rural Development, Department of Land Resource, Desert Development Programme, New Delhi
3. GoI: Planning Commission, Report on Development of Drought Prone Areas by National Committee on the Development of Backward Areas, New Delhi
4. GoI: IWMP, Ministry of Rural Development, New Delhi
5. GoI: Ministry of Development of North Eastern Region, New Delhi

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	5	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	--	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	--	--	--	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	--	--	--	--	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

	LAND MANAGEMENT AND REAL ESTATE (PLN4210)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Real Estate Planning and Management (B.Plan.)					
Co-requisites	Planning and Design Lab – II (Urban Planning)					

Catalog Description

This course aims to introduces students to the concept of land markets and development of cities with private developers with the interests of profit, as key players in the development process.One of the prime concerns of urban development is the issue of land availability. In addition to government policies on land, market forces guide and force development on different patterns based solely on the equilibrium of demand, supply and pricing. Hence this subject becomes very important to be understand thoroughly. At the end of the course students will be able to utilise this knowledge in their urban planning studio.

Course Objectives

The objective of this course is

1. To define the concept of land markets and land development in cities.
2. To cover the relationship of real estate and land market in urban areas.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the economic concept of land.

CO2: Relate real estate and land market and draw important insights for planning urban areas.

CO3: Explain land valuation techniques and methods.

CO4: Comprehend Real estate dynamics in India.

Modules	Blooms level*	Number of hours
MODULE 1: Economic Concept of Land Economic Concepts of Land; Objectives and Scope of Land Economics; Land Use and Land Values: Market Dynamics and Impact on Land Use Pattern; Land Use Restrictions Affecting Land Availability; Development of Land and Real Property Process - Cost of Development, Source of Finance; Economic Aspects of Land Policies at Various Levels of Decision Making; Private Ownership and Social Control of Land.	L1, L2 L3	9
MODULE 2: Real Estate and Land Market Definition of Real Estate - Physical, Financial and Social Perspectives; Comparison of Real Estate to Other Investment Avenues; Real, Local, National and Global Factors Affecting Real Estate; Real Estate as Facilitator of Development; Concepts of Real Estate Analysis - Mapping Supply to Understand Markets; Demand; Factors Affecting Real Estate Development, Demand-Supply Gap Analysis; Methods of Technical and Financial Feasibility Analysis for Different Product and Project Types.	L1, L2 L3	9
MODULE 3: Valuation of Land Valuation of Land and Property; Methods of Valuation: Comparison Method, Residual Method, Discounted Cash Flow Method; Transaction and Renting of Real Estate: Lease Deeds/ Sale Deeds, Sale Documents, Registration; Mortgage and Pledging.	L1, L2 L3	9
MODULE 4: Real Estate Dynamics in India Real Estate Dynamics, Profiling of Metropolitan Cities, Tier I, Tier II And Tier III Cities; Changing Cycles of Real Estate Development; Emerging Areas of Real Estate Development: Diversification to Logistic Hubs, Industrial Parks, Hospitality Sector, Health and Education Sector by Private Players; Introduction to Financial Models Divided cities- the concept of affordability and housing as against shelter as a basic requirement; towards inclusive cities.	L1, L2 L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Luque, J. (2015). *Urban land economics*. *Urban Land Economics* (pp. 1–154). Springer International Publishing. https://doi.org/10.1007/978-3-319-15320-9
2. Rocha, K., Salles, L., Garcia, F. A. A., Sardinha, J. A., & Teixeira, J. P. (2007). Real estate and real options - A case study. *Emerging Markets Review*, *8*(1), 67–79. https://doi.org/10.1016/j.ememar.2006.09.008
3. Shatkin, G. (2016). The real estate turn in policy and planning: Land monetization and the political economy of peri-urbanization in Asia. *Cities*, *53*, 141–149. https://doi.org/10.1016/j.cities.2015.11.015

Reference Books

1. Buttimer, R. J., Clark, S. P., &Ott, S. H. (2008). Land development: Risk, return and risk management. *Journal of Real Estate Finance and Economics*, *36*(1), 81–102. https://doi.org/10.1007/s11146-007-9077-z

2. Graaskamp, J. A. (1992). Fundamentals of Real Estate Development. *Journal of Property Valuation and Investment*, *10*(3), 619–639. https://doi.org/10.1108/14635789210031253
3. Weinstein, L. (2008). Mumbai's development mafias: Globalization, organized crime and land development. *International Journal of Urban and Regional Research*, *32*(1), 22–39. https://doi.org/10.1111/j.1468-2427.2008.00766.x

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	--	--	--	--	1	--	--	--	--	--	--	--	--	1	--
CO2	1	--	--	--	--	1	--	--	--	--	--	--	--	--	1	--
CO3	1	--	--	--	--	1	--	--	--	--	--	--	--	--	1	--
CO4	1	--	--	--	--	1	--	--	--	--	--	--	--	--	1	--

1: strongly related, 2: moderately related and 3: weakly related

	TRANSPORTATION PLANNING AND MANAGEMENT (PLN4211)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Traffic and Transportation Planning – I & II(B.Plan.)					
Co-requisites	Planning and Design Lab – II& II					

Catalog Description

The aim of this course is to introduce to the students of planning with the integration of transportation planning and its interface of land use planning. Another objective is to ensure that students have a sound understanding of the key issues affecting the planning, management and financing of public transport in developed and developing countries. At the end of the course, students will be able to analyse on transport related plans and policies.

Course Objectives

The objective of this course is

1. To equip students with an integration of transportation planning and its interface of land use planning.
2. To prepare students to analyze the key issues affecting the planning, management and financing of public transport.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define the concept of sustainable transport planning and its relevance in Indian Context

CO2: Apply transport planning process while preparing transport plans.

CO3: Calculate External Cost of Urban Transportation and plan for urban and regional freight

CO4: Utilize transport planning software.

Modules	Blooms level*	Number of hours
MODULE 1: Sustainable Transport Planning Understanding Sustainable Development and Sustainable Transport; Land-Use and Transport Planning – Key Relationships; Land Use Transport Integration Models; Transport and its Relationships with the Economy, Environment and Social Progress; Accessibility Measures, Indicators of Progress, Frameworks of Assessment, Development Control and Travel Planning.	L1, L2 L3	9
MODULE 2: Transportation Planning Process Area Delineation, Zoning (TAZ); Four Stage Planning Process: Trip Generation, Trip Distribution, Trip Assignment and Modal Split; Traffic Management- Signal design; Phasing and Time cycles; Principles of one-way system design; Pedestrianization and non-motorized transportation- Issues, policies and case studies; Towards more inclusive cities; Comprehensive Mobility Plan.	L1, L2 L3	9
MODULE 3: External Cost of Urban Transportation and Freight Transport Introduction to External Cost of Urban Transportation: Issues, Level of Service and Transport Pricing, Congestion Pricing, Policy Issues, Emission Standards and Energy Policy; National Urban Transport Policy 2006; Pricing and Revenue in Transport- Pricing; Revenue and Forecasting; Willingness to Pay. Introduction to Freight Transport- differences from passenger transport; location choice of transport hubs in relation to regional distribution linkages, Regional Transport Issues: Intercity Connectivity; Urban –Rural Linkages and Road Hierarchy; Road and Rail as Competing/Complementary Modes; Highway Standards in Indian Context.	L1, L2 L3	9

MODULE 4: Software Applications Software Applications: E.G. Cube 6- Network Coding, Creation of Models, Data Base and Scenarios in Cube Base, Cube Voyager Modelling Functions; Urban Land Use &Transportation Planning Applications.	L1, L2 L3, L4	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Curtis, C. (2008). Planning for sustainable accessibility: The implementation challenge. *Transport Policy*, *15*(2), 104–112. https://doi.org/10.1016/j.tranpol.2007.10.003
2. Morris, J. M., Dumble, P. L., &Wigan, M. R. (1979). Accessibility indicators for transport planning. *Transportation Research Part A: General*, *13*(2), 91–109. https://doi.org/10.1016/0191-2607(79)90012-8
3. Rodrigue, J. P., Comtois, C., & Slack, B. (2016). *The geography of transport systems*. *The Geography of Transport Systems* (pp. 1–440). Taylor and Francis. https://doi.org/10.4324/9781315618159
4. Scott, D. M., Novak, D. C., Aultman-Hall, L., &Guo, F. (2006). Network Robustness Index: A new method for identifying critical links and evaluating the performance of transportation networks. *Journal of Transport Geography*, *14*(3), 215–227. https://doi.org/10.1016/j.jtrangeo.2005.10.003

Reference Books

1. Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, *15*(2), 73–80. https://doi.org/10.1016/j.tranpol.2007.10.005
2. Curtis, C., &Scheurer, J. (2017). Performance measures for public transport accessibility: Learning from international practice. *Journal of Transport and Land Use*, *10*(1), 93–118. https://doi.org/10.5198/jtlu.2016.683
3. Lucas, K. (2012). Transport and social exclusion: Where are we now? *Transport Policy*, *20*, 105–113. https://doi.org/10.1016/j.tranpol.2012.01.013
4. May, A. D. (2015). Encouraging good practice in the development of Sustainable Urban Mobility Plans. *Case Studies on Transport Policy*, *3*(1), 3–11. https://doi.org/10.1016/j.cstp.2014.09.001
5. Parkin, J., &Koorey, G. (2012). Network planning and infrastructure design. In *Transport and Sustainability* (Vol. 1, pp. 131–160). Emerald Group Publishing Ltd. https://doi.org/10.1108/S2044-9941(2012)0000001008

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO2	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO3	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--
CO4	1	2	1	2	--	--	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

	DEMOGRAPHY AND QUANTITATIVE ANALYSIS (PLN4212)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Planning Studio IIndand IIIrdSem.					
Co-requisites	Statistical Data Analysis Software (Elective)					

Catalog Description

The course consists of two parts of Demography and Statistics, dealing with each independently and as well as connecting the applications of statistics to demography.

Demography: The aim of the section on Demography is to provide the students with an understanding of basic concepts on demography. This course would make the students aware of the importance of population geography in economic development, the various theories that explain the growth of population in a country and demographic techniques applied. The course aims to help students identify appropriate sources of data, perform basic demographic analyses using various techniques and ensure their comparability across populations. The student will also be able to produce population projections and interpret the information gathered by the different demographic methods.

Quantitative Methods:The emphasis of the section on Statistics shall be on conceptual underpinnings of statistics with a focus on defining different statistical tools indispensable for urban planning. In view of the course according more emphasis on inferential statistics than descriptive statistics, the objective of the course will be to introduce the most useful and commonly employed statistical tools and discuss the conditions under which use of those tools is appropriate. The course has been so designed as to train the students interpret the results of an analysis to provide insight into the answer to the problem at hand. Use of SPSS is also included in the program, but will be taught separately as an elective subject in second semester itself.

Course Objectives

The objective of this course is

1. To overview concepts of demography and its relation as well as utilization in planning.
2. To demonstrate various methods for quantitative/demographic data analysis.

Course Outcomes

On completion of this course, the students will be able to

CO1: Acquire knowledge on demographic parameters used in planning.

CO2: Appreciate demographic theories, trends and impacts of migration as well as project population.

CO3: Use statistical methods of data analysis which are utilised in planning.

CO4: Apply statistical sampling techniques and advanced data analysis methods.

Module	Blooms level*	Number of hours
Module 1: Demography and Planning Distribution and Density of Population - Measures of Population Distribution and Concentration; Factors Affecting Population Distribution and Density; World Population Distribution; Density Distribution in India Population Change - Fertility and Its Measures; Mortality and Its Measures; Mobility; Factors Affecting Population Change; Determinants of Fertility and Mortality.	L1, L2, L3	9
Module 2: Demographic Theories, Migration, Population Composition and Projections Demographic Transition Theory; Some Population Theories (Overview only); Migration - Types of Migration; Determinants of Migration; Migration Models; Population Composition - Age and Sex Composition and Its Determinants; Age Pyramids; Working Force and Its Determinants; Composition of Work Force and Occupational Composition; Population Projections – Assumptions, Methods, Techniques.	L1, L2, L3	9
Module 3: Quantitative Methods-I Measures of Central Tendency and Dispersion - Arithmetic Mean; Weighted Mean; Geometric and Harmonic Mean; Median and Mode; Variance and Standard Deviation; Time Series and Forecasting - Trend Analysis - Cyclical Variation, Seasonal Variation, Irregular Variation; Various Methods in Time Series Analysis – Moving Average, Ratio to Trend, Link Relative and Residual; Factor Analysis	L1, L2, L3	9

- Principal Component Analysis		
Module 4: Quantitative Methods-II Probability Distribution and Sampling Distribution - Use of Expected Value in Decision Making; Binomial, Poisson and Normal Distribution (only application); Determination of Sample Size and Types of Sampling; Sampling Distribution (concept only); Design of Experiments (concept only); Correlation and Regression - Two Variable versus Multiple Linear Regression; Simple and Multiple Correlation; Estimation of Parameters – The Method of Ordinary Least Squares; Hypothesis Testing, Goodness of Fit; Applications of Features of Excel for statistical analysis.	L1, L2, L3	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Burch, T. K. (2017). Fundamentals of Demographic Analysis: Concepts, Measures, and Methods. *Canadian Studies in Population*, *44*(1–2), 121. https://doi.org/10.25336/p6tw25
2. Schabenberger, O., &Gotway, C. A. (2017). *Statistical methods for spatial data analysis*. *Statistical Methods for Spatial Data Analysis* (pp. 1–488). CRC Press. https://doi.org/10.1201/9781315275086
3. Yusuf, F., Swanson, D. A., & Martins, J. M. (2014). *Methods of demographic analysis*. *Methods of Demographic Analysis* (Vol. 9789400767843, pp. 1–310). Springer Netherlands. https://doi.org/10.1007/978-94-007-6784-3

Reference Books

1. Chi, G., & Zhu, J. (2008, February). Spatial regression models for demographic analysis. *Population Research and Policy Review*. https://doi.org/10.1007/s11113-007-9051-8
2. Wachter, K. W. (2015). *Essential Demographic Methods*. *Essential Demographic Methods*. Harvard University Press. https://doi.org/10.4159/9780674369757

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO2	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO3	1	2	2	2	--	2	--	--	--	--	--	--	1	--	2	--
CO4	1	2	2	1	--	2	--	--	--	--	--	--	1	--	2	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING STUDIO II - URBAN (PLN4206)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	8	10
Pre-requisites/Exposure	Planning Studio I					
Co-requisites	-					

Catalog Description

The studio is designed to expose the students to issues of urban planning and equip them with knowledge and techniques to enable them to analyse urban situations and develop logical decision making processes to address the complex overlays of conceptualisation, implementation and finance. The studio is designed to study one particular urban area and analyse its issues and develop spatial plans with thrust on critical sectors. It focuses on the preparation of integrated development plan for a selected urban area analysing all aspects of physical planning including socio-economic factors and physical infrastructure and also formulation of methods of implementation and projectisation. The course deliverables would be designed based on specific projects undertaken, keeping in mind the overall objective of the course.

Course Objectives

The objective of this course is

1. To relate theoretical knowledge of planning with urban planning practices.
2. To conceptualize and prepare an urban development plan for the given study area.

Course Outcomes

On completion of this course, the students will be able to

CO1: Applying learnt planning concepts for the conceptualization and designing of an urban plan.

CO2: Present and document meaningful inferences and strategies/proposals for sustainable urban development.

Modules	Blooms level*	Number of hours
MODULE 1: Pre-Field visit Stage Identification of an urban area; Identification and Formulation of Planning Objectives for the project; Field Visit and Survey of the study area. Data collection through primary and secondary surveys.	L3, L4 L5	40
MODULE 2: Post-Field visit Stage Analyses and presentation of data and information; Review of Planning Objectives post data analysis; Redefining objectives; Planning for urban area and its region (structure plan / development plan) with emphasis on: Land use, transportation networks and Infrastructure networks; Preparation of Detailed Project Report (case specific); Identification and Detailing of Action Area, Local Area plans or Project Plans (case specific); Plan Implementation strategies: Stake holder participation, project funding options; Implementation strategies including urban governance and management issue.	L3, L4 L5	80

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Essential Elements/Deliverables:

- Defining characteristics of identified areas
- Case study and literature review of planning concepts and norms for the selected area/special area
- Formulation of Aim, Objectives and Methodology
- Selection of site and collection data (field trip of 1-week duration)
- Data analysis and presentation
- Outline framework of development – sectoral and spatial
- Implementation framework – capital investment and funding methods
- Governance and management aspects.

Text Books

1. Flood, J. (1997). Urban and housing indicators. *Urban Studies*, *34*(10), 1635–1665. https://doi.org/10.1080/0042098975385

2. De Freitas, E. L. H., & De Melo Bueno, L. M. (2018, May 1). Participatory processes for preparation of Urban Plans and Zoning: Recent experiences innovations. *Urbe*. Editora CHAMPAGNAT. https://doi.org/10.1590/2175-3369.010.002.ao09
3. Medrano, L., &Spinelli, J. (2014). Urban policies and projects for social housing in central areas.
4. Huxley, M. (2009). Planning, Urban. In *International Encyclopedia of Human Geography* (pp. 193–198). Elsevier Inc. https://doi.org/10.1016/B978-008044910-4.01097-X
5. The case of the Habitasampa competition (São Paulo, Brazil). *Habitat International*, *42*, 39–47. https://doi.org/10.1016/j.habitatint.2013.10.004

References

1. Allen, P. M. (2012). *Cities and regions as self-organizing systems: Models of complexity*. *Cities and Regions as Self-Organizing Systems: Models of Complexity* (pp. 1–309). Taylor and Francis. https://doi.org/10.4324/9780203990018
2. Berghöfer, A. A., Gettkant, A., Lossack, H., Mayer, C., Prem, I., Riha, K., …Wittmer, H. (2012). Integrating Ecosystem Services into Development Planning A stepwise approach for practitioners based on the TEEB approach. *Environment and Climate Change Department, Deutsche GesellschaftFürInternationale*
3. GOI. (2010). *The Gazette of India*. *DisClosure* (Vol. 2011, pp. 1–216). https://doi.org/http://www.indianemployees.com/uploads/documents/042015/1428239209-16-92.pdf
4. Planning, S. (1996). Statewide Planning Goals & Guidelines. *Development*, *97310*(Dlcd), 1–77.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**P -1**	**P -2**	**S**	**R**	**CE**	**A**	**ESE**
Weightage (%)	50	50	60	20	15	05	200

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO2	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO3	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO4	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	SPECIAL AREA PLANNING (PLN4213) (Elective)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Introduction to Regional Planning					
Co-requisites	Metropolitan Planning, Development and Management					

Catalog Description

The aim of this course is to introduce the students to various Special Areas with their specific planning needs and priorities and the implication on development in these areas. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be on studying the need and process required for special area planning. This course will provide the students hands-on experience Special area that required a different planning process in a built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

1. To familiarize students with planning process required for special areain Indian context.
2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Appreciate the need, planning process and legislation required for special area planning

CO2: Prepare the detail report and presentation on a given project related to Special area planning.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to SAP and its Management Special Areas under consideration would include Formal and Functional Regions (Hill Areas, Coastal Areas,Desert Areas, Special Economic Zones, Port City, Aerotropolis, Medi-City, Knowledge City, TOD etc.)., Types of special areas and their defining characteristics, Legislations and norms for Special Area Development in the Indian context, Capital investment and funding methods, public private partnerships in development process, Governance and Management aspects, Case Studies of various typologies of Special Area Development Plans in Indian and international context.	L1, L2, L3	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Development of Hill Areas, Dobha G.L, Concept Publishing
2. Environmental Problems of Coastal Areas in India, Sharma Vinod, Bookwell
3. Integrated Development of Hill Districts in India: Issues and Approaches, Gupta, R.C., SPACE
4. Special Economic Zones In India, P. K. Manoj, Serials Publications

References

1. Aerotropolis: The Way Well Live Next, John Kasarda, Allen Lane
2. Environmental act in India, Ruma Chatterjee, Oxford University Press
3. CRZ Regulations, 2011, MoEF

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	STATISTICAL DATA ANALYSIS IN PLANNING (PLN4214)(Elective)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Demography and Quantitative Analysis					
Co-requisites	Planning and Design Lab -V &VI					

Catalog Description

The aim of this course is to expose students to learn the SPSS (Statistical Package for the Social Sciences)/any other available software for statistical data analysis. The basic application of this program is to analyse statistical data related with the social sciences. Planning students rigorously work on census data, hence learning of SPSS software will enhance their data analysis skill. Furthermore, leaning SPSS will increase students chances of employability. This course is to learn the practical knowledge base on the theory and also students must be able to utilise this software for statistical data analysis in planning domain. The course would be conducted through literature survey, case studies, site visits, and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objectives of this course are

1. To familiarize with the functioning of Statistical data analysis softwarefor performingdifferent quantitativedata analysis methods on census data.
2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Operate SPSS/other statistical analysis software for handling census data analyse and drawing meaningful inferences.

CO2: Prepare the detail report and presentation on a given project related to availablecensus data.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Statistical data analysis software and its applicationsin planning Introduction to SPSS/any other available software, Data Analysis with SPSS/other available software. General Description and Function of SPSS, SPSS file Management; Input and data cleaning, definition variable, manual input of data, Automated input of data and file import; Data Manipulation such as Data Transformation, Syntax files and scripts and Output management; Methods for statistical data analysis e.g. Correlation, Regression, Hypothesis testing; Interpretation of results and drawing meaningful inferences. Students needs to work on census data for learning the functionality of SPSS.	L2, L3, L4	15
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	21

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. *Statistics* (Vol. 58). SAGE Publications Ltd.
2. Field, A. (2005). *Discovering statistics using SPSS (2nd ed.). Discovering statistics using SPSS (2nd ed.).* Sage Publications, Inc. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2005-05622-000&site=ehost-live
3. Introduction to SPSS. (2012). In *Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS* (pp. 15–27). SAGE Publications India Pvt Ltd. https://doi.org/10.4135/9788132108306.n1

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1. Beddo, V. C., &Kreuter, F. (2004). A Handbook of Statistical Analyses Using SPSS . *Journal of Statistical Software*, *11*(Book Review 2). https://doi.org/10.18637/jss.v011.b02
2. Discovering statistics using R. (2012). *Choice Reviews Online*, *50*(04), 50-2114-50–2114. https://doi.org/10.5860/choice.50-2114
3. Marques De Sá, J. P. (2007). *Applied statistics using SPSS, STATISTICA, MATLAB and R. Applied Statistics Using SPSS, STATISTICA, MATLAB and R* (pp. 1–505). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-71972-4

Mode of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	URBAN DESIGN, RENEWAL AND CONSERVATION (PLN4215)(Elective)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Introduction to Urban Design (B.Plan)					
Co-requisites	Planning and Design Lab II					

Catalog Description

The aim of this course is to introduce the students to learn the urban design. It is the design of towns and cities, streets and spaces, collaborative and multi-disciplinary process of shaping the physical setting for life in cities, towns and villages, the art of making places, design in an urban context. This course is to learn the quality of urban design - creates safe, attractive and secure pathways and links between centres, landmarks and neighbourhoods, facilitates green networks that link public and private open space, places a high priority on walking, cycling and public transport. During the course the students will be able work on live projects in groups which are preferably interdisciplinary of architect, planner engineer etc.

Course Objectives

The objectives of this course are

1. To assess the urban renewal/redevelopment approaches at old city and historical sites in the context of having better access to services and sustainable urban development.

2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Applicatethe concept, challenges and solutions for Urban Design, Renewal and Conservation.

CO2:Prepare the detail report and presentation on a given project related to urban design, Renewal and Conservation.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Urban Design, Renewal and Conservation Urban History and Development Theories, Urban Design Methodologies, Digital Skills for Urban Design and Landscape, Research Methodology, Site Planning, Case Studies of Urban Design and Landscape in Indian and international context.Urban Renewal, and Conservation, Development Approaches of Old City, A brief history of the landscape concept, Principle for Conservation and Renewal of decay areas within City Area, Principles and methods for the assessment of the cultural landscape, Landscape resources, management and planning structure, Mechanism for Development of Historical Area includes the Environment, Social, Culture and Economic aspect; Infrastructure and Services Facilities System of Old Area within City. Governance System and Planning aspect to build new Plan. Case Studies.	L1, L2, L3	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4-Analysis; L5-Synthesis, L6-Evaluation

Text Books

1. Spiro Kostof, The City Assembled, Thames and Hudson.
2. Spiro Kostof, The City Shaped, Thames and Hudson.
3. Jon Lang, Urban Design Typology and procedures, Architectural Press
4. Lawrence W.C. Lai., Frank T. Lorne.Sustainable Urban Renewal and Built Heritage
5. Conservation in a Global Real Estate Revolution, Sustainability., 11 (580), 2019

References

1. A.E.J. Morris, History of Urban Form, Longman Scientific and Technical.

2. Kevin Lynch, Good City Form, MIT Press. Edmund Bacon, Design of Cities.
3. Geoffrey Broadbent, Emerging Concepts of urban Design

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

Syllabus – Third Semester

	PROJECT PLANNING AND FINANCE MANAGEMENT (PLN4302)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Project Formulation, Appraisal and Management (B.Plan.)					
Co-requisites	Urban Finance (B.Plan.)					

Catalog Description

The aim of the course on Project Planning and Financial Management is to train the students in managing a project right from its conception to evaluation. The organisation of the course has been so designed that it graduates from concept to application on all aspects of project management Besides, this course also exposes the students to the various concepts, mechanism and role of development finance and its relevance with various hierarchy of government system.

Course Objectives

The objective of this course is

1. To assess skillset of conceptualizing and managing projects related to planning.
2. To grasp development and channelization mechanism of financial and other resources for planning projects and schemes.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply Project Planning and Project appraisal techniques.

CO2: Utilise Project formulation and evaluation techniques.

CO3: Comprehend Financial Management, Resources mobilisation and Municipal Finance with reference to planning projects.

CO4: Explain concept of Investment Planning and Financing Mechanism.

Modules	Blooms level*	Number of hours
MODULE 1: Project Planning and Appraisal Introduction to Project and Project Management; Importance of Project Management; Stages of Project Life Cycle; Causes of Project Delay; Behavioural Aspects of Project Management; Role of Project Manager; Attributes of a Successful Project Manager; Introduction to Project Planning; Process of Project Planning; Project Planning during Investment Phase; Planning for Project Work (Work Breakdown Structure); Planning for Manpower and Organisation; Planning for Project Finance; Planning for Information System; Introduction to Project Appraisal; Types of Feasibility; Financial and Economic Appraisals; Ascertaining Project Costs and Benefits; Project Financial Appraisal Techniques – Payback Period, Benefit Cost Ratio, Net Present Value, Internal Rate of Return; Components of a Feasibility Study; Social Cost Benefit Analysis.	L1, L2 L3	9
MODULE 2: Project Formulation and Evaluation Process of Project Formulation; Constraints in Project Formulation; Breakeven Analysis; Sensitivity Analysis; Project Budgeting and Performance Budgeting; Definition of Project Scheduling; Steps in Project Scheduling; Network Techniques in Project Scheduling; Activity on Arc/Node; Forward Pass and Backward Pass; Critical Path and Slack; CPM Simulation; PERT (Concept only); Gantt Chart (Concept only); Definition of Project Monitoring; Criteria for Decision Making; Parameters and Tools of Control; Use of Network Analysis in Project Monitoring; Analysis of Cost and Time; Reporting and Corrective Actions; Resource Management – Resource Loading and Resource Levelling; Project Reporting; Types of Project Evaluation; Tools of Project Evaluation; Time Frame in Evaluation; Project Cash Flows – Elements of Cash Flow Stream; Principles of Cash Flow Estimation; Project Benefits; Sources of Funds – Disposition of	L1, L2 L3	9

Funds; Financial Closure		
MODULE 3: Financial Management, Resources and Municipal Finance Concept of development of finance; Approaches; Development administration at National, State and Local Level and the process of Formulation; Financial Institutions: concept, typology and their role; Structure of finances; Fiscal Problems and issues of financial management; Implementation of 74th Amendment for Municipal Finance, expenditure Pattern, mobilising resources for a project – financial resources, land resources, project resources etc.; Finance Commissions, Fiscal agenda of development schemes and Sources of revenues; equities; loans; debt financing; Pooled finance development fund, national urban infrastructure fund; municipal bonds and miscellaneous sources.	L1, L2 L3	9
MODULE 4: Investment Planning and Financing Mechanism Links with Spatial Plans, Process, Components, Investment needs, Budgeting; Financial investments in infrastructure and services; Financing of Urban and Regional Development, infrastructure and services – Mechanism and Instruments, Subsidy reduction, cost recovery, Public Private Partnership (PPP), Micro Finance, Financial Appraisal, Investment Appraisal; Financial Risks- Sources, measures and perspectives on risk, Sensitivity Analysis, Property Tax Administration, Rent Control System.	L1, L2 L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Botter, C. H. (1982). Project management: A systems approach to planning, scheduling and controlling. *European Journal of Operational Research*, *10*(2), 211. https://doi.org/10.1016/0377-2217(82)90164-3
2. Lester, A. (2007). *Project Management, Planning and Control*. *Project Management, Planning and Control*. Elsevier Ltd. https://doi.org/10.1016/B978-0-7506-6956-6.X5000-X
3. Phillips, J. J., Brantley, W., & Phillips, P. P. (2011). The Project Management Lifecycle. In *Project Management ROI* (pp. 15–30). John Wiley & Sons, Inc. https://doi.org/10.1002/9781118122587.ch2
4. Slack, E. (2009). *Guide to Municipal Finance*. (X. Quan Zhang, E. Orina, & C. Ng, Eds.), *Human Settlements Finance Tools and Best Practices* (pp. 1–90). Nairobi: UN Habitat. Retrieved from http://www.citiesalliance.org/sites/citiesalliance.org/files/UNH_Guide_Municipal_Finance.pdf

References

1. Agudelo-Vera, C. M., Mels, A. R., Keesman, K. J., &Rijnaarts, H. H. M. (2011, October). Resource management as a key factor for sustainable urban planning. *Journal of Environmental Management*. https://doi.org/10.1016/j.jenvman.2011.05.016
2. Papke-Shields, K. E., & Boyer-Wright, K. M. (2017). Strategic planning characteristics applied to project management. *International Journal of Project Management*, *35*(2), 169–179. https://doi.org/10.1016/j.ijproman.2016.10.015
3. Wellman, K., & Spiller, M. (2012). *Urban Infrastructure: Finance and Management*. *Urban Infrastructure: Finance and Management* (pp. 1–305). Wiley-Blackwell. https://doi.org/10.1002/9781118401637

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	--	--	--	1	--	1	1	1	2	1	1	--	--	--	--
CO2	1	--	--	--	1	--	1	1	1	2	1	1	--	--	--	--
CO3	1	1	--	--	1	2	1	1	1	2	1	1	--	--	--	--

CO4	1	1	--	--	1	1	1	1	1	2	1	1	--	--	--	--

1: strongly related, 2: moderately related and 3: weakly related

	PUBLIC POLICY IN PLANNING (PLN4304)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Urban Governance, Planning Practice I & II (B.Plan.)					
Co-requisites	Planning and Design Lab – II& III					

Catalog Description

This course aims to provide an in-depth study of the various approaches for policy formulation, implementation and evaluation. It addresses issues in policy analysis, and explains the forces that influence the functioning of executive, legislature, judiciary, civil society, NGOs and administration. It will also cover a critical analysis of policies that are directly connected with inclusive sustainable urban development.

Course Objectives

The objective of this course is

1. To observe and compare various approaches for policy formulation, implementation and evaluation.
2. To cover critical analysis of policies relating to inclusive and sustainable urban development.

Course Outcomes

On completion of this course, the students will be able to

CO1: Define Policy concept and significance in planning.

CO2: Use Policy Monitoring and evaluation techniques.

CO3: Explain Policy making and implementation techniques.

CO4: Compare between different case studies of Policy implementation and monitoring.

Modules	Blooms level*	Number of hours
MODULE 1: Policy Analysis: Nature and Significance Policy Analysis: Nature, Scope, Significance and Contextual Perspectives; Policy Making Approaches and Models: Power Approaches to Policy-Making, Institutional Approaches to Policy Analysis, Strategic Planning Approach for Improving Public Policy, Rational Approach and Simon's Rationality Model; Decision-Making Process and Techniques	L1, L2 L3	9
MODULE 2: Policy Monitoring and Evaluation Policy Monitoring: Approaches and Techniques; Policy Evaluation: Techniques and Approaches; Policy Evaluation: Role, Process and Criteria; Policy Performance: Evaluating Impact.	L1, L2 L3	9
MODULE 3: Policy Making and Implementation Policy-Making Techniques: Structure of Power and Public Policy-Making Process; Power and Role of Non-Officials in Policy-Making; Policy-Making Power within the Executive; Intergovernmental Relations and Public Policy Issues Public Policy Implementation: Approaches and Models; Inter-Organizational Relations and Public Policy Implementation; Public Policy Delivery Agencies and Implementers; Public Policy Implementation: Gaps and Problems.	L1, L2 L3	9
MODULE 4: Case Studies International Agencies and Globalization of Policy Agendas Critical Analysis of Making, Implementation and Monitoring of following Policies:- National Urban Sanitation Policy, National Urban Housing & Habitat Policy 2007 National Policy for Urban Street Vendors-2009, National Environmental Policy 2006 National Urban Transport Policy 2006, National Water Policy 2002 and 2012 (draft) Policy on Energy.	L1, L2 L3	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Urban Policy in Practice, Tim Blackman, Publisher: Routledge
2. Public Policy: Art and Craft of Policy Analysis, R. K. Sapru, PHI Learning Pvt. Ltd- New Delhi
3. Public Policy Analysis, William N. Dunn, Pearson Education
4. Public Policy, Analysis and Design, VK Agnihothri, Concept Publishing
5. Approaching Public Policy Analysis: An Introduction to Policy and Programme Research,
6. Kent E. Portney, Prentice Hall- Gale

Reference Books

1. http://urbanindia.nic.in/policies/TransportPolicy.pdf
2. http://envfor.nic.in/nep/nep2006.html
3. http://urbanindia.nic.in/programme/uwss/NUSP.pdf
4. http://mhupa.gov.in/w_new/sug_npusv.pdf
5. http://wrmin.nic.in/writereaddata/linkimages/nwp20025617515534.pdf
6. http://mowr.gov.in/writereaddata/linkimages/DraftNWP2012_English9353289094.pdf

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	2	2	1	1	1	1	2	1	1	1	2	2	--
CO2	1	1	1	2	2	1	1	1	1	2	1	1	1	2	2	--
CO3	1	1	1	2	2	1	1	1	1	2	1	1	1	2	2	--
CO4	1	1	1	2	2	1	1	1	1	2	1	1	1	2	2	--

1: strongly related, 2: moderately related and 3: weakly related

	RESILIENCE AND PLANNING (PLN4308)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Ecology, Environment and Resource Development and Management (B.Plan.)					
Co-requisites	Planning and Design Lab – II& III					

Catalog Description

This course aims at developing a systematic understanding for identifying, assessing and reducing the risks of disaster. It helps in assessing physical, socio-economic and environmental vulnerabilities and mitigation mechanisms for various types of disasters and making out settlements more resilient. The course also aims at giving a general understanding of climate change and strategies for mitigating the effects of climate change.

Course Objectives

The objective of this course is

1. To understand the basic concepts of disaster management.
2. To appreciate disaster management mechanisms; disaster risk mitigation; and post disaster measures
3. To explain the fundamentals of climate change science.
4. To present the international climate change legal and policy framework and explain key issues under negotiation.

Course Outcomes

On completion of this course, the students will be able to

CO1: Explain the concepts, prevention strategies and post disaster management for various types of disasters.

CO2: Describe the role of government authorities and others organizations in disaster management

CO3: Explain the basic concepts of climate change science and analyse different climate change scenarios and their implications

CO4: Incorporate the importance and mechanisms of adaptation in preparing for and coping with climate change

Modules	Blooms level*	Number of hours
MODULE 1: Basic Concepts of Disaster Management Disaster –related terms, definitions, concepts; Types and classifications of disasters- causes and consequences; Overview of disasters across the world; Disaster management cycle, Phases of disasters; Disaster Vulnerability: physical vulnerability, socio-economic vulnerability, environmental vulnerability; Disaster Risk Mapping; Emergency phase of disasters; Disaster Rescue and Relief; Post disaster recovery and rebuilding process	L1, L2 L3	9
MODULE 2: Disaster Management Mechanisms Recent initiatives at national and state level; Kyoto Framework of disaster mitigation and management; Disaster Management Act – national and states; Roles and Responsibilities of National Disaster Management Authority, State Disaster Management Authorities, District Disaster Management Authorities; Various role players in disaster management – NGOs / CBOs and Armed Forces; Community Based Disaster Preparedness (CBDP); Physical planning and disaster management plans; Applications of Remote sensing and GIS in disaster management.	L1, L2 L3	9
MODULE 3: Introduction to Climate Change Basics of climate change science; Concepts of climate and weather, greenhouse gas; Impact of climate change on surface temperature, precipitation, ocean pH, sea-level; Energy and climate change; Water and climate change; Soil and climate change; Landscape and climate change	L1, L2 L3	9
MODULE 4: Climate Change Adaptations Introduction to the concept of climate change adaptation; Assessing climate vulnerability; Introduction to linkages between climate change adaptation and development; Important international adaptation initiatives and programmes; International climate change negotiations; The 4 United Nations Framework Convention on Climate Change (UNFCCC); The Kyoto Protocol and its associated bodies	L1, L2 L3	9

**Bloom's Level:*

L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Christian N. Madu, (2017). *Handbook of Disaster Risk Reduction & Management: Climate Change And Natural Disasters*
2. Damon P Capolla, (2007). *Introduction to international Disaster Management*: Butterworth Heinemann
3. Klijn, F.(2012).*Comprehensive Flood Risk Management: Research for Policy and Practice*
4. Wisner, B., Blaikie, P. M., Cannon, T., Davis, I. (2004) 'At Risk: Natural Hazards, People's Vulnerability and Disasters' Psychology Press, ISBN 0415252164, 9780415252164

References

1. Blakie, P., Cannon, T., Davis, I. and Wisner, B. (1994), 'At Risk: Natural Hazards, People's Vulnerability and Disasters', Routledge, London
2. Cannon, T. (2000). Vulnerability Analysis in Disasters. In: D. Parker, ed., Floods, pp. 43-55. London
3. Coburn, A. and Spence, R., (2002) 'Earthquake Protection', John Wiley & Sons, Ltd, England
4. Dowrick, D. (2003) 'Earthquake Risk Reduction', John Wiley & Sons, Ltd, England.
5. George D Haddow and Jane A Bullock, (2006). *Introduction to Emergency Management*: Elsevier Butterworth Heinemann
5. IISD, UNITAR & UNEP (2009). IEA Training Material: Vulnerability and Climate Change Impact Assessment for Adaptation.
6. NDMA, (2007-11). *Disaster Management Guidelines:* New Delhi
7. UNDP (2004) 'Reducing Disaster Risk: A Challlenge for Development' United Nations Development Programme, ISBN 92-1-126160-0 Available: http://www.undp.org/cpr/whats_new/rdr_english.pdf
8. UNEP & UNDP (2011). Mainstreaming Climate Change Adaptation into Development Planning: A Guide for Practitioners

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	5	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	URBAN AND REGIONAL GOVERNANCE (PLN4309)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Urban Governance (B.Plan.)					
Co-requisites	Planning Studio II & III					

Catalog Description

The aim of this course is to discuss the evolution of governance arrangements, in the context of urbanization trends in India; producing equitable, inclusive and sustainable urban environments. Emphasis is on comprehending Indian constitutional foundation of urban bodies as democratic institutions, and not merely as providers of urban services within the prevailing institutional dimension of urban Politics. At the end of the course students will be able to utilise governance and institutional mechanism for giving proposals for the effective plan execution. The course will be delivered through theoretical inputs, class discussions and seminar presentations by students on selected topics.

Course Objectives

The objective of this course is

1. To assess available urban and regional governance mechanism
2. To observe national and international e-governance experiences in rural and urban areas.

Course Outcomes

On completion of this course, the students will be able to

CO1: Compare government and governance mechanism.

CO2: Appraise national and local government framework.

CO3: Comprehend Urban and Regional perspectives of governance system

CO4: Utilize concept of municipal governance, public participation and e-governance prospects in plan/policy implementations.

Modules	Blooms level*	Number of hours
MODULE 1: Government verses Governance Definitions, concepts and types-Indian government-Administration and Political boundaries of India- Democracy and Government, Electoral system and formation of government in India and abroad.	L2, L3 L4	9
MODULE 2: National and Local Government Central-State-Local government relations and Controls; Pre-independence and post-independence government system in India; Theories and methods of Administration system; 74th CAA Government of India-Municipal Acts and structure of Local government; Municipal election governance system- City Mayor and Commissioner elections.	L2, L3 L4	9
MODULE 3: Governance: Urban and Regional Perspectives Urban government and urban system; Administration set-up; Institutional arrangement of urban local government; Urban development management and UN habitat initiatives; Municipal Infrastructure development and service delivery system- water, health, sanitation, security and poverty reduction; Urban disaster preparedness and management; Panchayati Raj, Governance at rural levels.	L2, L3 L4	9
MODULE 4: Municipal Governance, Public Participation and e-Governance Evolution of centralised versus decentralisation of governments; Government Reforms, Lessons from JNNURM; Demography and participating demography, participatory governance, Role of people in government decision making process. Network Governance and Multi-stakeholders Governance; information communication system and local government; National and international experiences of e-governance; e-Readiness of local government; e-governance for smart cities in India and abroad.	L2, L3 L4	9

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Biswas, R., Jana, A., Arya, K., &Ramamritham, K. (2019). A good-governance framework for urban management. *Journal of Urban Management*, *8*(2), 225–236. https://doi.org/10.1016/j.jum.2018.12.009
2. Feiock, R. C. (2007). Rational choice and regional governance. *Journal of Urban Affairs*, *29*(1), 47–63. https://doi.org/10.1111/j.1467-9906.2007.00322.x
3. Healey, P. (2006). *Urban complexity and spatial strategies: Towards a relational planning for our times*. *Urban Complexity and Spatial Strategies: Towards a Relational Planning for Our Times* (pp. 1–328). Routledge Taylor & Francis Group. https://doi.org/10.4324/9780203099414

References

1. Armitage, D. (2007). Governance and the Commons in a Multi-Level World. *International Journal of the Commons*, *2*(1), 7. https://doi.org/10.18352/ijc.28
2. Harpham, T., &Boateng, K. A. (1997). Urban governance in relation to the operation of urban services in developing countries. *Habitat International*, *21*(1), 65–77. https://doi.org/10.1016/S0197-3975(96)00046-X
3. Evans-Cowley, J., & Conroy, M. M. (2004). E-Government. *APA Planning Advisory Service Reports*, (525), 1–41. https://doi.org/10.4018/jdsst.2010100101

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO2	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO3	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--
CO4	1	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--

1: strongly related, 2: moderately related and 3: weakly related

	RESEARCH METHODOLOGY AND THESIS PLANNING (PLN4310)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	0	2	2
Pre-requisites/Exposure	Technical Report Writing and Research Methodology(B.Plan.)					
Co-requisites	Planning Thesis					

Catalog Description

The aim of this course is to introduce students to literature review, research processes, techniques and colloquial arguments, so as to help them finalise a topic for their thesis in the subsequent semester. Two seminars would be conducted in the course of the semester to initiate the process of literature review related to student areas of interest culminating in selection of an appropriate thesis topic. Students will also be taught reference management software-Mendeley as a part of this course.

Course Objectives

The objective of this course is

1. To equip students with good research qualities and ethics.
2. To prepare students to plan their thesis in an effective manner well in advance.

Course Outcomes

On completion of this course, the students will be able to

CO1: Absorb basic qualities and requirement of a good research.

CO2: Use research communication Techniques.

CO3: Develop their thesis with a good research design.

CO4: Present two seminars based on the proposed research conceptual plan.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction to Research and Research Ethics Definition of Research, types, Basics of academic and applied research; Different Approaches to research; Elements of research: epistemology, theoretical perspective, methods, methodology; Justification of Choice and use of Methods and Methodology; Paradigms in Research. Knowledge on act of plagiarism; Prior permission and intimation form the source; Time management in research; Conduct of interview, asking right question, confidentiality, elimination of researcher biases; Role and Responsibility of Researcher.	L1, L2 L3	6
MODULE 2: Research Communication Research vocabulary, Reading- notes taking, material organisation, indexing; Technical Writing- Content synthesising, paraphrasing, citation and referencing; APA referencing system, Use of Mendeley in Reference Management; Academic writing- Research Proposal, Synopsis, Abstract writing, Report Writing and mapping; Presentation: effective content structuring, oral communication, voice modulation, body language, audio-visual aids, handouts.	L1, L2 L3	6
MODULE 3: Developing Thesis • Identification of topic of interest having relevance to planning profession, integration and application of the learnt research processes to the pre-thesis work • Book reviews and journal article compilation to establish the body of work existing in the selected area of work • Collection of data and opinions by the stakeholders, decision makers, urban managers, advocates, technocrats, user groups, etc. on the topic selected. • Based on the literature review and inputs from the colloquial arguments, the topics shall be finalised for thesis in the subsequent semester.	L3, L4 L5	12

• Selection of study area, identification of extent and spread of intervention; collection of data for preparation of base map. • Development of research thrust and work methodology. Identification of data sources. • Data collection and analysis: sample determination, data tabulation (coding, de-coding, etc.), quantitative and qualitative data analysis. Appropriate and relevant data analysis methods would need to be studied by individual students based on thesis topic and research area.		
MODULE 4: Professional Practice Finalisation of topic; formulation of problem statement, literature review, working hypothesis, research brief, research methodology, sample determination, data collection and analysis, report structuring. The student will be required to make two seminar presentations and submit a report at the end of the semester which will qualify as the literature review and research methodology component of his/her thesis in the forthcoming semester.	L3, L4 L5	12

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Condry, R. (2004). Writing Your Thesis. *The British Journal of Sociology*, *55*(4), 597–598. https://doi.org/10.1111/j.1468-4446.2004.00040_9.x
2. Shanti Bhushan Mishra and ShashiAlok., (2017): Hand Book of Research Methodology, GateResearch
3. Taylor, G. (2009). *A Student's Writing Guide: How to Plan and Write Successful Essays*. *Social Sciences* (p. 266). Retrieved from http://www.cambridge.org/9780521729796
4. Wentz, E. A. (2017). *How to Design, Write, and Present a Successful Dissertation Proposal*. *How to Design, Write, and Present a Successful Dissertation Proposal*. SAGE Publications, Ltd. https://doi.org/10.4135/9781506374710

Reference Books

1. American Psychological Association. (2010). *APA Sixth Edition*. *Intellectual Property* (Vol. 1968, p. 272). https://doi.org/10.1006/mgme.2001.3260

2. ChineloLgwenagu, (2016): Fundamental of Research Method and data collection, British Council,Research Gate
3. Jennifer Mason, (2002): Qualitative Researching, 2nd edition, SAGE Publications, London
4. Neville, C. (2007). The complete guide to referencing and avoiding plagiarism. *Open University Press*, 27–41. https://doi.org/10.1016/B978-0-08-100072-4.00007-1

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	-	10	70	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO2	1	2	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO3	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--
CO4	1	1	1	1	--	--	2	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING STUDIO-III - REGIONAL (PLN4307)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	8	10
Pre-requisites/Exposure	Planning Studio I& II					
Co-requisites	-					

Catalog Description

The course aims to understand the theoretical basis for various concepts and analytical tools of Regional Planning and learn the practice of regional planning in the Indian context. Elements of settlement system in the regional context are also incorporated in this course. The course provides an in-depth understanding of the issues of regional development, regional disparity and the need for balanced regional development in the context of globalization and rapid economic transformations in the country. Regional policies and sectoral policies are also discussed. Metropolitan regions, districts as planning regions and rural planning issues are discussed in the wider spectrum of holistic regional planning and development. Students will be able to apply the knowledge gained through theoretical subjects in their studio planning.

Course Objectives

The objective of this course is

1. To relate theoretical knowledge of planning with regional planning practices.
2. To conceptualize and prepare regional development plan for the given study area.

Course Outcomes

On completion of this course, the students will be able to

CO1: Applying learnt planning concepts for the conceptualization and designing of a regional plan.

CO2: Present and document meaningful inferences and strategies/proposals for sustainable regional development.

Modules	Blooms level*	Number of hours
MODULE 1: Concept of Regional Planning • Concept of Region: Region Types and Regionalization; Concept of Regional Planning: Nature, Objectives, Levels and Aims • Elements of Settlement System: Function, Spacing, Linkage, Settlement Pattern and Factors Responsible Thereof; Potentials and Centrality of Settlements • Regional Inequalities – Growth, Density and Spatial Inequalities of Population Distribution, Spatial Patterns and Characteristics of Occupational Types; Regional Planning Policies and Its Relevance • Introduction to Economic and Regional Growth Processes: Some Approaches of Rostow, Hirschman, Myrdal, Friedman, Haggerstand; Concept of Growth Centres, Growth Pole, Service Centre and Agro-Politan District and their Application in India • Regional Development Strategies: Centralized and Decentralized; Regional Planning Process: Location of New Regional Economic Activities; Tools and Techniques of Regional Analysis • Metropolitan Regions: Concept of Degree of Primacy, Area of Influence, Service Area; City Regions and Delineation Techniques; Centralization and Decentralization Processes • Concepts of Ring and Satellite Towns, Counter-Magnets; Forms and Concepts for Metropolitan Planning and Development	L2, L3 L4	40
MODULE 2: Governance Mechanism and Implementation • District Planning Process: Identification of Plan Objectives; Collection, Classification and Analysis of Data; Norms and Standards for District Planning; Components of District Planning in the Context of 73rd CAA, 1992, Planning Process Under District Planning. • Committee, Metropolitan Planning Committee; Plan Implementation: Five Year Plans and Rural Development; Planning Process, Policies and Programmes at National, State, Regional and District Levels; Planning, Development, Implementing and Monitoring Organizations and Agencies: National and State. • Concepts of Rural Area and Rural Development; Scope of Rural Development; Causes of Rural Backwardness; Historical Evolution of Rural Development and Rural Settlement Pattern in Indian Context; Economic Issues of Rural Development -	L2, L3 L4	80

Differentiating Economic Growth and Economic Development; Rural Jobs and Income Sources; Rural Economic Policy. • Infrastructure and Plan Implementation; Tools and Constraints in the Implementation of Plans in Terms of Administration; Schemes, Programmes, Policies for development of regions, districts, villages and cities; Selected Case Studies in Indian Context.		

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Essential Elements/Deliverables:

- Defining characteristics of identified areas
- Case study and literature review of planning concepts and norms for the selected area/special area
- Formulation of Aim, Objectives and Methodology
- Selection of site and collection data (field trip of 1 week duration)
- Data analysis and presentation
- Outline framework of development – sectoral and spatial
- Implementation framework – capital investment and funding methods
- Governance and management aspects.

Text Books

1. Berghöfer, A. A., Gettkant, A., Lossack, H., Mayer, C., Prem, I., Riha, K., …Wittmer, H. (2012). Integrating Ecosystem Services into Development Planning A stepwise approach for practitioners based on the TEEB approach. *Environment and Climate Change Department, Deutsche GesellschaftFürInternationaleZusammenarbeit (GIZ) GmbH Registered. Bonn and Eschborn, Germany*, 82.
2. Haughton, G., &Counsell, D. (2004). Regions and sustainable development: Regional planning matters. *Geographical Journal*, *170*(2), 135–145. https://doi.org/10.1111/j.0016-7398.2004.00115.x
3. Seo, J. K. (2009). Balanced national development strategies: The construction of Innovation Cities in Korea. *Land Use Policy*, *26*(3), 649–661. https://doi.org/10.1016/j.landusepol.2008.08.014
4. Zarenda. (2013). South Africa's National Development Plan and its implications for regional development. *Tralac Working Paper No.D13WP01/2013*, (June), 1–17. https://doi.org/10.1093/jb/mvp206

References

1. Allen, P. M. (2012). *Cities and regions as self-organizing systems: Models of complexity*. *Cities and Regions as Self-Organizing Systems: Models of Complexity* (pp. 1–309). Taylor and Francis. https://doi.org/10.4324/9780203990018
2. McGee, G., Cullen, A., &Gunton, T. (2010). A new model for sustainable development: A case study of The Great Bear Rainforest regional plan. *Environment, Development and Sustainability*, *12*(5), 745–762. https://doi.org/10.1007/s10668-009-9222-3
3. GOI. (2010). *The Gazette of India*. *DisClosure* (Vol. 2011, pp. 1–216). https://doi.org/http://www.indianemployees.com/uploads/documents/042015/1428239209-16-92.pdf

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**P -1**	**P -2**	**S**	**R**	**CE**	**A**	**ESE**
Weightage (%)	50	50	60	20	15	05	200

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO2	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO3	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--
CO4	1	1	1	2	1	1	1	1	1	1	1	1	--	1	1	--

1: strongly related, 2: moderately related and 3: weakly related

	SETTLEMENT ANTHROPOLOGY AND INCLUSIVE DEVELOPMENT (PLN4311) (ELECTIVE)	L	T	P	S	C
Version 1.1	Date of Approval:	1	0	2	0	2
Pre-requisites/Exposure	Development, Management and Finance, Infrastructure Planning					
Co-requisites	Public Policy in Planning, Urban Finance					

Catalog Description

The aim of this course is to offer opportunities in specialized or advance learning in anthropological aspects which are of concern to physical planning. The courses will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The focus of the course will be on studying social aspects of human settlements and empowering marginalised sections of the population by improving the institutions of social structure. The course will provide the students hands-on experience of cultural, sociological and psychological studies of the built environment. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

1. To expose the students to various techniques and decisive strategies that brings inclusivity and equality in the Plan.
2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply various determinants of anthropology and elements of inclusive development by reviewing and conducting different case studies.

CO2: Prepare the detail report and presentation on a given project related to inclusive planning.

Modules	Blooms level*	Number of hours
MODULE 1: Settlement Anthropology and Inclusive Development Basic introduction to various critical social aspects; Role of anthropology in settlement planning; Determinants of sociology- social structure, social status, social control, social institutions, social mobility; Vulnerable and Marginalized groups in society; Elements of inclusive growth; Challenges in achieving inclusive growth; Methods to measure inclusive growth; Indicators of inclusive development; Various case studies related to gender inequality and development planning, community development- community response towards development strategy etc.; Strategies for involving people in development planning process and thereafter in policy/program/plan/scheme implementation.	L1, L2, L3	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Cragun R.T.(2006). Introduction to Sociology, Wikibooks.
2. Oomen T.K. and Venugopal C.N. (2004), Sociology, Eastern Book Company.
3. Steve Barkan (2010), Sociology: Understanding and Changing the Social World, Flat World Reference Books

References

1. Sinha A. (2013) “An India for Everyone: A Path of Inclusive Development,Herpercollins
2. Tejchman A. (2016) “The Politics of Inclusive Development”, Palgrave Macmillan.

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	SMART CITIES AND ADVANCED TECHNOLOGIES FOR EMERGING PLANNING ISSUES (PLN4312) (ELECTIVE)	L	T	P	S	C
Version 1.1		1	0	2	0	2
Pre-requisites/Exposure	Development, Management and Finance, Infrastructure Planning					
Co-requisites	Public Policy in Planning, Urban Finance					

Catalog Description

The aim of this course is to introduce the students to smart cities concepts and solutions with their specific planning needs and priorities and the implication on development in these areas. Besides, this course also offers opportunities in specialized or advance learning in emerging spatial planning issues and planners need to give special attention to them while preparing the plans. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The course will provide the students hands-on experience of infrastructural, environmental problems emerging in a city. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

1. To grasp Smart city concept as well as understanding emerging challenges in a city/region and finding out ways to resolve them.
2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply smart city planning as well as critically analyze immerging multifaceted planning issues and technology-based solution to address them.

CO2: Prepare the detail report and presentation on a given project with an emphasis on smart solutions in order to achieve the goal of sustainable development.

Modules	Blooms level*	Number of hours
MODULE 1: Smart Cities, Advance Technologies and Emerging Planning Issues Introduction to smart cities, the city as a system of systems, smart citizens, Infrastructure, technology and data, Innovation and enterprise, smart leadership and strategy, standards and capacity building, smart measurement, and learning. Case Studies of various smart cities in Indian and international context. Challenges and problems faced by Mega city and its region, Issues- rapid unplanned growth, urban sprawl, infrastructure related issues such as shortage of Water Supply, Public transport, Parking Issue, Shortage of housing, Solid waste management, environmental issues such as deforestation, land conversion, depletion of ground water etc. Advanced Solution- Advanced Transport Planning system, Smart Mobility, Application technology for improving agriculture productivity, Rain water harvesting, green roofs Sustainable housing affordability, Zero-carbon city, Use of Information and Communication Technology in Planning and Governance- E-Governance, E-Planning, Case studies covering various planning issues at different level of Planning	L1, L2, L3	12
MODULE 2: Project Work Selection and understanding of case study; Formulation of Aim and Objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Dash, R. Environmental Sustainability Index for Indian States 2009 Informing Environmental Action. Chenna: Centre for Development Finance, Institute for Financial Management and Research.
2. GRIHA. (2010). National Rating System, 'GRIHA' Green Rating for Integrated Habitat Assessment, An evaluation tool to help design, build, operate and maintain a resource-efficient built environment, GRIHA manual Volume 1. TERI Press, New Delhi: Ministry of New and Renewable, Energy, Government of India and The Energy and Resources Institute.
3. Girardet, H. _1990.. The metabolism of cities. In: Cadman, D.and Payne, G. _eds. _1990.. The Living City: Towards a Sustainable Future London: Routledge.
4. Smart Cities Unbundled, Sameer Sharma, Bloomsbury India
5. The Smart City Transformations: The Revolution of The 21st Century, Amitabh Satyam, Bloomsbury India

References

1. Basiago, A. D. _1996.. The search for the sustainable city in20th century urban planning. The Environmentalist, 16
2. Douglas, I. Urban ecology and urban ecosystems: understanding the links to human health and well-being.Curr. Opine. Environ. Sustain. 2012, 4, 385–392.
3. Smart Technologies, K. Worden, World Scientific Publishing Co Pte Ltd
4. Smart Technologies for Smart Governments, Manuel Pedro Rodríguez Bolívar, Springer Publications

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	CT-1	CT-2	HA	S/P	CE	A	ESE
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	1	2	--	--	--	--	--	--	--	--	--	1	2	--	--

1: strongly related, 2: moderately related and 3: weakly related

	ENVIRONMENTAL IMPACT ASSESSMENT (PLN4313) (ELECTIVE)	L	T	P	S	C
Version 1.1		1	0	2	0	2
Pre-requisites/Exposure	Land Economics and Real Estate Planning Disaster Risk Mitigation and Management					
Co-requisites	Project Management and Financial Development Planning Design Lab VII					

Catalog Description

The aim of the course is to provide advance learning on the field of Environment Planning in the context of EIA which is one of the key concern of policy makers and land use planner. The course will generally be conducted in the seminar/studio mode to encourage research, exploration and skill developments. The aim of this course is to provide exposure to the students to essential understanding of Environmental Impact Assessment (EIA). UNEP defines Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. This course will enable the students using EIA as tool for both environmental and economic benefits, such as reduced cost and time of project implementation and design, avoided treatment/clean-up costs and impacts of laws and regulations. Students will also be able to apply or reference these techniques in their planning studios. The course contents to be followed will be developed by course teachers based on the resources at hand and opportunities for interdisciplinary learning. The course would be conducted through literature survey, case studies, site visits, community surveys and hands on experimentations. During the course the students will be working on live projects in groups which are preferably interdisciplinary.

Course Objectives

The objective of this course is

1. To learn with different methods and process of Environment Impact Assessment.
2. To develop interdisciplinary understanding and sensitivities of future planners.

Course Outcomes

On completion of this course, the students will be able to

CO1: Apply EIA techniques while assessing the impacts on land use, resources, health and social conditions.

CO2: Prepare the detail report and presentation on a given project related to Environment Impact Assessment.

Modules	Blooms level*	Number of hours
MODULE 1: Introduction Role of Environmental Impact Assessment in the planning and decision-making process; Definition and need, evolution and objectives and scope. Different methods of Environmental Impact Assessment; Advantages and limitations; Public - private - people's participation in EIA, Impact assessment on land use, resources, social and health impacts.	L1, L2, L3	12
MODULE 2: Project Work Selection and understanding of case study by reviewing case studies from India and abroad on projects of various types covering different levels of planning and practical exercises on Environmental Impact Assessments. Formulation of aim and objectives, Collection of data through primary and secondary sources; Conducting survey; Database development using relevant and advance software; Qualitative and quantitative data analysis; Report writing and presentations.	L4, L5, L6	24

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Raman N.S., Gajbhiye, A.R., (2014). Environmental Impact Assessment, I. K. International Publishing House New Delhi, India
2. Marriott, Betty Bowers, (1997). Environmental Impact Assessment – A Practical Guide, Mcgraw Hill, New Delhi, India
3. Watheren, Peter, (2004). Environmental Impact Assessment: Theory and Practice, Tayler & Francis, New York & London

Reference

1. Jay, S., Jones, C., Slinn, P., & Wood, C. (2007). Environmental impact assessment: Retrospect and prospect. *Environmental Impact Assessment Review*, *27*(4), 287–300. https://doi.org/10.1016/j.eiar.2006.12.001
2. Ott, K., Mohaupt, F., & Ziegler, R. (2012). Environmental Impact Assessment. In *Encyclopedia of Applied Ethics* (pp. 114–123). Elsevier Inc. https://doi.org/10.1016/B978-0-12-373932-2.00345-8

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Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	-	-	-	90	05	05	-

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2	1	--	--	1	1	--	--	2	1	--	1	--	1	2
CO2	1	2	2	--	--	--	--	--	--	--	--	--	1	2	--	2

1: strongly related, 2: moderately related and 3: weakly related

Syllabus – Fourth Semester

	PLANNING LEGISLATION AND PROFESSIONAL PRACTICE (PLN4403)	L	T	P	S	C
Version 1.1	Date of Approval:	2	1	0	0	2
Pre-requisites/Exposure	Planning Legislation (B.Plan)					
Co-requisites	Planning Practice I & II, Human Values in Planning (B.Plan)					

Catalog Description

The aim of this course is to introduce the significance of planning laws, legislations, acts, regulations and professional practices in planning. As students are passing out after this semester, therefore, the relevance of this subject becomes very crucial at this stage. At the end of the course student will be able to utilise the learnt skills of planning legislations and professional practice in their career.

Course Objectives

The objective of this course is

1. To prepare students to deal with legal dimensions of planning.
2. To equip students with professional planning ethics to transform them into committed and responsible future planner.

Course Outcomes

On completion of this course, the students will be able to

CO1: Grasp basic legal terminologies for enhanced understanding of legislation.

CO2: Comprehend land related legislations as well as getting an enriched knowledge of Urban and Regional planning Acts.

CO3: Analyze environmental planning regulations and laws.

CO4: Absorb professional planning ethics/values and transforming into a professional planner.

Modules	Blooms level*	Number of hours
MODULE 1: Basic Terminologies and Legislation The meaning, significance and objectives of planning legislation; Evolution of planning legislation and overview; Concept of Law; Sources of law; meaning of the term of law, legislation, ordinance, bill act, regulations and bye-laws; doctrine of separation of powers; judiciary, legislature and executive-rule of law, Judicial precedents; PIL; significance of law and its relationship to urban planning; Indian Constitution.	L3, L4 L5	9
MODULE 2: Land related Legislation, Urban and Regional Planning Acts Land Acquisition Act 1894; Betterment charges and compensation provisions in planning law; Legislation controlling use of land, ULCRA; Tools of development control-zoning, sub-division regulations, building regulations, model building byelaws, Special regulations like TDR, Rent Control Acts; Apartment Ownership Acts; Transfer of Property Right Act; The estate duty Act; Easement Act; Slum improvement and clearance Act, Indian Contract Act; Arbitration and conciliation Act Municipal Acts; Improvement Trust and Development Authority Acts; Model town and Country planning Acts; Legislations relating to urban art commissions; 73rd and 74th Constitutional Amendments; Cooperative Societies Act; Special Purpose Legislations viz; Special Economic Zones Act; Special Investment Region Act.	L3, L4 L5	9

MODULE 3: Environmental Legislations Evolution of environmental Law in India; Law of Torts; the first environmental law; Pollution control Act- air, water and environmental protection acts; Forest and wildlife acts; other important international environmental laws; Hazardous waste management and handling rules/biomedical rules/solid waste management rules; Environment tribunal act; Archaeological sites and remains of national importance; Conservation of natural resources including mining and forestry acts; MOEF guidelines and notifications.	L3, L4 L5	9
MODULE 4: Professional Practice Role of a Planner; relationship with client, developers, institutions contractors and experts; Role and responsibilities of planning consultants, professional ethics, code of conduct and scale of professional charges; Role in interdisciplinary groups; Formulation of project proposal and outlines; consultancy agreements, contracts and inviting tenders; Nature of Engagements, agreements and safeguards, completion and copyrights; Aims and Objectives of the professional institute.	L3, L4 L5	9

**Bloom's Level:*
L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation

Text Books

1. Campbell, H., & Marshall, R. (1998). Acting on principle: dilemmas in planning practice. *Planning Practice and Research*, *13*(2), 117–128. https://doi.org/10.1080/02697459816139
2. Kulshreshtha, S.K. (2012) Urban and Regional Planning in India - A Handbook of Professional Practice, SAGE Publications India Private limited, New Delhi

References

1. Dwivedi, S. K., &Kashyap, P. K. (2013). Environmental Protection Law and Policy in India. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2266021
2. Sivaramakrishnan, K. (2011). Environment, law, and democracy in India. *Journal of Asian Studies*, *70*(4), 905–928. https://doi.org/10.1017/S0021911811001719

Suggested Readings of Bare Acts

1. Town and Country Planning Act (any State Act)
2. Model Municipal Act, Ministry of Urban Development, Government of India
3. Nagar Raj Act (any State Act)
4. Environment Protection Act (Central Act)
5. Mining and Forestry Act (Central Act)
6. Building Byelaws (any State Act)
7. Apartment Ownership Act (any State Act)
8. Development Authority Act (any State Act)
9. Water Bodies Conservation Act (any State Act)

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**CT-1**	**CT-2**	**HA**	**S/P**	**CE**	**A**	**ESE**
Weightage (%)	10	10	10	10	05	05	50

CT: Class Test, HA: Home Assignment, S/P: Seminar/Presentation, CE: Continuous Evaluation, A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	--	--	--	--	--	--	--	--	--	1	1	--	--	1
CO2	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1	1
CO3	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1	1
CO4	1	1	--	2	--	--	--	--	2	--	--	1	1	--	1	1

1: strongly related, 2: moderately related and 3: weakly related

	PLANNING THESIS (PLN4437)	L	T	P	S	C
Version 1.1	Date of Approval:	2	0	0	16	18
Pre-requisites/Exposure	Planning Studio I, II & III					
Co-requisites	All Theory and Elective Subjects					

Catalog Description

The aim of thesis is to develop independent critical thinking and design/research abilities and apply the knowledge gained, skills developed and professionalism inculcated over the last three semesters in an exercise of own interest and significant complexity. The thesis project is to be undertaken independently by each student on a topic of his/her choice related to urban and regional planning, selected and approved by the faculty during the previous semester as part of course requirements of the subject seminar. The students' needs to present and defend their thesis research work in periodic juries conducted by the department as well as in the external jury appointed by the University/School. They are also expected to write a thesis report with the constant guidance of respective guides. Students will submit the same before external jury in a hard bound prescribed format, given by the department.

Course Objectives

The objective of this course is

1. To utilize acquired knowledge in planning and reviewed literature for conceptualizing and pursuing good research.
2. To provide viable solutions to the undertaken research problem and document the entire work.

Course Outcomes

On completion of this course, the students will be able to

CO1: Conceptualise a rationale research problem and creating a good research Design.

CO2: Drawing meaningful insights as well as communicate and document practical ideas to solve the selected problem.

Module	Blooms level*	Number of hours
Module 1: Research Problem and Research Design • Conceptualization of Research problem for Thesis work. • Background and Need of the study area. • Rigorous Literaturereview • Formulation of Aim and objectives. • Writing objective based Research Questions. • Constructing Research Methodology. • Designing Analytical Framework. • Sampling and Sample selection. Preparations of Check list and Questionnaire. • Methods of data collection.	L3, L4, L5	26
Module 2: Data Analysis,Proposals and Report Writing • Processing and Interpretation of data. • Data Analysis. • Findings and Results. • Identification of Issues • Conclusions. • Formulation of policies/Proposal Plans. • Strategies and Recommendations. • Suggestion for Future Research, if any • Report Writing.	L4, L5, L6	190

**Bloom's Level: L1-Knowledge; L2-Comprehension; L3-Application; L4:Analysis; L5:Synthesis, L6:Evaluation*

Text Books

1. Evans, D., Gruba, P., &Zobel, J. (2014). *How to Write a Better Thesis*. *How to Write a Better Thesis*. Springer International Publishing. https://doi.org/10.1007/978-3-319-04286-2
2. Condry, R. (2004). Writing Your Thesis. *The British Journal of Sociology*, *55*(4), 597–598. https://doi.org/10.1111/j.1468-4446.2004.00040_9.x
3. Shanti Bhushan Mishra and ShashiAlok., (2017): Hand Book of Research Methodology, GateResearch
4. Wentz, E. A. (2017). *How to Design, Write, and Present a Successful Dissertation Proposal*. *How to Design, Write, and Present a Successful Dissertation Proposal*. SAGE Publications, Ltd. https://doi.org/10.4135/9781506374710

Reference Books

1. American Psychological Association. (2010). *APA Sixth Edition*. *Intellectual Property* (Vol. 1968, p. 272). https://doi.org/10.1006/mgme.2001.3260

2. ChineloLgwenagu, (2016): Fundamental of Research Method and data collection, British Council,Research Gate
3. Jennifer Mason, (2002): Qualitative Researching, 2nd edition, SAGE Publications, London
4. Neville, C. (2007). The complete guide to referencing and avoiding plagiarism. *Open University Press*, 27–41. https://doi.org/10.1016/B978-0-08-100072-4.00007-1
5. Taylor, G. (2009). *A Student's Writing Guide: How to Plan and Write Successful Essays*. *Social Sciences* (p. 266). Retrieved from http://www.cambridge.org/9780521729796

Modes of Evaluation: Presentation/Assignment/Class Test /Written Examination

Examination Scheme:

Components	**P -1**	**P -2**	**S**	**R**	**CI**	**A**	**ESE**
Weightage (%)	100	100	100	50	45	05	400

P: Presentation, S: Seminar (Internal Jury), R: Report, CI: Class Interaction (continuous evaluation by guide), A: Attendance; ESE: End Semester Examination.

CO, PO and PSO mapping

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1
CO2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1

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List of MOU's focusing on Employability, Entrepreneurship and Skill Development

Sl. No.	Organisation with which MoU is signed	Year of signing MoU
1	Managment and Science University , Malaysia	2021-2022
2	Paras Health Care Limited	2021-2022
3	Miles Education Private limited	2021-2022
4	Commonwealth Educational Media Centre for Asia	2021-2022
5	CSIR-National Environmental Engineering and Research Institute (NEERI), Nagpur, India.	2021-2022
6	Department of Biotechnology,Ministry of Science & Technology	2021-2022
7	Media And Entertainment Skills Council (MESC)	2021-2022
8	UAS International A Unit of United Accrual Services Pvt. Ltd. & UAS International Holidays Pvt. Ltd.	2021-2022
9	VFN Group	2021-2022
10	Manas Foundation	2021-2022
11	Defence Institute of Advanced Technology, Pune	2021-2022
12	InnoDx Solutions Pvt. Ltd.	2021-2022
13	Education Division Taipei & Cultural Centre In India, Taiwan	2021-2022
14	France Medias Monde	2021-2022
15	Tecc(Taiwan Economic And Cultural Center)In India	2021-2022
16	We, The People	2021-2022
17	BSK Legal	2021-2022

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8	UAS International A Unit of United Accrual Services Pvt. Ltd. & UAS International Holidays Pvt. Ltd.	2021-2022
9	VFN Group	2021-2022
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16	We, The People	2021-2022
17	BSK Legal	2021-2022

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